Surface Mount Multilayer Ceramic Chip Capacitors (SMD MLCCs)

Y5V Dielectric, 6.3 – 50 VDC (Commercial Grade)

Overview

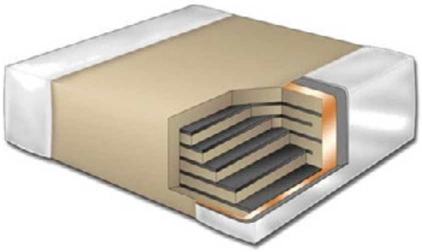
KEMET's Y5V dielectric features an 85°C maximum operating temperature and is considered "general-purpose." The Electronics Components, Assemblies & Materials Association (EIA) characterizes Y5V dielectric as a Class III material. Components of this classification are fixed, ceramic dielectric capacitors suited for bypass and decoupling or other applications in which dielectric losses, high insulation resistance and capacitance stability are not of major importance. Y5V exhibits a predictable change in capacitance with respect to time and voltage and displays wide variations in capacitance with reference to ambient temperature. Capacitance change is limited to +22%, -82% from -30°C to +85°C.

Benefits

- -30°C to +85°C operating temperature range
- Pb-Free and RoHS Compliant
- EIA 0402, 0603, 0805, 1206, and 1210 case sizes
- DC voltage ratings of 6.3 V, 10 V, 16 V, 25 V, and 50 V
- Capacitance offerings ranging from 0.022 μF to 22 μF
- Available capacitance tolerance of +80%/ -20%
- Non-polar device, minimizing installation concerns
- 100% pure matte tin-plated termination finish that allowing for excellent solderability

Applications

Typical applications include limited temperature, decoupling and bypass.



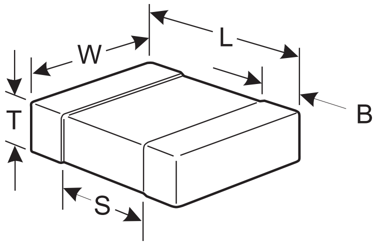
Ordering Information

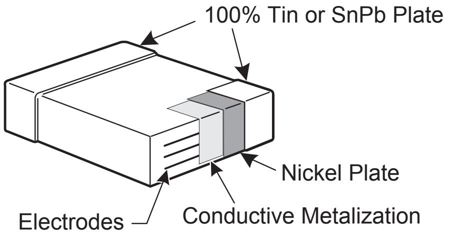
C	1210	C	226	Z	4	V	A	C	TU
Ceramic	Case Size (L" x W")	Specification/ Series	Capacitance Code (pF)	Capacitance Tolerance	Voltage	Dielectric	Failure Rate/ Design	Termination Finish[1]	Packaging/Grade (C-Spec)[2]
	0402 0603 0805 1206 1210	C = Standard	2 Significant Digits + Number of Zeros	Z = +80%/ -20%	9 = 6.3 V 8 = 10 V 4 = 16 V 3 = 25 V 5 = 50 V	V = Y5V	A = N/A	C = 100% Matte Sn	Blank = Bulk TU = 7" Reel Unmarked

[1] *Additional termination finish options may be available. Contact KEMET for details.*

[2] *Additional reeling or packaging options may be available. Contact KEMET for details.*

Dimensions – Millimeters (Inches)





EIA Size Code	Metric Size Code	L Length	W Width	T Thickness	B Bandwidth	S Separation Minimum	Mounting Technique
0402	1005	1.00 (.040) ± 0.05 (.002)	0.50 (.020) ± 0.05 (.002)	See Table 2 for Thickness	0.30 (.012) ± 0.10 (.004)	0.30 (.012)	Solder Reflow Only
0603	1608	1.60 (.063) ± 0.15 (.006)	0.80 (.032) ± 0.15 (.006)		0.35 (.014) ± 0.15 (.006)	0.70 (.028)	Solder Wave or Solder Reflow
0805	2012	2.00 (.079) ± 0.20 (.008)	1.25 (.049) ± 0.20 (.008)		0.50 (0.02) ± 0.25 (.010)	0.75 (.030)	
1206	3216	3.20 (.126) ± 0.20 (.008)	1.60 (.063) ± 0.20 (.008)		0.50 (0.02) ± 0.25 (.010)	N/A	
1210	3225	3.20 (.126) ± 0.20 (.008)	2.50 (.098) ± 0.20 (.008)		0.50 (0.02) ± 0.25 (.010)		Solder Reflow Only

Qualification/Certification

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

Environmental Compliance

Pb-Free and RoHS Compliant.

RoHS Compliant

Electrical Parameters/Characteristics

Item	Parameters/Characteristics
Operating Temperature Range	-30°C to +85°C
Capacitance Change with Reference to +25°C and 0 VDC Applied (TCC)	+22%, -82%
Aging Rate (Maximum % Capacitance Loss/Decade Hour)	7.0%
Dielectric Withstanding Voltage (DWV)	250% of rated voltage (5 ±1 seconds and charge/discharge not exceeding 50 mA)
Dissipation Factor (DF) Maximum Limit @ 25°C	10% (6.3 and 10 V), 7% (16 and 25 V) and 5% (50 V)
Insulation Resistance (IR) Limit @ 25°C	See Insulation Resistance Limit Table (Rated voltage applied for 120 ±5 seconds @ 25°C)

Regarding aging rate: Capacitance measurements (including tolerance) are indexed to a referee time of 1,000 hours.
To obtain IR limit, divide MΩ-µF value by the capacitance and compare to GΩ limit. Select the lower of the two limits.
Capacitance and Dissipation Factor (DF) measured under the following conditions:

1 kHz ±50 Hz and 1.0 ±0.2 Vrms

120 Hz ±10 Hz and 0.5 ±0.1 Vrms if capacitance >10 µF

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."

Post Environmental Limits

High Temperature Life, Biased Humidity, Moisture Resistance					
Dielectric	Rated DC Voltage	Capacitance Value	Dissipation Factor (Maximum %)	Capacitance Shift	Insulation Resistance
Y5V	> 25	All	7.5	±30%	10% of Initial Limit
	16/25		10.0		
	< 16		15.0		

Insulation Resistance Limit Table

EIA Case Size	100 Megohm Microfarads or 10 GΩ	50 Megohm Microfarads or 10 GΩ
All	≥ 16 V	≤ 10 V

Table 1 – Capacitance Range/Selection Waterfall (0402 – 1210 Case Sizes)

Capacitance	Cap Code	Case Size / Series		C0402C			C0603C				C0805C					C1206C					C1210C				
		Voltage Code		9	8	4	9	8	4	3	9	8	4	3	5	9	8	4	3	5	9	8	4	3	5
		Rated Voltage (VDC)		6.3	10	16	6.3	10	16	25	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50
		Capacitance Tolerance		Product Availability and Chip Thickness Codes See Table 2 for Chip Thickness Dimensions																					
22,000 pF	223	M	Z	BB	BB	BB	CB	CB	CB	CB	DC	DC	DC	DC	DC										
27,000 pF	273	M	Z	BB	BB	BB	CB	CB	CB	CB	DC	DC	DC	DC	DC										
33,000 pF	333	M	Z	BB	BB	BB	CB	CB	CB	CB	DC	DC	DC	DC	DC										
39,000 pF	393	M	Z	BB	BB	BB	CB	CB	CB	CB	DD	DD	DD	DD	DD										
47,000 pF	473	M	Z	BB	BB	BB	CB	CB	CB	CB	DD	DD	DD	DD	DD										
56,000 pF	563	M	Z	BB	BB	BB	CB	CB	CB	CB	DD	DD	DD	DD	DD										
68,000 pF	683	M	Z	BB	BB	BB	CB	CB	CB	CB	DD	DD	DD	DD	DD										
82,000 pF	823	M	Z	BB	BB	BB	CB	CB	CB	CB	DD	DD	DD	DD	DD										
0.10 µF	104	M	Z	BB	BB	BB	CC	CC	CC	CC	DC	DC	DC	DC	DC										
0.12 µF	124	M	Z				CC	CC	CC	CC	DC	DC	DC	DC											
0.15 µF	154	M	Z				CC	CC	CC	CC	DC	DC	DC	DC											
0.18 µF	184	M	Z				CC	CC	CC	CC	DC	DC	DC	DC											
0.22 µF	224	M	Z	BB			CC	CC	CC	CC	DC	DC	DC	DC	DG	EC	EC	EC	EC		FD	FD	FD	FD	FD
0.27 µF	274	M	Z				CC	CC	CC	CC	DC	DC	DC	DC		EB	EB	EB	EB		FD	FD	FD	FD	FD
0.33 µF	334	M	Z				CC	CC	CC	CC	DC	DC	DC	DC		EB	EB	EB	EB		FD	FD	FD	FD	FD
0.39 µF	394	M	Z				CC	CC	CC		DC	DC	DC	DC		EB	EB	EB	EB		FD	FD	FD	FD	FD
0.47 µF	474	M	Z	BB			CC	CC	CC		DC	DC	DC	DC		EC	EC	EC	EC		FD	FD	FD	FD	FD
0.56 µF	564	M	Z				CC	CC			DD	DD	DD	DD		EB	EB	EB	EB		FD	FD	FD	FD	FD
0.68 µF	684	M	Z				CC	CC			DE	DE	DE	DE		EB	EB	EB	EB		FD	FD	FD	FD	FD
0.82 µF	824	M	Z				CC	CC			DG	DG	DG	DG		EB	EB	EB	EB		FF	FF	FF	FF	FF
1.0 µF	105	M	Z	BB	BB		CC	CC	CC	CC	DG	DG	DG	DG	DG	EF	EF	EF	EG		FH	FH	FH	FH	FH
1.2 µF	125	M	Z								DC	DC	DC			EC	EC	EC			FD	FD	FD		
1.5 µF	155	M	Z								DC	DC	DC			EC	EC	EC			FD	FD	FD		
1.8 µF	185	M	Z								DD	DD	DD			ED	ED	ED			FD	FD	FD		
2.2 µF	225	M	Z	BB	BB						DG	DG	DG			EE	EE	EE			FD	FD	FD		
3.3 µF	335	M	Z								DL	DL	DG			EH	EH	EF			FE	FE	FE		
4.7 µF	475	M	Z								DG	DG	DG			EM	EM	EM			FT	FT	FT		
5.6 µF	565	M	Z								DF	DF				EJ	EJ	EJ			FG	FG	FG		
6.8 µF	685	M	Z								DG	DG				EJ	EJ				FH	FH	FH		
10 µF	106	M	Z								DG	DG				EH	EH	EH	EH		FH	FH	FH		
15 µF	156	M	Z																		FH	FH	FH		
22 µF	226	M	Z													EH	EH				FT	FT	FJ	FH	
Capacitance	Cap Code	Rated Voltage (VDC)		6.3	10	16	6.3	10	16	25	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50
		Voltage Code		9	8	4	9	8	4	3	9	8	4	3	5	9	8	4	3	5	9	8	4	3	5
		Case Size / Series		C0402C			C0603C				C0805C					C1206C					C1210C				

Roll Over for Order Info.

Table 2 – Chip Thickness/Packaging Quantities

Thickness Code	Case Size	Thickness ± Range (mm)	Paper Quantity		Plastic Quantity	
			7" Reel	13" Reel	7" Reel	13" Reel
BB	0402	0.50 ± 0.05	10,000	50,000	0	0
CB	0603	0.80 ± 0.07	4,000	10,000	0	0
CC	0603	0.80 ± 0.10	4,000	10,000	0	0
DC	0805	0.78 ± 0.10	4,000	10,000	0	0
DD	0805	0.90 ± 0.10	4,000	10,000	0	0
DL	0805	0.95 ± 0.10	0	0	4,000	10,000
DE	0805	1.00 ± 0.10	0	0	2,500	10,000
DF	0805	1.10 ± 0.10	0	0	2,500	10,000
DG	0805	1.25 ± 0.15	0	0	2,500	10,000
EB	1206	0.78 ± 0.10	4,000	10,000	4,000	10,000
EC	1206	0.90 ± 0.10	0	0	4,000	10,000
ED	1206	1.00 ± 0.10	0	0	2,500	10,000
EE	1206	1.10 ± 0.10	0	0	2,500	10,000
EF	1206	1.20 ± 0.15	0	0	2,500	10,000
EM	1206	1.25 ± 0.15	0	0	2,500	10,000
EG	1206	1.60 ± 0.15	0	0	2,000	8,000
EH	1206	1.60 ± 0.20	0	0	2,000	8,000
EJ	1206	1.70 ± 0.20	0	0	2,000	8,000
FD	1210	0.95 ± 0.10	0	0	4,000	10,000
FE	1210	1.00 ± 0.10	0	0	2,500	10,000
FF	1210	1.10 ± 0.10	0	0	2,500	10,000
FG	1210	1.25 ± 0.15	0	0	2,500	10,000
FH	1210	1.55 ± 0.15	0	0	2,000	8,000
FJ	1210	1.85 ± 0.20	0	0	2,000	8,000
FT	1210	1.90 ± 0.20	0	0	1,500	4,000
Thickness Code	**Case Size**	**Thickness ± Range (mm)**	**7" Reel**	**13" Reel**	**7" Reel**	**13" Reel**
			Paper Quantity		**Plastic Quantity**	

Package quantity based on finished chip thickness specifications.

Table 3 – Chip Capacitor Land Pattern Design Recommendations per IPC-7351

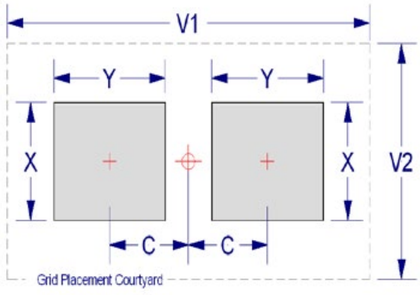
EIA Size Code	Metric Size Code	Density Level A: Maximum (Most) Land Protrusion (mm)					Density Level B: Median (Nominal) Land Protrusion (mm)					Density Level C: Minimum (Least) Land Protrusion (mm)				
		C	Y	X	V1	V2	C	Y	X	V1	V2	C	Y	X	V1	V2
0402	1005	0.50	0.72	0.72	2.20	1.20	0.45	0.62	0.62	1.90	1.00	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
1206	3216	1.60	1.35	1.90	5.60	2.90	1.50	1.15	1.80	4.70	2.30	1.40	0.95	1.70	4.00	2.00
1210	3225	1.60	1.35	2.80	5.65	3.80	1.50	1.15	2.70	4.70	3.20	1.40	0.95	2.60	4.00	2.90
1210[1]	3225	1.50	1.60	2.90	5.60	3.90	1.40	1.40	2.80	4.70	3.30	1.30	1.20	2.70	4.00	3.00

[1] *Only for capacitance values ≥ 22 µF*

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 EIA 0603, 0805, and 1206 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 EIA case sizes 0603, 0805, and 1206
- All other EIA case sizes are limited to solder reflow only

Recommended Soldering Profile:

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

Table 4 – Performance & Reliability: Test Methods and Conditions

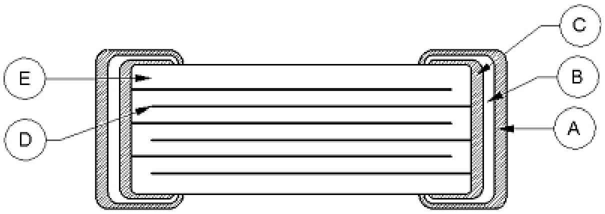
Stress	Reference	Test or Inspection Method
Terminal Strength	JIS–C–6429	Appendix 1, Note: Force of 1.8 kg for 60 seconds.
Board Flex	JIS–C–6429	Appendix 2, Note: Standard termination system – 2.0 mm (minimum) for all except 3 mm for C0G. Flexible termination system – 3.0 mm (minimum).
Solderability	J–STD–002	Magnification 50 X. Conditions:
		a) Method B, 4 hours @ 155°C, dry heat @ 235°C
		b) Method B @ 215°C category 3
		c) Method D, category 3 @ 260°C
Temperature Cycling	JESD22 Method JA–104	1,000 Cycles (-55°C to +125°C). Measurement at 24 hours +/- 2 hours after test conclusion.
Biased Humidity	MIL–STD–202 Method 103	Load Humidity: 1,000 hours 85°C/85% RH and rated voltage. Add 100 K ohm resistor. Measurement at 24 hours +/- 2 hours after test conclusion.
		Low Volt Humidity: 1,000 hours 85°C/85% RH and 1.5 V. Add 100 K ohm resistor. Measurement at 24 hours +/- 2 hours after test conclusion.
Moisture Resistance	MIL–STD–202 Method 106	t = 24 hours/cycle. Steps 7a and 7b not required. Unpowered. Measurement at 24 hours +/- 2 hours after test conclusion.
Thermal Shock	MIL–STD–202 Method 107	-55°C/+125°C. Note: Number of cycles required – 300, maximum transfer time – 20 seconds, dwell time – 15 minutes. Air – Air.
High Temperature Life	MIL–STD–202 Method 108 /EIA–198	1,000 hours at 125°C (85°C for X5R, Z5U and Y5V) with 2 X rated voltage applied.
Storage Life	MIL–STD–202 Method 108	150°C, 0 VDC for 1,000 hours.
Vibration	MIL–STD–202 Method 204	5 g's for 20 min., 12 cycles each of 3 orientations. Note: Use 8" X 5" PCB 0.031" thick 7 secure points on one long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10 – 2,000 Hz
Mechanical Shock	MIL–STD–202 Method 213	Figure 1 of Method 213, Condition F.
Resistance to Solvents	MIL–STD–202 Method 215	Add aqueous wash chemical, OKEM Clean or equivalent.

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 40ºC 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

Reference	Item		Material
A	Termination System	Finish	100% Matte Sn
B		Barrier Layer	Ni
C		Base Metal	Cu
D	Inner Electrode		Ni
E	Dielectric Material		$BaTiO_3$



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

Capacitor Marking (Optional):

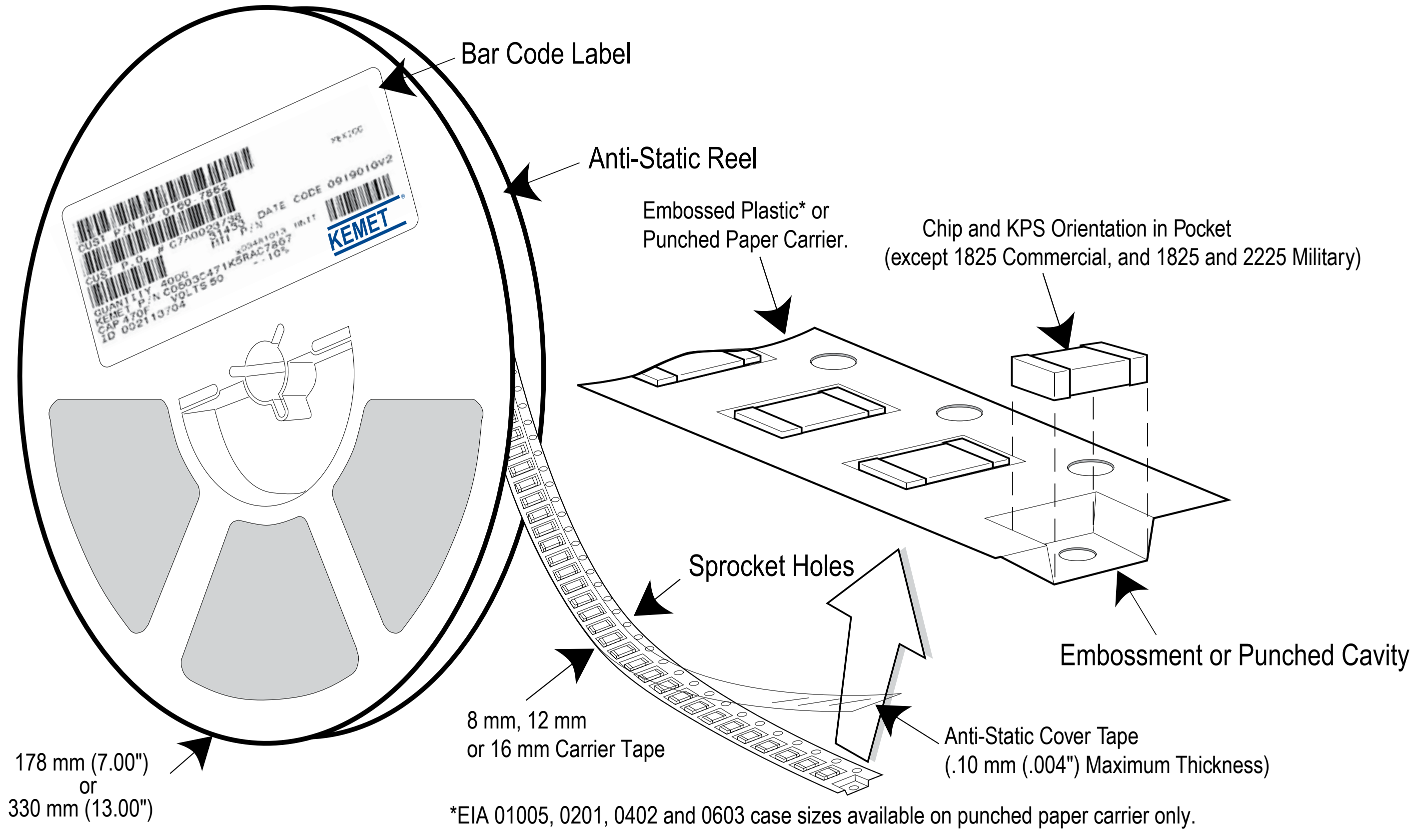
Laser marking option is not available on:

- C0G, Ultra Stable X8R and Y5V dielectric devices
- EIA 0402 case size devices
- EIA 0603 case size devices with Flexible Termination option.
- KPS Commercial and Automotive grade stacked devices.

These capacitors are supplied unmarked only.

Tape & Reel Packaging Information

KEMET offers multilayer ceramic chip capacitors packaged in 8, 12 and 16 mm tape on 7" and 13" reels in accordance with EIA Standard 481. This packaging system is compatible with all tape-fed automatic pick and place systems. See Table 2 for details on reeling quantities for commercial chips.



*EIA 01005, 0201, 0402 and 0603 case sizes available on punched paper carrier only.

Table 5 – Carrier Tape Configuration – Embossed Plastic & Punched Paper (mm)

EIA Case Size	Tape Size (W)*	Pitch (P_1)*
01005 – 0402	8	2
0603 – 1210	8	4
1805 – 1808	12	4
≥ 1812	12	8
KPS 1210	12	8
KPS 1812 & 2220	16	12
Array 0508 & 0612	8	4

**Refer to Figures 1 & 2 for W and P_1 carrier tape reference locations.*
**Refer to Tables 6 & 7 for tolerance specifications.*

Figure 1 – Embossed (Plastic) Carrier Tape Dimensions

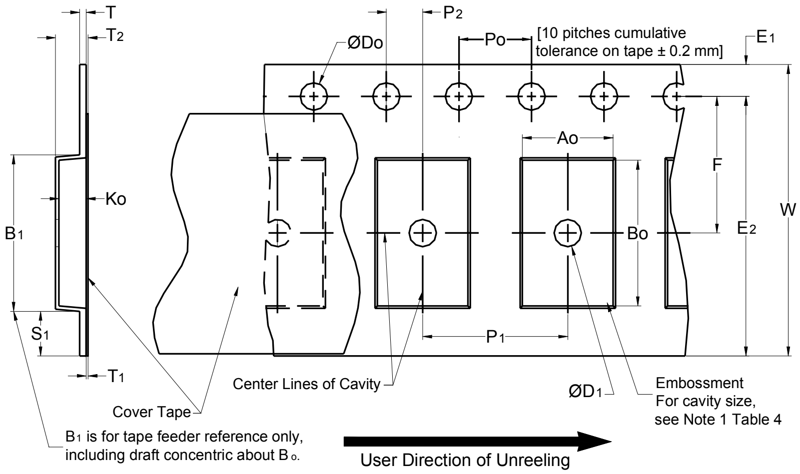


Table 6 – Embossed (Plastic) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)								
Tape Size	D_0	D_1 Minimum Note 1	E_1	P_0	P_2	R Reference Note 2	S_1 Minimum Note 3	T Maximum	T_1 Maximum
8 mm	1.5 +0.10/-0.0 (0.059 +0.004/-0.0)	1.0 (0.039)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	25.0 (0.984)	0.600 (0.024)	0.600 (0.024)	0.100 (0.004)
12 mm		1.5 (0.059)				30 (1.181)			
16 mm									

Variable Dimensions — Millimeters (Inches)								
Tape Size	Pitch	B_1 Maximum Note 4	E_2 Minimum	F	P_1	T_2 Maximum	W Maximum	A_0,B_0 & K_0
8 mm	Single (4 mm)	4.35 (0.171)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	4.0 ±0.10 (0.157 ±0.004)	2.5 (0.098)	8.3 (0.327)	Note 5
12 mm	Single (4 mm) & Double (8 mm)	8.2 (0.323)	10.25 (0.404)	5.5 ±0.05 (0.217 ±0.002)	8.0 ±0.10 (0.315 ±0.004)	4.6 (0.181)	12.3 (0.484)	
16 mm	Triple (12 mm)	12.1 (0.476)	14.25 (0.561)	7.5 ±0.05 (0.138 ±0.002)	12.0 ±0.10 (0.157 ±0.004)	4.6 (0.181)	16.3 (0.642)	

1. *The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.*
2. *The tape with or without components shall pass around R without damage (see Figure 6).*
3. *If S_1 < 1.0 mm, there may not be enough area for cover tape to be properly applied (see EIA Standard 481 paragraph 4.3 section b).*
4. *B_1 dimension is a reference dimension for tape feeder clearance only.*
5. *The cavity defined by A_0, B_0 and K_0 shall surround the component with sufficient clearance that:*
   (a) the component does not protrude above the top surface of the carrier tape.
   (b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.
   (c) rotation of the component is limited to 20° maximum for 8 and 12 mm tapes and 10° maximum for 16 mm tapes (see Figure 3).
   (d) lateral movement of the component is restricted to 0.5 mm maximum for 8 and 12 mm wide tape and to 1.0 mm maximum for 16 mm tape (see Figure 4).
   (e) for KPS Series product, A_0 and B_0 are measured on a plane 0.3 mm above the bottom of the pocket.
   (f) see Addendum in EIA Standard 481 for standards relating to more precise taping requirements.

Figure 2 – Punched (Paper) Carrier Tape Dimensions

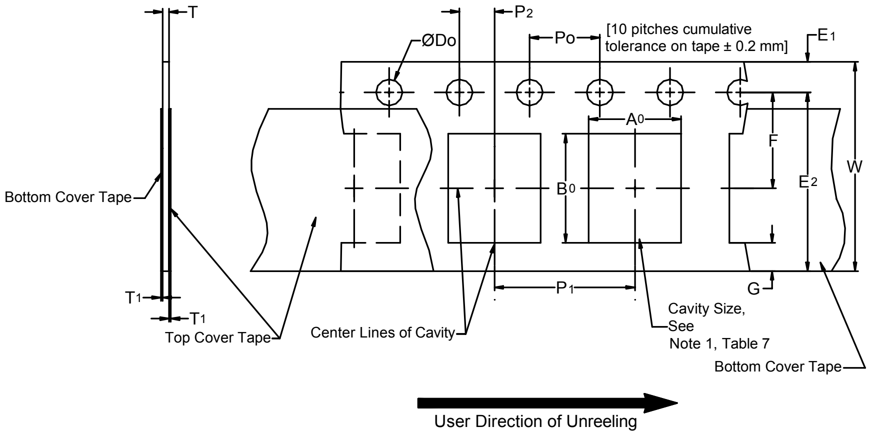


Table 7 – Punched (Paper) Carrier Tape Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)							
Tape Size	D_0	E_1	P_0	P_2	T_1 Maximum	G Minimum	R Reference Note 2
8 mm	1.5 +0.10 -0.0 (0.059 +0.004 -0.0)	1.75 ±0.10 (0.069 ±0.004)	4.0 ±0.10 (0.157 ±0.004)	2.0 ±0.05 (0.079 ±0.002)	0.10 (0.004) Maximum	0.75 (0.030)	25 (0.984)
Variable Dimensions — Millimeters (Inches)							
Tape Size	Pitch	E2 Minimum	F	P_1	T Maximum	W Maximum	$A_0 B_0$
8 mm	Half (2 mm)	6.25 (0.246)	3.5 ±0.05 (0.138 ±0.002)	2.0 ±0.05 (0.079 ±0.002)	1.1 (0.098)	8.3 (0.327)	Note 1
8 mm	Single (4 mm)			4.0 ±0.10 (0.157 ±0.004)		8.3 (0.327)	

1. *The cavity defined by A_0, B_0 and T shall surround the component with sufficient clearance that:*
   - *a) the component does not protrude beyond either surface of the carrier tape.*
   - *b) the component can be removed from the cavity in a vertical direction without mechanical restriction, after the top cover tape has been removed.*
   - *c) rotation of the component is limited to 20° maximum (see Figure 3).*
   - *d) lateral movement of the component is restricted to 0.5 mm maximum (see Figure 4).*
   - *e) see Addendum in EIA Standard 481 for standards relating to more precise taping requirements.*
2. *The tape with or without components shall pass around R without damage (see Figure 6).*

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 3 – Maximum Component Rotation

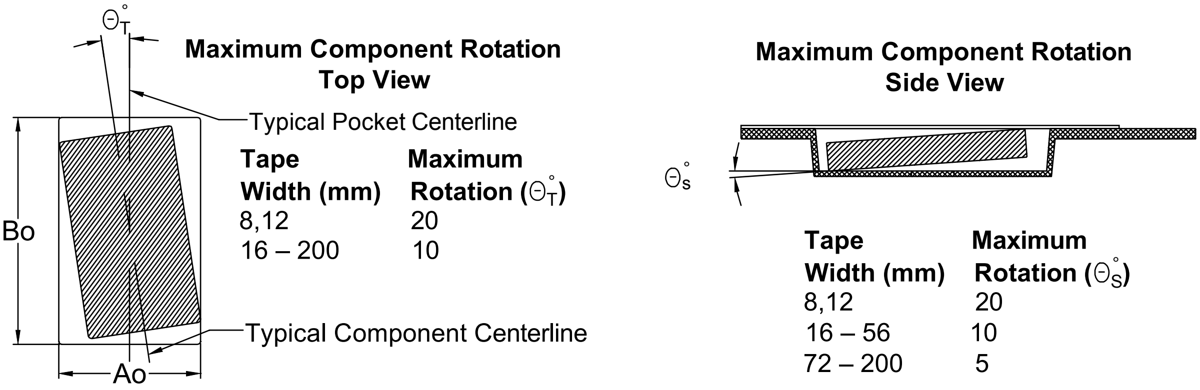


Figure 4 – Maximum Lateral Movement

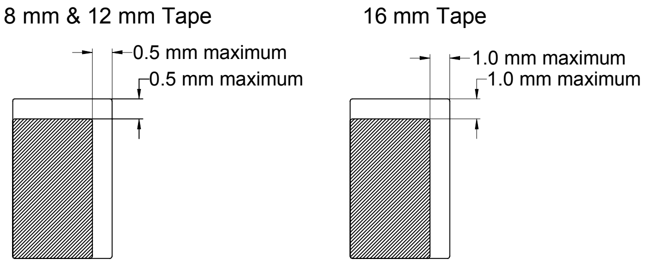


Figure 5 – Bending Radius

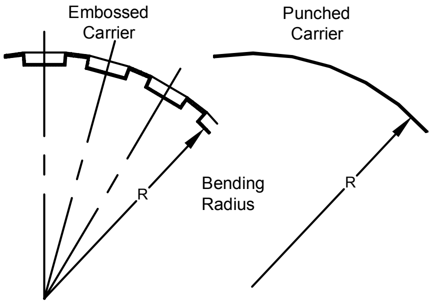
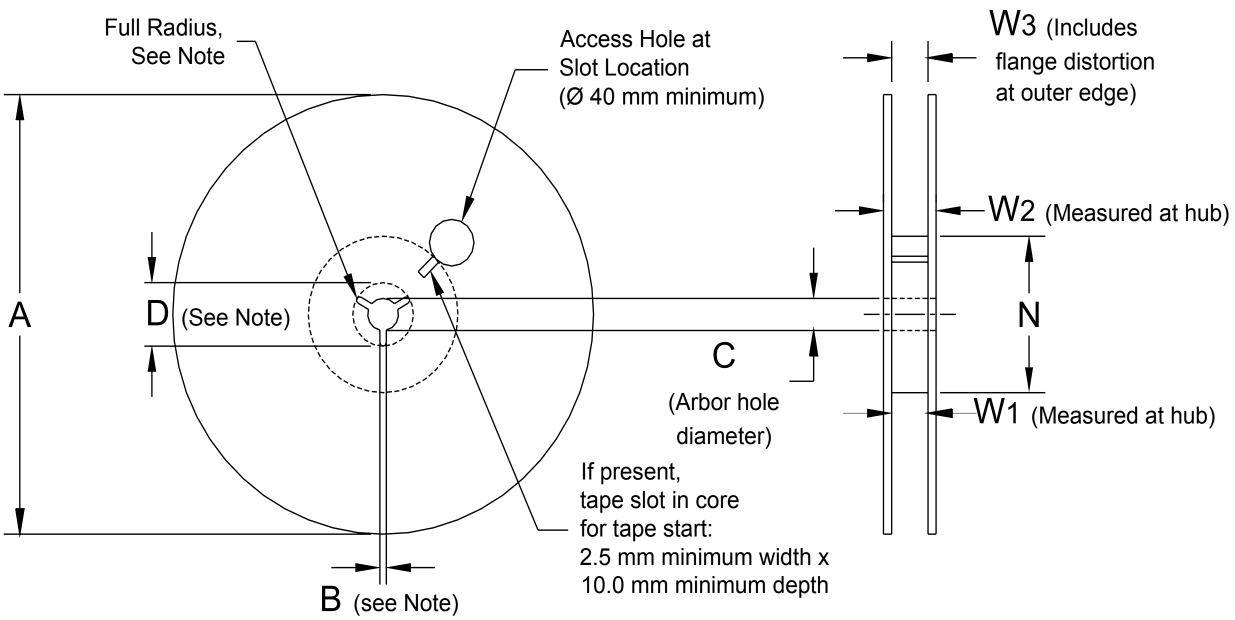


Figure 6 – Reel Dimensions



Note: Drive spokes optional; if used, dimensions B and D shall apply.

Table 8 – Reel Dimensions

Metric will govern

Constant Dimensions — Millimeters (Inches)				
Tape Size	A	B Minimum	C	D Minimum
8 mm	178 ±0.20 (7.008 ±0.008) or 330 ±0.20 (13.000 ±0.008)	1.5 (0.059)	13.0 +0.5/-0.2 (0.521 +0.02/-0.008)	20.2 (0.795)
12 mm				
16 mm				
Variable Dimensions — Millimeters (Inches)				
Tape Size	N Minimum	W_1	W_2 Maximum	W_3
8 mm	50 (1.969)	8.4 +1.5/-0.0 (0.331 +0.059/-0.0)	14.4 (0.567)	Shall accommodate tape width without interference
12 mm		12.4 +2.0/-0.0 (0.488 +0.078/-0.0)	18.4 (0.724)	
16 mm		16.4 +2.0/-0.0 (0.646 +0.078/-0.0)	22.4 (0.882)	

Figure 7 – Tape Leader & Trailer Dimensions

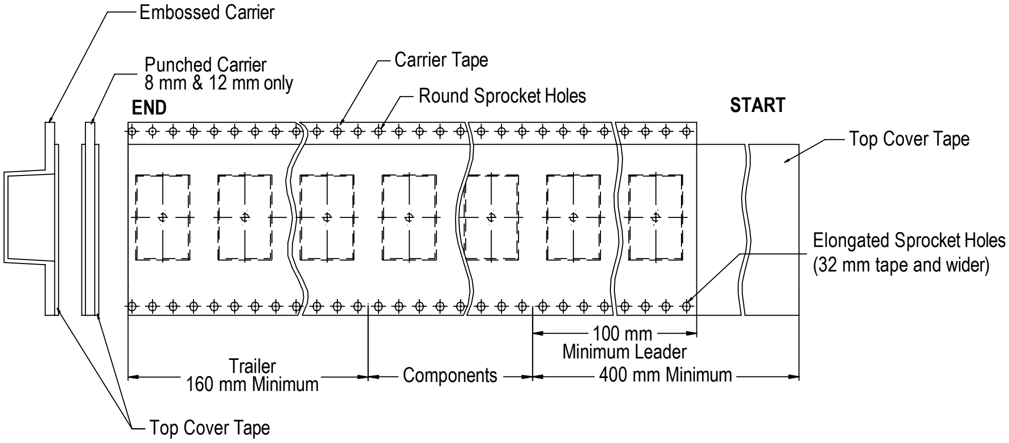


Figure 8 – Maximum Camber

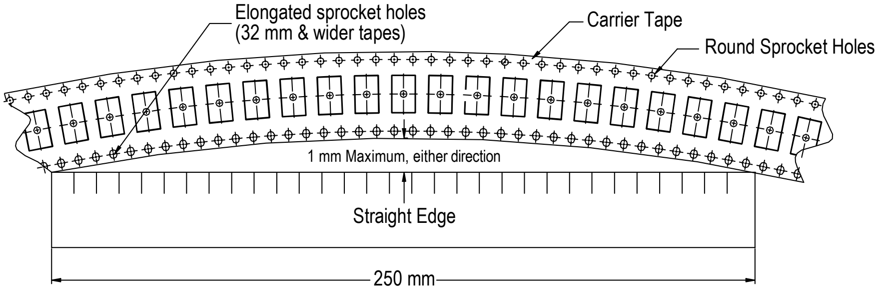


Figure 9 – Bulk Cassette Packaging (Ceramic Chips Only)

Meets Dimensional Requirements IEC–286 and EIAJ 7201

*Unit mm *Reference*

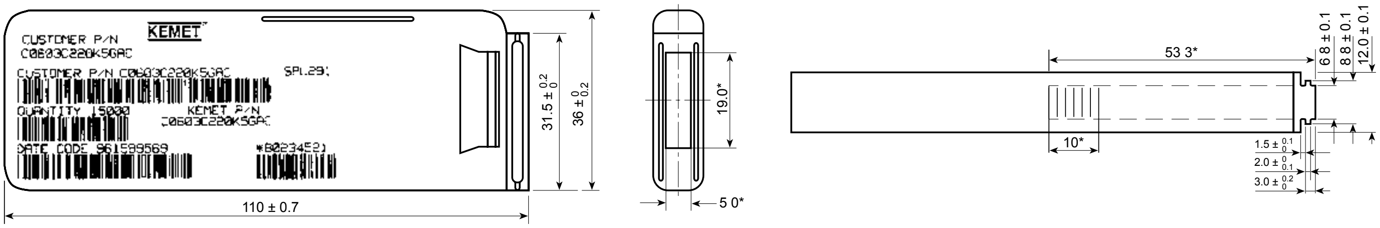


Table 9 – Capacitor Dimensions for Bulk Cassette

Cassette Packaging – Millimeters

EIA Size Code	Metric Size Code	L Length	W Width	B Bandwidth	S Separation Minimum	T Thickness	Number of Pieces/Cassette
0402	1005	1.0 ±0.05	0.5 ±0.05	0.2 to 0.4	0.3	0.5 ±0.05	50,000
0603	1608	1.6 ±0.07	0.8 ±0.07	0.2 to 0.5	0.7	0.8 ±0.07	15,000

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