

CBR Series, C0G Dielectric, Ultra High Q, Low ESR, 6.3VDC–250VDC (RF & Microwave)

Overview

KEMET's CBR Series surface mount multilayer ceramic capacitors (MLCCs) in C0G dielectric feature a robust and exceptionally stable copper electrode dielectric system that offers excellent low loss performance (High Q). These devices provide extremely low ESR and high self-resonance characteristics, and are well-suited for resonant circuit applications or those where Q and stability of capacitance characteristics are required. CBR Series capacitors exhibit no change in capacitance with respect to time and voltage and boast a negligible change in capacitance with reference to ambient temperature. Capacitance change is limited to ± 30 ppm/ $^{\circ}\text{C}$ from -55°C to $+125^{\circ}\text{C}$.

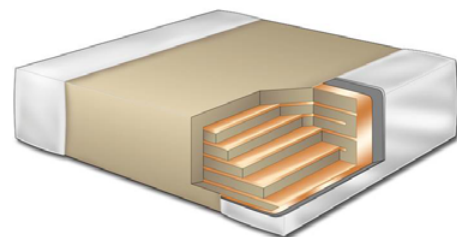
CBR Series devices are suitable for many circuit applications including RF power amplifiers, mixers, oscillators, low noise amplifiers, filter networks, antenna tuning, timing circuits, delay lines and MRI imaging coils.



Benefits

- -55°C to $+125^{\circ}\text{C}$ operating temperature range
- Ultra high Q
- Base metal electrode (BME) dielectric system
- Pb-Free and RoHS Compliant
- 0201, 0402, 0603 and 0805 case sizes (inches)
- DC voltage ratings of 6.3 V, 10 V, 25 V, 50 V, 100 V and 250 V
- Capacitance offerings ranging from 0.1 pF up to 100 pF
- Available capacitance tolerances of ± 0.05 pF, ± 0.1 pF, ± 0.25 pF, ± 0.5 pF, $\pm 1\%$, $\pm 2\%$, $\pm 5\%$ and $\pm 10\%$
- No piezoelectric noise
- Low ESR
- High thermal stability

- No capacitance change with respect to applied rated DC voltage
- Negligible capacitance change with respect to temperature
- No capacitance decay with time
- Non-polar device, minimizing installation concerns
- 100% pure matte tin-plated termination finish allowing for excellent solderability

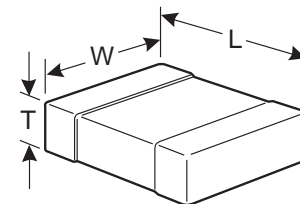


Ordering Information

CBR	02	C	330	F	9	G	A	C	
Series	Case Size (L"x W")	Specification/ Series	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Dielectric	Termination Style	Termination Finish	Packaging/Grade (C-Spec) ¹
CBR	02 = 0201 04 = 0402 06 = 0603 08 = 0805	C = Standard	2 Sig. Digits + Number of Zeros Use 9 for 1.0 - 9.9 pF Use 8 for 0.5 - .99 pF ex. 2.2 pF = 229 ex. 0.5 pF = 508	A = ± 0.05 pF B = ± 0.1 pF C = ± 0.25 pF D = ± 0.5 pF F = $\pm 1\%$ G = $\pm 2\%$ J = $\pm 5\%$	9 = 6.3V 8 = 10V 3 = 25V 5 = 50V 1 = 100V A = 250V	G = C0G	A = N/A	C = 100% Matte Sn	Blank = 7" Reel Unmarked

¹ When ordering CBR series devices, a "suffix" or "Cspec" is not required to indicate a 7" reel packaging option. CBR devices are only available and shipped on 7" reels (paper tape). Bulk bag and cassette packaging options are not available. Please contact KEMET if you have a specific, non-standard packaging requirement.

Dimensions – Millimeters (Inches)



Case Size (in.)	Case Size (mm)	L Length	W Width	T Thickness	B Bandwidth	Mounting Technique
0201	0603	0.60 ± 0.03 (0.024 ± 0.001)	0.30 ± 0.03 (0.012 ± 0.001)	0.30 ± 0.03 (0.012 ± 0.001)	0.15 ± 0.05 (0.006 ± 0.002)	Solder Reflow Only
0402	1005	1.00 ± 0.05 (0.040 ± 0.002)	0.50 ± 0.05 (0.020 ± 0.002)	0.50 ± 0.05 (0.020 ± 0.002)	0.25 + 0.05 / -0.10 (0.010 + 0.002 / -0.004)	
0603	1608	1.60 ± 0.10 (0.063 ± 0.004)	0.80 ± 0.10 (0.031 ± 0.004)	0.80 ± 0.07 (0.031 ± 0.003)	0.40 ± 0.15 (0.016 ± 0.006)	Solder Wave or Solder Reflow
0805	2012	2.00 ± 0.20 (0.079 ± 0.008)	1.25 ± 0.20 (0.049 ± 0.008)	0.85 ± 0.10 (0.031 ± 0.004)	0.50 ± 0.20 (0.020 ± 0.008)	

Applications

Typical applications include critical timing, tuning, bypass, coupling, feedback, filtering, impedance matching and DC blocking.

Field applications include wireless and cellular base stations, wireless LAN, subscriber-based wireless services, wireless broadcast equipment, satellite communications, RF power amplifier (PA) modules, filters, voltage-controlled oscillators (VCOs), PAs, matching networks, RF modules, and medical electronics.

Qualification

RF and microwave products are subject to internal qualification. Details regarding test methods and conditions are referenced in Table 4, Performance & Reliability.

Electrical Parameters/Characteristics

Item	Parameters/Characteristics
Operating Temperature Range:	-55°C to +125°C
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC)	0 ±30 ppm/°C (0 ±60 ppm/°C for 0201 case size product ≥ 22 pF)
Aging Rate (Max % Cap Loss/Decade Hour)	0%
Dielectric Withstanding Voltage (DWV)	See Dielectric Withstanding Voltage Table (5 ±1 seconds and charge/discharge not exceeding 50 mA)
Quality Factor (Q)	≥1,000 for capacitance values ≥30 pF ≥400 +20°C for capacitance values < 30 pF
Insulation Resistance (IR) Limit @ 25°C	10GΩ minimum (rated voltage applied for 120 ±5 seconds)

Capacitance and Quality Factor (Q) measured at 25°C and 30-70% relative humidity under the following conditions:

1 MHz ± 100 kHz and 1.0 ± 0.2 Vrms if capacitance ≤1,000 pF

1 kHz ± 100 Hz and 1.0 ± 0.2 Vrms if capacitance >1,000 pF

Note: When measuring capacitance it is important to ensure the set voltage level is held constant. The HP4284 and Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON."

Dielectric Withstanding Voltage Table

Rated Voltage (VDC)	≤ 100 V	250 V
DWV	250%	200%

Environmental Compliance

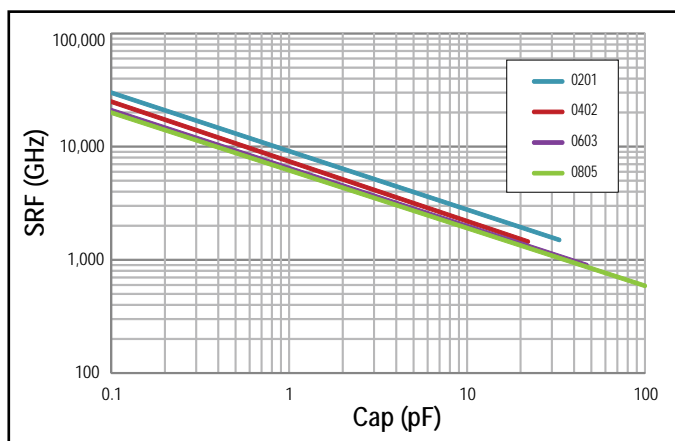
Pb-Free and RoHS Compliant.



RoHS Compliant

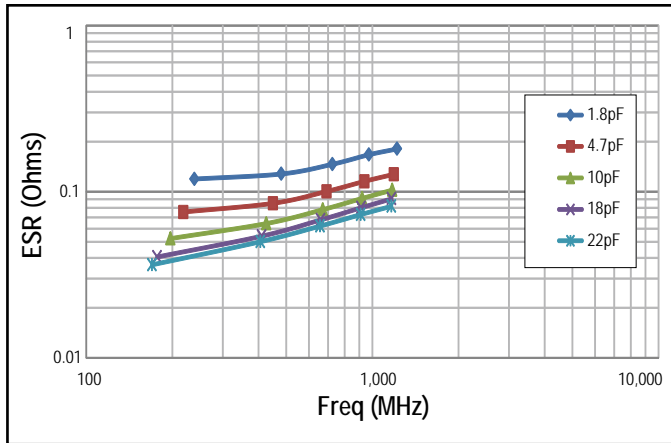
Electrical Characteristics

SRF (GHz) vs. Cap (pF)

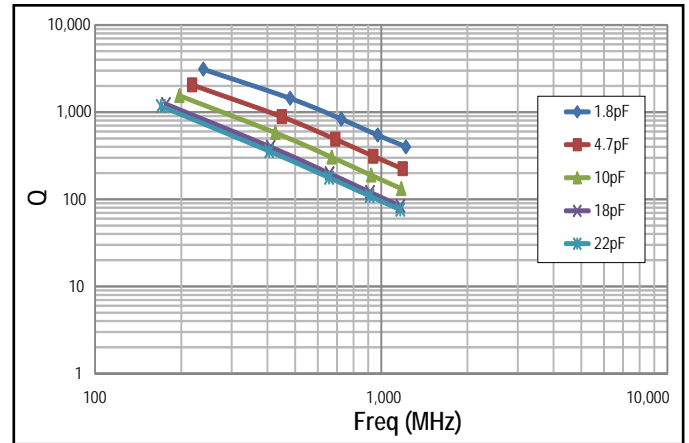


Electrical Characteristics cont'd

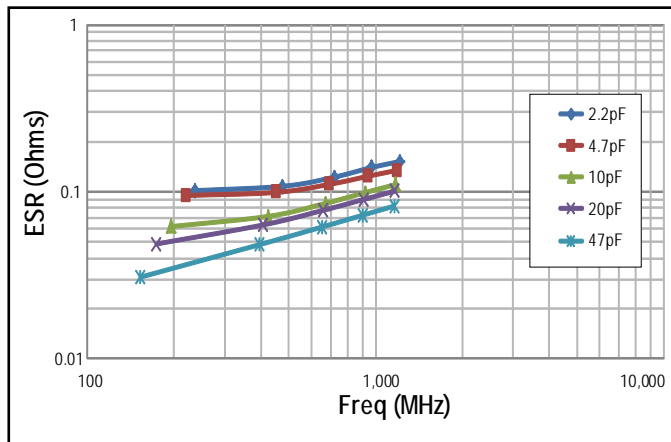
ESR vs. Frequency 0402



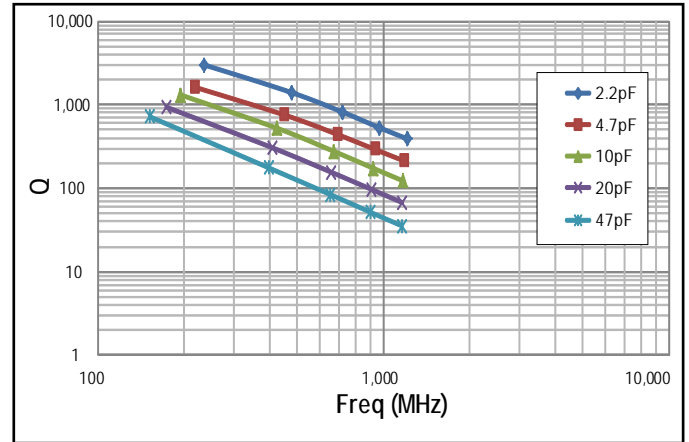
Q vs. Frequency 0402



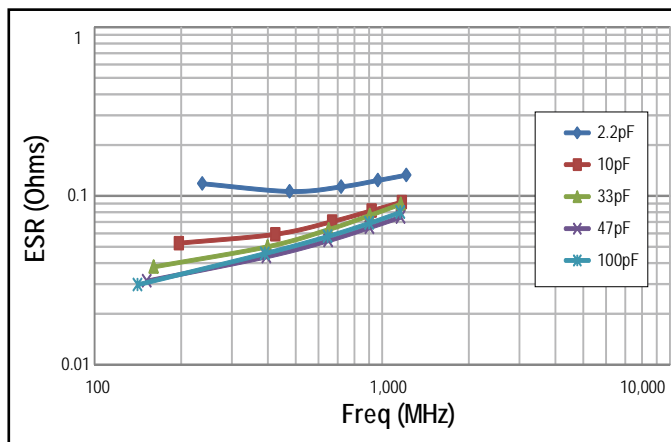
ESR vs. Frequency 0603



Q vs. Frequency 0603



ESR vs. Frequency 0805



Q vs. Frequency 0805

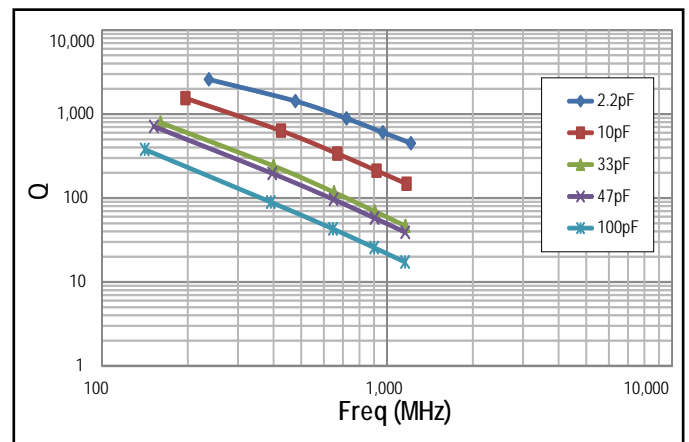


Table 1 – CBR Series, Capacitance Range Waterfall

Case Size - in.(mm)		0201 (0603)			0402 (1005)		0603 (1608)			0805 (2012)		
Length	mm (in.)	0.50 ± 0.05 (0.020 ± 0.002)			1.00 ± 0.05 (0.040 ± 0.002)		1.60 ± 0.10 (0.063 ± 0.004)			2.00 ± 0.20 (0.079 ± 0.008)		
Width	mm (in.)	0.30 ± 0.03 (0.012 ± 0.001)			0.50 ± 0.05 (0.020 ± 0.002)		0.80 ± 0.10 (0.031 ± 0.004)			1.25 ± 0.20 (0.049 ± 0.008)		
Thickness	mm (in.)	0.30 ± 0.03 (0.012 ± 0.001)			0.50 ± 0.05 (0.020 ± 0.002)		0.80 ± 0.07 (0.031 ± 0.003)			0.85 ± 0.10 (0.031 ± 0.004)		
Bandwidth	mm (in.)	0.15 ± 0.05 (0.006 ± 0.002)			0.25 + 0.05 / -0.10 (0.010 + 0.002 / -0.004)		0.40 ± 0.15 (0.016 ± 0.006)			0.50 ± 0.20 (0.020 ± 0.008)		
Rated Voltage (VDC)		6.3	10	25	50	100	50	100	250	50	100	250
Voltage Code		9	8	3	5	1	5	1	A	5	1	A
Capacitance	Capacitance Tolerance	Capacitance Code (Available Capacitance)										
0.1 pF	A = ± 0.05 pF B = ± 0.1 pF C = ± 0.25 pF	108	108	108	108	108						
0.2 pF		208	208	208	208	208						
0.3 pF		308	308	308	308	308	308	308	308	308	308	308
0.4 pF		408	408	408	408	408	408	408	408	408	408	408
0.5 pF		508	508	508	508	508	508	508	508	508	508	508
0.6 pF		608	608	608	608	608	608	608	608	608	608	608
0.7 pF		708	708	708	708	708	708	708	708	708	708	708
0.8 pF		808	808	808	808	808	808	808	808	808	808	808
0.9 pF		908	908	908	908	908	908	908	908	908	908	908
1.0 pF		109	109	109	109	109	109	109	109	109	109	109
1.2 pF		129	129	129	129	129	129	129	129	129	129	129
1.5 pF		159	159	159	159	159	159	159	159	159	159	159
1.8 pF		189	189	189	189	189	189	189	189	189	189	189
2.0 pF		209	209	209	209	209	209	209	209	209	209	209
2.2 pF		229	229	229	229	229	229	229	229	229	229	229
2.7 pF		279	279	279	279	279	279	279	279	279	279	279
3.0 pF		309	309	309	309	309	309	309	309	309	309	309
3.3 pF		339	339	339	339	339	339	339	339	339	339	339
3.9 pF		399	399	399	399	399	399	399	399	399	399	399
4.0 pF	409	409	409	409	409	409	409	409	409	409	409	
4.7 pF	479	479	479	479	479	479	479	479	479	479	479	
5.0 pF	509	509	509	509	509	509	509	509	509	509	509	
5.6 pF	569	569	569	569	569	569	569	569	569	569	569	
6.0 pF	609	609	609	609	609	609	609	609	609	609	609	
6.8 pF	689	689	689	689	689	689	689	689	689	689	689	
7.0 pF	709	709	709	709	709	709	709	709	709	709	709	
8.0 pF	809	809	809	809	809	809	809	809	809	809	809	
8.2 pF	829	829	829	829	829	829	829	829	829	829	829	
9.0 pF	909	909	909	909	909	909	909	909	909	909	909	
10 pF	100	100	100	100	100	100	100	100	100	100	100	
11 pF	110	110	110	110	110	110	110	110	110	110	110	
12 pF	120	120	120	120	120	120	120	120	120	120	120	
13 pF	130	130	130	130	130	130	130	130	130	130	130	
15 pF	150	150	150	150	150	150	150	150	150	150	150	
16 pF	160	160	160	160	160	160	160	160	160	160	160	
18 pF	180	180	180	180	180	180	180	180	180	180	180	
20 pF	200	200	200	200	200	200	200	200	200	200	200	
22 pF	220	220	220	220	220	220	220	220	220	220	220	
24 pF	240	240	240	240	240	240	240	240	240	240	240	
27 pF	270	270	270	270	270	270	270	270	270	270	270	
30 pF	300	300	300	300	300	300	300	300	300	300	300	
33 pF	330	330	330	330	330	330	330	330	330	330	330	
36 pF							360	360	360	360	360	360
39 pF							390	390	390	390	390	390
43 pF							430	430	430	430	430	430
47 pF							470	470	470	470	470	470
56 pF										560	560	560
68 pF										680	680	680
82 pF										820	820	820
100 pF										101	101	101
Rated Voltage (VDC)		6.3	10	25	50	100	50	100	250	50	100	250
Voltage Code		9	8	3	5	1	5	1	A	5	1	A

Table 2 – Chip Thickness/Reeling Quantities

Chip Size in. (mm)	Chip Thickness (mm)	Reel Quantity	
		7" Paper	13" Paper
0201 (0603)	0.30 ± 0.03	15,000	Contact KEMET for availability.
0402 (1005)	0.50 ± 0.05	10,000	
0603 (1608)	0.80 ± 0.07	4,000	
0805 (2012)	0.85 ± 0.10	4,000	

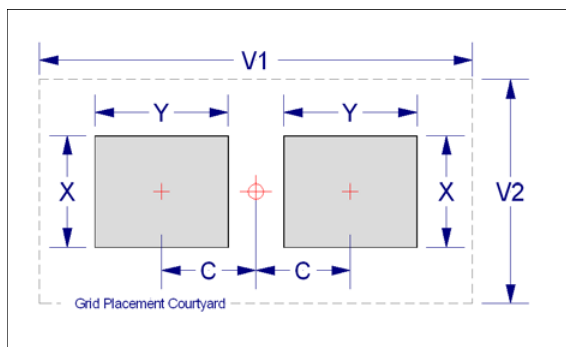
Table 3 – Chip Capacitor Land Pattern Design Recommendations per IPC–7351 (mm)

Case Size (in.)	Case Size (mm)	Density Level A: Maximum (Most) Land Protrusion					Density Level B: Median (Nominal) Land Protrusion					Density Level C: Minimum (Least) Land Protrusion				
		C	Y	X	V1	V2	C	Y	X	V1	V2	C	Y	X	V1	V2
0201	0603	0.38	0.56	0.52	1.80	1.00	0.33	0.46	0.42	1.50	0.80	0.28	0.36	0.32	1.20	0.60
0402	1005	0.50	0.72	0.72	2.20	1.20	0.45	0.62	0.62	1.90	1.00	0.40	0.52	0.52	1.60	0.80
0603	1608	0.90	1.15	1.10	4.00	2.10	0.80	0.95	1.00	3.10	1.50	0.60	0.75	0.90	2.40	1.20
0805	2012	1.00	1.35	1.55	4.40	2.60	0.90	1.15	1.45	3.50	2.00	0.75	0.95	1.35	2.80	1.70

Density Level A: For low-density product applications. Recommended for wave solder applications and provides a wider process window for reflow solder processes. KEMET only recommends wave soldering of 0603(1608) and 0805 (2012) case sizes.

Density Level B: For products with a moderate level of component density. Provides a robust solder attachment condition for reflow solder processes.

Density Level C: For high component density product applications. Before adapting the minimum land pattern variations the user should perform qualification testing based on the conditions outlined in IPC Standard 7351 (IPC–7351).



Soldering Process

Recommended Soldering Technique:

- Solder wave or solder reflow for 0603 and 0805 case sizes
- 0201 and 0402 case sizes are limited to solder reflow only

Recommended Soldering Profile:

- KEMET recommends following the guidelines outlined in IPC/JEDEC J-STD-020

Recommended Solder Alloys:

Alloy	Composition	Solidus	Liquidous
In50	50 In, 50 Pb	180°C	209°C
In52	52 In, 48 Sn	118°C	118°C
Sn62	62.5 Sn, 36.1 Pb, 1.4 Ag	179°C	179°C
Sn63	63 Sn, 37 Pb	183°C	183°C
Pb-Free	95.5 Sn, 3.8 Ag, 0.7 Cu	217°C	217°C
Hi-Temp	5 Sn, 93.5 Pb, 1.5 Ag	296°C	301°C
Sn5	5 Sn, 95 Pb	308°C	312°C

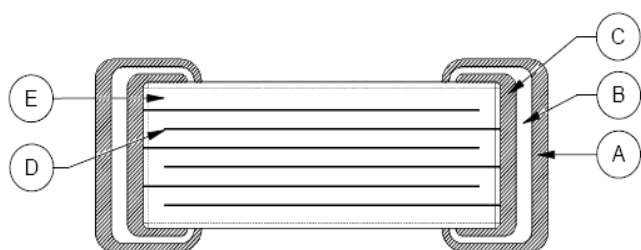
Table 4 – Performance & Reliability: Test Methods & Conditions

Stress	Test or Inspection Method	Requirements															
Terminal Strength	Pressurizing force: 0201 case size: 2N 0402 & 0603 case sizes: 5N 0805 case size: 10N Test time: 10 ± 1 sec.	No visible damage or separation of termination system.															
Vibration Resistance	Vibration frequency: 10 ~ 55 Hz/min. Total amplitude: 1.5 mm Test time: 6 hours (Two hours each in three mutually perpendicular directions.)	No visible damage. Cap change and Q/DF: To meet initial spec.															
Solderability	Solder temperature: 235 ± 5°C Dipping time: 2 ± 0.5 sec.	95% min. coverage of termination finish.															
Board Flex	Capacitor is mounted to a substrate which is flexed by means of ram at a rate of 1 mm per second until the deflection becomes 1 mm. (Deflection is maintained for 5 ± 1 second) Store at room temperature for 24 ± 2 hours before measuring electrical properties.	No visible damage. Cap change: within ±5.0% or ±0.5 pF, whichever is larger. (Capacitance change is monitored during flexure.)															
Resistance to Soldering Heat	Solder temperature: 260 ± 5°C Dipping time: 10 ± 1 second Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. Store at room temperature for 24 ± 2 hours before measuring electrical properties.	No visible damage. Cap change: within ±2.5% or ±0.25 pF, whichever is larger. Q/DF, IR and dielectric strength: To meet initial requirements. 25% max. leaching on each edge.															
Temperature Cycling	5 cycles of steps 1 - 4: <table border="1" data-bbox="370 1024 885 1213"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temp</td> <td>2 ~ 3</td> </tr> <tr> <td>3</td> <td>Max. operating temp. +3/-0</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temp (25°C)</td> <td>2 ~ 3</td> </tr> </tbody> </table> Store at room temperature for 24 ± 2 hours before measuring electrical properties.	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	30 ± 3	2	Room temp	2 ~ 3	3	Max. operating temp. +3/-0	30 ± 3	4	Room temp (25°C)	2 ~ 3	No visible damage. Cap change: within ±2.5% or ±0.25 pF, whichever is larger. Q/DF, IR and dielectric strength: To meet initial requirements.
Step	Temp. (°C)	Time (min.)															
1	Min. operating temp. +0/-3	30 ± 3															
2	Room temp	2 ~ 3															
3	Max. operating temp. +3/-0	30 ± 3															
4	Room temp (25°C)	2 ~ 3															
Humidity (Damp Heat) Steady State	Test temperature: 40 ± 2°C Humidity: 90 ~ 95% RH Test time: 500 +24/-0 hours Store at room temperature for 24 ± 2 hours before measuring electrical properties.	No visible damage. Cap change: within ±5.0% or ±0.5 pF, whichever is larger. Q/DF value: Cap ≥ 30 pF, Q ≥ 350, 10 pF ≤ Cap < 30 pF, Q ≥ 275 +2.5°C Cap < 10 pF; Q ≥ 200 +10°C IR: ≥ 1GΩ															
Humidity (Damp Heat) Load	Test temperature: 40 ± 2°C Humidity: 90 ~ 95% RH Test time: 500 +24/-0 hours Applied voltage: rated voltage Store at room temperature for 24 ± 2 hours before measuring electrical properties.	No visible damage. Cap change: within ±7.5% or ±0.75 pF, whichever is larger. Q/DF value: Cap ≥ 30 pF, Q ≥ 200, Cap < 30 pF, Q ≥ 100+10/3°C IR: ≥ 500MΩ															
High Temperature Life	Test temperature: 125 ± 3°C Applied voltage: 200% of rated voltage. Test time: 1000 +24/-0 hours Store at room temperature for 24 ± 2 hours before measuring electrical properties.	No visible damage. Cap change: within ±3.0% or ±0.3 pF, whichever is larger. Q/DF value: Cap ≥ 30 pF, Q ≥ 350, 10 pF ≤ Cap < 30 pF, Q ≥ 275 +2.5°C Cap < 10 pF, Q ≥ 200 +10°C IR: ≥ 1 GΩ															

Storage and Handling

Ceramic chip capacitors should be stored in normal working environments. While the chips themselves are quite robust in other environments, solderability will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature – reels may soften or warp, and tape peel force may increase. KEMET recommends that maximum storage temperature not exceed 40°C, and maximum storage humidity not exceed 70% relative humidity. Temperature fluctuations should be minimized to avoid condensation on the parts, and atmospheres should be free of chlorine and sulfur bearing compounds. For optimized solderability, chip stock should be used promptly, preferably within 1.5 years of receipt.

Construction



Note: Image is exaggerated in order to clearly identify all components of construction

Reference	Item	Material
A	Termination System	Finish
B		Barrier Layer
C		Base metal
D	Inner Electrode	Cu
E	Dielectric Material	BaTiO ₃

Marking

CBR series devices are supplied unmarked.

Figure 1 – Punched (Paper) Carrier Tape Dimensions

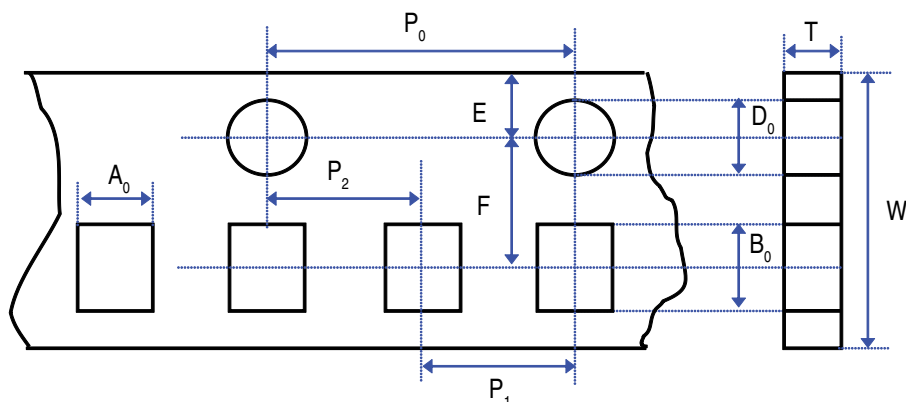


Table 6 – Punched (Paper) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)						
Tape Size	D_0	E_1	P_0	P_2	R Ref. Note 2	
8 mm	1.55 ± 0.05 (0.061 ± 0.002)	1.55 ± 0.05 (0.061 ± 0.002)	4.0 ± 0.10 (0.157 ± 0.004)	2.0 ± 0.05 (0.079 ± 0.002)	25.0 (0.984)	
Variable Dimensions — Millimeters (Inches)						
Tape Size	Pitch	F	P1	T	W	
8 mm	Half (2 mm)	3.5 ± 0.05 (0.138 ± 0.002)	2.0 ± 0.05 (0.079 ± 0.002)	0.42 ± 0.05 (0.017 ± 0.002)	8.0 ± 0.10 (0.315 ± 0.004)	
				0.60 ± 0.05 (0.024 ± 0.002)		
8 mm	Single (4 mm)		4.0 ± 0.10 (0.157 ± 0.004)	0.95 ± 0.05 (0.037 ± 0.002)		0.97 ± 0.05 (0.038 ± 0.002)
						0.75 ± 0.05 (0.030 ± 0.002)

2. The tape with or without components shall pass around R without damage (see Figure 3).

Packaging Information Performance Notes

- 1. Cover Tape Break Force:** 1.0 Kg minimum.
- 2. Cover Tape Peel Strength:** The total peel strength of the cover tape from the carrier tape shall be:

Tape Width	Peel Strength
8 mm	0.1 to 1.0 Newton (10 to 100 gf)
12 and 16 mm	0.1 to 1.3 Newton (10 to 130 gf)

The direction of the pull shall be opposite the direction of the carrier tape travel. The pull angle of the carrier tape shall be 165° to 180° from the plane of the carrier tape. During peeling, the carrier and/or cover tape shall be pulled at a velocity of 300 ±10 mm/minute.

- 3. Labeling:** Bar code labeling (standard or custom) shall be on the side of the reel opposite the sprocket holes. Refer to EIA Standards 556 and 624.

Figure 2 – Bending Radius

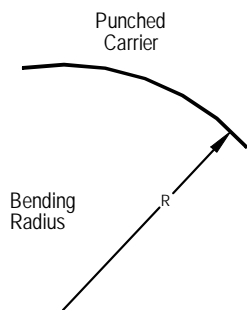


Figure 3 – Tape Leader & Trailer Dimensions

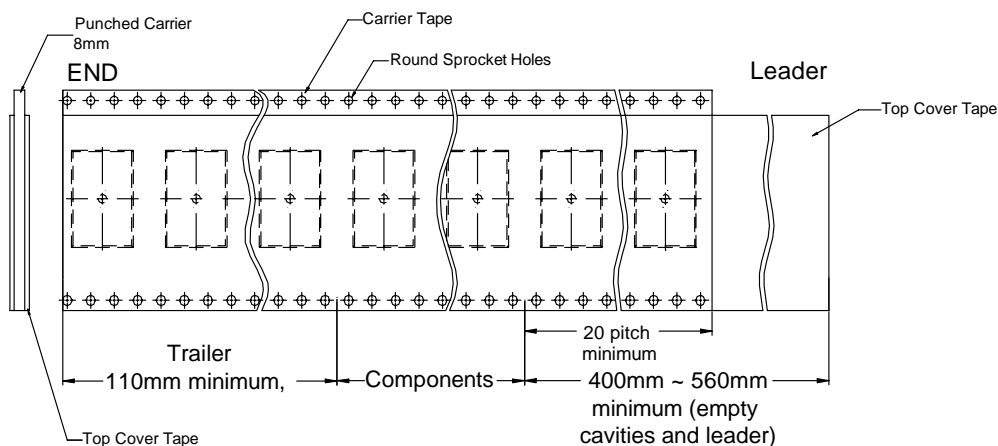


Figure 4 – Maximum Camber

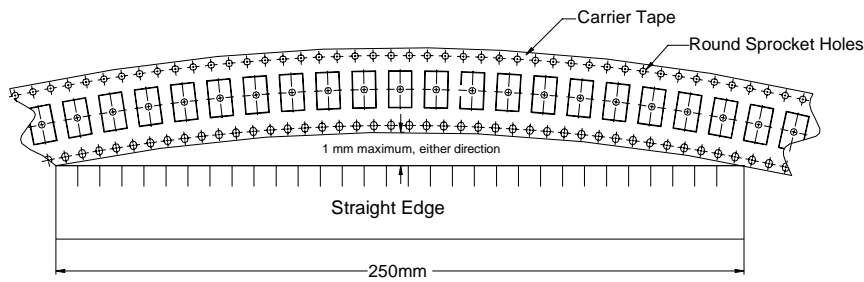


Figure 5 – Reel Dimensions

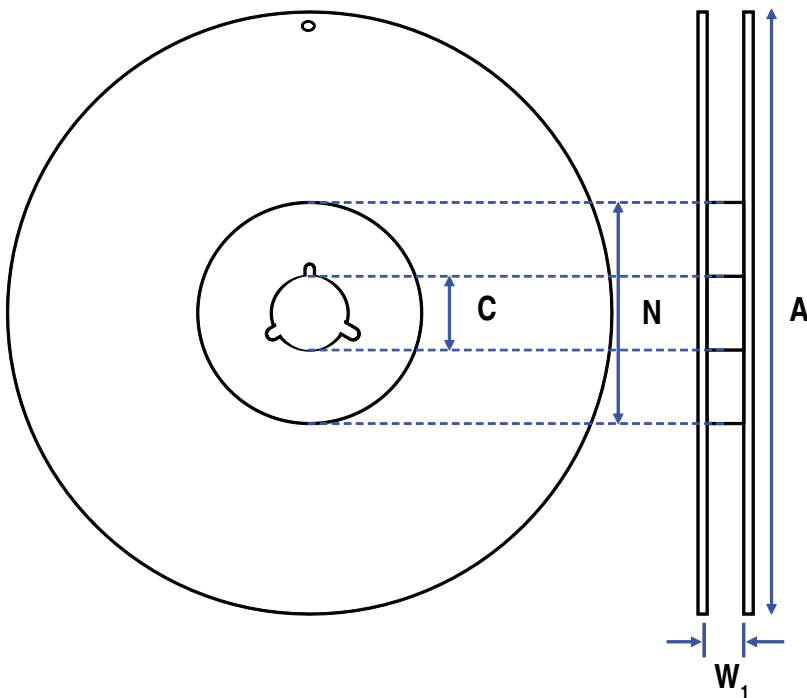


Table 7 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)			
Tape Size	Reel Size	A	C
8 mm	7	178 ± 0.10 (7.008 ± 0.004)	13.0 ± 0.20 (0.512 ± 0.008)
Variable Dimensions — Millimeters (Inches)			
Tape Size	N Min. See Note 2, Table 5	W ₁	
8 mm	50 (1.969)	8.4 + 1.5/-0.0 (0.331 + 0.059/-0.0)	

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Tel: 39-02-57518176

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Tel: 39-06-23231718

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Tel: 34-91-804-4303

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Tel: 49-8191-3350800

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Coatbridge, Scotland
Tel: 44-1236-434455

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Tel: 86-21-6447-0707

Taipei, Taiwan
Tel: 886-2-27528585

Southeast Asia

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Tel: 65-6586-1900

Penang, Malaysia
Tel: 60-4-6430200

Bangalore, India
Tel: 91-806-53-76817

Note: KEMET reserves the right to modify minor details of internal and external construction at any time in the interest of product improvement. KEMET does not assume any responsibility for infringement that might result from the use of KEMET Capacitors in potential circuit designs. KEMET is a registered trademark of KEMET Electronics Corporation.

Other KEMET Resources

Tools	
Resource	Location
Configure A Part: CapEdge	http://capacitoredge.kemet.com
SPICE & FIT Software	http://www.kemet.com/spice
Search Our FAQs: KnowledgeEdge	http://www.kemet.com/keask

Product Information	
Resource	Location
Products	http://www.kemet.com/products
Technical Resources (Including Soldering Techniques)	http://www.kemet.com/technicalpapers
RoHS Statement	http://www.kemet.com/rohs
Quality Documents	http://www.kemet.com/qualitydocuments

Product Request	
Resource	Location
Sample Request	http://www.kemet.com/sample
Engineering Kit Request	http://www.kemet.com/kits

Contact	
Resource	Location
Website	www.kemet.com
Contact Us	http://www.kemet.com/contact
Investor Relations	http://www.kemet.com/ir
Call Us	1-877-MyKEMET
Twitter	http://twitter.com/kemetcapacitors

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Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.

