# muRata

**Reference Specification** 

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

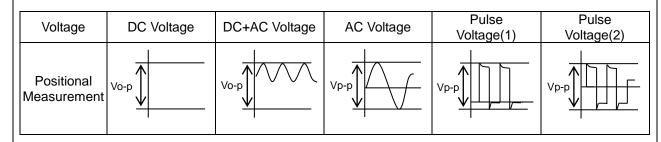
Product specifications in this catalog are as of Jun. 2019, and are subject to change or obsolescence without notice.

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

## 

### 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 selfgenerated 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  $\phi$ 0.1mm 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.

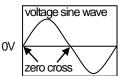
\*ZERO CROSS is the point where voltage sine wave pass 0V. - See the right figure -

### 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.

### \Lambda ΝΟΤΕ

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.

### 1. Application

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

Type SA is Safety Standard Certified capacitors of Class X1,Y2.

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	r
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	Standard number	*Certified number	AC Rated volt. V(r.m.s.)
UL/cUL	UL60384-14	E37921	
ENEC		400,400,00	
(VDE)	EN60384-14	40042990	X1:300 Y2:250
CQC	IEC60384-14	CQC15001137840	12.200
ктс	KC60384-14	HU03008-17009	

\*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
2-2. Rated Voltage	X1:AC300V(r.m.s.)
	Y2:AC250V(r.m.s.)

#### 2-3. Part number configuration

ex.) <u>DE2</u>	B3	SA	471	K	A3	В	T02F
Product	Temperature	Туре	Capacitance	Capacitance	Lead	Packing	Individual
code	characteristic	name		tolerance	code	style code	specification

• Product code DE2 denotes class X1,Y2.

#### •Temperature characteristic

Code	Temperature characteristic
1X	SL
B3	В
E3	E

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

### • Type name

This denotes safety certified type name Type SA.

Capacitance

The first two digits denote significant figures ; the last digit denotes the multiplier of 10 in pF. ex.) In case of 471.

$$47 \times 10^1 = 470 \text{pF}$$

• Capacitance tolerance Please refer to [ Part number list ].

Lead code

Code	Lead style			
A*	Vertical crimp long type			
J*	Vertical crimp short type			
N*	Vertical crimp taping type			
* Please refe	r to [Part number list].			

Packing style code

ig otylo oodo		
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.

chu or purt n							
Code	Specification						
T01F	Dielectric strength between lead wires: AC2000V(r.m.s.)	<ul> <li>Rated voltage : X1:AC300V(r.m.s.) Y2:AC250V(r.m.s.)</li> <li>Halogen Free</li> </ul>					
T02F	Dielectric strength between lead wires: AC2600V(r.m.s.)	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(SA) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

### 3. Marking

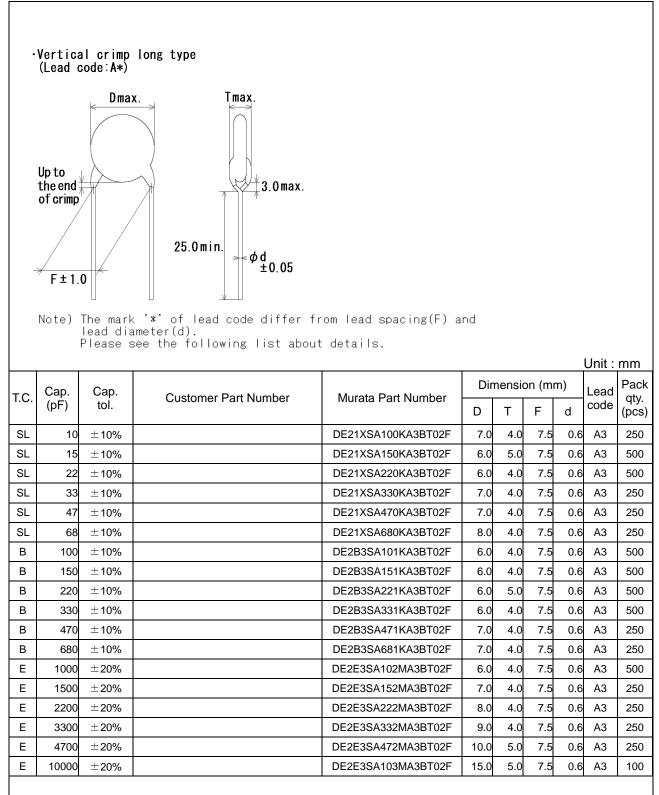
Type name	: SA
<b>51</b>	
Nominal capacitance	: Actual value(under 100pF)
	3 digit system(100pF and over)
Capacitance tolerance	: Code
Class code and Rated voltage mark	: X1 300~
-	Y2 250~
Manufacturing year	: Letter code(The last digit of A.D. year.)
Manufacturing month	: Code
-	$($ Feb./Mar. $\rightarrow 2$ Aug./Sep. $\rightarrow 8$ $)$
	Apr./May. $\rightarrow 4$ Oct./Nov. $\rightarrow 0$
	$ \left( \begin{array}{ccc} \text{Feb./Mar.} \rightarrow 2 & \text{Aug./Sep.} \rightarrow 8 \\ \text{Apr./May.} \rightarrow 4 & \text{Oct./Nov.} \rightarrow 0 \\ \text{Jun./Jul.} \rightarrow 6 & \text{Dec./Jan.} \rightarrow D \end{array} \right) $
Company name code	: CM15 (Made in Thailand)

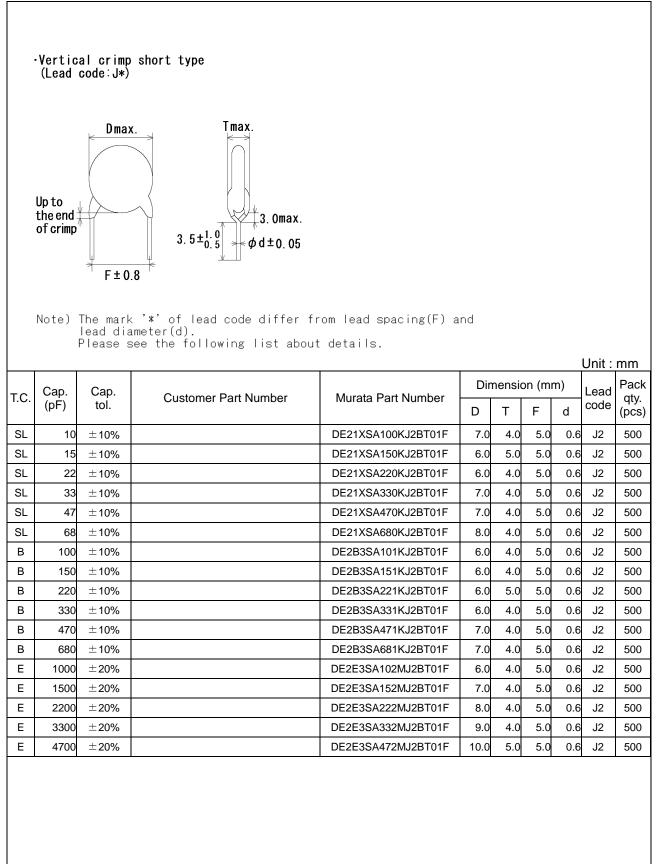
(Example)

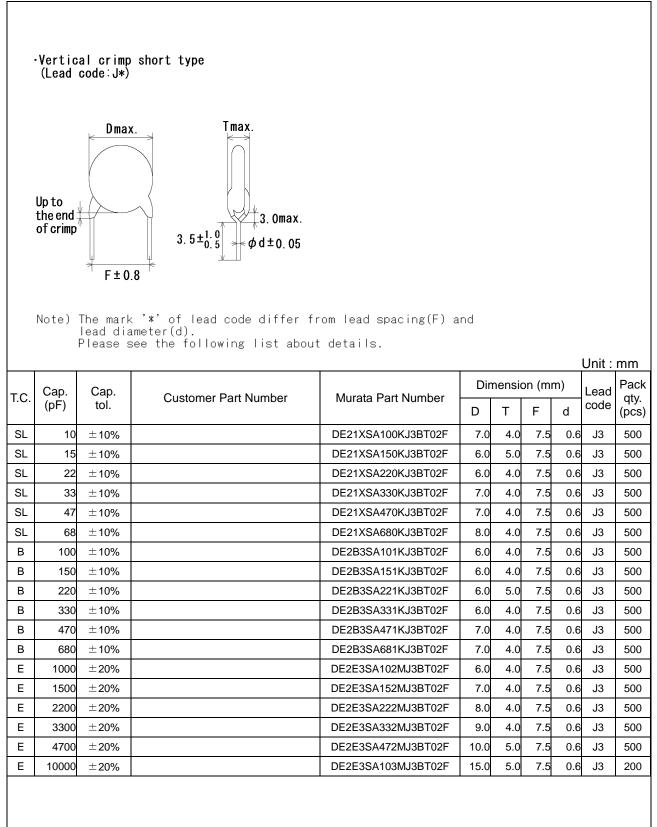


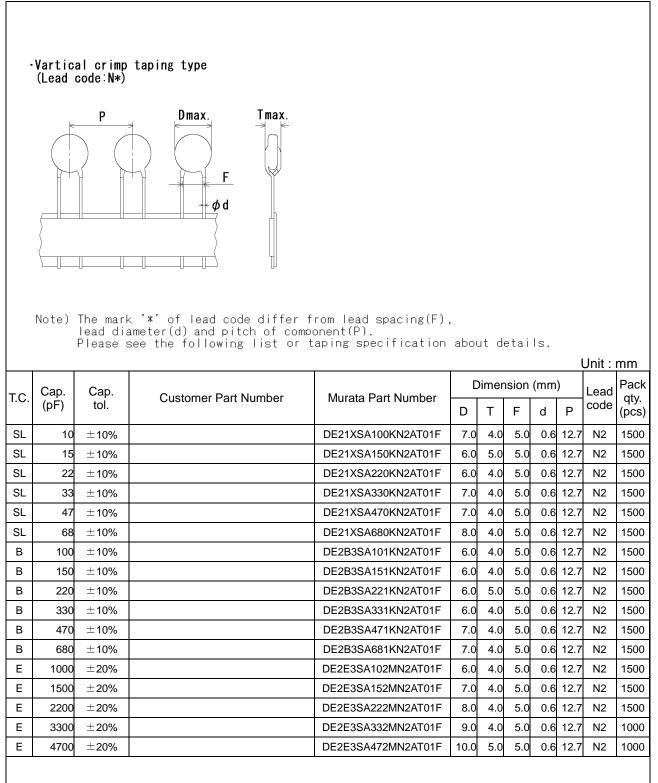
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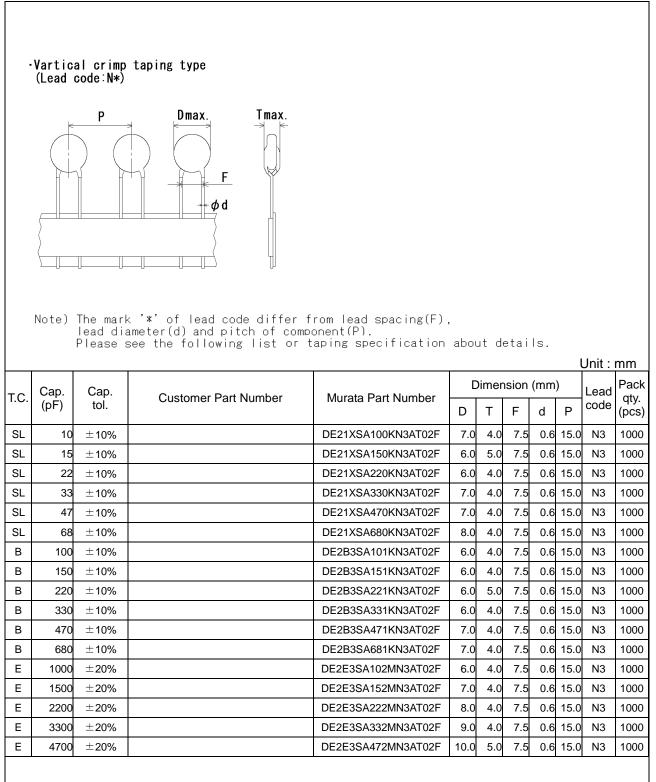
4. Part number list •Vertical crimp long type (Lead code:A*)										
		0 The mark lead dia	Tmax. Tmax. 3.0 max. 25.0 min. $\phi d$ $\pm 0.05$ $\phi d$ $\pm 0.05$ $\phi d$ $\pm 0.05$ $\phi d$ $\pm 0.05$ $\phi d$ $\pm 0.05$ $\phi d$ $\phi d$ $\phi d$ $\pm 0.05$ $\phi d$ $\phi d$		.nd					mm
T.C.	Cap. (pF)	Cap. tol.	Customer Part Number	Murata Part Number	Dimension (mm)			m)		Pack qty.
01		+ 10%						d	A 2	
SL	10	±10%		DE21XSA100KA2BT01F	7.0	4.0	5.0	0.6		500
SL	10 15	±10%		DE21XSA150KA2BT01F	7.0 6.0	4.0 5.0	5.0 5.0	0.6 0.6	A2	500 500
SL SL	10 15 22	±10% ±10%			7.0 6.0 6.0	4.0 5.0 4.0	5.0 5.0 5.0	0.6 0.6 0.6	A2 A2	500 500 500
SL	10 15	±10%		DE21XSA150KA2BT01F DE21XSA220KA2BT01F	7.0 6.0	4.0 5.0	5.0 5.0	0.6 0.6	A2 A2 A2	500 500
SL SL SL	10 15 22 33	±10% ±10% ±10%		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F	7.0 6.0 6.0 7.0	4.0 5.0 4.0 4.0	5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6	A2 A2 A2 A2	500 500 500 500
SL SL SL SL	10 15 22 33 47	±10% ±10% ±10% ±10%		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F	7.0 6.0 6.0 7.0 7.0	4.0 5.0 4.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2	500 500 500 500 500
SL SL SL SL	10 15 22 33 47 68	±10% ±10% ±10% ±10% ±10%		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F	7.0 6.0 6.0 7.0 7.0 8.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2	500 500 500 500 500 250
SL SL SL SL B	10 15 22 33 47 68 100	± 10% ± 10% ± 10% ± 10% ± 10%		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2 A2	500 500 500 500 500 250 500
SL SL SL SL B B	10 15 22 33 47 68 100 150	$\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F DE2B3SA151KA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0 6.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2 A2 A2 A2	500 500 500 500 500 250 500 500
SL SL SL SL B B B	10 15 22 33 47 68 100 150 220	$\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F DE2B3SA151KA2BT01F DE2B3SA221KA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0 6.0 6.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 5.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2	500 500 500 500 500 250 500 500
SL SL SL SL B B B B B	10 15 22 33 47 68 100 150 220 330	$\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F DE2B3SA151KA2BT01F DE2B3SA221KA2BT01F DE2B3SA331KA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0 6.0 6.0 6.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 5.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2	500 500 500 500 250 500 500 500 500
SL SL SL SL B B B B B B B	10 15 22 33 47 68 100 150 220 330 470	$\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$ $\pm 10\%$		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F DE2B3SA151KA2BT01F DE2B3SA221KA2BT01F DE2B3SA331KA2BT01F DE2B3SA471KA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0 6.0 6.0 6.0 7.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 5.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A	500 500 500 500 250 500 500 500 500 500
SL SL SL SL B B B B B B B B	10 15 22 33 47 68 100 150 220 330 470 680	$\pm 10\%$ $\pm 10\%$		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F DE2B3SA151KA2BT01F DE2B3SA221KA2BT01F DE2B3SA331KA2BT01F DE2B3SA471KA2BT01F DE2B3SA681KA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0 6.0 6.0 6.0 7.0 7.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 5.0 4.0 4.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A	500 500 500 500 250 500 500 500 500 500
SL SL SL SL B B B B B B B E	10 15 22 33 47 68 100 150 220 330 470 680 1000	$\pm 10\%$ $\pm 20\%$		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F DE2B3SA151KA2BT01F DE2B3SA221KA2BT01F DE2B3SA331KA2BT01F DE2B3SA471KA2BT01F DE2B3SA681KA2BT01F DE2E3SA102MA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0 6.0 6.0 7.0 7.0 6.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 5.0 4.0 4.0 4.0 4.0 4.0	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2          A2	500 500 500 500 250 500 500 500 500 500
SL SL SL B B B B B B B E E	10 15 22 33 47 68 100 150 220 330 470 680 1000 1500	$\pm 10\%$ $\pm 20\%$		DE21XSA150KA2BT01F DE21XSA220KA2BT01F DE21XSA330KA2BT01F DE21XSA470KA2BT01F DE21XSA680KA2BT01F DE2B3SA101KA2BT01F DE2B3SA151KA2BT01F DE2B3SA221KA2BT01F DE2B3SA331KA2BT01F DE2B3SA471KA2BT01F DE2B3SA681KA2BT01F DE2E3SA102MA2BT01F DE2E3SA152MA2BT01F	7.0 6.0 7.0 7.0 8.0 6.0 6.0 6.0 6.0 7.0 7.0 6.0 7.0	4.0 5.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6	A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A2 A	500 500 500 500 250 500 500 500 500 500

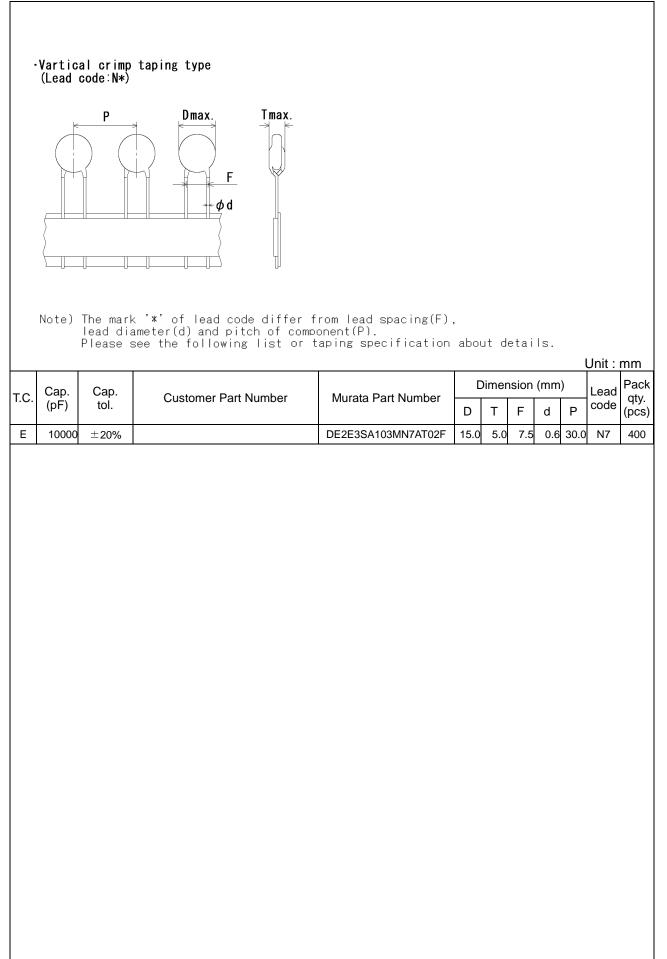










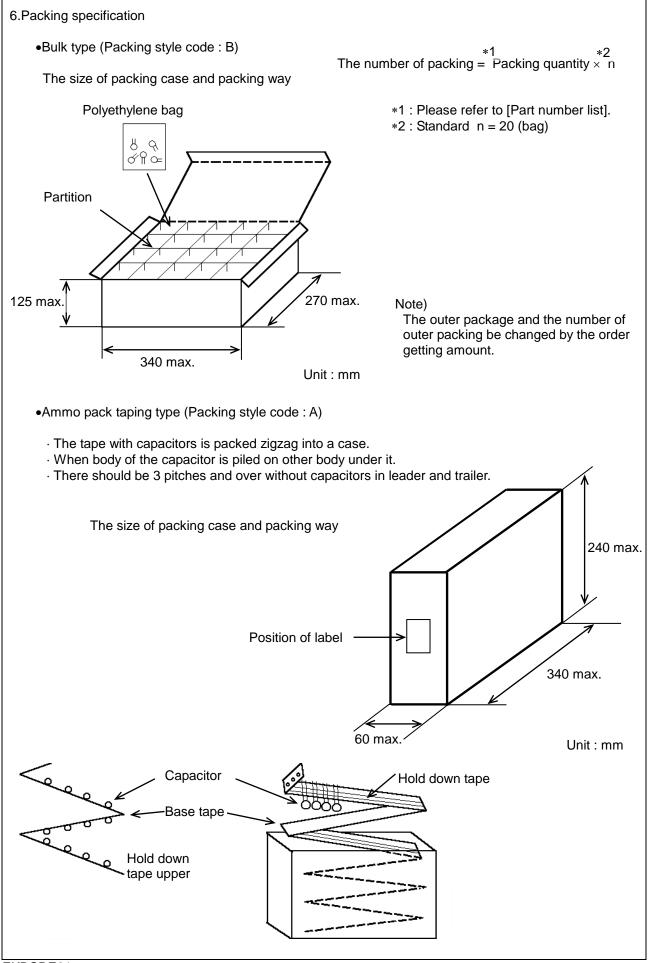


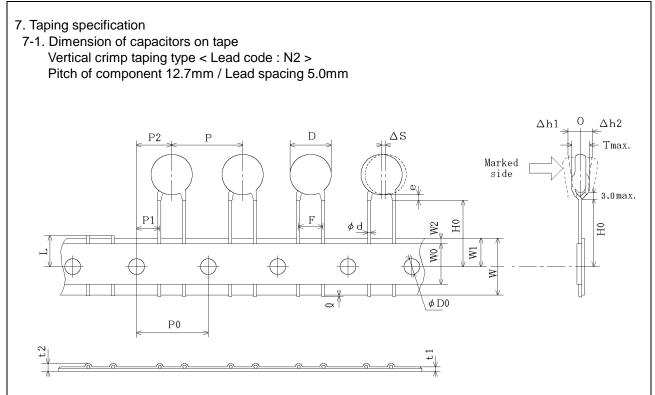
	ecification and test		Cro	cification	1		Tar	at mothod		
No. 1	Item         Specification           Appearance and dimensions         No marked defect on appearance			nce Th	Test method The capacitor should be inspected by naked eyes					
·	FF FERRING GIRL	form and dimensions.		for	The capacitor should be inspected by naked eyes for visible evidence of defect.					
				Part number lis	st]. Dir	mensions sl	nould be i	measured		
2	Marking		To be easily le		Th					
3	Dielectric	Between lead	No failure.	No failure.		The capacitor should be inspected by naked eyes The capacitor should not be damaged when AC2000V(r.m.s.) [in case of individual specificatio				
	strength wires		rength wires			2000v(r.m. 01F] or AC2				
					. IC	ecification:1	02F1 <50	/60Hz> is	applied b	etween
						e lead wires		,	appilea s	
		Body	No failure.			st, the term		ne capacito	or should	be
		insulation				nnected tog		а	V	
						en, a metal closely wra			Ŷ	
						e body of the			etal 🖉 📜	
					to	the distance	e of	foi		3 to 4 m
						out 3 to 4m		<u> </u>		oo Metal
						m each terr en, the cap		uld ha ina		
						ntainer filled				
						ameter. Fina				
					ар	plied for 60	s betwee			
_	Incudation Deal 1		40000140			d metal ball	-		h a	
4	Insulation Resista	nce (I.K.)	10000MΩ min			e insulation h DC500±5				
						e voltage sl				
						ough a resi			capac	
5	Capacitance		Within specifie	d tolerance.		e capacitan			ured at 20	)°C with
_	<b>-</b>					0.1kHz and				
6	Dissipation Factor	r (D.F.)	2.5% max.			e dissipatio				) mor
					at	at 20°C with 1±0.1kHz and AC1±0.2V(r.m.s.) max				.) max
7	Temperature char	acteristic	Char. SL : +350 to -1000 pm/°C		C Th	e capacitan	ce measi	urement sl	nould be r	nade at
				+20 to +85°C )		ch step spe				
			Char. B : Wit	hin ±10 %						
			Char. E : Wit							
			(Temp. range	: -25 to +85°C )						
				Step	1	2	3	4	5	1
				Temp.(°C)	20±2	-25±2	20±2	4 85±2	20±2	-
						-			-	
8	Active flammabilit	у		oth should not be		e capacitor				
			fire.			ast one but i eese-cloth.				
						discharges				
						scharges sh				
					ma	aintained for	2min aft	er the last	discharge	Э.
						S1		1 L2	R	
								$2 \stackrel{-}{\downarrow} \stackrel{-}{c_3} \stackrel{-}{\downarrow} c_3$		
										~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
								- <del>-</del> ī	·  [	
									Oscilos	cope
					C1	.2 · 1.1E	+10% C	3 : 0.033µ		•
						to L4 : 1.5r		•		
					R			: 3μF±5%		
					UA	Ac : UR	±5% U	R : Rated		oltage
					Cx		acitor und			
			1		F Ut		e, Rated 1 age applie			
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							Ux 5kV		time	

			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, apply a tensile weight gradually to each lead wire in the radial direction of
ſ				capacitor up to 10N and keep it for 10±1 s.
		Bending		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
				about 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
ľ				in the opposite direction.
10	Vibration	Appearance	No marked defect.	The capacitor should be firmly soldered to the
ľ	resistance	Capacitance	Within the specified tolerance.	supporting lead wire and vibration which is 10 to
ľ		D.F.	2.5% max.	55Hz in the vibration frequency range,1.5mm in total amplitude, and about 1min in the rate of
ľ				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	ls	Lead wire should be soldered with	The lead wire of a capacitor should be dipped into
			uniformly coated on the axial direction over 3/4 of the	a ethanol solution of 25wt% rosin and then into
l			circumferential direction.	molten solder for $2\pm0.5$ s. In both cases the depth of dipping is up to about 1.5 to 2.0mm from the
				root of lead wires.
ľ				Temp. of solder :
				245±5°C Lead Free Solder (Sn-3Ag-0.5Cu)
12	Soldering effect	Appearance	No marked defect.	Solder temperature: 350±10°C or 260±5°C
	(Non-preheat)	Capacitance change	Within ±10%	Immersion time : $3.5\pm0.5$ s
ľ		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		
ľ				Thermal Capacitor
ľ				1.5
				□ = = = 1 = 1 + to 2.0mm
ľ				Solder
				Pre-treatment : Capacitor should be stored at
				125±2°C for 1 h, and apply the AC2000V(r.m.s.) 60s then placed
ľ				at $^{1}$ room condition for 24±2 h
				before initial measurements.
				(Do not apply to Char. SL)
				Post-treatment : Capacitor should be stored for 1
13	Soldering effect	Appearance	No marked defect.	to 2 h at *1room condition. First the capacitor should be stored at 120+0/-5°C
.0	(On-preheat)	Capacitance	Within ±10%	for 60+0/-5 s.
I	- /	change		Then, as in figure, the lead wires should be
		I.R.	1000MΩ min.	immersed solder of $260+0/-5^{\circ}$ C up to 1.5 to 2.0mm
		Dielectric	Per item 3	from the root of terminal for 7.5+0/-1 s.
		strength		Thermal Capacitor
				insulating
				1.5
ľ				
ľ				solder
				Pre-treatment : Capacitor should be stored at
				125±2°C for 1 h, and apply the
				AC2000V(r.m.s.) 60s then placed
				at *1room condition for 24±2 h before initial measurements.
				(Do not apply to Char. SL)
				Post-treatment : Capacitor should be stored for 1 to
	<u> </u>			2 h at *1room condition.
* <sup>1</sup> "ro	om condition" Tempe	erature: 15 to 35°	C, Relative humidity: 45 to 75%, Atmo	ospheric pressure: 86 to 106kPa

			Reference only	
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	Capacitor
			1 to 4 30 s max.	13 Flame
			5 60 s max.	
			5 00 3 max.	is the second se
				Gas Burner
15	Passive flammabilit	y	The burning time should not be	The capacitor under test should be held in the flame
			exceeded the time 30 s. The tissue paper should not ignite.	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. $0.5\pm0.11111$
				Gas : Butane gas Purity 95% min.
				About 8mm
				Gas burner -> Flame
				200±5mm
				Tissue
				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	Capacitance	Char. SL : Within ±5%	95% relative humidity.
	state)	change	Char. B : Within ±10%	Dro trootmont , Consultant should be stored at
			Char. E : Within ±15%	Pre-treatment : Capacitor should be stored at 125±2°C for 1 h, and apply the
		D.F.	Char. SL : 2.5% max. Char. B, E : 5.0% max.	AC2000V(r.m.s.) 60s then placed
		I.R.	3000MΩ min.	at *1room condition for 24±2 h
		Dielectric	Per item 3	before initial measurements.
		strength		(Do not apply to Char. SL)
				Post-treatment :Capacitor should be stored for 1 to 2 h at *1 room condition.
17	Humidity loading	Appearance	No marked defect.	Apply AC300V(r.m.s.) for 500±12 h at 40±2°C in
		Capacitance	Char. SL : Within ±5%	90 to 95% relative humidity.
		change	Char. B : Within ±10%	Pro trootmont . Consolitor should be stared at
		D.F.	Char. E : Within ±15%	Pre-treatment : Capacitor should be stored at 125±2°C for 1 h, and apply the
		D.F.	Char. SL : 2.5% max. Char. B, E : 5.0% max.	AC2000V(r.m.s.) 60s then placed
		I.R.	3000MΩ min.	at *1room condition for 24±2 h
		Dielectric	Per item 3	before initial measurements.
		strength		(Do not apply to Char. SL) Post-treatment :Capacitor should be stored for 1
				to $2 \text{ h at }^{-1}$ room condition.
*1 "ro	om condition" Tempe	rature: 15 to 35°	C, Relative humidity: 45 to 75%, Atmo	
	402E			

Iten	Appearance Capacitance change I.R. Dielectric strength	Specification         No marked defect.         Within ±20%         3000MΩ min.         Per item 3	Test method         Impulse voltage         Each individual capacitor should be subjected to a 5kV impulses for three times. Then the capaciting are applied to life test.         Front time (T1) = 1.7 $\mu$ s=1.67T         Time to half-value (T2) = 50 $\mu$ s
	Capacitance change I.R. Dielectric	Within ±20% 3000MΩ min.	Each individual capacitor should be subjected to a 5kV impulses for three times. Then the capacit are applied to life test. $100 \frac{(\%)}{50}$ Front time (T1) = 1.7 $\mu$ s=1.67T Time to half-value (T2) = 50 $\mu$ s
	change I.R. Dielectric	3000MΩ min.	a 5kV impulses for three times. Then the capacit are applied to life test. Front time (T1) = $1.7 \mu$ s= $1.67$ T Time to half-value (T2) = $50 \mu$ s
	I.R. Dielectric		Front time (T1) = $1.7 \mu$ s= $1.67$ T 50 50 30 30 50 50 50 50 50 50 50 50 50 5
			50 30-
	strength		50 30-
			30
			TT
			T2
			The capacitors are placed in a circulating air over
			for a period of 1000 h. The air in the oven is maintained at a temperatu
			of 125+2/-0 °C, and relative humidity of 50% ma
			Throughout the test, the capacitors are subjecte
			to a AC425V(r.m.s.)<50/60Hz> alternating voltage
			of mains frequency, except that once each hour
			voltage is increased to AC1000V(r.m.s.) for 0.1 s
			Pre-treatment : Capacitor should be stored at
			125±2°C for 1 h, and apply the AC2000V(r.m.s.) 60s then plac
			at *1room condition for 24±2 h
			before initial measurements.
			(Do not apply to Char. SL)
			Post-treatment :Capacitor should be stored for
			24±2 h at *1room condition.
perature and	Appearance	No marked defect.	The capacitor should be subjected to 5 temperat
ersion cycle	Capacitance	Char. SL : Within ±5%	cycles, then consecutively to 2 immersion cycles
	change	Char. B : Within ±10%	<temperature cycle=""></temperature>
	D.F.	Char. E : Within ±20% Char. SL : 2.5% max.	
	D.F.	Char. B, E : 5.0% max.	Step Temperature(°C) Time
	I.R.	3000MΩ min.	<u>1</u> -40+0/-3 30 min 2 Room temp. 3 min
	Dielectric	Per item 3	2 Room temp. 3 min 3 +125+3/-0 30 min
	strength		4 Room temp. 3 min
	en en gui		Cycle time:5 cycles
			<pre></pre>
			Step Temperature(°C) Time water
			Clean
			1 +65+5/-0 15 min water
			2 0±3 15 min Salt
			water
			Cycle time:2 cycles
			Pre-treatment : Capacitor should be stored at
			125±2°C for 1 h, and apply the
			AC2000V(r.m.s.) 60s then plac
			at *1room condition for 24±2 h
			before initial measurements.
			(Do not apply to Char. SL)
			Post-treatment : Capacitor should be stored for
			24±2 h at *1room condition.

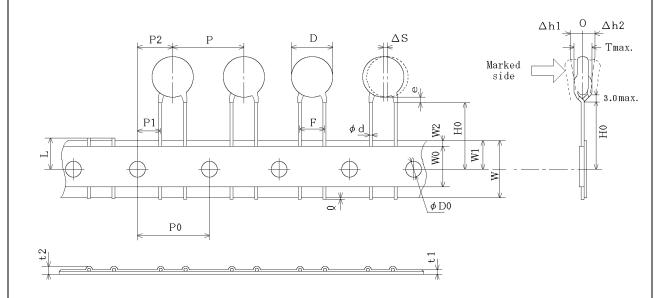




Unit : mm

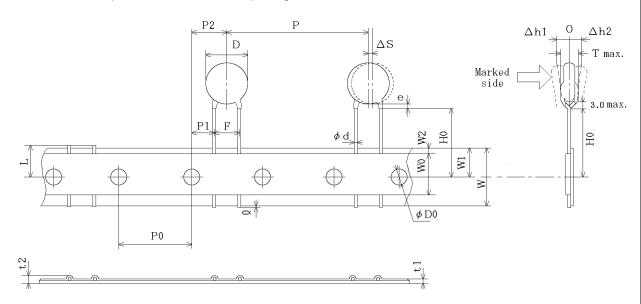
Item	Code	Dimensions	Remarks
Pitch of component		12.7±1.0	
Pitch of sprocket hole		12.7±0.3	
Lead spacing		0.8 5.0±0.2	
Length from hole center to component center	P2	6.35±1.3	Deviation of progress direction
Length from hole center to lead	P1	3.85±0.7	
Body diameter		Please refer to [Part number list ].	
Deviation along tape, left or right	ΔS	0±1.0	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	HO	18.0± <sup>2.0</sup> <sub>0</sub>	
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	1.0 max.	
Deviation across tape, rear	∆h2		
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 ].	

Vertical crimp taping type < Lead code : N3 > Pitch of component 15.0mm / Lead spacing 7.5mm



			Unit : mm
Item	Code	Dimensions	Remarks
Pitch of component	Р	15.0±2.0	
Pitch of sprocket hole	P0	15.0±0.3	
Lead spacing	F	7.5±1.0	
Length from hole center to component center	P2	7.5±1.5	
Length from hole center to lead	P1	3.75±1.0	Deviation of progress direction
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	H0	18.0± <sup>2.0</sup> <sub>0</sub>	
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		
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	WO	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 ].

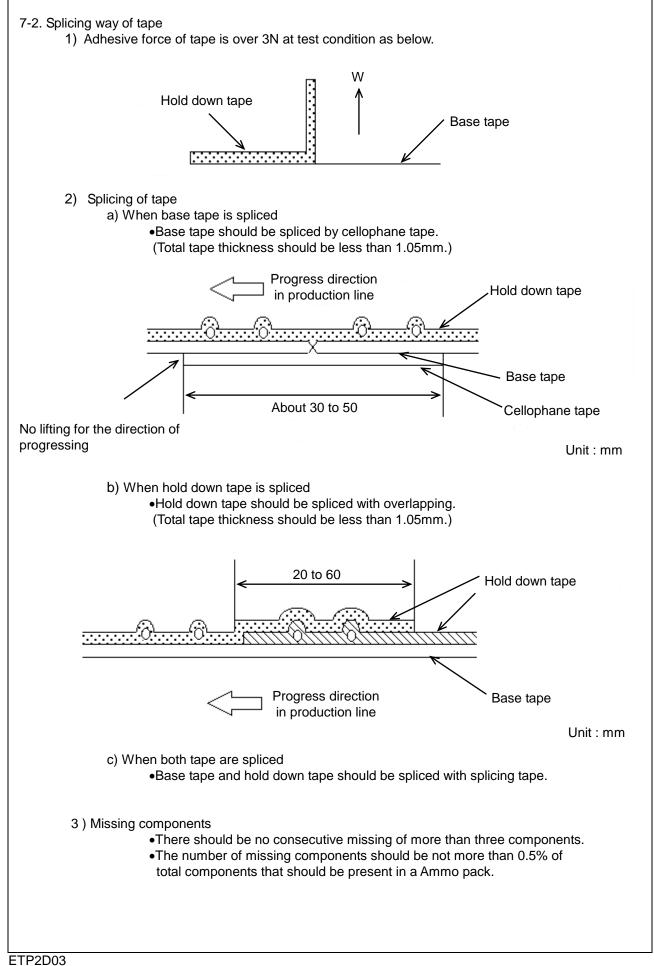
Vertical crimp taping type < Lead code : N7 > Pitch of component 30.0mm /Lead spacing 7.5mm



Unit : mm

Item	Code	Dimensions	Remarks
Pitch of component		30.0±2.0	
Pitch of sprocket hole		15.0±0.3	
Lead spacing		7.5±1.0	
Length from hole center to component center		7.5±1.5	Deviation of progress direction
Length from hole center to lead		3.75±1.0	
Body diameter		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	HO	$18.0\pm_{0}^{2.0}$	
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 thicknes
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± <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 ].

ETP1N70101A



### 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

## **Mouser Electronics**

Authorized Distributor

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DE2B3SA331KJ3BT02F DE2E3SA102MJ3BT02F DE21XSA100KJ3BT02F DE2E3SA152MJ3BT02F
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