Safety Recognized / High Voltage Ceramic Capacitors

DEC Series (Class 1, 2/DC6.3kV)

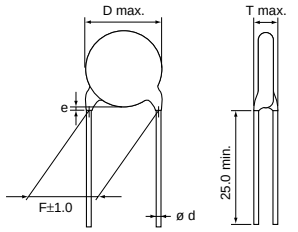
■ Features

1. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
2. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

1. Ideal for use as the ballast in back lighting inverters for liquid crystal displays (SL Char.).
2. Ideal for use on high voltage circuits such as Cockcroft circuits (B Char.).

[Bulk]
Straight Long (C4)



(in mm)

Lead Code	Coating Extension e	ø d
C4	3.0 max.	0.6±0.05

■ Marking

Temp. Char. / Nominal Body Diameter	SL	B	E
ø7mm	5D 6KV	———	———
ø8-9mm	47J 6KV 66	331K 6KV 66	———
ø10-15mm	151J 6KV Ⓜ66	B 102K 6KV Ⓜ66	222Z 6KV Ⓜ66
Temperature Characteristics	Marked with code for char. B (omitted for nominal body diameter ø9mm and under)		
Nominal Capacitance	Under 100pF: Actual value, 100pF and over: Marked with 3 figures		
Capacitance Tolerance	Marked with code		
Rated Voltage	Marked with code (In case of DC6.3kV, marked with 6KV)		
Manufacturer's Identification	Marked with Ⓜ (omitted for nominal body diameter ø9mm and under)		
Manufactured Date Code	Abbreviation (omitted for nominal body diameter ø7mm)		

SL Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)
DEC1X3J050DC4BMS1	6300	5 ±0.5pF	7	10.0	7.0
DEC1X3J100JC4BMS1	6300	10 ±5%	7	10.0	7.0
DEC1X3J120JC4B	6300	12 ±5%	8	10.0	7.0
DEC1X3J150JC4B	6300	15 ±5%	8	10.0	7.0
DEC1X3J180JC4B	6300	18 ±5%	9	10.0	7.0
DEC1X3J220JC4B	6300	22 ±5%	9	10.0	7.0
DEC1X3J270JC4B	6300	27 ±5%	9	10.0	7.0
DEC1X3J330JC4B	6300	33 ±5%	9	10.0	7.0
DEC1X3J390JC4B	6300	39 ±5%	9	10.0	7.0
DEC1X3J470JC4B	6300	47 ±5%	9	10.0	7.0
DEC1X3J560JC4B	6300	56 ±5%	10	10.0	7.0
DEC1X3J680JC4B	6300	68 ±5%	12	10.0	7.0
DEC1X3J820JC4B	6300	82 ±5%	12	10.0	7.0
DEC1X3J101JC4B	6300	100 ±5%	13	10.0	7.0
DEC1X3J121JC4B	6300	120 ±5%	14	10.0	7.0
DEC1X3J151JC4B	6300	150 ±5%	15	10.0	7.0

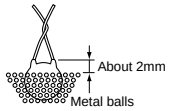
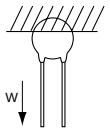
B Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)
DECB33J101KC4B	6300	100 ±10%	9	10.0	7.0
DECB33J151KC4B	6300	150 ±10%	9	10.0	7.0
DECB33J221KC4B	6300	220 ±10%	9	10.0	7.0
DECB33J331KC4B	6300	330 ±10%	9	10.0	7.0
DECB33J471KC4B	6300	470 ±10%	10	10.0	7.0
DECB33J681KC4B	6300	680 ±10%	11	10.0	7.0
DECB33J102KC4B	6300	1000 ±10%	13	10.0	7.0

E Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)
DECE33J102ZC4B	6300	1000 +80/-20%	11	10.0	7.0
DECE33J222ZC4B	6300	2200 +80/-20%	15	10.0	7.0

DEC Series Specifications and Test Methods

No.	Item		Specifications	Testing Method
1	Operating Temperature Range		-25 to +85°C	
2	Appearance and Dimensions		No marked defect on appearance form and dimensions are within specified range.	The capacitor should be visually inspected for evidence of defect. Dimensions should be measured with slide calipers.
3	Marking		To be easily legible	The capacitor should be visually inspected.
4	Dielectric Strength	Between Lead Wires	No failure	The capacitor should not be damaged when DC voltage of 200% of the rated voltage is applied between the lead wires for 1 to 5 sec. (Charge/Discharge current≦50mA)
		Body Insulation	No failure	The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short circuited, is kept about 2mm off the metal balls as shown in the figure at right, and DC voltage of 1.3kV is applied for 1 to 5 sec. between capacitor lead wires and metal balls. (Charge/Discharge current≦50mA) 
5	Insulation Resistance (I.R.)	Between Lead Wires	10000MΩ min.	The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging.
6	Capacitance		Within specified tolerance	The capacitance should be measured at 20°C with 1±0.2kHz (Char. SL: 1±0.2MHz) and AC5V(r.m.s.) max.
7	Q		Char. SL: 400+20C*2min. (30pF under) 1000 min. (30pF min.)	The dissipation factor and Q should be measured at 20°C with 1±0.2kHz (Char. SL: 1±0.2MHz) and AC5V(r.m.s.) max.
	Dissipation Factor (D.F.)		Char. B, E: 2.5% max.	
8	Temperature Characteristics		Char. SL: +350 to -1000ppm/°C (Temp. range: +20 to +85°C) Char. B: Within ±10% Char. E: Within +20/-55%	The capacitance measurement should be made at each step specified in Table.
			Pre-treatment : Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before measurements. (Char. B, E)	
9	Strength of Lead	Pull	Lead wire should not be cut off. Capacitor should not be broken.	As shown in the figure at right, fix the body of the capacitor and apply a tensile weight gradually to each lead wire in the radial direction of the capacitor up to 10N and keep it for 10±1 sec. 
		Bending		Each lead wire should be subjected to 5N of weight and bent 90° at the point of egress, in one direction, then returned to its original position and bent 90° in the opposite direction at the rate of one bend in 2 to 3 sec.
10	Vibration Resistance	Appearance	No marked defect	The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1 minute rate of vibration change from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions.
		Capacitance	Within specified tolerance	
		Q	Char. SL: 400+20C*2min. (30pF under) 1000 min. (30pF min.)	
		D.F.	Char. B, E: 2.5% max.	
11	Solderability of Leads		Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.	The lead wire of a capacitor should be dipped into a ethanol solution of 25wt% rosin and then into molten solder for 2±0.5 sec. In both cases the depth of dipping is up to about 1.5 to 2mm from the root of lead wires. Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C H63 Eutectic Solder 235±5°C
12	Soldering Effect (Non-Preheat)	Appearance	No marked defect	The lead wire should be immersed into the melted solder of 350±10°C up to about 1.5 to 2mm from the main body for 3.5±0.5 sec. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition. (Char. SL) Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *1room condition. (Char. B, E)
		Capacitance Change	Char. SL: Within ±2.5% Char. B: Within ±5% Char. E: Within ±15%	
		Dielectric Strength (Between Lead Wires)	Per item 4.	

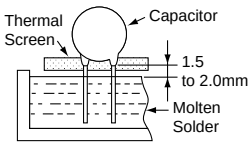
Step	1	2	3	4	5
Temp. (°C)	20±2	-25±3	20±2	85±2	20±2

*1 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa
*2 "C" expresses nominal capacitance value (pF)

Continued on the following page.

DEC Series Specifications and Test Methods

Continued from the preceding page.

No.	Item		Specifications	Testing Method
13	Soldering Effect (On-Preheat)	Appearance	No marked defect	First the capacitor should be stored at 120+0/-5°C for 60+0/-5 sec. Then, as in figure, the lead wires should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec.  Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition. (Char. SL) Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *1room condition. (Char. B, E)
		Capacitance Change	Char. SL: Within ±2.5% Char. B: Within ±5% Char. E: Within ±15%	
		Dielectric Strength (Between Lead Wires)	Per item 4.	
14	Temperature and Immersion Cycle	Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. <Temperature cycle> Step / Temperature (°C) / Time (min): 1 / -25±3 / 30; 2 / Room Temp. / 3; 3 / 85±3 / 30; 4 / Room Temp. / 3 Cycle time: 5 cycle <Immersion cycle> Step / Temperature (°C) / Time (min) / Immersion water: 1 / 65 +5/-0 / 15 / Clean water; 2 / 0 ±3 / 15 / Salt water Cycle time: 2 cycle Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *1room condition.
		Capacitance Change	Char. SL: Within ±3% Char. B: Within ±10% Char. E: Within ±20%	
		Q	Char. SL: 275+5/2C*2min. (30pF under) 350 min. (30pF min.)	
		D.F.	Char. B, E: 4.0% max.	
		I.R.	2000MΩ min.	
		Dielectric Strength (Between Lead Wires)	Per item 4.	
15	Humidity (Under Steady State)	Appearance	No marked defect	Set the capacitor for 500 +24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		Capacitance Change	Char. SL: Within ±5% Char. B: Within ±10% Char. E: Within ±20%	
		Q	Char. SL: 275+5/2C*2min. (30pF under) 350 min. (30pF min.)	
		D.F.	Char. B, E: 5.0% max.	
		I.R.	1000MΩ min.	
16	Humidity Loading	Appearance	No marked defect	Apply the rated voltage for 500 +24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. (Charge/Discharge current≦50mA.) Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition. (Char. SL) Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. (Char. B, E)
		Capacitance Change	Char. SL: Within ±7.5% Char. B: Within ±10% Char. E: Within ±20%	
		Q	Char. SL: 100+10/3C*2min. (30pF under) 200 min. (30pF min.)	
		D.F.	Char. B, E: 5.0% max.	
		I.R.	500MΩ min.	
17	Life	Appearance	No marked defect	Apply a DC voltage of 150% of the rated voltage for 1000 +48/-0 hrs. at 85±2°C with a relative humidity of 50% max. (Charge/Discharge current≦50mA.) Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition. (Char. SL) Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. (Char. B, E)
		Capacitance Change	Char. SL: Within ±3% Char. B: Within ±10% Char. E: Within ±20%	
		Q	Char. SL: 275+5/2C*2min. (30pF under) 350 min. (30pF min.)	
		D.F.	Char. B, E: 4.0% max.	
		I.R.	2000MΩ min.	

*1 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa
*2 "C" expresses nominal capacitance value (pF)

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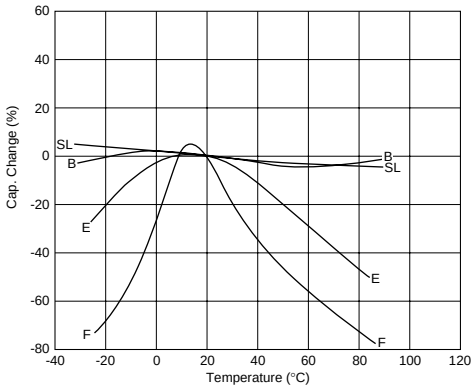
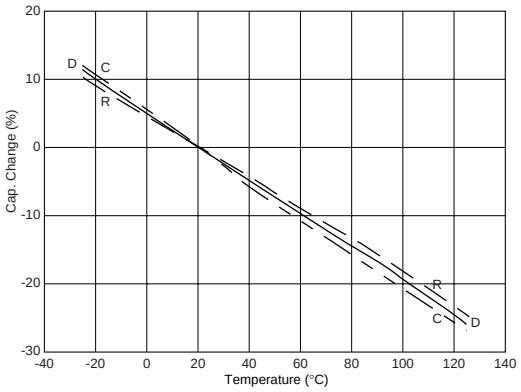
High Voltage Ceramic Capacitors Characteristics Data (Typical Example)

■ Capacitance-Temperature Characteristics

B, E, F, SL char.



C, D, R char.



■ Capacitance-DC Bias Characteristics