



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

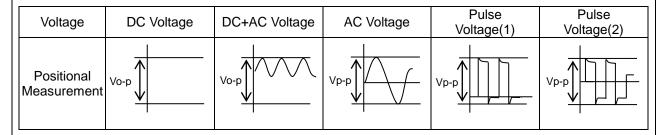
Product specifications in this catalog are as of Dec. 2017, and are subject to change or obsolescence without notice.

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

# $\triangle$ 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 -

# voltage sine wave

# 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 °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.

# **⚠** 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	
SEMKO		1612604	X1:440
DEMKO	JE 000004 44	D-05321	Y1:250
FIMKO	IEC60384-14, EN60384-14	FI 29602	
NEMKO	LN00304-14	P16221232	
ESTI		15.0075	
IMQ	EN60384-14	V4069	
CQC	GB/T6346.14	CQC04001011643	

<sup>\*</sup>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	<u>N01F</u>
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: 3.5mm					
N*	Vertical crimp taping type						

<sup>\*</sup> Please refer to [ Part number list ]

• Packing style code

<u> </u>	
Code	Packing type
В	Bulk type
Α	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.

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Code	Specification
N01F	<ul> <li>Halogen free         <ul> <li>Br ≤ 900ppm, Cl ≤ 900ppm</li> <li>Br + Cl ≤ 1500ppm</li> </ul> </li> <li>CP wire</li> </ul>

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 : 250~
Class code : X1Y1
Halogen free mark : HF

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

Manufacturing month : Code

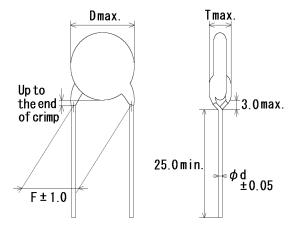
Company name code : (Made in Thailand)

(Example)

472M KX250~ X1Y1 |<del>F</del> 5D (M15

# 4. Part number list

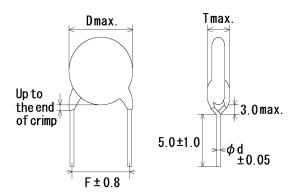
Vertical crimp long type (Lead code: A\*)



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%		DE1B3KX101KA4BN01F	7.0	7.0	10.0	0.6	A4	250
В	150	±10%		DE1B3KX151KA4BN01F	7.0	7.0	10.0	0.6	A4	250
В	220	±10%		DE1B3KX221KA4BN01F	8.0	7.0	10.0	0.6	A4	250
В	330	±10%		DE1B3KX331KA4BN01F	7.0	7.0	10.0	0.6	A4	250
В	470	$\pm 10\%$		DE1B3KX471KA4BN01F	7.0	7.0	10.0	0.6	A4	250
В	680	$\pm 10\%$		DE1B3KX681KA4BN01F	8.0	7.0	10.0	0.6	A4	250
Е	1000	±20%		DE1E3KX102MA4BN01F	7.0	7.0	10.0	0.6	A4	250
Е	1500	±20%		DE1E3KX152MA4BN01F	8.0	7.0	10.0	0.6	A4	250
Е	2200	±20%		DE1E3KX222MA4BN01F	9.0	7.0	10.0	0.6	A4	250
Е	3300	±20%		DE1E3KX332MA4BN01F	10.0	7.0	10.0	0.6	A4	250
Е	4700	$\pm 20\%$		DE1E3KX472MA4BN01F	12.0	7.0	10.0	0.6	A4	200

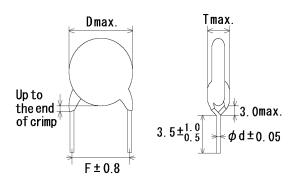
Vertical crimp short type (Lead code:B\*)



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

Cap. Cap. Customer Part N		Customer Part Number	Murata Part Number	Dir	nensi	Lead	Pack		
(pF)	tol.	Customer Fait Number	Mulata Fait Nullibel	D	Т	F	d	code	qty. (pcs)
100	±10%		DE1B3KX101KB4BN01F	7.0	7.0	10.0	0.6	B4	500
150	±10%		DE1B3KX151KB4BN01F	7.0	7.0	10.0	0.6	B4	500
220	±10%		DE1B3KX221KB4BN01F	8.0	7.0	10.0	0.6	B4	500
330	±10%		DE1B3KX331KB4BN01F	7.0	7.0	10.0	0.6	B4	500
470	±10%		DE1B3KX471KB4BN01F	7.0	7.0	10.0	0.6	B4	500
680	±10%		DE1B3KX681KB4BN01F	8.0	7.0	10.0	0.6	B4	500
1000	±20%		DE1E3KX102MB4BN01F	7.0	7.0	10.0	0.6	B4	500
1500	±20%		DE1E3KX152MB4BN01F	8.0	7.0	10.0	0.6	B4	500
2200	±20%		DE1E3KX222MB4BN01F	9.0	7.0	10.0	0.6	B4	500
3300	±20%		DE1E3KX332MB4BN01F	10.0	7.0	10.0	0.6	B4	500
4700	$\pm$ 20%		DE1E3KX472MB4BN01F	12.0	7.0	10.0	0.6	B4	250
	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 Fact Number         Mutata Fact Number           100         ±10%         DE1B3KX101KB4BN01F           150         ±10%         DE1B3KX221KB4BN01F           220         ±10%         DE1B3KX331KB4BN01F           330         ±10%         DE1B3KX471KB4BN01F           470         ±10%         DE1B3KX681KB4BN01F           680         ±10%         DE1B3KX681KB4BN01F           1000         ±20%         DE1E3KX152MB4BN01F           1500         ±20%         DE1E3KX222MB4BN01F           3300         ±20%         DE1E3KX332MB4BN01F	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D           100         ±10%         DE1B3KX101KB4BN01F         7.0           150         ±10%         DE1B3KX221KB4BN01F         7.0           220         ±10%         DE1B3KX221KB4BN01F         8.0           330         ±10%         DE1B3KX331KB4BN01F         7.0           470         ±10%         DE1B3KX471KB4BN01F         7.0           680         ±10%         DE1B3KX681KB4BN01F         8.0           1000         ±20%         DE1E3KX102MB4BN01F         7.0           1500         ±20%         DE1E3KX222MB4BN01F         9.0           3300         ±20%         DE1E3KX332MB4BN01F         10.0	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D         T           100         ±10%         DE1B3KX101KB4BN01F         7.0         7.0           150         ±10%         DE1B3KX151KB4BN01F         7.0         7.0           220         ±10%         DE1B3KX221KB4BN01F         8.0         7.0           330         ±10%         DE1B3KX331KB4BN01F         7.0         7.0           470         ±10%         DE1B3KX471KB4BN01F         7.0         7.0           680         ±10%         DE1B3KX681KB4BN01F         8.0         7.0           1000         ±20%         DE1E3KX102MB4BN01F         7.0         7.0           1500         ±20%         DE1E3KX222MB4BN01F         9.0         7.0           3300         ±20%         DE1E3KX332MB4BN01F         10.0         7.0	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D         T         F           100         ±10%         DE1B3KX101KB4BN01F         7.0         7.0         10.0           150         ±10%         DE1B3KX151KB4BN01F         7.0         7.0         10.0           220         ±10%         DE1B3KX221KB4BN01F         8.0         7.0         10.0           330         ±10%         DE1B3KX331KB4BN01F         7.0         7.0         10.0           470         ±10%         DE1B3KX471KB4BN01F         8.0         7.0         10.0           680         ±10%         DE1B3KX102MB4BN01F         8.0         7.0         10.0           1000         ±20%         DE1E3KX152MB4BN01F         8.0         7.0         10.0           2200         ±20%         DE1E3KX222MB4BN01F         9.0         7.0         10.0           3300         ±20%         DE1E3KX332MB4BN01F         10.0         7.0         10.0	(pF)         tol.         Design and state and the state and stat	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D         T         F         d         code           100         ±10%         DE1B3KX101KB4BN01F         7.0         7.0         10.0         0.6         B4           150         ±10%         DE1B3KX151KB4BN01F         7.0         10.0         0.6         B4           220         ±10%         DE1B3KX221KB4BN01F         7.0         10.0         0.6         B4           330         ±10%         DE1B3KX331KB4BN01F         7.0         7.0         10.0         0.6         B4           470         ±10%         DE1B3KX471KB4BN01F         7.0         7.0         10.0         0.6         B4           680         ±10%         DE1B3KX681KB4BN01F         8.0         7.0         10.0         0.6         B4           1000         ±20%         DE1E3KX102MB4BN01F         7.0         10.0         0.6         B4           2200         ±20%         DE1E3KX222MB4BN01F         9.0         7.0         10.0         0.6         B4           3300         ±20%         DE1E3KX332MB4BN01F         10.0         7.0         10.0         0.6         B4

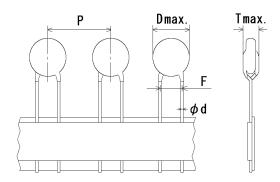
·Vertical crimp short type
(Lead code:J\*)



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

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%		DE1B3KX101KJ4BN01F	7.0	7.0	10.0	0.6	J4	500
В	150	±10%		DE1B3KX151KJ4BN01F	7.0	7.0	10.0	0.6	J4	500
В	220	±10%		DE1B3KX221KJ4BN01F	8.0	7.0	10.0	0.6	J4	500
В	330	±10%		DE1B3KX331KJ4BN01F	7.0	7.0	10.0	0.6	J4	500
В	470	$\pm 10\%$		DE1B3KX471KJ4BN01F	7.0	7.0	10.0	0.6	J4	500
В	680	$\pm 10\%$		DE1B3KX681KJ4BN01F	8.0	7.0	10.0	0.6	J4	500
Е	1000	±20%		DE1E3KX102MJ4BN01F	7.0	7.0	10.0	0.6	J4	500
Е	1500	±20%		DE1E3KX152MJ4BN01F	8.0	7.0	10.0	0.6	J4	500
Е	2200	±20%		DE1E3KX222MJ4BN01F	9.0	7.0	10.0	0.6	J4	500
Е	3300	$\pm 20\%$		DE1E3KX332MJ4BN01F	10.0	7.0	10.0	0.6	J4	500
Е	4700	$\pm$ 20%		DE1E3KX472MJ4BN01F	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.	Cap. Cap. Customer Part Number		Murata Part Number	D	imer	Lead	Pack			
(pF)	tol.	Customer Fait Number	IVIUIAIA FAIT INUIIIDEI	D	Τ	F	d	Р	code	qty. (pcs)
100	$\pm$ 10%		DE1B3KX101KN4AN01F	7.0	7.0	10.0	0.6	25.4	N4	500
150	$\pm 10\%$		DE1B3KX151KN4AN01F	7.0	7.0	10.0	0.6	25.4	N4	500
220	$\pm 10\%$		DE1B3KX221KN4AN01F	8.0	7.0	10.0	0.6	25.4	N4	500
330	$\pm 10\%$		DE1B3KX331KN4AN01F	7.0	7.0	10.0	0.6	25.4	N4	500
470	$\pm 10\%$		DE1B3KX471KN4AN01F	7.0	7.0	10.0	0.6	25.4	N4	500
680	$\pm 10\%$		DE1B3KX681KN4AN01F	8.0	7.0	10.0	0.6	25.4	N4	500
1000	±20%		DE1E3KX102MN4AN01F	7.0	7.0	10.0	0.6	25.4	N4	500
1500	±20%		DE1E3KX152MN4AN01F	8.0	7.0	10.0	0.6	25.4	N4	500
2200	±20%		DE1E3KX222MN4AN01F	9.0	7.0	10.0	0.6	25.4	N4	500
3300	$\pm 20\%$		DE1E3KX332MN4AN01F	10.0	7.0	10.0	0.6	25.4	N4	500
4700	$\pm$ 20%		DE1E3KX472MN4AN01F	12.0	7.0	10.0	0.6	25.4	N4	500
	100 150 220 330 470 680 1000 1500 2200 3300	$\begin{array}{c c} (pF) & tol. \\ \hline 100 & \pm 10\% \\ \hline 150 & \pm 10\% \\ \hline 220 & \pm 10\% \\ \hline 330 & \pm 10\% \\ \hline 470 & \pm 10\% \\ \hline 680 & \pm 10\% \\ \hline 1000 & \pm 20\% \\ \hline 1500 & \pm 20\% \\ \hline 2200 & \pm 20\% \\ \hline 3300 & \pm 20\% \\ \hline \end{array}$	(pF) tol. Sustainer Fart Number  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%         DE1B3KX101KN4AN01F           150         ±10%         DE1B3KX221KN4AN01F           220         ±10%         DE1B3KX331KN4AN01F           470         ±10%         DE1B3KX471KN4AN01F           680         ±10%         DE1B3KX681KN4AN01F           1000         ±20%         DE1E3KX102MN4AN01F           1500         ±20%         DE1E3KX222MN4AN01F           3300         ±20%         DE1E3KX332MN4AN01F           3300         ±20%         DE1E3KX332MN4AN01F	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D           100         ±10%         DE1B3KX101KN4AN01F         7.0           150         ±10%         DE1B3KX151KN4AN01F         7.0           220         ±10%         DE1B3KX221KN4AN01F         7.0           470         ±10%         DE1B3KX331KN4AN01F         7.0           680         ±10%         DE1B3KX681KN4AN01F         8.0           1000         ±20%         DE1E3KX102MN4AN01F         7.0           1500         ±20%         DE1E3KX222MN4AN01F         8.0           2200         ±20%         DE1E3KX332MN4AN01F         9.0           3300         ±20%         DE1E3KX332MN4AN01F         10.0	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D         T           100         ±10%         DE1B3KX101KN4AN01F         7.0         7.0           150         ±10%         DE1B3KX151KN4AN01F         7.0         7.0           220         ±10%         DE1B3KX221KN4AN01F         7.0         7.0           470         ±10%         DE1B3KX471KN4AN01F         7.0         7.0           680         ±10%         DE1B3KX681KN4AN01F         8.0         7.0           1000         ±20%         DE1E3KX102MN4AN01F         7.0         7.0           1500         ±20%         DE1E3KX222MN4AN01F         9.0         7.0           3300         ±20%         DE1E3KX332MN4AN01F         10.0         7.0	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D         T         F           100         ±10%         DE1B3KX101KN4AN01F         7.0         7.0         10.0           150         ±10%         DE1B3KX151KN4AN01F         7.0         7.0         10.0           220         ±10%         DE1B3KX221KN4AN01F         7.0         7.0         10.0           470         ±10%         DE1B3KX471KN4AN01F         7.0         7.0         10.0           680         ±10%         DE1B3KX681KN4AN01F         8.0         7.0         10.0           1000         ±20%         DE1E3KX102MN4AN01F         7.0         7.0         10.0           2200         ±20%         DE1E3KX222MN4AN01F         9.0         7.0         10.0           3300         ±20%         DE1E3KX332MN4AN01F         10.0         7.0         10.0	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         D         T         F         d           100         ±10%         DE1B3KX101KN4AN01F         7.0         7.0         10.0         0.6           150         ±10%         DE1B3KX151KN4AN01F         7.0         7.0         10.0         0.6           220         ±10%         DE1B3KX221KN4AN01F         7.0         7.0         10.0         0.6           330         ±10%         DE1B3KX471KN4AN01F         7.0         7.0         10.0         0.6           470         ±10%         DE1B3KX681KN4AN01F         8.0         7.0         10.0         0.6           680         ±10%         DE1B3KX102MN4AN01F         8.0         7.0         10.0         0.6           1000         ±20%         DE1E3KX152MN4AN01F         8.0         7.0         10.0         0.6           2200         ±20%         DE1E3KX222MN4AN01F         9.0         7.0         10.0         0.6           3300         ±20%         DE1E3KX332MN4AN01F         10.0         7.0         10.0         0.6	(pF)         tol.         D         T         F         d         P           100         ±10%         DE1B3KX101KN4AN01F         7.0         7.0         10.0         0.6         25.4           150         ±10%         DE1B3KX221KN4AN01F         7.0         7.0         10.0         0.6         25.4           220         ±10%         DE1B3KX221KN4AN01F         8.0         7.0         10.0         0.6         25.4           330         ±10%         DE1B3KX331KN4AN01F         7.0         7.0         10.0         0.6         25.4           470         ±10%         DE1B3KX471KN4AN01F         7.0         7.0         10.0         0.6         25.4           680         ±10%         DE1B3KX681KN4AN01F         8.0         7.0         10.0         0.6         25.4           1000         ±20%         DE1E3KX102MN4AN01F         7.0         7.0         10.0         0.6         25.4           2200         ±20%         DE1E3KX222MN4AN01F         9.0         7.0         10.0         0.6         25.4           3300         ±20%         DE1E3KX332MN4AN01F         10.0         7.0         10.0         0.6         25.4	Cap. (pF)         Cap. tol.         Customer Part Number         Murata Part Number         Dimension (mm)         Lead code           100         ±10%         DE1B3KX101KN4AN01F         7.0         7.0         10.0         0.6         25.4         N4           150         ±10%         DE1B3KX151KN4AN01F         7.0         7.0         10.0         0.6         25.4         N4           220         ±10%         DE1B3KX221KN4AN01F         8.0         7.0         10.0         0.6         25.4         N4           330         ±10%         DE1B3KX331KN4AN01F         7.0         7.0         10.0         0.6         25.4         N4           470         ±10%         DE1B3KX471KN4AN01F         7.0         7.0         10.0         0.6         25.4         N4           680         ±10%         DE1B3KX681KN4AN01F         8.0         7.0         10.0         0.6         25.4         N4           1000         ±20%         DE1E3KX102MN4AN01F         7.0         10.0         0.6         25.4         N4           2200         ±20%         DE1E3KX222MN4AN01F         9.0         7.0         10.0         0.6         25.4         N4           2200         ±20%

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Dissipation ractor (D.r.)							
Temperature characteristic Char. B: Within ±10 %							
Char. E: Within +20/-55%		eac	ch step speci	fied in Tab	le.		
(Temp. rar	nge: -25 to +85°C)						
	Step	1	2	3	4	5	
		20±2	-25±2	20±2	85±2	20±2	
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	Within specific 2.5% max  tic Char. B : Char. E : (Temp. rar	Within specified tolerance.  2.5% max.  tic Char. B: Within ±10 % Char. E: Within +20/-55% (Temp. range: -25 to +85°C)  Step Temp.(°C)  The cheese-cloth should not be	R.) 10 000 MΩ min. The Condition of the Condition of Con	Then, the capacicontainer filled with diameter. Finally, AC4000' 60 s between the balls.  R.)  10 000MΩ min.  The insulation reduction of the color of the capacitance of the capacitance.  Within specified tolerance.  Within specified tolerance.  The capacitance of the capacitan	container filled with metal diameter. Finally, AC4000V (r.m.s.)-60 s between the capacite balls.  The insulation resistance DC500±50V within 60±5 s The voltage should be appthrough a resistor of 1MΩ  Within specified tolerance.  The capacitance should b 1±0.1kHz and AC5V(r.m.s.) The dissipation factor showith 1±0.1kHz and AC5V(r.m.s.)  Char. B: Within ±10 % Char. E: Within ±20/-55% (Temp. range: -25 to +85°C)  Step 1 2 3 Temp.(°C) 20±2 -25±2 20±2  The cheese-cloth should not be on fire.  The capacitors should be least one but more than to cheese-cloth. The capacit to 20 discharges. The intel discharges should be 5 s maintained for 2min after  C1,2 : 1μF±10%, C3: L1 to L4: 1.5mH±20% 16 R: 100Ω±2%, Ct: UAc: UR ±5% UR Cx: Capacitor under F: Fuse, Rated 10, Ut: Voltage applied	Then, the capacitor should be insert container filled with metal balls of ab diameter. Finally, AC4000V (r.m.s.) < 50/60Hz>60 s between the capacitor lead wire balls.  R.) 10000MΩ min. The insulation resistance should be DC500±50V within 60±5 s of chargin The voltage should be applied to the through a resistor of 1MΩ. The capacitance should be measure 1±0.1kHz and AC5V(r.m.s.) max. The dissipation factor should be measure 1±0.1kHz and AC5V(r.m.s.) max. The dissipation factor should be measure with 1±0.1kHz and AC5V(r.m.s.) max. The capacitance measurement should act the search step specified in Table.    Step	

			Reference only	
No.	Item	า	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
.0	resistance	Capacitance	Within the specified tolerance.	supporting lead wire and vibration which is 10 to
		D.F.	2.5% max.	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	The lead wire of a capacitor should be dipped into a
			With uniformly coated on the	ethanol solution of 25wt% rosin and then into
			axial direction over 3/4 of the circumferential direction.	molten solder for 2±0.5 s. In both cases the depth of
			Shourmoronial anothers.	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	Within ±10%	Immersion time : 3.5±0.5 s
		change I.R.	1000MΩ min.	(In case of 260±5°C: 10±1 s) The depth of immersion is up to about
		Dielectric	Per item 3	1.5 to 2.0mm from the root of lead wires.
		strength		
				Thermal insulating
				4.5 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.
		change I.R.	1,000MO min	Then, as in figure, the lead wires should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm
		Dielectric	1000MΩ min.  Per item 3	from the root of terminal for 7.5+0/-1 s.
		strength		Thermal Capacitor
				Thermal Capacitor insulating
				1.5 to 2.0mm
				-
				I II 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
*1 "ro	om condition" Tempo	 	Locative humidity: 45 to 75%, Atn	2 h at *1room condition.
100	эн сонашон теттре	กลเนเ <del>ย</del> . 13 10 35°	o, relative numbility. 40 to 75%, Ath	nospheno pressure. 00 to rooke a

	Reference only								
No.	Item		Specification	Test method					
14	Flame test		The capacitor flame discontinue as follows.  Cycle Time 1 to 4 30 s max. 5 60 s max.	The capacitor should be subjected to applied flame for 15 s. and then removed for 15 s until 5 cycle.					
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.  Capacitor  About 8mm Flame 200±5mm  About 10mm thick board					
16	Humidity (Under steady state)	Appearance Capacitance change D.F. I.R. Dielectric strength	No marked defect.  Char. B: Within ±10%  Char. E: Within ±15%  5.0% max.  3000MΩ min.  Per item 3	Set the capacitor for 500±12 h at 40±2°C in 90 to 95% relative humidity.  Post-treatment: Capacitor should be stored for 1 to 2 h at *1room condition.					
17	Humidity loading	Appearance Capacitance change D.F. I.R. Dielectric strength	No marked defect.  Char. B: Within $\pm 10\%$ Char. E: Within $\pm 15\%$ 5.0% max. 3000M $\Omega$ min.  Per item 3	Apply the rated voltage for 500±12 h at 40±2°C in 90 to 95% relative humidity.  Post-treatment: Capacitor should be stored for 1 to 2 h at *1room condition.					

<sup>\*1 &</sup>quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Appearance Capacitance change  I.R. 3000MΩ min.  Dielectric Strength  Per item 3  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 1254-270 °C, and relative humidity of 50% max.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m as resulting air oven for a period of 1000 h.  The air in the oven is maintained at a temperature of 1254-270 °C, and relative humidity of 50% max.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 500/60m ax.  Throughout the test his capacitors are subjected to a AC425V(r.m.s.) < 600/60m axis in the oven is maintained at a temperature of 1254-270 °C, and relative humidity of 50% max.  Throughout the test.  Per item 3  Throughout the test.  Per apperature (Capacitance of 1254-270 °C, and relative humidity of 150% max.  Throughout the test.  Per apperature (Capacitance of 1254-270 °C, and relative humidity of 150% max.  Throughout the test.  Per apperature (Capacitance of 1254-270 °C, and relative humidity of 150% max.  Throughout the test.  Per apperature (Capacitance of 1254-270 °C, and relative humidity of 150% max.  Throughout the test.  Per apperature (Capacitance of 1254-270 °C, and relative humidity of 150% max.  Throughout the test.  Per apperature (Capacitance of 1254-270 °C, and relative humidity of 150% max.  Throughout the test.  Per apperature (Capacitance of 1254-27	Appearance   No marked defect.   Impulse voltage   Each individual capacitor should be subjected to a RkV impulses for three times. Then the capacitors are applied to life test.	NO.	Item	1	Reference or Specification	Test method
Capacitance change   I.R.   3000MΩ min.	Capacitance change   I.R.   3000MΩ min.	<u>√o.</u> 18				
LR   3000MΩ min.	LR   3000MΩ min.	10	LIIO			Each individual capacitor should be subjected to a
Temperature and immersion cycle   D.F.   5.0% max.   I.R.   3000MΩ min.	I.R.   3000MΩ min.   Dielectric strength   Per item 3   The capacitors are placed in a circulating air over 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 AC425V(r.m.s.) for 0.   Post-treatment : Capacitor should be subjected to 5 temperature and immersion cycle   Char. B : Within ±10% Char. E : Within ±20%   D.F.   5.0% max.   I.R.   3000MΩ min.   The capacitor should be subjected to 5 temperature cycles.   Step Temperature (°C)   Time   Time to half-value (°C)   Time   1   40+00°-3   30 min   3   +125+3²-0   30 min   Cycle time : 5 cycle time : 2   0±3   15 min   Sait water   Capacitor should be stored at a 55±2°C for 1 h, then placed at "froom condition for 24±2 h.   Post-treatment : Capacitor should be stored for 2   Pre-treatment : Capacitor should be stored at a 55±2°C for 1 h, then placed at "froom condition for 24±2 h.   Post-treatment : Capacitor should be stored for 2 h at "froom condition for 24±2 h.   Post-treatment : Capacitor should be stored for 2 h at "froom condition for 24±2 h.   Post-treatment : Capacitor should be stored for 2 h at "froom condition for 24±2 h.   Post-treatment : Capacitor should be stored for 2 h at "froom condition for 24±2 h.   Post-treatment : Capacitor should be stored for 2 h at "froom condition for 24±2 h.   Post-treatment : Capacitor should be stored for 4 chance is marked to a condition for 24±2 h.   Post-treatment : Capacitor should be stored for 4 chance is marked to a chance is marked				VVILIIII ±20%	
Dielectric strength  Per item 3  Dielectric strength  Per item 3  Dielectric strength  Per item 3  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 AC425V(r.m.s.)-s0/60Hz> alternating voltage of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) tor 0.  Post-treatment: Capacitor should be stored for 1 2 h at "froom condition.  Post-treatment is capacitor should be subjected to 5 temperature cycles. The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. Temperature cycles  The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. Temperature cycles in 4-40+0/-3 30 min 2 Room temp. 3 min 3 + 125+3/-0 30 min 2 Room temp. 3 min 3 + 125+3/-0 30 min 3 + 125+3/-0 30 min 2 Room temp. 3 min 3 + 125+3/-0 30 min 3 + 1	Dielectric strength  Per item 3  Dielectric strength  Dielectric strength  Dielectric strength  Per item 3  Dielectric strength  Dielectric strength  Dielectric strength  Per item 3  Dielectric strength  Dielectri					
strength    The capacitors are placed in a circulating air over for a period of 1000 h. The air in the oven is maintained at a temperature of 125-22-0°C, and relative humidity of 50% max. Throughout the test, the capacitors are subjected to a AC4250 (r.m.s.) <a href="https://doi.org/10.1001/j.cm.s.">https://doi.org/10.1001/j.cm.s.</a>   Temperature and immersion cycle    Appearance	strength    The capacitors are placed in a circulating air over for a period of 1000 h. The air in the oven is maintained at a temperature of 125-22-0°C, and relative humidity of 50% max Throughout the test, the capacitors are subjected to a AC428V(r.m.s)-\$50/60Hz-satemating volume of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0. Post-treatment: Capacitors should be stored for 1 2 h at "troom condition.    Appearance					are applied to life test.
Time to helf-value (T2) = 50 \( \text{is} \) is a consistency of 1000 h.  The capacitors are placed in a circulating air over 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, he capacitors are subjected to a AC4250/(rm.s.)-\$50/60H2-a tetrnating voltage of mains frequency, except that once each hour the voltage is increased to AC1 000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 1 2 h at *1'room condition.  The capacitor should be stored for 1 2 h at *1'room condition.  The capacitor should be stored for 1 2 h at *1'room condition.  The capacitor should be stored for 4 2 h at *1'room condition for 24±2 h.  The capacitor should be subjected to 5 temperature (*C) = 1 fill the stored at 85±2 °C for 1 h, then placed at *1'room condition for 24±2 h.  Post-treatment: Capacitor should be stored at 85±2 °C for 1 h, then placed at *1'room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 4 the stored condition.	The capacitors are placed in a circulating air over for a period of 1 000 h.  The air in the oven is maintained at a temperature of 125+2/-0 °C, and relative humidity of 50% max and Throughout the test, tin in the oven is subjected to a AC425V(rm.s)-\$5060H2-a letmating voltage of mains frequency, except that once each hour the voltage is increased to AC1 000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 1 2 h at *1room condition.  The capacitors are placed in a circulating air over for a period of 1 000 h.  The air in the oven is maintained at a temperature of 125+2/-0 °C, and relative humidity of 50% max and Throughout the test, the capacitors are subjected to a AC425V(rm.s.)-\$5060H2-a letmating voltage of mains frequency, except that once each hour the voltage is increased to AC1 000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 2 h at *1room condition.  The capacitors should be stored the voltage is increased to AC1 000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *100 more of the capacitor should be stored for 24 h at *1room condition.			Dielectric	Per item 3	m()
Time to helf-value (Tz) = 50 µ 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 AC4259/(rm.s.)<60/60Hz-a temperature of 125+2/-0 °C, and relative humidity of 50% max.  Throughout the test, the capacitors are subjected to a AC4259/(rm.s.)<50/60Hz-a temperature of 125+2/-0 °C, and relative humidity of 50% max.  Throughout the test, the capacitors are subjected to a AC4259/(rm.s.)<50/60Hz-a temperature of 125+2/-0 °C, and relative humidity of 50% max.  Throughout the test, the capacitors should be stored for 1 2 h at *1room condition.  The capacitor should be stored for 4 at *1room condition for 24±2 h.  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 capacitor should be stored of a subject of 1000 h.  The air in the oven is maintained at a temperature of 125 h at *1room condition.  The capacitors should be stored for 4 at *1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 at *1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 at *1room condition.	Time to helf-value (Tz) = 50 // s and Time to helf-value (Tz) = 50 // s and Time to helf-value (Tz) = 50 // s and the subjected to a Ac4250/(rm.s.)<60/60Hz-alternative young of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 12 h at *1'room condition.  The capacitors are placed in a circulating air over 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 subjected to a Ac4250/(rm.s.)<60/60Hz-alternative young of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 12 h at *1'room condition.  The capacitor should be stored that the voltage is increased to AC1000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1'room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 424 h at *1'room condition.			strength		Front time (T1) = 1.2 $\mu$ s=1.67T
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+27-0°C, and relative humidity of 50% max. Throughout the test, the capacitors are subjected to a AC425V(r.m.s.). \$40,60Hz> alternating voltage of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 1 2 h at "froom condition.  The air in the oven is maintained at a temperature of 125+27-0°C, and relative humidity of 50% max. Throughout the test, the capacitors are subjected to 26 hour the voltage is increased to AC1000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 1 2 h at "froom condition.  The capacitor of 2 h at "froom condition.  The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. Time the capacitor should be subjected to 5 temperature cycles. Time the stored of 2 h and the consecutively to 2 immersion cycles.  Step Temperature (°C) Time the step temperature cycle time: 5 cycle time: 2 cycle time: 3 cycle time: 2 cycle time: 3 cycle time: 4 cycle time: 5 cy	The capacitors are placed in a circulating air over 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 AC425V(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.  Post-treatment: Capacitor should be stored for 1 2 h at **room condition.  The air in the oven is maintained at a temperature of 125±2/0 °C, and relative humidity of 50% max at Throughout the test, the capacitors are subjected to a AC425V(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.  Post-treatment: Capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.  **Temperature cycle**  I.R. 3000M/2 min.  Dielectric strength  Per item 3  **Step Temperature(°C) Time Immersion cycles and a 125±3/-0 30 min 2 and a 125±3/-0 30 min 2 and a 125±3/-0 30 min 3 and a 125±3/-0 and					If $         $ If $     $ If $   $ If $     $ If $     $ If $     $ If $     $ If $     $ If $   $ If $   $ If $     $ If $     $ If $     $ If $     $ If $     $ If
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Temperature and immersion cycle  Appearance No marked defect. Capacitance Char. E: Within ±10% Chan. E: S. 0.96 max. I.R. 3000 MΩ min.  Dielectric strength  Per Item 3  Temperature (°C) Time Immersion cycles the marked sate and immersion cycle of the strength  Per Item 3  Temperature (°C) Time Immersion cycle of the strength water 2 0±3 15 min water 2 0±3 15 min water 2 0±3 15 min water 3 cycle immersion cycles  Per-treatment: Capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.  The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.  The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.  Temperature cycle>  Temperature cycle>  Step Temperature (°C) Time Immersion water 1 +65+5/-0 15 min water 2 0±3 15 min water 3 cycle immersion cycles are 1 +65+5/-0 15 min water 2 0±3 15 min water 3 cycle immersion cycles 2 cycle immersion cycles are 1 +65+5/-0 15 min water 2 0±3 15 min water 3 cycle immersion cycles 2 cycle immersion cycles 2 cycle immersion cycles 2 cycle immersion cycles 2 cycle immersion cycles 3 cycle im	The capacitors are placed in a circulating air over 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 voltage is increased to AC1000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 1 2 h at "froom condition.  The capacitors are subjected to a AC425V(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.  Post-treatment: Capacitor should be stored for 1 2 h at "froom condition.  The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.  I.R. 3000MΩ min.  Dielectric strength  Per item 3  The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.  **Temperature cycle>  **Step   Temperature (°C)   Time   Ti					Ι ΙΙΙΙΙ Ι Τ
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Temperature and immersion cycle   Appearance   No marked defect.   Capacitance change   Char. B : Within ±10%   Char. E : Within ±20%	Temperature and immersion cycle   Appearance   No marked defect.   Post-treatment : Capacitor should be stored for 1 2 h at *1 room condition.					
of mains frequency, except that once each hour the voltage is increased to AC1 000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 1 2 h at *¹room condition.  The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.  Char. B: Within ±10% char. E: Within ±20%  D.F.  I.R.  3000MΩ min.  Dielectric strength  Der item 3  Step Temperature(°C) Time  1 -40+0/-3 30 min  2 Room temp. 3 min  3 +125+3/-0 30 min  Cycle time: 5 cyclemersion cycles  Step Temperature(°C) Time Immersion water  1 +65+5/-0 15 min water  2 0±3 15 min Salt water  Cycle time: 2 cycle time: 3 cycle time: 4 cycle time:	of mains frequency, except that once each hour the voltage is increased to AC1 000V(r.m.s.) for 0.  Post-treatment: Capacitor should be stored for 1 2 h at *1room condition.  Appearance No marked defect. Capacitance Char. B: Within ±10% Char. E: Within ±20% D.F. I.R. 3000MΩ min. Dielectric strength  Per item 3  Step Temperature(°C) Time 1 +40+0/-3 30 min 2 Room temp. 3 min 3 +125+3/-0 30 min 4 Room temp. 3 min Cycle time: 5 cycle time: 5 cycle time: 2 cycle ti					
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Post-treatment : Capacitor should be stored for 1 2 h at *¹room condition.  Appearance   No marked defect.   Capacitance change   Char. B : Within ±10%   Char. E : Within ±20%   D.F.   5.0% max.   I.R.   3000MΩ min.   Dielectric strength   Per item 3	Post-treatment : Capacitor should be stored for 1 2 h at *1room condition.  Appearance   No marked defect.   Capacitance   Char. B : Within ±10%   Char. E : Within ±20%   D.F.   5.0% max.   I.R.   3000MΩ min.   Dielectric   strength   Per item 3   1 -40+0/-3   30 min   2   Room temp.   3 min   3 +125+3/-0   30 min   2   Room temp.   3 min   Cycle time : 5 cycle time : 5 cycle time : 2 cycle ti					of mains frequency, except that once each hour
Temperature and immersion cycle   Appearance   Capacitance change   Char. B : Within ±10%   Char. E : Within ±20%   D.F.   5.0% max.     I.R.   3000MΩ min.   Dielectric strength   Per item 3   Temperature(°C)   Time   Temperature(°C)   Te	Temperature and immersion cycle   Appearance   Char. B : Within ±10%   Char. E : Within ±20%   D.F.   5.0% max.   I.R.   3000MΩ min.   Dielectric strength   Per item 3   Temperature(°C)   Time					the voltage is increased to AC1 000V(r.m.s.) for 0.7
Temperature and immersion cycle   Appearance   Capacitance change   Char. B : Within ±10%   Char. E : Within ±20%   D.F.   5.0% max.     I.R.   3000MΩ min.   Dielectric strength   Per item 3   Temperature(°C)   Time   Temperature(°C)   Te	Temperature and immersion cycle   Appearance   Char. B : Within ±10%   Char. E : Within ±20%   D.F.   5.0% max.   I.R.   3000MΩ min.   Dielectric strength   Per item 3   Temperature(°C)   Time					Doot tractment . Conscitor should be stored for 1
Temperature and immersion cycle    Appearance   Capacitance change   Char. B : Within ±10%   Char. E : Within ±20%     D.F.   5.0% max.     I.R.   3000MΩ min.     Dielectric strength   Per item 3   Step   Temperature(°C)   Time     1	Appearance   Capacitance change   Char. B : Within ±10%   Char. E : Within ±20%     D.F.   5.0% max.     I.R.   3000MΩ min.     Dielectric strength   Per item 3     Cycle time : 5 cycle time : 5 cycle time : 2 cyc					
Capacitance char. B: Within ±10% Char. E: Within ±20% D.F.	Capacitance change   Char. B : Within ±10% Char. E : Within ±20%     D.F.   5.0% max.     I.R.   3000MΩ min.     Dielectric strength   Per item 3     Cycles   Temperature (°C)   Time     1	9	Temperature and	Appearance	No marked defect	
Change   Char. E : Within ±20%     D.F.   5.0% max.     I.R.   3000MΩ min.     Dielectric strength   Per item 3     Step   Temperature(°C)   Time     1	Change   Char. E : Within ±20%     D.F.   5.0% max.     I.R.   3000MΩ min.     Dielectric strength   Per item 3     Step   Temperature (°C)   Time     1	-				
D.F.   5.0% max.   1.R.   3000MΩ min.   Step   Temperature (°C)   Time   1	D.F.   5.0% max.   Step   Temperature (°C)   Time   1					eyelee, alon concecumely to 2 millioners eyeleer
Step   Temperature(°C)   Time   1	Step   Temperature(°C)   Time   1					<temperature cycle=""></temperature>
Dielectric strength  Per item 3  Dielectric strength  Die	Dielectric strength  Per item 3  Per item 4  Per item 5  Per item 6  Per item 6  Per item 6  Per item 9  Per item 9  Per item 1  Per item 2  Per item 1  Per item 2  Per item 1  Per item					Step Temperature(°C) Time
strength    2   Room temp.   3 min   3   +125+3/-0   30 min   4   Room temp.   3 min   Cycle time : 5 cy	strength    2   Room temp.   3 min   3   +125+3/-0   30 min   4   Room temp.   3 min   Cycle time : 5 cycle time : 2 cycle tim					
3 +125+3/-0 30 min 4 Room temp. 3 min  Cycle time: 5 cy  Immersion cycle>  Step Temperature(°C) Time Immersion water  1 +65+5/-0 15 min Clean water  2 0±3 15 min Salt water  Cycle time: 2 cy  Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1 room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1 room condition.	3				T CI IICIII 3	
4 Room temp. 3 min  Cycle time: 5 cy <a href="#">Cycle time: 5 cy</a> <a href="#">Cycle time: 5 cy</a> <a href="#">Immersion water</a> 1 +65+5/-0 15 min Clean water  2 0±3 15 min Salt water  Cycle time: 2 cy  Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1 room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1 room condition.	A   Room temp.   3 min   Cycle time : 5 cycle time : 2 cycle tim			Strength		
Cycle time : 5 cy  Immersion cycle>  Step Temperature(°C) Time Immersion water  1 +65+5/-0 15 min Clean water  2 0±3 15 min Salt water  Cycle time : 2 cy  Pre-treatment : Capacitor should be stored at 85±2°C for 1 h, then placed at *1 room condition for 24±2 h.  Post-treatment : Capacitor should be stored for 4 24 h at *1 room condition.	Cycle time : 5 cycle time : 2 cycle					
Immersion cycle>   Step Temperature(°C) Time Immersion water   1 +65+5/-0 15 min Clean water   2 0±3 15 min Salt water   Cycle time: 2 cy Pre-treatment: Capacitor should be stored at *5±2°C for 1 h, then placed at *1 room condition for 24±2 h. Post-treatment: Capacitor should be stored for 4 24 h at *1 room condition.	Step Temperature(°C) Time Immersion water 1 +65+5/-0 15 min Clean water 2 0±3 15 min Salt water Cycle time: 2 cy Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1 room condition for 24±2 h. Post-treatment: Capacitor should be stored for 4 24 h at *1 room condition.					4 Room temp. 3 min
Immersion cycle>   Step Temperature(°C) Time Immersion water   1 +65+5/-0 15 min Clean water   2 0±3 15 min Salt water   Cycle time: 2 cy Pre-treatment: Capacitor should be stored at *5±2°C for 1 h, then placed at *1 room condition for 24±2 h. Post-treatment: Capacitor should be stored for 4 24 h at *1 room condition.	Step Temperature(°C) Time Immersion water 1 +65+5/-0 15 min Clean water 2 0±3 15 min Salt water Cycle time: 2 cy Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1 room condition for 24±2 h. Post-treatment: Capacitor should be stored for 4 24 h at *1 room condition.					Cycle time: 5 cy
Step Temperature(°C) Time Immersion water  1 +65+5/-0 15 min Clean water  2 0±3 15 min Salt water  Cycle time : 2 cy  Pre-treatment : Capacitor should be stored at 85±2°C for 1 h, then placed at *1 room condition for 24±2 h.  Post-treatment : Capacitor should be stored for 4 24 h at *1 room condition.	Step Temperature(°C) Time Immersion water  1 +65+5/-0 15 min Clean water  2 0±3 15 min Salt water  Cycle time: 2 cy  Pre-treatment: Capacitor should be stored at 85±2°C for 1 h, then placed at *1 room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1 room condition.					,
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The state of the s	Pre-treatment: Capacitor should be stored at \$5±2°C for 1 h, then placed at *1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1room condition.					step remperature( c) Time water
Pre-treatment: Capacitor should be stored at *1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1room condition.	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 24 h at *1room condition.					1 +65+5/-0 15 min Clean
Cycle time : 2 cy  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 24 h at *1room condition.	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 24 h at *1room condition.					water
Cycle time: 2 cy  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 24 h at *1room condition.	Cycle time: 2 cy  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 24 h at *1room condition.					1 1 2 1 11+3 1 15 min 1
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 24 h at *1room condition.	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 24 h at *1room condition.					water
85±2°C for 1 h, then placed at *1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1room condition.	85±2°C for 1 h, then placed at *¹room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *¹room condition.					Cycle time : 2 cy
*1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1room condition.	*1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1room condition.					Pre-treatment: Capacitor should be stored at
*1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1room condition.	*1room condition for 24±2 h.  Post-treatment: Capacitor should be stored for 4 24 h at *1room condition.					85±2°C for 1 h, then placed at
24 h at *1 room condition.	24 h at *1room condition.					
24 h at *1 room condition.	24 h at *1room condition.					
		"ro	om condition" Tempe	rature: 15 to 35°	L. Relative humidity: 45 to 75%	
			·		•	•

# 6. Packing specification

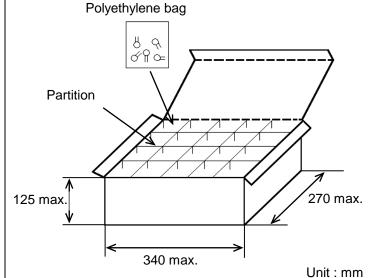
•Bulk type (Packing style code : B)

\*1 \*2
The number of packing = Packing quantity × n

The size of packing case and packing way

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

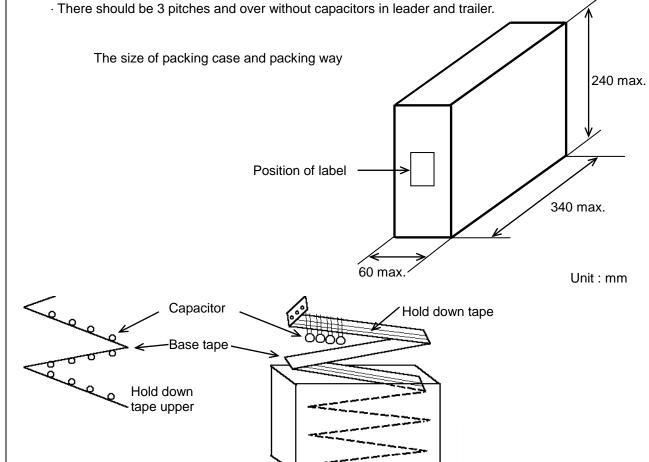
\*2 : Standard n = 20 (bag)



Note)

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

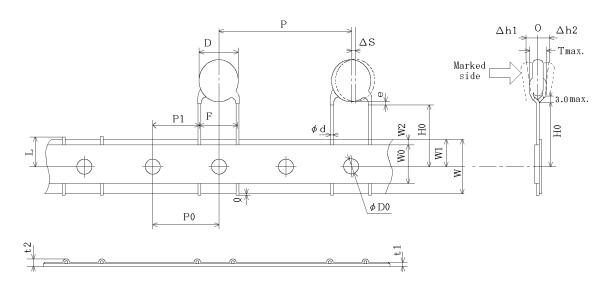
- •Ammo pack taping type (Packing style code : A)
  - · The tape with capacitors is packed zigzag into a case.
  - · When body of the capacitor is piled on other body under it.



# 7. Taping specification

# 7-1. Dimension of capacitors on tape

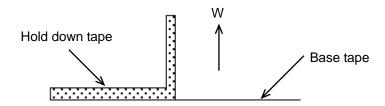
Vertical crimp taping type < Lead code : N4 >
Pitch of component 25.4mm / Lead spacing 10.0mm



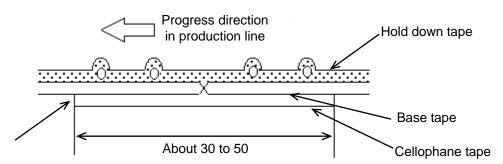
Item	Code	Dimensions	Remarks
Pitch of component	Р	25.4±2.0	
Pitch of sprocket hole	P0	12.7±0.3	
Lead spacing	F	10.0±1.0	
Length from hole center to lead	P1	7.7±1.5	
Body diameter	D	Please refer to [ Part number list ].	
Deviation along tape, left or right	ΔS	0±2.0	They include deviation by lead bend .
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± <sub>0</sub> <sup>2.0</sup>	
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	
Total thickness, tape and lead wire	t2	1.5 max.	They include hold down tape thickness.
Deviation across tape, front	∆h1	2.0 may	
Deviation across tape, rear	∆h2	2.0 max.	
Portion to cut in case of defect	L	11.0± <sup>0</sup> <sub>1.0</sub>	
Hold down tape width	W0	11.5 min.	
Hold down tape position	W2	1.5±1.5	
Coating extension on lead	е	Up to the end of crimp	
Body thickness	Т	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.



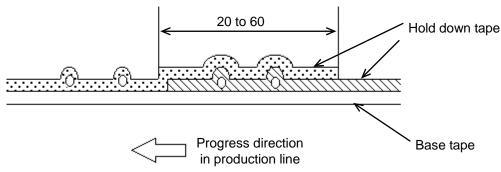
- 2) Splicing of tape
  - a) When base tape is spliced
    - •Base tape should be spliced by cellophane tape. (Total tape thickness should be less than 1.05mm.)



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