

Multi-layer ceramic chip capacitors

MCH43 (4532 (1812) size, chip capacitor)

●Features

- 1) High capacitance
- 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

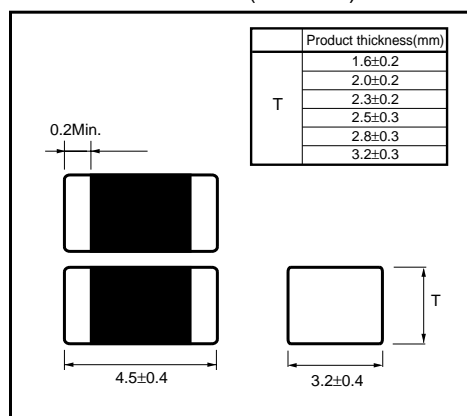
Part No.	Size code	Temperature characteristics code	Temperature characteristics (ppm/°C)	Operating temp. range (°C)	Rated voltage (V)	Capacitance (pF)	Capacitance tolerance	Thickness (mm)
MCH43	4532 (1812)	AN	0±30 (CG) (C0G)	-55 to +125	50	150,000 (E6 Series)	J(±5%)	2.5 ± 0.3
						220,000 (E6 Series)		3.2 ± 0.3

●High dielectric constant

Part No.	Size code	code	Temperature characteristics	Operating temp. range (°C)	Rated voltage (V)	Capacitance (pF)	Capacitance tolerance	Thickness (mm)
MCH43	4532 (1812)	CN	±10% (B)	-25 to +85	50	2,200,000 (E6 Series)	K(±10%)	1.6 ± 0.2
						3,300,000 (E6 Series)		2.0 ± 0.2
					25	4,700,000 (E6 Series)		1.6 ± 0.2
						6,800,000 (E6 Series)		2.0 ± 0.2
			±15% (R) (X7R)	-55 to +125	50	2,200,000 (E6 Series)		1.6 ± 0.2
						3,300,000 (E6 Series)		2.0 ± 0.2
					25	4,700,000 (E6 Series)		1.6 ± 0.2
						6,800,000 (E6 Series)		2.0 ± 0.2
					16	10,000,000 (E6 Series)		2.5 ± 0.3
						15,000,000 (E6 Series)		2.3 ± 0.2
						22,000,000 (E6 Series)		2.5 ± 0.3
						33,000,000 (E6 Series)		2.3 ± 0.2
			±15% (X5R)	-55 to +85	10	47,000,000 (E6 Series)	M(±20%)	2.8 ± 0.3
						68,000,000 to 100,000,000 (E6 Series)		
					6.3	10,000,000 (E3 Series)		
						22,000,000 (E3 Series)		
					25	47,000,000 (E3 Series)		
						100,000,000 (E3 Series)		
					50	10,000,000 (E3 Series)		
						22,000,000 (E3 Series)		
					16	47,000,000 (E3 Series)		
						100,000,000 (E3 Series)		
		FN	+30% , -80% (F)	-25 to +85	50	10,000,000 (E3 Series)	Z(+80% , -20%)	2.0± 0.2
						22,000,000 (E3 Series)		
					25	47,000,000 (E3 Series)		
						100,000,000 (E3 Series)		
			+22% , -82% (Y5V)	-30 to +85	50	10,000,000 (E3 Series)		
						22,000,000 (E3 Series)		
					16	47,000,000 (E3 Series)		
						100,000,000 (E3 Series)		

Ceramic capacitors

●External dimensions (Unit : mm)



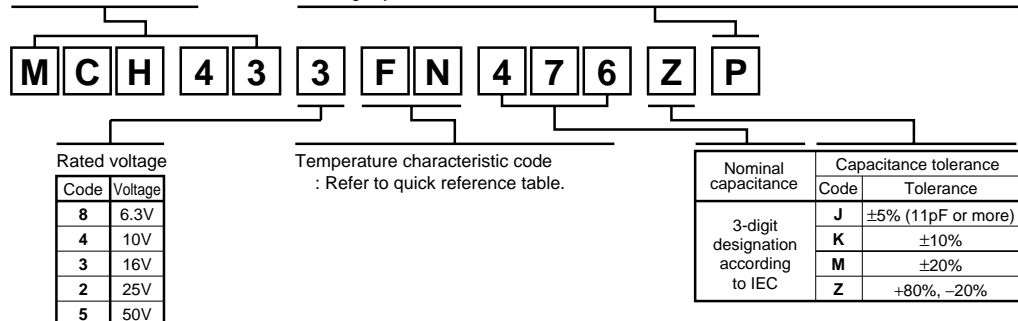
●Product designation

Code	Product thickness	Packing specification	Reel	Basic ordering unit (pcs.)
P	1.6mm	Plustic tape (width 12mm, pitch 8mm)	φ180mm (7in.)	1,000
P	2.0mm	Plustic tape (width 12mm, pitch 8mm)	φ180mm (7in.)	1,000
P	2.3mm	Plustic tape (width 12mm, pitch 8mm)	φ180mm (7in.)	500
P	2.5mm	Plustic tape (width 12mm, pitch 8mm)	φ180mm (7in.)	500
P	2.8mm	Plustic tape (width 12mm, pitch 8mm)	φ180mm (7in.)	500
P	3.2mm	Plustic tape (width 12mm, pitch 8mm)	φ180mm (7in.)	500

Reel (φ180mm) : compatible with EIAJ ET-7200A

Part No.

Packing Style

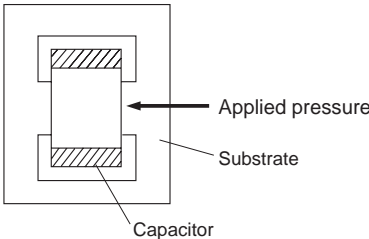


Ceramic capacitors

•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 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><th colspan="2">Table 1</th></tr><tr><th>Charac- teristic</th><th>Voltage</th></tr><tr><td>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></table> Voltage shall be applied for 1 to 5s with 50mA charging and discharging current.	Table 1		Charac- teristic	Voltage	AN	300% Rated voltage	CN	250% Rated voltage	FN						
Table 1																			
Charac- teristic	Voltage																		
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><tr><th colspan="3">Table 2</th></tr><tr><th>Charac- teristic</th><th colspan="2">Frequency・Voltage</th></tr><tr><td>AN</td><td colspan="2">1+/-0.1kHz 0.5 to 5Vrms.</td></tr><tr><td>CN</td><td>≤ 10μF</td><td>> 10μF</td></tr><tr><td>FN</td><td>1+/-0.1KHz 1+/-0.2Vrms.</td><td>120+/-24Hz 0.5+/-0.2Vrms.</td></tr></table>	Table 2			Charac- teristic	Frequency・Voltage		AN	1+/-0.1kHz 0.5 to 5Vrms.		CN	≤ 10μF	> 10μF	FN	1+/-0.1KHz 1+/-0.2Vrms.	120+/-24Hz 0.5+/-0.2Vrms.
Table 2																			
Charac- teristic	Frequency・Voltage																		
AN	1+/-0.1kHz 0.5 to 5Vrms.																		
CN	≤ 10μF	> 10μF																	
FN	1+/-0.1KHz 1+/-0.2Vrms.	120+/-24Hz 0.5+/-0.2Vrms.																	
5	Dielectric loss tangent	A N	tan δ ≤ 0.1%	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.															
	C N	Rated voltage=16, 10V tan δ ≤ 7.5% Rated voltage=6.3V tan δ ≤ 10.0%																	
	F N	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 N	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.								
			C N	B +/-10% (-25°C to +85°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.								
			X5R +/-15% (-55°C to +85°C)										
			F N +30%, -80% (-25°C to +85°C) +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. Ans 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. <table><tr><th colspan="2">Table3</th></tr><tr><th>Charac-teristic</th><th>Time</th></tr><tr><td>AN</td><td>24+/-2 h</td></tr><tr><td>CN, FN</td><td>48+/-4 h</td></tr></table>	Table3		Charac-teristic	Time	AN	24+/-2 h	CN, FN	48+/-4 h
		Table3											
		Charac-teristic	Time										
		AN	24+/-2 h										
		CN, FN	48+/-4 h										
			Change rate from initial value	A N		Within +/-2.5%							
				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.											
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/s²) Table3 <table><tr><td>Charac-teristic</td><td>Time</td></tr><tr><td>AN</td><td>24+/-2 h</td></tr><tr><td>CN, FN</td><td>48+/-4 h</td></tr></table>	Charac-teristic	Time	AN	24+/-2 h	CN, FN	48+/-4 h									
		Charac-teristic	Time																	
		AN	24+/-2 h																	
		CN, FN	48+/-4 h																	
	Change rate from initial value	A N	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><tr><td>Step</td><td>Temp. (°C)</td><td>Time (min)</td></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>	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
		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																
	Change rate from initial value	A N		Within +/-2.5%																
		C N	Rated voltage 25V,16V,10V	Within +/-7.5%																
			Rated voltage 6.3V	Within +/-10%																
	F N		Within +/-20%																	
Dielectric loss tangent	Within specified initial value.																			
Insulation resistance	Within specified initial value.																			
Withstanding voltage	No defects shall be allowed.																			
				Table3 <table><tr><td>Charac-teristic</td><td>Time</td></tr><tr><td>AN</td><td>24+/-2 h</td></tr><tr><td>CN, FN</td><td>48+/-4 h</td></tr></table>	Charac-teristic	Time	AN	24+/-2 h	CN, FN	48+/-4 h										
Charac-teristic	Time																			
AN	24+/-2 h																			
CN, FN	48+/-4 h																			

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><tr><td>Charac-teristic</td><td>Time</td></tr><tr><td>AN</td><td>24+/-2 h</td></tr><tr><td>CN, FN</td><td>48+/-4 h</td></tr></table>	Charac-teristic	Time	AN	24+/-2 h	CN, FN	48+/-4 h
		Charac-teristic	Time								
		AN	24+/-2 h								
		CN, FN	48+/-4 h								
		Change rate from initial value	A N			Within +/-5.0%					
			C N	Rated voltage 25V,16V,10V		Within +/-12.5%					
				Rated voltage 6.3V		Within +/-25.0%					
			F N			Within +/-30%					
		Dielectric tangent	A N			$\tan \delta \leq 0.3\%$					
			C N			Less than 200% of initial spec.					
F N			Less than 150% of initial spec.								
Insulation resistance	Not less than 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><tr><td>Charac-teristic</td><td>Time</td></tr><tr><td>AN</td><td>24+/-2 h</td></tr><tr><td>CN, FN</td><td>48+/-4 h</td></tr></table>	Charac-teristic	Time	AN	24+/-2 h	CN, FN	48+/-4 h
		Charac-teristic	Time								
		AN	24+/-2 h								
		CN, FN	48+/-4 h								
		Change rate from initial value	A N			Within +/-7.5%					
			C N	Rated voltage 25V,16V,10V		Within +/-12.5%					
				Rated voltage 6.3V		Within +/-25.0%					
			F N			Within +/-30%					
		Dielectric loss tangent	A N			$\tan \delta \leq 0.3\%$					
			C N			Less than 200% of initial spec.					
F N			Less than 150% of initial spec.								
Insulation resistance	Not less than 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.		As per 4.23 of JIS C 5101-1. As per 4.15 of JIS C 5101-10										
		Change rate from initial value	A N		Within +/-3.0%										
			C N	Rated voltage 25V,16V,10V	Within +/-15%										
				Rated voltage 6.3V	Within +/-25%										
			F N		Within +/-30%										
		Dielectric loss tangent	A N		$\tan \delta \leq 0.5\%$										
			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.)												
						<p>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> <p>Table3</p> <table><tr><td>Charac-teristic</td><td>Time</td></tr><tr><td>AN</td><td>24+/-2 h</td></tr><tr><td>CN, FN</td><td>48+/-4 h</td></tr></table>				Charac-teristic	Time	AN	24+/-2 h	CN, FN	48+/-4 h
		Charac-teristic	Time												
		AN	24+/-2 h												
	CN, FN	48+/-4 h													

[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.

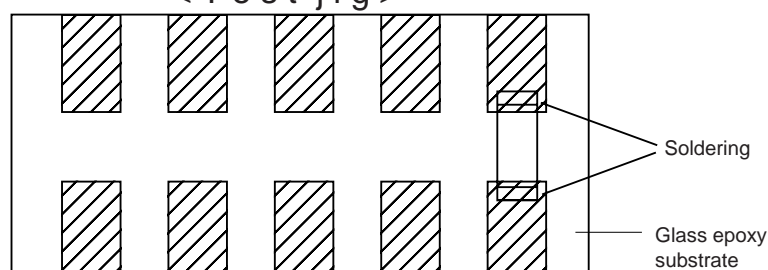
(1) Thermal pre-conditioning

Prior to initial measurements, specimens shall be conditioned at a temperature of $150 \pm 10^\circ\text{C}$ 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

<Test jig>



Ceramic capacitors

●Packaging specifications

Taping dimensions

Pulling direction

P: Plastic tape

Symbol	C	D	E	F	G	H	J	t	t ₁
Dimensions	12.0 +/-0.3	5.5 +/-0.05	1.75 +/-0.1	8.0 +/-0.1	2.0 +/-0.05	4.0 +/-0.1	φ1.5 +0.1/-0	0.6 MAX.	6.5 MAX.

(Unit : mm)

Symbol	A	B
MCH43	3.6	4.9

(Unit : mm)

Reel dimensions

Label pasting

As per EIAJ ET-7200A

(Unit : mm)

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

Kind of reel	Series	Plastic tape	
		Quantity	Symbol
φ180 reel	MCH43	500 pcs.	P

- (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 160mm (no chips)
- Beginning(reel's round) : Approx. Over 160mm (no chips)
- : Approx. 240mm (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.

●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.

●Numbering system for LOT No.

Example	<u>03</u>	<u>01</u>	<u>A0001</u>	<u>F</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

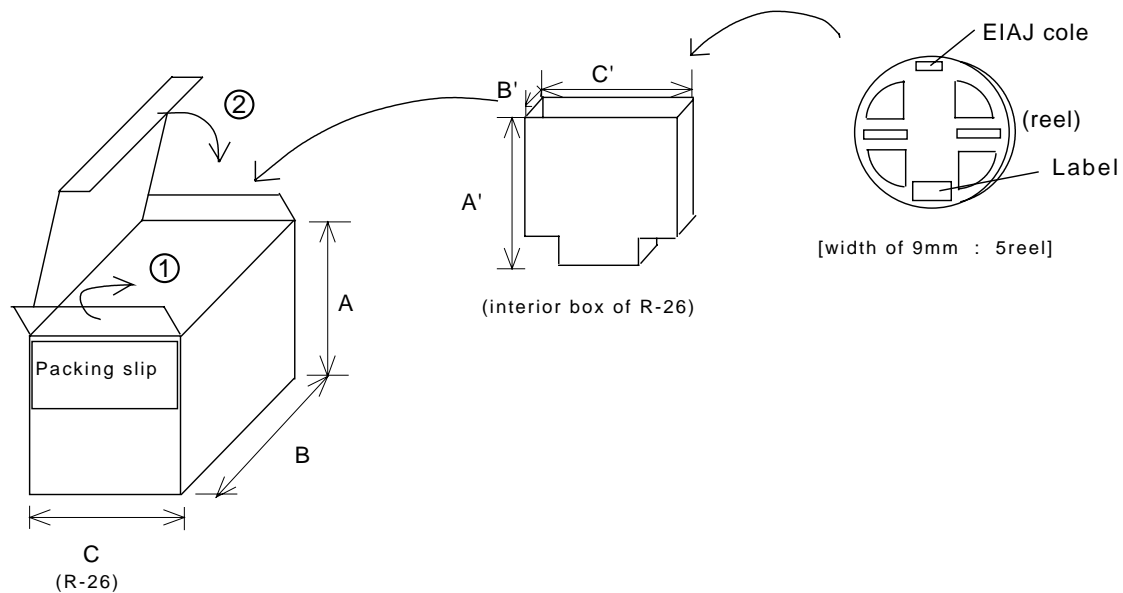
< Label Example > Part Number : MCH435AN104JP



Part Number
Division cord
Quantity
Lot No.
The Country of origin
Inspector
QR code
Trademark

●Packing method

1) $\phi 180$ mm Reel



Ceramic capacitors

< Packaging unit >

Symbol	K
Quantity of reel in interior box	3
Quantity of reel in box of R-26	12

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

Notes

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