

High-voltage Ceramic Capacitors (DC250V-6.3kV)

muRata

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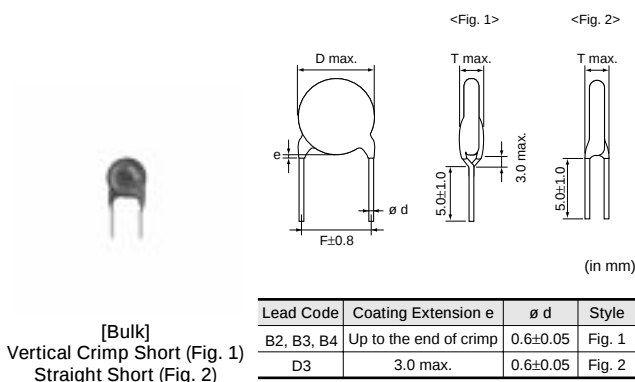
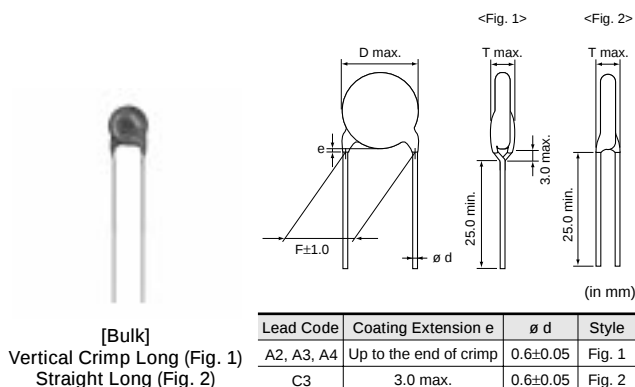
DEH Series (125 deg. C Guaranteed/Low-dissipation Factor/DC250V-3.15kV)

■ Features

1. Reduced heat dissipation permitted due to small dielectric loss of the ceramic material.
2. Operating temperature range guaranteed up to 125 degree C.
3. Coated with flame-retardant epoxy resin. (equivalent to UL94V-0 standards)
4. We eliminated lead (Pb) from plating lead wires.
5. Taping available for automatic insertion.

■ Applications

Ideal use on high-frequency pulse circuit such as horizontal resonance circuit for CTV and snubber circuit for switching power supply.



■ Marking

Rated Voltage		DC250V	DC500V	DC1-3.15kV
Temp. Char.		R	C	R
Nominal body diameter	ø6mm	HR 102 66	HR 471 66	—
	ø7-9mm	HR R 332K 250V 66	HR C 152K 66	HR R 102K 1KV 66
	ø10-21mm	HR R 103K 250V M66	HR C 472K M66	HR R 272K 3KV M66
High Temperature Guaranteed Code		HR		
Temperature Characteristic		Marked with code (Omitted for nominal body diameter ø6mm)		
Nominal Capacitance		Marked with 3 figures		
Capacitance Tolerance		Marked with code (Omitted for nominal body diameter ø6mm)		
Rated Voltage	DC250V	Marked with code (Marked with horizontal line over nominal capacitance for nominal body diameter ø6mm)		
	DC500V	Omitted		
	DC1-3.15kV	Marked with code (In case of DC3.15kV, marked with 3KV)		
Manufacturer's Identification		Marked with  (Omitted for nominal body diameter ø9mm and under)		
Manufactured Date Code		Abbreviation		

DC250V, R 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
DEHR32E221K□□□	250	220 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E331K□□□	250	330 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E471K□□□	250	470 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E681K□□□	250	680 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E102K□□□	250	1000 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E152K□□□	250	1500 +10,-10%	7	5.0	4.0	A2B	B2B	N2A
DEHR32E222K□□□	250	2200 +10,-10%	8	5.0	4.0	A2B	B2B	N2A
DEHR32E332K□□□	250	3300 +10,-10%	9	5.0	4.0	A2B	B2B	N2A
DEHR32E472K□□□	250	4700 +10,-10%	10	5.0	4.0	A2B	B2B	N2A
DEHR32E682K□□□	250	6800 +10,-10%	12	5.0	4.0	A2B	B2B	N2A
DEHR32E103K□□□	250	10000 +10,-10%	12	5.0	4.0	A2B	B2B	N2A

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

DC500V, C 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
DEHC32H331K□□□	500	330 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEHC32H471K□□□	500	470 +10,-10%	6	5.0	4.0	A2B	B2B	N2A
DEHC32H681K□□□	500	680 +10,-10%	7	5.0	4.0	A2B	B2B	N2A
DEHC32H102K□□□	500	1000 +10,-10%	8	5.0	4.0	A2B	B2B	N2A
DEHC32H152K□□□	500	1500 +10,-10%	9	5.0	4.0	A2B	B2B	N2A
DEHC32H222K□□□	500	2200 +10,-10%	10	5.0	4.0	A2B	B2B	N2A
DEHC32H332K□□□	500	3300 +10,-10%	12	5.0	4.0	A2B	B2B	N2A
DEHC32H472K□□□	500	4700 +10,-10%	14	10.0	4.0	A4B	B4B	-

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

DC1-3.15kV, R 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
DEHR33A221K□□□	1000	220 +10,-10%	7	5.0	4.5	A2B	B2B	N2A
DEHR33A331K□□□	1000	330 +10,-10%	7	5.0	4.5	A2B	B2B	N2A
DEHR33A471K□□□	1000	470 +10,-10%	7	5.0	4.5	A2B	B2B	N2A
DEHR33A681K□□□	1000	680 +10,-10%	8	5.0	4.5	A2B	B2B	N2A
DEHR33A102K□□□	1000	1000 +10,-10%	9	5.0	4.5	A2B	B2B	N2A
DEHR33A152K□□□	1000	1500 +10,-10%	11	5.0	4.5	A2B	B2B	N2A
DEHR33A222K□□□	1000	2200 +10,-10%	13	7.5	4.5	A3B	B3B	N3A
DEHR33A332K□□□	1000	3300 +10,-10%	15	7.5	4.5	A3B	B3B	N7A
DEHR33A472K□□□	1000	4700 +10,-10%	17	7.5	4.5	A3B	B3B	N7A
DEHR33D221K□□□	2000	220 +10,-10%	7	7.5	5.0	C3B	D3B	P3A
DEHR33D271K□□□	2000	270 +10,-10%	7	7.5	5.0	C3B	D3B	P3A
DEHR33D331K□□□	2000	330 +10,-10%	8	7.5	5.0	A3B	B3B	N3A
DEHR33D391K□□□	2000	390 +10,-10%	8	7.5	5.0	A3B	B3B	N3A
DEHR33D471K□□□	2000	470 +10,-10%	9	7.5	5.0	A3B	B3B	N3A
DEHR33D561K□□□	2000	560 +10,-10%	9	7.5	5.0	A3B	B3B	N3A
DEHR33D681K□□□	2000	680 +10,-10%	10	7.5	5.0	A3B	B3B	N3A
DEHR33D821K□□□	2000	820 +10,-10%	11	7.5	5.0	A3B	B3B	N3A
DEHR33D102K□□□	2000	1000 +10,-10%	12	7.5	5.0	A3B	B3B	N3A
DEHR33D122K□□□	2000	1200 +10,-10%	12	7.5	5.0	A3B	B3B	N3A
DEHR33D152K□□□	2000	1500 +10,-10%	12	7.5	5.0	A3B	B3B	N3A
DEHR33D182K□□□	2000	1800 +10,-10%	14	7.5	5.0	A3B	B3B	N7A

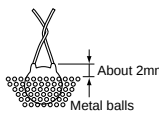
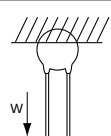
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Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping
DEHR33D222K□□□	2000	2200 +10,-10%	15	7.5	5.0	A3B	B3B	N7A
DEHR33D272K□□□	2000	2700 +10,-10%	17	7.5	5.0	A3B	B3B	N7A
DEHR33D332K□□□	2000	3300 +10,-10%	19	10.0	5.0	A4B	B4B	-
DEHR33D392K□□□	2000	3900 +10,-10%	20	10.0	5.0	A4B	B4B	-
DEHR33D472K□□□	2000	4700 +10,-10%	21	10.0	5.0	A4B	B4B	-
DEHR33F151K□□□	3150	150 +10,-10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F181K□□□	3150	180 +10,-10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F221K□□□	3150	220 +10,-10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F271K□□□	3150	270 +10,-10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F331K□□□	3150	330 +10,-10%	8	7.5	6.0	A3B	B3B	N3A
DEHR33F391K□□□	3150	390 +10,-10%	9	7.5	6.0	A3B	B3B	N3A
DEHR33F471K□□□	3150	470 +10,-10%	10	7.5	6.0	A3B	B3B	N3A
DEHR33F561K□□□	3150	560 +10,-10%	10	7.5	6.0	A3B	B3B	N3A
DEHR33F681K□□□	3150	680 +10,-10%	11	7.5	6.0	A3B	B3B	N3A
DEHR33F821K□□□	3150	820 +10,-10%	12	7.5	6.0	A3B	B3B	N3A
DEHR33F102K□□□	3150	1000 +10,-10%	13	7.5	6.0	A3B	B3B	N3A
DEHR33F122K□□□	3150	1200 +10,-10%	14	7.5	6.0	A3B	B3B	N7A
DEHR33F152K□□□	3150	1500 +10,-10%	15	7.5	6.0	A3B	B3B	N7A
DEHR33F182K□□□	3150	1800 +10,-10%	16	7.5	6.0	A3B	B3B	N7A
DEHR33F222K□□□	3150	2200 +10,-10%	17	7.5	6.0	A3B	B3B	N7A
DEHR33F272K□□□	3150	2700 +10,-10%	19	10.0	6.0	A4B	B4B	-

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 +125°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 (In case of rated voltage: DC1 to 3.15kV) or DC voltage of 250% of the rated voltage (In case of rated voltage: DC250V, DC500V) are applied between the lead wires for 1 to 5 s. (Charge/Discharge current ≤ 50mA.) 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 AC1250V (r.m.s.)<50/60Hz> is applied for 1 to 5 s between capacitor lead wires and small metals. (Charge/Discharge current ≤ 50mA.) 										
		Body Insulation	No failure.											
5	Insulation Resistance (I.R.)	Between Lead Wires	Char. R[DC1 to 3.15kV], Char. C : 10000MΩ min. Char. R[DC250V] : 1000MΩ min.	The insulation resistance shall be measured with DC500±50V (Char. R[DC 250V]: DC100±15V) 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. R[DC250V]: 0.4% max. Char. R[DC1 to 3.15kV] : 0.2% max. Char. C : 0.3% max.	The dissipation factor shall be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max..										
8	Temperature Characteristic		<table><tr><td rowspan="2">T. C.</td><td colspan="2">Temp. char.</td></tr><tr><td>-25 to +85°C</td><td>+85 to +125°C</td></tr><tr><td>R</td><td>Within ±15%</td><td rowspan="2">Within +15/-30%</td></tr><tr><td>C</td><td>Within ±20%</td></tr></table>	T. C.	Temp. char.		-25 to +85°C	+85 to +125°C	R	Within ±15%	Within +15/-30%	C	Within ±20%	The capacitance measurement shall be made at each step specified in Table.
			T. C.		Temp. char.									
-25 to +85°C	+85 to +125°C													
R	Within ±15%	Within +15/-30%												
C	Within ±20%													
Pre-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *1room condition for 24±2 h 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>125±2</td><td>20±2</td></tr></table>		Step	1	2	3	4	5	Temp.(°C)	20±2	-25±3	20±2	125±2	20±2	
Step	1	2	3	4	5									
Temp.(°C)	20±2	-25±3	20±2	125±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. R[DC250V] : 0.4% max. Char. R[DC1 to 3.15kV] : 0.2% max. Char. C : 0.3% 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 up to about 1.5 to 2.0mm from the main body for 3.5±0.5 s. Pre-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *1room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 24±2 h at *1room condition. Measurement order : Dielectric strength -> Pre-treatment -> Capacitance -> Soldering effect test -> Post-treatment -> Capacitance · Dielectric strength (Char. R[DC250V])										
		Capacitance Change	Within ±10%											
		Dielectric Strength (Between Lead Wires)	Per item 4.											

*1 "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

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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 125±3°C for 1 h, then placed at *1room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 1 to 2 h at *1room condition. Measurement order : I.R. -> Pre-treatment -> Capacitance · D.F. -> Humidity test -> Post-treatment -> Capacitance · D.F. · I.R. (Char. R[DC250V])															
		Capacitance Change	Within ±10%																
		D.F.	0.4% 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 125±3°C for 1 h, then placed at *1room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 1 to 2 h at *1room condition. (Char. R[DC1 to 3.15kV], Char. C) Post-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *1room condition for 24±2 h. (Char. R[DC250V]) Measurement order : I.R. -> Pre-treatment -> Capacitance · D.F. -> Humidity loading test -> *2 I.R. -> Post-treatment -> Capacitance · D.F. (Char. R[DC250V])															
		Capacitance Change	Within ±10%																
		D.F.	0.6% max.																
		I.R.	1000MΩ min.																
15	Life	Appearance	No marked defect.	Apply a DC voltage of 200% of the rated voltage (In case of rated voltage:DC250V, DC500V) or DC voltage of 150% of the rated voltage (In case of rated voltage:DC1 to 3.15kV) for 1000 +48/-0 h at 125±2°C and relative humidity of 50% max.. (Charge/Discharge current≤50mA.) Pre-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *1room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *1room condition for 24±2 h. Measurement order : I.R. -> Pre-treatment -> Capacitance · D.F. -> Life test -> *3I.R. -> Post-treatment -> Capacitance · D.F. (Char. R[DC250V])															
		Capacitance Change	Within ±10%																
		D.F.	0.4% max.																
		I.R.	Char. R[DC1 to 3.15kV], Char. C : 2000MΩ min. Char. R[DC250V] : 1000MΩ min.																
16	Temperature Cycle	Appearance	No marked defect.	The capacitor shall be subjected to 5 temperature cycles. <Temperature cycle> <table><tr><th>Step</th><th>Temperature(°C)</th><th>Time</th></tr><tr><td>1</td><td>-25±3</td><td>30 min</td></tr><tr><td>2</td><td>Room Temp.</td><td>3 min</td></tr><tr><td>3</td><td>+125±3</td><td>30 min</td></tr><tr><td>4</td><td>Room Temp.</td><td>3 min</td></tr></table> Cycle time : 5 cycle Pre-treatment : Capacitor shall be stored at 125±3°C for 1 h, then placed at *1room condition for 24±2 h before initial measurements. Post-treatment : Capacitor shall be stored for 24±2 h at *1room condition. Measurement order : I.R. · Dielectric strength -> Pre-treatment -> Capacitance · D.F. -> Temperature cycle test -> Post-treatment -> Capacitance · D.F. · I.R. · Dielectric strength (Char. R[DC250V])	Step	Temperature(°C)	Time	1	-25±3	30 min	2	Room Temp.	3 min	3	+125±3	30 min	4	Room Temp.	3 min
		Step	Temperature(°C)		Time														
		1	-25±3		30 min														
		2	Room Temp.		3 min														
		3	+125±3		30 min														
4	Room Temp.	3 min																	
Capacitance Change	Within ±10%																		
D.F.	0.4% max.																		
I.R.	1000MΩ min.																		
Dielectric Strength (Between Lead Wires)	Per item 4.																		

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

*2 The measurement of I.R. will be held in 1 to 2 h after Humidity loading test.

*3 The measurement of I.R. will be held in 12 to 24 h after Life test.