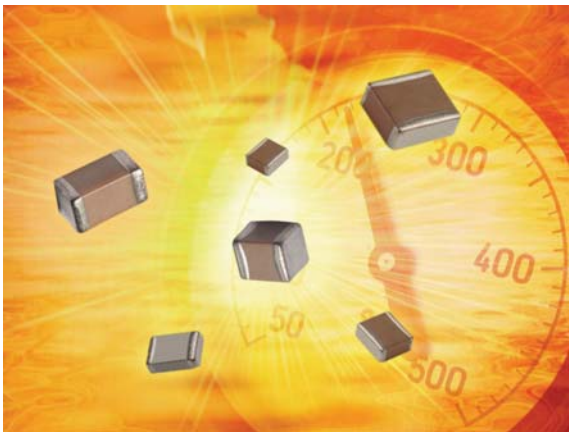
AT Series

High Temperature MLCC – 200ºC & 250°C Rated



Present military specifications, as well as a majority of commercial applications, require a maximum operating temperature of 125°C. However, the emerging market for high temperature electronics demands capacitors operating reliably at temperatures beyond 125°C. AVX's new high temperature chip capacitor product line, with verified capability of long-term operation up to 250°C is a response to both military and commercial business needs. The new capacitors demonstrate high current handling capabilities, high volumetric efficiency, high insulation resistance and low ESR/ESL. This product has been designed for the most demanding applications, such as "down-hole" oil exploration and aerospace programs.

HOW TO ORDER

AT10	3	T	104	K	A	T	2	A
AVX Style	**Voltage Code**	**Temperature Coefficient**	**Capacitance Code** (2 significant digits + no. of zeros)	**Capacitance Tolerance**	**Test Level**	**Termination**	**Packaging**	**Special Code**
AT03 = 0603	16V = Y	C0G 250ºC = A	101 = 100pF	J = ±5%	A = Standard	1 = Pd/Ag	2 = 7" Reel	A = Standard
AT05 = 0805	25V = 3	C0G 200ºC = 2	102 = 1nF	K = ±10%		T = 100% Sn Plated (RoHS Compliant)	4 = 13" Reel	
AT06 = 1206	50V = 5	VHT 250ºC = T	103 = 10nF	M = ±20%			9 = Bulk	
AT10 = 1210		VHT 200ºC = 4	104 = 100nF					
AT12 = 1812			105 = 1µF					
AT14 = 2225								

ELECTRICAL SPECIFICATIONS

Temperature Coefficient
C0G: A 0±30 ppm/°C, -55°C to +250°C
VHT: T ±15%, -55°C to +150°C
See TCC Plot for +250°C

Capacitance Test (MIL-STD-202, Method 305)
25°C, 1.0 ± 0.2 Vrms (open circuit voltage) @ 1kHz

Dissipation factor 25°C
C0G: 0.15% Max at 1.0 ± 0.2 Vrms (open circuit voltage) @ 1kHz
VHT: 2.5% Max at 1.0 ± 0.2 Vrms (open circuit voltage) @ 1kHz

Insulation Resistance 25°C (MIL-STD-202, Method 302)
100GΩ or 1000MΩ.µF (whichever is less)

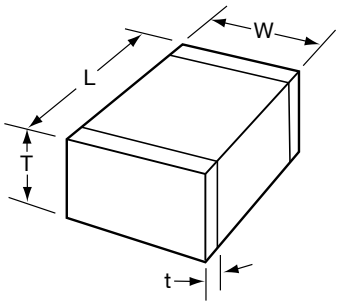
Insulation Resistance 125°C (MIL-STD-202, Method 302)
10GΩ or 100MΩ.µF (whichever is less)

Insulation Resistance 200°C (MIL-STD-202, Method 302)
1GΩ or 10MΩ.µF (whichever is less)

Insulation Resistance 250°C (MIL-STD-202, Method 302)
100MΩ or 1MΩ.µF (whichever is less)

Direct Withstanding Voltage 25°C (Flash Test)
250% rated voltage for 5 seconds with 50mA max charging current (500 Volt units @ 750VDC)

DIMENSIONS



millimeters (inches)

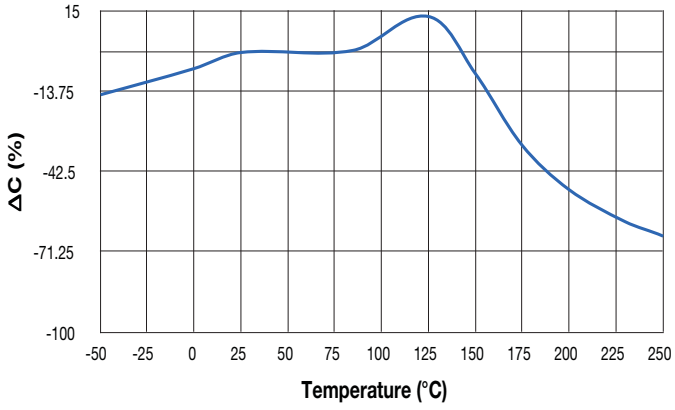
Size	AT03 = 0603	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225
(L) Length	1.60 ± 0.15 (0.063 ± 0.006)	2.01 ± 0.20 (0.079 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	4.50 ± 0.30 (0.177 ± 0.012)	5.72 ± 0.25 (0.225 ± 0.010)
(W) Width	0.81 ± 0.15 (0.032 ± 0.006)	1.25 ± 0.20 (0.049 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)	2.50 ± 0.20 (0.098 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	6.35 ± 0.25 (0.250 ± 0.010)
(T) Thickness Max.	1.02 (0.040)	1.30 (0.051)	1.52 (0.060)	1.70 (0.067)	2.54 (0.100)	2.54 (0.100)
(t) terminal min.	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)
max.	0.75 (0.030)	0.75 (0.030)	0.75 (0.030)	0.75 (0.030)	1.02 (0.040)	1.02 (0.040)

AT Series

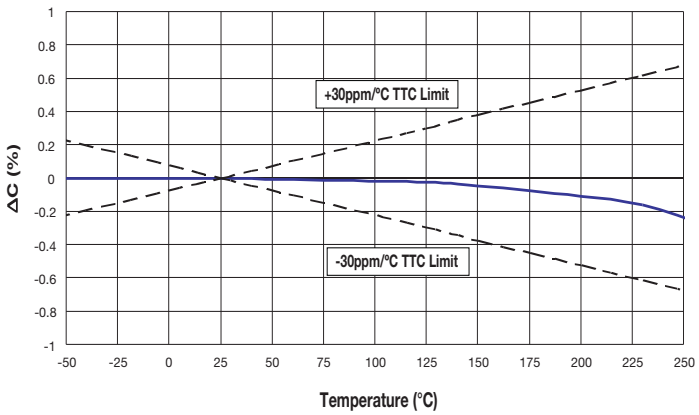
High Temperature MLCC – 200ºC & 250°C Rated

PERFORMANCE CHARACTERISTICS

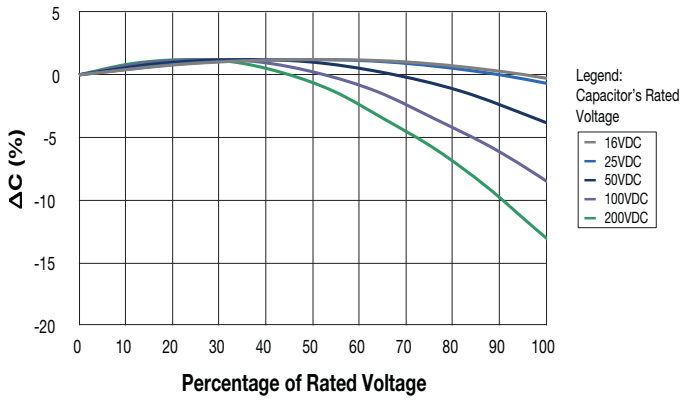
Typical Temperature Coefficient of Capacitance (VHT Dielectric)



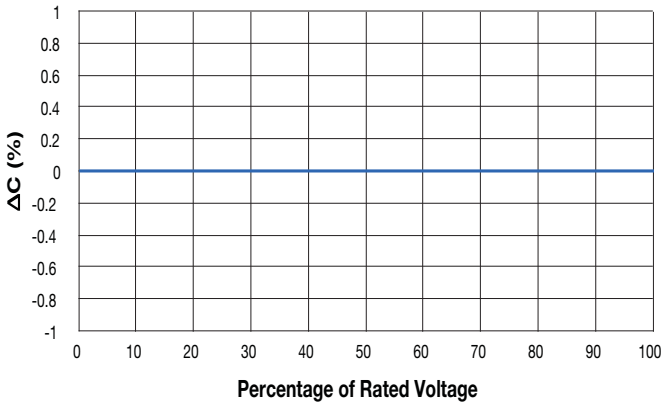
Typical Temperature Coefficient of Capacitance (C0G Dielectric)



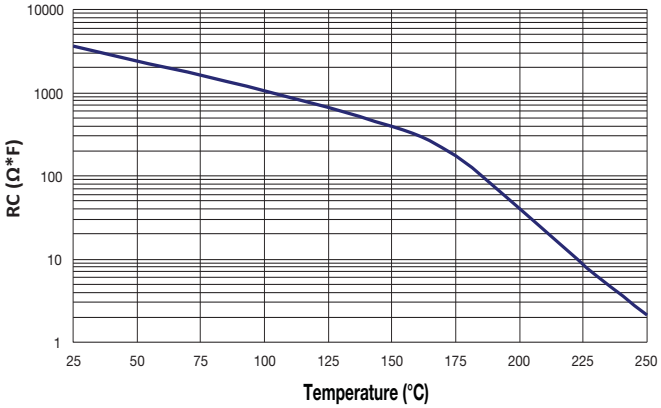
Typical Voltage Coefficient of Capacitance (VHT Dielectric)



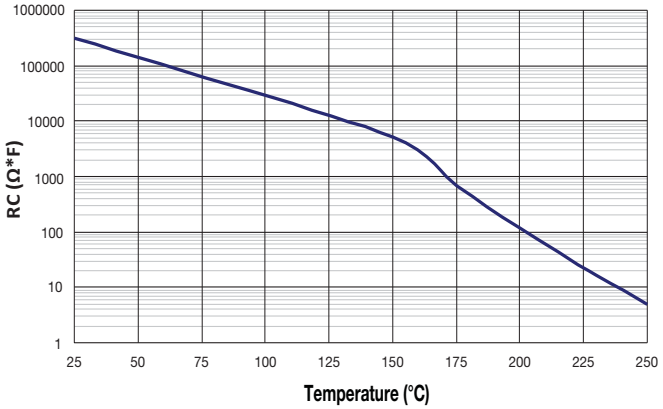
Typical Voltage Coefficient of Capacitance (C0G Dielectric)



Typical RC vs Temperature (VHT Dielectric)



Typical RC vs Temperature (C0G Dielectric)

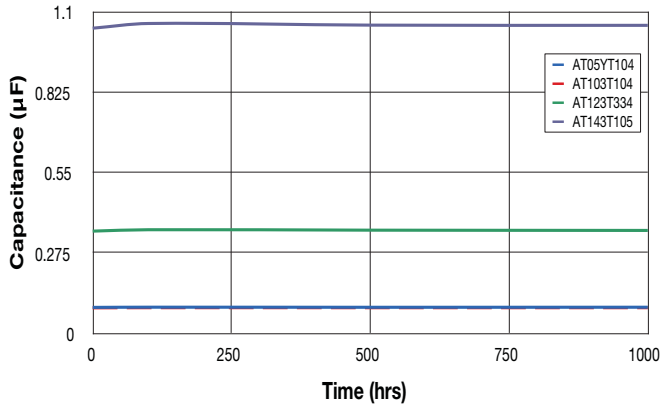


AT Series

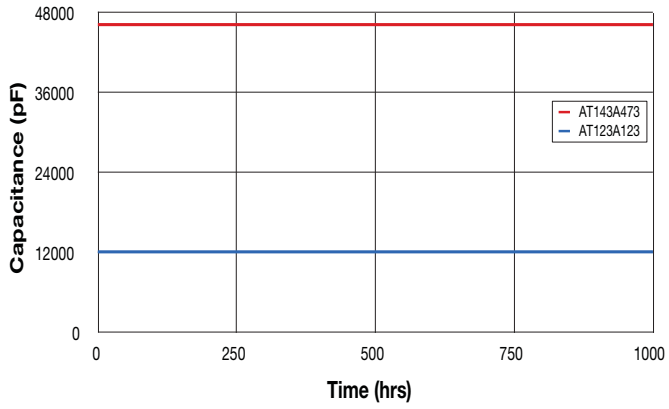
High Temperature MLCC – 200ºC & 250°C Rated

RELIABILITY

250°C Life Test @ 2x Rated Voltage (VHT Dielectric)



250°C Life Test @ 2x Rated Voltage (C0G Dielectric)



VHT - Failure Rate @ 90% Confidence Level (%/1000 hours)		
Temperature (°C)	50% Rated Voltage	100% Rated Voltage
200	0.002	0.017
250	0.026	0.210

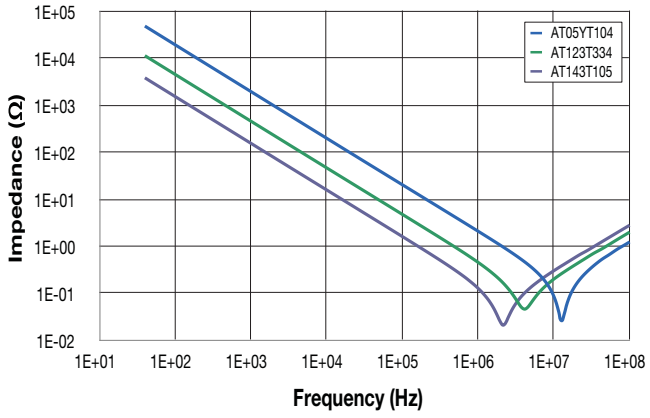
*Typical 1210, 1812, 2225 Failure Rate Analysis based on 250°C testing and voltage ratings specified on the following page.

C0G - Failure Rate @ 90% Confidence Level (%/1000 hours)		
Temperature (°C)	50% Rated Voltage	100% Rated Voltage
200	0.006	0.047
250	0.074	0.590

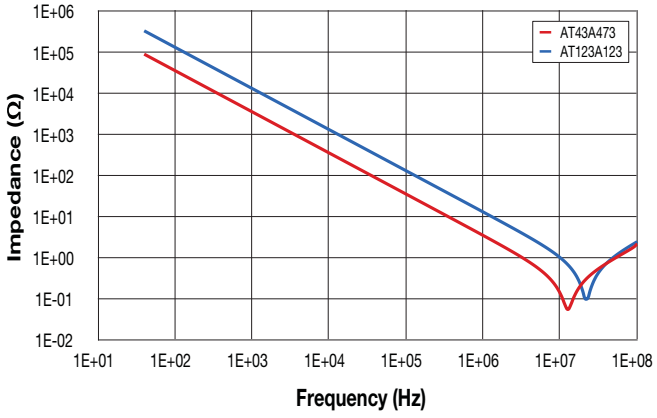
*Typical 1812 and 2225 Failure Rate Analysis based on 250°C testing and voltage ratings specified on the following page.

FREQUENCY RESPONSE

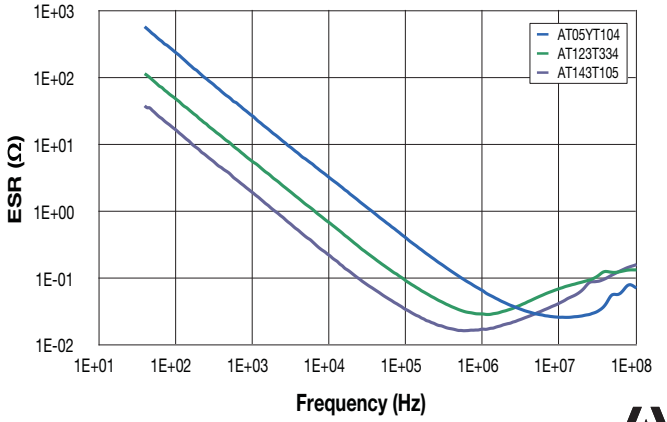
Impedance Frequency Response (VHT Dielectric)



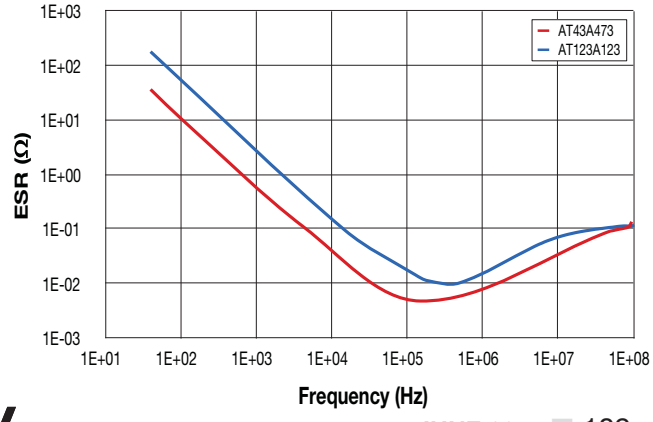
Impedance Frequency Response (C0G Dielectric)



ESR Frequency Response (VHT Dielectric)



ESR Frequency Response (C0G Dielectric)



High Temperature MLCC

200ºC Rated Capacitance Range

CAPACITANCE RANGE

PREFERRED SIZES ARE SHADED

VHT **Temp. Coefficient: 4** **200ºC Rated**

Case Size			AT03 = 0603	AT05 = 0805		AT06 = 1206		AT10 = 1210		AT12 = 1812	AT14 = 2225
Soldering			Reflow/Wave	Reflow/Wave		Reflow/Wave		Reflow Only		Reflow Only	Reflow Only
(L) Length		mm (in.)	1.60 ± 0.15 (0.063 ± 0.006)	2.01 ± 0.20 (0.079 ± 0.008)		3.20 ± 0.20 (0.126 ± 0.008)		3.20 ± 0.20 (0.126 ± 0.008)		4.50 ± 0.30 (0.177 ± 0.012)	5.72 ± 0.25 (0.225 ± 0.010)
(W) Width		mm (in.)	0.81 ± 0.15 (0.032 ± 0.006)	1.25 ± 0.20 (0.049 ± 0.008)		1.60 ± 0.20 (0.063 ± 0.008)		2.50 ± 0.20 (0.098 ± 0.008)		3.20 ± 0.20 (0.126 ± 0.008)	6.35 ± 0.25 (0.250 ± 0.010)
(T) Thickness		mm (in.)	1.02 (0.040)	1.30 (0.051)		1.52 (0.060)		1.70 (0.067)		2.54 (0.100)	2.54 (0.100)
(t) Terminal		min	0.25 (0.010)	0.25 (0.010)		0.25 (0.010)		0.25 (0.010)		0.25 (0.010)	0.25 (0.010)
		max	0.75 (0.030)	0.75 (0.030)		0.75 (0.030)		0.75 (0.030)		1.02 (0.040)	1.02 (0.040)
Rated Temp. (ºC)			200	200		200		200		200	200
Temp. Coefficeint			4	4		4		4		4	4
Voltage (V)			25	25	50	25	50	25	50	50	50
Cap (pF)	1000	102									
	1200	122									
	1500	152									
	1800	182									
	2200	222									
	2700	272									
	3300	332									
	3900	392									
	4700	472									
	5600	562									
	6800	682									
	8200	822									
Cap (µF)	0.010	103									
	0.012	123									
	0.015	153									
	0.018	183									
	0.022	223									
	0.027	273									
	0.033	333									
	0.039	393									
	0.047	473									
	0.056	563									
	0.068	683									
	0.082	823									
	0.100	104									
	0.120	124									
	0.150	154									
	0.180	184									
	0.220	224									
	0.270	274									
	0.330	334									
	0.390	394									
	0.470	474									
	0.560	564									
	0.680	684									
	0.820	824									
	1.000	105									
Voltage (V)			25	25	50	25	50	25	50	50	50
Rated Temp. (ºC)			200	200		200		200		200	200
Case Size			AT03 = 0603	AT05 = 0805		AT06 = 1206		AT10 = 1210		AT12 = 1812	AT14 = 2225

Voltage rating per table. Capacitance values specified at 25ºC, derate capacitance value based on TCC and VCC Plots on page 2.

NOTE: Contact factory for non-specified capacitance values.

High Temperature MLCC

250ºC Rated Capacitance Range

CAPACITANCE RANGE

PREFERRED SIZES ARE SHADED

VHT **Temp. Coefficient: T** **250ºC Rated**

Case Size			AT03 = 0603	AT05 = 0805		AT06 = 1206		AT10 = 1210		AT12 = 1812	AT14 = 2225
Soldering			Reflow/Wave	Reflow/Wave		Reflow/Wave		Reflow Only		Reflow Only	Reflow Only
(L) Length		mm (in.)	1.60 ± 0.15 (0.063 ± 0.006)	2.01 ± 0.20 (0.079 ± 0.008)		3.20 ± 0.20 (0.126 ± 0.008)		3.20 ± 0.20 (0.126 ± 0.008)		4.50 ± 0.30 (0.177 ± 0.012)	5.72 ± 0.25 (0.225 ± 0.010)
(W) Width		mm (in.)	0.81 ± 0.15 (0.032 ± 0.006)	1.25 ± 0.20 (0.049 ± 0.008)		1.60 ± 0.20 (0.063 ± 0.008)		2.50 ± 0.20 (0.098 ± 0.008)		3.20 ± 0.20 (0.126 ± 0.008)	6.35 ± 0.25 (0.250 ± 0.010)
(T) Thickness		mm (in.)	1.02 (0.040)	1.30 (0.051)		1.52 (0.060)		1.70 (0.067)		2.54 (0.100)	2.54 (0.100)
(t) Terminal		min max	0.25 (0.010) 0.75 (0.030)	0.25 (0.010) 0.75 (0.030)		0.25 (0.010) 0.75 (0.030)		0.25 (0.010) 0.75 (0.030)		0.25 (0.010) 1.02 (0.040)	0.25 (0.010) 1.02 (0.040)
Rated Temp. (ºC)			250	250		250		250		250	250
Temp. Coefficeint			T	T		T		T		T	T
Voltage (V)			16	16	25	16	25	16	25	25	25
Cap (pF)	1000	102									
	1200	122									
	1500	152									
	1800	182									
	2200	222									
	2700	272									
	3300	332									
	3900	392									
	4700	472									
	5600	562									
	6800	682									
	8200	822									
Cap (µF)	0.010	103									
	0.012	123									
	0.015	153									
	0.018	183									
	0.022	223									
	0.027	273									
	0.033	333									
	0.039	393									
	0.047	473									
	0.056	563									
	0.068	683									
	0.082	823									
	0.100	104									
	0.120	124									
	0.150	154									
	0.180	184									
	0.220	224									
	0.270	274									
	0.330	334									
	0.390	394									
	0.470	474									
	0.560	564									
	0.680	684									
	0.820	824									
	1.000	105									
Voltage (V)			16	16	25	16	25	16	25	25	25
Rated Temp. (ºC)			250	250		250		250		250	250
Case Size			AT03 = 0603	AT05 = 0805		AT06 = 1206		AT10 = 1210		AT12 = 1812	AT14 = 2225

Voltage rating per table. Capacitance values specified at 25ºC, derate capacitance value based on TCC and VCC Plots on page 2.

NOTE: Contact factory for non-specified capacitance values.

AT Series

High Temperature MLCC – 200ºC & 250°C Rated

CAPACITANCE RANGE
PREFERRED SIZES ARE SHADED

C0G **Temp. Coefficient: 2** **200ºC Rated**

Case Size			AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225
Soldering			Reflow/Wave	Reflow/Wave	Reflow Only	Reflow Only	Reflow Only
(L) Length		mm (in.)	2.01 ± 0.20 (0.079 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	4.50 ± 0.30 (0.177 ± 0.012)	2.75 ± 0.25 (0.225 ± 0.010)
(W) Width		mm (in.)	1.25 ± 0.20 (0.049 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)	2.50 ± 0.20 (0.098 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	6.35 ± 0.25 (0.250 ± 0.010)
(T) Thickness		mm (in.)	1.30 (0.051)	1.52 (0.060)	1.70 (0.067)	2.54 (0.100)	2.54 (0.100)
(t) Terminal		min	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)
		max	0.75 (0.030)	0.75 (0.030)	0.75 (0.030)	1.02 (0.040)	1.02 (0.040)
Rated Temp. (ºC)			200	200	200	200	200
Temp. Coefficeint			2	2	2	2	2
Voltage (V)			50	50	50	50	50
Cap (pF)	100	101	■				
	120	121	■				
	150	151	■				
	180	181	■				
	220	221	■				
	270	271	■	■			
	330	331	■	■			
	390	391	■	■			
	470	471	■	■			
	560	561	■	■			
	680	681	■	■			
	820	821	■	■			
	1000	102		■	■		
	1200	122		■	■		
	1500	152		■	■		
	1800	182		■	■		
	2200	222		■	■	■	
	2700	272			■	■	
	3300	332			■	■	
	3900	392			■	■	
	4700	472			■	■	
	5600	562				■	
	6800	682				■	
	8200	822				■	■
Cap (µF)	0.010	103				■	■
	0.012	123				■	■
	0.015	153					■
	0.018	183					■
	0.022	223					■
	0.027	273					■
	0.033	333					■
	0.039	393					■
	0.047	473					■
	0.056	563					
	0.068	683					
	0.082	823					
	0.100	104					
Voltage (V)			50	50	50	50	50
Rated Temp. (ºC)			200	200	200	200	200
Case Size			AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225

C0G **Temp. Coefficient: A** **250ºC Rated**

Case Size			AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225
Soldering			Reflow/Wave	Reflow/Wave	Reflow Only	Reflow Only	Reflow Only
(L) Length		mm (in.)	2.01 ± 0.20 (0.079 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	4.50 ± 0.30 (0.177 ± 0.012)	2.75 ± 0.25 (0.225 ± 0.010)
(W) Width		mm (in.)	1.25 ± 0.20 (0.049 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)	2.50 ± 0.20 (0.098 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	6.35 ± 0.25 (0.250 ± 0.010)
(T) Thickness		mm (in.)	1.30 (0.051)	1.52 (0.060)	1.70 (0.067)	2.54 (0.100)	2.54 (0.100)
(t) Terminal		min	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)	0.25 (0.010)
		max	0.75 (0.030)	0.75 (0.030)	0.75 (0.030)	1.02 (0.040)	1.02 (0.040)
Rated Temp. (ºC)			250	250	250	250	250
Temp. Coefficeint			A	A	A	A	A
Voltage (V)			25	25	25	25	25
Cap (pF)	100	101	■				
	120	121	■				
	150	151	■				
	180	181	■				
	220	221	■				
	270	271	■	■			
	330	331	■	■			
	390	391	■	■			
	470	471	■	■			
	560	561	■	■			
	680	681	■	■			
	820	821	■	■			
	1000	102		■	■		
	1200	122		■	■		
	1500	152		■	■		
	1800	182		■	■		
	2200	222		■	■	■	
	2700	272			■	■	
	3300	332			■	■	
	3900	392			■	■	
	4700	472			■	■	
	5600	562				■	
	6800	682				■	
	8200	822				■	■
Cap (µF)	0.010	103				■	■
	0.012	123				■	■
	0.015	153					■
	0.018	183					■
	0.022	223					■
	0.027	273					■
	0.033	333					■
	0.039	393					■
	0.047	473					■
	0.056	563					
	0.068	683					
	0.082	823					
	0.100	104					
Voltage (V)			25	25	25	25	25
Rated Temp. (ºC)			250	250	250	250	250
Case Size			AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225

Voltage rating per table. Capacitance values specified at 25ºC, derate capacitance value based on TCC and VCC Plots on page 2.

NOTE: Contact factory for non-specified capacitance values.