

# EMI Core

EMI Co



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## ***EMI Core*** Vol.13



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## Introduction of EMI Core

		Series Name	Shape	Model	Material	Outer Diameter (mm)	Inner Diameter (mm)	Height (mm)	Page
<b>Solid</b>	<b>for Round Cables</b>								
	Bare type	Toroidal Cores (Bare Type)		ESD-R	Mn-Zn & Ni-Zn	9.5~38.1	5.0~19.0	3.0~28.5	14
	Coated type	Toroidal Cores (Coated Type)		ESD-R	Mn-Zn & Ni-Zn	12.0~32.0	6.2~19.0	3.0~28.8	18
	with Case	Toroidal Cores with Case		ESD-R	Mn-Zn & Ni-Zn	12.9~61.0	6.0~32.4	6.4~24.0	20
	with High Heat Resistance	Toroidal Cores with High Heat Resistance		ESD-R-H	Mn-Zn & Ni-Zn	15.0~61.0	5.0~33.2	9.0~25.0	11
	with Snail-shaped Case	Toroidal Cores with Snail-shaped Case		ESD-R-B	Mn-Zn & Ni-Zn	21.5~51.5	8.8~25.5	13.0~17.5	22
	Cores suitable for a low frequency noise	ESD-R-SR, ESD-R-47H, etc.		ESD-R-SR, ESD-R-47H, etc.	Mn-Zn, etc.	57, 52.5, etc.	36, 22.7, etc.	20, 8.5, etc.	6
<b>Split</b>	<b>for Flat Cables</b>								
	Bare type	Solid Core for Flat Cables		ESD-FPL	Ni-Zn	14.5~80.0	0.55~2.2	2.75~12.0	26
	<b>for Round Cables</b>								
	with Case	Snap-on Core for Round Cables (ESD-SR series)		ESD-SR	Ni-Zn	—	φ6~φ14.5	—	24
	with High Heat Resistance and Cable Holding Mechanism	Snap-on Core for Round Cables (ESD-SR-H/HL series)		ESD-SR-H/HL	Ni-Zn	—	φ9~φ13	—	13
	<b>for Flat Cables</b>								
	with Metal Clamp	Split Core for Flat Cables		ESD-FPD	Ni-Zn	37.0~80.0	2.0~2.6	10	26
	with Plastic	Split Core for Flat Cables		ESD-FPD-1	Ni-Zn	37.0~80.0	2.0~2.6	10	26
<b>Beads</b>	Single Piece Core	Beads Core		B-20	Mn-Zn & Ni-Zn	2.8~9.7	0.8~4.8	1.2~8.0	34

Case by case product guide

● **When you have worry about damages to cable covering and insulation.**

Coated Type, with Case, with High Heat Resistance..... page 11,18~21

● **When you want to retrofit the core**

Hinged-Clamp Core

• For Round Cable: ESD-SR, ESD-SR-H/HL series ..... page 13,24~25

• For Flat Cable: ESD-FPD series ..... page 26

● **When you want to fix the core**

with Snail Shaped Case

• For Round Cable: ESD-R-H, ESD-R-B series..... page 9,22~23

• For Flat Cable: ESD-FPD-1 series ..... page 26



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## Tips on EMI Core Usages

### ■ Characteristics and how to count turns

Number of turns are counted by how many times the lead wire passes through the inner hole of the core. Do not count the number of lead wire winding outside the core, as it results in different turn count. (Fig. 1)

When desired performance can not be obtained just by 1 turn, impedance characteristics value can be raised by increasing the turn. In this case, the effective frequency band should be checked that it is in the desired range as adding turns results in lowering down the effective band range. (Fig. 2)

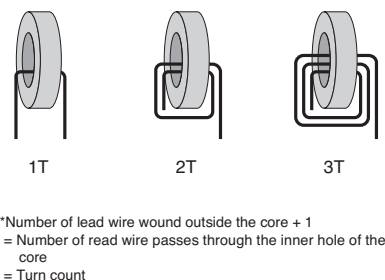


Fig.1 How to count turns

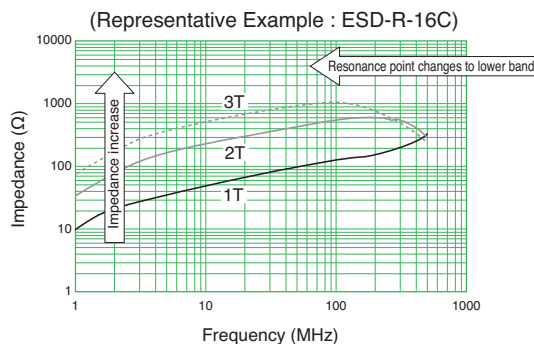


Fig.2 Relationship between impedance and turn counts

### ■ Effective band range depending on core material

There are two materials of ferrite, Ni-Zn series and Mn-Zn series. Ni-Zn series is effective for MHz band range such as FM band while Mn-Zn series is effective for kHz band range.

Note that above effective band range is a reference only. Examination of effectiveness with actual instrument is necessary.

As Mn-Zn series has lower resistance compared to Ni-Zn series, make sure to provide adequate insulation before use.

Mn-Zn series vs Ni-Zn series | Z | -f Characteristics (representative example)  
(measurement condition: measured with same-dimension ring core)

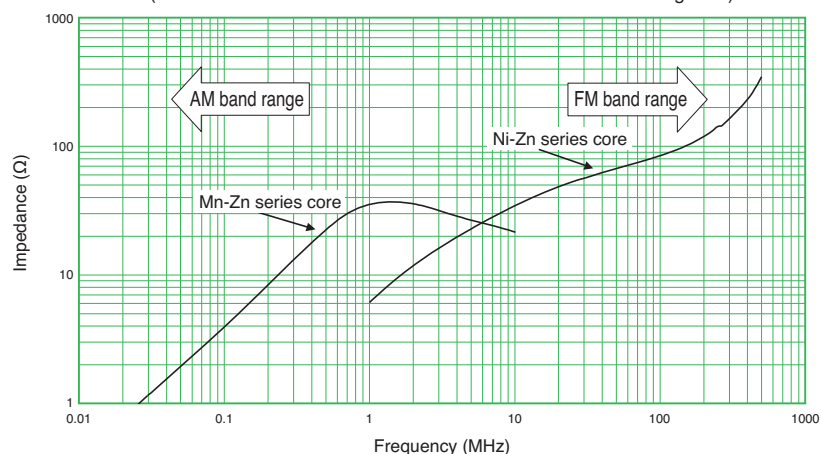


Fig.3 Effective Band Range of Mn-Zn series / Ni-Zn series ferrite



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Cores Suitable for a Low Frequency Noise  
(High Impedance Type)  
**ESD-R-SR Series**  
[RoHS Compliant]



Features

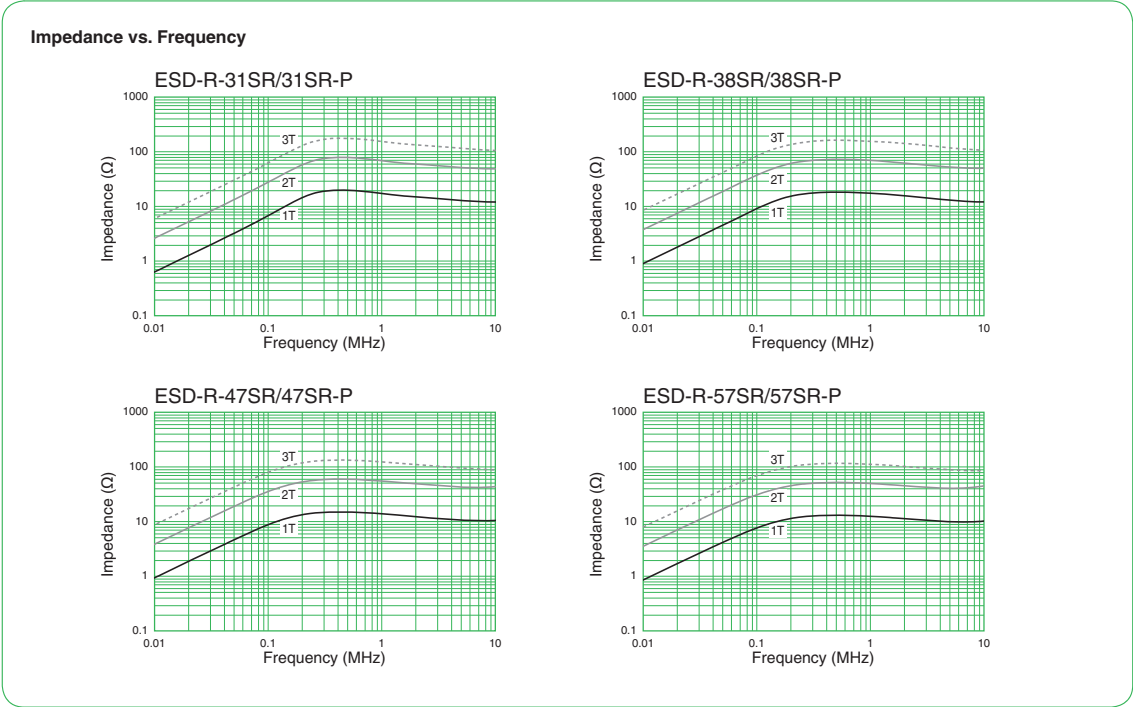
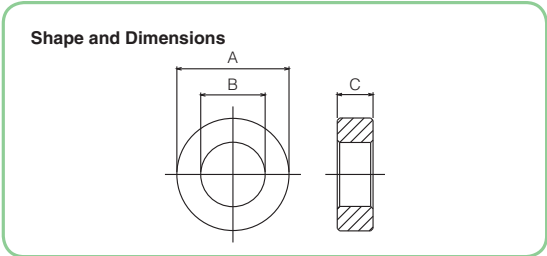
- ① High impedance from using materials with the industry's highest level of magnetic permeability. (Approx. 40% increase in Z-score as compared with previous material <at 150kHz>)
- ② Effectively suppresses radiation and transfer noise on harnesses. Especially well-suited for the medium wave band (300kHz or above)
- ③ Large-size ring type.
- ④ Coated type also available. (See below)

Applications

- Power conditioners
- HEV/PHV
- Air conditioners
- Industrial equipment
- Multifunction printers for business use

Model (Bare type)	Model (Coated type)	Dimensions(mm)		
		A	B	C
ESD-R-31SR	ESD-R-31SR-P	31 (32)	20 (19)	14.9 (16)
ESD-R-38SR	ESD-R-38SR-P	38 (39.5)	19 (18)	12.7 (14)
ESD-R-47SR	ESD-R-47SR-P	47 (48.5)	27 (26)	15 (16)
ESD-R-57SR	ESD-R-57SR-P	57 (59)	36 (34)	20 (21)

Note: Coated type dimensions in parentheses ( )



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# Cores Suitable for a Low Frequency Noise (Large-size Ring Type) [RoHS Compliant]



## Features

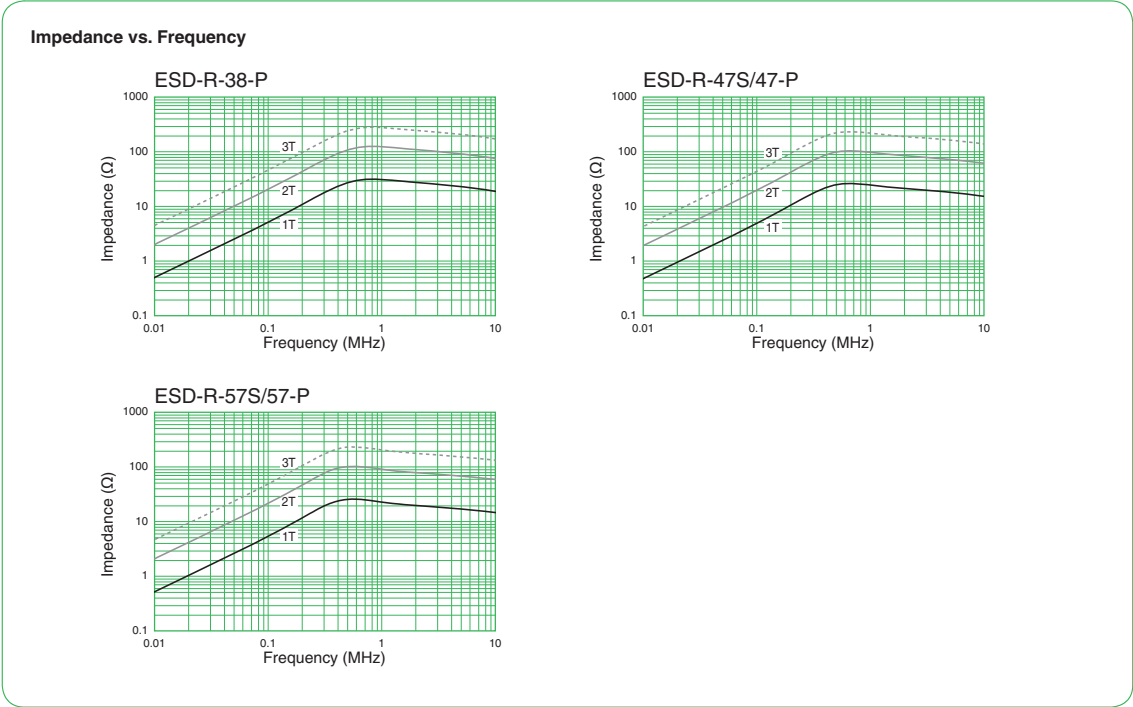
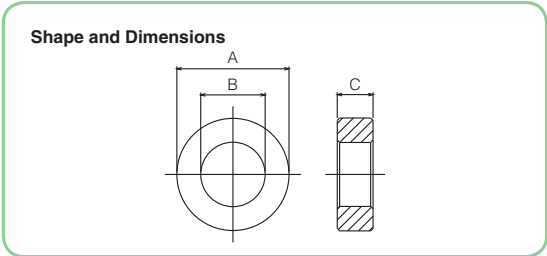
- ① Large-size ring type. (High permeability material : Mn-Zn ferrite)
- ② Effectively suppresses radiation and transfer noise on harnesses.
- ③ Coated type also available. (See below)

## Applications

- Power conditioners
- HEV/PHV
- Air conditioners
- Industrial equipment
- Multifunction printers for business use

Model (Bare type)	Model (Coated type)	Dimensions(mm)		
		A	B	C
— *	ESD-R-38-P	— (39.5)	— (18)	— (14)
<b>ESD-R-47S</b>	ESD-R-47-P	47 (48.5)	27 (26)	15 (16)
<b>ESD-R-57S</b>	ESD-R-57-P	57 (59)	36 (34)	20 (21)

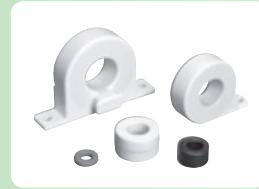
Note: Coated type dimensions in parentheses ( )  
\* Correspond to ESD-R-38D (see page 8)



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# Cores Suitable for a Low Frequency Noise

[RoHS Compliant]



## Features

- ① Performs effectively in a low frequency range, mainly in the AM band (from 535 to 1605 kHz), by using a high permeability material (Mn-Zn ferrite).
- ② Available in various shapes and sizes depending on applications.

## Applications

- Consumer electronics  
(air conditioners, refrigerators, etc.)
- Industrial equipment (INV, robots, etc.)

### ◎Toroidal cores (bare type)

Model	Dimensions(mm)		
	OD	ID	T
<b>ESD-R-16</b>	15.8	11.6	8.4
<b>ESD-R-19S</b>	18.5	10.0	10.0
<b>ESD-R-25S</b>	25.0	15.0	12.0
<b>ESD-R-38D</b>	38.1	19.0	12.7

### ◎Toroidal cores (coated type)

Model	Dimensions(mm)			Color of coating	Compatible toroidal core (bare type)
	OD	ID	T		
<b>ESD-R-14A</b>	15.0	6.2	3.5	Green	—
<b>ESD-R-31-P</b>	32.0	19.0	15.8	Green	—

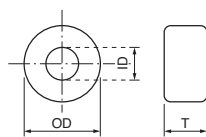
### ◎Toroidal cores with case

Model	Dimensions(mm)			Color of case	Compatible toroidal core (bare type)
	OD	ID	T		
<b>ESD-R-19</b>	19.0	9.0	11.0	White	ESD-R-19S
<b>ESD-R-25</b>	26.0	14.0	15.0	White	ESD-R-25S
<b>ESD-R-38</b>	39.0	17.5	14.0	White	ESD-R-38D
<b>ESD-R-47</b>	48.0	25.5	16.0	White	ESD-R-47S
<b>ESD-R-57</b>	61.0	32.4	24.0	White	ESD-R-57S

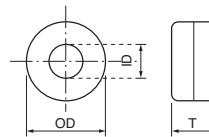
\* Flame resistant grade of the case : UL94 V-2

## Shape and Dimensions

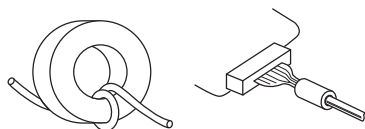
### ●ESD-R Series



### ●ESD-R Series (with case)



## Installation Example



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◎Toroidal cores with snail-shaped case

Model	Dimensions(mm)				Color of case	Compatible toroidal core (bare type)
	A	B	C	D		
<b>ESD-R-19B</b>	21.5	8.8	13.0	18.5	White	ESD-R-19S
<b>ESD-R-25B</b>	29.3	13.9	15.0	23.0	White	ESD-R-25S
<b>ESD-R-38B</b>	42.4	17.9	16.0	28.0	White	ESD-R-38D
<b>ESD-R-47B</b>	51.5	25.5	17.5	34.0	White	ESD-R-47S

\* Flame resistant grade of the case : UL94 V-2

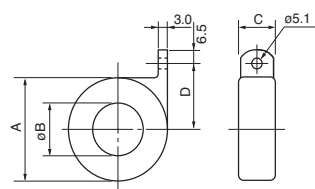
◎Toroidal cores with high heat resistance and cable holding mechanism

Model	Dimensions(mm)	Color of case	Compatible toroidal core (bare type)
<b>ESD-R-47H</b>	See below	White	—

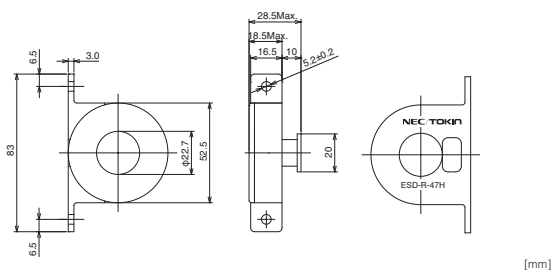
\* Flame resistant grade of the case : UL94 V-0

Shape and Dimensions

●ESD-R-B Series



●ESD-R-47H



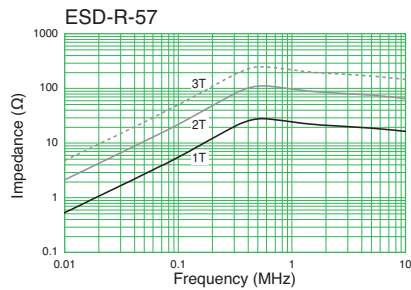
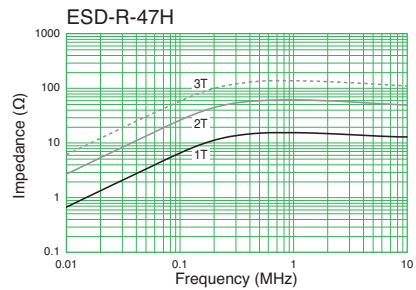
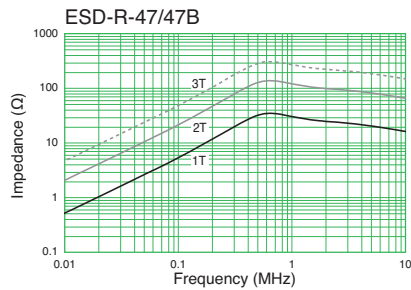
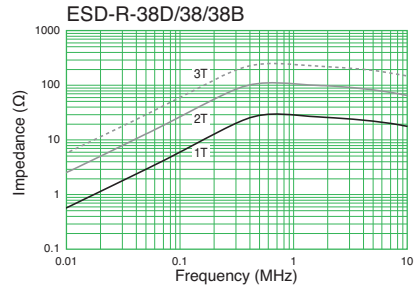
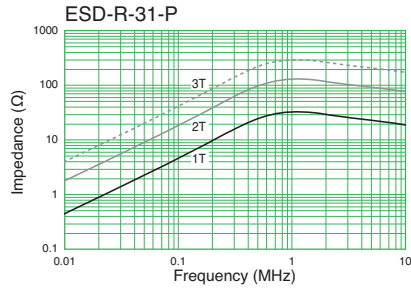
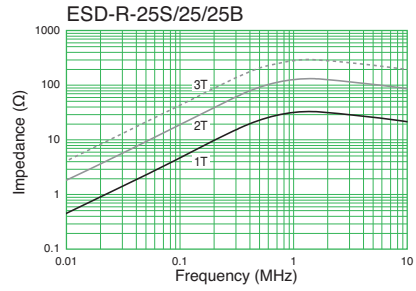
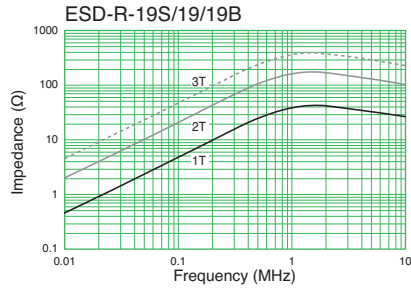
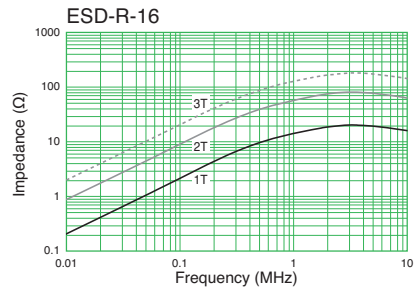
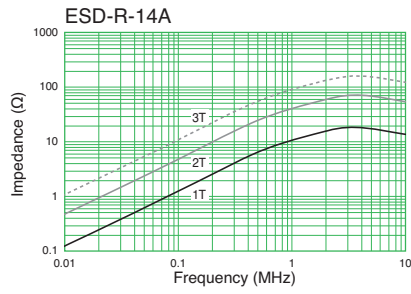
[mm]

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Impedance vs. Frequency

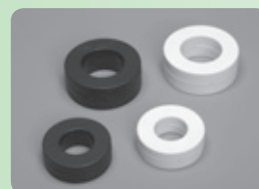


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# Toroidal Cores with High Heat Resistance

## ESD-R-H Series

[RoHS Compliant]



### Features

- ① Wider operational temperature range. (-40°C to +120°C)
- ② Advanced characteristics achieved by using optimal core materials for target frequency range.  
Low frequency range (ESD-R-M-H series)  
High frequency range (ESD-R-N-H series)
- ③ Flame retardancy: UL94 V-0

### Applications

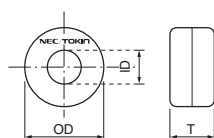
- Automotive (EPS, etc.)
- Information and communication devices, audio-visual equipment, consumer electronics

Model	Dimensions(mm)			Frequency range		Color of case	Compatible toroidal core (bare type)
	OD	ID	T	up to 10MHz (mainly AM band range)	up to 300MHz (mainly FM band range)		
ESD-R-12M-H	15.0	5.0	9.0	●		White	—
ESD-R-12N-H	15.0	5.0	9.0		●	Black	ESD-R-12S
ESD-R-19M-H	22.0	7.7	14.0	●		White	ESD-R-19S
ESD-R-19N-H	22.0	7.7	14.0		●	Black	ESD-R-19SD
ESD-R-25M-H	29.0	12.7	16.0	●		White	ESD-R-25SD
ESD-R-25N-H	29.0	12.7	16.0		●	Black	ESD-R-25SD
ESD-R-38M-H	42.0	16.7	17.0	●		White	ESD-R-38D
ESD-R-38N-H	42.0	16.7	17.0		●	Black	—
ESD-R-47M-H	51.0	24.4	19.0	●		White	ESD-R-47S
ESD-R-47N-H	51.0	24.4	19.0		●	Black	—
ESD-R-57M-H	61.0	33.2	25.0	●		White	ESD-R-57S
ESD-R-57N-H	61.0	33.2	25.0		●	Black	—

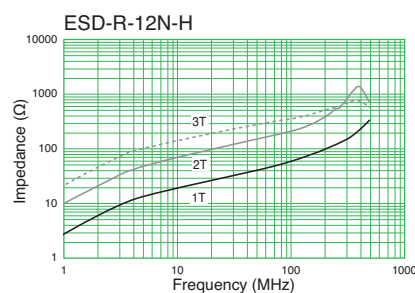
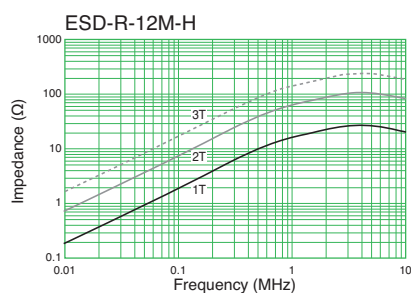
\* Above frequency range is a reference only. Please test with actual device before use.

### Shape and Dimensions

#### ● ESD-R-H Series

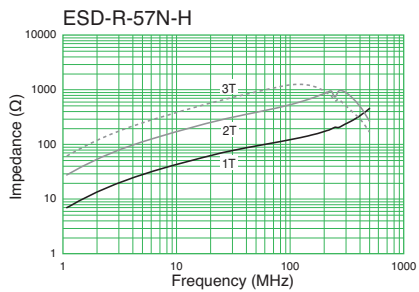
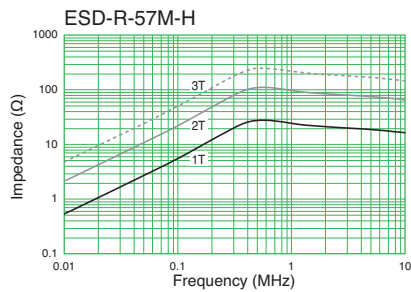
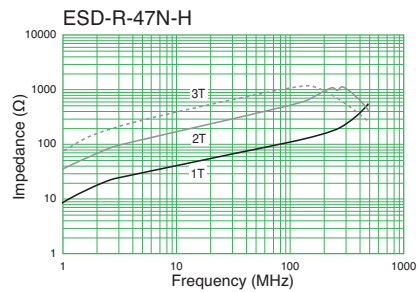
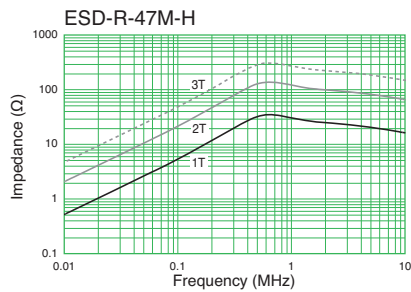
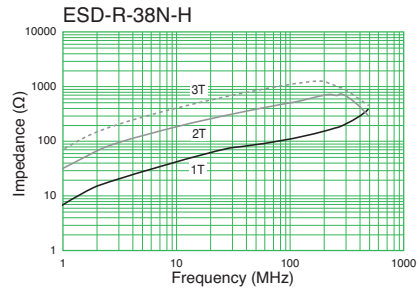
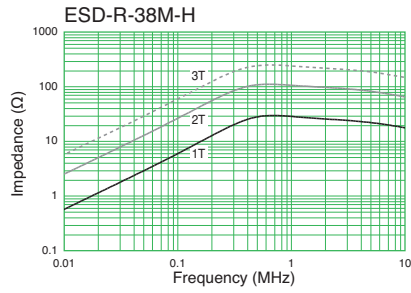
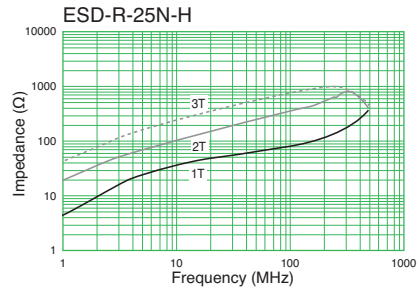
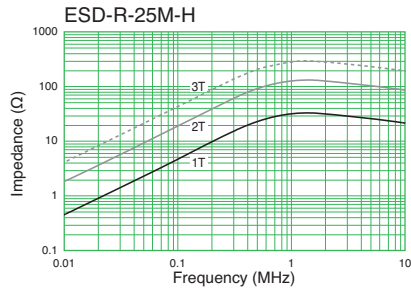
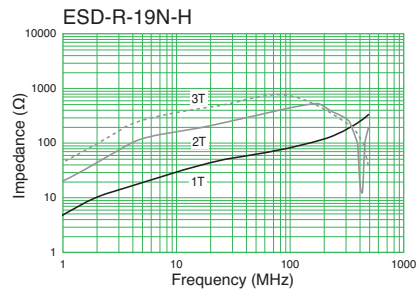
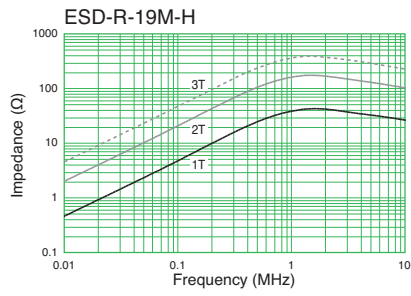


### Impedance vs. Frequency



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Impedance vs. Frequency



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**Snap-on Cores for Round Cables with High Heat Resistance and Cable Holding Mechanism**  
**ESD-SR-H/HL Series**  
[RoHS Compliant]



**Features**

- ① Wider operational temperature range.  
ESD-SR-160H/250H: -40°C to +100°C  
ESD-SR-160HL/250HL: -40°C to +125°C
- ② Holding mechanisms provided  
(Fixing of cables / enclosures with fixing bands possible)
- ③ Split design allows easy post-fitting.

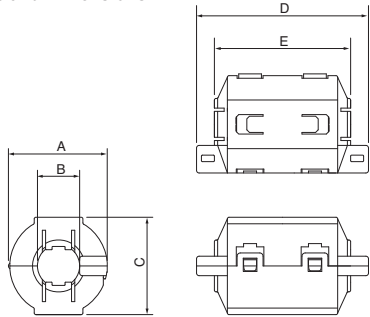
**Applications**

- Automotive (EPS, etc.)
- Information and communication devices, audio-visual equipment, consumer electronics

Model	Dimensions(mm)					Weight(g)	Color of case
	A	φB	C	D	E		
ESD-SR-160H/HL	19.5	Up to 9	19.5	46.5	38.5	23	black
ESD-SR-250H/HL	30.0	Up to 13	30.0	53.0	42.0	63	black

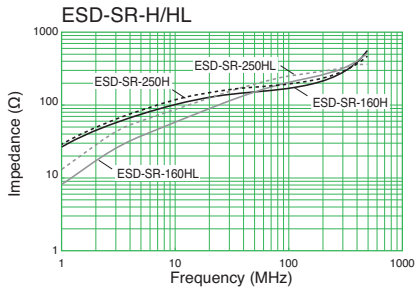
\* Flame resistant grade of the case : UL94 V-0

**Shape and Dimensions**



\* HL series are indicated by dot printing (white dot) on the case. [mm]

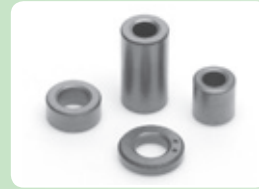
**Impedance vs. Frequency**



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# Toroidal Cores (Bare Type)

[RoHS Compliant]



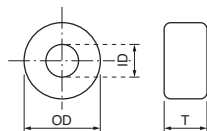
Model	Dimensions(mm)			Frequency range	
	OD	ID	T	up to 10MHz (mainly AM band range)	up to 300MHz (mainly FM band range)
ESD-R-10D	9.5	5.0	10.0		●
ESD-R-10E	10.0	5.0	5.0		●
ESD-R-10S	10.5	5.5	20.0		●
ESD-R-12C	11.8	7.3	15.0		●
ESD-R-12E	11.8	7.3	8.0		●
ESD-R-12F	12.0	8.5	15.0		●
ESD-R-12S	12.0	7.0	5.5		●
ESD-R-14C	14.0	7.0	3.0		●
ESD-R-14E	14.0	10.0	8.0		●
ESD-R-14S	14.3	6.3	28.5		●
ESD-R-15C-1	15.0	10.5	12.0		●
ESD-R-16	15.8	11.6	8.4	●	
ESD-R-16C	16.0	9.0	17.0		●
ESD-R-17S	17.5	9.5	28.5		●
ESD-R-18SD	18.0	10.0	6.0		●
ESD-R-19S	18.5	10.0	10.0	●	
ESD-R-19SD	18.5	10.0	10.0		●
ESD-R-22SD	22.5	13.8	6.4		●
ESD-R-25SD	25.0	15.0	12.0		●
ESD-R-25S	25.0	15.0	12.0	●	
ESD-R-26S	26.0	13.0	28.5		●
ESD-R-28C	28.0	16.0	13.0		●
ESD-R-31C	31.0	19.0	8.0		●
ESD-R-38D	38.1	19.0	12.7	●	

\* Other sizes available. Please contact NEC TOKIN.

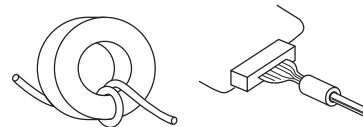
\* Above frequency range is a reference only. Please test with actual device before use.

## Shape and Dimensions

● ESD-R Series

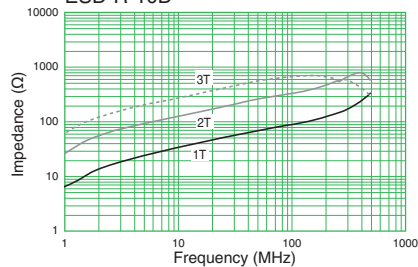


## Installation Example

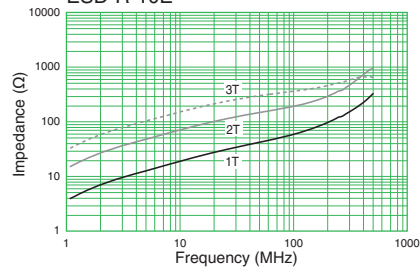


## Impedance vs. Frequency

ESD-R-10D

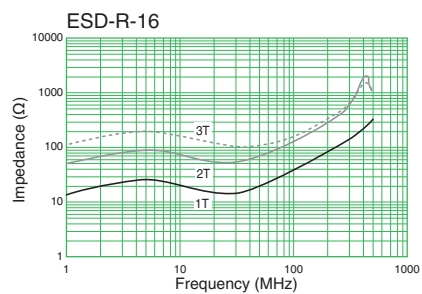
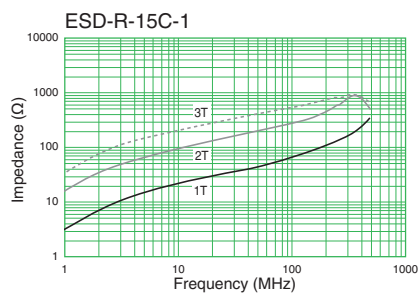
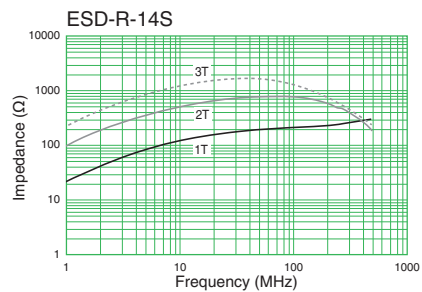
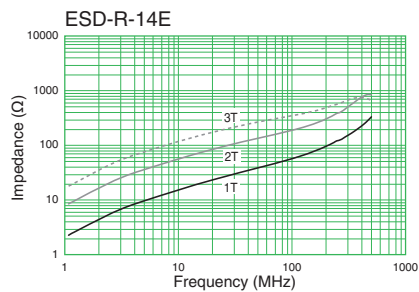
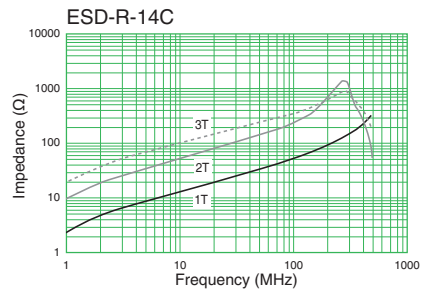
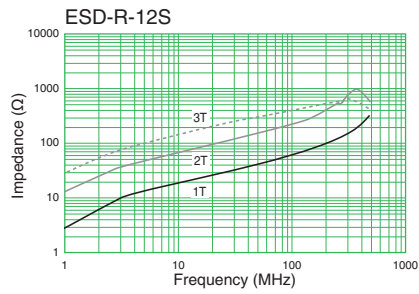
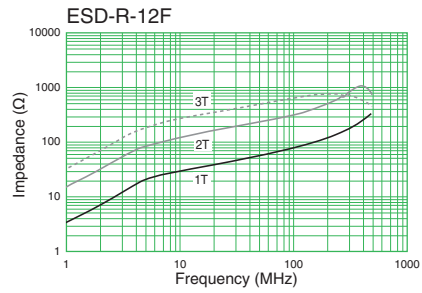
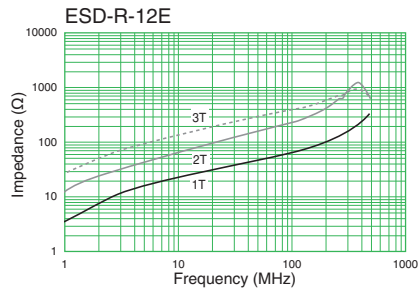
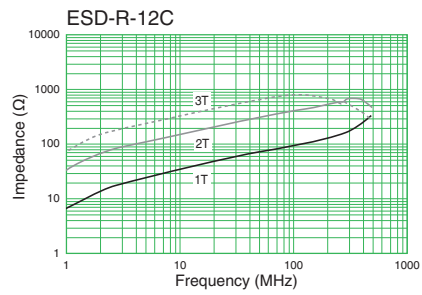
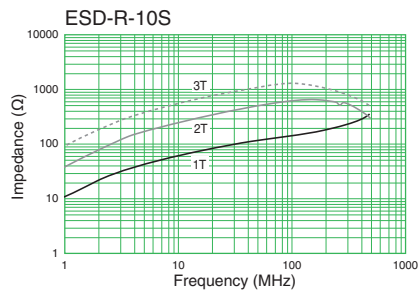


ESD-R-10E



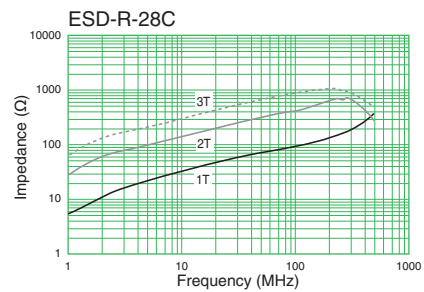
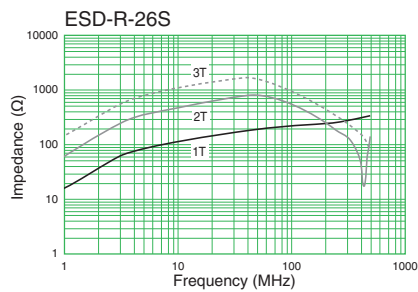
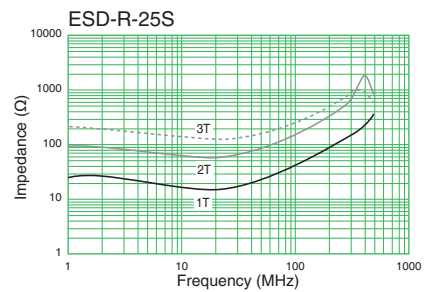
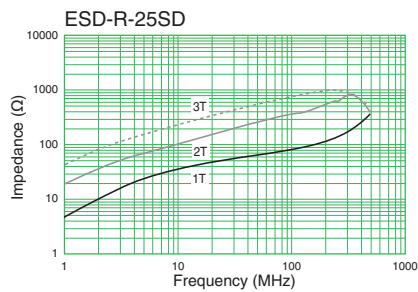
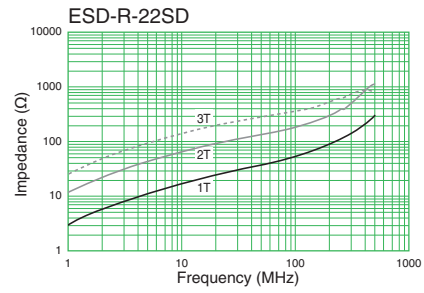
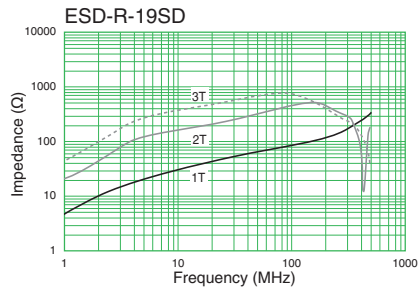
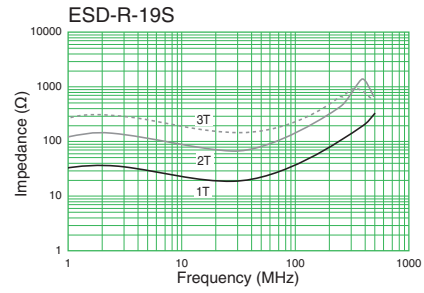
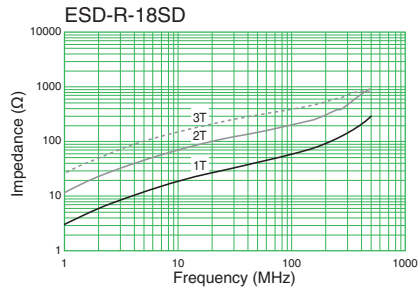
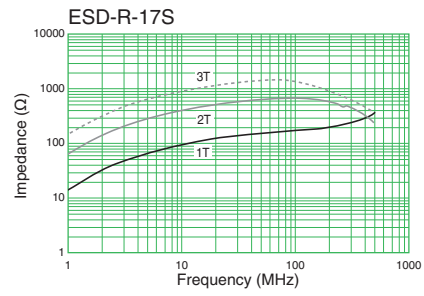
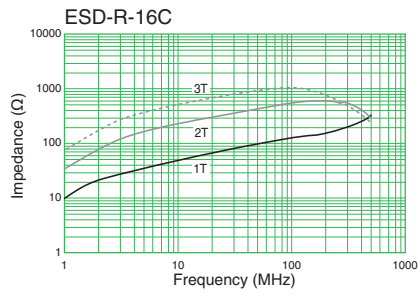
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## Impedance vs. Frequency



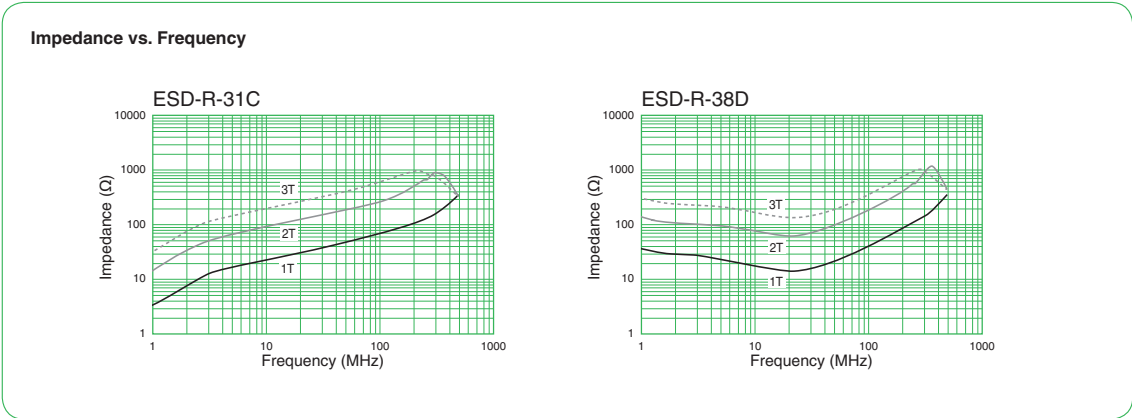
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Impedance vs. Frequency



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# Toroidal Cores (Coated Type)

[RoHS Compliant]

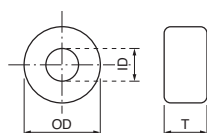


Model	Dimensions(mm)			Frequency range		Color of coating	Compatible toroidal core (bare type)
	OD	ID	T	up to 10MHz (mainly AM band range)	up to 300MHz (mainly FM band range)		
ESD-R-12C-2	12.0	7.3	15.3		●	Blue	
ESD-R-14A	15.0	6.2	3.5	●		Green	—
ESD-R-14C-2	14.0	7.0	3.0		●	Blue	ESD-R-14C
ESD-R-15C	15.2	10.5	12.5		●	Blue	ESD-R-15C-1
ESD-R-17S-1	17.7	9.4	28.8		●	Blue	ESD-R-17S
ESD-R-19E-1	19.0	10.7	5.3		●	Blue	—
ESD-R-25D-8	25.0	15.0	8.0		●	Blue	—
ESD-R-25L-A	25.3	15.1	12.1		●	Blue	ESD-R-25SD
ESD-R-28C-1	28.2	15.8	13.2		●	Blue	—
ESD-R-31C-1	32.0	19.5	9.0		●	Green	ESD-R-31C
ESD-R-31-P	32.0	19.0	15.8	●		Green	

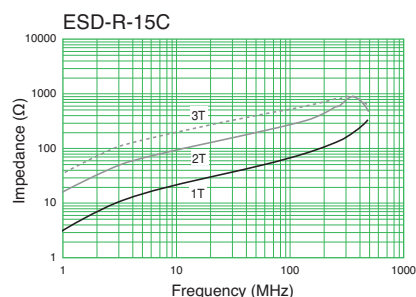
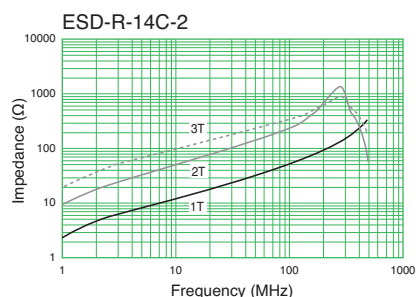
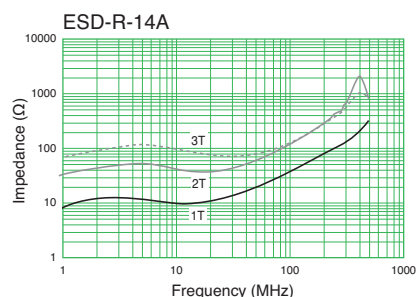
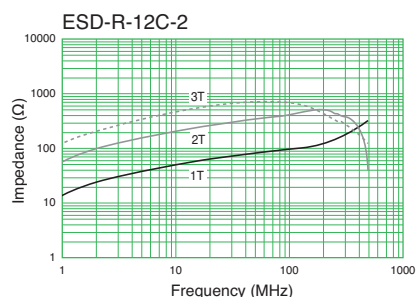
\* Above frequency range is a reference only. Please test with actual device before use.

## Shape and Dimensions

●ESD-R Series

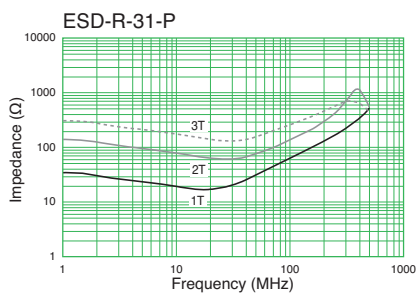
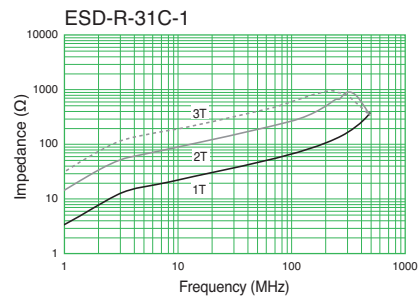
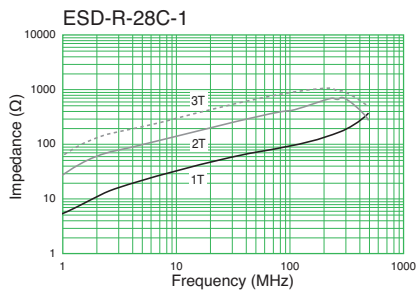
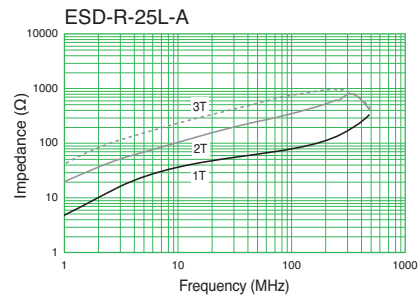
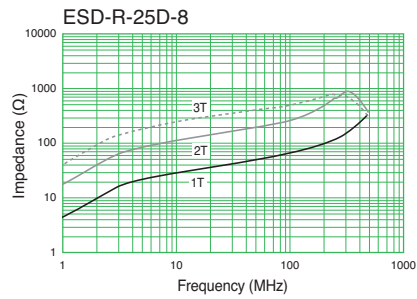
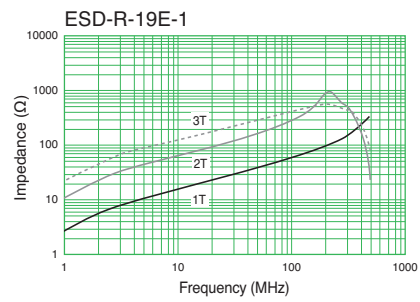
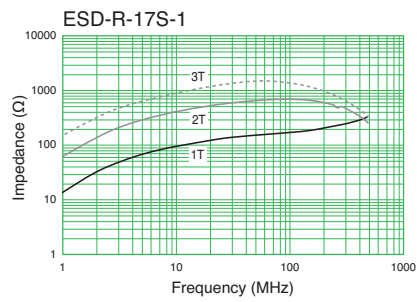


## Impedance vs. Frequency



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# Toroidal Cores with Case

[RoHS Compliant]



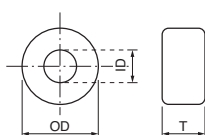
Model	Dimensions(mm)			Frequency range		Remarks	Color of case	Compatible toroidal core (bare type)
	OD	ID	T	up to 10MHz (mainly AM band range)	up to 300MHz (mainly FM band range)			
ESD-R-12D	12.9	6.0	6.4		●		black	ESD-R-12S
ESD-R-19	19.0	9.0	11.0	●			white	ESD-R-19S
ESD-R-19D	19.0	9.0	11.0		●		black	ESD-R-19SD
ESD-R-25	26.0	14.0	15.0	●			white	ESD-R-25S
ESD-R-25D	26.0	14.0	15.0		●		black	ESD-R-25SD
ESD-R-38	39.0	17.5	14.0	●			white	ESD-R-38D
ESD-R-38C-1	39.0	17.5	14.0		●	with tape(black)	white	—
ESD-R-47	48.0	25.5	16.0	●			white	ESD-R-47S
ESD-R-47D-1	48.0	25.5	16.0		●	with tape(black)	white	—
ESD-R-57	61.0	32.4	24.0	●			white	ESD-R-57S
ESD-R-57D-1	61.0	32.4	24.0		●	with tape(black)	white	—

\* Above frequency range is a reference only. Please test with actual device before use.

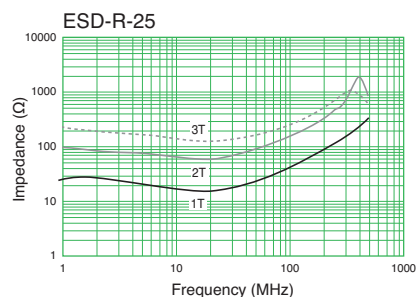
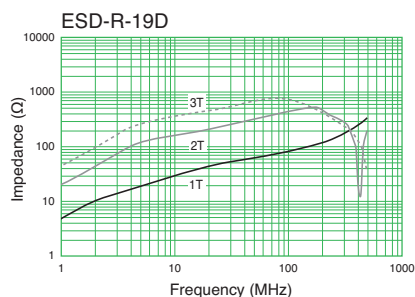
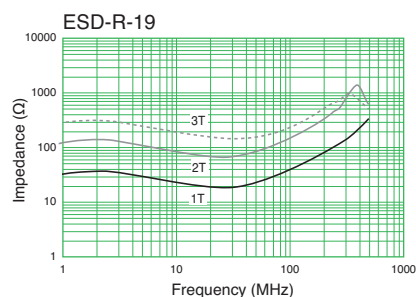
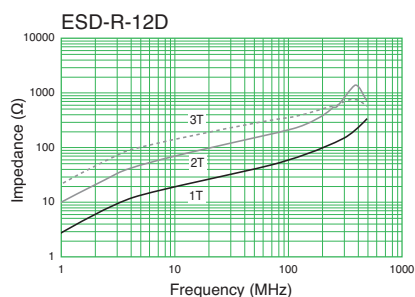
\* Flame resistant grade of the case : UL94 V-2

## Shape and Dimensions

●ESD-R Series

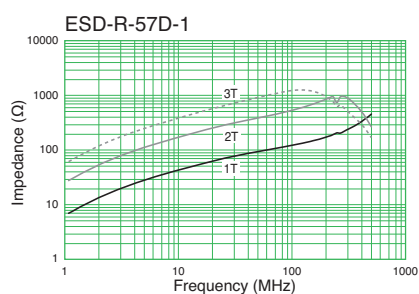
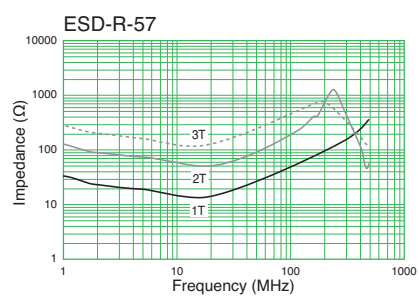
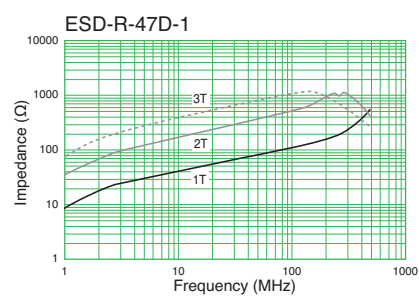
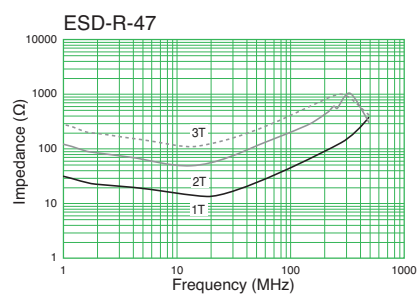
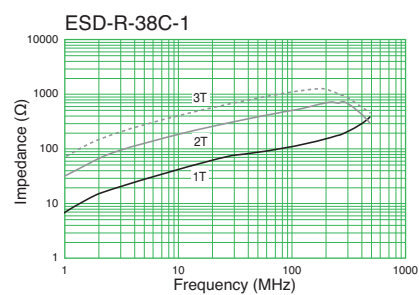
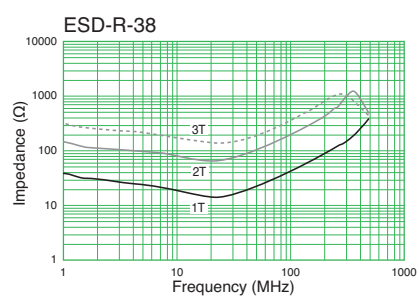
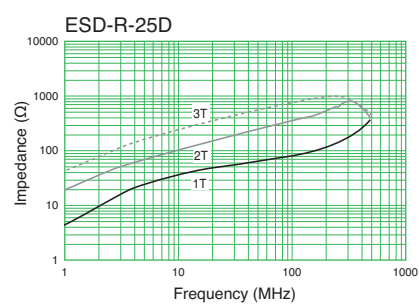


## Impedance vs. Frequency



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# Toroidal Cores with Snail-shaped Case

[RoHS Compliant]



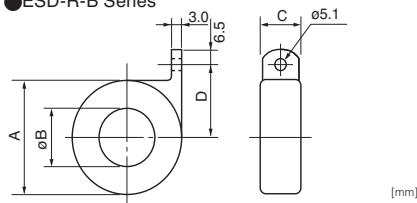
Model	Dimensions(mm)				Frequency range		Color of case	Compatible toroidal core (bare type)
	A	B	C	D	up to 10MHz (mainly AM band range)	up to 300MHz (mainly FM band range)		
ESD-R-19B	21.5	8.8	13.0	18.5	●		white	ESD-R-19S
ESD-R-19D-B	21.5	8.8	13.0	18.5		●	black	ESD-R-19SD
ESD-R-25B	29.3	13.9	15.0	23.0	●		white	ESD-R-25S
ESD-R-25D-B	29.3	13.9	15.0	23.0		●	black	ESD-R-25SD
ESD-R-38B	42.4	17.9	16.0	28.0	●		white	ESD-R-38D
ESD-R-38D-B	42.4	17.9	16.0	28.0		●	black	—
ESD-R-47B	51.5	25.5	17.5	34.0	●		white	ESD-R-47S
ESD-R-47D-B	51.5	25.5	17.5	34.0		●	black	—

\* Above frequency range is a reference only. Please test with actual device before use.

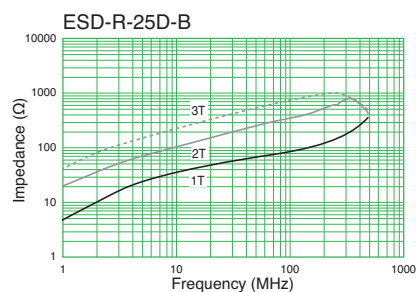
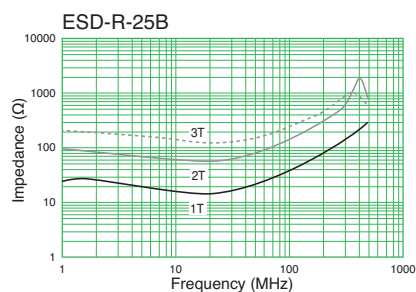
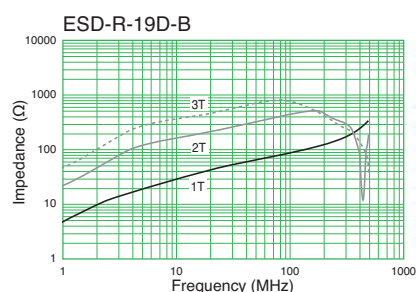
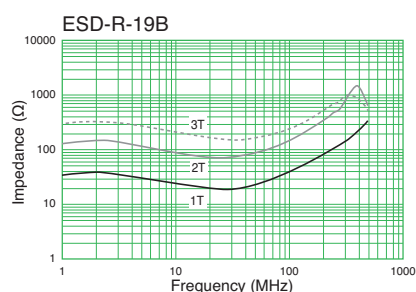
\* Flame resistant grade of the case : UL94 V-2

## Shape and Dimensions

●ESD-R-B Series

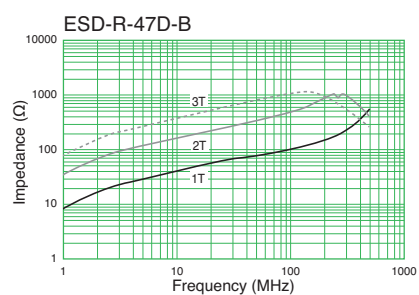
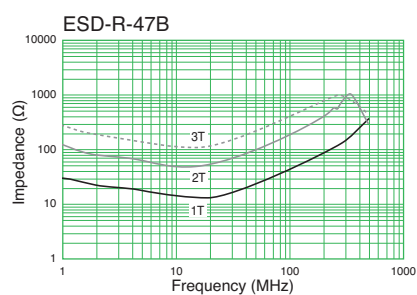
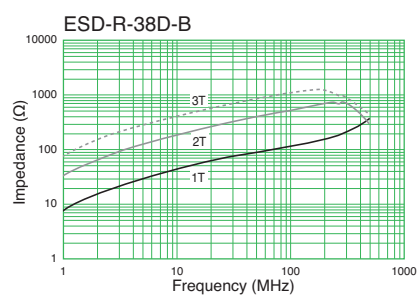
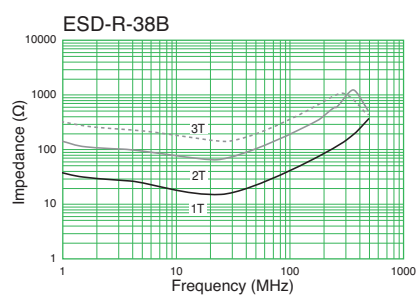


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Snap-on Cores for Round Cables

[RoHS Compliant]



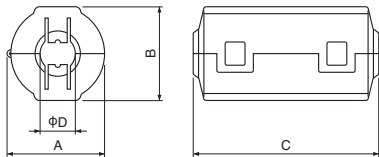
ESD-SR Series

Model	Dimensions(mm)			$\phi D$	Weight (g)	Color of case
	A max.	B max.	C max.			
ESD-SR-100	16.5	16.5	21.0	Up to 6.0	7.2	Black, Gray, Violet
ESD-SR-110	14.4	14.2	28.0	Up to 5.0	6.9	Black, Gray, Violet
ESD-SR-S10	15.5	14.0	18.5	Up to 6.0	4.1	Black
ESD-SR-120	16.0	16.4	33.0	Up to 6.0	13.3	Black, Gray, Violet
ESD-SR-150	19.6	20.3	37.4	Up to 7.0	23.4	Black, Gray, Violet
ESD-SR-160	20.2	20.0	39.0	Up to 9.0	22.7	Black, Gray, Violet
ESD-SR-250	31.5	31.6	38.0	Up to 13.0	59.5	Black, Gray, Violet
ESD-SR-S16	23.0	20.0	20.5	Up to 8.0	12.9	Black
ESD-SR-S25	33.0	29.0	15.5	Up to 14.5	21.3	Black

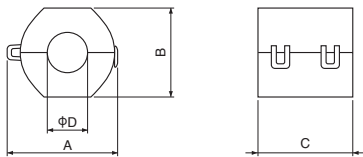
\* The Violet case is built-to-order item.  
\* Flame resistant grade of the case : UL94 V-0

Shape and Dimensions

ESD-SR-□□□□



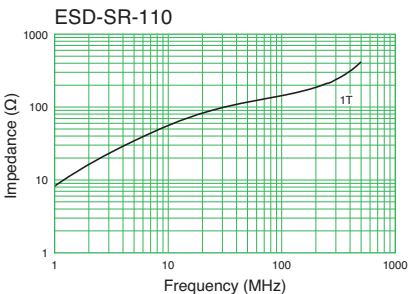
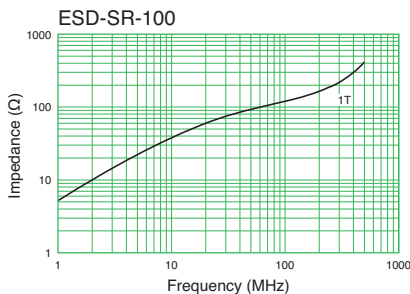
ESD-SR-S□□□



Case Color

ESD-SR-□□□□ (blank) Black  
ESD-SR-□□□□G Gray  
ESD-SR-□□□□V Violet  
\* Black only for ESD-SR-S□□□

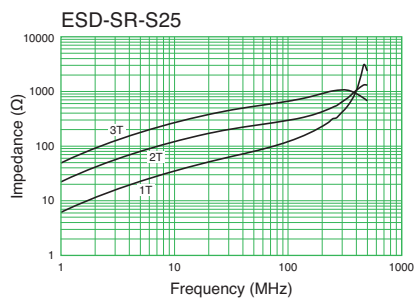
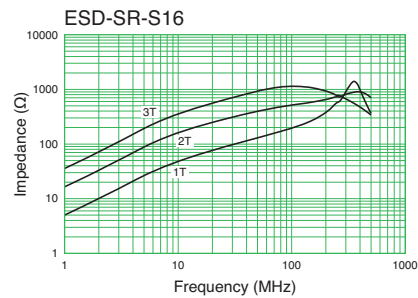
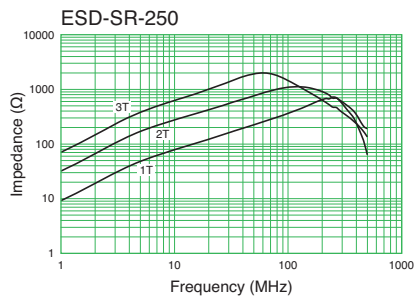
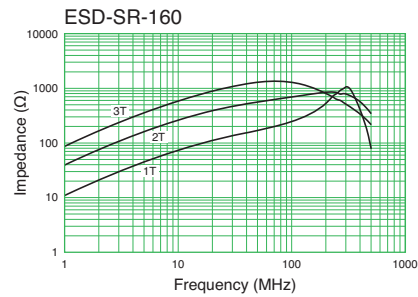
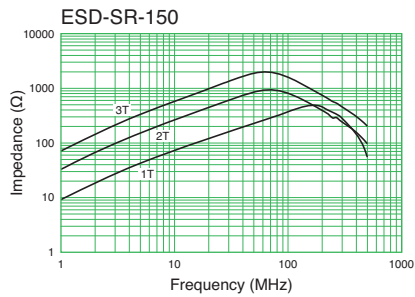
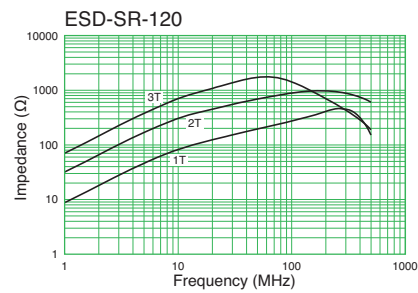
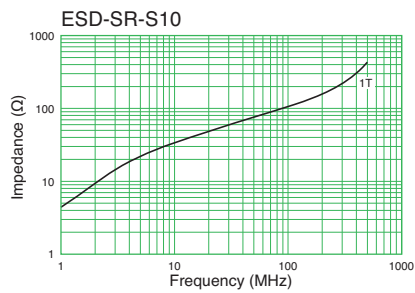
Impedance vs. Frequency



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# Solid / Split Cores for Flat Cables

[RoHS Compliant]



## ●ESD-FPL Series

Model	Dimensions(mm)					Applicable cable	shape	Remarks
	a	b	c	d	e			
ESD-FPL-14.5-3	14.5	11.0	2.75	3.0	0.80	FPC-FFC	Fig.3	Thin type
ESD-FPL-14.5-5	14.5	11.0	2.75	5.0	0.80	FPC-FFC	Fig.3	Thin type
ESD-FPL-14.5-8	14.5	11.0	2.75	8.0	0.80	FPC-FFC	Fig.3	Thin type
ESD-FPL-14.5-10	14.5	11.0	2.75	10.0	0.80	FPC-FFC	Fig.3	Thin type
ESD-FPL-16-12	16.0	11.5	4.50	12.0	0.85	8 core	Fig.3	
ESD-FPL-18-6	18.0	14.0	5.00	6.0	1.00	FPC-FFC	Fig.3	
ESD-FPL-18-8	18.0	14.0	5.00	8.0	1.00	10 core	Fig.3	
ESD-FPL-18-12	18.0	14.0	5.00	12.0	1.00	FPC-FFC	Fig.3	
ESD-FPL-18.7-3	18.7	15.0	2.75	3.0	0.70	FPC-FFC	Fig.3	Thin type
ESD-FPL-18.7-7	18.7	15.0	2.75	7.0	0.70	FPC-FFC	Fig.3	Thin type
ESD-FPL-18.7-10	18.7	15.0	2.75	10.0	0.70	FPC-FFC	Fig.3	Thin type
ESD-FPL-18.7-12	18.7	15.0	2.75	12.0	0.70	FPC-FFC	Fig.3	Thin type
ESD-FPL-21-8	21.0	17.0	5.00	8.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-21.5-8	21.5	16.5	6.50	8.0	1.30	12 core	Fig.3	
ESD-FPL-23.8-7	23.8	18.8	6.30	7.0	1.10	12 core	Fig.3	
ESD-FPL-13	23.8	18.8	6.30	15.0	1.10	13 core	Fig.3	
ESD-FPL-24-8	24.0	19.0	6.50	8.0	1.30	14 core	Fig.3	
ESD-FPL-24.5-6	24.5	20.0	4.50	6.0	0.90	FPC-FFC	Fig.3	
ESD-FPL-24.5-8	24.5	20.0	4.50	8.0	0.90	FPC-FFC	Fig.3	
ESD-FPL-25-12	25.0	21.0	5.00	12.0	0.85	16 core	Fig.3	
ESD-FPL-27-8	27.0	22.0	6.50	8.0	1.30	16 core	Fig.3	
ESD-FPL-7	28.0	23.5	7.70	7.0	1.50	16 core	Fig.2	
ESD-FPL-15	28.0	23.5	7.70	14.6	1.50	16 core	Fig.2	
ESD-FPL-28-10	28.0	24.0	5.00	10.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-31-9	31.0	27.0	5.00	9.0	0.55	FPC	Fig.3	Minimal gap type
ESD-FPL-31-12	31.0	27.0	5.00	12.0	0.55	FPC	Fig.3	Minimal gap type
ESD-FPL-32-8	32.0	28.0	5.00	8.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-32-12	32.0	28.0	5.00	12.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-20-12	33.2	27.0	8.00	12.0	1.50	20 core	Fig.3	
ESD-FPL-20-15	33.2	27.0	8.00	15.0	1.50	20 core	Fig.3	
ESD-FPL-33.5-8	33.5	27.5	6.50	8.0	1.30	20 core	Fig.3	
ESD-FPL-33.5-10	33.5	27.5	6.50	10.0	1.30	20 core	Fig.3	
ESD-FPL-33.5-12	33.5	27.5	6.50	12.0	1.30	20 core	Fig.3	
ESD-FPL-34-15	34.0	30.0	6.00	15.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-35-5	35.0	30.0	8.00	5.0	1.30	22 core	Fig.3	
ESD-FPL-35-8	35.0	30.0	8.00	8.0	1.30	22 core	Fig.3	
ESD-FPL-16	37.0	25.4	12.00	12.7	1.90	16 core	Fig.1	
ESD-FPL-38-12	38.0	34.0	5.00	12.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-38.5-8	38.5	35.0	4.00	8.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-38.5-12	38.5	35.0	4.00	12.0	0.80	FPC-FFC	Fig.3	
ESD-FPL-40-10	40.0	34.8	6.50	10.0	1.30	26 core	Fig.3	
ESD-FPL-40-12	40.0	34.8	6.50	12.0	1.30	26 core	Fig.3	
ESD-FPL-40-15	40.0	34.8	6.50	15.0	1.30	26 core	Fig.3	
ESD-FPL-26	41.2	35.0	7.70	15.0	1.50	26 core	Fig.3	
ESD-FPL-45.2-8	45.2	40.0	6.50	8.0	1.30	30 core	Fig.3	
ESD-FPL-45-12	45.2	40.0	6.50	12.0	1.50	30 core	Fig.3	
ESD-FPL-49.6-12	49.6	44.5	6.50	12.0	1.30	32 core	Fig.3	
ESD-FPL-57.6-12	57.6	52.0	6.50	12.0	1.30	40 core	Fig.3	
ESD-FPL-34	60.0	48.5	12.00	12.7	2.20	34 core	Fig.1	
ESD-FPL-50	80.0	68.6	12.00	12.7	1.90	50 core	Fig.1	

\* Other sizes available. Please contact NEC TOKIN.



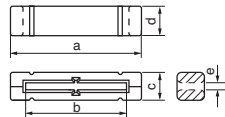
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## ●ESD-FPD Series

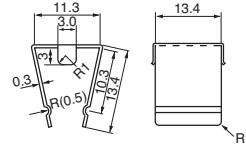
Model	Dimensions(mm)					Applicable cable	Remarks
	a	b	c	d	e		
<b>ESD-FPD-16</b>	37.0	25.4	10.0	12.7	2.6	16 core	Stainless steel clamp
<b>ESD-FPD-16-1</b>	37.0	25.4	10.0	12.7	2.6	16 core	Nylon clamp
<b>ESD-FPD-34</b>	60.0	48.3	10.0	12.7	2.0	34 core	Stainless steel clamp
<b>ESD-FPD-34-1</b>	60.0	48.3	10.0	12.7	2.0	34 core	Nylon clamp
<b>ESD-FPD-40</b>	68.0	56.0	10.0	12.7	2.0	40 core	Stainless steel clamp
<b>ESD-FPD-40-1</b>	68.0	56.0	10.0	12.7	2.0	40 core	Nylon clamp
<b>ESD-FPD-50</b>	80.0	68.6	10.0	12.7	2.0	50 core	Stainless steel clamp
<b>ESD-FPD-50-1</b>	80.0	68.6	10.0	12.7	2.0	50 core	Nylon clamp

## Shape and Dimensions

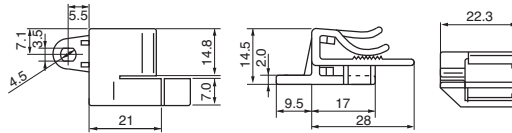
## ●ESD-FPD Series (Core)



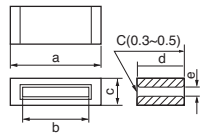
## ●ESD-FPD Series Clamp (Stainless steel)



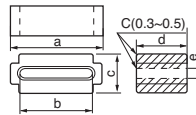
## ●ESD-FPD-1 Series Clamp FPD-CL-1 (Black nylon with cable stopper)



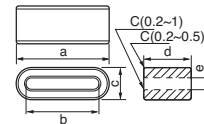
## ●Fig.1



## ●Fig.2

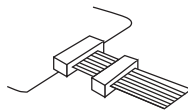


## ●Fig.3



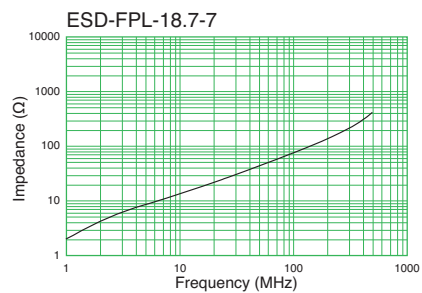
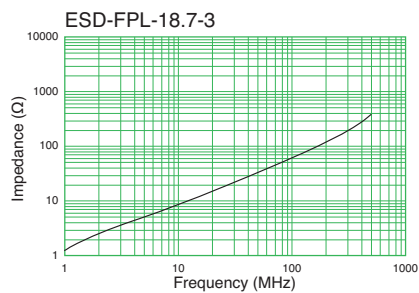
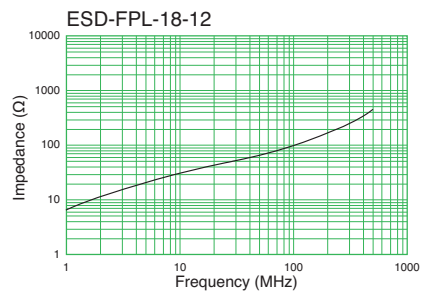
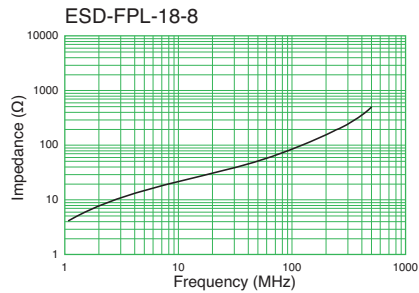
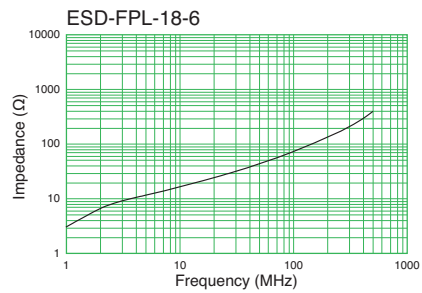
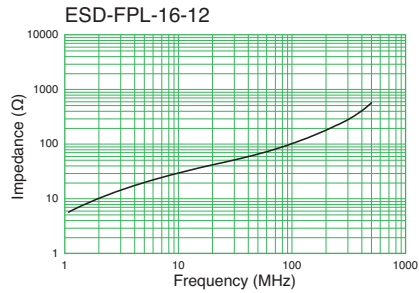
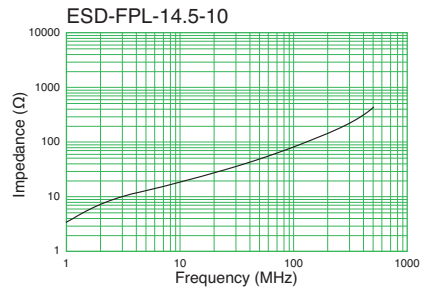
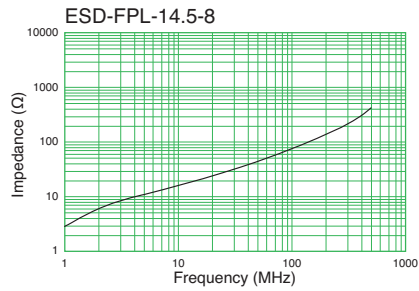
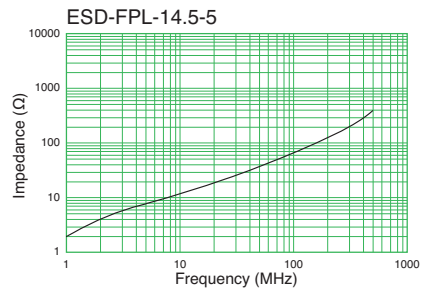
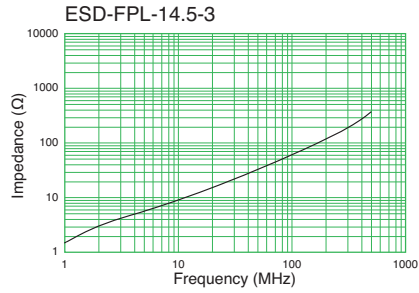
[mm]

## Installation Example



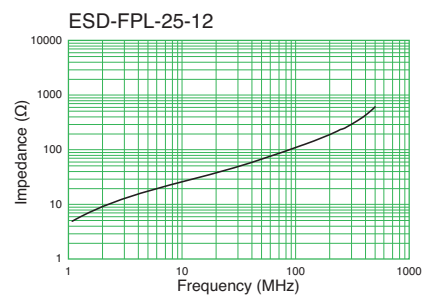
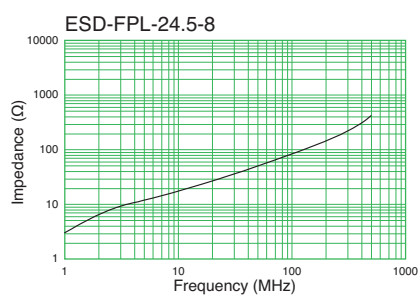
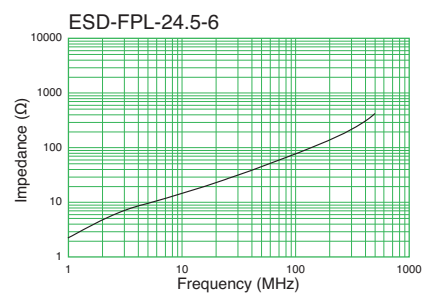
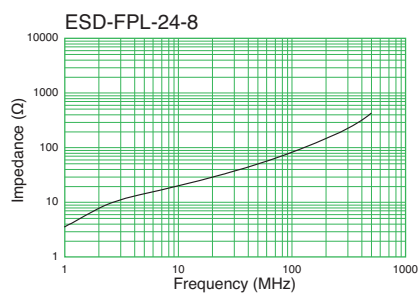
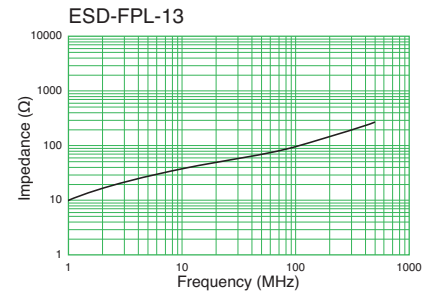
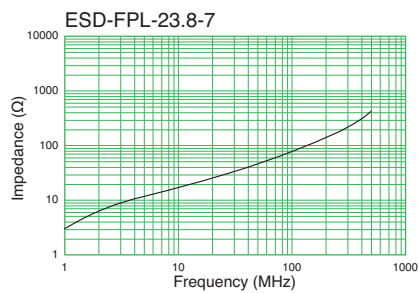
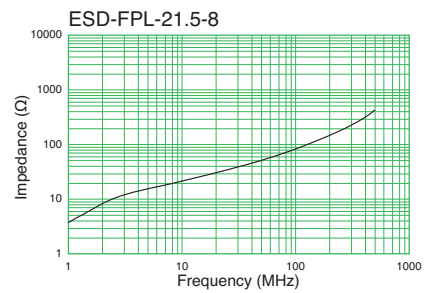
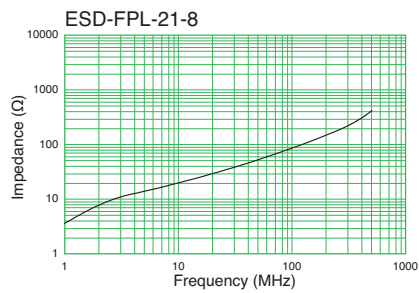
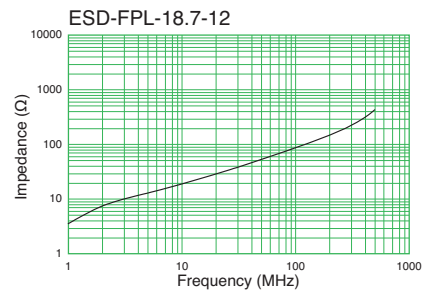
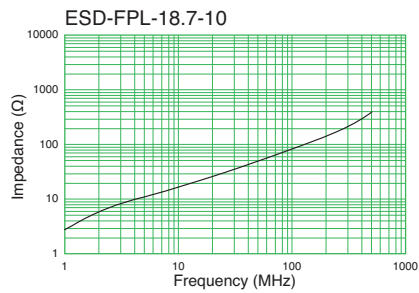
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Impedance vs. Frequency



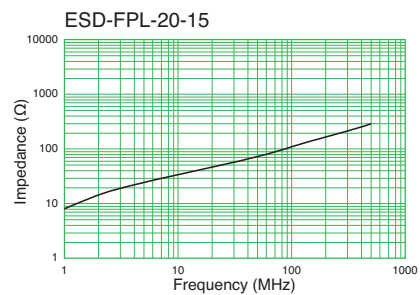
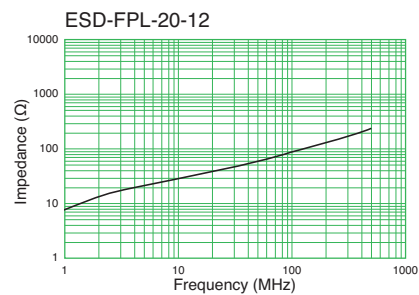
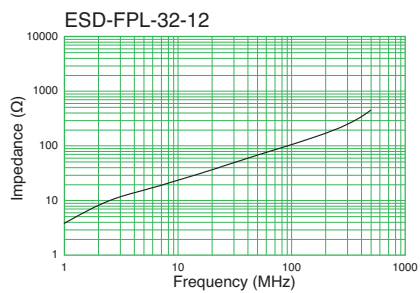
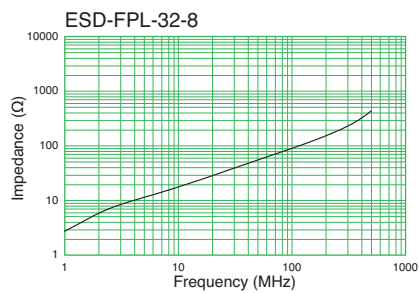
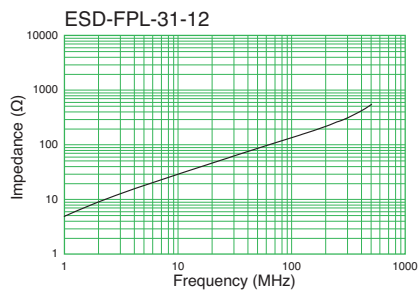
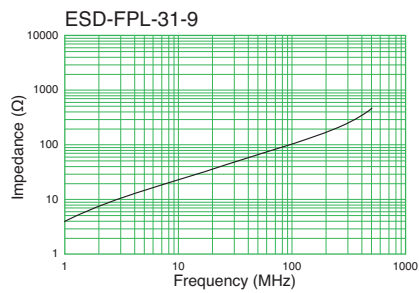
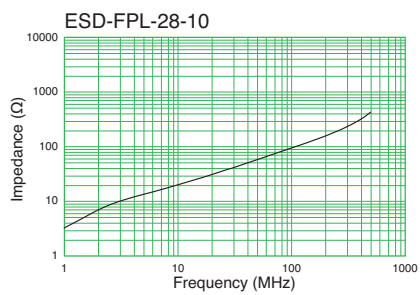
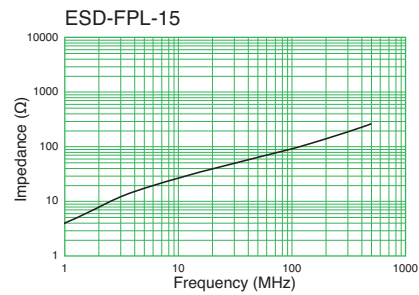
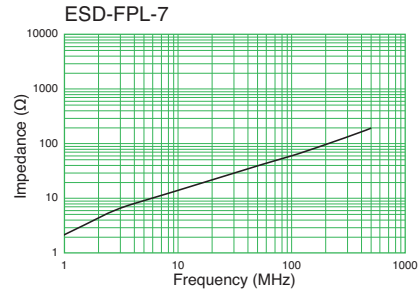
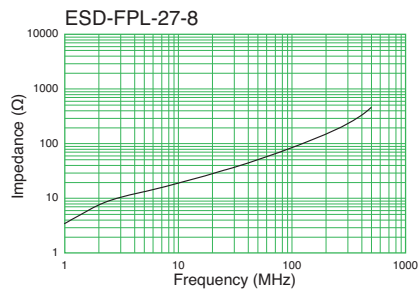
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## Impedance vs. Frequency



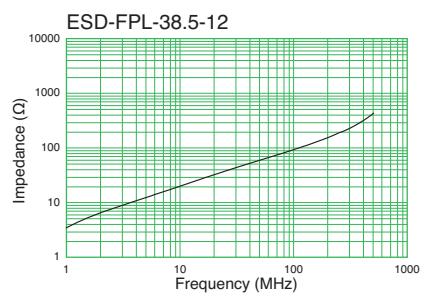
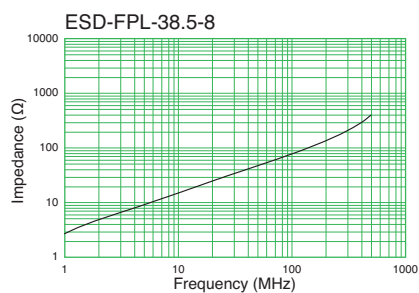
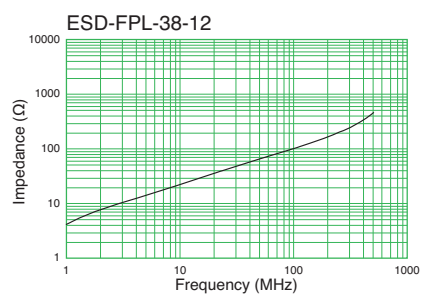
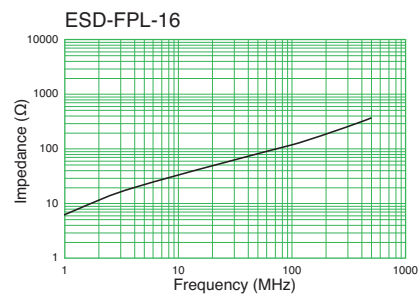
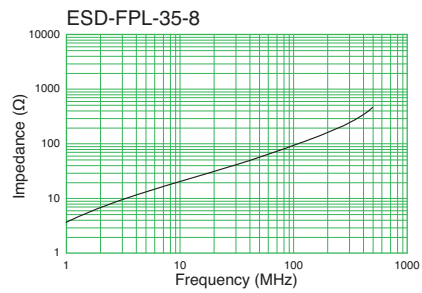
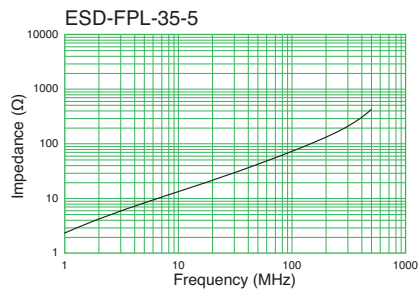
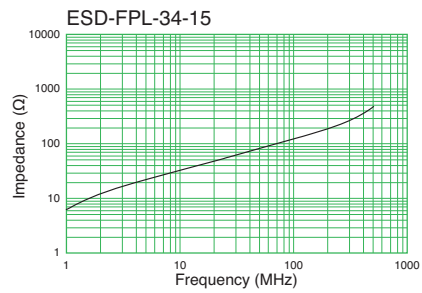
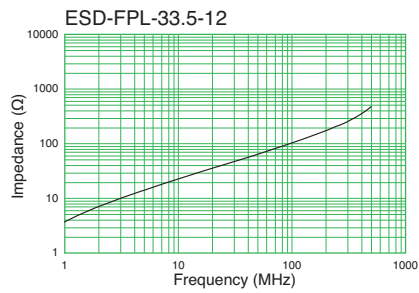
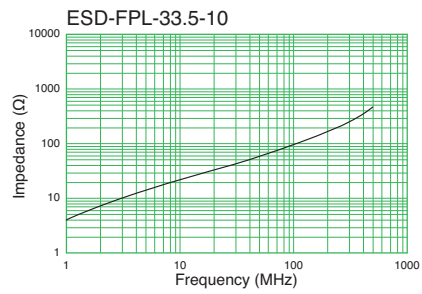
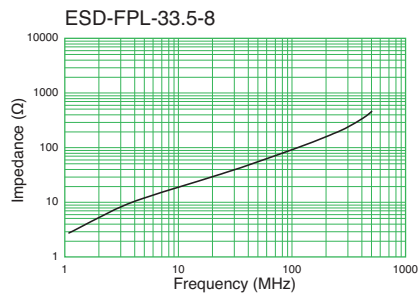
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Impedance vs. Frequency



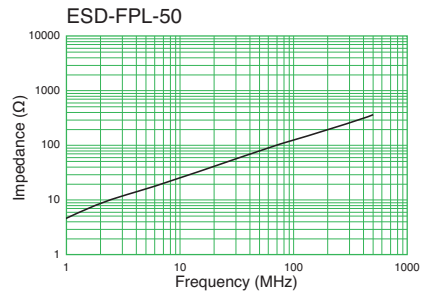
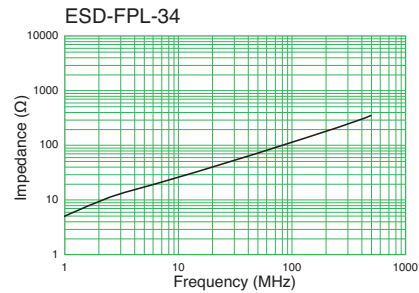
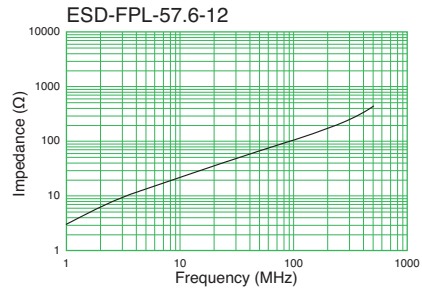
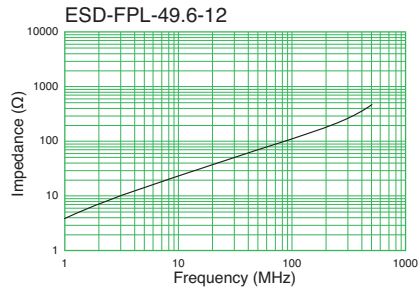
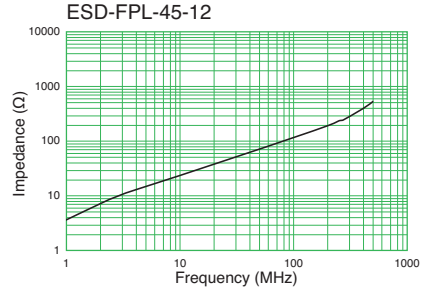
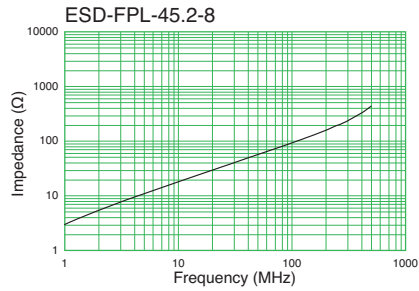
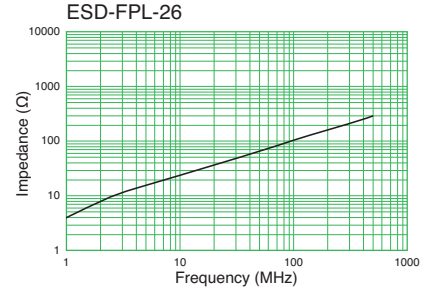
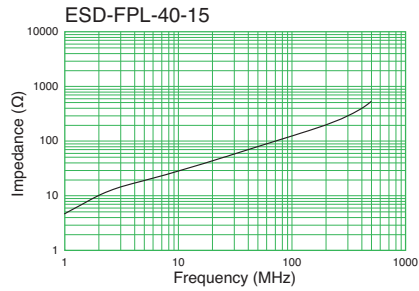
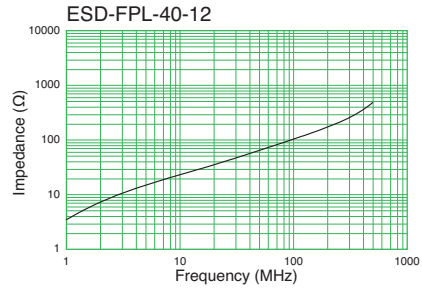
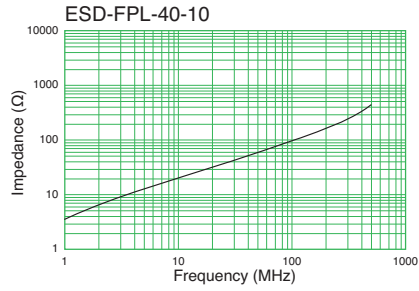
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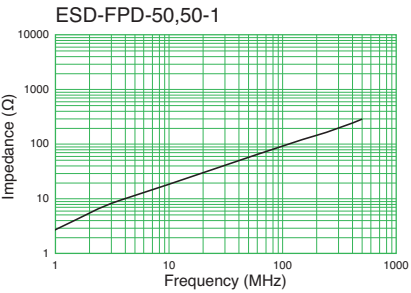
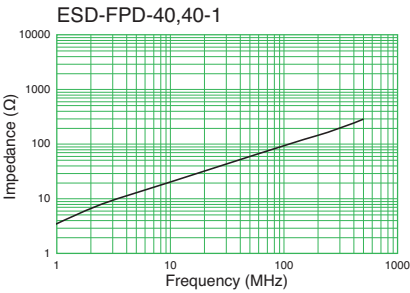
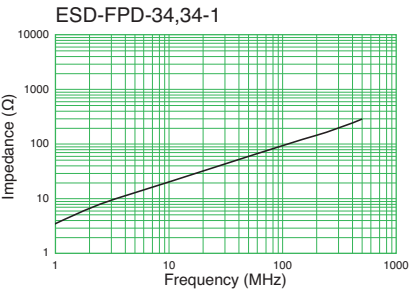
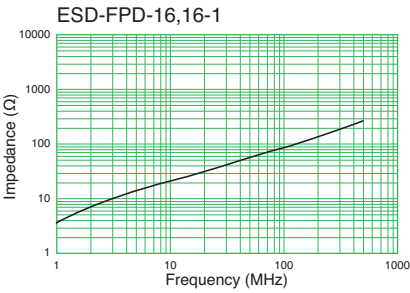
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Bead Cores

[RoHS Compliant]

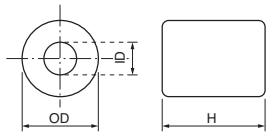


Model	Dimensions(mm)			Frequency range		Remarks
	OD	ID	H	up to 10MHz (mainly AM band range)	up to 300MHz (mainly FM band range)	
B-20F-28	2.8	1.3	3.0	●		
B-20F-38	3.8	1.5	4.3	●		
B-20F-46	4.6	1.5	4.3	●		
B-20F-57	5.7	1.5	8.0	●		
B-20L-25	2.5	1.0	1.2		●	
B-20L-34	3.4	0.8	4.4		●	
B-20L-44	4.4	1.6	7.0		●	
B-20L-48B	4.8	2.4	4.8		●	
B-20L-95B	9.7	4.8	4.2		●	(coated)

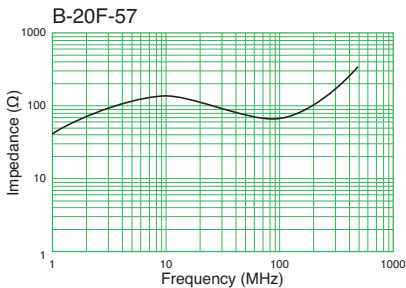
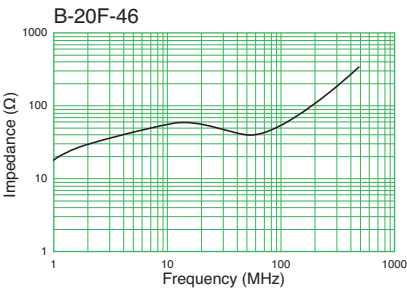
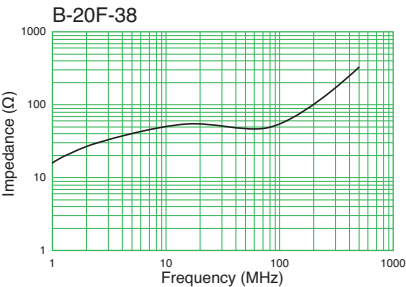
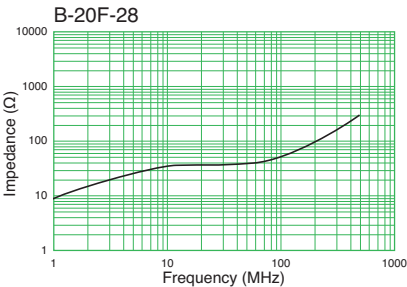
\* Above frequency range is a reference only. Please test with actual device before use.

Shape and Dimensions

●Beads Cores

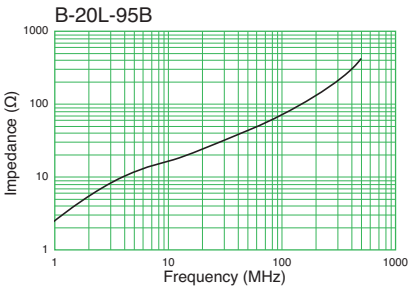
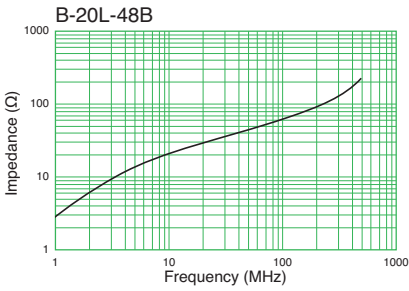
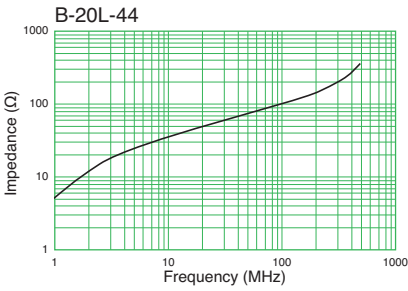
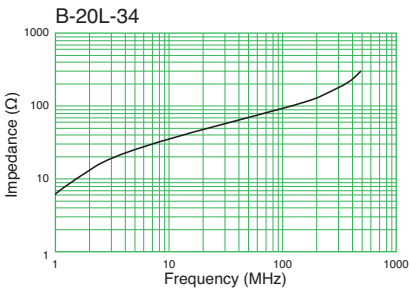
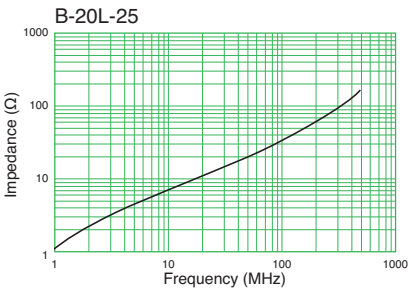


Impedance vs. Frequency



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# Precautions



- The names of the products and the specifications in this catalog are subject to change without notice for the sake of improvement. The manufacturer also reserves the right to discontinue any of these products. At the time of delivery, please ask for specifications sheets to check the contents in order to use the products properly and safely.
- Descriptions in this catalog regarding product characteristics and quality are based solely on discrete components. When using these components, be sure to check the specifications with the component in question mounted on the products.
- The manufacturer's warranty will not cover any disadvantage or damage caused by improper use of the products that deviates from the characteristics, specifications, or conditions for use described in this catalog.
- The products in this catalog are intended for use in ordinary electronic products. If any of these products are to be used in special applications requiring extremely high reliability, such as in aviation equipment and nuclear power controllers where product defects might pose a safety risk, please consult your NEC TOKIN sales representatives.
- Though the manufacturer has taken all possible precautions to ensure the quality and reliability of its products, improper use of products may result in bodily injury, fire, or similar accident. If you have any questions regarding the use of the products in question, please consult your NEC TOKIN sales representatives.
- Please be advised that the manufacturer accepts no responsibility for any infraction by users of the manufacturer's products on third party patents or industrial copyrights. The manufacturer is responsible only when such infractions are attributable to the structural design of the product and its manufacturing process.
- Export Control  
For customers outside Japan  
NEC TOKIN 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.  
For customers in Japan  
For products which 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.
- This catalog is current as of July 2015.



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