Electromagnetic Wave Absorbing Sheet "F-CO TM Sheet EMI"

1. INTRODUCTION

Furukawa Electric and F-CO have jointly developed and brought into the market F-CO TM Sheet EMI that is low-molecular-weight siloxane-free and electromagnetic wave absorbing. F-CO TM Sheet EMI comes in three types —electromagnetic wave absorbing sheet combined with thermal conductivity and the one exclusively for electromagnetic wave absorbing use, and the latter includes a type that is particularly effective in the low frequency range. Due to this complete lineup, F-CO TM Sheet EMI can be used in many applications for electronic equipment.

2. PREVENTION OF ELECTROMAGNETIC INTERFERENCE (EMI)

As various components for electronic equipment improve in performance in recent years, electromagnetic waves generated by these components are presenting problems together with heat generation. In particular, digital equipment that have rapidly diffused into our offices and homes adversely influence the electromagnetic environment, so that some countermeasures against electromagnetic noise have become indispensable.

There are two ways to prevent such electromagnetic interference: electromagnetic shielding technology in which the electromagnetic noise generated is confined by shielding taking advantage of reflection from shielding materials; and electromagnetic absorbing technology in which the electromagnetic noise is absorbed and transformed into heat taking advantage of absorbing materials. This electromagnetic wave absorbing technology is of considerable importance as a viable countermeasure against intra-equipment interference. The use of electromagnetic wave absorbing sheets, for example, is known to be very effective in shortening the developmental periods of digital equipment, making itself an essential design technology.

Today the electromagnetic wave absorbing sheets are widely used in digital video cameras, digital cameras, hard disk-based video recorders, mobile phones, notebook PCs, etc., thereby increasing technological awareness of the importance of the sheets.

3. FEATURES OF F-CO TM SHEET EMI

Since F-CO TM Sheet EMI is not a silicone-related material, it is siloxane-free thus presenting no problem of contact faults for electronic equipment. Moreover, it is an environment-friendly material in compliance with the RoHS Directive coming into force in 2006.

Three types of F-CO TM Sheet EMI are currently available as described below.

3.1 EE/EMI Type

The EE/EMI type is an electromagnetic wave absorbing sheet combined with superior thermal conductivity. The sheet is based on acrylic rubber compounded with a heat-conductive filler and a soft magnetic material, and it is self-adhesive on one side while the other side is not so, permitting ease of attachment. It is an environment-friendly, halogen-free sheet with a thickness ranging from 0.5 mm to 5 mm, and its material performance is such that the electromagnetic wave absorbing property is effective for a wide frequency range; the thermal conductivity is 2 W/m·K and more, amply allowing applications in the areas of high heat generation; and the flame retardance conforms to UL94 V-0.

Main applications are game machines and communications equipment for mobile phone base stations.

Photo 1 F-CO TM Sheet EMI, EE/EMI type.

3.2 EMI Type

This product can be used in a wide frequency range, but is especially effective in the high-frequency range of one to some GHz.

The EMI type sheet is based on a polyolefin-related polymer compounded with a soft magnetic material having a special granular shape, and achieves a high mechanical strength irrespective of its small thickness.

The product with a thickness of about 0.1 mm is available in long lengths thanks to a continuous production method that takes advantage of our proprietary tape manufacturing technology. One side of the product is coated

Table 1 Characteristics of F-CO TM Sheet EMI.

Item / Type	EE/EMI	EMI	EMI-4
Thickness (mm)	0.5~5	0.1~1	0.1~1
Thermal conductivity (W/m·K)	2.3	0.8	1
Volume resistivity (Ω-cm)	1×10^{10}	1×10^{9}	1×10^{9}
Breakdown voltage (kV/mm)	2	2	2
Flame retardance (UL94)	V-0	V-0 ~ HB	V-0 ~ HB
Hardness (Asker C)	60	75	75
Adhesion (N/25mm)	Self-adhesive on one side	Adhesive on one side	Adhesive on one side
Note	Halogen-free; High thermal conductivity	Halogen-free grade / Ordinary grade	Halogen-free; Electromagnetic wave absorbing for low frequencies below some MHz

with a heat-conductive adhesive to improve the workability in sheet attachment.

Main applications are digital video cameras, digital cameras and mobile terminals.

3.3 EMI-L Type

The EMI-L type sheet can also be used in a wide frequency range, but is especially effective in the low-frequency range of below some MHz.

The product is based on a soft, halogen-free resin compounded with a proprietary soft magnetic material, and is processed into an environment-friendly thin sheet using a special process which provides the product with the advantage of the shape and composition of the magnetic component. Thus the product offers superior magnetic characteristics in terms of permeability and magnetic attenuation, realizing a sufficient noise reduction effect in the sub-MHz range as illustrated in Figure 1.

Main applications are digital home appliances in general, digital video cameras, digital cameras, hard disk-based video recorders, mobile phones and notebook PCs.

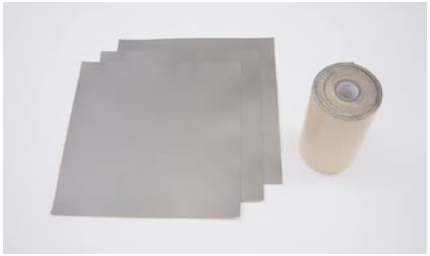
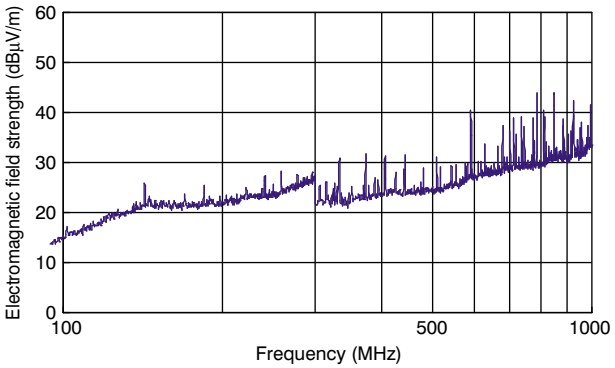


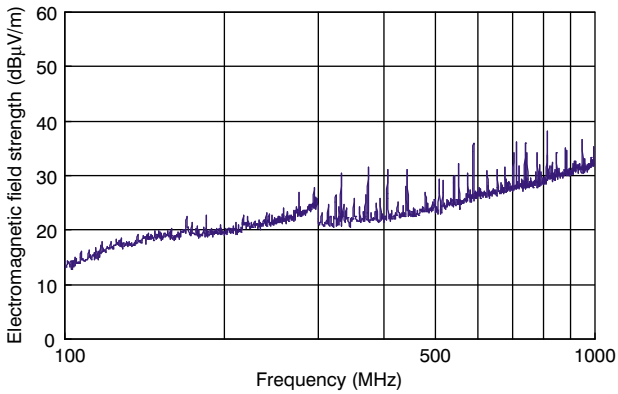
Photo 2 F-CO TM Sheet EMI, EMI type and EMI/EMI-L type.

4. CONCLUSIONS

We intend to promote hereafter the development of electromagnetic wave absorbing sheet in response to diversified customers' needs. We are ready to offer our development proposals for any requirements concerning EMI-resistant sheet not covered in the description presented here. So, please feel free to contact us.



(a) VCCI characteristics without sheet



(b) VCCI characteristics with sheet

Figure 1 Noise reduction effects of the sheet.

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