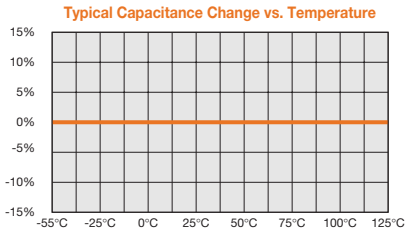
Ceramic Chip Capacitors

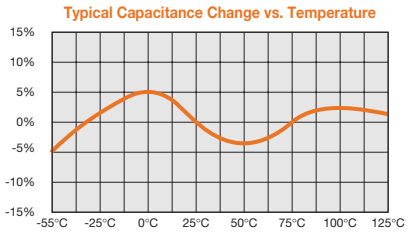
Multilayer chip capacitors have a low residual inductance, an excellent frequency response and minimal stray capacitance since there are no leads. These characteristics enable design to be very close to the theoretical values of the capacitors.

NP0/C0G: SPECIFICATIONS:



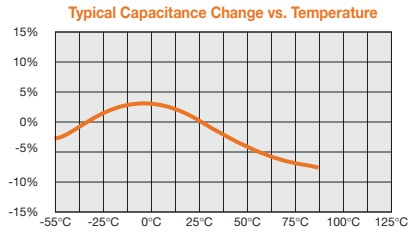
OPERATING TEMPERATURE RANGE:	-55°C to +125°C
TEMPERATURE COEFFICIENT:	0 ±30PPM/°C
TEMPERATURE VOLTAGE COEFFICIENT:	0 ±30PPM/°C
DISSIPATION FACTOR:	0.1% MAX.
INSULATION RESISTANCE:	>1000 ohms F or 100 G ohms, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)
AGEING:	None
WITHSTANDING VOLTAGE:	>2.5 times VDCW
TEST PARAMETERS:	1MHz ± 100KHz at 1.0 ± 0.2 Vrms ≤ 100 pF, 25°C 1KHz ± 100Hz at 1.0 ± 0.2 Vrms > 100 pF, 25°C
CAPACITANCE TOLERANCE:	B,C,D,F,G,J,K

X7R: SPECIFICATIONS:



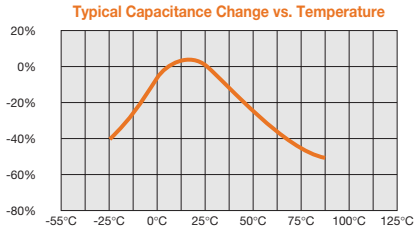
OPERATING TEMPERATURE RANGE:	-55°C to +125°C
TEMPERATURE COEFFICIENT:	0 ±15%Δ°C MAX.
TEMPERATURE VOLTAGE COEFFICIENT:	X7R not applicable
DISSIPATION FACTOR:	For 50 volts and 100 volts: 2.5% MAX.; For 25 volts: 3.0% MAX.; For 16 volts: 3.5% MAX.; For 10 volts: 5.0% MAX.; For 6.3 volts: 10% MAX. For values > 10µF and voltages ≤ 10V, the D.F. is 10% MAX.
INSULATION RESISTANCE:	>1000 ohms F or 100 G ohms, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)
AGEING:	2.5% per decade hour, typical
WITHSTANDING VOLTAGE:	>2.5 times VDCW
TEST PARAMETERS:*	1KHz ± 100Hz at 1.0 ± 0.2 Vrms > 100 pF, 25°C
CAPACITANCE TOLERANCE:	J,K,M

X5R: SPECIFICATIONS:



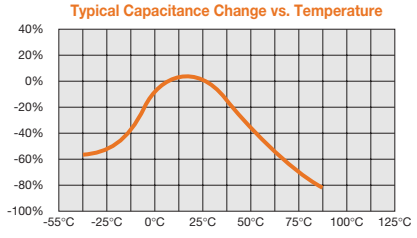
OPERATING TEMPERATURE RANGE:	-55°C to +85°C
TEMPERATURE COEFFICIENT:	0 ±15%Δ°C MAX.
TEMPERATURE VOLTAGE COEFFICIENT:	X5R not applicable
DISSIPATION FACTOR:	For 50 volts and 100 volts: 2.5% MAX.; For 25 volts: 3.0% MAX.; For 16 volts: 3.5% MAX.; For 10 volts: 5.0% MAX.; For 4.0 volts and 6.3 volts: 10% MAX. For values > 10µF and voltages ≤ 10V, the D.F. is 10% MAX.
INSULATION RESISTANCE:	>1000 ohms F or 100 G ohms, whichever is less at 25°C, VDCW. (10,000 ohms at 125°C)
AGEING:	2.5% per decade hour, typical
WITHSTANDING VOLTAGE:	>2.5 times VDCW
TEST PARAMETERS:*	1KHZ ± 100Hz at 1.0 ± 0.2 Vrms > 100 pF, 25°C
CAPACITANCE TOLERANCE:	K,M

Z5U: SPECIFICATIONS:



OPERATING TEMPERATURE RANGE:	+10°C to +85°C
TEMPERATURE COEFFICIENT:	+22% - 56%Δ°C MAX.
DISSIPATION FACTOR:	4.0% MAX.
INSULATION RESISTANCE:	>100 ohms F or 10 G ohms, whichever is less at 25°C, VDCW.
AGEING:	5% per decade hour, typical
WITHSTANDING VOLTAGE:	>2.5 times VDCW
TEST PARAMETERS:	1KHz ± 100Hz at 0.5 ± 0.1 Vrms, 25°C
CAPACITANCE TOLERANCE:	M,Z,P

Y5V: SPECIFICATIONS:

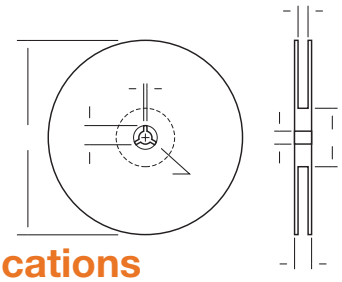


OPERATING TEMPERATURE RANGE:	-30°C to +85°C
TEMPERATURE COEFFICIENT:	+22% - 82%Δ°C MAX.
DISSIPATION FACTOR:	For 25 volts and 50 volts: 5% MAX.; For 16 volts: 7% MAX.; For 10 volts: 9% MAX.; For 6.3 volts: 11% MAX. For higher Cap values > 10µF, the D.F. is 20% MAX.
INSULATION RESISTANCE:	>100 ohms F or 10 G ohms, whichever is less at 25°C, VDCW.
AGEING:	7% per decade hour, typical
WITHSTANDING VOLTAGE:	>2.5 times VDCW
TEST PARAMETERS:*	1KHz ± 100Hz at 1.0 ± 0.2 Vrms, 25°C
CAPACITANCE TOLERANCE:	M,Z

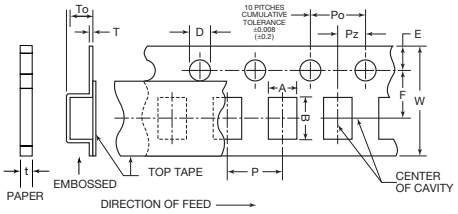
* Test parameters for Hi-Caps: X7R, X5R and Y5V
1KHz ± 100Hz at 1.0 ± 0.2 Vrms ≤ 10uF (10 V min.)
1KHz ± 100Hz at 0.5 ± 0.1 Vrms ≤ 10uF (6.3V max.)
120Hz ± 24Hz at 0.5 ± 0.1 Vrms > 10uF

All components in this section are RoHS compliant per the EU directives and definitions.

All tape and reel specifications must be adhered to per EIA-481-1-A as noted and stated in the Chip Resistor section on page 61.



Taping Specifications



Reel Dimensions

Unit: mm (inch)

TAPE	B min	C	A (7")	A (13")	D min	N min	G	T max
8mm	0.3 (.012)	13 ± .05 (.512 ± .02)	178 ± 2.0 (7 ± .079)	330 ± 2.0 (13 ± .08)	20.2 (.795)	50 (1.97)	10 ± 1.5 (.394 ± .059)	14.9 (.587)
12mm	0.3 (.012)	13 ± .05 (.512 ± .02)	178 ± 2.0 (7 ± .079)	330 ± 2.0 (13 ± .08)	20.2 (.795)	50 (1.97)	10 ± 1.5 (.394 ± .059)	14.9 (.587)

7 in. Reel Quantities**

SIZE	01005	0201*	0402*	0603	0805	1206	1210	1812	2221
TAPE SIZE	8mm	8mm	8mm	8mm	8mm	8mm	8mm	12mm	12mm
MIN QTY PER REEL	20,000†	15,000	5000	3000	2000	2000	1000	1000	1000
MAX QTY PER REEL	20,000†	15,000	10,000	4000	5000	5000	5000	3000	1000

** Quantity dependent on Chip Thickness
* 0201 and 0402 Pitch ("P") is .079" ± .004" (2.0 ± 0.1mm)
† Smaller quantities may be available. Please contact your sales person.

Paper Tape Carrier Dimensions (8mm)

Unit: mm (inch)

SIZE	A	B	W	F	E	Po	Pz	D	t	P
01005	0.25 ± 0.05 (0.010 ± .002)	0.45 ± 0.05 (0.018 ± .002)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.039 ± .002)	1.5 + 0.1 - 0.0 (.064 + .004 - .000)	1.15 MAX (.045 MAX)	2.0 ± 0.05 (.079 ± .002)
0201	0.37 ± 0.05 (0.014 ± .002)	0.67 ± 0.05 (0.026 ± .002)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.039 ± .002)	1.5 + 0.1 - 0.0 (.064 + .004 - .000)	1.15 MAX (.045 MAX)	2.0 ± 0.05 (.079 ± .002)
0402	0.65 ± 0.1 (.026 ± .004)	1.10 ± 0.2 (.043 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.039 ± .002)	1.5 + 0.1 - 0.0 (.064 + .004 - .000)	1.15 MAX (.045 MAX)	2.0 ± 0.05 (.079 ± .002)
0603	1.10 ± 0.2 (.043 ± .008)	1.90 ± 0.2 (.075 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.064 + .004 - .000)	1.15 MAX (.045 MAX)	4.0 ± 0.1 (.157 ± .004)
0805	1.16 ± 0.2 (.046 ± .008)	2.4 ± 0.2 (.095 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.064 + .004 - .000)	1.15 MAX (.045 MAX)	4.0 ± 0.1 (.157 ± .004)
1206	2.0 ± 0.2 (.079 ± .008)	3.6 ± 0.2 (.142 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.064 + .004 - .000)	1.15 MAX (.045 MAX)	4.0 ± 0.1 (.157 ± .004)

Embossed Carrier Dimensions (8mm & 12mm)

SIZE	A	B	W	F	E	Po	Pz	D	To	T	P
0805	1.48 ± 0.2 (.058 ± .008)	2.3 ± 0.2 (.091 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± .0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 + .004 - .000)	2.5 MAX (.098 MAX)	0.6 MAX (.024 MAX)	4.0 ± 0.1 (.157 ± .004)
1206	2.0 ± 0.2 (.079 ± .008)	3.6 ± 0.2 (.142 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± .0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 + .004 - .000)	2.5 MAX (.098 MAX)	0.6 MAX (.024 MAX)	4.0 ± 0.1 (.157 ± .004)
1210	2.9 ± 0.2 (.114 ± .008)	3.6 ± 0.2 (.142 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± .0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 + .004 - .000)	2.5 MAX (.098 MAX)	0.6 MAX (.024 MAX)	4.0 ± 0.1 (.157 ± .004)
1812	3.6 ± 0.2 (.142 ± .008)	4.9 ± 0.2 (.193 ± .008)	12.0 ± 0.3 (.472 ± .012)	5.6 ± .0.1 (.221 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 + .004 - .000)	3.8 MAX (.150 MAX)	0.6 MAX (.024 MAX)	8.0 ± 0.1 (.315 ± .004)

How To Order

C0805 Series — See Chart

C0G Temperature Characteristic

500 — Rated Voltage
1st two digits are significant followed by number of zeroes.
4R0 = 4.0 VDCW
6R3 = 6.3 VDCW
100 = 10 VDCW
160 = 16 VDCW
250 = 25 VDCW
500 = 50 VDCW
630 = 63 VDCW
101 = 100 VDCW
201 = 200 VDCW
251 = 250 VDCW

101 Capacitance (pico - Farads)
1st two digits are significant, followed by number of zeroes.
101 = 100 pF
R denotes decimal
6R8 = 6.8 pF

J Tolerance Code:
*B = ± 0.1 pF
*C = ± 0.25 pF
*D = ± 0.5 pF
F = ± 1%
G = ± 2%
J = ± 5%
K = ± 10%
M = ± 20%
N = ± 30%
Z = +80 - 20%
P = +100 - 0%
* For capacitance values below 10 pF only.

N Termination
N = Nickel Barrier, Tinned Termination Composition is 100% matte Tin (Sn)
‡ P = Palladium Silver
‡ G = Gold over Nickel
Pb: 90% Tin (Sn)/10% Lead (Pb) Termination

Standard termination finish for this product is 100% matte Tin (Sn). If a 100% Tin designation is required, add Sn.

‡ Pd/Ag & Gold terminations have limited values available. Please consult your salesperson.

☐ Marking**
6 = EIA "J" Code
"Leave blank if No Marking"

P — Packaging
D = Paper Tape (10" Reel)
E = Embossed Tape (7" Reel)
P = Paper Tape (7" Reel)
R = Paper Tape (13" Reel)
U = Embossed Tape (13" Reel)

***** Optional Identifier

** 0201 and 0402 size capacitors cannot be marked

— * OPTIONAL IDENTIFIER

Min./Max. thickness
– designates minimum thickness
* designates maximum thickness

The following letters define thickness as signified below:

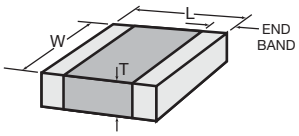
CODE:	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	6
DIMENSION:	.010	.015	.020	.026	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.023

Please Note: Venkel offers Engineering Kits for this product. See page 117 for details.

NOTE: See the Web site for soldering information. 0603 size and smaller are not recommended for wave soldering.

Ceramic Chip Capacitors

NP0/C0G Dielectric



Values that are typically available.

25V Available in 25V only.

(All measurements in inches)																				
Size		**01005** (± 0.0008)		**0201** (± 0.002)		**0402** (± 0.004)		**0504** (± 0.008)		**0603** (± 0.006)		**0805** (± 0.008)			**1206** (± 0.008)		**1210** (±0.008)		**1812** (±0.012)	
L		.016		.024		.040		.050		.063		.080			.126		.126		.177	
W		.008		.012		.020		.040		.032		.050			.063		.098		.126	
*T (max)**		.008		.012		.025		.040		.033		.055			.070		.075		.085	
Min E/B		.002		.002		.004		.005		.008		.020 ± .010			.020 ± .010		.020 ± .010		.024 ± .015	
VDCW (MAX)		16V		25V	50V	25V	50V	50V	100V	50V	100V	25V	50V	100V	50V	100V	50V	100V	50V	100V
CAP. CODE	CAP. VALUE																			
0R1	0.1pF	■		■	■	■	■			■	■	■	■	■						
0R2	0.2pF	■		■	■	■	■			■	■	■	■	■						
0R3	0.3pF	■		■	■	■	■			■	■	■	■	■						
0R4	0.4pF	■		■	■	■	■			■	■	■	■	■						
0R5	0.5pF	■		■	■	■	■	■	■	■	■	■	■	■	■	■				
1R0	1.0pF	■		■	■	■	■	■	■	■	■	■	■	■	■	■				
1R2	1.2	■		■	■	■	■	■	■	■	■	■	■	■	■	■				
1R5	1.5	■		■	■	■	■	■	■	■	■	■	■	■	■	■				
1R8	1.8	■		■	■	■	■	■	■	■	■	■	■	■	■	■				
2R2	2.2	■	2.0	■	■	■	■	■	■	■	■	■	■	■	■	■				
2R7	2.7	■		■	■	■	■	■	■	■	■	■	■	■	■	■				
3R3	3.3	■	3.0	■	■	■	■	■	■	■	■	■	■	■	■	■				
3R9	3.9	■		■	■	■	■	■	■	■	■	■	■	■	■	■				
4R7	4.7	■	4.0	■	■	■	■	■	■	■	■	■	■	■	■	■				
5R6	5.6	■	5.0	■	■	■	■	■	■	■	■	■	■	■	■	■				
6R8	6.8	■	6.0	■	■	■	■	■	■	■	■	■	■	■	■	■				
8R2	8.2	■	7.0 8.0 9.0	■	■	■	■	■	■	■	■	■	■	■	■	■				
100	10pF	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
120	12	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
150	15	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
180	18			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
220	22			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
270	27			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
330	33			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
390	39			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
470	47			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
560	56			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
680	68			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
820	82			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
101	100pF			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
121	120					■	■	■	■	■	■	■	■	■	■	■	■	■		
151	150					■	■	■	■	■	■	■	■	■	■	■	■	■		
181	180					■	■	■	■	■	■	■	■	■	■	■	■	■		
221	220					■	■	■	■	■	■	■	■	■	■	■	■	■	■	
271	270					■	■	■	■	■	■	■	■	■	■	■	■	■	■	
331	330					■	■	■		■	■	■	■	■	■	■	■	■	■	
391	390					■	■	■		■	■	■	■	■	■	■	■	■	■	
471	470					■	■			■	■	■	■	■	■	■	■	■	■	
561	560					■	■			■	■	■	■	■	■	■	■	■	■	
681	680					■	■			■	■	■	■	■	■	■	■	■	■	
821	820					■	■			■		■	■	■	■	■	■	■	■	
102	1000pF					■	■			■	■	■	■	■	■	■	■	■	■	■
122	1200									■		■	■	■	■	■	■	■	■	■
152	1500									■		■	■	■	■	■	■	■	■	■
182	1800									■		■	■	■	■	■	■	■	■	■
222	2200									■		■	■	■	■	■	■	■	■	■
272	2700									■		■	■		■	■	■	■	■	■
332	3300											■	■		■	■	■	■	■	■

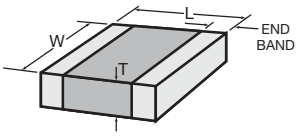
* Values shown to the left are available for 01005 size

* Values shown to the left are also available for 0201 size

Note: * For additional values that may be available, please consult your salesperson.

Ceramic Chip Capacitors

NP0/C0G Dielectric



Values that are typically available.

25V Available in 25V only.

(All measurements in inches)																				
Size			**0201** (± 0.002)		**0402** (± 0.004)		**0504** (± 0.008)		**0603** (± 0.006)		**0805** (± 0.008)			**1206** (± 0.008)		**1210** (±0.008)		**1812** (±0.012)		**2220 / 2221** (±0.016)	
L			.024		.040		.050		.063		.080			.126		.126		.177		.225 / .225	
W			.012		.020		.040		.032		.050			.063		.098		.126		.200 / .210	
*T (max)**			.012		.025		.040		.033		.055			.070		.075		.085		.108 /.108	
Min E/B			.002		.004		.005		.008		.020 ± .010			.020 ± .010		.020 ± .010		.024 ± .015		.025 ± .015	
VDCW (MAX)			25V		25V	50V	50V	100V	50V	100V	25V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V
CAP. CODE	CAP. VALUE																				
392	3900																				
472	4700																				
562	5600																				
682	6800																				
822	8200																				
103	.01µF																				
123	.012																				
153	.015																				
183	.018																				
223	.022																				
273	.027																				
333	.033																				
393	.039																				
473	.047																				
563	.056																				
683	.068																				
823	.082																				
104	.100µF													25V							
124	.120																				
154	.150																				
184	.180																				
224	.220																				
274	.270																				
334	.330																				
394	.390																				
474	.470																				
564	.560																				
684	.680																				
824	.820																				
105	1.00µF																				
125	1.20																				
155	1.50																				
185	1.80																				
225	2.20																				
335	3.30																				
395	3.90																				
475	4.70																				
685	6.80																				
106	10.0µF																				
156	15.0µF																				
226	22.0µF																				
476	47.0µF																				
107	100.0µF																				

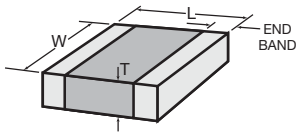
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

* For values above 1uF, thickness may be greater than specified above.

Ceramic Chip Capacitors

X7R Dielectric



Values that are typically available.

X5R — Available in X5R only. See X5R chart on page 14, for all values 1µF and above

(All measurements in inches)																				
Size		**01005** (± 0.0008)	**0201** (± 0.002)				**0402** (± 0.004)			**0504** (± 0.008)			**0603** (± 0.006)					**0805** (± 0.008)		
L		.016	.024				.040			.050			.063					.080		
W		.008	.012				.020			.040			.032					.050		
*T (max)**		.008	.012				.025			.040			.033					.055		
Min E/B		.002	.002				.004			.005			.008					.020 ± .010		
VDCW (MAX)		6.3V	6.3V	10V	16V	25V	16V	25V	50V	25V	50V	100V	10V	16V	25V	50V	100V	25V	50V	100V
CAP. CODE	CAP. VALUE																			
101	100pF																			
121	120																			
151	150																			
181	180																			
221	220																			
271	270																			
331	330																			
391	390																			
471	470																			
561	560																			
681	680																			
821	820																			
102	1000pF	X5R																		
122	1200																			
152	1500	X5R																		
182	1800																			
222	2200	X5R																		
272	2700																			
332	3300	X5R																		
392	3900																			
472	4700	X5R																		
562	5600																			
682	6800	X5R																		
822	8200																			
103	.01µF	X5R																		
123	.012																			
153	.015		X5R																	
183	.018																			
223	.022		X5R																	
273	.027																			
333	.033		X5R																	

* For values above 1uF, thickness may be greater than specified above.
T(max): 0603 – 0.048"
0805 – 0.075"

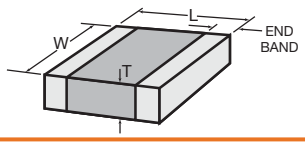
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

All components manufactured with the X7R dielectric are also available as an X5R dielectric.

Ceramic Chip Capacitors

X7R Dielectric



Values that are typically available.

X5R — Available in X5R only. See X5R chart on page 14, for all values 1µF and above

(All measurements in inches)																						
Size		**0201** (± 0.002)			**0402** (± 0.004)					**0603** (± 0.006)						**0805** (± 0.008)					
L		.024			.040					.063						.080					
W		.012			.020					.032						.050					
*T (max)**		.012			.025					.033						.055					
Min E/B		.002			.004					.008						.020 ± .010					
VDCW (MAX)		4V	6.3V	10V	4V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V
CAP. CODE	CAP. VALUE																				
393	.039		X5R																		
473	.047		X5R																		
563	.056																				
683	.068																				
823	.082																				
104	.100µF		X5R						X5R												
124	.120																				
154	.150																				
184	.180																				
224	.220	X5R																			
274	.270																				
334	.330					X5R															
394	.390																				
474	.470																				
564	.560																				
684	.680									X5R	X5R										
824	.820																				
105	1.00µF					X5R	X5R					X5R									
125	1.20																				
155	1.50																				
185	1.80																				
225	2.20				X5R	X5R				X5R	X5R	X5R									
335	3.30																X5R	X5R			
475	4.70									X5R	X5R						X5R				
685	6.80																				
106	10.0µF									X5R							X5R				
156	15.0µF																				
226	22.0µF																				
476	47.0µF																				
107	100.0µF																				

* For values above 1uF, thickness may be greater than specified above.
T(max): 0603 – 0.048"
0805 – 0.075"

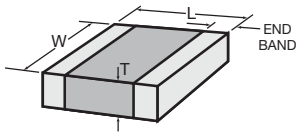
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

All components manufactured with the X7R dielectric are also available as an X5R dielectric.

Ceramic Chip Capacitors

X7R Dielectric



Values that are typically available.

X5R — Available in X5R only. See X5R chart on page 14, for all values 1µF and above

(All measurements in inches)																					
Size		**1206** (± 0.008)					**1210** (±0.008)					**1812** (±0.012)						**2220 / 2221** (±0.016)			
L		.126					.126					.177						.225 / .225			
W		.063					.098					.126						.200 / .210			
*T (max)**		.070					.075					.085						.108 /.108			
Min E/B		.020 ± .010					.020 ± .010					.024 ± .015						.025 ± .015			
VDCW (MAX)		10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	16V	25V	50V	100V
CAP. CODE	CAP. VALUE																				
102	1000pF			■	■	■			■	■	■										
122	1200			■	■	■			■	■	■										
152	1500			■	■	■			■	■	■										
182	1800			■	■	■			■	■	■										
222	2200			■	■	■			■	■	■										
272	2700			■	■	■			■	■	■										
332	3300			■	■	■			■	■	■										
392	3900			■	■	■			■	■	■										
472	4700			■	■	■			■	■	■										
562	5600			■	■	■			■	■	■										
682	6800			■	■	■			■	■	■					■	■				
822	8200			■	■	■			■	■	■					■	■				
103	.01µF			■	■	■			■	■	■			■	■	■	■				
123	.012			■	■	■			■	■	■			■	■	■	■				
153	.015			■	■	■			■	■	■			■	■	■	■				
183	.018			■	■	■			■	■	■			■	■	■	■				
223	.022			■	■	■			■	■	■			■	■	■	■		■	■	■
273	.027			■	■	■			■	■	■			■	■	■	■		■	■	■
333	.033			■	■	■			■	■	■			■	■	■	■		■	■	■
393	.039			■	■	■			■	■	■			■	■	■	■		■	■	■
473	.047			■	■	■			■	■	■			■	■	■	■		■	■	■
563	.056			■	■	■			■	■	■			■	■	■	■		■	■	■
683	.068			■	■	■			■	■	■			■	■	■	■		■	■	■
823	.082			■	■	■			■	■	■			■	■	■	■		■	■	■
104	.100µF		■	■	■	■	■	■	■	■	■			■	■	■	■		■	■	■
124	.120		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■
154	.150		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■
184	.180		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■
224	.220		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■
274	.270		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■
334	.330		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■

* For values above 1uF, thickness may be greater than specified above.
T(max): 1206 – 0.110" 1812 – 0.130"
1210 – 0.125" 2220 – 0.135"

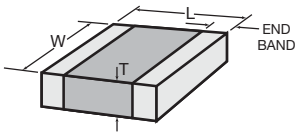
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

All components manufactured with the X7R dielectric are also available as an X5R dielectric.

Ceramic Chip Capacitors

X7R Dielectric



Values that are typically available.

X5R — Available in X5R only. See X5R chart on page 14, for all values 1µF and above

(All measurements in inches)			1206					1210					1812						2220 / 2221			
Size			**1206** (± 0.008)					**1210** (±0.008)					**1812** (±0.012)						**2220 / 2221** (±0.016)			
L			.126					.126					.177						.225 / .225			
W			.063					.098					.126						.200 / .210			
*T (max)**			.070					.075					.085						.108 /.108			
Min E/B			.020 ± .010					.020 ± .010					.024 ± .015						.025 ± .015			
VDCW (MAX)			10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	16V	25V	50V	100V
CAP. CODE		CAP. VALUE																				
	394	.390		■	■	■		■	■	■	■				■	■	■	■		■	■	■
	474	.470		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■
	564	.560		■	■	■		■	■	■	■				■	■	■	■		■	■	■
	684	.680		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■
	824	.820		■	■	■		■	■	■					■	■	■			■	■	■
	105	1.00µF	■	■	■	■	■	■	■	■	■	■			■	■	■			■	■	■
	125	1.20													■	■	■			■	■	■
	155	1.50	■	■	■	■		■	■	■										■		
	185	1.80																				
	225	2.20	■	■	■	■		■	■	■					■	■						
	335	3.30	■	■	■			■	■	■												
	475	4.70	■	■	■			■	■	■	■				■	■						■
	685	6.80																				
	106	10.0µF	■	X5R	X5R			■	■	■				■	■	X5R						
	156	15.0µF																		X5R		
	226	22.0µF						X5R	X5R	X5R				■	X5R	X5R			■			
	476	47.0µF											X5R	X5R								
	107	100.0µF																				

* For values above 1uF, thickness may be greater than specified above.
T(max): 1206 – 0.110" 1812 – 0.130"
1210 – 0.125" 2220 – 0.135"

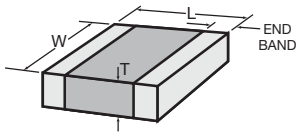
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

All components manufactured with the X7R dielectric are also available as an X5R dielectric.

Ceramic Chip Capacitors

X5R Dielectric (1µF and above)



Values that are typically available.

For values less than 1µF, see X7R chart on pages 10–13.

(All measurements in inches)																								
Size		**0402** (± 0.004)			**0603** (± 0.006)					**0805** (± 0.008)				**1206** (± 0.008)				**1210** (±0.008)				**1812** (±0.012)		
L		.040			.063					.080				.126				.126				.177		
W		.020			.032					.050				.063				.098				.126		
*T (max)**		.025			.033					.055				.070				.075				.085		
Min E/B		.004			.008					.020 ± .010				.020 ± .010				.020 ± .010				.024 ± .015		
VDCW (MAX)		4V	6.3V	10V	4V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V
CAP. CODE	CAP. VALUE																							
105	1.00µF		■	■		■	■	■	■	■	■	■	■	■	■	■	■							
125	1.20																							
155	1.50																							
185	1.80																							
225	2.20	■	■			■	■	■		■	■	■	■	■	■	■	■							
335	3.30									■	■	■		■	■	■	■			■	■			

* For values above 1uF, thickness may be greater than specified above.

T(max): 0603 – 0.048" 1206 – 0.110" 1812 – 0.130"
0805 – 0.075" 1210 – 0.125" 2220 – 0.135"

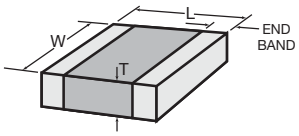
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

All components manufactured with the X7R dielectric are also available as an X5R dielectric.

Ceramic Chip Capacitors

X5R Dielectric (1µF and above)



Values that are typically available.

For values less than 1µF, see X7R chart on pages 10–13.

(All measurements in inches)																											
Size		**0402** (± 0.004)	**0603** (± 0.006)				**0805** (± 0.008)				**1206** (± 0.008)				**1210** (±0.008)				**1812** (±0.012)				**2220 / 2221** (±0.016)			
L		.040	.063				.080				.126				.126				.177				.225 / .225			
W		.020	.032				.050				.063				.098				.126				.200 / .210			
*T (max)**		.025	.033				.055				.070				.075				.085				.108 /.108			
Min E/B		.004	.008				.020 ± .010				.020 ± .010				.020 ± .010				.024 ± .015				.025 ± .015			
VDCW (MAX)		6.3V	4V	6.3V	10V	16V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	6.3V	10V	25V	50V
CAP. CODE	CAP. VALUE																									
395	3.90																									
475	4.70			■	■		■	■	■	■	■	■	■	■	■	■	■	■		■	■	■				
685	6.80																									
106	10.0µF		■	■			■	■			■	■	■	■	■	■	■	■		■	■	■				■
156	15.0µF																								■	
226	22.0µF						■				■					■	■	■	■	■	■	■				
476	47.0µF										■				■				■	■			■	■		
107	100.0µF										■				■				■				■			

* For values above 1uF, thickness may be greater than specified above.

T(max): 0603 – 0.048" 1206 – 0.110" 1812 – 0.130"
0805 – 0.075" 1210 – 0.125" 2220 – 0.135"

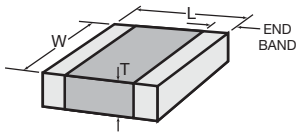
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

All components manufactured with the X7R dielectric are also available as an X5R dielectric.

Ceramic Chip Capacitors

Z5U Dielectric



Values that are typically available.

(All measurements in inches)														
Size	**0504** (± 0.008)		**0603** (± 0.006)		**0805** (± 0.008)		**1206** (± 0.008)		**1210** (±0.008)		**1812** (±0.012)		**2220 / 2221** (±0.016)	
L	.050		.063		.080		.126		.126		.177		.225 / .225	
W	.040		.032		.050		.063		.098		.126		.200 / .210	
*T (max)**	.040		.033		.055		.070		.075		.085		.108 /.108	
Min E/B	.005		.008		.020 ± .010		.020 ± .010		.020 ± .010		.024 ± .015		.025 ± .015	
VDCW (MAX)	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V
CAP. CODE	CAP. VALUE													
102	1000pF	■	■											
122	1200	■	■											
152	1500	■	■											
182	1800	■	■											
222	2200	■	■											
272	2700	■	■											
332	3300	■	■											
392	3900	■	■											
472	4700	■	■			■								
562	5600	■	■			■	■							
682	6800	■	■			■	■							
822	8200	■	■			■	■							
103	.01µF	■	■	■	■	■	■	■	■	■	■			
123	.012	■	■	■	■	■	■	■	■	■	■			
153	.015	■	■	■	■	■	■	■	■	■	■			
183	.018	■	■	■	■	■	■	■	■	■	■			
223	.022	■	■	■	■	■	■	■	■	■	■			
273	.027	■	■	■	■	■	■	■	■	■	■			
333	.033	■	■	■	■	■	■	■	■	■	■			
393	.039	■	■	■	■	■	■	■	■	■	■			
473	.047	■	■	■	■	■	■	■	■	■	■			
563	.056	■		■	■	■	■	■	■	■	■			
683	.068	■		■	■	■	■	■	■	■	■			
823	.082	■		■	■	■	■	■	■	■	■			
104	.100µF	■		■	■	■	■	■	■	■	■	■	■	
124	.120			■		■	■	■	■	■	■	■	■	
154	.150			■		■	■	■	■	■	■	■	■	■
184	.180			■		■	■	■	■	■	■	■	■	■
224	.220			■		■	■	■	■	■	■	■	■	■
274	.270					■	■	■	■	■	■	■	■	■
334	.330			■		■	■	■	■	■	■	■	■	■

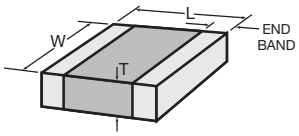
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

* For values above 1uF, thickness may be greater than specified above.

Ceramic Chip Capacitors

Z5U Dielectric



Values that are typically available.

(All measurements in inches)														
Size	**0504** (± 0.008)		**0603** (± 0.006)		**0805** (± 0.008)		**1206** (± 0.008)		**1210** (±0.008)		**1812** (±0.012)		**2220 / 2221** (±0.016)	
L	.050		.063		.080		.126		.126		.177		.225 / .225	
W	.040		.032		.050		.063		.098		.126		.200 / .210	
*T (max)**	.040		.033		.055		.070		.075		.085		.108 /.108	
Min E/B	.005		.008		.020 ± .010		.020 ± .010		.020 ± .010		.024 ± .015		.025 ± .015	
VDCW (MAX)	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V
CAP. CODE	CAP. VALUE													
394	.390					■		■	■	■	■	■	■	■	■
474	.470					■		■	■	■	■	■	■	■	■
564	.560					■		■		■	■	■	■	■	■
684	.680							■		■	■	■	■	■	■
824	.820							■		■	■	■	■	■	■
105	1.00µF							■		■	■	■	■	■	■
125	1.20									■	■	■	■	■	■
155	1.50									■	■	■	■	■	■
185	1.80									■	■	■	■	■	■
225	2.20									■		■	■	■	■
335	3.30									■		■		■	■
395	3.90									■				■	
475	4.70									■				■	
685	6.80														
106	10.0µF														■
156	15.0µF														
226	22.0µF														
476	47.0µF														
107	100.0µF														

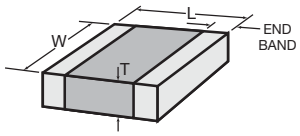
Note:

Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

* For values above 1uF, thickness may be greater than specified above.

Ceramic Chip Capacitors

Y5V Dielectric



Values that are typically available.

(All measurements in inches)																												
Size	**0201** (± 0.002)	**0402** (± 0.004)					**0603** (± 0.006)					**0805** (± 0.008)					**1206** (± 0.008)				**1210** (±0.008)				**1812** (±0.012)		
L	.024	.040					.063					.080					.126				.126				.177		
W	.012	.020					.032					.050					.063				.098				.126		
*T (max)**	.012	.025					.033					.055					.070				.075				.085		
Min E/B	.002	.004					.008					.020 ± .010					.020 ± .010				.020 ± .010				.024 ± .015		
VDCW (MAX)	10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	25V
CAP. CODE	CAP. VALUE																											
102	1000pF	■				■	■																					
122	1200					■	■																					
152	1500					■	■																					
182	1800					■	■																					
222	2200	■				■	■																					
272	2700					■	■																					
332	3300	■				■	■																					
392	3900					■	■																					
472	4700	■				■	■																					
562	5600					■	■																					
682	6800	■				■	■																					
822	8200					■	■																					
103	.01µF	■			■	■	■			■	■	■																
123	.012				■	■				■	■	■																
153	.015				■	■				■	■	■																
183	.018				■	■				■	■	■																
223	.022				■	■				■	■	■																
273	.027				■	■				■	■	■																
333	.033				■	■				■	■	■																
393	.039				■	■				■	■	■				■												
473	.047				■	■				■	■	■				■												
563	.056				■	■				■	■	■				■												
683	.068				■	■				■	■	■				■												
823	.082				■	■				■	■	■				■												
104	.100µF		■	■	■	■		■	■	■	■	■			■	■	■			■	■							
124	.120							■	■	■	■				■	■	■			■	■							
154	.150							■	■	■	■				■	■	■			■	■							
184	.180							■	■	■	■				■	■	■			■	■							
224	.220		■	■	■			■	■	■	■	■			■	■	■			■	■							
274	.270									■	■				■	■	■			■	■							
334	.330		■	■						■	■				■	■	■			■	■			■	■			

Note:

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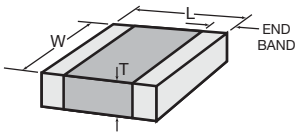
Ceramic Chip Capacitors

Y5V Dielectric



Values that are typically available.

(All measurements in inches)																													
Size		**0201** (± 0.002)	**0402** (± 0.004)					**0603** (± 0.006)					**0805** (± 0.008)					**1206** (± 0.008)				**1210** (±0.008)				**1812** (±0.012)		
L		.024	.040					.063					.080					.126				.126				.177		
W		.012	.020					.032					.050					.063				.098				.126		
*T (max)**		.012	.025					.033					.055					.070				.075				.085		
Min E/B		.002	.004					.008					.020 ± .010					.020 ± .010				.020 ± .010				.024 ± .015		
VDCW (MAX)		10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	25V
CAP. CODE	CAP. VALUE																												
394	.390														■	■	■			■	■			■	■			
474	.470		■	■				■	■	■	■				■	■	■			■	■			■	■			
564	.560														■					■				■	■			
684	.680														■				■	■				■	■			
824	.820														■				■	■				■	■			
105	1.00µF		■					■	■	■	■		■	■	■	■	■	■	■	■				■	■		■	■
125	1.20																		■	■				■	■		■	■
155	1.50																		■	■				■	■		■	■
185	1.80																		■					■	■		■	■
225	2.20							■	■				■	■	■	■		■	■	■				■	■		■	■
335	3.30												■	■					■	■				■	■		■	■
395	3.90																		■					■	■		■	■
475	4.70							■	■				■	■	■	■		■	■	■				■	■		■	■
685	6.80																		■					■	■			
106	10.0µF												■	■	■			■	■	■				■	■		■	■
156	15.0µF																												
226	22.0µF																	■						■		■	■	
476	47.0µF																					■	■			■	■	
107	100.0µF																					■				■		

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Due to demand and raw material fluctuations in the market, changes and availability of individual values may occur. Minimum order quantities may apply.

* For values above 1uF, thickness may be greater than specified above.

All components in this section are RoHS compliant per the EU directives and definitions.