muRata

Chip EMIFIL®Chip 3-terminal Capacitor for Automotive

NFM21HC102R1H3_ (0805, 1000pF, DC50V)

_: packaging code

Reference Sheet

1.Scope

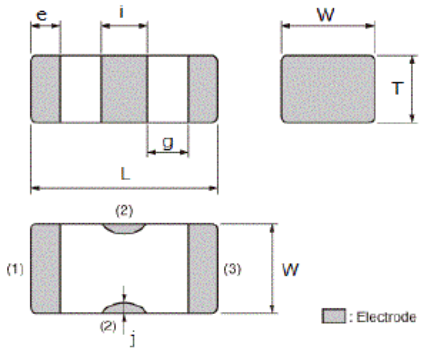
This product specification is applied to Chip EMIFIL®Chip 3-terminal Capacitor used for Automotive Electronic equipment.

2.MURATA Part NO. System

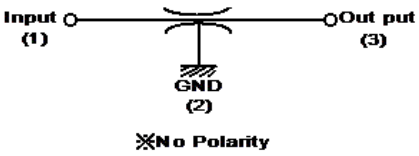
(Ex.)

NFM	21	HC	102	R	1H	3	D
	(1)L/W Dimensions	(2)Features	(3)Nominal Capacitance	(4)Temperature Characteristics	(5)DC Rated Voltage	(6)Electrode	(7)Packaging Code

3. Type & Dimensions



a)Equivalent Circuit



(Unit:mm)

(1)-1 L	(1)-2 W	T	e	g
i	j			
2.0±0.2	1.25±0.1	0.85±0.1	0.3±0.2	0.2 min.
0.6±0.2	0.2+0.2/-0.1			

4.Rated value

(3) Nominal Capacitance	Capacitance Tolerance	(5) DC Rated Voltage	Rated Current (mA)	DC Resistance	Insulation Resistance	Specifications and Test Methods (Operating /Storage Temp. Range)
1000 pF	±20 %	DC 50 V	1A(DC)	300mΩmax.	1000MΩmin.	-55 to 125 °C / -55 to 125 °C

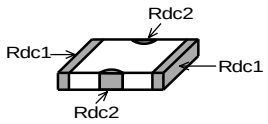
5.Package

mark	(7) Packaging	Packaging Unit
D	ϕ180mm Reel PAPER W8P4	4000 pcs./Reel

Product specifications in this catalog are as of Mar.3,2016,and are subject to change or obsolescence without notice.
Please consult the approval sheet before ordering.
Please read rating and !Cautions first.

■AEC-Q200 Murata Standard Specification and Test Methods

Electrical Performance

No	Item	Specification	Test Method
1	Capacitance (Cap.)	Shown in Rated value.	Frequency 22 to 100pF : 1±0.1MHz 220pF to 1uF : 1±0.1kHz Voltage : 1±0.2V(rms)
2	Insulation Resistance(I.R.)		Voltage : Rated Voltage Time : 2 minutes max.
3	DC Resistance (Rdc1,2)		Measured with 100mA max. Rdc1 : between signal terminals Rdc2 : between ground terminals 
4	Withstanding Voltage	Products shall not be damaged.	Test Voltage : Rated Voltage X 300% Time : 1 to 5 s Charge Current : 50 mA max.
5	Operating Temperature	Shown in Rated value.	Includes self-heating
6	Storage Temperature		

Standard Testing Condition

< Unless otherwise specified >	< In case of doubt >
Temperature : Ordinary Temp. / 15 °C to 35 °C	Temperature: 20 °C ± 2 °C
Humidity: Ordinary Humidity / 25 %(RH) to 85 %(RH)	Humidity: 60 %(RH) to 70 %(RH)
	Atmospheric pressure: 86 kPa to 106 kPa

■AEC-Q200 Murata Standard Specification and Test Methods

Mechanical Performance (based on Table 2 for Tantalum & Ceramic Capacitors)

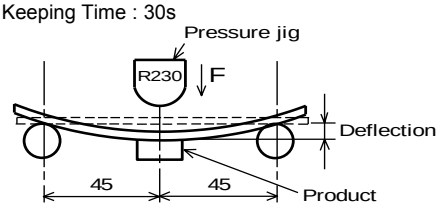
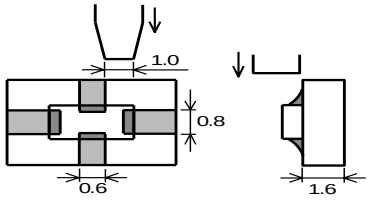
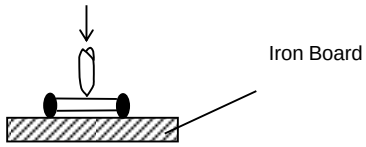
AEC-Q200 Rev.C issued June 17. 2005

AEC-Q200			Murata Specification / Deviation
No.	Stress	Test Method	
3	High Temperature Exposure	Unpowered 1000 hours @ T=150C (Ceramics) Measurement at 24+/-2 hours after test	Meet Table D after testing.
4	Temperature Cycling	1000cycles (-55C to +125C) Measurement at 24+/-2 hours after test	Meet Table A after testing.
6	Moisture Resistance	t=24 hours/cycle. Note: Steps 7a & 7b not required. Unpowered.	Meet Table D after testing.
7	Biased Humidity	1000hours 85C/85%RH. Note: Ceramics only Specified conditions: Rated Voltage and 1.3 to 1.5 volts. Add 100Kohm resister. Tantalums-Rated Voltage only. Measurement at 24+/-2 hours after test	Meet Table D after testing.
8	Operational Life	Condition D Steady State TA=125C Full rated ceramic caps Measurement at 24+/-2 hours after test conclusion.	Meet Table D after testing.
9	External Visual	Visual inspection	No abnormalities
10	Physical Dimension	Within the specified dimensions.	No defects
12	Resistance to Solvents	Per MIL-STD-202 Method 215	Not Applicable
13	Mechanical Shock	Figure 1 of Method 213. SMD:Condition F Leaded:Condition C	Meet Table C after testing.
14	Vibration	5g's for 20 minutes, 12cycles each of 3 oritentations Use 8"X5" PCB, .031"thick. 7 secure points on one long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000Hz.	Meet Table C after testing.
15	Resistance to Soldering Heat	Note: Condition B No pre-heat of samples. Note:Single Wave Solder-Procedure 2 for SMD. Procedure 1 for Leaded with solder within 1.5mm of device body.	Meet Table A after testing. Deviation for AEC-Q200; Testing condition Flux: Ethanol solution of rosin, 25(wt)% Pre-heating: 150C+/-10C, 60 to 90s Solder: Sn-3.0Ag-0.5Cu Solder Temperature: 270C+/-5C Immesion Time: 10s+/-1s Immesion and emersion rates: 25mm/s Then measured after exposure in the room
16	Thermal Shock	-55C/+125C Note: Number of cycles required-300, Maximum transfer time-20 s, Dwell time-15 minuites. Air-Air.	Meet Table A after testing.
17	ESD	Per AEC-Q200-002	Component Classification:Meet Table E
18	Solderability	Per J-STD-002	95% of the terminations is to be soldered. Method B : Not Applicable
19	Electrical Characterization	Summary to show Min, Max, Mean and Standard deviation at room as well as Min and Max operating temperatures.	Deviation for AEC-Q200; Shown in Rated value.

■AEC-Q200 Murata Standard Specification and Test Methods

Mechanical Performance (based on Table 2 for Tantalum & Ceramic Capacitors)

AEC-Q200 Rev.C issued June 17. 2005

AEC-Q200			Murata Specification / Deviation
No.	Stress	Test Method	
21	Board Flex	Appendix 2. Note:2mm(min) for all except 3mm for class 1.	Meet Table B after testing. Deviation for AEC-Q200; It shall be soldered on the Glass-epoxy substrate (t = 1mm). • Deflection : 2mm • Keeping Time : 30s 
22	Terminal Strength	Per AEC-Q200-006 A force of 1.8 kg for 60 s	The electrode should show no failure after testing. Deviation for AEC-Q200; It shall be soldered on the substrate. • Applying Force : 17.6N • Applying Time : 60s 
23	Beam Load Test	Per AEC-Q200-003	The chip endure 20N. Deviation for AEC-Q200 Place the capacitor in the beam load fixture as below figure. Pressure Jig: R0.5  Speed supplied the Stress Load: 0.5mm/s.

Mechanical Performance (based on Table 2 for Tantalum & Ceramic Capacitors)

AEC-Q200 Rev.C issued June 17. 2005

Table A

Appearance	No damage
Capacitance Change	Within +/-7.5% at 20C
I.R.	1000MΩ min. (22pF-470000pF) 500MΩ min. (1000000pF)
DC Resistance(Rdc1,2)	0.5Ω max (22pF-2200pF) 0.05Ω max (22000pF-1000000pF)

Tabe B

Appearance	No damage
Capacitance Change	Within +/-12.5% at 20C
DC Resistance(Rdc1,2)	0.5Ωmax (22pF-2200pF) 0.05Ω max (22000pF-1000000pF)

Table C

Appearance	No damage
Capacitance	Meet initial value (Shown in Rated value.)
DC Resistance(Rdc1,2)	0.5Ωmax (22pF-2200pF) 0.05Ω max (22000pF-1000000pF)

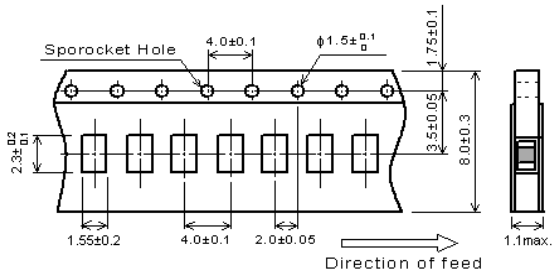
Table D

Appearance	No damage
Capacitance Change	Within +/-12.5% at 20C
I.R.	1000MΩ min. (22pF-470000pF) 500M Ω min. (1000000pF)
DC Resistance(Rdc1,2)	0.5Ωmax (22pF-2200pF) 0.05Ω max (22000pF-1000000pF)

Table E

Murata PN	DC Resistance (Rdc 1,2) Value After Testing (ohm) max.	ESD Component Classification 1C: 1kV(DC) to＜2kV(DC)
NFM21HC220U1H3D	0.5	1C
NFM21HC470U1H3D	0.5	1C
NFM21HC101U1H3D	0.5	1C
NFM21HC221R1H3D	0.5	1C
NFM21HC471R1H3D	0.5	1C
NFM21HC102R1H3D	0.5	1C
NFM21HC222R1H3D	0.5	1C
NFM21HC223R1H3D	0.05	1C
NFM21HC104R1A3D	0.05	1C
NFM21HC224R1A3D	0.05	1C
NFM21HC474R1A3D	0.05	1C
NFM21HC105R1C3D	0.05	1C

1. Appearance and Dimensions (8mm-wide paper tape)

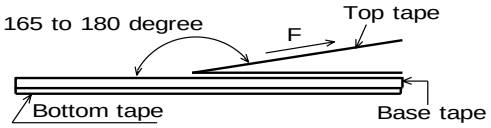


(in mm)

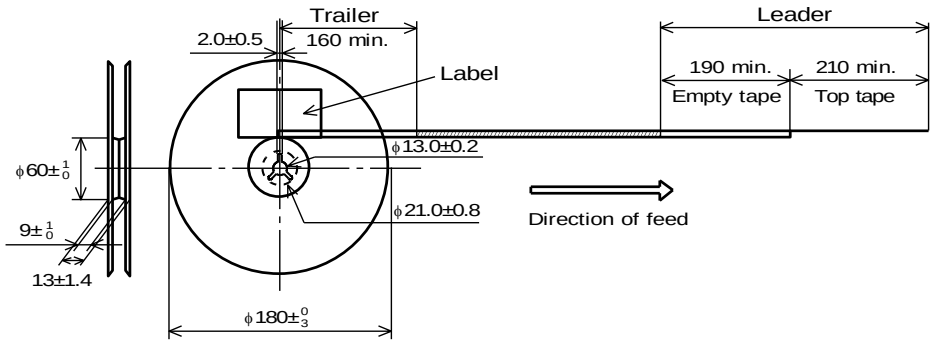
2. Specification of Taping
   (1) Packing quantity (standard quantity)
   4000 pcs. / reel
   (2) Packing Method
   Products shall be packaged in the cavity of the base tape and sealed by top tape and bottom tape.
   (3) Sprocket Hole
   The sprocket holes are to the right as the tape is pulled toward the user.
   (4) Base tape and Top tape
   The base tape and top tape have no spliced point.
   (5) Cavity
   There shall not be burr in the cavity.
   (6) Missing components number
   Missing components number within 0.1% of the number per reel or 1 pc., whichever is greater, and are not continuous.
   The specified quantity per reel is kept.

3. Pull Strength of Top Tape and Bottom Tape
   5N min.

4. Peeling off force of top tape
   0.1N to 0.6N (minimum value is typical)
   Speed of Peeling off : 300 mm / min



5. Dimensions of Leader-tape, Trailer and Reel
   There shall be leader-tape (top tape and empty tape) and trailer-tape (empty tape) as follows.



(in mm)

1.Operating Environment
Do not use this product under the following environmental conditions, on deterioration of the performance, such as insulation resistance may result from the use.
(1) in the corrodible atmosphere (acidic gases, alkaline gases, chlorine, sulfur gases, organic gases and etc.)
(2) in the atmosphere where liquid such as organic solvent, may splash on the products.
(3) in the atmosphere where dust rises.

2. Caution (Rating)
Do not use products beyond the Operating Temperature Range, Rated Voltage and Rated Current.

3. Attention regarding product's lay out
< Attention regarding the heat generated by other products >
Please provide special attention when mounting products in close proximity to other products that radiate heat.

4. Attention regarding chip mounting
An excessively low bottom dead point of the suction nozzle imposes great force on the chip during mounting, causing cracked chips.
Please set the suction nozzle's bottom dead point on the upper surface of the board, after the board is adjusted flat.
The chip received force (static loading) from the suction nozzle's should be 1N to 3N.

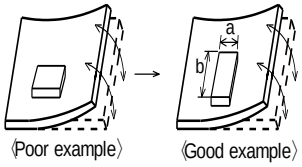
5. Note for Assembling
< Thermal Shock >
Pre-heating should be in such a way that the temperature difference between solder and products surface is limited to 100°C max. Also cooling into solvent after soldering should be in such a way that the temperature difference is limited to 100°C max.

6. Attention Regarding P.C.B. Bending

The following shall be considered when designing P.C.B.'s and laying out products.

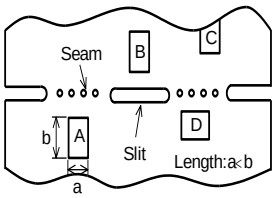
(1) P.C.B. shall be designed so that products are not subject to the mechanical stress for board warpage.

[Products direction]



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

(2) Products location on P.C.B. near seam for separation.



Products (A,B,C,D) shall be located carefully so that products a not subject to the mechanical stress due to warping the board. Because they may be subjected the mechanical stress in order of A >C >B≒D.

7. Pre-heating Temperature

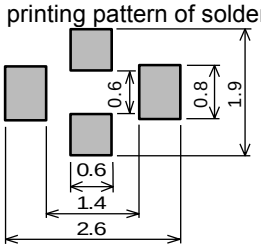
Soldering shall be handled so that the difference between pre-heating temperature and solder temperature shall be limited to 100°C max. to avoid the heat stress for the products.

8. Reflow Soldering

1) Soldering paste printing for reflow

• Standard thickness of solder paste: 100µm to 150µm.
• Use the solder paste printing pattern of the right pattern.
• For the resist and copper foil pattern, use standard land dimensions.

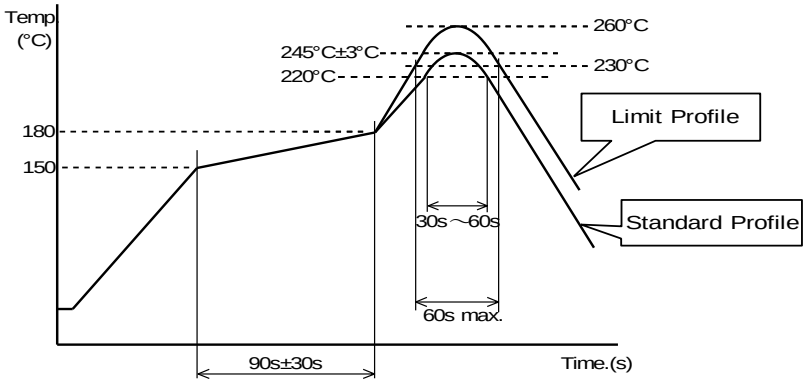
• Standard printing pattern of solder paste.



(in mm)

2) Soldering Conditions

Standard soldering profile and the limit soldering profile is as follows.
The excessive limit soldering conditions may cause leaching of the electrode and/or resulting in the deterioration of product quality.



	Standard Profile	Limit Profile
Pre-heating	150°C ~ 180°C , 90s ± 30s	
Heating	above 220°C , 30s ~ 60s	above 230°C , 60s max.
Peak temperature	245°C ± 3°C	260°C , 10s
Cycle of reflow	2 times	2 times

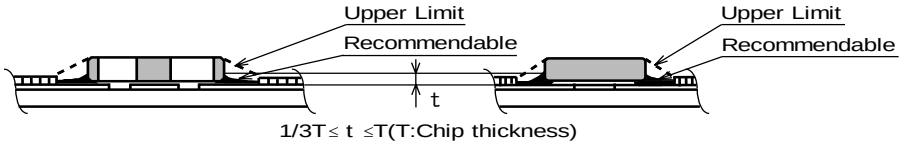
9. Reworking with Soldering iron

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

• Pre-heating : 150°C, 1 min • Soldering iron output : 30W max.
• Tip temperature : 350°C max. • Tip diameter : φ3mm max.
• Soldering time : 3(+1,-0) s • Times : 2times max.

Note: Do not directly touch the products with the tip of the soldering iron in order to prevent the crack on the ceramic material due to the thermal shock.

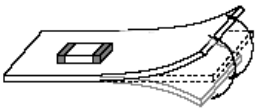
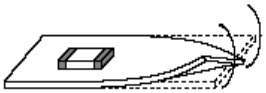
10. Solder Volume
Solder shall be used not to be exceeded as shown below.



Accordingly increasing the solder volume, the mechanical stress to product is also increased.
Excessive solder volume may cause the failure of mechanical or electrical performance.

11.Resin coating
The capacitance value may change and/or it may affect on the product's performance due to high cure-stress of resin to be used for coating / molding products. So please pay your careful attention when you select resin. In prior to use, plea make the reliability evaluation with the product mounted in your application set.

12. Handling of a substrate
After mounting products on a substrate, do not apply any stress to the product caused by bending or twisting to the substr when cropping the substrate, inserting and removing a connector from the substrate or tightening screw to the substrate. Excessive mechanical stress may cause cracking in the product.

Bending  Twisting 

Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used.

13.Fail-safe
Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

14.Limitation of Applications
Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.
(1)Aircraft equipment (2)Aerospace equipment (3)Undersea equipment (4)Power plant control equipment
(5)Medical equipment (6)Transportation equipment(trains, ships, etc.) (7)Traffic signal equipment
(8)Disaster prevention / crime prevention equipment (9)Data-processing equipment
(10)Applications of similar complexity or with reliability requirements comparable to the applications listed in the above

Products can only be soldered with reflow.
This product is designed for solder mounting.
Please consult us in advance for applying other mounting method such as conductive adhesive.

1. Flux and Solder

Flux	Use rosin-based flux, Do not use highly acidic flux (with chlorine content exceeding 0.2(wt)%). Do not use water-soluble flux. Other flux (except above) Please contact us for details, then use.
Solder	Use Sn-3.0Ag-0.5Cu solder Use of Sn-Zn based solder will deteriorate performance of products. In case of using Sn-Zn based solder, please contact Murata in advance.

2. Cleaning Conditions
Products shall be cleaned on the following conditions.
(1) Cleaning temperature shall be limited to 60°C max. (40°C max. for Isopropyl alcohol (IPA))
(2) Ultrasonic cleaning shall comply with the following conditions, with avoiding the resonance phenomenon at the mounted products and P.C.B.

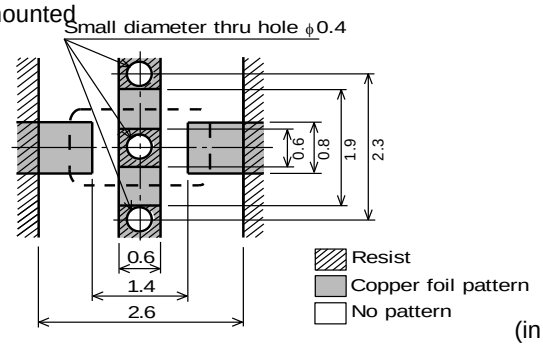
Power : 20W / l max.
Frequency : 28kHz to 40kHz
Time : 5 minutes max.

(3) Cleaner 1. Cleaner
Isopropyl alcohol (IPA)
2. Aqueous agent
PINE ALPHA ST-100S

(4) There shall be no residual flux and residual cleaner after cleaning.
In the case of using aqueous agent, products shall be dried completely after rinse with de-ionized water in order to remove the cleaner.
(5) Other cleaning
Please contact us.

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

< Standard land dimensions for reflow >
・Side on which chips are mounted



(in mm)

4.Storage and Delivery condition
(1) Storage period
Use the products within 12 months after delivered.
Solderability should be checked if this period is exceeded.
(2) Storage environment condition
・Products should be stored in the warehouse on the following conditions.
Temperature: -10 to +40°C
Humidity: 15 to 85% relative humidity
No rapid change on temperature and humidity
・Don't keep products in corrosive gases such as sulfur, chlorine gas or acid, or it may cause oxidization of electrode, resulting in poor solderability.
・Products should be stored on the palette for the prevention of the influence from humidity, dust and so on.
・Products should be stored in the warehouse without heat shock, vibration, direct sunlight and so on.
・Products should be stored under the airtight packaged condition.
(3) Delivery
Care should be taken when transporting or handling product to avoid excessive vibration or mechanical shock.

(1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
(2) You are requested not to use our product deviating from the agreed specifications.
(3) We consider it not appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.