EMI FILTER

MCF18 (1608 (0603) size, 4A)

●Features

1) Small package.
2) Suitable for noise reduction for power supply lines.
3) The entire series is rated at 4A.
4) Low inner resistance, low dissipation internal.

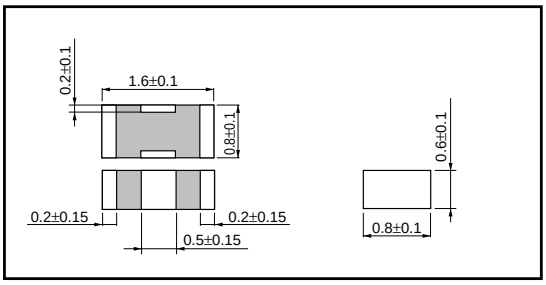
●Quick Reference

The design and specifications are subject to change without prior notice. Please check the most recent technical specifications prior to placing orders or using the product. For more detail information regarding packaging style code, please check product designation.

Part No.	Model Name	Capacitance (pF)	Capacitance tolerance (%)	Temperature characteristics code		Rated voltage (V)	Rated current (A/DC)	Insulation resistance(MΩ)	Operating temperature(°C)	Thickness (mm)
MCF18	MCF182CN102M04AK	1000	M (±20)	CN	Rate of capacitance change ±15%	25	4	1000 Min.	−55 to +125	0.6
	MCF182CN222M04AK	2200								
	MCF182CN332M04AK	3300								
	MCF182CN472M04AK	4700								
	MCF182CN103M04AK	10000								
	MCF182CN223M04AK	22000								
	MCF182CN473M04AK	47000								
	MCF183CN104M04AK	100000				16		500 Min.		
	☆MCF184CN224M04AK	220000				10		230 Min.	−55 to +85	
	☆MCF184CN474M04AK	470000						110 Min.		
	☆MCF188CN105M04AK	1000000				6.3		50 Min.		

☆Under development

●Dimensions (Unit : mm)



●Part No. Explanation

Code	Rated current
04A	4A

Rated current

Code	Product thickness	Packaging specifications	Reel	Basic ordering unit(pcs.)
K	0.6mm	Paper tape(width 8mm, pitch 4mm)	ϕ180mm (7inch)	4,000

Reel(ϕ180mm):Compatible with JEITA standard "EIAJ ET-7200B"

Packaging Style

Part No.

M	C	F	1	8	2	C	N	3	3	2	M	0	4	A	K

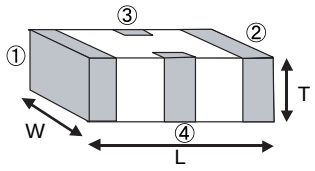
Rated voltage

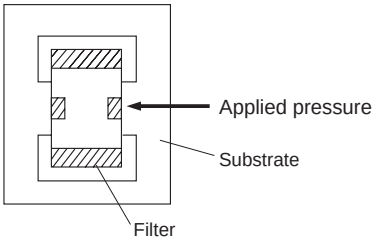
Code	Voltage
2	25V
3	16V
4	10V
8	6.3V

Temperature characteristic code
:Refer to quick reference table.

Nominal capacitance	Capacitance tolerance	
	Code	Tolerance
3-digit designation according to IEC	**M**	±20%

●Performance and test method

<table>
<tr><th>No.</th><th>Items</th><th>Performance</th><th>Test Method</th></tr>
<tr><td>1</td><td>Appearance and dimensions</td><td>No marked defects shall be allowed for appearance.</td><td>Using a Magnifier.</td></tr>
<tr><td>2</td><td>Withstanding voltage</td><td>No dielectrical breakdown or other damage shall be allowed.</td><td>Voltage shall be applied as per Table1.
Table 1
<table><tr><th>Charac-teristic</th><th>Voltage</th></tr><tr><td>CN</td><td>250% Rated voltage</td></tr></table>
Voltage shall be applied for 1 to 5s with 50mA charging and discharging current.</td></tr>
<tr><td>3</td><td>Insulation resistance</td><td>Not less than 1000MΩ or 100MΩ・μF, whichever is less.</td><td>Measurements shall be made after 60+/–5s period of the rated voltage</td></tr>
<tr><td>4</td><td>Capacitance</td><td>Capacitance shall be within specified tolerance range.</td><td>Measurements shall be made under the conditions specified in Table 2.
Table 2
<table><tr><th>Characteristics</th><th>Frequency・Voltage</th></tr><tr><td>CN</td><td>1+/–0.1kHz
1+/–0.1Vrms.</td></tr></table></td></tr>
<tr><td>5</td><td>Dielectric loss tangent</td><td>CN</td><td>tan δ ≤ 3.0%
Measurements shall be made under the conditions specified in Table 2.</td></tr>
<tr><td>6</td><td>Resistance</td><td>Within specified tolerance range
<table><tr><th>Rated current</th><th>between①-② terminal resistance</th><th>between③-④ terminal resistance</th></tr><tr><td>4A</td><td>20mΩMax.</td><td>2000mΩMax.</td></tr></table></td><td>Measurement current 100mA max
 
</td></tr>
</table>

<table>
<tr><th>No.</th><th colspan="2">Items</th><th colspan="2">Performance</th><th>Test Method</th></tr>
<tr><td>7</td><td>Temperature characteristic</td><td>Without voltage application</td><td>CN</td><td>+/–15%
(–55°C to +125°C)</td><td>If required measurements shall be made at a given temperature.</td></tr>
<tr><td>8</td><td colspan="2">Solderability</td><td colspan="2">More than 75% of each end termination shall be covered with new solder.</td><td>The solder specified in SnAg3.0Cu0.5 shall be used. And the flux containing 25% rosin and ethanol solution shall be used.
The specimens shall be immersed into the solder at 235+/–5°C for 2+/–0.5s
So that both end terminations are completely under solder.</td></tr>
<tr><td rowspan="4">9</td><td rowspan="4">Resistance to solderin heat</td><td>Appearance</td><td colspan="2">Without mechanical damage.</td><td rowspan="4">The solder specified in SnAg3.0Cu0.5 shall be used.
The specimens shall be immersed into the solder at 260+/–5°C for 5+/–0.5s so that both end terminations are completely under the solder.
Pre-heating at 150+/–10°C for 1 to 2min
Initial measurements prior to test shall be performed after the thermal
Pre-conditioning specified in Remarks (1).
Final measurements shall be made after the specimens have been left at room temperature as per Table3.
Table3
<table><tr><th>Charac-teristic</th><th>Time</th></tr><tr><td>CN</td><td>48+/–4 h</td></tr></table></td></tr>
<tr><td>Change rate from initial value</td><td>CN</td><td>Within +/–7.5%</td></tr>
<tr><td>Dielectric loss tangent</td><td colspan="2">Within specified initial value.</td></tr>
<tr><td>Insulation resistance</td><td colspan="2">Within specified initial value.</td></tr>
<tr><td>10</td><td colspan="2">End termination adherence</td><td colspan="2">Without peeling or sign of peeling shall be allowed on the end terminations.</td><td>A 5N weight for 10+/–1s shall be applied to the soldered specimens as shown by the arrow mark in the below sketch.
 
</td></tr>
</table>

<table>
<tr><th>No.</th><th colspan="2">Items</th><th colspan="2">Performance</th><th>Test Method</th></tr>
<tr><td>11</td><td>Bending strength</td><td>Appearance</td><td colspan="2">Without mechanical damage.</td><td>Glass epoxy board with soldered specimens shall be bent till 1mm by 1.0mm/s.</td></tr>
<tr><td rowspan="4">12</td><td rowspan="4">Vibration</td><td>Appearance</td><td colspan="2">Without mechanical damage.</td><td rowspan="4">The specimens shall be soldered on the specified test jig.
Initial measurements shall be made after the thermal pre-conditioning specified in Remarks(1).
Final measurements shall be made after the specimens have been left at room temperature as per Table3.
[Condition]
Directions : 2h each in X, Y and Z directions
Total : 6h
Frequency range : 10 to 55 to 10Hz(1min)
Applitude : 1.5mm
(shall not exceed acceleration196m/s^2)
Table3<table><tr><th>Charac-teristic</th><th>Time</th></tr><tr><td>CN</td><td>48+/–4 h</td></tr></table></td></tr>
<tr><td>Change rate from initial value</td><td>CN</td><td>Within +/–7.5%</td></tr>
<tr><td colspan="3">Dielectric loss tangent</td><td>Within specified initial value.</td></tr>
<tr><td rowspan="4">13</td><td rowspan="4">Temperature cycling</td><td>Appearance</td><td colspan="2">Without mechanical damage.</td><td rowspan="4">The specimens shall be soldered on the test jig shown in Remarks.
Temperature cycle : 100cycles Initial measurements prior to test shall be performed after the thermal per-conditioning specified in Remarks (1).
Final measurements shall be made after the specimens have been left at room temperature as per Table3.
<table><tr><th>Step</th><th>Temp. (°C)</th><th>Time (min)</th></tr><tr><td>1</td><td>Min operating temp.+/–3</td><td>30+/–3</td></tr><tr><td>2</td><td>Room temp.</td><td>≤ 3</td></tr><tr><td>3</td><td>Max operating temp.+/–3</td><td>30+/–3</td></tr><tr><td>4</td><td>Room temp.</td><td>≤ 3</td></tr></table>Table3<table><tr><th>Charac-teristic</th><th>Time</th></tr><tr><td>CN</td><td>48+/–4 h</td></tr></table></td></tr>
<tr><td>Change rate from initial value</td><td>CN</td><td>Within +/–7.5%</td></tr>
<tr><td>Dielectric loss tangent</td><td colspan="2">Within specified initial value.</td></tr>
<tr><td>Insulation resistance</td><td colspan="2">Within specified initial value.</td></tr>
</table>

<table>
<tr><th>No.</th><th colspan="2">Items</th><th colspan="2">Performance</th><th>Test Method</th></tr>
<tr><td rowspan="4">14</td><td rowspan="4">Humidity (Steady)</td><td>Appearance</td><td colspan="2">Without mechanical damage.</td><td rowspan="4">Test temperature : 60+/–2°C
Relative humidity : 90 to 95%
Test time : 500 +24/–0 h
Initial measurements prior to test shall be made after the voltage pre-conditioning specified in Remarks (2).
Final measurements have been left at room temperature as per Table3.
Table3<table><tr><th>Charac-teristic</th><th>Time</th></tr><tr><td>CN</td><td>48+/–4 h</td></tr></table></td></tr>
<tr><td>Change rate from initial value</td><td>CN</td><td>Within +/–12.5%</td></tr>
<tr><td>Dielectric tangent</td><td>CN</td><td>tan δ ≤ 200% initial spec.</td></tr>
<tr><td>Insulation resistance</td><td colspan="2">Not less than 500MΩ or 10MΩ µF, whichever is less.</td></tr>
<tr><td rowspan="4">15</td><td rowspan="4">Humidity life test</td><td>Appearance</td><td colspan="2">Without mechanical damage.</td><td rowspan="4">Test temperature : 60+/–2°C
Relative humidity : 90 to 95%
Voltage : Rated voltage
Test time : 500 +24/–0 h
Initial measurements prior to test shall be made after the voltage pre-conditioning specified in Remarks (2).
Final measurements shall be made after the specimens have been left at room temperature as per Table3.
Table3<table><tr><th>Charac-teristic</th><th>Time</th></tr><tr><td>CN</td><td>48+/–4 h</td></tr></table></td></tr>
<tr><td>Change rate from initial value</td><td>CN</td><td>Within +/–12.5%</td></tr>
<tr><td>Dielectric loss tangent</td><td>CN</td><td>tan δ ≤ 200% initial spec.</td></tr>
<tr><td>Insulation resistance</td><td colspan="2">Not less than 500MΩ or 10MΩ • µF, whichever is less.</td></tr>
<tr><td rowspan="4">16</td><td rowspan="4">Heat life test</td><td>Appearance</td><td colspan="2">Without mechanical damage.</td><td rowspan="4">Test temperature : 125+/–2°C
Voltage : Reated voltage x 200%
Test time : 1000 +48/–0 h
Initial measurements prior to test shall be made after the voltage pre-conditioning specified in Remarks (2).
Final measurements shall be made after the specimens have been left at room temperature as per Table3.
Table3<table><tr><th>Charac-teristic</th><th>Time</th></tr><tr><td>CN</td><td>48+/–4 h</td></tr></table></td></tr>
<tr><td>Change rate from initial value</td><td>CN</td><td>Within +/–15%</td></tr>
<tr><td>Dielectric loss tangent</td><td>CN</td><td>tan δ≤ 200% initial spec.</td></tr>
<tr><td>Insulation resistance</td><td colspan="2">Not less than 1000MΩ or 50MΩ • µF, whichever is less.</td></tr>
</table>

[Remarks]

Pre-conditioning

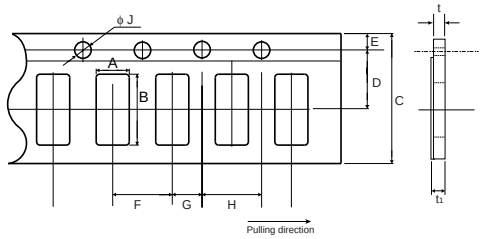
If specified in test method of as per 3(Performance and test method), capacitors of CN, characteristics shall be pre-conditionded as follows.

(1) Thermal pre-conditioning
Prior to initial measurements, specimens shall be conditioned at a temperature of 150 0/–10°C for a period of 1hr., and shall be allowed to stabilize at room temperature for 48+/–4h

(2) Voltage pre-conditioning
Prior to initial measurements, voltage specified as a test condition shall be applied to specimens for a period of 1hr., and the specimens shall be allowed to stabilize at room temperature for 48+/–4h

●Packaging specifications

Taping dimensions



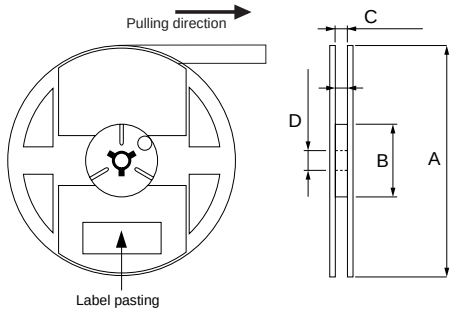
Symbol	C	D	E	F	G	H	J	t	t1
Dimensions	8.0 +/ −0.3	3.5 +/ −0.05	1.75 +/ −0.1	4.0 +/ −0.1	2.0 +/ −0.05	4.0 +/ −0.1	ϕ1.5 +0.1/ −0	0.9 MAX.	1.2 MAX.

(Unit : mm)

Style \ Symbol	A	B
MCF18	1.0 +/ −0.05	1.8 +/ −0.05

(Unit : mm)

Reel dimensions



As per EIAJ ET−7200A

(Unit : mm)

A	B	C	D
$\phi 180^{+0}_{-1.5}$	$\phi 60^{+1.0}_{-0}$	$9.0^{+1.0}_{-0}$	ϕ13± 0.2

●Electrical characteristics

■ CN (X7R) Characteristics

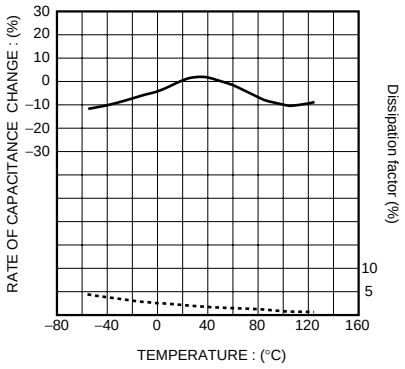


Fig.1 Capacitance - temperature characteristics

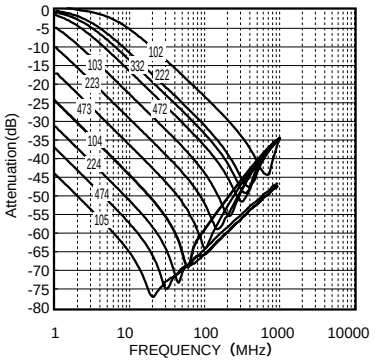


Fig.2 Attenuation characteristics

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