

Safety Recognized/High Voltage Ceramic Capacitors

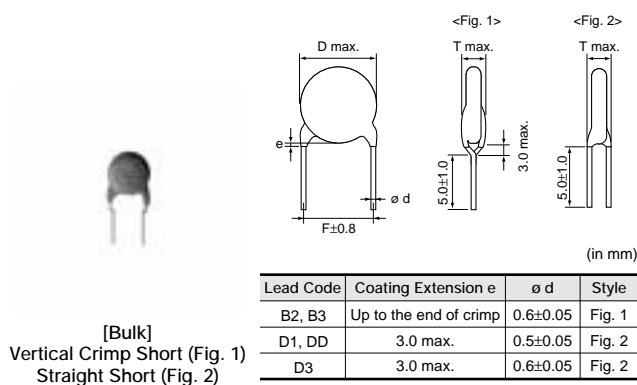
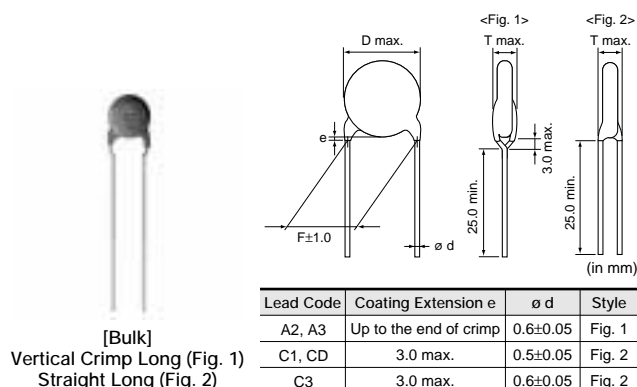
DEB Series (Class 2/DC1k-3.15kV)

■ Features

1. Small size and high capacitance
2. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
3. Taping available for automatic insertion.
4. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

Ideal for use on decoupling circuits for power supplies.



■ Marking

Temp. Char.	B	E	F
Nominal Body Diameter			
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 M 66	E 472Z 3KV M 66	103Z 2KV M 66
Temperature Characteristics	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 case of DC3.15kV, marked with 3KV)		
Manufacturer's Identification	Marked with M (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%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A151K□□□	1000	150 ±10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A221K□□□	1000	220 ±10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A331K□□□	1000	330 ±10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A471K□□□	1000	470 ±10%	5	5.0	4.0	C1B	D1B	P2A
DEBB33A681K□□□	1000	680 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEBB33A102K□□□	1000	1000 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEBB33A152K□□□	1000	1500 ±10%	8	5.0	4.0	A2B	B2B	N2A
DEBB33A222K□□□	1000	2200 ±10%	9	5.0	4.0	A2B	B2B	N2A
DEBB33A332K□□□	1000	3300 ±10%	10	5.0	4.0	A2B	B2B	N2A
DEBB33A472K□□□	1000	4700 ±10%	12	7.5	4.0	A3B	B3B	N3A
DEBB33A682K□□□	1000	6800 ±10%	15	7.5	4.0	A3B	B3B	N7A
DEBB33D101K□□□	2000	100 ±10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D151K□□□	2000	150 ±10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D221K□□□	2000	220 ±10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D331K□□□	2000	330 ±10%	5	5.0	5.0	C1B	D1B	P2A
DEBB33D471K□□□	2000	470 ±10%	6	5.0	5.0	A2B	B2B	N2A
DEBB33D681K□□□	2000	680 ±10%	7	5.0	5.0	A2B	B2B	N2A
DEBB33D102K□□□	2000	1000 ±10%	8	5.0	5.0	A2B	B2B	N2A
DEBB33D152K□□□	2000	1500 ±10%	9	5.0	5.0	A2B	B2B	N2A
DEBB33D222K□□□	2000	2200 ±10%	10	5.0	5.0	A2B	B2B	N2A
DEBB33D332K□□□	2000	3300 ±10%	12	7.5	5.0	A3B	B3B	N3A
DEBB33D472K□□□	2000	4700 ±10%	15	7.5	5.0	A3B	B3B	N7A
DEBB33F101K□□□	3150	100 ±10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F151K□□□	3150	150 ±10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F221K□□□	3150	220 ±10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F331K□□□	3150	330 ±10%	6	7.5	6.0	C3B	D3B	P3A
DEBB33F471K□□□	3150	470 ±10%	7	7.5	6.0	C3B	D3B	P3A
DEBB33F681K□□□	3150	680 ±10%	8	7.5	6.0	A3B	B3B	N3A
DEBB33F102K□□□	3150	1000 ±10%	9	7.5	6.0	A3B	B3B	N3A
DEBB33F152K□□□	3150	1500 ±10%	11	7.5	6.0	A3B	B3B	N3A
DEBB33F222K□□□	3150	2200 ±10%	13	7.5	6.0	A3B	B3B	N3A
DEBB33F332K□□□	3150	3300 ±10%	15	7.5	6.0	A3B	B3B	N7A

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

E Characteristics

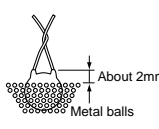
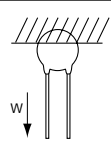
Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping
DEBE33A102Z□□□	1000	1000 +80/-20%	5	5.0	4.0	C1B	D1B	P2A
DEBE33A222Z□□□	1000	2200 +80/-20%	7	5.0	4.0	A2B	B2B	N2A
DEBE33A472Z□□□	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 the three columns on the right for the appropriate code.


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 the three columns on the right for the appropriate code.

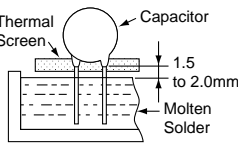
No.	Item		Specifications	Testing Method								
1	Operating Temperature Range		-25 to +85°C									
2	Appearance and Dimensions		No marked defect on appearance form and dimensions are within specified range.	The capacitor should be visually inspected for evidence of defect. Dimensions should be measured 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 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 should be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max.								
8	Temperature Characteristics		Char. B: Within ±10% Char. E: Within +20/-55% Char. F: Within +30/-80%	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 *room condition for 24±2 hrs. before measurements. <table><tr><td>Step</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Temp. (°C)</td><td>20±2</td><td>-25±3</td><td>20±2</td><td>85±2</td><td>20±2</td></tr></table>		Step	1	2	3	4	5	Temp. (°C)	20±2
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 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 (5N for lead diameter 0.5mm), and keep it for 10±1 sec. 								
		Bending		Each lead wire should be subjected to 5N (2.5N for lead diameter 0.5mm) 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									
		D.F.	Char. B, E: 2.5% max. Char. F: 5.0% 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 (Body of ø5mm and under: 270±5°C) up to about 1.5 to 2mm from the main body for 3.5±0.5 sec. (Body of ø5mm and under: 5±0.5 sec.) Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. 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. 

DEB Series Specifications and Test Methods

Continued from the preceding page.

No.	Item		Specifications	Testing Method																											
13	Soldering Effect (On-Preheat)	Appearance	No marked defect	<div>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 *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *room condition.</div> <div></div>																											
		Capacitance Change	Char. B: Within ± 5% Char. E: Within ± 15% Char. F: Within ± 20%																												
		Dielectric Strength (Between Lead Wires)	Per item 4.																												
14	Temperature and Immersion Cycle	Appearance	No marked defect	<div>The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. <Temperature cycle><table><tr><th>Step</th><th>Temperature (°C)</th><th>Time (min)</th></tr><tr><td>1</td><td>-25±3</td><td>30</td></tr><tr><td>2</td><td>Room Temp.</td><td>3</td></tr><tr><td>3</td><td>85±3</td><td>30</td></tr><tr><td>4</td><td>Room Temp.</td><td>3</td></tr></table>Cycle time: 5 cycle <Immersion cycle><table><tr><th>Step</th><th>Temperature (°C)</th><th>Time (min)</th><th>Immersion water</th></tr><tr><td>1</td><td>65 +5/-0</td><td>15</td><td>Clean water</td></tr><tr><td>2</td><td>0 ±3</td><td>15</td><td>Salt water</td></tr></table>Cycle time : 2 cycle Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *room condition.</div>	Step	Temperature (°C)	Time (min)	1	-25±3	30	2	Room Temp.	3	3	85±3	30	4	Room Temp.	3	Step	Temperature (°C)	Time (min)	Immersion water	1	65 +5/-0	15	Clean water	2	0 ±3	15	Salt water
		Step	Temperature (°C)		Time (min)																										
		1	-25±3		30																										
		2	Room Temp.		3																										
		3	85±3		30																										
4	Room Temp.	3																													
Step	Temperature (°C)	Time (min)	Immersion water																												
1	65 +5/-0	15	Clean water																												
2	0 ±3	15	Salt water																												
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.																														
15	Humidity (Under Steady State)	Appearance	No marked defect	<div>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 *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *room condition.</div>																											
		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.																												
16	Humidity Loading	Appearance	No marked defect	<div>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 *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs.</div>																											
		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.																												
17	Life	Appearance	No marked defect	<div>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 *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs.</div>																											
		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.																												

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