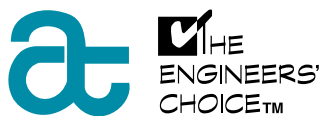
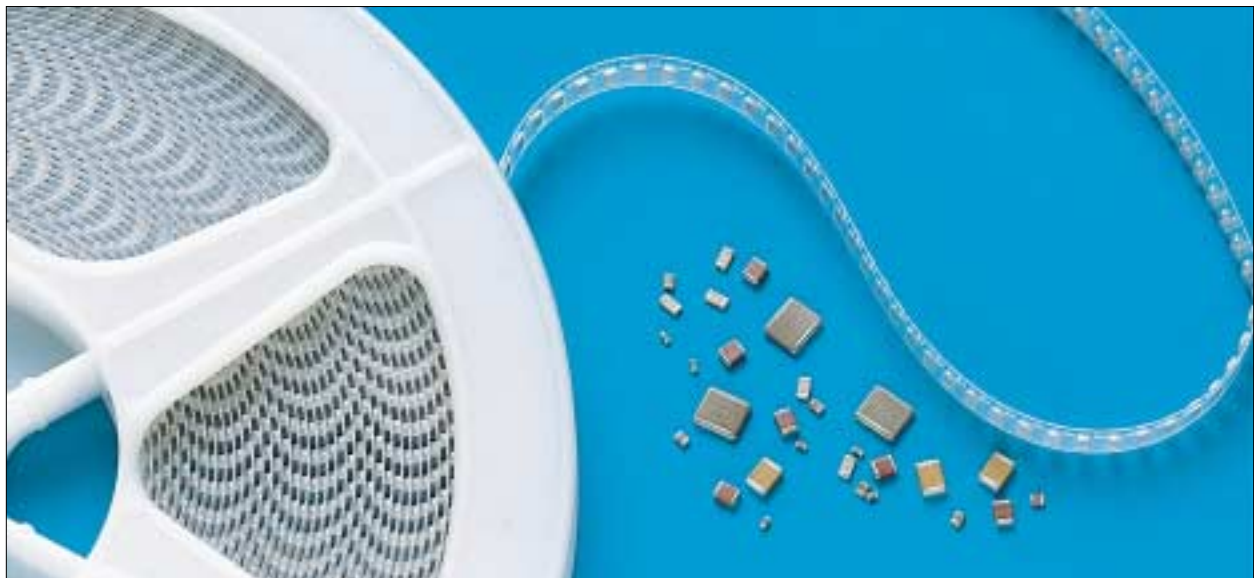


# ***ATC General Purpose Capacitors***

Low Cost  
Multilayer Ceramic Capacitors  
For Surface Mount Applications  
Manufactured for ATC



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ATC North America  
631-622-4700  
[sales@atceramics.com](mailto:sales@atceramics.com)

ATC Europe  
+46 8 6800410  
[sales@atceramics-europe.com](mailto:sales@atceramics-europe.com)

ATC Asia  
+86 755 8366-4318  
[sales@atceramics-asia.com](mailto:sales@atceramics-asia.com)

ATC 001-847  
Rev. G; 5/04

# ATC GENERAL PURPOSE CAPACITORS: NPO (COG) DIELECTRIC

## ELECTRICAL CHARACTERISTICS

**CAPACITANCE RANGE:** 0.5 pF to 0.10  $\mu$ F.

**TEMPERATURE CHARACTERISTIC:**  $0 \pm 30\text{ppm}/^\circ\text{C}$ .

**OPERATING TEMPERATURE RANGE:**  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$ .

**DISSIPATION FACTOR:**

0.1% (max.) @  $+25^\circ\text{C}$  and  $+125^\circ\text{C}$  @ 1.0  $V_{\text{rms}}$  and 1 KHz for  $>1000$  pF. 1 MHz  $<1000$  pF.

**INSULATION RESISTANCE @  $+25^\circ\text{C}$  and rated  $V_{\text{dc}}$ :**

100,000 megohms (min.) or 1000 ohm-farads (min.), whichever is less.

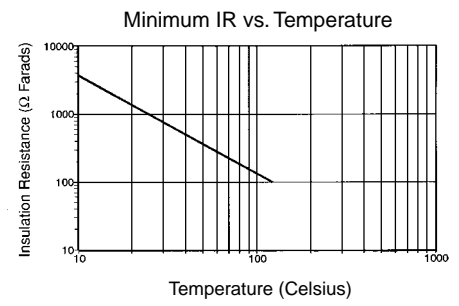
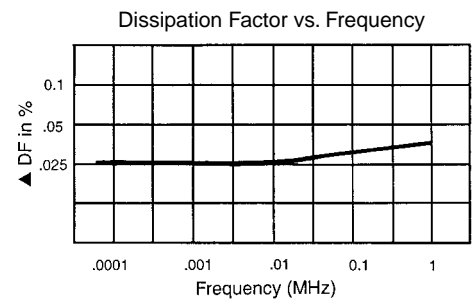
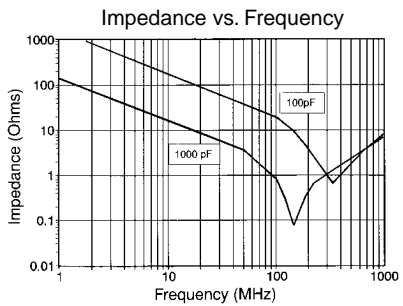
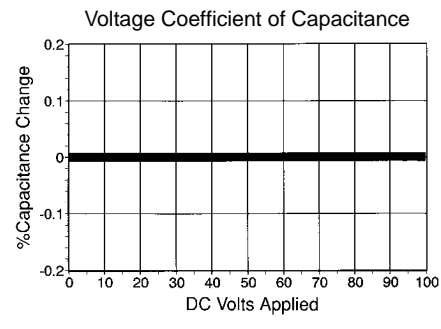
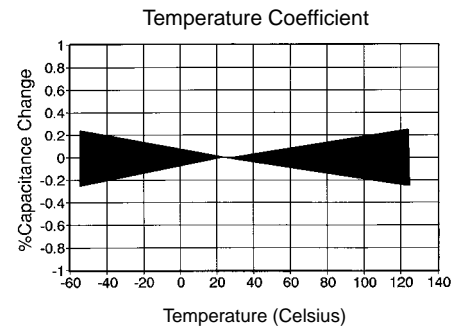
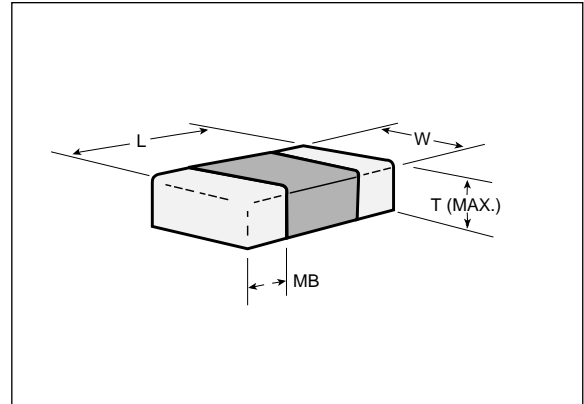
**INSULATION RESISTANCE @  $+125^\circ\text{C}$  and rated  $V_{\text{dc}}$ :**

10,000 megohms (min.) or 100 ohm-farads (min.), whichever is less.

**DIELECTRIC WITHSTANDING VOLTAGE:**

250% of rated voltage for  $5 \pm 1$  seconds, 50 milliamps (max.).

Unless otherwise specified all test data is at  $+25^\circ\text{C}$ .



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ATC North America  
631-622-4700 sales@atceramics.com

ATC Europe  
+46 8 6800410 sales@atceramics-europe.com

ATC Asia  
86-755-8366-4318 sales@atceramics-asia.com

# ATC GENERAL PURPOSE CAPACITORS: NPO (COG) DIELECTRIC

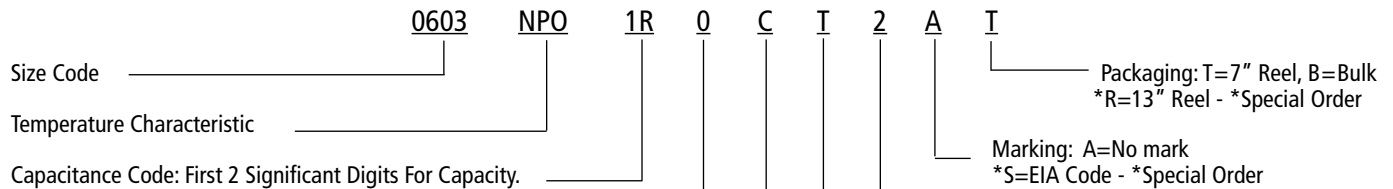
SIZE	0402	0504	0603	0805	1206	1210	1812	2225*
Length (L)	.040 (1.02)	.050 (1.27)	.063 (1.60)	.079 (2.00)	.126 (3.20)	.126 (3.20)	.177 (4.50)	.220 (5.59)
Width (W)	.020 (0.51)	.040 (1.02)	.031 (0.80)	.049 (1.25)	.063 (1.60)	.098 (2.50)	.126 (3.20)	.250 (6.35)
Tol. L & W	±.004 (0.10)	±.006 (.152)	±.005 (0.12)	±.008 (0.2)	±.008 (0.2)	±.008 (0.2)	±.010 (0.25)	±.015 (0.38)
T Max.	.025 (0.64)	.044 (1.12)	.035 (0.89)	.051 (1.30)	.051 (1.30)	.067 (1.70)	.067 (1.70)	.070 (1.78)
Term. (MB) Min.	.004 (.10)	.005 (.12)	.005 (.12)	.010 (.25)	.010 (.25)	.010 (.25)	.010 (.25)	.010 (.25)
Max.	.012 (.30)	.015 (.38)	.015 (.38)	.028 (.71)	.028 (.71)	.028 (.71)	.030 (.76)	.030 (.76)
Min. Cap.	0R5	0R5	0R5	0R5	0R5	681	471	102
Max. Cap. (code) & WVDC								
10V								
16V	271	182	102	103	153	273	393	104
25V	331	122	102	472	223	223	393	104
50V	221	102	102	332	103	223	333	104
100V	101	561	102	182	562	103	183	683
200V	680	391	271	122	392	822	123	473
500V				471	102	222	392	153
1000V				331	821	182	222	103
2000V					271	681	122	472
5000V								

Dimensions shown in inches (mm)

Higher voltages available upon request.

\* IR and Vapor Phase soldering only recommended.

## PART NUMBER CODE



Indicates number of zeros following digits of capacitance in picofarads  
R=Decimal Point

CAPACITANCE TOLERANCE				
Code	B*	C	G*	J
Tol.	±0.1	±0.25	±2	±5
	pF (Values < 10 pF)		% (Values > 10 pF)	

\*Tighter tolerances available.

WVDC Code	A	7	1	2	3	4	5	6	8	9
WVDC	10	16	25	50	100*	200*	500*	1000*	2000*	5000*

\*Special Order - Consult Factory

Termination Code

T = Lead Free Solderable Nickel Barrier (Standard)

W = Solderable Nickel Barrier\*\*

C = Palladium Silver (non-magnetic)\*\*

\*\*Consult ATC for availability

## STANDARD EIA CAPACITANCE VALUES REFERENCE TABLE

Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF
0R5	0.5	6R8	6.8	560	56	471	470	392	3900	273	.027	224	.22	185	1.8
1R0	1.0	8R2	8.2	680	68	561	560	472	4700	333	.033	274	.27	225	2.2
1R2	1.2	100	10	820	82	681	680	562	5600	393	.039	334	.33	275	2.7
1R5	1.5	120	12	101	100	821	820	682	6800	473	.047	394	.39	335	3.3
1R8	1.8	150	15	121	120	102	1000	822	8200	563	.056	474	.47	395	3.9
2R2	2.2	180	18	151	150	122	1200			683	.068	564	.56	475	4.7
2R7	2.7	220	22	181	180	152	1500	Cap. Code	Cap. pF	823	.082	684	.68	565	5.6
3R3	3.3	270	27	221	220	182	1800	103	.010	824	.082	685	.68	566	5.6
3R9	3.9	330	33	271	270	222	2200	123	.012	104	.10	825	.82	567	5.6
4R7	4.7	390	39	331	330	272	2700	153	.015	124	.12	105	1.0	568	5.6
5R6	5.6	470	47	391	390	332	3300	183	.018	154	.15	125	1.2	569	5.6
								223	.022	184	.18	155	1.5	570	5.6

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ATC North America  
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ATC Europe  
+46 8 6800410 sales@atceramics-europe.com

ATC Asia  
86-755-8366-4318 sales@atceramics-asia.com

# ATC GENERAL PURPOSE CAPACITORS: X7R DIELECTRIC

## ELECTRICAL CHARACTERISTICS

**CAPACITANCE RANGE:** 220 pF to 2.2  $\mu$ F.

**TEMPERATURE CHARACTERISTIC:**  $\pm 15\%$  with 0 Vdc applied.

**OPERATING TEMPERATURE RANGE:**  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

**DISSIPATION FACTOR:** 50v, 100v, ratings, 2.5% (max.) @ 1.0 Vrms and 1 KHz - 25v ratings, 2.5% (max.) @ 0.5 Vrms and 1 KHz.

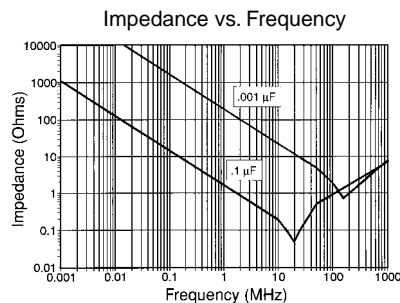
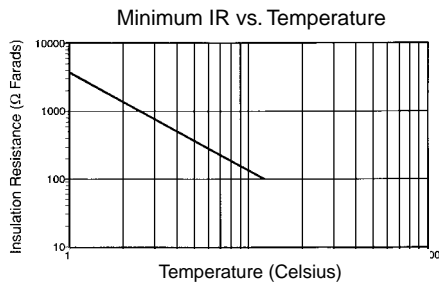
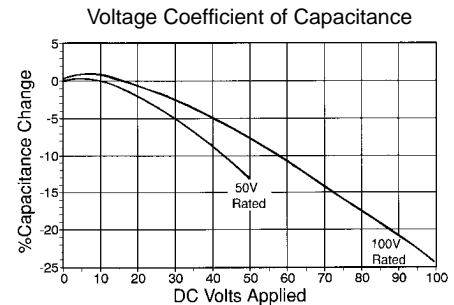
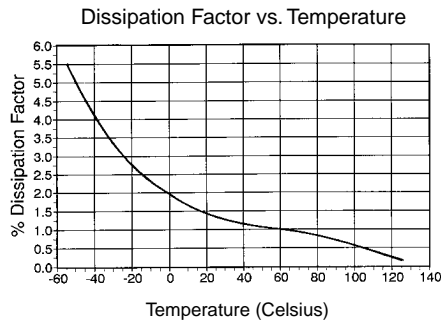
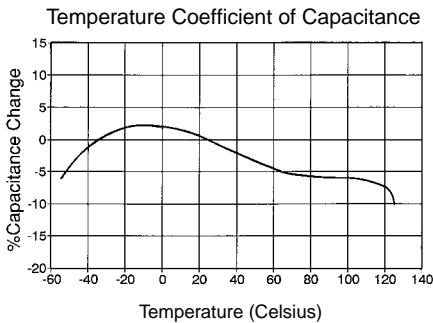
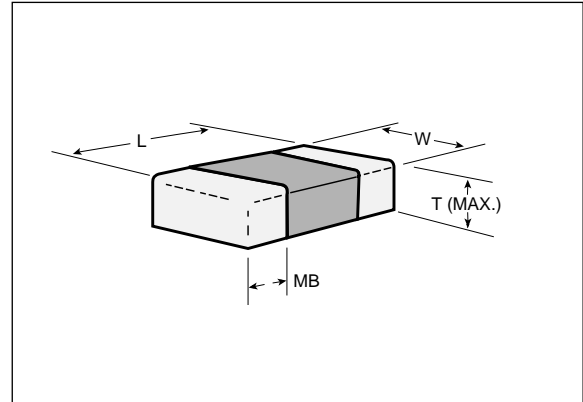
**INSULATION RESISTANCE @  $+25^{\circ}\text{C}$  and rated Vdc:**  
100,000 megohms (min.) or 1000 ohm-farads (min.), whichever is less.

**INSULATION RESISTANCE @  $+125^{\circ}\text{C}$  and rated Vdc:**  
10,000 megohms (min.) or 100 ohm-farads (min.), whichever is less.

**DIELECTRIC WITHSTANDING VOLTAGE:** 250% of rated voltage for  $5 \pm 1$  seconds, 50 milliamps (max.).

**AGING RATE:** 1% (maximum) per decade.

Unless otherwise specified all test data is at  $+25^{\circ}\text{C}$ .



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ATC North America  
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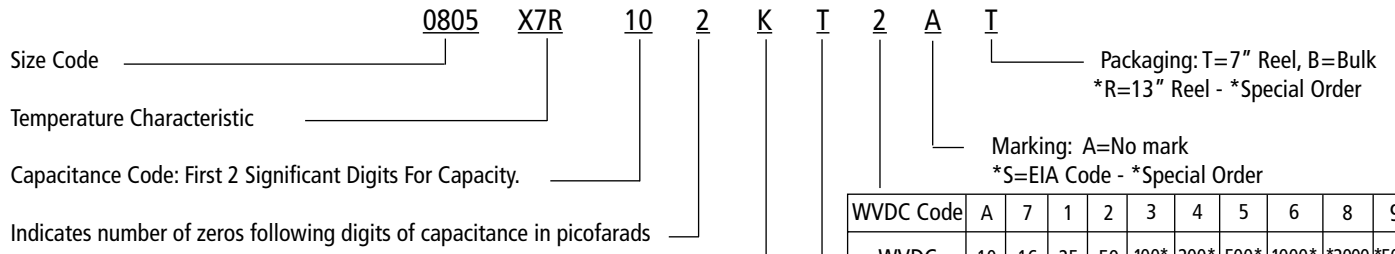
# ATC GENERAL PURPOSE CAPACITORS: X7R DIELECTRIC

SIZE	0402	0504	0603	0805	1206	1210	1812	2225*
Length (L)	.040 (1.02)	.050 (1.27)	.063 (1.60)	.079 (2.00)	.126 (3.20)	.126 (3.20)	.177 (4.50)	.220 (5.59)
Width (W)	.020 (0.51)	.040 (1.02)	.031 (0.80)	.049 (1.25)	.063 (1.60)	.098 (2.50)	.126 (3.20)	.250 (6.35)
Tol. L & W	±.004 (0.10)	±.006 (.152)	±.005 (0.12)	±.008 (0.2)	±.008 (0.2)	±.008 (0.2)	±.010 (0.25)	±.015 (0.38)
T Max.	.025 (0.64)	.044 (1.12)	.035 (0.89)	.051 (1.30)	.051 (1.30)	.067 (1.70)	.067 (1.70)	.070 (1.78)
Term. (MB) Min.	.004 (.10)	.005 (.12)	.005 (.12)	.010 (.25)	.010 (.25)	.010 (.25)	.010 (.25)	.010 (.25)
Max.	.012 (.30)	.015 (.38)	.015 (.38)	.028 (.71)	.028 (.71)	.028 (.71)	.030 (.76)	.030 (.76)
Min. Cap.	121	221	331	471	102	102	122	183
Max. Cap. (code) & WVDC								
10V				475				
16V	104	393	224	335	334	684	125	225
25V	273	273	104	474	274	564	105	185
50V	103	273	104	224	474	105	225	335
100V	272	153	103	563	154	105	105	225
200V	182	103	682	333	823	184	334	105
500V				103	273	563	104	334
1000V				272	682	153	273	124
2000V					102	222	392	183
5000V								

Dimensions shown in inches (mm)

\* IR and Vapor Phase soldering only recommended.

## PART NUMBER CODE



Packaging: T=7" Reel, B=Bulk  
\*R=13" Reel - \*Special Order

WVDC Code	A	7	1	2	3	4	5	6	8	9
WVDC	10	16	25	50	100*	200*	500*	1000*	*2000	*5000

\* Special Order - Consult Factory

Termination Code  
 T = Lead Free Solderable Nickel Barrier (Standard)  
 W = Solderable Nickel Barrier\*\*  
 C = Palladium Silver (non-magnetic)\*\*  
 \*\*Consult ATC for availability

CAPACITANCE TOLERANCE		
Code	*J	K
Tol.	±5	±10

\*Tighter tolerances available.

## STANDARD EIA CAPACITANCE VALUES REFERENCE TABLE

Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF
0R5	0.5	6R8	6.8	560	56	471	470	392	3900	273	.027	224	.22	185	1.8
1R0	1.0	8R2	8.2	680	68	561	560	472	4700	333	.033	274	.27	225	2.2
1R2	1.2	100	10	820	82	681	680	562	5600	393	.039	334	.33	275	2.7
1R5	1.5	120	12	101	100	821	820	682	6800	473	.047	394	.39	335	3.3
1R8	1.8	150	15	121	120	102	1000	822	8200	563	.056	474	.47	395	3.9
2R2	2.2	180	18	151	150	122	1200			683	.068	564	.56	475	4.7
2R7	2.7	220	22	181	180	152	1500	103	.010	823	.082	684	.68	565	5.6
3R3	3.3	270	27	221	220	182	1800	123	.012	104	.10	824	.82	685	6.8
3R9	3.9	330	33	271	270	222	2200	153	.015	124	.12	105	1.0	825	8.2
4R7	4.7	390	39	331	330	272	2700	183	.018	154	.15	125	1.2	106	10.0
5R6	5.6	470	47	391	390	332	3300	223	.022	184	.18	155	1.5	126	12.0

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ATC North America 631-622-4700 sales@atceramics.com  
 ATC Europe +46 8 6800410 sales@atceramics-europe.com  
 ATC Asia 86-755-8366-4318 sales@atceramics-asia.com

# ATC GENERAL PURPOSE CAPACITORS: Z5U DIELECTRIC

## ELECTRICAL CHARACTERISTICS

**CAPACITANCE RANGE:** .01  $\mu\text{F}$  to 15  $\mu\text{F}$ .

**TEMPERATURE CHARACTERISTIC:** +22%, -56%

**OPERATING TEMPERATURE RANGE:** +10°C to +85°C.

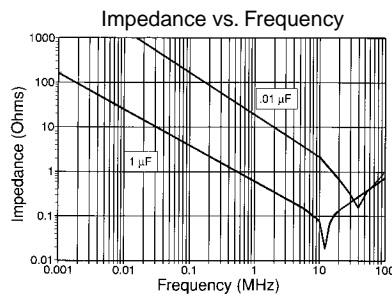
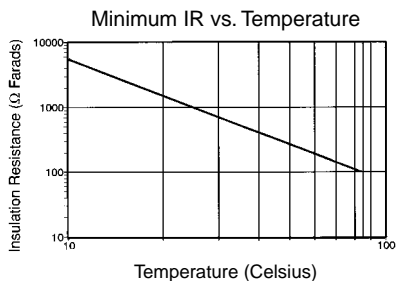
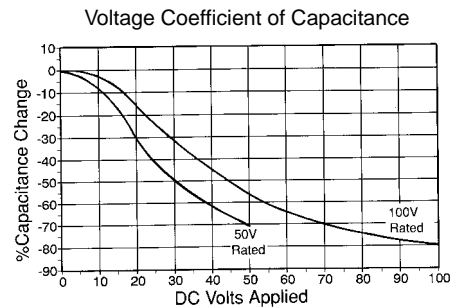
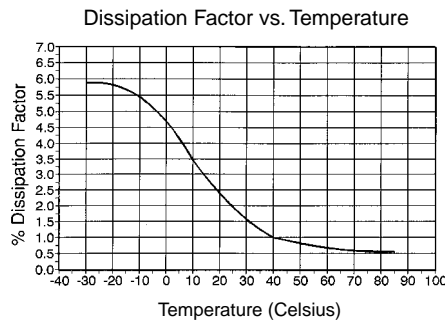
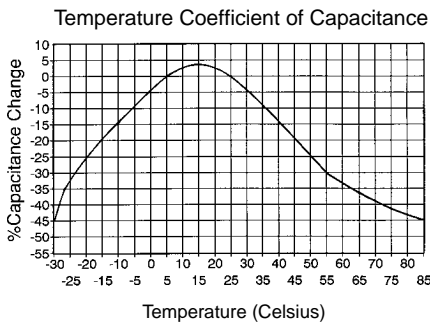
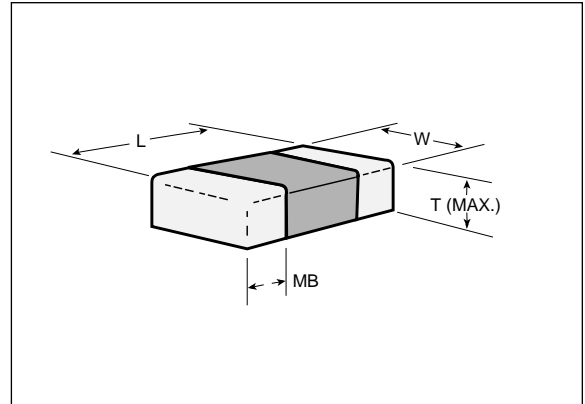
**DISSIPATION FACTOR:** 50v ratings, 3.0% (max.) @ .5 Vrms and 1 kHz - 25v ratings, 3.5% (max.) @ .5 Vrms and 1 KHz.

**INSULATION RESISTANCE @ + 25°C and rated Vdc:**  
100 ohm-farads (min.).

**DIELECTRIC WITHSTANDING VOLTAGE:**  
250% of rated voltage for  $5 \pm 1$  seconds, 50 milliamps (max.).

**AGING RATE:** 3% (maximum) per decade.

Unless otherwise specified all test data is at + 25°C.



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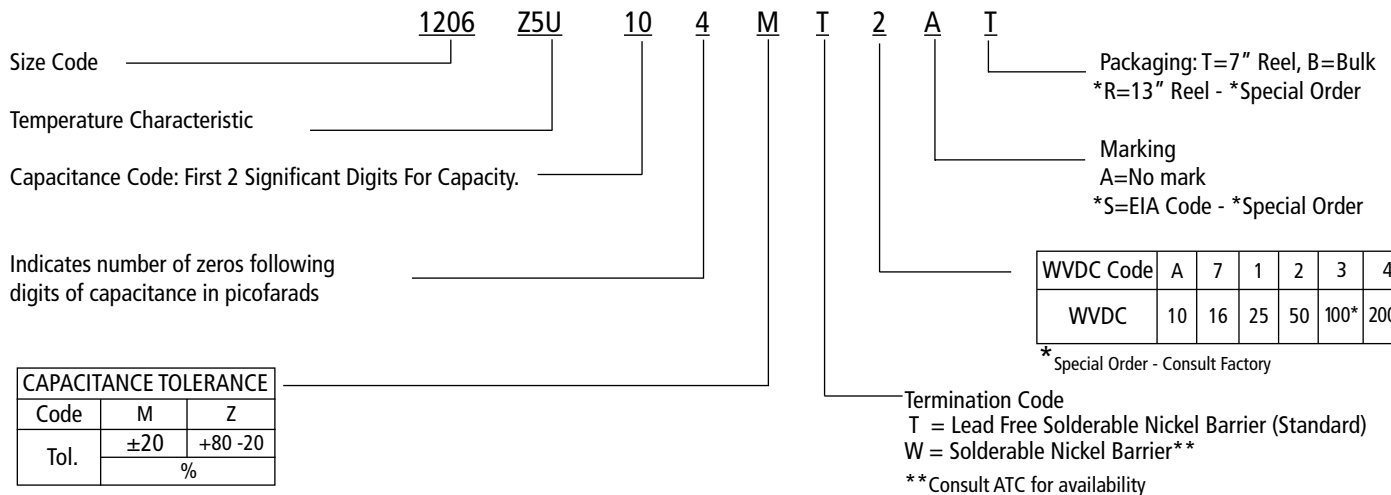
# ATC GENERAL PURPOSE CAPACITORS: Z5U DIELECTRIC

SIZE	0603	0805	1206	1210	1812	2225*
Length (L)	.063 (1.60)	.079 (2.00)	.126 (3.20)	.126 (3.20)	.177 (4.50)	.220 (5.59)
Width (W)	.031 (0.80)	.049 (1.25)	.063 (1.60)	.098 (2.50)	.126 (3.20)	.250 (6.35)
Tol. L & W	±.005 (0.12)	±.008 (0.2)	±.008 (0.2)	±.008 (0.2)	±.010 (0.25)	±.015 (0.38)
T Max.	.035 (0.89)	.051 (1.30)	.051 (1.30)	.067 (1.70)	.067 (1.70)	.070 (1.78)
Term. (MB) Min.	.005 (.12)	.010 (.25)	.010 (.25)	.010 (.25)	.010 (.25)	.010 (.25)
Max.	.015 (.38)	.028 (.71)	.028 (.71)	.028 (.71)	.030 (.76)	.030 (.76)
Min Cap	562	103	223	333	154	105
Max. Cap. (code) & WVDC						
10V						
16V	154	684	155	335	565	106
25V	104	474	125	225	475	106
50V	683	334	105	185	395	825
100V	273	124	274	564	125	225
200V	562	333	823	184	394	684

Dimensions shown in inches (mm)

\* IR and Vapor Phase soldering only recommended.

## PART NUMBER CODE



## STANDARD EIA CAPACITANCE VALUES REFERENCE TABLE

Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF	Cap. Code	Cap. pF
0R5	0.5	6R8	6.8	560	56	471	470	392	3900	273	.027	224	.22	185	1.8
1R0	1.0	8R2	8.2	680	68	561	560	472	4700	333	.033	274	.27	225	2.2
1R2	1.2	100	10	820	82	681	680	562	5600	393	.039	334	.33	275	2.7
1R5	1.5	120	12	101	100	821	820	682	6800	473	.047	394	.39	335	3.3
1R8	1.8	150	15	121	120	102	1000	822	8200	563	.056	474	.47	395	3.9
2R2	2.2	180	18	151	150	122	1200	683	.068	564	.56	475	.47	475	4.7
2R7	2.7	220	22	181	180	152	1500	823	.082	684	.68	565	5.6	685	6.8
3R3	3.3	270	27	221	220	182	1800	103	.010	824	.82	685	6.8	825	8.2
3R9	3.9	330	33	271	270	222	2200	123	.012	104	.10	824	.82	825	8.2
4R7	4.7	390	39	331	330	272	2700	153	.015	124	.12	105	1.0	106	10.0
5R6	5.6	470	47	391	390	332	3300	183	.018	154	.15	125	1.2	126	12.0
								223	.022	184	.18	155	1.5	156	15.0

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# APPLICATION NOTES

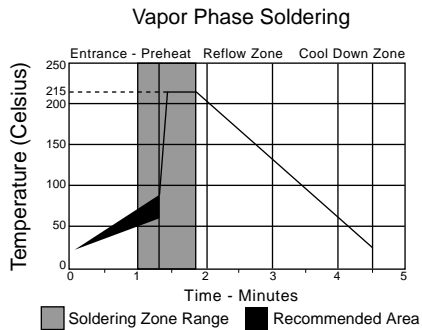
## TERMINATION STYLES

- T = Lead Free Solderable Nickel Barrier (Standard)
- W = Solderable Nickel Barrier\*\*
- C = Palladium Silver (non-magnetic)\*\*

\*\*Consult ATC for availability

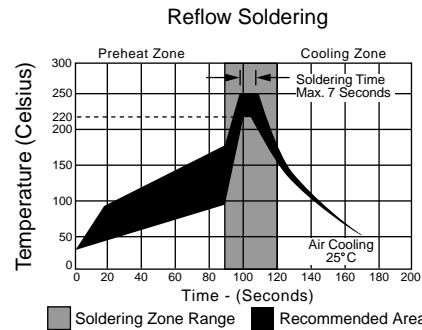
## RECOMMENDED SOLDERING PROFILES

- A mildly activated rosin flux 'RMA' is recommended.
- Sn60 (60% Sn, 40% Pb) or Sn62 (62.5% Sn, 36.1% Pb, 1.4% Ag) are recommended.
- Sizes 2225 and larger should be re-flow or vapor phase soldered. Wave solder is not recommended on these larger sizes.



## POST ASSEMBLY COOLDOWN AND CLEANING

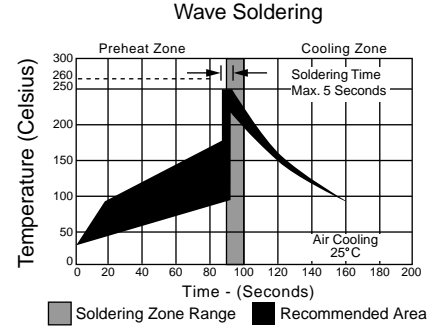
- Allow assembly to cool to room temperature. Do not attempt to speed up cooldown cycle as thermal cracking may result.
- Cleaning solvents are dependant on materials and flux type used. Multi-stage cleaning in alcohol, water, hydrocarbons, and common degreaser solvents will not damage our chip capacitors.



## SOLDERING TECHNIQUES

The reflow, vapor phase, and wave soldering profiles shown are recommended. Hand soldering is not preferred but can be accomplished successfully if the following precautions are followed:

- Use a low wattage iron with correct size tip.
- A preheat of 150°C minimum is recommended.
- Do not exceed 280°C maximum.
- Apply heat thru the solder. Minimize the contact to termination metalization.
- Keep the soldering process as short as possible.



## TAPE AND REEL PACKAGING FOR AUTOMATIC INSERTION

- Tape and reel packaging is preferred and is available for all sizes.
- To specify 7" reel use "T" in part number code.
- For 13" reel use "R" in part number code.
- Parts are packaged per EIA-RS481 specification.
- For tape size and approximate quantity per reel consult factory.

## ATC CROSS REFERENCE GUIDE

ATC SERIES	DESCRIPTION	AVX (KYOCERA)	KEMET	JOHANSON	MURATA	NOVACAP	PANASONIC	PHILLIPS	TDK	VITRAMON
ATC 0402	EIA 0402 SIZE, NICKEL BARRIER TERMINATIONS NPO, X7R	0402	C0402	R07	GRM36	0402	ECU (Q)	CXXXX0402	CC0402	VJ0402
ATC 0603	EIA 0603 SIZE, NICKEL BARRIER TERMINATIONS NPO, X7R, Z5U	0603	C0603	R14	GRM39	0603	-	CXXXX0603	CC0603	VJ0603
ATC 0805	EIA 0805 SIZE, NICKEL BARRIER TERMINATIONS NPO, X7R, Z5U	0805	C0805	R15	GRM40	0805	ECU (N)	CXXXX0805	CC0805	VJ0805
ATC 1206	EIA 1206 SIZE, NICKEL BARRIER TERMINATIONS NPO, X7R, Z5U	1206	C1206	R18	GRM42-6	1206	ECU (M)	CXXXX1206	CC1206	VJ1206
ATC 1210	EIA 1210 SIZE, NICKEL BARRIER TERMINATIONS NPO, X7R, Z5U	1210	C1210	S41	GRM42-2	1210	EPU (P)	CXXXX1210	CC1210	VJ1210
ATC 1812	EIA 1812 SIZE, NICKEL BARRIER TERMINATIONS NPO, X7R, Z5U	1812	C1812	S43	GRM43-2	1812	-	-	-	VJ1812
ATC 2225	EIA 2225 SIZE, NICKEL BARRIER TERMINATIONS NPO, X7R, Z5U	2225	C2225	S48	-	2225	-	-	-	VJ2225

## AMERICAN TECHNICAL CERAMICS

ATC North America  
631-622-4700 sales@atceramics.com

ATC Europe  
+46 8 6800410 sales@atceramics-europe.com

ATC Asia  
86-755-8399-5205 sales@atceramics-asia.com