SMD/BLOCK Type
EMI Suppression Filters

EMIFIL®

Innovator in Electronics

Murata Manufacturing Co., Ltd.

Introduction

Murata Manufacturing Co., Ltd. has been developed the EMI suppression device market since the invention of 3 terminal capacitor DS310 series in 1979. Also, we have been struggling to develop and popularize new noise countermeasure technologies as well as new products in the concept of "Develop unique products", as the best solution partner of customers.
We hope you can find your key device to your noise problem.

Explanation of symbols in this catalog

	Features of each series	Features of each item
All Products	Flow soldering available	New product
	Reflow soldering available	Exist in design kit
	Meet large current lines	Rated current 1A or more
		Rated current 3A or more
Chip Ferrite Bead	Meet high frequency noise up to 1-2GHz	
	Meet ultra high frequency noise up to 10GHz	
LC Combined Type Filter		Low cut off frequency type for UHF band noise which affects to digital TV tuner
Chip Common Mode Choke Coil		for high speed differential signal lines (USB2.0/LVDS/IEEE1394 etc.)
		for ultra high speed differential signal lines (HDMI/DVI/Display Port/USB3.0 etc.)
		Line impedance has been matched to transmission lines

for EU RoHS Compliant

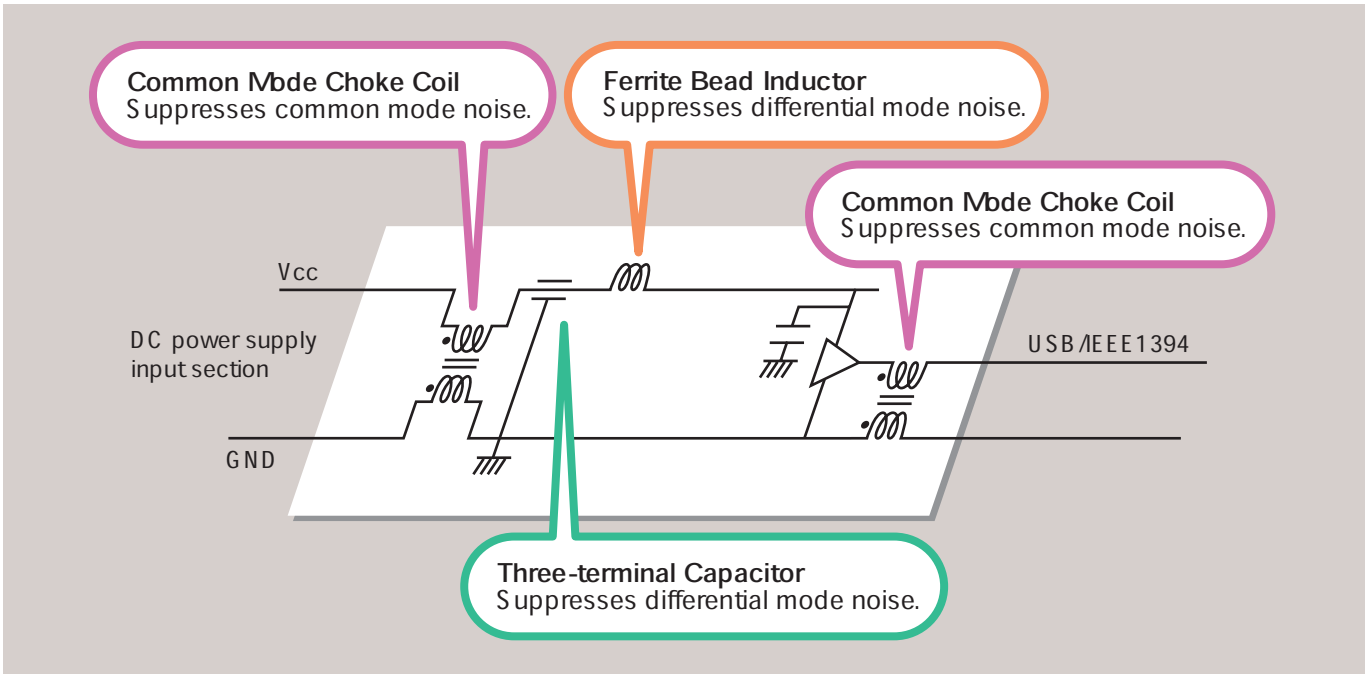
- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).

CONTENTS

●Features & Suitable Circuits

Type	Features	Suitable Circuits
Ferrite Bead BLM/BLA Series 	Miniaturized Unnecessary of GND connection Effective at low impedance line	Application set with less noise radiation Low impedance line
Capacitor Type NFM/NFA/NFE/NFR/ NFL/NFW Series 	Great noise suppression effect With effect as By-Pass capacitor (Lineup for Power) Good noise separation from signal (LC filter for Signal) Effective at high impedance line	Application set with higher noise radiation High impedance line Circuit with By-Pass capacitor Circuit driven by high frequency
Common Mode Choke Coil 	Possible to suppress noise with less affect of ultra high speed signal Great effect for common mode noise Less magnetic saturation by current	High speed differential signal line I/F cable driver Power line

●Example



EMI Filter Selection by Circuits and Noise Frequency

●Chip Ferrite Bead / Chip EMIFIL®

Circuit Type?

Noise Frequency?

Noise Frequency: Under 1GHz

Inductor Type (Suppression Effect: Normal)

Power Line	General Signal Line (Under 10MHz)	High Speed Signal Line (Over 10MHz)
BLM03AX p22 0201/0.2-1A/Imp.10-1000Ω	BLM02A p45 01005/Imp.10-120Ω	BLM03B p56 0201/Imp.10-600Ω
BLM03P p30 0201/0.75-0.9A/Imp.22-33Ω	BLM03A p46 0201/Imp.10-1000Ω	BLM15B p58 0402/Imp.5-1800Ω
BLM15AX p24 0402/0.35-1.74A/Imp.10-1000Ω	BLM15A p48 0402/Imp.10-1000Ω	BLM18B p62 0603/Imp.5-2500Ω
BLM15P p31 0402/1-2.2A/Imp.10-120Ω	BLM18A p51 0603/Imp.120-1000Ω	BLM21B p66 0805/Imp.5-2700Ω
BLM18P p33 0603/0.5-3A/Imp.30-470Ω	BLM18T p55 0603/Imp.120-1000Ω	Array Type
BLM21P p35 0805/1.5-6A/Imp.22-330Ω	BLM18R p69 0603/Imp.120-1000Ω	BLA2AB p83 0804/Imp.10-1000Ω
BLM31P p37 1206/1.5-6A/Imp.33-600Ω	BLM21A p53 0805/Imp.120-1000Ω	BLA31B p86 1206/Imp.120-1000Ω
BLM41P p39 1806/1.5-6A/Imp.60-1000Ω	BLM21R p71 0805/Imp.120-1000Ω	
Low DC Resistance Type	Array Type	
BLM18K p41 0603/1.3-6A/Imp.26-600Ω	BLA2AA p83 0804/Imp.120-1000Ω	
BLM18S p43 0603/1.5-6A/Imp.26-330Ω	BLA31A p86 1206/Imp.30-1000Ω	

Capacitor Type (Suppression Effect: High)

Power Line	General Signal Line (Under 10MHz)	High Speed Signal Line (Over 10MHz)
NFM18PC p111 0603/2-4A/Cap.0.1-2.2μF	NFM18C p118 0603/Cap.22-22000pF	LC Combined
NFM21P p113 0805/2-6A/Cap.0.1-4.7μF	NFM21C p119 0805/Cap.22-22000pF	NFL18ST p123 0603/Cut off 200-500MHz
NFM3DP p114 1205/2A/Cap.0.022μF	NFM3DC p120 1205/Cap.22-22000pF	NFL18SP p124 0603/Cut off 150-500MHz
NFM31P p115 1206/6A/Cap.27μF	NFM41C p121 1806/Cap.22-22000pF	NFL21S p125 0805/Cut off 10-500MHz
NFM41P p116 1806/2-6A/Cap.0.2-1.5μF	Array Type	NFW31S p131 1206/Cut off 10-500MHz
NFM55P p117 2220/6A/Cap.1.5μF	NFA31C p122 1206/Cap.22-22000pF	RC Combined
T Circuit Filter Feed Through Type	T Circuit Filter Feed Through Type	NFR21G p133 0805/22-100Ω/Cap.10-100pF
NFE31P p108 1206/6A/Cap.22-2200pF	NFE31P p108 1206/Cap.22-22000pF	Array Type (RC/LC Combined)
NFE61P p109 2706/2A/Cap.33-4700pF	NFE61P p109 2706/Cap.33-4700pF	NFA31G p134 1206/6.8-100Ω/Cap.10-100pF
Block Type		NFA18S p126 0603/Cut off 50-480MHz
BNX022/023 p179 10-15A/Range1MHz-2GHz		NFA21S p129 0805/Cut off 50-330MHz

Noise Frequency: GHz Band

Inductor Type (Suppression Effect: Normal)

Power Line	General Signal Line (Under 10MHz)	High Speed Signal Line (Over 10MHz)
BLM15EG p27 0402/0.7-1.5A/Imp.120-220Ω	BLM03HG p74 0201/Imp.600-1000Ω	BLM15HD p75 0402/Imp.600-1800Ω
BLM18HE p77 0603/0.5-0.8A/Imp.600-1500Ω	BLM15HG p75 0402/Imp.600-1000Ω	BLM15HB p75 0402/Imp.120-220Ω
BLM18EG p28 0603/0.5-2A/Imp.100-600Ω	BLM15EG p27 0402/Imp.120-220Ω	BLM18HD p77 0603/Imp.470-1000Ω
	BLM18HG p77 0603/Imp.470-1000Ω	BLM18HB p77 0603/Imp.120-330Ω
	BLM18HK p77 0603/Imp.330-1000Ω	BLM18HE p77 0603/Imp.600-1500Ω
	BLM18EG p28 0603/Imp.100-600Ω	

Capacitor Type (Suppression Effect: High)

Power Line	General Signal Line (Under 10MHz)	High Speed Signal Line (Over 10MHz)
NFM18PS p110 0603/2A/Cap.0.47-1.0μF		LC Combined
		NFL18ST p123 0603/Cut off 200-500MHz
		Array Type (LC Combined)
		NFA18S p126 0603/Cut off 50-480MHz
		NFA21S p129 0805/Cut off 50-330MHz

Noise Frequency: High-GHz Band

Inductor Type

Power Line	General Signal Line (Under 10MHz)	High Speed Signal Line (Over 10MHz)
	BLM15GG p81 0402/Imp.220-470Ω	BLM15GA p81 0402/Imp.75Ω
	BLM18GG p82 0603/Imp.470Ω	

BL□

Inductor Type

		Series		Size Code Inch (mm)	Impedance (Ω) at 100MHz (10 / 100 / 1000)	Effective Frequency Range (10kHz 100kHz 1MHz 10MHz 100MHz 1GHz 10GHz)
For High-GHz Band Noise	Signal Lines Type	BLM15GG	p81	0402 (1005)	220 470	
		BLM15GA	p81	0402 (1005)	75	
		BLM18GG	p82	0603 (1608)	470	

NF□

Capacitor Type

	Series		Size Code Inch (mm)	Capacitance (F) (10p 100p 1000p 10000p 0.1μ 1μ 10μ)	Effective Frequency Range (10kHz 100kHz 1MHz 10MHz 100MHz 1GHz 10GHz)
Signal Lines Type	NFM18C	p118	0603 (1608)	22 47 100 220 470 1000 2200 22000	
	NFM21C	p119	0805 (2012)	22 47 100 220 470 1000 2200 22000	
	NFM3DC	p120	1205 (3212)	22 47 100 220 470 1000 2200 22000	
	NFM41C	p121	1806 (4516)	22 47 100 220 470 1000 2200 22000	
	NFA31C (4 circuits array)	p122	1206 (3216)	22 47 100 220 470 1000 2200 22000	
Power Lines Type	NFM18P	p110	0603 (1608)	0.1 0.22 0.47 1.0 2.2	
	NFM21P	p113	0805 (2012)	0.1 0.22 0.47 1.0 2.2 4.7	
	NFM3DP*	p114	1205 (3212)	22000	
	NFM31P	p115	1206 (3216)	27	
	NFM41P	p116	1806 (4516)	0.2 1.5	
	NFM55P	p117	2220 (5750)	1.5	
Universal Type [Power Lines / Signal Lines]	NFE31P	p108	1206 (3216)	22 47 100 220 470 1500 2200	
	NFE61P	p109	2706 (6816)	33 68 100 180 360 680 1000 4700	

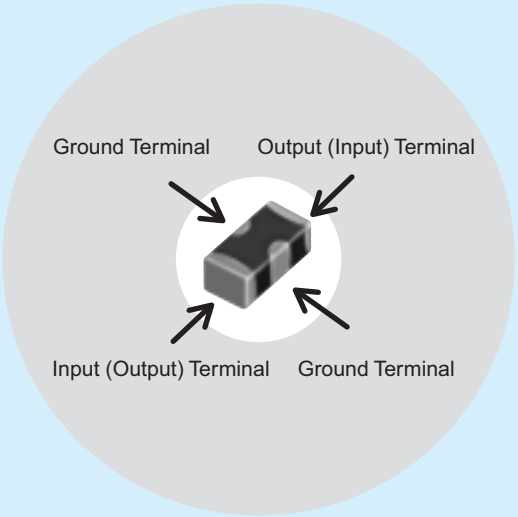
NF□

LC (RC) Combined Type

	Series		Size Code Inch (mm)	Cut-off Frequency (MHz) (10 / 100 / 500)	Effective Frequency Range (10kHz 100kHz 1MHz 10MHz 100MHz 1GHz 10GHz)
Signal Lines Type	NFL18ST	p123	0603 (1608)	200 300 500	
	NFL18SP	p124	0603 (1608)	150 200 300 500	
	NFL21S	p125	0805 (2012)	10 20 50 70 100 150 200 300 400 500	
	NFA18S (4 circuits array)	p126	0603 (1608)	50 130 180 200 220 300 400 480	
	NFA21S (4 circuits array)	p129	0805 (2012)	50 80 200 280 300 310 330	
	NFW31S	p131	1206 (3216)	10 20 50 100 150 200 300 400 500	
	NFR21G	p133	0805 (2012)	10 47 100	
	NFA31G (4 circuits array)	p134	1206 (3216)	10 47 100	

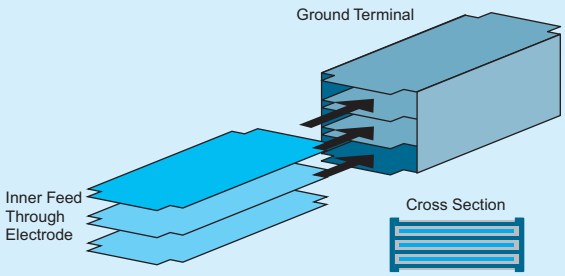
* The derating of rated current is required for some items according to the operating temperature on the each product page.

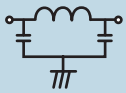
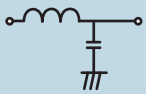
NF□ Series Introduction

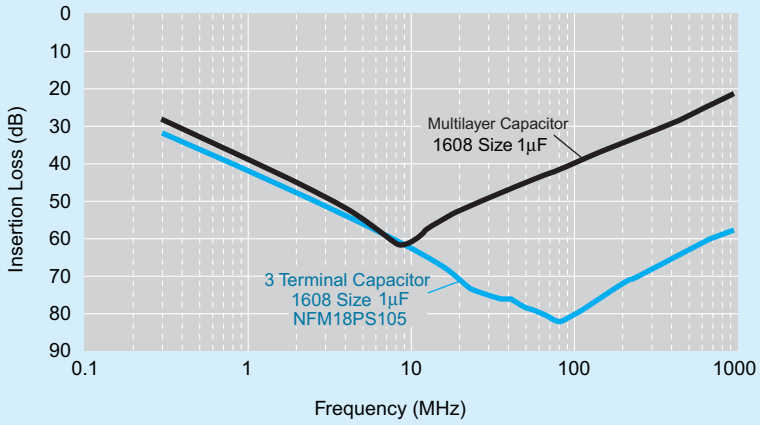


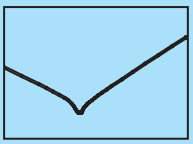
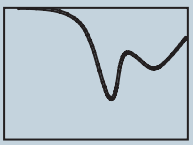
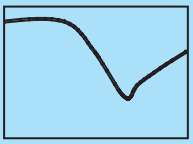
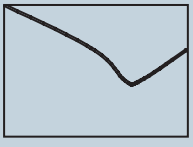
Example of 3 Terminal Capacitor Structure

Chip 3 terminal capacitor is chip shaped 3 terminal capacitor designed for noise suppression. Its inner structure like feed through capacitor makes its ground impedance quite low. Owing to this structure, 3 terminal capacitor has good noise suppression effect at high frequency range up to several hundred MHz.



Series	Equivalent Circuit	Part Number
NFM Series (3 terminal capacitor)		**NFM18CC** **NFM21CC** **NFM18PC** **NFM18PS** **NFM21PC**
NFL / NFW Series (LC filter)		**NFL18ST**
		**NFL18SP** **NFL21SP** **NFW31SP**
		**NFA21S** **NFA18S**
NFR Series (RC filter)		**NFR21GD** **NFA31GD**
NFE Series (Feed through capacitor with ferrite cores)		**NFE31PT** **NFE61PT**



Insertion Loss Sample	Features			Applications	Example
	Standard of 3 terminal capacitor	**NFM_CC**	Standard type with varied capacitance	Noise suppression in low speed signal lines	Low speed interface lines, sensors
		NFM_PC	Meet large current, high capacitance available, for power lines	Noise suppression in power lines	Individual IC power lines
	Sharp insertion loss curve enables low damage to signal waveform	**NFL_ST**	T-type filter, effective in low impedance circuits	Noise suppression in high speed signal lines	High speed interface lines Bus lines LCD lines Camera I/Fs High speed analog lines RGB / D terminal
		NFL_SP	π-type filter, effective in high impedance circuits		
		NFW_SP	π-type filter, designed for low impedance circuits		
		NFA_SL	4-line array, suitable for bus lines or flat cables		
	Limit noise using resistor, also loop back to ground			Noise suppression in signal line with unstable ground	Interface lines Clock lines
	Meet large current, good high frequency performance because of its feed through structure			Noise suppression in power lines / low impedance lines	Various power lines, sensors

LC Combined (1)

(Part Number)

NF	L	18	ST	107	X	1C	3	L
❶	❷	❸	❹	❺	❻	❼	❽	❾

❶Product ID

Product ID	
NF	Chip EMIFIL®

❷Structure

Code	Structure
L	Maltilayer, LC Combined Type
W	Wire Wound, LC Combined Type
E	Block, LC Combined Type

❸Dimensions (L×W)

Code	Dimensions (L×W)	EIA
18	1.6×0.8mm	0603
21	2.0×1.25mm	0805
31	3.2×1.6mm	1206
61	6.8×1.6mm	2606

❹Features

Code	Features
SP	π Circuit for Signal Lines
ST	T Circuit for Signal Lines
PT	T Circuit for Large Current

❺Cut-off Frequency (**NFL/NFW** Series)

Expressed by three figures. The unit is in hertz (Hz). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

❺Capacitance (**NFE** Series)

Expressed by three figures. The unit is in pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

❻Characteristics (**NFL/NFW** Series)

Code	Characteristics
X	Cut-off Frequency

❻Characteristics (**NFE** Series)

Code	Capacitance Change (Temperature Characteristics)
B	±10%
C	±20% , ±22%
D	+20/-30% , +22/-33%
E	+20/-55% , +22/-56%
F	+30/-80% , +22/-82%
R	±15%
U	-750 ±120ppm/℃
Z	Other

❼Rated Voltage

Code	Rated Voltage
1A	10V
1C	16V
1E	25V
1H	50V
2A	100V

❽Electrode

Code	Electrode	Series
3/7	Sn Plating	NFL
4	Lead Free Solder Coating	NFW
9	Others	NFE

❾Packaging

Code	Packaging	Series
K	Embossed Taping (ø330mm Reel)	NFW31/NFE
L	Embossed Taping (ø180mm Reel)	NFW31/NFE
B	Bulk	NFL18/NFL21/NFE
D	Paper Taping (ø180mm Reel)	NFL18/NFL21

Type	Size Code (Inch)	Thickness (mm)	Part Number	Rated Voltage	Capacitance	Nominal Cut-off Frequency	Rated Current	New	Kit	≧1A ≧3A	DTV	Flow	ReFlow
LC Combined Type for Power Lines and Signal Lines	p108 1206	1.6	NFE31PT220R1E9	25Vdc	22pF+30%-30%	-	6A			≧3A			ReFlow
		1.6	NFE31PT470C1E9	25Vdc	47pF+50%-20%	-	6A			≧3A			ReFlow
		1.6	NFE31PT101C1E9	25Vdc	100pF+80%-20%	-	6A			≧3A			ReFlow
		1.6	NFE31PT221D1E9	25Vdc	220pF+50%-20%	-	6A			≧3A			ReFlow
		1.6	NFE31PT471F1E9	25Vdc	470pF+50%-20%	-	6A			≧3A			ReFlow
		1.6	NFE31PT152Z1E9	25Vdc	1500pF+50%-20%	-	6A		Kit	≧3A			ReFlow
		1.6	NFE31PT222Z1E9	25Vdc	2200pF+50%-50%	-	6A		Kit	≧3A			ReFlow
	p109 2706	1.6	NFE61PT330B1H9	50Vdc	33pF+30%-30%	-	2A			≧1A		Flow	ReFlow
		1.6	NFE61PT680B1H9	50Vdc	68pF+30%-30%	-	2A			≧1A		Flow	ReFlow
		1.6	NFE61PT101Z1H9	50Vdc	100pF+30%-30%	-	2A			≧1A		Flow	ReFlow
		1.6	NFE61PT181B1H9	50Vdc	180pF+30%-30%	-	2A			≧1A		Flow	ReFlow
		1.6	NFE61PT361B1H9	50Vdc	360pF+20%-20%	-	2A			≧1A		Flow	ReFlow
		1.6	NFE61PT681B1H9	50Vdc	680pF+30%-30%	-	2A			≧1A		Flow	ReFlow
		1.6	NFE61PT102E1H9	50Vdc	1000pF+80%-20%	-	2A		Kit	≧1A		Flow	ReFlow
		1.6	NFE61PT472C1H9	50Vdc	4700pF+80%-20%	-	2A		Kit	≧1A		Flow	ReFlow
LC Combined Multilayer Type for Signal Lines	p123 0603 p124	0.8	NFL18ST207X1C3	16Vdc	25pF+20%-20%	200MHz	150mA		Kit				ReFlow
		0.8	NFL18ST307X1C3	16Vdc	18pF+20%-20%	300MHz	200mA		Kit				ReFlow
		0.8	NFL18ST507X1C3	16Vdc	10pF+20%-20%	500MHz	200mA		Kit				ReFlow
		0.6	NFL18SP157X1A3	10Vdc	34pF+20%-20%	150MHz	100mA		Kit				ReFlow
		0.6	NFL18SP207X1A3	10Vdc	24pF+20%-20%	200MHz	100mA		Kit				ReFlow
		0.6	NFL18SP307X1A3	10Vdc	19pF+20%-20%	300MHz	100mA		Kit				ReFlow
		0.6	NFL18SP507X1A3	10Vdc	11pF+20%-20%	500MHz	100mA		Kit				ReFlow
	p125 0805	0.85	NFL21SP106X1C3	16Vdc	670pF+20%-20%	10MHz	100mA		Kit				ReFlow
		0.85	NFL21SP206X1C7	16Vdc	240pF+20%-20%	20MHz	100mA		Kit				ReFlow
		0.85	NFL21SP506X1C3	16Vdc	84pF+20%-20%	50MHz	150mA		Kit				ReFlow
		0.85	NFL21SP706X1C3	16Vdc	76pF+20%-20%	70MHz	150mA		Kit				ReFlow
		0.85	NFL21SP107X1C3	16Vdc	44pF+20%-20%	100MHz	200mA		Kit				ReFlow
		0.85	NFL21SP157X1C3	16Vdc	28pF+20%-20%	150MHz	200mA		Kit				ReFlow
		0.85	NFL21SP207X1C3	16Vdc	22pF+20%-20%	200MHz	250mA		Kit				ReFlow
		0.85	NFL21SP307X1C3	16Vdc	19pF+10%-10%	300MHz	300mA		Kit				ReFlow
		0.85	NFL21SP407X1C3	16Vdc	16pF+10%-10%	400MHz	300mA		Kit				ReFlow
		0.85	NFL21SP507X1C3	16Vdc	12pF+10%-10%	500MHz	300mA		Kit				ReFlow
LC Combined Array Type for Signal Lines	p126 0603	0.6	NFA18SL137V1A45	10Vdc	-	130MHz	50mA		Kit		DTV		ReFlow
		0.6	NFA18SL187V1A45	10Vdc	-	180MHz	50mA		Kit		DTV		ReFlow
		0.6	NFA18SL207V1A45	10Vdc	-	200MHz	50mA		Kit		DTV		ReFlow
		0.6	NFA18SL227V1A45	10Vdc	-	220MHz	25mA	New	Kit		DTV		ReFlow
		0.5	NFA18SL307V1A45	10Vdc	-	300MHz	100mA		Kit				ReFlow
		0.5	NFA18SL407V1A45	10Vdc	-	400MHz	100mA		Kit				ReFlow
		0.5	NFA18SL487V1A45	10Vdc	-	480MHz	100mA		Kit				ReFlow
		0.6	NFA18SL506X1A45	10Vdc	-	50MHz	25mA		Kit				ReFlow
	p128	0.6	NFA18SD187X1A45	10Vdc	-	180MHz	25mA	New	Kit		DTV		ReFlow
		0.6	NFA18SD207X1A45	10Vdc	-	200MHz	25mA	New	Kit		DTV		ReFlow
	p129 0805	0.5	NFA21SL287V1A45	10Vdc	-	280MHz	100mA		Kit				ReFlow
		0.5	NFA21SL317V1A45	10Vdc	-	310MHz	100mA		Kit				ReFlow
		0.5	NFA21SL337V1A45	10Vdc	-	330MHz	100mA		Kit				ReFlow
		0.85	NFA21SL287V1A48	10Vdc	-	280MHz	100mA		Kit				ReFlow
		0.85	NFA21SL317V1A48	10Vdc	-	310MHz	100mA		Kit				ReFlow
		0.85	NFA21SL337V1A48	10Vdc	-	330MHz	100mA		Kit				ReFlow
		0.5	NFA21SL207X1A45	10Vdc	-	200MHz	100mA		Kit				ReFlow
		0.5	NFA21SL307X1A45	10Vdc	-	300MHz	100mA		Kit				ReFlow
		0.85	NFA21SL506X1A48	10Vdc	-	50MHz	20mA		Kit				ReFlow
		0.85	NFA21SL806X1A48	10Vdc	-	80MHz	20mA		Kit				ReFlow
		0.85	NFA21SL207X1A48	10Vdc	-	200MHz	100mA		Kit				ReFlow
		0.85	NFA21SL307X1A48	10Vdc	-	300MHz	100mA		Kit				ReFlow

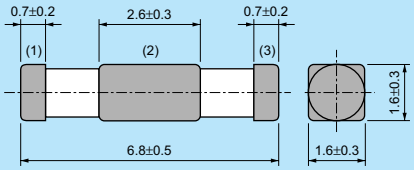
Continued on the following page.

NFE61P Series (2706 Size)

Hi Power Flow OK Reflow OK

T-type filter with built-in ferrite bead.

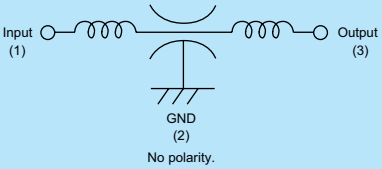
■ Dimensions



: Electrode

(in mm)

■ Equivalent Circuit



No polarity.

■ Packaging

Code	Packaging	Minimum Quantity
L	180mm Reel Embossed Tape	2500
K	330mm Reel Embossed Tape	8000
B	Bulk(Bag)	500

Refer to pages from p.136 to p.141 for mounting information.

■ Rated Value (□: packaging code)

Part Number	Capacitance	Rated Current	Rated Voltage	Insulation Resistance (min.)	Operating Temperature Range	
NFE61PT330B1H9□	33pF+30%-30%	2A	50Vdc	1000M ohm	-25°C to +85°C	≧1A
NFE61PT680B1H9□	68pF+30%-30%	2A	50Vdc	1000M ohm	-25°C to +85°C	≧1A
NFE61PT101Z1H9□	100pF+30%-30%	2A	50Vdc	1000M ohm	-25°C to +85°C	≧1A
NFE61PT181B1H9□	180pF+30%-30%	2A	50Vdc	1000M ohm	-25°C to +85°C	≧1A
NFE61PT361B1H9□	360pF+20%-20%	2A	50Vdc	1000M ohm	-25°C to +85°C	≧1A
NFE61PT681B1H9□	680pF+30%-30%	2A	50Vdc	1000M ohm	-25°C to +85°C	≧1A
NFE61PT102E1H9□	1000pF+80%-20%	2A	50Vdc	1000M ohm	-25°C to +85°C	Kit ≧1A
NFE61PT472C1H9□	4700pF+80%-20%	2A	50Vdc	1000M ohm	-25°C to +85°C	Kit ≧1A

Number of Circuit: 1

■ Insertion Loss Characteristics (Main Items)