

# EMI FILTER

## MCF18 (1608 (0603) size, 4A)

### ●Features

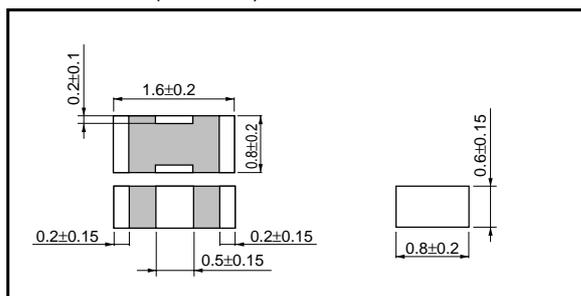
- 1) Industry's smallest size(1608 size)
- 2) The entire series is rated at 4A, making them ideal for high current circuits in or around the power supply.
- 3) The internal resistance is lower than in standard products (competitors' 2A units)

### ●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.

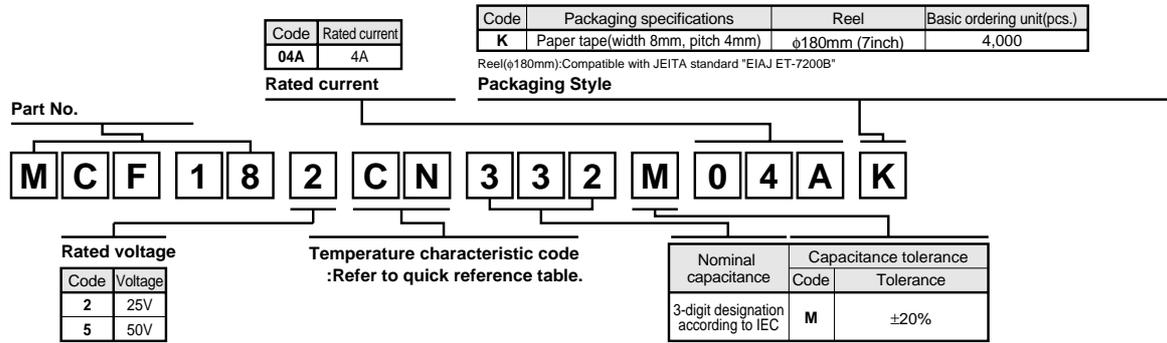
Part No.	Model Name	Capacitance (pF)	Capacitance tolerance (%)	Temperature characteristics		Rated voltage (V)	Rated current (A/DC)	Insulation resistance(MΩ)	Operating temperature(°C)	Thickness (mm)
				code						
MCF18	MCF185AN100M04AK	10	M (±20)	AN	0±30 ppm/°C	50	4	1000	-55 to +125	0.6
	MCF185AN220M04AK	22								
	MCF185AN470M04AK	47								
	MCF185AN101M04AK	100								
	MCF185AN221M04AK	220								
	MCF185AN471M04AK	470								
	MCF182CN102M04AK	1000		CN	Rate of capacitance change ±15%	25				
	MCF182CN222M04AK	2200								
	MCF182CN332M04AK	3300								
	MCF182CN472M04AK	4700								
	MCF182CN103M04AK	10000								
	MCF182CN223M04AK	22000								
	MCF182CN473M04AK	47000								

### ●Dimensions (Unit : mm)



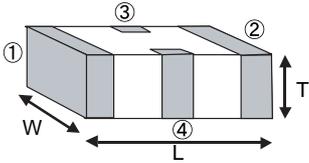
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●Part No. Explanation

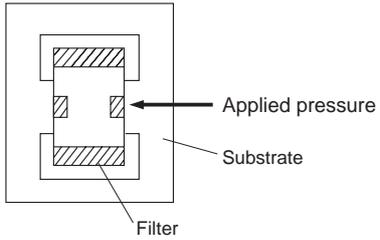


## EMI Filters

## •Performance and test method

No.	Items	Performance	Test Method						
1	Appearance and dimensions	No marked defects shall be allowed for appearance.	Using a Magnifier.						
2	Withstanding voltage	No dielectrical breakdown or other damage shall be allowed.	Voltage shall be applied as per Table1. <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Table 1</caption> <thead> <tr> <th>Charac- teristic</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>AN</td> <td>300% Rated voltage</td> </tr> <tr> <td>CN</td> <td>250% Rated voltage</td> </tr> </tbody> </table> Voltage shall be applied for 1 to 5s with 50mA charging and discharging current.	Charac- teristic	Voltage	AN	300% Rated voltage	CN	250% Rated voltage
Charac- teristic	Voltage								
AN	300% Rated voltage								
CN	250% Rated voltage								
3	Insulation resistance	Not less than 1000M $\Omega$ or 100M $\Omega$ · $\mu$ F, whichever is less.	Measurements shall be made after 60+/-5s period of the rated voltage						
4	Capacitance	Capacitance shall be within specified tolerance range.	Measurements shall be made under the conditions specified in Table 2. <table border="1" style="margin-left: auto; margin-right: auto;"> <caption>Table 2</caption> <thead> <tr> <th>Characteristics</th> <th>Frequency · Voltage</th> </tr> </thead> <tbody> <tr> <td>AN</td> <td>1+/-0.1MHz 1+/-0.1Vrms.</td> </tr> <tr> <td>CN</td> <td>1+/-0.1kHz 1+/-0.1Vrms.</td> </tr> </tbody> </table>	Characteristics	Frequency · Voltage	AN	1+/-0.1MHz 1+/-0.1Vrms.	CN	1+/-0.1kHz 1+/-0.1Vrms.
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AN	1+/-0.1MHz 1+/-0.1Vrms.								
CN	1+/-0.1kHz 1+/-0.1Vrms.								
5	Dielectric loss tangent	<table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>AN</td> <td>Capacitance &lt; 30pF <math>\tan \delta \leq 100/(400+20C)\%</math> Capacitance <math>\geq 30\text{pF}</math> <math>\tan \delta \leq 0.1\%</math></td> </tr> <tr> <td>CN</td> <td><math>\tan \delta \leq 3.0\%</math></td> </tr> </tbody> </table>	AN	Capacitance < 30pF $\tan \delta \leq 100/(400+20C)\%$ Capacitance $\geq 30\text{pF}$ $\tan \delta \leq 0.1\%$	CN	$\tan \delta \leq 3.0\%$	Measurements shall be made under the conditions specified in Table 2.		
AN	Capacitance < 30pF $\tan \delta \leq 100/(400+20C)\%$ Capacitance $\geq 30\text{pF}$ $\tan \delta \leq 0.1\%$								
CN	$\tan \delta \leq 3.0\%$								
6	Resistance	Within specified tolerance range <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Rated current</th> <th>between①-② terminal resistance</th> <th>between③-④ terminal resistance</th> </tr> </thead> <tbody> <tr> <td>4A</td> <td>20m<math>\Omega</math>Max.</td> <td>2000m<math>\Omega</math>Max.</td> </tr> </tbody> </table>	Rated current	between①-② terminal resistance	between③-④ terminal resistance	4A	20m $\Omega$ Max.	2000m $\Omega$ Max.	Measurement current 100mA max 
Rated current	between①-② terminal resistance	between③-④ terminal resistance							
4A	20m $\Omega$ Max.	2000m $\Omega$ Max.							

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No.	Items		Performance		Test Method
7	Temperature characteristic	Without voltage application	AN	0+/-30ppm / °C (-55°C to +125°C)	If required measurements shall be made at a given temperature.
			CN	+/-15% (-55°C to +125°C)	
8	Solderability		More than 75% of each end termination shall be covered with new solder.		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.
9	Resistance to solderin heat	Appearance	Without mechanical damage.		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.
		Change rate from initial value	AN	Within +/-2.5%	
			CN	Within +/-7.5%	
		Dielectric loss tangent	Within specified initial value.		
Insulation resistance	Within specified initial value.				
10	End termination adherence		Without peeling or sign of peeling shall be allowed on the end terminations.		<p>A 5N weight for 10+/-1s shall be applied to the soldered specimens as shown by the arrow mark in the below sketch.</p> 

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No.	Items		Performance		Test Method																					
11	Bending strength	Appearance	Without mechanical damage.		Glass epoxy board with soldered specimens shall be bent till 1mm by 1.0mm/s.																					
12	Vibration	Appearance	Without mechanical damage.		<p>The specimens shall be soldered on the specified test jig.</p> <p>Initial measurements shall be made after the thermal pre-conditioning specified in Remarks(1).</p> <p>Final measurements shall be made after the specimens have been left at room temperature as per Table3.</p> <p>[Condition]</p> <p>Directions : 2h each in X, Y and Z directions Total : 6h</p> <p>Frequency range : 10 to 55 to 10Hz(1min)</p> <p>Applitude : 1.5mm (shall not exceed acceleration 196m/s<sup>2</sup>)</p> <p style="text-align: center;">Table3</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>AN</td> <td>24+/-2 h</td> </tr> <tr> <td>CN</td> <td>48+/-4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	AN	24+/-2 h	CN	48+/-4 h															
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	Dielectric loss tangent	Within specified initial value.																								
13	Temperature cycling	Appearance	Without mechanical damage.		<p>The specimens shall be soldered on the test jig shown in Remarks.</p> <p>Temperature cycle : 100cycles Initial measurements prior to test shall be performed after the thermal per-conditioning specified in Remarks (1).</p> <p>Final measurements shall be made after the specimens have been left at room temperature as per Table3.</p> <p style="text-align: center;">Table3</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <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> </tbody> </table> <p style="text-align: center;">Table3</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>AN</td> <td>24+/-2 h</td> </tr> <tr> <td>CN</td> <td>48+/-4 h</td> </tr> </tbody> </table>	Step	Temp. (°C)	Time (min)	1	Min operating temp.+/-3	30+/-3	2	Room temp.	≤ 3	3	Max operating temp.+/-3	30+/-3	4	Room temp.	≤ 3	Charac-teristic	Time	AN	24+/-2 h	CN	48+/-4 h
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	Insulation resistance	Within specified initial value.																								

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No.	Items		Performance		Test Method						
14	Humidity (Steady)	Appearance	Without mechanical damage.		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 border="1"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>AN</td> <td>24+/-2 h</td> </tr> <tr> <td>CN</td> <td>48+/-4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	AN	24+/-2 h	CN	48+/-4 h
		Charac-teristic	Time								
		AN	24+/-2 h								
		CN	48+/-4 h								
		Change rate from initial value	AN	Within +/-5.0%							
CN	Within +/-12.5%										
Dielectric tangent	AN	$\tan \delta \leq 0.3\%$									
	CN	$\tan \delta \leq 200\%$ initial spec.									
Insulation resistance	Not less than 500MΩ or 10MΩ · μF, whichever is less.										
15	Humidity life test	Appearance	Without mechanical damage.		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 border="1"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>AN</td> <td>24+/-2 h</td> </tr> <tr> <td>CN</td> <td>48+/-4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	AN	24+/-2 h	CN	48+/-4 h
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		Change rate from initial value	AN	Within +/-7.5%							
CN	Within +/-12.5%										
Dielectric loss tangent	AN	$\tan \delta \leq 0.5\%$									
	CN	$\tan \delta \leq 200\%$ initial spec.									
Insulation resistance	Not less than 500MΩ or 10MΩ · μF, whichever is less.										

No.	Items	Performance	Test Method						
16	Heat life test	Appearance	Without mechanical damage.						
		Change rate from initial value	AN	Within +/-3.0%					
			CN	Within +/-15%					
		Dielectric loss tangent	AN	$\tan \delta \leq 0.3\%$					
			CN	$\tan \delta \leq 200\%$ initial spec.					
Insulation resistance	Not less than 1000M $\Omega$ or 50M $\Omega \cdot \mu$ F, whichever is less.								
<p>Test temperature : 125+/-2°C  Voltage : Rated 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.</p> <p style="text-align: center;">Table3</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>AN</td> <td>24+/-2 h</td> </tr> <tr> <td>CN</td> <td>48+/-4 h</td> </tr> </tbody> </table>				Charac-teristic	Time	AN	24+/-2 h	CN	48+/-4 h
Charac-teristic	Time								
AN	24+/-2 h								
CN	48+/-4 h								

## [Remarks]

## Pre-conditioning

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

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●Packaging specifications

Taping dimensions		Reel dimensions								
Symbol	C D E F G H J t t1	As per EIAJ ET-7200A								
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	$\phi$ 1.5 +0.1/-0	0.9 MAX.	1.2 MAX.	
Symbol	A B	(Unit : mm)								
Style	A B									
MCF18	1.0 +/-0.05	1.8 +/-0.05								
	(Unit : mm)									
A	B	C	D							
$\phi$ 180 <sup>+0</sup> / <sub>-1.5</sub>	$\phi$ 60 <sup>+1.0</sup> / <sub>-0</sub>	9.0 <sup>+1.0</sup> / <sub>-0</sub>	$\phi$ 13 $\pm$ 0.2							

●Electrical characteristics

■ A (C0G) Characteristics

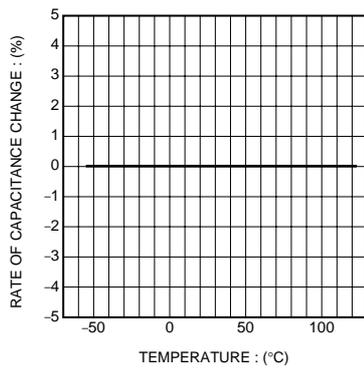


Fig.1 Capacitance - temperature characteristics

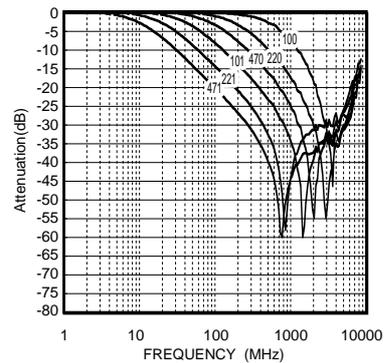


Fig.2 Attenuation characteristics

■ CN (X7R) Characteristics

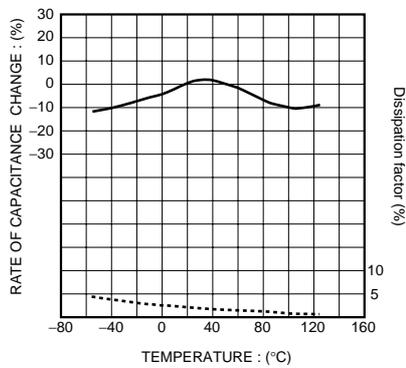


Fig.3 Capacitance - temperature characteristics

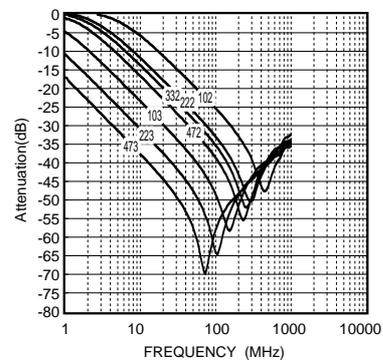


Fig.4 Attenuation characteristics

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