# ESD-R Toroidal Cores for Round Cables for Low & High Frequency (Bare, coated & with case)

## Overview

The KEMET ESD-R series solid toroidal cores are designed to use on round cables. The wide range of Manganese Zinc (MnZn) and Nickel Zinc (NiZn) options are available in bare, coated, and case types and allows for targeting of specific frequency ranges.

EMI cores are part of a family of passive components, which address the issues of noise or electromagnetic interference (EMI) in circuits or systems.

## Applications

- Consumer electronics
- Air conditioners
- Power conditioners
- Refrigerators
- Washing machines
- Industrial equipment
- Medical equipment
- Adapters
- Computers
- Telecommunications

## Benefits

- MnZn ≤ 10 MHz (AM band range) and NiZn ≤ 300 MHz (FM band range) options available
- Solid construction
- Bare, coated, and case types available
- Wide range of products available

Bare Type



Coated Type



Case Type





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## Part Number System

| ESD- | R- | 10 | D |
|---|---|---|---|
| Series | Shape Type | Core Size<br>Outer Dimension Code (mm) | Internal Management Code |
| ESD- | Ring | See Table 1 | |

## Turns and Impedance Characteristics

When the desired performance of an EMI core cannot be obtained with a single pass through the core, the impedance characteristics can be changed with multiple turns.

A turn is counted by the number of lead-wire windings which pass through the inner hole of the core. Windings on the outside of the core do not count.

See Figure 1 for examples of one, two, and three turns.

Adding turns will result in higher impedance while also lowering the effective frequency range.

See Figure 2 for an example.

*Figure 1 – How to count turns*

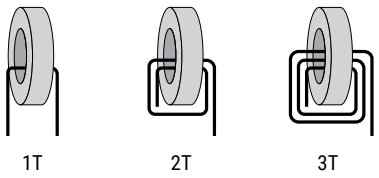
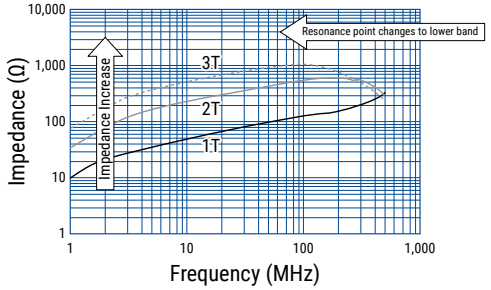



*Figure 2 – Relationship between impedance and turn count. (Representative example: ESD-R-16C)*



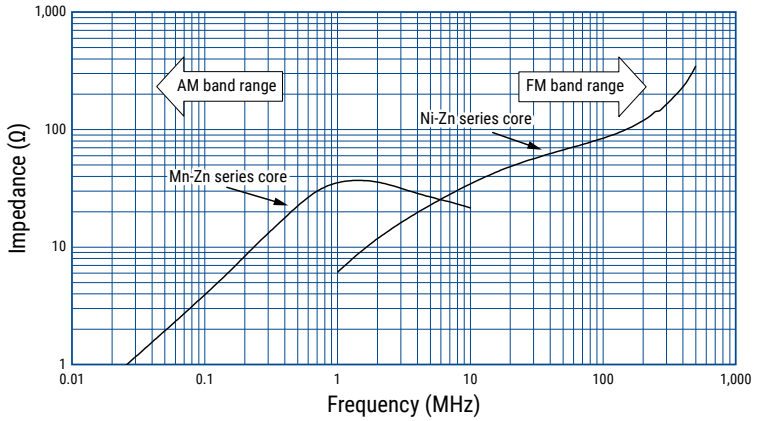

## Core Material and Effective Frequency Range

There are two ferrite material options for KEMET EMI Cores: Nickel Zinc (Ni-Zn) and Manganese Zinc (Mn-Zn). Each core material has a different resistance and effective frequency range. The MnZn core material has a lower resistance compared to the Ni-Zn; therefore, adequate insulation is required before use.

The Ni-Zn core material is typically effective for frequencies in the MHz band range such as the FM-band, while the Mn-Zn core material is typically effective for the kHz band range such as the AM-band. See Figure 3.

It is recommended to measure the actual frequency range effectiveness in the target application.

*Figure 3 – Effective band range of Mn-Zn and Ni-Zn ferrite core material. (Representative example, measured with same-dimension ring core)*



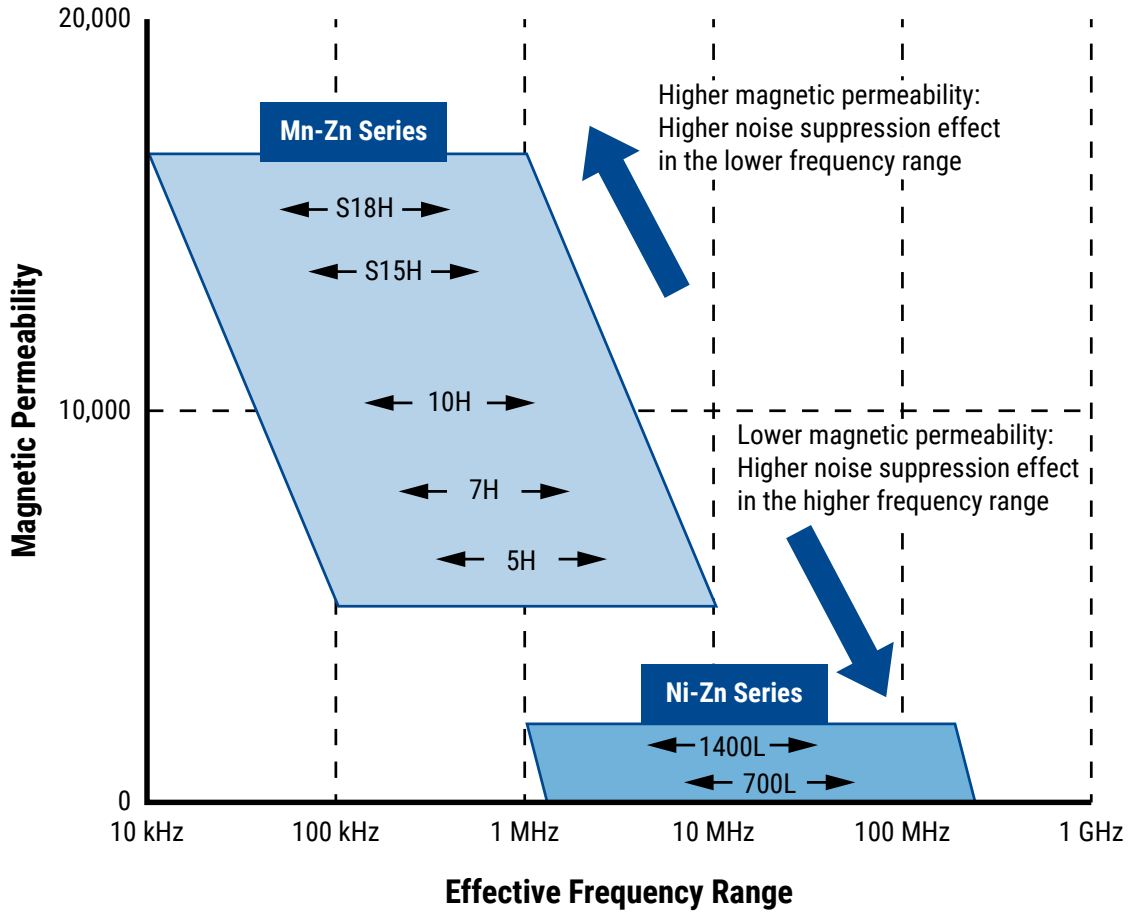
## Magnetic Permeability of Ferrite Material

In order to achieve most efficient noise reduction, it is important to select the material according to the target frequency band. Depending on its magnetic permeability, a particular ferrite material will be effective in a certain frequency band. A schematic representation of the relationship between the magnetic permeability of each material and the corresponding effective band range is shown in Figure 1. Materials with higher magnetic permeability are effective in the lower frequency range, while those with lower magnetic permeability are effective in the higher frequency range. Thus, Mn-Zn products are mainly used for reducing conduction noise, while Ni-Zn products are commonly used for radiation noise countermeasures.

The effective frequency range varies depending on core shape, size and number of windings. This frequency dependence of the magnetic permeability as shown in the figure serves for reference purposes only and it should be tested on the actual device to determine its effectiveness.

S18H, S15H, 10H, 7H, 5H, 1400L and 700L are KEMET's proprietary ferrite material names.
Other materials can also be available on request.

*Figure 4 - Relationship between the magnetic permeability of each material and its effective frequency range*

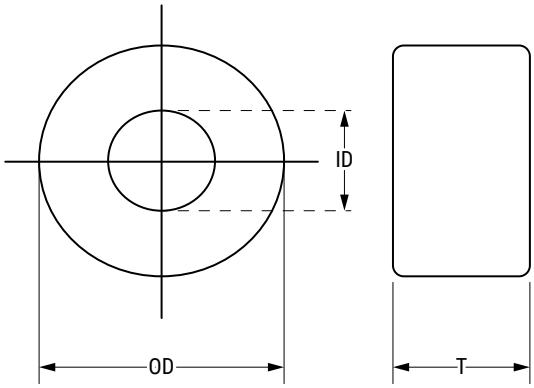


## Environmental Compliance

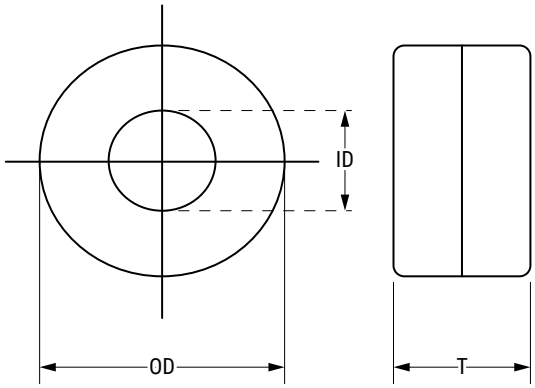
All KEMET EMI cores are RoHS compliant.

## Dimensions – Millimeters

**Bare and Coated Types**

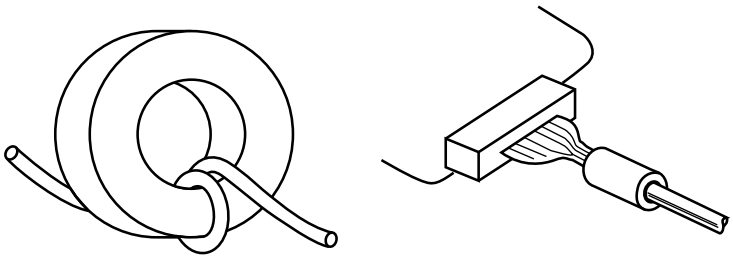



**Case Type**




*See Table 1 for dimensions*

## Installation Example



## Performance Characteristics

| Item | Performance Characteristics |
|---|---|
| Operating temperature | Bare and coated: –25°C to +85°C |
| | Case : –25°C to +60°C |
| Frequency range | Low frequency and high frequency |
| Outer diameter | 9.5 – 61.0 mm |
| Inner diameter | 5.0 – 36.0 mm |
| Thickness | 3.0 – 28.8 mm |
| Type | Bare, coated, and case |
| Case flame resistant rating | UL94 V–2 |
| Material | MnZn 5H and NiZn 700L |

## Table 1 – Ratings & Part Number Reference

| Part Number | Dimensions (mm) | | | Weight | Type | Color | Compatible Toroid Core (Bare Type) | Frequency Range[1] | | Material | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | OD | ID | T | (g) | | | | ≤ 10 MHz (AM band range) | ≤ 300 MHz (FM band range) | MnZN | NiZn |
| ESD-R-10D | 9.5 ±0.5 | 5.0 ±0.5 | 10.0 ±0.5 | 2.5 | Bare | – | – | | X | – | 700L |
| ESD-R-10E | 10.0 ±0.5 | 5.0 ±0.4 | 5.0 ±0.4 | 1.5 | Bare | – | – | | X | – | 700L |
| ESD-R-10S | 10.5 ±0.8 | 5.5 ±0.8 | 20.0 ±0.8 | 6.3 | Bare | – | – | | X | – | 700L |
| ESD-R-12C | 11.8 ±0.7 | 7.3 ±0.8 | 15.0 ±0.7 | 5.0 | Bare | – | – | | X | – | 700L |
| ESD-R-12E | 11.8 ±0.7 | 7.3 ±0.7 | 8.0 ±0.7 | 2.7 | Bare | – | – | | X | – | 700L |
| ESD-R-12F | 12.0 ±0.5 | 8.5 ±0.5 | 15.0 ±0.5 | 4.1 | Bare | – | – | | X | – | 700L |
| ESD-R-12S | 12.0 ±0.5 | 7.0 ±0.4 | 5.5 ±0.4 | 2.1 | Bare | – | – | | X | – | 700L |
| ESD-R-14C | 14.0 ±0.7 | 7.0 ±0.7 | 3.0 ±0.7 | 1.7 | Bare | – | – | | X | – | 700L |
| ESD-R-14E | 14.0 ±0.6 | 10.0 ±0.6 | 8.0 ±0.5 | 3.1 | Bare | – | – | | X | – | 700L |
| ESD-R-14S | 14.3 ±0.5 | 6.3 ±0.5 | 28.5 ±0.8 | 17.1 | Bare | – | – | | X | – | 700L |
| ESD-R-15C-1 | 15.0 ±0.5 | 10.5 ±0.5 | 12.0 ±0.5 | 5.3 | Bare | – | – | | X | – | 700L |
| ESD-R-16 | 15.8 ±0.6 | 11.6 ±0.6 | 8.4 ±0.6 | 3.6 | Bare | – | – | X | | 5H | – |
| ESD-R-16C | 16.0 ±0.7 | 9.0 ±0.7 | 17.0 ±0.7 | 11.2 | Bare | – | – | | X | – | 700L |
| ESD-R-17S | 17.5 ±0.5 | 9.5 ±0.3 | 28.5 ±0.5 | 24.4 | Bare | – | – | | X | – | 700L |
| ESD-R-18SD | 18.0 ±0.5 | 10.0 ±0.5 | 6.0 ±0.5 | 5.1 | Bare | – | – | | X | – | 700L |
| ESD-R-19S | 18.5 ±1.0 | 10.0 ±1.0 | 10.0 ±1.0 | 10.4 | Bare | – | – | X | | 5H | – |
| ESD-R-19SD | 18.5 ±1.0 | 10.0 ±1.0 | 10.0 ±1.0 | 10.0 | Bare | – | – | | X | – | 700L |
| ESD-R-22SD | 22.5 ±0.7 | 13.8 ±0.5 | 6.4 ±0.5 | 7.8 | Bare | – | – | | X | – | 700L |
| ESD-R-25SD | 25.0 ±0.5 | 15.0 ±0.5 | 12.0 ±0.3 | 18.5 | Bare | – | – | | X | – | 700L |
| ESD-R-25S | 25.0 ±0.8 | 15.0 ±0.8 | 12.0 ±0.8 | 18.5 | Bare | – | – | X | | 5H | – |
| ESD-R-26S | 26.0 ±0.5 | 13.0 ±0.3 | 28.5 ±0.5 | 53.3 | Bare | – | – | | X | – | 700L |
| ESD-R-27S | 27.0 ±0.8 | 19.0 ±0.8 | 15.0 ±0.5 | 21.3 | Bare | – | – | X | | 10H | – |
| ESD-R-28C | 28.0 ±0.8 | 16.0 ±0.5 | 13.0 ±0.6 | 27.3 | Bare | – | – | | X | – | 700L |
| ESD-R-31C | 31.0 ±0.8 | 19.0 ±0.5 | 8.0 ±0.5 | 18.1 | Bare | – | – | | X | – | 700L |
| ESD-R-38D | 38.1 ±1.0 | 19.0 ±0.7 | 12.7 ±0.7 | 53.0 | Bare | – | – | X | | 5H | – |
| ESD-R-47S | 47.0 ±1.0 | 27.0 ±0.8 | 15.0 ±0.5 | 83.7 | Bare | – | – | X | | 5H | – |
| ESD-R-57D | 57.0 ±1.5 | 36.0 ±1.5 | 20.0 ±0.7 | 139.1 | Bare | – | – | | X | – | 700L |
| ESD-R-57S | 57.0 ±1.5 | 36.0 ±1.0 | 20.0 ±0.5 | 139.1 | Bare | – | – | X | | 5H | – |
| Part Number | OD | ID | T | (g) | Type | Color | Compatible Toroid Core (Bare Type) | ≤ 10 MHz (AM band range) | ≤ 300 MHz (FM band range) | MnZn | NiZn |
| | Dimensions | | | Weight | | | | Frequency Range[1] | | Material | |

[1] *Frequency range is for reference only. Please test with actual device before use.*

** Other sizes available on request. Please contact KEMET.*

## Table 1 – Ratings & Part Number Reference cont.

| Part Number | Dimensions (mm) | | | Weight | Type | Color | Compatible Toroid Core (Bare Type) | Frequency Range[1] | | Material | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | OD | ID | T | (g) | | | | ≤ 10 MHz (AM band range) | ≤ 300 MHz (FM band range) | MnZN | NiZn |
| ESD-R-12C-2 | 12.0 ±0.7 | 7.3 ±0.7 | 15.3 ±0.7 | 5.0 | Coated | Blue | – | | X | – | 1400L |
| ESD-R-12CM | 12.0 ±0.5 | 7.0 ±0.5 | 15.0 ±0.7 | 5.0 | Coated | Gray | ESD-R-12C | | X | – | 700L |
| ESD-R-14A | 15.0 Maximum | 6.2 Minimum | 3.5 Maximum | 1.8 | Coated | Green | – | X | | 5H | – |
| ESD-R-14C-2 | 14.0 ±0.5 | 7.0 ±0.5 | 3.0 ±0.5 | 1.7 | Coated | Blue | ESD-R-14C | | X | – | 700L |
| ESD-R-15C | 15.2 ±0.5 | 10.5 ±0.5 | 12.5 ±0.5 | 5.3 | Coated | Blue | ESD-R-15C-1 | | X | – | 700L |
| ESD-R-17S-1 | 17.7 ±0.5 | 9.4 ±0.3 | 28.8 ±0.5 | 24.4 | Coated | Blue | ESD-R-17S | | X | – | 700L |
| ESD-R-19E-1 | 19.0 ±0.5 | 10.7 ±0.5 | 5.3 ±0.5 | 6.0 | Coated | Blue | – | | X | – | 700L |
| ESD-R-25D-8 | 25.0 ±0.5 | 15.0 ±0.5 | 8.0 ±0.5 | 12.9 | Coated | Blue | – | | X | – | 700L |
| ESD-R-25L-A | 25.3 ±0.8 | 15.1 ±0.8 | 12.1 ±0.8 | 19.4 | Coated | Blue | ESD-R-25SD | | X | – | 700L |
| ESD-R-25MK | 25.3 ±0.6 | 14.8 ±0.6 | 12.3 ±0.6 | 21.0 | Coated | | ESD-R-25S | X | | 5H | – |
| ESD-R-28C-1 | 28.2 ±0.8 | 15.8 ±0.5 | 13.2 ±0.6 | 28.3 | Coated | Blue | – | | X | – | 700L |
| ESD-R-31C-1 | 32.0 Maximum | 18.5 Minimum | 9.0 Maximum | 18.5 | Coated | Green | ESD-R-31C | | X | – | 700L |
| ESD-R-31-P | 32.0 Maximum | 19.0 Minimum | 15.8 Maximum | 32.2 | Coated | Green | – | X | | 5H | – |
| ESD-R-38-P | 39.5 Maximum | 18.0 Minimum | 14.0 Maximum | 52.8 | Coated | Green | – | X | | 5H | – |
| ESD-R-47-P | 48.5 Maximum | 26.0 Minimum | 16.0 Maximum | 84.8 | Coated | Green | – | X | | 5H | – |
| ESD-R-57-P | 59.0 Maximum | 34.0 Minimum | 21.0 Maximum | 140.9 | Coated | Green | – | X | | 5H | – |
| | | | | | | | | | | | |
| ESD-R-12D | 12.9 ±1.0 | 6.0 ±1.0 | 6.4 ±1.0 | 2.4 | Case | Black | ESD-R-12S | | X | – | 700L |
| ESD-R-19 | 19.0 ±1.0 | 9.0 ±1.0 | 11.0 ±1.0 | 11.1 | Case | White | ESD-R-19S | X | | 5H | – |
| ESD-R-19D | 19.0 ±1.0 | 9.0 ±1.0 | 11.0 ±1.0 | 10.7 | Case | Black | ESD-R-19SD | | X | – | 700L |
| ESD-R-25 | 26.0 ±1.0 | 14.0 ±1.0 | 15.0 ±1.0 | 20.4 | Case | White | ESD-R-25S | X | | 5H | – |
| ESD-R-25D | 26.0 ±1.0 | 14.0 ±1.0 | 15.0 ±1.0 | 20.4 | Case | Black | ESD-R-25SD | | X | – | 700L |
| ESD-R-25D-1 | 26.0 ±1.0 | 14.0 ±1.0 | 15.0 ±1.0 | 21.0 | Case | Black with yellow tape | ESD-R-25SD | | X | – | 700L |
| ESD-R-38 | 39.0 ±0.8 | 17.5 ±0.8 | 14.0 ±0.8 | 55.3 | Case | White | ESD-R-38D | X | | 5H | – |
| ESD-R-38-1 | 39.0 ±1.0 | 17.5 ±1.0 | 14.0 ±1.0 | 56.0 | Case | White with yellow tape | ESD-R-38D | X | | 5H | – |
| ESD-R-38C-1 | 39.0 ±1.0 | 17.5 ±1.0 | 14.0 ±1.0 | 55.5 | Case | White with black tape | – | | X | – | 700L |
| ESD-R-38SA | 39.0 ±0.8 | 17.5 ±0.8 | 14.0 ±0.8 | 56.0 | Case | White | – | X | | 10H | – |
| ESD-R-47 | 48.0 ±1.0 | 25.5 ±1.0 | 16.0 ±1.0 | 84.4 | Case | White | – | X | | 5H | – |
| ESD-R-47-1 | 50.0 Maximum | 23.0 Minimum | 18.0 Maximum | 90.0 | Case | White with yellow tape | ESD-R-47S | X | | 5H | – |
| ESD-R-47D-1 | 48.0 ±1.0 | 25.5 ±1.0 | 16.0 ±1.0 | 84.6 | Case | White with black tape | – | | X | – | 700L |
| ESD-R-57 | 61.0 Maximum | 32.4 ±1.0 | 24.0 Maximum | 150.1 | Case | White | – | X | | 5H | – |
| ESD-R-57A-1 | 61.0 Maximum | 32.4 ±1.0 | 24.0 Maximum | 150.1 | Case | White with yellow tape | ESD-R-57S | X | | 5H | – |
| ESD-R-57D-1 | 61.0 Maximum | 32.4 ±1.0 | 24.0 Maximum | 154.2 | Case | White with black tape | – | | X | – | 700L |
| Part Number | OD | ID | T | (g) | Type | Color | Compatible Toroid Core (Bare Type) | ≤ 10 MHz (AM band range) | ≤ 300 MHz (FM band range) | MnZn | NiZn |
| | Dimensions | | | Weight | | | | Frequency Range[1] | | Material | |

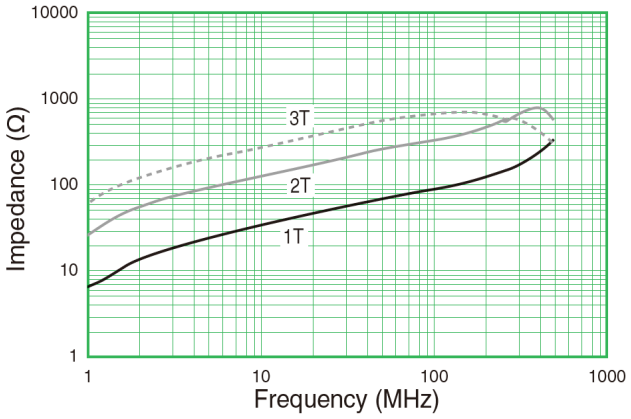
[1] *Frequency range is for reference only. Please test with actual device before use.*

** Other sizes available on request. Please contact KEMET.*

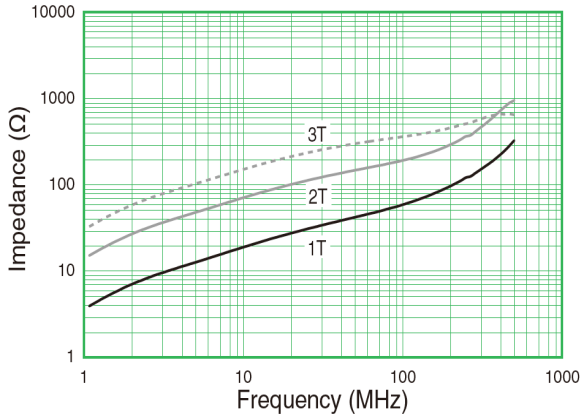
## Impedance vs. Frequency

Bare Type

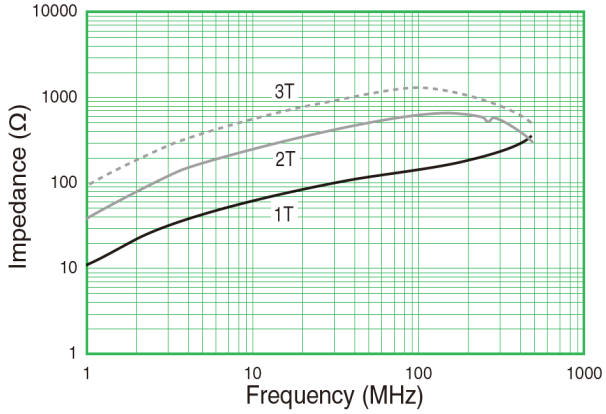
ESD-R-10D



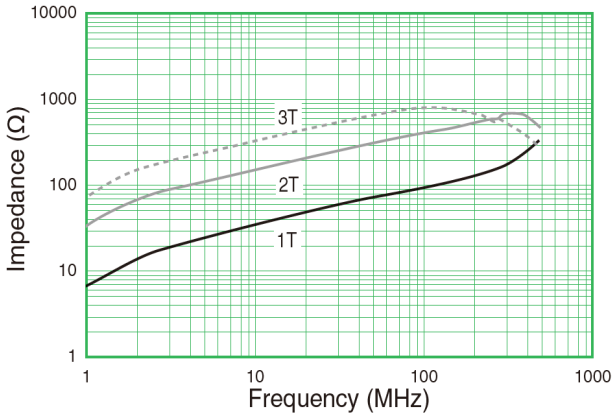

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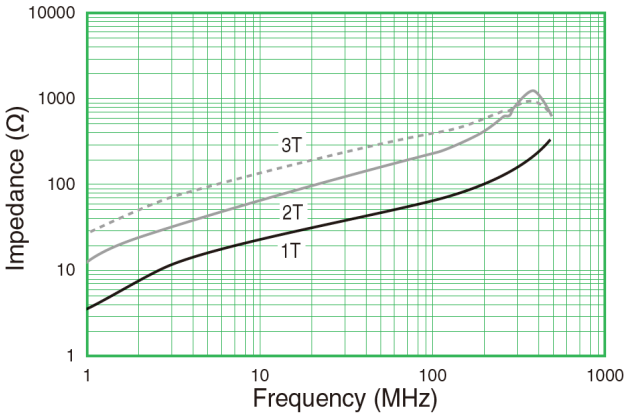

ESD-R-10S



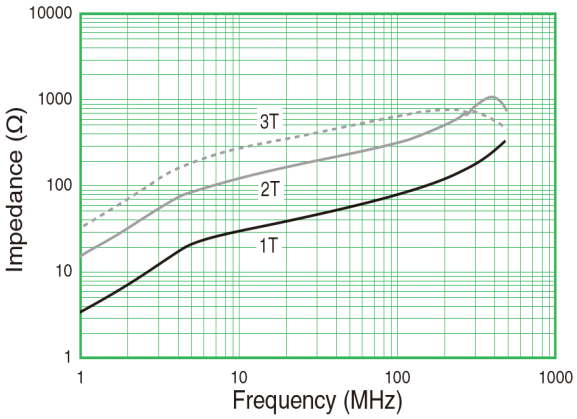

ESD-R-12C




ESD-R-12E



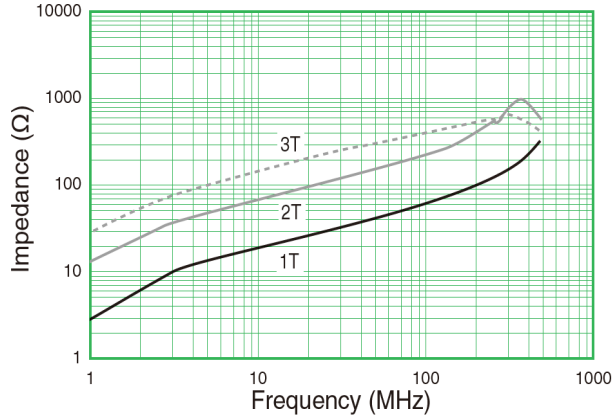

ESD-R-12F



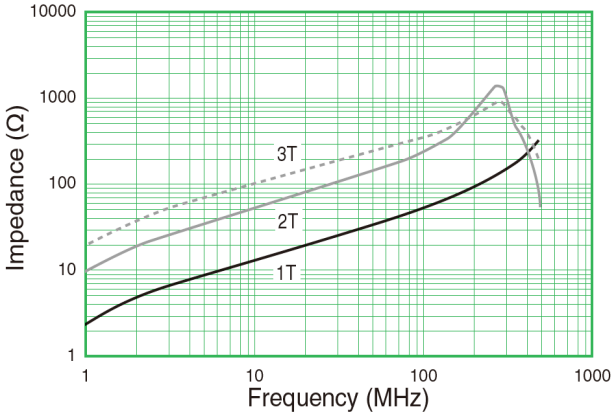
## Impedance vs. Frequency cont.

Bare Type

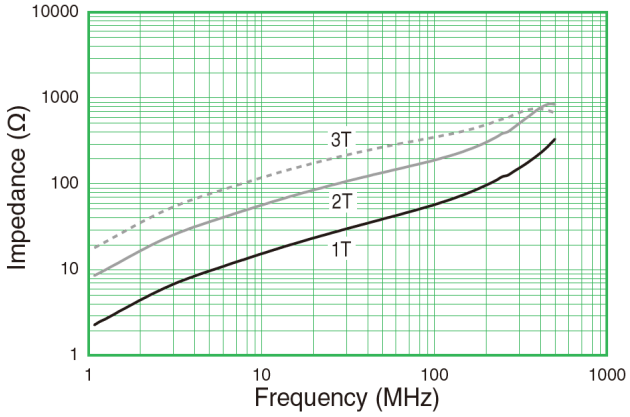
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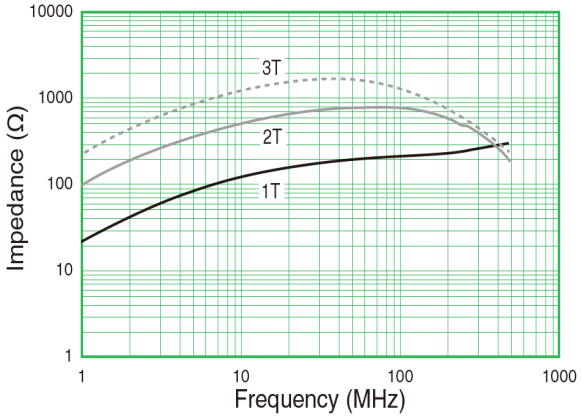

ESD-R-14C



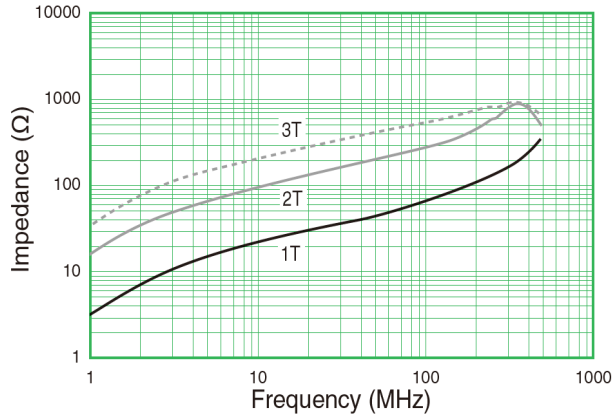

ESD-R-14E



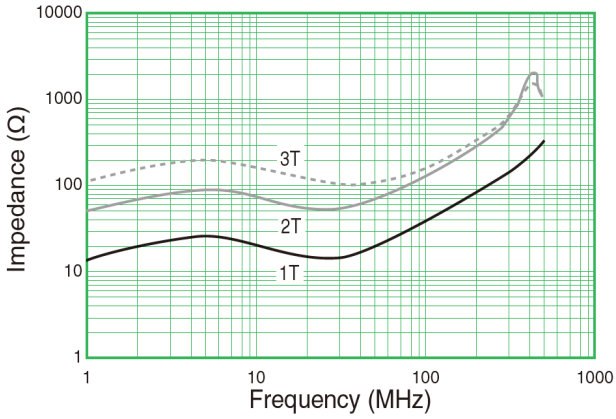

ESD-R-14S




ESD-R-15C-1



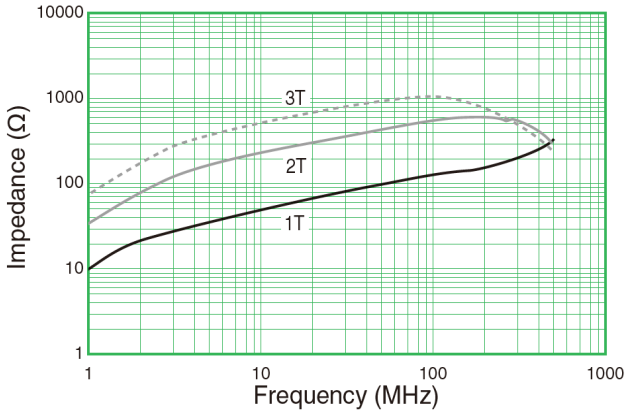

ESD-R-16



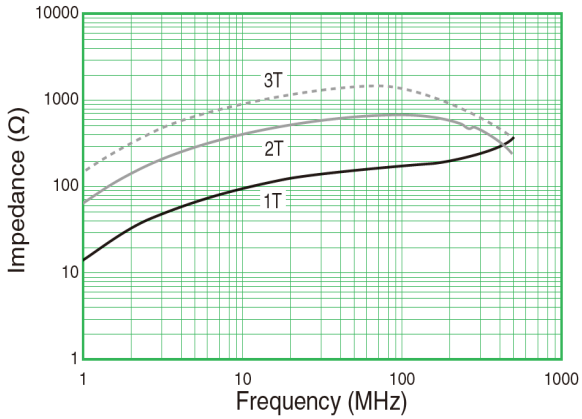
## Impedance vs. Frequency cont.

Bare Type

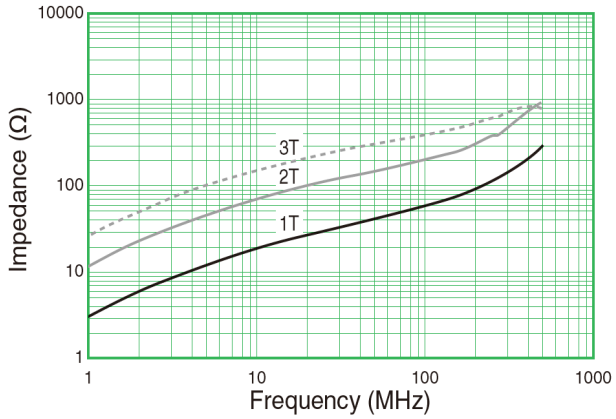
ESD-R-16C



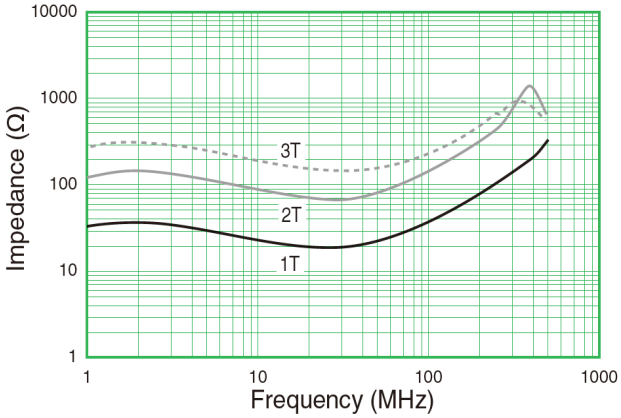

ESD-R-17S



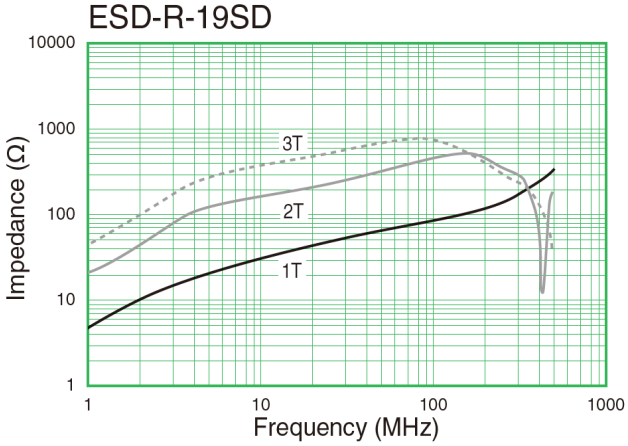

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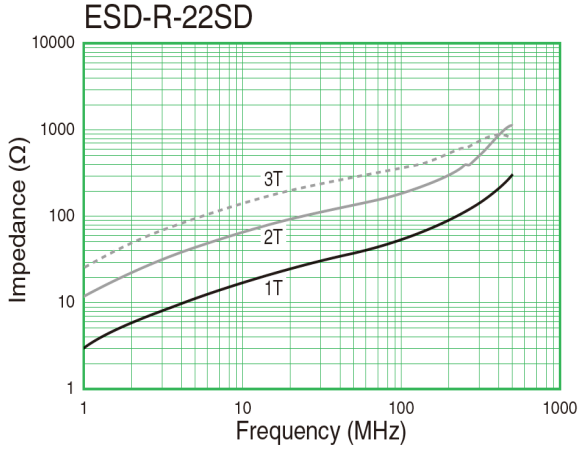

ESD-R-19S




ESD-R-19SD



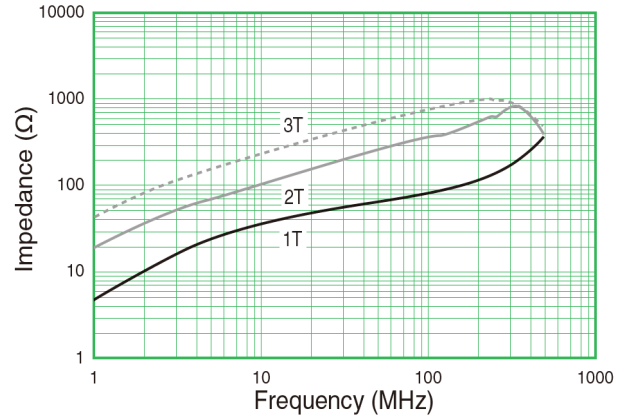

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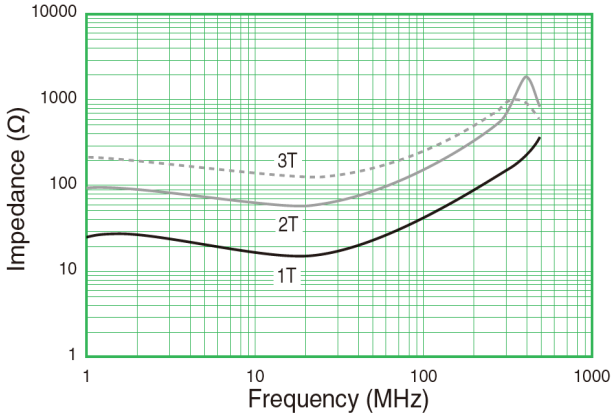
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Bare Type

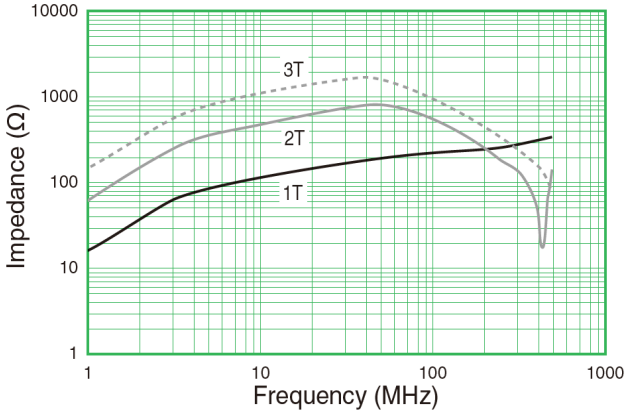
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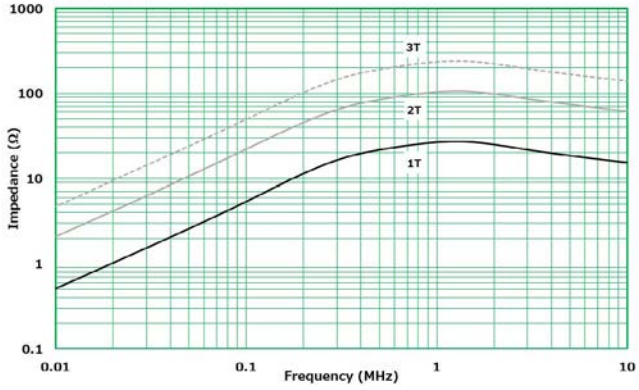

ESD-R-25S



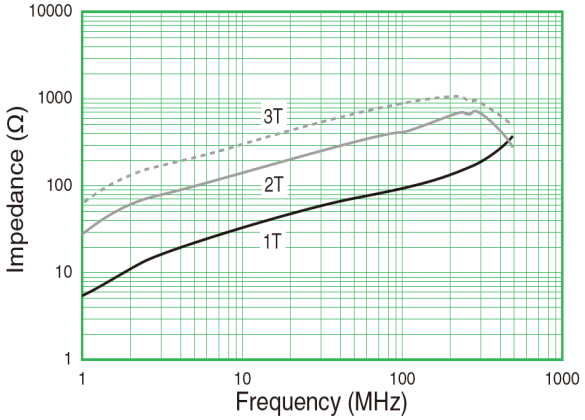

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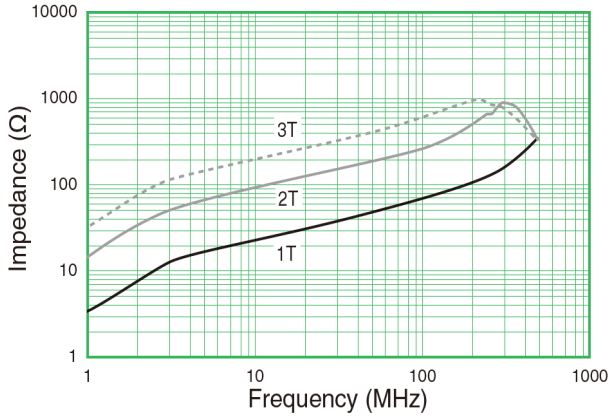

ESD-R-27S




ESD-R-28C



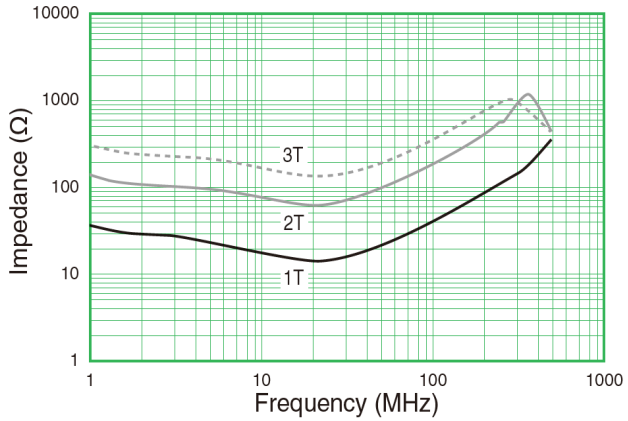

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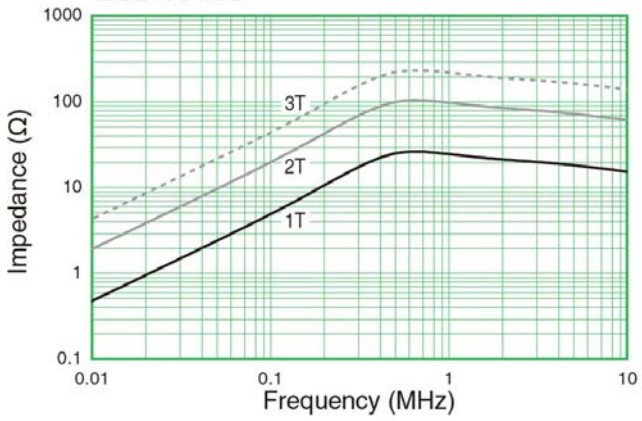
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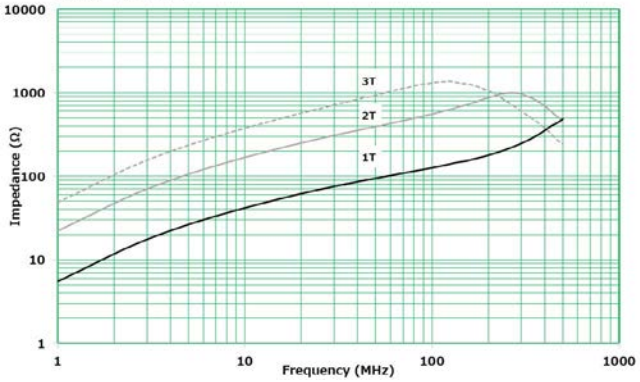
ESD-R-38D



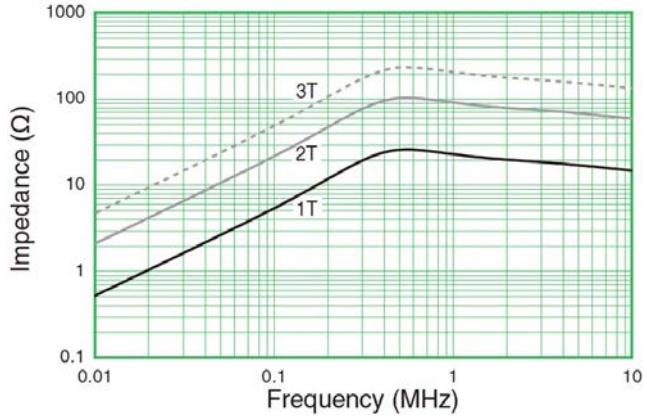

ESD-R-47S




ESD-R-57D

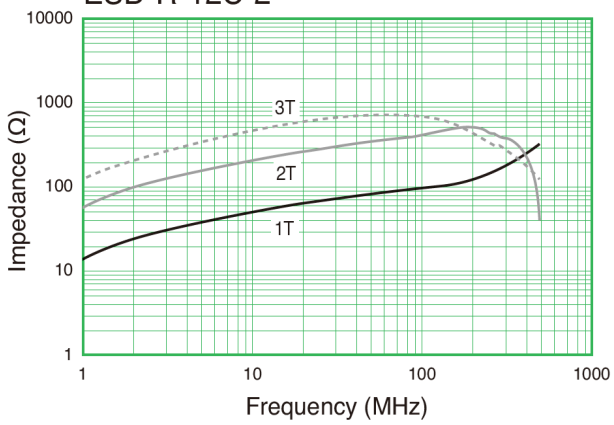



ESD-R-57S

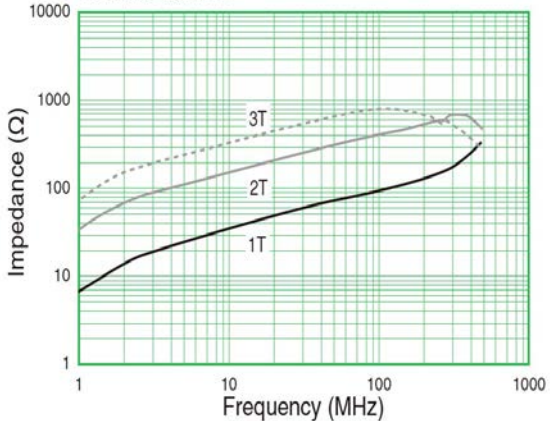



Coated Type

ESD-R-12C-2



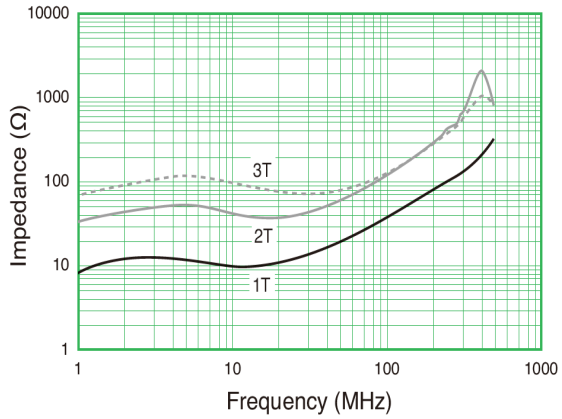

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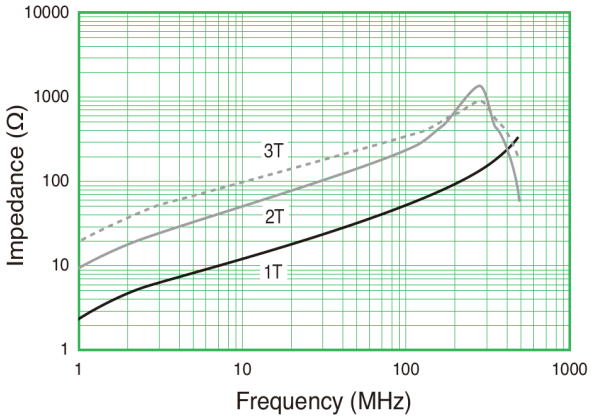
## Impedance vs. Frequency cont.

Coated Type

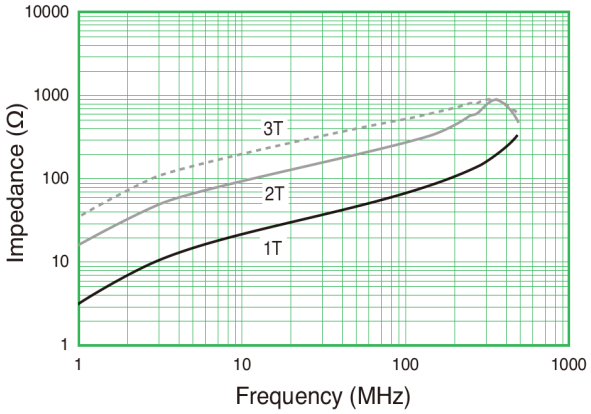
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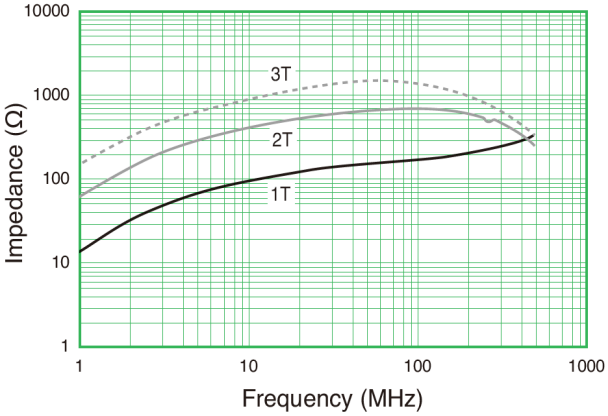

ESD-R-14C-2



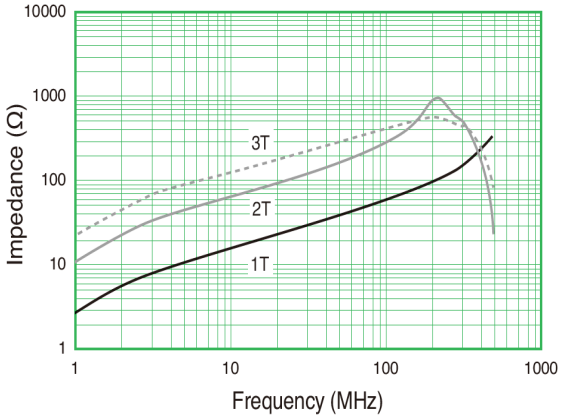

ESD-R-15C



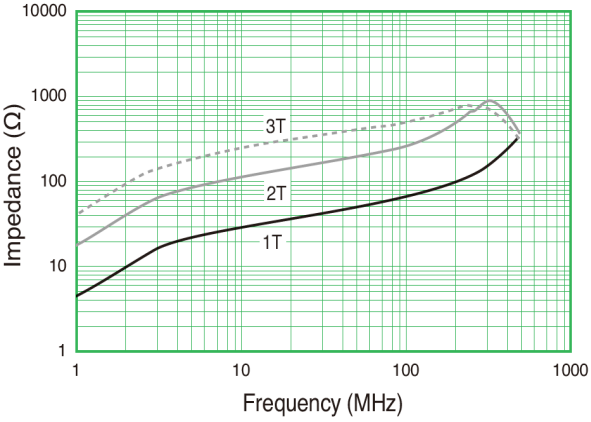

ESD-R-17S-1




ESD-R-19E-1



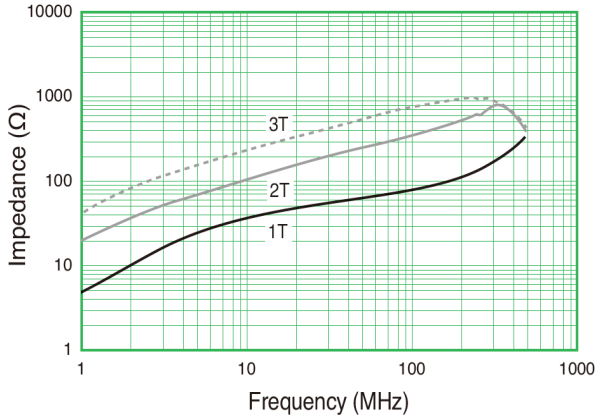

ESD-R-25D-8



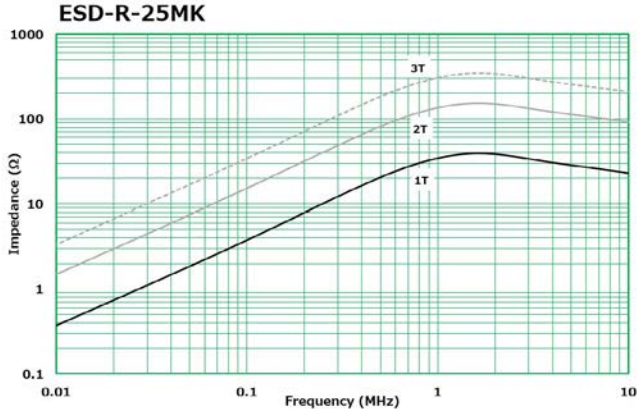
## Impedance vs. Frequency cont.

Coated Type

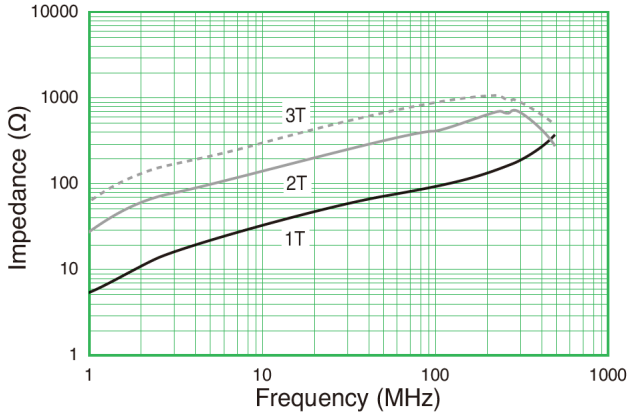
ESD-R-25L-A



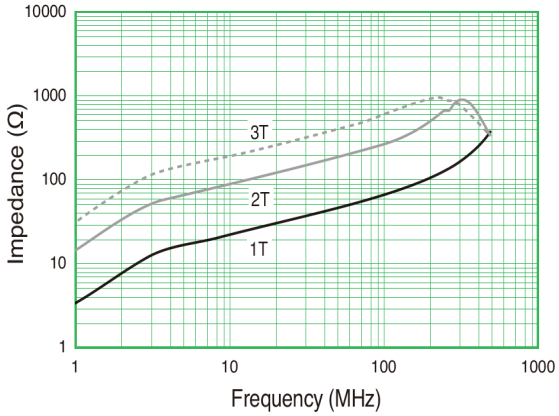

ESD-R-25MK



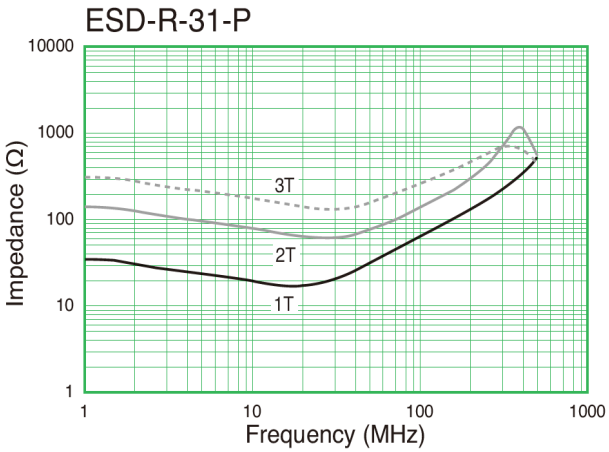

ESD-R-28C-1



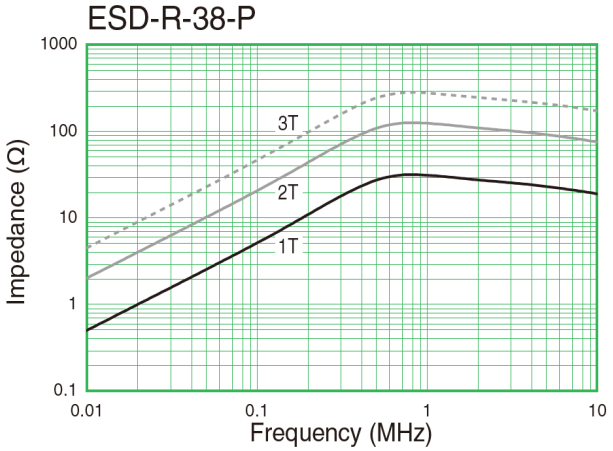

ESD-R-31C-1




ESD-R-31-P

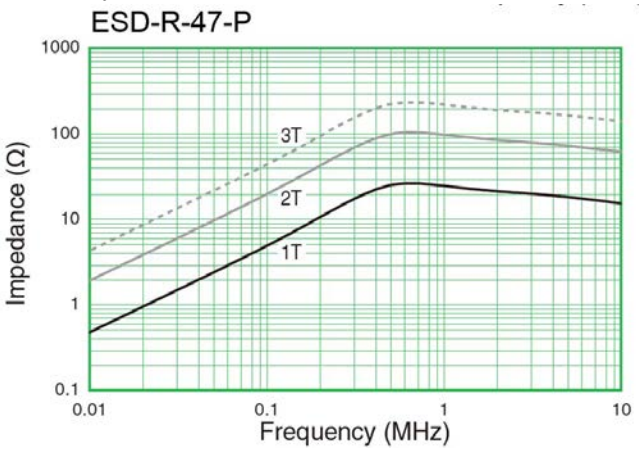


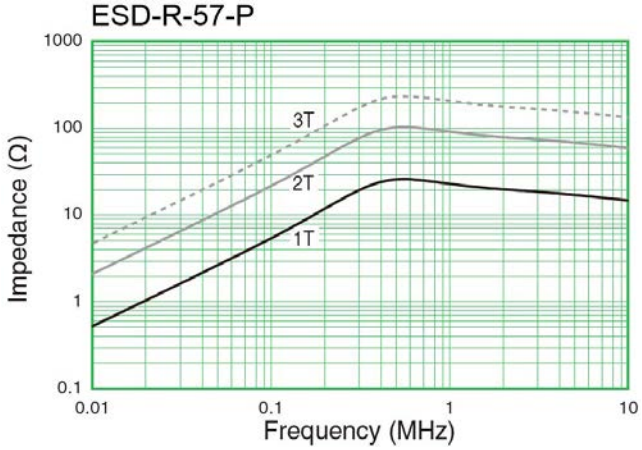

ESD-R-38-P



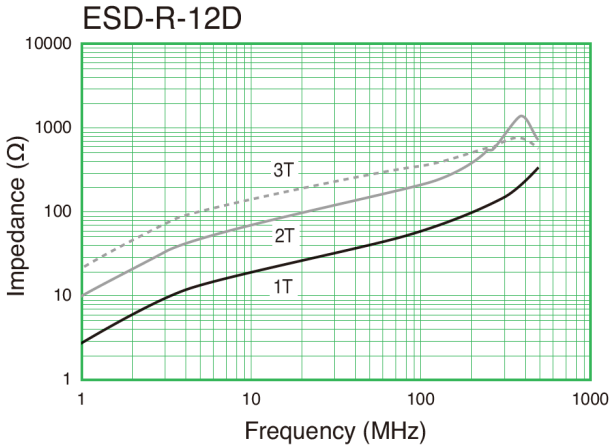
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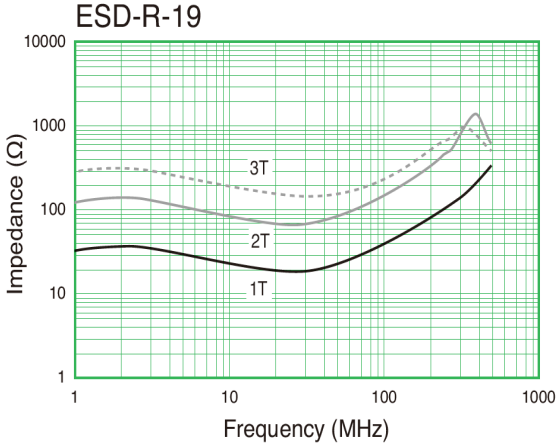
Coated Type

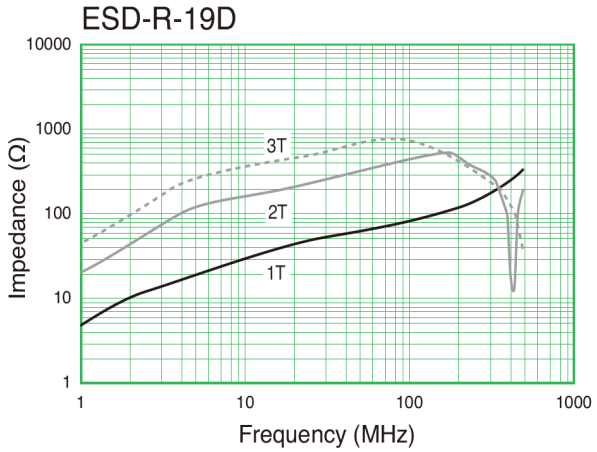


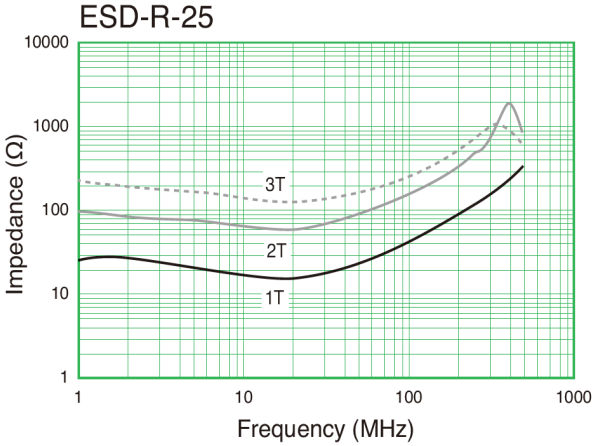




Case Type



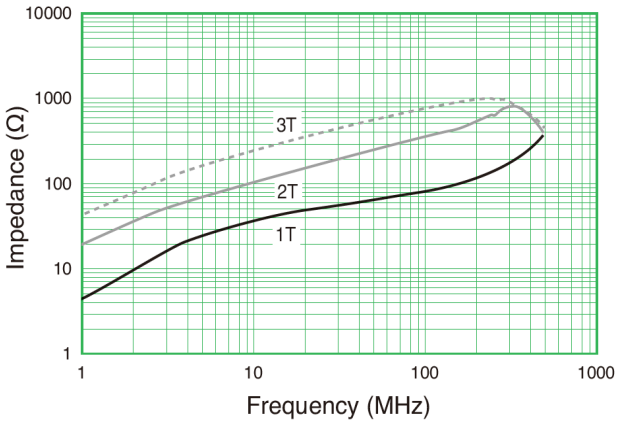



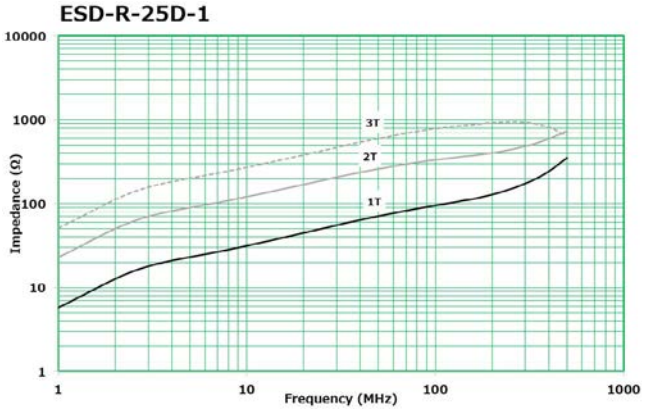
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Case Type

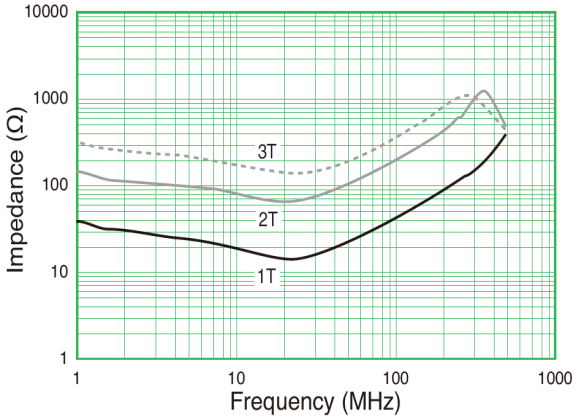
ESD-R-25D



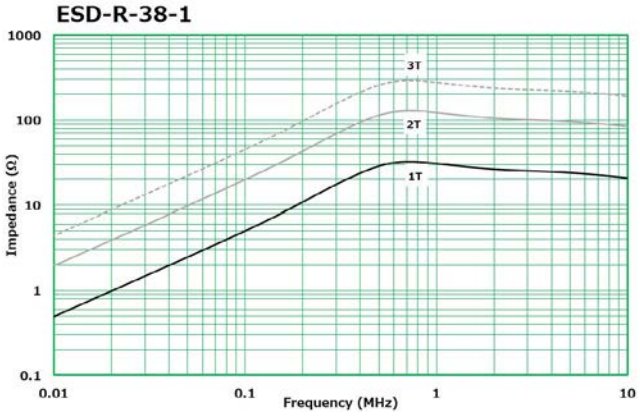

ESD-R-25D-1



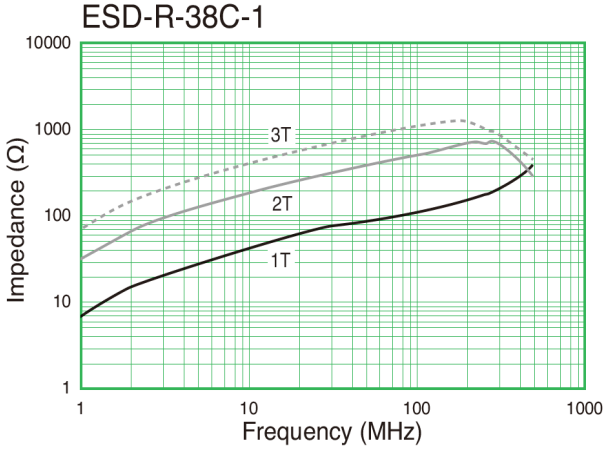

ESD-R-38



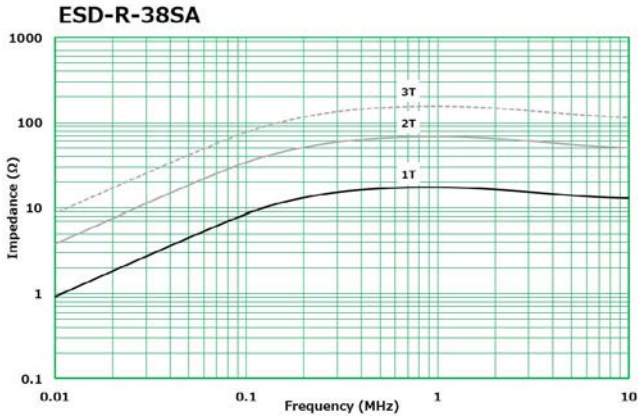

ESD-R-38-1




ESD-R-38C-1



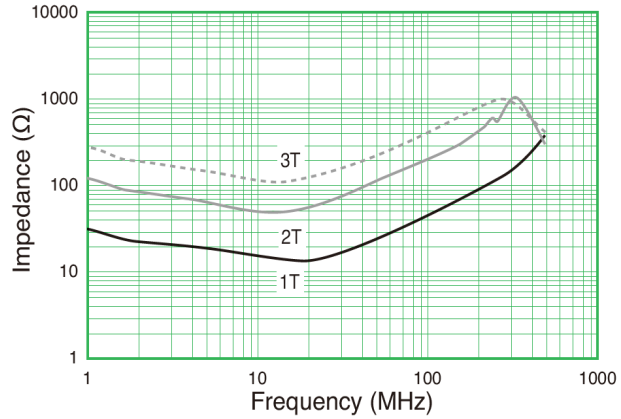

ESD-R-38SA



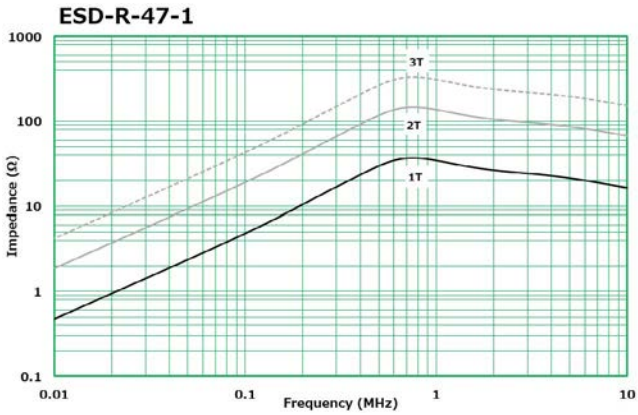
## Impedance vs. Frequency cont.

Case Type

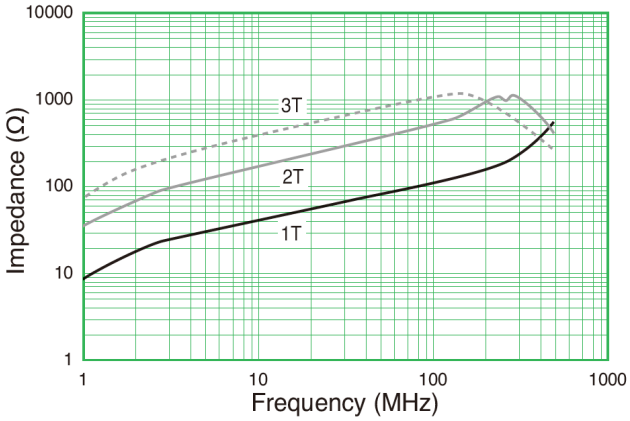
ESD-R-47



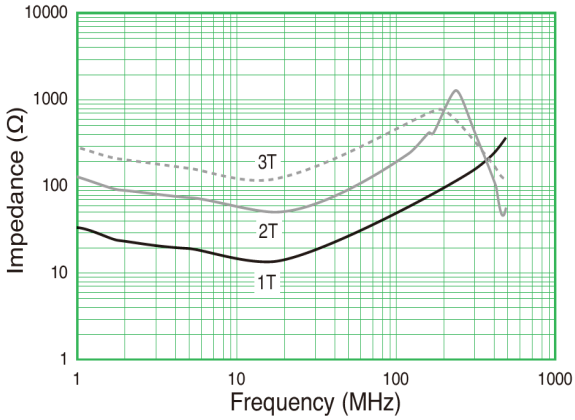

ESD-R-47-1



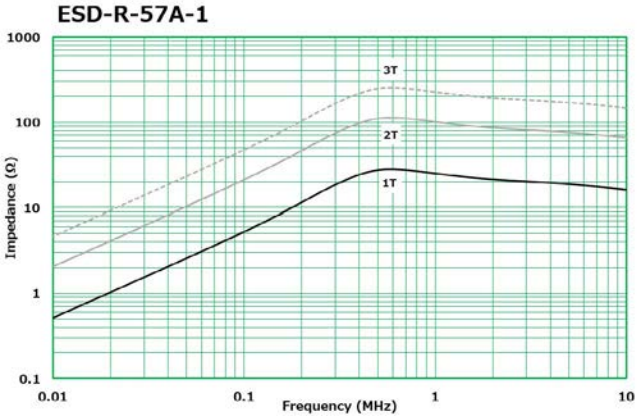

ESD-R-47D-1



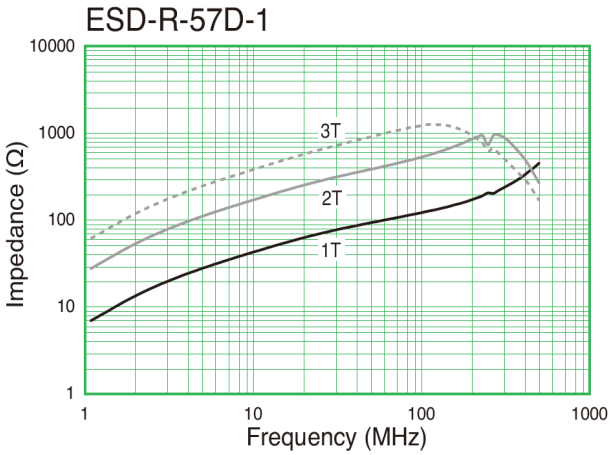

ESD-R-57




ESD-R-57A-1




ESD-R-57D-1



## Packaging

| Part Number | Packaging Type | Pieces per Box |
|---|---|---|
| ESD-R-10D | Tray | 3,600 |
| ESD-R-10E | | 7,000 |
| ESD-R-10S | | 1,260 |
| ESD-R-12C | | 1,400 |
| ESD-R-12E | | 1,500 |
| ESD-R-12F | | 1,400 |
| ESD-R-12S | | 1,500 |
| ESD-R-14C | | 6,000 |
| ESD-R-14E | | 2,400 |
| ESD-R-14S | | 550 |
| ESD-R-15C-1 | | 800 |
| ESD-R-16 | | 780 |
| ESD-R-16C | | 720 |
| ESD-R-17S | | 440 |
| ESD-R-18SD | | 1,664 |
| ESD-R-19S | | 480 |
| ESD-R-19SD | | 1,120 |
| ESD-R-22SD | | 1,014 |
| ESD-R-25SD | | 540 |
| ESD-R-25S | | 300 |
| ESD-R-26S | | 200 |
| ESD-R-27S | | 300 |
| ESD-R-28C | | |
| ESD-R-31C | | |
| ESD-R-38D | | 200 |
| ESD-R-47S | | 100 |
| ESD-R-57D | | 75 |
| ESD-R-57S | | 60 |
| ESD-R-12C-2 | | 1,400 |
| ESD-R-12CM | | 1,500 |
| ESD-R-14A | | 6,000 |
| ESD-R-14C-2 | | |
| ESD-R-15C | | 800 |
| ESD-R-17S-1 | | 440 |
| ESD-R-19E-1 | | 800 |
| ESD-R-25D-8 | | 600 |
| ESD-R-25L-A | | 540 |
| ESD-R-25MK | | 400 |
| ESD-R-28C-1 | | 300 |
| ESD-R-31C-1 | | |
| ESD-R-31-P | | |
| ESD-R-38-P | | 200 |
| ESD-R-47-P | | 100 |

## Packaging cont.

| Part Number | Packaging Type | Pieces per Box |
|---|---|---|
| ESD-R-57-P | Tray | 60 |
| ESD-R-12D | | 2,000 |
| ESD-R-19 | | 480 |
| ESD-R-19D | | |
| ESD-R-25 | | 300 |
| ESD-R-25D | | |
| ESD-R-25D-1 | | |
| ESD-R-38 | | 200 |
| ESD-R-38-1 | | |
| ESD-R-38C-1 | | |
| ESD-R-38SA | | |
| ESD-R-47 | | 100 |
| ESD-R-47-1 | | |
| ESD-R-47D-1 | | |
| ESD-R-57 | | 60 |
| ESD-R-57A-1 | | |
| ESD-R-57D-1 | | |

## Handling Precautions

EMI Cores should be stored in normal working environments. While the EMI Cores themselves are quite robust in other environments, avoid exposure to high temperatures, high humidity, corrosive atmospheres and long term storage for case, snap-on and split types.

KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 75% relative humidity. Atmospheres should be free of chlorine, sulfur and alkali bearing compounds. Avoid also storage near strong magnetic fields as this might magnetize the product.

Temperature fluctuations should be minimized to avoid condensation or cracks on the parts. Mechanical shocks can bring to cracks as well.

## 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**
EMI Core products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.

## KEMET Electronics Corporation Sales Offices

For a complete list of our global sales offices, please visit www.kemet.com/sales.

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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 indicted or that other measures may not be required.

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Global Electronic Components Distributor

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MPXV1D1054L100 C0603C470K5RACAUTO C0603X339C5GACTU C0805C339D5GACTU C0603C273K1RACTU R66ID3220AA7AK C1206C222K2RACTU SS26V-080350 T350A104K035AT T498X106K050ATE500 CBR04C808B5GAC MPX1D1235L1R0 PEH532RDG4180M2 SNT-D30T SN8S-40P2 C0603C160J5GACTU C4AQLBU5160M11K GTX-2200-Y0X LDEDD4100KA0N00 R413F1100CK00M RM4A(025)-185X70T0800 SBC4-471-491 C0805X221M5RACTU CBR04C339B5GAC MPX1D1740L6R8 RSBEC1470AA00K T496X227K010ATE500 C0805C473K2RACTU CBR04C180F2GAC EXV227M050A9PAA