

PRODUCT SPECIFICATION

Standard Multilayer Ceramic Capacitors

042TYPE Class I (C0K/C0J/C0H), Class II (X5R/X7R)
(Equivalent to EIA:CC01005)

Soldering: Reflow only

(Applicable products to RoHS restriction)

Document No.

MLRME12001

Specifications
Multilayer Ceramic Capacitor
 (Temperature compensating type), (High dielectric type)

1. Scope

This specification covers multilayer chip type ceramic capacitor (Pb-Free) for use in electronic appliances and electric communications equipment.

2. Part Numbering System

Part number is indicated as follows.

(Example) Temperature compensating type :

$\frac{\text{E}}{\text{①}}$ MK $\frac{\text{042}}{\text{②}}$ $\frac{\text{---}}{\text{③}}$ $\frac{\text{CH}}{\text{④}}$ $\frac{\text{101}}{\text{Capacitance}}$ $\frac{\text{J}}{\text{⑤}}$ $\frac{\text{C}}{\text{⑥}}$ $\frac{\text{-W}}{\text{⑦}}$

High dielectric type :

$\frac{\text{J}}{\text{①}}$ MK $\frac{\text{042}}{\text{②}}$ $\frac{\text{---}}{\text{③}}$ $\frac{\text{BJ}}{\text{④}}$ $\frac{\text{223}}{\text{Capacitance}}$ $\frac{\text{K}}{\text{⑤}}$ $\frac{\text{C}}{\text{⑥}}$ $\frac{\text{-W}}{\text{⑦}}$

①Rated voltage

Code	Voltage
E	16V DC
L	10V DC
J	6.3V DC
A	4.0V DC

②Size (mm)

Code	L×W
042	0.4×0.2

③Control Code

※Per Fig.1.

④Temperature characteristics (Temperature compensating type)

Characteristic	Temperature characteristic
CK(C0K)	0±250 ppm/°C
CJ(C0J)	0±120 ppm/°C
CH(C0H)	0±60 ppm/°C

④Temperature characteristics (High dielectric type)

Characteristic	Capacitance change rate	Temperature range	Reference temperature
BJ(X5R)	±15%(EIA)	-55~+85°C	25°C
B7(X7R)	±15%(EIA)	-55~+125°C	25°C

⑤Tolerance

Code	Tolerance	Code	Tolerance
C	±0.25pF	K	±10%
D	±0.5pF	M	±20%
J	±5%		

⑥Thickness

Code	Thickness rank [mm]
C	0.2
D	0.2

⑦Packaging

Code	Packaging
-W	Taping

Multilayer Ceramic Chip Capacitor

3. Test Conditions

Standard test conditions shall be temperature of 5 to 35°C and relative humidity of 45 to 85%, and air pressure of 86 to 106kPa. Test shall be conducted at temperature of $20 \pm 2^\circ\text{C}$, relative humidity of 60 to 70%, and air pressure of 86 to 106kPa if test result is suspectable.

Unless otherwise specified, all tests shall be conducted under standard test conditions.

4. Construction, Dimensions and Performance

Details of construction, dimensions and performance shall be specified in the following sheets.

5. Packaging

Packaging shall be made to avoid damages of capacitors during transportation or storage.

Packaging shall be marked with part number, quantity, lot number and manufacturer's name at its appropriate position.

6. Manufacturing site

TAIYO YUDEN CO., LTD. (JAPAN)

TAIYO YUDEN (GUANG DONG) CO., LTD. (CHINA)

7. Precautions

- Please refer to precautions in our general catalog prior to product being used.

If you need further information, please contact us.

- CAUTION: This specification can't be assured when Sn-Zn lead free solder is used.

8. Storage conditions

- To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible.

- Recommended conditions

Ambient temperature 30°C and below

Humidity 70% RH and below

The ambient temperature must be kept below 40°C . Even under ideal storage conditions capacitor electrode Solderability decreases as time passes, so ceramic chip capacitors should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.

- The packaging material should be kept where no chlorine or sulfur exists in the air.

Multilayer Ceramic Chip Capacitor

9. RoHS compliance

- This product conform to "RoHS compliance."
- "RoHS compliance" means that the product does not contain lead, cadmium, mercury, hexavalent chromium, PBB or PBDE referring to EU Directive 2002/95/EC, except other non-restricted substances or impurities which could not be technically removed at the refining process.

10. Others

Resin-coating:

- Coating/molding capacitors with resin may have negative effects on the capacitor functions.
- When capacitors are coated/molded with resin, please check effects on the capacitors by analyzing them in actual applications prior to use.

No.	Item	Specified Value	Remarks										
1	Operating Temperature Range	Capable of continuous operation under these conditions.	Temperature compensating type : -55~+125°C High dielectric type : X5R : -55~+85°C X7R : -55~+125°C										
2	Shape and Dimensions	Per Fig.1											
3	Heat Treatment (High dielectric type)		Initial value shall be measured after test sample is heat-treated at 150 +0/-10°C for an hour and kept at room temperature for 24±2 hours.										
4	Voltage Treatment (High dielectric type)		Initial value shall be measured after test sample is voltage-treated for an hour at temperature and voltage which are specified as test conditions, and kept at room temperature for 24±2 hours.										
5	Dielectric Withstanding Voltage (between terminals)	No abnormality.	Conforming to EIA RS-198-D (1991). 300% of DC rated voltage for temperature compensating type and 250% of DC rated voltage for high dielectric type shall be applied for 1 to 5 seconds. Charging and discharging current shall be 50mA or less.										
6	Insulation Resistance	Temperature compensating type : 10,000MΩ min.	Conforming to EIA RS-198-D (1991). Voltage to be measured shall be rated voltage and voltage applying time shall be 1 minute±5 seconds. Charging and discharging current shall be 50mA or less.										
		High dielectric type : Per Table 1.											
7	Capacitance	Per Table 1.	<p>Conforming to EIA RS-198-D (1991). For high dielectric type capacitors, heat treatment specified in No.3 of the specification shall be conducted prior to measurement. Measuring frequency and voltage shall conform to the table shown below.</p> <p>[Temperature compensating type]</p> <table border="1"> <thead> <tr> <th>Measuring Frequency</th> <th>Measuring Voltage</th> </tr> </thead> <tbody> <tr> <td>1MHz±10%</td> <td>0.5~5Vrms</td> </tr> </tbody> </table> <p>[High dielectric type]</p> <table border="1"> <thead> <tr> <th>Measuring Frequency</th> <th>Measuring Voltage</th> </tr> </thead> <tbody> <tr> <td>1kHz±10%</td> <td>1.0±0.2Vrms</td> </tr> <tr> <td>1kHz±10%</td> <td>0.5±0.1Vrms</td> </tr> </tbody> </table>	Measuring Frequency	Measuring Voltage	1MHz±10%	0.5~5Vrms	Measuring Frequency	Measuring Voltage	1kHz±10%	1.0±0.2Vrms	1kHz±10%	0.5±0.1Vrms
Measuring Frequency	Measuring Voltage												
1MHz±10%	0.5~5Vrms												
Measuring Frequency	Measuring Voltage												
1kHz±10%	1.0±0.2Vrms												
1kHz±10%	0.5±0.1Vrms												

No.	Item	Specified Value	Remarks										
8	Q or Dissipation Factor ($\tan \delta$)	Per Table 1.	<p>Conforming to EIA RS-198-D (1991). For high dielectric type capacitors, heat treatment specified in No.3 of the specification shall be conducted prior to measurement. Measuring frequency and voltage shall conform to the table shown below.</p> <p>[Temperature compensating type]</p> <table border="1"> <thead> <tr> <th>Measuring Frequency</th> <th>Measuring Voltage</th> </tr> </thead> <tbody> <tr> <td>1MHz\pm10%</td> <td>0.5~5Vrms</td> </tr> </tbody> </table> <p>[High dielectric type]</p> <table border="1"> <thead> <tr> <th>Measuring Frequency</th> <th>Measuring Voltage</th> </tr> </thead> <tbody> <tr> <td>1kHz\pm10%</td> <td>1.0\pm0.2Vrms</td> </tr> <tr> <td>1kHz\pm10%</td> <td>0.5\pm0.1Vrms</td> </tr> </tbody> </table>	Measuring Frequency	Measuring Voltage	1MHz \pm 10%	0.5~5Vrms	Measuring Frequency	Measuring Voltage	1kHz \pm 10%	1.0 \pm 0.2Vrms	1kHz \pm 10%	0.5 \pm 0.1Vrms
Measuring Frequency	Measuring Voltage												
1MHz \pm 10%	0.5~5Vrms												
Measuring Frequency	Measuring Voltage												
1kHz \pm 10%	1.0 \pm 0.2Vrms												
1kHz \pm 10%	0.5 \pm 0.1Vrms												
9	Temperature Characteristic	Temperature compensating type : Per P.1④	<p>Conforming to EIA RS-198-D (1991). Capacitance value at 25°C and 85°C shall be measured and calculated from formula shown below.</p> $T. C = \frac{C_{85} - C_{25}}{C_{25} \times \Delta T} \times 10^6 \text{ [ppm/}^\circ\text{C]}$										
		High dielectric type : Per P.1④	<p>Conforming to EIA RS-198-D (1991). Heat treatment specified in No.3 of the specification shall be conducted prior to measurement. Maximum capacitance deviation in both (+) and (-) sides in range of lowest temperature to highest temperature for capacitor shall be indicated in ratio of variation in reference to capacitance value at reference temperature.</p>										
10	Adhesive Force of Terminal Electrodes	Terminal electrodes shall be no exfoliation or a sign of exfoliation.	<p>Conforming to EIA RS-198-D (1991). Test sample shall be soldered to test board shown in Fig.2 and a force of 2N(200gf) shall be applied in arrow direction for 10\pm1 seconds.</p>										
11	Vibration	Initial performance shall be satisfied.	<p>Conforming to EIA RS-198-D (1991). Test sample shall be soldered to test board shown in Fig.2. For high dielectric type capacitors, heat treatment specified in No.3 of the specification shall be conducted prior to test.</p> <p>Test conditions: Frequency range: 10~55Hz Overall amplitude: 1.5mm Sweeping method: 10~55~10Hz for 1 min. Each two hours in X,Y,Z direction: 6 hours in total</p>										

No.	Item	Specified Value	Remarks																
12	Resistance to Soldering Heat	Appearance	No abnormality	<p>Conforming to EIA RS-198-D (1991). Used solder shall be [JIS Z 3282 H60A or H63A]. Test sample shall be completely submerged in molten solder of $270 \pm 5^\circ\text{C}$ for 3 ± 0.5 seconds. Preheating as shown in the table below shall be continuously conducted before submersion and test sample shall be kept at normal temperature after test.</p> <table border="1" data-bbox="922 533 1380 607"> <thead> <tr> <th>Temperature($^\circ\text{C}$)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>150 ± 1</td> <td>1~2</td> </tr> </tbody> </table> <p>For high dielectric type capacitors, heat treatment specified in No.3 of the specification shall be conducted prior to test. Measurement shall be conducted after test sample is kept at room temperature for 24 ± 2 hours.</p>	Temperature($^\circ\text{C}$)	Time(min)	150 ± 1	1~2											
		Temperature($^\circ\text{C}$)	Time(min)																
		150 ± 1	1~2																
		Capacitance Change	Temperature compensating type: Per Table 2. High dielectric type: Per Table 4.																
		Q or Dissipation Factor	Temperature compensating type: [Q]Per Table 3. High dielectric type: [Dissipation Factor] Per Table 4.																
Insulation Resistance	Initial value shall be satisfied.																		
Dielectric Withstanding Voltage (between terminals)	No abnormality																		
13	Solderability	More than 95% of terminal electrode shall be covered with fresh solder.	<p>【Eutectic】 Used solder shall be [JIS Z 3282 H60A or H63A]. Test sample shall be completely submerged in molten solder of $230 \pm 5^\circ\text{C}$ for 4 ± 1 seconds.</p>																
			<p>【Pb free】 Used solder shall be [Sn/3.0Ag/0.5Cu]. Test sample shall be completely submerged in molten solder of $245 \pm 3^\circ\text{C}$ for 4 ± 1 seconds.</p>																
14	Thermal Shock	Appearance	No abnormality	<p>Conforming to EIA RS-198-D (1991). Test sample shall be soldered to test board shown in Fig.2. For high dielectric type capacitors, heat treatment specified in No.3 of the specification shall be conducted prior to test. Test sample shall be kept for specified time at each of temperature in steps 1 to 4 shown below in sequence.</p> <table border="1" data-bbox="922 1509 1449 1771"> <thead> <tr> <th>Step</th> <th>Temperature ($^\circ\text{C}$)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Lowest operating temperature</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Normal temperature</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Highest operating temperature</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Normal temperature</td> <td>2~3</td> </tr> </tbody> </table> <p>Temperature cycle shall be repeated five times in this method, and measurement shall be conducted after test sample is kept for 24 ± 2 hours.</p>	Step	Temperature ($^\circ\text{C}$)	Time (min)	1	Lowest operating temperature	30 ± 3	2	Normal temperature	2~3	3	Highest operating temperature	30 ± 3	4	Normal temperature	2~3
		Step	Temperature ($^\circ\text{C}$)		Time (min)														
		1	Lowest operating temperature		30 ± 3														
		2	Normal temperature		2~3														
		3	Highest operating temperature		30 ± 3														
4	Normal temperature	2~3																	
Capacitance Change	Temperature compensating type: Per Table 2. High dielectric type: Per Table 4.																		
Q or Dissipation Factor	Temperature compensating type: [Q]Per Table 3. High dielectric type: [Dissipation Factor] Per Table 4.																		
Insulation Resistance	Initial value shall be satisfied.																		
Dielectric Withstanding Voltage (between terminals)	No abnormality																		

No.	Item	Specified Value	Remarks	
15	Humidity (Steady State)	Appearance	No abnormality	Conforming to EIA RS-198-D (1991). Test sample shall be at $40 \pm 2^\circ\text{C}$ with relative humidity of 90 to 95% for 500+24/-0 hours. For high dielectric type capacitors, heat treatment specified in No.3 of the specification shall be conducted prior to test. Measurement shall be conducted after test sample is kept for the 24 ± 2 hours.
		Capacitance Change	Temperature compensating type : Per Table 2. High dielectric type : Per Table 4.	
		Q or Dissipation Factor	Temperature compensating type : [Q]Per Table 3. High dielectric type : [Dissipation Factor] Per Table 4.	
		Insulation Resistance	Temperature compensating type : 1,000M Ω min. High dielectric type : Per Table 4.	
16	High Temperature Loading	Appearance	No abnormality	Conforming to EIA RS-198-D (1991). For temperature compensating type test sample shall be put in thermostatic oven with maximum temperature and 200% of DC rated voltage shall be continuously applied for 1000+48/-0 hours. For high dielectric type applied DC voltage is described in table4. Charging and discharging current shall be 50mA or less. For high dielectric type capacitors, voltage treatment specified in No.4 of the specification shall be conducted prior to test. Measurement shall be conducted after test sample is kept for 24 ± 2 hours.
		Capacitance Change	Temperature compensating type : Per Table 2. High dielectric type : Per Table 4.	
		Q or Dissipation Factor	Temperature compensating type : [Q]Per Table 3. High dielectric type : [Dissipation Factor] Per Table 4.	
		Insulation Resistance	Temperature compensating type : 1,000M Ω min. High dielectric type : Per Table 4.	

No.	Item	Specified Value	Remarks	
17	Humidity Loading	Appearance	No abnormality	<p>Conforming to EIA RS-198-D (1991). Test sample shall be put in thermostatic oven with $40 \pm 2^\circ\text{C}$ and relative humidity 90 to 95% and DC rated voltage shall be continuously applied for $500+24/-0$ hours. Charging and discharging current shall be 50mA or less. For high dielectric type capacitors, voltage treatment specified in No.4 of the specification shall be conducted prior to test. Measurement shall be conducted after test sample is kept for 24 ± 2 hours.</p>
		Capacitance Change	Temperature compensating type: Per Table 2. High dielectric type: Per Table 4.	
		Q or Dissipation Factor	Temperature compensating type: [Q]Per Table 3. High dielectric type: [Dissipation Factor] Per Table 4.	
		Insulation Resistance	Temperature compensating type: $500\text{M}\Omega$ min. High dielectric type: Per Table 4.	
18	Bending Strength	Appearance	No abnormality	<p>Test sample shall be soldered to test board as shown in Fig.3. Soldering shall be conducted with care of avoiding an abnormality such as heat shock. Deflection test is such that force to cause deflection as much as 1.0mm is applied for 10 seconds in method shown in Fig.4. Measurement shall be conducted with deflection of 1.0mm.</p>
		Capacitance Change	Temperature compensating type: Per Table 2. High dielectric type: Within $\pm 12.5\%$	

Table1 Nominal Capacitance Range and Tolerance

[Temperature compensating type : For reflow soldering]

[Temperature Characteristic CK:C0K,CJ:C0J,CH:C0H] 0.2mm thickness (C,D)

Ordering code	Temperature characteristics	Rated voltage (VDC)	Capacitance (pF)	Capacitance tolerance	Q (min)	Thickness T(mm)
EMK042CK0R5CD-W	CK/C0K	16	0.5	C	410	0.2±0.02
EMK042CK010CD-W	CK/C0K	16	1	C	420	0.2±0.02
EMK042CK1R5CD-W	CK/C0K	16	1.5	C	430	0.2±0.02
EMK042CK020CD-W	CK/C0K	16	2	C	440	0.2±0.02
EMK042CJ030CD-W	CJ/C0J	16	3	C	460	0.2±0.02
EMK042CH040CD-W	CH/C0H	16	4	C	480	0.2±0.02
EMK042CH050CD-W	CH/C0H	16	5	C	500	0.2±0.02
EMK042CH060DD-W	CH/C0H	16	6	D	520	0.2±0.02
EMK042CH070DD-W	CH/C0H	16	7	D	540	0.2±0.02
EMK042CH080DD-W	CH/C0H	16	8	D	560	0.2±0.02
EMK042CH090DD-W	CH/C0H	16	9	D	580	0.2±0.02
EMK042CH100DD-W	CH/C0H	16	10	D	600	0.2±0.02
EMK042CH120JD-W	CH/C0H	16	12	J	640	0.2±0.02
EMK042CH150JD-W	CH/C0H	16	15	J	700	0.2±0.02
EMK042CH180JC-W	CH/C0H	16	18	J	760	0.2±0.02
EMK042CH220JC-W	CH/C0H	16	22	J	840	0.2±0.02
EMK042CH270JC-W	CH/C0H	16	27	J	940	0.2±0.02
EMK042CH330JC-W	CH/C0H	16	33	J	1000	0.2±0.02
EMK042CH390JC-W	CH/C0H	16	39	J	1000	0.2±0.02
EMK042CH470JC-W	CH/C0H	16	47	J	1000	0.2±0.02
EMK042CH560JC-W	CH/C0H	16	56	J	1000	0.2±0.02
EMK042CH680JC-W	CH/C0H	16	68	J	1000	0.2±0.02
EMK042CH820JC-W	CH/C0H	16	82	J	1000	0.2±0.02
EMK042CH101JC-W	CH/C0H	16	100	J	1000	0.2±0.02

Table1 Nominal Capacitance Range and Tolerance [High dielectric type : For reflow soldering]
 [Temperature Characteristic BJ:B/X5R] 0.2mm thickness (C)

Ordering code※1	Temperature characteristics (JIS/ EIA)	Rated voltage (VDC)	Capacitance (pF)	Insulation Resistance (MΩ · μ F)min ※2	DF (% max.)	Measuring Frequency/ Measuring Voltage	Thickness T(mm)
LMK042 BJ101□C-W	B/ X5R	10	100		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ151□C-W	B/ X5R	10	150		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ221□C-W	B/ X5R	10	220		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ331□C-W	B/ X5R	10	330		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ471□C-W	B/ X5R	10	470		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ681□C-W	B/ X5R	10	680		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ102□C-W	B/ X5R	10	1000		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ152□C-W	X5R	10	1500		10.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ222□C-W	X5R	10	2200		10.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ332□C-W	X5R	10	3300		10.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ472□C-W	X5R	10	4700		10.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ682□C-W	X5R	10	6800		10.0	1kHz-1.0Vrms	0.2±0.02
LMK042 BJ103□C-W	X5R	10	10000		10.0	1kHz-1.0Vrms	0.2±0.02
JMK042 BJ152□C-W	B/ X5R	6.3	1500		10.0	1kHz-0.5Vrms	0.2±0.02
JMK042 BJ222□C-W	B/ X5R	6.3	2200		10.0	1kHz-0.5Vrms	0.2±0.02
JMK042 BJ332□C-W	B/ X5R	6.3	3300		10.0	1kHz-0.5Vrms	0.2±0.02
JMK042 BJ472□C-W	B/ X5R	6.3	4700		10.0	1kHz-0.5Vrms	0.2±0.02
JMK042 BJ682□C-W	B/ X5R	6.3	6800		10.0	1kHz-0.5Vrms	0.2±0.02
JMK042 BJ103□C-W	B/ X5R	6.3	10000		10.0	1kHz-0.5Vrms	0.2±0.02
JMK042 BJ223□C-W	X5R	6.3	22000	100	10.0	1kHz-0.5Vrms	0.2±0.02
AMK042 BJ473MC-W	X5R	4.0	47000	100	10.0	1kHz-0.5Vrms	0.2±0.02
AMK042 BJ104MC-W	X5R	4.0	100000	100	10.0	1kHz-0.5Vrms	0.2±0.02

[Temperature Characteristic B7:X7R] 0.2mm thickness (C)

Ordering code※1	Temperature characteristics (EIA)	Rated voltage (VDC)	Capacitance (pF)	Insulation Resistance (MΩ · μ F)min ※2	DF (% max.)	Measuring Frequency/ Measuring Voltage	Thickness (mm)
LMK042 B7101□C-W	X7R	10	100		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 B7151□C-W	X7R	10	150		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 B7221□C-W	X7R	10	220		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 B7331□C-W	X7R	10	330		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 B7471□C-W	X7R	10	470		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 B7681□C-W	X7R	10	680		5.0	1kHz-1.0Vrms	0.2±0.02
LMK042 B7102□C-W	X7R	10	1000		5.0	1kHz-1.0Vrms	0.2±0.02

【Note】 ※1 : □ is for Tolerance code K or M.

※2 : Blank indicates 10,000MΩ min.

Table2 Specification for Capacitance Change after test [Temperature compensating type]

Test item	Capacitance change (ΔC)
Resistance to Soldering Heat Thermal Shock	Less than $\pm 2.5\%$ or $\pm 0.25\text{pF}$, whichever is more.
Humidity (Steady State) Bending Strength	Less than $\pm 5.0\%$ or $\pm 0.5\text{pF}$, whichever is more.
High Temperature Loading	Less than $\pm 3.0\%$ or $\pm 0.3\text{pF}$, whichever is more.
Humidity Loading	Less than $\pm 7.5\%$ or $\pm 0.75\text{pF}$, whichever is more.

Table3 Specification for Q Change [Temperature compensating type]

Test item	Q change
Resistance to Soldering Heat Thermal Shock	$C \geq 30\text{pF}$ $Q \geq 1000$ $C < 30\text{pF}$ $Q \geq 400 + 20 \cdot C$
Humidity (Steady state) High Temperature Loading	$C \geq 30\text{pF}$ $Q \geq 350$ $10\text{pF} \leq C < 30\text{pF}$ $Q \geq 275 + 5/2 \cdot C$ $C < 10\text{pF}$ $Q \geq 200 + 10 \cdot C$
Humidity Loading	$C \geq 30\text{pF}$ $Q \geq 200$ $C < 30\text{pF}$ $Q \geq 100 + 10/3 \cdot C$

C: Nominal capacitance

Table4 Specification for Capacitance Change and Dissipation Factor Change[High dielectric type]
 [Temperature Characteristic BJ: B/X5R] 0.2mm thickness (C)

Test item	Resistance to Soldering Heat/ Thermal shock		Humidity (Steady state)			High Temperature Loading				Humidity Loading		
	Capacitance change rate (%)	DF (% max.)	Capacitance change rate (%)	DF (% max.)	※1	Capacitance change rate (%)	DF (% max.)	※3	※1	Capacitance change rate (%)	DF (% max.)	※2
LMK042 BJ101□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 BJ151□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 BJ221□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 BJ331□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 BJ471□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 BJ681□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 BJ102□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 BJ152□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
LMK042 BJ222□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
LMK042 BJ332□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
LMK042 BJ472□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
LMK042 BJ682□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
LMK042 BJ103□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
JMK042 BJ152□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
JMK042 BJ222□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
JMK042 BJ332□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
JMK042 BJ472□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
JMK042 BJ682□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
JMK042 BJ103□C-W	±12.5	10.0	±12.5	20.0		±15.0	20.0	150		±20.0	20.0	
JMK042 BJ223□C-W	±15.0	10.0	±25.0	20.0	10	±25.0	20.0	150	10	±25.0	20.0	5
AMK042 BJ473MC-W	±15.0	10.0	±25.0	20.0	10	±25.0	20.0	150	10	±25.0	20.0	5
AMK042 BJ104MC-W	±15.0	10.0	±25.0	20.0	10	±25.0	20.0	150	10	±25.0	20.0	5

[Temperature Characteristic B7: X7R] 0.2mm thickness (C)

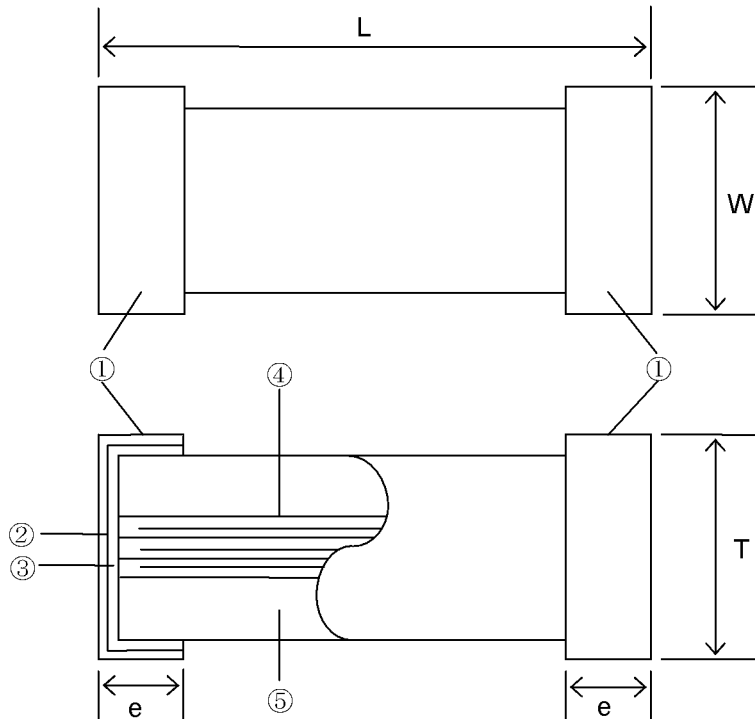
Test item	Resistance to Soldering Heat/ Thermal shock		Humidity (Steady state)			High Temperature Loading				Humidity Loading		
	Capacitance change rate (%)	DF (% max.)	Capacitance change rate (%)	DF (% max.)	※1	Capacitance change rate (%)	DF (% max.)	※3	※1	Capacitance change rate (%)	DF (% max.)	※2
LMK042 B7101□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 B7151□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 B7221□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 B7331□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 B7471□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 B7681□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	
LMK042 B7102□C-W	±7.5	5.0	±12.5	7.5		±12.5	7.5			±15.0	7.5	

【Note】 ※1 : IR after test(MΩ·μF min): Blank indicates lesser value of 1,000MΩ · μ F min.

※2 : IR after test(MΩ·μF min): Blank indicates lesser value of 500MΩ · μ F min.

※3 : Applied voltage(%): Blank indicates rated voltage 200%

Fig.1 Shape and Dimensions



[Temperature compensating type]

No.	Name	Material
①	Terminal Electrodes (Surface)	Sn Plating
②	Terminal Electrodes	Ni Plating
		Cu Plating
③	External Electrodes	Ni
④	Internal Electrodes	Ni
⑤	Dielectric	Ceramics of CaZrO_3

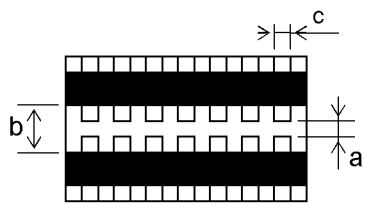
[High dielectric type]

No.	Name	Material
①	Terminal Electrodes (Surface)	Sn Plating
②	Terminal Electrodes	Ni Plating
		Cu Plating
③	External Electrodes	Ni
④	Internal Electrodes	Ni
⑤	Dielectric	Barium titanate

Type	L		W		T		e
	Control Code	Dimensions	Control Code	Dimensions	Control Code	Dimensions	Dimensions
042	Space	0.4 ± 0.02	Space	0.2 ± 0.02	Space	0.2 ± 0.02	0.1 ± 0.03

[Unit: mm]

Fig.2 Board / Test Jig of Adhesive force of Terminal Electrodes, Vibration and Thermal Shock

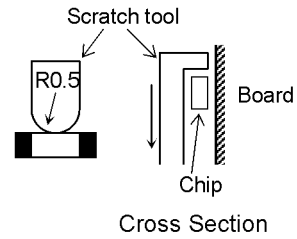


Size (L×W)	a	B	c
0.4×0.2	0.2	0.5	0.2

[Unit: mm]

Material: Glass epoxy board [JIS C 6484]

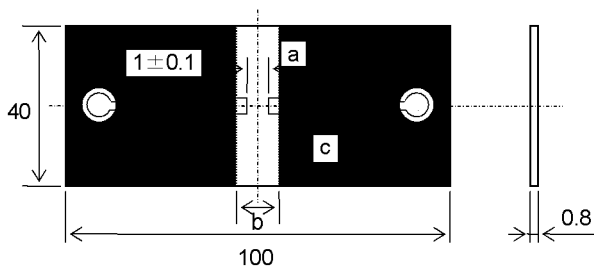
Copper foil (thickness: 0.035mm)
 Solder resist



Remarks: Uniform soldering shall be conducted with solder (H60A or H63A in JIS Z 3282) by using an iron or soldering oven.

Soldering shall be conducted with care of avoiding an abnormality such as heat shock.

Fig.3 Test Board



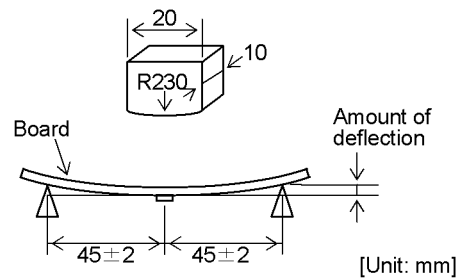
Material: Glass epoxy board [JIS C 6484]

Copper foil (thickness: 0.035mm)
 Solder resist

Size (L×W)	a	b	c
0.4×0.2	0.2	0.5	0.2

[Unit: mm]

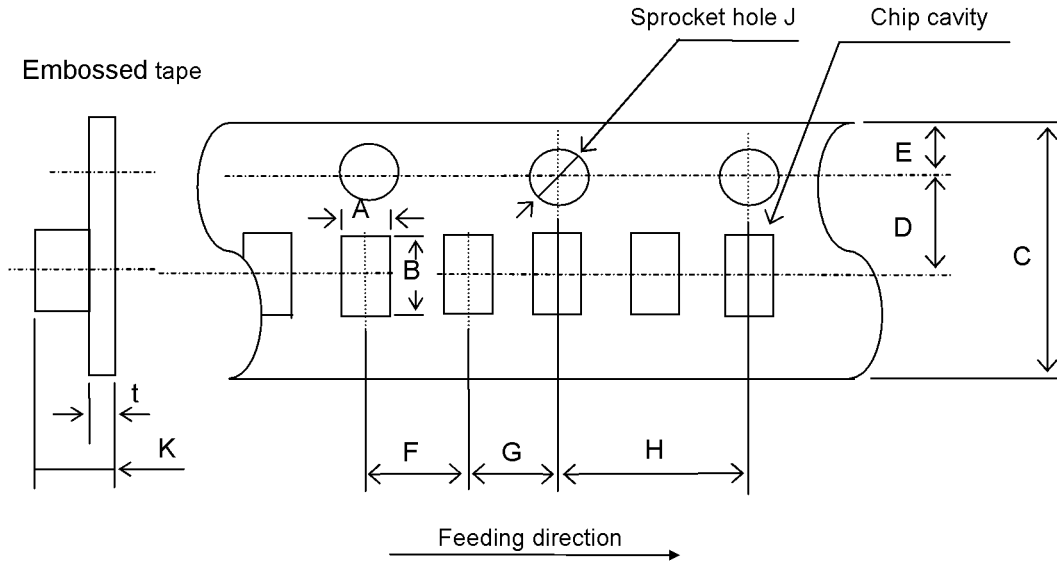
Fig.4



Apply pressure at the rate of 0.5mm/sec. until amount of deflection reaches to 1.0mm.

Tape Packaging 042 Type

⊙In case of taping packaging, embossed tapes shall be used.



Dimensions [Unit: mm]

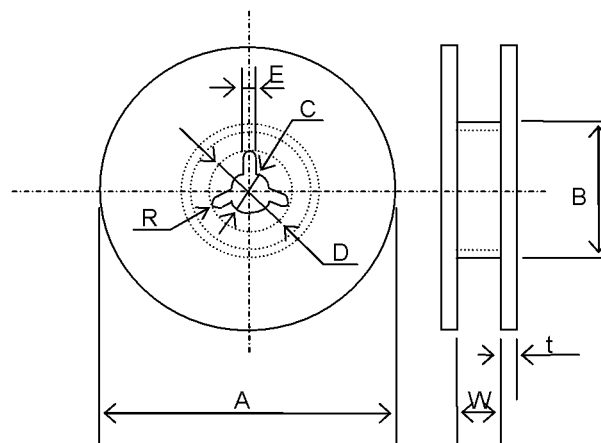
Type	A※	B※
042	0.23 ± 0.03	0.43 ± 0.03

Dimensions

C	D	E	F	G	H	J	K※	t
4.0 ± 0.05	1.8 ± 0.02	0.9 ± 0.05	1.0 ± 0.02	1.0 ± 0.02	2.0 ± 0.04	$\phi 0.8 \pm 0.04$	0.50max	0.25max

※A, B, K : Sufficient clearance.

[Unit: mm]



Dimensions of Reel

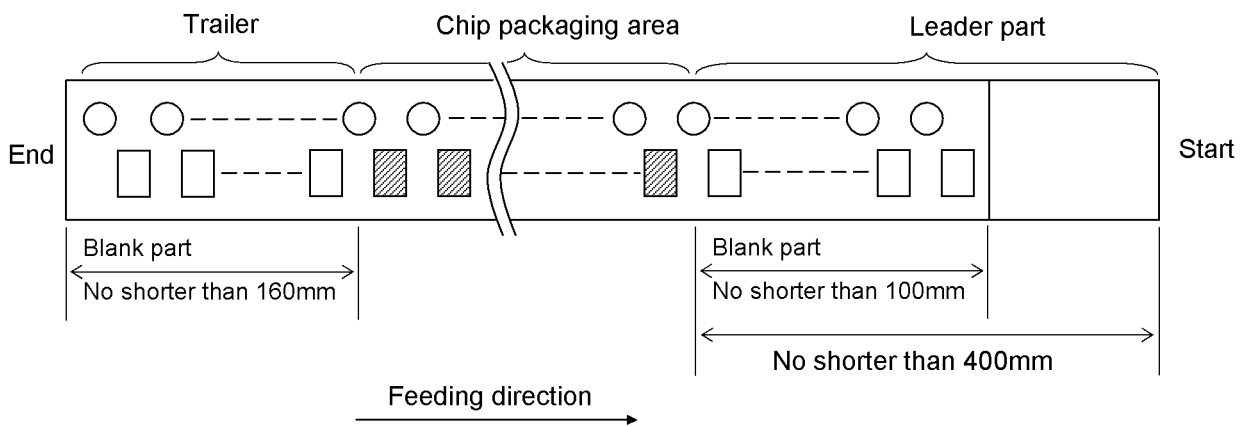
A	B	C	D	E	W	t	R
$\phi 178 \pm 2.0$	$\phi 50\text{min}$	$\phi 13.0 \pm 0.2$	$\phi 21.0 \pm 0.8$	2.0 ± 0.5	5.0 ± 1.0	1.5max.	1.0

[Unit: mm]

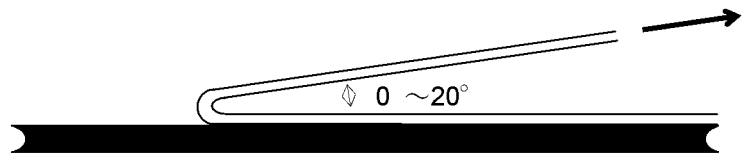
Tape Packaging

1. Taping shall be right-sided wound. When the end is pulled out, sprocket hole will be at the right-hand side.
2. Components are inserted in chip cavity of carrier tape with their thickness and width sides faced up at random.
3. For packaging chips by taping, blank spaces are provided on taping as shown in the figure.

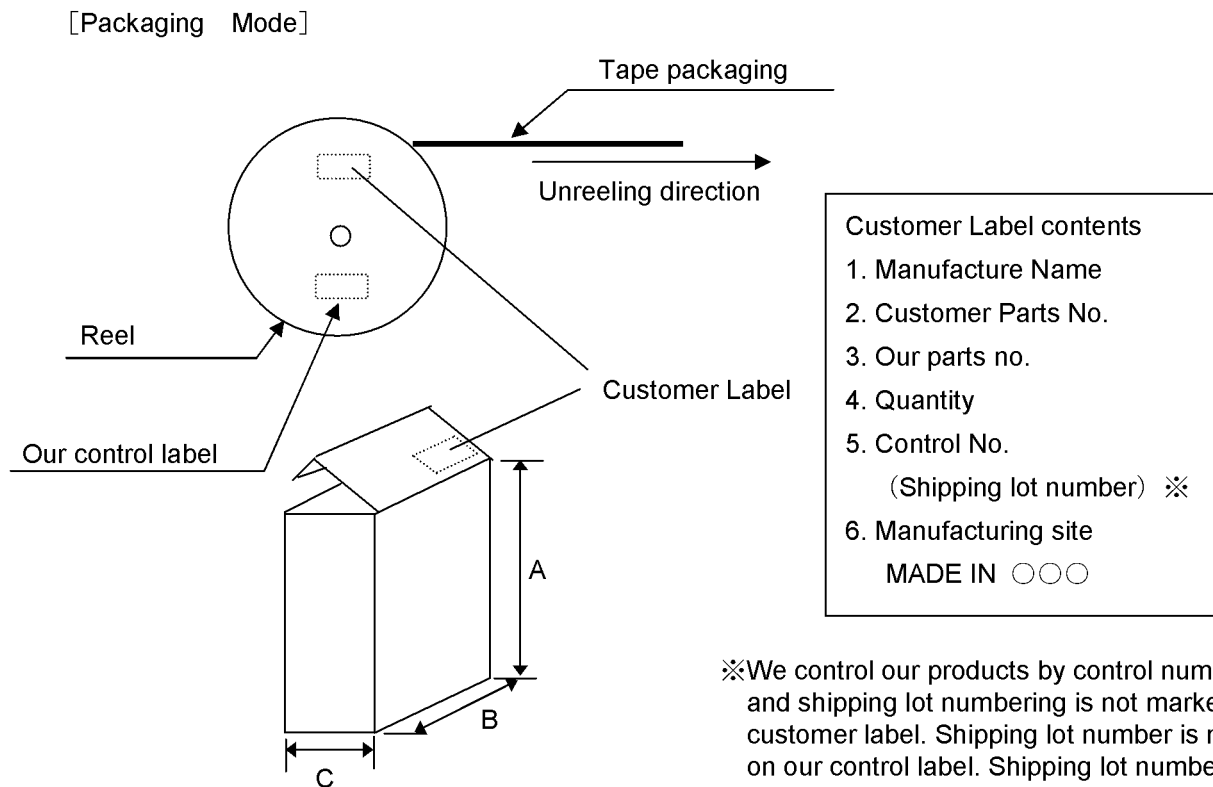
- Leader part 400mm min.
- Leader part (Blank part) 100mm min.
- Trailer (Blank part) 160mm min.



4. Top tape of embossed taping shall not be crossed over sprocket holes.
5. Embossed tape shall not be seamed.
6. Tensile strength of the tape is 5N (0.51kgf) or over.
7. Number of chips missed from tape reel shall be 1 piece maximum per reel.
8. Standard number of chips contained in a reel shall be 40,000 pieces.
9. Label indicating part No., quantity and control No. shall be attached to the outside of reel.
10. Peeling strength of top tape shall be 0.1~0.7N (10.2~71.4gf) when top tape is peeled from carrier tape at an angle of $0^{\circ} \sim 20^{\circ}$.



Tape Packaging 042 Type



※We control our products by control number, and shipping lot numbering is not marked on customer label. Shipping lot number is marked on our control label. Shipping lot number is traceable from our control number marked on customer label

Code	A	B	C	reel
Size	193	189	78	10reel max

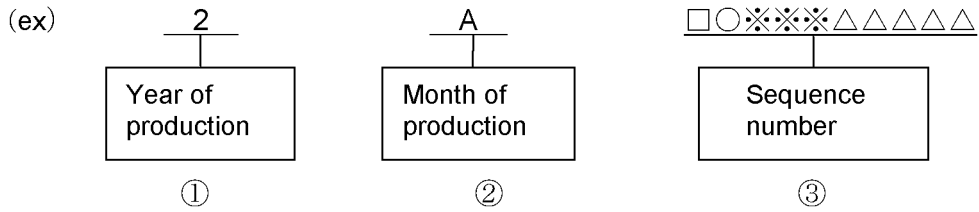
Material : Paper [Unit : mm]

(The size is only for reference.)

Packaging unit : Maximum 10reels in a box.

• To attach labels means that all products are passed.

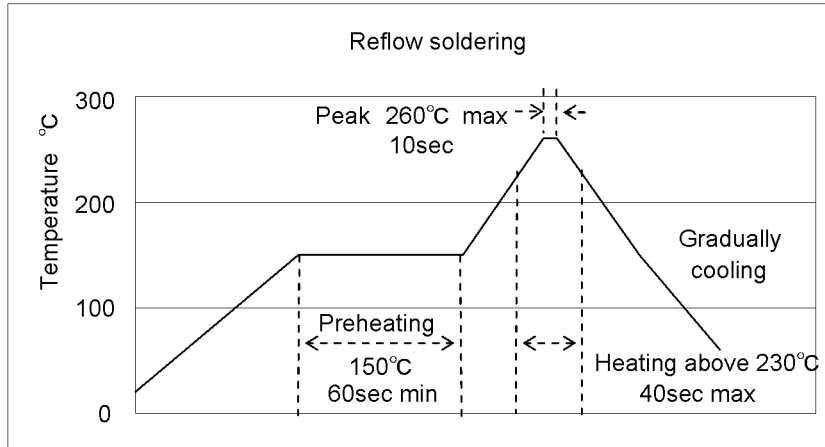
Composition of the shipping lot number



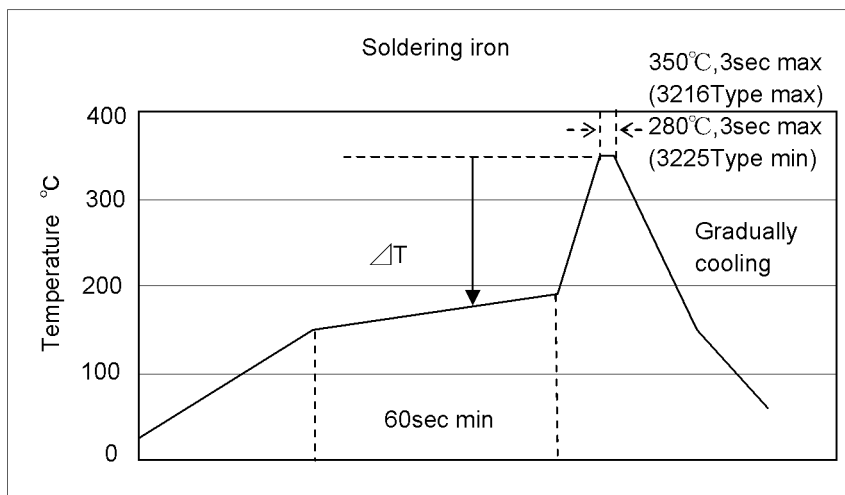
- ① Year of production (The last numeral of the Christian era. 2012year → 2)
- ② Month of production (It is due to the table below.)
- ③ Sequence number is alphanumeric including space.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Code	A	B	C	D	E	F	G	H	J	K	L	M

Recommended Soldering Profiles for Lead-free Solder Paste



- ※Ceramic chip components should be preheated to within **100 to 130°C** from the soldering temperature.
- ※Assured to be reflow soldering for **2 times**.



- ※ $\Delta T \leq 150^\circ\text{C}$ (3216 Type max) , $\Delta T \leq 130^\circ\text{C}$ (3225 Type min)
- ※Preheating control: Boards and components should be preheated sufficiently with temperature over 150°C, and soldering should be conducted by soldering iron while temperature of boards and components keep sufficient temperature.
- ※The soldering iron should not directly touch the components.
- ※Assured to be soldering iron for **1 time**.
- ※It is recommended to use 20W soldering iron and the tip is 1 ϕ or less.

Temperature in usage of Pb-free solder (Sn-3Ag-0.5Cu)

Case size	Soldering iron tip temp.	Preheating temp.
3216 type max.	$\leq 350^\circ\text{C}$	$\geq 150^\circ\text{C}$
3225 type min.	$\leq 280^\circ\text{C}$	$\geq 150^\circ\text{C}$

Note: The above profiles are the maximum allowable soldering condition, therefore these profiles are not always recommended.

Operating conditions for guarantee of this product are as shown in the specification.

Please note that Taiyo Yuden Co., Ltd. shall not be responsible for a failure and/or abnormality which are caused by use under the conditions other than aforesaid operating conditions.

- All electronic components listed in this specification are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation, (automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network(telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.

Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required. In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.
- The contents of this specification are applicable to the products which are purchased from our sales offices or distributors (so called TAIYO YUDEN's official sales channel).
It is only applicable to the products purchased from any of TAIYO YUDEN's official sales channel.
- Please note that Taiyo Yuden Co., Ltd. shall have no responsibility for any controversies or disputes that may occur in connection with a third party's intellectual property rights and other related rights arising from your usage of products in this specification. Taiyo Yuden Co., Ltd. grants no license for such rights.
- Caution for export
Certain items in this specification may require specific procedures for export according to Foreign Exchange and Foreign Trade Control Law of Japan, U.S. Export Administration Regulations, and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.