[illegible]

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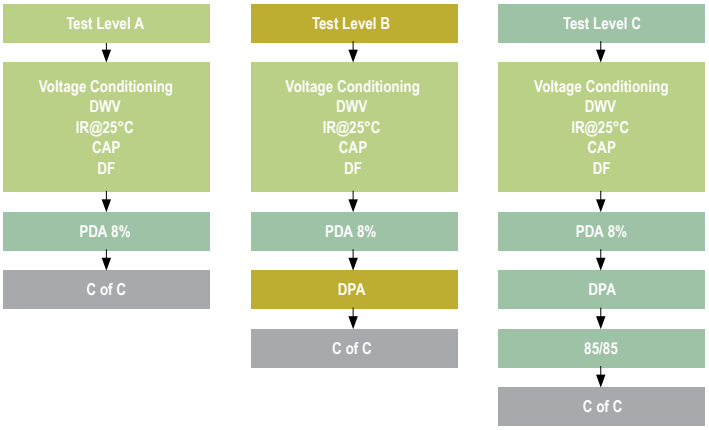
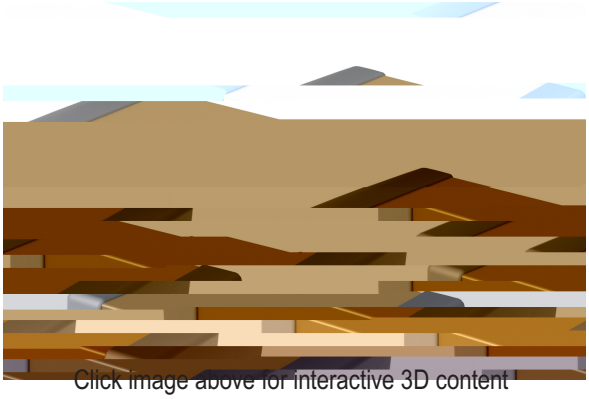
KEMET's COTS program is an extension of KEMET knowledge of high reliability test regimes and requirements. KEMET regularly supplies "up-screened" products by working with customer drawings and imposing specified design and test requirements. The COTS program offers the same high quality and high reliability components as up-screened products, but at a lower cost to the customer. This is accomplished by eliminating the need for customer-specific drawings to achieve the reliability level required for customer applications. A series of tests and inspections have been selected to provide the accelerated conditioning and 100% screening necessary to eliminate infant mortal failures from the population.

KEMET's X7R dielectric features a 125°C maximum operating temperature and is considered "temperature stable." The Electronics Components, Assemblies & Materials Association (EIA) characterizes X7R dielectric as a Class II material. Components of this classification are fixed, ceramic dielectric capacitors suited for bypass and decoupling applications or for frequency discriminating circuits where Q and stability of capacitance characteristics are not critical. X7R exhibits a predictable change in capacitance with respect to time and voltage and boasts a minimal change in capacitance with reference to ambient temperature. Capacitance change is limited to ±15% from −55°C to +125°C.

All COTS testing includes voltage conditioning and post-electrical testing as per MIL–PRF–55681. For enhanced reliability, KEMET also provides the following test level options and conformance certifications:





Click image above for interactive 3D content

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Ceramic	Case Size (L" x W")	Specification/ Series	Capacitance Code (pF)	Capacitance Tolerance	Rated Voltage (VDC)	Dielectric	Failure Rate/Design	Termination Finish[1]	Packaging/ Grade (C-Spec)
	0402 0603 0805 1206 1210 1812 2220	T = COTS	Two significant digits and number of zeros	J = ±5% K = ±10% M = ±20%	9 = 6.3 8 = 10 4 = 16 3 = 25 5 = 50 1 = 100 2 = 200 A = 250	R = X7R	A = Testing per MIL–PRF–55681 PDA 8% B= Testing per MIL–PRF–55681 PDA 8%, DPA per EIA–469 C = Testing per MIL–PRF–55681 PDA 8%, DPA per EIA–469, Humidity per MIL–STD–202, Method 103, Condition A	C = 100% Matte Sn L = SnPb (5% Pb minimum)	See "Packaging C-Spec Ordering Options Table" below

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

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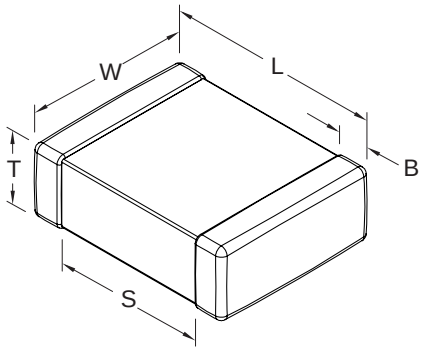

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0402	1005	1.00 (0.040) ±0.05 (0.002)	0.50 (0.020) ±0.05 (0.002)	See Table 2 for Thickness	0.30 (0.012) ±0.10 (0.004)	0.30 (0.012)	Solder Reflow Only
0603	1608	1.60 (0.063) ±0.15 (0.006)	0.80 (0.032) ±0.15 (0.006)		0.35 (0.014) ±0.15 (0.006)	0.70 (0.028)	Solder Wave or Solder Reflow
0805	2012	2.00 (0.079) ±0.20 (0.008)	1.25 (0.049) +0.20 (0.008)		0.50 (0.02) ±0.25 (0.010)	0.75 (0.030)	
1206	3216	3.20 (0.126) ±0.20 (0.008)	1.60 (0.063) ±0.20 (0.008)		0.50 (0.02) ±0.25 (0.010)	N/A	
1210[1]	3225	3.20 (0.126) +0.20 (0.008)	2.50 (0.098) ±0.20 (0.008)		0.50 (0.02) ±0.25 (0.010)		Solder Reflow Only
1812	4532	4.50 (0.177) ±0.30 (0.012)	3.20 (0.126) ±0.30 (0.012)		0.60 (0.024) ±0.35 (0.014)		
2220	5650	5.70 (0.224) ±0.40 (0.016)	5.00 (0.197) ±0.40 (0.016)		0.60 (0.024) ±0.35 (0.014)		

[1] *For capacitance values ≥ 4.7 µF add 0.02 (0.001) to the width tolerance dimension and 0.10 (0.004) to the length tolerance dimension.*

5YEPM¼GEXMSR 'IVXM¼GEXMSR

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

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Lead (Pb)-free, RoHS, and REACH compliant without exemptions (excluding SnPb termination finish option).

[illegible]

[illegible]	[illegible]
Operating Temperature Range	−55°C to +125°C
Capacitance Change with Reference to +25°C and 0 Vdc Applied (TCC)	±15%
[1]Aging Rate (Maximum % Capacitance Loss/Decade Hour)	3.0%
[2]Dielectric Withstanding Voltage (DWV)	250% of rated voltage (5±1 seconds and charge/discharge not exceeding 50mA)
[3]Dissipation Factor (DF) Maximum Limit at 25°C	5%(6.3V & 10V), 3.5%(16V & 25V) and 2.5%(50V to 250V)
[4]Insulation Resistance (IR) Minimum Limit at 25°C	See Insulation Resistance Limit Table (Rated voltage applied for 120±5 seconds at 25°C)

[1] Regarding Aging Rate: Capacitance measurements (including tolerance) are indexed to a referee time of 1,000 hours.

[2] DWV is the voltage a capacitor can withstand (survive) for a short period of time. It exceeds the nominal and continuous working voltage of the capacitor.

[3] Capacitance and dissipation factor (DF) measured under the following conditions:
1kHz ± 50Hz and 1.0 ± 0.2 Vrms if capacitance ≤10µF
120Hz ± 10Hz and 0.5 ± 0.1 Vrms if capacitance >10µF

[4] To obtain IR limit, divide MΩ-µF value by the capacitance and compare to GΩ limit. Select the lower of the two limits.

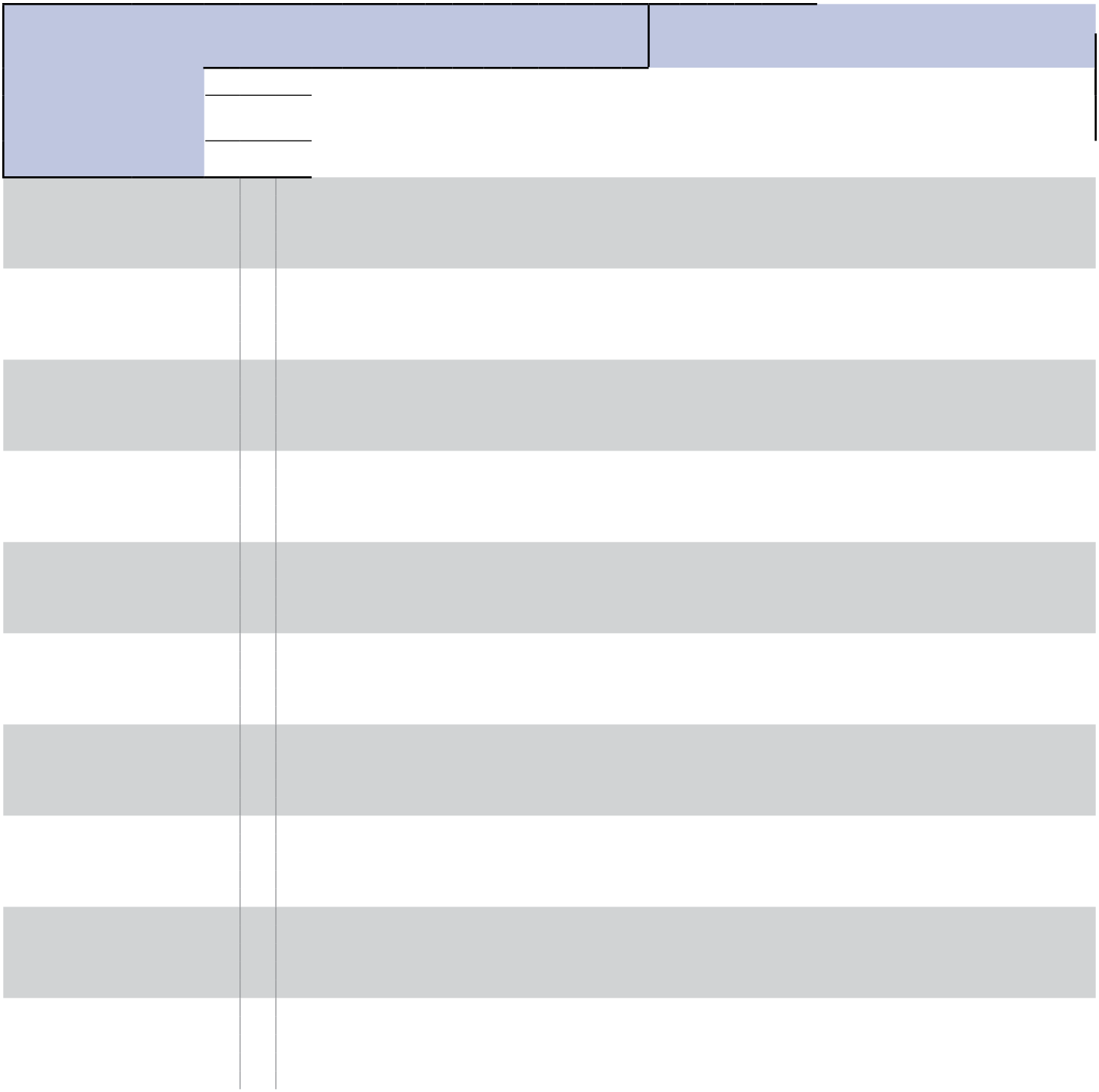
Note: When measuring capacitance it is important to ensure the set voltage level is held constant. The HP4284 & Agilent E4980 have a feature known as Automatic Level Control (ALC). The ALC feature should be switched to "ON".

[illegible]

[illegible]					
Dielectric	Rated DC Voltage	Capacitance Value	Dissipation Factor (Maximum %)	Capacitance Shift	Insulation Resistance
X7R	> 25	All	3.0	±20%	10% of Initial Limit
	16/25		5.0		
	< 16		7.5		

[illegible]

[illegible]	[illegible]	[illegible]
0201	N/A	ALL
0402	< 0.012 µF	≥ 0.012 µF
0603	< 0.047 µF	≥ 0.047 µF
0805	< 0.15 µF	≥ 0.15 µF
1206	< 0.47 µF	≥ 0.47 µF
1210	< 0.39 µF	≥ 0.39 µF
1808	ALL	N/A
1812	< 2.2 µF	≥ 2.2 µF
1825	ALL	N/A
2220	< 10 µF	≥ 10 µF
2225	ALL	N/A



8.2 µF 10 µF	825 106	J J	K K	M M																				EH EH	EH EH	EH EH				

*Capacitance range Includes E24 decade values only. (i.e., 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56 68, 75, 82, and 91)
**Capacitance range Includes E12 decade values only. (i.e., 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, and 82)

[redacted]

[redacted]

[redacted] decade values only. (i.e., 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, and 91)

**Capacitance range Includes E12 decade values only. (i.e., 10, 12, 15, 18, 22, 27, 33, 39, 47, 56, 68, and 82)

[illegible]

Package quantity based on finished chip thickness specifications.

[1] If ordering using the 2 mm Tape and Reel pitch option, the packaging quantity outlined in the table above will be doubled. This option is limited to EIA 0603 (1608 metric) case size devices. For more information regarding 2 mm pitch option see "Tape & Reel Packaging Information".

[illegible]

[illegible]	[illegible]		
		Bulk Bag (default)	
Packaging C-Spec[1]		N/A[2]	
[illegible]		[illegible]	
EIA (in)	Metric (mm)	Minimum	Maximum
0402	1005	1	50,000
0603	1608		
0805	2012		
1206	3216		
1210	3225		
1808	4520		20,000
1812	4532		
1825	4564		
2220	5650		
2225	5664		

[1] *The "Packaging C-Spec" is a 4 to 8 digit code which identifies the packaging type and/or product grade. When ordering, the proper code must be included in the 15th through 22nd character positions of the ordering code. See "Ordering Information" section of this document for further details. Commercial Grade product ordered without a packaging C-Spec will default to our standard "Bulk Bag" packaging. Contact KEMET if you require a bulk bag packaging option for Automotive Grade products.*

[2] *A packaging C-Spec (see note 1 above) is not required for "Bulk Bag" packaging (excluding Anti-Static Bulk Bag and Automotive Grade products). The 15th through 22nd character positions of the ordering code should be left blank. All product ordered without a packaging C-Spec will default to our standard "Bulk Bag" packaging.*

[illegible]	[illegible]	[illegible]					[illegible]					[illegible]				
[illegible]	[illegible]	[illegible]					[illegible]					[illegible]				

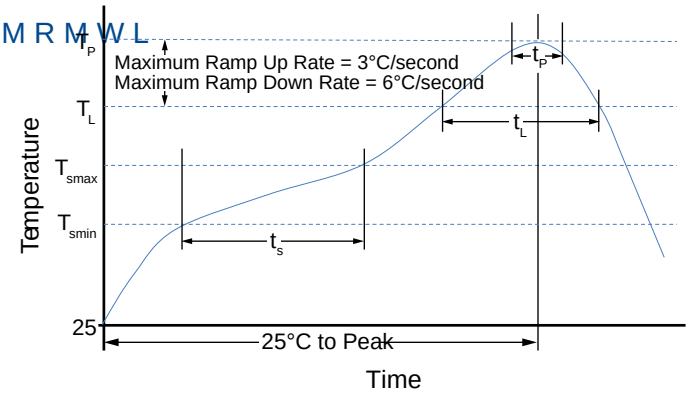
[illegible]

[illegible]

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

6IGSQQIRHIH 6I½S[7SPHIVMRK 4VS¼PI

KEMET's families of surface mount multilayer ceramic capacitors (SMD MLCCs) are compatible with wave (single or dual), convection, IR or vapor phase reflow techniques. Preheating of these components is recommended to avoid extreme thermal stress. KEMET's recommended profile conditions for convection and IR reflow reflect the profile conditions of the IPC/J-STD-020 standard for moisture sensitivity testing. These devices can safely withstand a maximum of three reflow passes at these conditions.

4VS¼PI *IEXYVI	8IVQMREXMSR *MRMWL	
	SnPb	100% Matte Sn
[illegible]		
Temperature Minimum (T_{Smin})	100°C	150°C
Temperature Maximum (T_{Smax})	150°C	200°C
Time (t_S) from T_{Smin} to T_{Smax}	60 – 120 seconds	60 – 120 seconds
Ramp-Up Rate (T_L to T_P)	3°C/second maximum	3°C/second maximum
Liquidous Temperature (T_L)	183°C	217°C
Time Above Liquidous (t_L)	60 – 150 seconds	60 – 150 seconds
Peak Temperature (T_P)	235°C	260°C
Time Within 5°C of Maximum Peak Temperature (t_P)	20 seconds maximum	30 seconds maximum
Ramp-Down Rate (T_P to T_L)	6°C/second maximum	6°C/second maximum
Time 25°C to Peak Temperature	6 minutes maximum	8 minutes maximum

Note 1: All temperatures refer to the center of the package, measured on the capacitor body surface that is facing up during assembly reflow.