

Multi-layer ceramic chip capacitors

MCH02 (0402 (01005) size, chip capacitor)

●Features

- 1) The world's smallest (0.4mm x 0.2mm), Ultra thin (0.2mm), Ultra light (0.08mg)
- 2) Suitable for mobile end products
- 3) Lead-free plating terminal
- 4) No polarity

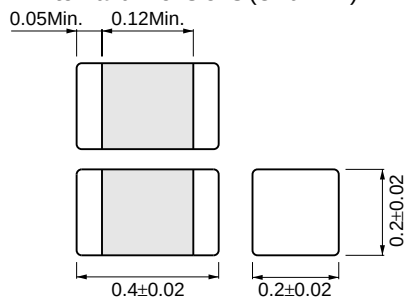
●Quick Reference

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.

Thermal compensation

	Part No.	Size code	Temperature characteristics code	(ppm/°C)	Operating temp. range (°C)	Rated voltage (V)	Capacitance(pF)	Capacitance tolerance	Thickness (mm)			
New	MCH02	0402	A	0±250(CK)	-55 to +125	25	0.5 to 2.0	C(±0.25pF)	0.2±0.02			
				0±120(CJ)			3.0					
				0±60(CH)			4.0 to 5.0	D(±0.5pF)				
							6.0 to 7.0					

●External dimensions (Unit : mm)



Ceramic capacitors

●Product designation

Code	Product thickness	Packing specification	Reel	Basic ordering unit(pcs.)
K	0.2mm	Paper tape(width 8mm, pitch 2mm)	φ180mm (7in.)	15,000

Part No.

Packaging Style

M C H 0 2 2 A 4 R 7 C K

Rated voltage

Code	Voltage
2	25V

Temperature characteristic code
:Refer to quick reference table.

Nominal capacitance	Capacitance tolerance	
	Code	Tolerance
3-digit designation according to IEC	C	±0.25pF(0.5 to 5pF)
	D	±0.5pF(6.0to 7pF)

Product No. list

●Capacitance range

Thermal compensation

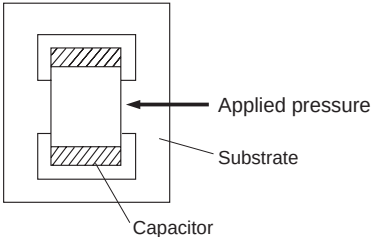
Capacitance (pF)	Temperature		A·(CH) (CJ) (CK)Characteristics	
	Rated voltage (V)			25V
	Tolerance	Product thickness (mm)		Product No.
0.5	C(±0.25PF)	0.2 ± 0.02	MCH022A 0R5CK	
1.0			MCH022A 010CK	
2.0			MCH022A 020CK	
3.0			MCH022A 030CK	
4.0			MCH022A 040CK	
5.0			MCH022A 050CK	
6.0	D(±0.5PF)		MCH022A 060DK	
7.0			MCH022A 070DK	

Ceramic capacitors

●Performance and test method

No.	Items	Performance	Test Method (As per JIS C 5101-1, JIS C 5101-10)				
1	Appearance and dimensions	No marked defects shall be allowed for appearance. Dimensions shall be as specified in the clause 4.	As per 4.4 of JIS C 5101-1. As per 4.5 of JIS C 5101-10 Using a Magnifier.				
2	Withstanding voltage	No dielectrical breakdown or other damage shall be allowed.	As per 4.6 of JIS C 5101-1. As per 4.6.4 of JIS C 5101-10 Voltage shall be applied as per Table1. <table><tr><td>Table 1</td></tr><tr><td>Voltage</td></tr><tr><td>300% Rated voltage</td></tr></table> Voltage shall be applied for 1 to 5s with 50mA charging and discharging current.	Table 1	Voltage	300% Rated voltage	
Table 1							
Voltage							
300% Rated voltage							
3	Insulation resistance	More than 10000MΩ	As per 4.5 of JIS C 5101-1. As per 4.6.3 of JIS C 5101-10 Measurements shall be made after 60+/-5s period of the rated voltage applied.				
4	Capacitance	Capacitance shall be within specified tolerance range.	As per 4.7 of JIS C 5101-1. As per 4.6.1 of JIS C 5101-10 Measurements shall be made under the conditions specified in Table 2. <table><tr><td>Table 2</td></tr><tr><td>Frequency · Voltage</td></tr><tr><td>1+/-0.1MHz</td></tr><tr><td>1+/-0.1Vrms.</td></tr></table>	Table 2	Frequency · Voltage	1+/-0.1MHz	1+/-0.1Vrms.
Table 2							
Frequency · Voltage							
1+/-0.1MHz							
1+/-0.1Vrms.							
5	Dielectric loss tangent	$\tan \delta \leq 100/(400+20 \cdot C)$ *C=Capacitance(pF)	As per 4.8 of JIS C 5101-1 As per 4.6.2 of JIS C 5101-10 Measurements shall be made under the conditions specified in Table 2.				
6	Temperature characteristic	0+/-250ppm / °C (0.5 to +2pF) 0+/-120ppm / °C (3pF) 0+/-60ppm / °C (4 to +7pF) (-55°C to +125°CpF)	As per 4.24 of JIS C 5101-1. As per 4.7 of JIS C 5101-10 Temperature coefficient shall be calculated at 20°C and 85°C.				
7	Solderability	More than 3/4 of each end termination shall be covered with new solder.	As per 4.15.2 of JIS C 5101-1. As per 4.11 of JIS C 5101-10 The solder specified in JIS Z 3282 H63A 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.				

Ceramic capacitors

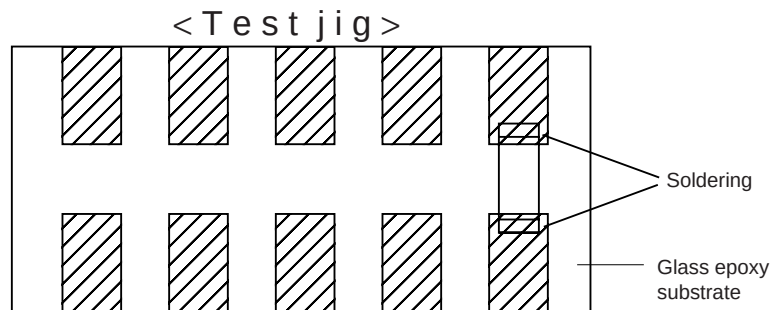
No.	Items		Performance	Test Method (As per JIS C 5101-1, JIS C 5101-10)		
8	Resistance to solder in heat	Appearance	Without mechanical damage.	As per 4.14 of JIS C 5101-1. As per 4.10 of JIS C 5101-10 The solder specified in JIS Z 3282, H63A shall be used. The specimens shall be immersed into the solder 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><td>Time</td></tr><tr><td>24+/-2 h</td></tr></table>	Time	24+/-2 h
		Time				
		24+/-2 h				
		Change rate from initial value	Within +/-0.25pF			
		Dielectric loss tangent	Within specified initial value.			
Insulation resistance	Within specified initial value.					
Withstanding voltage	No defects shall be allowed.					
9	End termination adherence		Without peeling or sign of peeling shall be allowed on the end terminations.	As per 4.13 of JIS C 5101-1. As per 4.8 of JIS C 5101-10 A 1N weight for 10+/-1s shall be applied to the soldered specimens as shown by the arrow mark in the below sketch. 		
10	Bending strength	Appearance	Without mechanical damage.	As per 4.35 of JIS C 5101-1. As per 4.9 of JIS C 5101-10 Glass epoxy board with soldered specimens shall be bent till 1mm by 1.0mm/s.		
		Change rate from initial value	Within +/-0.5pF			
11	Vibration	Appearance	Without mechanical damage.	As per 4.17 of JIS C 5101-1. The specimens shall be soldered on the specified test jig. Final measurements shall be made after the specimens have been left at room temperature as per Table3. [Condition] Directions : 2h each X, Y and Z directions Total : 6h Frequency range : 10 to 55 to 10Hz(1min) Applitude : 1.5mm (shall not exceed acceleration196m/s²) Table3 <table><tr><td>Time</td></tr><tr><td>24+/-2 h</td></tr></table>	Time	24+/-2 h
		Time				
		24+/-2 h				
Change rate from initial value	Within +/-0.25pF					
Dielectric loss tangent	Within specified initial value.					

Ceramic capacitors

No.	Items		Performance	Test Method (As per JIS C 5101-1, JIS C 5101-10)																					
12	Temperature cycling	Appearance	Without mechanical damage.	As per 4.16 of JIS C 5101-1. As per 4.12 of JIS C 5101-10 The specimens shall be soldered on the test jig shown in Remarks. Temperature cycle : 100cycles. Final measurements shall be made after the specimens have been left at room temperature as per Table3. Test condition <table><tr><th>Step</th><th>Temp. (°C)</th><th>Time (min)</th></tr><tr><td>1</td><td>Min operating temp.</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.</td><td>30+/-3</td></tr><tr><td>4</td><td>Room temp.</td><td>≤ 3</td></tr></table> <table><tr><th colspan="2">Table3</th></tr><tr><td colspan="2">Time</td></tr><tr><td colspan="2">24+/-2 h</td></tr></table>	Step	Temp. (°C)	Time (min)	1	Min operating temp.	30+/-3	2	Room temp.	≤ 3	3	Max operating temp.	30+/-3	4	Room temp.	≤ 3	Table3		Time		24+/-2 h	
		Step	Temp. (°C)		Time (min)																				
		1	Min operating temp.		30+/-3																				
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Change rate from initial value	Within +/-0.25pF																								
Dielectric loss tangent	Within specified initial value.																								
Insulation resistance	Within specified initial value.																								
Withstanding voltage	No defects shall be allowed.																								
13	Humidity (Steady)	Appearance	Without mechanical damage.	As per 4.22 of JIS C 5101-1 JIS C 5101-10 Test temperature : 60+/-2°C Relative humidity : 90 to 95% Test time : 500 +24/-0 h Final measurements have been left at room temperature as per Table3. Table3 <table><tr><th>Time</th></tr><tr><td>24+/-2 h</td></tr></table>	Time	24+/-2 h																			
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		24+/-2 h																							
		Change rate from initial value	Within +/-5.0pF																						
Dielectric tangent	$\tan \delta \leq 100/(200+10 \cdot C)$ *C=Capacitance(pF)																								
Insulation resistance	More than 1000MΩ																								
14	Humidity life test	Appearance	Without mechanical damage.	As per 4.22 of JIS C 5101-1 As per 4.14 of JIS C 5101-10 Test temperature : 60+/-2°C Relative humidity : 90 to 95% Voltage : Rated voltage Test time : 500 +24/-0 h Final measurements shall be made after the specimens have been left at room temperature as per Table3. Table3 <table><tr><th>Time</th></tr><tr><td>24+/-2 h</td></tr></table>	Time	24+/-2 h																			
		Time																							
		24+/-2 h																							
		Change rate from initial value	Within +/-0.75pF																						
Dielectric tangent	$\tan \delta \leq 100/(100+10 \cdot C/3)$ *C=Capacitance(pF)																								
Insulation resistance	More than 500MΩ																								
15	Heat life test	Appearance	Without mechanical damage.	As per 4.23 of JIS C 5101-1. As per 4.15 of JIS C 5101-10 <table><tr><th>Test temperature(°C)</th><th>Voltage</th><th>Test time (h)</th></tr><tr><td>125</td><td>200% Rated voltage</td><td>1000 +48/-0</td></tr></table> Final measurements shall be made after the specimens have been left at room temperature Table3 <table><tr><th>Time</th></tr><tr><td>24+/-2 h</td></tr></table>	Test temperature(°C)	Voltage	Test time (h)	125	200% Rated voltage	1000 +48/-0	Time	24+/-2 h													
		Test temperature(°C)	Voltage		Test time (h)																				
		125	200% Rated voltage		1000 +48/-0																				
		Time																							
24+/-2 h																									
Change rate from initial value	Within +/-0.3pF																								
Dielectric tangent	$\tan \delta \leq 100/(100+10 \cdot C)$ *C=Capacitance(pF)																								
Insulation resistance	More than 1000MΩ																								

Ceramic capacitors

[Remarks]



●Packaging specification

Taping dimensions

Technical drawing of a carrier tape showing top and side views. The top view includes dimensions C (overall width), D (height of the tape body), E (height of the reel hole), F (pitch between components), G (pitch between components), H (pitch between components), J (pitch between components), t (thickness of the tape), and d (thickness of the tape). A pulling direction arrow is shown below the top view.

Symbol	C	D	E	F	G	H	J	t	d
Dimensions	8.0 +/-0.1	3.5 +/-0.05	1.75 +/-0.05	2.0 +/-0.05	2.0 +/-0.05	4.0 +/-0.08	φ1.5 +0.1/-0	0.3 +/-0.02	0.25 +/-0.02

Symbol	A	B
Style	0.24	0.45
MCH02	+/-0.03	+/-0.03

(Unit : mm)

Reel dimensions

Technical drawing of a reel showing top and side views. The top view includes dimensions φ13.0±0.2 (inner diameter), 9.0+1.0/-0 (width of the reel), φ60.0+1.0/-0 (inner diameter of the reel), φ180+0/-1.5 (outer diameter of the reel), and φ180+0/-1.5 (outer diameter of the reel). A pulling direction arrow and a label pasting arrow are shown.

As per EIAJ ET-7002A

(Unit : mm)

●Electrical characteristics curves

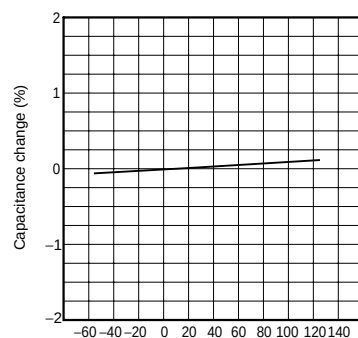


Fig.1 Temperature (°C)

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