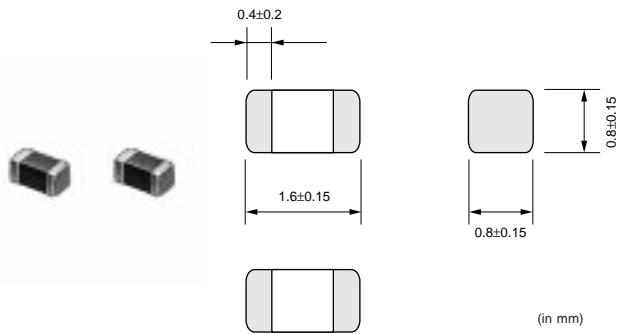


## Chip Inductor Type

Chip Ferrite Bead BLM18\_SH Series



Part Number	Impedance (ohm) (at 100MHz, Under Standard Testing Condition)	Impedance (ohm) Typical	Rated Current (mA) (*1)	DC Resistance (ohm max.) Initial Values	DC Resistance (ohm max.) Values After Testing	Remark
BLM18PG300SH1	20 min.	30	1000	0.05	0.10	For DC power line
BLM18PG330SH1	33±25%	33	3000	0.025	0.050	For DC power line
BLM18PG600SH1	40 min.	60	500	0.1	0.2	For DC power line
BLM18PG121SH1	120±25%	120	2000	0.050	0.100	For DC power line
BLM18PG181SH1	180±25%	180	1500	0.090	0.180	For DC power line
BLM18AG121SH1	120±25%	120	200	0.2	0.3	For general use
BLM18AG151SH1	150±25%	150	200	0.25	0.35	For general use
BLM18AG221SH1	220±25%	220	200	0.3	0.4	For general use
BLM18AG331SH1	330±25%	330	200	0.45	0.55	For general use
BLM18AG471SH1	470±25%	470	200	0.5	0.6	For general use
BLM18AG601SH1	600±25%	600	200	0.5	0.6	For general use
BLM18AG102SH1	1000±25%	1000	100	0.7	0.8	For general use
BLM18BB050SH1	5±25%	5	700	0.1	0.2	For high speed signal line
BLM18BA050SH1	5±25%	5	500	0.2	0.3	For high speed signal line
BLM18BB100SH1	10±25%	10	500	0.15	0.25	For high speed signal line
BLM18BA100SH1	10±25%	10	500	0.25	0.35	For high speed signal line
BLM18BB220SH1	22±25%	22	500	0.25	0.35	For high speed signal line
BLM18BA220SH1	22±25%	22	500	0.35	0.45	For high speed signal line
BLM18BB470SH1	47±25%	47	500	0.3	0.4	For high speed signal line
BLM18BA470SH1	47±25%	47	300	0.55	0.65	For high speed signal line
BLM18BB600SH1	60±25%	60	200	0.35	0.45	For high speed signal line
BLM18BA750SH1	75±25%	75	300	0.70	0.80	For high speed signal line
BLM18BB750SH1	75±25%	75	200	0.35	0.45	For high speed signal line
BLM18BB121SH1	120±25%	120	200	0.5	0.6	For high speed signal line
BLM18BD121SH1	120±25%	120	200	0.4	0.5	For high speed signal line
BLM18BA121SH1	120±25%	120	200	0.9	1.0	For high speed signal line
BLM18BB141SH1	140±25%	140	200	0.55	0.65	For high speed signal line
BLM18BB151SH1	150±25%	150	200	0.55	0.65	For high speed signal line
BLM18BD151SH1	150±25%	150	200	0.4	0.5	For high speed signal line
BLM18BB221SH1	220±25%	220	200	0.65	0.75	For high speed signal line
BLM18BD221SH1	220±25%	220	200	0.45	0.55	For high speed signal line
BLM18BB331SH1	330±25%	330	200	0.75	0.85	For high speed signal line
BLM18BD331SH1	330±25%	330	200	0.5	0.6	For high speed signal line
BLM18BD421SH1	420±25%	420	200	0.55	0.65	For high speed signal line
BLM18BB471SH1	470±25%	470	50	1.0	1.1	For high speed signal line
BLM18BD471SH1	470±25%	470	200	0.55	0.65	For high speed signal line
BLM18BD601SH1	600±25%	600	200	0.65	0.75	For high speed signal line
BLM18BD102SH1	1000±25%	1000	100	0.85	0.95	For high speed signal line
BLM18BD152SH1	1500±25%	1500	50	1.2	1.3	For high speed signal line
BLM18BD182SH1	1800±25%	1800	50	1.5	1.6	For high speed signal line

Continued on the following page.

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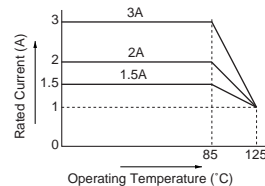
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Part Number	Impedance (ohm) (at 100MHz, Under Standard Testing Condition)	Impedance (ohm) Typical	Rated Current (mA) (*1)	DC Resistance (ohm max.) Initial Values	DC Resistance (ohm max.) Values After Testing	Remark
<b>BLM18BD222SH1</b>	2200±25%	2200	50	1.5	1.6	For high speed signal line
<b>BLM18BD252SH1</b>	2500±25%	2500	50	1.5	1.6	For high speed signal line

Operating Temperature : -55 to +125°C

Storage Temperature : -55 to +125°C

(\*1) As for BLM18PG type, Rated Current is derated as right figure depending on the operating temperature.



## Standard Testing Conditions

<Unless otherwise specified>

Temperature : Ordinary Temp. (15 to 35 °C)

Humidity : Ordinary Humidity (25 to 85% (RH))

<In case of doubt>

Temperature : 20±2 °C

Humidity : 60 to 70% (RH)

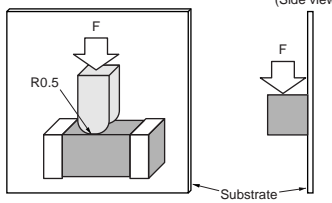
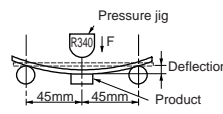
Atmospheric pressure : 86 to 106kPa

## Specifications

### 1. Electrical Performance

No.	Item	Specifications	Test Methods
1	Impedance	Meet rating table above Impedance frequency Characteristics(Typical) : see the appendix.	Measuring Equipment : Agilent 4291A or the equivalent Measuring Frequency : 100±1MHz Test Fixture : Agilent 16092A or the equivalent (for BLM18BA□□□SH1□ type : Agilent 16192A or the equivalent)
2	DC Resistance	Meet rating table above.	Measuring Equipment : Digital multi meter

### 2. Mechanical Performance

No.	Item	Specifications	Test Methods
1	Appearance and Dimensions	Meet dimensions.	Visual Inspection and measured with Silde Calipers.
2	Solderability	The electrodes should be at least 95% covered with new solder coating.	Flux : Ethanol solution of rosin, 25 (wt) % Pre-Heating : 150±5°C, 60±5s Solder : Sn/Pb=60/40 Solder Temperature : 230±5°C Immersion Time : 4±1s Immersion and emersion rates : 25mm/s
3	Resistance to Soldering Heat		Pre-Heating : 150±5°C, 60±5s Solder : Sn/Pb=60/40 Solder Temperature : 270±5°C Immersion Time : 10±0.5s Immersion and emersion rates : 25mm/s Then measured after exposure in the room condition for 48±4hrs..
4	Bonding Strength	Meet Table 1.	It should be soldered on the substrate. Applying Force (F) : 6.8N Applying Time : 5±1s 
5	Bending Strength		It should be soldered on the substrate. Subatrate:100 x 40 x 1.6mm Deflection (n) : 1.0mm (Glass-epoxy substrate) Speed of Applying Force : 0.5mm/s Keeping Time : 30s 

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No.	Item	Specifications	Test Methods
6	Vibration	Meet Table 1.	It should be soldered on the substrate. Oscillation Frequency : 10 to 2000 to 10Hz for 20 min. Total Amplitude : 1.5mm or Acceleration amplitude 49 m/s <sup>2</sup> whichever is smaller. Testing Time : A period of 2 hours in each of 3 mutually perpendicular directions. (Total 6 hrs.)

### 3. Environmental Performance

It shall be soldered on the substrate.

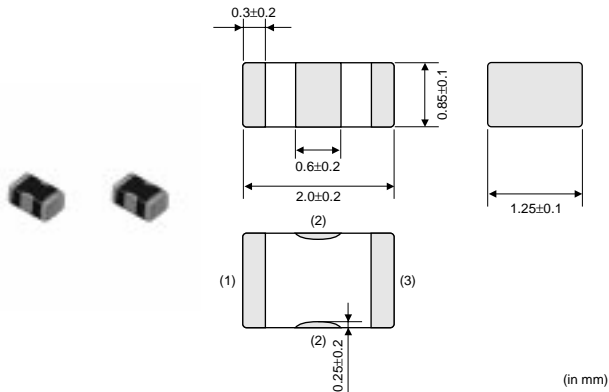
No.	Item	Specifications	Test Methods
1	Humidity	Meet Table 1.	Temperature : 70±2°C Humidity : 90 to 95% (RH) Time : 1000hrs. (+48hrs., -0hr.) Then measured after exposure in the room condition for 48±4hrs..
2	Heat Life		Temperature : 125±3°C (for BLM18PG330SH1/121SH1/181SH1 : +85±2°C) Applying Current : Rated Current Time : 1000hrs. (+48hrs., -0hr.) Then measured after exposure in the room condition for 48±4hrs..
3	Cold Resistance		Temperature : -55±2°C Time : 1000hrs. (+48hrs., -0hr.) Then measured after exposure in the room condition for 48±4hrs..
4	Temperature Cycle		1 cycle: 1 step : -55°C (+0°C, -3°C) / 30±3min 2 step : Room Temperature / within 5min. 3 step : +125°C (+3°C, -0°C) / 30±3min 4 step : Room Temperature / within 5min. Total of 1000 cycles Then measured after exposure in the room condition for 48±4hrs..

Table 1

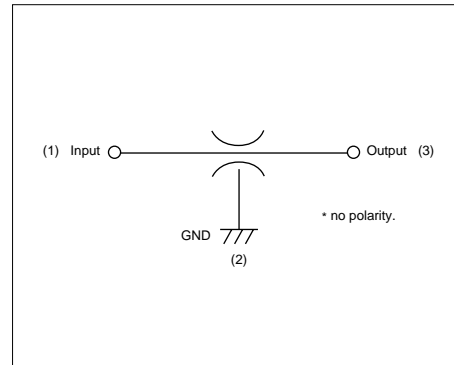
Appearance	No damaged
Impedance Change	within±30%
DC Resistance	Meet rating table above.

## Chip Capacitor

### Chip 3-terminal Capacitor NFM21H Series



Equivalent Circuit



Part Number	Capacitance	Rated Voltage	Withstanding Voltage	Rated Current	DC Resistance (Rdc1,2)	Insulation Resistance
NFM21HC220U1H3	22pF±20%	50V (DC)	150V (DC)	300mA (DC)	0.3 ohm max.	1000M ohm min.
NFM21HC470U1H3	47pF±20%	50V (DC)	150V (DC)	300mA (DC)	0.3 ohm max.	1000M ohm min.
NFM21HC101U1H3	100pF±20%	50V (DC)	150V (DC)	300mA (DC)	0.3 ohm max.	1000M ohm min.
NFM21HC221R1H3	220pF±20%	50V (DC)	150V (DC)	300mA (DC)	0.3 ohm max.	1000M ohm min.
NFM21HC471R1H3	470pF±20%	50V (DC)	150V (DC)	300mA (DC)	0.3 ohm max.	1000M ohm min.
NFM21HC102R1H3	1000pF±20%	50V (DC)	150V (DC)	300mA (DC)	0.3 ohm max.	1000M ohm min.
NFM21HC222R1H3	2200pF±20%	50V (DC)	150V (DC)	300mA (DC)	0.3 ohm max.	1000M ohm min.
NFM21HC223R1H3	22000pF±20%	50V (DC)	150V (DC)	2A (DC)	0.03 ohm max.	1000M ohm min.

Operating Temperature / Storage Temperature : -55 to +125°C

### Standard Testing Condition

<Unless otherwise specified>

Temperature : Ordinary Temp. / 15 to 35 °C

Humidity : Ordinary Humidity / 25 to 85 % (RH)

<In case of doubt>

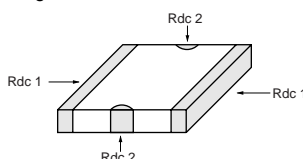
Temperature : 20±2 °C

Humidity : 60 to 70 % (RH)

Atmospheric pressure : 86 to 106 kPa

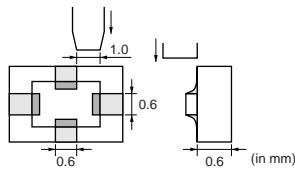
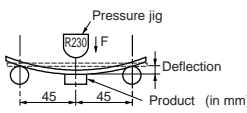
### Specifications

#### 1. Electrical Performance

No.	Item	Specifications	Test Methods
1	Capacitance (Cap.)	Meet rating table above.	Frequency 22 to 100pF : 1.0±0.1MHz 220 to 22000pF : 1.0±0.1kHz Voltage : 1±0.2V (rms)
2	Insulation Resistance (I. R.)		Voltage : Rated Voltage Charging Time : 2 minutes max.
3	Withstanding Voltage	Products should not be damaged.	Test Voltage : 150V(DC) Testing Time : 1 to 5 s Charge/Dis charge Current : 50 mA max.
4	DC Resistance (Rdc1,2)	Meet rating table above.	Measured with 100mA max. Rdc1 : between signal terminals Rdc2 : between ground terminals 

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• You are able to read a detailed specification in the website (<http://search.murata.co.jp/>) before to require our product specification or to transact the approval sheet for product specification.

## 2. Mechanical Performance

No.	Item	Specifications	Test Methods														
1	Appearance and Dimensions	Meet dimensions.	Visual Inspection and measured with Slide Calipers.														
2	Solderability	Electrodes should be at least 90% covered with new solder coating.	Flux : Ethanol solution of rosin, 25(wt)% Pre-heat : 150±5°C, 60±5 s Solder : Sn / Pb = 60 / 40 Solder Temperature : 230 ± 5°C Immersion Time : 2±0.5 s Immersion and emersion rates : 25mm / s														
3	Resistance to soldering heat	Meet Table 1. Table 1 <table border="1"> <tr> <td>Appearance</td> <td colspan="2">No damaged</td> </tr> <tr> <td>Cap. Change</td> <td colspan="2">within ± 7.5%</td> </tr> <tr> <td>I. R.</td> <td colspan="2">meet rating table above</td> </tr> <tr> <td rowspan="2">Rdc 1, 2</td> <td>22 to 2200pF</td> <td>0.5Ω max.</td> </tr> <tr> <td>22000pF</td> <td>0.05Ω max.</td> </tr> </table>	Appearance	No damaged		Cap. Change	within ± 7.5%		I. R.	meet rating table above		Rdc 1, 2	22 to 2200pF	0.5Ω max.	22000pF	0.05Ω max.	Flux : Ethanol solution of rosin, 25 (wt)% Pre-heat : 150±5°C, 60±5s Solder : Sn / Pb = 60 / 40 Solder Temperature : 270 ± 5°C Immersion Time : 10 ± 1 s Immersion and emersion rates : 25mm / s Then measured after exposure in the room condition f or following hours. 22 to 100pF : 24±2 hrs. 220 to 22000pF : 48±4 hrs. Initial values : About 220 to 22000pF, measured after heat treatment [150°C (+0, -10°C), 1hour] and exposure in the room condition for 48±4h.
Appearance	No damaged																
Cap. Change	within ± 7.5%																
I. R.	meet rating table above																
Rdc 1, 2	22 to 2200pF	0.5Ω max.															
	22000pF	0.05Ω max.															
4	Bonding Strength	The electrodes should be no failure after tested.	It should be soldered on the glass-epoxy substrate. Applying Force (F) : 17.6 N Applying Time : 60 s 														
5	Bending Strength	Meet Table 2. Table 2 <table border="1"> <tr> <td>Appearance</td> <td colspan="2">No damaged</td> </tr> <tr> <td>Cap. Change</td> <td colspan="2">within ± 12.5%</td> </tr> <tr> <td rowspan="2">Rdc 1, 2</td> <td>22 to 2200pF</td> <td>0.5Ω max.</td> </tr> <tr> <td>22000pF</td> <td>0.05Ω max.</td> </tr> </table>	Appearance	No damaged		Cap. Change	within ± 12.5%		Rdc 1, 2	22 to 2200pF	0.5Ω max.	22000pF	0.05Ω max.	It should be soldered on the glass-epoxy substrate (t = 1.0mm). Deflection : 2 mm Keeping Time : 30 s 			
Appearance	No damaged																
Cap. Change	within ± 12.5%																
Rdc 1, 2	22 to 2200pF	0.5Ω max.															
	22000pF	0.05Ω max.															
6	Vibration	Meet Table 3. Table 3 <table border="1"> <tr> <td>Appearance</td> <td colspan="2">No damaged</td> </tr> <tr> <td>Capacitance</td> <td colspan="2">meet rating table above</td> </tr> <tr> <td rowspan="2">Rdc 1, 2</td> <td>22 to 2200pF</td> <td>0.5Ω max.</td> </tr> <tr> <td>22000pF</td> <td>0.05Ω max.</td> </tr> </table>	Appearance	No damaged		Capacitance	meet rating table above		Rdc 1, 2	22 to 2200pF	0.5Ω max.	22000pF	0.05Ω max.	It should be soldered on the glass-epoxy substrate. Oscillation Frequency : 10 to 55 to 10Hz for 1 min Total Amplitude : 1.5 mm or Acceleration anplitude 49m/s <sup>2</sup> whichever is smaller. Testing Time : A period of 2 hrs. in each of 3 mutually perpendicular directions. (Total 6 hrs.) Initial values : About 220 to 22000pF, measured after heat treatment [150°C (+0, -10°C), 1hour] and exposure in the room condition for 48±4h.			
Appearance	No damaged																
Capacitance	meet rating table above																
Rdc 1, 2	22 to 2200pF	0.5Ω max.															
	22000pF	0.05Ω max.															

### 3. Environment Performance (It should be soldered on the glass-epoxy substrate.)

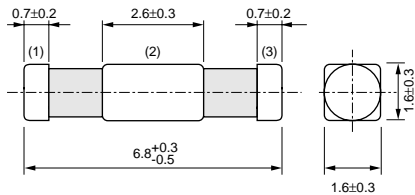
No.	Item	Specifications	Test Methods														
1	Humidity		Temperature : $70 \pm 2 \text{ }^\circ\text{C}$ Humidity : 90 to 95%(RH) Time : 1000 hrs. (+48hrs., -0 hr.) Then measured after exposure in the room condition for following hours. 22 to 100pF : $24 \pm 2$ hrs. 220 to 22000pF : $48 \pm 4$ hrs.														
2	Heat Life	Meet Table 4. Table 4 <table border="1"> <tr> <td>Appearance</td> <td colspan="2">No damaged</td> </tr> <tr> <td>Cap. Change</td> <td colspan="2">within <math>\pm 12.5\%</math></td> </tr> <tr> <td>I. R.</td> <td colspan="2">meet rating table above</td> </tr> <tr> <td rowspan="2">Rdc 1, 2</td> <td>22 to 2200pF</td> <td>0.5<math>\Omega</math> max.</td> </tr> <tr> <td>22000pF</td> <td>0.05<math>\Omega</math> max.</td> </tr> </table>	Appearance	No damaged		Cap. Change	within $\pm 12.5\%$		I. R.	meet rating table above		Rdc 1, 2	22 to 2200pF	0.5 $\Omega$ max.	22000pF	0.05 $\Omega$ max.	Temperature : $125 \pm 3 \text{ }^\circ\text{C}$ Test Voltage : Rated Voltage x 200% Applying Current : 50 mA max. Time : 1000 hrs. (+48hrs., -0hr.) Then measured after exposure in the room condition for following hours. 22 to 100pF : $24 \pm 2$ hrs. 220 to 22000pF : $48 \pm 4$ hrs. Initial values : About 220 to 22000pF, measured after heat treatment [ $150^\circ\text{C}$ (+0, - $10^\circ\text{C}$ ), 1hour] and exposure in the room condition for $48 \pm 4$ h.
Appearance	No damaged																
Cap. Change	within $\pm 12.5\%$																
I. R.	meet rating table above																
Rdc 1, 2	22 to 2200pF	0.5 $\Omega$ max.															
	22000pF	0.05 $\Omega$ max.															
3	Cold Resistance		Temperature : $-55 \pm 2 \text{ }^\circ\text{C}$ Time : 1000 hrs. (+48hrs., -0hr.) Then measured after exposure in the room condition for following hours. 22 to 100pF : $24 \pm 2$ hrs. 220 to 22000pF : $48 \pm 4$ hrs.														
4	Temperature Cycling	Meet Table 5. Table 5 <table border="1"> <tr> <td>Appearance</td> <td colspan="2">No damaged</td> </tr> <tr> <td>Cap. Change</td> <td colspan="2">within <math>\pm 7.5\%</math></td> </tr> <tr> <td>I. R.</td> <td colspan="2">meet rating table above</td> </tr> <tr> <td rowspan="2">Rdc 1, 2</td> <td>22 to 2200pF</td> <td>0.5<math>\Omega</math> max.</td> </tr> <tr> <td>22000pF</td> <td>0.05<math>\Omega</math> max.</td> </tr> </table>	Appearance	No damaged		Cap. Change	within $\pm 7.5\%$		I. R.	meet rating table above		Rdc 1, 2	22 to 2200pF	0.5 $\Omega$ max.	22000pF	0.05 $\Omega$ max.	1 Cycle 1 step : $-55 \pm 3 \text{ }^\circ\text{C}$ / 30 $\pm 3$ minutes 2 step : Room Temperature / within 5 min. 3 step : $-125 \pm 3 \text{ }^\circ\text{C}$ / 30 $\pm 3$ minutes 4 step : Room Temperature / within 5 min. Total of 1000 cycles Then measured after exposure in the room condition for following hours. 22 to 100pF : $24 \pm 2$ hrs. 220 to 22000pF : $48 \pm 4$ hrs. Initial values : About 220 to 22000pF, measured after heat treatment [ $150^\circ\text{C}$ (+0, - $10^\circ\text{C}$ ), 1hour] and exposure in the room condition for $48 \pm 4$ h.
Appearance	No damaged																
Cap. Change	within $\pm 7.5\%$																
I. R.	meet rating table above																
Rdc 1, 2	22 to 2200pF	0.5 $\Omega$ max.															
	22000pF	0.05 $\Omega$ max.															

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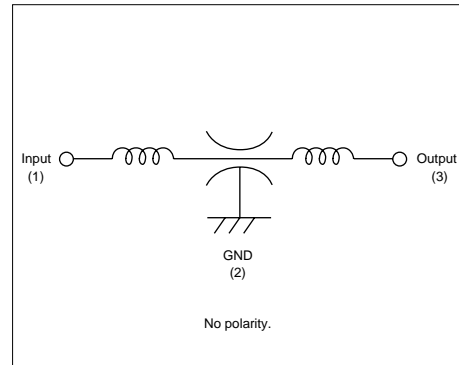
## Chip LC Combined

T-type Chip EMIFIL<sup>®</sup> NFE61H Series

Equivalent Circuit



(in mm)



Part Number	Capacitance	Rated Voltage	Withstanding Voltage	Rated Current	Insulation Resistance
NFE61HT330U2A9	33pF±30%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.
NFE61HT680R2A9	68pF±30%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.
NFE61HT101Z2A9	100pF±30%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.
NFE61HT181C2A9	180pF±30%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.
NFE61HT361C2A9	360pF±20%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.
NFE61HT681D2A9	680pF±30%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.
NFE61HT102F2A9	1000pF +80, -20%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.
NFE61HT332Z2A9	3300pF +80, -20%	100V (DC)	250V (DC)	2A (DC)	1000Mohm min.

Operating Temperature : -55 to +125 °C

Storage Temperature : -55 to +125 °C

### ■ Standard Testing Condition

<Unless otherwise specified>

Temperature : Ordinary Temp. 15 to 35°C

Humidity : Ordinary Humidity 25 to 85% (RH)

<In case of doubt>

Temperature : 20±2°C

Humidity : 60 to 70% (RH)

Atmospheric pressure : 86 to 106kPa

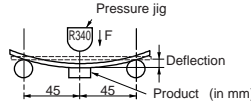
### ■ Specifications

#### 1. Electrical Performance

No.	Item	Specifications	Test Methods														
1	Capacitance	Meet rating table above	Table 1 <table border="1"> <thead> <tr> <th>Capacitance</th> <th>Voltage</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>33, 68, 100 (pF)</td> <td>1 to 5 V (rms)</td> <td>1MHz±10%</td> </tr> <tr> <td>180, 360, 680, 1000, 3300 (pF)</td> <td>1±0.2 V (rms)</td> <td>1kHz±10%</td> </tr> </tbody> </table>	Capacitance	Voltage	Frequency	33, 68, 100 (pF)	1 to 5 V (rms)	1MHz±10%	180, 360, 680, 1000, 3300 (pF)	1±0.2 V (rms)	1kHz±10%					
Capacitance	Voltage	Frequency															
33, 68, 100 (pF)	1 to 5 V (rms)	1MHz±10%															
180, 360, 680, 1000, 3300 (pF)	1±0.2 V (rms)	1kHz±10%															
2	Insulation Resistance (I. R.)	Meet rating table above	Voltage : 100 V (DC) Charging Time : 60±5s														
3	Withstanding Voltage	Products should not be damaged.	Test Voltage : 250 V (DC) Testing Time : 1 to 5 s Charge/Discharge current : 10mA max.														
4	Resistance to Surge Voltage	Meet Table 2. Table 2 <table border="1"> <thead> <tr> <th>Appearance</th> <th colspan="2">No damaged</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Cap. Change</td> <td>33, 68, 100, 180, 360, 680 (pF)</td> <td>within±15%</td> </tr> <tr> <td>1000, 3300 (pF)</td> <td>within±30%</td> </tr> <tr> <td>I. R.</td> <td colspan="2">Meet rating table above.</td> </tr> <tr> <td>Withstanding Voltage</td> <td colspan="2">No damaged</td> </tr> </tbody> </table>	Appearance	No damaged		Cap. Change	33, 68, 100, 180, 360, 680 (pF)	within±15%	1000, 3300 (pF)	within±30%	I. R.	Meet rating table above.		Withstanding Voltage	No damaged		Attenuating transient voltage of exponential function should be applied to products on the condition.  Peak Voltage : 400 V Force Period : 1 s The number of Surges : 10 <sup>5</sup>
Appearance	No damaged																
Cap. Change	33, 68, 100, 180, 360, 680 (pF)	within±15%															
	1000, 3300 (pF)	within±30%															
I. R.	Meet rating table above.																
Withstanding Voltage	No damaged																

△Note • This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specification or transact the approval sheet for product specification before ordering. Especially, please read rating and △CAUTION (for storage and operating, rating, soldering and mounting, handling) in them to prevent smoking and/or burning, etc.  
 • You are able to read a detailed specification in the website (<http://search.murata.co.jp/>) before to require our product specification or to transact the approval sheet for product specification.

## 2. Mechanical Performance

No.	Item	Specifications	Test Methods								
1	Appearance and Dimensions	Meet dimensions.	Visual Inspection and measured with Slide Calipers								
2	Solderability	The electrodes should be at least 75% covered with new solder coating.	Flux : Ethanol solution of rosin,25 (wt)% Pre-heat : 150±5 °C, 60±5 s Solder : Sn/Pb = 60/40 Solder Temperature : 230±5 °C Immersion Time : 4±1 s Immersion and emersion rates : 25mm / s								
3	Resistance to soldering heat		Flux : Ethanol solution of rosin,25 (wt)% Pre-heat : 150±5 °C, 60±5 s Solder : Sn/Pb = 60/40 Solder Temperature : 270±5 °C (for NFE61HT332Z2A9□ : 250±5°C) Immersion Time : 10±1 s Immersion and emersion rates : 25 mm/s.								
4	Bending Strength	Meet Table 3. Table 3 <table border="1"> <thead> <tr> <th>Appearance</th> <th colspan="2">No damaged</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Cap. Change</td> <td>33, 68, 100, 180, 360, 680 (pF)</td> <td>within±15%</td> </tr> <tr> <td>1000, 3300 (pF)</td> <td>within±30%</td> </tr> </tbody> </table>	Appearance	No damaged		Cap. Change	33, 68, 100, 180, 360, 680 (pF)	within±15%	1000, 3300 (pF)	within±30%	It should be soldered on the Paper-phenol substrate. (t=1.6mm)  Deflection : 3 mm Keeping Time : 30 s
Appearance	No damaged										
Cap. Change	33, 68, 100, 180, 360, 680 (pF)	within±15%									
	1000, 3300 (pF)	within±30%									
5	Vibration		Oscillation Frequency : 10 to 2000 to 10Hz for 20 min Total Amplitude : 1.5 mm or Acceleration amplitude 49m/s <sup>2</sup> whichever is smaller Testing Time : A period of 2 hours on each of 3 mutually perpendicular directions (Total 6 hrs.)								

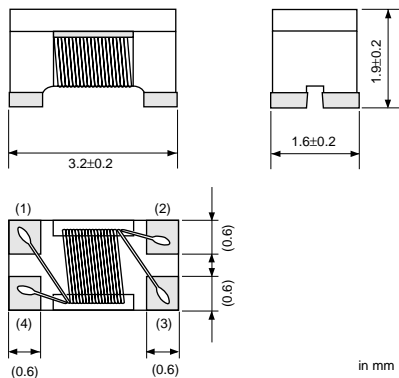
## 3. Environment Performance (It should be soldered on the substrate.)

No.	Item	Specifications	Test Methods														
1	Humidity	Meet Table 4. Table 4	Temperature : 85±2 °C Humidity : 85 % (RH) Time : 1000 hrs. (+48 hrs. , -0 hr.) Then measured after exposure in the room condition for 4 to 48 hrs..														
2	Heat Life	<table border="1"> <thead> <tr> <th>Appearance</th> <th colspan="2">No damaged</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Cap. Change</td> <td>33, 68, 100, 180, 360, 680 (pF)</td> <td>within±15%</td> </tr> <tr> <td>1000, 4700 (pF)</td> <td>within±30%</td> </tr> <tr> <td>I. R.</td> <td colspan="2">100 MΩ min.</td> </tr> <tr> <td>Withstanding Voltage</td> <td colspan="2">No damaged</td> </tr> </tbody> </table>	Appearance	No damaged		Cap. Change	33, 68, 100, 180, 360, 680 (pF)	within±15%	1000, 4700 (pF)	within±30%	I. R.	100 MΩ min.		Withstanding Voltage	No damaged		Temperature : 125±2 °C Test Voltage : 33,68,100,180,360,680 (pF) : Rated Voltage x 200% 1000,3300 (pF) : Rated Voltage x 150% Time : 1000 hrs. (+48hrs. , -0hr.) Then measured after exposure in the room condition for 4 to 48 hrs..
Appearance	No damaged																
Cap. Change	33, 68, 100, 180, 360, 680 (pF)	within±15%															
	1000, 4700 (pF)	within±30%															
I. R.	100 MΩ min.																
Withstanding Voltage	No damaged																
3	Cold Resistance		Temperature : -55±2 °C Time : 500 hrs. (+24hrs., -0hr.)														
4	Temperature Cycling	Meet Table 2	1 Cycle 1step : -55°C (+0°C, -3°C) / 30±3 min. 2step : Room Temperature / within 5 min. 3step : +125°C (+3°C, -0°C) / 30±3 min. 4step : Room Temperature / within 5 min. Total of 500 cycles Then measured after exposure in the room condition for 4 to 48 hrs..														

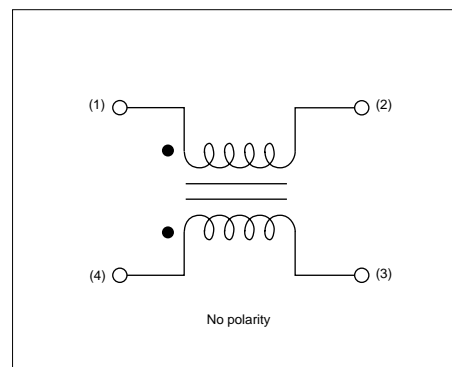


## Chip Common Mode Choke Coils Winding Type

Wire Wound DLW31SH Series



Equivalent Circuit



Part Number	Common Mode Impedance (at 100MHz, Under Standard Testing Condition)	Rated Voltage V (DC)	Withstanding Voltage V (DC)	Rated Current (mA)	DC Resistance	Insulation Resistance (Mohm min.)
<b>DLW31SH222SQ2</b>	2200 ohm±25%	32	80	80	1.6 ohm±20%	10

Operating Temperature : -40 to +125°C Storage Temperature : -40 to +125°C

### Notice (Handling)

- Do not make any resin coating.  
Resin coating may cause;
- a change in impedance value
  - open circuit of wire

### Standard Testing Condition

<Unless otherwise specified>

Temperature : Ordinary Temperature 15 to 35°C

Humidity : Ordinary Humidity 25 to 85% (RH)

<In case of doubt>

Temperature : 20±2°C

Humidity : 60 to 70% (RH)

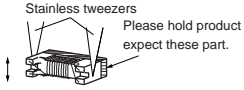
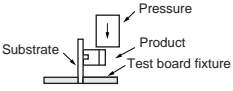
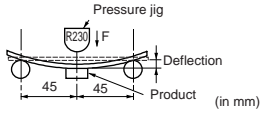
Atmospheric Pressure : 86 to 106kPa

### Specifications

#### 1. Electrical Performance

No.	Item	Specifications	Test Methods
1	Common Mode Impedance (Zc)	Meet rating table above	Measuring Equipment : HP4291A or the equivalent Measuring Frequency : 100±1MHz Test Fixture : Agilent 16092A or equivalent
2	Insulation Resistance (I.R.)		Measuring voltage : Rated Voltage Charging time : 1 minute max.
3	Withstanding Voltage	Products should not be damaged.	Test Voltage : 2.5 times for Rated Voltage Tsting Time : 1 to 5 s Charge/Dis charge Current : 1 mA max.
4	DC Resistance (Rdc)	Meet rating table above	Measuring current : 10mA max. (In case of doubt in the above mentioned standard condition, measure by 4 terminal methods.)

## 2. Mechanical Performance

No.	Item	Specifications	Test Methods
1	Appearance and Dimensions	Meet dimensions.	Visual Inspection and measured with Slide Calipers
2	Solderability	The electrodes should be at least 90% covered with new solder coating.	<p>The electrodes should be at least 90% covered with new solder coating.</p> <p>Flux : Ethanol solution of rosin,25 (wt) % includes activator equivalent to 0.06 to 0.10 (wt) % chlorine                      Pre-Heating : 150±5°C, 60±5s                      Solder : Sn/Pb=60/40                      Solder Temperature : 230±5°C                      Immersion Time : 3±0.5 s                      Immersion and emersion rates : 25mm / s</p> 
3	Resistance to Soldering Heat	Meet Table 1.	<p>Flux : Ethanol solution of rosin,25(wt)% includes activator equipment to 0.06 to 0.10(wt)% chlorine                      Pre-Heating : 150±5°C, 60±5s                      Solder: Sn/Pb=60/40                      Solder Temperature : 260±5°C                      Immersion Time : 10±1s                      Immersion and emersion rates : 25mm / s                      Then measured after exposure in the room condition for 4 to 48 hrs..</p>
4	Bonding Strength	No evidence of coming off substrate. Products should not be mechanical damaged.	<p>It should be soldered on the substrate.                      Applying Force(F) : 10N                      Applying Time : 5±1 s</p> 
5	Bending Strength	Meet Table 1.	<p>It should be soldered on the Glass-epoxy substrate (t=1.0mm).                      Deflection (n) : 2.0mm                      Keeping time : 5 s                      Speed of Applying Force : 0.5mm/s</p> 
6	Vibration		<p>It should be soldered on the substrate.                      Oscillation Frequency : 10 to 2000 to 10Hz for 20 min                      Total Amplitude 1.5mm or Acceleration amplitude 49m/s<sup>2</sup> whichever is smaller.                      Testing Time : A period of 2 hrs. in each of 3 mutually perpendicular directions. (Total 6 hrs.)</p>

## 3. Environmental Performance (Products shall be soldered on the substrate.)

No.	Item	Specifications	Test Methods
1	Humidity	Meet Table 1.	Temperature : 85±2°C Humidity : 85%(RH) Time : 1000hrs. (+48 hrs., -0 hr.) Then measured after exposure in the room condition for 4 to 48 hrs..
2	Heat Life		Temperature : 125±2°C Applying Voltage : Rated Current Time : 1000hrs. (+48 hrs., -0 hr.) Then measured after exposure in the room condition for 4 to 48 hrs..
3	Cold Resistance		Temperature : -40± 2°C Time : 1000hrs. (+48 hrs., -0 hr.) Then measured after exposure in the room condition for 4 to 48 hrs..

Continued on the following page.

Continued from the preceding page.

No.	Item	Specifications	Test Methods
4	Temperature Cycle	Meet Table 1.	1 Cycle Step 1 -40°C (+0°C, -3°C) / 30±3 min Step 2 Room Temperature / within 5 min. Step 3 +125°C (+3°C, -0°C) / 30±3 min Step 4 Room Temperature / within 5 min. Total of 1000 cycles Then measured after exposure in the room condition for 4 to 48 hrs..

Table 1

Appearance	No damaged
Common Mode Impedance Change	within±20%
Insulation Resistance	10MΩ min.
Withstanding Voltage	No damaged

#### 4. Test Terminal (When measuring and supplying the voltage, the following terminal is applied.)

No.	Item	Terminal to be Tested
1	Common Mode Impedance (Measurement Terminal)	
2	Withstanding Voltage (Measurement Terminal)	
3	DC Resistance (Measurement Terminal)	
4	Insulation Resistance (Measurement Terminal)	
5	Heat Life (Supply Terminal)	

#### ■ Measuring Method for Common Mode Impedance

Measured common mode impedance may be included measurement error due to stray capacitance, residual inductance of test fixture.

To correct this error, the common mode impedance should be calculate as follows;

- (1) Measure admittance of the fixture (opened),  $G_o$   $B_o$ .
- (2) Measure impedance of the fixture (shorted),  $R_s$   $X_s$ .
- (3) Measure admittance of the specimen,  $G_m$   $B_m$ .
- (4) Calculate corrected impedance  $|Z|$  using the formula below.

$$|Z| = (R_x^2 + X_x^2)^{1/2}$$

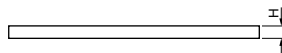
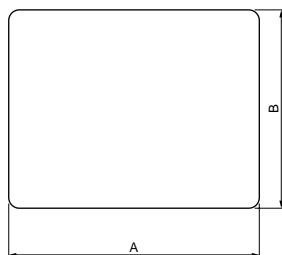
Where

$$R_x = \frac{G_m - G_o}{(G_m - G_o)^2 + (B_m - B_o)^2} - R_s$$

$$X_x = \frac{-(B_m - B_o)}{(G_m - G_o)^2 + (B_m - B_o)^2} - X_s$$

# Ferrite Cores for EMI Suppression

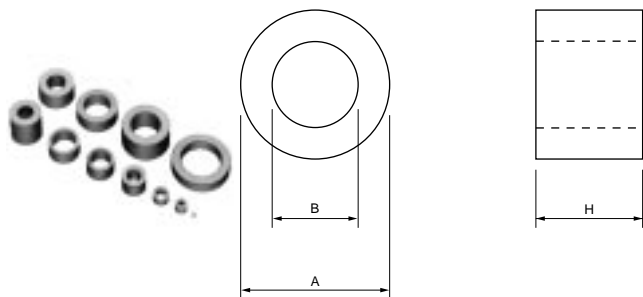
## Plate Cores



Part Number	A: Outer Dimension (mm)	B: Width Dimension (mm)	H: Thickness Dimension (mm)
FSSA100Z55RN000T	10.0	10.0	0.55
FSSA100008RN000T	10.0	10.0	0.8
FSSA100010RN000T	10.0	10.0	1.0
FSSA190010RN000T	19.0	6.0	1.0
FSSA202010RN000T	20.0	16.5	1.0
FSSA202015RN000T	20.0	16.5	1.5
FSSA203005RN000T	20.0	20.0	0.5
FSSA203010RN000T	20.0	20.0	1.0
FSSA222011RT000T	22.8	16.5	1.1
FSSA230008RN000T	23.0	23.0	0.8
FSSA230010RN000T	23.0	23.0	1.0
FSSA230015RN000T	23.0	23.0	1.5
FSSA270010RN000T	27.0	20.0	1.0
FSSA271010RN000T	27.0	27.0	1.0
FSSA271020RN000T	27.0	27.0	2.0
FSSA271050RN000T	27.0	27.0	5.0
FSSA300010RN000T	30.0	30.0	1.0
FSSA450015RT000T	45.0	10.0	1.5
FSSA530015RT000T	52.8	28.5	1.5
FSSA600020RN000T	60.5	30.6	2.0

# Ferrite Cores for EMI Suppression

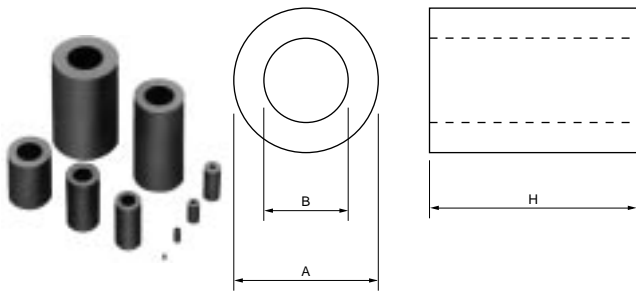
## Ring Core



Part Number	Phi A: Outer Dimension (mm)	Phi B: Inner Dimension (mm)	H: Length Dimension (mm)	Impedance at 100MHz (3 turns) (ohm)
FSRB060040RNB00B	5.5	2.7	4.0	290
FSRB071040RNB00B	7.0	4.0	4.0	222
FSRB090060RNB00B	9.0	5.0	6.0	356
FSRB090080RNB00B	9.0	5.0	8.0	466
FSRB091060RNB00B	9.0	4.3	6.0	451
FSRB091080RNB00B	9.0	4.3	8.0	582
FSRB100030RTB00B	10.0	6.0	3.0	170
FSRB100060RTB00B	10.0	6.0	6.0	316
FSRB100080RTB00B	10.0	6.0	8.0	388
FSRB100100RTB00B	10.0	6.0	10.0	475
FSRB120050RTB00T	12.0	7.0	5.0	264
FSRB120060RTB00T	12.0	7.0	6.0	310
FSRB120080RTB00T	12.0	7.0	8.0	400
FSRB120100RTB00T	12.0	7.0	10.0	450
FSRB121060RTB00T	12.0	5.6	6.0	406
FSRB121080RTB00T	12.0	5.6	8.0	490
FSRB121100RTB00T	12.0	5.6	10.0	535
FSRB140080RNB00T	14.0	10.0	8.0	340
FSRB140140RNB00T	14.0	10.0	14.0	450
FSRB142060RXB00T	14.0	8.0	6.0	325
FSRB142080RXB00T	14.0	8.0	8.0	415
FSRB142100RXB00T	14.0	8.0	10.0	492
FSRB143140RNB00T	14.0	11.0	14.0	364
FSRB160G75RN000T	16.0	12.0	7.75	247
FSRB162030RNB00T	16.3	8.3	3.0	230
FSRB162050RN000T	16.3	8.3	5.0	310
FSRB162100RNB00T	16.3	8.3	10.0	557
FSRB162160RN000T	16.3	8.3	16.0	640
FSRB190060RTB00T	19.0	10.0	6.0	360
FSRB190100RT000T	19.0	10.0	10.0	480
FSRB190180RT000T	19.0	10.0	18.0	619
FSRB221080RNB00T	22.0	14.0	8.0	360
FSRB250120RT000T	25.0	15.0	12.0	470
FSRB300080RT000T	30.0	20.0	8.0	300

# Ferrite Cores for EMI Suppression

## Beads Core

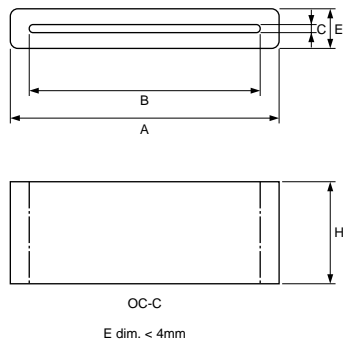


Part Number	Phi A: Outer Dimension (mm)	Phi B: Inner Dimension (mm)	H: Length Dimension (mm)	Impedance at 100MHz (1 turn) (ohm)
FSRH021049RNB00B	1.95	1.02	4.9	34
FSRH030060RNB00B	3.36	1.1	6.0	74
FSRH041D85RNB00B	3.6	1.0	4.85	66
FSRH044050RNB00B	3.6	1.5	5.0	53
FSRH050050RN000B	4.7	1.4	5.0	64
FSRH050100RN000B	4.7	1.4	10.0	120
FSRH060080RN000B	5.5	2.7	8.0	64
FSRH070080RN000B	7.0	4.0	8.0	59
FSRH070140RN000B	7.0	4.0	14.0	82
FSRH090100RN000B	9.0	5.0	10.0	72
FSRH090160RN000B	9.0	5.0	16.0	100
FSRH090200RN000T	9.0	5.0	20.0	135
FSRH091100RN000B	9.0	4.3	10.0	94
FSRH091160RN000T	9.0	4.3	16.0	145
FSRH100150RTB00T	10.0	6.0	15.0	92
FSRH120150RT000T	12.0	7.0	15.0	90
FSRH120200RT000T	12.0	7.0	20.0	120
FSRH120285RT000T	12.0	7.0	28.5	175
FSRH121150RT000T	12.0	5.6	15.0	130
FSRH121200RT000T	12.0	5.6	20.0	170
FSRH121250RT000T	12.0	5.6	25.0	223
FSRH142150RX000T	14.0	8.0	15.0	97
FSRH142200RX000T	14.0	8.0	20.0	127
FSRH142280RX000T	14.0	8.0	28.0	170
FSRH162200RN000T	16.3	8.3	20.0	162
FSRH162280RN000T	16.3	8.3	28.0	225
FSRH190285RT000T	19.0	10.0	28.5	200

# Ferrite Cores for EMI Suppression

## Flat Cables

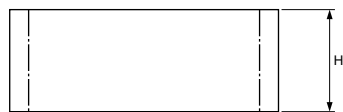
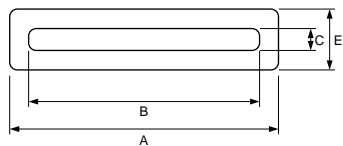
● Thin Type



Part Number	A: Outer Dimension (mm)	B: Inner Dimension (mm)	H: Length Dimension (mm)	E: Width Dimension (mm)	C: Gap Dimension (mm)	Impedance at 100MHz (ohm)	Number of Turn
FSRC080030RTB00B	8.0	6.0	3.0	2.7	0.7	28	1
FSRC080060RTB00B	8.0	6.0	6.0	2.7	0.7	39	1
FSRC080090RTB00B	8.0	6.0	9.0	2.7	0.7	51	1
FSRC080120RTB00B	8.0	6.0	12.0	2.7	0.7	63	1
FSRC100030RTB00B	10.0	8.0	3.0	1.75	0.7	25	1
FSRC100060RTB00B	10.0	8.0	6.0	1.75	0.7	30	1
FSRC120020RXB00B	11.5	8.0	2.0	3.0	0.7	24	1
FSRC120050RXB00B	11.5	8.0	5.0	3.0	0.7	35	1
FSRC120060RXB00B	11.5	8.0	6.0	3.0	0.7	36	1
FSRC120090RXB00B	11.5	8.0	9.0	3.0	0.7	48	1
FSRC120120RXB00B	11.5	8.0	12.0	3.0	0.7	59	1
FSRC150030RTB00B	15.6	13.6	3.0	1.85	0.7	25	1
FSRC150060RTB00B	15.6	13.6	6.0	1.85	0.7	30	1
FSRC160040RTB00T	15.6	13.6	4.0	2.8	0.7	26	1
FSRC171030RTB00T	17.0	13.6	3.0	2.8	0.7	26	1
FSRC171060RTB00T	17.0	13.6	6.0	2.8	0.7	37	1
FSRC171090RTB00T	17.0	13.6	9.0	2.8	0.7	44	1
FSRC171120RTB00T	17.0	13.6	12.0	2.8	0.7	53	1
FSRC221150RTF10T	22.8	18.8	15.0	2.8	0.55	73	1
FSRC222060RX000T	22.8	18.7	6.0	2.8	0.7	37	1
FSRC222090RX000T	22.8	18.7	9.0	2.8	0.7	46	1
FSRC222120RX000T	22.8	18.7	12.0	2.8	0.7	53	1
FSRC230060RTB00T	22.7	20.6	6.0	1.75	0.6	33	1
FSRC230090RTB00T	22.7	20.6	9.0	1.75	0.6	39	1
FSRC253060RT000T	25.0	21.0	6.0	3.0	0.8	41	1
FSRC253090RT000T	25.0	21.0	9.0	3.0	0.8	48	1
FSRC253120RT000T	25.0	21.0	12.0	3.0	0.8	56	1
FSRC280060RX000T	28.0	24.0	6.0	3.5	0.8	39	1
FSRC280090RX000T	28.0	24.0	9.0	3.5	0.8	46	1
FSRC280120RX000T	28.0	24.0	12.0	3.5	0.8	56	1
FSRC360060RX000T	36.0	32.0	6.0	3.5	0.8	40	1
FSRC360090RX000T	36.0	32.0	9.0	3.5	0.8	47	1
FSRC360120RX000T	36.0	32.0	12.0	3.5	0.8	56	1
FSRC420060RX000T	42.0	38.0	6.0	2.8	0.7	42	1
FSRC420090RX000T	42.0	38.0	9.0	2.8	0.7	48	1
FSRC420120RX000T	42.0	38.0	12.0	2.8	0.7	57	1

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● Standard Type



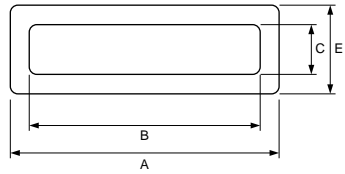
OC-B  
Normal type

Part Number	A: Outer Dimension (mm)	B: Inner Dimension (mm)	H: Length Dimension (mm)	E: Width Dimension (mm)	C: Gap Dimension (mm)	Impedance at 100MHz (ohm)	Number of Turn
FSRC140030RXB00T	13.8	9.6	3.0	5.0	0.8	30	1
FSRC140040RXB00T	13.8	9.6	4.0	5.0	0.8	36	1
FSRC140060RXB00T	13.8	9.6	6.0	5.0	0.8	44	1
FSRC140090RXB00T	13.8	9.6	9.0	5.0	0.8	66	1
FSRC140120RX000T	13.8	9.6	12.0	5.0	0.8	78	1
FSRC140200RXB00T	13.8	9.6	20.0	5.0	0.8	126	1
FSRC141060RXB00T	13.8	10.8	6.0	5.0	1.3	39	1
FSRC141120RXB00T	13.8	10.8	12.0	5.0	1.3	62	1
FSRC170030RTB00T	17.0	13.0	3.0	5.0	0.8	26	1
FSRC170060RTB00T	17.0	13.0	6.0	5.0	0.8	37	1
FSRC170070RT000T	17.0	13.0	7.0	5.0	0.8	45	1
FSRC170090RTB00T	17.0	13.0	9.0	5.0	0.8	53	1
FSRC170120RT000T	17.0	13.0	12.0	5.0	0.8	75	1
FSRC170200RT000T	17.0	13.0	20.0	5.0	0.8	107	1
FSRC192090RTB00T	18.8	14.6	9.0	5.9	1.6	47	1
FSRC240150RX000T	23.8	18.8	15.0	6.3	1.1	76	1
FSRC250070RT000T	25.0	21.0	7.0	5.0	0.8	45	1
FSRC250120RT000T	25.0	21.0	12.0	5.0	0.8	70	1
FSRC252050RT000T	25.0	21.0	5.0	5.0	1.2	35	1
FSRC252060RT000T	25.0	21.0	6.0	5.0	1.2	39	1
FSRC252090RT000T	25.0	21.0	9.0	5.0	1.2	47	1
FSRC252120RT000T	25.0	21.0	12.0	5.0	1.2	55	1
FSRC260060RT000T	26.0	22.0	6.0	5.0	1.2	38	1
FSRC260090RT000T	26.0	22.0	9.0	5.0	1.2	49	1
FSRC271113RN000T	27.0	22.25	11.3	8.05	2.15	60	1
FSRC310060RN000T	31.0	27.0	6.0	5.0	0.8	47	1
FSRC310090RN000T	31.0	27.0	9.0	5.0	0.8	58	1
FSRC310120RN000T	31.0	27.0	12.0	5.0	0.8	70	1
FSRC310200RN000T	31.0	27.0	20.0	5.0	0.8	102	1
FSRC320080RT000T	32.0	27.8	8.0	6.5	1.3	45	1
FSRC320120RT000T	32.0	27.8	12.0	6.5	1.3	60	1
FSRC400120RTF10T	40.0	35.0	12.0	4.0	0.5	80	1
FSRC401120RT000T	40.0	35.0	12.0	4.5	1.0	65	1
FSRC410150RN000T	41.2	35.0	15.0	7.7	1.5	70	1
FSRC560120RT000T	56.2	52.2	12.0	4.8	0.9	70	1
FSRC580060RT000T	58.0	52.8	6.0	6.7	1.5	46	1
FSRC580120RT000T	58.0	52.8	12.0	6.7	1.5	62	1
FSRC581180RTF00T	58.0	52.8	18.0	6.2	1.0	95	1
FSRC600100RN000T	60.0	48.0	10.0	12.0	1.9	69	1
FSRC600127RN000T	60.0	48.0	12.7	12.0	1.9	72	1
FSRC800127RTF30T	80.0	68.6	12.7	10.0	2.6	71	1

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● Wide Type



OC-A

C dim.  $\geq$  3mm

Part Number	A: Outer Dimension (mm)	B: Inner Dimension (mm)	H: Length Dimension (mm)	E: Width Dimension (mm)	C: Gap Dimension (mm)	Impedance at 100MHz (ohm)	Number of Turn
<b>FSRC142150RTB00T</b>	14.0	9.0	15.0	9.0	4.0	90	1
<b>FSRC190060RTB00T</b>	19.0	15.0	6.0	7.0	3.5	34	1
<b>FSRC191085RT000T</b>	19.0	13.0	8.5	18.0	12.0	44	1
<b>FSRC321100RN000T</b>	32.0	28.0	10.0	7.5	3.5	35	1
<b>FSRC321150RN000T</b>	32.0	28.0	15.0	7.5	3.5	47	1
<b>FSRC440100RN000T</b>	44.0	40.0	10.0	7.5	3.8	34	1

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