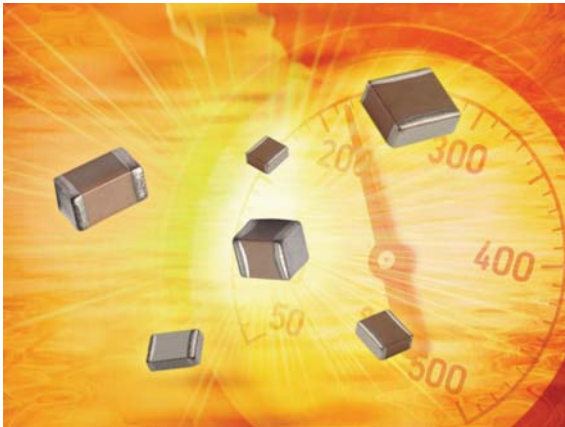


# AT Series

## High Temperature MLCC – 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

AT10	3	T	104	K	A	T	2	A
<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>	<b>Termination</b>	<b>Packaging</b>	<b>Special Code</b>
AT03 = 0603 AT05 = 0805 AT06 = 1206 AT10 = 1210 AT12 = 1812 AT14 = 2225	16V = Y 25V = 3 50V = 5	PME COG 250°C = A COG 200°C = 2 VHT 250°C = T VHT 200°C = 4 BME COG 250°C = 5 COG 200°C = 3	101 = 100pF 102 = 1nF 103 = 10nF 104 = 100nF 105 = 1µF	J = ±5% K = ±10% M = ±20%	A = Standard	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	A = Standard

### 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)

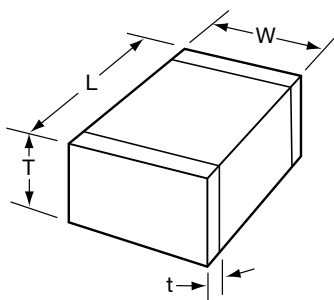
#### Insulation Resistance 250°C (MIL-STD-202, Method 302)

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)

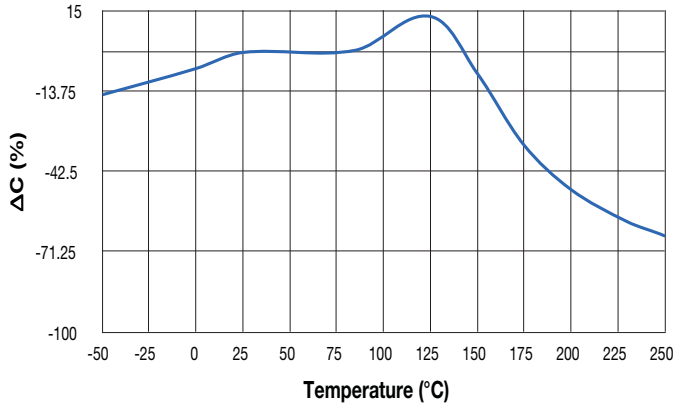
Size	AT03 = 0603	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225
(L) Length	1.60 ± 0.15 (0.063 ± 0.006)	2.01 ± 0.20 (0.079 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	4.50 ± 0.30 (0.177 ± 0.012)	5.72 ± 0.25 (0.225 ± 0.010)
(W) Width	0.81 ± 0.15 (0.032 ± 0.006)	1.25 ± 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. 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)

# AT Series

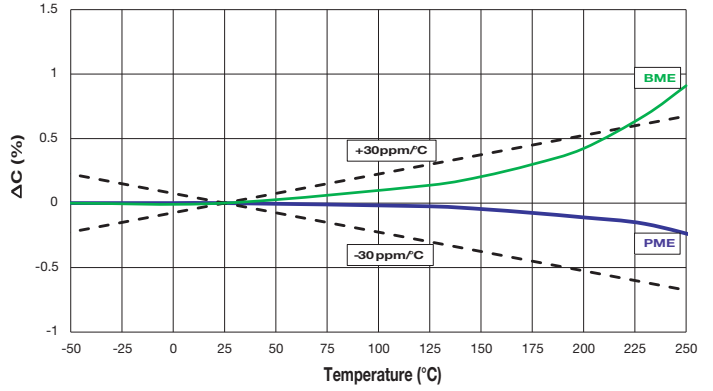
## High Temperature MLCC – 200°C & 250°C Rated

### PERFORMANCE CHARACTERISTICS

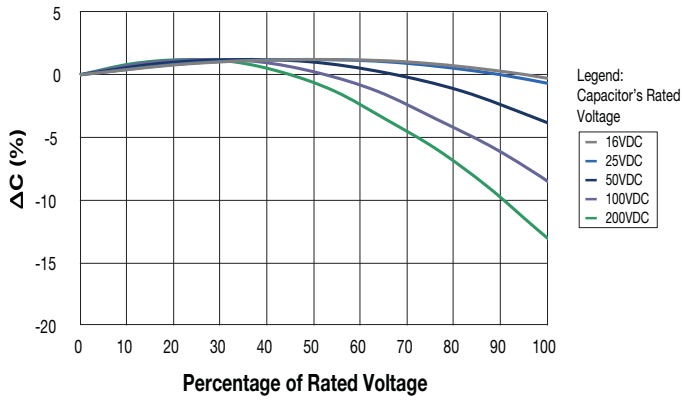
Typical Temperature Coefficient of Capacitance (VHT Dielectric)



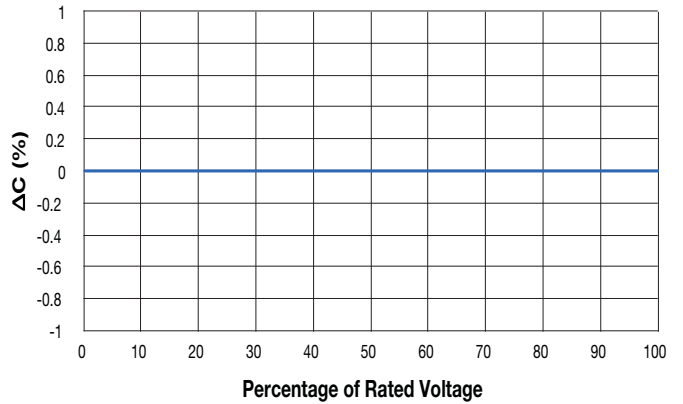
Typical Temperature Coefficient of Capacitance (COG Dielectric)



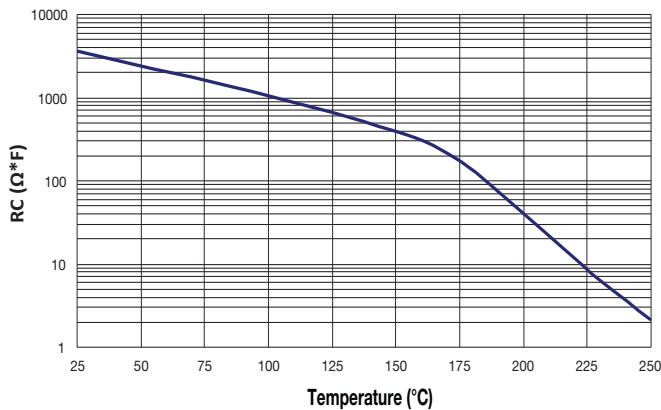
Typical Voltage Coefficient of Capacitance (VHT Dielectric)



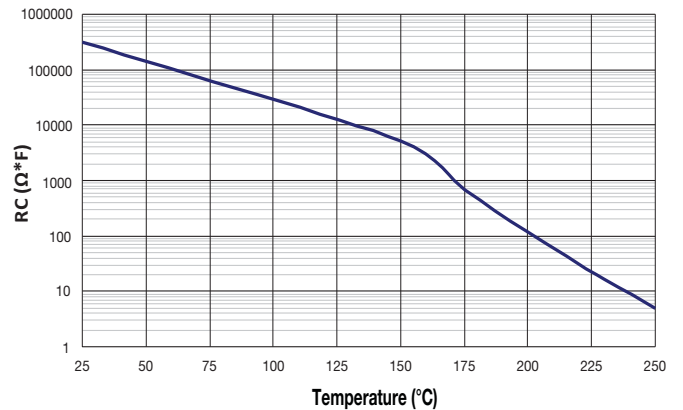
Typical Voltage Coefficient of Capacitance (COG Dielectric)



Typical RC vs Temperature (VHT Dielectric)



Typical RC vs Temperature (COG Dielectric)

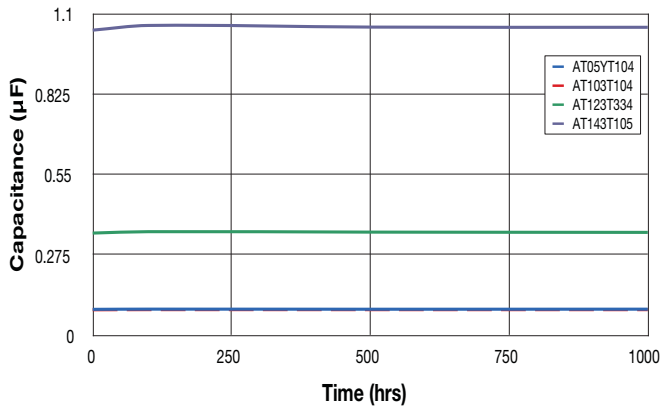


# AT Series

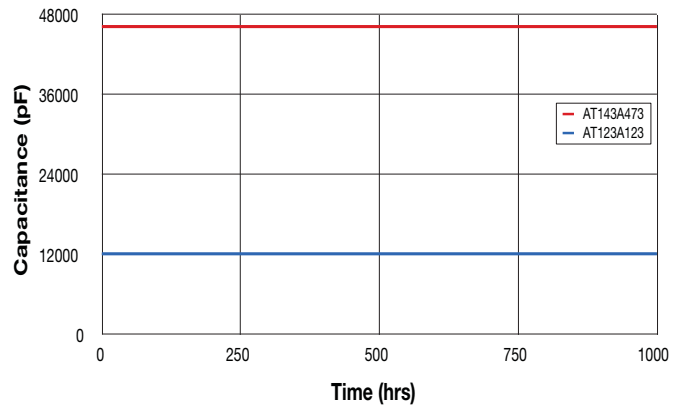
## High Temperature MLCC – 200°C & 250°C Rated

### 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

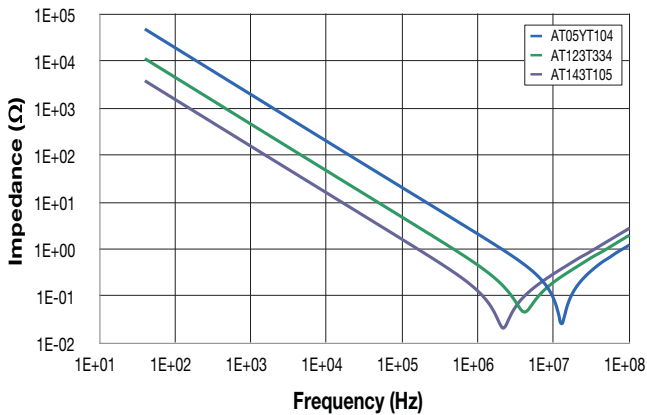
\*Typical 1210, 1812, 2225 Failure Rate Analysis based on 250°C testing and voltage ratings specified on the following page.

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

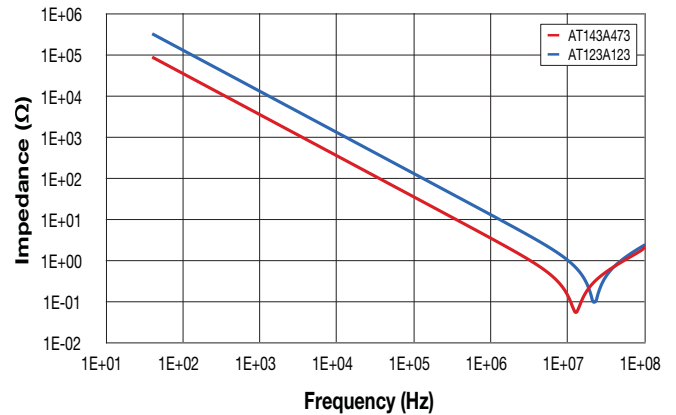
\*Typical 1812 and 2225 Failure Rate Analysis based on 250°C testing and voltage ratings specified on the following page.

### FREQUENCY RESPONSE

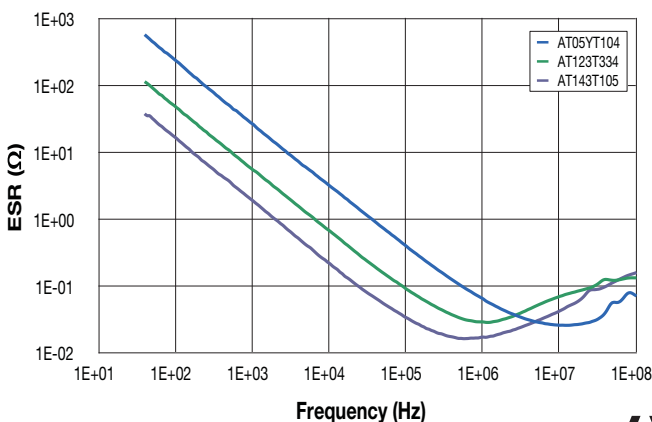
Impedance Frequency Response (VHT Dielectric)



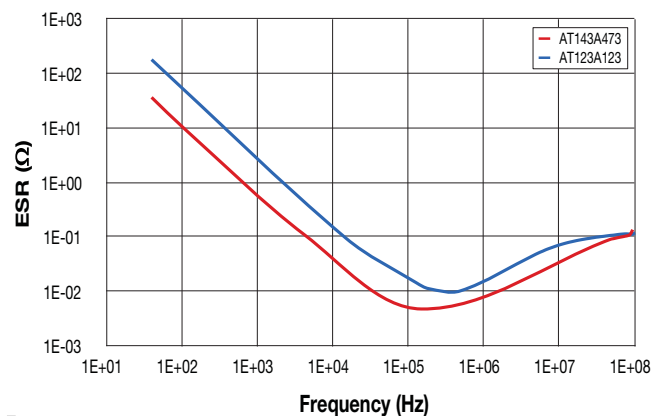
Impedance Frequency Response (C0G Dielectric)



ESR Frequency Response (VHT Dielectric)



ESR Frequency Response (C0G Dielectric)



# AT Series

## High Temperature MLCC – 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 (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)
<b>Rated Temp. (°C)</b>	200	200	200	200	200	200
<b>Temp. Coefficient</b>	4	4	4	4	4	4
<b>Voltage (V)</b>	25	25 50	25 50	25 50	50	50
<b>Cap (pF)</b>	1000 102					
	1200 122					
	1500 152					
	1800 182					
	2200 222					
	2700 272					
	3300 332					
	3900 392					
	4700 472					
	5600 562					
	6800 682					
	8200 822					
<b>Cap (µF)</b>	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					
<b>Voltage (V)</b>	25	25 50	25 50	25 50	50	50
<b>Rated Temp. (°C)</b>	200	200	200	200	200	200
<b>Case Size</b>	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 (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)
<b>Rated Temp. (°C)</b>	250	250	250	250	250	250
<b>Temp. Coefficient</b>	T	T	T	T	T	T
<b>Voltage (V)</b>	16	16 25	16 25	16 25	25	25
<b>Cap (pF)</b>	1000 102					
	1200 122					
	1500 152					
	1800 182					
	2200 222					
	2700 272					
	3300 332					
	3900 392					
	4700 472					
	5600 562					
	6800 682					
	8200 822					
<b>Cap (µF)</b>	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					
<b>Voltage (V)</b>	16	16 25	16 25	16 25	25	25
<b>Rated Temp. (°C)</b>	250	250	250	250	250	250
<b>Case Size</b>	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 88.

NOTE: Contact factory for non-specified capacitance values.

# AT Series

## High Temperature MLCC – 200°C & 250°C Rated

### CAPACITANCE RANGE PREFERRED SIZES ARE SHADED

#### BME COG Temp. Coefficient: 3 200°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	
(l) Length 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	
(w) Width in.	(0.032 ± 0.006)		(0.049 ± 0.008)		(0.063 ± 0.008)	
(T) Thickness mm	1.02		1.30		1.52	
(t) Thickness in.	(0.040)		(0.051)		(0.060)	
(H) Terminal min	0.25 (0.010)		0.25 (0.010)		0.25 (0.010)	
(h) Terminal 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				
	56	560				
	68	680				
	82	820				
	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	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	
(l) Length 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	
(w) Width in.	(0.032 ± 0.006)		(0.049 ± 0.008)		(0.063 ± 0.008)	
(T) Thickness mm	1.02		1.30		1.52	
(t) Thickness in.	(0.040)		(0.051)		(0.060)	
(H) Terminal min	0.25 (0.010)		0.25 (0.010)		0.25 (0.010)	
(h) Terminal 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				
	56	560				
	68	680				
	82	820				
	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	
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 88.

NOTE: Contact factory for non-specified capacitance values.

# AT Series

## High Temperature MLCC – 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 (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 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) 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
<b>Cap (pF)</b>	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				
<b>Cap (µF)</b>	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>	AT05 = 0805	AT06 = 1206	AT10 = 1210	AT12 = 1812	AT14 = 2225

#### 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 (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 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) 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
<b>Cap (pF)</b>	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				
<b>Cap (µF)</b>	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>	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 88.

NOTE: Contact factory for non-specified capacitance values.

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