

# On-Board Type (DC) EMI Suppression Filters(EMIFIL®)

## Chip EMIFIL® Arrays NFAC1C/NFA6CC/NFA31C Series

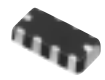


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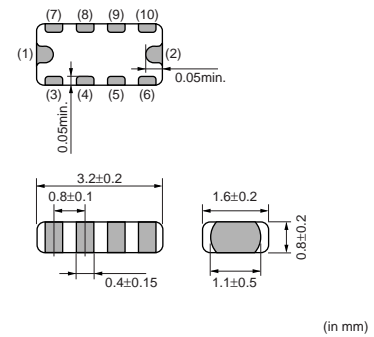
The NFA series of chip EMI suppression filters is designed for surface mount applications. 4, 6 or 8 circuits are condensed into one package. The series is well suited for EMI suppression in digital I/O lines of varied electronic equipment such as notebook size PCs.

### ■ Features

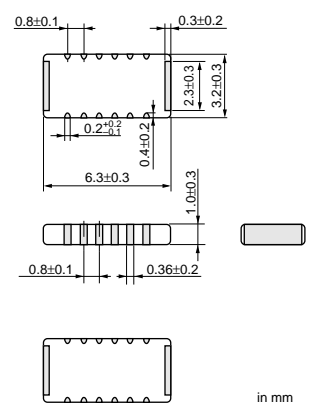
1. The 3-terminal structure realizes excellent EMI suppression at high frequencies. The series has a unique internal structure that minimizes crosstalk.
2. The filter has two ground terminals to provide perfect ground conditions for all filter circuits. In this way, excellent EMI suppression in a narrow path can be realized using uncomplicated land designs.
3. The nickel barrier structure of the external electrodes provides excellent solder heat resistance. Both flow and reflow soldering techniques are possible.



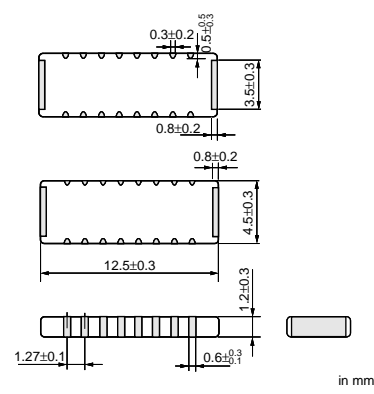
NFA31C



NFA6CC



NFAC1C



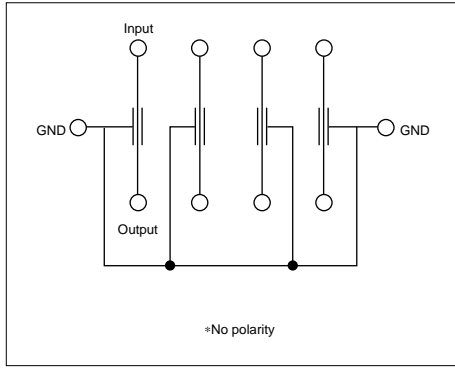
### NFA31C Series

Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFA31CC220S1E4	22 +20%,-20%	25	200	1000 min.	-40 to 85
NFA31CC470S1E4	47 +20%,-20%	25	200	1000 min.	-40 to 85
NFA31CC101S1E4	100 +20%,-20%	25	200	1000 min.	-40 to 85
NFA31CC221S1E4	220 +20%,-20%	25	200	1000 min.	-40 to 85
NFA31CC471R1E4	470 +20%,-20%	25	200	1000 min.	-40 to 85
NFA31CC102R1E4	1000 +20%,-20%	25	200	1000 min.	-40 to 85
NFA31CC222R1E4	2200 +20%,-20%	25	200	1000 min.	-40 to 85
NFA31CC223R1C4	22000 +20%,-20%	16	200	1000 min.	-40 to 85

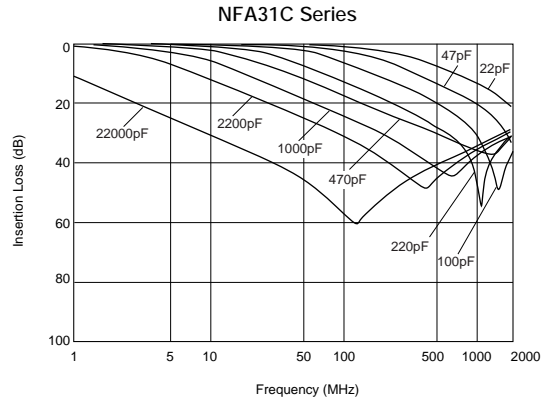
Number of Circuit : 4



■ Equivalent Circuit



■ Insertion Loss Characteristics (Typical)



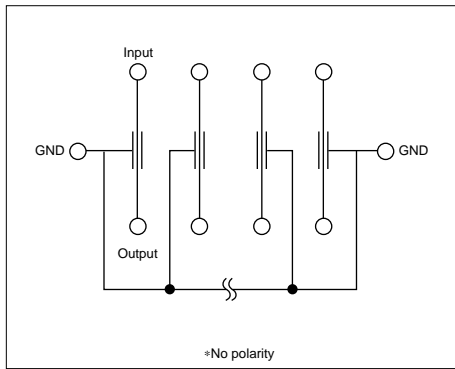
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**NFA6CC Series**

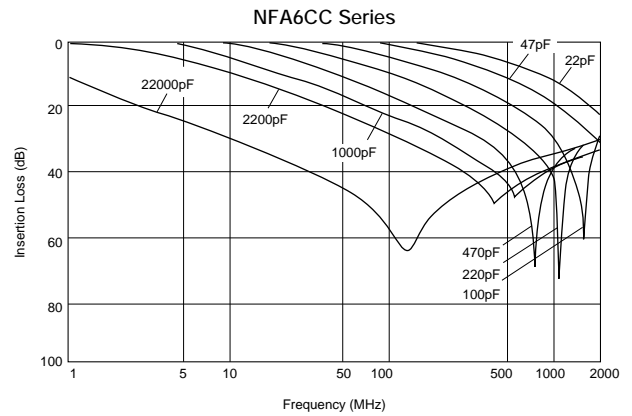
Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFA6CCC220S1H6	22 +50%, -20%	50	200	1000 min.	-55 to 85
NFA6CCC470S1H6	47 +50%, -20%	50	200	1000 min.	-55 to 85
NFA6CCC101S1H6	100 +50%, -20%	50	200	1000 min.	-55 to 85
NFA6CCC221S1H6	220 +50%, -20%	50	200	1000 min.	-55 to 85
NFA6CCC471S1H6	470 +50%, -20%	50	200	1000 min.	-55 to 85
NFA6CCC102S1H6	1000 +50%, -20%	50	200	1000 min.	-55 to 85
NFA6CCC222R1H6	2200 +50%, -20%	50	200	1000 min.	-55 to 85
NFA6CCC223R1H6	22000 +50%, -20%	50	200	1000 min.	-55 to 85

Number of Circuit : 6

■ Equivalent Circuit



■ Insertion Loss Characteristics (Typical)

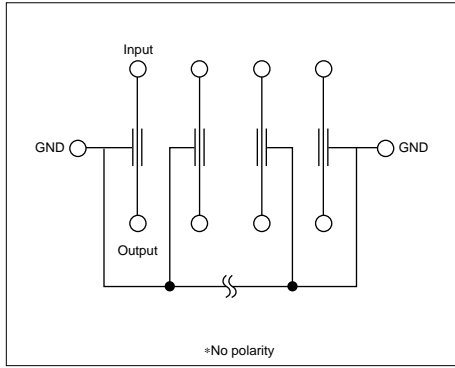


**NFAC1C Series**

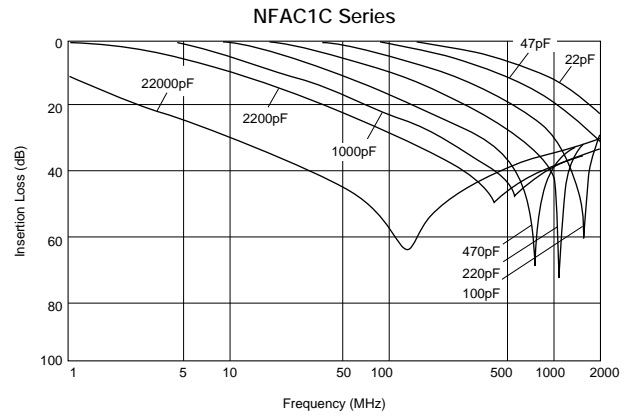
Part Number	Capacitance (pF)	Rated Voltage (Vdc)	Rated Current (mA)	Insulation Resistance (M ohm)	Operating Temperature Range (°C)
NFAC1CC220S1H8	22 +50%, -20%	50	300	1000 min.	-55 to 125
NFAC1CC470S1H8	47 +50%, -20%	50	300	1000 min.	-55 to 125
NFAC1CC101S1H8	100 +50%, -20%	50	300	1000 min.	-55 to 125
NFAC1CC221S1H8	220 +50%, -20%	50	300	1000 min.	-55 to 125
NFAC1CC471S1H8	470 +50%, -20%	50	200	1000 min.	-55 to 125
NFAC1CC102R1H8	1000 +50%, -20%	50	200	1000 min.	-55 to 125
NFAC1CC222R1H8	2200 +50%, -20%	50	200	1000 min.	-55 to 125
NFAC1CC223R1H8	22000 +50%, -20%	50	300	1000 min.	-55 to 125

Number of Circuit : 8

### ■ Equivalent Circuit



### ■ Insertion Loss Characteristics (Typical)



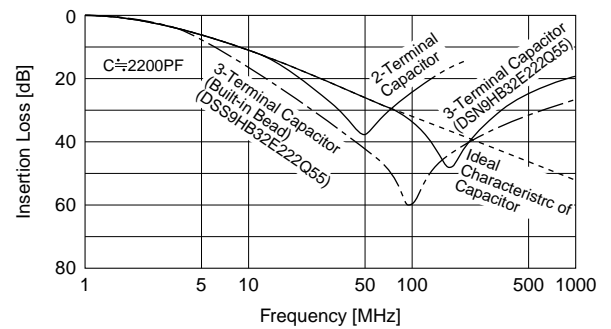
# Outlines of EMI Suppression Filter (EMIFIL<sup>®</sup>) for DC Line

- Chip Solid EMIFIL<sup>®</sup>
- T-type Chip EMIFIL<sup>®</sup>
- Disk Type EMIFIL<sup>®</sup>

<p>Chip Solid EMIFIL<sup>®</sup> .....P.69–74 P.87–90</p> <p>NFM21C      NFM21P      NFA6CC</p> <p>NFM3DC      NFAC1C      NFA31C</p>	<p>T-type Chip EMIFIL<sup>®</sup> .....P.84–86</p> <p>NFE31P      NFE61P/H</p>
<p>Disk Type EMIFIL<sup>®</sup> .....P.132–137</p> <p>DS□6      DS□9      DS□9H</p>	


- This capacitor type EMI suppression filter has a large noise suppression effect at frequencies ranging from a few MHz to hundreds of MHz. This type of filter is used widely as a universal, high performance EMI suppression component.
- The chip solid EMIFIL<sup>®</sup> incorporates a built-in three-terminal capacitor, eliminating the lead wire and thereby increasing the high-frequency performance characteristic.
- The T-type chip EMIFIL<sup>®</sup> is a chip EMI suppression filter with a built-in feed-thru capacitor. The use of ferrite beads on input and output terminals minimizes resonance with surrounding circuits.
- Whatever the situation, 3-terminal construction reduces residual inductance, thereby substantially improving noise suppression at frequencies over 10MHz.

[Comparison of Insertion Loss Characteristics]



A 3-terminal capacitor has a high self resonance frequency than general 2-terminal type and exhibits effective noise suppression at high frequency

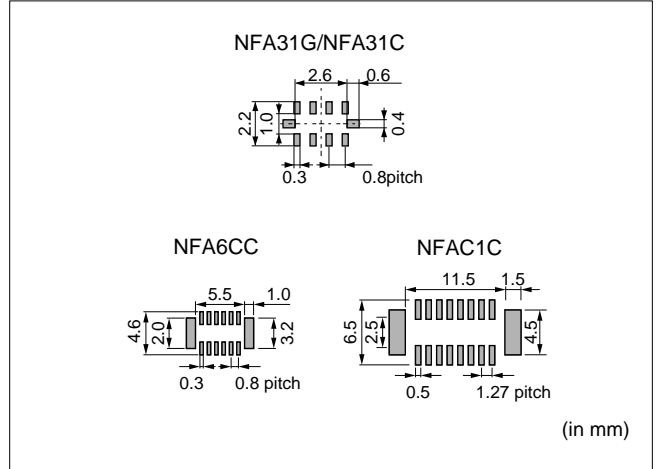
## NFA Series Notice (Soldering and Mounting)

 Continued from the preceding page.

### (1) Solder Paste Printing

NFA Series

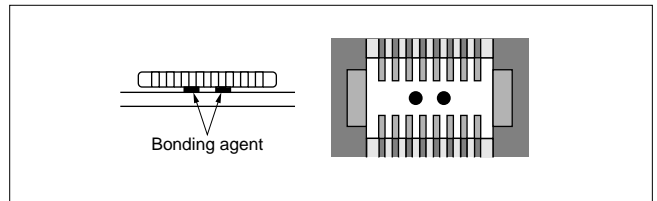
- Coat the solder paste a thickness of 100μm to 200μm.
- Use H60A solder for pattern printing.



### (2) Adhesive Application

NFA Series

- Apply 0.5mg to 0.9mg for NFAC1C and 0.25mg to 0.6mg for NFA6CC of bonding agent at each chip, and ensure not to cover electrodes.



### 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.

#### (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.

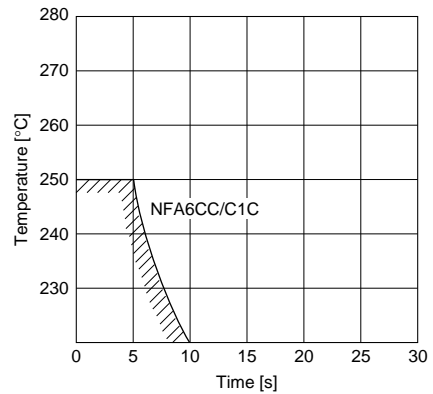
#### Solder and Flux

Solder : H60A H63A solder(JIS Z 3238)

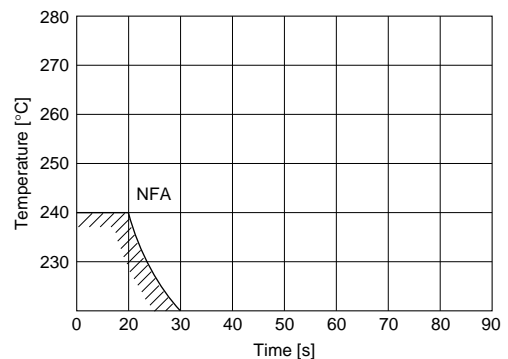
Flux :


- Use Rosin-based fulx(when using RA type solder, clean products sufficiently to avoid residual fulx.
- Do not use strong acidic fulx(with chlorine content exceeding 0.20wt%)
- Do not use water-soluble fulx.

Allowable Flow Soldering Temperature and Time



Allowable Reflow Soldering Temperature and Time

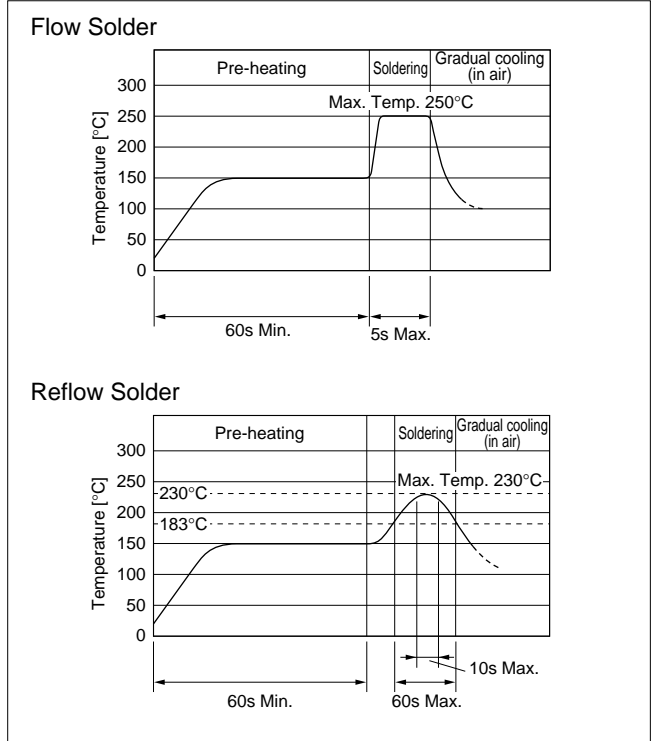


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## NFA Series Notice (Soldering and Mounting)

Continued from the preceding page.

### (3) SOLDERING CONDITIONS



### (4) REWORKING WITH SOLDER IRON

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

- Pre-heating : 150°C 60 second Min.
- Soldering iron power output : 30W Max.
- Temperature of soldering iron tip : 280°C Max.
- Soldering time : 10 second Max.

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

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

### 4. Cleaning

Following conditions should be observed when cleaning chip EMI filter.

- (1) Cleaning Temperature : 60degree C max. (40degree C max. for CFC alternatives and alcohol cleaning agents)
- (2) Ultrasonic
  - Output : 20W/liter max.
  - Duration : 5 minutes max.
  - Frequency : 28kHz 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) CFC alternatives and alcohol cleaning agents
  - Isopropyl alcohol (IPA)
  - HCFC-225

- b) Aqueous cleaning agent
  - Surface active agent (Clean Thru 750H)
  - Hydrocarbon (Techno Cleaner 335)
  - High grade alcohol (Pine Alpha ST-100S)
  - 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.

### Chip EMIFIL® Capacitor Array Type

(Global Part Number) **NF** **A** **31** **CC** **101** **S** **1E** **4** **B**  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

#### ① Product ID

Product ID	
<b>NF</b>	Chip EMI Filters Capacitor Type

#### ② Structure

Code	Structure
<b>A</b>	Array Type

#### ③ Dimension (L×W)

Code	Dimension (L×W)
<b>31</b>	3.20×1.60mm
<b>6C</b>	6.30×3.20mm
<b>C1</b>	12.5×4.5mm

#### ④ Features

Code	Features
<b>CC</b>	Capacitor Type for Signal Lines

#### ⑤ Capacitance

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 zero which follow the two figures.

#### ⑥ Capacitance Change

Code	Capacitance Change
<b>F</b>	+30/-80%
<b>R</b>	±15%
<b>S</b>	+350 to -1000ppm

#### ⑦ Rated Voltage

Code	Rated Voltage
<b>1C</b>	16V
<b>1E</b>	25V
<b>1H</b>	50V

#### ⑧ Numbers of Circuit

Code	Number of Circuit
<b>4</b>	4 circuit
<b>6</b>	6 circuit
<b>8</b>	8 circuit

#### ⑨ Packaging

Code	Packaging
<b>B</b>	Bulk
<b>D</b>	Paper Taping (ø180mm Reel)
<b>L</b>	Plastic Taping (ø180mm Reel)