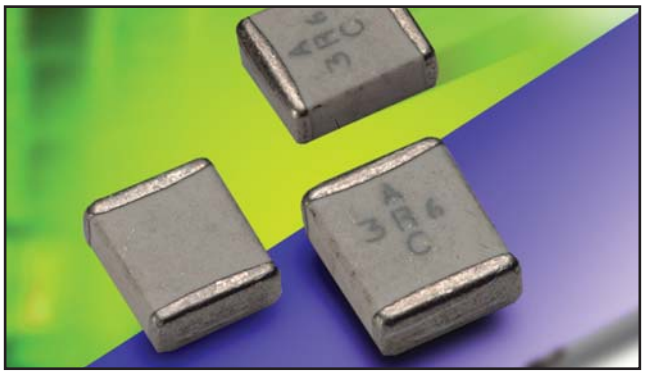
Microwave MLC's

AQ Series

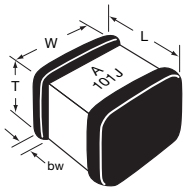


These porcelain and ceramic dielectric multilayer capacitor (MLC) chips are best suited for RF/ Microwave applications typically ranging from 10 MHz to 4.2 GHz. Characteristic is a fine grained, high density, high purity dielectric material impervious to moisture with heavy internal palladium electrodes.

These characteristics lend well to applications requiring:

1) high current carrying capabilities;
2) high quality factors;
3) very low equivalent series resistance;
4) very high series resonance;
5) excellent stability under stresses of changing voltage, frequency, time and temperature.

MECHANICAL DIMENSIONS: inches (millimeters)



Case	Length (L)	Width (W)	Thickness (T)	Band Width (bw)
AQ11	.055±.015 (1.40±.381)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 + .010 -.005 (.254 +.254 -.127)
AQ12	.055 + .015 - .010 (1.40+ .381 - .254)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 + .010 -.005 (.254 +.254 -.127)
AQ13	.110±.020 (2.79±.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)
AQ14	.110 + .020 - .010 (2.79 +.889 -.254)	.110±.010 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)

HOW TO ORDER

AQ — **AVX Style**
AQ11, AQ12, AQ13, AQ14

11 — **Case Size**
(See Chart)

E — **Voltage Code**
5 = 50V
1 = 100V
E = 150V
2 = 200V
9 = 300V
7 = 500V

M — **Temperature Coefficient Code**
M = +90±20ppm/°C (AQ11/12/13/14)
A = 0±30ppm/°C (AQ11/12/13/14)
C = 15% ("J" Termination only) (AQ12/14)

100 — **Capacitance**
EIA Capacitance Code in pF.
First two digits = significant figures or "R" for decimal place.
Third digit = number of zeros or after "R" significant figures.

J — **Capacitance Tolerance Code**
B = ±.1 pF
C = ±.25 pF
D = ±.5 pF
F = ±1%
G = ±2%
J = ±5%
K = ±10%
M = ±20%
N = ±30%

A — **Failure Rate Code**
A = Not Applicable

1 — **Termination Style Code**
1 = Pd/Ag (AQ11/13 only)
7 = Ag/Ni/Au (AQ11/13 only)
J = Nickel Barrier Sn/Pb (60/40) - (AQ12/14 only)
T = 100% Tin (AQ12/14 only)

ME — **Packaging* Code**
3A = 13" Reel Unmarked
ME = 7" Reel Marked
RE = 13" Reel Marked
WE = Waffle Pack Marked
BE = Bulk Marked

PACKAGING

Standard Packaging = Waffle Pack (maximum quantity is 80)

TAPE & REEL: All tape and reel specifications are in compliance with EIA RS481 (equivalent to IEC 286 part 3).

Sizes SQCA through SQCB, CDR11/12 through 13/14.

—8mm carrier
—7" reel: ≤0.040" thickness = 2000 pcs
≤0.075" thickness = 2000 pcs
—13" reel: ≤0.075" thickness = 10,000 pcs

Not RoHS Compliant

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

For RoHS compliant products, please select correct termination style.

9

ELECTRICAL SPECIFICATIONS

AQ11, AQ12, AQ13, AQ14			
		M & A	**C**
Temperature Coefficient (TCC)		(M) +90 ± 20 PPM/ºC (-55ºC to +125ºC) (M) +90 ± 30 PPM/ºC (+125ºC to +175ºC) (A) 0 ± 30 PPM/ºC	±15% (-55ºC to 125ºC)
Capacitance Range		(M) 0.1 pF to 1000 pF (A) 0.1 pF to 5100 pF	0.001µF to 0.1µF
Operating Temperature		0.1 pF to 330 pF: from -55ºC to +175ºC 360 pF to 5100 pF: from -55ºC to +125ºC	-55°C to +125°C
Quality Factor (Q)	M Dielectric A & B Case	Greater than 10,000 at 1 MHz	2.5% @ 1kHz
	A Dielectric B Case	Greater than 10,000 at 1 MHz Greater than 2,000 at 1 MHz Greater than 2,000 at 1 KHz	0.1 - 200 pF 220 - 1000 pF 1100 - 5100 pF
	A Dielectric A Case	Greater than 10,000 at 1 MHz Greater than 2,000 at 1 MHz	0.1 - 100 pF 110 - 1000 pF
Insulation Resistance (IR)		0.1 pF to 470 pF 10^6 Megohms min. @ 25ºC at rated WVDC 10^5 Megohms min. @ 125ºC at rated WVDC 510 pF to 5100 pF 10^5 Megohms min. @ 25ºC at rated WVDC 10^4 Megohms min. @ 125ºC at rated WVDC	10^4 Megohms min. @ 25ºC at rated WVDC 10^3 Megohms min. @ 125ºC at rated WVDC
Working Voltage (WVDC)		See Capacitance Values table	See Capacitance Values table
Dielectric Withstanding Voltage (DWV)		250% of rated WVDC for 5 secs (for 500V rated 150% of rated voltage)	250% of rated WVDC for 5 secs
Aging Effects		None	<3% per decade hour
Piezoelectric Effects		None	None
Capacitance Drift		± (0.02% or 0.02 pF), whichever is greater	Not Applicable

ENVIRONMENTAL CHARACTERISTICS

AVX SQLB will meet and exceed the requirements of EIA-198, MIL-PRF-55681 and MIL-PRF-123

Themal Shock	Mil-STD-202, Method 107, Condition A
Moisture Resistance	Mil-STD-202, Method 106
Low Voltage Humidity	Mil-STD-202, Method 103, condition A, with 1.5 VDC applied while subjected to an environment of 85ºC with 85% relative humidity for 240 hours
Life Test	Mil-STD-202, Method 108, for 2000 hours at 125ºC
Shock	Mil-STD-202, Method 213, Condition J
Vibration	Mil-STD-202, Method 204, Condition B
Immersion	Mil-STD-202, Method 104, Condition B
Salt Spray	Mil-STD-202, Method 101, Condition B
Solderability	Mil-STD-202, Method 208
Terminal Strength	Mil-STD-202, Method 211
Temperature Cycling	Mil-STD-202, Method 102, Condition C
Barometric Pressure	Mil-STD-202, Method 105, Condition B
Resistance to Solder Heat	Mil-STD-202, Method 210, Condition C

Microwave MLC's

AQ Series Available Capacitance/Size/WVDC/T.C.

TABLE I: TC: M (+90±20PPM/°C)
CASE SIZE 11, 12, 13 & 14

DIMENSIONS: inches (millimeters)

Case	Length	Width	Thickness	Band Width	Avail. Term.
11	.055±.015 (1.40±.381)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 +.010 -.005 (.254 +.254 -.127)	1 & 7
12	.055±.025 (1.40±.635)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 +.010 -.005 (.254 +.254 -.127)	J
13	.110±.020 (2.79±.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)	1 & 7
14	.110 +0.035 -0.020 (2.79 +.889 -.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)	J

Case: AQ11, AQ12

Cap. pF	Cap. Tol.	WVDC
0.1	B	150
0.2	B	150
0.3	B,C	150
0.4	B,C	150
0.5	B, C, D	150
0.6	B, C, D	150
0.7	B, C, D	150
0.8	B, C, D	150
0.9	B, C, D	150
1.0	B, C, D	150
1.1	B, C, D	150
1.2	B, C, D	150
1.3	B, C, D	150
1.4	B, C, D	150
1.5	B, C, D	150
1.6	B, C, D	150
1.7	B, C, D	150
1.8	B, C, D	150
1.9	B, C, D	150
2.0	B, C, D	150
2.2	B, C, D	150
2.4	B, C, D	150
2.7	B, C, D	150
3.0	B, C, D	150
3.3	B, C, D	150
3.6	B, C, D	150
3.9	B, C, D	150
4.3	B, C, D	150
4.7	B, C, D	150
5.1	B, C, D	150
5.6	B, C, D	150
6.2	B, C, D	150
6.8	B, C, J, K, M	150
7.5	B, C, J, K, M	150
8.2	B, C, J, K, M	150
9.1	B, C, J, K, M	150
10	F, G, J, K, M	150
11	F, G, J, K, M	150
12	F, G, J, K, M	150
13	F, G, J, K, M	150
15	F, G, J, K, M	150
16	F, G, J, K, M	150
18	F, G, J, K, M	150
20	F, G, J, K, M	150
22	F, G, J, K, M	150
24	F, G, J, K, M	150
27	F, G, J, K, M	150
30	F, G, J, K, M	150
33	F, G, J, K, M	150
36	F, G, J, K, M	150
39	F, G, J, K, M	150
43	F, G, J, K, M	150
47	F, G, J, K, M	150
51	F, G, J, K, M	150
56	F, G, J, K, M	150
62	F, G, J, K, M	150
68	F, G, J, K, M	150
75	F, G, J, K, M	150
82	F, G, J, K, M	150
91	F, G, J, K, M	150
100	F, G, J, K, M	150

Case: AQ13, AQ14

Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC
0.1	B	500	100	F, G, J, K, M	500
0.2	B	500	110	F, G, J, K, M	300
0.3	B,C	500	120	F, G, J, K, M	300
0.4	B,C	500	130	F, G, J, K, M	300
0.5	B, C, D	500	150	F, G, J, K, M	300
0.6	B, C, D	500	160	F, G, J, K, M	300
0.7	B, C, D	500	180	F, G, J, K, M	300
0.8	B, C, D	500	200	F, G, J, K, M	300
0.9	B, C, D	500	220	F, G, J, K, M	200
1.0	B, C, D	500	240	F, G, J, K, M	200
1.1	B, C, D	500	270	F, G, J, K, M	200
1.2	B, C, D	500	300	F, G, J, K, M	200
1.3	B, C, D	500	330	F, G, J, K, M	200
1.4	B, C, D	500	360	F, G, J, K, M	200
1.5	B, C, D	500	390	F, G, J, K, M	200
1.6	B, C, D	500	430	F, G, J, K, M	200
1.7	B, C, D	500	470	F, G, J, K, M	200
1.8	B, C, D	500	510	F, G, J, K, M	150
1.9	B, C, D	500	560	F, G, J, K, M	150
2.0	B, C, D	500	620	F, G, J, K, M	150
2.2	B, C, D	500	680	F, G, J, K, M	150
2.4	B, C, D	500	750	F, G, J, K, M	150
2.7	B, C, D	500	820	F, G, J, K, M	150
3.0	B, C, D	500	910	F, G, J, K, M	150
3.3	B, C, D	500	1000	F, G, J, K, M	150
3.6	B, C, D	500			
3.9	B, C, D	500			
4.3	B, C, D	500			
4.7	B, C, D	500			
5.1	B, C, D	500			
5.6	B, C, D	500			
6.2	B, C, D	500			
6.8	B, C, J, K, M	500			
7.5	B, C, J, K, M	500			
8.2	B, C, J, K, M	500			
9.1	B, C, J, K, M	500			
10	F, G, J, K, M	500			
11	F, G, J, K, M	500			
12	F, G, J, K, M	500			
13	F, G, J, K, M	500			
15	F, G, J, K, M	500			
16	F, G, J, K, M	500			
18	F, G, J, K, M	500			
20	F, G, J, K, M	500			
22	F, G, J, K, M	500			
24	F, G, J, K, M	500			
27	F, G, J, K, M	500			
30	F, G, J, K, M	500			
33	F, G, J, K, M	500			
36	F, G, J, K, M	500			
39	F, G, J, K, M	500			
43	F, G, J, K, M	500			
47	F, G, J, K, M	500			
51	F, G, J, K, M	500			
56	F, G, J, K, M	500			
62	F, G, J, K, M	500			
68	F, G, J, K, M	500			
75	F, G, J, K, M	500			
82	F, G, J, K, M	500			
91	F, G, J, K, M	500			

Microwave MLC's

AQ Series Available Capacitance/Size/WVDC/T.C.

TABLE II: TC: A (0±30PPM/°C)
CASE SIZE 11, 12, 13 & 14

DIMENSIONS: inches (millimeters)

Case	Length	Width	Thickness	Band Width	Avail. Term.
11	.055±.015 (1.40±.381)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 +.010 -.005 (.254 +.254 -.127)	1 & 7
12	.055±.025 (1.40±.635)	.055±.015 (1.40±.381)	.020/.057 (.508/1.45)	.010 +.010 -.005 (.254 +.254 -.127)	J
13	.110±.020 (2.79±.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)	1 & 7
14	.110 +0.035 -0.020 (2.79 +.889 -.508)	.110±.020 (2.79±.508)	.030/.102 (.762/2.59)	.015±.010 (.381±.254)	J

Case: AQ11, AQ12

Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC
0.1	B	150	24	F, G, J, K, M	150
0.2	B	150	27	F, G, J, K, M	150
0.3	B,C	150	30	F, G, J, K, M	150
0.4	B,C	150	33	F, G, J, K, M	150
0.5	B, C, D	150	36	F, G, J, K, M	150
0.6	B, C, D	150	39	F, G, J, K, M	150
0.7	B, C, D	150	43	F, G, J, K, M	150
0.8	B, C, D	150	47	F, G, J, K, M	150
0.9	B, C, D	150	51	F, G, J, K, M	150
1.0	B, C, D	150	56	F, G, J, K, M	150
1.1	B, C, D	150	62	F, G, J, K, M	150
1.2	B, C, D	150	68	F, G, J, K, M	150
1.3	B, C, D	150	75	F, G, J, K, M	150
1.4	B, C, D	150	82	F, G, J, K, M	150
1.5	B, C, D	150	91	F, G, J, K, M	150
1.6	B, C, D	150	100	F, G, J, K, M	150
1.7	B, C, D	150	110	F, G, J, K, M	50
1.8	B, C, D	150	120	F, G, J, K, M	50
1.9	B, C, D	150	130	F, G, J, K, M	50
2.0	B, C, D	150	150	F, G, J, K, M	50
2.2	B, C, D	150	160	F, G, J, K, M	50
2.4	B, C, D	150	180	F, G, J, K, M	50
2.7	B, C, D	150	200	F, G, J, K, M	50
3.0	B, C, D	150	220	F, G, J, K, M	50
3.3	B, C, D	150	240	F, G, J, K, M	50
3.6	B, C, D	150	270	F, G, J, K, M	50
3.9	B, C, D	150	300	F, G, J, K, M	50
4.3	B, C, D	150	330	F, G, J, K, M	50
4.7	B, C, D	150	360	F, G, J, K, M	50
5.1	B, C, D	150	390	F, G, J, K, M	50
5.6	B, C, D	150	430	F, G, J, K, M	50
6.2	B, C, D	150	470	F, G, J, K, M	50
6.8	B, C, J, K, M	150	510	F, G, J, K, M	50
7.5	B, C, J, K, M	150	560	F, G, J, K, M	50
8.2	B, C, J, K, M	150	620	F, G, J, K, M	50
9.1	B, C, J, K, M	150	680	F, G, J, K, M	50
10	F, G, J, K, M	150	750	F, G, J, K, M	50
11	F, G, J, K, M	150	820	F, G, J, K, M	50
12	F, G, J, K, M	150	910	F, G, J, K, M	50
13	F, G, J, K, M	150	1000	F, G, J, K, M	50
15	F, G, J, K, M	150			
16	F, G, J, K, M	150			
18	F, G, J, K, M	150			
20	F, G, J, K, M	150			
22	F, G, J, K, M	150			

Case: AQ13, AQ14

Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC
0.1	B	500	51	F, G, J, K, M	500
0.2	B	500	56	F, G, J, K, M	500
0.3	B,C	500	62	F, G, J, K, M	500
0.4	B,C	500	68	F, G, J, K, M	500
0.5	B, C, D	500	75	F, G, J, K, M	500
0.6	B, C, D	500	82	F, G, J, K, M	500
0.7	B, C, D	500	91	F, G, J, K, M	500
0.8	B, C, D	500	100	F, G, J, K, M	500
0.9	B, C, D	500	110	F, G, J, K, M	300
1.0	B, C, D	500	120	F, G, J, K, M	300
1.1	B, C, D	500	130	F, G, J, K, M	300
1.2	B, C, D	500	150	F, G, J, K, M	300
1.3	B, C, D	500	160	F, G, J, K, M	300
1.4	B, C, D	500	180	F, G, J, K, M	300
1.5	B, C, D	500	200	F, G, J, K, M	300
1.6	B, C, D	500	220	F, G, J, K, M	200
1.7	B, C, D	500	240	F, G, J, K, M	200
1.8	B, C, D	500	270	F, G, J, K, M	200
1.9	B, C, D	500	300	F, G, J, K, M	200
2.0	B, C, D	500	330	F, G, J, K, M	200
2.2	B, C, D	500	360	F, G, J, K, M	200
2.4	B, C, D	500	390	F, G, J, K, M	200
2.7	B, C, D	500	430	F, G, J, K, M	200
3.0	B, C, D	500	470	F, G, J, K, M	200
3.3	B, C, D	500	510	F, G, J, K, M	150
3.6	B, C, D	500	560	F, G, J, K, M	150
3.9	B, C, D	500	620	F, G, J, K, M	150
4.3	B, C, D	500	680	F, G, J, K, M	150
4.7	B, C, D	500	750	F, G, J, K, M	150
5.1	B, C, D	500	820	F, G, J, K, M	150
5.6	B, C, D	500	910	F, G, J, K, M	150
6.2	B, C, D	500	1000	F, G, J, K, M	150
6.8	B, C, J, K, M	500	1100	F, G, J, K, M	50
7.5	B, C, J, K, M	500	1200	F, G, J, K, M	50
8.2	B, C, J, K, M	500	1300	F, G, J, K, M	50
9.1	B, C, J, K, M	500	1500	F, G, J, K, M	50
10	F, G, J, K, M	500	1600	F, G, J, K, M	50
11	F, G, J, K, M	500	1800	F, G, J, K, M	50
12	F, G, J, K, M	500	2000	F, G, J, K, M	50
13	F, G, J, K, M	500	2200	F, G, J, K, M	50
15	F, G, J, K, M	500	2400	F, G, J, K, M	50
16	F, G, J, K, M	500	2700	F, G, J, K, M	50
18	F, G, J, K, M	500	3000	F, G, J, K, M	50
20	F, G, J, K, M	500	3300	F, G, J, K, M	50
22	F, G, J, K, M	500	3600	F, G, J, K, M	50
24	F, G, J, K, M	500	3900	F, G, J, K, M	50
27	F, G, J, K, M	500	4300	F, G, J, K, M	50
30	F, G, J, K, M	500	4700	F, G, J, K, M	50
33	F, G, J, K, M	500	5000	F, G, J, K, M	50
36	F, G, J, K, M	500	5100	F, G, J, K, M	50
39	F, G, J, K, M	500			
43	F, G, J, K, M	500			
47	F, G, J, K, M	500			

TABLE III: TC: C (±15%) CASE SIZE 12 & 14

Case: AQ12

Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC
1000	K, M, N	50	2200	K, M, N	50	5100	K, M, N	50
1200	K, M, N	50	2700	K, M, N	50	5600	K, M, N	50
1500	K, M, N	50	3300	K, M, N	50	6800	K, M, N	50
1800	K, M, N	50	3900	K, M, N	50	8200	K, M, N	50
2000	K, M, N	50	4700	K, M, N	50	10000	K, M, N	50

Case: AQ14

Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC
5000	K, M, N	50	15000	K, M, N	50	47000	K, M, N	50
6800	K, M, N	50	18000	K, M, N	50	68000	K, M, N	50
8200	K, M, N	50	27000	K, M, N	50	82000	K, M, N	50
10000	K, M, N	50	33000	K, M, N	50	100000	K, M, N	50
12000	K, M, N	50	39000	K, M, N	50			