Messrs: Ropla

Issued date : 2017.06.28

SPECIFICATION

Part Description : Type DS (Safety standard Recognized Ceramic Capacitor)

Customer Part No	DONG IL Part No
-	DS Series

DONG IL			CUSTOMER		
WRITTEN by	CHECKED by	APPROVED by	WRITTEN by	CHECKED by	APPROVED by
W.C.JUNG		Y.H.LIM			
06/28		06/28	/	/	/

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▣ Record of Revision

Date	Rev.No	Description	Issued by	Checked by	Remark
2011.02.03	rev.01	Production specification review	J.HUHM	B.S MIN	
2011.07.14	rev.02	Production specification review Lead Type C04(3.2mm) → C03(2.8mm)	S.H PARK	H.S CHI	
2012. 04.03	rev.03	specification review - Cover → HF - Contents → 1page - Standard Marking format → 7page - Capacitor structure & Material → 13page - Packing specification → 14page	W.C Jung	J.H.Park	
2012.09.10	Rev.04	Production specification review [Type Designation (part Number)] rev.	W.C.JUNG	Y.H.LIM	

1. SCOPE

This specification relates high dielectric disc type fixed AC (Alternating Current) ceramic capacitor, intended for use in equipment for telecommunication and electronic devices.

1-1. Features

1. We design capacitors in much more compact size than current Type DA, having reduced the diameter by 20% max.
2. Operating temperature range guaranteed up to -45℃ ~ 125 ℃
3. Dielectric strength : AC2600V
4. Class X1,Y2 capacitors which are recognized by UL, CSA, KC, CQC, ENEC.
   * ENEC mark has replaced all the following European National marks (FIMKO, DEMKO, NEMKO, SEMKO, SEV, VDE)
5. Possible to use with a component in appliance requiring reinforced insulation and double insulation, based on UL 1492, IEC 60065 and IEC 60950.
6. Coated with flame-retardant epoxy resin. (conforming to UL94V-0 standard)

1-2. Applications and Standard Recognition

1. Ideal for use as X, Y capacitors for AC line filter and primary-secondary coupling on switching power supplies and AC adaptes.
2. This specification is applied to following safety standard reconized ceramic capacitor.

Safety standard and recognized number

Safety standard	Standard number	Recognized No.	R.V (ac)	Temp. Char
UL	UL 60384-14	FOWX2.E128646	250V	SL. B. E. F
CSA	CSA E60384-1:03 CSA E60384-14	FOWX8.E128646	250V	SL. B. E. F
ENEC	IEC60384-14:2013	ENEC/FI 2016054	250V	SL. B. E. F
KC	K60384-14	SJ03001-2002A	250V	SL. B. E. F
CQC	CNCA-V01-010:2003	CQC14001110432	250V	SL. B. E. F

2. Type Designation (Part Number)

DS	2E	YE	103	M	B	K	4	L2
2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9

2-1. Type

Type	AC Testing Voltage
DS	AC 2600V

2-2. Rating Voltage

250V AC

2-3. Capacitance temperature characteristic

T.C	Temp. Range	Change Rate
SL	-25 ~ +85℃	- 1000 ~ + 350ppm / ℃
B	-25 ~ +85℃	+10 ~ -10%
E	-25 ~ +85℃	+22 ~ -56%
F	-25 ~ +85℃	+30 ~ -80%

Characteristic specification : -25 ℃ ~ + 85℃

Operating Temperature Range : -45℃ ~ +125℃.

2-4. Nominal Capacitance

The nominal capacitance value in pF is expressed by three digit number.

The first two digits denote significant figure ; the last digit denotes the mulitiplier of 10 in pF of zero to follow. Ex) In case of 103 : 10 x 10^3= 10000pF

2-5. Capacitance Tolerance

D : ±0.5pF	J : ±5%	K : ±10%	M : ±20%	Z : +80~-20%

2-6. Packing Style

B	Bulk Type
T	Taping Type "Flat Pack"

2-7. Lead Variation

V	V (Vertical-climp)
K	Out-Kink Type
S	Straight Type

2-8. Lead Cutting Length

Lead Type	Code	Length (L)
straight out kink vertical	0	Taping
	2	2.1 ± 0.2
	3	2.8 ± 0.3
	4	3.2 ± 0.3
	5	5.0 ± 0.3
	7	6.3 ± 0.5
	X	10.0 ± 0.3
	L	Long

* Straight Long Type : 20 ± 1.0

2-9. Lead Pitch-Spacing(F)

L1	12.7 - F5.0
L2	15.0 - F7.5
L3	15.0 - F10
L4	25.4 - F7.5
L5	25.4 - F10
L6	25.4 - F12.5

3. Part Numbering

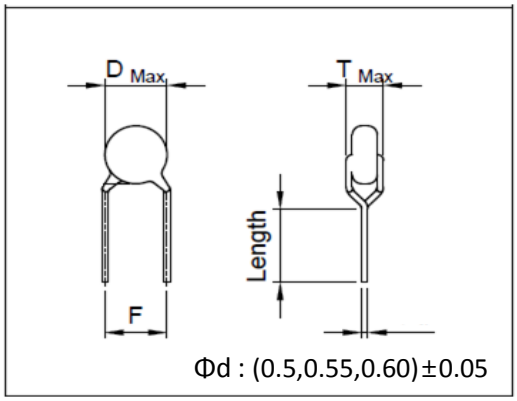
Part Number	Temp Char	Capacitance (pF)	Tolerance (%)	Dimensions(mm)		
				D (max)	T (max)	Lead Spacing(F)
DS2EYE102M****	E	1000	±20	7.0	6.0	7.5±1
DS2EYE222M****	E	2200	±20	9.0	6.0	7.5±1
DS2EYE472M****	E	4700	±20	13.0	6.0	7.5±1
DS2EYF222M****	F	2200	±20	8.0	6.0	7.5±1
DS2EYF332M****	F	3300	±20	9.0	6.0	7.5±1
DS2EYF472M****	F	4700	±20	10.0	6.0	7.5±1 or 10.0±1
DS2EYF103M****	F	10000	±20	14.0	6.0	7.5±1 or 10.0±1

* DONG IL part number might have additional code digits due to lead type and speicial settings

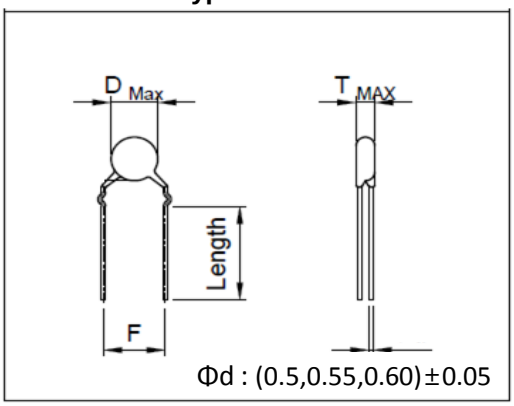
4. Capacitors Type

4-1. Bulk Type Capacitors

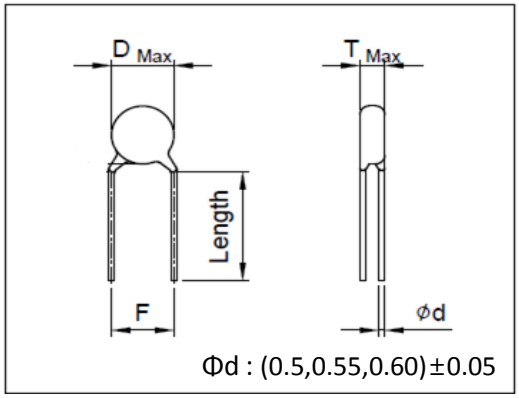
Straight Type



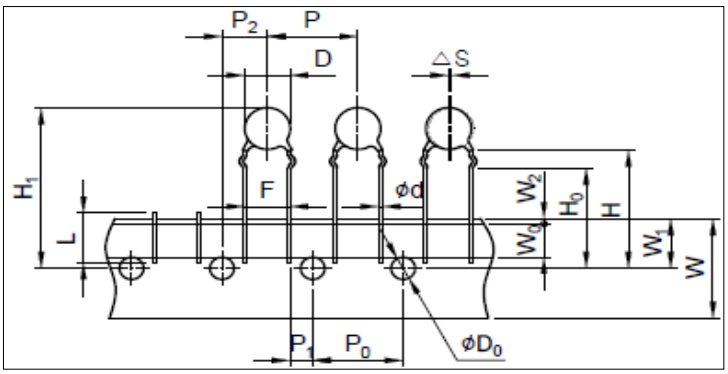
Out Kink Type

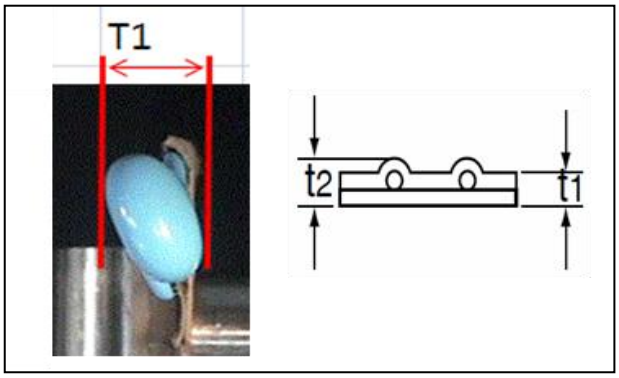


Vertical Type



4-2. Taping Type Capacitors



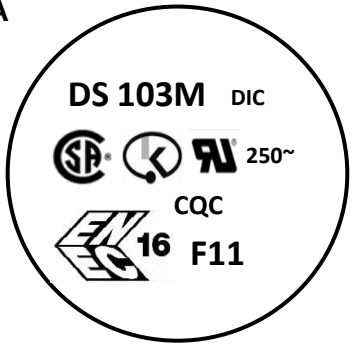


ITEM	CODE	Dimensions(mm)
Body Diameter	D	Max 7.0 ~14.0
Body Thickness	T	Max 6.0
	T1	Max 6.5
Lead Diameter	ød	(0.5,0.55,0.60)±0.05
Pitch of Sprocket Hole	P0	15.0±1.0
Pitch of Component	P	15.0±1.0
Lead length from Hole Center to Lead	P1	3.75±1.0
Lead length from Hole Center to component Center	P2	7.50±1.5
Lead Spacing(Center to center of Lead)	F	7.50±1.0
Deviation along Tape, Left, or Right	△S	0±2.0
Deviation across Tape	△h	0±2.0
Carrier tape width	W	18.0 ＋0.8 －0.2
Hold down tape Width	W0	7.0 Min
Position of Sproket hole	W1	9.0±0.5
Hold Down Tape Position	W2	3.0 Max
Height of Component From Hole Center	H	20.0±1.0
Lead-Wire Clinch Height	H0	16.0±0.5
Cpmponent Height	H1	32.25 Max
Portion to Cut in case of Defect	L	11.0 Max
Lead Protrusion	Lx	1.0 Max
Diameter of Sprocket Hole	øD0	4.0±0.2
Total Tape Thickness	t1	0.7±0.2
Total Thickness, Tape and Lead Wire	t2	1.5 Max

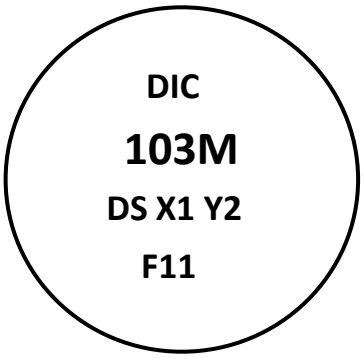
※ Taping pattern in the Package is all "FLAT PACK".

5. Standard Marking Format

A



B



* Safety certifications can be printed on either the capacitor body or packing label.
Marking format type A or type B can be used.

Marking Form

Type Designation : **DS**	Sub-Class	: **X1, Y2**
Nominal Capacitance : 103	Rating Voltage	: **X1 400~ , Y2 250~**
Capacitance Tolerance : **M**	A Type	Production Date : F11 (2017.01.01)
Company Name : **DIC**	B Type	Production Date : F11 (2017.01.01) Production Equipment Unit : 1 Production sequence : 1
Approved Monogram	ENEC CQC UL KC	

Production Date Table

Year		Month				Date											
Year	Code	Month	Code	Month	Code	Date	Code	Date	Code	Date	Code	Date	Code	Date	Code	Date	Code
2015	**D**	1	**1**	7	**7**	1	**1**	7	**7**	13	**D**	19	**J**	25	**P**	31	**V**
2016	**E**	2	**2**	8	**8**	2	**2**	8	**8**	14	**E**	20	**K**	26	**Q**		
2017	**F**	3	**3**	9	**9**	3	**3**	9	**9**	15	**F**	21	**L**	27	**R**		
2018	**G**	4	**4**	10	**O**	4	**4**	10	**A**	16	**G**	22	**M**	28	**S**		
2019	**H**	5	**5**	11	**N**	5	**5**	11	**B**	17	**H**	23	**N**	29	**T**		
2020	**I**	6	**6**	12	**D**	6	**6**	12	**C**	18	**I**	24	**O**	30	**U**		

6. Specification and Reliability test method

6-1. Capacitance

Capacitance shall be within the specified tolerance when measured at 20±2℃, 1±0.1KHz, at 1Vrms (SL : 1±0.1MHz)

6-2. Dissipation Factor (tanδ or Q)

Measured at 1±0.1KHz, 1Vrms and 20±2℃ (SL : 1±0.1MHz)

Char.	Quality or Dissipation Factor (Tanδ)
SL	Q ≥ 400+(20xC*) (C < 30pF)
	Q ≥ 1000 (C ≥ 30pF)
B,E	Tanδ 2.5% max

C* : Capacitance (pF)

6-3. Insulation Resistance

Insulation Resistance shall exceed 10,000MΩ when measured after 1 minute ±10% charge with 500V DC

6-4. Withstanding Voltage (Between terminals)

DS : 2,600V AC for 60sec ±10% frequency 60Hz.
(Charge & Discharge current : 50mA Max)

6-5. Withstanding Voltage (Between terminal and body)

Capacitors shall not be damaged when Rated Voltage as below condition applied both connected leads and body. DS : 2,600V AC for 60sec ±10% frequency 60Hz.

6-6. Temperature Characteristics

Capacitance measurement should be made with the following 5 consecutive steps.

Steps	1	2	3	4	5
Temperature	+20℃	-25℃	+20℃	+85℃	+20℃
Temperature	+20℃	-25℃	+20℃	+105℃	+20℃

Capacitance change rate during 5 steps is calculated and standardized with the C value of the 3rd

T.C	Temp. Range	Change Rate
SL	-25 ~ +85℃	- 1000 ~ + 350ppm / ℃
B	-25 ~ +85℃	+10 ~ -10%
	-25 ~ +105℃	+10 ~ -15%
E	-25 ~ +85℃	+22 ~ -56%
F	-25 ~ +85℃	+30 ~ -80%

6-7. Reliability Test

6-7-1. Humidity Resistance Test

Capacitor shall be subjected to 70±5℃ temperature, 90 to 95% relative humidity for 500±12hrs. After placing in room condition for 1 to 2 hr, the following measurement satisfies table I.

Table I.

Appearance	No remarkable damage	
	Hi-k	T.C
Cap. Changes	B: ±10% Max	SL: ±5.0% Max
	E: ±20% Max	
	F: ±30% Max	
D.F (tanδ)	B: ±5% Max	Q ≥ 275+5/2C*) (C < 30pF)
	E: ±5% Max	Q ≥ 350 (C ≥ 30pF)
	F: ±7.5% Max	
Insulation Resistance	3000 MΩ Min	

C* : Capacitance (pF)

6-7-2. Humidity Resistance Load Test

Temperature : 70±5℃ , Humidity : 90 ~ 95%
Applied Voltage : Rating Voltage
Testing time : 500±12 hr
Rated value is the same table I

6-7-3. High Temperature Load Test

Capacitors are to placed in a circulating air oven for 1000±48.-0 hrs the air oven be maintained at a is be maintained at a temperature of 85±3℃ throughout the test, each capacitor is to be to a 800Vrms alternating potential having a frequency of 50-60Hz, except that once each hour the potential is to be increased to 1600rms for 1/10 sec. After this test, capacitors shall satisfy Table I.

6-7-4. Thermal Shock Test

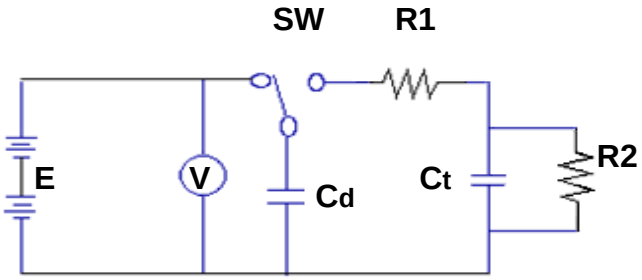
-45℃(30min)~+125℃(30min), It is 100 Cycle operation to → one Cycle (One hour)
measure it after 12 to 24 hour, the following measurement satisfies table I.

6-7-5. Discharge Test I (Impulse test)

Table II.

Insulation Resistance	1000MΩ Min
Withstand Voltage between terminals and envelope	No failure

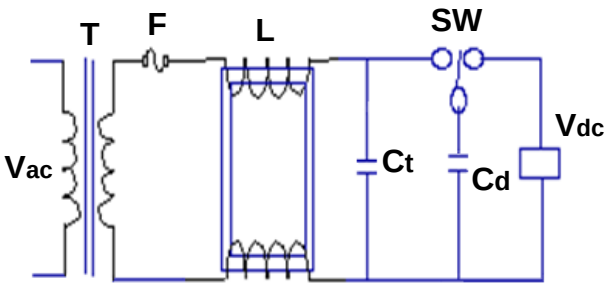
Capacitor shall withstand 15 times of discharges from a dump capacitor with an interval of 5 sec between successive discharges. After this test, capacitor shall satisfy table II



SW : Switch R1: 1kΩ
V : DC Voltmeter R2: 1000MΩ(UL,CSA)
Ct: Test sample 4MΩ(VDE)
E : 10kv DC

6-7-6. Discharge Test II (Impulse test)

Capacitor shall withstand, without causing a hazard, four discharges from a dump capacitor charged to a voltage value that when discharged places a potential of Vdc across the capacitor under test, with an interval of 5 sec between successive discharges.



Vac : 120V, 60Hz
T : Option isolation transformer of pulse blocking
F : Plug fuse 30A power supply
L : 3mH, 0.03 ohm choke coil
Ct : Test specimen
Cd : Dump Capacitor

Ct Capacitance	Cd Capacitance	Capacitance (%)
0 to 0.005㎌	0.005㎌	0.5 Within
0.005 to 0.05㎌	0.05㎌	0.5 Within

Vdc: Variable DC power supply

Vdc = 5000 (Cd + Ct) / Cd (VDC)

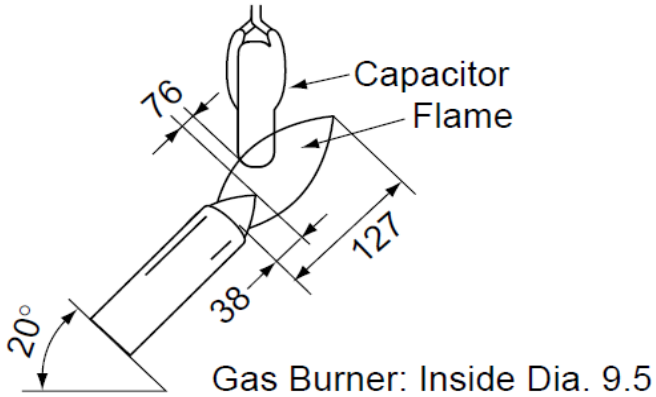
6-7-7. Flaming Test

The flame shall applied for 15 sec, and than removed for 15 sec until 5 such have been made.

applications The material to fourth cycle more than 1 minute in last cycle.

Cycle	Time (sec)
1 to 4	30 max
5	60 max

Dimensions(mm)



6-8 Mechanical Test

6-8-1. Terminal Strength (Tensile)

Capacitors shall not be damaged, when tested as follows :

Lead Diameter	Load
0.50 ~ 0.65mm	1.0kg

- The load in table shall be applied gradually to the terminal in its draw-out direction and held thus for 1 to 5 sec.

6-8-2. Terminal Strength (Bending)

Capacitors shall not be damaged or broken, when tested as follows :

Lead Diameter	Load
0.50 ~ 0.65mm	0.5kg

- The Capacitor shall be held so that draw-out axis of the lead is kept vertical and load in left table shall be bent 90°and returned its original position in 5 sec.
- Then the body shall be bent 90°To opposite direction and returned to its original position in the same speed.

6-8-3. Solderability of Leads

The lead wire shall be soldered with uniformly coated on the axial direction over 75% of the circumferential direction

- Flux : Solution of rosin in 25%
- Solder : Sn 97.5%
- Solder temp : 260±5℃
- Immersion time : 2±0.5sec.
- Immersion depth : up to 3~4mm

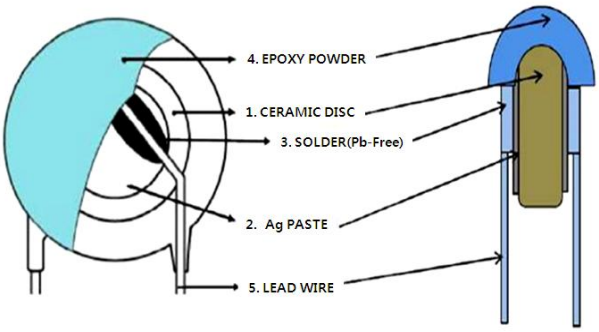
6-8-4. Resistance of Soldering Heat

- Solder temp. : 270±5℃
- Immersion time : 5±0.5sec

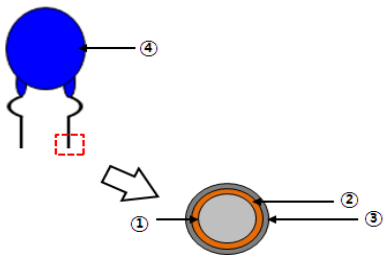
Appearance		No visible damage
Capacitance Change	SL	± 5% max
	B	± 10% max
	E,F	± 20% max
Dielectric Strength		No. Failure

7. Capacitor structure & Material

7-1. Capacitor structure



7-2. Lead wire



No.	Material
①	Steel-wire (Fe)
②	Copper (Cu)
③	TIN (Sn)
④	Epoxy Resin

7-3 Material Vender Imformation

NO	Material Name	Vender Name	Location	Substance
1	Dieletric Powder	CPT, and etc..	Korea	BaTiO3, TiO2
2	Ag Paste	Daejoo and etc..	Korea	Ag, resin and etc.
3	Solder(Lead Free)	DONG IL	Korea	Sn, Ag, Cu
4	Epoxy Resin	Pelnox and etc..	Japan	Silica, Bisphenol A, etc.
5	Lead Wire	Kistron and etc..	Korea	Cu-plated Steel-Wire

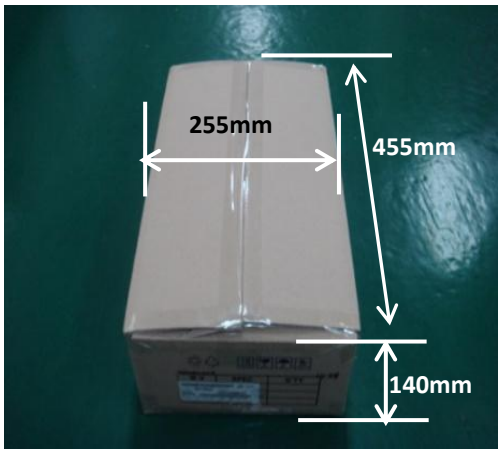
8. Packing Specification

8-1. Bulk Type

Type	Diameter /mm	Straight Long type		Forming Cutting type	
		Vinyl	In box	Vinyl	In box
DS	6.0 >	1,000	5,000	1,000	10,000
	6.0 ~ 6.9	1,000	5,000	1,000	6,000
	7.0 ~ 8.9	500	4,000	1,000	6,000
	9.0 ~ 10	500	2,000	500	4,000
	12 ~14	500	2,000	500	2,000

8-1-1. In-Box Shape & Size

8-1-2. Out-Box Shape & Size



8-1-3. Out-Box Mark

<RoHS, Lead Free>

<Loading Capacity, Handle with Care Mark>

8-2. Taping Type

IN-BOX Q'TY		OUT-BOX Q'TY	
DA, DS Type (15Pitch)	1,000 pcs	DA, DS Type (15Pitch)	6,000 pcs
DA, DS Type (30Pitch)	500 pcs	DA, DS Type (30Pitch)	3,000 pcs

8-2-1. In-Box Shape & Size

8-2-2. Out-Box Shape & Size

8-2-3. Out-Box Mark

<RoHS, Lead Free>

<Loading Capacity, Handle with Care Mark>

8-3. Packing label

Label sample	NO	Explanation
	①	Customer Part No.
	②	Product Name
	③	Safety Certifications
	④	Q'ty
	⑤	Label Printer Number
	⑥	Production Date
	⑦	Lead-Free, RoHS

9. Causion for Certified Ceramic Capacitors

FAILURE TO FOLLOW CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

9-1. Storage and Operating Condition

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. Also, 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 degrees centigrade and 15 to 85%.
Use capacitors within 6 months after delivery. Check the solderability after 6 months or more.

9-2. Soldering and Mounting

1. Vibration and Impact

Do not expose a capacitor or its lead wires to excessive shock or vibration during use. Excessive shock or vibration may cause fatigue destruction of lead wires mounted on the circuit board.
Please take measures to hold a capacitor on the circuit boards by adhesive, molding resin or another coating.
Please confirm there is no influence of holding measures on the product with the intended equipment.

2. Soldering

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specifications 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.
Soldering the capacitor with a soldering iron should be performed in the following conditions.

*Temperature of iron-tip: 400 degrees C. max.
* Soldering iron wattage: 50W max.
* Soldering time: 3.5 sec. max.

9-2. Soldering and Mounting (Coun')

3. Bonding, Resin Molding and Coating

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

When 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 outer coating resin cracking and/or ceramic element cracking of a capacitor in a temperature cycling.

4. Treatment after Bonding, Resin Molding and Coating

When the outer coating is hot (over 100 degrees C.) after soldering, it becomes soft and fragile. Therefore, please be careful not to give it mechanical stress.

9-3. Handling

Vibration and Impact

Do not expose a capacitor or its lead wires to excessive shock or vibration during use. Excessive shock or vibration may cause fatigue destruction of lead wires mounted on the circuit board.

Please take measures to hold a capacitor on the circuit boards by adhesive, molding resin or another coating.

Please confirm there is no influence of holding measures on the product with the intended equipment.