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.

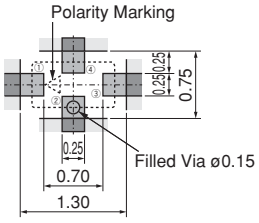
Land Pattern + Solder Resist
Land Pattern
Solder Resist

(in mm)

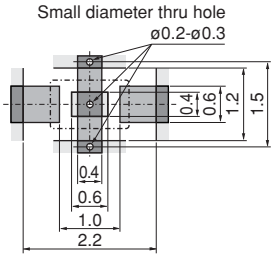
NFM18
NFL15S
NFL18
NFM55P
NFM21C
NFM21P
NFR21G
NFL21S

Reflow Soldering

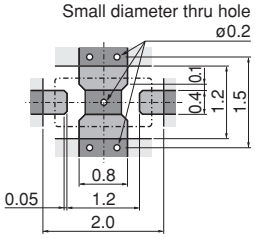
NFL15S



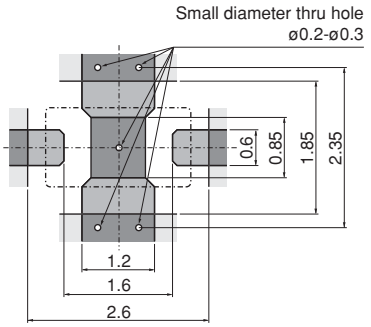
NFM18C/NFM18PC
NFL18ST



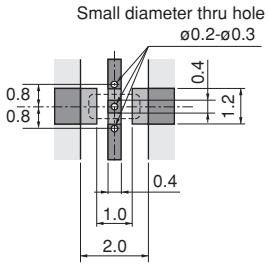
NFM18PS



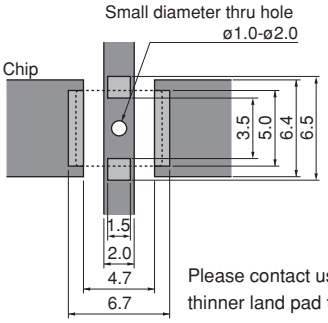
NFM21PS



NFL18SP

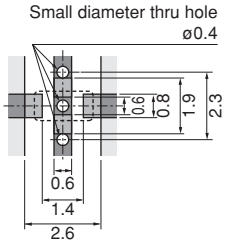


NFM55P



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

NFM21C/NFR21G
NFM21PC/NFL21S

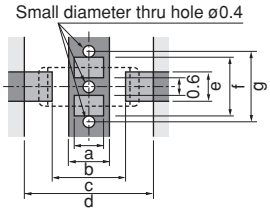


• NF□18, NF□21, NFM55P are specially adapted for reflow soldering.

NFM3D
NFM31P
NFM31K
NFM41

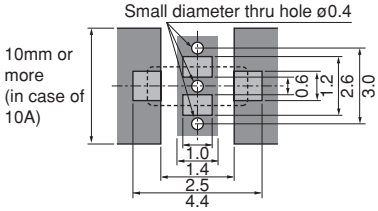
● Reflow Soldering Chip mounting side

NFM3DC/NFM3DP/NFM31P/NFM41C/NFM41P



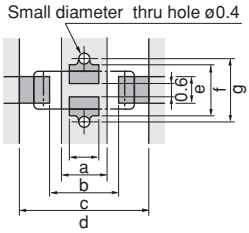
Part Number	Size (mm)						
	a	b	c	d	e	f	g
NFM3DC NFM3DP	1.0	1.4	2.5	4.4	1.0	2.0	2.4
NFM31P	1.0	1.4	2.5	4.4	1.2	2.6	3.0
NFM41C NFM41P	1.5	2.0	3.5	6.0	1.2	2.6	3.0

NFM31K*1



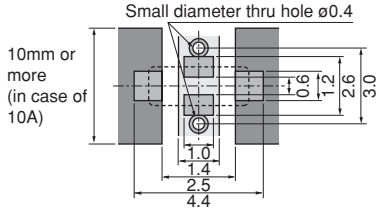
*1 For large current design, width of signal land pattern should be wider not less than 1mm per 1A (1mm/A).
For example
In case of 10A, signal land pattern width should be 10mm or more.
(1mm/A*10A=10mm)

● 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
NFM31P	1.0	1.4	2.5	4.4	1.2	2.6	3.0
NFM41C NFM41P	1.5	2.0	3.5	6.0	1.2	2.6	3.0

NFM31K*1



*1 For large current design, width of signal land pattern should be wider not less than 1mm per 1A (1mm/A).
For example
In case of 10A, signal land pattern width should be 10mm or more.
(1mm/A*10A=10mm)

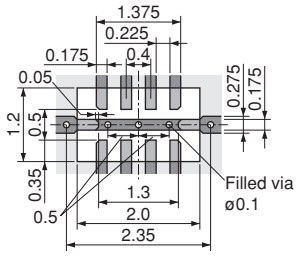
Continued on the following page.

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

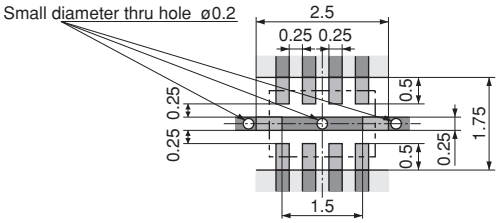
NFA18S
NFA21S

Reflow Soldering

NFA18S

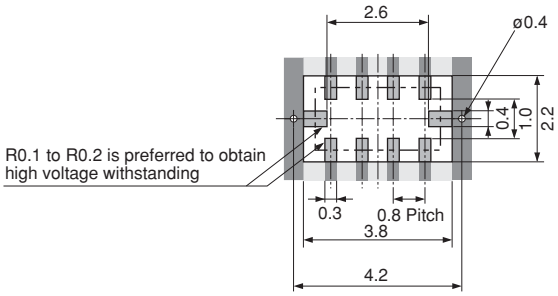


NFA21S

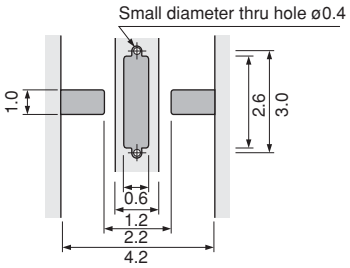


NFA31G
NFA31C
NFW31S
NFE31P

● Reflow Soldering NFA31G/31C

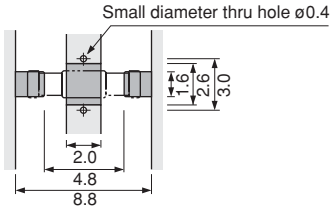


● Reflow and Flow NFW31S
● Reflow Soldering NFE31P

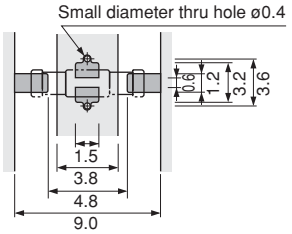


NFE61P

● Reflow Soldering



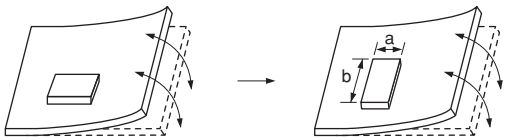
● Flow Soldering



● PCB Warping

PCB should be designed so that products are not subjected to the mechanical stress caused by warping the board.

Products should be located in the sideways direction (Length: a<b) to the mechanical stress.



2. Solder Paste Printing and Adhesive Application

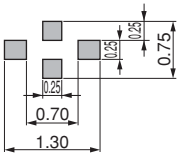
When reflow soldering the chip EMI suppression filter, the printing must be conducted in accordance with the following cream solder printing conditions.
If too much solder is applied, the chip will be prone to damage by mechanical and thermal stress from the PCB and may crack.
Standard land dimensions 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.

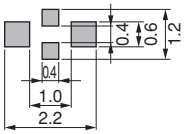
(in mm)

Series	Solder Paste Printing	Adhesive Application
NFM **NFR** **NFL**	●Guideline of solder paste thickness: 100-150μm: NFM18/21/3D/31P, NFR, NFL 150-200μm: NFM55P 100-200μm: NFM41	■ NFM3D/31/41 Series Apply 0.1mg for NFM41C/41 and 0.06mg for NFM3D/NFM31 of bonding agent at each chip. Do not cover electrodes.

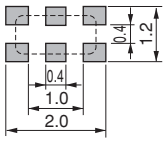
NFL15S



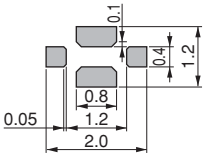
NFM18C/18PC
NFL18ST



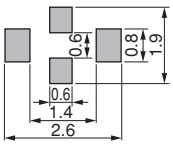
NFL18SP



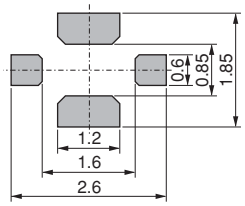
NFM18PS



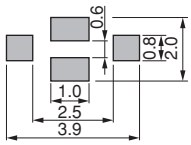
NFM21C/21PC
NFR21G/NFL21S



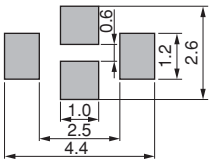
NFM21PS



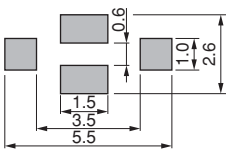
NFM3DC/3DP



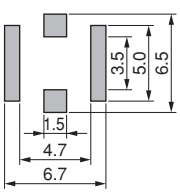
NFM31P/31K

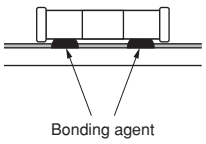


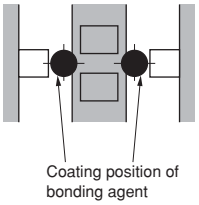
NFM41C/41P



NFM55P



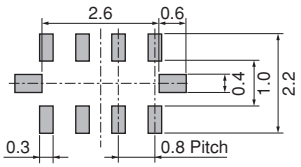


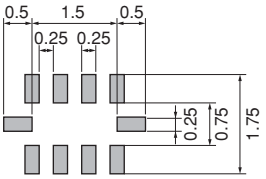


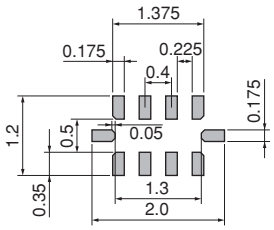
Continued on the following page.

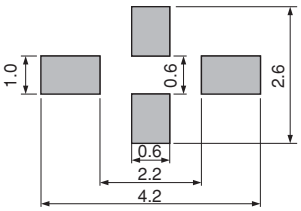
(in mm)

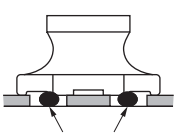
<table>
<tr><th>Series</th><th>Solder Paste Printing</th><th>Adhesive Application</th></tr>
<tr><td>NFA</td><td>●Guideline of solder paste thickness:
100-200μm: NFA31G/31C
100-150μm: NFA18S/21S

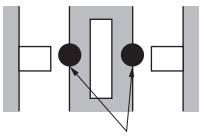
NFA31G/31C
 

NFA21S
 

NFA18S
 
</td><td rowspan="1"></td></tr>
<tr><td>NFW31S
NFE31P</td><td>●Guideline of solder paste thickness:
150-200μm

 
</td><td>■ NFW31S Series
Apply 0.2mg of bonding agent at each chip.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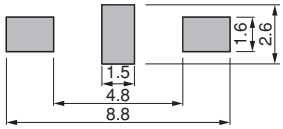
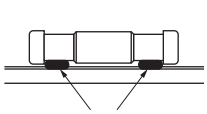
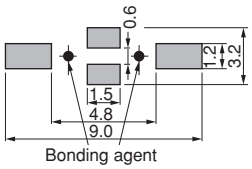
<tr><td>NFE61P</td><td>●Guideline of solder paste thickness:
150-200μm

 
</td><td>Apply 1.0mg of bonding agent at each chip.


</td></tr>
</table>

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: Use Sn-3.0Ag-0.5Cu solder. 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.

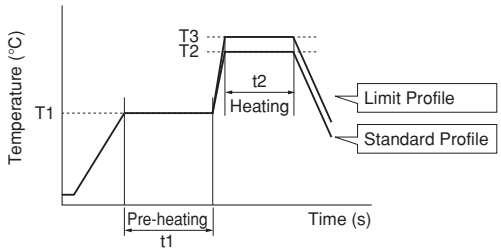
Flux:

- Use Rosin-based flux.
  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.

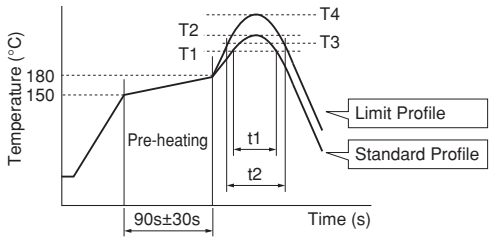
(2) Soldering Profile

●Flow Soldering Profile
(Sn-3.0Ag-0.5Cu Solder)



Series	Pre-heating		Standard Profile			Limit Profile		
			Heating		Cycle of Flow	Heating		Cycle of Flow
	Temp. (T1)	Time. (t1)	Temp. (T2)	Time. (t2)		Temp. (T3)	Time. (t2)	
NFM3D/31/41 NFE61P	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 time

●Reflow Soldering Profile
(Sn-3.0Ag-0.5Cu Solder)



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)		
NFA, NFE NFL, NFM (Except NFM55P) NFR	220°C min.	30 to 60s	245±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 time

(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 / Tip diameter:
30W max. / ø3mm max.

Temperature of soldering iron tip / Soldering time / Times:
350°C max. / 3-4s / 2 times*2

*2 NFE31PT152Z1E9: 280°C max. / 10s 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.

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.

(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.