**CHIP EMIFIL®**EMIFIL® is the trademark of
Murata Manufacturing Co., Ltd.**muRata****Chip Common Mode Choke Coil PLM3216K Series**

For common mode noise suppression in high speed signal lines. SMD, ultra small size common mode choke coil.

The PLM3216K series is effective in high frequency noise suppression and suitable for suppression of radiation noise in signal cables. The common mode choke coil structure enables noise suppression without damaging the signal. Murata's original material technology and monolithic technology enable a compact size of 3.2×1.6×1.15mm.

■FEATURES

1. The PLM3216K series is effective for common mode noise suppression in digital equipment which causes radiation from cables.
2. Low leakage flux due to monolithic structure enables high density mounting.
3. The nickel barrier structure of the external electrodes provides excellent solder heat resistance.

■APPLICATIONS

- Prevention of common mode noise on signal line in personal computers, computer built in equipments, facsimiles, digital telephones, etc.

■PART NUMBERING

(Please specify the part number when ordering.)

(Ex.) **PLM3216K** **281** **SJ** **2** **T1**

① ② ③ ④ ⑤

① Type

② Typical Impedance at 100MHz
281 : 280Ω

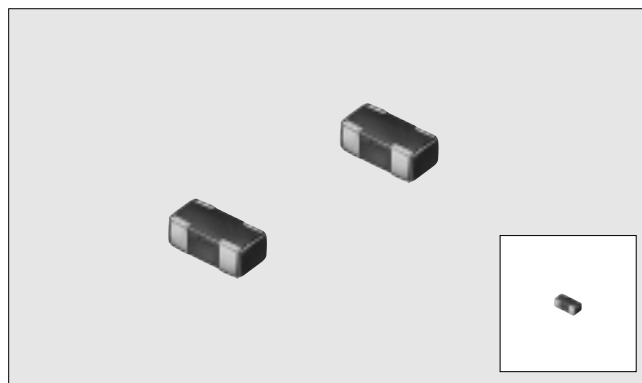
③ Other Characteristics

④ Number of Line

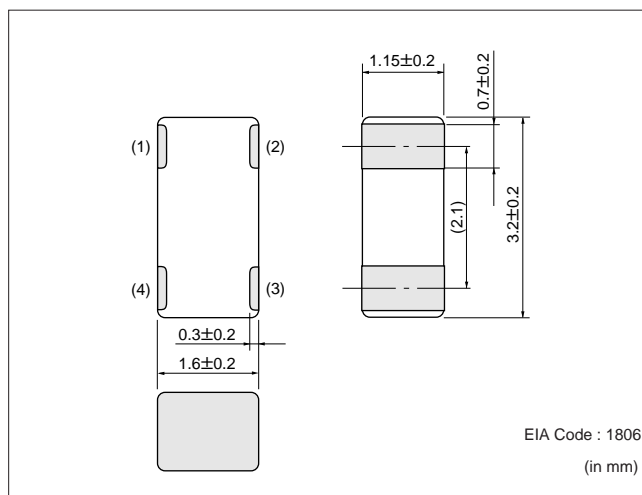
⑤ Packaging code

T1 : Taped

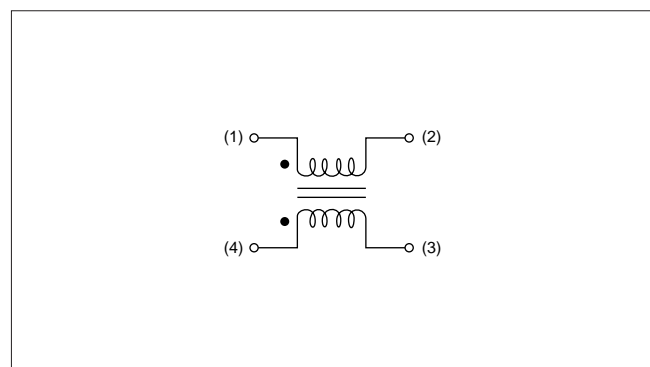
B1 : Bulk Package



■DIMENSIONS



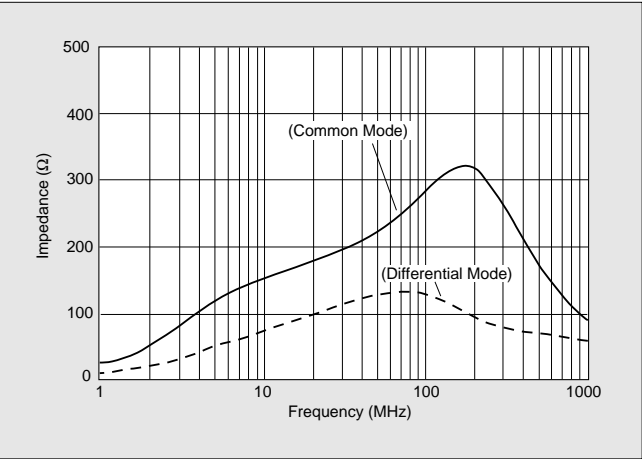
■EQUIVALENT CIRCUIT DIAGRAM

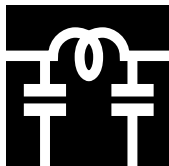


SPECIFICATIONS

Part Number	Rated Current (mA)	Common mode Impedance (Ω) (Typ.) at 100MHz	Rated Voltage (VDC)	Withstand Voltage (VDC)	Insulation Resistance (Ω) min.	Operating Temp. Range ($^{\circ}$ C)
PLM3216K281SJ2	200	280	50	125	100M	-55 to +85

IMPEDANCE-FREQUENCY CHARACTERISTICS
(TYPICAL)




CHIP EMIFIL®

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muRata

 Chip Common Mode Choke Coil **PLM250H/S Series**

Wire Wound Chip Type with High Impedance, Large Current, High Coupling Are Condensed into Small Chip

FEATURES

1. High impedance (maximum of 4kΩ at 100MHz : PLM250H10) enables great noise suppression.
2. Large rated current (maximum of 2A) enables power line use.
3. The PLM250 series dose not damage high speed signal due to high coupling common mode choke coil structure.
4. Automatic mounting can be applied.
5. The PLM250 series is specially adapted for reflow soldering.

APPLICATIONS

- Common mode noise suppression of signal lines in high speed digital equipment such as HDTVs, computers and peripherals
- Common mode noise suppression of DC power lines in AC adapter of notebook size computers, game machines and digital audio equipments

PART NUMBERING

(Please specify the part number when ordering.)

 (Ex.)

PLM250S	20	T1
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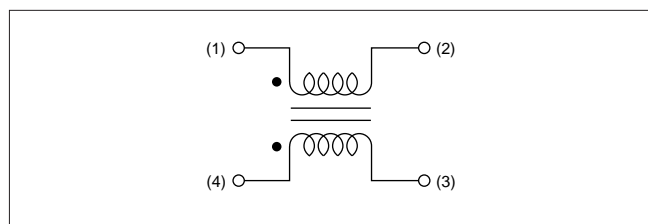
① ② ③

① Type

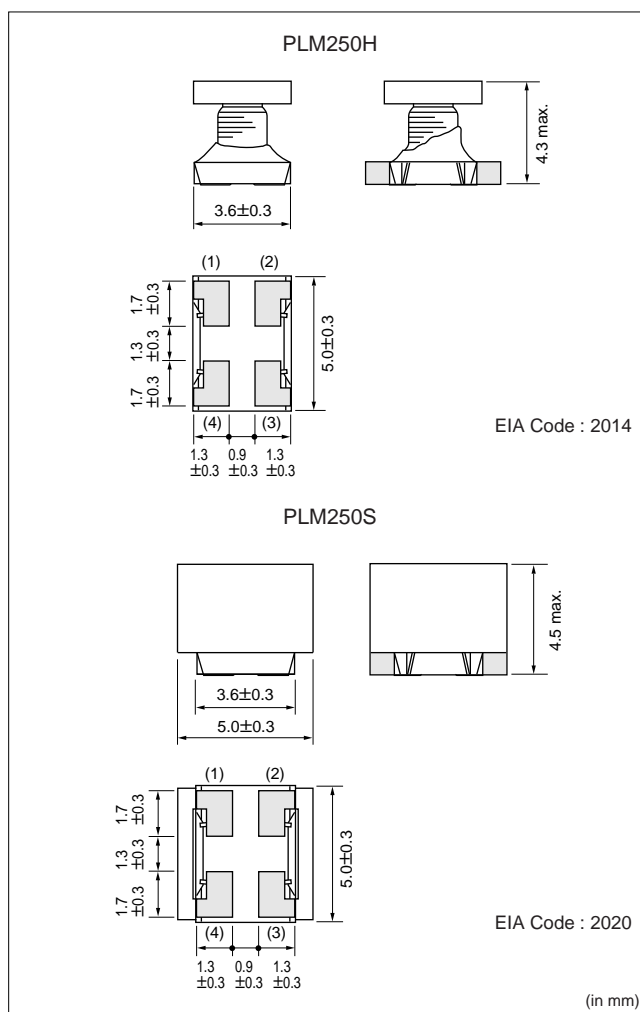
② Class No.

 ③ Packaging Code T1 : Taped (Ø180mm reel)
 T2 : Taped (Ø330mm reel)
 B1 : Bulk Package

EQUIVALENT CIRCUIT DIAGRAM



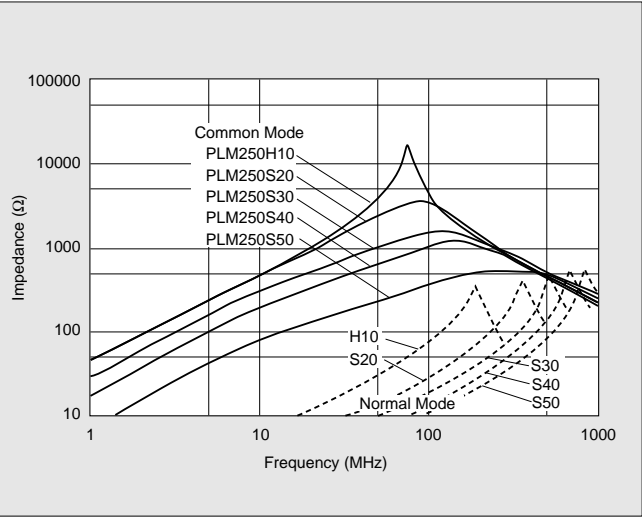
DIMENSIONS



SPECIFICATIONS

Part Number	Rated Current (A)	Impedance (Ω) (Typ.) at 100MHz	DC Resistance (Ω) max.	Rated Voltage (VDC)	Withstand Voltage (VDC)	Insulation Resistance (MΩ) min.	Operating Temp. Range (°C)
PLM250H10	0.2	4000	3.0	50	125	10	−25 to +85
PLM250S20	0.5	3000	0.3				
PLM250S30	1.0	1500	0.1				
PLM250S40	1.5	1000	0.06				
PLM250S50	2.0	350	0.04				

IMPEDANCE-FREQUENCY CHARACTERISTICS (TYPICAL)



Notice of Chip EMIFIL[®]/Chip Varistor

1. Standard Land Pattern Dimensions

The capacitor type chip EMI suppression filters (NFM/NFA series) suppress noise by conducting the high-frequency noise element to ground. Therefore, to obtain maximum performance from these filters, the ground pattern should be made as large as possible during the PCB design stage.

As shown below, one side of the PCB is used for chip mounting, and the other is used for grounding. Small diameter feedthrough holes are then used to connect the grounds on each side of the PCB. This reduces the high-frequency impedance of the grounding and maximizes the filter's performance.

■ Copper Foil Pattern □ Resist (in mm)

BLM10/11/21/31/41

● Reflow and Flow for Mounting Alone

BLM Series
(Except 21P300S, 31P500S, 41P600S/750S)

BLM21P300S/31P500S
BLM41P600S/750S

Type	Size (mm)				
	L	W	a	b	c
BLM10	1.0	0.5	0.4	1.2-1.4	0.5
BLM11 (Flow)	1.6	0.8	0.7	2.2-2.6	0.7
BLM11 (Reflow)	1.6	0.8	0.7	1.8-2.0	0.7
BLM21	2.0	1.25	1.2	3.0-4.0	1.0
BLM31	3.2	1.6	2.0	4.2-5.2	1.2
BLM41	4.5	1.6	3.0	5.5-6.5	1.2

Type	Size (mm)			Land pad thickness and Dimension d		
	a	b	c	18 μm	35 μm	70 μm
BLM21P300S	1.2	3.0-4.0	1.0	2.4	1.2	1.00
BLM31P500S	2.0	4.2-5.2	1.2	6.4	3.3	1.20
BLM41P600S	3.0	5.5-6.5	1.2	2.4	1.2	1.65
BLM41P750S				2.4	1.2	1.20

• Please contact us if using thinner land pad than 18μm.

• Don't apply narrower pattern than listed above to BLM□□P. Narrow pattern can cause excessive heat or open circuit.

● Flow Mounting in High Density

BLM31/41

Type	Size (mm)				
	a	b	c	d	e
BLM31	2.0	4.2 to 5.2	1.2	1.3	1.35
BLM41	3.0	5.5 to 6.5	1.2	1.8	1.5

BLA41/BLA62
BLA81

● Reflow and Flow

BLA41

BLA62



BLA81

*The land for reinforcing electrode should be electrically isolated.

BLA3216

● Reflow and Flow

*The excessive heat by land pads may cause deterioration at joint of products with substrate.

Notice of Chip EMIFIL[®]/Chip Varistor
 Copper Foil Pattern  Resist (in mm)

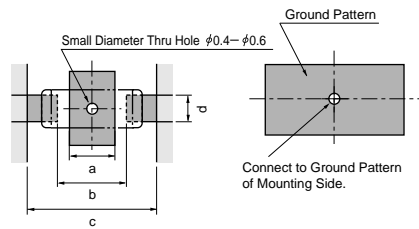
NFM39R/40R/41R
NFM40P/41P
NFM839R
VFM41R



● Reflow Soldering

Chip Mounting Side

Back Side

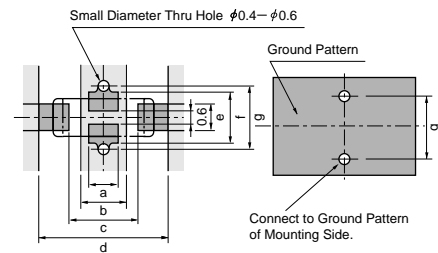


Type	Dimensions (mm)			
	a	b	c	d
NFM39R/839R	0.8	1.4	2.6	0.6
NFM40R/40P	1.4	2.5	4.4	1.0
NFM41R/41P VFM41R	2.0	3.5	6.0	1.2

● Flow Soldering

Chip Mounting Side

Back Side



Type	Dimensions (mm)						
	a	b	c	d	e	f	g
NFM39R/839R	0.6	0.8	1.4	2.6	0.6	1.9	2.3
NFM40R/40P	1.0	1.4	2.5	4.4	1.0	2.0	2.4
NFM41R/41P VFM41R	1.5	2.0	3.5	6.0	1.2	2.6	3.0

NFA41R
NFA62R
NFA81R

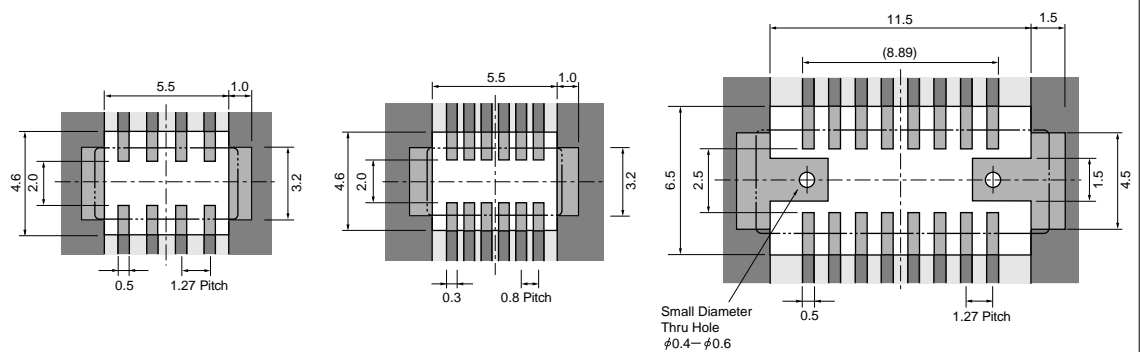


● Reflow and Flow

NFA41R

NFA62R

NFA81R



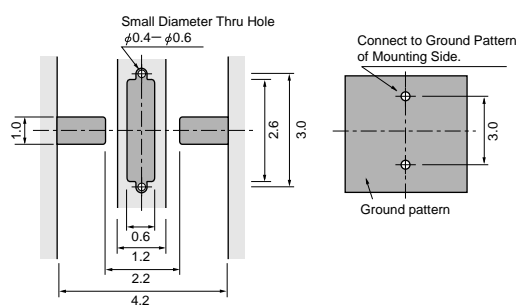
NFM51R
NFM60R



● Reflow and Flow

Chip Mounting Side

Back Side



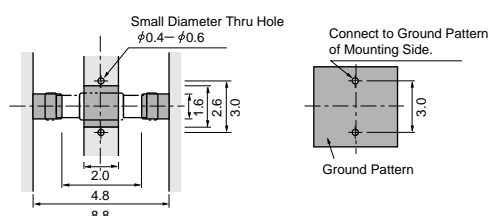
NFM61R
NFM61RH



● Reflow Soldering

Chip Mounting Side

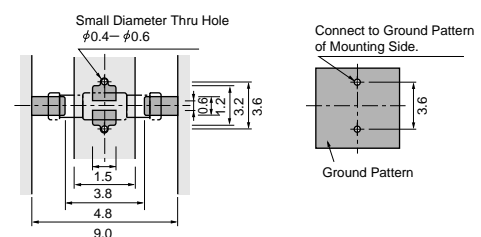
Back Side





● Flow Soldering

Chip Mounting Side

Back Side



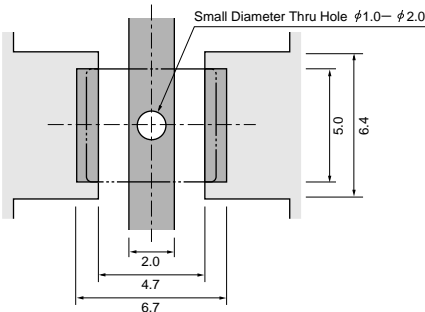
Notice of Chip EMIFIL[®]/Chip Varistor

 Copper Foil Pattern  Resist (in mm)

NFM46P

● Reflow Soldering

Chip Mounting Side

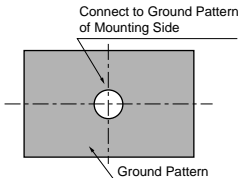


Small Diameter Thru Hole $\phi 1.0 - \phi 2.0$

2.0
4.7
6.7
5.0
6.4

Back Side

Ground on back side should be designed to be as large as possible.



Connect to Ground Pattern of Mounting Side

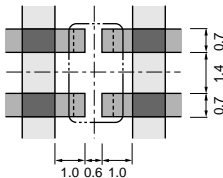
Ground Pattern

- NFM46P is specially adapted for reflow soldering.
- Please contact us if using thinner land pad than 18 μm .

PLM3216K
PLM250

● Reflow and Flow

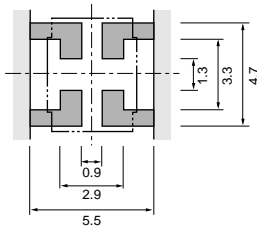
PLM3216K



1.0 0.6 1.0
0.7 1.4 0.7

● Reflow Soldering

PLM250

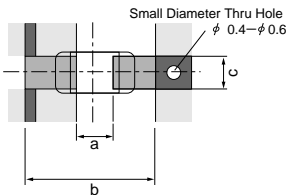


0.9 2.9 5.5
1.3 3.3 4.7

VCM11R
VCM21R

● Reflow and Flow

Chip Mounting Side



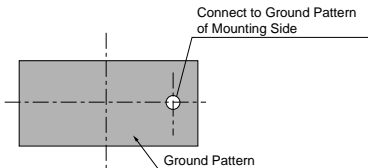
Small Diameter Thru Hole $\phi 0.4 - \phi 0.6$

a
b
c

Type		Size (mm)		
		a	b	c
VCM11R	Flow	0.7	2.2—2.6	0.7
	Reflow	0.7	1.8—2.0	0.7
VCM21R		1.2	3.0—4.0	1.0

Back Side

Ground on back side should be designed to be as large as possible.



Connect to Ground Pattern of Mounting Side

Ground Pattern

Notice of Chip EMIFIL[®]/Chip Varistor

2. Solder Paste Printing and Adhesive Application

When reflow soldering the chip EMI suppression filter/Chip Varistor, the printing must be conducted in accordance with the following cream solder printing conditions.

If too much solder is applied, the chip will prone to be damaged by mechanical and thermal stress from the PCB and may crack.


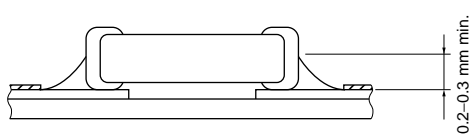
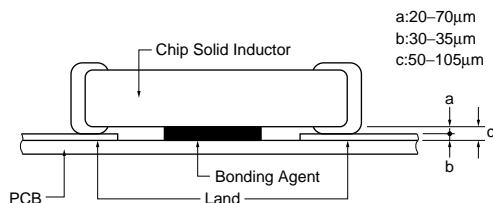

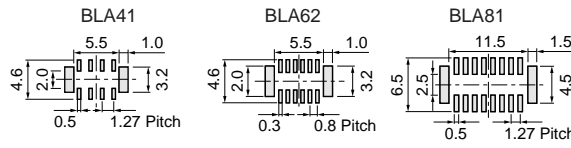
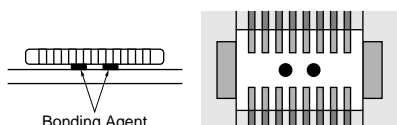

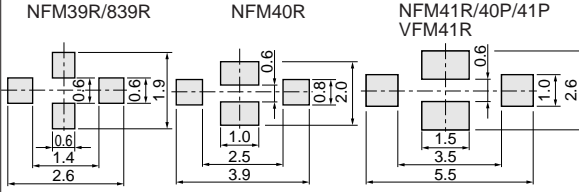
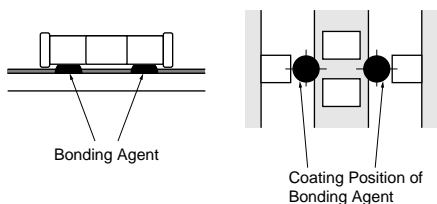

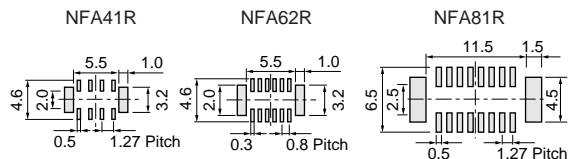
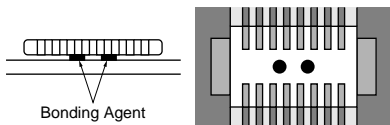
In contrast, if too little solder is applied, there is the potential that the termination strength will be insufficient, creating the potential for detachment.

Standard land dimensions should be used for resist and copper foil patterns.

When flow soldering the EMI suppression filter/Chip Varistor, apply the adhesive in accordance with the following conditions.


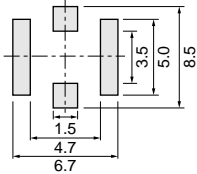

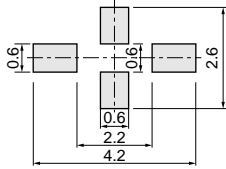
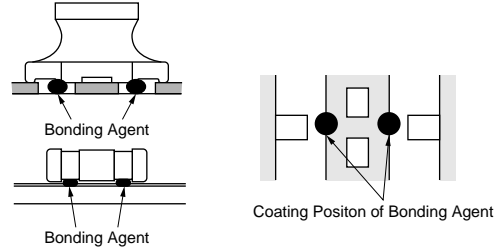

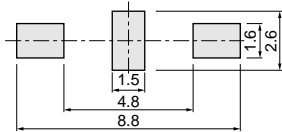
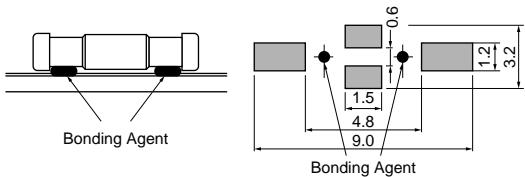

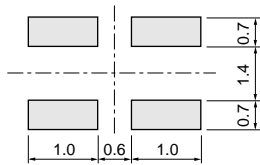
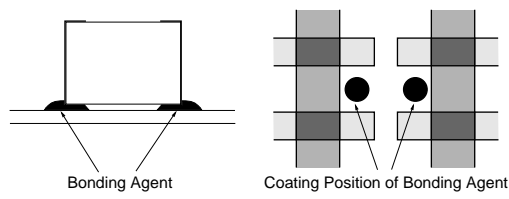

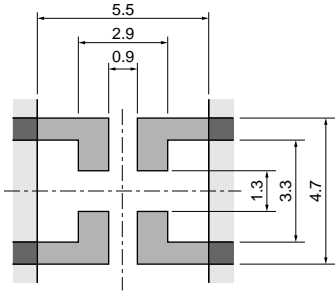
If too much adhesive is applied, then it may overflow into the land or termination areas and yield poor solderability. In contrast, if insufficient adhesive is applied, or if the adhesive is not sufficiently hardened, then the chip may become detached during flow soldering.

(in mm)

Series	Solder Paste Printing	Adhesive Application
BLM10/11/21/31/41 BLA3216 VCM11R/21R 	<ul style="list-style-type: none"> Ensure that solder is applied smoothly to a minimum height of 0.2mm to 0.3mm at the end surface of the part. Coat the solder paste a thickness of 100 μm to 200 μm. 	<ul style="list-style-type: none"> Coating amount is illustrated in the following diagram. 
BLA41/62/81 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 100 μm to 200 μm (BLA41), 150 μm (BLA62), and 200 μm (BLA81). Use H60A solder for pattern printing. 	<ul style="list-style-type: none"> Apply 0.5mg to 0.9mg for BLA81 and 0.25mg to 0.6mg for BLA41/62 of bonding agent at each chip, and ensure not to cover electrodes. 
NFM39R/40R/41R NFM40P/41P NFM839R VFM41R 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 100 μm to 150 μm (NFM39R/40R/839R/40P) and 100 μm to 200 μm (NFM41R/41P, VFM41R). Use H60A solder for pattern printing. 	<ul style="list-style-type: none"> Apply 0.1mg for NFM41R/41P, VFM41R and 0.06mg for NFM40R/40P and 0.05mg for NFM39R/839R of bonding agent at each chip. 
NFA41R/62R/81R 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 150 μm (NFA62R/41R) and 200 μm (NFA81R). Use H60A solder for pattern printing. 	<ul style="list-style-type: none"> Apply 0.5mg to 0.9mg for NFA81R and 0.25mg to 0.6mg for NFA62R/41R of bonding agent at each chip, and ensure not to cover electrodes. 

Notice of Chip EMIFIL[®]/Chip Varistor

(in mm)

Series	Solder Paste Printing	Adhesive Application
NFM46P 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 200 μm. Use H60A solder for pattern printing. 	
NFM51R NFM60R 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 200 μm (NFM51R) and 150 μm (NFM60R). Use H60A solder for pattern printing. 	<ul style="list-style-type: none"> Apply 0.2mg of bonding agent at each chip. 
NFM61R/61RH 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 200 μm. Use H60A solder for pattern printing. 	<ul style="list-style-type: none"> Apply 1.0mg of bonding agent at each chip. 
PLM3216K 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 150 μm. Use H60A solder for pattern printing. 	<ul style="list-style-type: none"> Apply 0.3mg of bonding agent at each chip. 
PLM250 	<ul style="list-style-type: none"> Coat the solder paste a thickness of 200 μm. Use H60A solder for pattern printing. 	

Notice of Chip EMIFIL[®]/Chip Varistor

3. Standard Soldering Conditions

(1)Soldering Methods

Use flow and reflow soldering methods only.

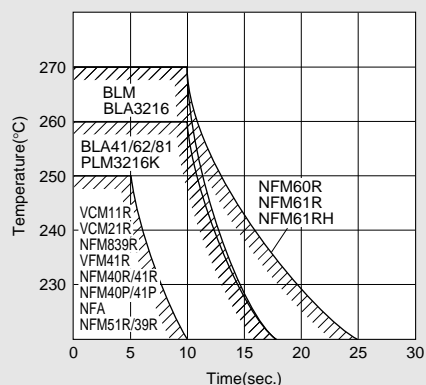
Use standard soldering conditions when soldering chip EMI suppression filters, Chip Varistor.

In cases where several different parts are soldered, each having different soldering conditions, use those conditions requiring the least heat and minimum time.

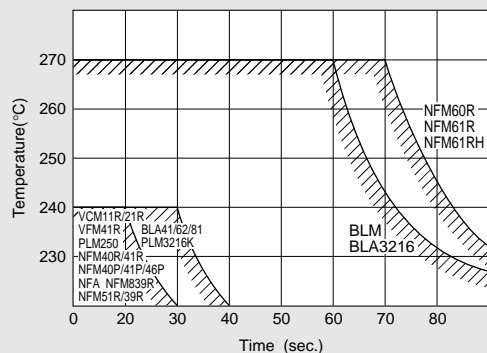
(2)Soldering Temperature and Time

To prevent external electrode solder leaching and performance deterioration, solder within the temperature and time combinations illustrated by the slanted lines in the following graphs. If soldering is repeated, please note that the allowed time is the accumulated time.

● Allowable Flow Soldering Temperature and Time



● Allowable Reflow Soldering Temperature and Time



(3)Solder and Flux

Solder : H60A solder.

Flux : Use Rosin-based flux, but not strong acidic flux (with chlorine content exceeding 0.20wt%).
When using RA type solder, clean products sufficiently to avoid remaining flux.

(4)Reworking with Soldering Iron

The following conditions must be strictly followed when using a soldering iron.

Soldering iron : 30W max.

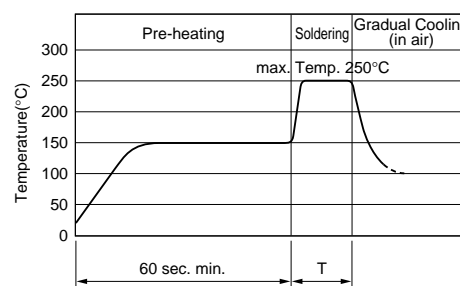
Tip Temperature : 280°C max.

Soldering Time : 10 seconds max.

Do not allow the tip of the soldering iron to directly contact the chip.

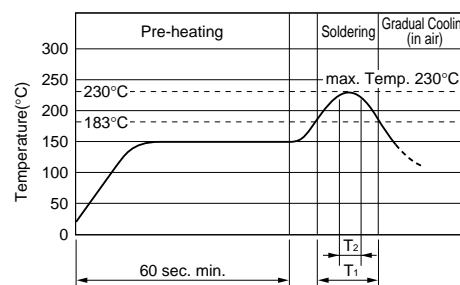
(5)Soldering Conditions

● Flow Solder



Series	Pre-heating (150 °C)	Soldering Time (T)	Soldering Temperature (°C)
BLM, BLA3216	60sec. min.	10sec. max.	250
BLA41/62/81, NFA			
NFM40R/41R			
NFM40P/41P			
NFM51R/39R			
NFM839R			
NFM61R(H)/60R			
VFM41R			
PLM3216K			

● Reflow Solder



Series	Pre-heating (150°C)	Soldering Time	
		(T1) (183°C)	(T2) (230°C)
NFM61R(H)/60R	60sec. min.	60sec. max.	250°C, 20sec. max.
BLM, BLA3216			20sec. max.
BLA41/62/81, NFA			10sec. max.
NFM39R/40R/41R			
NFM40P/41P/46P			
NFM51R			
VFM41R			
PLM3216K/250			
VCM11R/21R			
NFM839R			

Notice of Chip EMIFIL®/Chip Varistor

4. Cleaning

Following conditions should be observed when cleaning chip EMIFIL®.

- (1) Cleaning temperature : 60°C max. (40°C max. for CFC alternatives and alcohol cleaning agents)
- (2) Ultrasonic
 - Output : 20W/l max.
 - Duration : 5 minutes max.
 - Frequency : 28 to 40kHz
- (3) Cleaning agent

The following list of cleaning agents have been tested on the individual components. Evaluation of final assembly should be completed prior to production.

 1. CFC alternatives and alcohol cleaning agents
 - Isopropyl alcohol (IPA)
 - HCFC-225
 2. Aqueous cleaning agent (PLM250 cannot be cleaned)
 - Surface active agent (Clean Thru 750H)
 - Hydrocarbon (Techno Cleaner 335)
 - High grade alcohol (Pine Alpha ST-100S)*

* VFM41R/VCM11R/21R series cannot be cleaned with high grade alcohol type aqueous cleaning agent.

 - Alkaline saponifier (Aqua Cleaner 240-cleaner should be diluted within 20% using deionized water.)
- (4) Ensure that flux residue is completely removed.

Component should be thoroughly dried after aqueous agent has been removed with deionized water.
- (5) Some products may become slightly whitened.

However, product performance or usage is not affected. For additional cleaning methods, please contact Murata engineering.

5. Operating Environment

Do not use products in corrosive gas such as chlorine gas, acid or sulfide gas.

6. Storage and Handling Requirements

- (1) Storage conditions
 - Storage temperature : -10 to +40°C
 - Relative humidity : 30 to 70%
 - Avoid sudden changes in temperature and humidity.
- (2) Do not store products in corrosive gas such as chlorine gas, acid or sulfide gas.

■WARNING

1. Rated Current/Rated Voltage/Operating Temperature
 - Don't use products beyond the rated current, the rated voltage and the operating temperature range, or, a fire may result due to the deterioration of the insulation resistance, excessive heat, etc.
2. Mounting Density
 - Give special attention when mounting products close to other product that radiate heat. The excessive heat by other products may cause deterioration of insulation resistance and excessive heat at this product, resulting in the fire.

Tape Dimensions of Chip EMIFIL[®]/Chip Varistor (EIA-J:RC-1009B)

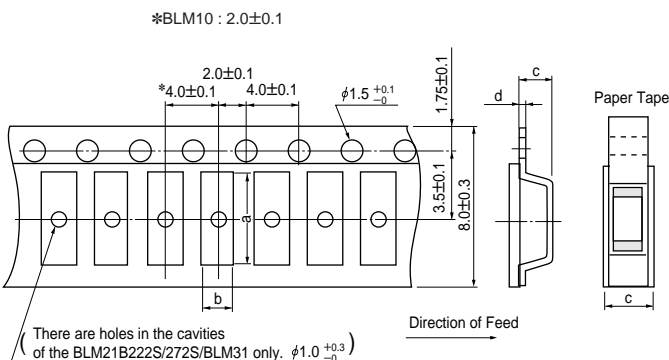
Missing components number

The number of missing components are less than which-ever greater, 1piece or 0.1% of specified quantity per reel.

The missing components are not continued. The specified quantity per reel are kept.

BLM10/11/21/31, BLA3216, NFM39R/839R/40R/40P/51R/60R, VCM11R/21R, PLM3216K (8mm width paper/plastic tape)

Part Number	Cavity Size				Minimum Quantity(pcs/reel)		Type
	a	b	c	d	φ180mm	φ330mm	
BLM10	1.15	0.65	0.8		10,000	—	Paper
BLM11	1.85	1.05	1.1	—	4,000	10,000	
BLM21 (Except B222S/B272S)	2.25	1.45	1.1		4,000	10,000	
BLA3216	3.25	1.8	1.1	—	4,000	—	
BLM21 B222S/B272S	2.25	1.45	1.3		3,000	10,000	Plastic
BLM31 (A700S)	3.5	1.9	1.3 (1.75)	0.2	3,000 (2,500)	10,000 (8,000)	
NFM39R/839R	2.3	1.55	0.7	0.25	4,000	—	
NFM40R/40P	3.4	1.4	0.85	0.2	4,000	—	
NFM51R/60R	3.6	1.9	2.0		2,000	—	
VCM11R	1.85	1.05	0.95	0.25	4,000	—	
VCM21R	2.25	1.45	1.3	0.3	3,000	—	
PLM3216K	3.5	1.9	1.3	0.25	3,000	—	

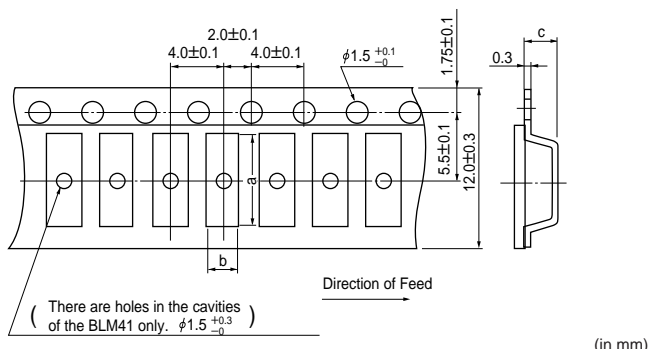


Please contact us for BLM10/11 in bulk case.

(in mm)

BLM41, NFM41R/41P, NFM61R/61RH, VFM41R (12mm width plastic tape)

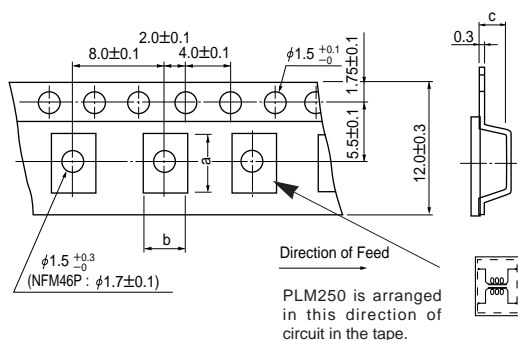
Part Number	Cavity Size			Minimum Quantity(pcs/reel)	
	a	b	c	φ 180mm	φ 330mm
BLM41	4.8	1.9	1.75	2,500	8,000
NFM41R/41P	4.8	1.8	1.1	4,000	—
NFM61R/61RH	7.2	1.9	1.75	2,500	8,000
VFM41R	4.8	1.8	1.35	2,500	—



(in mm)

BLA62/41, NFA62R/41R, NFM46P, PLM250 (12mm width plastic tape)

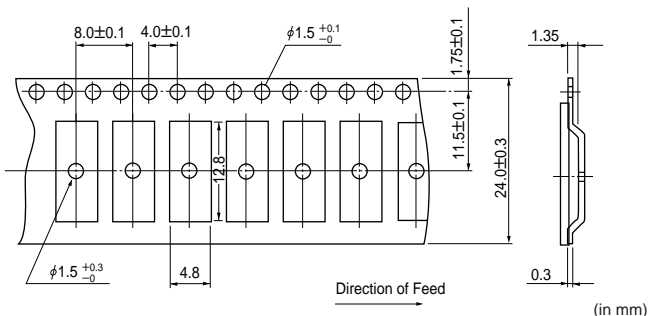
Part Number	Cavity Size			Minimum Quantity(pcs/reel)	
	a	b	c	φ180mm	φ330mm
BLA62/41	6.6	3.5	1.13	1,000	—
NFA62R/41R	6.0	5.3	2.5	500	—
NFM46P	5.5 (5.4)	5.4 (4.1)	4.7 (4.4)	400	1,500



(in mm)

BLA81/NFA81R (24mm width plastic tape)

Part Number	Cavity Size			Minimum Quantity(pcs/reel)	
	a	b	c	φ180mm	φ330mm
BLA81/NFA81R	8.0±0.1	4.0±0.1	1.5±0.1	1,000	—



(in mm)

Minimum Quantity (order in sets only) : 1,000pcs./reel (φ180mm)