

## 1. Standard Land Pattern Dimensions

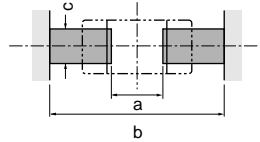
NF□ series suppress noise by conducting the high-frequency noise element to ground. Therefore, to obtain maximum performance from these filters, the ground pattern should be made as large as possible during the PCB design stage. As shown below, one side of the PCB is used for chip mounting, and the other 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.



**BLM02**  
**BLM03**  
**BLM15**  
 (Except BLM  
 15A\_AN series)  
**BLM18**  
**BLM21**  
**BLM31**  
**BLM41**

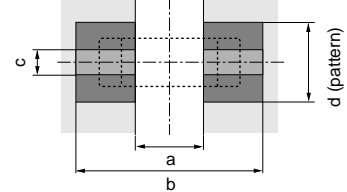
### ●Reflow and Flow BLM Series



Type	Soldering	a	b	c
<b>BLM02</b>	Reflow	0.16-0.2	0.4-0.56	0.2-0.23
<b>BLM03</b>	Reflow	0.2-0.3	0.6-0.9	0.3
<b>BLM15</b>	Reflow	0.4	1.2-1.4	0.5
<b>BLM18</b>	Flow (except 18G)	0.7	2.2-2.6	0.7
	Reflow		1.8-2.0	
<b>BLM21</b>	Flow/ Reflow	1.2	3.0-4.0	1.0

- Except BLM03PG/15PD-PG/18PG-SG/21PG.  
And BLM02/03/15/18G is specially adapted for reflow soldering.

### BLM□□P/S

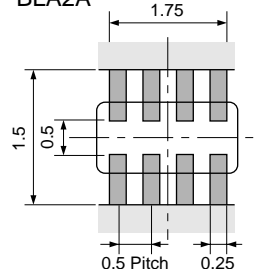


Type	Rated Current (A)	Soldering	a	b	c	Land pad thickness and dimension d		
						18μm	35μm	70μm
<b>BLM03PG</b>	0.75-0.9	Reflow	0.2-0.3	0.6-0.9	0.3	0.3	0.3	0.3
<b>BLM15PD</b>	1.3-1.5	Reflow	0.4	1.2-1.4	0.5	0.5	0.5	0.5
	1.7-2.2					1.2	0.7	0.5
<b>BLM15PG</b>	1	Reflow	0.4	1.2-1.4	0.5	0.5	0.5	0.5
<b>BLM18PG</b>	0.5-1.5	Flow/ Reflow	0.7	2.2-2.6 Reflow 1.8-2.0	0.7	0.7	0.7	0.7
	2					1.2	0.7	0.7
	3					2.4	1.2	0.7
	1.5					0.7	0.7	0.7
<b>BLM18SG</b>	2.5					1.2	0.7	0.7
	3-4					2.4	1.2	0.7
	6					6.4	3.3	1.65
<b>BLM21PG</b>	1.5		1.2	3.0-4.0	1.0	1.0	1.0	1.0
	2					1.2	1.0	1.0
	3					2.4	1.2	1.0
	6					6.4	3.3	1.65
<b>BLM31PG</b>	1.5/2		2.0	4.2-5.2	1.2	1.2	1.2	1.2
	3					2.4	1.2	1.2
	6					6.4	3.3	1.65
<b>BLM41PG</b>	1-2		3.0	5.5-6.5	1.2	1.2	1.2	1.2
	3					2.4	1.2	1.2
	6					6.4	3.3	1.65

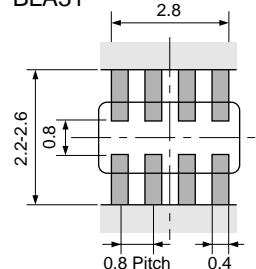
- Do not apply narrower pattern than listed above to BLM□□P/S. Narrow pattern can cause excessive heat or open circuit.

**BLA2A**  
**BLA31**


### ●Reflow soldering BLA2A



### ●Reflow and Flow BLA31



- If there are high amounts of self-heating on pattern, the contact points of PCB and part may become damaged.

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Land Pattern + Solder Resist  
Land Pattern  
Solder Resist (in mm)

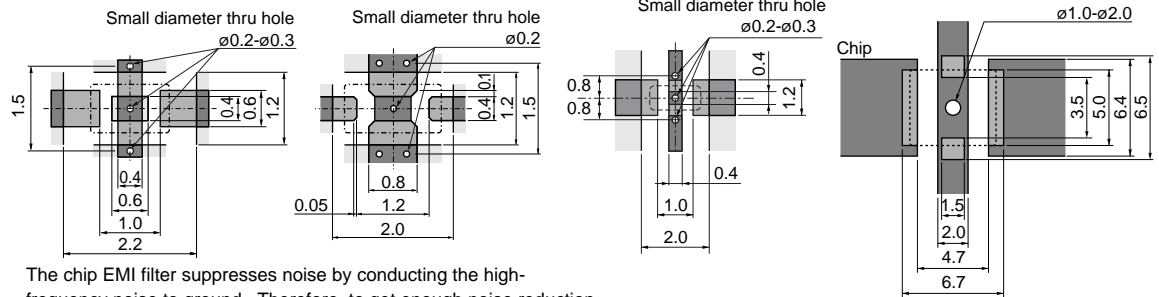
**NFM18**  
**NFL18**  
**NFM55**

Reflow Soldering  
NFM18C/NFM18PC/  
NFL18ST

**NFM18PS**

**NFL18SP**

**NFM55P**



The chip EMI filter suppresses noise by conducting the high-frequency noise to ground. Therefore, to get enough noise reduction, feed through holes which are connected to ground-plane should be arranged according to the figure to reinforce the ground pattern.

• NFM18, NFM21, NFM55 are specially adapted for reflow soldering.

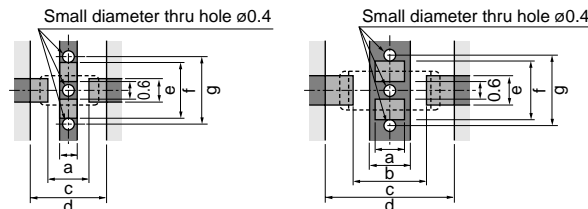
Please contact us if using thinner land pad than  $18\mu\text{m}$ .

**NFM21**  
**NFM3D**  
**NFM41**  
**NFR21G**  
**NFL21S**

● Reflow Soldering Chip mounting side

NFM21C/NFR21G  
NFM21P/NFL21S

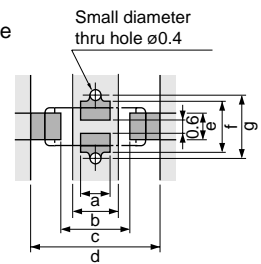
NFM3DC/NFM3DP  
NFM41C/NFM41P



Part Number	Size (mm)						
	a	b	c	d	e	f	g
NFM21C/NFR21G NFM21P/NFL21S	0.6	-	1.4	2.6	0.8	1.9	2.3
NFM3DC/NFM3DP	1.0	1.4	2.5	4.4	1.0	2.0	2.4
NFM41C/NFM41P	1.5	2.0	3.5	6.0	1.2	2.6	3.0

● Flow Soldering

Chip mounting side



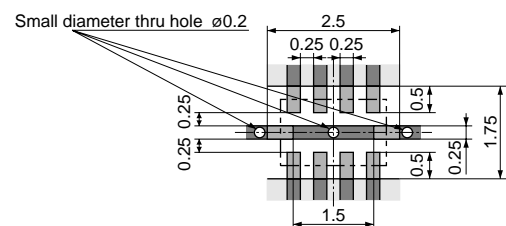
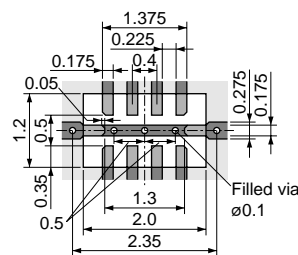
Part Number	Size (mm)						
	a	b	c	d	e	f	g
NFM3DC NFM3DP	1.0	1.4	2.5	4.4	1.0	2.0	2.4
NFM41C NFM41P	1.5	2.0	3.5	6.0	1.2	2.6	3.0

**NFA18S**  
**NFA21S**

Reflow Soldering  
Chip mounting side

**NFA18S**

**NFA21S**



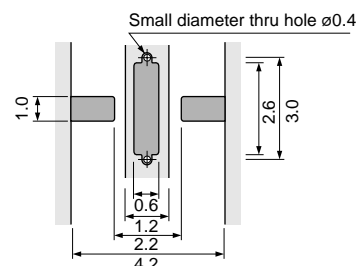
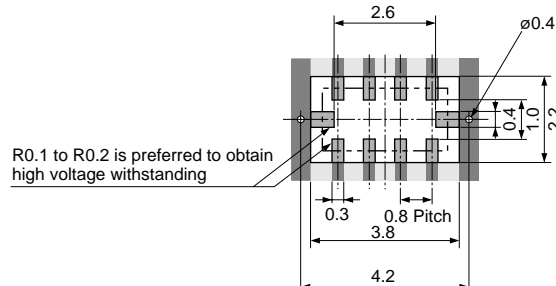
**NFA31G**  
**NFA31C**  
**NFW31S**  
**NFE31P**

● Reflow Soldering NFA31G/31C

● Reflow and Flow NFW31S

● Reflow Soldering NFE31P

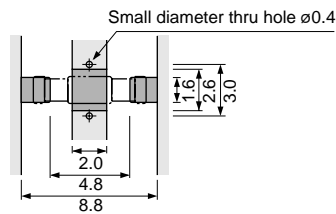
Chip mounting side



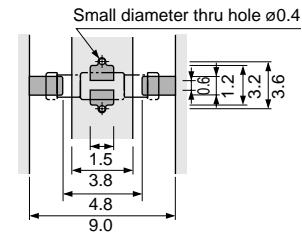
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**NFE61P**  
**NFE61H**

● Reflow Soldering  
Chip mounting side

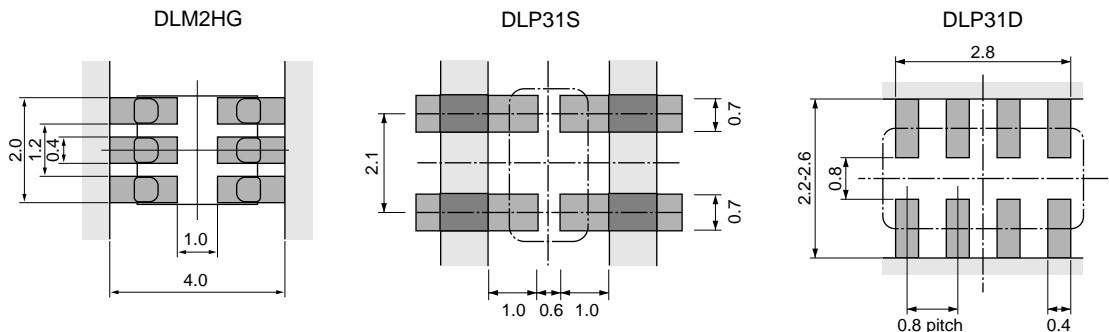


● Flow Soldering (Except NFE61HT332)  
Chip mounting side

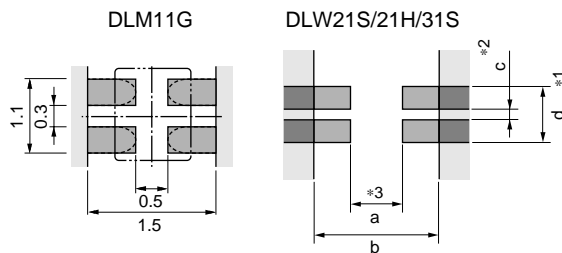
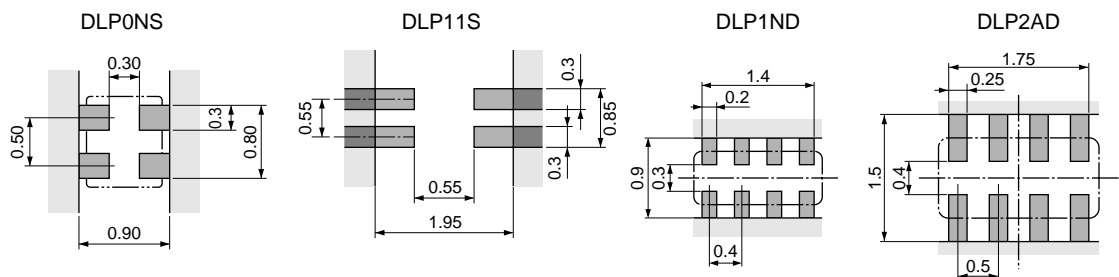


**DLM11G**  
**DLM2HG**  
**DLP0NS**  
**DLP11S**  
**DLP1ND**  
**DLP2AD**  
**DLP31S**  
**DLP31D**  
**DLW21S**  
**DLW21H**  
**DLW31S**  
**DLW5AH**  
**DLW5BS**  
**DLW5BT**

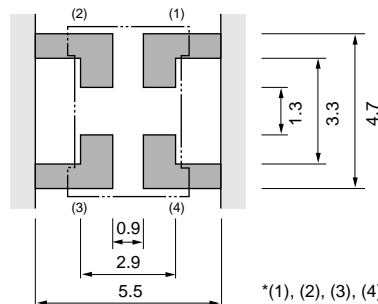
● Reflow and Flow



● Reflow Soldering



**DLW5AH/5BS/5BT**



\*(1), (2), (3), (4): Terminal Number

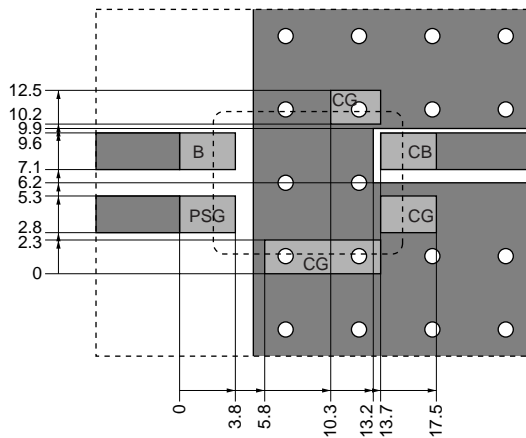
Series	a	b	c	d
<b>DLW21S/H</b>	0.8	2.6	0.4	1.2
<b>DLW31S</b>	1.6	3.7	0.4	1.6

- \* 1: If the pattern is made with wider than 1.2mm (DLW21) / 1.6mm (DLW31S) it may result in components turning around, because melting speed is different. In the worst case, short circuit between lines may occur.
- \* 2: If the pattern is made with less than 0.4mm, in the worst case, short circuit between lines may occur due to spread of soldering paste or mount placing accuracy.
- \* 3: If the pattern is made with wider than 0.8mm (DLW21) / 1.6mm (DLW31S), the bending strength will be reduced. Do not use gild pattern; excess soldering heat may dissolve metal of a copper wire.

Continued from the preceding page.

 Land Pattern  
 + Solder Resist  
 Land Pattern  
 Through Hole (in mm)

## BNX022



- (1) A double-sided print board (or multilayer board) as shown in the left figure is designed, and please apply a soldering Cu electrode with a product electrode to a "Land Pattern", apply resist to a "Land Pattern + Solder Resist" at Cu electrode.
- (2) Please drop CG on a ground electrode on the back layer (the same also in a multilayer case) by the through hole. And a surface ground electrode layer may also take a large area as much as possible.
- (3) It is recommended to use a double-sided printed circuit board with BNX mounting on one side and the ground pattern on the other in order to maximize filtering performance, multiple feed through holes are required to maximize the BNX's connection to ground.
- (4) The ground pattern should be designed to be as large as possible to achieve maximum filtering performance.

## 2. Solder Paste Printing and Adhesive Application

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

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

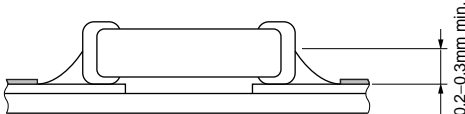
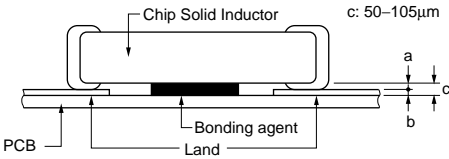
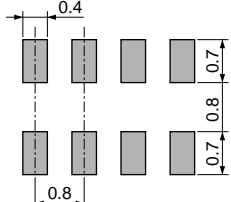
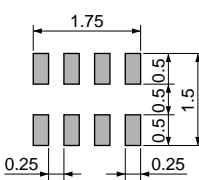
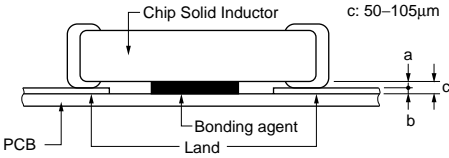
Standard land dimensions should be used for resist and copper foil patterns.

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

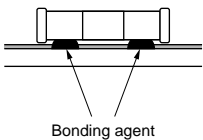
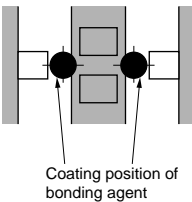
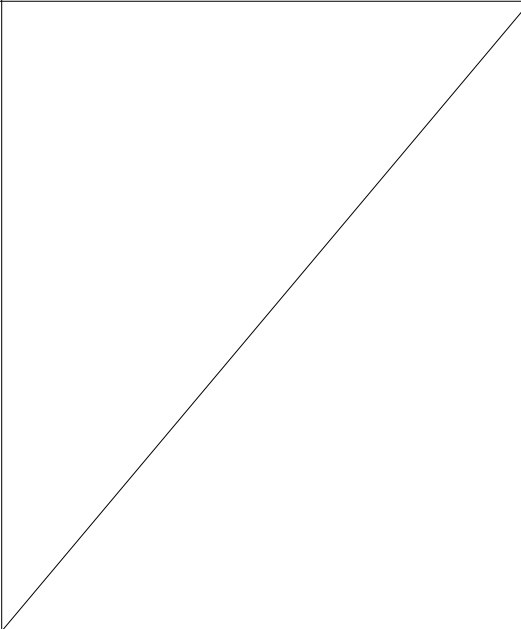
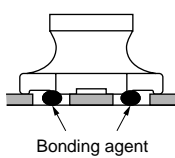
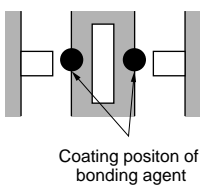
If too much adhesive is applied, then it may overflow into the land or termination areas and yield poor solderability.

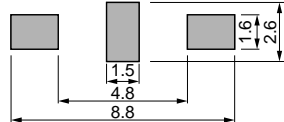
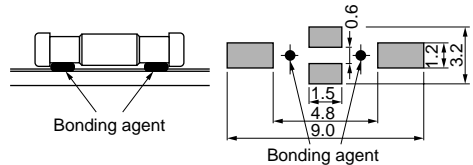
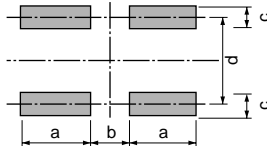
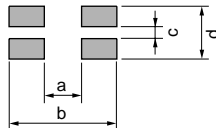
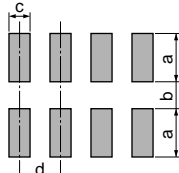
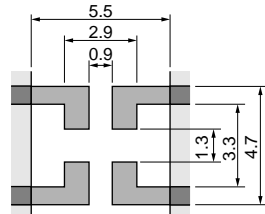
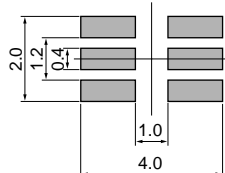
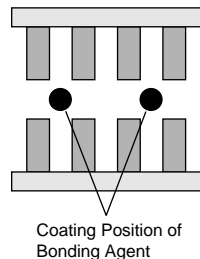
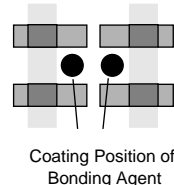
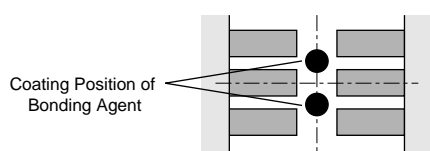
In contrast, if insufficient adhesive is applied, or if the adhesive is not sufficiently hardened, then the chip may become detached during flow soldering process.

(in mm)

Series	Solder Paste Printing	Adhesive Application
<b>BLM</b> (Except BLM 15A_AN series)	<ul style="list-style-type: none"> <li>● Ensure that solder is applied smoothly to a minimum height of 0.2mm to 0.3mm at the end surface of the part.</li> <li>● Coat with solder paste to the following thickness:              50-80μm: BLM02              100-150μm: BLM03              100-200μm: BLM15/18/21/31/41</li> </ul> 	<p>Coating amount is illustrated in the following diagram.</p> <p>a: 20-70μm b: 30-35μm c: 50-105μm</p> 
<b>BLA</b>	<ul style="list-style-type: none"> <li>● Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing. Use of Sn-Zn based solder will deteriorate performance of products. If using Sn-Zn based solder, please contact Murata in advance.</li> <li>● Coat with solder paste to the following thickness:              100-150μm: BLA2A              150-200μm: BLA31</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>BLA31</p>  </div> <div style="text-align: center;"> <p>BLA2A</p>  </div> </div>	<p>BLA31 Series only Coating amount is illustrated in the following diagram.</p> <p>a: 20-70μm b: 30-35μm c: 50-105μm</p> 

Continued on the following page. 

Series	Solder Paste Printing	Adhesive Application
<b>NFM</b> <b>NFR</b> <b>NFL</b>	<ul style="list-style-type: none"> <li>● Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing. Use of Sn-Zn based solder will deteriorate performance of products. If using NFM series with Sn-Zn based solder, please contact Murata in advance.</li> <li>● Coat with solder paste to the following thickness:  100-150μm: NFM18/21/3D, NFR, NFL  150-200μm: NFM55P  100-200μm: NFM41</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>NFM18C/18PC NFL18ST</p> </div> <div style="text-align: center;"> <p>NFL18SP</p> </div> <div style="text-align: center;"> <p>NFM21C/21P NFR21G/NFL21S</p> </div> </div> <div style="text-align: center; margin-top: 10px;"> <p>NFM18PS</p> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> <p>NFM3DC/3DP</p> </div> <div style="text-align: center;"> <p>NFM41C/41P</p> </div> <div style="text-align: center;"> <p>NFM55P</p> </div> </div>	<p>Apply 0.1mg for NFM41C/41P and 0.06mg for NFM3D of bonding agent at each chip. Do not cover electrodes.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
<b>NFA</b>	<ul style="list-style-type: none"> <li>● Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing.</li> <li>● Coat with solder paste to the following thickness:  100-200μm: NFA31G/31C  100-150μm: NFA18S/21S</li> </ul> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>NFA31G/31C</p> </div> <div style="text-align: center;"> <p>NFA21S</p> </div> </div> <div style="text-align: center; margin-top: 10px;"> <p>NFA18S</p> </div>	
<b>NFW31S</b> <b>NFE31P</b>	<ul style="list-style-type: none"> <li>● Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing.</li> <li>● Coat with solder paste to the following thickness:  150-200μm</li> </ul> <div style="text-align: center;"> </div>	<p>NFW31S Series Apply 0.2mg of bonding agent at each chip.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>

Series	Solder Paste Printing	Adhesive Application																																																												
NFE61P NFE61H	<ul style="list-style-type: none"><li>●Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing.</li><li>●Coat with solder paste to the following thickness: 150-200μm</li></ul> 	Apply 1.0mg of bonding agent at each chip. 																																																												
DLP DLW DLM	<ul style="list-style-type: none"><li>●Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing. Use of Sn-Zn based solder will deteriorate performance of products. If using DLP/DLM series with Sn-Zn based solder, please contact Murata in advance.</li><li>●Coat with solder paste to the following thickness: 100-150μm: DLW21S/21H/31S, DLP0NS/11S/1ND/2AD 150-200μm: DLP31D/31S, DLM2HG, DLW5AH/5BS/5BT</li></ul> <p>*Solderability is subject to reflow conditions and thermal conductivity. Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.</p> <div><div><p>DLP0NS/11S/31S/DLM11G</p><table><tr><th>Series</th><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>DLP0NS</td><td>0.3</td><td>0.3</td><td>0.3</td><td>0.5</td></tr><tr><td>DLP11S</td><td>0.7</td><td>0.55</td><td>0.3</td><td>0.55</td></tr><tr><td>DLP31S</td><td>1.0</td><td>0.6</td><td>0.7</td><td>2.1</td></tr><tr><td>DLM11G</td><td>0.5</td><td>0.5</td><td>0.4</td><td>0.7</td></tr></table></div><div><p>DLW21S/21H/31S</p><table><tr><th>Series</th><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>DLW21S/H</td><td>0.8</td><td>2.6</td><td>0.5</td><td>1.2</td></tr><tr><td>DLW31S</td><td>1.6</td><td>3.7</td><td>0.4</td><td>1.6</td></tr></table></div></div> <div><div><p>DLP1ND/2AD/31D</p><table><tr><th>Series</th><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>DLP1ND</td><td>0.3</td><td>0.3</td><td>0.2</td><td>0.4</td></tr><tr><td>DLP2AD</td><td>0.55</td><td>0.4</td><td>0.25</td><td>0.5</td></tr><tr><td>DLP31D</td><td>1.0</td><td>0.8</td><td>0.4</td><td>0.8</td></tr></table></div><div><p>DLW5AH/5BS/5BT</p></div><div><p>DLM2HG</p></div></div>	Series	a	b	c	d	DLP0NS	0.3	0.3	0.3	0.5	DLP11S	0.7	0.55	0.3	0.55	DLP31S	1.0	0.6	0.7	2.1	DLM11G	0.5	0.5	0.4	0.7	Series	a	b	c	d	DLW21S/H	0.8	2.6	0.5	1.2	DLW31S	1.6	3.7	0.4	1.6	Series	a	b	c	d	DLP1ND	0.3	0.3	0.2	0.4	DLP2AD	0.55	0.4	0.25	0.5	DLP31D	1.0	0.8	0.4	0.8	DLP31S/DLM2HG Apply 0.3mg of bonding agent at each chip. <div><div><p>DLP31D</p><p>Coating Position of Bonding Agent</p></div><div><p>DLP31S</p><p>Coating Position of Bonding Agent</p></div></div> <div><p>DLM2HG</p><p>Coating Position of Bonding Agent</p></div>
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Series	Solder Paste Printing	Adhesive Application
<b>BNX022</b>	<p>● Use Sn/Pb=60/40 or Sn-3.0Ag-0.5Cu solder for pattern printing.</p> <p>● Coat with solder paste to the following thickness: 150-200μm</p>	

### 3. Standard Soldering Conditions

#### (1) Soldering Methods

Use flow and reflow soldering methods only.

Use standard soldering conditions when soldering chip EMI suppression filters.

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

Solder: H60A H63A solder (JIS Z 3238)

In case of lead-free solder, use Sn-3.0Ag-0.5Cu solder. Use of Sn-Zn based solder will deteriorate performance of products.

If using BLA/NFM/DLP/DLM series with Sn-Zn based solder, please contact Murata in advance.

Flux:

- Use Rosin-based flux.

In case of DLW21/31 series, use Rosin-based flux with converting chlorine content of 0.06 to 0.1wt%.

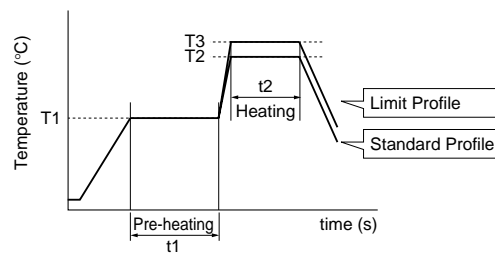
In case of using RA type solder, products should be cleaned completely with no residual flux.

- Do not use strong acidic flux (with chlorine content exceeding 0.20wt%)
- Do not use water-soluble flux.

For additional mounting methods, please contact Murata.

#### (2) Soldering profile

- Flow Soldering profile  
(Eutectic solder, Sn-3.0Ag-0.5Cu solder)



Series	Pre-heating		Standard Profile			Limit Profile		
	Temp. (T1)	Time. (t1)	Temp. (T2)	Time. (t2)	Cycle of flow	Temp. (T3)	Time. (t2)	Cycle of flow
BLM (Except BLM02/03/15/18G) BLA31 NFM3DC/3DP NFM41C/41P NFE61H*/61P DLM2HG DLP31D/31S	150°C	60s min.	250°C	4 to 6s	2 times max.	265±3°C	5s max.	2 times max.
NFW31S	150°C	60s min.	250°C	4 to 6s	2 times max.	265±3°C	5s max.	1 times

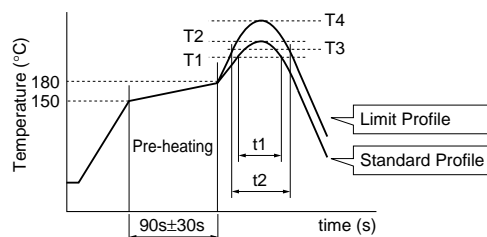
\*Except NFE61HT332

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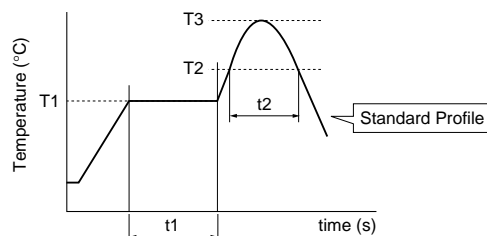
# ●Reflow Soldering profile

## ①Soldering profile for Lead-free solder (Sn-3.0Ag-0.5Cu)



Series	Standard Profile				Limit Profile			
	Heating		Peak temperature (T2)	Cycle of reflow	Heating		Peak temperature (T4)	Cycle of reflow
	Temp. (T1)	Time. (t1)			Temp. (T3)	Time. (t2)		
BLM, BLA NFA, NFE NFL, NFM (Except NFM55P) NFR, DLM DLP DLW21/31	220°C min.	30 to 60s	245±3°C	2 times max.	230°C min.	60s max.	260°C/10s	2 times max.
DLW5A/5B	220°C min.	30 to 60s	250±3°C	2 times max.	230°C min.	60s max.	260°C/10s	2 times max.
NFW31S, NFM55P	220°C min.	30 to 60s	245±3°C	2 times max.	230°C min.	60s max.	260°C/10s	1 times
BNX022	220°C min.	30 to 60s	250±3°C	2 times max.	230°C min.	60s max.	260°C/10s	2 times max.

## ②Soldering profile for Eutectic solder (Limit profile: refer to ①)



Series	Pre-heating		Standard Profile			
			Heating		Peak temperature (T3)	Cycle of reflow
	Temp. (T1)	Time. (t1)	Temp. (T2)	Time. (t2)		
BLM, BLA NFA, NFE NFL, NFM NFR, NFW DLM, DLP DLW, BNX022	150°C	60s min.	183°C min.	60s max.	230°C	2 times max.

## (3) Reworking with Solder Iron

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

Pre-heating: 150°C 60s min.\*1

\*1 NFM55P: 100°C/60s+200°C/60s

Soldering iron power output: 30W max.

Temperature of soldering iron tip / Soldering time: 350°C max./3s max.\*2

\*2 NFE31PT152Z1E9: 280°C max./10s max.


BNX022: 450°C max./5s max./2 times

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

For additional methods of reworking with a soldering iron, please contact Murata engineering.

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#### 4. Cleaning

Following conditions should be observed when cleaning chip EMI filter.

- (1) Cleaning Temperature: 60°C max. (40°C max. for alcohol type cleaner)
- (2) Ultrasonic
  - Output: 20W/liter 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.

Do not clean DLW21S/31S/5AH/5BS/BNX022 series.  
Before cleaning, please contact Murata engineering.

(a) Alcohol cleaning agent

Isopropyl alcohol (IPA)

(b) Aqueous cleaning agent

Pine Alpha ST-100S

- (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.

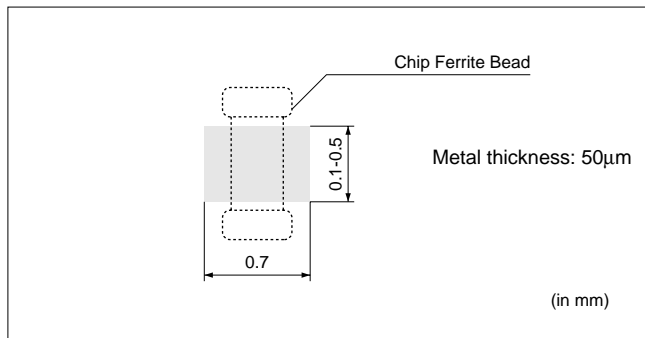
However, product performance or usage is not affected.  
For additional cleaning methods, please contact Murata engineering.

#### 5. Mounting of BLM15A\_AN Series

BLM15A\_AN is series for wire bonding mounting.

- (1) Die bonding mounting

- (a) Dimension of standard metal mask



- (b) Die bonding agent

- Use adhesive for die bonding for which the curing temperature is 200°C or less.

- (c) Notice

- Use a flat surface of substrate for bonding mounting.  
Slant mounting of product may affect the wire bonding.
- Adhesive for die bonding may affect the mounting reliability in wire bonding.  
Make sure of the mounting reliability with the adhesive to be used in advance.