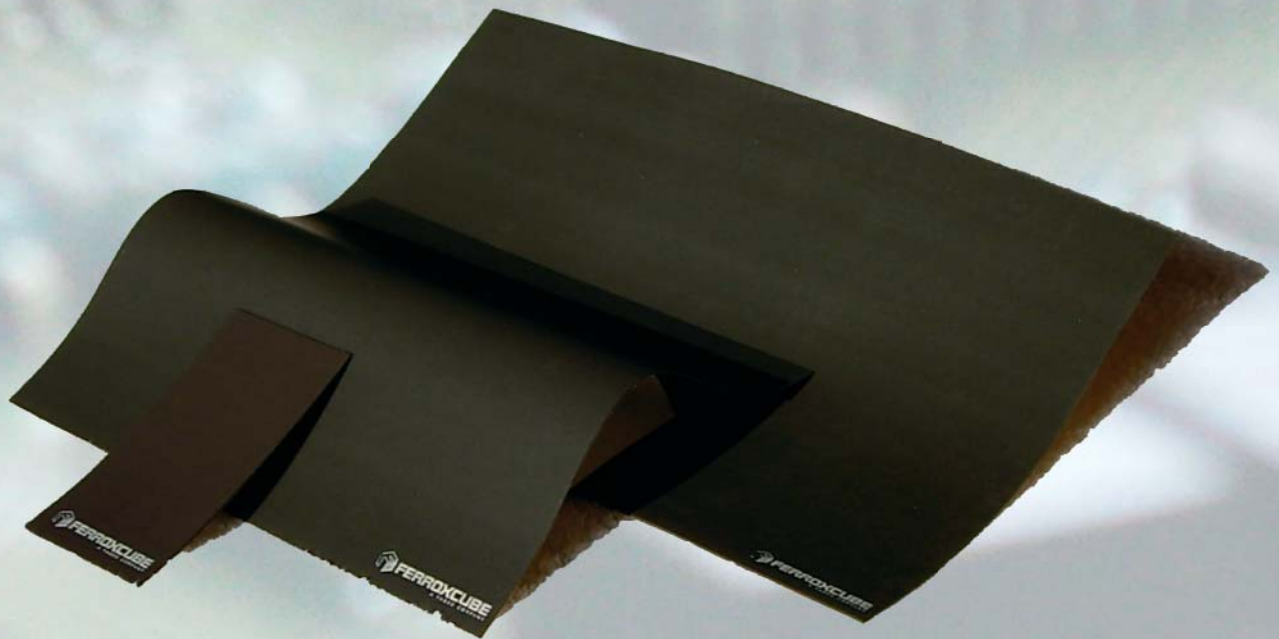


FerroxFoil

Flexible sheet EMI absorber



FerroxFoil - Flexible sheet EMI absorbers

Radiated EMI can be confined by enclosing the source in a metal box. This reflects the signal back without attenuation and will not lower the general noise level around the source.

It's better to enclose the source with an absorbing material. That is the case with FerroxFoil products, consisting of a sheet of absorptive material, constituted by a lossy magnetic material distributed in an organic matrix, which absorbs the electromagnetic energy of the incident radiation/wave and converts it into heat. Its flexible structure provides an excellent processability and allows its use in a huge

variety of configurations and applications: the sheets can easily be cut to custom shapes and sizes and wrapped closely around the and sizes and wrapped closely around the radiation source. This makes them very well suited for retrofit solutions if the source of interference has not been found yet.

Moreover, its high electrical resistivity makes possible to be applied on conductive material.

The materials are effective in the wide frequency band 100 MHz – 30 GHz and one HF material around the RFID frequency 13.56 MHz.

Ferroxfoil comes in four different grades: 1) 5WI (W = wideband), the basic grade; 2) 5RI (R = resistivity), for the same frequency band, but with high resistivity for high insulation requirements; 3) 5FI (F = high frequency), intended for higher frequencies, mainly for the microwave bands (500 MHz – 30 GHz) and; 4) 5TI (T = transponder), for lower frequency, especially designed for shielding metal parts in RFID for transponders operating at 13.56 MHz. For all grades, the sheets are available with different thicknesses, depending on the degree of attenuation required.

Materials and Properties

Material Name	5WI	5RI	5FI	5TI
Main Feature / Application	High Performance Wide Band	High Resistivity / High Insulation Requirements	High Frequency Use / Semi-Microwave Band	RFID Applications
Recommended frequency range	100 MHz – 10 GHz	100 MHz – 10 GHz	500 MHz – 30 GHz	13.56 MHz
Operating temperature range (°C)	-25° to 125° C	-25° to 125° C	-25° to 125° C	-25° to 125° C
Resistivity (Ωm)	10	10^4	10	10
Density (g/cm^3), typical	3.0	3.0	4.0	3.0
Typical initial permeability (μ_i), 100 MHz	10	5	5	10
Min / Max sheet dimensions (mm)	50 x 50 / 300 x 200			
Min / Max sheet thickness (mm)	0.1 / 6			
Typical sheet dimensions / thickness (mm)	100 x 100 x 0.5			
	100 x 100 x 1			
Environment	RoHS Compliant : Lead Free / Halogen Free			

Applications / Examples of use

Applications can be found where ever radiated EMI is present: in the far field (prevention of EMI radiation and protection against incoming EMI) or in the near field (between components on a PCB, between PCB's, around transmission lines) and to shield metal objects for RFID in the HF band (13.56 MHz).

In the far field, plane waves coincide with the sheet surface and are either frontally reflected, absorbed in the sheet or transmitted. All materials have been engineered in such a way that reflection is low and absorption high.

Reflection depends on the ratio of permeability and permittivity, while

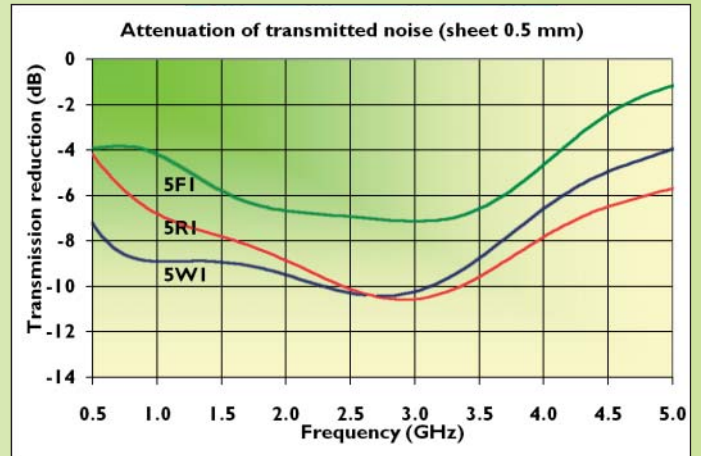
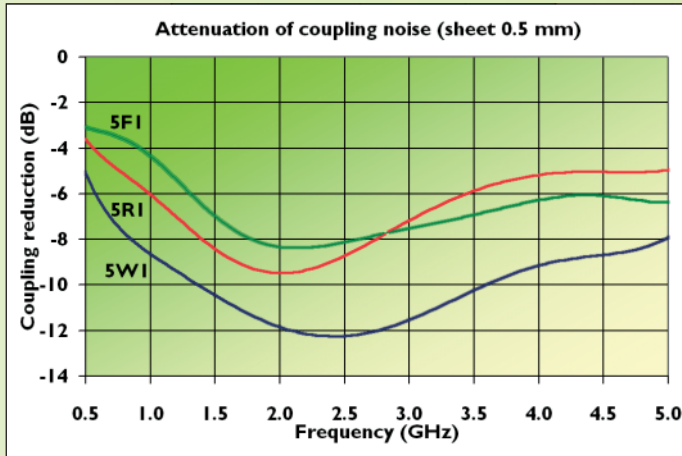
absorption depends on magnetic losses. In the near field, the geometry of the shielded object is important and it's difficult to give general rules other than absorption by magnetic losses.

Examples :

- Top shields for fast digital IC's (clock, microprocessor, memory)
- Prevention of unwanted high frequency circuit resonances
- Noise coupling reduction between components on the same PCB
- Noise coupling reduction between circuits on different (stacked) PCB's

- Noise coupling reduction between PCB circuits and an LCD display
- SAR regulation for mobile phones (human head protection)
- Noise absorption from PCB transmission lines and flatcable connections
- Noise absorption on steel casing inside to lower general radiation level
- Enhanced reading distance of RFID tags in the proximity of metals
- Directional shielding to prevent interference in wireless communication
- Directional shielding to prevent interference from radar equipment
- Directional shielding to prevent interference from medical equipment

Radiation Absorption

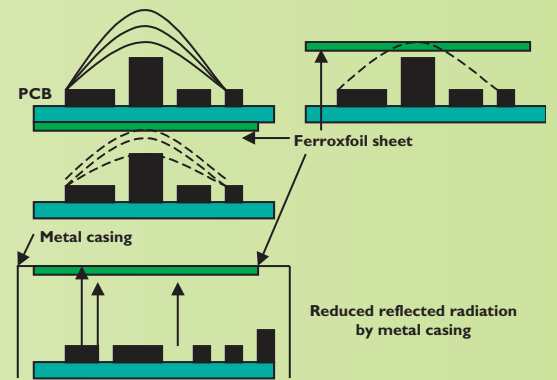


Coupling/Transmission reduction ratio (dB) = S_{21} (dB) with FerroxFoil - S_{21} (dB) without FerroxFoil

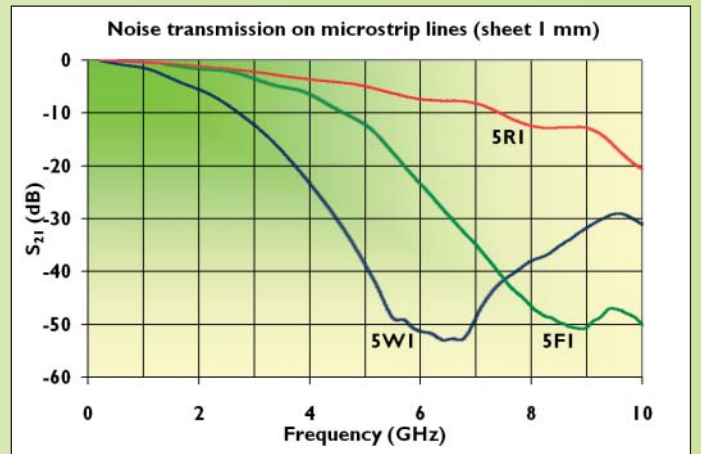
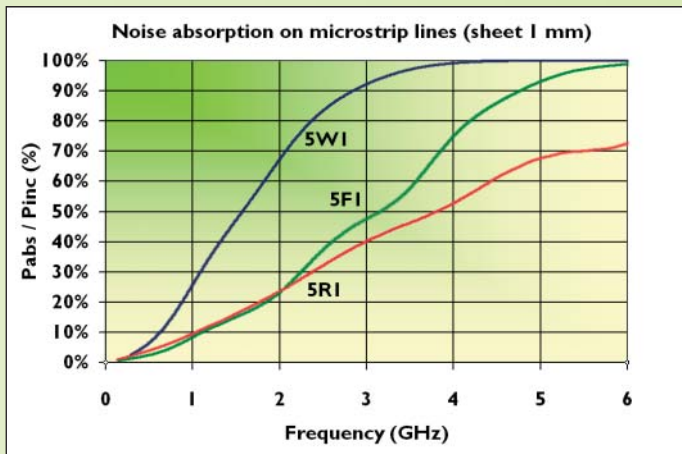
How to use it:

Reduction of magnetic coupling and noise between elements (signal lines, IC's...) of the same PCB or adjacent ones.

Reduction of electromagnetic noise reflected by metal casing.



Radiation Prevention



How to use it:

Suppression of radiated and transmitted electromagnetic noise on signal lines.

Noise suppression from cables.

Measurement methods according to draft version of IEC international standard (62333-2): "Noise suppression sheet for digital devices and equipment"

