



Type KX
Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose

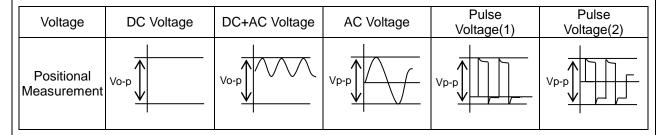
Product specifications in this catalog are as of Dec. 2017, and are subject to change or obsolescence without notice.

Please consult the approval sheet before ordering. Please read rating and Cautions first.

⚠ CAUTION

1. OPERATING VOLTAGE

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range. When the voltage is started to apply to the circuit or it is stopped applying, the irregular voltage may be generated for a transit period because of resonance or switching. Be sure to use a capacitor within rated voltage containing these irregular voltage.



2. OPERATING TEMPERATURE AND SELF-GENERATED HEAT

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself.

When the capacitor is used in a high-frequency current, pulse current or the like, it may have the self-generated heat due to dielectric-loss. Applied voltage should be the load such as self-generated heat is within 20 °C on the condition of atmosphere temperature 25 °C. When measuring, use a thermocouple of small thermal capacity-K of $\phi 0.1$ mm and be in the condition where capacitor is not affected by radiant heat of other components and wind of surroundings. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability.(Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

3. TEST CONDITION FOR WITHSTANDING VOLTAGE

(1) TEST EQUIPMENT

Test equipment for AC withstanding voltage should be used with the performance of the wave similar to 50/60 Hz sine wave.

If the distorted sine wave or over load exceeding the specified voltage value is applied, the defective may be caused.

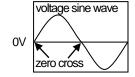
(2) VOLTAGE APPLIED METHOD

When the withstanding voltage is applied, capacitor's lead or terminal should be firmly connected to the out-put of the withstanding voltage test equipment, and then the voltage should be raised from near zero to the test voltage.

If the test voltage without the raise from near zero voltage would be applied directly to capacitor, test voltage should be applied with the *zero cross. At the end of the test time, the test voltage should be reduced to near zero, and then capacitor's lead or terminal should be taken off the out-put of the withstanding voltage test equipment.

If the test voltage without the raise from near zero voltage would be applied directly to capacitor, the surge voltage may arise, and therefore, the defective may be caused.

*ZERO CROSS is the point where voltage sine wave pass 0V. - See the right figure -



4. FAIL-SAFE

When capacitor would be broken, failure may result in a short circuit. Be sure to provide an appropriate fail-safe function like a fuse on your product if failure would follow an electric shock, fire or fume.

5. VIBRATION AND IMPACT

Do not expose a capacitor or its leads to excessive shock or vibration during use.

6. SOLDERING

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.

When soldering capacitor with a soldering iron, it should be performed in following conditions.

Temperature of iron-tip: 400 °C max. Soldering iron wattage: 50W max. Soldering time: 3.5s max.

7. BONDING, RESIN MOLDING AND COATING

In case of bonding, molding or coating this product, verify that these processes do not affect the quality of capacitor by testing the performance of the bonded, molded or coated product in the intended equipment.

In case of the amount of applications, dryness / hardening conditions of adhesives and molding resins containing organic solvents (ethyl acetate, methyl ethyl ketone, toluene, etc.) are unsuitable, the outer coating resin of a capacitor is damaged by the organic solvents and it may result, worst case, in a short circuit.

The variation in thickness of adhesive, molding resin or coating may cause a outer coating resin cracking and/or ceramic element cracking of a capacitor in a temperature cycling.

8. TREATMENT AFTER BONDING, RESIN MOLDING AND COATING

When the outer coating is hot (over 100 $^{\circ}$ C) after soldering, it becomes soft and fragile. So please be careful not to give it mechanical stress.

Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used.

9. OPERATING AND STORAGE ENVIRONMENT

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed -10 to 40 °C and 15 to 85%.

Use capacitors within 6 months after delivered. Check the solderability after 6 months or more.

10. LIMITATION OF APPLICATIONS

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

- 1. Aircraft equipment
- 2. Aerospace equipment
- 3. Undersea equipment
- 4. Power plant control equipment
- 5. Medical equipment
- 6. Transportation equipment (vehicles, trains, ships, etc.)
- 7. Traffic signal equipment
- 8. Disaster prevention / crime prevention equipment
- 9. Data-processing equipment exerting influence on public
- 10. Application of similar complexity and/or reliability requirements to the applications listed in the above.

NOTICE

1. CLEANING (ULTRASONIC CLEANING)

To perform ultrasonic cleaning, observe the following conditions.

Rinse bath capacity: Output of 20 watts per liter or less.

Rinsing time: 5 min maximum. Do not vibrate the PCB/PWB directly.

Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

2. CAPACITANCE CHANGE OF CAPACITORS

· Class 1 capacitors

Capacitance might change a little depending on a surrounding temperature or an applied voltage. Please contact us if you use for the strict time constant circuit.

· Class 2 and 3 capacitors

Class 2 and 3 capacitors like temperature characteristic B, E and F have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor leaves for a long time. Moreover, capacitance might change greatly depending on a surrounding temperature or an applied voltage. So, it is not likely to be able to use for the time constant circuit.

Please contact us if you need a detail information.

3. PERFORMANCE CHECK BY EQUIPMENT

Before using a capacitor, check that there is no problem in the equipment's performance and the specifications.

Generally speaking, CLASS 2 ceramic capacitors have voltage dependence characteristics and temperature dependence characteristics in capacitance. So, the capacitance value may change depending on the operating condition in a equipment. Therefore, be sure to confirm the apparatus performance of receiving influence in a capacitance value change of a capacitor, such as leakage current and noise suppression characteristic.

Moreover, check the surge-proof ability of a capacitor in the equipment, if needed, because the surge voltage may exceed specific value by the inductance of the circuit.

\triangle NOTE

- 1.Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- 2. You are requested not to use our product deviating from this specification.

EGD08E

1. Application

This specification is applied to Safety Standard Certified Lead Type Disc Ceramic Capacitors Type KX used for General Electric equipment.

Type KX is Safety Standard Certified capacitors of Class X1,Y1.

Do not use these products in any automotive power train or safety equipment including battery chargers for electric vehicles and plug-in hybrids.

Approval standard and certified number

	Standard number	*Certified number	AC Rated volt. V(r.m.s.)
UL	UL60384-14	E37921	
CSA	CSA E60384-14	1343810	
VDE	IEC60384-14, EN60384-14	40002831	
BSI	EN60065 (8.8,14.2), IEC60384-14, EN60384-14	KM 37901	X1:440
SEMKO		1612604	
DEMKO	JE 000004 44	D-05321	Y1:300
FIMKO	IEC60384-14, EN60384-14	fl 29602	
NEMKO	L1100304-14	P16221232	
ESTI		15.0075	
IMQ	EN60384-14	V4069	
CQC	IEC60384-14	CQC12001079941	

^{*}Above Certified number may be changed on account of the revision of standards and the renewal of certification.

2. Rating

2-1. Operating temperature range

-40 ~ +125°C

(-25 ~ +125°C is certified in safety certificates except UL and VDE.)

2-2. Part number configuration

ex.) <u>DE1</u>	E3	KX	472	M	A4	B	P01F
Product	Temperature	Type	Capacitance	Capacitance	Lead	Packing	Individual
code	characteristic	name		tolerance	code	style code	specification

Product code

DE1 denotes X1,Y1 class.

• Temperature characteristic

Code	Temperature characteristic
B3	В
E3	Е

Please confirm detailed specification on [Specification and test methods].

Type name

This denotes safety certified type name Type KX.

Capacitance

The first two digits denote significant figures; the last digit denotes the multiplier of 10 in pF. ex.) In case of 472.

$$47 \times 10^2 = 4700 pF$$

• Capacitance tolerance

Please refer to [Part number list].

• Lead code

Code	Lead style					
A*	Vertical crimp long type					
B*	Vertical crime abort tune	Lead Length: 5mm				
J*	Vertical crimp short type Lead Length: 3.5					
N*	Vertical crimp taping type					

^{*} Please refer to [Part number list]

• Packing style code

Code	Packing type
В	Bulk type
A	Ammo pack taping type

Individual specification

In case part number cannot be identified without 'individual specification', it is added at the end of part number.

ond or part nambor.	
Code	Specification
P01F	 Rated voltage : AC300V(r.m.s.) Halogen free (Br ≤ 900ppm, Cl ≤ 900ppm) Br + Cl ≤ 1500ppm CP wire

Note) Murata part numbers might be changed depending on lead code or any other changes. Therefore, please specify only the type name(KX) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

3. Marking

Nominal capacitance : 3 digit system

Capacitance tolerance : Code
Type name : KX
Rated voltage mark : 300~
Class code : X1Y1
Halogen free mark : HF

Manufacturing year : Letter code(The last digit of A.D. year.)

Manufacturing month : Code

Company name code : (Made in Thailand)

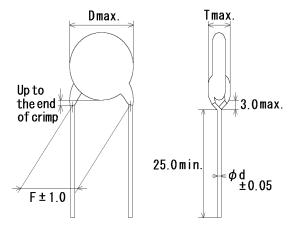
(Example)

472M KX300~ X1Y1 || 5D (<u>M</u>15

ETKX10G

4. Part number list

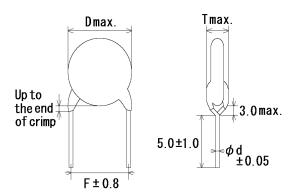
Vertical crimp long type (Lead code: A*)



Note) The mark '*' of lead code differ from lead spacing(F) and lead diameter(d).
Please see the following list about details.

			•							
T.C.	Cap. Cap.		Customer Part Number	Murata Part Number	Dimension (mm)				Lead	Pack
1.0.	(pF)	tol.	Customer Fait Number	Murata Part Number	D	Т	F	d	code	qty. (pcs)
В	100	±10%		DE1B3KX101KA4BP01F	7.0	7.0	10.0	0.6	A4	250
В	150	±10%		DE1B3KX151KA4BP01F	7.0	7.0	10.0	0.6	A4	250
В	220	±10%		DE1B3KX221KA4BP01F	8.0	7.0	10.0	0.6	A4	250
В	330	±10%		DE1B3KX331KA4BP01F	7.0	7.0	10.0	0.6	A4	250
В	470	$\pm 10\%$		DE1B3KX471KA4BP01F	7.0	7.0	10.0	0.6	A4	250
В	680	$\pm 10\%$		DE1B3KX681KA4BP01F	8.0	7.0	10.0	0.6	A4	250
Е	1000	±20%		DE1E3KX102MA4BP01F	7.0	7.0	10.0	0.6	A4	250
Е	1500	±20%		DE1E3KX152MA4BP01F	8.0	7.0	10.0	0.6	A4	250
Е	2200	±20%		DE1E3KX222MA4BP01F	9.0	7.0	10.0	0.6	A4	250
Е	3300	$\pm 20\%$		DE1E3KX332MA4BP01F	10.0	7.0	10.0	0.6	A4	250
Е	4700	\pm 20%		DE1E3KX472MA4BP01F	12.0	7.0	10.0	0.6	A4	200

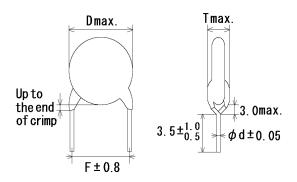
Vertical crimp short type (Lead code:B*)



Note) The mark '*' of lead code differ from lead spacing(F) and lead diameter(d).
Please see the following list about details.

Τ.	Cap.	c. Cap. Customer Part Number		Museus Doub Nussels on	Dir	nensi	I bad I	Pack		
T.C.	(pF)	toİ.	Customer Part Number	Murata Part Number	D	Т	F	d	code	qty. (pcs)
В	100	±10%		DE1B3KX101KB4BP01F	7.0	7.0	10.0	0.6	B4	500
В	150	\pm 10%		DE1B3KX151KB4BP01F	7.0	7.0	10.0	0.6	B4	500
В	220	±10%		DE1B3KX221KB4BP01F	8.0	7.0	10.0	0.6	B4	500
В	330	±10%		DE1B3KX331KB4BP01F	7.0	7.0	10.0	0.6	B4	500
В	470	$\pm 10\%$		DE1B3KX471KB4BP01F	7.0	7.0	10.0	0.6	B4	500
В	680	$\pm 10\%$		DE1B3KX681KB4BP01F	8.0	7.0	10.0	0.6	B4	500
Е	1000	±20%		DE1E3KX102MB4BP01F	7.0	7.0	10.0	0.6	B4	500
Е	1500	±20%		DE1E3KX152MB4BP01F	8.0	7.0	10.0	0.6	B4	500
Е	2200	±20%		DE1E3KX222MB4BP01F	9.0	7.0	10.0	0.6	B4	500
Е	3300	±20%		DE1E3KX332MB4BP01F	10.0	7.0	10.0	0.6	B4	500
Е	4700	\pm 20%		DE1E3KX472MB4BP01F	12.0	7.0	10.0	0.6	B4	250

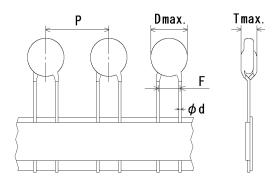
·Vertical crimp short type (Lead code: J*)



Note) The mark '*' of lead code differ from lead spacing(F) and lead diameter(d). Please see the following list about details.

Unit: mm Dimension (mm) Pack Lead Cap. Cap. T.C. **Customer Part Number** Murata Part Number qty. (pF) tol. code F D Τ d (pcs) DE1B3KX101KJ4BP01F 7.0 В $\pm 10\%$ 7.0 10.0 J4 100 0.6 500 В 150 $\pm 10\%$ DE1B3KX151KJ4BP01F 7.0 7.0 10.0 0.6 J4 500 В DE1B3KX221KJ4BP01F 8.0 7.0 10.0 0.6 500 220 $\pm 10\%$ J4 330 DE1B3KX331KJ4BP01F 7.0 7.0 10.0 0.6 J4 500 В $\pm 10\%$ В 470 DE1B3KX471KJ4BP01F 7.0 7.0 10.0 0.6 J4 500 $\pm 10\%$ В 680 $\pm 10\%$ DE1B3KX681KJ4BP01F 8.0 7.0 10.0 0.6 J4 500 Ε 1000 $\pm 20\%$ DE1E3KX102MJ4BP01F 7.0 7.0 10.0 0.6 J4 500 Ε 1500 $\pm 20\%$ DE1E3KX152MJ4BP01F 8.0 7.0 10.0 0.6 J4 500 Ε 2200 $\pm 20\%$ DE1E3KX222MJ4BP01F 9.0 10.0 0.6 J4 500 Е 3300 $\pm 20\%$ DE1E3KX332MJ4BP01F 10.0 7.0 10.0 0.6 J4 500 Ε 4700 $\pm 20\%$ DE1E3KX472MJ4BP01F 12.0 7.0 10.0 0.6 J4 250

Vartical crimp taping type (Lead code:N*)



Note) The mark '*' of lead code differ from lead spacing(F), lead diameter(d) and pitch of component(P). Please see the following list or taping specification about details.

									<u> </u>	
Сар.	Сар.	Cuctomor Part Number	Murata Bart Number	D	imer	Lead	Pack			
(pF)	tol.	Customer Fait Number	Murata Fart Number	D	Т	F	d	Р	code	qty. (pcs)
100	\pm 10%		DE1B3KX101KN4AP01F	7.0	7.0	10.0	0.6	25.4	N4	500
150	$\pm 10\%$		DE1B3KX151KN4AP01F	7.0	7.0	10.0	0.6	25.4	N4	500
220	$\pm 10\%$		DE1B3KX221KN4AP01F	8.0	7.0	10.0	0.6	25.4	N4	500
330	$\pm 10\%$		DE1B3KX331KN4AP01F	7.0	7.0	10.0	0.6	25.4	N4	500
470	$\pm 10\%$		DE1B3KX471KN4AP01F	7.0	7.0	10.0	0.6	25.4	N4	500
680	$\pm 10\%$		DE1B3KX681KN4AP01F	8.0	7.0	10.0	0.6	25.4	N4	500
1000	±20%		DE1E3KX102MN4AP01F	7.0	7.0	10.0	0.6	25.4	N4	500
1500	±20%		DE1E3KX152MN4AP01F	8.0	7.0	10.0	0.6	25.4	N4	500
2200	±20%		DE1E3KX222MN4AP01F	9.0	7.0	10.0	0.6	25.4	N4	500
3300	$\pm 20\%$		DE1E3KX332MN4AP01F	10.0	7.0	10.0	0.6	25.4	N4	500
4700	\pm 20%		DE1E3KX472MN4AP01F	12.0	7.0	10.0	0.6	25.4	N4	500
	100 150 220 330 470 680 1000 1500 2200 3300	(pF) tol. 100 ±10% 150 ±10% 220 ±10% 330 ±10% 470 ±10% 680 ±10% 1000 ±20% 1500 ±20% 2200 ±20% 3300 ±20%	(pF) tol. 100 ±10% 150 ±10% 220 ±10% 330 ±10% 470 ±10% 680 ±10% 1000 ±20% 1500 ±20% 2200 ±20% 3300 ±20%	(pF) tol. Odstorner Fart Number Midital Fart Number 100 ±10% DE1B3KX101KN4AP01F 150 ±10% DE1B3KX221KN4AP01F 220 ±10% DE1B3KX331KN4AP01F 470 ±10% DE1B3KX471KN4AP01F 680 ±10% DE1B3KX681KN4AP01F 1000 ±20% DE1E3KX102MN4AP01F 1500 ±20% DE1E3KX222MN4AP01F 3300 ±20% DE1E3KX332MN4AP01F 3300 ±20% DE1E3KX332MN4AP01F	Cap. (pF) Cap. tol. Customer Part Number Murata Part Number D 100 ±10% DE1B3KX101KN4AP01F 7.0 150 ±10% DE1B3KX151KN4AP01F 7.0 220 ±10% DE1B3KX221KN4AP01F 8.0 330 ±10% DE1B3KX331KN4AP01F 7.0 470 ±10% DE1B3KX471KN4AP01F 7.0 680 ±10% DE1B3KX681KN4AP01F 8.0 1000 ±20% DE1E3KX102MN4AP01F 7.0 1500 ±20% DE1E3KX222MN4AP01F 9.0 3300 ±20% DE1E3KX332MN4AP01F 10.0	Cap. (pF) Cap. tol. Customer Part Number Murata Part Number D T 100 ±10% DE1B3KX101KN4AP01F 7.0 7.0 150 ±10% DE1B3KX151KN4AP01F 7.0 7.0 220 ±10% DE1B3KX221KN4AP01F 8.0 7.0 330 ±10% DE1B3KX331KN4AP01F 7.0 7.0 470 ±10% DE1B3KX471KN4AP01F 7.0 7.0 680 ±10% DE1B3KX1681KN4AP01F 8.0 7.0 1000 ±20% DE1E3KX102MN4AP01F 7.0 7.0 2200 ±20% DE1E3KX222MN4AP01F 9.0 7.0 3300 ±20% DE1E3KX332MN4AP01F 10.0 7.0	Cap. (pF) Cap. tol. Customer Part Number Murata Part Number D T F 100 ±10% DE1B3KX101KN4AP01F 7.0 7.0 10.0 150 ±10% DE1B3KX151KN4AP01F 7.0 7.0 10.0 220 ±10% DE1B3KX221KN4AP01F 7.0 7.0 10.0 330 ±10% DE1B3KX471KN4AP01F 7.0 7.0 10.0 470 ±10% DE1B3KX4681KN4AP01F 8.0 7.0 10.0 680 ±10% DE1B3KX102MN4AP01F 8.0 7.0 10.0 1000 ±20% DE1E3KX152MN4AP01F 8.0 7.0 10.0 2200 ±20% DE1E3KX222MN4AP01F 9.0 7.0 10.0 3300 ±20% DE1E3KX332MN4AP01F 10.0 7.0 10.0	Cap. (pF) Cap. tol. Customer Part Number Murata Part Number D T F d 100 ±10% DE1B3KX101KN4AP01F 7.0 7.0 10.0 0.6 150 ±10% DE1B3KX151KN4AP01F 7.0 7.0 10.0 0.6 220 ±10% DE1B3KX221KN4AP01F 7.0 7.0 10.0 0.6 330 ±10% DE1B3KX331KN4AP01F 7.0 7.0 10.0 0.6 470 ±10% DE1B3KX471KN4AP01F 7.0 7.0 10.0 0.6 680 ±10% DE1B3KX102MN4AP01F 8.0 7.0 10.0 0.6 1000 ±20% DE1E3KX152MN4AP01F 8.0 7.0 10.0 0.6 2200 ±20% DE1E3KX222MN4AP01F 9.0 7.0 10.0 0.6 3300 ±20% DE1E3KX332MN4AP01F 10.0 7.0 10.0 0.6	(pF) tol. Design and the state of the s	Cap. (pF) Cap. tol. Customer Part Number Murata Part Number Dimension (mm) Lead code 100 ±10% DE1B3KX101KN4AP01F 7.0 7.0 10.0 0.6 25.4 N4 150 ±10% DE1B3KX151KN4AP01F 7.0 7.0 10.0 0.6 25.4 N4 220 ±10% DE1B3KX221KN4AP01F 8.0 7.0 10.0 0.6 25.4 N4 330 ±10% DE1B3KX331KN4AP01F 7.0 7.0 10.0 0.6 25.4 N4 470 ±10% DE1B3KX681KN4AP01F 7.0 7.0 10.0 0.6 25.4 N4 680 ±10% DE1B3KX681KN4AP01F 8.0 7.0 10.0 0.6 25.4 N4 1000 ±20% DE1E3KX102MN4AP01F 7.0 7.0 10.0 0.6 25.4 N4 2200 ±20% DE1E3KX222MN4AP01F 9.0 7.0 10.0 0.6 25.4 N4 3300

to the distance of foil about 3 to 6mm				170	eterence oni	y					
1		pecification and	test methods								
form and dimensions. Please refer to [Part number lists]. To be easily legible. To be easily legible. The capacitor should be insepected by naked wires from the capacitor should be the supplied between lead wires from the capacitor should be inspected by naked wires from the capacitor should be inspected by naked wires from the capacitor should be inspected by naked wires from the capacitor should be inspected by naked wires from the capacitor should be connected together. No failure. No failure. No failure. No failure. No failure. No failure. First, the terminals of the capacitor should be connected together around the body of the capacitor should be container filled with metal balls of about 1mm diameter. Finally, AC4000V (r.m.s.)-50/60Hz-ls applied to the capacitor should be measured at 50 set where the capacitor should be measured by the container filled with metal balls of about 1mm diameter. Finally, AC4000V (r.m.s.)-50/60Hz-ls applied to the capacitor should be measured at 20°C 110 set with											
Please refer to [Part number iss]. Dimensions should be measured with side or be easily legible.	1	Appearance and o	limensions							y naked ey	es
Addition										" حاداه ط	no==
Dielectric Strength Streng	2	Marking				j. Di	mensions sho	bould be me	asured Wit	n siide cali	pers.
Strength wires Body No failure. First, the terminals of the capacitor should be connected together. Then, a metal foil should be closely wrapped around the body of the capacitor in the distance of about 3 to 6 mm from each terminal. Then, the capacitor should be inserted into a container filled with metal balls of about 1 mm diameter. Finally, AC4000V (r.m.s.) -50/60Hz> is applied to 9 s between the capacitor lead wires and m balls.			Rotwoon load								es.
Body insulation No failure. First, the terminals of the capacitor should be connected together. Then, a metal foil should be closely wrapped around the body of the capacitor of the distance of about 3 to 6 mm from each terminal. Then, the capacitor should be inserted into a container filled with metal balls of about the distance of about 3 to 6 mm from each terminal. Then, the capacitor should be inserted into a container filled with metal balls of about the distance of the capacitor from distance should be measured at 20°C 1000 (2500-150 Within 6015 to 6 charging.) The voltage should be applied to the capacitor through a resistor of 1MO.	3			No failure.	No failule.						the
Body insulation First, the terminals of the capacitor should be connected together. Then, a metal foil should be (losely wrapped around the body of the capacitor to the distance of about 3 to 6mm from each terminal. Then, the capacitor should be inserted into a container filled with metal balls of about 1 mm diameter. Finally, AC4000V (r.m.s.) 4 Insulation Resistance (I.R.) 10 000MΩ min. The insulation resistance should be inserted into a container filled with metal balls of about 1 mm diameter. Finally, AC4000V (r.m.s.) The insulation resistance should be measured and the balls. The insulation resistance should be measured to the capacitor for the capacitor should be applied to the capacitor through a resistence of the capacitor should be applied to the capacitor through a resister of 1 MΩ. The capacitance should be measured at 20°C 110.1 kHz and AC5V(r.m.s.) max. 5 Capacitance Within specified tolerance. The capacitance should be measured at 20°C 110.1 kHz and AC5V(r.m.s.) max. 6 Dissipation Factor (D.F.) 2.5% max. The dissipation factor should be measured at with ±10.1 kHz and AC5V(r.m.s.) max. 7 Temperature characteristic Char. B.: Within ±10.% Char. E.: Within ±20°C 25% (Temp. range: ±25 to ±85°C) The capacitance measurement should be meach step specified in Table. 8 Active flammability The cheese-cloth should not be on fire. The capacitors should be individually ware should be should be maximated for 2 min after the last discharge. 8 Active flammability The capacitor should be suggested at 20°C 20°C 20°C 20°C 20°C 20°C 20°C 20°C		Suerigui	WIICS						2/ 13 applit	o between	i ti iC
Insulation In			Body	No failure.					capacitor s	hould be	
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			Reference only	
No.	Item		Specification	Test method
9	Robustness of terminations	Tensile	Lead wire should not cut off. Capacitor should not be broken.	Fix the body of capacitor, a tensile weight gradually to each lead wire in the radial direction of
		Bending		capacitor up to 10N and keep it for 10±1 s. With the termination in its normal position, the capacitor is held by its body in such a manner that the axis of the termination is vertical; a mass applying a force of 5N is then suspended from the end of the termination. The body of the capacitor is then inclined, within a period of 2 to 3 s, through an angle of
				approximately 90° in the vertical plane and then returned to its initial position over the same period of time; this operation constitutes one bend. One bend immediately followed by a second bend in the opposite direction.
10	Vibration	Appearance	No marked defect.	The capacitor should be firmly soldered to the
	resistance	Capacitance D.F.	Within the specified tolerance. 2.5% max.	supporting lead wire and vibration which is 10 to 55Hz in the vibration frequency range,1.5mm in total amplitude, and about 1min in the rate of vibration change from 10Hz to 55Hz and back to 10Hz is applied for a total of 6 h; 2 h each in
				3 mutually perpendicular directions.
11	Solderability of lead	ds	Lead wire should be soldered With uniformly coated on the axial direction over 3/4 of the circumferential direction.	The lead wire of a capacitor should be dipped into a ethanol solution of 25wt% rosin and then into molten solder for 2±0.5 s. In both cases the depth of dipping is up to about 1.5 to 2.0mm from the root of lead wires. Temp. of solder: 245±5°C Lead Free Solder (Sn-3Ag-0.5Cu) 235±5°C H63 Eutectic Solder
12	Soldering effect	Appearance	No marked defect.	Solder temperature: 350±10°C or 260±5°C
	(Non-preheat)	Capacitance change	Within ±10%	Immersion time : 3.5±0.5 s (In case of 260±5°C : 10±1 s)
		I.R.	1000MΩ min.	The depth of immersion is up to about
		Dielectric strength	Per item 3	1.5 to 2.0mm from the root of lead wires.
				Thermal insulating Capacitor 1.5 to 2.0mm Molten solder
				Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1room condition for 24±2 h before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 h at *1room condition.
13	Soldering effect	Appearance	No marked defect.	First the capacitor should be stored at 120+0/-5°C
	(On-preheat)	Capacitance	Within ±10%	for 60+0/-5 s. Then, as in figure, the lead wires should be
		change I.R.	1000MΩ min.	immersed solder of 260+0/-5°C up to 1.5 to 2.0mm
		Dielectric strength	Per item 3	from the root of terminal for 7.5+0/-1 s.
		Ü		Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1room condition for 24±2 h before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 h at *1room condition.
*1 "ro	om condition" Tempe	rature: 15 to 35°	C, Relative humidity: 45 to 75%, Atn	nospheric pressure: 86 to 106kPa

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No.	Item		Specification	Test method
14	Flame test		The capacitor flame discontinue as follows.	The capacitor should be subjected to applied flame for 15 s. and then removed for 15 s until 5 cycle.
			Cycle Time 1 to 4 30 s max. 5 60 s max.	Capacitor Flame Gas Burner
15	Passive flammabilit	у	The burning time should not be exceeded the time 30 s. The tissue paper should not ignite.	The capacitor under test should be held in the flame in the position which best promotes burning. Time of exposure to flame is for 30 s. Length of flame: 12±1mm Gas burner: Length 35mm min. Inside Dia. 0.5±0.1mm Outside Dia. 0.9mm max. Gas: Butane gas Purity 95% min. Gas burner About 8mm Flame 200±5mm About 10mm thick board
16	Humidity	Appearance	No marked defect.	Set the capacitor for 500±12 h at 40±2°C in 90 to
	(Under steady state)	Capacitance change	Char. B: Within ±10% Char. E: Within ±15%	95% relative humidity.
		D.F.	5.0% max.	Post-treatment: Capacitor should be stored for 1 to 2 h at *1room condition.
		I.R.	3000MΩ min.	1
		Dielectric strength	Per item 3	
17	Humidity loading	Appearance	No marked defect.	Apply the rated voltage for 500±12 h at 40±2°C in
		Capacitance	Char. B: Within ±10%	90 to 95% relative humidity.
		change	Char. E: Within ±15%	
		D.F.	5.0% max.	Post-treatment: Capacitor should be stored for 1 to 2 h at *1room condition.
		I.R.	3000MΩ min.	1
		Dielectric	Per item 3]
<u> </u>		strength		
*1 "ro	om condition" Tempe	rature: 15 to 35°	C. Relative humidity: 45 to 75% Atn	nospheric pressure: 86 to 106kPa

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

No.	Item		Specification	Test method
18	Life Appearance		No marked defect.	Impulse voltage
		Capacitance change	Within ±20%	Each individual capacitor should be subjected to a 8kV impulses for three times. Then the capacitors
		I.R.	3000MΩ min.	are applied to life test.
		Dielectric strength	Per item 3	Front time (T1) = 1.2μ s= $1.67T$ Front time (T1) = 1.2μ s= $1.67T$ Time to half-value (T2) = 50μ s
				The capacitors are placed in a circulating air oven for a period of 1000 h. The air in the oven is maintained at a temperature of 125+2/-0 °C, and relative humidity of 50% max Throughout the test, the capacitors are subjected to a AC510V(r.m.s.) 50/60Hz> alternating voltage of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 s Post-treatment: Capacitor should be stored for 1 to 2 h at *1room condition.
19	Temperature and	Appearance	No marked defect.	The capacitor should be subjected to 5 temperature
	immersion cycle	Capacitance change	Char. B : Within ±10% cycles, then consecutively to Char. E : Within ±20%	cycles, then consecutively to 2 immersion cycles. <temperature cycle=""></temperature>
		D.F.	5.0% max.	Step Temperature(°C) Time 1 -40+0/-3 30 min
		I.R.	3000MΩ min.	2 Room temp. 3 min
		Dielectric	Per item 3	3 +125+3/-0 30 min
		strength		4 Room temp. 3 min
ı				Cycle time : 5 cycle
				<pre></pre>
				Step Temperature(°C) Time Immersion water
				1 +65+5/-0 15 min Clean water
				2 0±3 15 min Salt water
				Cycle time : 2 cycle
				Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1room condition for 24±2 h.
				Post-treatment : Capacitor should be stored for 4 to 24 h at *1 room condition.
*1 "ro	om condition" Tempe	rature: 15 to 35°	C, Relative humidity: 45 to 75%, A	mospheric pressure: 86 to 106kPa

6. Packing specification

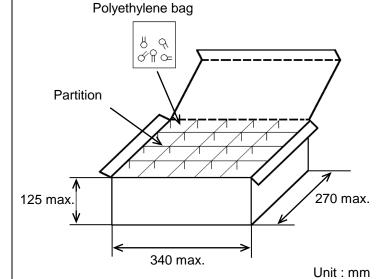
•Bulk type (Packing style code : B)

*1The number of packing = Packing quantity \times n

The size of packing case and packing way

*1 : Please refer to [Part number list].

*2 : Standard n = 20 (bag)

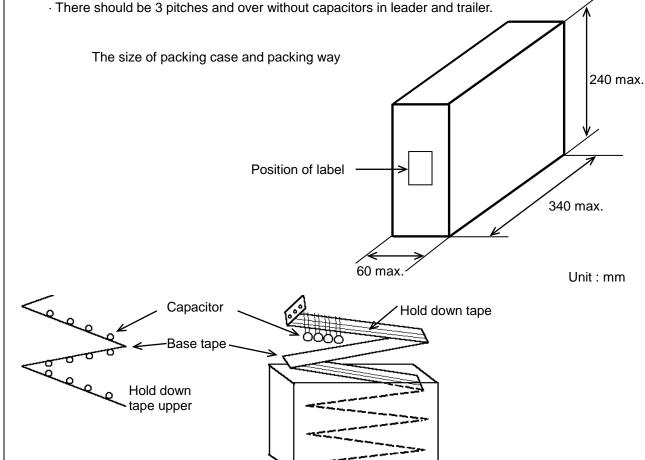


Note)

The outer package and the number of outer packing be changed by the order getting amount.

•Ammo pack taping type (Packing style code : A)

- · The tape with capacitors is packed zigzag into a case.
- \cdot When body of the capacitor is piled on other body under it.

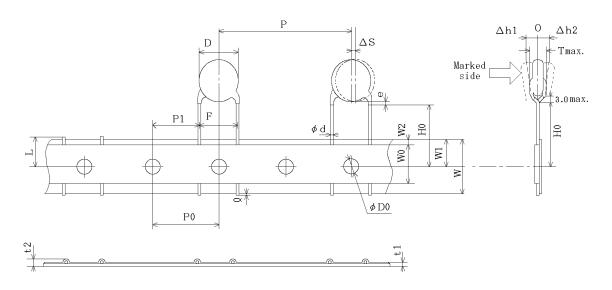


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7. Taping specification

7-1. Dimension of capacitors on tape

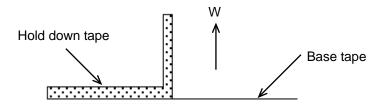
Vertical crimp taping type < Lead code : N4 >
Pitch of component 25.4mm / Lead spacing 10.0mm



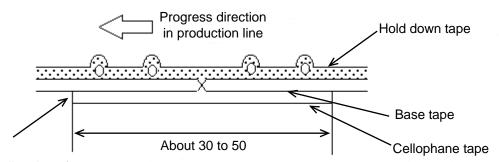
Item	Code	Dimensions	Remarks
Pitch of component	Р	25.4±2.0	
Pitch of sprocket hole	P0	12.7±0.3	
Lead spacing	F	10.0±1.0	
Length from hole center to lead	P1	7.7±1.5	
Body diameter	D	Please refer to [Part number list].	
Deviation along tape, left or right	ΔS	0±2.0	They include deviation by lead bend .
Carrier tape width	W	18.0±0.5	
Position of sprocket hole	W1	9.0±0.5	Deviation of tape width direction
Lead distance between reference and bottom planes	НО	18.0± ₀ ^{2.0}	
Protrusion length	Q	+0.5~-1.0	
Diameter of sprocket hole	φD0	4.0±0.1	
Lead diameter	φd	0.60±0.05	
Total tape thickness	t1	0.6±0.3	They include hold down tape thickness.
Total thickness, tape and lead wire	t2	1.5 max.	
Deviation across tape, front	∆h1	2.0 max.	
Deviation across tape, rear	∆h2		
Portion to cut in case of defect	L	11.0± _{1.0}	
Hold down tape width	W0	11.5 min.	
Hold down tape position	W2	1.5±1.5	
Coating extension on lead		Up to the end of crimp	
Body thickness T		Please refer to [Part number list].	

7-2. Splicing way of tape

1) Adhesive force of tape is over 3N at test condition as below.



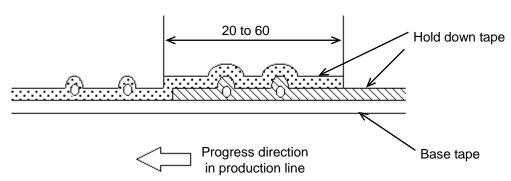
- 2) Splicing of tape
 - a) When base tape is spliced
 - •Base tape should be spliced by cellophane tape. (Total tape thickness should be less than 1.05mm.)



No lifting for the direction of progressing

Unit: mm

- b) When hold down tape is spliced
 - •Hold down tape should be spliced with overlapping. (Total tape thickness should be less than 1.05mm.)



- c) When both tape are spliced
 - •Base tape and hold down tape should be spliced with splicing tape.
- 3) Missing components
 - •There should be no consecutive missing of more than three components.
 - •The number of missing components should be not more than 0.5% of total components that should be present in a Ammo pack.

EU RoHS and Halogen Free

This products of the following crresponds to EU RoHS and Halogen Free

(1) RoHS

EU RoHs 2011/65/EC compliance

maximum concentration values tolerated by weight in homogeneous materials

- •1000 ppm maximum Lead
- •1000 ppm maximum Mercury
- •100 ppm maximum Cadmium
- •1000 ppm maximum Hexavalent chromium
- •1000 ppm maximum Polybrominated biphenyls (PBB)
- •1000 ppm maximum Polybrominated diphenyl ethers (PBDE)

(2) Halogen-Free

The International Electrochemical Commission's (IEC) Definition of Halogen-Free (IEC 61249-2-21) compliance

- •900 ppm maximum chlorine
- •900 ppm maximum bromine
- •1500 ppm maximum total chlorine and bromine