

## Overview

The KEMET Magnetic Sheet for radio frequency identification (RFID) Flex Suppressor® prevents interference between a loop antenna and metallic objects and effectively improves the communication range of RFID.

The flexible sheet is a polymer base, blended with micron-sized magnetic powders dispersed throughout the material. These sheets improve the magnetic flux convergence and can be cut into a variety of shapes and sizes.

## Applications

- Cell phone with radio frequency identification (RFID) function
- Contactless IC card
- RFID reader/writer
- RFID tag

## Benefits

- Magnetic flux convergence improvement – increases the relative permeability ( $\mu'$ ) while keeping the magnetic loss ( $\mu''$ ) low.
- Effective carrier frequency 13.56 MHz and below
- Resistant to shock, not brittle
- Thin, flexible material used in portable equipment
- Virtually no limitation in where it can be used
- Less time required for installation
- Easily cut into any shape
- Easily laminates the Flex Suppressor® roll to the tag roll
- RoHS compliant and halogen-free

Sheet Type



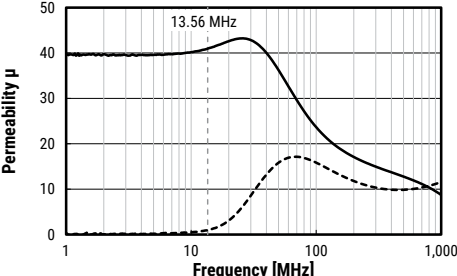
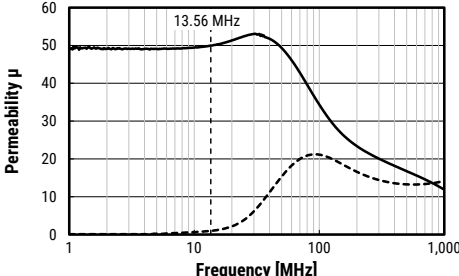
Roll Type



## Part Number System

M4	(100)-	240 X 240	T0800
Series	Thickness	Standard Dimensions	Adhesive Tape Thickness
M4 RM4A	(100)- = 0.1 mm (200)- = 0.2 mm (300)- = 0.3 mm (01)- = 0.1 mm (02)- = 0.2 mm (025)- = 0.25 mm (03)- = 0.3 mm	90 X 70 = Sheet 90 mm x 70 mm 185 X 70 = Sheet 185 mm x 70 mm 240 X 240 = Sheet 240 x 240 mm 240 X 20 M = Roll 240 mm x 20 m 240 X 30 M = Roll 240 mm x 30 m 240 X 50 M = Roll 240 mm x 50 m 220 X 185 = Sheet 220 mm x 185 mm	T0800 = 0.03 mm Blank = No adhesive tape

## Specifications

Features	High Magnetic Permeability & Low Magnetic Loss Type	
Series	M4	RM4A
Effective Carrier Frequency	13.56 MHz and below	
Operating Temperature (°C)	-40 to +105	-40 to +85
Thickness (mm)	0.1/0.2/0.3	0.1/0.2/0.25/0.3
Standard Dimensions (mm)	240 X 240 (Roll on request)	220 X 185
Permeability at 13.56 MHz	40 typical	50 typical
		
Specific Gravity <sup>1</sup>	3.1 typical	3.6 typical
Surface Resistivity (Ω/sq.)	1.0 X 10 <sup>7</sup> typical	
Approved Standard	UL 94 HB UL File No. E176124	-
Environment	RoHS	Compliant
	Halogen	Free
	PVC	Free
	Lead	Free
	Red Phosphorus	Free

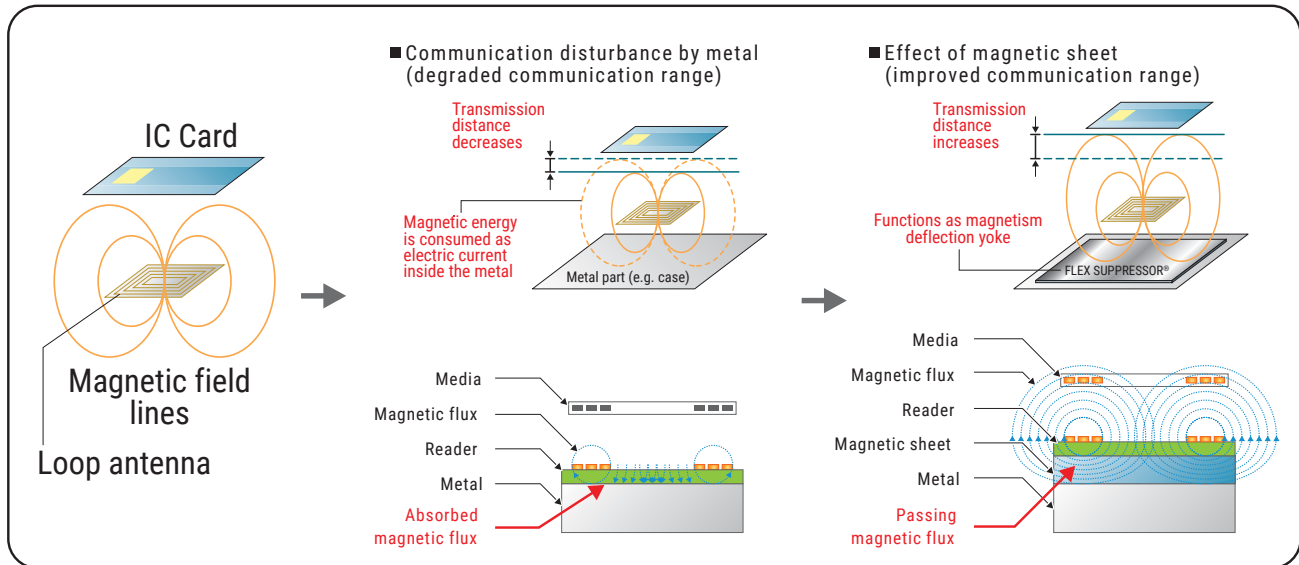
<sup>1</sup> Value in 23°C atmosphere.

Above specifications are for the Flex Suppressor® only (adhesives, etc., not included.)

**Table 1 – Ratings & Part Number Reference**

Part Number	Series	Thickness	Tape Thickness	Permeability	Specific Gravity	Surface Resistivity	Weight
		mm	mm	at 13.56 MHz	Typical	Ω/sq. typical	g
M4(100)-90X70T0800	M4	0.1	0.03	40	3.1	1.0 X 10 <sup>7</sup>	2.08
M4(100)-185X70T0800	M4	0.1	0.03	40	3.1	1.0 X 10 <sup>7</sup>	4.28
M4(100)-240X240T0800	M4	0.1	0.03	40	3.1	1.0 X 10 <sup>7</sup>	19.04
M4(100)-240X50M	M4	0.1	--	40	3.1	1.0 X 10 <sup>7</sup>	3,479.17
M4(100)-240X50MT0800	M4	0.1	0.03	40	3.1	1.0 X 10 <sup>7</sup>	3,966.67
M4(200)-90X70T0800	M4	0.2	0.03	40	3.1	1.0 X 10 <sup>7</sup>	3.91
M4(200)-185X70T0800	M4	0.2	0.03	40	3.1	1.0 X 10 <sup>7</sup>	8.04
M4(200)-240X240	M4	0.2	--	40	3.1	1.0 X 10 <sup>7</sup>	33.41
M4(200)-240X240T0800	M4	0.2	0.03	40	3.1	1.0 X 10 <sup>7</sup>	35.75
M4(200)-240X30M	M4	0.2	--	40	3.1	1.0 X 10 <sup>7</sup>	4,176.25
M4(200)-240X30MT0800	M4	0.2	0.03	40	3.1	1.0 X 10 <sup>7</sup>	4,468.75
M4(300)-90X70T0800	M4	0.3	0.03	40	3.1	1.0 X 10 <sup>7</sup>	5.74
M4(300)-185X70T0800	M4	0.3	0.03	40	3.1	1.0 X 10 <sup>7</sup>	11.79
M4(300)-240X240	M4	0.3	--	40	3.1	1.0 X 10 <sup>7</sup>	50.11
M4(300)-240X240T0800	M4	0.3	0.03	40	3.1	1.0 X 10 <sup>7</sup>	52.45
M4(300)-240X20M	M4	0.3	--	40	3.1	1.0 X 10 <sup>7</sup>	4,175.83
M4(300)-240X20MT0800	M4	0.3	0.03	40	3.1	1.0 X 10 <sup>7</sup>	4,370.83
RM4A(01)-90X70T0800	RM4A	0.1	0.03	50	3.6	1.0 X 10 <sup>7</sup>	2.52
RM4A(01)-185X70T0800	RM4A	0.1	0.03	50	3.6	1.0 X 10 <sup>7</sup>	5.19
RM4A(01)-220X185T0800	RM4A	0.1	0.03	50	3.6	1.0 X 10 <sup>7</sup>	16.31
RM4A(02)-90X70T0800	RM4A	0.2	0.03	50	3.6	1.0 X 10 <sup>7</sup>	4.79
RM4A(02)-185X70T0800	RM4A	0.2	0.03	50	3.6	1.0 X 10 <sup>7</sup>	9.85
RM4A(02)-220X185T0800	RM4A	0.2	0.03	50	3.6	1.0 X 10 <sup>7</sup>	30.96
RM4A(02)-220X185	RM4A	0.2	--	50	3.6	1.0 X 10 <sup>7</sup>	29.31
RM4A(025)-90X70T0800	RM4A	0.25	0.03	50	3.6	1.0 X 10 <sup>7</sup>	5.93
RM4A(025)-185X70T0800	RM4A	0.25	0.03	50	3.6	1.0 X 10 <sup>7</sup>	12.18
RM4A(025)-220X185T0800	RM4A	0.25	0.03	50	3.6	1.0 X 10 <sup>7</sup>	38.29
RM4A(025)-220X185	RM4A	0.25	--	50	3.6	1.0 X 10 <sup>7</sup>	36.63
RM4A(03)-90X70T0800	RM4A	0.3	0.03	50	3.6	1.0 X 10 <sup>7</sup>	7.06
RM4A(03)-185X70T0800	RM4A	0.3	0.03	50	3.6	1.0 X 10 <sup>7</sup>	14.51
RM4A(03)-220X185T0800	RM4A	0.3	0.03	50	3.6	1.0 X 10 <sup>7</sup>	45.61
RM4A(03)-220X185	RM4A	0.3	--	50	3.6	1.0 X 10 <sup>7</sup>	43.96
		mm	mm	at 13.56 MHz	Typical	Ω/sq. typical	g
<b>Part Number</b>	<b>Series</b>	<b>Thickness</b>	<b>Tape Thickness</b>	<b>Permeability</b>	<b>Specific Gravity</b>	<b>Surface Resistivity</b>	<b>Weight</b>

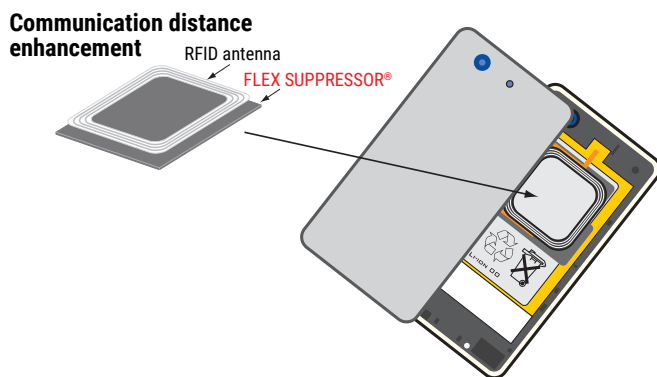
## Applications



Devices	RFID Transmission Quality Improvement
Mobile phone	For communication distance improvement
Notebook PC and tablet	
RFID card reader/writer	
RFID card and tag	

Application example in a cell phone with RFID function.

Laminating the Flex Suppressor® roll to the tag roll

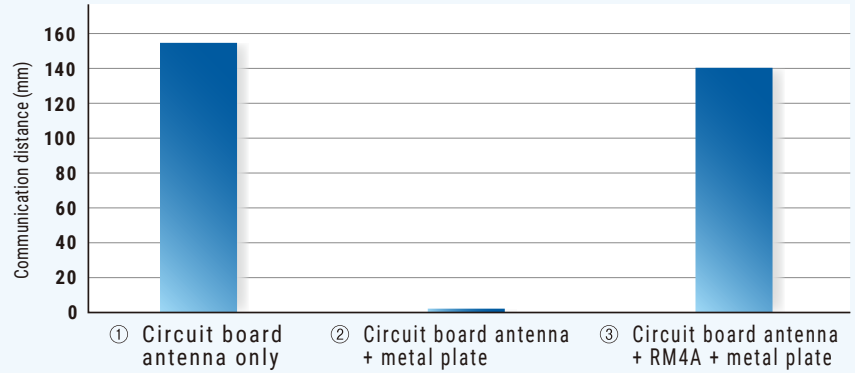


## Applications (cont'd)

Communication distance evaluation of a cell phone RFID antenna.

- **RFID** circuit board antenna for mobile phones (About 40 mm × 30 mm)
  - ① Circuit board antenna only (in open space)
  - ② Circuit board antenna with a metal plate in its proximity
  - ③ RM4A installed between the circuit board and a metal plate
- **ISO/IEC 18092** compatible Contactless reader/writer


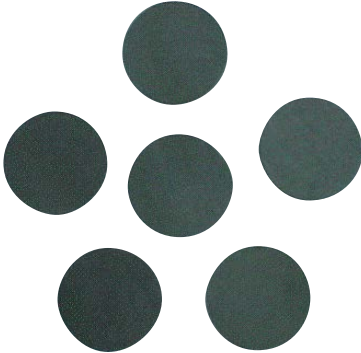

Measurement of the maximum communication distance of both of the above (3 levels)



\* This data does not represent guaranteed values.

## Examples of Shapes

KEMET Flex Suppressor® sheets can be cut into a variety of shapes and sizes:

With holes, cut-out shapes, and circular shapes		Precut
		

Reel	Roll	With Aluminum or PET sheet
		

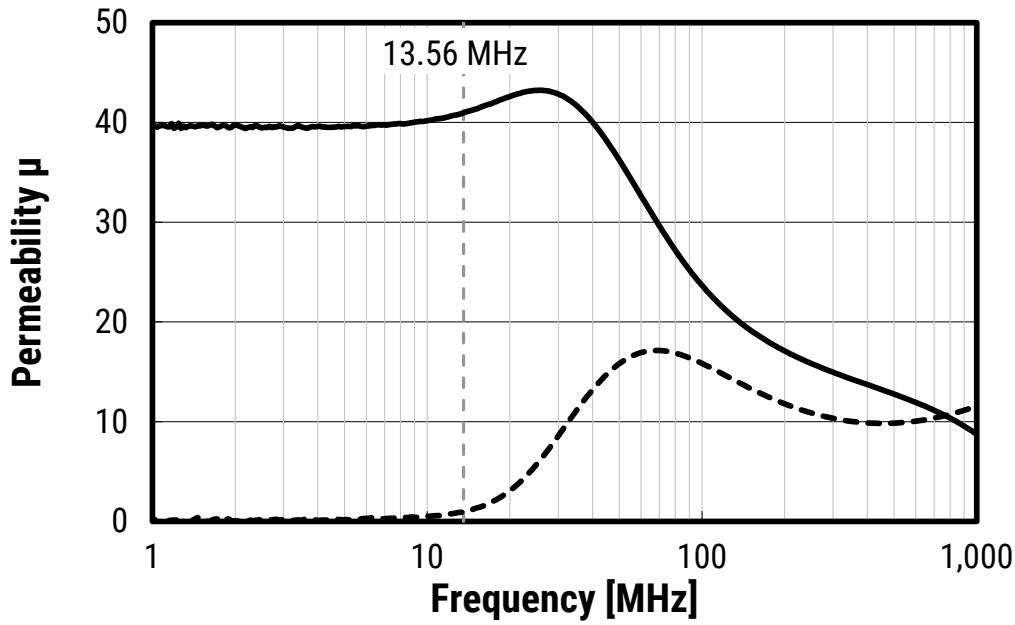
Some examples of customization, available upon request:

- The use of PET film in the front, for insulation or mechanical support
- The use of aluminum sheet in the front, for shielding effect
- The use of different adhesive tapes on the back - stronger, thinner, thicker, etc.

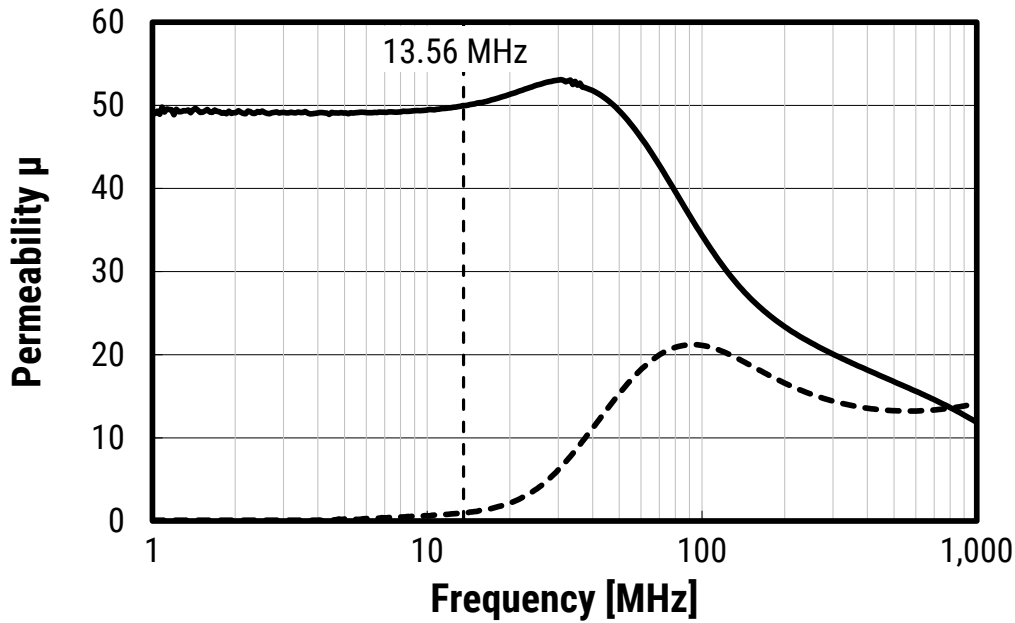
Customization Examples	Where	Function
PET Film	Front	Insulation or mechanical support
Aluminum sheet	Front	Shielding effect
Different adhesive tape	Back	Stronger adhesive tape Thinner or thicker tape Reflow capable, double-sided tape

## Permeable Characteristics

M4



RM4A



## Handling Precautions

Avoid high temperature, humidity and direct sunlight. Storage environment should be below 40°C and below 70% relative humidity. The surface resistance value listed in this catalog is a reference value of the circuit parameter to indicate noise suppression. The value does not represent the product's insulation characteristics. The value may become lower if an excess pressure is applied to the product. The products in this datasheet are not insulators, they need to be handled as conductors. Care must be taken when in use, so that conductive material does not contact the surface or the edge of the Flex Suppressor® sheet. Insulation process should be performed when contact to conductive material is probable. Depending on the processing procedure, powdery substance may drop out from sheet surface or the edge, if the cutting of the sheet is performed. Depending on the location, care must be taken, as this powder may effect the component's performance.

Any dust, oil or moisture must be cleaned from the surface of the installation area when using an adhesive tape to attach the sheet. The adhesive tape may begin to lose some of its adhesiveness after being in storage for six months. This has no impact on the EMI filtering effectiveness.

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## Export Control

### For customers in Japan

For products that are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

### For customers outside Japan

Flex Suppressor® products should not be used or sold for the use in the development, production, stockpiling or utilization of any conventional weapons, mass-destruction weapons (nuclear, chemical and biological weapons or missiles) or any other weapons.



## Information on environmentally influential substances

The Flex Suppressor® does not contain any of the substances listed below:

### (1) Ozone depleting substance

- CFC (chlorofluorocarbon)
- Halon
- Carbon tetrachloride
- 1,1,1-Trichloroethane
- HCFC (hydrochlorofluorocarbon)
- HBFC (hydrobromfluorocarbon)
- Methyl bromide

### (2) Substances regulated by RoHS Directive

- Lead and lead compound
- Mercury and mercury compound
- Cadmium and cadmium compound (content of plastics that are below 5 ppm)
- Hexavalent chromium and hexavalent chromium compound
- PBB (polybrominated biphenyl) and its kind
- PBDE (polybrominated diphenylether)

### (3) Other environmentally influential substances (examples)

- PCB (polychlorinated biphenyl)
- Polychlorinated naphthalene
- Hexachlorobenzene
- Organotin compounds (tributyl tin, triphenyl tin)
- Asbestos
- Azo compound
- Chlorinated paraffin and its kind (paraffin chloride, chlorinated paraffin and chloroparaffin)
- Radioactive substance
- PVC

## KEMET Electronics Corporation Sales Offices

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Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

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