Multilayer Ceramic Chip Capacitors

FEATURES

- General purpose dielectric
- Excellent aging characteristics
- Ideal for decoupling and filtering
- Ideal for surge suppression and high voltage applications
- Wide range of case sizes, voltage ratings and capacitance values
- Protective surface coating of high voltage capacitors maybe required to prevent surface arcing.

RoHS COMPLIANT

GENERAL SPECIFICATIONS

Note: Electrical characteristics at + 25 °C unless otherwise specified

Capacitance Range: 100 pF to 1.8 µF

Temperature Coefficient of Capacitance (TCC):
X7R: ± 15 % from - 55 °C to + 125 °C, with 0 Vdc applied

Dissipation Factor (DF):
≤ 25 V ratings: 3.5 % maximum at 1.0 Vrms and 1 kHz
> 25 V ratings: 2.5 % maximum at 1.0 Vrms and 1 kHz

Aging Rate: 1 % maximum per decade

Insulation Resistance (IR):
At + 25 °C and rated voltage 100 000 MΩ minimum or 1000 ΩF, whichever is less

At + 125 °C and rated voltage 10 000 MΩ minimum or 100 ΩF, whichever is less

Dielectric Withstanding Voltage (DWV):
This is the maximum voltage the capacitors are tested for a 1 to 5 second period and the charge/discharge current does not exceed 50 mA.
≤ 200 Vdc : DWV at 250 % of rated voltage
500 Vdc: DWV at 200 % of rated voltage
630/1000 Vdc: DWV at 150 % of rated voltage

ORDERING INFORMATION

VJ0805[3]	Y	102	K	X	A	A	T	###[2]
CASE CODE	DIELECTRIC	CAPACITANCE NOMINAL CODE	CAPACITANCE TOLERANCE	TERMINATION	DC VOLTAGE RATING [1]	MARKING	PACKAGING	PROCESS CODE
0402 0603 0805 1206 1210 1808 1812 1825 2220 2225 3640	Y = X7R	Expressed in picofarads (pF). The first two digits are significant, the third is a multiplier. **Examples:** 102 = 1000 pF	J = ± 5 % K = ± 10 % M = ± 20 %	X = Ni barrier 100 % tin plated F = AgPd	Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V C = 200 V E = 500 V L = 630 V G = 1000 V	A = Unmarked M = Marked **Note:** Marking is only available for 0805 and 1206	T = 7" reel/plastic tape C = 7" reel/paper tape R = 11 1/4" reel/plastic tape P = 11 1/4" reel/paper tape O = 7" reel/flamed paper tape I = 11 1/4"/13"reel/flamed paper tape **Note:** "I" and "O" is used for "F" termination paper taped	

Note
1. DC voltage rating should not be exceeded in application.
2. Process Code may be added with up to three digits, used to control non-standard products and/or special requirements.
3. Case size designator may be replaced by four digit drawing number used to control non-standard products and/or special requirements

X7R DIELECTRIC

STYLE		VJ0402				VJ0603					VJ0805							VJ1206							VJ1210[1]						
EIA TYPE		0402				0603					0805							1206							1210						
VOLTAGE (Vdc)		16	25	50	100	16	25	50	100	200	10	16	25	50	100	200	500	16	25	50	100	200	500	630	16	25	50	100	200	500	630
CAP. CODE	CAP.																														
121	120 pF	••	••	••	••																										
151	150 pF	••	••	••	••																										
181	180 pF	••	••	••	••																										
221	220 pF	••	••	••	••																										
271	270 pF	••	••	••	••																										
331	330 pF	••	••	••	••					••						••															
391	390 pF	••	••	••	••	••	••	••	••	••						••															•
471	470 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••															•
561	560 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••															•
681	680 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••						•	•	•							•
821	820 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••						•	•	•							•
102	1000 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•						•	•
122	1200 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•						•	•
152	1500 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•						•	•
182	1800 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•						•	•
222	2200 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•						•	•
272	2700 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•						•	•
332	3300 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•					•	•	•
392	3900 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•					•	•	•
472	4700 pF	••	••	••	••	••	••	••	••	••		••	••	••	••	••		•	•	•	•	•	•	•					•	•	•
562	5600 pF	••	••	••		••	••	••	••			••	••	••	••	••		•	•	•	•	•	•						•	•	•
682	6800 pF	••	••	••		••	••	••	••			••	••	••	••	••		•	•	•	•	•	•						•	•	•
822	8200 pF	••	••	••		••	••	••	••			••	••	••	••	••		•	•	•	•	•	•						•	•	•
103	0.010 µF	••	••			••	••	••	••			••	••	••	••	••		•	•	•	•	•	•		•	•	•	•	•	•	•
123	0.012 µF	••	••			••	••	••	••			••	••	••	••	••		•	•	•	•	•	•		•	•	•	•	•	•	
153	0.015 µF	••	••			••	••	••	••			••	••	••	••	•		•	•	•	•	•	•		•	•	•	•	•	•	
183	0.018 µF	••				••	••	••	••			••	••	••	••	•		•	•	•	•	•	•		•	•	•	•	•	•	
223	0.022 µF	••				••	••	••	••			••	••	••	••	•		•	•	•	•	•			•	•	•	•	•	•	
273	0.027 µF	••				••	••	••				••	••	••	••	•		•	•	•	•	•			•	•	•	•	•	•	
333	0.033 µF	••				••	••	••				••	••	••	•			•	•	•	•	•			•	•	•	•	•	•	
393	0.039 µF					••	••	••				••	••	••	•			•	•	•	•	•			•	•	•	•	•	•	
473	0.047 µF					••	••	••				••	••	••	•			•	•	•	•	•			•	•	•	•	•		
563	0.056 µF					••	••					••	••	••	•			•	•	•	•	•			•	•	•	•	•		
683	0.068 µF					••	••					•	•	•	•			•	•	•	•	•			•	•	•	•	•		
823	0.082 µF					••	••					•	•	•	•			•	•	•	•	•			•	•	•	•	•		
104	0.10 µF					••	••					•	•	•				•	•	•	•	•			•	•	•	•	•		
124	0.12 µF					•						•	•	•				•	•	•	•				•	•	•	•	•		
154	0.15 µF					•						•	•	•				•	•	•	•				•	•	•	•	•		
184	0.18 µF											•	•					•	•	•	•				•	•	•	•			
224	0.22 µF											•	•					•	•	•	•				•	•	•	•			
274	0.27 µF											•	•					•	•	•	•				•	•	•	•			
334	0.33 µF											•						•	•	•					•	•	•	•			
394	0.39 µF											•						•	•	•					•	•	•	•			
474	0.47 µF											•						•	•	•					•	•	•	•			
564	0.56 µF										•							•	•						•	•	•				
684	0.68 µF										•							•							•	•	•				
824	0.82 µF										•							•							•	•	•				
105	1.0 µF										•							•							•	•	•				
125	1.2 µF																														
155	1.5 µF																														
185	1.8 µF																														
225	2.2 µF																														
275	2.7 µF																														
335	3.3 µF																														
395	3.9 µF																														
475	4.7 µF																														
565	5.6 µF																														
685	6.5 µF																														

Note

1. See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

•• Available only in paper tape

X7R DIELECTRIC																																			
STYLE		VJ1808[1]					VJ1812[1]						VJ1825[1]						VJ2220[1]				VJ2225[1]						VJ3640[1]				
EIA TYPE		-					1812						1825						-				-						-				
VOLTAGE (Vdc)		50	100	200	500	1000	25	50	100	200	500	1000	25	50	100	200	500	1000	50	100	200	500	25	50	100	200	500	1000	25	50	100	200	500
CAP. CODE	CAP.																																
121	120 pF																																
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472	4700 pF			•	•	•					•	•																					
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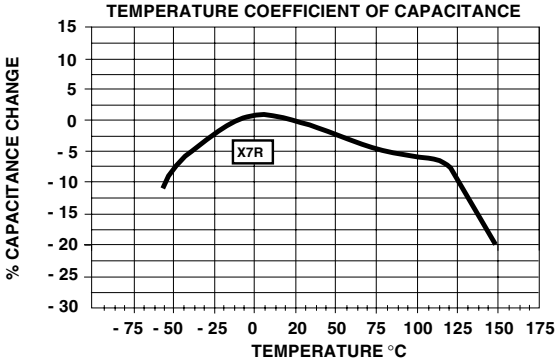
822	8200 pF			•	•	•					•	•																					
103	0.010 µF	•	•	•	•	•				•	•	•																					
123	0.012 µF	•	•	•	•					•	•	•																					
153	0.015 µF	•	•	•	•					•	•	•				•	•					•											
183	0.018 µF	•	•	•	•					•	•	•				•	•					•											
223	0.022 µF	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•				•											
273	0.027 µF	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•				•											•
333	0.033 µF	•	•	•			•	•	•	•	•		•	•	•	•	•	•				•	•	•	•	•	•	•				•	•
393	0.039 µF	•	•	•			•	•	•	•	•		•	•	•	•	•	•				•	•	•	•	•	•	•				•	•
473	0.047 µF	•	•	•			•	•	•	•	•		•	•	•	•	•	•				•	•	•	•	•	•	•				•	•
563	0.056 µF	•	•	•			•	•	•	•	•		•	•	•	•	•	•				•	•	•	•	•	•	•				•	•
683	0.068 µF	•	•	•			•	•	•	•	•		•	•	•	•	•					•	•	•	•	•	•	•				•	•
823	0.082 µF	•	•	•			•	•	•	•	•		•	•	•	•	•					•	•	•	•	•	•	•				•	•
104	0.10 µF	•	•	•			•	•	•	•	•		•	•	•	•	•				•	•	•	•	•	•	•	•				•	•
124	0.12 µF	•	•				•	•	•	•			•	•	•	•	•				•	•	•	•	•	•	•					•	•
154	0.15 µF	•	•				•	•	•	•			•	•	•	•	•				•	•	•	•	•	•	•					•	•
184	0.18 µF	•	•				•	•	•	•			•	•	•	•	•				•		•	•	•	•	•		•	•	•	•	•
224	0.22 µF	•					•	•	•	•			•	•	•	•					•		•	•	•	•	•		•	•	•	•	•
274	0.27 µF	•					•	•	•	•			•	•	•	•			•	•	•		•	•	•	•	•		•	•	•	•	•
334	0.33 µF						•	•	•	•			•	•	•	•			•	•	•		•	•	•	•	•		•	•	•	•	•
394	0.39 µF						•	•	•	•			•	•	•	•			•	•	•		•	•	•	•			•	•	•	•	•
474	0.47 µF						•	•	•				•	•	•	•			•	•	•		•	•	•	•			•	•	•	•	•
564	0.56 µF						•	•	•				•	•	•	•			•	•			•	•	•	•			•	•	•	•	•
684	0.68 µF						•	•	•				•	•	•	•			•	•			•	•	•	•			•	•	•	•	•
824	0.82 µF						•	•	•				•	•	•				•	•			•	•	•	•			•	•	•	•	
105	1.0 µF						•	•					•	•	•				•	•			•	•	•	•			•	•	•	•	
125	1.2 µF												•	•	•				•	•			•	•	•	•			•	•	•	•	
155	1.5 µF												•	•	•				•				•	•	•				•	•	•	•	
185	1.8 µF												•	•					•				•	•	•				•	•	•	•	
225	2.2 µF												•										•	•					•	•	•		
275	2.7 µF												•										•	•					•	•	•		
335	3.3 µF																						•						•	•	•		
395	3.9 µF																						•						•	•	•		
475	4.7 µF																						•						•	•			
565	5.6 µF																												•				
685	6.5 µF																												•				

Note

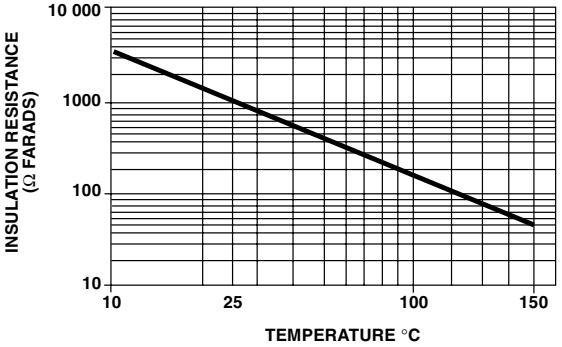
1. See soldering recommendations within this data book, or visit www.vishay.com/doc?45034

X7R DIELECTRIC - TYPICAL PARAMETERS

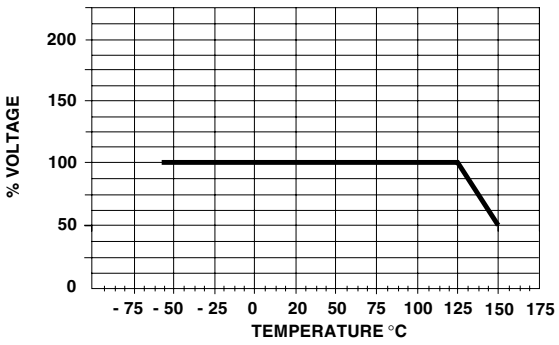
TYPICAL PARAMETER X7R
TEMPERATURE COEFFICIENT OF CAPACITANCE



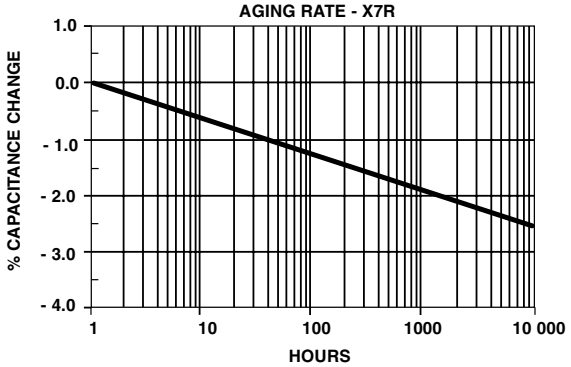
MINIMUM INSULATION
RESISTANCE VS TEMPERATURE



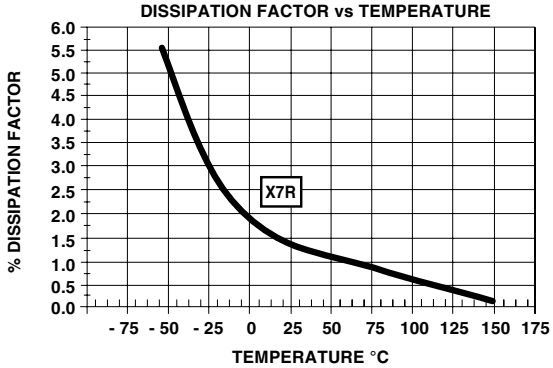
TYPICAL PARAMETER X7R
VOLTAGE VS TEMPERATURE



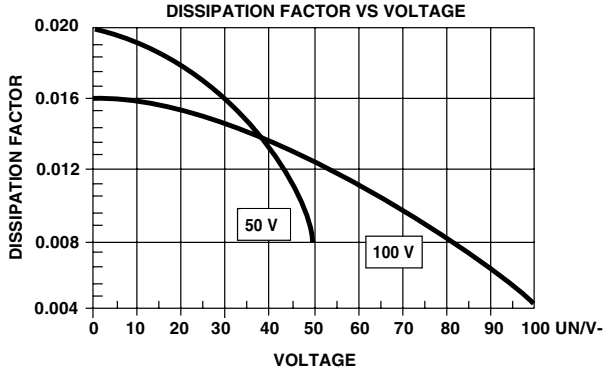
TYPICAL PARAMETER X7R
AGING RATE - X7R



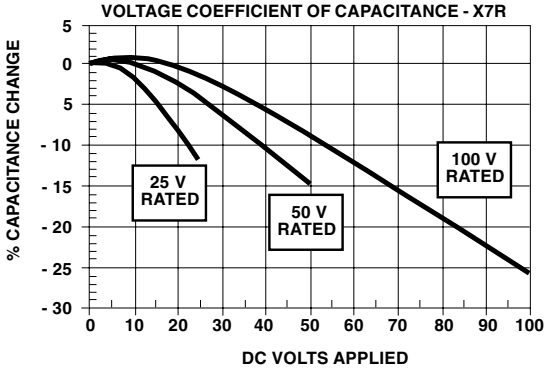
TYPICAL PARAMETER X7R
DISSIPATION FACTOR vs TEMPERATURE



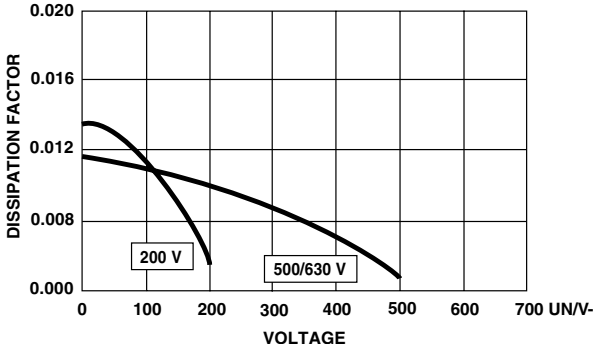
TYPICAL PARAMETER X7R
DISSIPATION FACTOR VS VOLTAGE



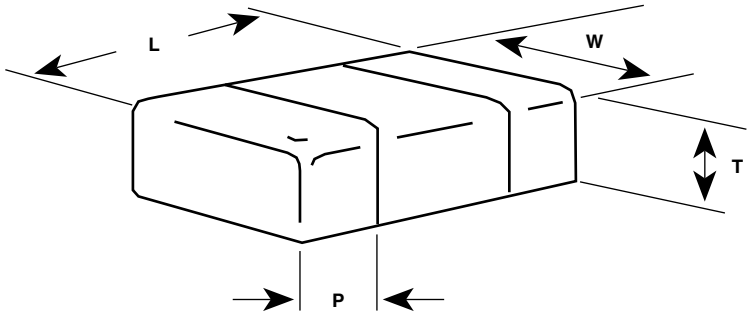
TYPICAL PARAMETER X7R
VOLTAGE COEFFICIENT OF CAPACITANCE - X7R



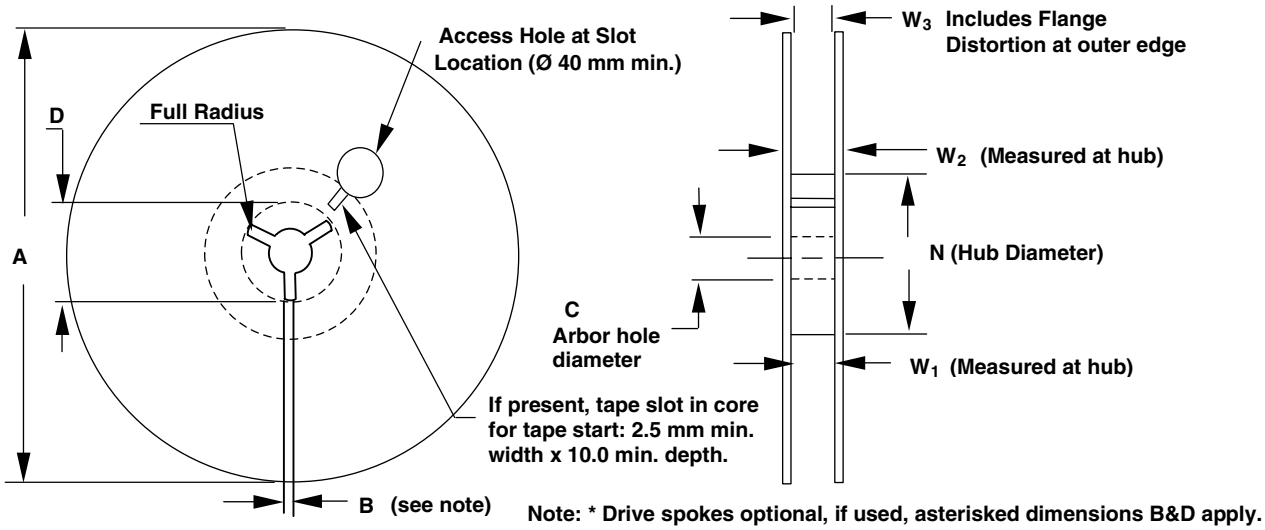
TYPICAL PARAMETER X7R
DISSIPATION FACTOR VS VOLTAGE



DIMENSIONS in inches [millimeters]



EIA STYLE	VISHAY VITRAMON STYLE DESIGNATION	LENGTH (L)	WIDTH (W)	MAXIMUM THICKNESS (T)	TERMINATION (P)	
					(Min.)	(Max.)
0402	VJ0402	0.040 + 0.004/- 0.002 [1.00 + 0.10/- 0.05]	0.020 + 0.004/- 0.002 [0.50 + 0.10/- 0.05]	0.024 [0.60]	0.004 [0.10]	0.016 [0.41]
0603	VJ0603	0.063 ± 0.005 [1.60 ± 0.12]	0.031 ± 0.005 [0.80 ± 0.12]	0.036 [0.92]	0.012 [0.30]	0.018 [0.46]
-	VJ0612	0.063 ± 0.008 [1.60 ± 0.20]	0.126 ± 0.008 [3.20 ± 0.20]	0.067 [1.70]	0.010 [0.25]	0.018 [0.46]
-	VJ0508	0.049 ± 0.008 [1.25 ± 0.20]	0.079 ± 0.008 [2.00 ± 0.20]	0.042 [1.07]	0.005 [0.13]	0.018 [0.46]
0805	VJ0805	0.079 ± 0.008 [2.00 ± 0.20]	0.049 ± 0.008 [1.25 ± 0.20]	0.057 [1.45]	0.010 [0.25]	0.028 [0.71]
1206	VJ1206	0.126 ± 0.008 [3.20 ± 0.20]	0.063 ± 0.008 [1.60 ± 0.20]	0.067 [1.70]	0.010 [0.25]	0.028 [0.71]
1210	VJ1210	0.126 ± 0.008 [3.20 ± 0.20]	0.098 ± 0.008 [2.50 ± 0.20]	0.067 [1.70]	0.010 [0.25]	0.028 [0.71]
-	VJ1808	0.177 ± 0.010 [4.50 ± 0.25]	0.080 ± 0.010 [2.03 ± 0.25]	0.067 [1.70]	0.010 [0.25]	0.030 [0.76]
1812	VJ1812	0.177 ± 0.010 [4.50 ± 0.25]	0.126 ± 0.008 [3.20 ± 0.20]	0.086 [2.18]	0.010 [0.25]	0.030 [0.76]
1825	VJ1825	0.177 ± 0.010 [4.50 ± 0.25]	0.252 ± 0.010 [6.40 ± 0.25]	0.086 [2.18]	0.010 [0.25]	0.030 [0.76]
-	VJ2220	0.220 ± 0.008 [5.59 ± 0.20]	0.200 ± 0.010 [5.08 ± 0.25]	0.086 [2.18]	0.010 [0.25]	0.030 [0.76]
-	VJ2225	0.220 ± 0.010 [5.59 ± 0.25]	0.250 ± 0.010 [6.35 ± 0.25]	0.086 [2.18]	0.010 [0.25]	0.030 [0.76]
-	VJ3640	0.360 ± 0.015 [9.14 ± 0.38]	0.400 ± 0.015 [10.20 ± 0.38]	0.086 [2.18]	0.010 [0.25]	0.030 [0.76]



Note: * Drive spokes optional, if used, asterisked dimensions B&D apply.

REEL DIMENSIONS in inches (millimeters)

TAPE SIZE	A MAX.	B MIN.	C	D MIN.	N MIN.	W_1	W_2 MAX.	W_3
8 mm	12.992 (330)	0.059 (1.5)	0.512 + 0.50 - 0.20	0.795 (20.2)	1.969 (50.0)	0.331 + 0.059/- 0.0 (8.4 + 1.5/- 0.0)	0.567 (14.4)	Shall accommodate tape width without interferance
12 mm						0.488 + 0.079/- 0.0 (12.4 + 2.0/- 0.0)	0.724 (18.4)	
16 mm			(13.0 + 0.50 - 0.20)		2.401 (61.0)	0.646 + 0.0789/- 0.0 (16.4 + 2.0/- 0.0)	0.882 (22.4)	

Note
1. For reels less than 360 mm diameter (A), the most widely used reel diameters are 178 mm ± 2 mm and 330 mm ± 2 mm. Reel diameters ranging from 254 mm to 292 mm also exist. Commonly used hub diameters are 80, 100, 150 and 178 mm.
2. Tape with components must wrap around hub without damage.

STANDARD PACKAGING QUANTITIES [1/2)]

		7" REEL QUANTITIES		11 1/4" AND 13"REEL QUANTITIES	
BODY SIZE	TAPE SIZE	PAPER TAPE PACKAGING CODE "C"/"O"[4)]	PLASTIC TAPE PACKAGING CODE "T"	PAPER TAPE PACKAGING CODE "P"/"I"[4)]	PLASTIC TAPE PACKAGING CODE "R"
0402 [3)]	8 mm	5000/10 000	N/A	10 000/30 000	N/A
0603	8 mm	4000	4000	10 000	N/A
0805 [4)]	8 mm	3000	3000	10 000	10 000
1206 [5)]	8 mm	N/A	3000	N/A	10 000
1210 [5)]	8 mm	N/A	3000	N/A	10 000
1808	12 mm	N/A	3000	N/A	10 000
1812	12 mm	N/A	1000	N/A	5000
1825	12 mm	N/A	1000	N/A	4000
2220	12 mm	N/A	1000	N/A	4000
2225	12 mm	N/A	1000	N/A	4000
3640	16 mm	N/A	500	N/A	2000

Note
1. REFERENCE: EIA Standard RS 481 – "Taping of Surface Mount Components for Automatic Placement"
2. N/A = Not Available, not supported anymore
3. Quantity can vary with customer request
4. Flamed paper tape code "O" (7" reel) and "I" (11 ¼/13" reel) for AgPd terminated parts (termination code F)
5. Packaging "C/P" or "T/R" and quantity can depend from product thickness

EMBOSSED 8, 12 AND 16 MM CARRIER TAPE

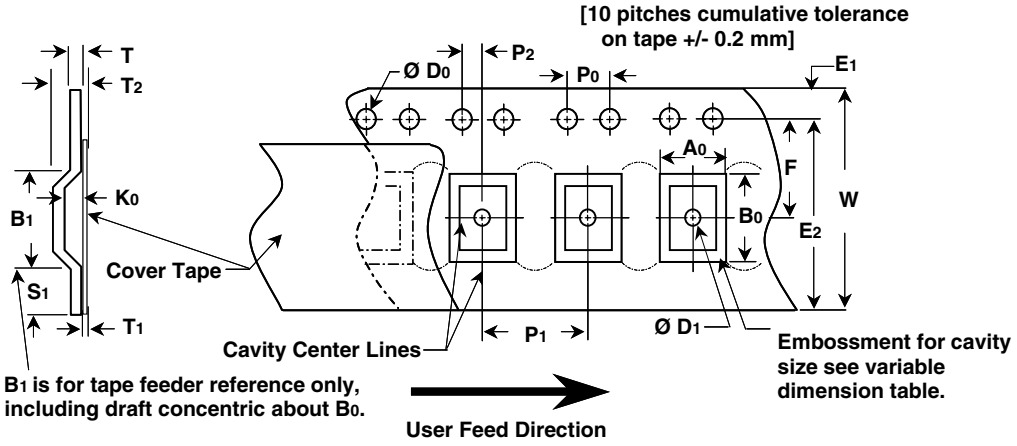


Figure 1

CONSTANT CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)							
TAPE SIZE	**D_0**	**E_1**	**P_0**	**P_2**	**S_1 MIN.**	**T MAX.**	**T_1**
8 mm and 12 mm	0.059 + 0.004/- 0.0 (1.50 + 0.10/- 0.0)	0.069 + 0.004 (1.75 ± 0.10)	0.175 + 0.004 (4.0 ± 0.10)	0.079 + 0.002 (2.0 ± 0.05)	0.024 (0.60)	0.024) (0.60)	0.004 (0.10) Max.

VARIABLE CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)									
TAPE SIZE	**B_1 MAX.**	**D_1 MIN.**	**E_2 MIN.**	**F**	**P_1**	**R MIN.**	**T_2**	**W MAX.**	**A_0, B_0 AND K_0**
8 mm 2 mm Pitch	0.171 (4.35)	0.177 (0.450)	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.79 ± 0.004 (2.00 ± 0.10)	0.984 (25.0)	0.098 (2.50) Max.	0.327 (8.30)	see note 1
8 mm 4 mm Pitch	0.171 (4.35)	0.177 (0.450)	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.157 ± 0.004 (4.00 ± 0.10)	0.984 (25.0)	0.098 (2.50) Max.	0.327 (8.30)	see note 1
12 mm 2 mm Pitch	0.323 (8.20)	0.059 (0.150)	0.404 (10.25)	0.217 ± 0.002 (5.50 ± 0.05)	0.157 ± 0.004 (4.00 ± 0.10)	1.181 (30.0)	0.256 (6.50) Max.	0.484 (12.30)	see note 1
16 mm 4 mm Pitch	0.476 (12.1)	0.059 (0.150)	0.561 (14.25)	0.295 ± 0.004 (7.50 ± 0.1)	0.157 ± 0.004 (4.00 ± 0.10)	1.181 (30.0)	0.341 (8.0) Max.	0.641 (16.3)	see note 1

Note

1. The cavity defined by Ao, Bo and Ko 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 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 figure 3 & 4.
   d) Lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 12mm wide tape and to 1.0 mm maximum for 16 mm wide tape figure 5.

PAPER 8 MM CARRIER TAPE

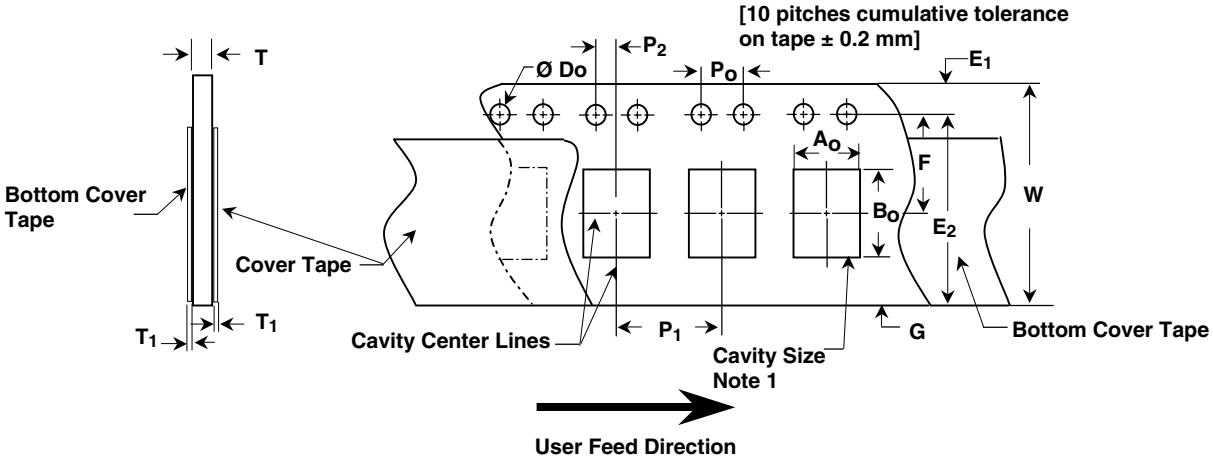


Figure 2

CONSTANT CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)							
TAPE SIZE	**D_0**	**E_1**	**P_0**	**P_2**	**T_1 MAX.**	**G MIN.**	**R REF.**
8 mm	0.059 + 0.004/- 0.0 (1.50 + 0.10/- 0.0)	0.069 + 0.004 (1.75 ± 0.10)	0.175 + 0.004 (4.0 ± 0.10)	0.079 + 0.002 (2.0 ± 0.05)	0.024 (0.60)	0.029 (0.75)	0.010 (0.25)

VARIABLE CARRIER TAPE METRIC DIMENSIONS in inches (millimeters)						
TAPE SIZE	**E_2 MIN.**	**F**	**P_1**	**W MAX.**	**A_0, B_0 AND K_0**	**T**
8 mm 2 mm Pitch	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.79 ± 0.004 (2.00 ± 0.10)	0.327 (8.30)	see note 1	1.1 mm maximum for paper base tape
8 mm 4 mm Pitch	0.246 (6.25)	0.138 ± 0.002 (3.50 ± 0.05)	0.157 ± 0.004 (4.00 ± 0.10)	0.327 (8.30)	see note 1	1.1 mm maximum for paper base tape

Note

1. The cavity defined by Ao, Bo and Ko 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 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 figure 3 & 4.
   d) Lateral movement of the component is restricted to 0.5 mm maximum for 8 mm and 1 2mm wide tape and to 1.0 mm maximum for 16 mm wide tape figure 5.

MAXIMUM COMPONENT ROTATION FOR PUNCHED AND EMBOSSED CARRIER

Figure 3 Maximum Lateral Movement Carrier Top View

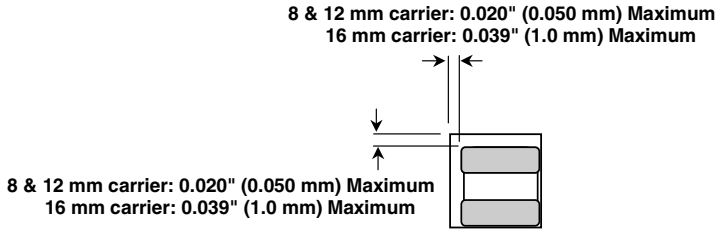
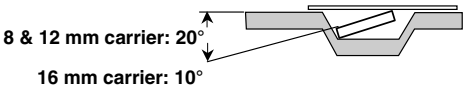
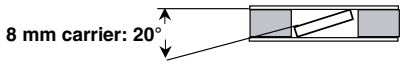


Figure 4

Maximum Component Rotation Embossed Carrier Side View

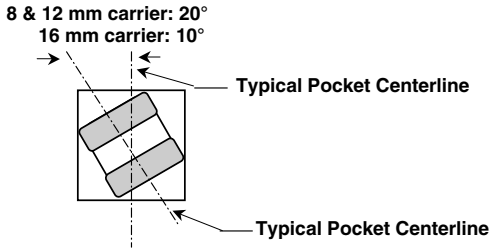


Maximum Component Rotation Paper Carrier Side View



MAXIMUM LATERAL MOVEMENT FOR PUNCHED AND EMBOSSED CARRIER

Figure 5 Maximum Component Rotation Top View



BENDING RADIUS FOR PUNCHED EMBOSSED CARRIER

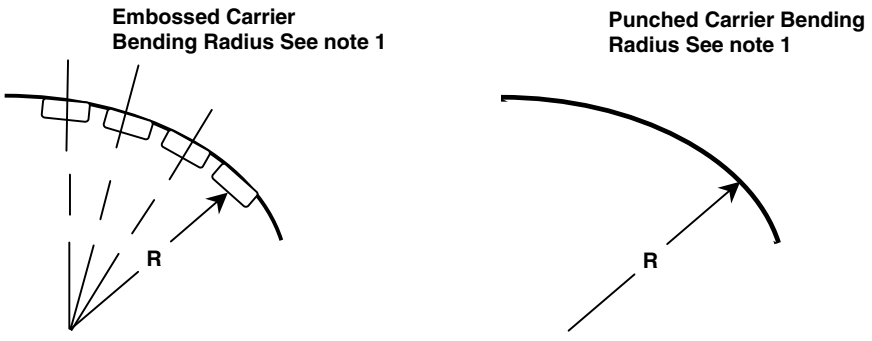


Figure 6

Note 1: The tape with or without components shall pass without damage round “R”, see dimensions table

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