

Multi-layer ceramic chip capacitors

MCH18 (1608 (0603) size, chip capacitor)

●Features

- 1) Miniture, light weight
- 2) Achieved high capacitance by thin and multi layer technology
- 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	Temperature characteristics (ppm/°C)	Operating temp. range (°C)	Rated voltage (V)	Capacitance (pF)	Capacitance tolerance	Thickness (mm)
MCH18	1608 (0603)	A (AN)	0±120(CJ)	-55 to +125	50	0.5 to 3.9 (E24 Series) *	C(±0.25pF)	0.8 ± 0.1
			0±60(CH)			4 to 5 (E24 Series) *		
			0±30 (CG)(C0G)			5.1 to 9.1 (E24 Series) *	D(±0.5pF)	
						10 (E24 Series) *	J(±5%)	
						11 to 820 (E24 Series)		
1,000 to 3,300 (E12 Series)								

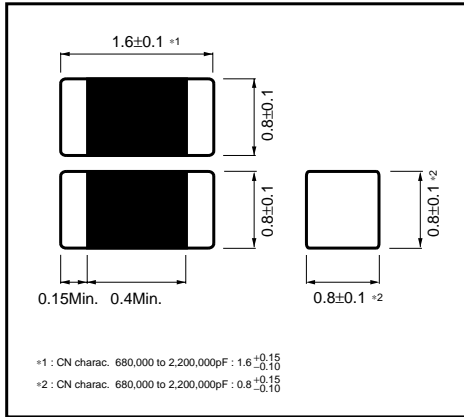
* : 0.5pF/0.75pF/2pF/3pF/4pF/5pF/6pF/7pF/8pF/9pF available

●High dielectric constant

Part No.	Size code	Temperature characteristics code	Temperature characteristics	Operating temp. range (°C)	Rated voltage (V)	Capacitance (pF)	Capacitance tolerance	Thickness (mm)
MCH18	1608 (0603)	CN	0±10% (B)	-25 to +85	50	220 to 22,000 (E6 Series)	K(±10%)	0.8 ± 0.1
					25	33,000 to 100,000 (E6 Series)		
			0±15% (R) (X7R)	-55 to +125	50	220 to 100,000 (E6 Series)		
					25	33,000 to 100,000 (E6 Series)		
				-55 to +85	10	150,000 to 470,000 (E6 Series)		
					6.3	680,000 to 1,000,000 (E6 Series)		
		FN	+30% , -80% (F)	-25 to +85	50	1,000 to 47,000 (E3 Series)	Z(+80% , -20%)	0.8 ± 0.1
					25	100,000 (E3 Series)		
					16	220,000 (E3 Series)		
			+22% , -82% (Y5V)	-30 to +85	10	470,000 to 2,220,000 (E3 Series)		
					6.3	4,700,000 (E3 Series)		
					50	1,000 to 47,000 (E3 Series)		
	25	100,000 (E3 Series)						
	16	220,000 (E3 Series)						
	10	470,000 to 2,200,000 (E3 Series)						
	6.3	4,700,000 (E3 Series)						

Ceramic capacitors

●Dimensions (Unit : mm)



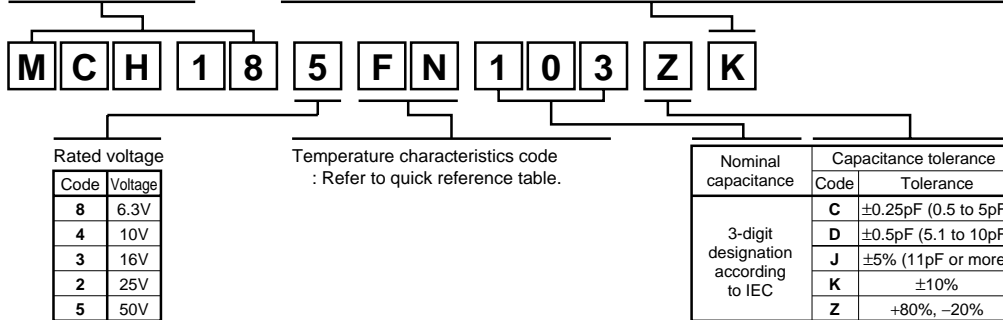
●Product designation

Code	Product thickness	Packing specification	Reel	Basic ordering unit (pcs.)
K	0.8mm	Paper tape(width 8mm, pitch 4mm)	φ180mm (7in.)	4,000
L	0.8mm	Paper tape(width 8mm, pitch 4mm)	φ330mm (13in.)	16,000
C	0.8mm	Bulk case	-	15,000

Reel (φ180, φ330mm) : compatible with EIAJ ET-7200A
 Bulk case : compatible with EIAJ ET-7201A

Part No.

Packing Style



Ceramic capacitors

●Product No. list

●Thermal compensation capacitors

Capacitance (pF)	Temperature		A·AN(CG) (COG) (CH) Characteristics		Capacitance (pF)	Temperature		A·AN(CG) (COG) (CH) Characteristics	
	Rated voltage (V)		50V			Rated voltage (V)		50V	
	Tolerance	Product thickness (mm)	Product No.			Tolerance	Product thickness (mm)	Product No.	
0.5	C (±0.25pF)	0.8 ± 0.1	MCH185A (AN) 0R5C*		30	J (±5%)	0.8 ± 0.1	MCH185A (AN) 300J*	
0.75			MCH185A (AN) R75C*		33			MCH185A (AN) 330J*	
1.0			MCH185A (AN) 010C*		36			MCH185A (AN) 360J*	
1.1			MCH185A (AN) 1R1C*		39			MCH185A (AN) 390J*	
1.2			MCH185A (AN) 1R2C*		43			MCH185A (AN) 430J*	
1.3			MCH185A (AN) 1R3C*		47			MCH185A (AN) 470J*	
1.5			MCH185A (AN) 1R5C*		51			MCH185A (AN) 510J*	
1.6			MCH185A (AN) 1R6C*		56			MCH185A (AN) 560J*	
1.8			MCH185A (AN) 1R8C*		62			MCH185A (AN) 620J*	
2.0			MCH185A (AN) 020C*		68			MCH185A (AN) 680J*	
2.2			MCH185A (AN) 2R2C*		75			MCH185A (AN) 750J*	
2.4			MCH185A (AN) 2R4C*		82			MCH185A (AN) 820J*	
2.7			MCH185A (AN) 2R7C*		91			MCH185A (AN) 910J*	
3.0			MCH185A (AN) 030C*		100			MCH185A (AN) 101J*	
3.3			MCH185A (AN) 3R3C*		110			MCH185A (AN) 111J*	
3.6			MCH185A (AN) 3R6C*		120			MCH185A (AN) 121J*	
3.9			MCH185A (AN) 3R9C*		130			MCH185A (AN) 131J*	
4.0			MCH185A (AN) 040C*		150			MCH185A (AN) 151J*	
4.3			MCH185A (AN) 4R3C*		160			MCH185A (AN) 161J*	
4.7			MCH185A (AN) 4R7C*		180			MCH185A (AN) 181J*	
5.0	D (±0.5pF)	0.8 ± 0.1	MCH185A (AN) 050C*		200	J (±5%)	0.8 ± 0.1	MCH185A (AN) 201J*	
5.1			MCH185A (AN) 5R1D*		220			MCH185A (AN) 221J*	
5.6			MCH185A (AN) 5R6D*		240			MCH185A (AN) 241J*	
6			MCH185A (AN) 060D*		270			MCH185A (AN) 271J*	
6.2			MCH185A (AN) 6R2D*		300			MCH185A (AN) 301J*	
6.8			MCH185A (AN) 6R8D*		330			MCH185A (AN) 331J*	
7			MCH185A (AN) 070D*		360			MCH185A (AN) 361J*	
7.5			MCH185A (AN) 7R5D*		390			MCH185A (AN) 391J*	
8			MCH185A (AN) 080D*		430			MCH185A (AN) 431J*	
8.2			MCH185A (AN) 8R2D*		470			MCH185A (AN) 471J*	
9	J (±5%)	0.8 ± 0.1	MCH185A (AN) 090D*		510	J (±5%)	0.8 ± 0.1	MCH185A (AN) 511J*	
9.1			MCH185A (AN) 9R1D*		560			MCH185A (AN) 561J*	
10			MCH185A (AN) 100D*		620			MCH185A (AN) 621J*	
11			MCH185A (AN) 110J*		680			MCH185A (AN) 681J*	
12			MCH185A (AN) 120J*		750			MCH185A (AN) 751J*	
13			MCH185A (AN) 130J*		820			MCH185A (AN) 821J*	
15			MCH185A (AN) 150J*		1,000			MCH185A (AN) 102J*	
16			MCH185A (AN) 160J*		1,200			MCH185A (AN) 122J*	
18			MCH185A (AN) 180J*		1,500			MCH185A (AN) 152J*	
20			MCH185A (AN) 200J*		1,800			MCH185A (AN) 182J*	
22	MCH185A (AN) 220J*		2,200	MCH185A (AN) 222J*					
24	MCH185A (AN) 240J*		2,700	MCH185A (AN) 272J*					
27	MCH185A (AN) 270J*		3,300	MCH185A (AN) 332J*					

* : Packaging Code

Ceramic capacitors

•High dielectric constant capacitors

Capacitance (pF)	Temperature		CN (R) (B) (X7R) Characteristics		CN (X5R) Characteristics		
	Rated voltage (V)		50V	25V	10V	6.3V	
	Tolerance	Product thickness (mm)	Product No.	Product No.	Product No.	Product No.	
220	K (±10%)	0.8 ± 0.1	MCH185CN221K*				
330			MCH185CN331K*				
470			MCH185CN471K*				
680			MCH185CN681K*				
1,000			MCH185CN102K*				
1,500			MCH185CN152K*				
2,200			MCH185CN222K*				
3,300			MCH185CN332K*				
4,700			MCH185CN472K*				
6,800			MCH185CN682K*				
10,000			MCH185CN103K*				
15,000			MCH185CN153K*				
22,000			MCH185CN223K*				
33,000					MCH182CN333K*		
47,000					MCH182CN473K*		
68,000					MCH182CN683K*		
100,000					MCH182CN104K*		
150,000						MCH184CN154K*	
220,000						MCH184CN224K*	
330,000						MCH184CN334K*	
470,000						MCH184CN474K*	
680,000						MCH184CN684K*	
1,000,000						MCH184CN105K*	
2,200,000							MCH188CN225K*

*: Packaging code

Capacitance (pF)	Temperature		FN (F) (Y5V) Characteristics					
	Rated voltage (V)		50V	25V	16V	10V	6.3V	
	Tolerance	Product thickness (mm)	Product No.	Product No.	Product No.	Product No.	Product No.	
1,000	Z (+80%, -20%)	0.8 ± 0.1	MCH185FN102Z*					
2,200			MCH185FN222Z*					
4,700			MCH185FN472Z*					
10,000			MCH185FN103Z*					
22,000			MCH185FN223Z*					
47,000			MCH185FN473Z*					
100,000			MCH185FN104Z*	MCH182FN104Z*				
220,000						MCH183FN224Z*		
470,000							MCH184FN474Z*	
1,000,000							MCH184FN105Z*	
2,200,000							MCH184FN225Z*	
4,700,000								MCH188FN475Z*

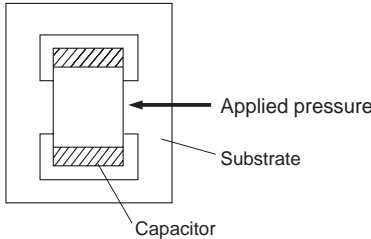
*: Packaging code

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 Table 1. <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>A (AN)</td> <td>300% Rated voltage</td> </tr> <tr> <td>CN</td> <td rowspan="2">250% Rated voltage</td> </tr> <tr> <td>FN</td> </tr> </tbody> </table> Voltage shall be applied for 1 to 5s with 50mA charging and discharging current.	Charac- teristic	Voltage	A (AN)	300% Rated voltage	CN	250% Rated voltage	FN							
Charac- teristic	Voltage																
A (AN)	300% Rated voltage																
CN	250% Rated voltage																
FN																	
3	Insulation resistance	Not less than 10000MΩ or 500MΩ · μF, whichever is less. (For products with rated voltage less than 16V, it is not less than 10000MΩ or 100MΩ · μF, whichever is less.)	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 border="1" style="margin-left: auto; margin-right: auto;"> <caption>Table 2</caption> <thead> <tr> <th rowspan="2">Charac- teristic</th> <th colspan="2">Frequency · Voltage</th> </tr> <tr> <th>≤ 1000 pF</th> <th>> 1000 pF</th> </tr> </thead> <tbody> <tr> <td>A (AN)</td> <td>1+/-0.1MHz 1+/-0.1Vrms.</td> <td>1+/-0.1kHz 1+/-0.1Vrms.</td> </tr> <tr> <td>CN</td> <td colspan="2">1+/-0.1kHz</td> </tr> <tr> <td>FN</td> <td colspan="2">1+/-0.1Vrms.</td> </tr> </tbody> </table>	Charac- teristic	Frequency · Voltage		≤ 1000 pF	> 1000 pF	A (AN)	1+/-0.1MHz 1+/-0.1Vrms.	1+/-0.1kHz 1+/-0.1Vrms.	CN	1+/-0.1kHz		FN	1+/-0.1Vrms.	
Charac- teristic	Frequency · Voltage																
	≤ 1000 pF	> 1000 pF															
A (AN)	1+/-0.1MHz 1+/-0.1Vrms.	1+/-0.1kHz 1+/-0.1Vrms.															
CN	1+/-0.1kHz																
FN	1+/-0.1Vrms.																
5	Dielectric loss tangent	<table border="1" style="width: 100%;"> <tbody> <tr> <td style="width: 10%;">A (AN)</td> <td>Capacitance < 30pF tan δ ≤ 100/(400+20C)% Capacitance ≥ 30pF tan δ ≤ 0.1%</td> </tr> <tr> <td>C N</td> <td>Rated voltage=25V tan δ ≤ 3.0% Rated voltage=16V tan δ ≤ 5.0%</td> </tr> <tr> <td>F N</td> <td>Rated voltage=50V tan δ ≤ 5.0% Rated voltage=25V tan δ ≤ 7.5% Rated voltage=16V tan δ ≤ 10.0% Rated voltage=10V tan δ ≤ 12.5%</td> </tr> </tbody> </table>	A (AN)	Capacitance < 30pF tan δ ≤ 100/(400+20C)% Capacitance ≥ 30pF tan δ ≤ 0.1%	C N	Rated voltage=25V tan δ ≤ 3.0% Rated voltage=16V tan δ ≤ 5.0%	F N	Rated voltage=50V tan δ ≤ 5.0% Rated voltage=25V tan δ ≤ 7.5% Rated voltage=16V tan δ ≤ 10.0% Rated voltage=10V tan δ ≤ 12.5%	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.								
A (AN)	Capacitance < 30pF tan δ ≤ 100/(400+20C)% Capacitance ≥ 30pF tan δ ≤ 0.1%																
C N	Rated voltage=25V tan δ ≤ 3.0% Rated voltage=16V tan δ ≤ 5.0%																
F N	Rated voltage=50V tan δ ≤ 5.0% Rated voltage=25V tan δ ≤ 7.5% Rated voltage=16V tan δ ≤ 10.0% Rated voltage=10V tan δ ≤ 12.5%																

Ceramic capacitors

No.	Items	Performance	Test Method (As per JIS C 5101-1, JIS C 5101-10)						
6	Temperature characteristic	A (AN)	CG • C0G	0+/-30ppm / °C (-55°C to +125°C)	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.				
			CH	0+/-60ppm / °C (-55°C to +125°C)					
			CJ	0+/-120ppm / °C (-55°C to +125°C)					
		C N	X7R • R	+/-15% (-55°C to +125°C)		As per 4.24 of JIS C 5101-1. As per 4.7 of JIS C 5101-10 If required, measurements shall be made at a given temperature.			
			B	+/-10% (-25°C to +85°C)					
			X5R	+/-15% (-55°C to +85°C)					
F N	F	+30%, -80% (-25°C to +85°C)							
	Y5V	+22%, -82% (-30°C to +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.						
8	Resistance to solderin 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.					
		Change rate from initial value	A (AN)		Within +/-2.5% or +/-0.25pF whichever is larger.				
			C N		Within +/-7.5%				
			F N		Within +/-20%				
		Dielectric loss tangent	Within specified initial value.						
		Insulation resistance	Within specified initial value.						
Withstanding voltage	No defects shall be allowed.								
			<p>Table3</p> <table border="1"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>A (AN)</td> <td>24+/-2 h</td> </tr> <tr> <td>CN, FN</td> <td>48+/-4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	A (AN)	24+/-2 h	CN, FN	48+/-4 h
Charac-teristic	Time								
A (AN)	24+/-2 h								
CN, FN	48+/-4 h								
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 5N weight for 10+/-1s shall be applied to the soldered specimens as shown by the arrow mark in the below sketch. 						

Ceramic capacitors

No.	Items		Performance		Test Method (As per JIS C 5101-1, JIS C 5101-10)																					
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.																					
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. 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 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 border="1"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>A (AN)</td> <td>24+/-2 h</td> </tr> <tr> <td>CN, FN</td> <td>48+/-4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	A (AN)	24+/-2 h	CN, FN	48+/-4 h															
		Charac-teristic	Time																							
		A (AN)	24+/-2 h																							
		CN, FN	48+/-4 h																							
Change rate from initial value	A (AN)	Capacitance shall be within specified tolerance range.																								
	C N	Within +/-7.5%																								
	F N	Within +/-20%																								
	Dielectric loss tangent	Within specified initial value.																								
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 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. Test condition <table border="1"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <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> </tbody> </table> Table3 <table border="1"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>A (AN)</td> <td>24+/-2 h</td> </tr> <tr> <td>CN, FN</td> <td>48+/-4 h</td> </tr> </tbody> </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	Charac-teristic	Time	A (AN)	24+/-2 h	CN, FN	48+/-4 h
		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																						
		Charac-teristic	Time																							
A (AN)	24+/-2 h																									
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Change rate from initial value	A (AN)	Within +/-2.5% or +/-0.25pF whichever is larger.																								
	C N	Within +/-7.5%																								
	F N	Within +/-20%																								
Dielectric loss tangent	Within specified initial value.																									
Insulation resistance	Within specified initial value.																									
Withstanding voltage	No defects shall be allowed.																									

Ceramic capacitors

No.	Items		Performance		Test Method (As per JIS C 5101-1, JIS C 5101-10)						
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 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>A (AN)</td> <td>24±2 h</td> </tr> <tr> <td>CN, FN</td> <td>48±4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	A (AN)	24±2 h	CN, FN	48±4 h
		Charac-teristic	Time								
		A (AN)	24±2 h								
		CN, FN	48±4 h								
		Change rate from initial value	A (AN)	Within +/-5.0% or +/-0.5pF whichever is larger.							
			C N	Within +/-12.5%							
			F N	Within +/-30%							
		Dielectric tangent	A (AN)	tan δ ≤ 0.3%							
			C N	Less than 200% of initial spec.							
			F N	Less than 150% of initial spec.							
Insulation resistance	Not less than 1000MΩ or 50MΩ · μF, whichever is less. (For products with rated voltage less than 16V, it is not less than 1000MΩ or 10MΩ · μF, whichever is less.)										
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 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>A (AN)</td> <td>24±2 h</td> </tr> <tr> <td>CN, FN</td> <td>48±4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	A (AN)	24±2 h	CN, FN	48±4 h
		Charac-teristic	Time								
		A (AN)	24±2 h								
		CN, FN	48±4 h								
		Change rate from initial value	A (AN)	Within +/-7.5% or +/-7.5pF whichever is larger.							
			C N	Within +/-12.5%							
			F N	Within +/-30%							
		Dielectric loss tangent	A (AN)	tan δ ≤ 0.5%							
			C N	Less than 200% of initial spec.							
			F N	Less than 150% of initial spec.							
Insulation resistance	Not less than 500MΩ or 25MΩ · μF, whichever is less. (For products with rated voltage less than 16V, it is not less than 500mΩ or 5MΩ · μF, whichever is less.)										

Ceramic capacitors

No.	Items	Performance	Test Method (As per JIS C 5101-1, JIS C 5101-10)																		
15	Heat life test	Appearance	Without mechanical damage.																		
		Change rate from initial value	A (AN)	Within $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever is larger.																	
			C N	Within $\pm 15\%$																	
			F N	Within $\pm 30\%$																	
		Dielectric loss tangent	A (AN)	$\tan \delta \leq 0.3\%$																	
			C N	Less than 200% of initial spec.																	
			F N	Less than 150% of initial spec.																	
		Insulation resistance	Not less than $1000\text{M}\Omega$ or $50\text{M}\Omega \cdot \mu\text{F}$, whichever is less. (For products with rated voltage less than 16V, it is not less than $1000\text{m}\Omega$ or $10\text{M}\Omega \cdot \mu\text{F}$, whichever is less.)																		
					As per 4.23 of JIS C 5101-1. As per 4.15 of JIS C 5101-10																
					<table border="1"> <thead> <tr> <th></th> <th>Test temperature(°C)</th> <th>Voltage</th> <th>Test time (h)</th> </tr> </thead> <tbody> <tr> <td>A (AN)</td> <td>125</td> <td>200% Rated voltage</td> <td>1000 +48/-0</td> </tr> <tr> <td rowspan="2">CN</td> <td>85</td> <td>200% Rated voltage</td> <td rowspan="2">1000 +48/-0</td> </tr> <tr> <td>125</td> <td>200% Rated voltage</td> </tr> <tr> <td>FN</td> <td>85</td> <td>200% Rated voltage</td> <td>1000 +48/-0</td> </tr> </tbody> </table>		Test temperature(°C)	Voltage	Test time (h)	A (AN)	125	200% Rated voltage	1000 +48/-0	CN	85	200% Rated voltage	1000 +48/-0	125	200% Rated voltage	FN	85
	Test temperature(°C)	Voltage	Test time (h)																		
A (AN)	125	200% Rated voltage	1000 +48/-0																		
CN	85	200% Rated voltage	1000 +48/-0																		
	125	200% Rated voltage																			
FN	85	200% Rated voltage	1000 +48/-0																		
			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																		
			<p style="text-align: center;">Table3</p> <table border="1"> <thead> <tr> <th>Charac-teristic</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>A (AN)</td> <td>24\pm2 h</td> </tr> <tr> <td>CN, FN</td> <td>48\pm4 h</td> </tr> </tbody> </table>	Charac-teristic	Time	A (AN)	24 \pm 2 h	CN, FN	48 \pm 4 h												
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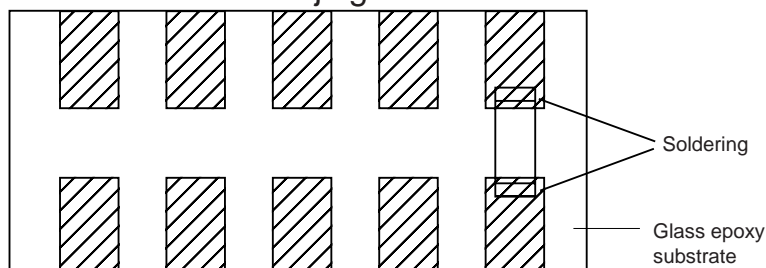
[Remarks]

Pre-conditioning

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

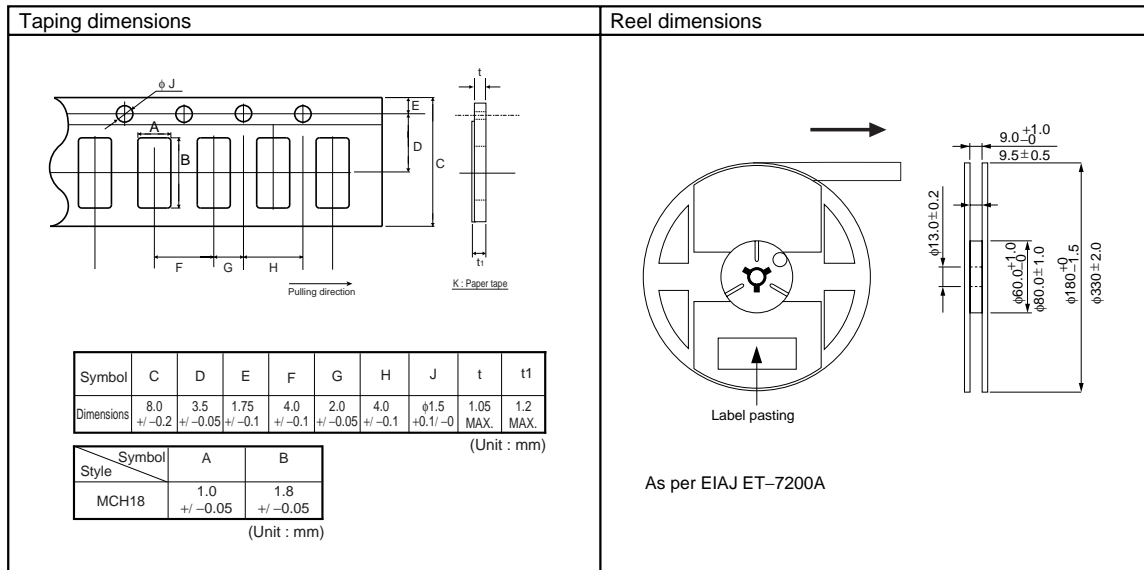
- (1) Thermal pre-conditioning
Prior to initial measurements, specimens shall be conditioned at a temperature of $150 \text{ } 0/-10^{\circ}\text{C}$ for a period of 1hr., and shall be allowed to stabilize at room temperature for 48 \pm 4h
- (2) Voltage pre-conditioning
Prior to initial measurements, 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 \pm 4h

<Test jig>



Ceramic capacitors

●Packaging specifications



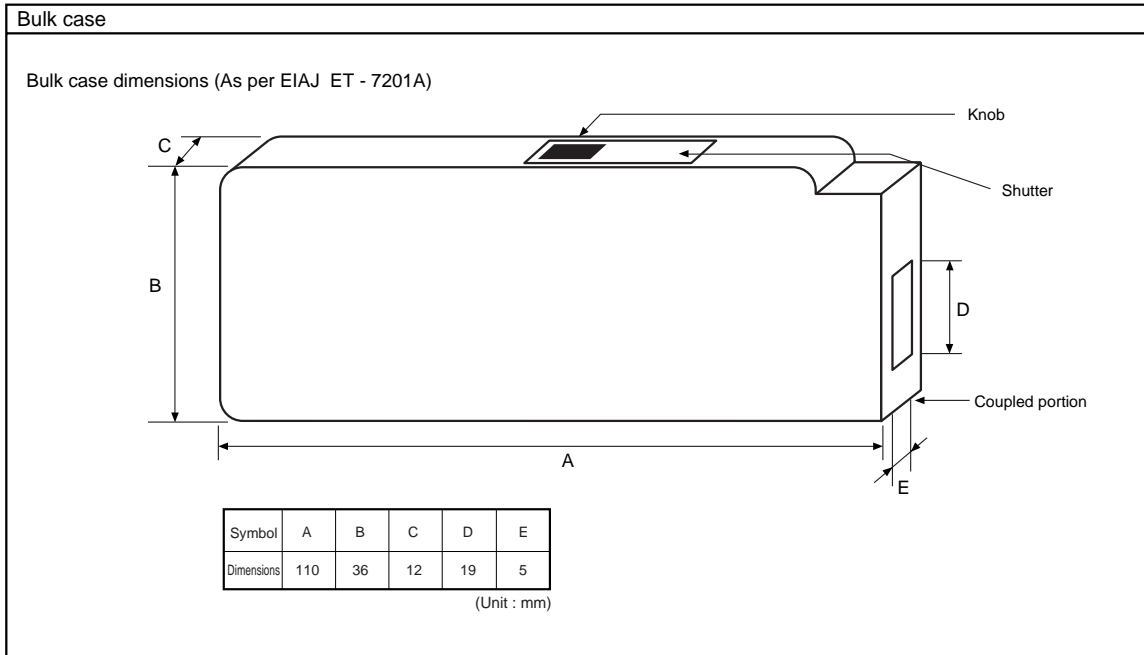
(1) The quantity for one reel is as bellows.

Kind of reel	Series	Paper tape	
		Quantity	Symbol
φ180 reel	MCH18	4,000 pcs.	K
φ330 reel	MCH18	16,000 pcs.	L

- (2) When the tape is pulled out towards the operator with the cover tape facing upward, the feeding holes shall be found on the right portion of the tape.
- (3) Specification of beginning and ending of the tape are as follows.
 - Ending(reel's center) : Approx. Over 300mm (no chips)
 - Beginning(reel's round) : Approx. Over 270mm (no chips)
 - : Approx. 30mm (no pasted tape)
 - : Approx. 260mm (cover tape only)
- (4) No juncture of tape shall be allowed.
- (5) The share strength of tape shall be more than 5N at the break down strength.
- (6) The peel strength of the cover tape shall be 0.1 to 0.7(N) when the cover tape are peeled 0 to 15° degree from the surface.
- (7) The number of missing components shall not exceed 0.1% of the total number of components (marked number) or one whichever is the larger, and no consecutive missing exceeding two is allowed.
- (8) The reels made from resin shall be used, as per EIAJ ET-7200A.

Ceramic capacitors

●Bulk case



(a)Quantity of package

Style	T dimensions(mm)	Quantity (pcs)
MCH18	0.8	15,000 +10/-0

●Marking

No marking shall be performed on the chip.

Trademark, parts number, quantity, lot No. , and country of origin shall be labeled on each reel, bulk case.

●Numbering system for LOT No.

Example

<u>04</u>	<u>01</u>	<u>A0001</u>	<u>J</u>
(1)	(2)	(3)	(4)

- (1) The end of the Christian Era <two digits> of production finish.
- (2) Week in completing part of production finish.
- (3) Manufacture continuity number.
- (4) The symbol of manufacturing plant.

Ceramic capacitors

●Label expression

The Figure below is label expression

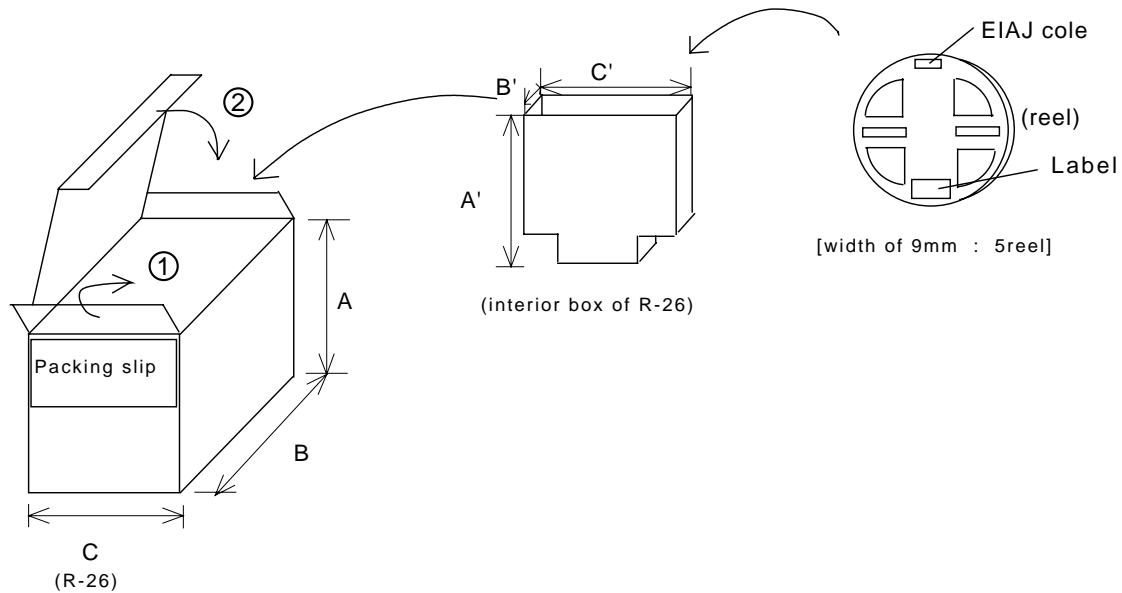
< Label Example > Part Number : MCH185A101JK



- ① Part Number
- ② Division cord
- ③ Quantity
- ④ Lot No.
- ⑤ The Country of origin
- ⑥ Inspector
- ⑦ QR code
- ⑧ Trademark

●Packing method

1) ϕ 180mm Reel



Ceramic capacitors

< Packaging unit >

Symbol	K
Quantity of reel in interior box	5
Quantity of reel in box of R-26	20

Dimensions	Packaging	
	R-26	interior box of R-26
A (A')	195	185
B (B')	255	60
C (C')	190	185

(Unit : mm)

< Appearance >

Carton

< Accumulation >

You must do accumulation by ten boxes

< Packaging slip >

1. Customer
2. Parts number
3. Quantity
4. Box quantity
5. Trade mark

●Weight / Piece

(Unit : mg)

Size	Item	Thickness	Characteristics	Weight / Piece
1608	MCH18	0.8mm	A	5.5
			AN	4.5
			CN	5.5
			FN	5.5

Note) The measured values in the table are for reference only.
Actual weight of these chips may vary slightly lot by lot.

●Electrical characteristics

■ A (COG) Characteristics

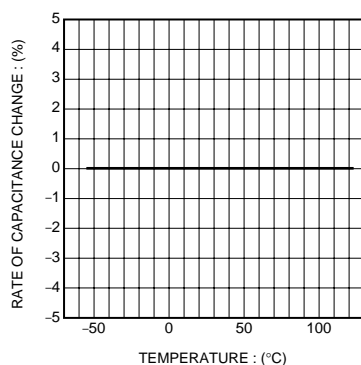


Fig.1 Capacitance - temperature characteristics

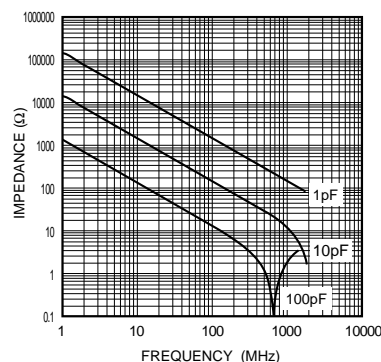


Fig.2 Impedance - frequency characteristics

Ceramic capacitors

■ CN (X7R) Characteristics

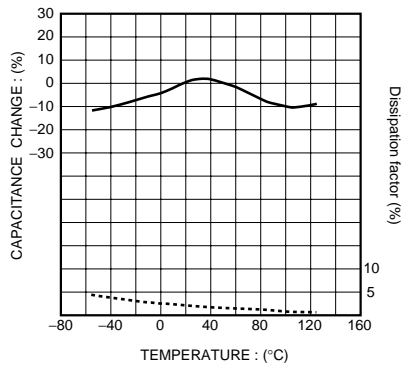


Fig.3 Capacitance - temperature characteristics

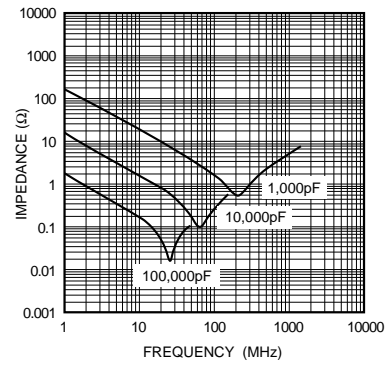


Fig.4 Impedance - frequency characteristics

■ FN (Y5V) Characteristics

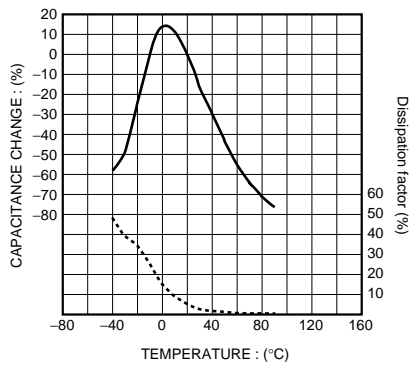


Fig.5 Capacitance - temperature characteristics

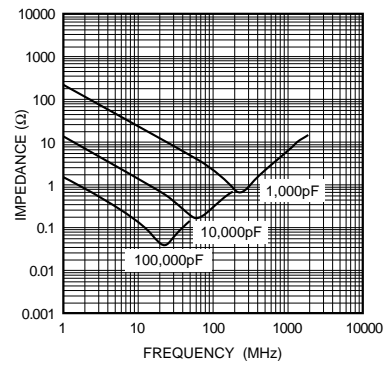


Fig.6 Impedance - frequency characteristics