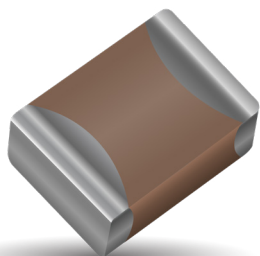


# High Temperature MLCCs

## AT Series – 200°C & 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 high temperature chip capacitor product line, has been extended with the BME COG chip. All AT chips have verified capabilities of long term operation up to 250°C for applications in both military and commercial businesses. These capacitors demonstrate high volumetric efficiency, high insulation resistance and low ESR/ESL for the most demanding applications, such as "down-hole" oil exploration and aerospace programs.

### HOW TO ORDER

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

### ELECTRICAL SPECIFICATIONS

#### Temperature Coefficient

PME COG 0±30ppm/°C, -55C to 250°C

BME COG 0±30ppm/°C, -55C to 200°C

See TCC Plot for +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

COG: 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)

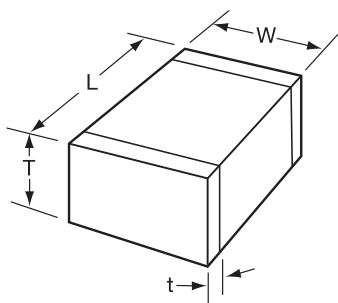
#### Insulation Resistance 250°C (MIL-STD-202, Method 302)

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

### 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) max. 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)

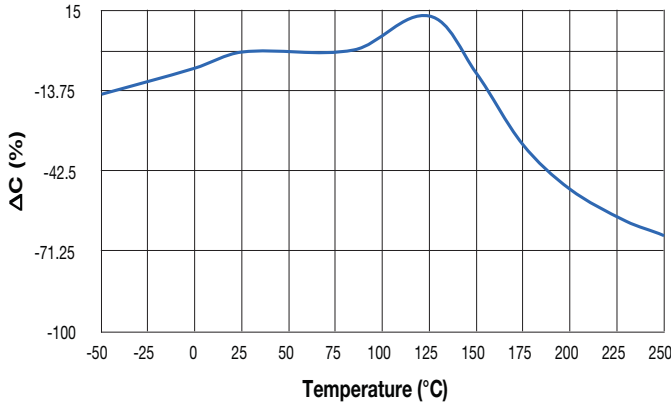
# High Temperature MLCC

## AT Series – 200°C & 250°C Rated

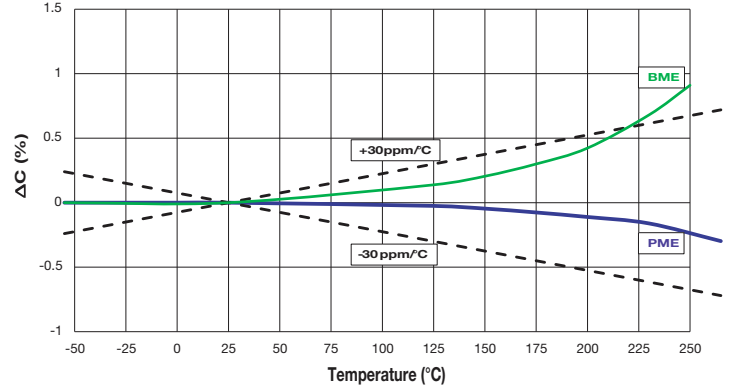


### PERFORMANCE CHARACTERISTICS

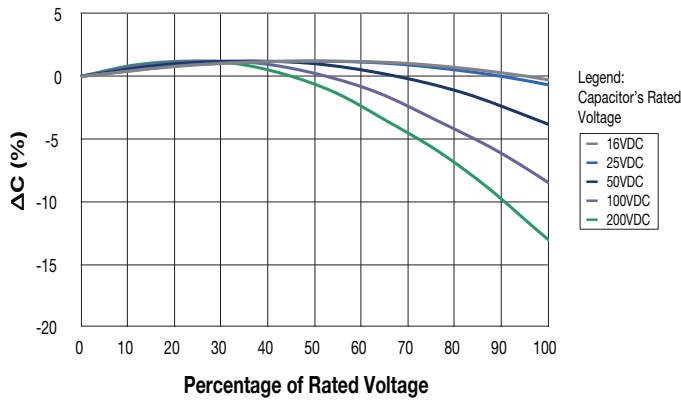
Typical Temperature Coefficient of Capacitance (VHT Dielectric)



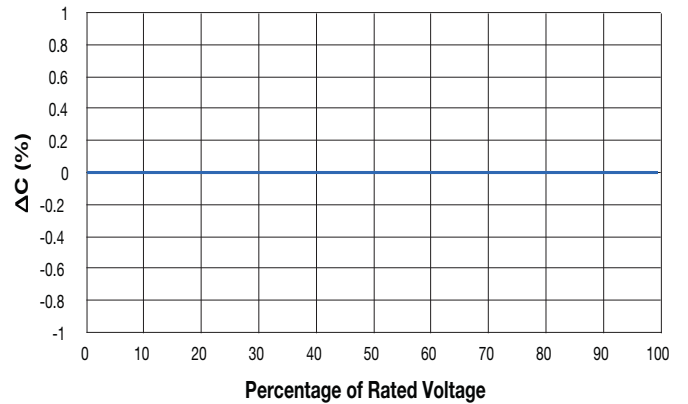
Typical Temperature Coefficient of Capacitance (COG Dielectric)



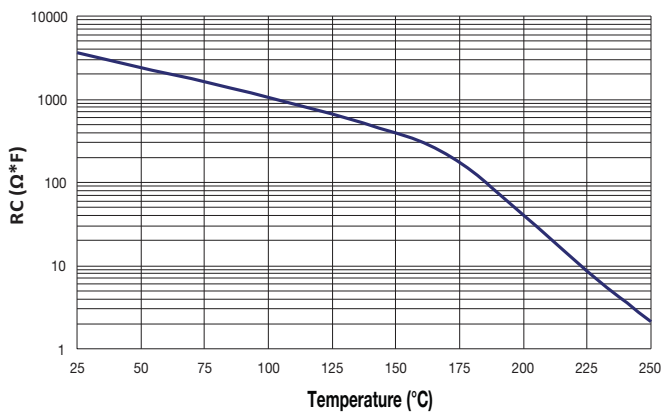
Typical Voltage Coefficient of Capacitance (VHT Dielectric)



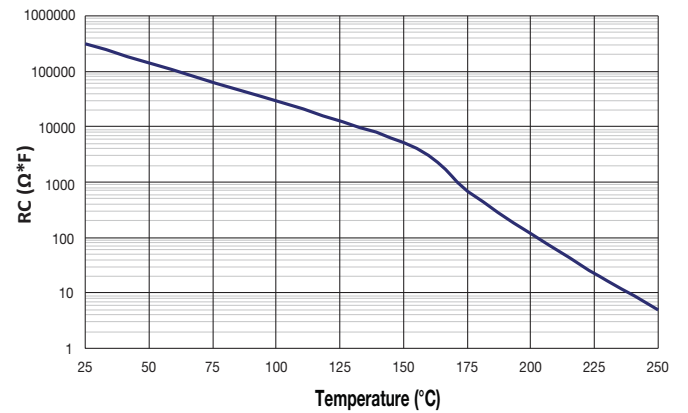
Typical Voltage Coefficient of Capacitance (COG Dielectric)



Typical RC vs Temperature (VHT Dielectric)



Typical RC vs Temperature (COG Dielectric)



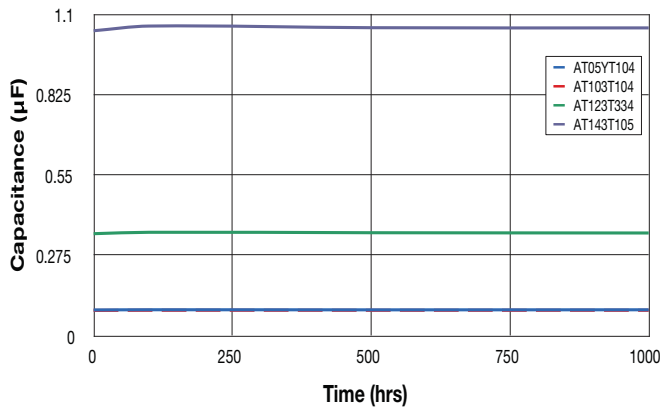
# High Temperature MLCC

## AT Series – 200°C & 250°C Rated

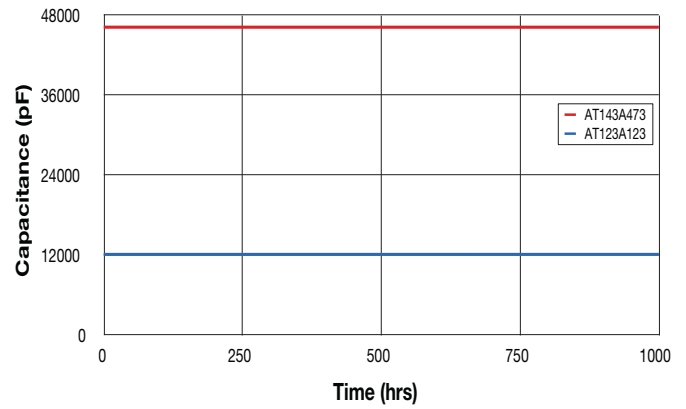


### RELIABILITY

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

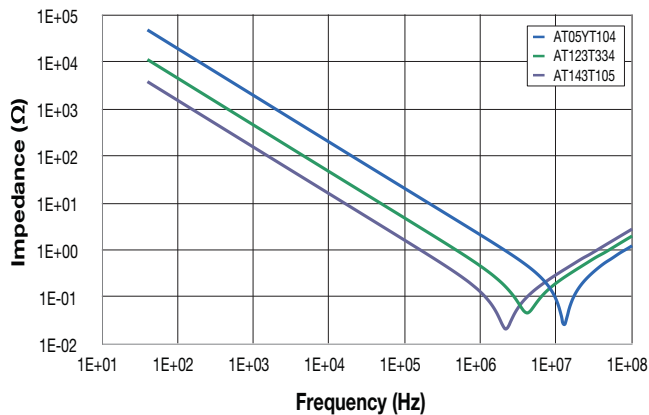
\*Typical 1210, 1812, 2225 Failure Rate Analysis based on 250°C testing and voltage ratings specified on the following page.

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

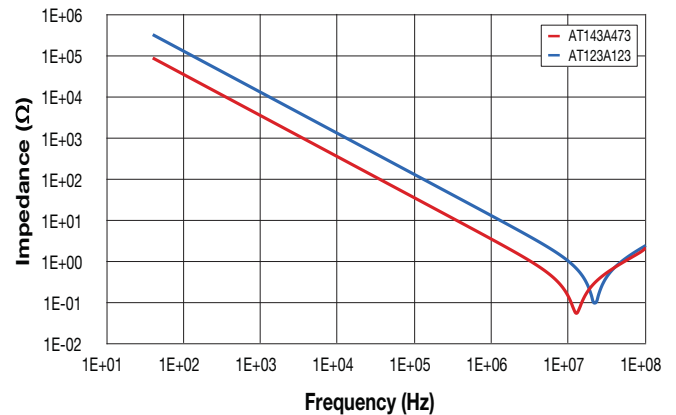
\*Typical 1812 and 2225 Failure Rate Analysis based on 250°C testing and voltage ratings specified on the following page.

### FREQUENCY RESPONSE

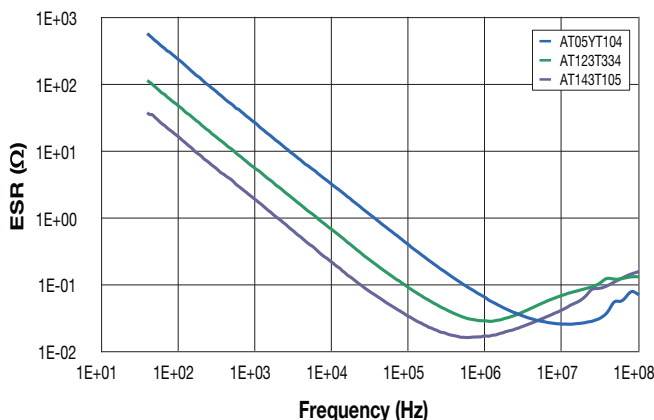
Impedance Frequency Response (VHT Dielectric)



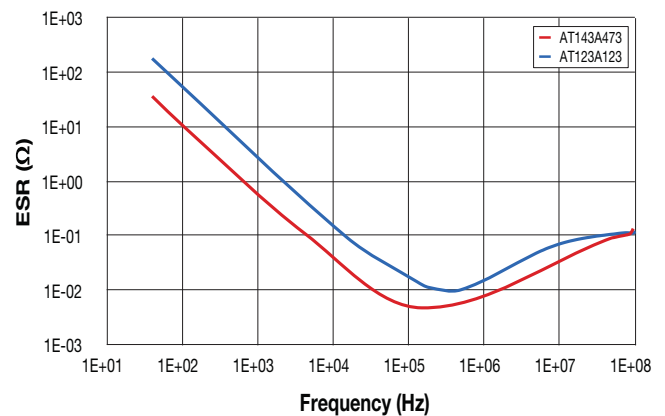
Impedance Frequency Response (C0G Dielectric)



ESR Frequency Response (VHT Dielectric)



ESR Frequency Response (C0G Dielectric)



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# High Temperature MLCC

## AT Series – 200°C & 250°C Rated



### CAPACITANCE RANGE

### PREFERRED SIZES ARE SHADED

**VHT** Temp. Coefficient: 4 200°C Rated

Case Size	AT03 = 0603	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225	
<b>Soldering</b>	Reflow/Wave	Reflow/Wave	Reflow/Wave	Reflow Only	Reflow Only	Reflow Only	
(L) Length	mm 1.60±0.15 (in.) (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 0.81±0.15 (in.) (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 1.02 (in.) (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) max 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. (°C)	200	200	200	200	200	200	
Temp. Coefficient	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						
Cap (µF)	6800 682						
	8200 822						
	0.010 103						
	0.012 123						
	0.015 153						
	0.018 183						
	0.022 223						
	0.027 273						
	0.033 333						
	0.039 393						
Cap (µF)	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						
Cap (µF)	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. (°C)	200	200	200	200	200	200
	Case Size	AT03 = 0603	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225

**VHT** Temp. Coefficient: T 250°C Rated

Case Size	AT03 = 0603	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225	
<b>Soldering</b>	Reflow/Wave	Reflow/Wave	Reflow/Wave	Reflow Only	Reflow Only	Reflow Only	
(L) Length	mm 1.60±0.15 (in.) (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 0.81±0.15 (in.) (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 1.02 (in.) (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) max 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. (°C)	250	250	250	250	250	250	
Temp. Coefficient	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						
Cap (µF)	6800 682						
	8200 822						
	0.010 103						
	0.012 123						
	0.015 153						
	0.018 183						
	0.022 223						
	0.027 273						
	0.033 333						
	0.039 393						
Cap (µF)	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						
Cap (µF)	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. (°C)	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 25°C, derate capacitance value based on TCC and VCC Plots on page 107.

NOTE: Contact factory for non-specified capacitance values.

# High Temperature MLCC

## AT Series – 200°C & 250°C Rated



### CAPACITANCE RANGE

### PREFERRED SIZES ARE SHADED

**BME COG** Temp. Coefficient: 4 200°C Rated

Case Size		AT03=0603		AT05=0805		AT06=1206	
Soldering		Reflow/Wave		Reflow/Wave		Reflow/Wave	
(L) Length	mm	1.60±0.15		2.01±0.20		3.20±0.20	
	(in.)	(0.063±0.006)		(0.079±0.008)		(0.126±0.008)	
(W) Width	mm	0.81±0.15		1.25±0.20		1.60±0.20	
	(in.)	(0.032±0.006)		(0.049±0.008)		(0.063±0.008)	
(T) Thickness	mm	1.02		1.30		1.52	
	(in.)	(0.040)		(0.051)		(0.060)	
(t) Terminal	min	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)	
Rated Temp. (°C)		200		200		200	
Temp. Coefficient		3		3		3	
Voltage (V)		25	50	25	50	25	50
Cap (pF)	39	390					
	47	470					
Cap (pF)	56	560					
	68	680					
Cap (pF)	82	820					
	100	101					
Cap (pF)	120	121					
	150	151					
Cap (pF)	180	181					
	220	221					
Cap (pF)	270	271					
	330	331					
Cap (pF)	390	391					
	470	471					
Cap (pF)	560	561					
	680	681					
Cap (pF)	820	821					
	1000	102					
Cap (pF)	1200	122					
	1500	152					
Cap (pF)	1800	182					
	2200	222					
Cap (pF)	2700	272					
	3300	332					
Cap (pF)	3900	392					
	4700	472					
Cap (pF)	5600	562					
	6800	682					
Cap (pF)	8200	822					
	0.010	103					
Cap (pF)	0.012	123					
	0.015	153					
Cap (pF)	0.018	183					
	0.022	223					
Cap (pF)	0.027	273					
	0.033	333					
Cap (pF)	0.039	393					
	0.047	473					
Cap (pF)	0.056	563					
	0.068	683					
Cap (pF)	0.082	823					
	0.100	104					
Voltage (V)		25	50	25	50	25	50
Rated Temp. (°C)		200	200	200	200	200	200
Case Size		AT03=0603		AT05=0805		AT06=1206	

**BME COG (Ni/Au)** Temp. Coefficient: 5 250°C Rated

Case Size		AT03=0603		AT05=0805		AT06 = 1206	
Soldering		Reflow/Wave		Reflow/Wave		Reflow/Wave	
(L) Length	mm	1.60±0.15		2.01±0.20		3.20±0.20	
	(in.)	(0.063±0.006)		(0.079±0.008)		(0.126±0.008)	
(W) Width	mm	0.81±0.15		1.25±0.20		1.60±0.20	
	(in.)	(0.032±0.006)		(0.049±0.008)		(0.063±0.008)	
(T) Thickness	mm	1.02		1.30		1.52	
	(in.)	(0.040)		(0.051)		(0.060)	
(t) Terminal	min	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)	
Rated Temp. (°C)		250		250		250	
Temp. Coefficient		5		5		5	
Voltage (V)		25		25		25	
Cap (pF)	39	390					
	47	470					
Cap (pF)	56	560					
	68	680					
Cap (pF)	82	820					
	100	101					
Cap (pF)	120	121					
	150	151					
Cap (pF)	180	181					
	220	221					
Cap (pF)	270	271					
	330	331					
Cap (pF)	390	391					
	470	471					
Cap (pF)	560	561					
	680	681					
Cap (pF)	820	821					
	1000	102					
Cap (pF)	1200	122					
	1500	152					
Cap (pF)	1800	182					
	2200	222					
Cap (pF)	2700	272					
	3300	332					
Cap (pF)	3900	392					
	4700	472					
Cap (pF)	5600	562					
	6800	682					
Cap (pF)	8200	822					
	0.010	103					
Cap (pF)	0.012	123					
	0.015	153					
Cap (pF)	0.018	183					
	0.022	223					
Cap (pF)	0.027	273					
	0.033	333					
Cap (pF)	0.039	393					
	0.047	473					
Cap (pF)	0.056	563					
	0.068	683					
Cap (pF)	0.082	823					
	0.100	104					
Voltage (V)		25		25		25	
Rated Temp. (°C)		250		250		250	
Case Size		AT03=0603		AT05=0805		AT06=1206	

Voltage rating per table. Capacitance values specified at 25°C, derate capacitance value based on TCC and VCC Plots on page 107.

NOTE: Contact factory for non-specified capacitance values.



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# High Temperature MLCC

## AT Series – 200°C & 250°C Rated



### CAPACITANCE RANGE

### PREFERRED SIZES ARE SHADED

**PME COG** Temp. Coefficient: 2 200°C Rated

Case Size	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225
<b>Soldering</b>	Reflow/Wave	Reflow/Wave	Reflow Only	Reflow Only	Reflow Only
(L) Length	mm 2.01 ± 0.20 (in.) (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 1.25 ± 0.20 (in.) (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 1.30 (in.) (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) max 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)
<b>Rated Temp. (°C)</b>	200	200	200	200	200
<b>Temp. Coefficient</b>	2	2	2	2	2
<b>Voltage (V)</b>	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					
<b>Voltage (V)</b>	50	50	50	50	50
<b>Rated Temp. (°C)</b>	200	200	200	200	200
<b>Case Size</b>	<b>AT05 = 0805</b>	<b>AT06 = 1206</b>	<b>AT10 = 1210</b>	<b>AT12 = 1812</b>	<b>AT14 = 2225</b>

**PME COG** Temp. Coefficient: A 250°C Rated

Case Size	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225
<b>Soldering</b>	Reflow/Wave	Reflow/Wave	Reflow Only	Reflow Only	Reflow Only
(L) Length	mm 2.01 ± 0.20 (in.) (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 1.25 ± 0.20 (in.) (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 1.30 (in.) (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) max 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)
<b>Rated Temp. (°C)</b>	250	250	250	250	250
<b>Temp. Coefficient</b>	A	A	A	A	A
<b>Voltage (V)</b>	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					
<b>Voltage (V)</b>	25	25	25	25	25
<b>Rated Temp. (°C)</b>	250	250	250	250	250
<b>Case Size</b>	<b>AT05 = 0805</b>	<b>AT06 = 1206</b>	<b>AT10 = 1210</b>	<b>AT12 = 1812</b>	<b>AT14 = 2225</b>

Voltage rating per table. Capacitance values specified at 25°C, derate capacitance value based on TCC and VCC Plots on page 107.

NOTE: Contact factory for non-specified capacitance values.