KITAGAWA GmbH

EMC PRODUCTS CATALOGUE

EMC PRODUCTS

FILTERING
SHIELDING
GROUNDING

ELECTRO–**M**AGNETIC **C**OMPATIBILITY

SYMBIOSIS & COLLABORATION

KITAGAWA INDUSTRIES CO., LTD. A global technology group providing high quality for life' s amenities through "Symbiosis & Collaboration"
The high pace of industrial technology innovationcan lead to various problems. We carry out the research and propose the solutions tothe problems in order to provide a clean electromagnetic environment.

R&D bases


Technology Center


Kasugai factory


Inazawa factory


Thailand factory


Wuxi (China) factory

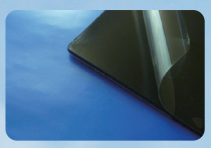

Shenzhen factory

Material Developments

FUNCTIONAL FILM

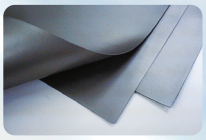
Sputtering technology applied at the nano-Level for producing functional coatings provides greater design exibility for high density electronic equipment.

KG-GEL (Vibration damping and shock buffering)



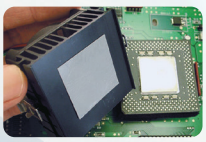
KG-GEL is a special polystyrene gel with super-low hardness of ASKER FP, which provides excellent shock buffering, vibration and noise damping for equipment and sub-assembly components.

LOSTOMER (Vibration damping)



High vibration damping and heat resistant properties (100℃) for a wide range of applications. Can be produced in customized configurations.

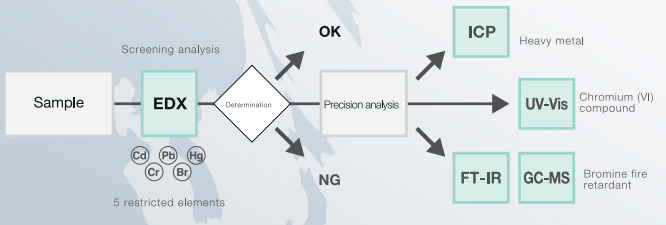
COOLPROVIDE (Heat+EMC)



Using our original composite technology we develop multifunctional materials for simultaneous management of EMC and thermal problems.

Environmental policy

Example of hazardous element Analysis



KGS is equipped with hazardous element analyticalequipment to provide safe products.

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ON-BOARD CONTACT／OG

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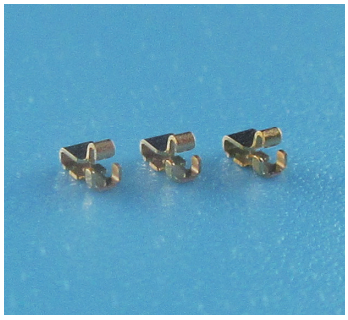

Ultra space saving grounding contact

Feature

- Foot print, saving by approx. 60% compared with conventional products.
- Enables equipments to be lighter and more compact.
- Recommended available height: 0.7 - 0.9 mm.

COOLPROVIDE™／EMPV5

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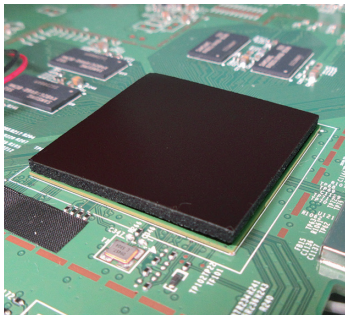


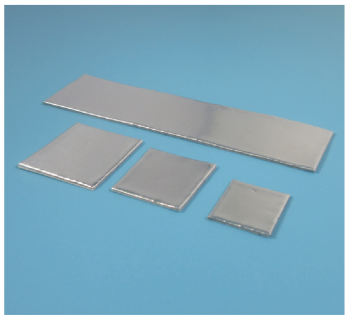
EMC noise suppression sheet in broad frequency band with high thermal conductivity

Feature

- Original composition is realized EMC noise suppression in broad band from 500MHz to 3GHz.
- Silicone-free, no siloxane outgassing.
- Oil bleeding is reduced compared to silicone-based thermal materials.

GHz SHIELD SHEET／GSS-HT

P.28



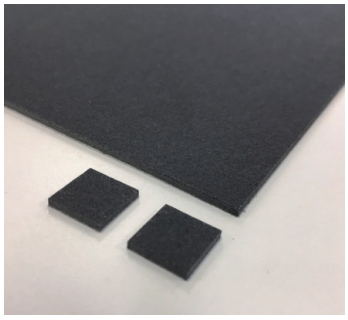
New shielding sheet for GHz band noise

Feature

- No trace design of the SHIELD SHEET is required on PC board surfaces, providing high flexibility in circuit design.
- Noise suppression in higher frequency band is available without redesign of PC board.
- Interference between ICs can be suppressed by applying the sheet shield to each IC.

LESSMIRROR／LMR-RW

P.30



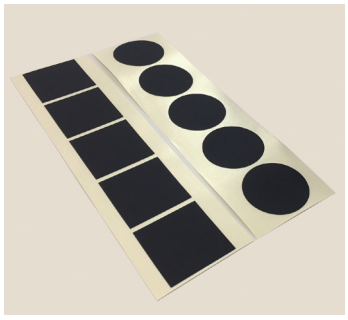
Thin and light, EM wave absorber with narrow GHz band

Feature

- Effective noise suppression in GHz band.
- Lighter than conventional rubber absorber due to paper used as the main material.
- Thin and suitable for small equipments.

MAGNEFILM／MFMAL

P.30



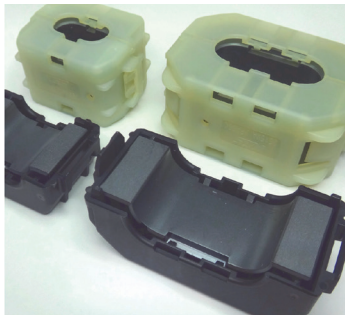
Thin film for magnetic shielding in low-frequencies

Feature

- High shielding effectiveness in low frequencies of 100 k to 1 MHz.
- Insulation by laminated layer. (Without end face).
- Easy mounting with adhesives.
- Cutting service is available upon request. ※Size limit.(Max. length: 110mm, Max. width: 40mm)

BLOCK FERRITE CLAMP, LOW CUT FERRITE CLAMP／BFCWN

P.40



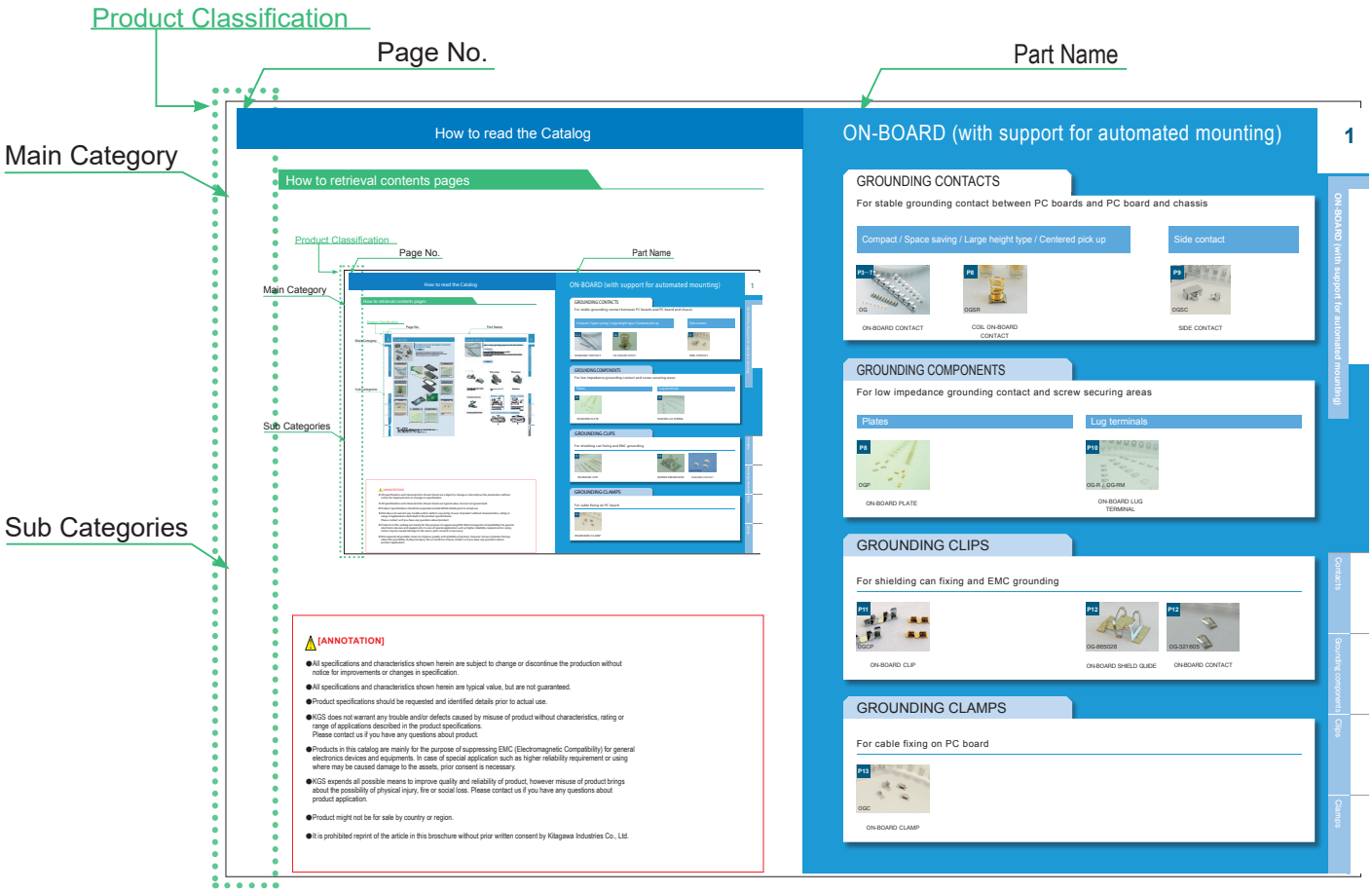
Low height noise filter saves space

Feature

- Low profile provides 30% space saving compared with the conventional type.
- Housing with anti-slip means for cable tie around its outer side.
- Optimal for onboard charging cables and inverter powercables that have limited space for conducted noise suppression
- High-frequency (BFCWN-A) and low-frequency (BFCWN-MA) noise versions.
- Operating temperature range:-40℃～+125℃.
- Applicable to vehicle vibrations requirements:ISO-16750-3-Ⅱ equivalent for passenger car transmission..

How to read the Catalog

How to retrieval contents pages



[ANNOTATION]

- All specifications and characteristics shown herein are subject to change or discontinue the production without notice for improvements or changes in specification.
- All specifications and characteristics shown herein are typical value, but are not guaranteed.
- Product specifications should be requested and identified details prior to actual use.
- KGS does not warrant any trouble and/or defects caused by misuse of product without characteristics, rating or range of applications described in the product specifications.
  Please contact us if you have any questions about product.
- Products in this catalog are mainly for the purpose of suppressing EMC (Electromagnetic Compatibility) for general electronics devices and equipments. In case of special application such as higher reliability requirement or using where may be caused damage to the assets, prior consent is necessary.
- KGS expends all possible means to improve quality and reliability of product, however misuse of product brings about the possibility of physical injury, fire or social loss. Please contact us if you have any questions about product application.
- Product might not be for sale by country or region.
- It is prohibited reprint of the article in this broschure without prior written consent by Kitagawa Industries Co., Ltd.

ON-BOARD (with support for automated mounting)

GROUNDING CONTACTS

For stable grounding contact between PC boards and PC board and chassis

Compact / Space saving / Large height type / Centered pick up

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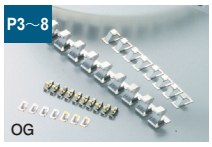

ON-BOARD CONTACT

Sidecontact

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SIDE CONTACT

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SIDE CONTACT

GROUNDING COMPONENTS

For low impedance grounding contact and screw securing areas

Plates

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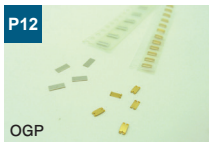
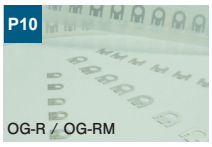


ON-BOARD PLATE

Lug terminals

P10



ON-BOARD LUG TERMINAL

GROUNDING CLIPS

For shielding can fixing and EMC grounding

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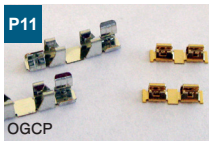

ON-BOARD CLIP

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ON-BOARD SHIELD GUIDE

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ON-BOARD CONTACT

GROUNDING CLAMPS

For cable fixing on PC board

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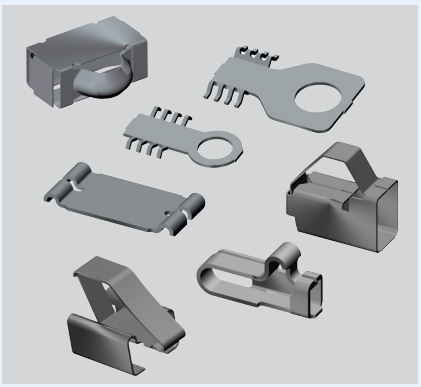
ON-BOARD CLAMP

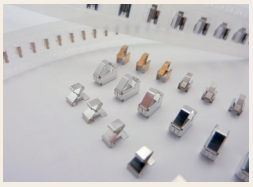


Grounding components, with support for automated mounting on PC board.

Feature

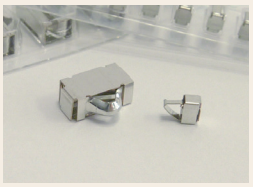
- Space saving and FG reinforcement at design stage of PC board.
- Supplied with embossed tape for automated mounting by chip mounter.
- Suitable management for emission and ESD immunity.

ON-BOARD CONTACT

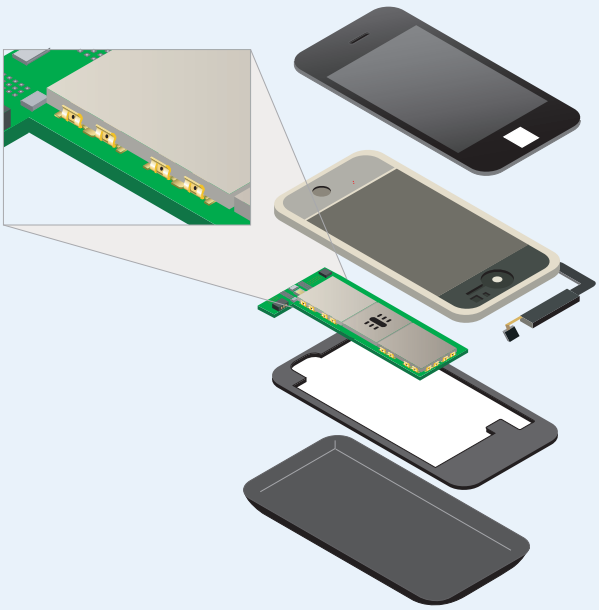


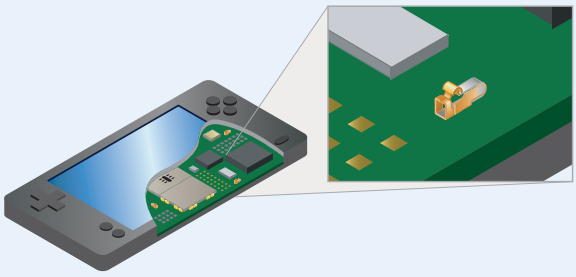
Upper faces of mounted make contact with chassis, PC board and component, etc.

SIDE CONTACT

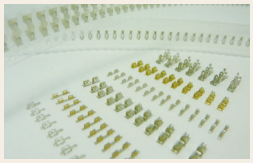


Side face of mounted parts makes contact with chassis, PC board and metal frame, etc.



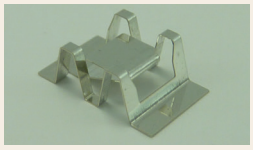


ON-BOARD CLIP



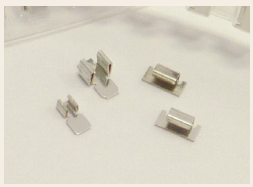
Clip mechanism enables stable fixing and grounding for shielding can.

ON-BOARD SHIELDING GUIDE



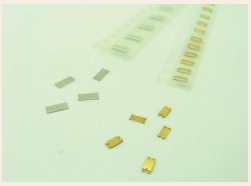
Displacement prevention mechanism improves shielding can grounding.

ON-BOARD CLAMP



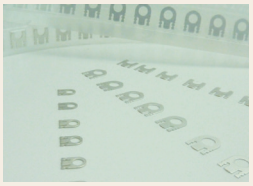
Space-saving cable wiring on PC boards.

ON-BOARD PLATE



Reinforcement at contact points provided for reliable grounding.

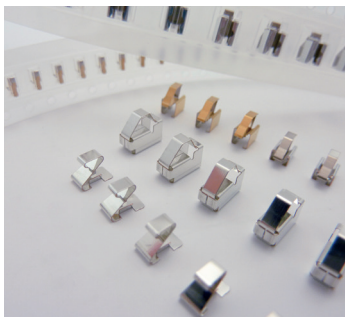
ON-BOARD LUG TERMINAL



Improved grounding reliability at screw area.

●Notes for On-Board series

Please contact our sales department for mounting specifications such as recommended pad dimensions, etc.
Trial mounting using our products is required prior to purchase. Please check the notes indicated on the back cover.
Galvanic corrosion may occur by contact with other metals.
With regard to sales lot and delivery lead time, please contact our sales department.



Super-compact grounding components with wide variations

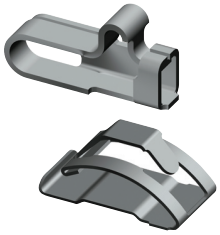
Feature

- Space saving, FG facilitated even where screws are precluded.
- Automated mounting on PC board is applicable.
- Box structure is introduced for distortion, deformation and damage prevention.(excluding some part numbers)

Material

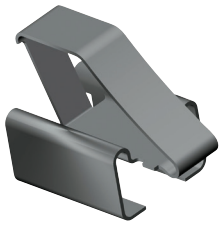
- As described below

■ Compact type



Down-sized compact type for narrow space configurations.

■ Space saving type



For space saving at pad area on PC board

■ Large height type

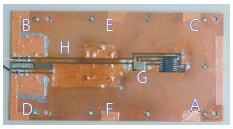
For large clearances

■ Centered vacuum pick-up type

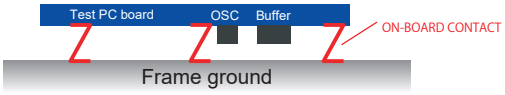
Vacuum pick-up point is placed at center

■Suppression of radiated emission by multi point grounding

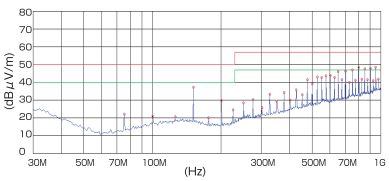
<Experimental contents>
- Exp 1: PC board + Metal plate (without grounding)
- Exp 2: PC board + Metal plate (4 points：A, B, C, D)
- Exp 3: PC board + Metal plate (8 points ：A, B, C, D, E, F, G, H)

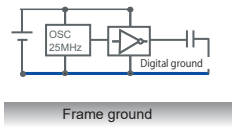


GND point on test PC board

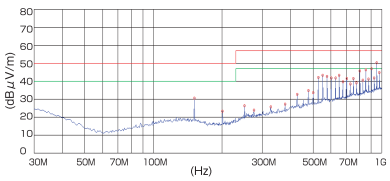


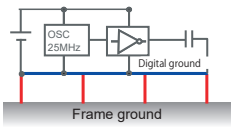
1) Without FG connection



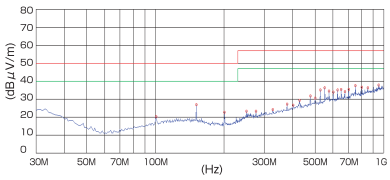


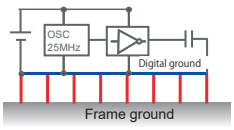
2) 4 points grounding





3) 8 points grounding

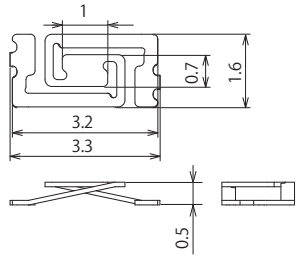




Multi point grounding enables large suppression effectiveness.

ON-BOARD CONTACT／OG

OG-321605

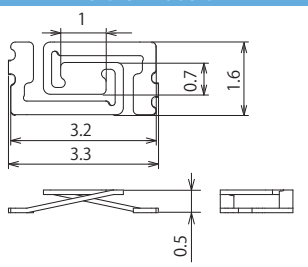


Material :Phosphor bronze for spring(t =0.1mm)

Surface treatment : Sn reflow plating

Recommended height :0.35mm or less

OG-321605G

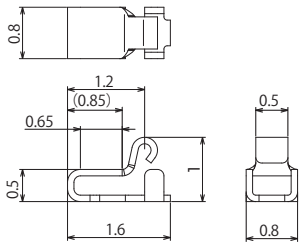


Material :Phosphor bronze for spring(t =0.1mm)

Surface treatment : Au plating (Ni underplating)

Recommended height :0.35mm or less

OG-160810S



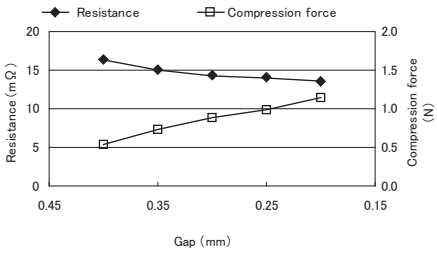
Material :Beryllium copper

Surface treatment : Partial Au plating

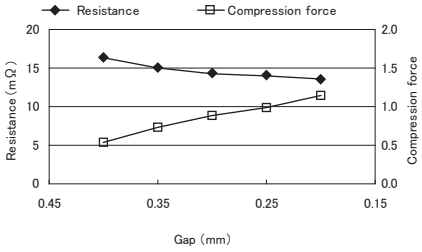
Recommended height :0.7～0. 9mm

Compression force vs Electric resistance

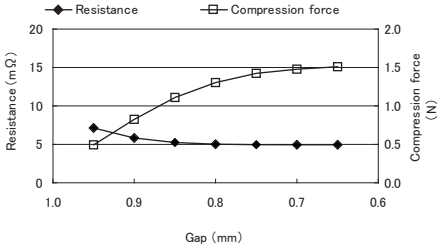
OG-321605



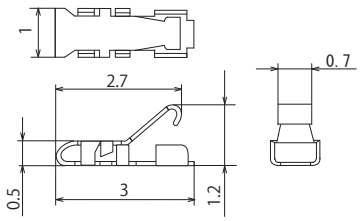
OG-321605



OG-160810S



OG-301012

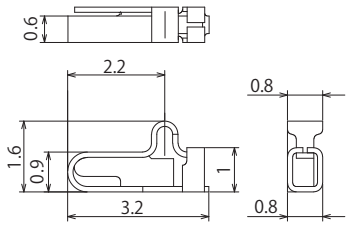


Material :Phosphor bronze for spring(t=0.08mm)

Surface treatment : Partial Au plating

Recommended height :0.6～1. 1mm

OG-320816

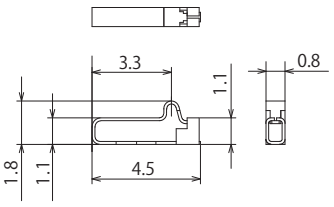


Material :Phosphor bronze for spring(t=0.12mm)

Surface treatment :Partial Au plating

Recommended height :1.1～1.4mm

OG-450818



Material :Beryllium copper(t=0.12mm)

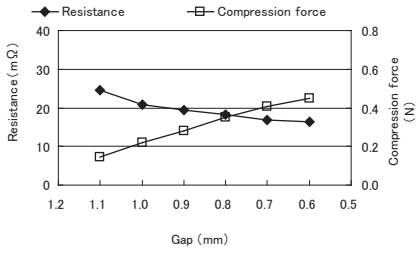
Surface treatment : Partial Au plating

Recommended height :1.2～1.6mm

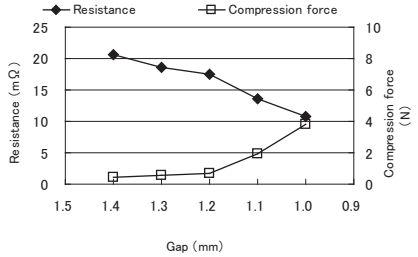
Unit:mm

Compression force vs Electric resistance

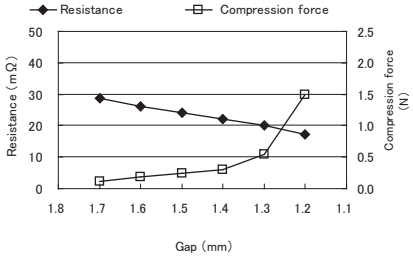
OG-301012



OG-320816



OG-450818



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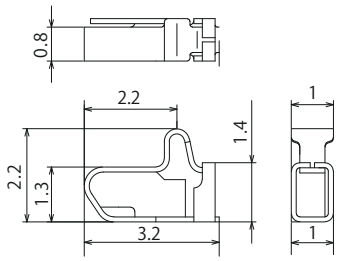
※The values are measured data for reference, not guaranteed.

OG-321022

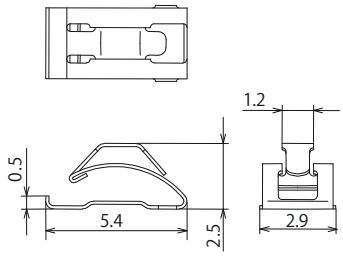


Material :Phosphor bronze for spring(t=0.12mm)

Surface treatment :PartialAu plating

Recommended height :1.5～2mm

OG-542925

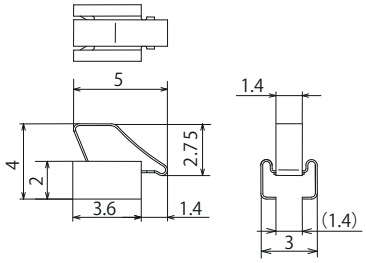


Material :Phosphor bronze for spring(t=0.12mm)

Surface treatment : Partial Au plating

Recommended height :1.5～2.3mm

OG-363040



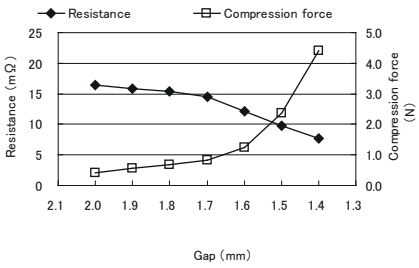
Material : Beryllium copper(t=0.1mm)

Surface treatment :Sn reflow plating(Ni plated contacts)

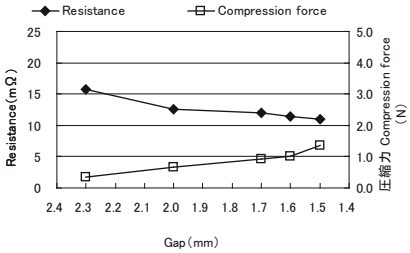
Recommended height :2.2～3.4mm

Compression force vs Electric resistance

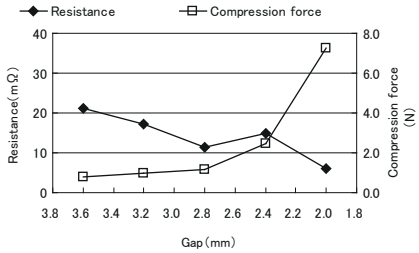
OG-321022



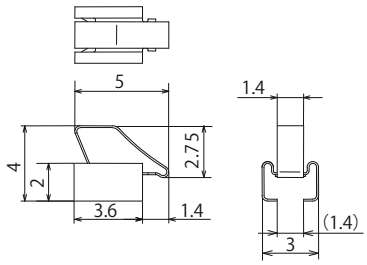
OG-542925



OG-363040



OG-363040G

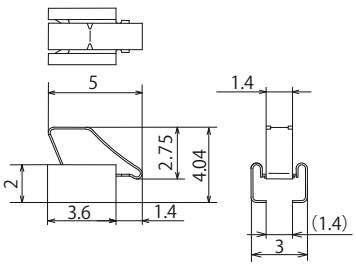


Material : Beryllium copper(t=0.1mm)

Surface treatment :Partial Au plating

Recommended height :2.2～3.4mm

OG-363040HD

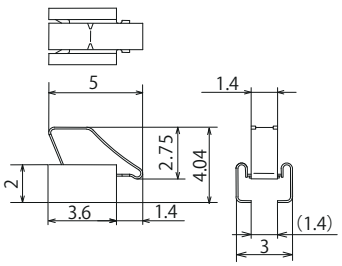


Material : Beryllium copper(t=0.1mm)

Surface treatment :Sn reflow plating(Ni plated contacts)

Recommended height :2.2～3.4mm

OG-363040HDR



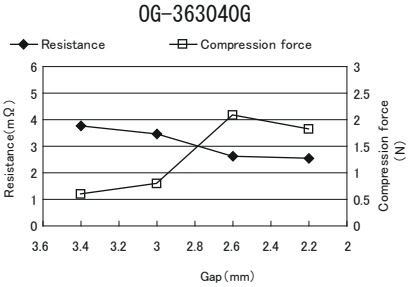
Material : Phosphor bronze for spring(t=0.1mm)

Surface treatment :Sn reflow plating

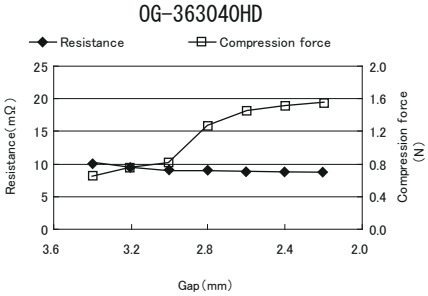
Recommended height :2.2～3.4mm

Compression force vs Electric resistance

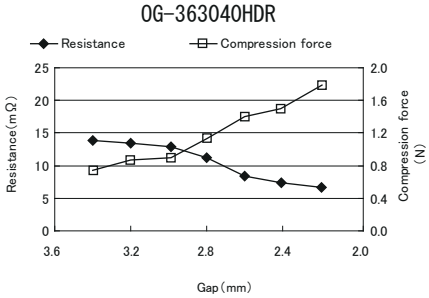
OG-363040G



OG-363040HD



OG-363040HDR



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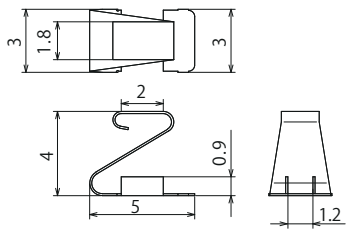
ON-BOARD CONTACT／OG

OG-503040

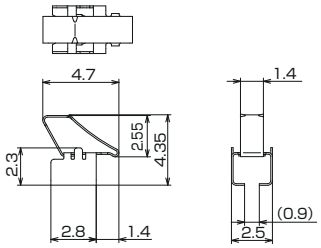


Material :Beryllium copper(t=0.1mm)

Surface treatment : Sn plating

Recommended height :2.2～3.6mm

OG-282543HDR

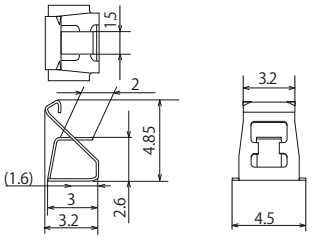


Material :Phosphor bronze for spring(t =0.1mm)

Surface treatment : Sn reflow plating

Recommended height :2.5～3.9mm

OG-453048



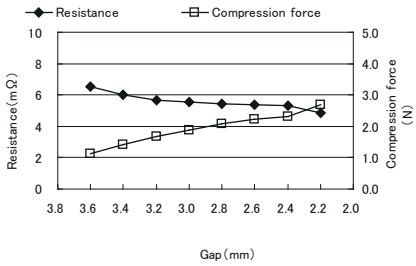
Material :Phosphor bronze for spring(t=0.1mm)

Surface treatment :Sn reflow plating

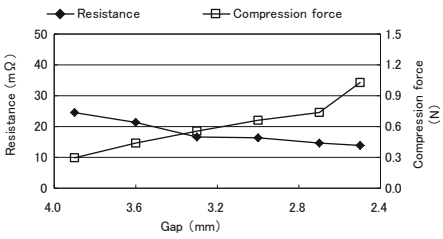
Recommended height :2.7～4.4mm

Compression force vs Electric resistance

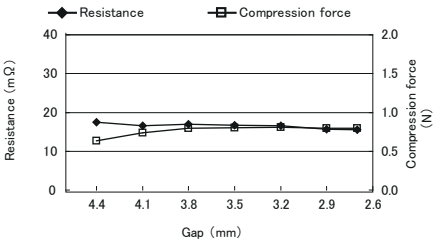
OG-503040



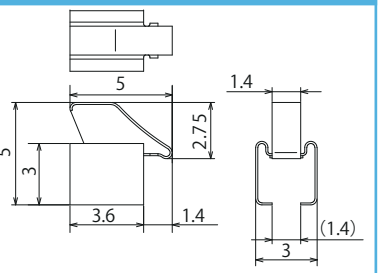
OG-282543HDR



OG-453048



OG-363050

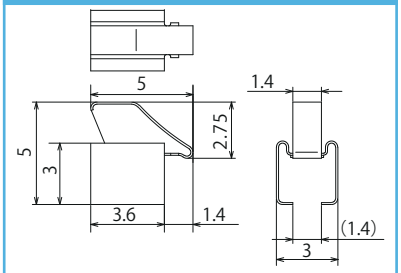


Material :Beryllium copper(t=0.1mm)

Surface treatment :Sn reflow plating(Ni plated contacts)

Recommended height :3.2～4.4mm

OG-363050G

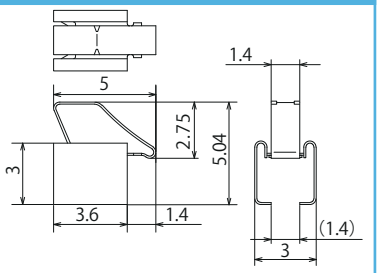


Material :Beryllium copper(t=0.1mm)

Surface treatment :Partial Au plating

Recommended height :3.2～4.4mm

OG-363050HD



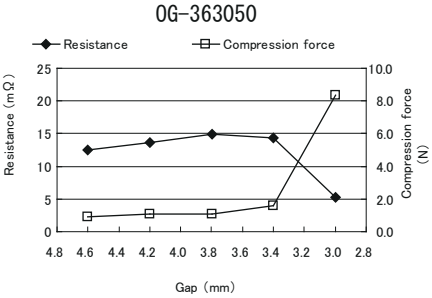
Material :Beryllium copper(t=0.1mm)

Surface treatment :Sn reflow plating(Ni plated contacts)

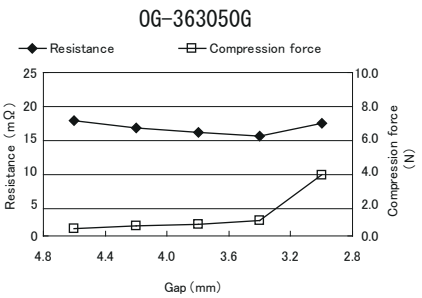
Recommended height :3.2～4.4mm

Compression force vs Electric resistance

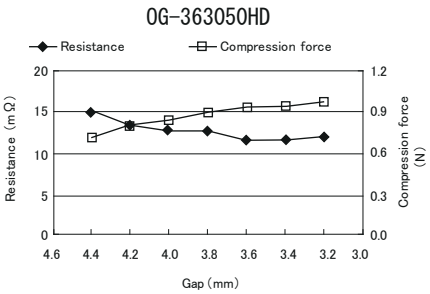
OG-363050



OG-363050G



OG-363050HD



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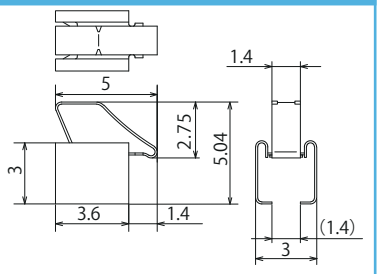
OG-363050HDR

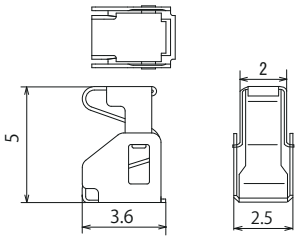


Material :Phosphor bronze for spring(t=0.1mm)

Surface treatment :Sn reflow plating

Recommended height :3.2～4.4mm

OG-362550

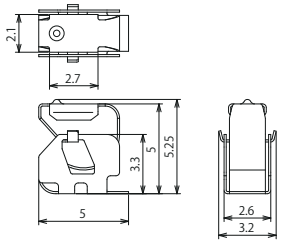


Material :Phosphor bronze for spring(t=0.15mm)

Surface treatment :Sn reflow plating

Recommended height :3.6～4.5mm

OG-503253-A



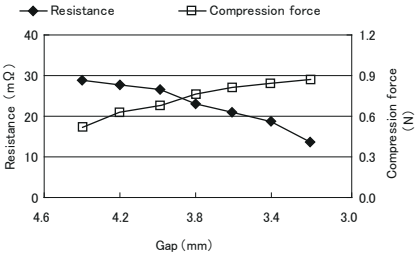
Material :Beryllium copper（t0.12mm）

Surface treatment :Sn reflow plating

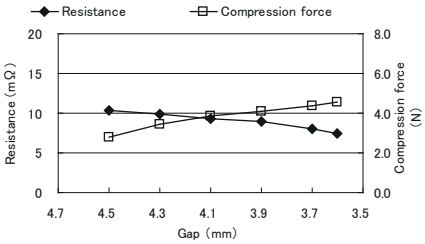
Recommended height :3.5～4.5mm

Compression force vs Electric resistance

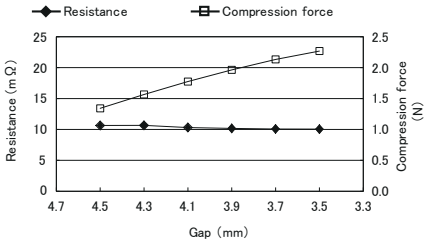
OG-363050HDR



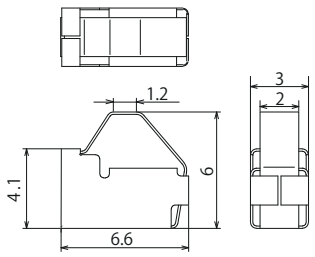
OG-362550



OG-503253-A



OG-603060

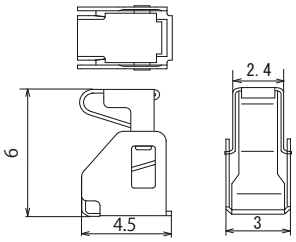


Material :Phosphor bronze for spring (t=0.12mm)

Surface treatment :Sn reflow plating

Recommended height :4.2～5.5mm

OG-453060

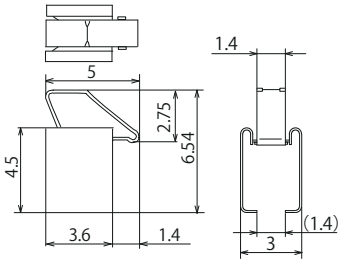


Material :Phosphor bronze for spring(t=0.2mm)

Surface treatment :Sn reflow plating

Recommended height :4.2～5.5mm

OG-363065HD



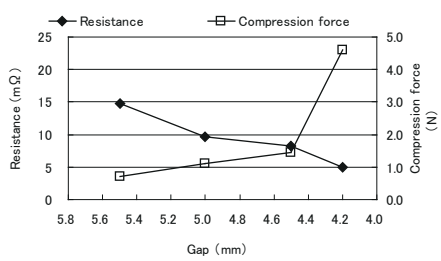
Material :Beryllium copper(t=0.1mm)

Surface treatment :Sn reflow plating(Ni plated contacts)

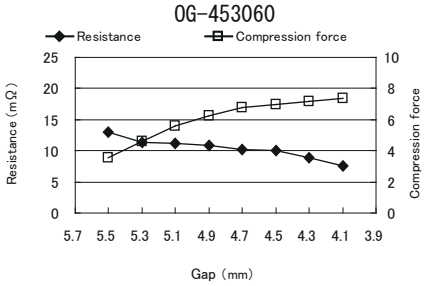
Recommended height :4.7～5.9mm

Compression force vs Electric resistance

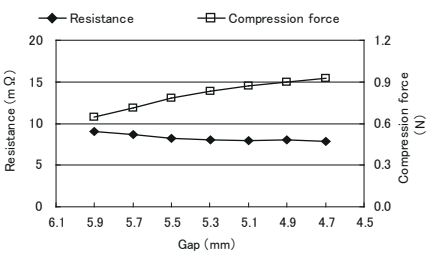
OG-603060



OG-453060



OG-363065HD



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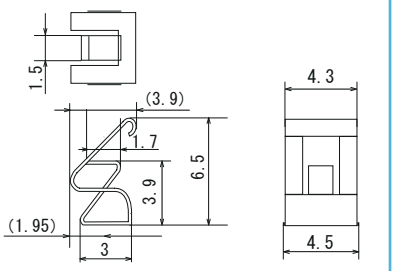
ON-BOARD CONTACT／OG

OG-453065

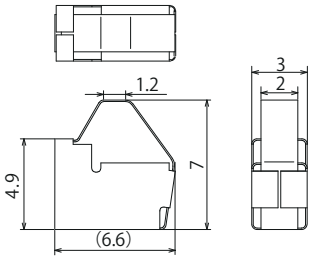


Material :Phosphor bronze for spring(t=0.15mm)

Surface treatment :Sn reflow plating.

Recommended height :4.2～6.0mm

OG-603070

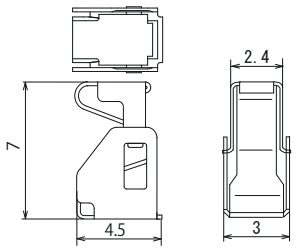


Material :Phosphor bronze for spring(t=0.08mm)

Surface treatment :Sn reflow plating

Recommended height :5～6.5mm

OG-453070



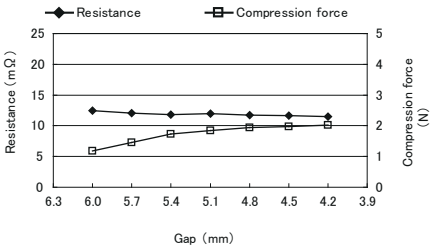
Material :Phosphor bronze for spring(t=0.2mm)

Surface treatment :Sn reflow plating

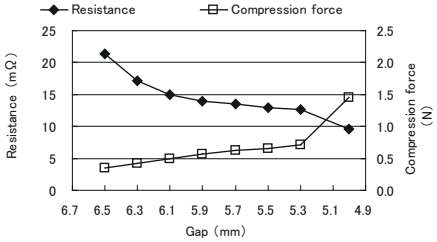
Recommended height :5.3～6.5mm

Compression force vs Electric resistance

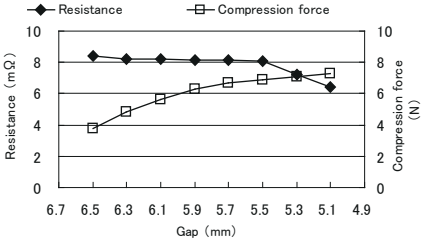
OG-453065



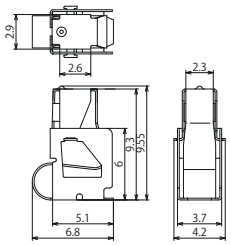
OG-603070



OG-453070



OG-684296

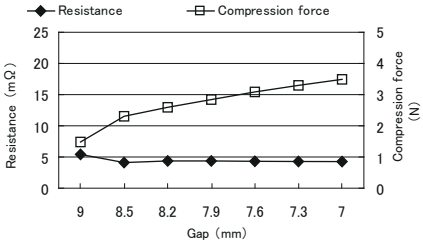


Material :Beryllium copper(t=0.15mm)

Surface treatment :Sn reflow plating

Recommended height :7.0～9.0mm

OG-684296



※The values are measured data for reference, not guaranteed.

SIDE CONTACT／OGSC-(T)(B)-302020

Side contact for perpendicular grounding

Feature

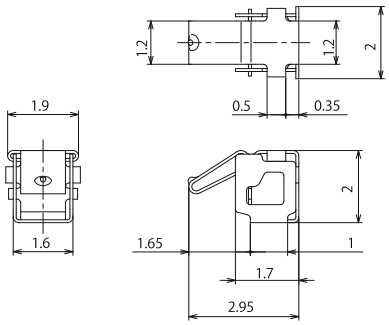
- Ideal for applications where standard grounding between parallel boards/ chassis is not possible .
- Due to low profile design (2mm), it's suitable for small electronic devices
- Operating temperature: -40~125℃

Material

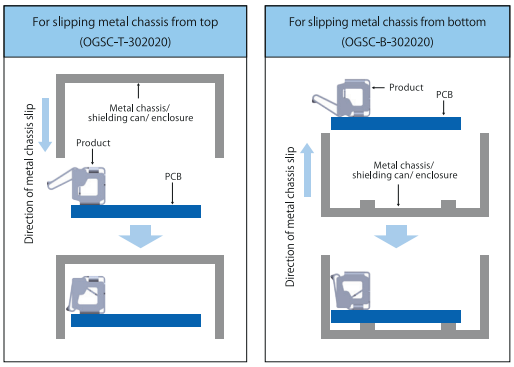
- Corson alloy (t0.08mm)

Specification

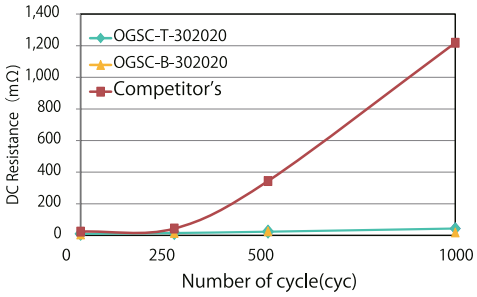
● Dimensions



Item	OGSC-T-302020	OGSC-B-302020
Applications	Ground contact for SMD	
Material	Corson alloy(t0.08mm)	
Surface treatment	Sn reflow plating (Underlying Cu plating)	
Recommended operating temperature range(℃)	−40 ～ 125	
Compression range(mm)	0.3 ～ 1.0	
Initial resistance (Ω)	≦0.05	
Initial compression force(N)	0.2 ～ 3.1	0.4 ～ 3.0



Heat cycle test



ON-BOARD LUG TERMINAL／OG-R・OG-RM

Secure contact of screwed area

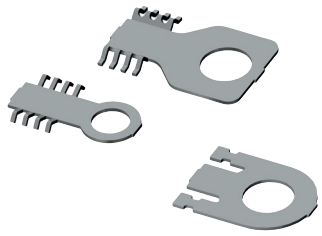
Feature

- FG reinforcement and reliable contact are achieved.
- Prevention of screw loosening caused by vibration.
- OG-RM is a space-saving fully-flat shape.
- OG-RM30HF provides even further space saving.

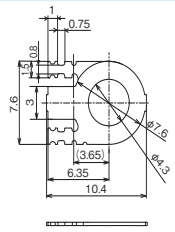
Material

- Tough pitch copper※(Sn plating)

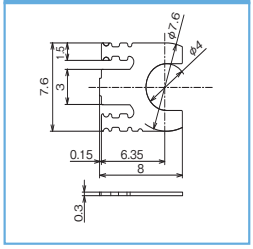
※OG-RM26 is made of brass.



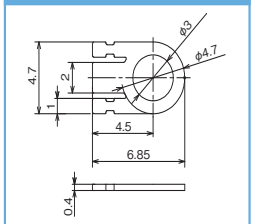
OG-RM30F



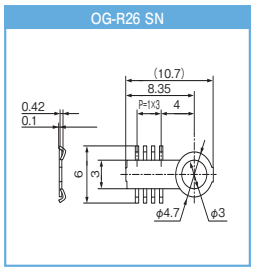
OG-RM30HF



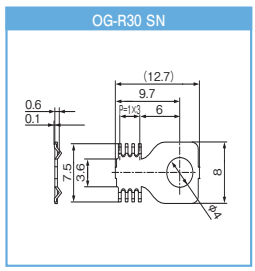
OG-RM26



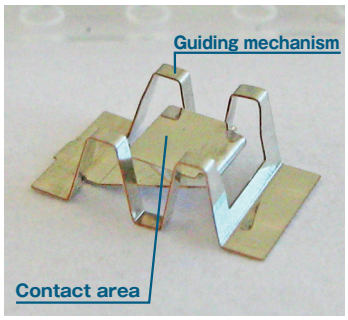
OG-R26 SN



OG-R30 SN



ON-BOARD SHIELD GUIDE／OG-865028



Displacement prevention mechanism improves grounding of shielding cans.

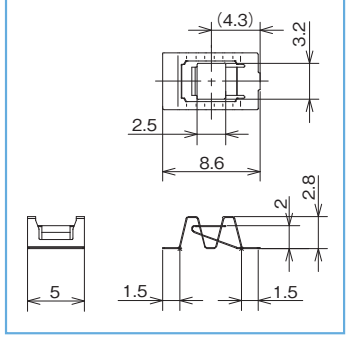
Feature

- Guiding mechanism makes easy installation for shielding cans.
- Applicable even at corners of shielding cans.
- Multi-point contact with the shielding can provides higher shielding effectiveness.

Material

- Phosphor bronze for spring (Sn reflow plating)

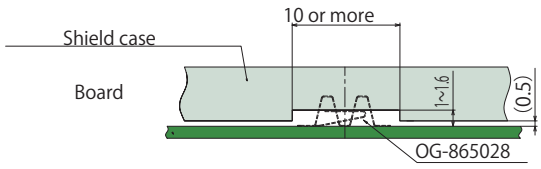
OG-865028

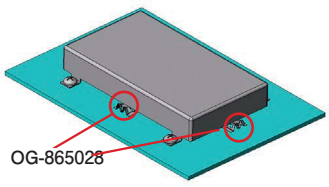


Unit：mm

Reference Installation Specifications

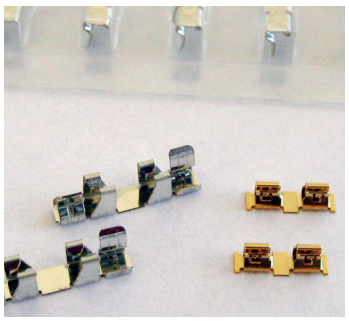
Applicable plate thickness : t=1.9 or less



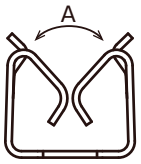


※The values are measured data for reference, not guaranteed.

ON-BOARD CLIP／OGCP



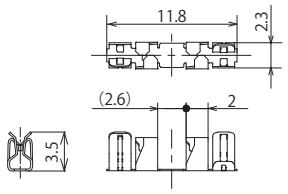
Automated mounting applicable fixture “On-Board Clip” for shielding can.



Feature

- Clip structure enables easy removal of shielding can.
- Multi-point GND is provided to shielding can. Improved shielding effect can be achieved.
- OGCP-502423:Wide opening (A) provides easy insertion of a shielding can.
- OGCP-1182435:Separate structure of clip and support portion resistant to side slide loading.
- OGCP-702020:Locking structure provides “click feel” on installation.
  It provides certainty and improved workability.

OGCP-1182435

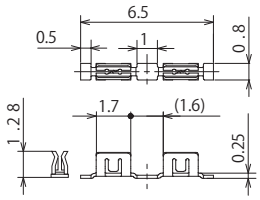


Material : Phosphor bronze for spring

Surface treatment : Sn reflow plating

Applicable thickness : t=0.3±0.02

OGCP-650813R

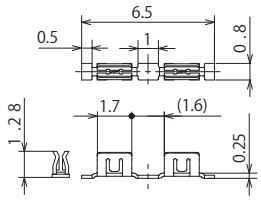


Material :Phosphor bronze for spring

Surface treatment : Sn reflow plating

Applicable thickness : t=0.15～0.2

OGCP-650813G

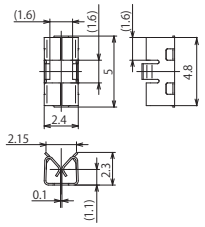


Material :Titanium Copper alloy

Surface treatment : Partial Au plating(Ni plated contacts)

Applicable thickness : t=0.15±0.03

OGCP-502423

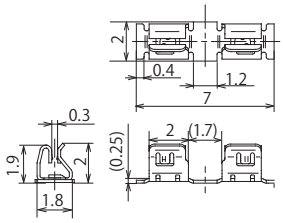


Material : Phosphor bronze for spring

Surface treatment : Sn reflow plating

Applicable thickness : t=0.28～0.56

OGCP-702020

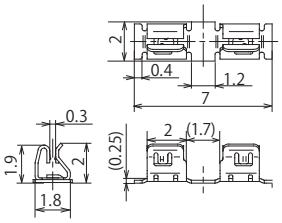


Material :Phosphor bronze for spring

Surface treatment : Sn reflow plating

Applicable thickness : t=0.3±0.02

OGCP-702020G



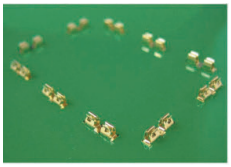
Material :Phosphor bronze for spring

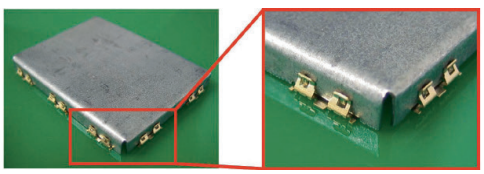
Surface treatment : Partial Au plating

Applicable thickness : t=0.3±0.02

Unit：mm

Installation example

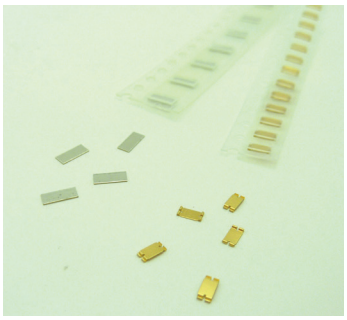




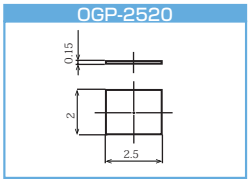
※Suffix "G" means Au plating. Please contact our sales representatives for details.

※Shielding can fixing is not guaranteed if the clip only is used.
※Verification of actual use conditions is required prior to use.
※Please confirm “Notes for Onboards series" on page 2 prior to purchase.

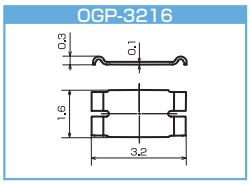
ON-BOARD PLATE／OGP-2520 ,-3216, -4520



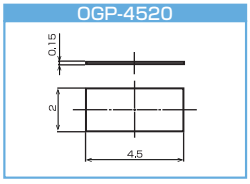
OGP-2520



OGP-3216



OGP-4520



Unit：mm

OGP configuration ensures reliable contact

Feature

- OGP solves contact failure problems caused by solder flux.
- Better reliability compared with solder.
- Eliminates continuity failure caused by pattern scraping between a PCB and pogo pins and a PCB and a metal plate.
- OGP-2520 is 40 % or more downsized from OGP-4520. (Product size: 2.5 mm)
- Gold-plated OGP-3216 can be used as a partial.

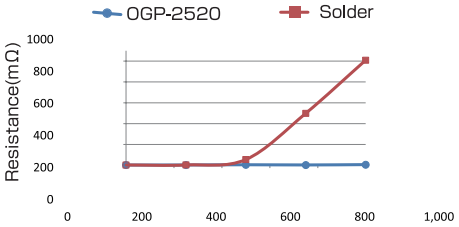
Material

- Base material: Brass Surface treatment: Sn reflow plating※(First plating: Cu plating)

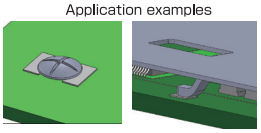
※Surface treatment for OGP-3216: Au/Ni plating on both sides.

Properties

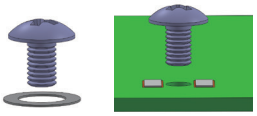
● Resistance measurement results



Application examples



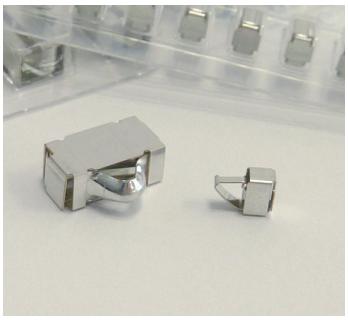
Screw loosening prevention and automated mounting



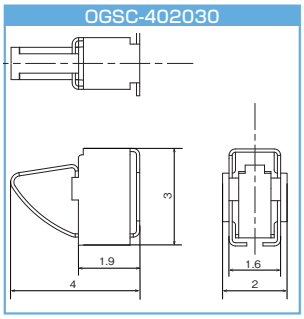
	washers	OGPseries
Mounting method	Manual	Automated

- Cost saving by automation!
- Parts are automatically counted by mounters.

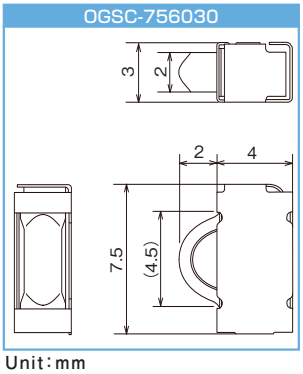
SIDE CONTACT／OGSC



OGSC-402030



OGSC-756030



Unit：mm

Automated mounting applicable component for grounding with side-contact on PC board.

Feature

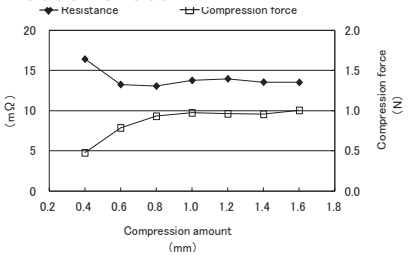
- Side-contact is applicable on PC board edge against chassis.
- Grounding contact is applicable between mother PC board and vertically placed daughter board.
- OGSC-402030:Down-sized compact design has been reduced by 80% of foot print area on PCB compared with existing part.
- OGSC-756030:Structure resists deformation even during lateral sliding.

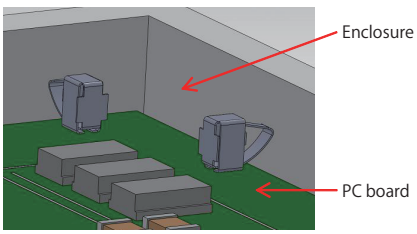
Material

- Phosphor bronze for spring (Sn reflow plating)

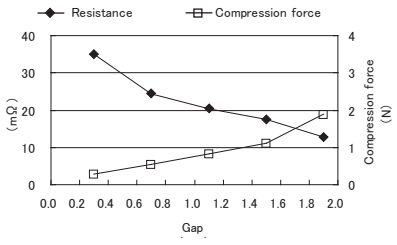
Characteristics between Compression Force and Resistance

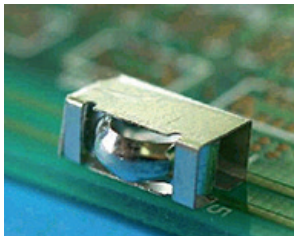
■ OGSC-402030



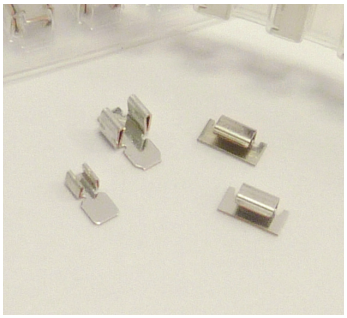


■ OGSC-756030





ON-BOARD CLAMP／OGC



Compact cable clamp applicable to automated mounting on PC board.

Feature

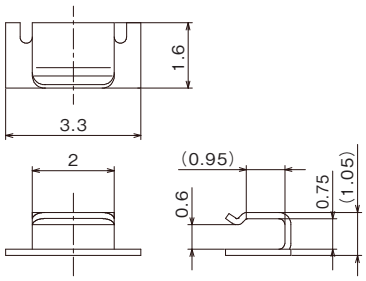
- Supporting wire harness on PC board.
- Side and top insertion types are available.
- Automated mounting and reflow soldering onPC board are applicable without boring.
- Wiring on PC board edges is available which brings space saving of equipment design.

Material

- Phosphor bronze for spring (Sn reflow plating)

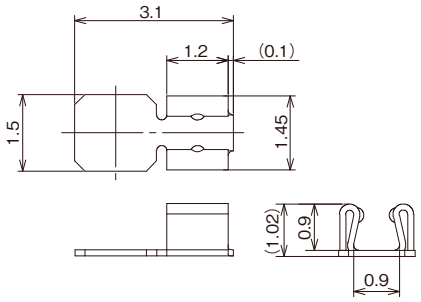
OGC-331610

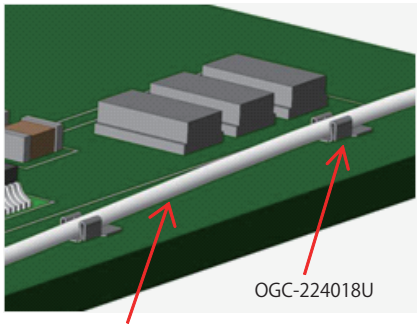
Applicable harness diameter : ϕ0.8



OGC-311510U

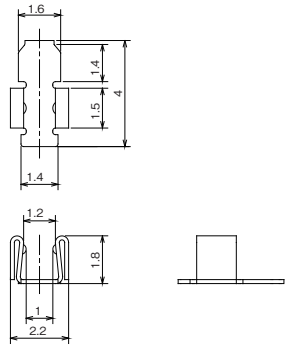
Applicable harness diameter : ϕ0.8





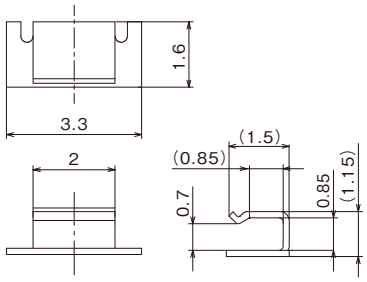
OGC-224018U

Applicable harness diameter : ϕ1.3~1.4



OGC-331612

Applicable harness diameter : ϕ0.86



Unit：mm

※Please confirm "Notes for Onboard series" on page 2 prior to purchase.

ON-BOARD CONTACT／OG-453239-A

SMT grounding contact for engine compartment PCB

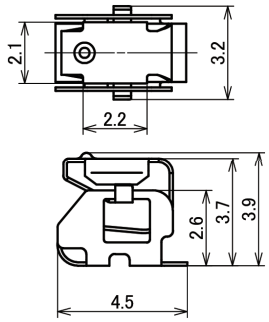
Feature

- Connecting a GND layer of PCB with multiple points on a chassis can be expected to suppress radiation noise.
- Connectors are prone to static electricity. When the OG is placed near a connector, it creates a ground connection with the chassis to release the static electricity.
- The spring structure has durability for 10 million vibrations, considering the deflection of PC boards caused by vibration.
- Sustained conduction is secured because of unique dimple design.
- Can be used under high temperature at 150℃

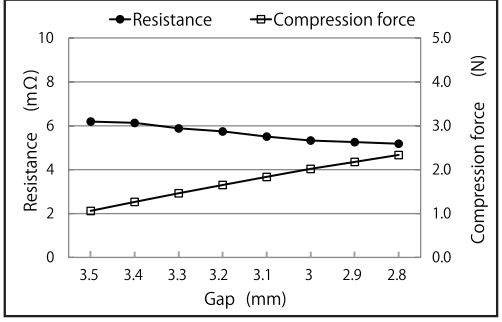
Material

- Basis material: Beryllium copper(t0.12mm)
- Surface treatment:Sn reflow plating (Underlying Cu plating)

Dimensions(mm)



Compression force vs Electric resistance



Reference

■ Metal grouping (reference)

※Galvanic corrosion may occourby contact with other metals.

anode			
Group Ⅰ	Group Ⅱ	Group Ⅲ	Group Ⅳ
Mg	Al	Cd plating	Brass
Mg alloy	Al alloy	carbon steel	stainless steel
Al	Zn・Zn plating	Fe	Be-Cu
Al alloy	Cr plating	Ni-Cr plating	Cu, Cu alloy
Zn・Zn plating	Cd plating	Sn・Sn plating	Ni-Cu alloy
Cr plating	carbon steel	Sn・Pb solder	Monel
	Fe	Pb	Ag
	Ni, Ni plating	Brass	Graphite
	Sn, Sn plating	stainless steel	Rb
	Sn・Pb solder	Be-Cu	Ti
		Cu, Cu alloy	Pt
		Ni-Cu alloy	Au
cathode			

EMC GROUNDING

For CABLES

Plastic clamps with grounding function

Clamps

P16


FG CLAMP

P16


FG CLAMP

For BOARDS, ENCLOSURES

Plastic fasteners with grounding function

Spacers

P17


FG SPACER

P17


FG EDGE SPACER

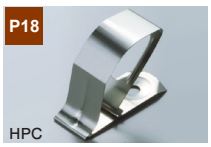
Guide rail for PC boards

P18


FG GUIDE RAIL

Metal grounding components

Contacts

P18


HIGH-POINT CONTACT

Straps

Wire mesh

P19

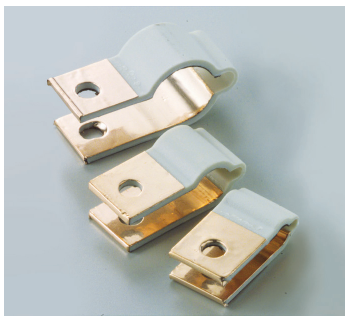

FG MESH

Metal foil

P19


FG STRAP

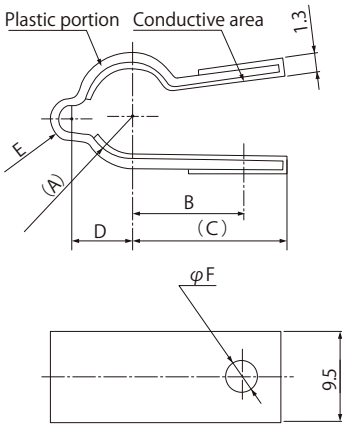
FG CLAMP／FGC



Plastic fastening and reliable copper foil grounding is provided simultaneously.

Feature

- Plastic body enables conductive layer to fit the cable and provides stable effectivity.
- Conductive area employs highly reliable copper foil.
- Plastic materials prevent the clamp from damaging the cable.



Material

- Plastic portion / nylon 66 (light gray / UL94V-0)
- Conductive area / Copper foil

■ M3 screw assembly type

Unit：mm

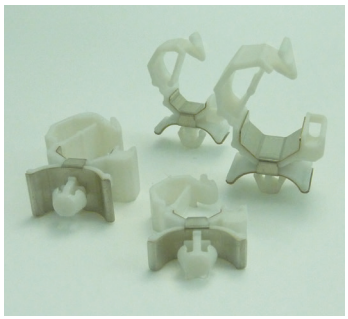
Part No.	(A)	B	(C)	D	E	F	Applicable cable diameter
FGC-3	R1.8	9.5	13.5	3.0	R1.5	φ3.2	φ2.7～φ3.5
FGC-5	R3.0	10.7	14.7	4.3	R2.0		φ5.0～φ5.5
FGC-8	R4.8	12.5	16.6	6.5	R2.3		φ8.2～φ9.0

■ M4 screw assembly type

Unit：mm

Part No.	(A)	B	(C)	D	E	F	Applicable cable diameter
FGC-3 M4	R1.8	9.5	13.5	3.0	R1.5	φ4.2	φ2.7～φ3.5
FGC-5 M4	R3.0	10.7	14.7	4.3	R2.0		φ5.0～φ5.5
FGC-8 M4	R4.8	12.5	16.6	6.5	R2.3		φ8.2～φ9.0

FG CLAMP／FGCS



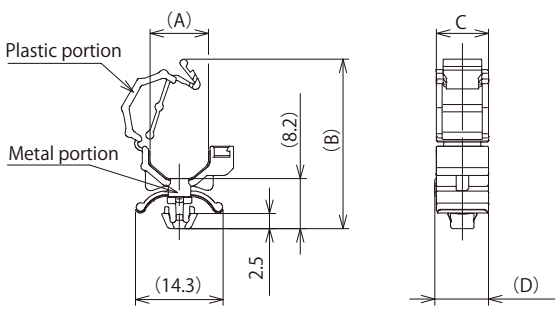
FG function combined wiring clamps

Feature

- Part numbers reduced through the integration of the plastic clamp and the metal FG component.
- Plastic and metal portions can be separated for disposal.
- Easily detachable cables allow improvement for maintenance.

Material

- Plastic portion / nylon 66 (Natural / UL94V-0)
- Metal portion / Phosphor bronze (Sn plating)



Installation specifications

- Board thickness : t0.8～1.6
- Hole diameter : $\phi 4.8^{+0.2}_{0}$

Unit：mm

Part No.	(A)	(B)	C	(D)	Applicable cable diameter
FGCS-5	7.0	23.3	5.5	5.7	φ5.0～φ5.5
FGCS-8	9.5	27.5	8.5	8.7	φ7.0～φ8.5

FG SPACER／FGS

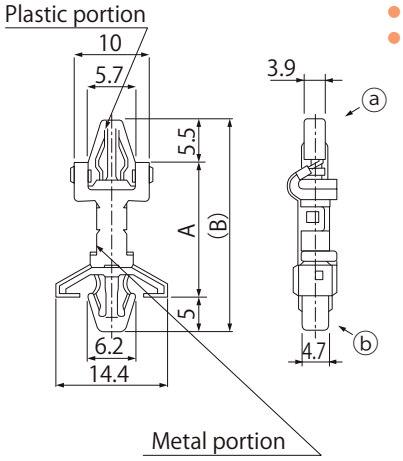
Screw free fixing spacer is combined with EMC grounding function.

Feature

- Grounding at the center of the PC board is easily achieved.
- Suitable for total cost downsizing through high workability and reduction of part numbers.

Material

- Plastic portion / PA66 (Black / UL94V-0)
- Metal portion / Phosphor bronze (Sn plating)



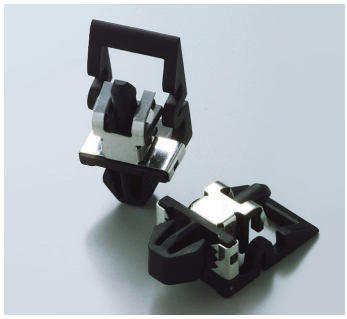
Installation specifications

- ⓐ : Board thickness／t＝1.6～2.0mm
  Hole diameter／ϕ4.0$^{+0.1}_{0}$mm
- ⓑ : Board thickness／t＝1～2.0mm
  Hole diameter／ϕ4.8$^{+0.1}_{0}$mm

Unit : mm

Part No.	A	(B)
FGS-3S	9.8	20.3
FGS-4S 1	11.4	21.9
FGS-6S	14.4	24.9
FGS-8S	17.7	28.2
FGS-9S	20.0	30.5

FG EDGE SPACER／FGES-10



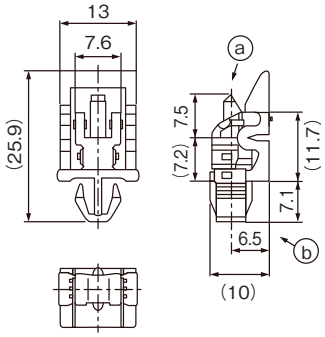
EMC grounding function is added to the spacer whose specialty lever system enables easy fixing and removal of PC board.

Feature

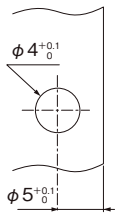
- Easy fixing, opening and closing of PC board are provided as well grounding function.
- The flux which is on the metal contact surface on the chassis side can be removed when fixing.
- High workability and reduction of part numbers enable total cost downsizing.

Material

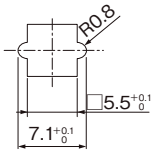
- Plastic portion / PA66 (Color : Black / Flammability : UL94V-0)
- Metal portion / Phosphor bronze (Sn reflow plating)



Installation specifications



ⓐ Board side : t1.6±0.15



ⓑ Chassis side : t0.8～2.3

Unit : mm

FG GUIDE RAIL／FGR-80WSP

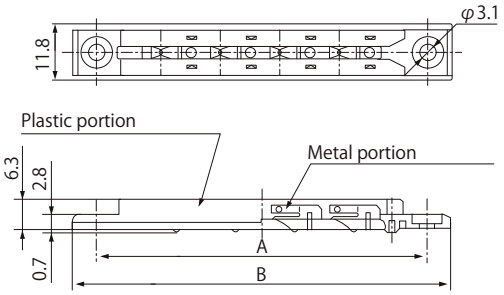
Grounding function added to the PC board guide rail

Feature

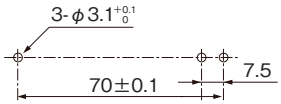
- Contact fingers of the guide sandwiches the PC board so that grounding is achieved from either top or bottom face.
- Spherical profile of the contact area prevents any damage to the PC board pattern.
- Assemble using M3 screws or nylon rivets.

Material

- Plastic portion / Polycarbonate（Black / UL94V-2）
- Metal portion / Phosphor bronze (Sn plating)



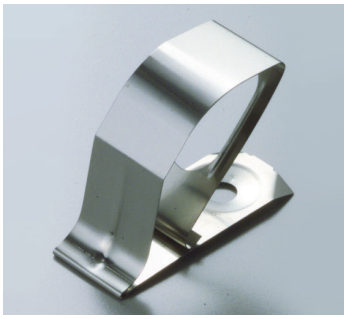
Installation specifications



Unit：mm

Part No.	A	B
FGR-80WSP	70	80

HIGH-POINT CONTACT／HPC



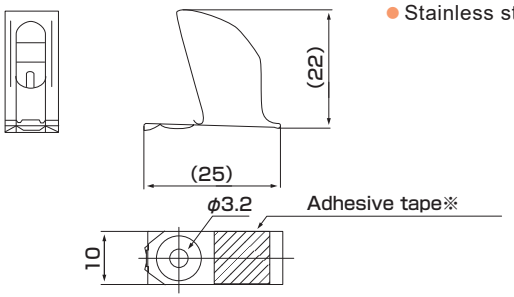
Suitable for contact in large clearance applications

Feature

- Special profile allows the contact clearance to vary from 10 to 20 mm.
- No change in spring length when compressed results in space saving.
- Assembled by screw or double-sided adhesive tape.

Material

- Stainless steel（SUS304／t＝0.15mm）



※ HPC-10-20T only

Unit：mm

Part No.	Specification
HPC-10-20T	Double-sided adhesive tape attached
HPC-10-20	Double-sided adhesive tape un-attached

FG MESH／FGM

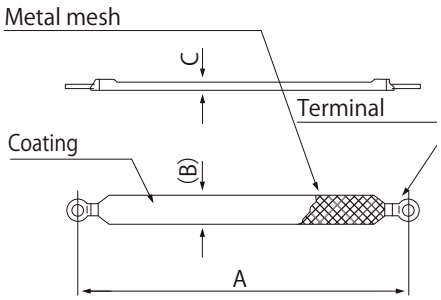
Metal mesh employed EMC grounding material

Feature

- Excellent flexible structure comprises metal wires braided into a cylinder mesh, coated with insulator.
- Large surface area of conductive mesh provides excellent impedance characteristics in the high frequency range.

Material

- Mesh / Tinned copper wire
- Terminal / Round terminal
- Coating / Heat shrink tube (black)



※Please contact our sales department for sizes outside of those specified.

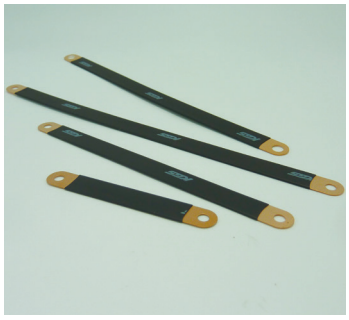
■ M3 screw assembly type　　Unit：mm

Part No.	A	(B)	C
FGM-50-M3	50	8.5	2.5
FGM-100-M3	100		
FGM-150-M3	150		
FGM-200-M3	200		

■ M4 screw assembly type　　Unit：mm

Part No.	A	(B)	C
FGM-50-M4	50	8.5	2.5
FGM-100-M4	100		
FGM-150-M4	150		
FGM-200-M4	200		
FGM-265-M4	265		
FGM-300-M4	300		
FGM-400-M4	400		

FG STRAP／GFGST



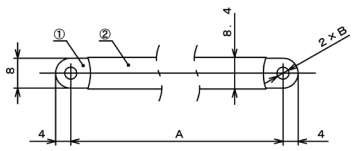
Metal foil employed EMC grounding material

Feature

- Flexible coated metal foil allows applications in narrow space configurations.

Material

- ①Copper foil / Tough Pitch Copper (t0.1mm)
- ②Heat shrink tubing / Polyolefin



Size variation

	Part No.	A	B
M3	GFGST-50-8-M3	50	Φ3.2
	GFGST-100-8-M3	100	Φ3.2
	GFGST-150-8-M3	150	Φ3.2
M4	GFGST-50-8-M4	50	Φ4.2
	GFGST-100-8-M4	100	Φ4.2
	GFGST-130-8-M4	130	Φ4.2
	GFGST-150-8-M4	150	Φ4.2
	GFGST-220-8-M4	220	Φ4.2

Impedance characteristics

Unit：Ω

MHz Frequency	GFGST-50-8-M3	GFGST-100-8-M3
1	0.13	0.28
25	3.19	7.01
100	12.79	28.38
500	72.03	225.57

Properties

- Surface resistance …… 0.002Ω
  (Value shown was measured with GFGST-50-8-M3 between both terminal ends)

※All specifications and characteristics shown herein are typical values, but are not guaranteed.
※All specifications and characteristics shown herein are subject to change without notice for improvements or changes in specification.

ELECTROMAGNETIC WAVE MANAGEMENT SHEET

ELECTROMAGNETIC NOISE SUPPRESSION SHEETS

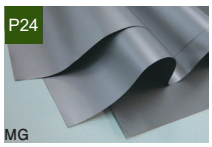
Near field EMI suppression with easy assembly. Simply attach, sandwich and wrap around

Magnetic metal filler type
Heat resistance upto 150°

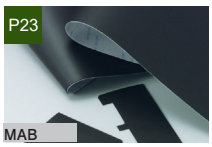
Soft ferrite

Ferrite sheet

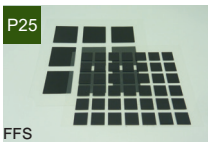
Thermal conductivity



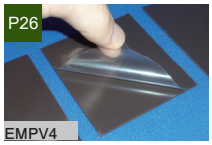
MG ABSORPTION SHEET



EMI ABSORPTION SHEET



SMARTPLY®



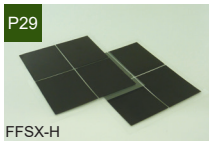
COOLPROVIDE®

COOLPROVIDE®

For RFID/NFC

Improvement of the communication efficiency of RFID/NFC(13.56MHz)

Ferrite sheet

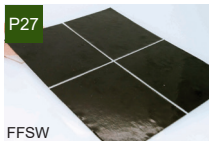


SMARTPLY

For WIRELESS CHARGING

Suitable for improvement of wireless charging efficiency and its shielding of leakage magnetic field.

Ferrite sheet

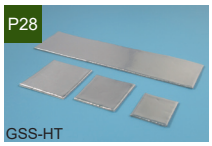


SMARTPLY

GHz SHIELD

Shielding sheet for GHz band noise

Originally designed material + Metal

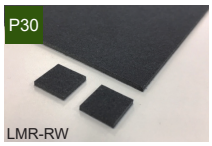


GHz SHIELD SHEET

Electromagnetic absorption product

Electromagnetic absorption sheet for GHz band

Lighter and thinner electromagnetic absorption paper

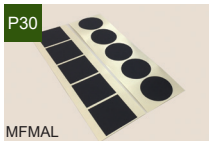


LESSMIRROR

MAGNETIC SHIELDING SHEET

Effective suppression against electromagnetic noise at low frequency and leakage of magnetic flux

MAGNEFILM



MAGNEFILM

ELECTROMAGNETIC NOISE SUPPRESSION SHEET

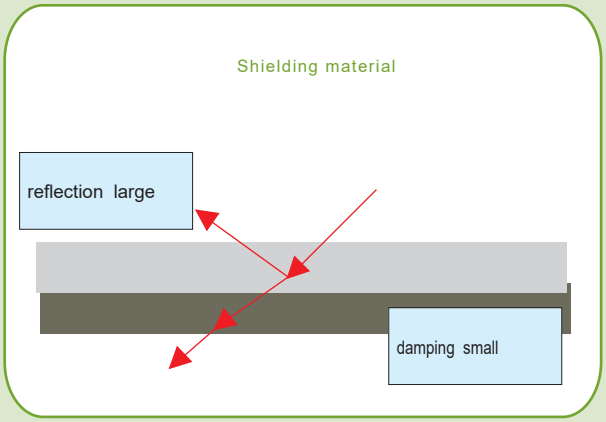
Effective suppression of electronic equipment noise

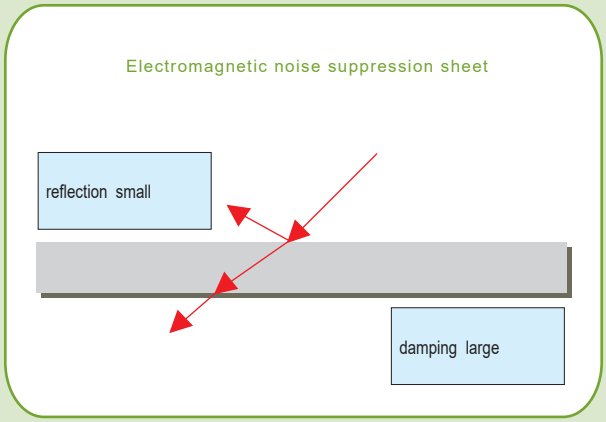
Feature

- Noise is easily suppressed with the simple assembly. Attach, sandwich and wrap around.
- Broad range of variations, sheet, core, heat-conductive types etc.
- Custom cutting and secondary processing are available.

Noise damping

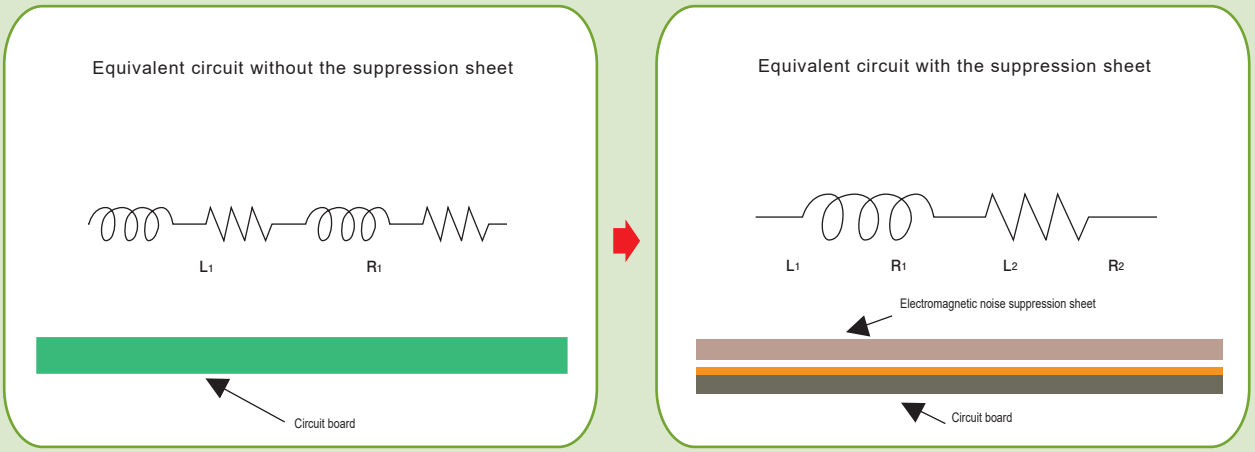
Noise level is lowered by loss effect of magnetic substance,
with smaller reflection suffered by conductive shielding materials.





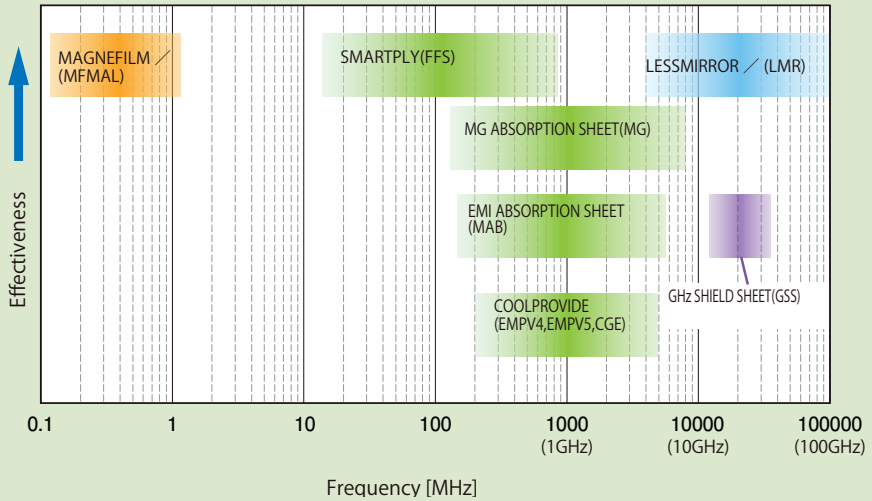
Suppression of antenna effects decreases the noise.

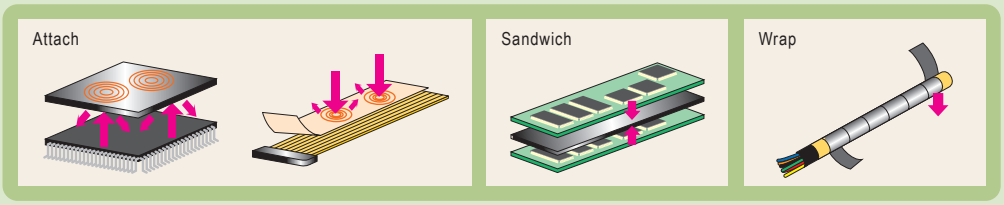
Radiation noise is emitted by cables or patterns acting as an antenna.
The magnetic substance reduce the noise by minimizing such antenna effects.



ELECTROMAGNETIC NOISE SUPPRESSION SHEET

Property comparison (reference)





Precautions for use

1. These products are designed and manufactured for the purpose of suppressing electromagnetic wave generated by a general electronic device. When intending to use them with applications such as for equipment or devices required high reliability and high accuracy (e.g. involving human lives at risk etc.), please contact our sales representatives in advance.

2. When using these products, it is necessary to first attach them to the actual equipment and then check the condition, such as the suppression effectiveness of electromagnetic wave, the strength of double-sided adhesives etc, in advance.

3. These products are not intended to use for the purpose of insulating any electrical or electronic parts. None of these products should be applied to areas, such as of parts used for a power supply section, requiring insulation.

4. Special care should be taken when attaching these products due to the reason that scratching, folding or tugging these products may cause damage such as cracks. And after attaching them, external stress, such as folding, tugging etc, should be avoided when using.

5. Once the product is attached, it is not easily removed. Removal may cause damage.If reattachment is necessary, please use a new product.

EMI ABSORPTION SHEET／MAB

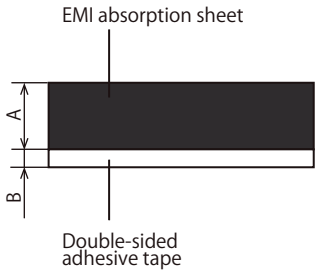
Flexible sheet consists of resin with soft ferrite filler

Feature

- Sheet thickness, 0.4 - 4.0mm are available.
- Flexible and easy handling.

Material

- Soft ferrite + resin

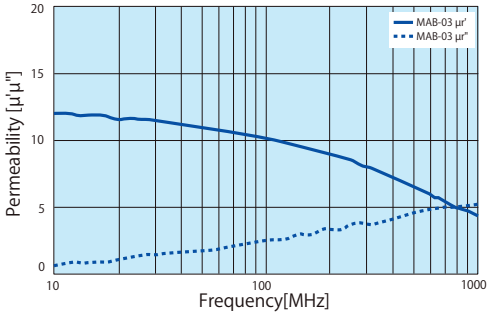


Part No.	Unit	Standard	MAB-03
A	mm	—	0.4/1.0/2.0/4.0
B	mm	—	0.16
Color※	—	—	Black
Volume resistivity※	Ω·cm	JIS K 6911 compliant	10^{12}
Flame resistance※	—	UL94	V-0
Operating temp※	℃	—	-40～85

※Double-sided adhesive tape not included

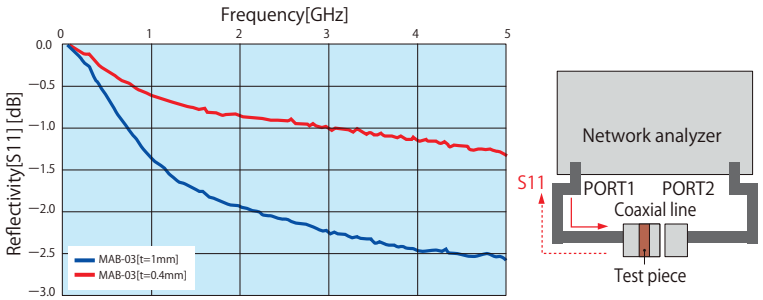
Properties

Permeability

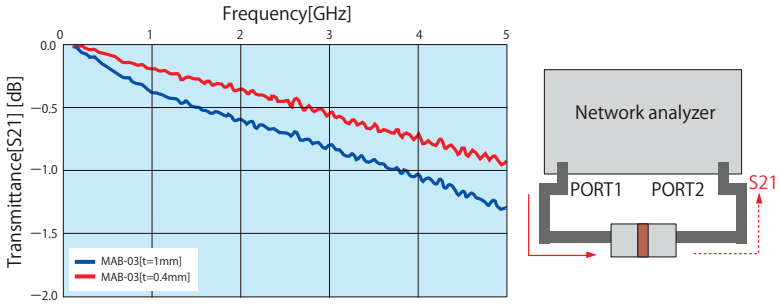


※The values are measured data for reference, not guaranteed.

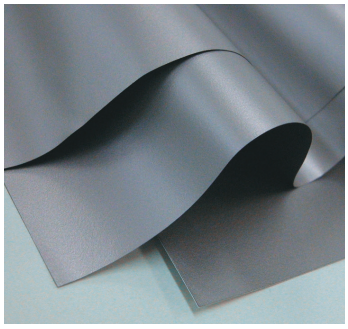
Reflection loss



Transmission loss



MG ABSORPTION SHEET／MG



High performance type mixed with magnetic metal filler

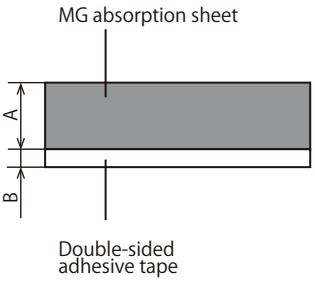
Feature

- Noise Suppression is available with simply attaching it onto ICs or Cables.
- Its flexibility achieves attaching on bending portion.
- Excellent processability, with secondary processing provided to fit the specific application.

Material

- Refer to the table below.

Variations



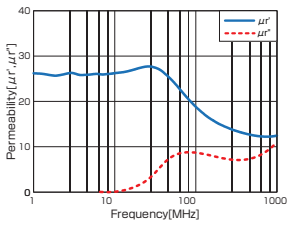
Part No.	Unit	Standard	MG-03A	MG-12
A	mm	—	0.5/1.0	0.1/0.25/0.5
B	mm	—	0.14	0.03
Color※	—	—	Silver	
Permeability※	μr'	—	25/10MHz	95/1MHz
Volume resistivity※	Ω·cm	JIS K 6911 compliant	10^7	10^7
Flame resistance※	—	UL94	H	V-0
Material※	—	—	Magnetic metal material + rubber	Magnetic metal material + resin
Operating temp	℃	—	-40～150	-40～105

※Double-sided adhesive tape not included

Properties

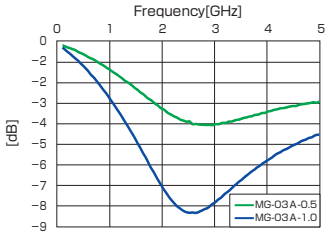
Permeability

MG-03A Series



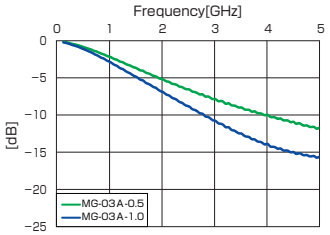
Reflection loss

MG-03A Series

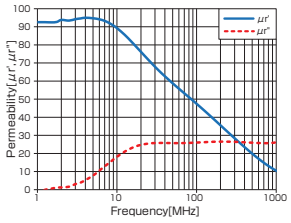


Transmission loss

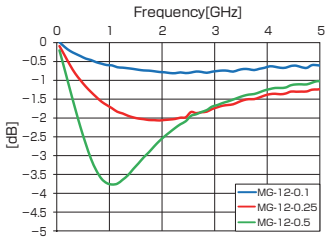
MG-03A Series



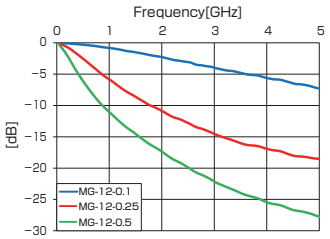
MG-12 Series

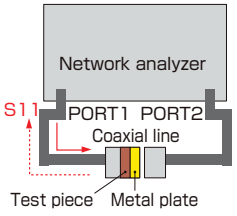


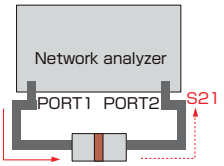
MG-012 Series



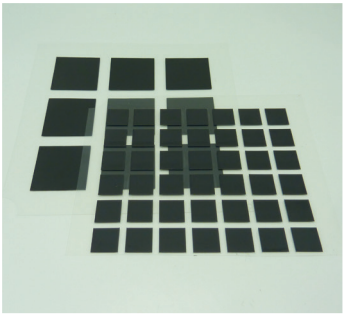
MG-12 Series







※The values are measured data for reference, not guaranteed.



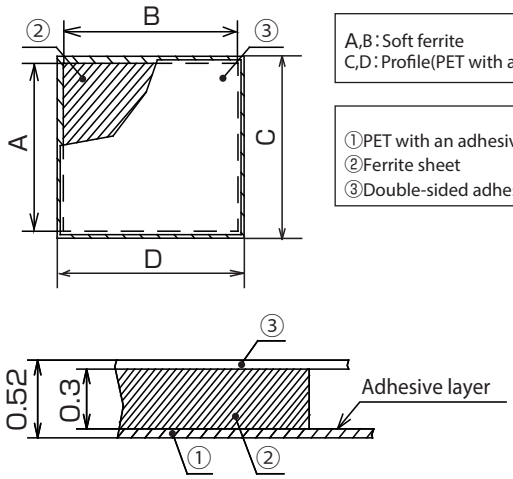
High performance ferrite sheet achieves excellent noise suppression simply by affixing it to desired areas.

Feature

- Excellent noise suppression in low frequency range compared to metal filler electromagnetic noise suppression sheet.
- Heat resistant tape allows application for areas where temperature can be elevated.
- Excellent insulation property due to its sintered body.

Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape



A,B：Soft ferrite
C,D：Profile(PET with adhesive layer)

①PET with an adhesive layer
②Ferrite sheet
③Double-sided adhesive tape

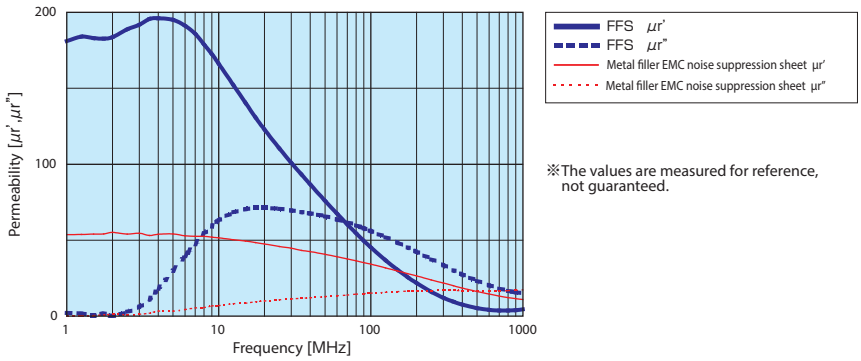
Dimensions

Unit：mm

Part No.	A	B	C	D
FFS-0.3-1010T	10	10	11.5	11.5
FFS-0.3-1020T		20		21.5
FFS-0.3-1515T	15	15	16.5	16.5
FFS-0.3-2020T	20	20	21.5	21.5
FFS-0.3-2030T		30		31.5
FFS-0.3-2525T	25	25	26.5	26.5
FFS-0.3-3030T	30	30	31.5	31.5
FFS-0.3-5050T	50	50	55	55

※Custom designs available.
Please contact our sales representative for further information.

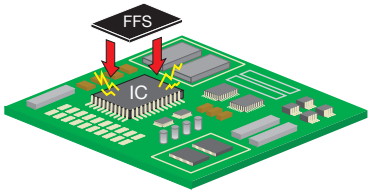
Properties



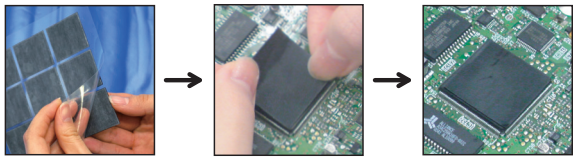
※The values are measured for reference, not guaranteed.

Application

■ EMC suppression for IC



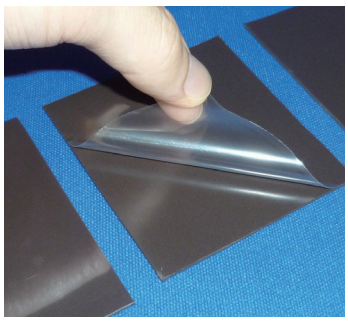
Mounting FFS onto IC device



Gently bend the liner while take the ferrite sheet off.

※It is not advisable to reuse the product once it is removed.

COOLPROVIDE／EMPV4

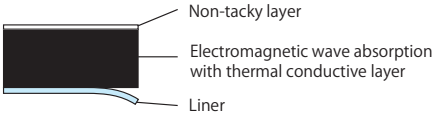


Electromagnetic noise suppression sheet with high permeability and possible thermal management

Feature

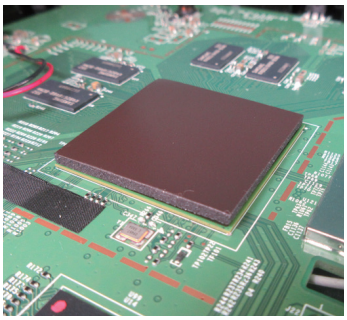
- Lower hardness(ASKER C40), high permeability(μ'=13) was realized as non silicone thermally conductive sheet.
- Due to lower hardness, it enables intimate contact and low load to the element while in mounting.
- Because of a non-silicon material, siloxane is not contained.
- Recommended operating temperature range is -40℃～110℃.

Test type	Unit	Standard	EMPV4-F
Thermal Conductivity	W/m·K	JIS R 2616 (Hot-wiremethod)	1.5
		ISO22007-2 (Hot Disc method)	1.4
Color	—	—	Black
Thickness	mm	—	1.0／1.5／2.0／2.5／3.0／3.5
Specific Gravity	—	JIS Z 8807	3.55
Hardness	ASKER C	JIS K 7312	40
	Shore 00	ASTM D 2240	70
Tensile strength	MPa	JIS K 6251	0.51
Elongation	mm	JIS K 6251	10.9
Volume Resistivity	Ω·cm	JIS K 6911 compliant	1.0×10^{12}
Breakdown voltage	kV/mm	JIS C 2110-1 compliant	6.0
Withstanding voltage	kV/mm	JIS C 2110-1 compliant	4.2
Dielectric constant	1MHz	Company standard	12.7
Loss tangent	1MHz	Company standard	0.13
Flammability	—	UL94	V-0 equivalent
Permeability (at 10MHz)	—	—	13
Operating temperature	℃	—	-40～110
Available max. dimension ※1	mm	—	210×510



※1) Please contact us for available pcs/sheet.

COOLPROVIDE／EMPV5

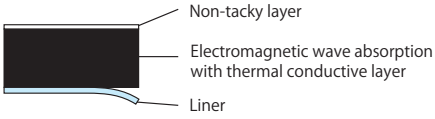


Thermal conductive sheet available for EMC noise suppression in broad frequency band

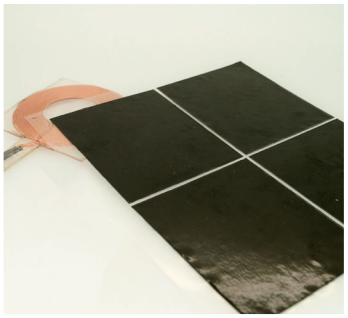
Feature

- Original composition is realized EMC noise suppression in broad band from 500MHz to 3GHz.
- Because of a non-silicon material, siloxane is not contained.
- Oil bleed is less, compared with silicone type.

Test type	Unit	Standard	EMPV5-F
Thermal Conductivity	W/m·K	ISO22007-2 (Hot-disk method)	0.8
Color	—	—	Black
Thickness	mm	—	1.0／1.5／2.0／2.5／3.0／3.5
Hardness	ASKER C	JIS K 7312	30
	Shore 00	ASTM D 2240	60
Volume Resistivity	Ω·cm	JIS K 6911 compliant	1.0×10^{11}
Breakdown voltage	kV/mm	JIS C 2110-1 compliant	8.8
Withstanding voltage	kV/mm	JIS C 2110-1 compliant	5.0
Flammability	—	UL94	V-0 equivalent
Permeability (at 10MHz)	—	—	7
Operating temperature	℃	—	-40～110



※The values are measured data for reference, not guaranteed.



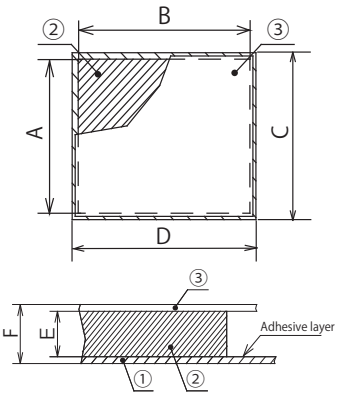
Thinner and flexible ferrite sheet for wireless charging

Feature

- It is higher permeability magnetic sheet which is suitable for magnetic shield and improving performance of wireless charging system according to international standard around 100kHz such as Qi standard.
- Sintered ferrite material with flexibility enables higher drop impact resistance.
- Suitable for thinner design of module. (Total thickness of product: 0.21mm)
- Custom profile is available upon request.

Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape



A,B:Soft ferrite
C,D:Profile(PET with adhesive layer)

①PET with an adhesive layer
②Ferrite sheet
③Double-sided adhesive tape

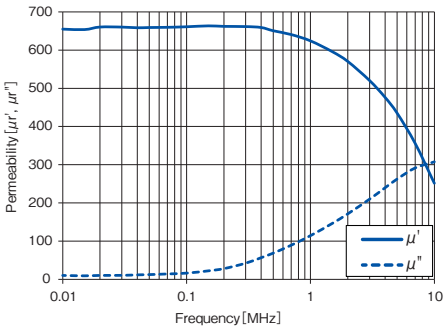
Unit：mm

Part No.	A	B	C	D	E	F
FFSW-0.1-5060T	50	60	52	62	0.1	0.21

※Custom designs available. Please contact our sales representative for further information.

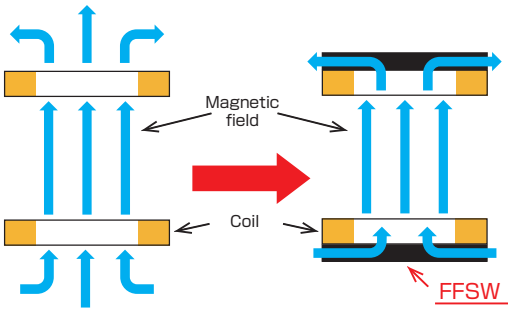
Properties

■ Permeability



Application

■ Wireless charging system

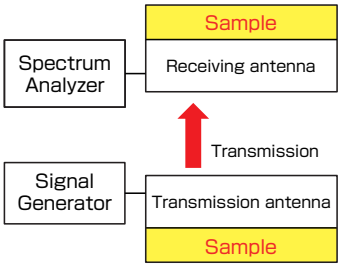


・Magnetic field generated in charge is shield, and do not affect the other elements.
・It is improved magnetic rotation and charging efficiency, too.

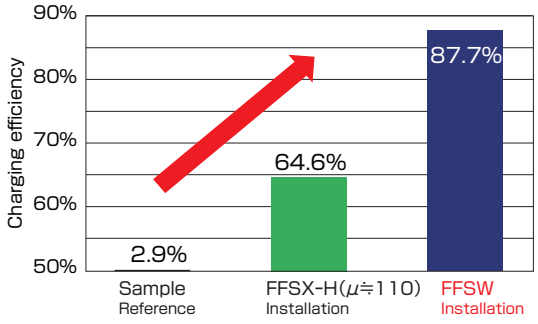
■ Charging efficiency between antennas.

◆**Test specification**

Operating frequency	100kHz
Gap between two antennas	10mm
Antenna size	φ50mm



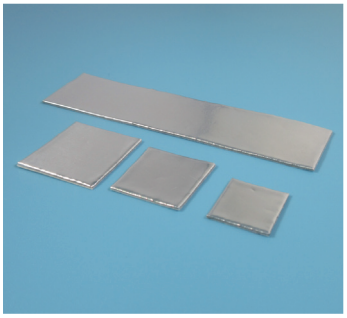
◆**Measurement results**



Charging efficiency is improved !!

※The values are measured data for reference, not guaranteed.

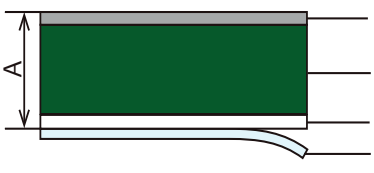
GHz SHIELD SHEET／GSS-HT



New shielding sheet for GHz band noise

Feature

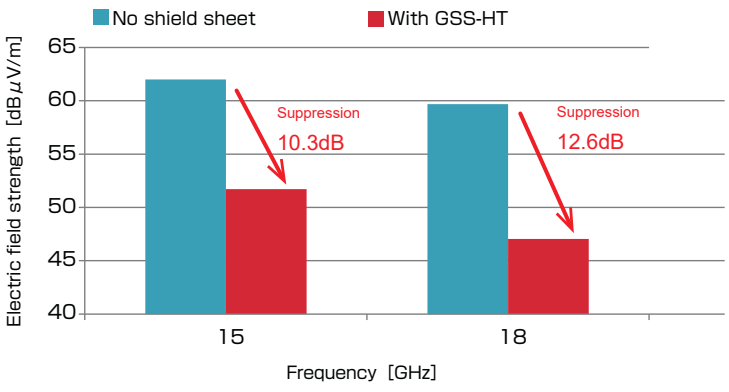
- No trace design of the SHIELD SHEET is required on PC board surfaces, providing high flexibility in circuit design.
- Noise suppression in higher frequency band is available without redesign of PC board.
- Interference between ICs can be suppressed by applying the sheet shield to each IC.



Part No.	Unit	Standard	GSS-1.0-HT
A	mm	—	1.0
Color※	—	—	Dark green
Specific Gravity※	—	JIS K 8807 compliant	2.24
Dielectric constant※	1MHz	Company standard	35
Flame resistance※	—	UL94	Equivalent to V-0
Adhesion	N/20mm	—	12.7
Operating temp	℃	—	-40～105

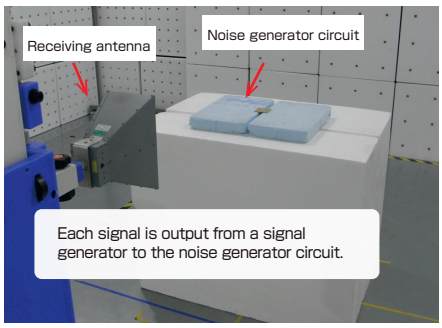
※GHz SHIELD SHEET only

Evaluation gesults(15GHz,18GHz)

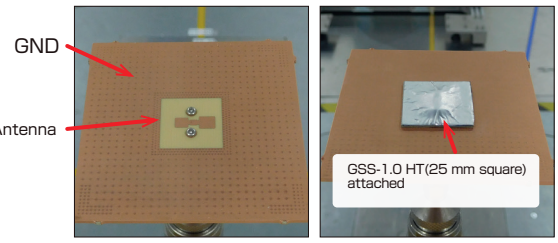


※Suppression in other frequencies may be obtaineddepending on the sheet size and/or environment.

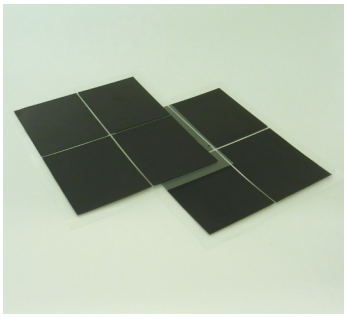
● Test conditions



<Noise generator circuit>



※The values are measured data for reference, not guaranteed.

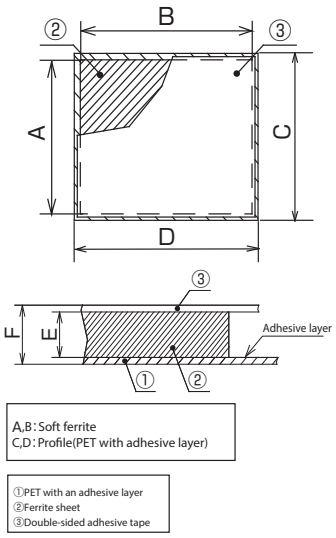


RFID・NFC(13.56MHz)

Thinner and flexible ferrite sheet for metal interference solution for RFID and NFC (13.56MHz).

Feature

- Improve the communication performance of RFID reader and tag by suppressing the metal interference.
- Ferrite material in which Q factor has been maximized at 13.56MHz is used for the sheet.
- Sintered material but thin with excellent in flexibility that enables easy design of custom profiles.



Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape

Dimensions

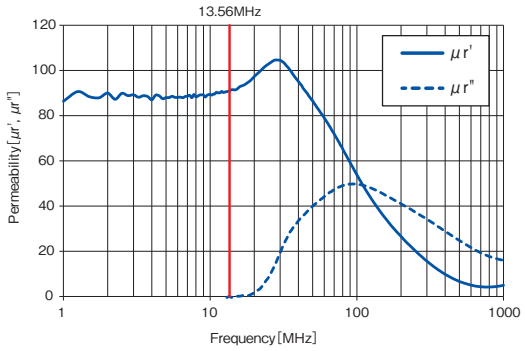
Unit：mm

Part No.	A	B	C	D	E	F
FFSX-0.1H-5060T	50	60	51.5	61.5	0.1	0.21
FFSX-0.2H-5060T					0.2	0.31
FFSX-0.3H-5060T					0.3	0.41

※Custom designs available. Please contact our sales representative for further information.

Properties

■ Permeability



※The values are measured data for reference, not guaranteed.

■ Coupling loss between antennas

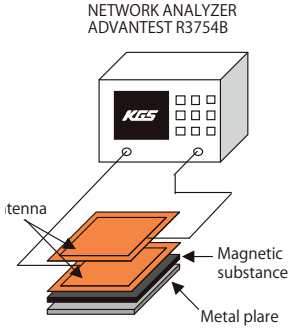
◆Test specification

Antenna

Size	31×42mm(Inner diameter)
Number of turn	3turns
Gap between antennas	3mm
Gap to metal plate	1mm

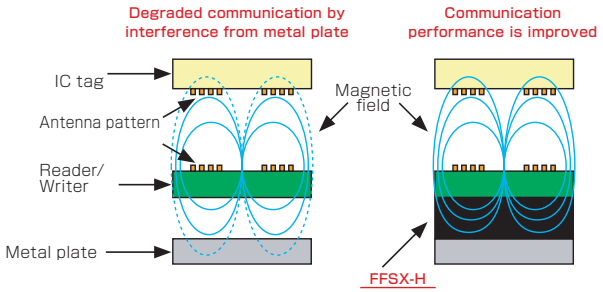
Magnetic substance

Size	50×60mm
Gap to antenna	0mm(Contact)
Thickness	FFSX-0.3H:t0.3mm
	FFS-0.3:t0.3mm

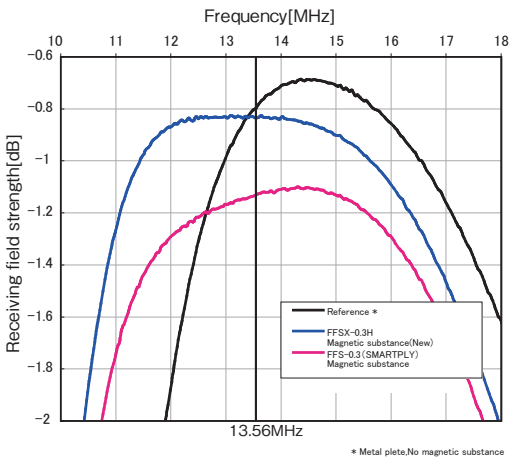


Application

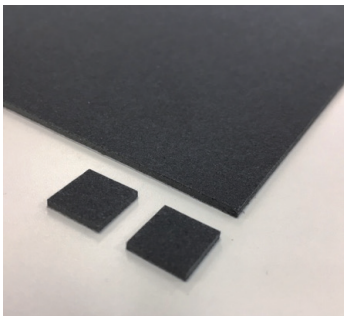
■ Contactless IC smart card system



◆Receiving field strength measurement



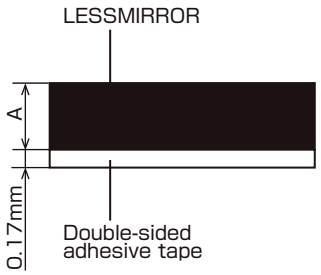
LESSMIRROR／LMR-RW



Thin and light, EM wave absorber with narrow GHz band

Feature

- Effective noise suppression in GHz band.
- Lighter than conventional rubber absorber due to paper used as the main material.
- Thin and suitable for small equipments.

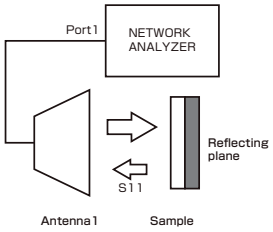


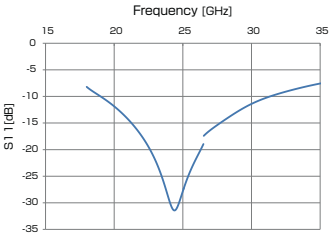
Test type	Unit	Standard	LMR-25RW
A	mm	—	1.45
Color ※	—	—	Black
Center frequency	GHz	—	25
Flammability ※	—	UL94	V-0 equivalent

※ Double-sided adhesive tape not included

Properties

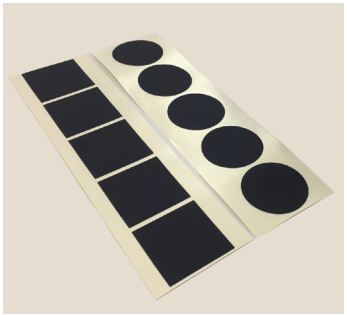
● Test Specification
Free-space field strength method
JIS R 1679





※The values are measured data for reference, not guaranteed.

MAGNEFILM／MFMAL

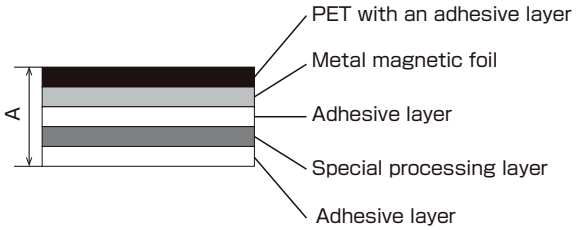


Thin film for magnetic shielding in low-frequencies

Feature

- High shielding effectiveness in low frequencies of 100 k to 1 MHz.
- Insulation by laminated layer. (Without end face).
- Easy mounting with adhesives.
- Cutting service is available upon request.

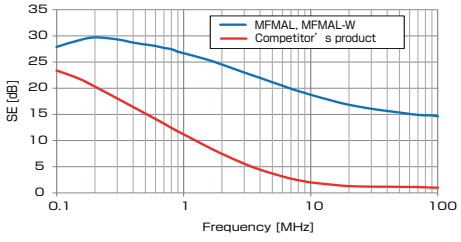
※ Size limit.(Max. length: 110mm, Max. width: 40mm)



Test type	Unit	Standard	MFMAL
A	mm	—	0.127
Color ※	—	—	Black

Properties

● Magnetic shielding effectiveness (KEC method)



※The values are measured data for reference, not guaranteed.

FERRITE CORE PRODUCTS

TOROIDAL / SLEEVE TYPE

Provided with plastic housing and fixtures for labor-saving assembly

Sleeve cores with plastic housing

Split type

P47


SLEEVE FERRITE CLAMP

P44


HIGH μ FERRITE CLAMP

P36


LOW CUT FERRITE CLAMP

Heat resistant type

P38


LOW CUT FERRITE CLAMP

Heat resistant type

P46


SLEEVE FERRITE CLAMP

P39


LOW CUT FERRITE CLAMP

P40


LOW CUT FERRITE CLAMP

Toroidal cores with plastic housing

Split type

P43


HIGH μ FERRITE CLAMP

P49


TOROIDAL FERRITE CLAMP

P48


TOROIDAL FERRITE CLAMP

P49


TOROIDAL FERRITE CLAMP

Sleeve cores

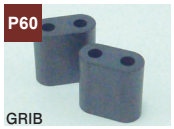
Non Split type

P56


SLEEVE CORE

P61


GRIP CORE

P60


RIB CORE

Toroidal cores

Non Split type

P53


TOROIDAL CORE

P55

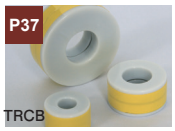

TOROIDAL CORE

P60

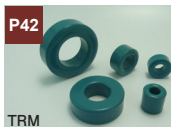

TOROIDAL CORE WITH HOUSING

P45

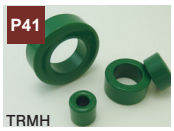

TOROIDAL CORE

P37


LOW CUT CORE TOROIDAL CORE

P42


LOW CUT CORE

P41


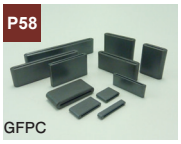
LOW CUT CORE (High μ type)

FLAT TYPE

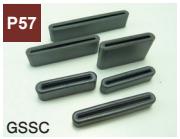
For a flat cable and FPC

Flat cores

Non Split type

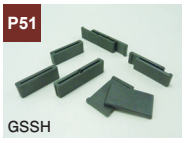
P58


GFPC CORE

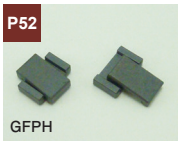
P57


FLAT CORE

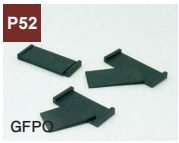
Split type

P51


FLAT CORE

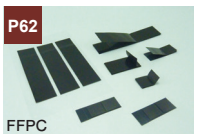
P52


SPLIT FPC CORE

P52


OPEN CIRCUIT CORE

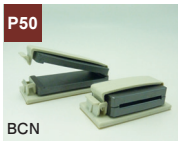
Smartply

P62


SMARTPLY

Flat cores with resin clamp

Split type

P50


BLOCK CORE

Others

Other ferrite

P34

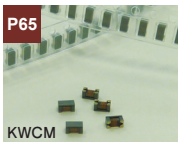

BROAD EFFECT CORE

P35


BROAD EFFECT CORE

P63


METAL CORE

P65


SMD COMMON MODE FILTER

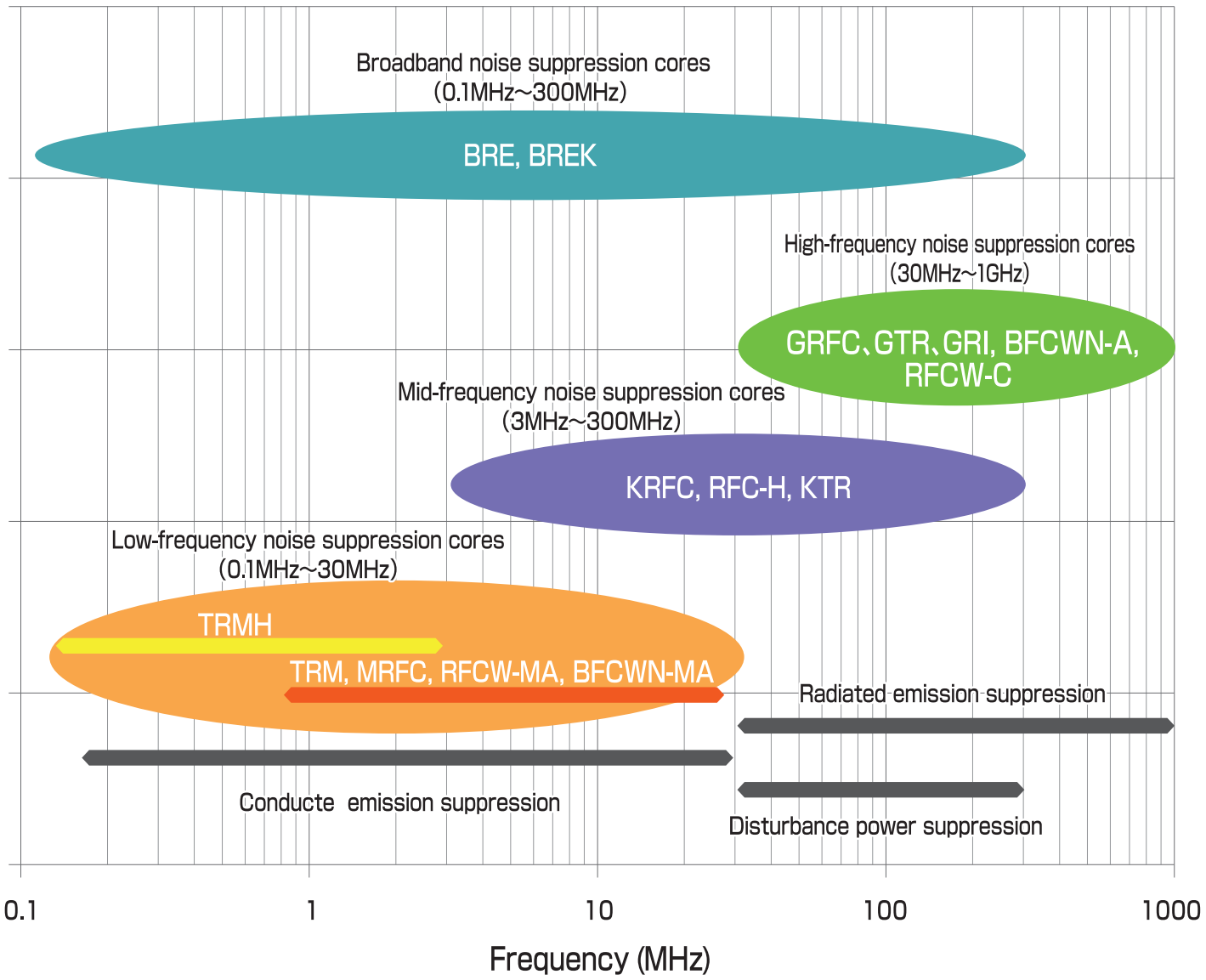
P69


CHIP BEADS FILTER

FERRITE CORE SELECTION CHART

Broadband noise suppression cores (0.1MHz~300MHz)	Non split type	With resin case	BROAD EFFECT CORE/BRE	p.34
			BREK	p.35
Low-frequency noise suppression cores (0.1MHz~30MHz)	Split ferrite clamp type	Flame retardant class, V0	LOW CUT FERRITE CLAMP/MRFC	p.36
		Heat resistance 125℃	LOW CUT FERRITE CLAMP/RFC-MA	p.38
			LOW CUT FERRITE CLAMP/RFCW-13MA-BK-1PC	p.39
		Large size	LOW CUT FERRITE CLAMP/MRFC-H40	p.37
		Automotive grade	LOW CUT FERRITE CLAMP/BFCWN-MA	p.40
	Non split type	With coating	LOW CUT CORE(High μ type)/TRMH	p.41
			LOW CUT CORE/TRM	p.42
		With resin case	TOROIDAL CORE/TRCB	p.37
Intermediate-frequency noise suppression cores (3MHz~300MHz)	Split ferrite clamp type	Flame retardant class, V0	High μ FERRITE CLAMP/KTFC	p.43
			/KRFC	p.44
			SLEEVE FERRITE CLAMP/ RFC-H13, RFC-20	p.47
		Heat resistance 125℃	SLEEVE FERRITE CLAMP/ RFC-H13-A, RFC-20-A	p.46
	Non split type	With coating	TOROIDAL CORE/KTR	p.45
High-frequency noise suppression cores (30MHz~1GHz)	Split ferrite clamp type	Flame retardant class, V0	SLEEVE FERRITE CLAMP/GRFC	p.47
			TOROIDAL FERRITE CLAMP/GTFCK	p.49
			GTFCR	p.49
			GTFC	p.48
		Heat resistance 125℃	SLEEVE FERRITE CLAMP/RFC-A	p.46
			SLEEVE FERRITE CLAMP/RFCW-C10-A-BK-1PC	p.39
		Automotive grade	BLOCK FERRITE CLAMP/BFCWN-A	p.40
	Split block type	With clamp	BLOCK CORE/BCN	p.50
	Split single type	Single type with no coating	FLAT CORE/GSSH	p.51
			SPLIT FPC CORE/GFPH	p.52
			OPEN CIRCUIT CORE/GFPO	p.52
	Non split type	Single type with no coating	TOROIDAL CORE/GTR	p.52
			GTRE	p.55
			SLEEVE CORE/GRI	p.56
			FPC CORE/GRIB	p.60
			FPC CORE/GFPC	p.58
			FLAT CORE/GSSC	p.57
		With resin case	TOROIDAL CORE/GTRCA	p.60
		Elastomer with bracket	GRIP CORE/GRIP	p.61
Thin flexible cores (100MHz~1GHz)	Split PET films	Tape fixing	SMARTPLY/FFPC	p.62
High performance core for saturation current (3MHz~300MHz)	Non split type	With coating	METAL CORE/MPTR	p.63
Common mode filter (30MHz~1GHz)	SMD type		SMD COMMON MODE FILTER/KWCM	p.65
			KWCM-HS	p.67
			KWCM-HDMI	p.68

APPLICABLE FREQUENCY CHART FOR NOISE SUPPRESSION



BROAD EFFECT CORE／BRE

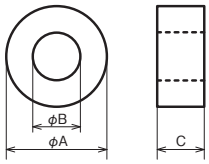
Highly effective measure for EMC noise suppression in broad frequency band

Feature

- Effective for suppression of conducted/radiated noise.
- High impedance characteristics decrease the number of cable turns.
- Since the variation in impedance characteristics against temperature is small, stable effect is ensured in wide temperature range.
- Plastic housing provides higher insulation properties.
- The material of the plastic housing is UL94V-0 certified.

Material

- Core: Nanocrystalline Alloys　Housing: PBT (Color:Black/Flammability:UL94V-0)

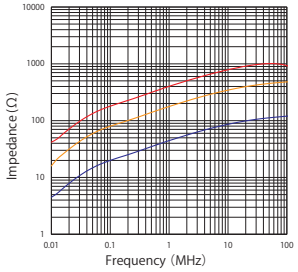


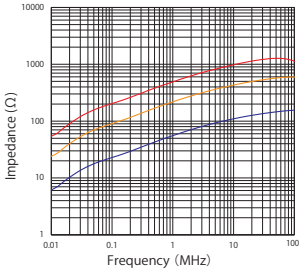
Unit/mm

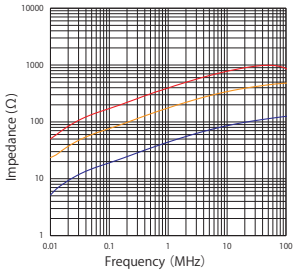
Part No.	A	B	C	Impedance* Ω/1MHz (1turn)
BRE-16-25-10	27.5	13.8	12.6	≧ 28
BRE-20-30-15	33.5	17.7	17.9	≧ 36
BRE-23-33-15	36.3	21.0	18.0	≧ 28
BRE-35-45-15	48.6	31.6	18.5	≧ 21
BRE-50-65-25	68.4	46.7	28.7	≧ 34
BRE-50-80-25	84.0	47.0	29.2	≧ 38

Impedance vs frequency

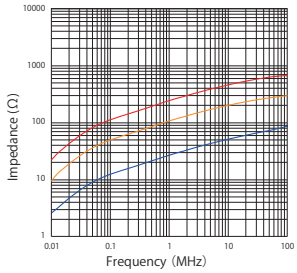
1Turn　2Turn　3Turn



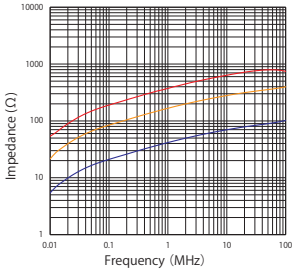




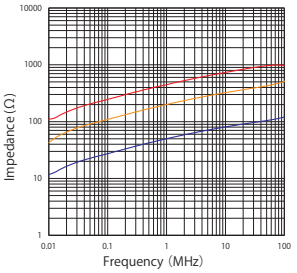
BRE-35-45-15



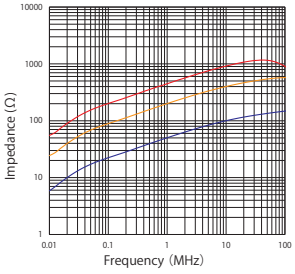
BRE-50-65-25



BRE-50-80-25



BRE-76-102-25

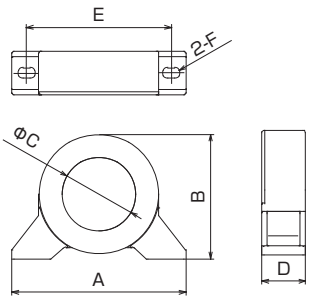


BROAD EFFECT CORE／BREK

High-performance noise suppression core with secure screw fixation

Feature

- The product can be securely fixed using screws.
- Effective for suppression of conducted/radiated noise.
- High impedance characteristics decrease the number of cable turns.
- Since the variation in impedance characterisctics against temperature is small, stable effect is ensured in wide temperature range.
- Plastic housing provides higher insulation properties.
- The material of the plastic housing is UL94V-0 certified.



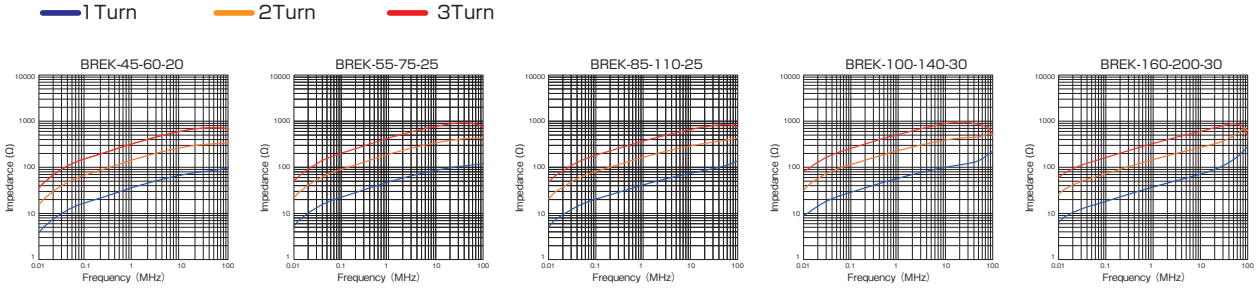
Material

- Core: Nanocrystalline Alloys Housing: PBT (Color:Black/Flammability:UL94V-0)

Unit：mm

Part No.	A	B	C	D	E	F (Applicable screw)	Impedance Ω/1MHz (1 turn)
BREK-45-60-20	94	67	40	25	80	M5	≧20
BREK-55-75-25	120	86	50.6	30	100	M6	≧27
BREK-85-110-25	180	133	76.8	30.5	150	M6	≧28
BREK-100-140-30	180	154	96.2	35	160	M6	≧40
BREK-160-200-30	241	211	155	36	220	M6	≧27

Impedance vs frequency



LOW CUT FERRITE CLAMP／MRFC

FERRITE CLAMP for low-frequency range with UL94V-0 housing.

※MRFCK2-20 is provided with mounting fixtures on both side.

Feature

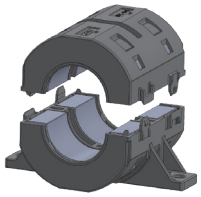
- Effective solutions for suppression of disturbance from switching power supply and motor.
- Due to conditioning the ferrite material, the product is suitable for suppressing low frequency noise from 150kHz to 30MHz.
- With optional mounting fixture, the product can be assembled on enclosure by M4 screw. (MRFC-13, MRFC-20)
- Fixing by M6 screw is available. (MRFC-H40)

Material

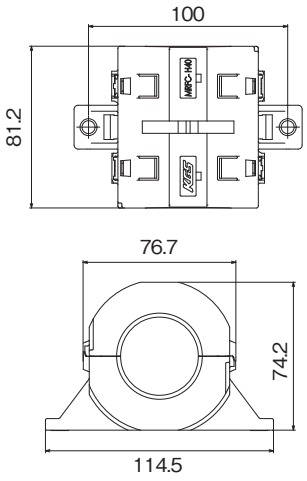
- Ferrite Core:Soft ferrite
- Housing:PA66 (Color:Light gray / Flammability:UL94V-0)
  ※MRFC-H40:PC/ABS (Color:Black / Flammability:UL94V-0)

MRFC-H40

Assembly with cable tie



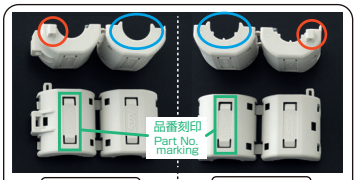
Split parts of top and bottom before assembly



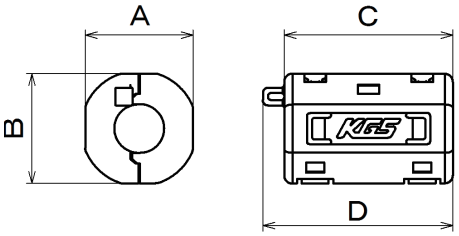
How to distinguish this product MRFC series (for low frequency) from GRFC series (for high frequency)

① Cable tie insertion position

② Cable clamp opening profile



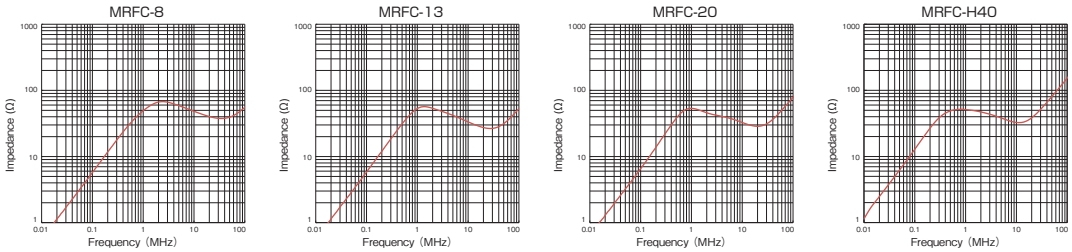
MRFC	GRFC
① Left side	① Right side
② No protrusion	② With protrusions



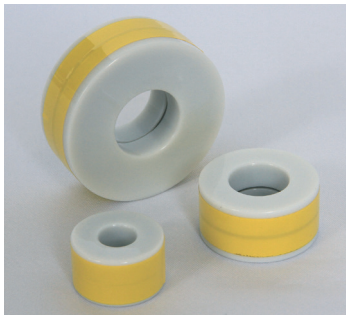
Unit：mm

Part No.	A	B	C	D	Applicable cable diameter	Impedance Ω/10MHz (1turn)
MRFC-8	20.1	20.4	31.5	35.5	Max.φ8.5	≧ 20
MRFC-13※1	29.1	33.05	32.3	37.1	Max.φ13.5	≧ 20
MRFC-20※1	40.3	40	47	53.5	Max.φ20.0	≧ 20
MRFC-H40	Shown in dimensional drawing ※2				Max.φ40.0	≧ 25(1MHz)

Impedance vs frequency



※The values are measured data for reference, not guaranteed.



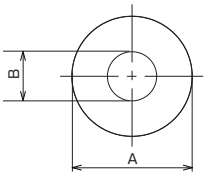
TOROIDAL CORE with housing which is suitable solution for suppressing noise in low-frequency range.

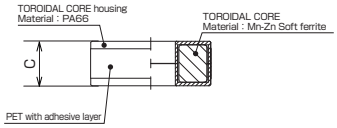
Feature

- With plastic housing preventing from cracking and chipping of the ferrite core.
- Effective noise filter for suppresing low-frequency noise in kHz to MHz range with the higher impedance characteristics.

Material

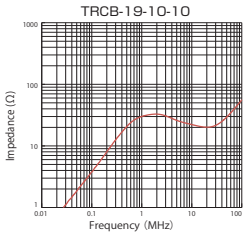
- Torodial Core: Mn-Zn Soft ferrite
- Housing:PA66(Color:Natural / Flammability:UL94V-0)
- PET with adhesive layer

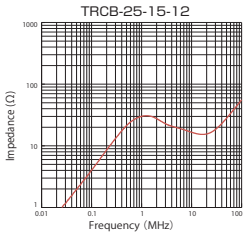


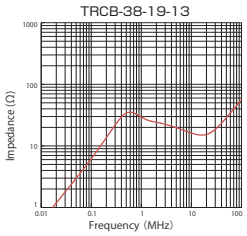


Unit：mm

Part No.	A	B	C	Impedance* Ω/10MHz (1 turn)
TRCB-19-10-10	20.0	8.1	(11.7)	≧ 11
TRCB-25-15-12	26.7	13.3	(13.5)	≧ 8
TRCB-38-19-13	40.5	16.6	(15.1)	≧ 7







※The values are measured data for reference, not guaranteed.

LOW CUT FERRITE CLAMP／RFC-**MA

Ferrite clamp with excellent heat resistance, effective for prevention of conducted/radiated noise in low-frequency range

Feature

- Operating temperature: -40°C to +125°C
- Suitable for suppression of low-frequency noise (150kHz to 30MHz) of power supply system.
- Split type Ferrite Clamp, making it easy to apply to assembled wires.
- Housing with anti-slip means for cable tie around its outer side. Highly reliable because of the lock of the housing as well as the fastening of the tie. *Excluding RFC-20MA
- The material of the plastic housing is UL94V-2 certified.

Material

- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：Natural／Flammability：UL94V-2)

Application

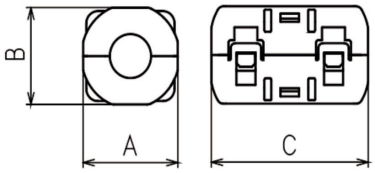
● Vehicle ECU, inverter, low-frequency noise prevention by motor drive

Specification

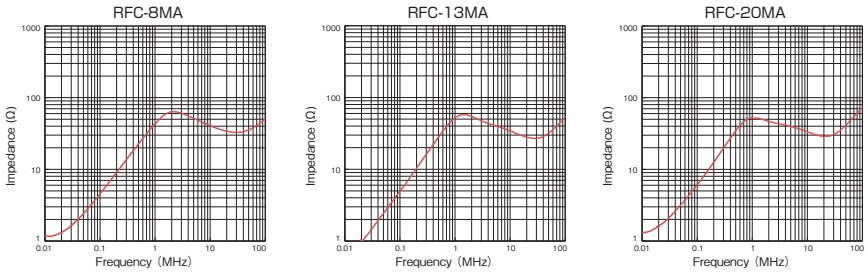
slip-proof for band

Unit：mm

Part No.	A	B	C	Applicable cable diameter	Impedance Ω/10MHz (1turn)
RFC-8MA	20.6	19.8	34.0	Max. φ8.5	≧ 20
RFC-13MA	29.6	28.4	34.0	φ12.5～ 13.5	≧ 20
RFC-20MA	40.0	40.0	47.0	Max. φ20	≧ 20



Impedance vs frequency



※The values are measured data for reference, not guaranteed.

Noise filter, usable in engine rooms

Feature

- Conducted noise suppression filter for applications up to 125℃ and 10G vibration.
- Applicable to vehicle vibrations requirements:
  ISO-16750-3-Ⅱ equivalent for passenger car transmission.
- High-frequency (RFCW-C10) and low-frequency (RFCW-13MA) noise versions.
- Tight fixing is available by its permanent lock structure.

Material

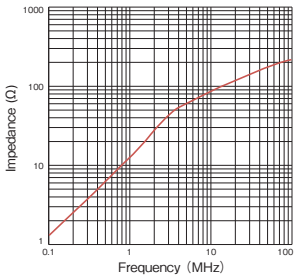
- Ferrite Core:Soft ferrite
- Housing:PA66(Color：Black/Flammability：UL94V-2)

Unit:mm

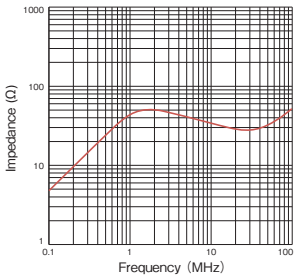
Part No.	A	B	C	D	Applicable cable diameter	Impedance* Ω/100MHz(1 turn)
RFCW-C10-A-BK-1PC	**34.6**	**36.8**	**35.0**	**58.7**	ϕ10 Corrugated tube	≧ 140
RFCW-13MA-BK-1PC	**31.4**	**33.6**	**34.8**	**58.3**	Max.ϕ13.5	≧ 20Ω(10MHz(1 turn)

Impedance vs frequency

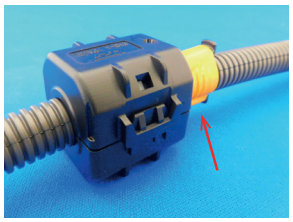
RFCW-C10-A-BK-1PC



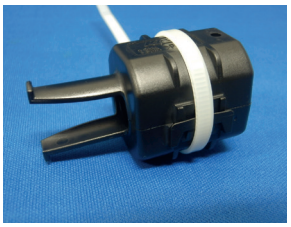
RFCW-13MA-BK-1PC



■ Fixing onto cable and chassis are available

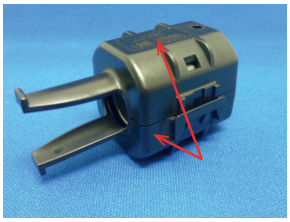


Its bracket fixture enables securing it with tape.



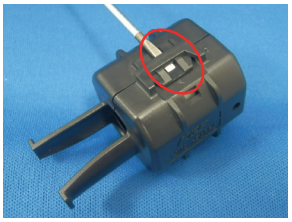
Housing with anti-slip means.

■ Metal springs used

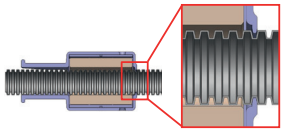


Heat-resistant and vibration-proof performance improves by embedded metal spring.

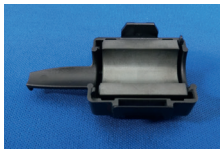
■ Easy to reopen



Removal with plug-in of flat-bladed screwdriver.



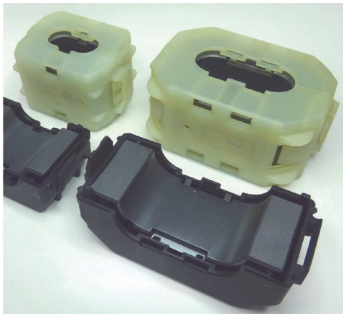
※RFCW-C10-A-BK-1PC
The bracket fixture allows temporary fixation on tube corrugations.



This product is in 1 set of configurations in two identical parts. (1pair=2pcs)

※The values are measured data for reference, not guaranteed.

LOW-CUT FERRITE CLAMP／BFCWN-MA
BLOCK FERRITE CLAMP／ BFCWN-A



Low height noise filter saves space

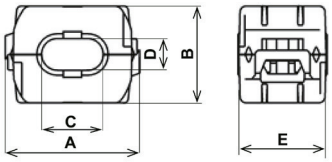
Feature

- Low profile provides 30% space saving compared with the conventional type.
- Housing with anti-slip means for cable tie around its outer side.
- Optimal for onboard charging cables and inverter powercables that have limited space for conducted noise suppression.

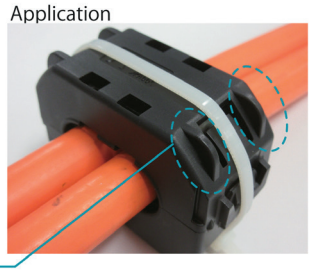
Material

- Ferrite core:Soft ferrite
  Housing: PA66 (High-frequency / Color:Black,Flammability:UL94V-2)
  (Low-frequency / Color:Natural,Flammability:UL94V-2)

Specification



Application

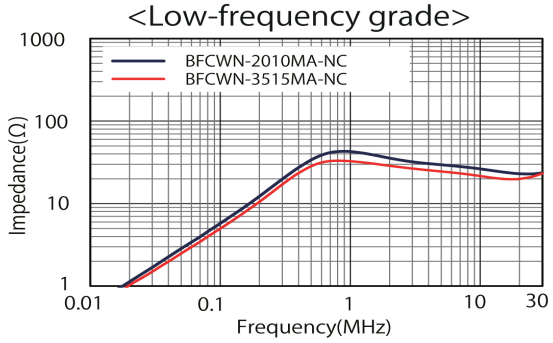


Unit：mm

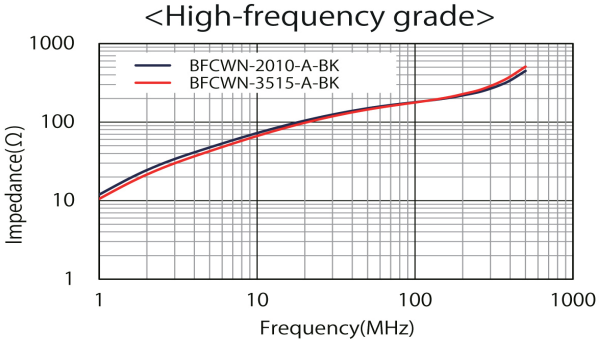
Part No.	Frequency	Color	A	B	C	D	E	Applicable cable diameter
BFCWN-2010-A-BK-1PC	High-frequency	Black	45	32	20	10	30	φ9 × two cables
BFCWN-2010-MA-NC-1PC	Low-frequency	Natural						
BFCWN-3515-A-BK-1PC	High-frequency	Black	67	44	35	15	31	φ14 × two cables
BFCWN-3515-MA-NC-1PC	Low-frequency	Natural						

● Impedance properties

<Low-frequency grade>



<High-frequency grade>



※The values are measured data for reference, not guaranteed.

LOW CUT CORE (High μ type)／TRMH

Most suitable ferrite core for suppressing conductive noise at 1 MHz or less

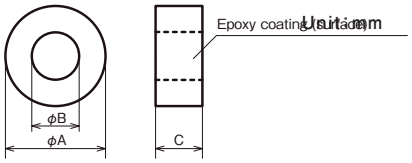
Feature

- Due to the higher impedance in the frequency range of 1 MHz or less, the product is effective for suppressing conductive noise around 150kHz.
- As the number of turns increases, the impedance improves and a better effectiveness of noise suppression can be obtained.
- Resin coated core prevents from cables getting damaged by the edge of the core.
- The wide variation of size is available. (φ7.2~φ87.9)

Material

- Mn-Zn soft ferrite (epoxy coating)

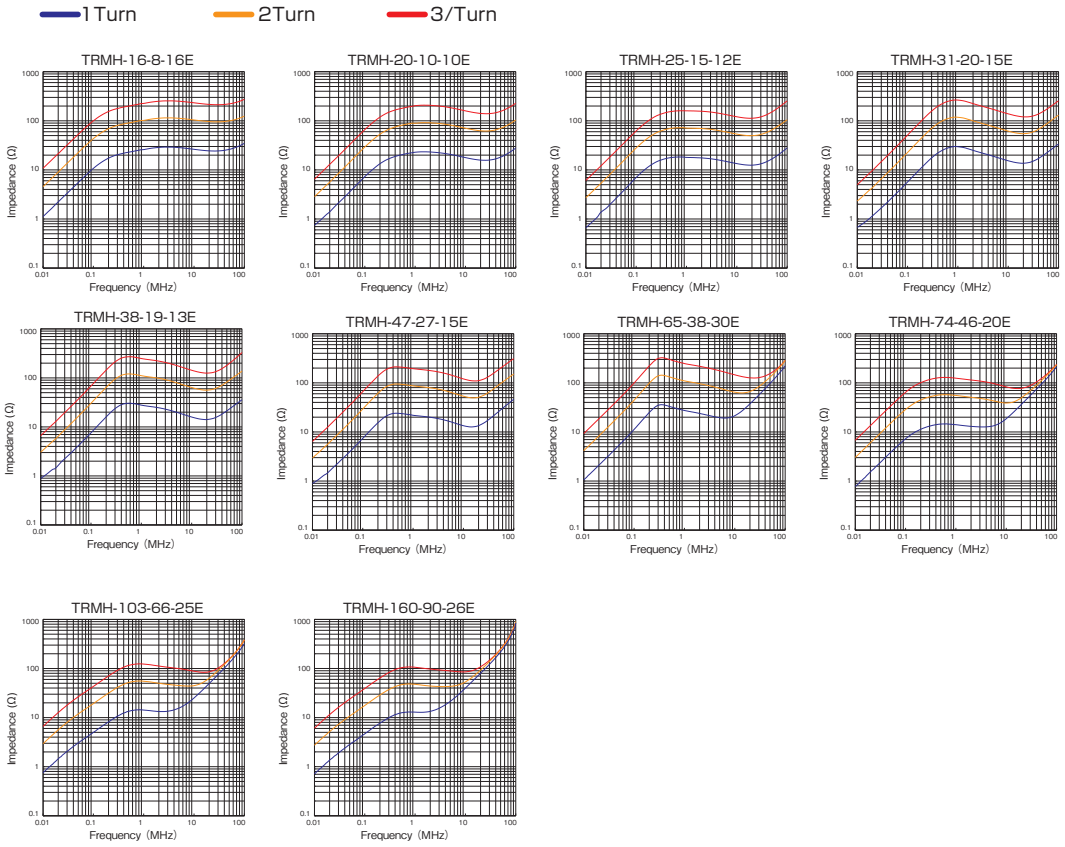
Specification



Unit：mm

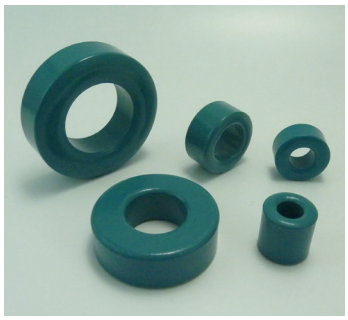
Part No.	A	B	C	Impedance Ω/1MHz (1turn)
TRMH-16-8-16E	16.9	7.2	16.8	≧ 18
TRMH-20-10-10E	21.0	9.2	10.9	≧ 11
TRMH-25-15-12E	25.9	14.1	12.8	≧ 9
TRMH-31-20-15E	32.1	19.0	15.9	≧ 9
TRMH-38-19-13E	39.1	18.0	13.9	≧ 11
TRMH-47-27-15E	48.3	26.0	15.9	≧ 10
TRMH-65-38-30E	67.3	36.6	31.1	≧ 12
TRMH-74-46-20E	75.76	44.22	21.0	≧ 6
TRMH-103-66-25E	105.6	63.1	26.9	≧ 6
TRMH-160-90-26E	165.1	87.9	28.1	≧ 6

Impedance vs frequency



※The values are measured data for reference, not guaranteed.

LOW CUT CORE／TRM



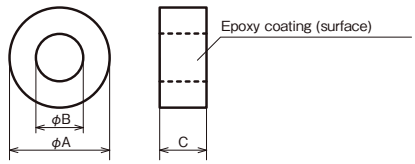
"Mn" ferrite cores, suitable solutions for conductive and radiation noise in low frequency range

Feature

- High impedance noise filter in low frequency (kHz to MHz) range.
- Epoxy coated ferrite core has rounded corners to reduce load on cable.

Material

- Mn-Zn soft ferrite (epoxy coating)



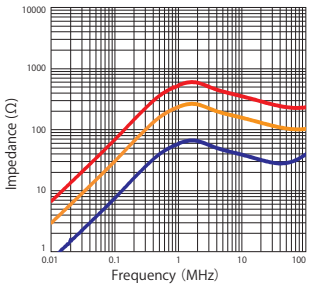
Unit：mm

Part No.	A	B	C	Impedance* Ω/10MHz (2turn)
TRM-16-8-16E-WE	17.0	7.1	16.9	≧ 70
TRM-20-10-10E-WE	21.0	9.1	10.9	≧ 35
TRM-25-15-12E-WE	26.0	14.1	12.9	≧ 35
TRM-31-20-15E-WE	32.1	19.0	15.9	≧ 30
TRM-38-19-13E-WE	39.2	17.9	14.0	≧ 35
TRM-47-27-15E-WE	48.5	25.7	16.3	≧ 25

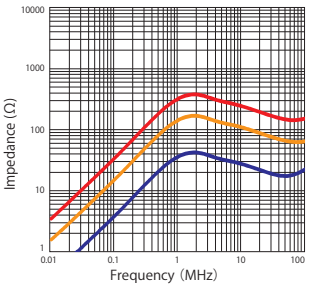
Impedance vs frequency

1 Turn　2 Turn　3 Turn

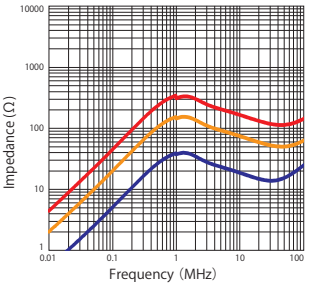
TRM-16-8-16E-WE



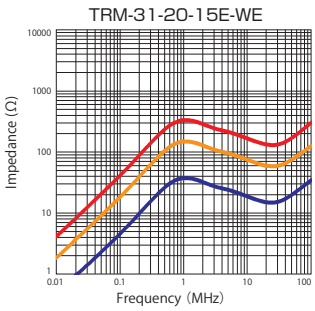
TRM-20-10-10E-WE



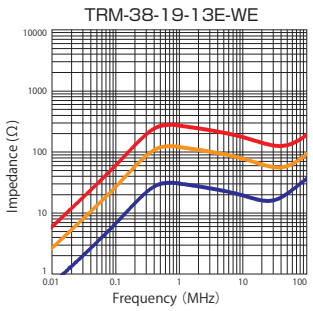
TRM-25-15-12E-WE



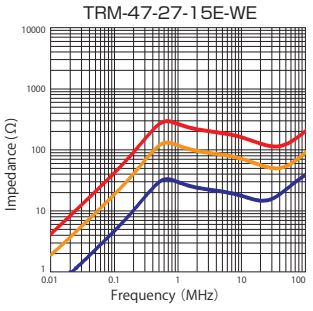
TRM-31-20-15E-WE



TRM-38-19-13E-WE



TRM-47-27-15E-WE

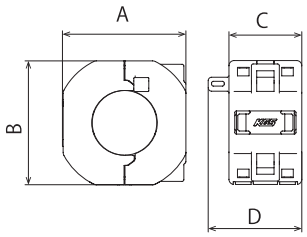


※The values are measured data for reference, not guaranteed.

Split ferrite clamp for intermediate frequency range from 3 to 50MHz.

Feature

- Effective for suppression both of conducted noise up to 30MHz and radiated noise over 30MHz.
- Split ferrite clamp with plastic housing enables to attach assembled cable and cables with connector.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness.
- Wire guiding system prevent wires from being pinched when winding assembly.
- With optional mounting fixture, the product can be assembled on enclosure by M4 screw.



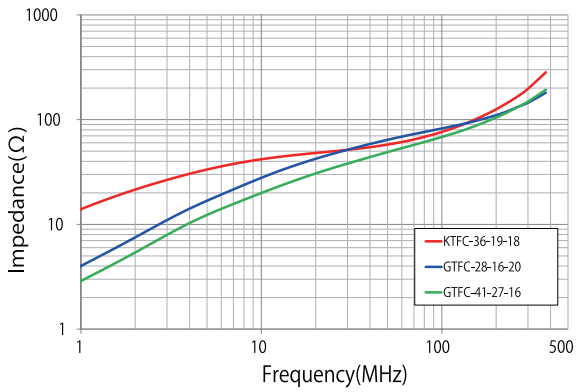
※1)P/N for the product with fixture:
KTFCK2-36-19-18

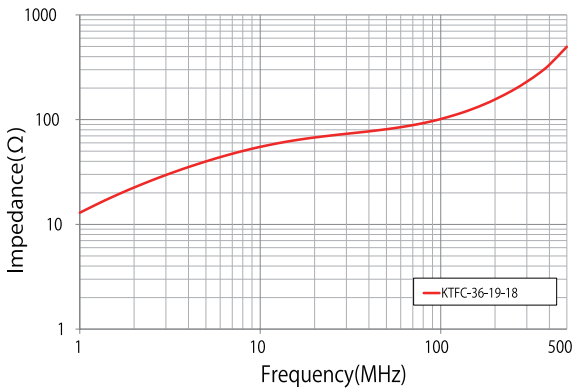
Material

- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：natural／Flammability：UL94V-0)

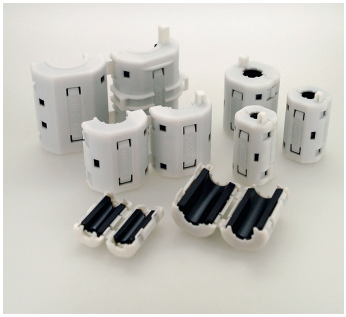
Part No.	A	B	C	D	Applicable cable diameter	Impedance Ω/100MHz (1turn)
KTFC-36-19-18※1	36.3	36.4	21.4	27.5	MAXφ18.5	≧ 66

Impedance vs Frequency characteristic (Number of turns in the wire：1turn)





HIGH μ FERRITE CLAMP／KRFC



Split ferrite clamp for intermediate frequency range from 3 to 50MHz.

Feature

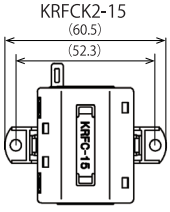
- Suitable for suppressing emitted noise caused by pulse waveforms of power devices etc. (inverters, servo amplifiers, switched-mode power supplies etc.)
- Split FERRITE CLAMP with plastic housing enables to attach assembled cable and cables with connecter.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness. (Excluding KRFC-4)
- Wire guiding system prevent wires from being pinchedwhen winding assembly.(Photo A)
- With optional mounting fixture, the product can be assembled on enclosure by M4 screw. (KRFCK2-15、KRFCK2-26)
- Operating temperature range is −40℃ ～ +85℃.

Material

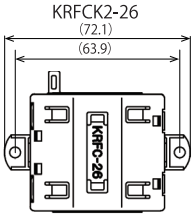
- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：natural／Flammability：UL94V-0)

There are Part Nos. with optional parts

KRFCK2-15



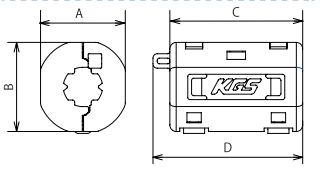
KRFCK2-26



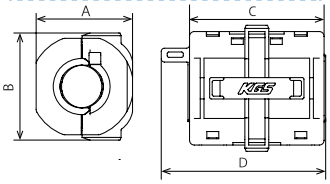
Part No.		A	B	C	D	Applicable cable diameter	Impedance(Ω) 100MHz (1 Turn)
KRFC-4	①	13.7	13.5	27.5	–	φ3.5～4.5	≧ 70
KRFC-6	①	18.1	18.4	31.5	35.5	φ5.5～6.5	≧ 110
KRFC-8	①	20.1	20.4	31.5	35.5	φ7.5～8.5	≧ 80
KRFC-9	①	20.1	20.4	31.5	35.5	φ8.5～9.5	≧ 80
KRFC-10	①	26.3	26.4	32.4	37.2	φ9.5～10.5	≧ 120
KRFC-13	①	29.1	29.4	31.5	36.3	φ12.5～13.5	≧ 105
KRFC-15※1	②	36.1	40.1	42.8	52.3	Max φ15.5	≧ 221
KRFC-26※1	②	52.8	52.1	44.8	54.3	Max φ 26.0	≧ 196

Dimensions

Profile：①　Cable slippage protection　Wire guide



Profile：②　Wire guide　There are Part Nos. with optional parts



Wire guide

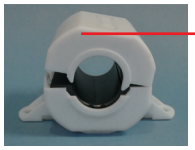


Photo A: KRFCK2-15

Wire-guiding System

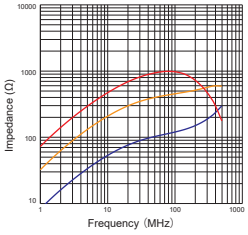
prevents wires/cables from being pinched when winding assembly

Cable slippage protection

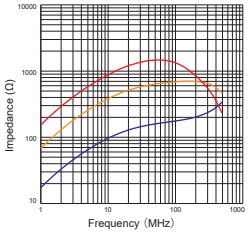
Cable Anti-slippage System

Opening has protrusions to firmly hold cables.
Easy to use on the exterior of machines since no additional tools are required and it reduces clutter.

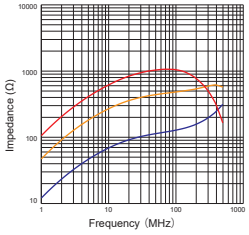
KRFC-4



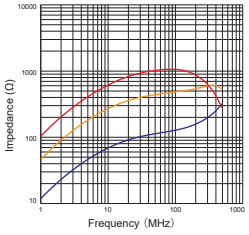
KRFC-6



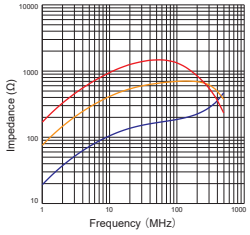
KRFC-8



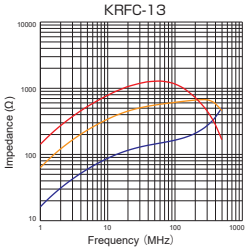
KRFC-9



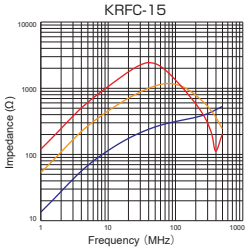
KRFC-10



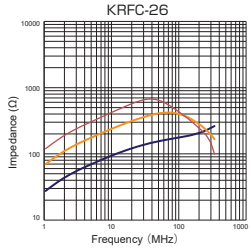
KRFC-13



KRFC-15



KRFC-26



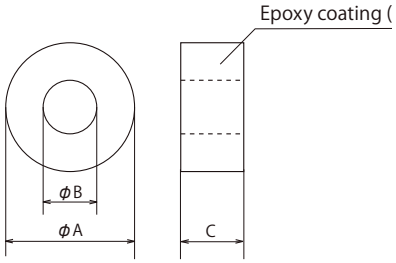
Non-split toroidal core for intermediate frequency range from 3 to 50MHz.

Feature

- Effective for suppression both of conducted noise upto 30MHz and radiated noise over 30MHz.
- With regard to variation of size, please contact our sales department.

Material

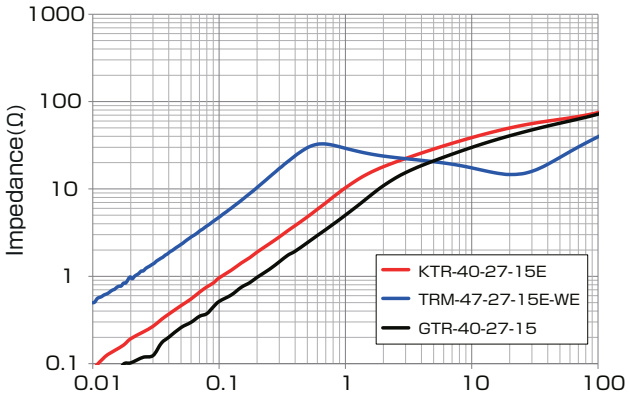
- Soft ferrite (Epoxy coating)

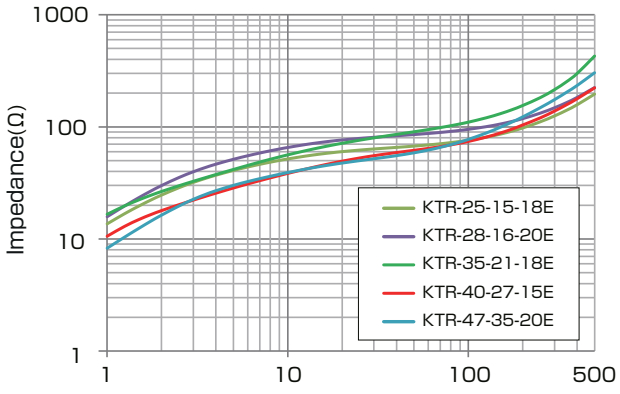


Unit:mm

Part No.	A	B	C	Impedance(Ω) 100MHz (1 Turn)
KTR-25-15-18E	26.7	13.4	19.5	≧ 54
KTR-28-16-20E	29.7	14.4	21.6	≧ 65
KTR-35-21-18E	35.6	20.0	18.8	≧ 80
KTR-40-27-15E	41.4	26.7	15.7	≧ 50
KTR-47-35-20E	49.1	33.1	21.6	≧ 54

● Impedance vs Frequency characteristic (Number of turns in the wire : 1turn)





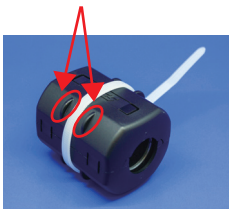
SLEEVE FERRITE CLAMP／RFC-A

FERRITE CLAMP with excellent heat resistance

Feature

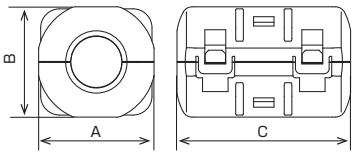
- Split type Ferrite Clamp, making it easy to apply to assembled wires.
- Housing structure with anti-slip means for cable tie.
  Highly reliable because of the lock of the housing as well as the fastening of the tie.
  (※Excluding RFC-20-A)
- Operating temperature range: -40°C to +125°C.

Housing with anti-slip-means



Material

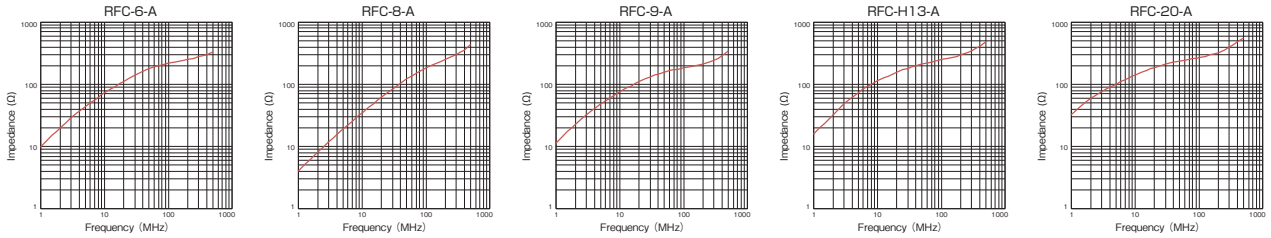
- Ferrite Core:Soft ferrite
- Housing:PA66 (Color:Black / Flammability:UL94V-2)



Unit：mm

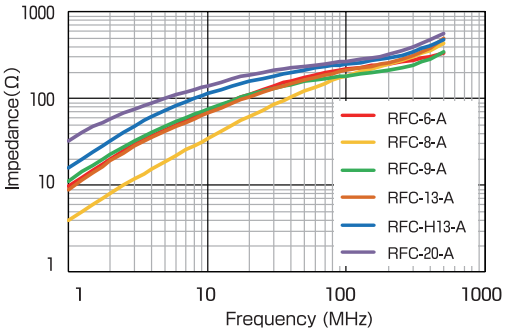
Part number	A	B	C	Applicable cable diameter
RFC-6-A	18.5	18.1	34.0	φ6.0
RFC-8-A	20.6	20.1	34.0	φ8.5
RFC-9-A	22.6	21.7	34.0	φ9.5
RFC-13-A	29.6	28.4	34.0	φ13.5
RFC-H13-A	31.7	29.4	41.0	φ13.5
RFC-20-A	40.0	40.0	47.0	φ20

Impedance vs frequency

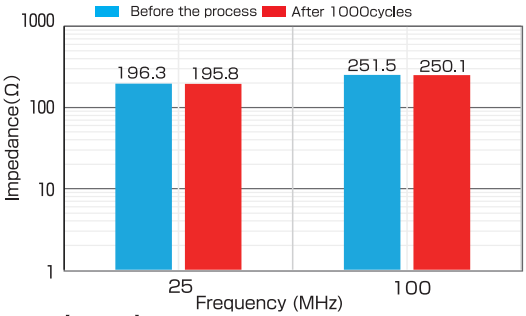


Properties

Impedance vs frequency



Impedance values (Heat shock test)



【Part No.】RFC-20-A
【Test conditions】-40℃(0. 5hour)⇔125℃(0. 5hour)
1000cycles
【Number of samples】n=5(AVE.)
【Method】 (1)Electric wire is inserted through the part, and the impedance of both ends of the wire is measured.
(2)The impedance of the processed part is measured after leaving it at room temperature and humidity more than 2 hours.

RFCK2-20 (RFC-20 with mounting fixture is available. Contact us for the details.)

Fair-Surface type with no protrusion of snap or hinge parts

Feature

- Split ferrite cores with plastic housing for easy fixing on assembled cables or cables with connectors.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness. (Excluding GRFC-3/4,RFC-H13,RFC-20)
- Wire guiding system prevents wires from being pinched when winding assembly.
- Light gray or black plastic case color available (except RFC-20), based on the color of your cable.

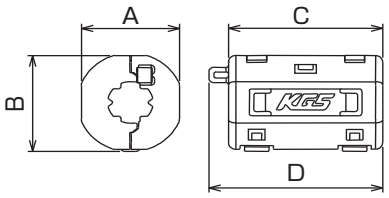
Material

- Ferrite Core：Soft ferrite
  Housing：PA66　(Color：Light gray／Flammability：UL94V-0)
  (Color：Black／Flammability：UL94V-2)

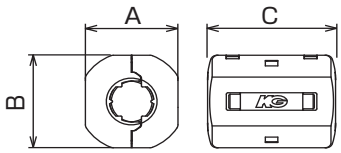
※ Black type has "BK" at the end of the part number.

※RFC-H13, RFC-20 have different configurations. Contact us for the details.

Profile ①



Profile ②



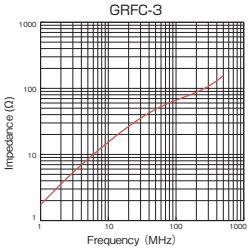
Unit：mm

Part No.	Profile	A	B	C	D	Applicable cable diameter	Impedance* Ω/100MHz (1 turn)
GRFC-3	※	13.7	13.5	18.0	—	φ3.0~4.0	≧ 35
GRFC-4	※	13.7	13.5	27.5	—	φ3.5~4.5	≧ 75
GRFC-5	①	18.1	18.4	31.5	35.5	φ4.5~5.5	≧100
GRFC-6	①	18.1	18.4	31.5	35.5	φ5.5~6.5	≧100
GRFC-7	※	14.25	15.8	20.0	24.0	Max.φ7	≧ 45
GRFC-8	①	20.1	20.4	31.5	35.5	φ7.5~8.5	≧ 75
GRFC-9	①	20.1	20.4	31.5	35.5	φ8.5~9.5	≧ 75
GRFC-10	①	26.3	26.4	32.4	37.2	φ9.5~10.5	≧105
GRFC-13	①	29.1	29.4	31.5	36.3	φ12.5~13.5	≧ 95
RFC-H13	②	29.4	31.7	41.0	—	φ12.5~13.5	≧170
RFC-20	※	40.0	40.0	47.0	—	Max.φ20	≧180

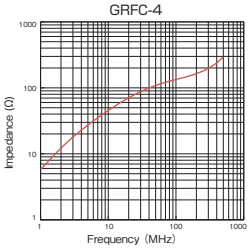
※GRFC-3, GRFC-4, GRFC-7 and RFC-20 have a slightly different configurations. Contact our sales department for details.

Impedance vs frequency

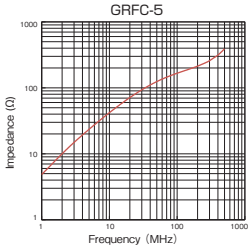
GRFC-3



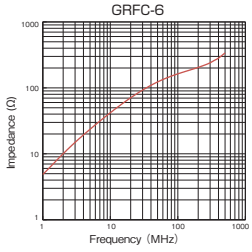
GRFC-4



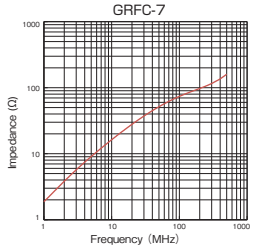
GRFC-5



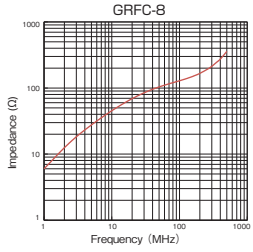
GRFC-6



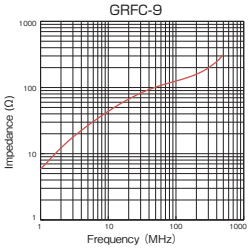
GRFC-7



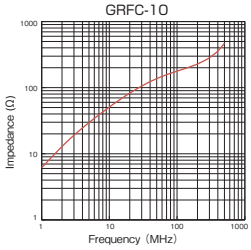
GRFC-8



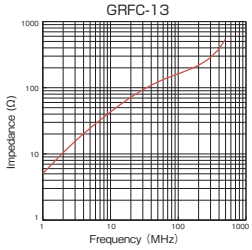
GRFC-9



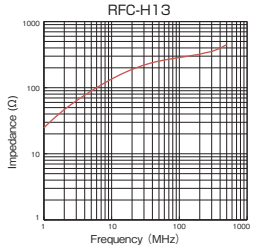
GRFC-10



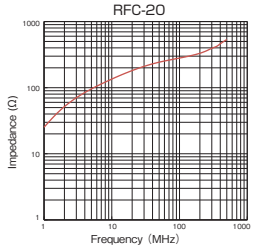
GRFC-13



RFC-H13

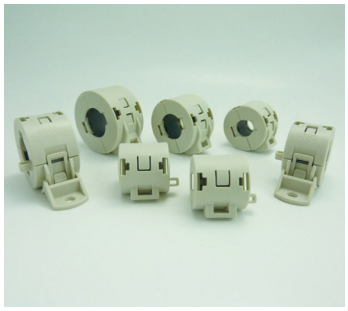


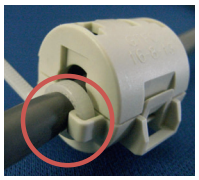
RFC-20



※The values are measured data for reference, not guaranteed.

TOROIDAL FERRITE CLAMP／GTFC





Toroidal design that makes cable easy to turn around it

Feature

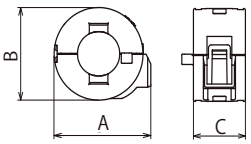
- Split ferrite cores with plastic housing for easy fixing on assembled cables or cables with connectors.
- Cable tie can assist to hold electric wires and enables the product to be fixed to wire harness. (Excluding GTFC-41-27-16)
- Wire guiding system prevents wires from being pinched when winding assembly.

Material

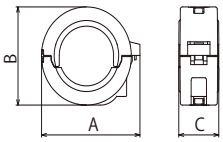
- Ferrite Core：Soft ferrite
- Housing：PA66　(Color：Light gray／Flammability：UL94V-0)

GTFC-**-**-**

Profile ①



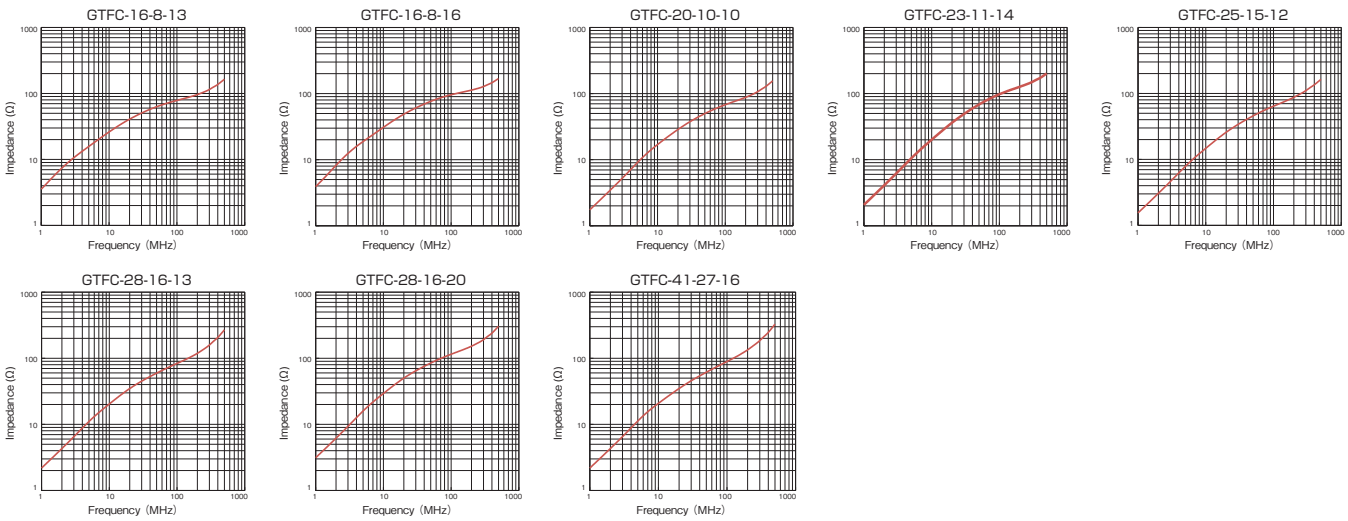
Profile ②(GTFC-41-27-16)



Unit：mm

Part No.	Profile	Applicable cable diameter	A	B	C	Impedance Ω/100MHz (1turn)
GTFC-16-8-13	①	Max.φ7.2	22.3	20.1	18.9	≧ 45
GTFC-16-8-16	①	Max.φ7.2	22.3	20.1	21.9	≧ 55
GTFC-20-10-10	①	Max.φ8.5	27.1	24.9	16	≧ 40
GTFC-23-11-14	①	Max.φ10.5	30.5	28.3	20.2	≧ 55
GTFC-25-15-12	①	Max.φ13	31.1	28.9	17.8	≧ 40
GTFC-28-16-13	①	Max.φ14.7	35.1	32.9	18.8	≧ 50
GTFC-28-16-20	①	Max.φ14.7	35.1	32.9	25.8	≧ 70
GTFC-41-27-16	②	Max.φ26	48.2	44.5	19.6	≧ 50

Impedance vs frequency



*The values are measured data for reference, not guaranteed.

※Contact us for the measurement conditions.

TOROIDAL FERRITE CLAMP／GTFCK

Toroidal cores with easily mounting fixture on chassis

Feature

- GTFCK series, which are provided with mounting fixtures, can be assembled on chassis by using a screw.

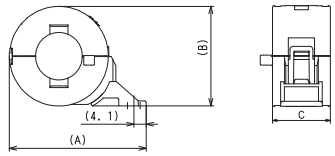
Material

- Ferrite Core：Soft ferrite
- Housing：PA66　(Color：Light gray／Flammability：UL94V-0)

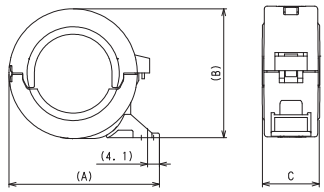
Unit：mm

Part No.	Profile	Applicable cable diameter	A	B	C	Impedance Ω/100MHz (1turn)
GTFCK-16-8-13	①	Max.φ7.2	32.5	20.4	18.9	≧ 45
GTFCK-16-8-16	①	Max.φ7.2	32.5	20.4	21.9	≧ 55
GTFCK-20-10-10	①	Max.φ8.5	37.1	24.9	16	≧ 40
GTFCK-23-11-14	①	Max.φ10.5	40.5	28.3	20.2	≧ 55
GTFCK-25-15-12	①	Max.φ13	41.2	28.9	17.8	≧ 40
GTFCK-28-16-13	①	Max.φ14.7	45.3	32.9	18.8	≧ 50
GTFCK-28-16-20	①	Max.φ14.7	45.3	32.9	25.8	≧ 70
GTFCK-41-27-16	②	Max.φ26	51.8	44.5	19.6	≧ 50

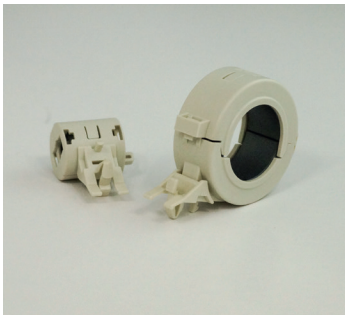
Profile ①



Profile ②



TOROIDAL FERRITE CLAMP／GTFCR



Toroidal cores with removable fixture

Feature

- Snap fastener for re-use is available for the product with fixture "GTFCR".

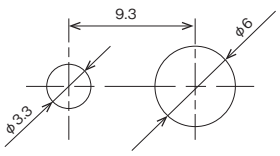
Material

- Ferrite Core：Soft ferrite
- Housing：PA66　(Color：Light gray／Flammability：UL94V-0)

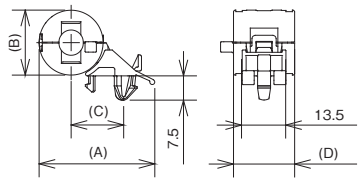
Unit：mm

Part No.	Profile	Applicable cable diameter	A	B	C	D	Impedance Ω/100MHz (1turn)
GTFCR-16-8-16	①	Max.φ7.2	35.8	20.1	16.3	21.9	≧ 55
GTFCR-41-27-16	②	Max.φ26	55.2	44.5	23.6	19.6	≧ 50

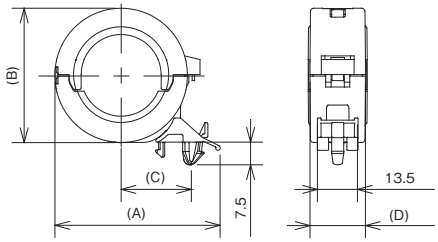
Mount hole



Profile①

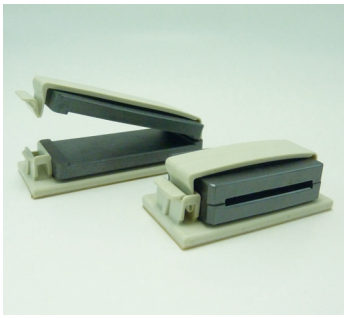


Profile②



※The values are measured data for reference, not guaranteed.

BLOCK CORE／BCN



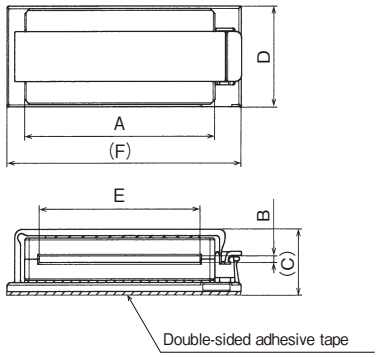
Labor-saving assembly and fixing by combination with plastic clamp

Feature

- Split core type, easy assembly on wired or connected ribbon cables.
- Plastic clamp integrated type allows easy assembly.

Material

- Core / Soft ferrite
- Clamp / Nylon 66 (Light gray / UL94V-0)

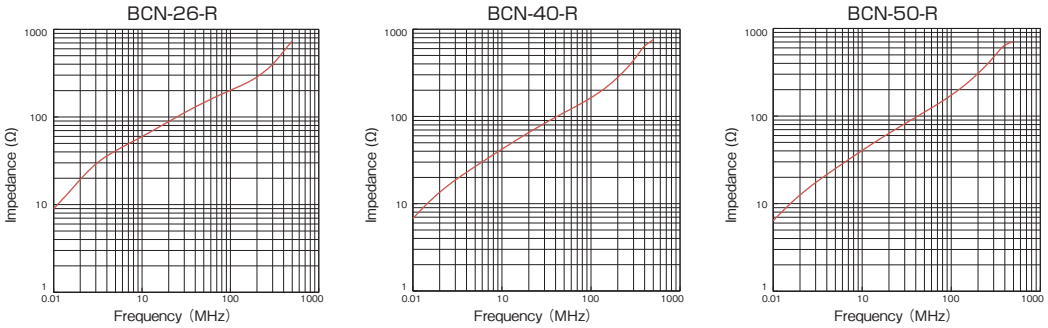


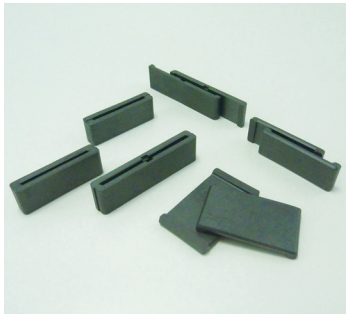
Unit：mm

Part No.	A	B	(C)	D	E	(F)	Impedance* Ω/100MHz (1 turn)
BCN-26-R	45.0	2.0	19.6	30.0	34.0	59.5	≧125
BCN-40-R	63.0		19.5		52.0	76.5	≧137
BCN-50-R	76.5				64.5	90.7	≧142

※Contact us for the measurement conditions.

Impedance vs frequency





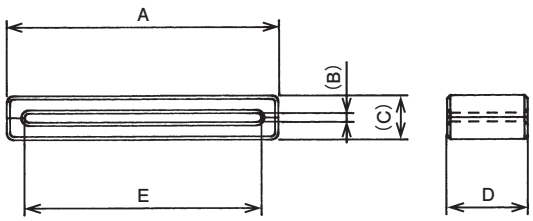
Split core type for easy assembly on wired or connected cables

Feature

- For filtering noise emission from ribbon cables, FPC etc..

Material

- Soft ferrite

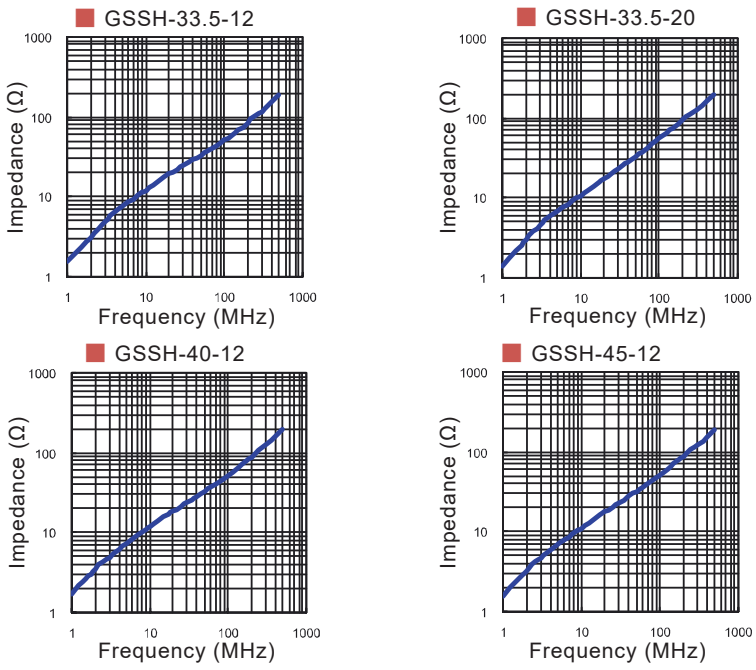


Unit：mm

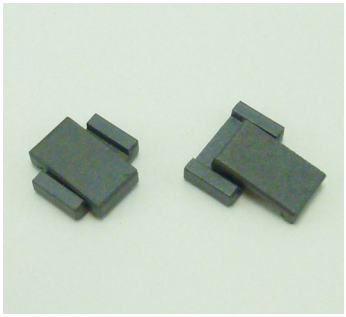
Part No.	A	(B)	(C)	D	E	Impedance* Ω/100MHz (1 turn)
GSSH-33.5-12	33.5	1.2	6.6	12.0	27.0	≧ 35
GSSH-33.5-20	33.5			20.0	27.0	≧ 50
GSSH-40-12	40.0			12.0	34.8	≧ 35
GSSH-45-12	45.2			12.0	40.0	≧ 35

※Contact us for the measurement conditions.

Impedance vs frequency



GFPH CORE／GFPH



Split core for convenient fitting on pre-wired cables

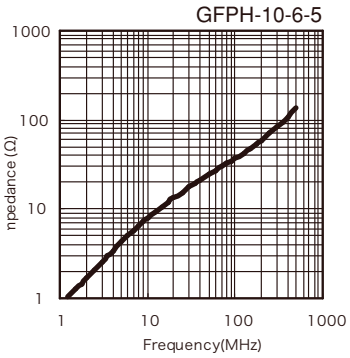
Feature

- GFPH ferrite core for effective filtering emission noise from FPC.

Material

- Soft ferrite

Impedance vs frequency



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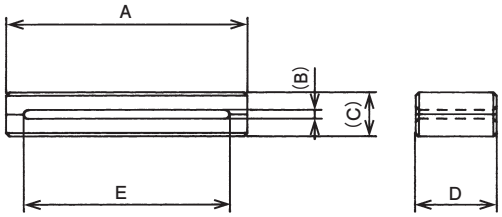
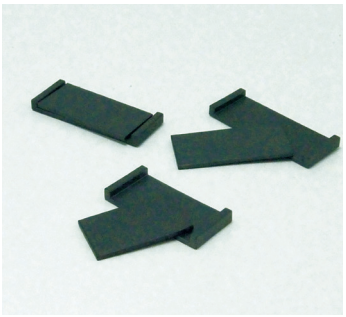


Unit：mm

Part No.	A	(B)	(C)	D	E	Impedance* Ω/100MHz (1 turn)
GFPH-10-6-5	10.0	1.8	5.0	6.0	6.8	≧25

※Contact us for the measurement conditions.

OPEN CIRCUIT CORE／GFPO



Open magnetic circuit structure provides high impedance with close contact on FPC

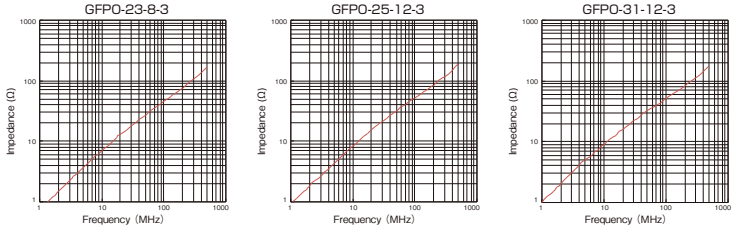
Feature

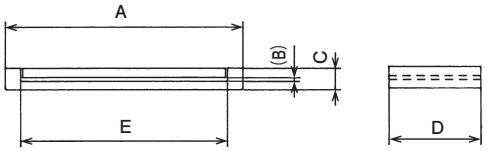
- Effective for noise attenuation over a broad frequency range, because the structure leads to a small impedance difference between individual cables of the FPC.

Material

- Soft ferrite

Impedance vs frequency





*The values are measured data for reference, not guaranteed.

Unit：mm

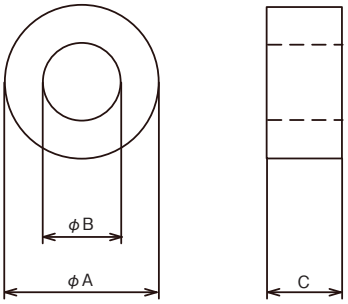
Part No.	A	B	C	D	E	Impedance＊Ω/100MHz(1turn)
GFPO-23-8-3	23.0	0.5	2.8	8.0	19.0	≧ 30
GFPO-25-12-3	25.0			12.0	21.0	≧ 35
GFPO-31-12-3	31.0			12.0	27.0	≧ 35

*Contact us for the measurement conditions.

Non-split toroidal cores

Material

- Soft ferrite



Unit：mm

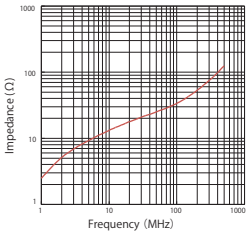
Part No.	ϕA	ϕB	C	Impedance* Ω/100MHz (1 turn)
GTR-7-3-4	7	3.5	4	≧20
GTR-9-5-8	9	5	8	≧30
GTR-10-5-5	10	5	5	≧25
GTR-11-5-9	11	5	9	≧45
GTR-12.5-8-12	12.6	8.1	12	≧35
GTR-13-7-6	13	7	6	≧25
GTR-13-7-12.7	13	7.1	12.7	≧45
GTR-14.5-10-8	14.5	10.2	8	≧20
GTR-16-8-13	16.5	8.2	13	≧55
GTR-16-8-16	16.5	8.2	16	≧65
GTR-16-10-7	16	10	7	≧25
GTR-16-10-10	16	10	10	≧30
GTR-18-10-6	18	10	6	≧25
GTR-20-10-5	20.5	10.2	5	≧25
GTR-20-10-10	20.5	10.2	10	≧45
GTR-21-13-6	21.2	12.7	6	≧25
GTR-22-14-10	22	14	10	≧30
GTR-23-11-14	23.6	11.4	14	≧60
GTR-25-15-8	25	15	8	≧30
GTR-25-15-12	25	15	12	≧40
GTR-28-16-13	28	16	13	≧45
GTR-28-16-20	28	16	20	≧70
GTR-31-19-8	31	19	8	≧30
GTR-31-19-16	31	19	16	≧60
GTR-40-27-15	40.6	27.4	15	≧45

*Contact us for the measurement conditions.

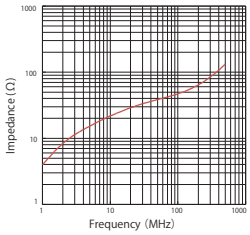
TOROIDAL CORE／GTR

Impedance vs frequency

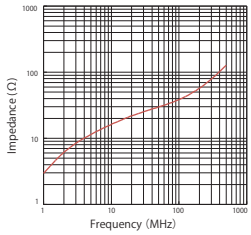
GTR-7-3-4



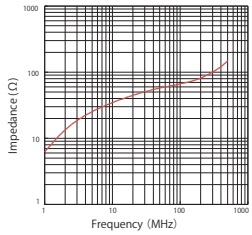
GTR-9-5-8



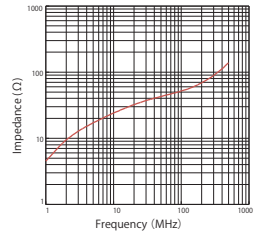
GTR-10-5-5



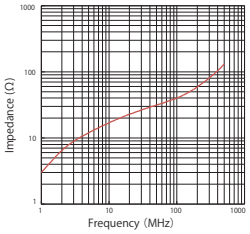
GTR-11-5-9



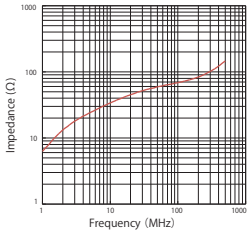
GTR-12.5-8-12



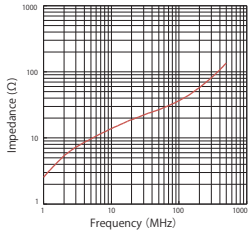
GTR-13-7-6



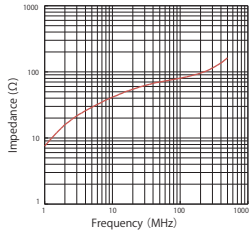
GTR-13-7-12.7



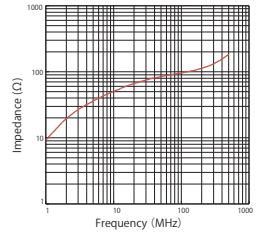
GTR-14.5-10-8



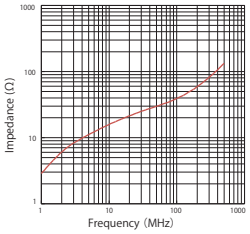
GTR-16-8-13



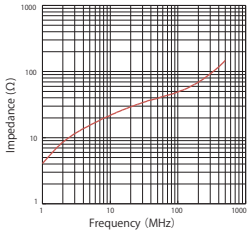
GTR-16-8-16



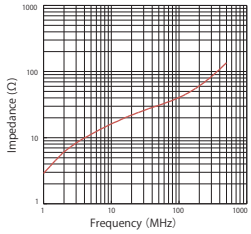
GTR-16-10-7



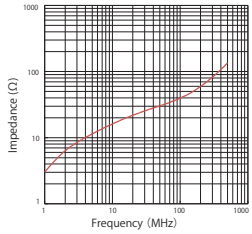
GTR-16-10-10



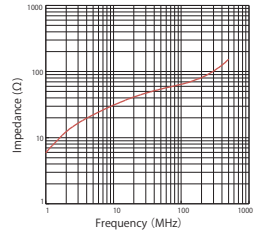
GTR-18-10-6



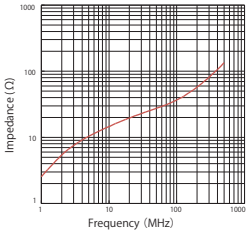
GTR-20-10-5



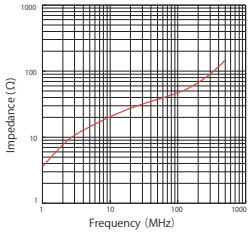
GTR-20-10-10



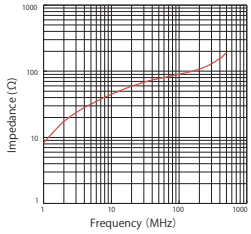
GTR-21-13-6



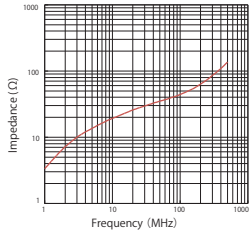
GTR-22-14-10



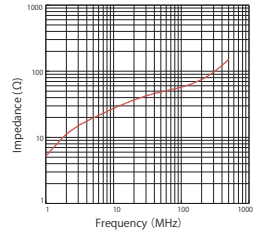
GTR-23-11-14



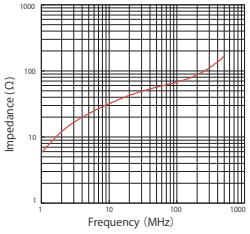
GTR-25-15-8



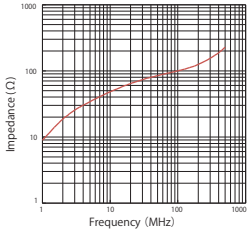
GTR-25-15-12



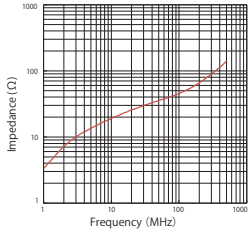
GTR-28-16-13



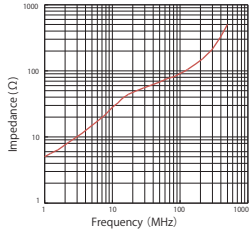
GTR-28-16-20



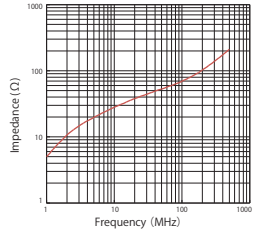
GTR-31-19-8



GTR-31-9-16



GTR-40-27-15



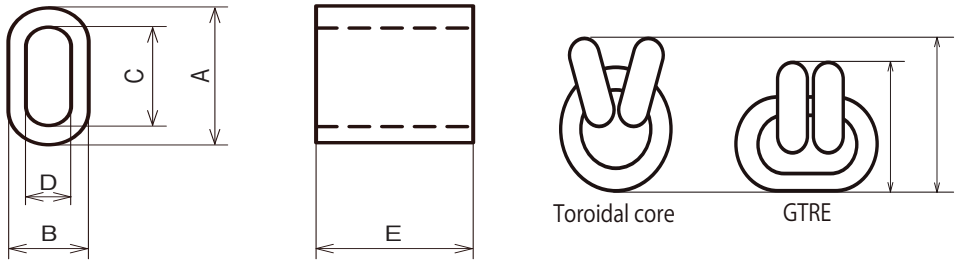
Oval style enables space-saving compared with toroidal type

Feature

- With cable either single or multiple turns, the over-all profile is lower than toroidal cores (refer to Fig. below).
- Oval shape allows assembly on connected cables with rectangular connectors, etc.

Material

- Soft ferrite

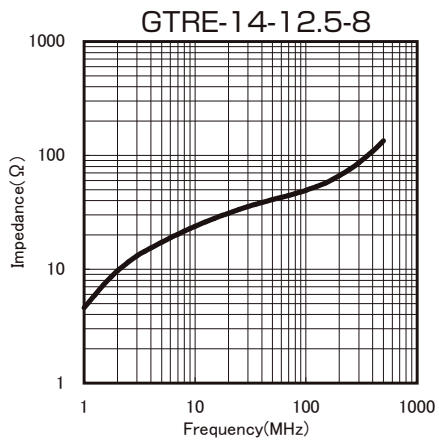


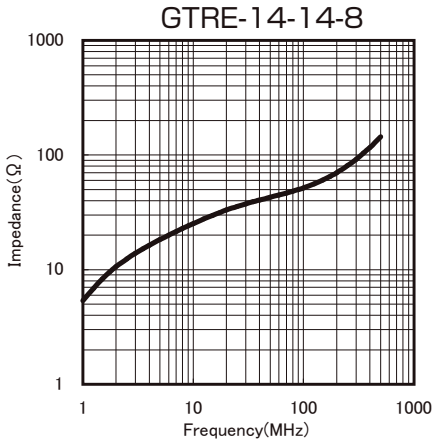
Unit：mm

Part No.	A	B	C	D	E	Impedance* Ω/100MHz (1 turn)
GTRE-14-12.5-8	14.0	8.0	10.0	4.0	12.5	≧ 30
GTRE-14-14-8					14.0	≧ 35

※Contact us for the measurement conditions.

Impedance vs frequency





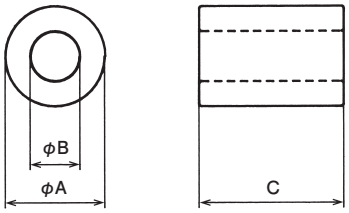
※The values are measured data for reference, not guaranteed.

Non-split sleeve cores

Material

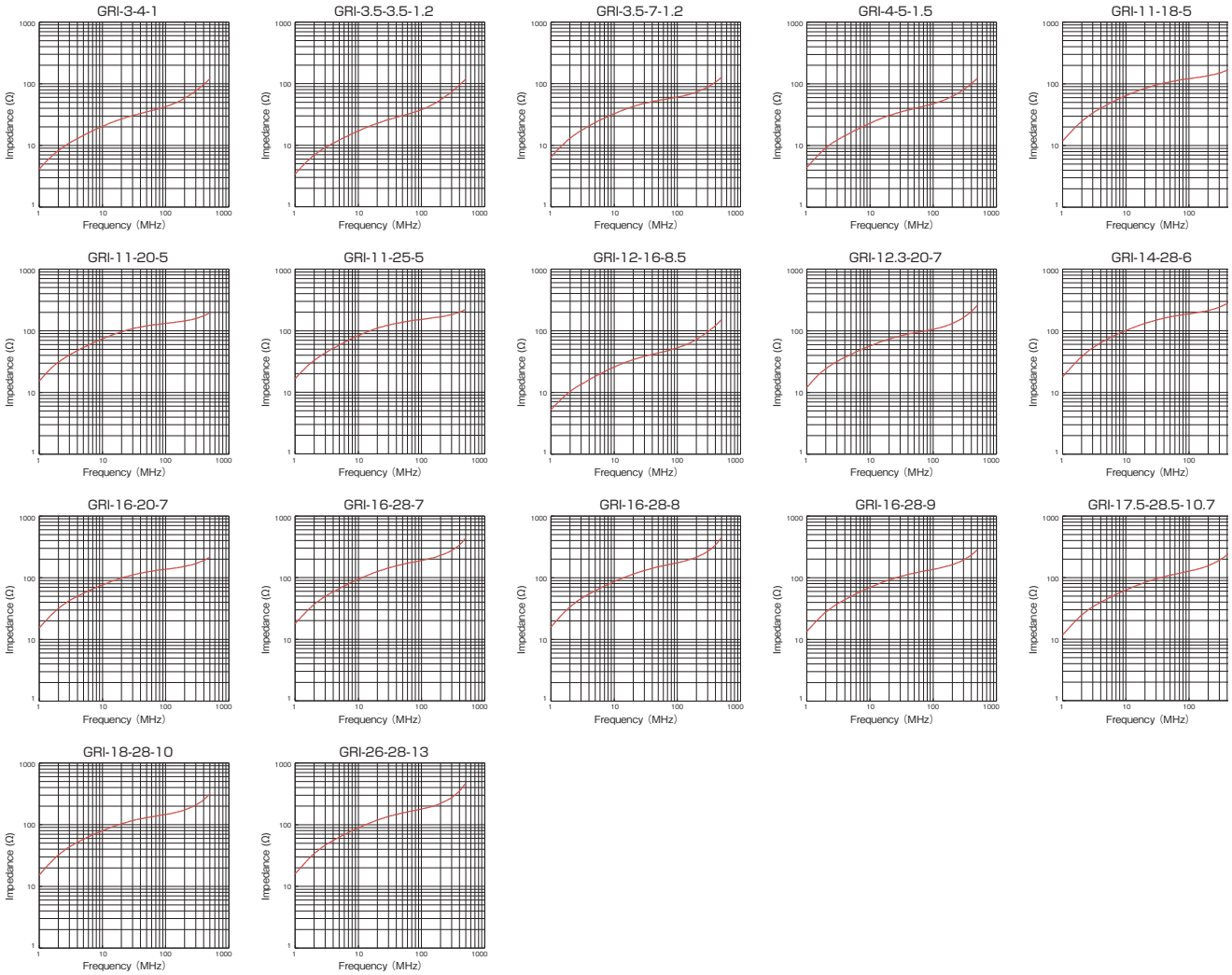
- Soft ferrite

Unit：mm



Part No.	φ A	φ B	C	Impedance*Ω/100MHz（1turn）
GRI-3-4-1	3	1	4	≧ 25
GRI-3.5-3.5-1.2	3.5	1.2	3.5	≧ 25
GRI-3.5-7-1.2	3.5	1.2	7	≧ 40
GRI-4-5-1.5	4	1.5	5	≧ 30
GRI-11-18-5	11	5	18.5	≧ 85
GRI-11-20-5	11	5	20	≧ 90
GRI-11-25-5	11	5	25	≧105
GRI-12-16-8.5	12	8.5	16	≧ 35
GRI-12.3-20-7	12.3	7	20	≧ 70
GRI-14-28-6	14.3	6.3	28.6	≧130
GRI-16-20-7	16	7	20	≧ 95
GRI-16-28-7	16	7	28	≧130
GRI-16-28-8	16	8	28	≧115
GRI-16-28-9	16	9	28	≧ 95
GRI-17.5-28.5-10.7	17.5	10.7	28.5	≧ 85
GRI-18-28-10	18	10	28	≧100
GRI-26-28-13	26	13	28	≧120

Impedance vs frequency



*The values are measured data for reference, not guaranteed.

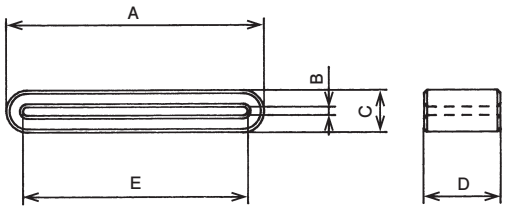
Noise suppression for ribbon cables

Feature

- GSSC suppresses emission noise for ribbon cables, FPC etc.

Material

- Soft ferrite



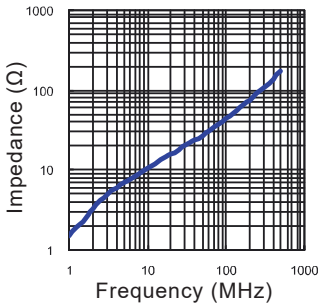
Impedance vs frequency

Unit：mm

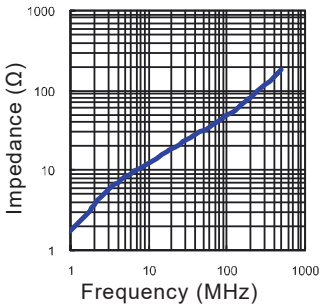
Part No.	A	B	C	D	E	Impedance*Ω/100MHz（1turn）
GSSC-33.5-8	33.5	1.4	6.5	8.0	28.4	≧ 30
GSSC-33.5-10	33.5	1.4		10.0	28.4	≧ 30
GSSC-33.5-10-2	33.5	2.2	7.4	10.0	27.0	≧ 30
GSSC-33.5-12	33.5	1.4	6.5	12.0	28.4	≧ 35
GSSC-33.5-20	33.5	1.3		20.0	27.8	≧ 50
GSSC-40-12	40.0	1.3		12.0	35.0	≧ 35
GSSC-45-8	45.2	1.3		8.0	40.0	≧ 30
GSSC-45-12	45.2	1.3		12.0	40.0	≧ 35
GSSC-50-12	50.0	1.4		12.0	44.9	≧ 35
GSSC-58-12	57.6	1.3		12.0	52.0	≧ 35

※Contact us for the measurement conditions.

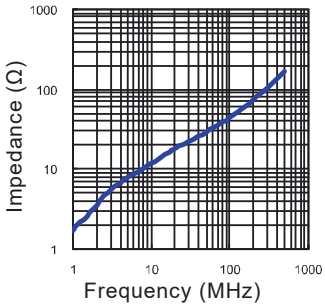
GSSC-33.5-8



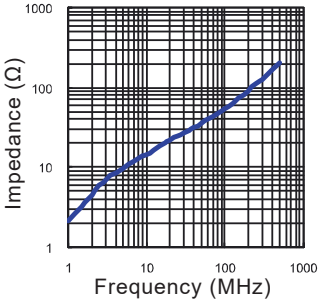
GSSC-33.5-10



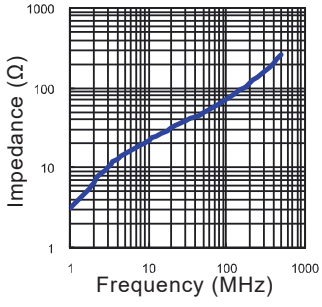
GSSC-33.5-10-2



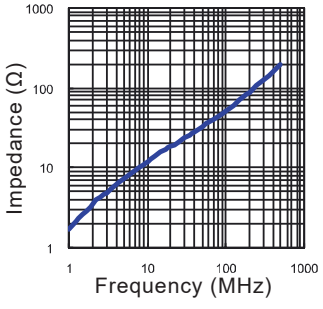
GSSC-33.5-12



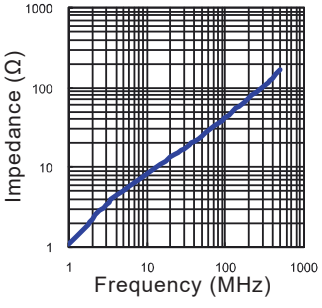
GSSC-33.5-20



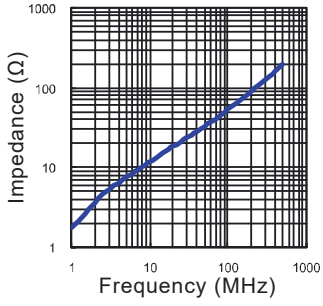
GSSC-40-12



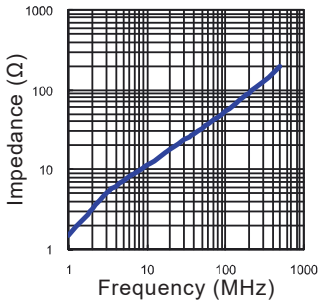
GSSC-45-8



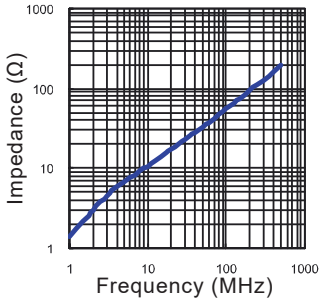
GSSC-45-12



GSSC-50-12

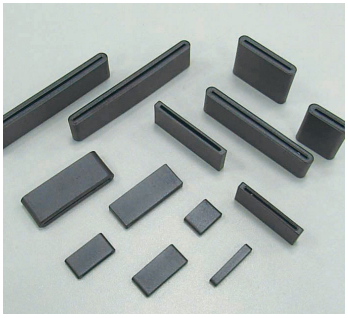


GSSC-58-12



*The values are measured data for reference, not guaranteed.

GFPC CORE／GFPC



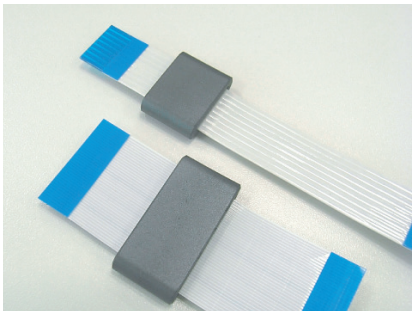
Suitable solutions for FPC noise problems

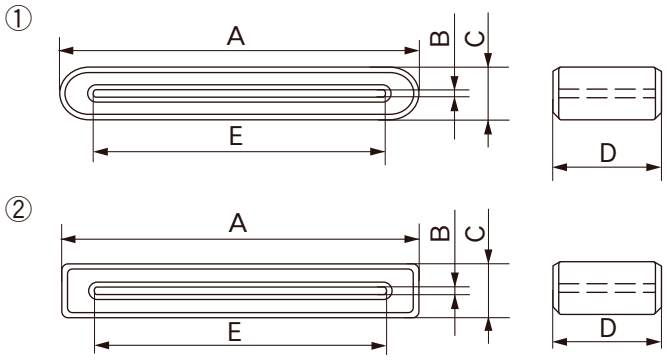
Feature

- Provided with 3mm and 5mm and 2.3mm thickness types.
- Effective filtering performance for emission noise from FPC.

Material

- Soft ferrite





Unit：mm

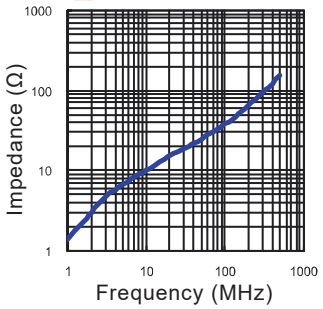
Part No.	Profile	A	B	C	D	E	Impedance*Ω/100MHz（1turn）
GFPC-11-8-2	①	11.0	0.7	2.3	8.0	9.0	≧ 25
GFPC-16-8-2	①	15.5	0.7		8.0	12.0	≧ 25
GFPC-18-3-2	①	18.0	0.7		3.0	14.5	≧ 20
GFPC-18-8-2	①	18.0	0.7		8.0	14.5	≧ 25
GFPC-22-8-2	①	21.5	0.7		8.0	18.0	≧ 25
GFPC-16-5-3	①	16.0	0.5	3.0	5.0	11.5	≧ 20
GFPC-16-8-3	①	16.0	0.5		8.0	11.5	≧ 25
GFPC-24-12-3	②	23.3	0.9		12.0	20.0	≧ 30
GFPC-25-10-3	②	25.5	0.8		10.0	21.5	≧ 25
GFPC-25-15-3	②	25.5	0.8		15.0	21.5	≧ 35
GFPC-31-12-3	②	31.0	1.0		12.0	27.0	≧ 30
GFPC-16-12	①	16.0	0.5	5.0	12.0	11.5	≧ 45
GFPC-16-20	①	16.0	0.8		20.0	11.5	≧ 60
GFPC-25-12	①	24.5	0.5		12.0	20.0	≧ 35
GFPC-25-20	①	24.5	0.5		20.0	20.0	≧ 50
GFPC-31-12	①	31.0	0.5		12.0	27.0	≧ 40
GFPC-46-12	①	46.0	0.5		12.0	41.5	≧ 40
GFPC-56-12	①	56.2	0.5		12.0	52.4	≧ 35

*Contact us for the measurement conditions.

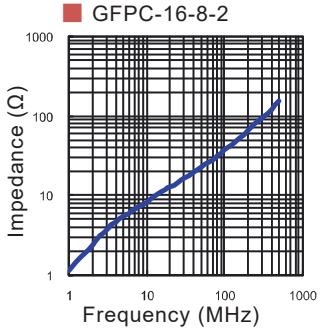
*The values are measured data for reference, not guaranteed.

Impedance vs frequency

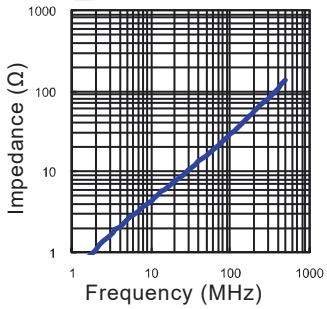
GFPC-11-8-2



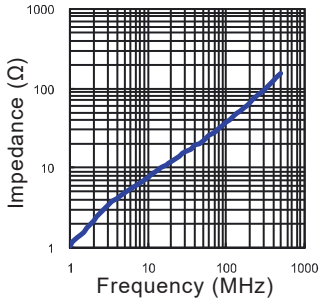
GFPC-16-8-2



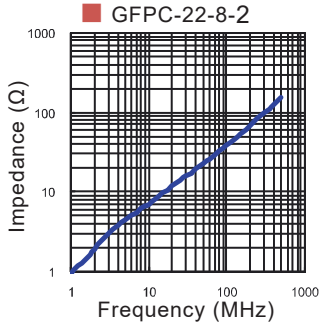
GFPC-18-3-2



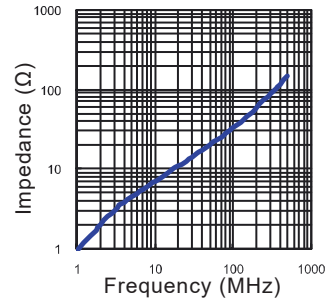
GFPC-18-8-2



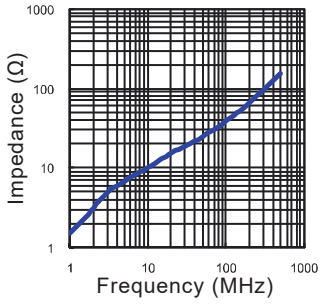
GFPC-22-8-2



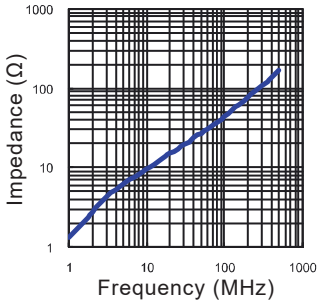
GFPC-16-5-3



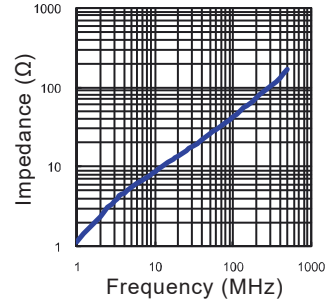
GFPC-16-8-3



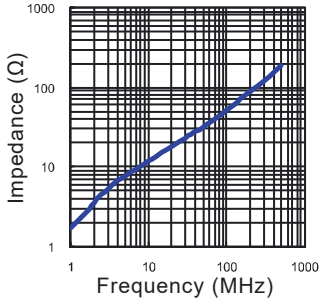
GFPC-24-12-3



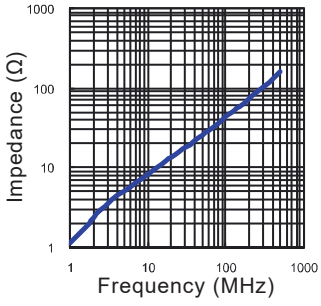
GFPC-25-10-3



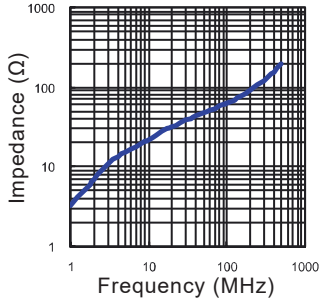
GFPC-25-15-3



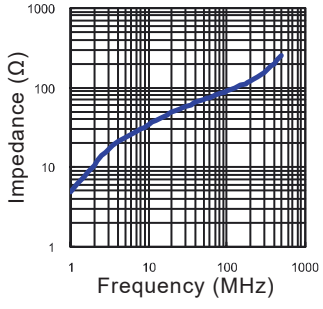
GFPC-31-12-3



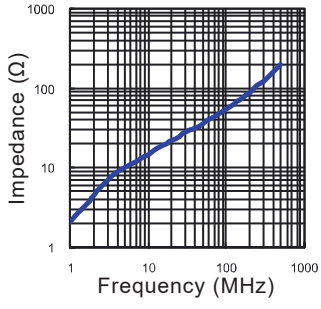
GFPC-16-12



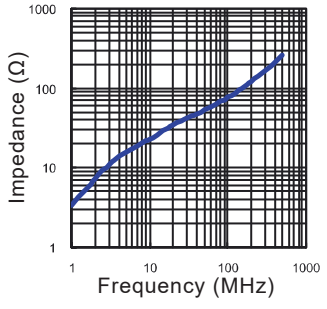
GFPC-16-20



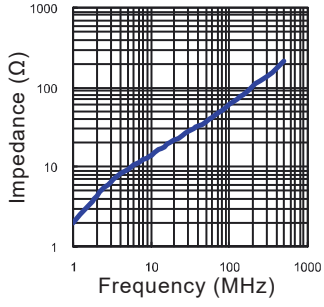
GFPC-25-12



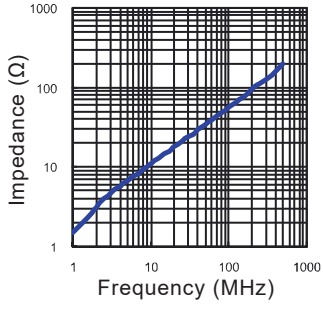
GFPC-25-20



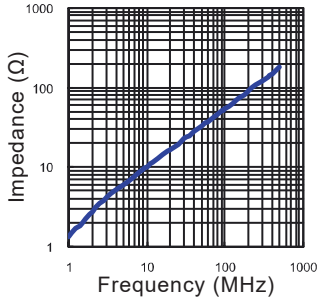
GFPC-31-12



GFPC-46-12



GFPC-56-12



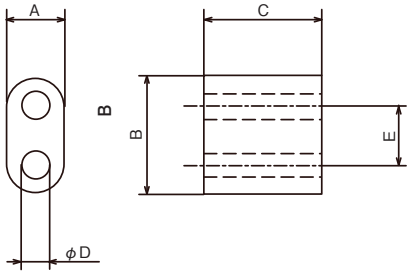
*The values are measured data for reference, not guaranteed.

RIB CORE／GRIB

2 hole type small core

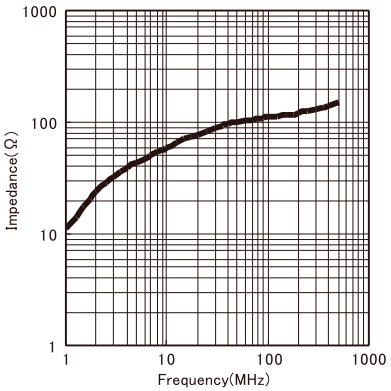
Material

- Soft ferrite



Impedance vs frequency

GRIB-3.5-7-7



※Contact us for the measurement conditions.

Unit:mm

Part No.	A	B	C	ϕD	E	Impedance* Ω/100MHz (1 turn)
GRIB-3.5-7-7	3.4	6.9	7.0	1.5	3.5	≧ 75

TOROIDAL CORE／GTRCA

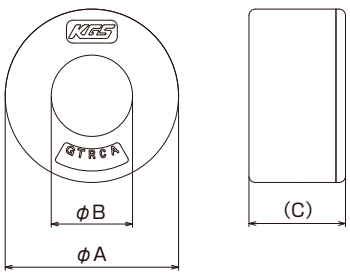
TOROIDAL CORE with housing which is suitable solution for suppressing noise in high-frequency range.

Feature

- With plastic housing preventing from cracking and chipping of the ferrite core.

Material

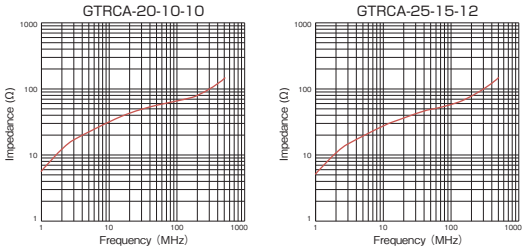
- Ferrite Core:Soft ferrite
- Housing: PA66 (Color: Light gray / Flammability:UL94V-0)



Unit:mm

Part No.	A	B	(C)	Impedance* Ω/100MHz (1 turn)
GTRCA-20-10-10	22.6	8.2	13.3	≧ 45
GTRCA-25-15-12	27.3	12.8	15.2	≧ 40

Impedance vs frequency



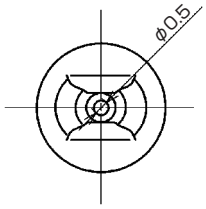
※The values are measured data for reference, not guaranteed.

GRIP CORE／GRIP-3.5-1.8-2

Ferrite core applicable to discrete device without adhesive

Feature

- Because temporaly fasten is available, it is much easy installation of discrete device with the product onto PC board.
- Fastening with no adhesive can be reduced conventional adhesive dispensing process.
- Ringing suppression is available from FET or diode.

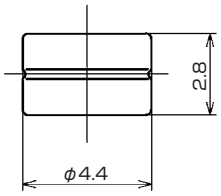


Material

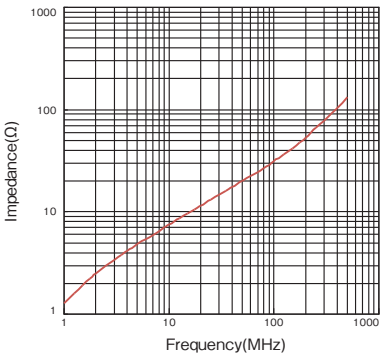
- Soft ferrite
- Silicone rubber

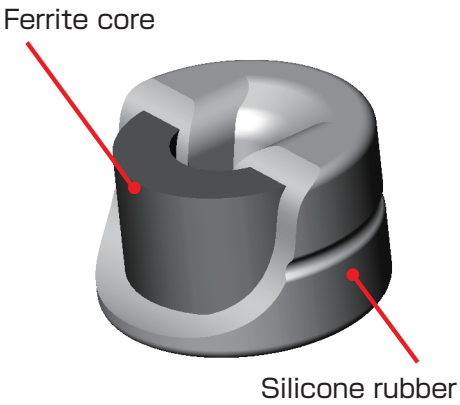
Unit：mm

Part No.	Profile	Height	Clindrical Lead Outer Diameter	Rectangular Leadcross-sectional dimension
GRIP-3.5-1.8-2	ϕ4.4	2.8	ϕ0.6～1.6	0.8～1.5(Width)/0.3～0.7(Thickness)

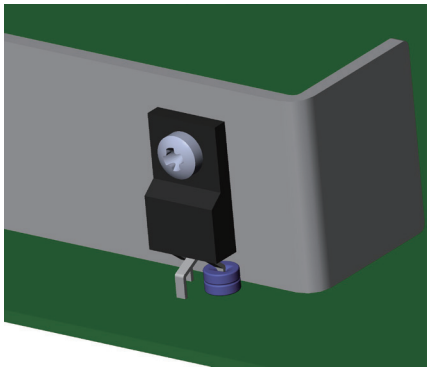


Impedance vs frequency

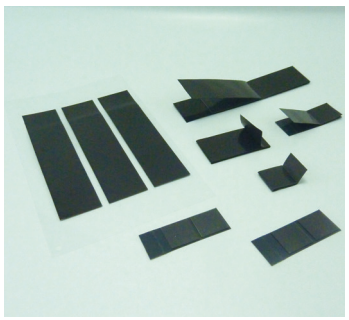




Application



SMARTPLY／FFPC



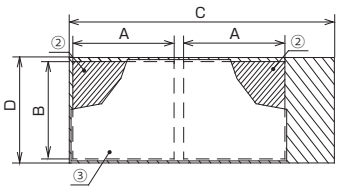
Thin Ferrite Sheet provides optimal EMC solution for FPC and FFC.

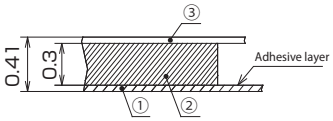
Feature

- Product design enables the sandwiching of FPC or FFC from top and bottom to suppress EMC.
- Suitable for mobile devices with its thin and light properties.
- Its flexible property does not impair FPC's flexibility.
- Prevent cracking and scattering of ferrite with PET and adhesives.

Material

- PET with adhesive layer
- Ferrite sheet
- Double-sided adhesive tape





A,B：Soft ferrite
C,D：Profile(PET with adhesive layer)

①PET with an adhesive layer
②Ferrite sheet
③Double-sided adhesive tape

Dimensions

Unit：mm

Part No.	A	B	C	D	Applicable cable width
FFPC-0.3-10-5	10	5	32.5	6.5	10
FFPC-0.3-10-10		10	30	11	
FFPC-0.3-12-8	12	8	38.5	9.5	12
FFPC-0.3-14-14	14	14	38	15	14

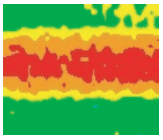
Part No.	A	B	C	D	Applicable cable width
FFPC-0.3-22-8	22	8	60.5	9.5	22
FFPC-0.3-22-14		14	54	15	
FFPC-0.3-27-14	27		70.5	15.5	27
FFPC-0.3-44-14	44		98	15	44

※Custom profiles design is also available. Please contact our sales representative for further information.

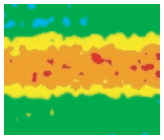
Properties

Higher insertion loss and excellent EMC suppression in low frequency range (30MHz~300MHz) compared to metal filler electromagnetic noise suppression sheet.

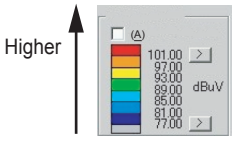
Radiated emission level from differential signal cable with component.



Metal filler EMC noise suppression sheet

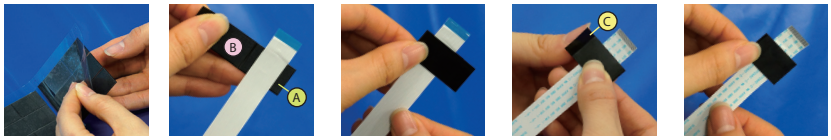


SMARTPLY



Emission level

Mounting FFPC onto flexible cable

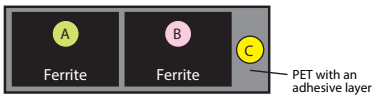


1.Gently bend the liner while take the ferrite sheet off.

2.Attach SMARTPLY to the cable on part (A).

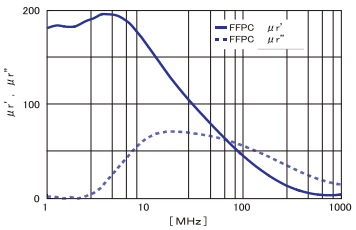
3.Attach on part (B) and wrap with SMARTPLY around the cable.

4.Fold part so as to attach part (C) on the back side of part (A). It's ready by simple procedure.

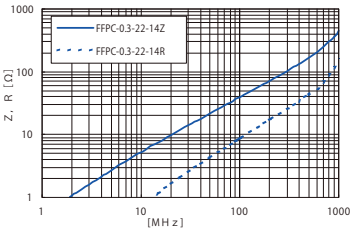


※ It is not advisable to reuse the product once it is removed.

Permeability



Impedance vs frequency



※The values are measured data for reference, not guaranteed.

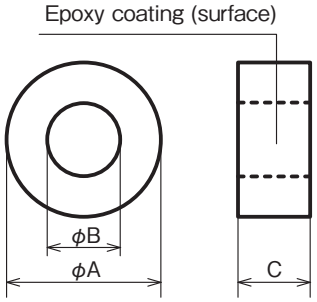
SMARTPLY ENGINEERING SAMPLE KIT／ESF-18

Various Smartplys in one booklet

Normal-mode noise suppressing core with excellent DC superposition property

Feature

- Impedance is not lowered by current superposition (Current at 20A or less) because of higher saturation magnetic flux density compare to ferrite. Possible to suppress normal-mode noise.
- Due to higher Curie temperature material, it enables stable temperature characteristics under condition of -40 °C to +85 °C, which does not allow impedance to be lowered.
- Resin-coated surface of the core, preventing its edge from damaging cables.



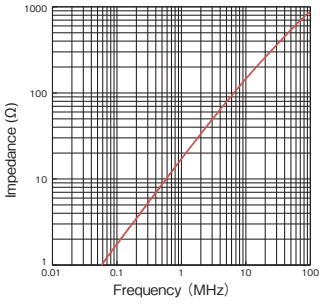
Dimensions

Unit：mm

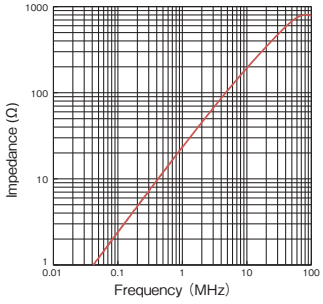
Part No.	Outer Diameter max.	Internal Diameter min.	Length max.	Impedance* Ω/1MHz (5turn)
MPTR-20-13-10E	21.2	11.8	10.9	≧ 7
MPTR-27-15-11E	27.8	13.8	12.1	≧ 12
MPTR-40-24-15E	40.9	23.1	15.48	≧ 12

Impedance vs frequency

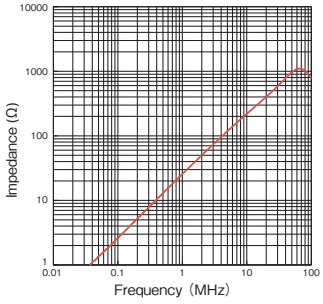
MPTR-20-13-10E



MPTR-27-15-11E

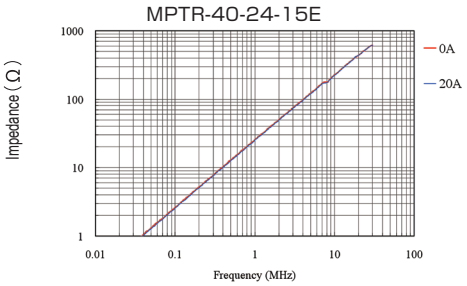


MPTR-40-24-15E



● Impedance with DC superposition (20A)

MPTR-40-24-15E

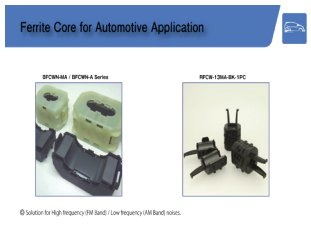


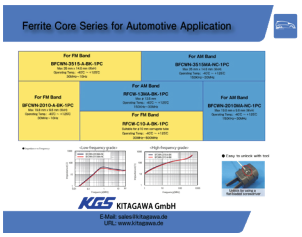
※Measurement conditions: Impedance measurement: 5 turns / DC superposition: 1 turn

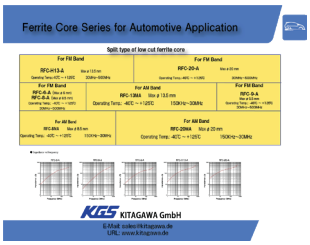
※The values are measured data for reference, not guaranteed.

FERRITE DESIGN KIT ESF-40

Design Kit with various of Ferrite Series for automotive applications.

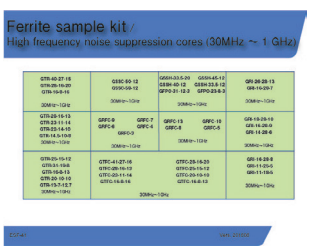


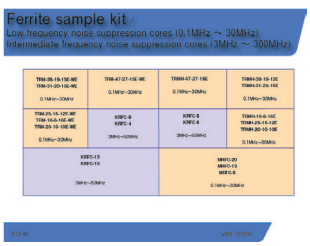


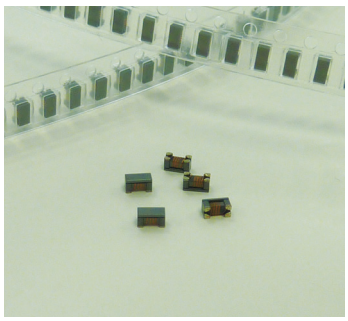


FERRITE DESIGN KIT ESF-41

Design Kit with various of Ferrite Series for high frequency, low frequency and intermediate frequency suppression.

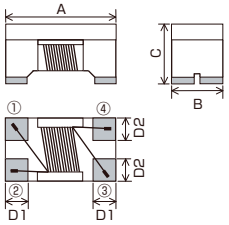




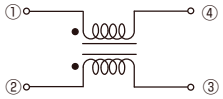


Wire-wound Common Mode Filter applicable to automated mounting on PC board.

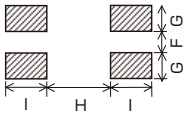
■ Outside dimensions



■ Equivalent circuit



■ Recommended pad dimensions



KWCM Series

- Wire-wound Common Mode Filter optimal for the High-speed differential signal(Applicable reflow soldering.)
- 2012 (2.0×1.2mm),3216 (3.2×1.6mm):2 size variation.

Unit:mm

Part Number / Size	A	B	C	D1 TYP	D2 TYP	F TYP	G TYP	H TYP	I TYP
KWCM-2012	2.0±0.2	1.2±0.2	1.2±0.2	0.45	0.4	0.4	0.4	0.8	0.9
KWCM-3216	3.2±0.2	1.6±0.2	2.0±0.2	0.6	0.6	0.4	0.6	1.6	1.05

Part Number Guide

KWCM - 2012 - 900 T
(1) (2) (3) (4)

(1) Product classification
(2) Size
(3) Impedance
(4) Packing specification

Electrical characteristics

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012-120T	≧ 12±25%	0.20	450	50 (DC)
KWCM-2012-240T	≧ 24±25%	0.25	420	50 (DC)
KWCM-2012-320T	≧ 32±25%	0.25	400	50 (DC)
KWCM-2012-500T	≧ 50±25%	0.25	400	50 (DC)
KWCM-2012-670T	≧ 67±25%	0.25	400	50 (DC)
KWCM-2012-900T	≧ 90±25%	0.30	400	50 (DC)
KWCM-2012-121T	≧ 120±25%	0.30	370	50 (DC)

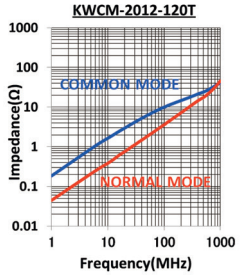
Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012-141T	≧ 140±25%	0.32	360	50 (DC)
KWCM-2012-161T	≧ 160±25%	0.35	350	50 (DC)
KWCM-2012-181T	≧ 180±25%	0.35	330	50 (DC)
KWCM-2012-201T	≧ 200±25%	0.40	300	50 (DC)
KWCM-2012-221T	≧ 220±25%	0.40	300	50 (DC)
KWCM-2012-261T	≧ 260±25%	0.40	300	50 (DC)
KWCM-2012-371T	≧ 370±25%	0.45	280	50 (DC)

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-3216-330T	≧ 33±25%	0.20	400	50 (DC)
KWCM-3216-500T	≧ 50±25%	0.25	400	50 (DC)
KWCM-3216-900T	≧ 90±25%	0.35	400	50 (DC)
KWCM-3216-121T	≧ 120±25%	0.30	400	50 (DC)
KWCM-3216-161T	≧ 160±25%	0.40	350	50 (DC)
KWCM-3216-221T	≧ 220±25%	0.45	300	50 (DC)
KWCM-3216-261T	≧ 260±25%	0.50	310	50 (DC)

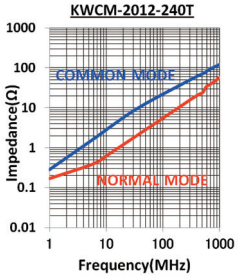
Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-3216-501T	≧ 500±25%	0.80	260	50 (DC)
KWCM-3216-601T	≧ 600±25%	0.80	260	50 (DC)
KWCM-3216-102T	≧ 1000±25%	1.20	250	50 (DC)
KWCM-3216-222T	≧ 2200±25%	1.20	200	50 (DC)

Impedance vs Frequency characteristics

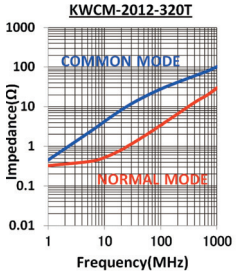
KWCM-2012-120T



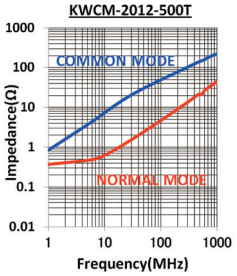
KWCM-2012-240T



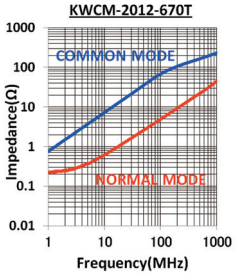
KWCM-2012-320T



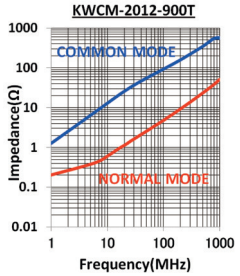
KWCM-2012-500T



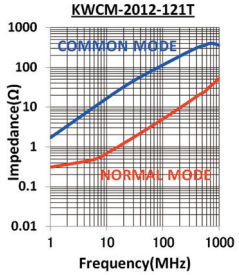
KWCM-2012-670T



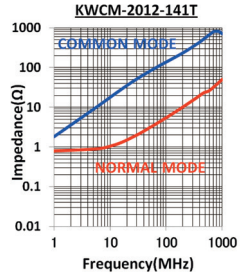
KWCM-2012-900T



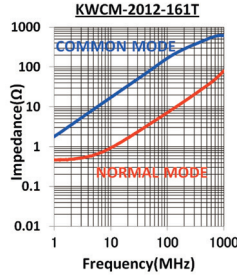
KWCM-2012-121T



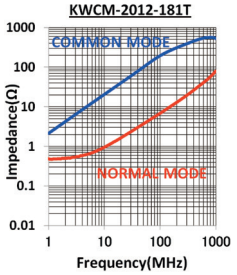
KWCM-2012-141T



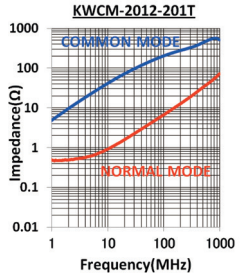
KWCM-2012-161T



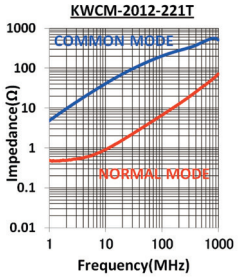
KWCM-2012-181T



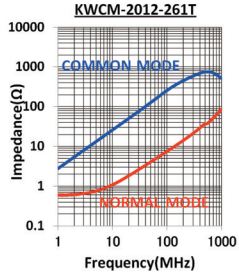
KWCM-2012-201T



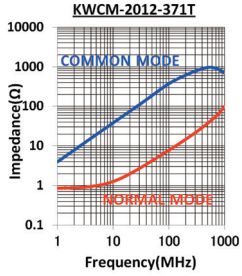
KWCM-2012-221T



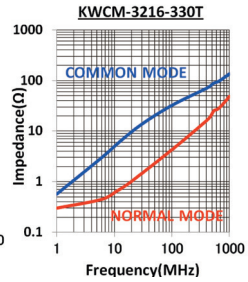
KWCM-2012-261T



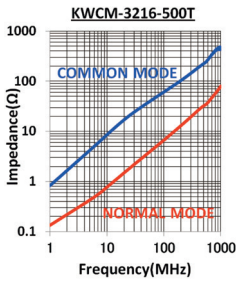
KWCM-2012-371T



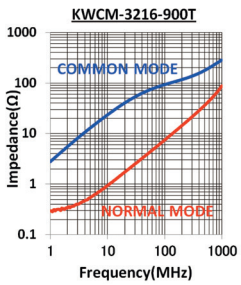
KWCM-3216-330T



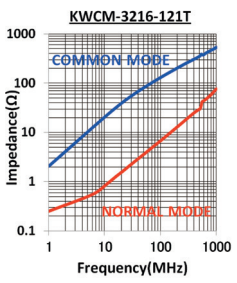
KWCM-3216-500T



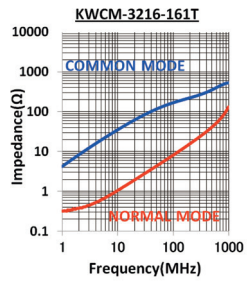
KWCM-3216-900T



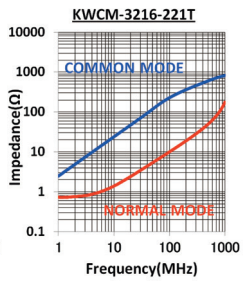
KWCM-3216-121T



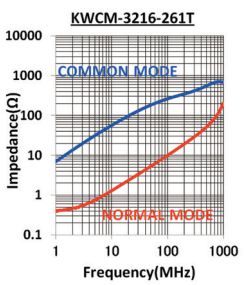
KWCM-3216-161T



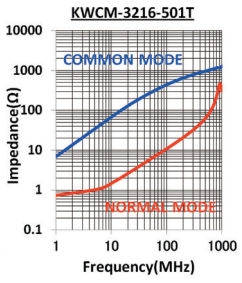
KWCM-3216-221T



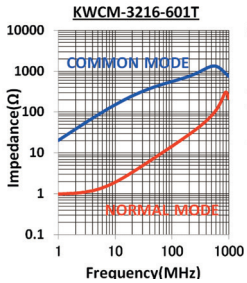
KWCM-3216-261T



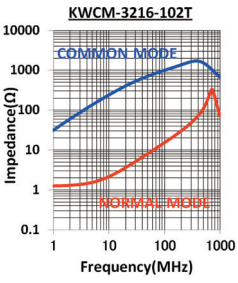
KWCM-3216-501T



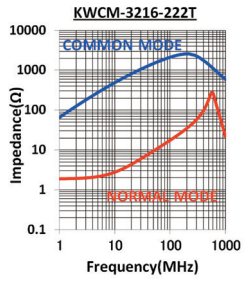
KWCM-3216-601T



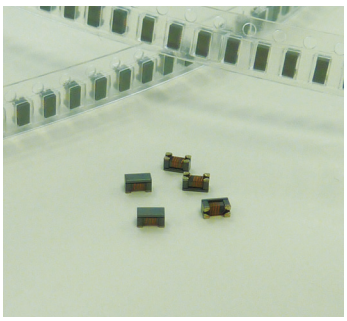
KWCM-3216-102T



KWCM-3216-222T

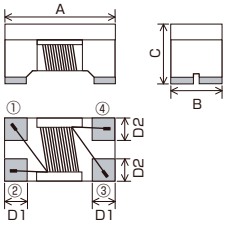


※The values are measured data for reference, not guaranteed.

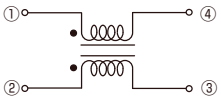


Wire-wound Common Mode Filter applicable to automated mounting on PC board.

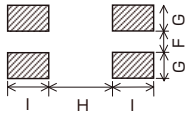
■ Outside dimensions



■ Equivalent circuit



■ Recommended pad dimensions



KWCM-HS Series

- Wire-wound Common Mode Filter optimal for the ultra-high-speed differential signal. (reflow applicable)
- 1210 (1.2×1.0mm) , 2012 (2.0×1.2mm): 2 size variation.
- Smaller negative effect to high speed differential signal due to the lower insertion-loss.

Unit：mm

Part Number / Size	A	B	C	D1 TYP	D2 TYP	F TYP	G TYP	H TYP	I TYP
KWCM-1210HS	1.2±0.2	1.0±0.2	0.9±0.2	0.36	0.38	0.3	0.45	0.6	0.45
KWCM-2012HS	2.0±0.2	1.2±0.2	1.2±0.2	0.45	0.4	0.4	0.4	0.8	0.9

Part Number Guide

KWCM - 2012 - HS - 900 T
(1) (2) (3) (4) (5)

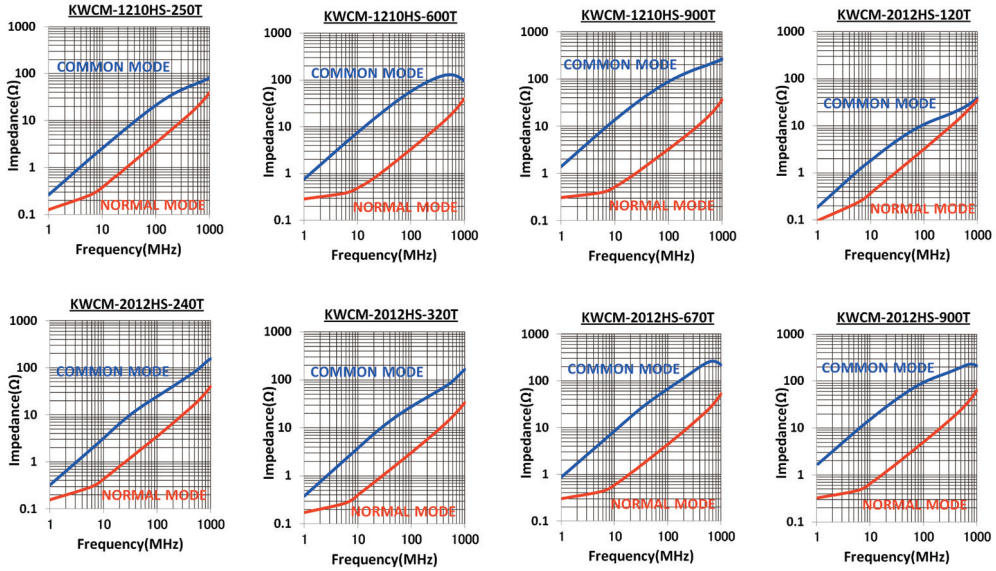
(1) Product classification
(2)Size
(3) Type
(4) Impedance
(5) Packing specification

Electrical characteristics

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-1210HS-250T	≧ 25±25%	0.25	420	50 (DC)
KWCM-1210HS-600T	≧ 60±25%	0.25	400	50 (DC)
KWCM-1210HS-900T	≧ 90±25%	0.30	400	50 (DC)
KWCM-2012HS-120T	≧ 12±25%	0.20	450	50 (DC)

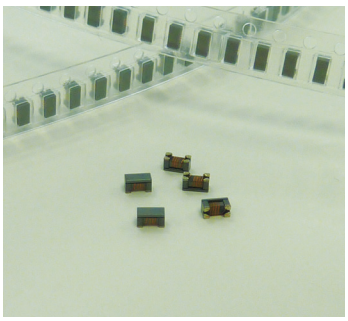
Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012HS-240T	≧ 24±25%	0.25	420	50 (DC)
KWCM-2012HS-320T	≧ 32±25%	0.25	400	50 (DC)
KWCM-2012HS-670T	≧ 67±25%	0.25	400	50 (DC)
KWCM-2012HS-900T	≧ 90±25%	0.30	400	50 (DC)

Impedance vs Frequency characteristics



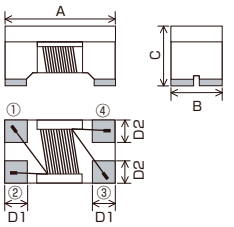
※The values are measured data for reference, not guaranteed.

SMD COMMON MODE FILTER／KWCM-HDMI

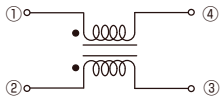


Wire-wound Common Mode Filter applicable to automated mounting on PC board.

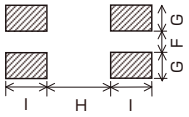
■ Outside dimensions



■ Equivalent circuit



■ Recommended pad dimensions



KWCM-HDMI Series

- Wire-wound Common Mode Filter optimal for the signal HDMI. (reflow applicable)
- Matching the characteristic impedance of 100Ω.
- Smaller negative effect to high speed differential signal due to the lower insertion-loss.

Unit:mm

Part Number / Size	A	B	C	D1 TYP	D2 TYP	F TYP	G TYP	H TYP	I TYP
KWCM-2012HDMI	2.0±0.2	1.2±0.2	1.2±0.2	0.45	0.4	0.4	0.4	0.8	0.9

Part Number Guide

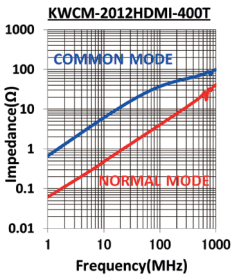
KWCM - 2012 - HDMI - 900 T
(1) (2) (3) (4) (5)

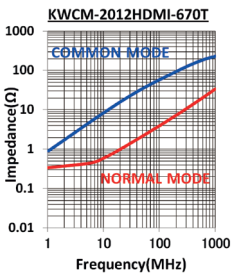
(1) Product classification
(2) Size
(3) Type
(4) Impedance
(5) Packing specification

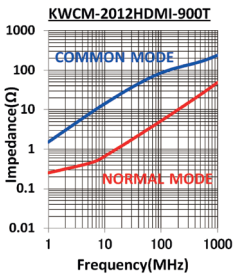
Electrical characteristics

Part No.	Common Mode Impedance (Ω) at 100MHz	DC Resistance (Ω) max.	Rated Current (mA.) max.	Rated Voltage (V) max.
KWCM-2012HDMI-400T	≧ 40±25%	0.25	400	50 (DC)
KWCM-2012HDMI-670T	≧ 67±25%	0.25	400	50 (DC)
KWCM-2012HDMI-900T	≧ 90±25%	0.30	400	50 (DC)

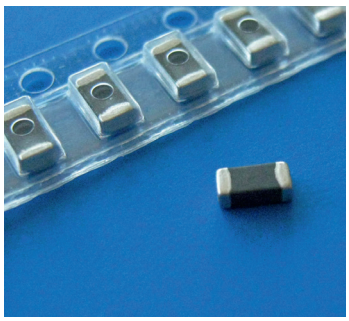
Impedance vs Frequency characteristics







※The values are measured data for reference, not guaranteed.



Ferrite Chip Bead, normal type

Feature

- MLB (Normal type) generates an impedance from the relatively lower to high frequency.
- Effective in noise suppression in the wide frequency range
- Impedance Range : 28 to 2000 ohm
- Rated Current Range : 100 mA to 500 mA
- Operating temperature Range : -40°C to +125°C
- Soldering Method : Reflow of Wave soldering, suitable for lead free soldering
- Packaging Method : Tape & Reel (per EIA Specifications)
- Storage Temperature : max.40°C, RH 70%

Application

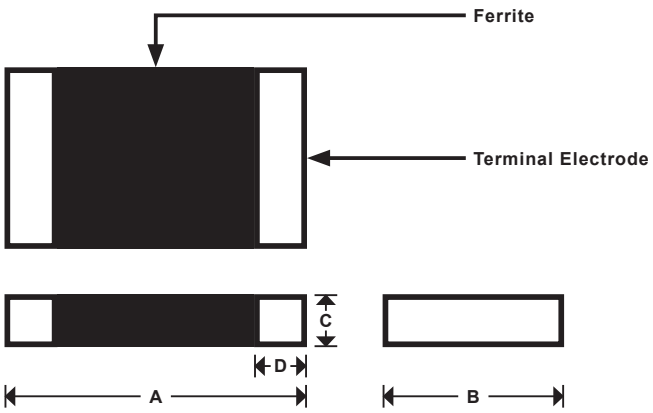
- General I/O wide band EMI suppression
- It is particular effective with unstable grounding.
- High frequency EMI preventation of computers, printers, VCRs,TVs, and portable telephone.

Part Number Code

MLB	-	160808	-	0010	N	01
Series Name		Size Code		Impedance (ex.0010=10 Ω ± 25%)	Classification	Rated Current
					N=Normal	01=100 mA

Notes for MLB Series
Please contact our sales department for the application other than above mentioned indication.
Please ask individual data sheet to verify detailed specification and performance.

Shape and Dimensions



Unit: mm

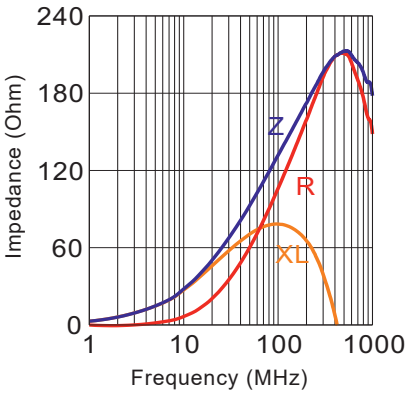
SIZE CODE	A	B	C	D	Chips/reel
100505(0402)	1.00+/-0.1	0.50+/-0.1	0.50+/-0.1	0.25+/-0.1	10000
160808(0603)	1.60+/-0.2	0.80+/-0.2	0.80+/-0.2	0.3+/-0.2	4000
201209(0805)	2.00+/-0.2	1.20+/-0.2	0.90+/-0.2	0.5+/-0.3	4000
321611(1206)	3.20+/-0.2	1.60+/-0.2	1.10+/-0.2	0.5+/-0.3	3000

FERRITE CHIP BEAD／MLB

Part No.	Impedance (Ω)@100MHz±25%	DCR (Ω)max	Rated Current (mA) max
MLB-100505-0120N015	120	0,500	150
MLB-100505-0300N01	300	0,800	100
MLB-100505-0600N01	600	1,000	100
MLB-160808-0028N03	28	0,300	300
MLB-160808-0060N03	60	0,200	300
MLB-160808-0080N03	80	0,300	300
MLB-160808-0090N03	90	0,300	300
MLB-160808-0120N02	120	0,300	200
MLB-160808-0150N02	150	0,400	200
MLB-160808-0220N02	220	0,400	200
MLB-160808-0300N02	300	0,500	200
MLB-160808-0600N02	600	0,600	200
MLB-160808-1000N01	1000	1,000	100
MLB-201209-0030N05	30	0,150	500
MLB-201209-0060N04	60	0,300	400
MLB-201209-0080N04	80	0,300	400
MLB-201209-0090N03	90	0,300	300
MLB-201209-0120N03	120	0,300	300
MLB-201209-0300N02	300	0,400	200
MLB-201209-0600N02	600	0,600	200
MLB-201209-1000N02	1000	0,800	200
MLB-321611-0032N05	32	0,150	500
MLB-321611-0090N04	90	0,300	400
MLB-321611-0120N04	120	0,300	400
MLB-321611-0300N03	300	0,500	300
MLB-321611-0600N02	600	0,600	200
MLB-321611-1000N02	1000	0,800	200
MLB-321611-1500N01	1500 (50MHz)	0,900	100
MLB-321611-2000N01	2000 (50MHz)	1,200	100

Please contact us if other specification
(Size,Impedance, Rated Current etc.) is needed.

■ MLB-100505-0120N015



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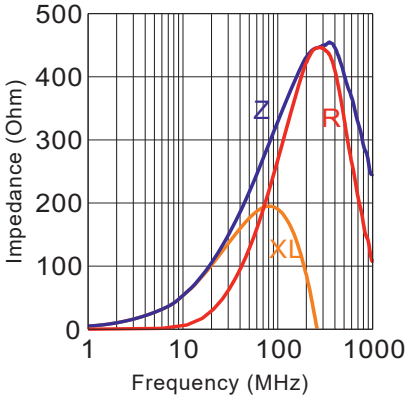

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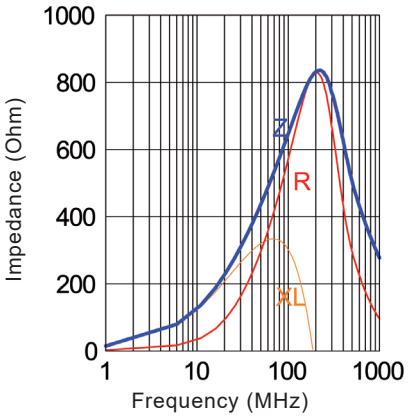
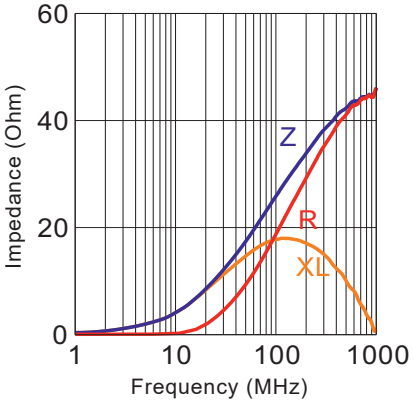


■ MLB-160808-0028N03



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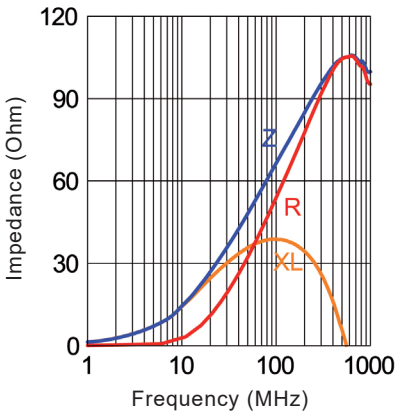

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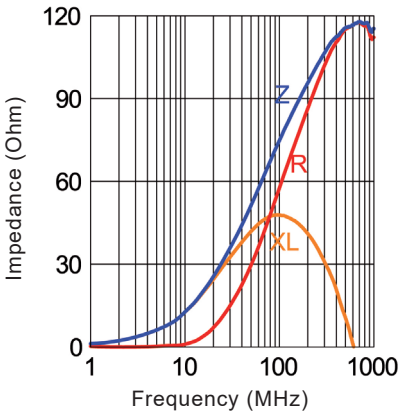

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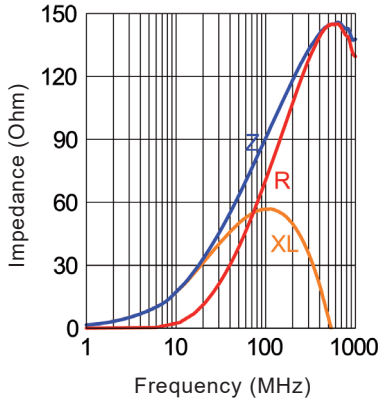

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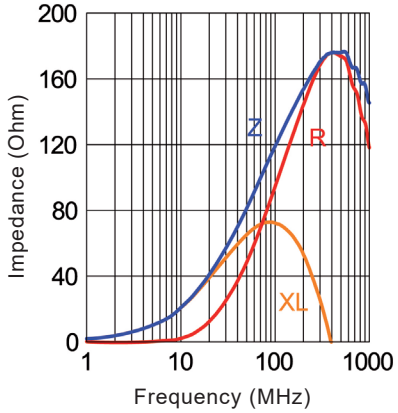

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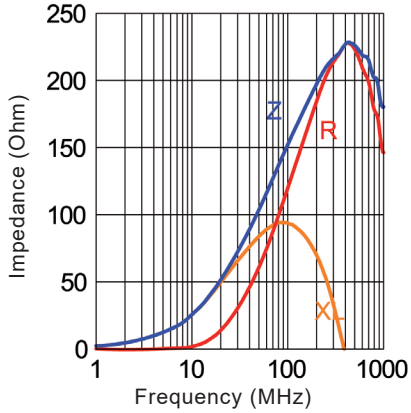

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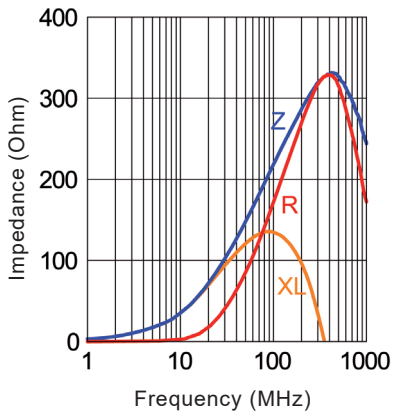

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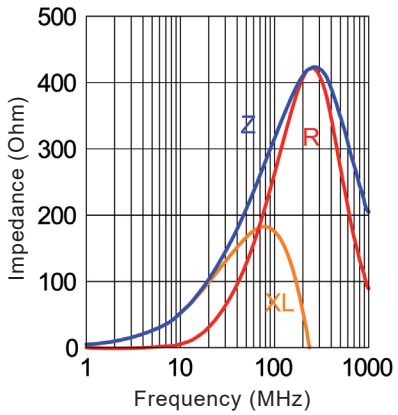

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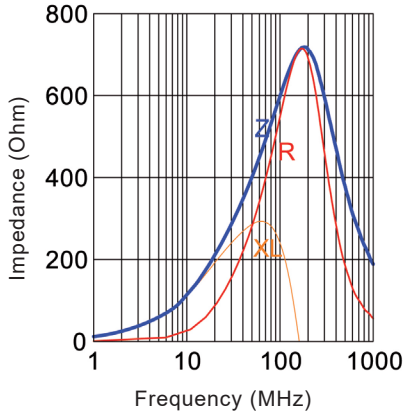

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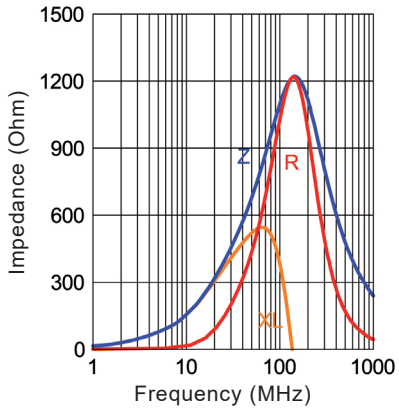

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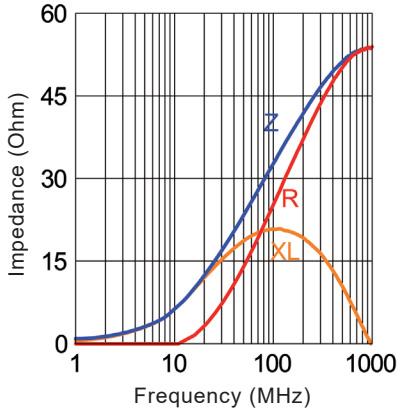

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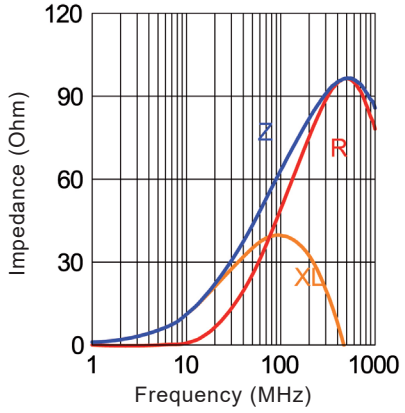

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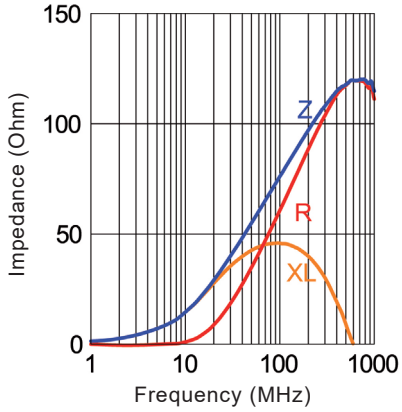

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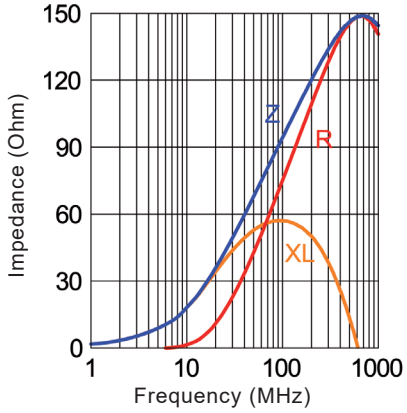

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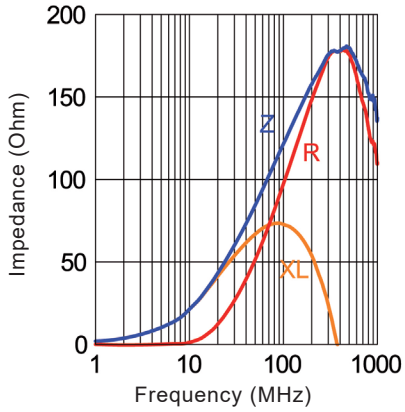

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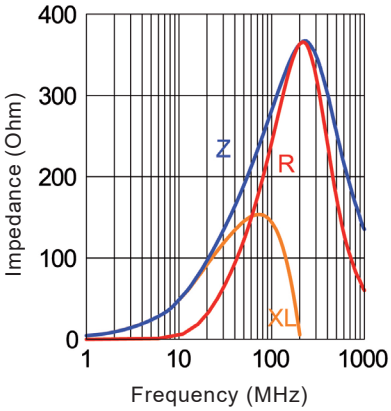

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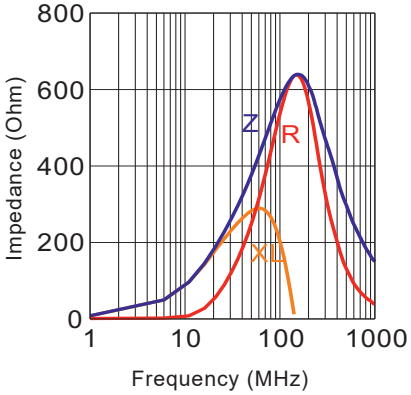

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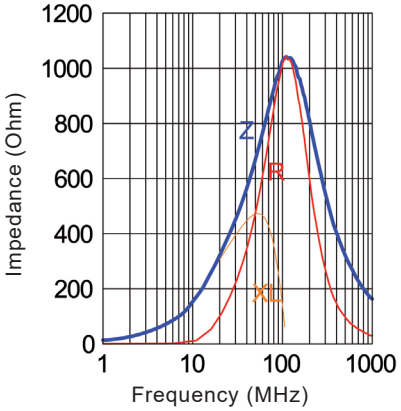

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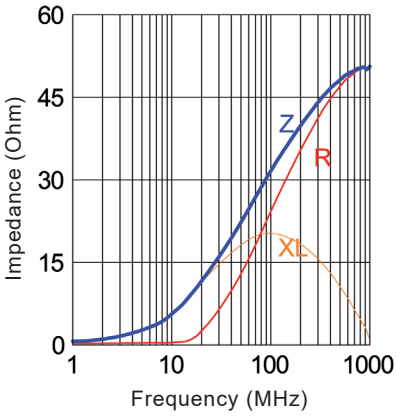

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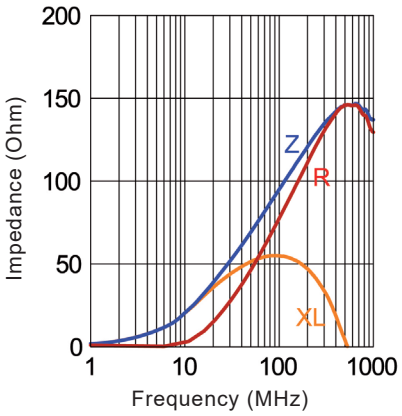

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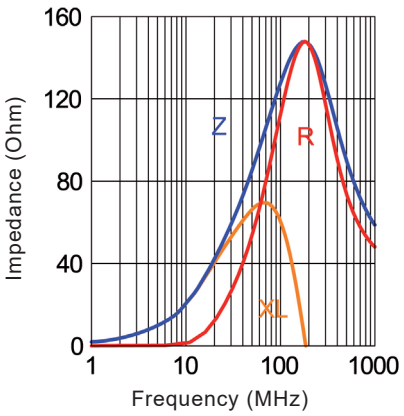

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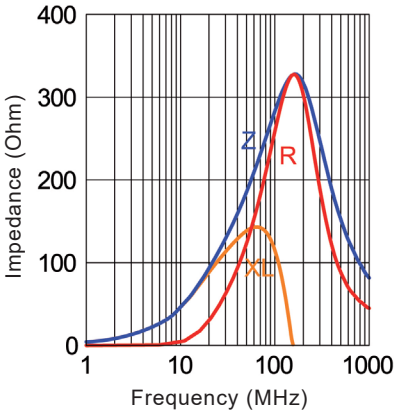

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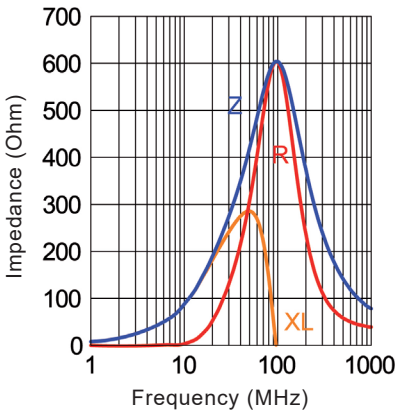

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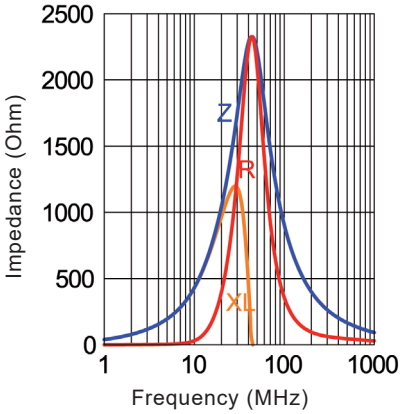

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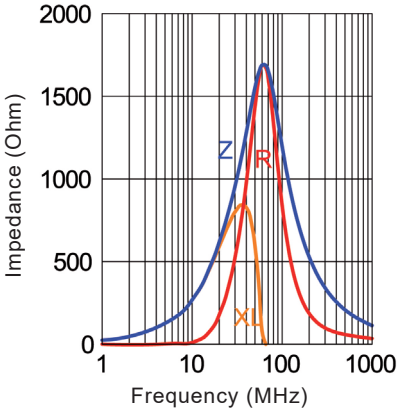

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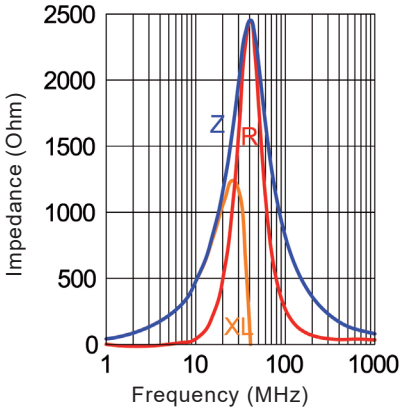
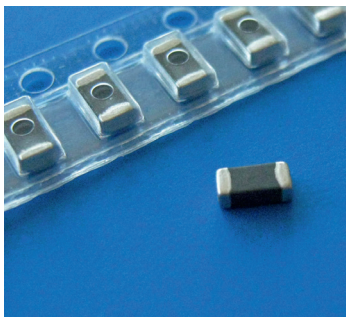




Ferrite Chip Bead, high current type

Feature

- MLB (high current type) can be used in high current circuit due to ist low DC resistance.
- It can match power line to a maximum of 6A DC.
- Impedance Range : 30 to 1000 ohm
- Rated Current Range : 1000 mA to 6000 mA
- Operating temperature Range : -40°C to +125°C
- Soldering Method : Reflow of Wave soldering, suitable for lead free soldering
- Packaging Method : Tape & Reel (per EIA Specifications)
- Storage Temperature : max.40°C, RH 70%

Application

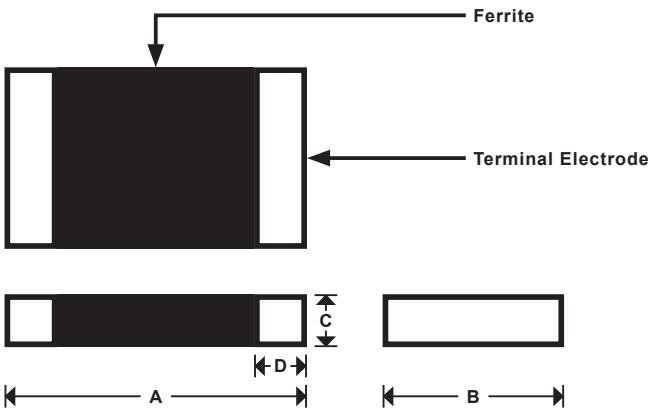
- EMI preventation for power line to a maximum of 6A DC.
- It is particular effective with unstable grounding.
- High frequency EMI preventation of computers, printers, VCRs,TVs, and portable telephone.

Part Number Code

MLB	-	160808	-	0010	C	25
Series Name		Size Code		Impedance (ex.0030=30 Ω ± 25%)	Classification	Rated Current
					C=High Current application	25=2500 mA

Notes for MLB Series
Please contact our sales department for the application other than above mentioned indication.
Please ask individual data sheet to verify detailed specification and performance.

Shape and Dimensions



Unit: mm

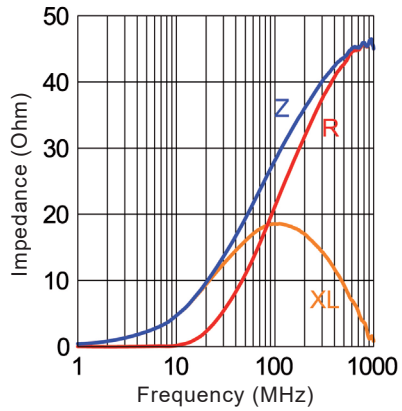
SIZE CODE	A	B	C	D	Chips/reel
160808(0603)	1.60+/-0.2	0.80+/-0.2	0.80+/-0.2	0.3+/-0.2	4000
201209(0805)	2.00+/-0.2	1.20+/-0.2	0.90+/-0.2	0.5+/-0.3	4000
321611(1206)	3.20+/-0.2	1.60+/-0.2	1.10+/-0.2	0.5+/-0.3	3000

HIGH CURRENT FERRITE CHIP BEAD／MLB

Part Co.	Impedance (Ω)@100MHz±25%	DCR (Ω)max	Rated Current (mA) max
MLB-160808-0030C25	30	0,050	2500
MLB-160808-0060C30	60	0,040	3000
MLB-160808-0080C30	80	0,040	3000
MLB-160808-0120C30	120	0,040	3000
MLB-160808-0220C15	220	0,150	1500
MLB-160808-0300C20	300	0,100	2000
MLB-160808-0600C10	600	0,200	1000
MLB-201209-0033C40	33	0,035	4000
MLB-201209-0060C40	60	0,035	4000
MLB-201209-0080C50	80	0,020	5000
MLB-201209-0120C50	120	0,020	5000
MLB-201209-0250C30	250	0,040	3000
MLB-201209-0300C30	300	0,040	3000
MLB-201209-0600C20	600	0,100	2000
MLB-201209-1000C10	1000	0,200	1000
MLB-321611-0080C40	80	0,035	4000
MLB-321611-0120C60	120	0,010	6000
MLB-321611-0300C10	300	0,200	1000
MLB-321611-0600C30	600	0,040	3000
MLB-321611-1000C10	1000	0,200	1000

Please contact us if other specification
(Size,Impedance, Rated Current etc.) is needed.

MLB-160808-0030C25



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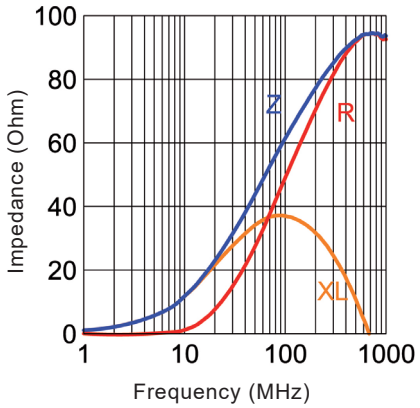

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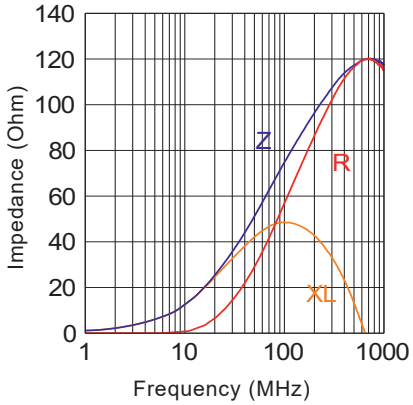

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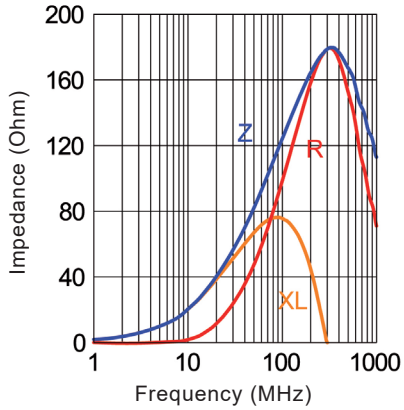
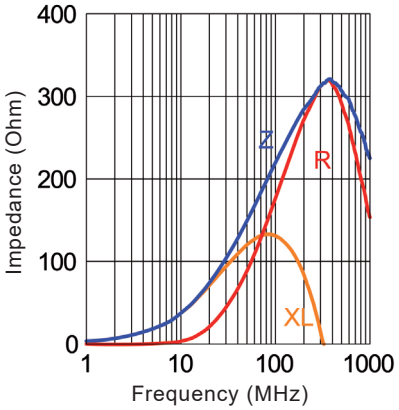


MLB-160808-0220C15



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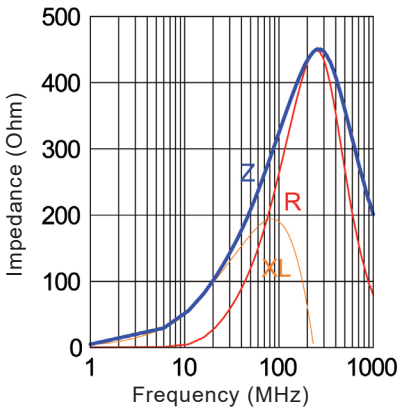
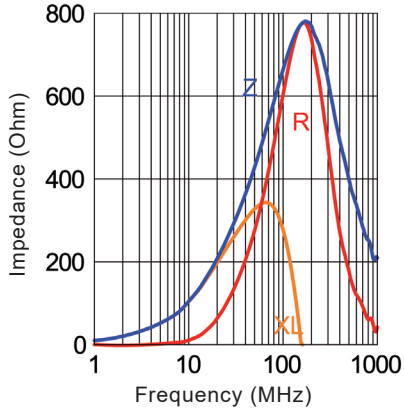
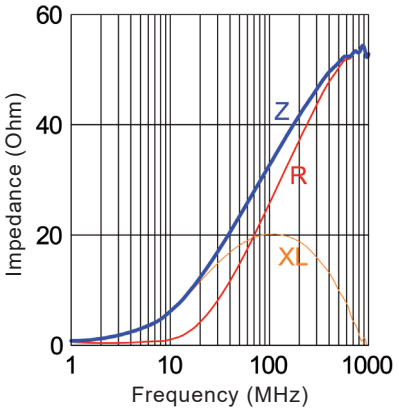


MLB-160808-0600C10



MLB-201209-0033C40



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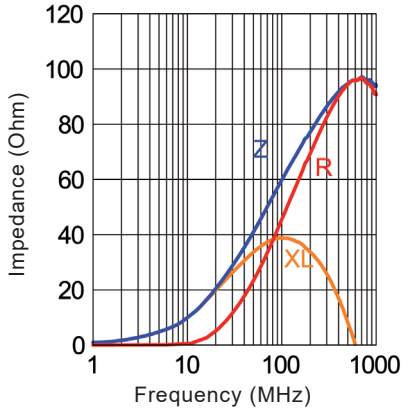

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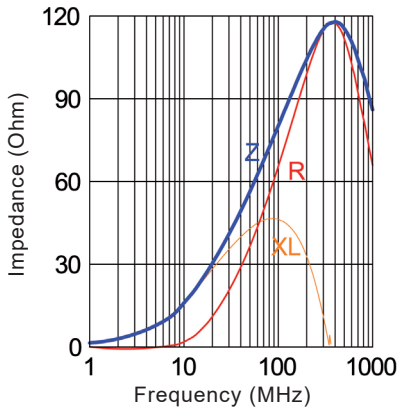

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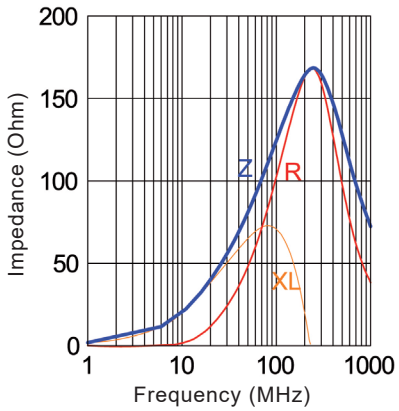

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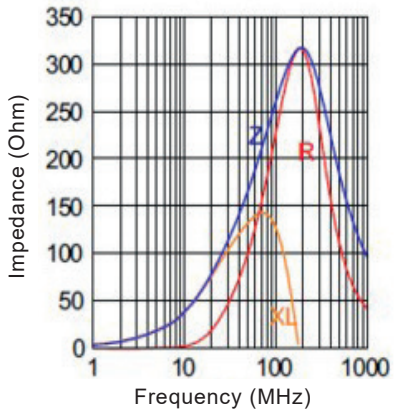

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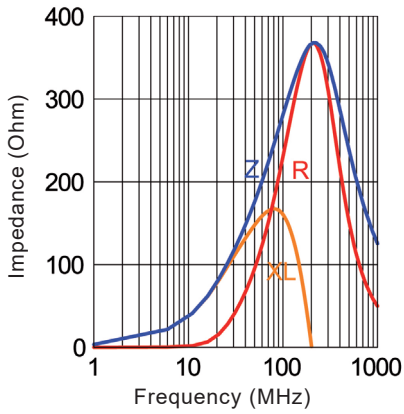

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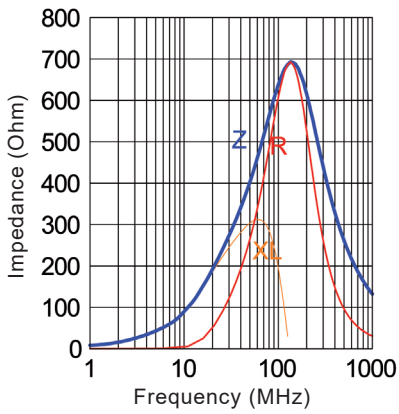

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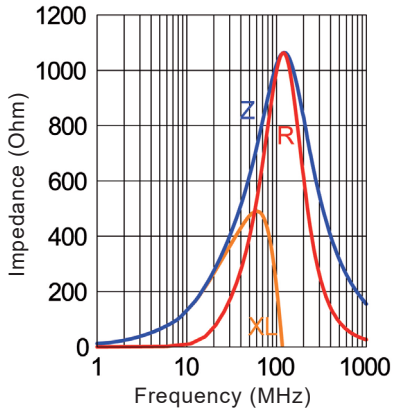
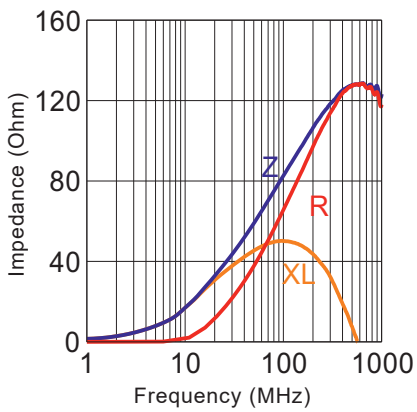
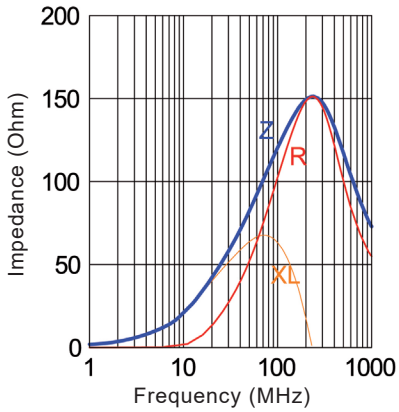


MLB-321611-0080C40



MLB-321611-0120C60



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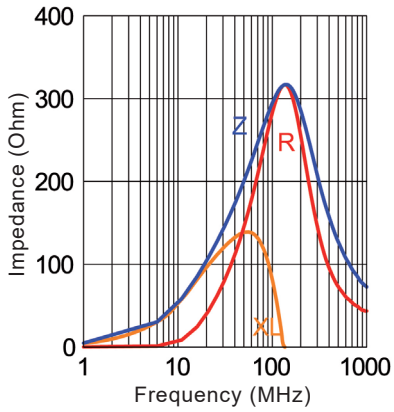

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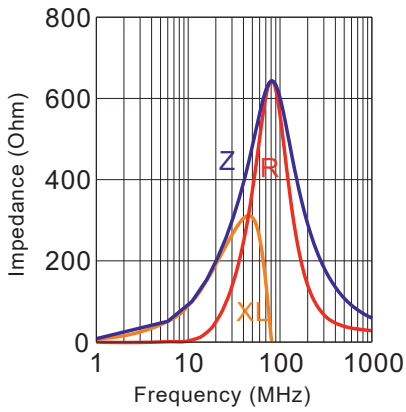
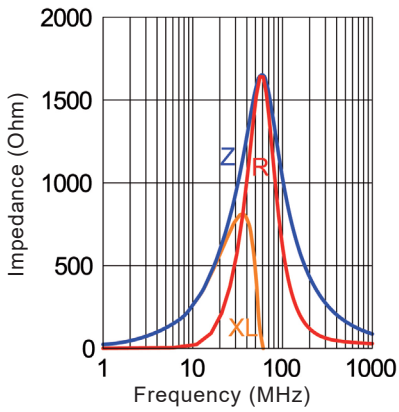
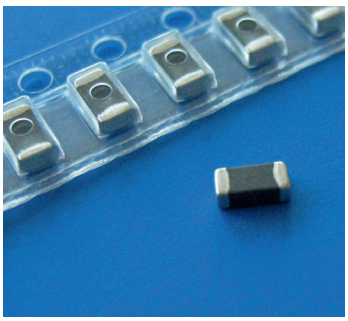


MLB-321611-1000C10



FERRITE CHIP BEAD FOR HIGH SPEED／MLB



Ferrite Chip Bead for high speed application

Feature

- MLB (for High speed) can minimize attenuation of the signal wave form for high speed signal due to ist sharp impedance characteristics.That is much lower impedance in frequency range lower than 100MHz.
- Impedance Range: 26 to 1000 ohm
- Rated Current Range: 100 mA to 500 mA
- Operating temperature Range: -40°C to +125°C
- Soldering Method: Reflow of Wave soldering, suitable for lead free soldering
- Packaging Method : Tape & Reel (per EIA Specifications)
- Storage Temperature : max.40°C, RH 70%

Application

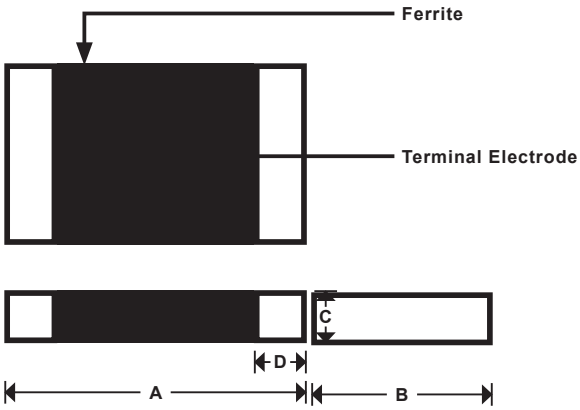
- EMI suppression for various electric equipment by addition of impedance to the circuit.
- It is particular effective with unstable grounding.
- High frequency EMI preventation of computers, printers, VCRs,TVs, and portable telephone.
- High speed signal or frequency (clock) harmonics EMI suppression.
- Clock, VGA data

Part Number Code

MLB	-	160808	-	0600	S	01
Series Name		Size Code		Impedance (ex.0600=600 Ω ± 25%)	Classification	Rated Current
					S=For High Speed Application	01=200 mA

Notes for MLB Series
Please contact our sales department for the application other than above mentioned indication.
Please ask individual data sheet to verify detailed specification and performance.

Shape and Dimensions



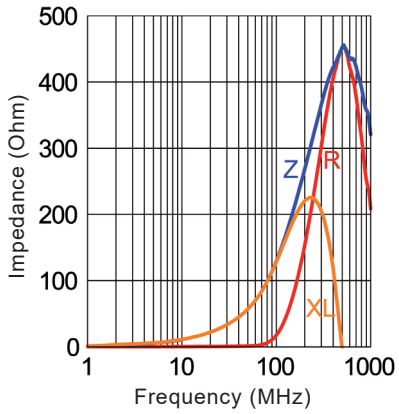
Unit: mm

SIZE CODE	A	B	C	D	Chips/reel
100505(0402)	1.00+/-0.1	0.50+/-0.1	0.50+/-0.1	0.25+/-0.1	10000
160808(0603)	1.60+/-0.2	0.80+/-0.2	0.80+/-0.2	0.3+/-0.2	4000
201209(0805)	2.00+/-0.2	1.20+/-0.2	0.90+/-0.2	0.5+/-0.3	4000
321611(1206)	3.20+/-0.2	1.60+/-0.2	1.10+/-0.2	0.5+/-0.3	3000

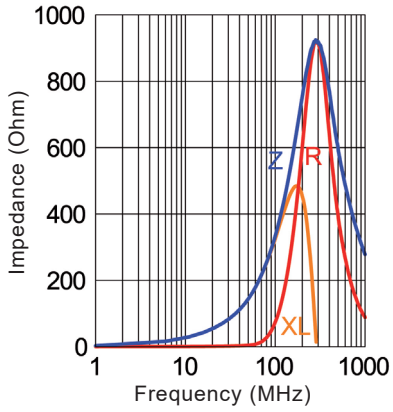
Part No.	Impedance (Ω)@100MHz±25%	DCR (Ω)max	Rated Current (mA) max
MLB-100505-0120S015	120	0,500	150
MLB-100505-0300S01	300	0,900	100
MLB-160808-0030S03	30	0,300	300
MLB-160808-0060S03	60	0,300	300
MLB-160808-0080S03	80	0,300	300
MLB-160808-0120S02	120	0,300	200
MLB-160808-0150S02	150	0,400	200
MLB-160808-0220S02	220	0,400	200
MLB-160808-0300S02	300	0,500	200
MLB-160808-0600S02	600	0,600	200
MLB-160808-1000S01	1000	1,000	100
MLB-201209-0026S05	26	0,200	500
MLB-201209-0060S04	60	0,300	400
MLB-201209-0120S03	120	0,300	300
MLB-201209-0300S02	300	0,500	200
MLB-201209-0600S02	600	0,600	200
MLB-201209-1000S02	1000	0,800	200
MLB-321611-0120S04	120	0,300	400
MLB-321611-0600S02	600	0,600	200

Please contact us if other specification
(Size,Impedance, Rated Current etc.) is needed.

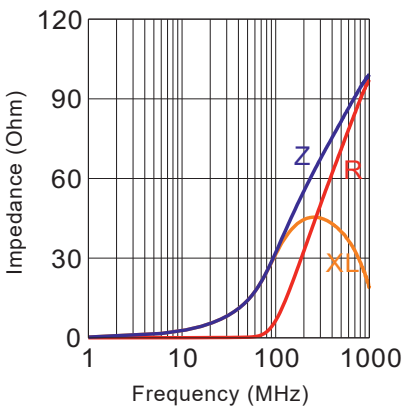
MLB-100505-0120S015



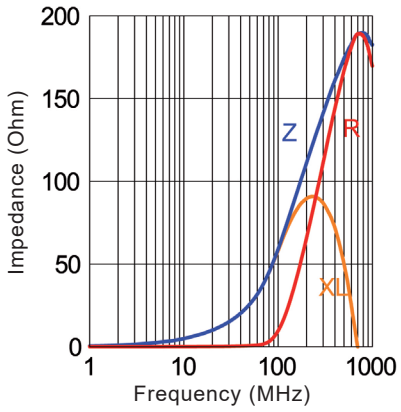
MLB-100505-0300S01



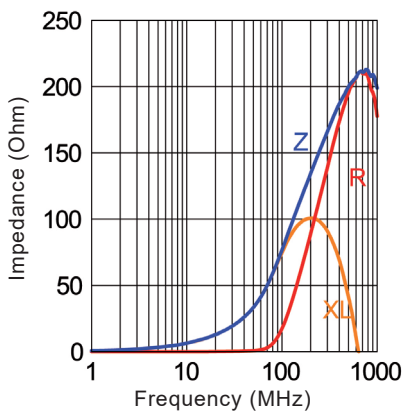
MLB-160808-0030S03



MLB-160808-0060S03



MLB-160808-0080S03



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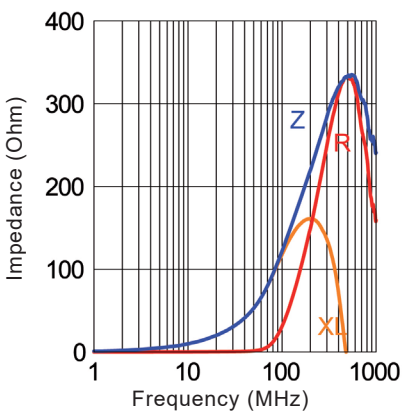
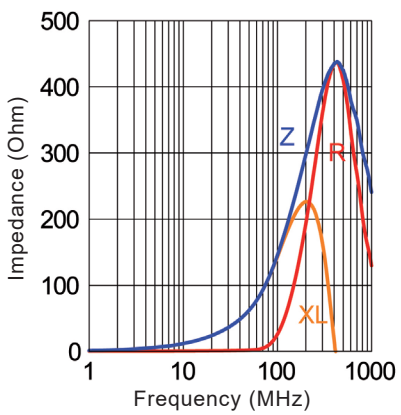
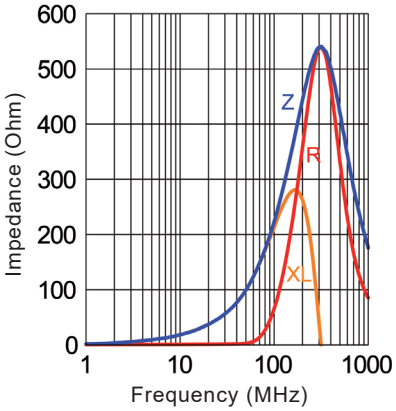


MLB-160808-0150S02

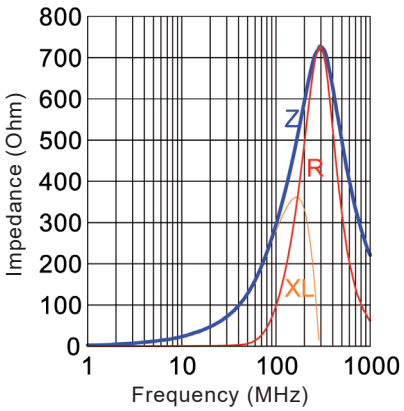


FERRITE CHIP BEAD FOR HIGH SPEED／MLB

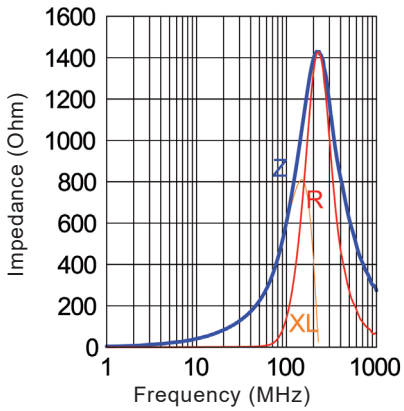
MLB-160808-0220S02



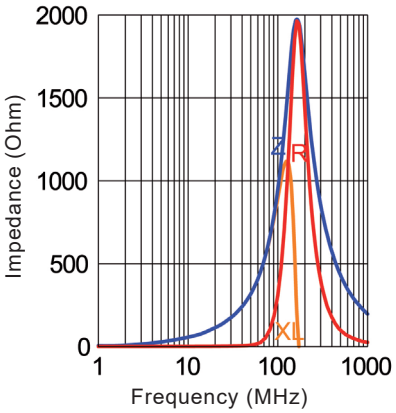
MLB-160808-0300S02



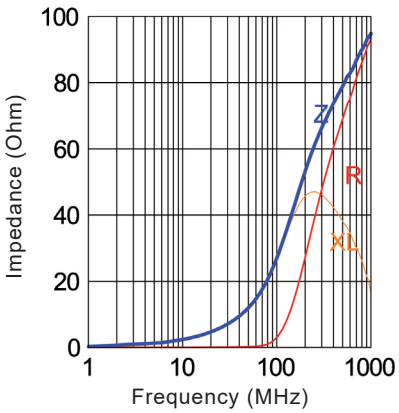
MLB-160808-0600S02



MLB-160808-1000S01



MLB-201209-0026S05



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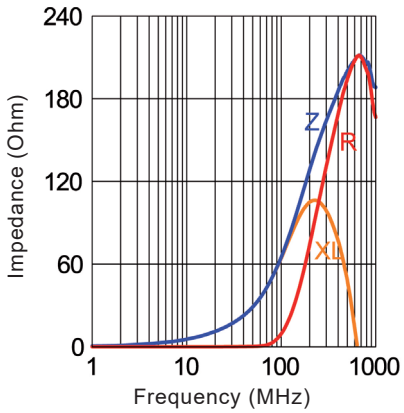

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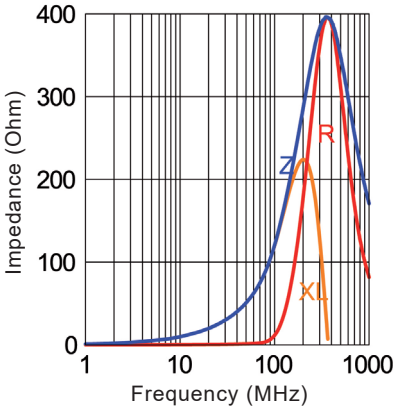

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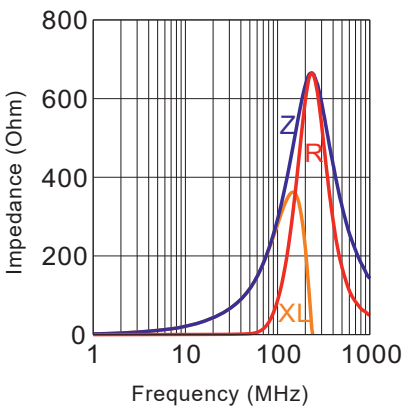

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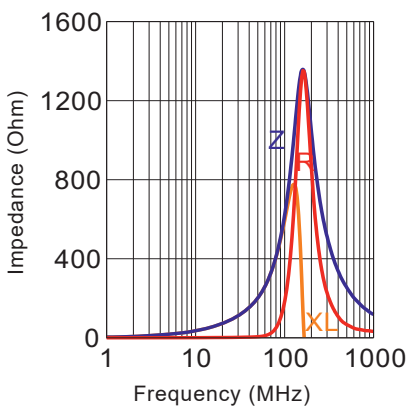

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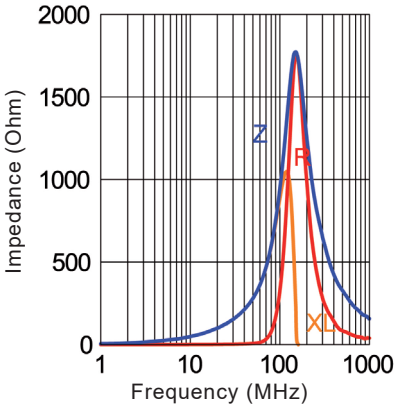
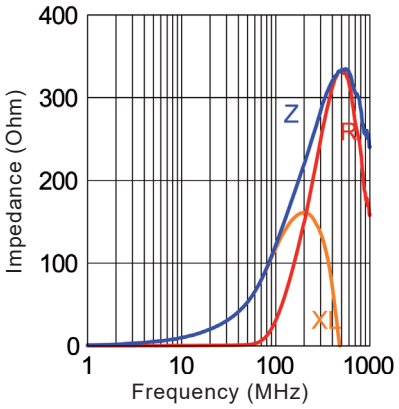
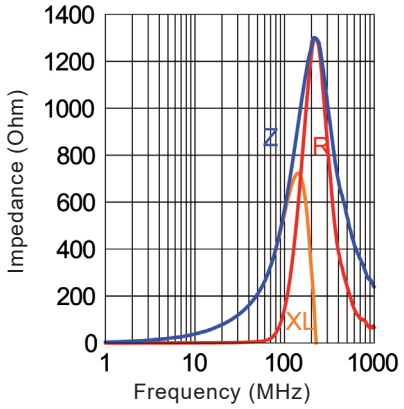


MLB-321611-0120S04



MLB-321611-0600S02



CHIP BEADS DESIGN KIT ESF-17CB

Various Chip Beads in compact booklet

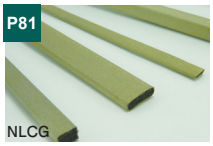
MEMO

GASKETS

SOFT

Stable performance provided with low-compression force

Foam



SOFT GASKET

CONDUCTIVE FOAM

Elastomer

CARBON RUBBER

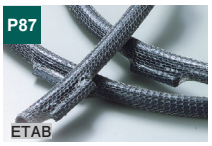
WIRE MESH

Wire braided mesh type

Wire mesh

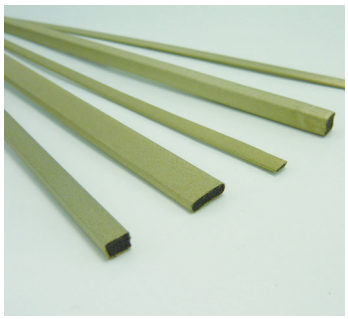
WIRE MESH

Wire mesh+Elastomer core



ELASTO MESH

ELASTO MESH



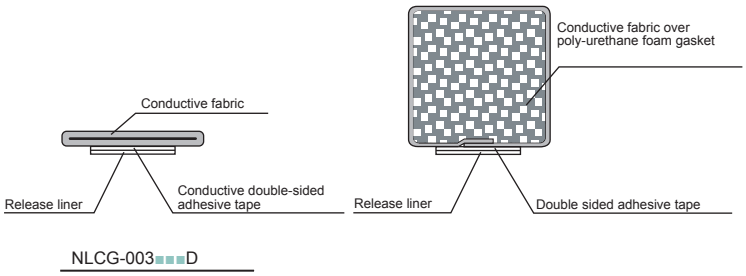
Stable electrical conductivity provided with low-compression force.

Feature

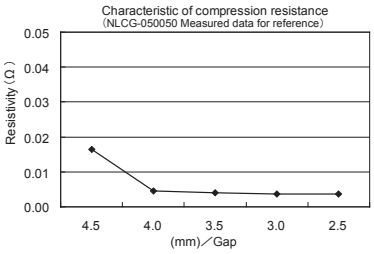
- Easy installation onto enclosure, etc. by adhesive tape.
  (Conductive adhesive tape is also available)
- UL94V-0 certified.(Conductive fabric over poly-urethane foam gasket portion.)
  (Except gaskets thinner 1.0 mm)
- UL94 VTM-0 certified adhesive tape.
  (Except conductive adhesive tape)
- Easy processing by scissors.
  (Please contact sales division for custom processing)
- Operating temperature range: -20°C to +70°C

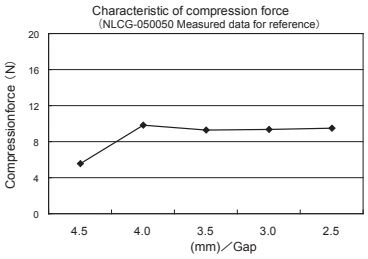
■ Standard length：1m

Structure



Properties





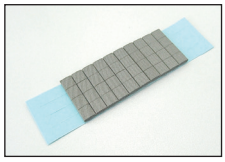
Part Number Guide

NLCG-■■■■■■ ■ L:■■■■

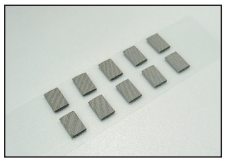
- Length in mm (not necessary for the standard length of 1 m)
- **Suffix "(D)":** *means customer can choose between conductive adhesive tape or adhesive tape.*
  Suffix "D ": *means conductive adhesive tape.*
  Suffix "NO TAPE": *means without adhesive tape.*
  Without Suffix: *means adhesive tape.*
- Width：e.g）050=5mm / 100=10mm
- Height：e.g）010=1mm / 120=12mm

e.g)：NLCG-010050 → Height 1mm × Width 5mm

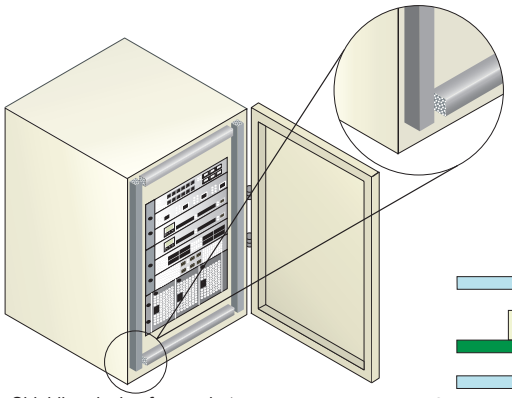
Secondary processing



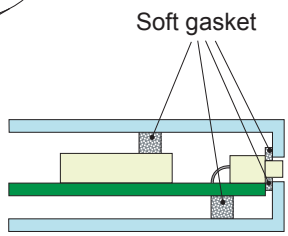
Kiss cut



Customized thin-out kiss cut



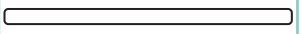
① Shielding design for gap between metal enclosure and door structure



② Stable grounding between PCB and Chassis

※All specifications and characteristics shown herein are subject to change without notice for improvements or changes in specification.
※Galvanic corrosion may occourby contact with other metals.

※The values are measured data for reference, not guaranteed.

NLCG-003030 D	NLCG-003050 D	NLCG-003300 D	NLCG-010030 (D)
Height:0.3mm Width:3mm	Height:0.3mm Width:5mm	Height:0.3mm Width:30mm	Height:1mm Width:3mm
NLCG-010040	**NLCG-010050 (D)**	**NLCG-010070 (D)**	**NLCG-010100 (D)**
Height:1mm Width:4mm	Height:1mm Width:5mm	Height:1mm Width:7mm	Height:1mm Width:10mm
NLCG-010130	**NLCG-010250**	**NLCG-015030 (D)**	**NLCG-015050 (D)**
Height:1mm Width:13mm	Height:1mm Width:25mm	Height:1.5mm Width:3mm	Height:1.5mm Width:5mm
NLCG-015070 (D)	**NLCG-015100 (D)**	**NLCG-020040**	**NLCG-020050 (D)**
 Height:1.5mm Width:7mm	 Height:1.5mm Width:10mm	 Height:2mm Width:4mm	 Height:2mm Width:5mm
NLCG-020060 (D)	**NLCG-020070 (D)**	**NLCG-020100 (D)**	**NLCG-020150**
 Height:2mm Width:6mm	 Height:2mm Width:7mm	 Height:2mm Width:10mm	 Height:2mm Width:15mm
NLCG-020210	**NLCG-020235 NT**	**NLCG-020350**	**NLCG-020510 NT**
 Height:2mm Width:21mm	 Height:2mm Width:23.5mm	 Height:2mm Width:35mm	 Height:2mm Width:51mm
NLCG-020560	**NLCG-025100 NT**	**NLCG-030040 (D)**	**NLCG-030050 (D)**
 Height:2mm Width:56mm	 Height:2.5mm Width:10mm	 Height:3mm Width:4mm	 Height:3mm Width:5mm

※**Suffix "(D)":** *means customer can choose between conductive adhesive tape or adhesive tape.*
※**Suffix "D ":** *means conductive adhesive tape.*
※**Suffix "NO TAPE":** *means without adhesive tape.*
※**Without Suffix:** *means adhesive tape.*
※The values are measured data for reference, not guaranteed.

NLCG-030100 (D)

Height:3mm Width:10mm

NLCG-035090

Height:3.5mm Width:9mm

NLCG-035120

Height:3.5mm Width:12mm

NLCG-040040

Height:4mm Width:4mm

NLCG-040050 (D)

Height:4mm Width:5mm

NLCG-040080 (D)

Height:4mm Width:8mm

NLCG-040100 (D)

Height:4mm Width:10mm

NLCG-040130

Height:4mm Width:13mm

NLCG-050050 (D)

Height:5mm Width:5mm

NLCG-050080

Height:5mm Width:8mm

NLCG-050100 (D)

Height:5mm Width:10mm

NLCG-050150 D

Height:5mm Width:15mm

NLCG-060060

Height:6mm Width:6mm

NLCG-060100

Height:6mm Width:10mm

NLCG-065060

Height:6.5mm Width:6mm

NLCG-070100

Height:7mm Width:10mm

NLCG-070130

Height:7mm Width:13mm

NLCG-080080

Height:8mm Width:8mm

NLCG-080100 (D)

Height:8mm Width:10mm

NLCG-095090

Height:9.5mm Width:9mm

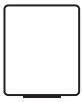
NLCG-100100

Height:10mm Width:10mm

NLCG-100120

Height:10mm Width:12mm

NLCG-120100 (D)

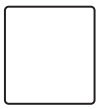


Height:12mm Width:10mm

NLCG-130100 (D)

Height:13mm Width:10mm

NLCG-130120 NT



Height:13mm Width:12mm

NLCG-150150

Height:15mm Width:15mm

※**Suffix "(D)":** *means customer can choose between conductive adhesive tape or adhesive tape.*
※**Suffix "D ":** *means conductive adhesive tape.*
※**Suffix "NO TAPE":** *means without adhesive tape.*
※**Without Suffix:** *means adhesive tape.*
※The values are measured data for reference, not guaranteed.

SOFT GASKET／NLCG R-PROFILE

Size variation Rectangular Profile

●: Double sided adhesive tape type
○: Conductive adhesive tape type

Height \ Width	3	4	5	6	7	8	9	10	12	13	15	21	23.5	25	30	35	51	56
0.3	○		○												○			
1	●○	●	●○		●○			●○		●				○	○			
1.5	●○		●○		●○			●○										
2		●	●○	●○	●○			●○			●	●				○		●
2.5																		
3		●○	●○					●○										
3.5							○		○									
4		●○	●○			●○		●○		○								
5			●○			●		●○			○							
6				●				●										
6.5				●														
7								●		●								
8						●		●○										
9.5							●		●○									
10								●	●									
12								●○										
13								●○										
15											●							

Unit: mm

SOFT GASKET／NLCG D-PROFILE

NLCG-D015030 (D)

Height:1.5mm Width:3mm

NLCG-D020050 NT

Height:2mm Width:5mm

NLCG-D025020 D

Height:2.5mm Width:2mm

NLCG-D030030 (D)

Height:3mm Width:3mm

NLCG-D030070

Height:3mm Width:7mm

NLCG-D035030 NT

Height:3.5mm Width:3mm

NLCG-D040060

Height:4mm Width:6mm

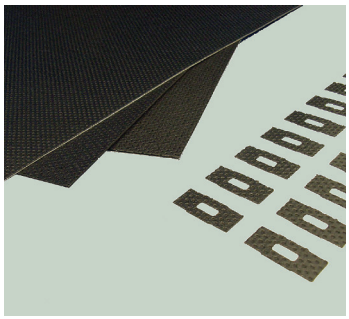
NLCG-D065090

Height:6.5mm Width:9mm

NLCG-D095120 (D)

Height:9.5mm Width:12mm

※**Suffix "(D)":** *means customer can choose between conductive adhesive tape or adhesive tape.*
※**Suffix "D ":** *means conductive adhesive tape.*
※**Suffix "NO TAPE":** *means without adhesive tape.*
※**Without Suffix:** *means adhesive tape.*
※The values are measured data for reference, not guaranteed.



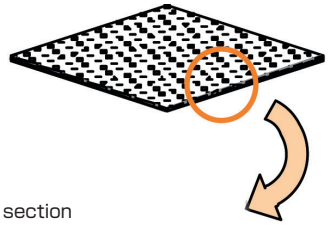
Thin EMI sheet gasket made with conductive foam

Feature

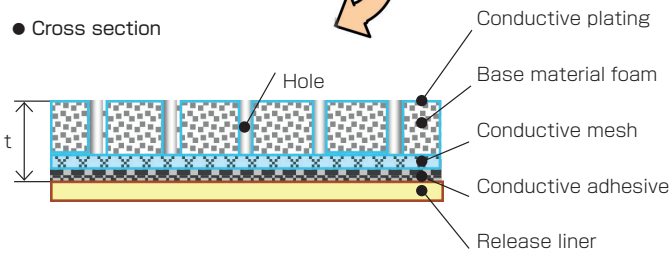
- Suitable solution for grounding for space saving areas such as mobile equipments, flat panel monitors etc.
- Thin and well cushioned foam gasket.
- Through hole process is provided. Conductivity between top and bottom surface is available. Custom profiles such as cutting, punching etc. are also available. (Conductive adhesive is used.)

Product structure

● Outline



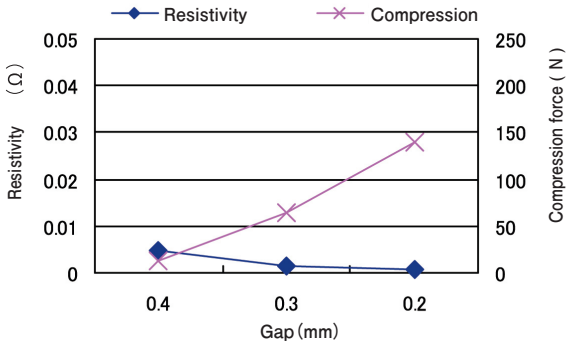
● Cross section



Properties

● Compression vs. Contact resistance (XYT-0.5)

Size: 25 x 25 mm



Specifications

Part No.	XYT-0.3	XYT-0.5	XYT-0.7
Base material	Foam: Olefinic foam / Mesh: Polyester		
Plating	Ni-Sn/Cu plating		
Conductive adhesive	Acrylic conductive adhesive		
Color	Black		
Total thickness t (mm)	0.3	0.5	0.7
Resistivity in the thickness direction (25mm² / 1kg load)	< 0.1 Ω		
Peel adhesion at 180°(25mm width)	Min 1kgf		

※All specifications and characteristics shown herein are typical values, but are not guaranteed.
※All specifications and characteristics shown herein are subject to change without notice for improvements or changes in specification.

CARBON RUBBER／CSR

Carbon filled silicone based rubber.

Feature

- Carbon Rubber is a good shielding gasket and an excellent environmental seal.
- Excellent formability available , various extruded shapes as shown below.

Material

- Conductive silicone

- Standard length: 10m

R type

Unit: mm

Part No.	A
CSR-R-15	1.5
CSR-R-20	2.0
CSR-R-30	3.0
CSR-R-40	4.0
CSR-R-50	5.0

O type

Unit: mm

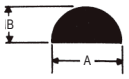
Part No.	A	B
CSR-0-25-15	2.5	1.5
CSR-0-60-30	6.0	3.0
CSR-0-65-30	6.5	3.0
CSR-0-100-65	10.0	6.5

P type

Unit: mm

Part No.	A	B	C
CSR-P-125-50	12.5	5.0	6.0
CSR-P-170-72	17.0	7.2	7.5
CSR-P-240-77	24.0	7.7	11.0

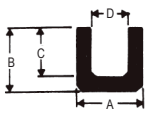
D type



Unit: mm

Part No.	A	B
CSR-D-40-15	4.0	1.5
CSR-D-45-25	4.5	2.5

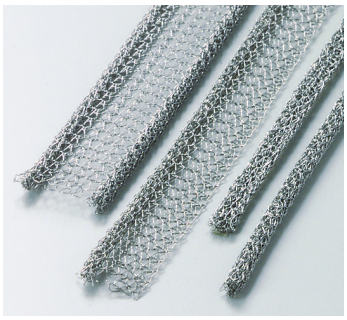
U type



Unit: mm

Part No.	A	B	C	D
CSR-U-48-48	4.8	4.8	3.2	1.6
CSR-U-55-110	5.5	11.0	8.0	2.5
CSR-U-80-130	8.0	13.0	9.5	3.5
CSR-U-95-130	9.5	13.0	9.5	5.0

WIRE MESH／WMS・WMR・WMH・WMD



Standard wire mesh gaskets

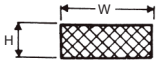
Feature

- Mesh structure conforms to irregular surfaces providing reliable shielding effects.
- No unbraiding or wire loosening type also available, allowing cutting to desired length.

Material

- Nickel-copper alloy (Monel) wire
- Custom cutting is available up on request

Rectangular



Unit: mm

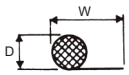
Part No.	H	W
WMS-15-15-M	1.5	1.5
WMS-15-32-M	1.5	3.2
WMS-23-23-M	2.3	2.3
WMS-23-32-M	2.3	3.2
WMS-32-32-M	3.2	3.2
WMS-32-39-M	3.2	3.9
WMS-47-47-M	4.7	4.7

Round

Unit: mm

Part No.	D
WMR-18-M	1.8
WMR-24-M	2.4
WMR-32-M	3.2
WMR-39-M	3.9
WMR-47-M	4.7
WMR-63-M	6.3
WMR-92-M	9.2

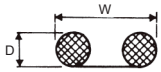
P section



Unit: mm

Part No.	D	W
WMH-19-95-M	1.9	9.5
WMH-25-128-M	2.5	12.8
WMH-32-126-M	3.2	12.6
WMH-63-158-M	6.3	15.8

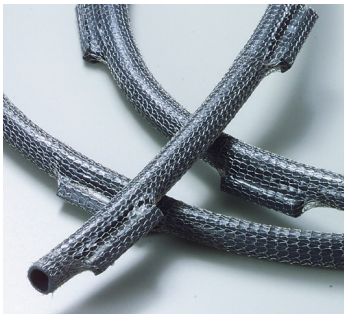
Double P section



Unit: mm

Part No.	D	W
WMD-19-92-M	1.9	9.2
WMD-19-126-M	1.9	12.6
WMD-19-158-M	1.9	15.8
WMD-25-126-M	2.5	12.6

ELASTO MESH／ETAB



Elastomer core with arrowhead allows easy installation on enclosures.

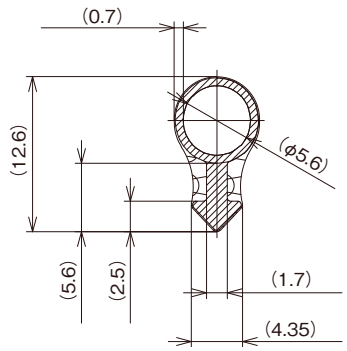
Feature

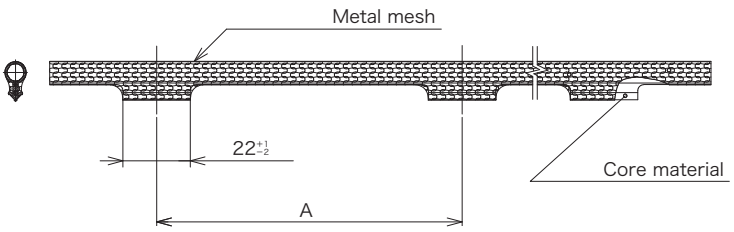
- Easier installation compared with conventional formed gaskets (rectangular or round).
- Small compression force, the special structure prevents fall-off of the gasket.
- No unbraiding or wire loosening type, allowing cutting to desired length.

Material

- Metal mesh / Nickel-copper alloy (Monel) wire
- Core material / Silicone

Cross-section

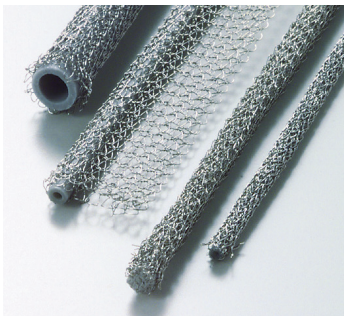




Unit: mm

Part No.	A
ETAB-79.5-***-***	79.5 +1 −2
ETAB-100 -***-***	100 +1 −2

*** indicates overall length and the length between the cut face and the starting point of the arrowhead.(Contact us for the details.)



Wire mesh gasket with an excellent elasticity elastomer core

Feature

- EMI/RFL gasket with silicone or chloroprene etc core enclosed in a wire mesh.
- High effectiveness can be gained with excellent elasticity and form recovery properties providing secure contact between the wire mesh and the metal face.

Material

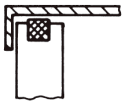
- Metal mesh / Nickel-copper alloy (Monel) wire
- Core material / Refer to the table below

■ Standard length: 10m

End of Part number	Material	
LS	Chloroprene Rubber	Latex Sponge
SS	Silicone	Sponge
ST		Tube

Installation example

Rectangular

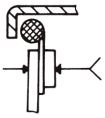


Insertion in groove assembly

Round

Rectangular

Adhesive assembly

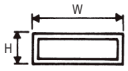


Spot-welding assembly

P section

Rivet assembly

Rectangular



Unit: mm

Part No.	H	W
EMS-100-100-MLS	10	10
EMS-100-200-MLS	10	20
EMS-120-200-MLS	12	20
EMS-150-150-MLS	15	15
EMS-150-200-MLS	15	20
EMS-200-200-MLS	20	20

(Latex sponge core type is available)

Unit: mm

Part No.	H	W
EMS-16-32-MSS	1.6	3.2
EMS-32-32-MSS	3.2	3.2
EMS-32-47-MSS	3.2	4.7
EMS-47-47-MSS	4.7	4.7

(Wire-loosening protection type is available)

Round (Gasket type)

Unit: mm

Part No.	D
EMR-15-MST	1.5
EMR-18-MST	1.8
EMR-24-MST	2.4
EMR-32-MST	3.2
EMR-47-MST	4.7
EMR-62-MST	6.2

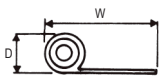
(Wire-loosening protection type is available)

Round (Cable shield type)

Unit: mm

Part No.	D1	D2
EMC-40-20-MST	4.0	2.0
EMC-60-40-MST	6.8	4.0

P section



Unit: mm

Part No.	D	W
EMH-32-126-MST	3.2	12.6

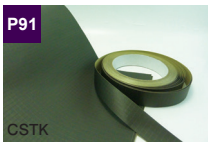
CONDUCTIVE TAPES／SHEETS

CONDUCTIVE FABRIC

Conductive fabric tape

Conductive fabric

P91



CONDUCTIVE FABRIC TAPE

METAL FOIL

Low-resistivity type using embossed metal foil and conductive adhesive material.

Metal foil

Standard type

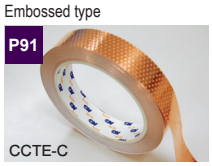
P90

CONDUCTIVE TAPE

Metal foil (embossed)

Embossed type

P91



COPPER EMBOSSING TAPE

CLEAR CONDUCTIVE FILM

ITO, Indium Tin Oxide, conductive film has superior optical transparency.

Transparent Conductive Film

P92

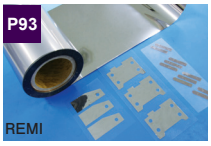
TRANSPARENT
CONDUCTIVE FILM

THIN FILM

Super-thin conductive film with thickness of 35 μm.

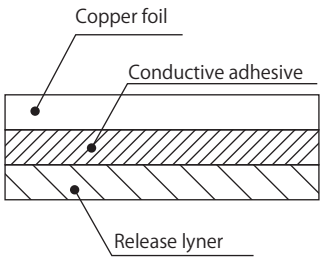
Thin film

P93



REMILESS

CONDUCTIVE TAPE／CCT



Thin and flexible metal foil tape backed by a conductive filler adhesive

Feature

- Highly conductive adhesive provides high shielding effectiveness.
- Easy punching and half-cutting to optimal configurations.

Material

- Base material / CCT-C : Copper foil
  CCT-A : Aluminum foil
- Adhesive layer / Conductive adhesive

- Standard length:20m

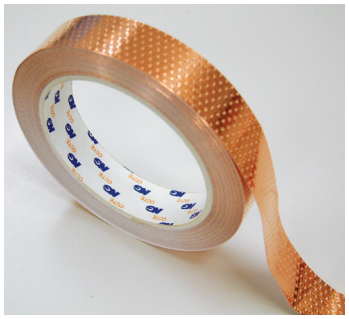
※Custom cuting is available upon request.

Part No.	Width (mm)	Thickness (mm)	adhesive strength	Resistivity
CCT-8-C	8	0.075	9.4N/25mm	0.004 Ω/inch²
CCT-10-C	10			
CCT-13-C	13			
CCT-20-C	20			
CCT-25-C	25			
CCT-50-C	50			
CCT-100-C	100			
CCT-600-C	600			
CCT-250-C※1	(□250)			
CCT-A4-C※1	(A4)			
CCT-6-A	6	0.09	8.6N/25mm	0.008 Ω/inch²
CCT-8-A	8			
CCT-15-A	15			
CCT-20-A	20			
CCT-25-A	25			
CCT-A4-A※1	(A4)			

※1)Sheet type

※The values are measured data for reference, not guaranteed.

COPPER EMBOSSING TAPE／CCTE-C



Embossed parts of the metal foil make direct contact with the object

Feature

- Embossed parts are bent to provide direct contact with the object.
- Large contact area provides stable contact.

Material

- Rolled copper foil
- Standard length:20m

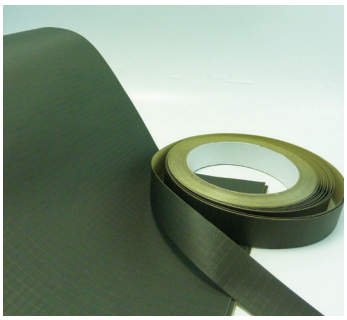
※Custom cuting is available up on request.

Part No.	(mm) Width	(mm) Thickness	adhesive strength	Resistivity
CCTE-10-C	10	0.13	10.1 N/20mm／Width	0.01 Ω/□20mm
CCTE-20-C	20			
CCTE-A4-C※1	(A4)			

※ 1)Sheet type

※The values are measured data for reference, not guaranteed.

CONDUCTIVE FABRIC TAPE／CSTK



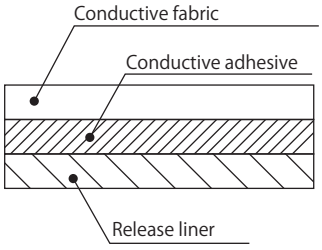
Thin and durable carbon-coated type

Feature

- Carbon-coating protects from the galvanic corrosion suffered by metal foils.
- Carbon-coated special knitting provides no yarn-loosening or fuzz on the surface.
- Carbon-coated tape with low resistivity, effective against electrostatic discharge.

Material

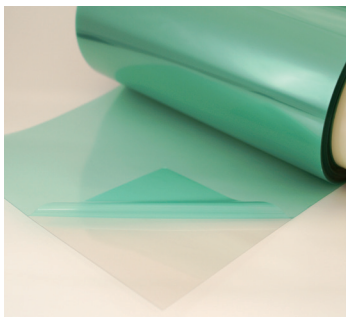
- Conductive woven fabric / Cu-Ni plated woven fabric with carbon-coating (UL510FR)
- Standard length: 20m



Part No.	(mm) Width	(mm) Thickness	adhesive strength	Resistivity
CSTK-008	8	0.1	8.53 N/25mm/Width	0.04 Ω/□20mm
CSTK-010	10			
CSTK-015	15			
CSTK-020	20			
CSTK-025	25			
CSTK-030	30			
CSTK-040	40			
CSTK-060	60			
CSTK-250	250			
CSTK-300	300			

※The values are measured data for reference, not guaranteed.

TRANSPARENT CONDUCTIVE FILM／WINAL



Sheet Film improving design for EMC and electro static discharge of LCD and its peripheral components.

Feature

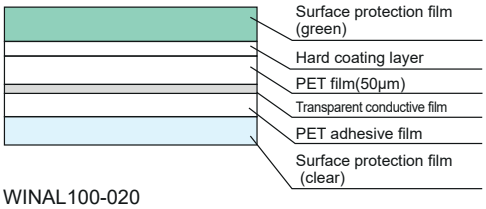
- Low surface electric resistance gives higher shielding effectiveness.
- Electrically conductive film with superior optical transparency.
- Flexible sheet film allows custom sheet cutting, punching, adhesive tape attachment etc. upon request.

Material

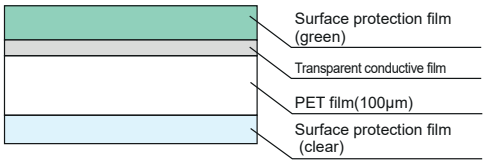
- Base material/PET film
- Surface protection film
- Transparent conductive film

■ Product structure

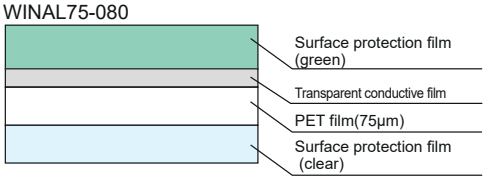
WINAL50-005



WINAL100-020



WINAL75-080

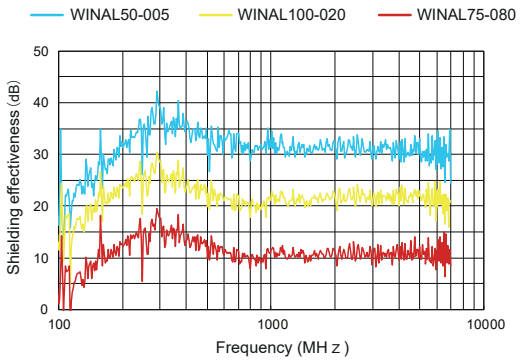


■Properties

Item	Unit	Standard	WINAL50-005	WINAL100-020	WINAL75-080
Product thickness※1	μm	–	94	100	75
Surface resistance	Ω/□	JIS K 7194	5	20	80
Total light transmittance	%	JIS K 7136	76		
Surface temperature range for use	℃	–	−30～80		
Flame resistance	—	UL94	—	VTM-2 equivalent	

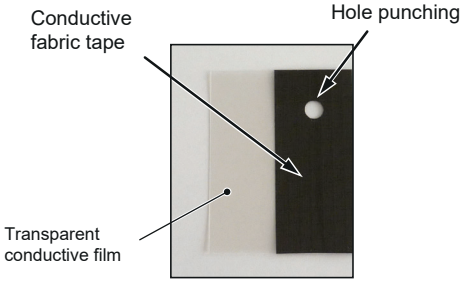
※1）Surface protection film not included

■ Electric shielding properties（MIL-STD-285）

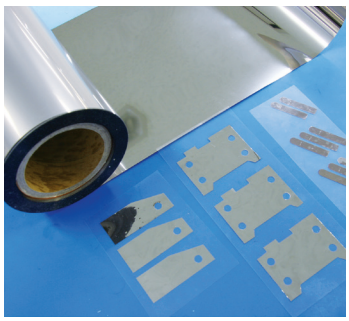


■ Additional process

- Attaching conductive fabric tape
- Cutting in any size
- Holepunching, etc.



※The values are measured data for reference, not guaranteed.



Super-thin surface-conductive film

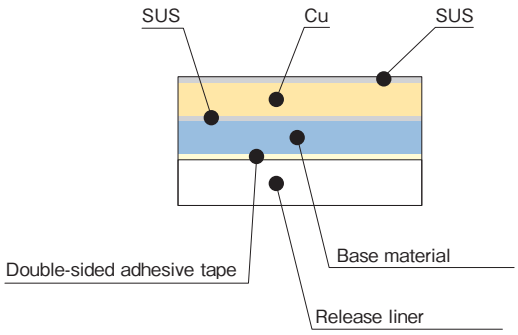
Feature

- Overall thickness 35μm (-FS,-SC)
- Provides high-shielding effectiveness and galvanic corrosion resistance.
- Safer handling compared with metal foil tapes.
- Suitable noise control for flexible cables.

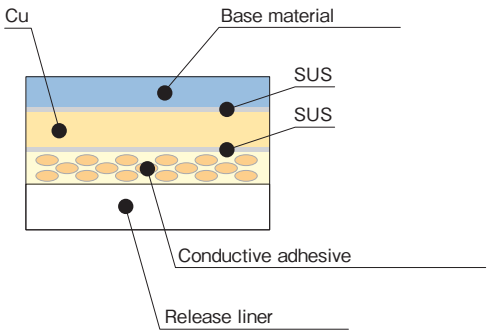
Material

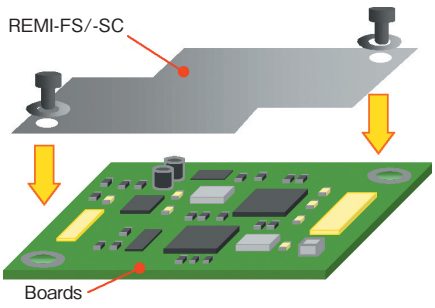
- Base material / PET(-FS,-FA) PPS(-SC,-AC)
- Metal membrane / SUS・Cu

REMI-FS/-SC（Surface conductive type）

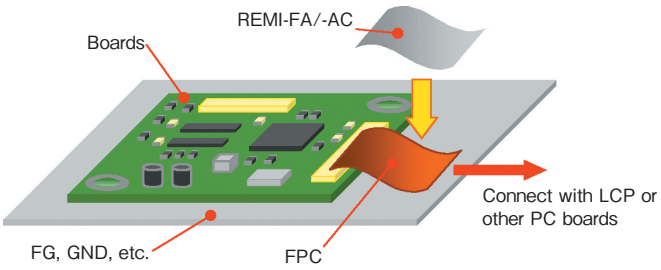


REMI-FA/-AC（Adhesive layer conductive type）



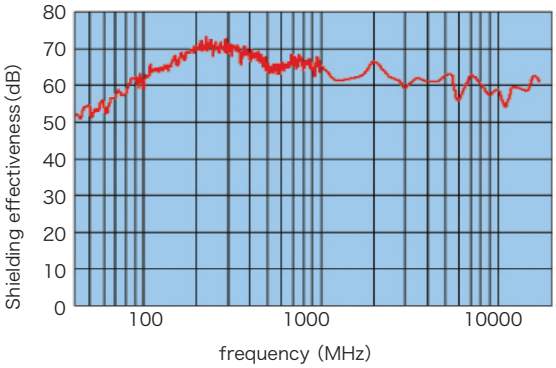


Application example) Shielding small boards using metal membrane face



Application example) Shielding and frame-grounding for FPC

Property



The values are measured data for reference, not guaranteed.

	REMI-FS	REMI-FA	REMI-SC	REMI-AC
Base material	PET		PPS	
Metal membrane	SUS/Cu			
Surface resistance[1] (Ω／□)	＜0.5		＜0.5	
Overall thickness (mm)	0.035	0.055	0.035	0.055
Flame retardant	—	—	UL94 VTM-0※2 Equivalent to UL94 VTM-0	UL510 FR

※ 1)Measured in film state ※ 2)Double-sided adhesive tape excluded

CABLE SHIELDS

WIRE MESH

Metal wire braided mesh

WIRE MESH

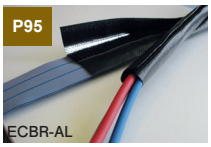
MESH TAPES

JACKETS

Jacket type can be assembled on wired cables.

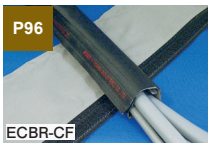
Hook and loop fastener type

Aluminium foil



CABLE SHIELD

Conductive fabric

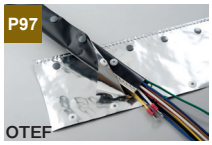


CABLE SHIELD

Zipper type

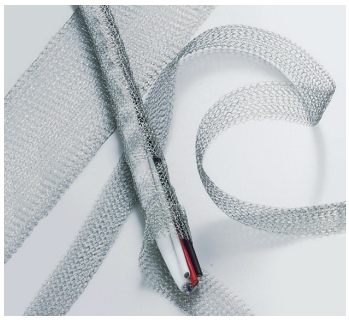
SHIELD TUBE

Snap type



SHIELD TUBE

MESH TAPE／MT



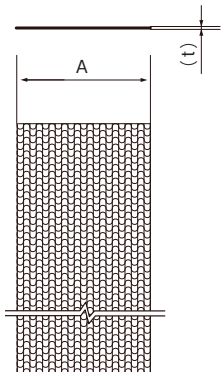
Extremely fine (0.12mm) metal wires braided into a cylinder mesh provides excellent flexibility

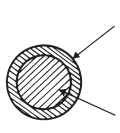
Feature

- Flexible material can be used by wrapping around cables or inserting cables in the mesh cylinder.

Material

- SN plated copper wire



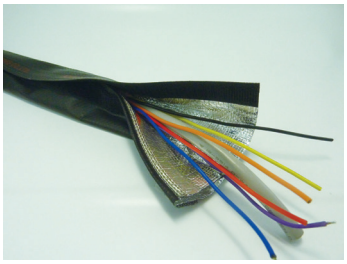


Unit: mm

Part No.	Dimensions	
	A	(t)
MT-17-CT	17	0.4
MT-25-CT	25	
MT-30-CT	30	
MT-35-CT	35	
MT-40-CT	40	
MT-55-CT	55	0.8
MT-85-CT	85	
MT-95-CT	95	
MT-120-CT	120	
MT-150-CT	150	
MT-175-CT	175	
MT-230-CT	230	

Contact us for other sizes not listed above.

CABLE SHIELD／ECBR-AL



Hook and loop fastener allows for easy assembly

Feature

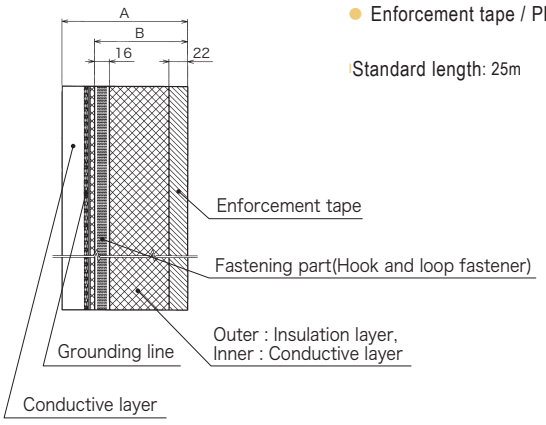
Installation on pre-wired cables or later insertion of additional cables is possible.

- Hook and loop fastener is attached on the fabric by melting so can be easily cut to the intended length without tape detachment.

Material

- Conductive layer / Aluminium foil
- Insulation layer / PET fabric based urethane
- Fastening part / Nylon
- Grounding line / Sn plated copper wire
- Enforcement tape / PET fabric based polyurethane

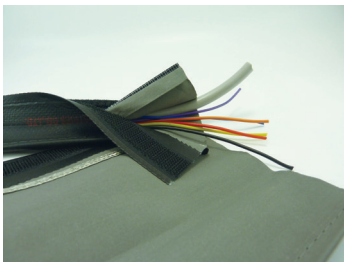
Standard length: 25m



Unit: mm

Part No.	A	B
ECBR-AL-15G	83	64
ECBR-AL-20G	135	100
ECBR-AL-30G	165	130
ECBR-AL-40G	195	160
ECBR-AL-50G	240	195
ECBR-AL-70G	295	240
ECBR-AL-100G	415	350

CABLE SHIELD／ECBR-CF



Highly flexible cable shield using conductive fabric.

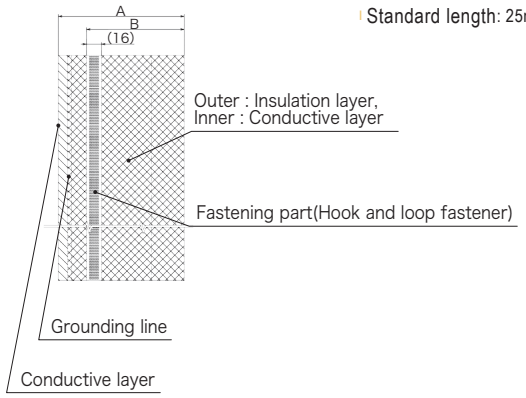
Feature

- Light weight and flexibility allowing winding along the cable.
- Assembly on pre-wired cables or later insertion of additional cables is possible.

Material

- Ni/Cu conductive fabric
- Insulation layer / PET fabric based urethane
- Fastening part / Nylon
- Grounding line / Sn plated copper wire

Standard length: 25m



Unit: mm

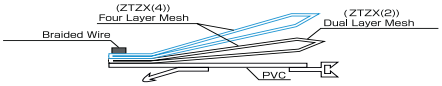
Part No.	A	B
ECBR-CF-20G	134	104
ECBR-CF-30G	164	134
ECBR-CF-40G	194	164
ECBR-CF-50G	224	194

SHIELD TUBE／ZTZX

Protective, Voltage Proof Sealing material

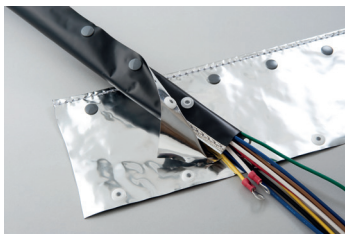
Feature

- Can easily be attached even after wiring has been connected
- Features our unique (Zipper Closing Mechanism), perfect for lengthwise closures
- ZT Pliers make bundling quick and easy
- Zipper Closing Mechanism ensures super strong closure mating



Item Name	ZTZX(2)	ZTZX(4)
Standard Length	25m	
Diameter(φ)	15,20,25,30,40,50,70,100	
Sheet	FR flexible PVC	
	Thickness：0.5mm	
Closing Mechanism	Zipper(FR semirigid PVC)	
Braided Ground Wire	Tin-plated soft copper wire	
Additional Shielding Material	Metallic Mesh(Dual Layer) Tin-plated soft copper wire	Metallic Mesh(Four Layer) Tin-plated soft copper wire
Color	Black	
Operating Temperature	−15~+105℃ (Sheet)	

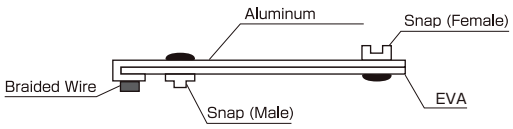
SHIELD TUBE／OTEF



Environment-friendly type with PVC-free sheet

Feature

- Can easily be attached even after wiring has been connected

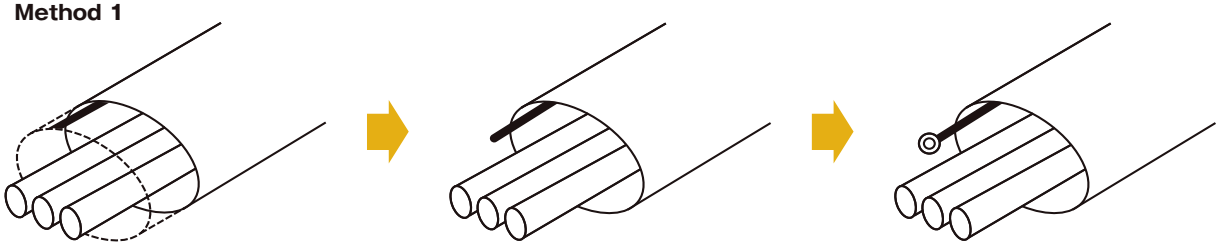


Item Name	OTEF
Standard Length	50m
Diameter (φ)	10,15,20,25,30,40,50,70,100
Sheet	FR EVA+PET film+AL foil (FR : UL94 VTM-2-equivalent product)
	22-961K RRSMCT : 「FR」
	Thickness：0.24mm
Closing Mechanism	Snap (FR polyacetal resin) /UL94 HB
Braided Ground Wire	Tin-plated soft copper wire
Color	Black
Operating Temperature	−15~+60℃

Shiel Tubing Installation Guide～Grounding method～

AL foil type

Method 1



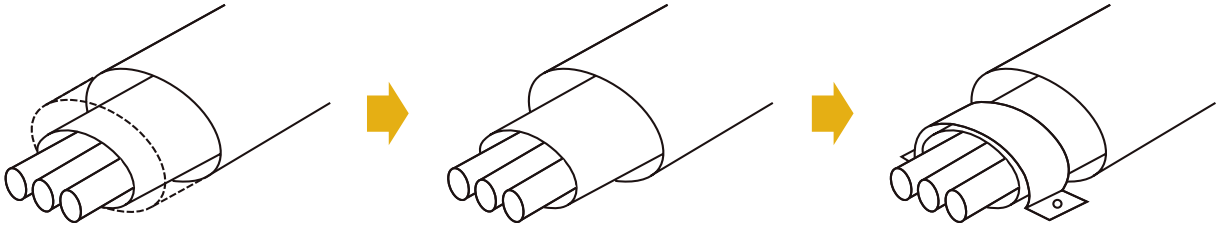
Cut extra length of sheet material to get the desired length of the braided grounding wire.

Expose the grounding wire.

Put a terminal on the grounding wire and connect to ground.

Mesh / Conductive Cloth Type

Method 2 (or 1)



The shielding material, mesh or conductive fabric, in side of the tube could be used for grounding. Cut extra length of sheet material to get the desired length of the shielding material.

Expose the shielding material, mesh or conductive fabric.

Apply an earth clamp over the shielding material and connect to ground.

ZT Pliers

Products with this mark, please use the dedicated zipper type pliers.

EMC CENTER

Total support to the EMC compliance design.

● Please contact us for the scope of the VLAC accreditation.

Feature

Measurements for standards (IEC/CISPR, EN, VCCI, ECE R10)

- VLAC (Voluntary EMC Laboratory Accreditation Center) accredited laboratory with ISO 17025.
- VCA(Vehicle Certification Agency) accredited test site.
- VCCI registered test site.
- MAZDA registered laboratory
- Testing and measurements performed by iNARTE (The interNational Association of Radio & Telecommunications Engineers, Inc.) certified engineers and technicians.

EMC test for on-board units (on-board electronic/electrical units, PHV/EV charger)

- CISPR 25 Emission measurement.
- ISO 11452-4: 2011 ※ TWC test can be performed.
- IEC 61851-21

EMC test for medical electrical equipment according to latest edition

- IEC 60601-1-2: 2014, EN 60601-1-2: 2015, JIS T 0601-1-2: 2018.
- Immunity test to proximity fields from RF wireless communications equipment (new test item) can be performed.

On site support

- Our engineer will visit customer's laboratories, factories or sites to provide technical support for noise management.

Consulting Services

- Consulting for CE marking or various international standards, and EMC design support service.

EMC Center

1423-101, Aza-Tonmyo, Akechi-cho, Kasugai, Aichi 480-0303

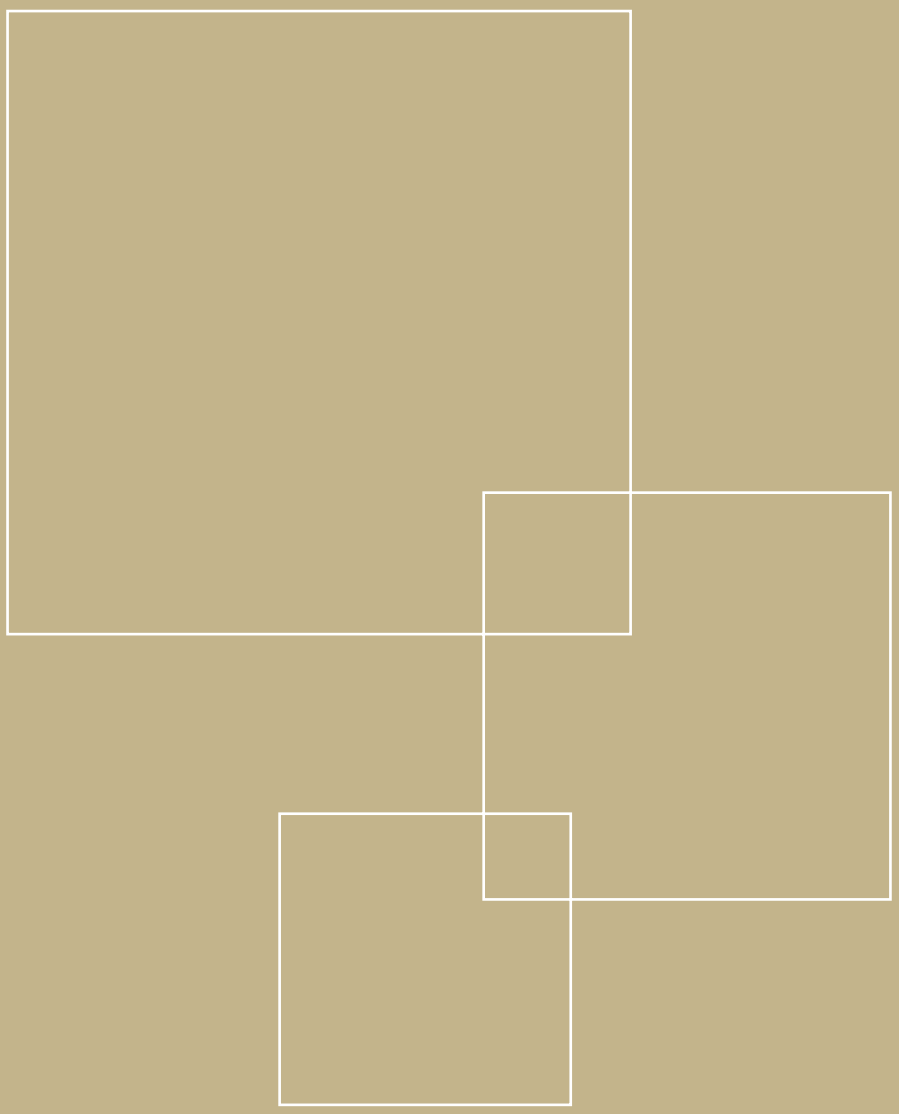
Tel.0568-88-7999 Fax.0568-93-0686

https://www.techno-kitagawa.com/product/emc-list/emc-center

Test room	Effective size	Power source	Turntable	Notes
10m electro-magnetic semi-anechoic chamber	9.9(W)×17.4(D)×7.7(H)m Door dimensions: 2.5(W)×2.5(H)m	AC Single-phase 2-wire ～300V(50/60 Hz, 12kVA(MAX60A)) AC Single-phase 3-wire ～300V(50/60 Hz, 8kVA) AC Three-phase 3-wire / 4-wire ～480V(50/60 Hz, 12kVA) DC ～420V(8kVA)	φ 3.0m MAX 3000kg Underground pit	Immunity test for medical electrical equipment to proximity fields from RF wireless communications equipment can be performed.
3m electro-magnetic semi-anechoic chamber	5.4(W)×8.3(D)×5.2(H)m Door dimensions: 2.0(W)×2.0(H)m	AC Single-phase 2-wire ～300V(50/60 Hz, 9kVA(MAX60A)) AC Single-phase 3-wire ～300V(50/60 Hz, 6kVA) AC Three-phase 3-wire / 4-wire ～480V(50/60 Hz, 9kVA) DC ～420V(6kVA)	φ 2.0m MAX 500kg	–
Shielded room	5.0(W)×6.4(D)×3.1(H)m Door dimensions： 2.0(W)×2.0(H)m	AC Single-phase 2-wire ～300V(50/60 Hz, 4kVA) DC ～420V(6kVA)※1	–	–

※1) Shared with the 3 m method anechoic chamber

Part Name／Part No. INDEX



ISO Certificate

SGS TÜV SAAR

Certificate DE12/81839360

SGS

The management system of

KGS KITAGAWA GmbH

Birkenwaldstraße 38
D-63179 Obertshausen

SYSTEM CERTIFICATION ISO 9001 SGS

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities

Trading of electronic components and EMC solutions

This certificate is valid from 16.06.2018 until 15.06.2021 and remains valid subject to satisfactory surveillance audits.
Re certification audit due before 18.04.2021
Issue 4
The audit leading to this certificate commenced on 16.04.2018
Previous issue certificate validity date was until 15.06.2021

Authorised by

ppa Jan Meemken
Director CBE Germany

Hagen Senne
Head of Certification Body

DAkkS Deutsche Akkreditierungsstelle D-ZM-12088-01-00

SGS-TÜV Saar GmbH
Am TÜV 1 66280 Sulzbach (Germany)
e-mail: de.cbe.zertifizierung@sgs.com www.sgs-tuev-saar.com

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SGS TÜV SAAR

Certificate DE12/81839359

SGS

The management system of

KGS KITAGAWA GmbH

Birkenwaldstraße 38
D-61379 Obertshausen

SYSTEM CERTIFICATION ISO 14001 SGS

has been assessed and certified as meeting the requirements of

ISO 14001:2015

For the following activities

Trading of electronic components and EMC solutions

This certificate is valid from 16.06.2018 until 15.06.2021 and remains valid subject to satisfactory surveillance audits.
Re certification audit due before 18.04.2021
Issue 3
The audit leading to this certificate commenced on 16.04.2018
Previous issue certificate validity date was until 15.06.2018

Authorised by

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Director CBE Germany

Hagen Senne
Head of Certification Body

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SGS-TÜV Saar GmbH
Am TÜV 1 66280 Sulzbach (Germany)
e-mail: de.cbe.zertifizierung@sgs.com www.sgs-tuev-saar.com

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IATF 16949

Management System Certificate

CERTIFIED JQA MANAGEMENT SYSTEM IATF 16949

Certificate Number : JQA-AU0368/IATF Certificate Number:0453315 1 / 2

Organization :
KITAGAWA INDUSTRIES CO., LTD.
KASUGAI FACTORY
1423-101 AZA-TONMYO, AKECHI-CHO, KASUGAI-CITY, AICHI, JAPAN

Scope of Registration:
·CUTTING OF SOFT GASKETS AND ELECTROMAGNETIC NOISE SUPPRESSION SHEETS.
·DESIGN AND MANUFACTURING OF FERRITE PRODUCTS FOR ELECTROMAGNETIC COMPATIBILITY MEASURES.
·DESIGN AND MANUFACTURING OF INJECTION MOLDED PARTS.
·DESIGN AND MANUFACTURING OF HEAT TRANSFER SHEETS AND ANTI-VIBRATION SHEETS.

JQA (IAOB-1016) certifies that the above organization operates the Quality Management System within the above scope and complies with the requirements of the following standard:

IATF 16949:2016

Last Renewal Date : July 8, 2022

Expiry Date : July 7, 2025

Feel free to contact JQA for the validity of this certificate.

N. Kobayashi

NORIAKI KOBAYASHI
PRESIDENT
1-25 KANDASUDACHO, CHIYODA-KU, TOKYO, JAPAN

JAPAN QUALITY ASSURANCE ORGANIZATION
To be used in conjunction with attached Appendix.

JQA

17.05 D7501167E

GENERAL TERMS OF DELIVERY AND PAYMENT

1. Scope

1.1 The following General Terms of Delivery and Payment shall be applicable – provided nothing to the contrary is stipulated in writing – to all of the deliveries and other performance effected by us.

1.2 Deviating General Terms of Business of the Purchaser shall not bind us.

1.3 Amendments and/or supplements to the following terms and to the additionally stipulated agreements upon the conclusion of the contract must be made in writing.

2. Conclusion of the Contract

2.1 The offers of Kitagawa GmbH are made without obligation.

2.2 A contract between Kitagawa GmbH and the Purchaser shall only come into effect in accordance with the contents of the written confirmation of order on the part of Kitagawa GmbH or through the delivery of the goods or the rendering of the agreed performance by Kitagawa GmbH.

2.3 The Purchaser shall be bound to its order for three weeks. Kitagawa GmbH reserves the right to deviate from the order specifications in the acceptance of the order if this is necessary for the fulfillment of the order and is acceptable for the Purchaser.

2.4. Kitagawa GmbH shall be entitled to effect an alteration to the goods at any time without prior notification insofar as this does not result in any shortfall of the contractually stipulated characteristics of the goods and the alteration is reasonable for the Purchaser. The alteration of already delivered contract cannot be subsequently demanded.

3. Delivery Terms

3.1 The delivery period of the goods shall be determined in accordance with the written confirmation of order of Kitagawa GmbH.

3.2 Indicated delivery periods shall run from the dispatch of the written confirmation or order. If the Purchaser is obliged to effect advance performance, then the delivery period shall commence with the receipt of the contractual advance performance of the Purchaser at Kitagawa GmbH.

3.3 If the Purchaser demands alterations to the contractually stipulated performance after a written confirmation of order has been effected, then Kitagawa GmbH shall be entitled to effect a reasonable extension to the delivery period if necessary.

3.4 In cases of force majeure. interventions by sovereign powers, natural disasters, war, revolts, strikes at its own company, at supply companies or at carriers, Kitagawa GmbH shall be entitled to make up the delivery after the cessation of the cause of the impediment and the delivery period shall be extended accordingly. The same applies if Kitagawa GmbH does not receive its own supplies in due time or in due form. There shall be no claims due to non-delivery or late delivery. This shall also be applicable if above indicated circumstances arise once the stipulated delivery period was already exceeded.

3.5 If a promised delivery date is not met by Kitagawa GmbH for reasons attributable to Kitagawa GmbH's fault,, then the Purchaser shall be entitled to set Kitagawa GmbH a two-week subsequent period after the expiry of the stipulated delivery period by means of registered letter. The Purchaser shall be entitled to withdraw from the agreement after the fruitless expiry of the period. Claims for damages, insofar as is legally permissible, as well as more extensive rights shall be excluded, provided the delay in delivery is neither due to intent nor gross negligence on the part of Kitagawa GmbH. This limitation of claims shall not apply in cases due to loss of life, bodily injury or damage of health. The burden of proof that intent or gross negligence is not applicable shall be borne by Kitagawa GmbH.

3.6 Kitagawa GmbH shall be entitled to effect part deliveries unless they should be unreasonable to be accepted by the Purchaser.

4. Shipment and passing of risk

4.1 Kitagawa GmbH shall undertake the shipments of the goods at the Purchaser's expense. Kitagawa GmbH shall select the forwarder/carrier to the best of its knowledge, without, however, assuming corresponding liability. Kitagawa GmbH shall award the shipping order on the customary terms in the sector in each case. Transport insurance shall only be taken out at the Purchaser's request and expense.

4.2 Risk shall pass when the goods leave the warehouse or upon the surrender of the goods to the forwarder/carrier.
The risk shall also pass to the Purchaser, if the goods are ready for shipment and delivery is delayed or fails for other reasons attributable to the Purchaser.

4.3 Any transport damage which occurs must be asserted by the Purchaser in due time to the forwarder/carrier or its insurance company.

5. Prices

The prices are indicated in the respective confirmation of order or Kitagawa GmbH and are expressed net in EURO plus the statutory rate of V.A.T. exclusive of packing, freight, postage, delivery charges etc.

6. Payment Terms

6.1 Insofar as no other payment terms are indicated in the confirmation of order of Kitagawa GmbH, the invoices are payable after the invoice date within 30 days net without any discount. Decisive for effecting payment on time is the receipt of the payment at Kitagawa GmbH. Cheques shall only be accepted on account of performance.

6.2 If the Purchaser is a businessman, then it shall be in default upon the exceeding of the due date without a separate warning. Kitagawa GmbH shall be entitled to assert default interest to the amount of 8 percentage points above the basic rate of interest.. The assertion of a more extensive loss caused by default remains reserved.

6.3 In the event that the Purchaser should be in default with payment, Kitagawa GmbH may upon its discretion request advance payment before

delivery of the goods. The same shall apply if the Purchaser's economic conditions give reason to concern regarding the due fulfillment of payment obligations.

6.4 The Purchaser shall only be entitled to set off the claims of Kitagawa GmbH against those claims which are undisputed or legally binding.
7. Warranty

7.1 Kitagawa warrants for the duration of 12 months that the goods contained not material or fabrication defects at the time the risks passes. This warranty ("Gewährleistung") commences upon delivery of the goods.

7.2 Warranty shall not be effected in the case of improper utilization, faulty installation, incorrect operation etc. No warranty shall similarly be effected for losses which arise through the operation of the goods together with such appliances whose compatibility has not been expressly confirmed in writing by Kitagawa GmbH.

7.3 The Purchaser shall notify Kitagawa GmbH of any defects of the delivery in writing as soon as such defects are detected under conditions of normal business operations. Section 377 German Trade Code applies.

7.4 In the case of defects the warranty shall be effected at the option of Kitagawa GmbH by subsequent rectification or substitute delivery free of charge. If the subsequent rectification also fails on the second attempt or in if the second substitute delivery also contains defects or if Kitagawa GmbH does not meet its subsequent delivery or substitute delivery obligation within a reasonable period, then the Purchaser shall be entitled to a reduction of the purchase price or rescission of the contract.

7.5 Claims for damages caused by defects shall be excluded. This exclusion shall not apply in case a defect has been fraudulently concealed, in the event that life, body or health is injured and acts of Kitagawa GmbH with intention or gross negligence. In the case a guaranteed characteristic of the goods should be lacking, liability shall be restricted to the loss which is to be expected in accordance with the customary course of events. More extensive claims on account of the faulty nature of the goods shall be excluded. This shall also be applicable to the reparation of consequential losses and to the violation of ancillary contractual obligations.

7.6 The afore mentioned exclusion of liability shall also be applicable to claims in tort and in connection with the initiation, conclusion and processing of a contract, not, however, in the case of claims in accordance with the Product
Liability Act.

8. Retention of Title

8.1 Kitagawa GmbH shall retain title to all goods until the payment in full of all receivables resulting from the business relations with Kitagawa GmbH. If the value of the collateral which is in existence in favour of Kitagawa GmbH should exceed the claims against the contract partner by more than 10 per cent in total, then Kitagawa GmbH shall be obliged to release collateral at the request of the Purchaser.

8.2 The Purchaser shall be entitled to resell the goods subject to retention of title in customary business transactions. For this case, the Purchaser hereby assigns all claims arising out of such resale, whether the goods have been processed or not, to Kitagawa. Herewith, Kitagawa accepts this assignment. Notwithstanding Kitagawa's right to claim direct payment, the Purchaser shall be entitled to receive the payment on the assigned claims. To this end, Kitagawa agrees to not demand payment on the assigned claims to the extent the Purchaser complies with all its obligations for payment and does not become subject to an application for insolvency or similar proceedings or to any delay of payments. Moreover, the Purchaser shall not be entitled to pledge the goods subject to retention of title or to assign all claims to which it is entitled from a future sale of the goods subject to retention of title against its purchasers to Kitagawa GmbH by way of security.

8.3 In the case of the processing or reconstruction of the goods subject to retention of title by the Purchaser, this shall always be effected for Kitagawa GmbH. If the goods subject to retention of title are processed with other articles which do not belong to Kitagawa GmbH, then Kitagawa shall acquire co-ownership to the new article in proportion to the value of the goods subject to retention of title to the other processed articles at the time of processing. If the Purchaser sells the goods subject to retention of title together with other goods which do not belong to Kitagawa GmbH, or after joining or processing, then the assignment shall only be effected to the amount of the outstanding invoices sum of the respective goods subject to retention of title.

8.4 The Purchaser shall be entitled to collect the assigned receivable in its own name. Kitagawa GmbH shall, however, be entitled to revoke this collection authority at any time, especially in the case of default in payment by the Purchaser. In the case of revocation the Purchaser shall be obliged to provide Kitagawa GmbH with or to surrender to it all necessary information and documentation for the assertion of the assigned receivables and to disclose the assignments to its purchasers. In the case of default in payment by the Purchaser Kitagawa GmbH shall be entitled to notify its purchasers of the assignment.

8.5 The Purchaser shall be obliged to provide Kitagawa GmbH with information at any time on the where-abouts of the goods subject to retention of title and on the receivables arising from their resale. The Purchaser shall be obliged to inform Kitagawa GmbH in writing of a seizure by a third party of the goods subject to retention of title or of the receivables assigned to Kitagawa GmbH and it shall be obliged to draw the third party's attention to the rights of Kitagawa GmbH. The Purchaser shall furthermore be obliged to support Kitagawa GmbH upon the assertion and enforcement of its rights against this third party, especially at its expense to lodge the necessary immediate remedies/appeals in order to safeguard the rights of Kitagawa GmbH.

8.6 In case of default in payment on the part of the Purchaser Kitagawa GmbH shall be entitled to take back the goods subject to retention of title. The Purchaser shall accordingly be obliged to surrender these goods. The taking back of the goods subject to retention of title does not constitute a withdrawal from the contract, unless Kitagawa GmbH expressly states such a withdrawal in writing.

8.7 The Purchaser shall be obliged to treat the delivered goods subject to retention of title with care. It shall especially be obliged to take out adequate insurance cover for the goods subject to retention of title at its own expense against loss or damage through fire, water, burglary or theft. The Purchaser hereby assigns its corresponding insurance claim to Kitagawa GmbH. Kitagawa GmbH hereby accepts this assignment and states the reassignment to the Purchaser with the proviso that this shall become effective if and as soon as the retention of title has expired.

9. Final Provisions

9.1 The Purchaser shall not be entitled to assign rights and obligations to third parties arising from the contract concluded with Kitagawa GmbH without the prior approval of Kitagawa GmbH.

9.2 The contractual relations between the contracting parties shall be subject to the Law of the Federal Republic of Germany. The provisions of the Convention on Contracts of the International Sale of Goods (CISG, Vienna Convention) shall not apply to the contract concluded with the Purchaser.

9.3 Venue for all disputes and types of proceedings arising from or in connection with the contractual relations between the parties shall be Darmstadt, Federal Republic of Germany, provided the Purchaser is a businessman.

9.4 Kitagawa GmbH shall be entitled to store and to use the personal data to which it has obtained access from the business relations with the Purchaser under the terms of the German Data Protection Act for its own business purposes.

9.5 If a provision of these General Terms of Business or of the contract concluded with the Purchaser should be or become ineffective, then this shall not affect the effectiveness of the remaining provisions of these General Terms of Business or of the concluded contract.

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Notice:

The specifications provided in this catalogue are believed to be accurate and reliable. Kitagawa GmbH reserves the right to make changes to specifications to improve manufacturing process performance and reliability.

This catalogue is intended for representation only and is not to form any part of any order. Engineering specifications are available upon request.

Any information/specification supplied by Kitagawa GmbH is based upon Kitagawa Industries laboratory test data and is believed to the reliable. It is recommended that our products are tested by the customer to ensure suitability for the intended application.

If any Kitagawa product is to be used in a life threatening application (such areas as Medical Automotive and Aerospace etc) the application must be discussed with Kitagawa GmbH and its written approval must be obtained.

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