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3M™ Flux Field Directional Material EM04TP

Developmental Status Notice

3M™ Flux Field Directional Material (FFDM) EM04TP is a 3M developmental product. It is currently available on a limited basis and only provided for market and technical evaluation. The future availability, formulation, performance properties, and pricing of the material is not guaranteed and is subject to change. To discuss your evaluation, please contact your local 3M Technical Service.

Product Description

Note: The data presented in this preliminary data sheet are 3M's best estimates for the current product construction being evaluated. While this product is being developed for general commercialization, this product is still considered developmental at this time and changes in the product construction or process conditions may occur that can cause subsequent changes in product characteristics or performance. User should consult with 3M before making any business plans in reliance upon the future availability or the current properties of this product.

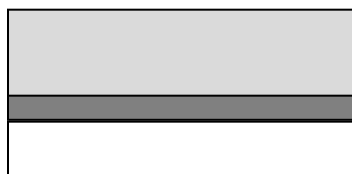
3M™ Flux Field Directional Material (FFDM) EM04TP is a composite material consisting of a carrier resin, magnetic fillers and an acrylic pressure sensitive adhesive (PSA). This magnetic material is designed to interact and influence an Electro-Magnetic (EM) field. The EM field could be generated for various reasons and in many applications it is desired to focus the EM field across a specific volumetric area, such as a secondary EM field pick-up coil or antenna.

3M FFDM EM04TP is designed to efficiently couple to the EM field and redirect and focus the field as desired in a given application.

Key Features

- Targeted permeability for < 20MHz FFDM performance
- Multiple thickness options
- Black PET protection tape cover film (optional)
- Pressure sensitive acrylic adhesive
- Supplied on a removable liner for ease handling

3M™ Flux Field Directional Material (FFDM) EM04TP



Composite Magnetic FFDM Layer

Acrylic Adhesive (Optional)

PET Film Release Liner

3M™ Flux Field Directional Material (FFDM) EM04TP

Product Construction/ Materials Description

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes. Final product specifications and testing methods will be outlined in the products Certificate of Analysis (COA) that is provided once the product is approved by 3M for general commercialization and development work is completed.

3M™ Flux Field Directional Material EM04TP		
Structure	Type	Thickness
Cover Film Type	Black Colored PET (optional)	5 / 10 / 20 µm
Magnetic Type	Soft Magnetic Composite [#]	Options below
Adhesive Type	Acrylic (optional)	10 – 30 µm
Magnetic Layer Thickness (excluding protective film) Tolerance: +/-10%	EM04TP-005 EM04TP-010 EM04TP-XXX-A-C*	0.05mm 0.10mm -XXX-A-C
Total Thickness		Cover Film (Optional) + Magnetic Layer + Adhesive Layer (Optional)

*XXX = custom magnetic layer thickness options, A = Optional Adhesive layer, C= Optional Cover film; Adhesive layer thickness can vary based on application need. Heat Activated Films (HAF) can also be options.

[#] Soft Magnetic Composite includes magnet powders and polyurethane resin.

Application Ideas

3M FFDM EM04TP has potential to be used for:

- Shield DC and low frequency magnetic field
- Shielding solution for RFID and NFC system.
- Wireless power system power transfer efficiency improvement
- Potential devices include mobile phone, computers, tablets, measurement and sensors.
- Protect magnetic flux sensitive device such as a hall sensor and a flux gate from external low frequency magnetic fields
- Assembly of magnet coil for Wireless Charging System
- Electronic equipment protection for automobile applications

As an initial design, it is suggested to test the 3M FFDM products at the greatest thickness allowed (1x, 2x, 3x layers, etc.), largest XY dimension, multiple locations or multiple parts to determine a potential maximum performance level associated with the material. Once a baseline level of performance is established, the 3M FFDM material thickness can be reduced and the XY shape and location can be changed to determine the minimum material needed to meet a specification. The desire to test first the 3M FFDM products with the thickest and/or largest footprint design is to establish that an FFDM material solution is reasonable and also to understand a maximum associated performance level. Once a maximum performance level is established, the overall design can be reviewed to understand if other materials should be considered, including non-FFDM changes not initially considered, but now possible with the new performance level associated with using the 3M FFDM materials.

Effectiveness

3M FFDM EM04TP material performance and effectiveness is based on several application considerations:

- 1) Permeability of this material at the frequency range or frequency peak of the intended application can affect the performance. Permeability of the 3M FFDM EM04TP varies with frequency and is a measure of how well the EM material may couple with the EM field and impact performance.
- 2) Thickness of the 3M FFDM EM04TP product can be used to optimize an applications performance.
- 3) End use application orientation and location affects the 3M EM products interaction with an EM field.

3M™ Flux Field Directional Material (FFDM) EM04TP

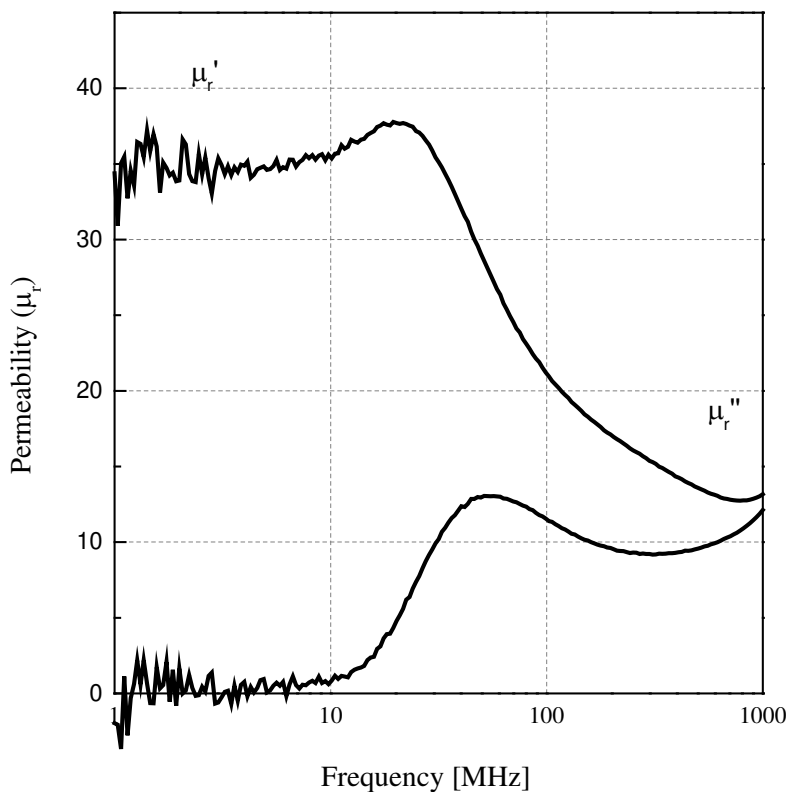
Typical Physical Properties and Performance Characteristics

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes. Final product specifications and testing methods will be outlined in the products Certificate of Analysis (COA) that is provided once the product is approved by 3M for general commercialization and development work is completed.

3M™ Flux Field Directional Material EM04TP	
Property	Value
Electrical Resistivity	$2 \times 10^{-4} \Omega\text{m}$ (minimum)
Typical Permeability (@1 MHz)*	30 ~ 40
Temperature Range	-25 ~ 90°C

*Permeability & results of Vibrating Sample Magnetometers (VSMs) can vary with test method and/or equipment used for testing at different test sites

Figure 1. Real and Imaginary Part of Permeability with Frequency



Storage and Shelf Life

The shelf life of 3M™ Flux Field Directional Material EM04TP is 12 months from the date of manufacture when stored in the original packaging materials and stored at 21°C (70°F) and 50% relative humidity.

3M™ Flux Field Directional Material (FFDM) EM04TP

Certificate of Analysis (COA)

The 3M Certificate of Analysis (COA) for this product is established when the product is commercially available from 3M. The commercially available product will have a COA specification established. The COA contains the 3M specifications and test methods for the products performance limits that the product will be supplied against. The 3M product is supplied to 3M COA test specifications and the COA test methods. Contact your local 3M representative for this product's COA.

This technical data sheet may contain preliminary data and may not match the COA specification limits and/or test methods that may be used for COA purposes.

Final product specifications and testing methods will be outlined in the products Certificate of Analysis (COA) that is provided once the product is approved by 3M for general commercialization and development work is completed.

Regulatory: For regulatory information about this product, contact your 3M representative.

Experimental Product: This 3M product is an experimental or developmental product that has not been introduced or commercialized for general sale, and its formulation, performance characteristics and other properties, specifications (if any), availability, and pricing are not guaranteed and are subject to change or withdrawal without notice.

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