High-voltage Ceramic Capacitors (DC250V-6.3kV)

DEB Series (Class 2/DC1k-3.15kV)

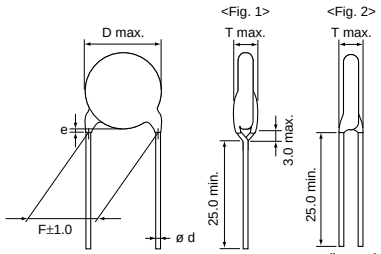
■ Features

1. Small size and high capacitance.
2. Coated with flame-retardant epoxy resin. (equivalent to UL94V-0 standards)
3. We eliminated lead (Pb) from plating lead wires.
4. Taping available for automatic insertion.

■ Applications

Ideal use on decoupling circuit for power supply.

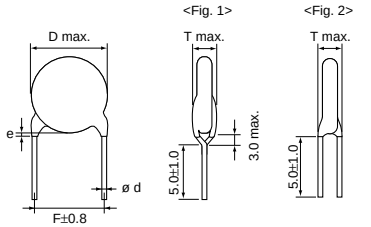
[Bulk]
Vertical Crimp Long (Fig. 1)
Straight Long (Fig. 2)



(in mm)

Lead Code	Coating Extension e	ø d	Style
A2, A3	Up to the end of crimp	0.6±0.05	Fig. 1
C1, CD	3.0 max.	0.5±0.05	Fig. 2
C3	3.0 max.	0.6±0.05	Fig. 2

[Bulk]
Vertical Crimp Short (Fig. 1)
Straight Short (Fig. 2)



(in mm)

Lead Code	Coating Extension e	ø d	Style
B2, B3	Up to the end of crimp	0.6±0.05	Fig. 1
D1, DD	3.0 max.	0.5±0.05	Fig. 2
D3	3.0 max.	0.6±0.05	Fig. 2

■ Marking

Temp. Char. / Nominal body diameter	B	E	F
ø4.5-5mm	221 3KV	102 1KV	102 2KV
ø6mm	331 3KV 66	102 2KV 66	222 1KV 66
ø7-9mm	102K 3KV 66	102Z 3KV 66	472Z 2KV 66
ø10-16mm	B 332K 3KV Ⓜ 66	E 472Z 3KV Ⓜ 66	103Z 2KV Ⓜ 66
Temperature Characteristic	Marked with code for char. B and E (Omitted for nominal body diameter ø9mm and under).		
Nominal Capacitance	Marked with 3 figures		
Capacitance Tolerance	Marked with code (Omitted for nominal body diameter ø6mm and under)		
Rated Voltage	Marked with code (In cace of DC3.15kV, marked with 3KV)		
Manufacturer's Identification	Marked with Ⓜ (Omitted for nominal body diameter ø9mm and under)		
Manufactured Date Code	Abbreviation (Omitted for nominal body diameter ø5mm and under)		

B Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping
DEBB33A101K□□□	1000	100 +10,-10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A151K□□□	1000	150 +10,-10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A221K□□□	1000	220 +10,-10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A331K□□□	1000	330 +10,-10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A471K□□□	1000	470 +10,-10%	5	5.0	4.0	C1B	D1B	P2A
DEBB33A681K□□□	1000	680 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEBB33A102K□□□	1000	1000 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEBB33A152K□□□	1000	1500 +10,-10%	8	5.0	4.0	A2B	B2B	N2A
DEBB33A222K□□□	1000	2200 +10,-10%	9	5.0	4.0	A2B	B2B	N2A
DEBB33A332K□□□	1000	3300 +10,-10%	10	5.0	4.0	A2B	B2B	N2A
DEBB33A472K□□□	1000	4700 +10,-10%	12	7.5	4.0	A3B	B3B	N3A
DEBB33A682K□□□	1000	6800 +10,-10%	15	7.5	4.0	A3B	B3B	N7A
DEBB33D101K□□□	2000	100 +10,-10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D151K□□□	2000	150 +10,-10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D221K□□□	2000	220 +10,-10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D331K□□□	2000	330 +10,-10%	5	5.0	5.0	C1B	D1B	P2A
DEBB33D471K□□□	2000	470 +10,-10%	6	5.0	5.0	A2B	B2B	N2A
DEBB33D681K□□□	2000	680 +10,-10%	7	5.0	5.0	A2B	B2B	N2A
DEBB33D102K□□□	2000	1000 +10,-10%	8	5.0	5.0	A2B	B2B	N2A
DEBB33D152K□□□	2000	1500 +10,-10%	9	5.0	5.0	A2B	B2B	N2A
DEBB33D222K□□□	2000	2200 +10,-10%	10	5.0	5.0	A2B	B2B	N2A
DEBB33D332K□□□	2000	3300 +10,-10%	12	7.5	5.0	A3B	B3B	N3A
DEBB33D472K□□□	2000	4700 +10,-10%	15	7.5	5.0	A3B	B3B	N7A
DEBB33F101K□□□	3150	100 +10,-10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F151K□□□	3150	150 +10,-10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F221K□□□	3150	220 +10,-10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F331K□□□	3150	330 +10,-10%	6	7.5	6.0	C3B	D3B	P3A
DEBB33F471K□□□	3150	470 +10,-10%	7	7.5	6.0	C3B	D3B	P3A
DEBB33F681K□□□	3150	680 +10,-10%	8	7.5	6.0	A3B	B3B	N3A
DEBB33F102K□□□	3150	1000 +10,-10%	9	7.5	6.0	A3B	B3B	N3A
DEBB33F152K□□□	3150	1500 +10,-10%	11	7.5	6.0	A3B	B3B	N3A
DEBB33F222K□□□	3150	2200 +10,-10%	13	7.5	6.0	A3B	B3B	N3A
DEBB33F332K□□□	3150	3300 +10,-10%	15	7.5	6.0	A3B	B3B	N7A

Three blank columns are filled with the lead and packaging codes. Please refer to each code which is shown in the right end.

E Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping
DEBE33A102Z□□□	1000	1000 +80,-20%	5	5.0	4.0	C1B	D1B	P2A
DEBE33A222Z□□□	1000	2200 +80,-20%	7	5.0	4.0	A2B	B2B	N2A
DEBE33A472Z□□□	1000	4700 +80,-20%	9	5.0	4.0	A2B	B2B	N2A
DEBE33A103Z□□□	1000	10000 +80,-20%	13	7.5	4.0	A3B	B3B	N3A
DEBE33D102Z□□□	2000	1000 +80,-20%	6	5.0	5.0	A2B	B2B	N2A
DEBE33D222Z□□□	2000	2200 +80,-20%	8	5.0	5.0	A2B	B2B	N2A
DEBE33D472Z□□□	2000	4700 +80,-20%	11	5.0	5.0	A2B	B2B	N2A
DEBE33D103Z□□□	2000	10000 +80,-20%	16	7.5	5.0	A3B	B3B	N7A
DEBE33F102Z□□□	3150	1000 +80,-20%	7	7.5	6.0	C3B	D3B	P3A
DEBE33F222Z□□□	3150	2200 +80,-20%	10	7.5	6.0	A3B	B3B	N3A
DEBE33F472Z□□□	3150	4700 +80,-20%	13	7.5	6.0	A3B	B3B	N3A

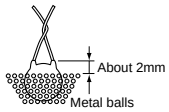
Three blank columns are filled with the lead and packaging codes. Please refer to each code which is shown in the right end.

F Characteristics

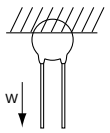
Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping
DEBF33A222Z□□□	1000	2200 +80,-20%	6	5.0	4.0	A2B	B2B	N2A
DEBF33A472Z□□□	1000	4700 +80,-20%	7	5.0	4.0	A2B	B2B	N2A
DEBF33A103Z□□□	1000	10000 +80,-20%	10	5.0	4.0	A2B	B2B	N2A
DEBF33D102Z□□□	2000	1000 +80,-20%	5	5.0	5.0	C1B	D1B	P2A
DEBF33D222Z□□□	2000	2200 +80,-20%	7	5.0	5.0	A2B	B2B	N2A
DEBF33D472Z□□□	2000	4700 +80,-20%	9	5.0	5.0	A2B	B2B	N2A
DEBF33D103Z□□□	2000	10000 +80,-20%	12	7.5	5.0	A3B	B3B	N3A

Three blank columns are filled with the lead and packaging codes. Please refer to each code which is shown in the right end.

Specifications and Test Methods

No.	Item		Specification	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 shall be inspected by naked eyes for visible evidence of defect. Dimensions shall be measured with slide calipers.
3	Marking		To be easily legible.	The capacitor shall be inspected by naked eyes.
4	Dielectric Strength	Between Lead Wires	No failure.	The capacitor shall not be damage when DC voltage of 200% of the rated voltage are applied between the lead wires for 1 to 5 s. (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, shortcircuited, is kept about 2mm off the balls as shown in the figure, and DC voltage of 1.3kV is applied for 1 to 5 s between capacitor lead wires and small metals. (Charge/Discharge current≦50mA.) 
5	Insulation Resistance (I.R.)	Between Lead Wires	10000MΩ min.	The insulation resistance shall be measured with DC500±50V within 60±5 s of charging.
6	Capacitance		Within specified tolerance.	The capacitance shall be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max..
7	Dissipation Factor (D.F.)		Char. B,E : 2.5% max. Char. F : 5.0% max.	The dissipation factor shall be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max..
8	Temperature Characteristic		Char. B : Within ±10% Char. E : Within +20/-55% Char. F : Within +30/-80% Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h before measurements.	The capacitance measurement shall be made at each step specified in Table.

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

9	Strength of Lead	Pull	Lead wire shall not cut off. Capacitor shall not be broken.	As a figure, fix the body of capacitor, apply a tensile weight gradually to each lead wire in the radial direction of capacitor up to 10N (5N for lead diameter ø0.5mm), and keep it for 10±1 s. 
		Bending		Each lead wire shall be subjected to 5N (2.5N for lead diameter ø0.5mm) weight and then a 90° bend, at the point of egress, in one direction, return to original position, and then a 90° bend in the opposite direction at the rate of one bend in 2 to 3 s.
10	Vibration Resistance	Appearance	No marked defect.	The capacitor shall firmly be soldered to the supporting lead wire and vibration which is 10 to 55Hz in the vibration frequency range,1.5mm in total amplitude, and about 1min. in the rate of vibration change from 10Hz to 55Hz and back to 10Hz is applied for a total of 6 h; 2 h each in 3 mutually perpendicular directions.
		Capacitance	Within specified tolerance.	
		D.F.	Char. B,E : 2.5% max. Char. F : 5.0% max.	
11	Solderability of Leads		Lead wire shall be soldered with uniformly coated on the axial direction over 3/4 of the circumferential direction.	The lead wire of a capacitor shall be dipped into a ethanol solution of 25wt% rosin and then into molten solder of 235±5°C for 2±0.5 s. In both cases the depth of dipping is up to about 1.5 to 2mm from the root of lead wires.
12	Soldering Effect	Appearance	No marked defect.	The lead wire shall be immersed into the melted solder of 350±10°C (Body of ø5mm and under: 270±5°C) up to about 1.5 to 2.0mm from the main body for 3.5±0.5 s. (Body of ø5mm and under: 5±0.5 s.) Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 4 to 24 h at *room condition.
		Capacitance Change	Char. B : Within ± 5% Char. E : Within ± 15% Char. F : Within ± 20%	
		Dielectric Strength (Between Lead Wires)	Per item 4.	

* "room condition" ..... Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

Specifications and Test Methods

Continued from the preceding page.

No.	Item		Specification	Testing Method
13	Humidity (Under Steady State)	Appearance	No marked defect.	Set the capacitor for 500 +24/-0 h at 40±2°C in 90 to 95% relative humidity. Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 1 to 2 h at *room condition.
		Capacitance Change	Char. B : Within ±10% Char. E : Within ±20% Char. F : Within ±30%	
		D.F.	Char. B,E : 5.0% max. Char. F : 7.5% max.	
		I.R.	1000MΩ min.	
14	Humidity Loading	Appearance	No marked defect.	Apply the rated voltage for 500 +24/-0 h at 40±2°C in 90 to 95% relative humidity.(Charge/Discharge current≦50mA.) Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h.
		Capacitance Change	Char. B : Within ±10% Char. E : Within ±20% Char. F : Within ±30%	
		D.F.	Char. B,E : 5.0% max. Char. F : 7.5% max.	
		I.R.	500MΩ min.	
15	Life	Appearance	No marked defect.	Apply a DC voltage of 150% of the rated voltage for 1000 +48/-0 h at 85±2°C, and relative humidity of 50% max.. (Charge/Discharge current≦50mA.) Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h.
		Capacitance Change	Char. B : Within ±10% Char. E : Within ±20% Char. F : Within ±30%	
		D.F.	Char. B,E : 4.0% max. Char. F : 7.5% max.	
		I.R.	2000MΩ min.	
16	Temperature and Immersion Cycle	Appearance	No marked defect.	The capacitor shall be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. <Temperature cycle> Step 1: -25±3, 30 min Step 2: Room Temp., 3 min Step 3: +85±3, 30 min Step 4: Room Temp., 3 min Cycle time : 5 cycle <Immersion cycle> Step 1: +65 +5/-0, 15 min, Clean water Step 2: 0 ±3, 15 min, Salt water Cycle time : 2 cycle Pre-treatment : Capacitor shall be stored at 85±2°C for 1 h, then placed at *room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 4 to 24 h at *room condition.
		Capacitance Change	Char. B : Within ±10% Char. E : Within ±20% Char. F : Within ±30%	
		D.F.	Char. B,E : 4.0% max. Char. F : 7.5% max.	
		I.R.	2000MΩ min.	
		Dielectric Strength (Between Lead Wires)	Per item 4.	

* "room condition" ..... Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa