

# FAM3

## Flexible Absorbent Material



### Features

Provide effective EMI suppression over a wide frequency range (10MHz to 18GHz)  
Ultra thin and extremely flexible, can be easily fitted to a wide range of form-factors  
UL approved non-conductive adhesive backing available as an option  
Highly effective in preventing resonance and suppressing coupling  
High surface resistance ( $10^8$  -  $10^9$  ohms)  
Manufacturing friendly solution  
Can be cut to any shape

### Applications

Notebooks, PCs, workstations  
LNBS for satellite systems  
Mobile communications equipment  
Base stations for mobile phones and handsets  
Peripheral devices for computers  
Wireless equipment  
Mobile phones  
High speed clocks and timing devices  
RFID (Radio Frequency Identification) systems  
NFC (Near field communication) systems  
Wireless chargers

### RFID Applications

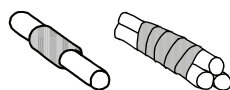
Besides the suppression and control of EMI issues, FAM can be a solution for RFID devices as well.

FAM is highly suitable for LF(125KHz) and HF(13.56MHz) bands. FAM can deal with complex issues such as when the RFID Reader/Writer or RFID tag is attached to a metal surface. When used in this way FAM can reduce design complexity and significantly lower the total cost of ownership.

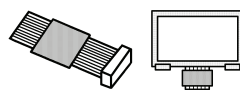
### Material List

| Property                        | Unit                | FAM3                     | Test Method |
|---------------------------------|---------------------|--------------------------|-------------|
| Operating Temperature           | °C                  | -20 to 80                | -           |
| Applicable Frequency            | GHz                 | 0.01 to 18               | -           |
| Thickness Range                 | mm                  | 0.05 to 0.50             | -           |
| Max. Dimension                  | mm                  | 210 x 297 (A4)           | -           |
| Surface Resistance              | ohm                 | $10^8$                   | ASTM D257   |
| Hardness                        | Shore A             | 50                       | ASTM D2240  |
| Specific Gravity                | g/cm <sup>3</sup>   | 2.7                      | ASTM D792   |
| Elongation                      | %                   | 2.5                      | ASTM D412   |
| Tensile Strength                | Kgf/cm <sup>2</sup> | 30                       | ASTM D412   |
| Thermal Conductivity            | W/mK                | 0.5                      | ASTM D5470  |
| RoHS Compliance<br>2002/95/EC - | -                   | Yes                      | -           |
| Halogen-Free                    | -                   | Yes                      | -           |
| Flame Retardant                 | -                   | Equivalent to<br>UL94V-0 | -           |

### Sheet Shape Examples



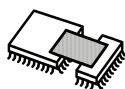
Cable wrap



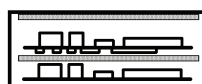
Flat cables



IC covers



IC interface



Interface between  
case and board

| Item |        | 0.9 GHz         | 1.8 GHz         | 2.4 GHz         | Application Examples                                                                                                              |
|------|--------|-----------------|-----------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------|
| FAM3 | 0.05mm | -0.21dB (4.7%)  | -0.50dB (11.0%) | -0.84dB (17.8%) | [Shielding Box] [GPS]<br>[Power Supply] [IC]<br>[Mobile Phone] [NB]<br>[Battery] [NFC]<br>[RFID tag/reader]<br>[Wireless Charger] |
|      | 0.10mm | -0.46dB (9.9%)  | -0.88dB (18.3%) | -1.10dB (22.6%) |                                                                                                                                   |
|      | 0.20mm | -0.62dB (13.4%) | -1.05dB (21.8%) | -1.40dB (27.4%) |                                                                                                                                   |
|      | 0.30mm | -0.76dB (16.2%) | -1.20dB (24.2%) | -1.70dB (32.4%) |                                                                                                                                   |
|      | 0.50mm | -1.10dB (22.6%) | -1.50dB (29.0%) | -2.30dB (40.9%) |                                                                                                                                   |

\*Test results may vary from application to application

## Tube Shape

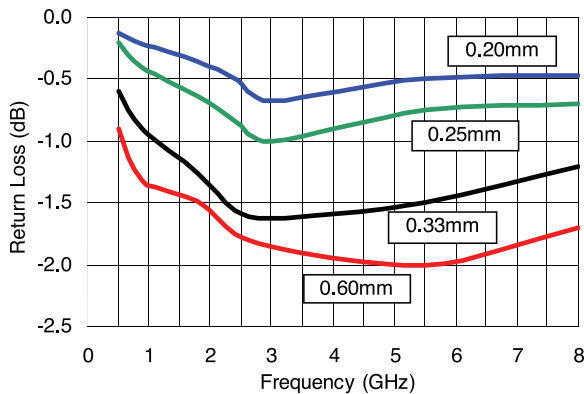
| Item    | FT0302 | FT0504 | FT0705 | FT0906 | FT1107 | FT1309 | FT1510 |
|---------|--------|--------|--------|--------|--------|--------|--------|
| OD (mm) | 3.0    | 5.0    | 7.0    | 9.0    | 11.0   | 13.0   | 15.0   |
| ID (mm) | 2.0    | 4.0    | 5.0    | 6.0    | 7.0    | 9.0    | 10.0   |



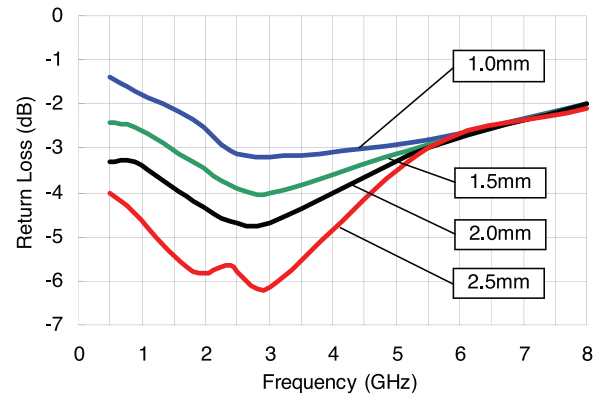
## Return Loss – Frequency:

| Return Loss (dB) | 0.5 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 20 | 30   |
|------------------|-----|----|----|----|----|----|----|----|----|----|----|----|------|
| Absorb Rate (%)  | 11  | 21 | 37 | 50 | 60 | 69 | 75 | 80 | 86 | 89 | 90 | 99 | 99.9 |

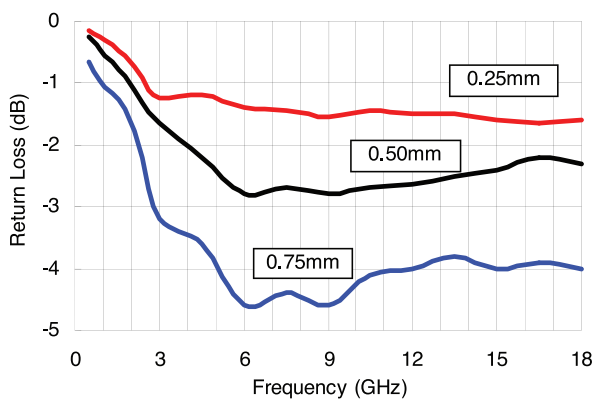
**FAM1 (0.2 - 0.6mm)**



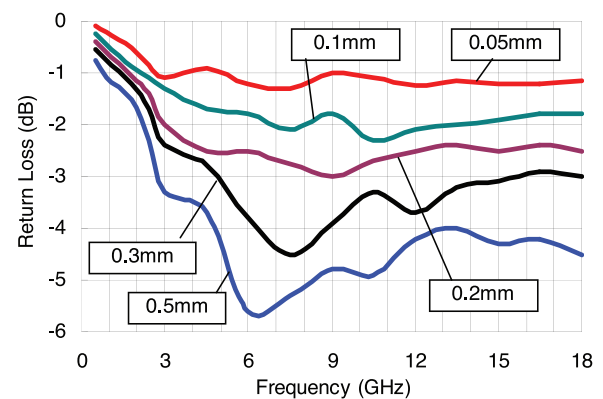
**FAM1 (1.0 - 2.5mm)**



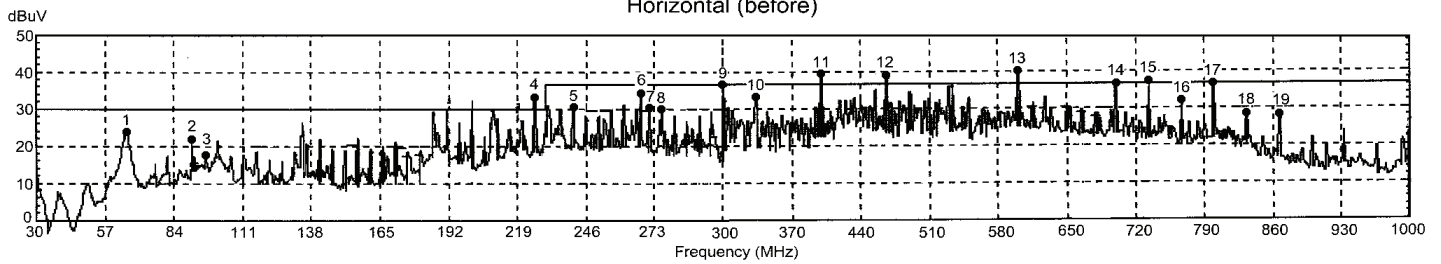
**FAM3**



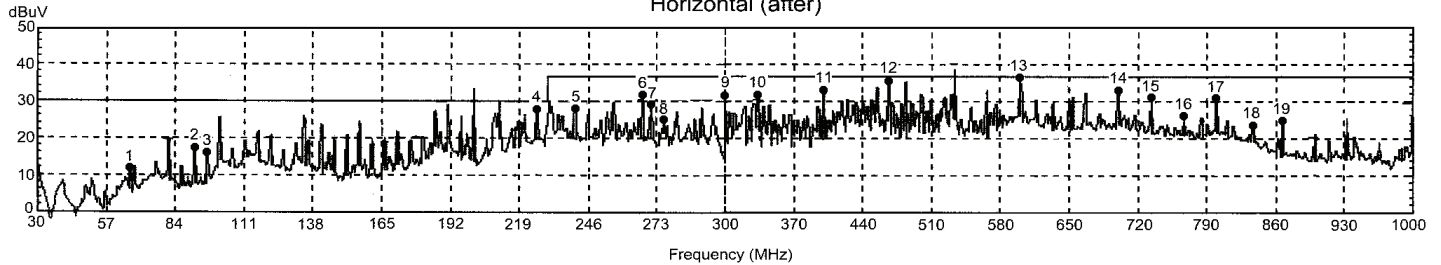
**FAM5**



Horizontal (before)

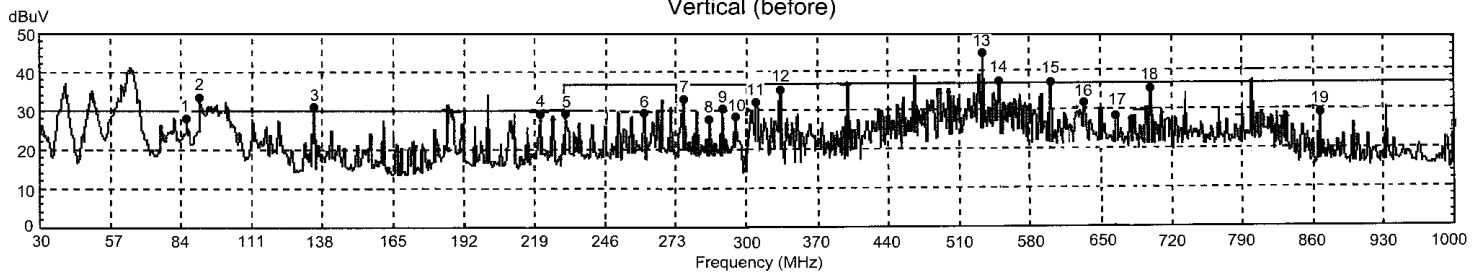


Horizontal (after)

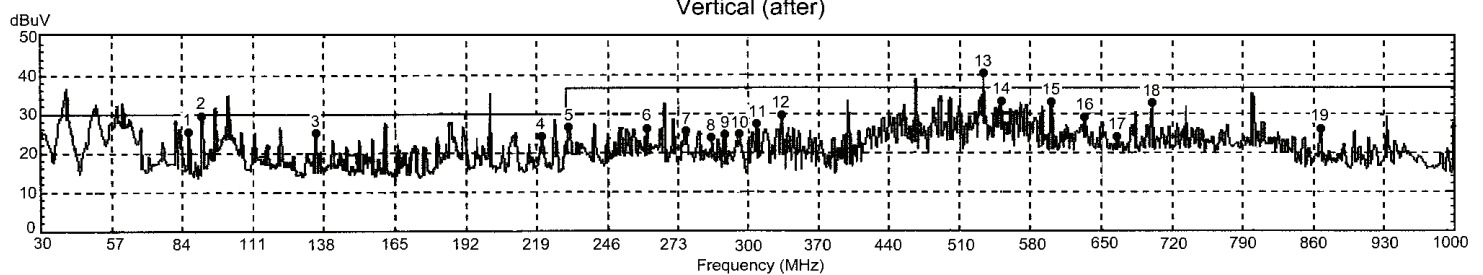


| Horizontal         | 1    | 2    | 3    | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    |
|--------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Frequency(MHz)     | 65.1 | 91.7 | 96.3 | 225.6 | 241.0 | 267.2 | 270.7 | 275.7 | 300.0 | 334.0 | 399.0 | 466.0 | 600.0 | 700.0 | 733.0 | 767.0 | 800.0 | 833.0 | 867.0 |
| Before [dBuV]      | 23.8 | 21.6 | 18.9 | 32.7  | 30.1  | 33.5  | 30.2  | 29.7  | 36.4  | 34.3  | 39.9  | 38.9  | 40.2  | 36.8  | 37.0  | 31.6  | 35.6  | 27.9  | 27.6  |
| After [dBuV]       | 12.0 | 16.9 | 15.4 | 27.1  | 28.0  | 31.2  | 27.5  | 24.7  | 31.1  | 31.2  | 32.9  | 36.9  | 36.6  | 32.7  | 30.5  | 25.9  | 30.7  | 23.0  | 24.6  |
| Attenuation [dBuV] | 11.8 | 4.7  | 3.5  | 5.6   | 2.1   | 2.3   | 2.7   | 5.0   | 5.3   | 3.1   | 7.0   | 2.0   | 3.6   | 4.1   | 6.5   | 5.7   | 4.9   | 4.9   | 3.0   |

Vertical (before)



Vertical (after)



| Vertical           | 1    | 2    | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19    |
|--------------------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Frequency(MHz)     | 86.1 | 91.3 | 134.5 | 221.3 | 230.6 | 261.0 | 275.3 | 285.7 | 290.7 | 295.4 | 309.0 | 333.0 | 534.0 | 550.0 | 633.0 | 665.0 | 701.0 | 709.0 | 866.0 |
| Before [dBuV]      | 28.0 | 33.1 | 30.4  | 28.2  | 28.8  | 28.8  | 32.3  | 27.3  | 30.2  | 28.4  | 31.7  | 24.5  | 43.8  | 36.7  | 36.3  | 30.9  | 28.0  | 34.9  | 38.7  |
| After [dBuV]       | 25.1 | 29.0 | 24.9  | 22.8  | 26.2  | 25.8  | 25.3  | 23.9  | 25.8  | 24.7  | 26.8  | 29.6  | 40.6  | 33.3  | 32.7  | 27.8  | 24.1  | 32.4  | 25.9  |
| Attenuation [dBuV] | 2.9  | 4.1  | 5.5   | 5.4   | 2.6   | 3.0   | 7.0   | 3.4   | 4.4   | 3.7   | 4.9   | 4.9   | 3.2   | 3.4   | 3.6   | 3.1   | 3.9   | 2.5   | 2.8   |

## LF/HF RFID on metal application:

When a RFID tag or RFID reader/writer is attached to a metal surface, the read distance will become much shorter than expected. The traditional solution is to increase the space between the RFID antenna and the metal but this can be detrimental when a thin device is desired. FAM can be an excellent solution to improve the read distance for both LF (125/134.2KHz) and HF (13.56MHz) bands. FAM is inserted between the RFID antenna and the metal surface to give an improvement of read distance of up to 80%. This can significantly improve the device footprint and overall efficiency.

## Frequently Asked Questions:

### How to use FAM with an RFID tag?

Place the cut FAM pad into the cavity and ensure good adhesion. When attaching to a metal surface FAM should not be attached to the antenna side

### How to use FAM for RFID reader/writer applications?

Insert the pre-cut FAM pad between the antenna and PCB. The antenna side should not be attached to the metal surface directly.

### Can I use FAM for UHF RFID applications?

FAM works well in LF/HF RFID applications but is not suitable for UHF RFID (Electric-field) applications

### How do I select the correct FAM thickness?

FAM is available in a number of standard thicknesses. T-Global engineers can offer application advice for design and engineering applications

### What FAM dimension should I use?

The FAM pad should cover the entire RFID antenna area for optimum performance

### Are the faces of FAM the same?

Unless an adhesive is applied there is no need to mount the FAM pad in a specific orientation.

## Read Distance (Reference):

| ISO Card | No Metal | On Metal | FAM1   |         |         |        |        |        |        |        | FAM3    |         |         | FAM5    |        |        |        |        |
|----------|----------|----------|--------|---------|---------|--------|--------|--------|--------|--------|---------|---------|---------|---------|--------|--------|--------|--------|
|          |          |          | 0.2 mm | 0.25 mm | 0.33 mm | 0.6 mm | 1.0 mm | 1.5 mm | 2.0 mm | 2.5 mm | 0.25 mm | 0.50 mm | 0.75 mm | 0.05 mm | 0.1 mm | 0.2 mm | 0.3 mm | 0.5 mm |
| Icode2   | 11       | 0        | 5.5    | 6.5     | 6.5     | 8      | 7.5    | 7      | 7      | 7      | 6       | 6.5     | 7       | 4.5     | 8      | 7      | 6.5    | 6      |
| TI 2048  | 14       | 0        | 4      | 5       | 5.5     | 9      | 7      | 7      | 6      | 6      | 4.5     | 8.5     | 9       | 5.5     | 7      | 7      | 5.5    | 5      |
| EM4100   | 19       | 4.5      | 8      | 9       | 9.5     | 12     | 7.5    | 5      | 4      | 4      | 9.5     | 12      | 9       | 11      | 12     | 4      | 4      | 3      |

- The read distance unit is CM
- Different reader will cause different read distance