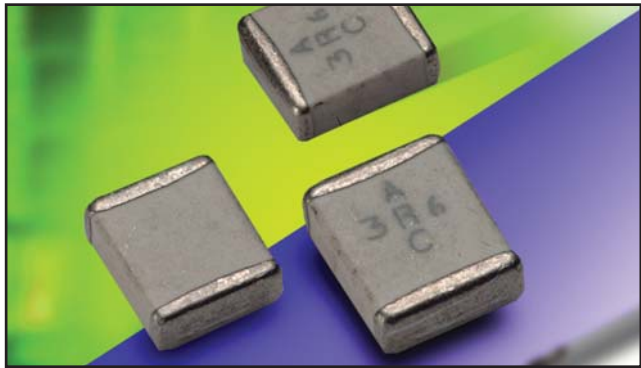


Microwave MLC's

AQ Series

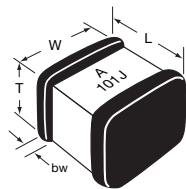


These porcelain and ceramic dielectric multilayer capacitor (MLC) chips are best suited for RF/ Microwave applications typically ranging from 10 MHz to 4.2 GHz. Characteristic is a fine grained, high density, high purity dielectric material impervious to moisture with heavy internal palladium electrodes.

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 ME = 7" Reel RE = 13" Reel WE = Waffle Pack
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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

ELECTRICAL SPECIFICATIONS

AQ11, AQ12, AQ13, AQ14		
	M & A	C
Temperature Coefficient (TCC)	(M) $+90 \pm 20$ PPM/°C (-55°C to +125°C) (M) $+90 \pm 30$ PPM/°C (+125°C to +175°C) (A) 0 ± 30 PPM/°C	$\pm 15\%$ (-55°C to 125°C)
Capacitance Range	(M) 0.1 pF to 1000 pF (A) 0.1 pF to 5100 pF	0.001 μ F to 0.1 μ F
Operating Temperature	0.1 pF to 330 pF: from -55°C to +175°C 360 pF to 5100 pF: from -55°C to +125°C	-55°C to +125°C
Quality Factor (Q)	Greater than 10,000 at 1 MHz	2.5% @ 1kHz
Insulation Resistance (IR)	0.1 pF to 470 pF 10 ⁶ Megohms min. @ 25°C at rated WVDC 10 ⁵ Megohms min. @ 125°C at rated WVDC 510 pF to 5100 pF 10 ⁵ Megohms min. @ 25°C at rated WVDC 10 ⁴ Megohms min. @ 125°C at rated WVDC	10 ⁴ Megohms min. @ 25°C at rated WVDC 10 ³ Megohms min. @ 125°C at rated WVDC
Working Voltage (WVDC)	See Capacitance Values table	See Capacitance Values table
Dielectric Withstanding Voltage (DWW)	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	$\pm$ (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

Thermal 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 85°C with 85% relative humidity for 240 hours
Life Test	Mil-STD-202, Method 108, for 2000 hours at 125°C
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			Case: AQ13, AQ14		
Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC
0.1	B	150	0.1	B	500
0.2	B	150	0.2	B	500
0.3	B,C	150	0.3	B,C	500
0.4	B,C	150	0.4	B,C	500
0.5	B, C, D	150	0.5	B, C, D	500
0.6	B, C, D	150	0.6	B, C, D	500
0.7	B, C, D	150	0.7	B, C, D	500
0.8	B, C, D	150	0.8	B, C, D	500
0.9	B, C, D	150	0.9	B, C, D	500
1.0	B, C, D	150	1.0	B, C, D	500
1.1	B, C, D	150	1.1	B, C, D	500
1.2	B, C, D	150	1.2	B, C, D	500
1.3	B, C, D	150	1.3	B, C, D	500
1.4	B, C, D	150	1.4	B, C, D	500
1.5	B, C, D	150	1.5	B, C, D	500
1.6	B, C, D	150	1.6	B, C, D	500
1.7	B, C, D	150	1.7	B, C, D	500
1.8	B, C, D	150	1.8	B, C, D	500
1.9	B, C, D	150	1.9	B, C, D	500
2.0	B, C, D	150	2.0	B, C, D	500
2.2	B, C, D	150	2.2	B, C, D	500
2.4	B, C, D	150	2.4	B, C, D	500
2.7	B, C, D	150	2.7	B, C, D	500
3.0	B, C, D	150	3.0	B, C, D	500
3.3	B, C, D	150	3.3	B, C, D	500
3.6	B, C, D	150	3.6	B, C, D	500
3.9	B, C, D	150	3.9	B, C, D	500
4.3	B, C, D	150	4.3	B, C, D	500
4.7	B, C, D	150	4.7	B, C, D	500
5.1	B, C, D	150	5.1	B, C, D	500
5.6	B, C, D	150	5.6	B, C, D	500
6.2	B, C, D	150	6.2	B, C, D	500
6.8	B, C, J, K, M	150	6.8	B, C, J, K, M	500
7.5	B, C, J, K, M	150	7.5	B, C, J, K, M	500
8.2	B, C, J, K, M	150	8.2	B, C, J, K, M	500
9.1	B, C, J, K, M	150	9.1	B, C, J, K, M	500
10	F, G, J, K, M	150	10	F, G, J, K, M	500
11	F, G, J, K, M	150	11	F, G, J, K, M	500
12	F, G, J, K, M	150	12	F, G, J, K, M	500
13	F, G, J, K, M	150	13	F, G, J, K, M	500
15	F, G, J, K, M	150	15	F, G, J, K, M	500
16	F, G, J, K, M	150	16	F, G, J, K, M	500
18	F, G, J, K, M	150	18	F, G, J, K, M	500
20	F, G, J, K, M	150	20	F, G, J, K, M	500
22	F, G, J, K, M	150	22	F, G, J, K, M	500
24	F, G, J, K, M	150	24	F, G, J, K, M	500
27	F, G, J, K, M	150	27	F, G, J, K, M	500
30	F, G, J, K, M	150	30	F, G, J, K, M	500
33	F, G, J, K, M	150	33	F, G, J, K, M	500
36	F, G, J, K, M	150	36	F, G, J, K, M	500
39	F, G, J, K, M	150	39	F, G, J, K, M	500
43	F, G, J, K, M	150	43	F, G, J, K, M	500
47	F, G, J, K, M	150	47	F, G, J, K, M	500
51	F, G, J, K, M	150	51	F, G, J, K, M	500
56	F, G, J, K, M	150	56	F, G, J, K, M	500
62	F, G, J, K, M	150	62	F, G, J, K, M	500
68	F, G, J, K, M	150	68	F, G, J, K, M	500
75	F, G, J, K, M	150	75	F, G, J, K, M	500
82	F, G, J, K, M	150	82	F, G, J, K, M	500
91	F, G, J, K, M	150	91	F, G, J, K, M	500
100	F, G, J, K, M	150			

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									Case: AQ14								
Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC	Cap. pF	Cap. Tol.	WVDC	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	5000	K, M, N	50	15000	K, M, N	50	47000	K, M, N	50
1200	K, M, N	50	2700	K, M, N	50	5600	K, M, N	50	6800	K, M, N	50	18000	K, M, N	50	68000	K, M, N	50
1500	K, M, N	50	3300	K, M, N	50	6800	K, M, N	50	8200	K, M, N	50	27000	K, M, N	50	82000	K, M, N	50
1800	K, M, N	50	3900	K, M, N	50	8200	K, M, N	50	10000	K, M, N	50	33000	K, M, N	50	100000	K, M, N	50
2000	K, M, N	50	4700	K, M, N	50	10000	K, M, N	50	12000	K, M, N	50	39000	K, M, N	50			



Microwave MLC's

Automatic Insertion Packaging



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

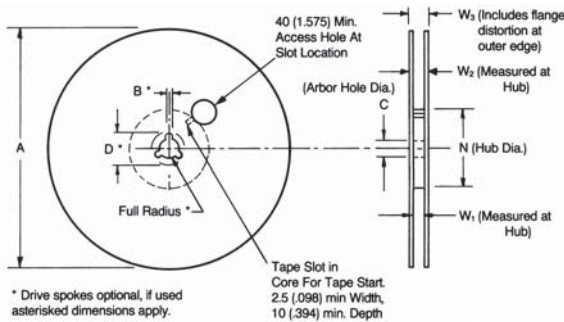
Sizes SQCA through SQCB, CDR11/12 through 13/14.

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

"U" Series - 402/0603/0805/1210 Size Chips

- 8mm carrier
- 7" reel: 0402 = 10,000 pcs
0603 & 0805 ≤ 0.40 " thickness = 4000 pcs
0805 . 0.040" thickness & 1210 = 2000 pcs
- 13" reel: ≤ 0.075 " thickness = 10,000 pcs

REEL DIMENSIONS: millimeters (inches)



Tape Size ⁽¹⁾	A Max.	B* Min.	C	D* Min.	N Min.	W ₁	W ₂ Max.	W ₃
8mm	330 (12.992)	1.5 (.059)	13.0 $\pm$ 0.20 (.512 $\pm$.008)	20.2 (.795)	50 (1.969)	8.4 $^{+1.0}_{-0.0}$ (.331 $^{+0.060}_{-0.0}$)	14.4 (.567)	7.9 Min. (.311) 10.9 Max. (.429)
12mm						12.4 $^{+2.0}_{-0.0}$ (.488 $^{+0.075}_{-0.0}$)	18.4 (.724)	11.9 Min. (.469) 15.4 Max. (.607)

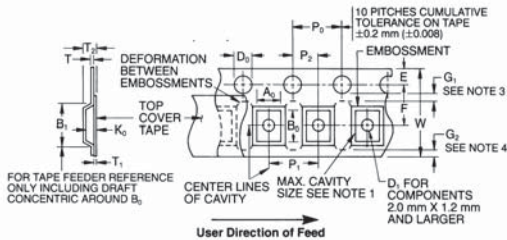
Metric dimensions will govern.
English measurements rounded and for reference only.
(1) For tape sizes 16mm and 24mm (used with chip size 3640) consult EIA RS-481 latest revision.

EMBOSSED CARRIER CONFIGURATION

8 & 12 MM TAPE ONLY

CONSTANT DIMENSIONS

Tape Size	D ₀	E	P ₀	P ₂	T Max.	T ₁	G ₁	G ₂
8mm and 12mm	8.4 $^{+0.10}_{-0.0}$ (.059 $^{+0.004}_{-0.0}$)	1.75 $\pm$ 0.10 (.069 $\pm$.004)	4.0 $\pm$ 0.10 (.157 $\pm$.004)	2.0 $\pm$ 0.05 (.079 $\pm$.002)	0.600 (.024)	0.10 (.004) Max.	0.75 (.030) Min. See Note 3	0.75 (.030) Min. See Note 4

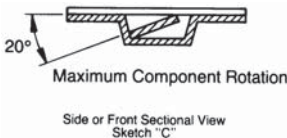
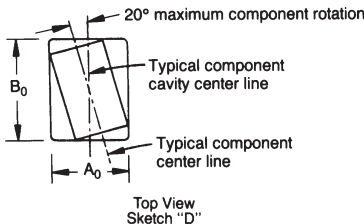


VARIABLE DIMENSIONS

Tape Size	B ₁ Max. See Note 6	D ₁ Min. See Note 5	F	P ₁	R Min. See Note 2	T ₂	W	A ₀ B ₀ K ₀
8mm	4.55 (.179)	1.0 (.039)	3.5 $\pm$ 0.05 (.138 $\pm$.002)	4.0 $\pm$ 0.10 (.157 $\pm$.004)	25 (.984)	2.5 Max (.098)	8.0 $^{+0.3}_{-0.1}$ (.315 $^{+0.012}_{-0.004}$)	See Note 1
12mm	8.2 (.323)	1.5 (.059)	5.5 $\pm$ 0.05 (.217 $\pm$.002)	4.0 $\pm$ 0.10 (.157 $\pm$.004)	30 (1.181)	6.5 Max (.256)	12.0 $\pm$.30 (.472 $\pm$.012)	See Note 1

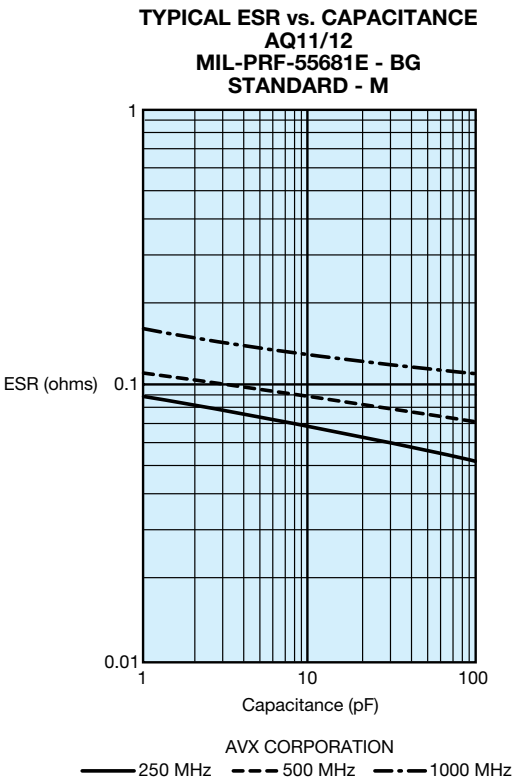
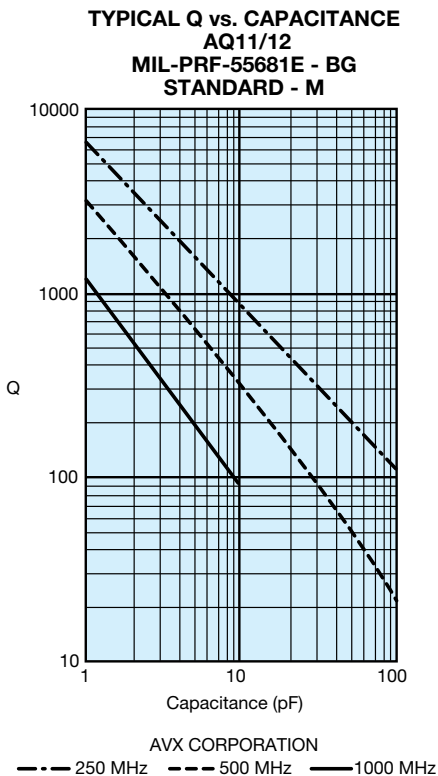
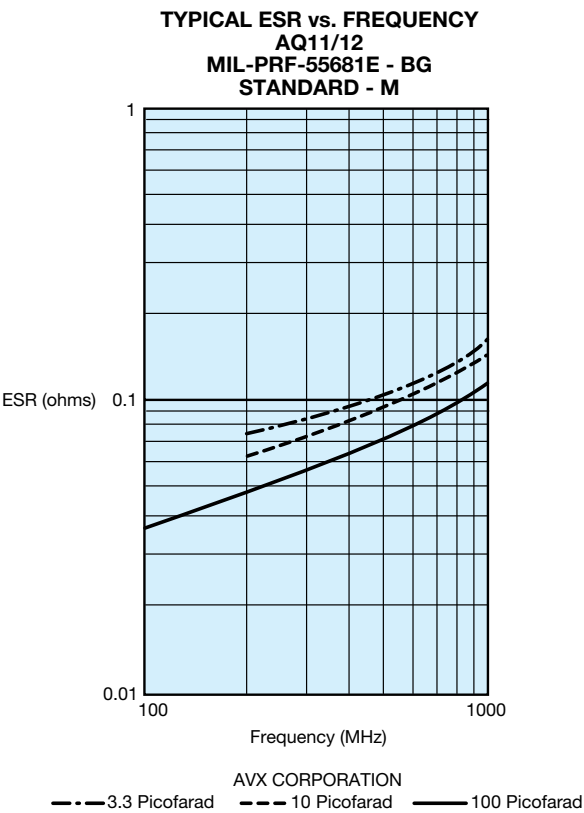
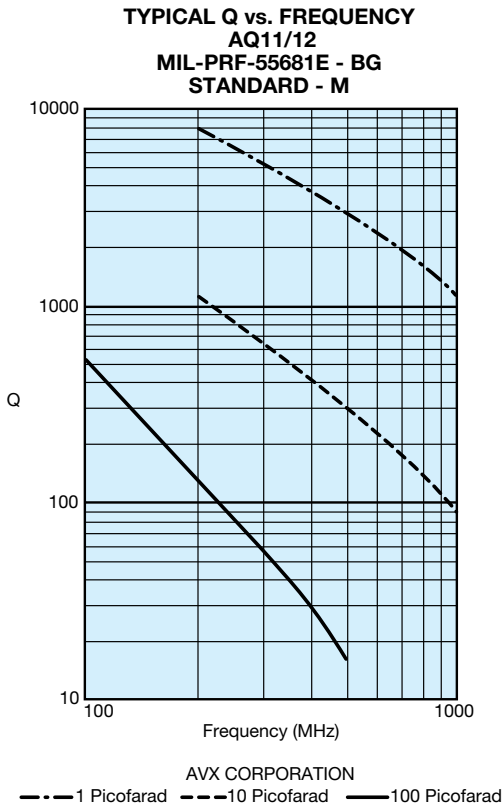
NOTES:

- A₀, B₀, and K₀ are determined by the max. dimensions to the ends of the terminals extending from the component body and/or the body dimensions of the component. The clearance between the end of the terminals or body of the component to the sides and depth of the cavity (A₀, B₀, and K₀) must be within 0.05 mm (.002) min. and 0.50 mm (.020) max. The clearance allowed must also prevent rotation of the component within the cavity of not more than 20 degrees (see sketches C & D).
- Tape with components shall pass around radius "R" without damage. The minimum trailer length (Note 2 Fig. 3) may require additional length to provide R min. for 12mm embossed tape for reels with hub diameters approaching N min. (Table 4).
- G₁ dimension is the flat area from the edge of the sprocket hole to either the outward deformation of the carrier tape between the embossed cavities or to the edge of the cavity whichever is less.
- G₂ dimension is the flat area from the edge of the carrier tape opposite the sprocket holes to either the outward deformation of the carrier tape between the embossed cavity or to the edge of the cavity whichever is less.
- The embossment hole location shall be measured from the sprocket hole controlling the location of the embossment. Dimensions of embossment location and hole location shall be applied independent of each other.
- B₁ dimension is a reference dimension for tape feeder clearance only.



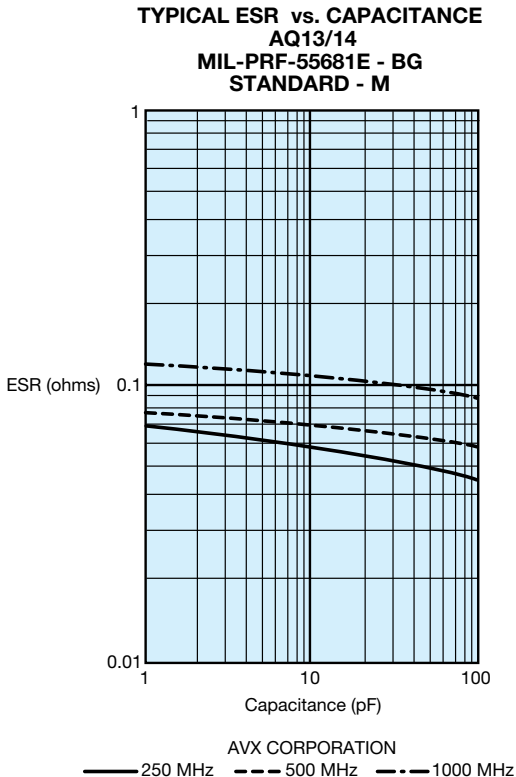
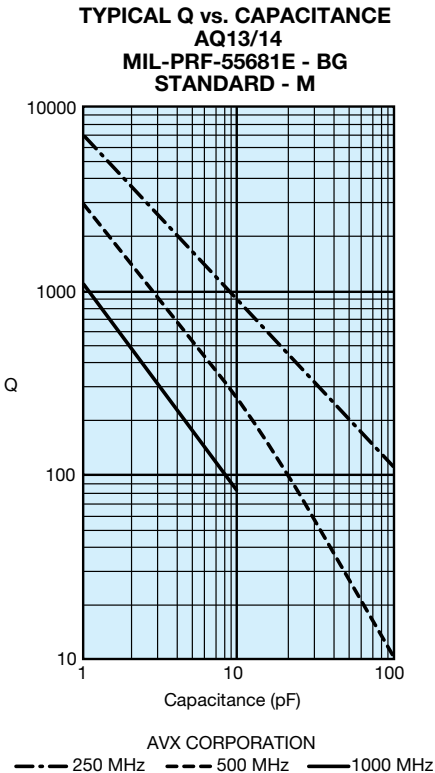
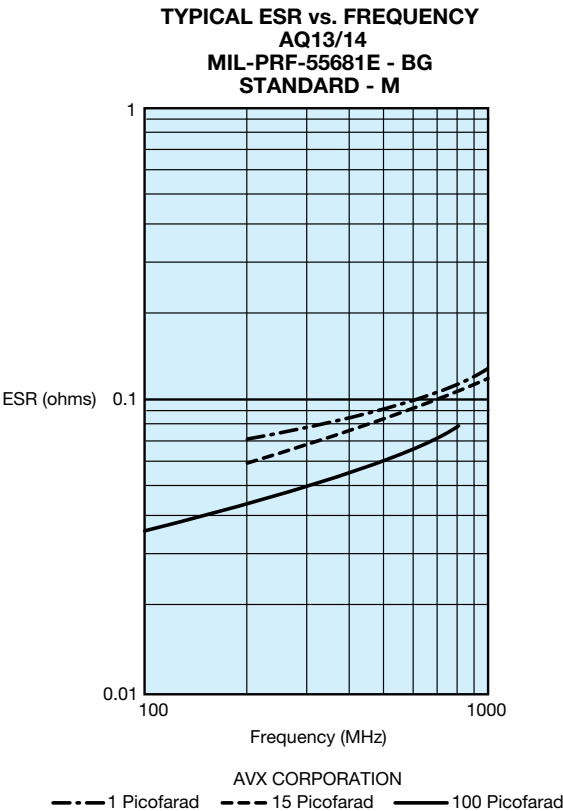
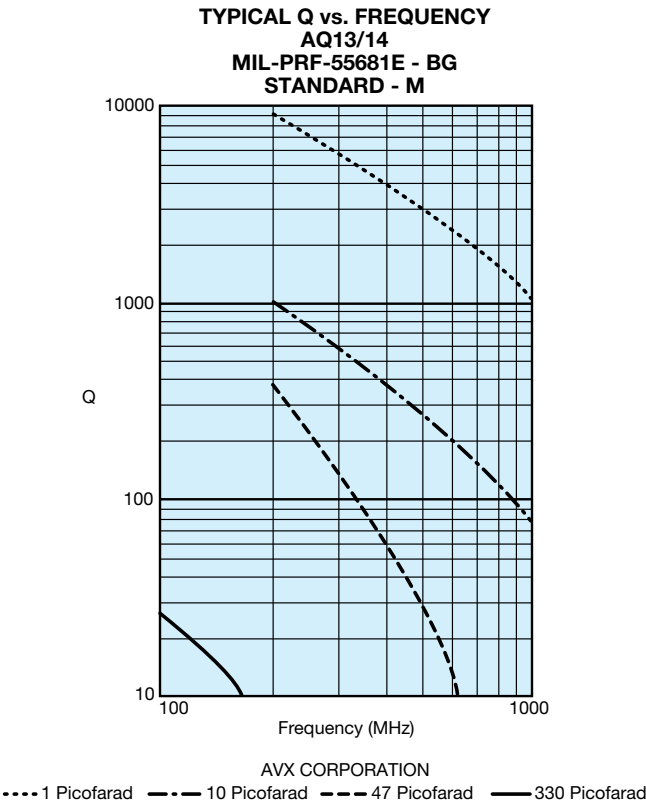
Microwave MLC's

Performance Curves



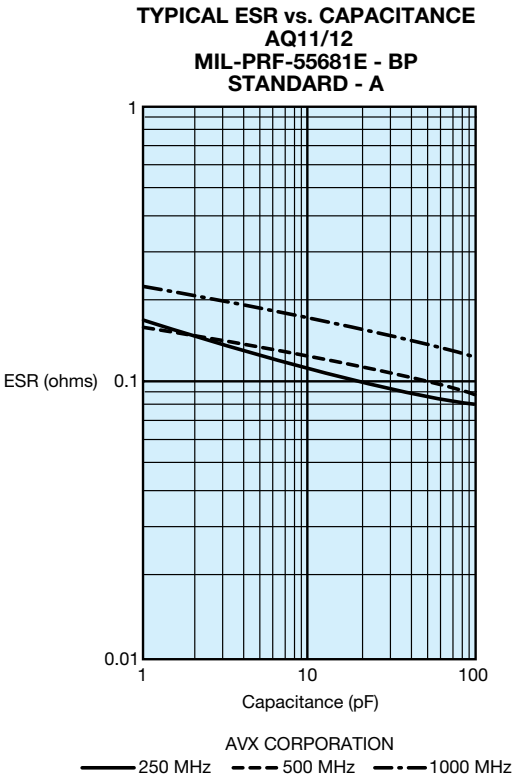
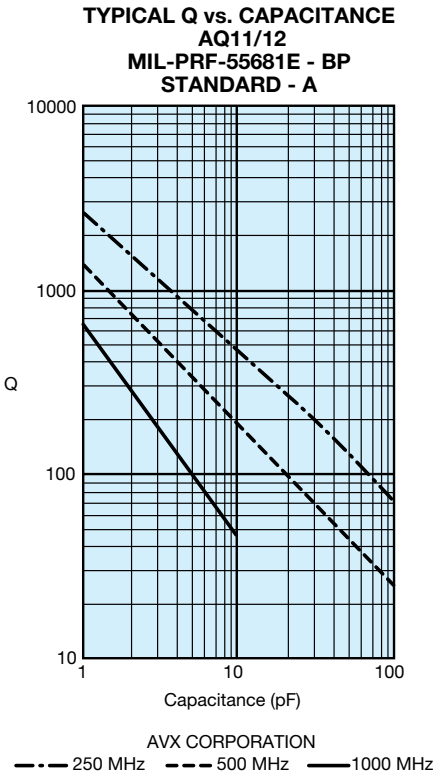
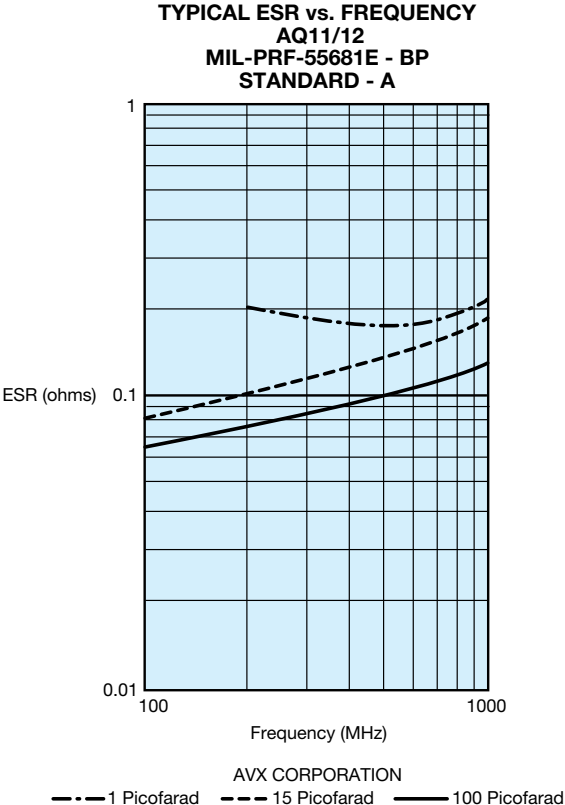
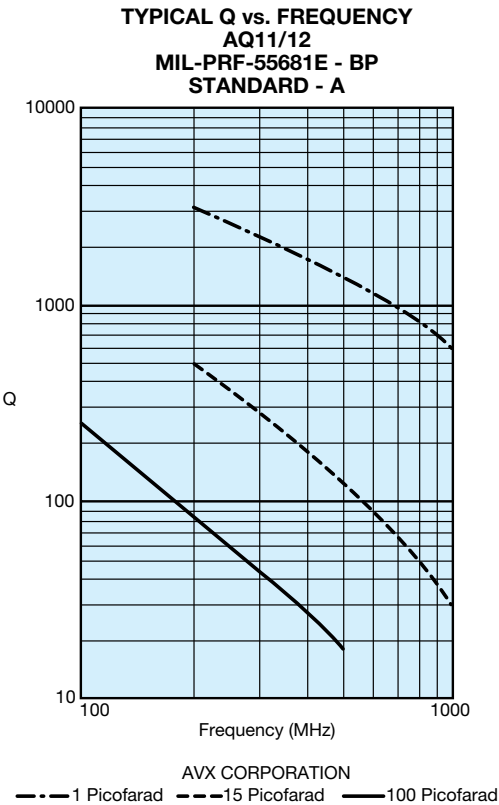
Microwave MLC's

Performance Curves



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