Devices thru Material Innovation

NEC/TOKIN

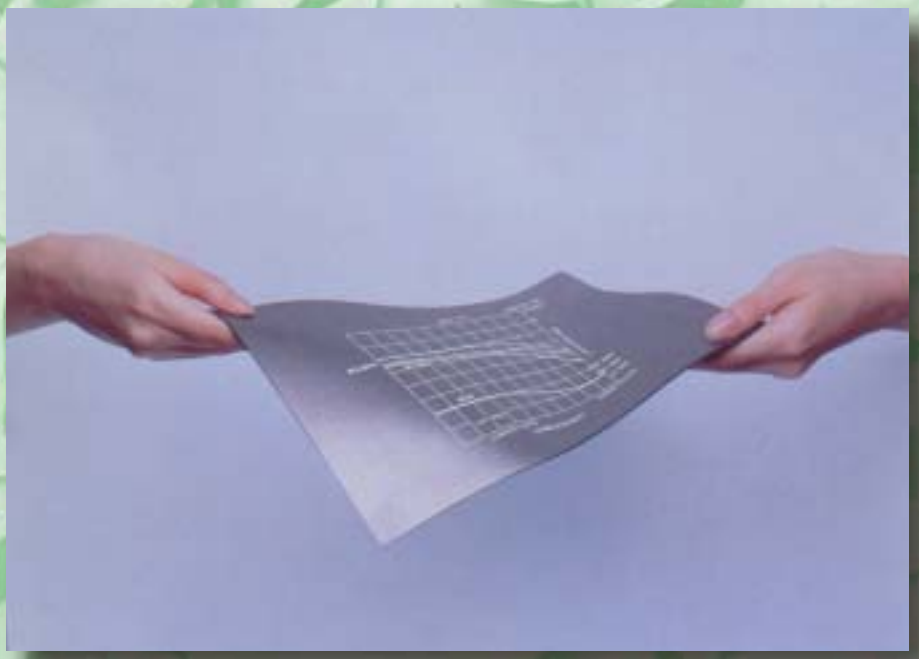
FLEX-SUPPRESSOR™

FILM IMPEDOR™

Noise suppression sheets

Vol.02

An EMI suppressor sheet that absorbs harmful noises, insuring clean electromagnetic environments.



The secret of FLEX-SUPPRESSOR™ an EMI suppressor-lies in its structure, where ultra-thin magnetic metal foils on the micron order overlap each other in the same direction. Because of this unique configuration, FLEX-SUPPRESSOR™ can suppress noise at a level surpassing that of ferrite-based devices.
Just as green leaves absorb carbon dioxide (CO_2) in the atmosphere, FLEX-SUPPRESSOR™ absorbs harmful noises and converts them into heat to create clean electromagnetic environments.

FLEX-SUPPRESSOR™

Outline

This product is a sheet type noise suppressor effectively suppress-ing high-frequency noise generated from electronic devices. It is particularly effective for preventing wide-band, high-frequency EMC that has not been successfully eliminated with conventional ferrite and ceramic parts.

Features

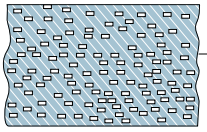
- Usable in quasi microwave ranges→can be used in high-speed clocks (10 MHz to 3 GHz)
- Thin, flexible material→can be used in portable equipment
- Virtually no limitation in where it can be used→less time required for installation
- Can be manufactured in a variety of shapes/sizes→usable in a wide variety of applications
- High electrical resistance (10^4 to $10^7\Omega$)→functions as an absorber

Applications

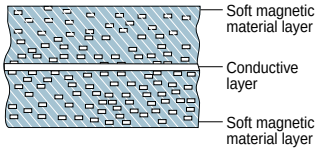
- Radiation noise suppression in all kinds of electronic equipment
- Intra-system application to suppress noise in quasi microwave ranges
- Mobile communications equipment, wireless equipment (BS,CS tuners), office automation equipment (personal computers, TFT LCDs, etc.), communication terminals in audio/video equipment, digital exchanges, etc.

Structural Diagram

●Single layer



●Triple layer



Specifications

Features		Standard specifications	Heat resistance specifications	+ Shielding	Low cycle specifications
Type		K4E	TS7	3GF	R4N
Structure		Single layer		Triple layer	Single layer
Frequency range		100MHz to 3GHz			10MHz to 1GHz
Operating temperature (℃)		-25 to +85	-40 to +105	-25 to +85	-25 to +85
Thickness (mm)		0.3, 0.5, 1.0	0.5, 1.0	1.0	0.1, 0.3, 0.5, 1.0
Dimensions	Standard (mm)	25×15, 70×50, 210×150	25×15, 70×50, 200×160		25×25, 70×50
	Maximum (mm)	160×500	160×400		240×240
Specific gravity *1		3.0 (typ.)	3.3 (typ.)	3.2 (typ.)	3.1 (typ.)
Tensile strength (Mpa)		3.4 (min.)	3.9 (min.)	4.4 (min.)	3.8 (min.)
Surface resistance (Ω)		1.0×10^6 (min.)	1.0×10^5 (min.)	1.0×10^4 (min.)	1.0×10^6 (min.)
Thermal conductivity (W/m·K)		0.22 (typ.)	0.47 (typ.)	0.40 (typ.)	0.40 (typ.)
Approved standard		UL-94 V1	UL-94 V0		
		UL File No.E176124			
Details		Standard type Flexible. Available in thickness from 0.3 mm up. Twice as effective as conventional ferrite-base sheets (company data). Excellent adopted records in various markets.	Im proved heat resistance of the conventional K4E type. Heat resistant up to 105℃. Adoptable to applications requiring excellent durability to ambient temperature, such as car audios equipment and CPU in PC.	Achieves a large transmission attenuation (approx. 20 dB) by providing a conductive layer as the center layer. Highly effective for suppressing internal interference between substrates.	Overwhelming permeability compared with the previous K4E type. Designed as a noise countermeasure for 10MHz to 1GHz range.

*1 Value in 23℃ atmosphere

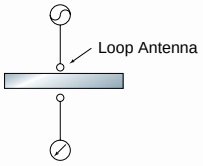
Classification

K4E (05) – 70×50 T S

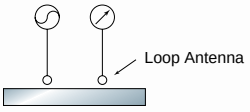
- S: Half cut delivery
- T: Adhesive tape
- 70×50: Size (mm)
- (05): Thickness (03=0.3mm, 05=0.5mm, 10=1.0mm)
- K4E: Type

Measurement Method

●Attenuation of transmission noise



●Attenuation of coupling noise

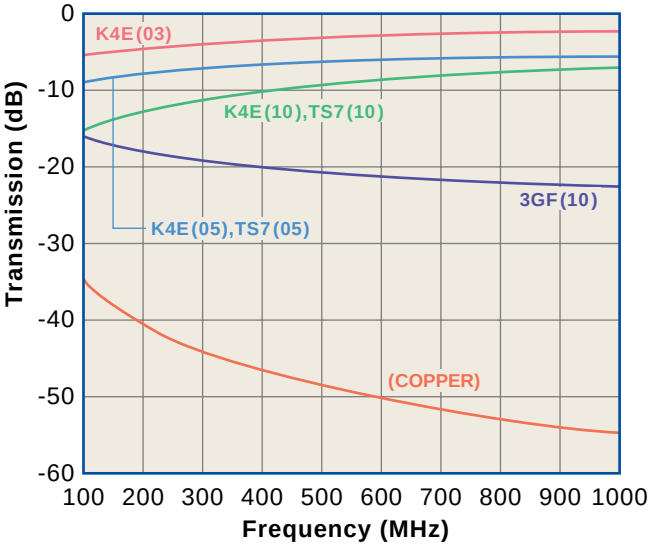


Characteristics* (Reference)

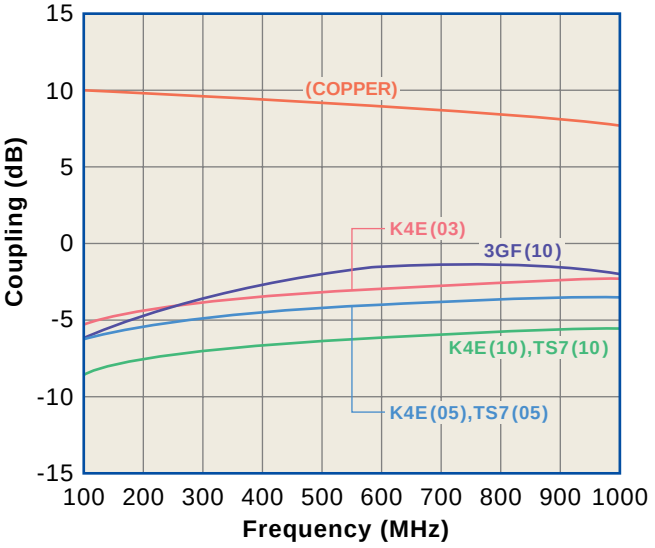
FLEX-SUPPRESSOR I

TYPE / K4E (03), K4E (05), K4E (10), TS7 (05), TS7 (10), 3GF (10)

●Attenuation of transmission noise



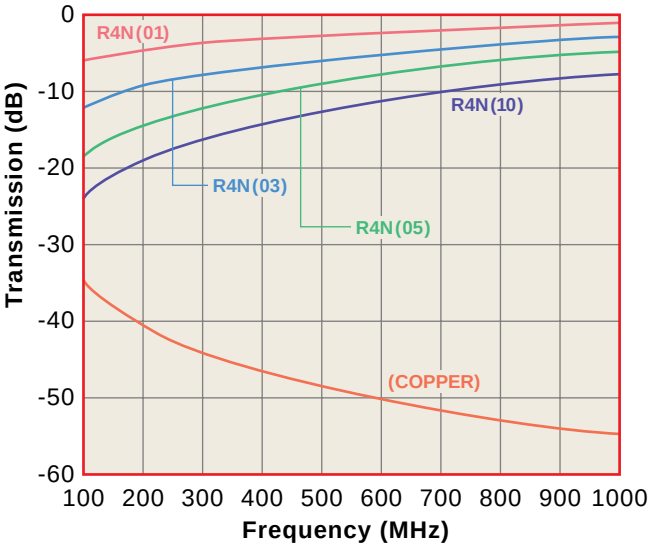
●Attenuation of coupling noise



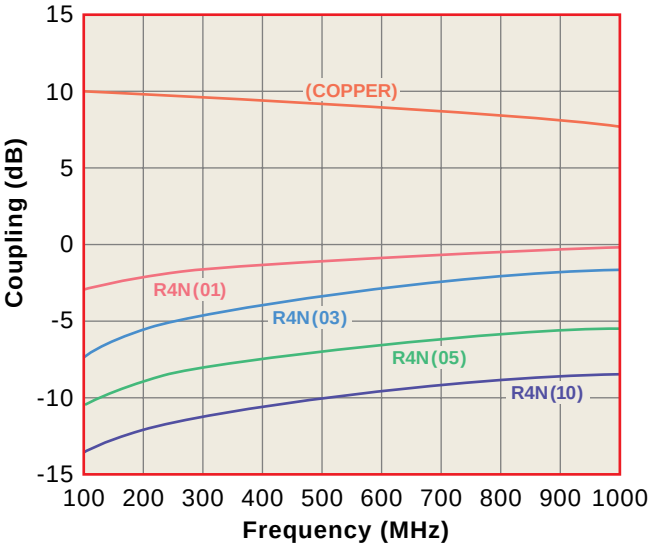
FLEX-SUPPRESSOR II

TYPE / R4N (01), R4N (03), R4N (05), R4N (10)

●Attenuation of transmission noise

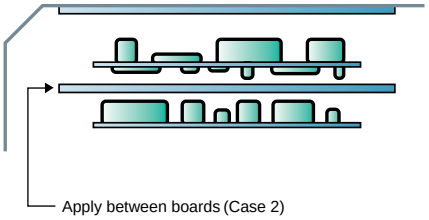


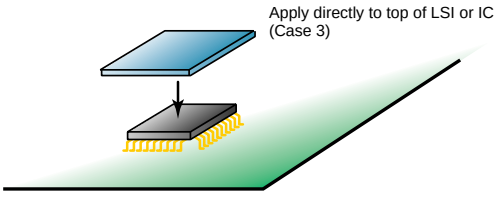
●Attenuation of coupling noise

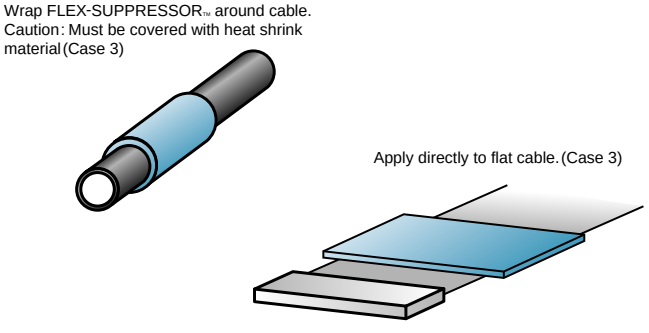


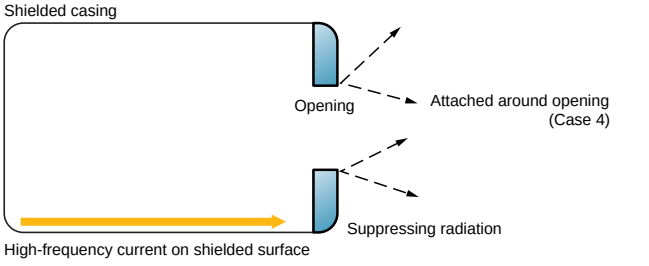
When and Where FLEX-SUPPRESSOR™

- To suppress noise generated by casing ···· Case 1
- To suppress noise generated between PCB boards ···· Case 2
- To suppress unwanted radiation of noises from LSI ,IC and cables ···· Case 3
- To suppress noise radiation (reflected noise) from the opening of shielding casings, etc ···· Case 4









FLEX-SUPPRESSOR™ Applications

To comply with regulations governing radiated noise (VCCI, FCC, EN, etc.)

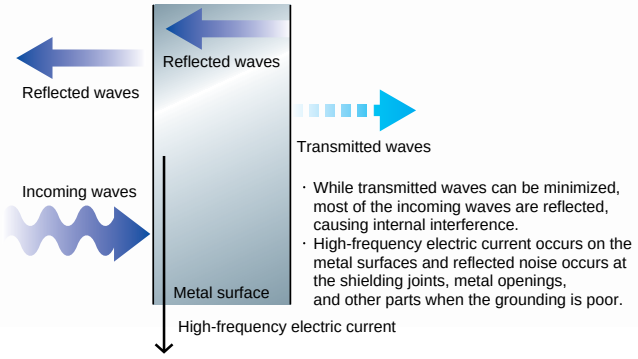
Devices	Installation Location	Applications
Notebook PCs	Around FPC cables inside TFT panel	Case 3
	Onto LSIs (mainly clock generator-types)	Case 3
SCSI PC cards for notebook PCs	Onto inside surface of shielded casing	Case 1
CD/DVD-ROM	Onto CD-ROM boards and ICs in PCs	Case 3
	Onto FPCs and ICs	Case 3
TFT LCDs	Onto FPCs inside panel	Case 3
Workstations	Onto FPCs between system and graphics boards	Case 3
Household game machines	Onto main ICs	Case 3
Digital camcorders	Onto ICs	Case 3
Digital cameras	Onto ICs	Case 3
Projectors	Onto ICs	Case 3
Facsimiles	Onto boards	Case 3
PDAs	Onto communications connectors	Cases 3,4
Printers	Onto ICs and boards	Case 3

To minimize internal interference and prevent unexpected operations

Devices	Installation Location	Applications
PCS,PCN base stations	Onto inside surface of metal shielding walls at radio wave transmission stations	Case 1
Cellular and PCS,PCN phones	Onto VCOs and transmitters	Case 3
	Around lead paired wires for microphones	Case 3
	Onto DSPs and Cordec ICs	Case 3
Navigation	Onto down-conversion ICs	Case 3
Cellular phones and PDAs	Onto inside surface of shielding plates	Case 1
Optical transmission modules	Onto inside surface of metal shielding plates	Case 1
Notebook PCs	Onto inside surface of metal shielding plates	Case 1
	Onto shielding plates at PCMCIA card slots	Case 1
Measuring instruments	Between boards	Case 2

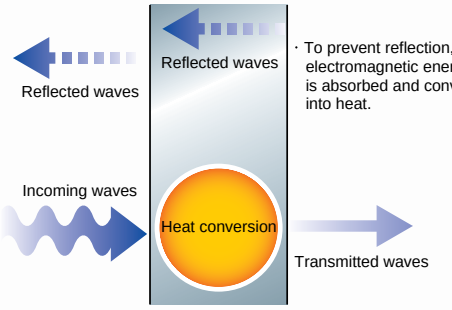
Shielding Materials and Radio Wave Absorbers

●Shielding materials (metal, electrically conductive material)



・While transmitted waves can be minimized, most of the incoming waves are reflected, causing internal interference.
・High-frequency electric current occurs on the metal surfaces and reflected noise occurs at the shielding joints, metal openings, and other parts when the grounding is poor.

●Radio wave absorbers



・To prevent reflection, electromagnetic energy is absorbed and converted into heat.

●Shielding material + radio wave absorber

Transmitted waves and reflected waves can be minimized by mounting metal plates on the back of radio wave absorbers.
Reference: Other absorbing and reflecting examples

	Absorbing	Reflecting
Radio waves	Radio waves absorbers	Metals
Light	Black objects	White objects, Mirrors
Sound	Absorbers, Felt	Solid bodies (Concrete, etc.)

Applications

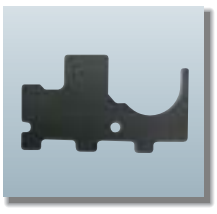
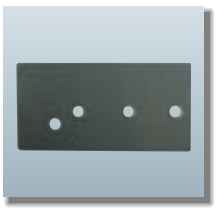
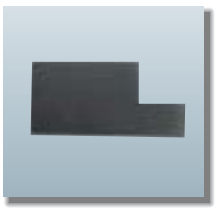
●When a ferrite-based component is less effective.
300MHz to -3GHz
●When there is no space for ferrite components, though they are effective. **10MHz to -300MHz**
●When upgrading the circuit is not possible in time, alternative components such as beads inductor, chip EMC, etc. can be used. **10MHz to -300MHz**

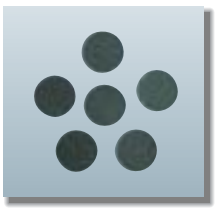
Personal computers, peripheral devices, low-end devices for image and information, equipment for industrial technology, game machines, consumer electronics, Instrumentation devices, medical equipment, etc.

Workstations, high-end personal computers, cellular phones, PCS, PCN base stations for mobile communications, base stations for PCS, PCN etc.

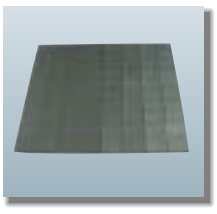
Typical Shapes

①With holes, cut-out shapes, circular shapes



②Half cut



FILM IMPEDOR™

Outline

Made of soft magnetic material, Film Impedor efficiently suppresses high-frequency radiated noise.
Apply it on PCB, cables, etc. to suppress the high frequency noise between lines and between line and grounding.

Applications

・Radiated noise suppression in all kinds of electronic equipment and its internal interference problems.
Examples cellularphones, PCS, PCN BS/CS tuners, PCs, WSs, Instrumentation, etc.

Features

・Effective frequency range → 100MHz-3GHz
・Thin, lightweight. → good for portable equipment
・Can be manufactured in a variety of shapes/sizes
・High electrical resistance

Specifications

Features		Ultra-thin		Thin type
Type		E25 (NEW)	E50	K(01)
Structure		Single-layer		
Frequency range		100MHz to 3GHz		3MHz to 3GHz
Operating temperature (˚C)		-25 to +85		-20 to +80
Thickness (mm)		0.025	0.05	0.1
Dimensions	Standard (mm)	70×50, 210×150		
	Maximum (mm)	240×500		
Specific gravity *1		2.9 (typ.)	2.9 (typ.)	1.6 (typ.)
Tensile strength (Mpa)		2.0 (min.)	2.0 (min.)	17.6 (min.)
Surface resistance (MΩ)		1.0×10⁶ (min.)	1.0×10⁶ (min.)	1.0×10⁶ (min.)
Acquisition standard		-	-	-
Approved standard		Equivalent to UL94 V-0		-
Details		While only half the thickness of the E50, it still has three times the magnetic permeability of the conventional version, the K01. It's perfect for cell phones, DVDs, CD-R/RWs, MDs and other devices in which thinness is required.	Overwhelming permeability compared with the previous K01 type. Effectively suppresses high-frequency noise despite its extremely thickness of 50μm.	Standard model.

*1 Value in 23˚C atmosphere

Classification

E 50 – 70 × 50 T08 S

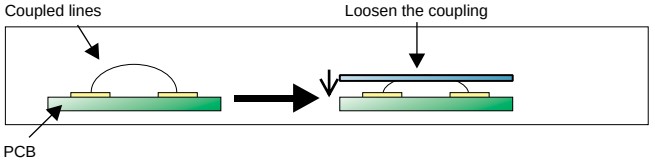
- S: Half cut delivery
- T08: Adhesive tape
- 70 × 50: Size (mm)
- 50: Thickness (25=25μm, 50=50μm, (01)=0.1mm)
- E: Type

When & Where Film Impedor is used.

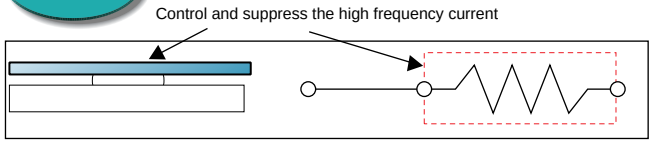
●Apply on signal lines or ground line (frame grounding)

Case 1 : Loose magnetical coupling between lines.
Case 2 : Suppress radiated high-frequency noise from signal lines.
Case 3 : Lower the radiation effectiveness of cables.

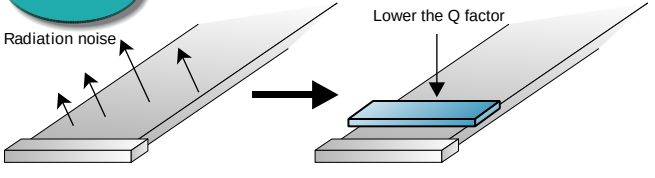
Case 1



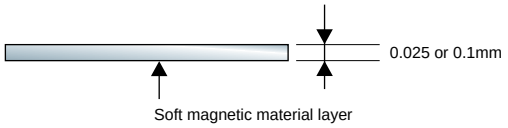
Case 2



Case 3



Structual Diagram



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- The names of the products and the specifications in this catalog are subject to change without notice for the sake of improvement. The manufacturer also reserves the right to discontinue any of these products. At the time of delivery, please ask for specifications sheets to check the contents before use.
- Descriptions in this catalog regarding product characteris-tics and quality are based solely on discrete components. When using these components, be sure to check the specifications with the component in question mounted on the products.
- The manufacturer's warranty will not cover any disadvan-tage or damage caused by improper use of the products that deviates from the characteristics, specifications, or conditions for use described in this catalog.
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