



**THE DATASHEET OF  
SQCA5A471GATME**



# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### SQ Series Ultra Low ESR MLC



#### FEATURES

- Low ESR
- High Q
- High Self Resonance
- Capacitance Range 0.1 pF to 5100pF
- 175°C Capability SQCB (Standard voltages only)

#### APPLICATIONS

- RF Power Amplifiers
- Low Noise Amplifiers
- Filter Networks
- MRI Systems

#### HOW TO ORDER

<b>SQ</b>	<b>CA</b>	<b>7</b>	<b>M</b>	<b>100</b>	<b>J</b>	<b>A</b>	<b>T</b>	<b>1A</b>
↓	↓	↓	↓	↓	↓	↓	↓	↓
<b>AVX Style</b>	<b>Case Size</b>	<b>Voltage Code</b>	<b>Temperature Coefficient Code</b>	<b>Capacitance</b>	<b>Capacitance Tolerance Code</b>	<b>Failure Rate Code</b>	<b>Termination Style Code</b>	<b>Packaging Code</b>
	CA = 0605 CB = 1210	5 = 50V 1 = 100V E = 150V 2 = 200V V = 250V 9 = 300V 7 = 500V C = 600V A = 1000V S = 1500V	M = +90±20ppm/°C A = 0±30ppm/°C C = 15% ("J" Termination only)	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.	A = ±.05 pF B = ±.1 pF C = ±.25 pF D = ±.5 pF F = ±1% G = ±2% J = ±5% K = ±10% M = ±20%	A = Not Applicable	J=Nickel Barrier Sn/Pb (60/40) **T=100% Tin **C=Non-Magnetic Barrier/Tin	ME = 7" Reel Marked (0605, 1210 & 0709 only) 2A = 7" Unmarked (0402, 0603, & 0805 only) * Vertical T&R available
							<b>**RoHS compliant</b>	



#### MECHANICAL DIMENSIONS: inches (millimeters)

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

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

—8mm carrier

—7" reel:

#### WAFFLE PACK

SQCA 100 pcs

SQCB 100 pcs



For RoHS compliant products, please select correct termination style.

Also available in:

**Not RoHS Compliant**

# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### SQ Series Ultra Low ESR MLC



#### ELECTRICAL SPECIFICATIONS

Dielectric		M & A	C
Temperature Coefficient (TCC)		(M) $+90 \pm 20$ PPM/ $^{\circ}$ C ( $-55^{\circ}$ C to $+125^{\circ}$ C) (M) $+90 \pm 30$ PPM/ $^{\circ}$ C ( $+125^{\circ}$ C to $+175^{\circ}$ C)* (A) $0 \pm 30$ PPM/ $^{\circ}$ C	$\pm 15\%$ ( $-55^{\circ}$ C to $125^{\circ}$ C)
Capacitance Range		(M) 0.1 pF to 1000 pF (A) 0.1 pF to 5100 pF	0.001 $\mu$ F to 0.1 $\mu$ F
Operating Temperature		A Case: $-55^{\circ}$ C to $+125^{\circ}$ C*  B Case (M Dielectric): 0.1 pF to 330 pF: from $-55^{\circ}$ C to $+175^{\circ}$ C 360 pF to 5100 pF: from $-55^{\circ}$ C to $+125^{\circ}$ C  B Case (A Dielectric): 0.1 pF to 200 pF: from $-55^{\circ}$ C to $+175^{\circ}$ C 220 pF to 5100 pF: from $-55^{\circ}$ C to $+125^{\circ}$ C	$-55^{\circ}$ C to $+125^{\circ}$ 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 1000 pF 105 Megohms min. @ $25^{\circ}$ C at rated WVDC 104 Megohms min. @ $125^{\circ}$ C at rated WVDC	$10^4$ Megohms min. @ $25^{\circ}$ C at rated WVDC $10^3$ Megohms min. @ $125^{\circ}$ C 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	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
Piezoelectric Effects		None	
Capacitance Drift		$\pm$ (0.02% or 0.02 pF), whichever is greater	

#### ENVIRONMENTAL CHARACTERISTICS

AVX SQ 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 $85^{\circ}$ C with 85% relative humidity for 240 hours
Life Test	Mil-STD-202, Method 108, for 2000 hours at $125^{\circ}$ C 200% WVDC
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

# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### SQ Series Ultra Low ESR MLC



## Case Size A

TABLE I: TC: M (+90±20PPM/°C)

Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*	
		STD	HV			STD	HV			STD	HV			STD	HV
0.1	B	150	250	1.7	B, C, D	150	250	6.8	B, C, J, K	150	250	33	F, G, J, K	150	250
0.2	B	150	250	1.8	B, C, D	150	250	7.5	B, C, J, K	150	250	36	F, G, J, K	150	250
0.3	B, C	150	250	1.9	B, C, D	150	250	8.2	B, C, J, K	150	250	39	F, G, J, K	150	250
0.4	B, C	150	250	2.0	B, C, D	150	250	9.1	B, C, J, K	150	250	43	F, G, J, K	150	250
0.5	B, C, D	150	250	2.2	B, C, D	150	250	10	F, G, J, K	150	250	47	F, G, J, K	150	250
0.6	B, C, D	150	250	2.4	B, C, D	150	250	11	F, G, J, K	150	250	51	F, G, J, K	150	250
0.7	B, C, D	150	250	2.7	B, C, D	150	250	12	F, G, J, K	150	250	56	F, G, J, K	150	250
0.8	B, C, D	150	250	3.0	B, C, D	150	250	13	F, G, J, K	150	250	62	F, G, J, K	150	200
0.9	B, C, D	150	250	3.3	B, C, D	150	250	15	F, G, J, K	150	250	68	F, G, J, K	150	200
1.0	B, C, D	150	250	3.6	B, C, D	150	250	16	F, G, J, K	150	250	75	F, G, J, K	150	200
1.1	B, C, D	150	250	3.9	B, C, D	150	250	18	F, G, J, K	150	250	82	F, G, J, K	150	200
1.2	B, C, D	150	250	4.3	B, C, D	150	250	20	F, G, J, K	150	250	91	F, G, J, K	150	200
1.3	B, C, D	150	250	4.7	B, C, D	150	250	22	F, G, J, K	150	250	100	F, G, J, K	150	200
1.4	B, C, D	150	250	5.1	B, C, D	150	250	24	F, G, J, K	150	250				
1.5	B, C, D	150	250	5.6	B, C, D	150	250	27	F, G, J, K	150	250				
1.6	B, C, D	150	250	6.2	B, C, D	150	250	30	F, G, J, K	150	250				

TABLE II: TC: A (0±30PPM/°C)

Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*	
		STD	HV			STD	HV			STD	HV			STD	HV
0.1	B	150	250	2.7	B, C, D	150	250	22	F, G, J, K	150	250	180	F, G, J, K	150	-
0.2	B	150	250	3.0	B, C, D	150	250	24	F, G, J, K	150	250	200	F, G, J, K	150	-
0.3	B, C	150	250	3.3	B, C, D	150	250	27	F, G, J, K	150	250	220	F, G, J, K	150	-
0.4	B, C	150	250	3.6	B, C, D	150	250	30	F, G, J, K	150	250	240	F, G, J, K	150	-
0.5	B, C, D	150	250	3.9	B, C, D	150	250	33	F, G, J, K	150	250	270	F, G, J, K	150	-
0.6	B, C, D	150	250	4.3	B, C, D	150	250	36	F, G, J, K	150	250	300	F, G, J, K	150	-
0.7	B, C, D	150	250	4.7	B, C, D	150	250	39	F, G, J, K	150	250	330	F, G, J, K	150	-
0.8	B, C, D	150	250	5.1	B, C, D	150	250	43	F, G, J, K	150	250	360	F, G, J, K	150	-
0.9	B, C, D	150	250	5.6	B, C, D	150	250	47	F, G, J, K	150	250	390	F, G, J, K	150	-
1.0	B, C, D	150	250	6.2	B, C, D	150	250	51	F, G, J, K	150	250	430	F, G, J, K	150	-
1.1	B, C, D	150	250	6.8	B, C, J, K	150	250	56	F, G, J, K	150	250	470	F, G, J, K	150	-
1.2	B, C, D	150	250	7.5	B, C, J, K	150	250	62	F, G, J, K	150	200	510	F, G, J, K	150	-
1.3	B, C, D	150	250	8.2	B, C, J, K	150	250	68	F, G, J, K	150	200	560	F, G, J, K	150	-
1.4	B, C, D	150	250	9.1	B, C, J, K	150	250	75	F, G, J, K	150	200	620	F, G, J, K	150	-
1.5	B, C, D	150	250	10	F, G, J, K	150	250	82	F, G, J, K	150	200	680	F, G, J, K	50	-
1.6	B, C, D	150	250	11	F, G, J, K	150	250	91	F, G, J, K	150	200	750	F, G, J, K	50	-
1.7	B, C, D	150	250	12	F, G, J, K	150	250	100	F, G, J, K	150	-	820	F, G, J, K	50	-
1.8	B, C, D	150	250	13	F, G, J, K	150	250	110	F, G, J, K	150	-	910	F, G, J, K	50	-
1.9	B, C, D	150	250	15	F, G, J, K	150	250	120	F, G, J, K	150	-	1000	F, G, J, K	50	-
2.0	B, C, D	150	250	16	F, G, J, K	150	250	130	F, G, J, K	150	-				
2.2	B, C, D	150	250	18	F, G, J, K	150	250	150	F, G, J, K	150	-				
2.4	B, C, D	150	250	20	F, G, J, K	150	250	160	F, G, J, K	150	-				

TABLE III: TC: C (±15%)

Cap. pF	Cap. Tol.	WVDC STD	Cap. pF	Cap. Tol.	WVDC STD	Cap. pF	Cap. Tol.	WVDC STD
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

\*STD = Standard voltage rating; HV = High voltage rating



The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at [www.avx.com/disclaimer/](http://www.avx.com/disclaimer/) by reference and should be reviewed in full before placing any order.

# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### SQ Series Ultra Low ESR MLC



## Case Size B

TABLE IV: TC: M (+90±20PPM/°C)

Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*		Cap. pF	Cap. Tol.	WVDC*	
		STD	HV			STD	HV			STD	HV			STD	HV
0.1	B	500	1500	2.7	B, C, D	500	1500	22	F, G, J, K	500	1500	180	F, G, J, K	300	1000
0.2	B	500	1500	3.0	B, C, D	500	1500	24	F, G, J, K	500	1500	200	F, G, J, K	300	1000
0.3	B, C	500	1500	3.3	B, C, D	500	1500	27	F, G, J, K	500	1500	220	F, G, J, K	200	1000
0.4	B, C	500	1500	3.6	B, C, D	500	1500	30	F, G, J, K	500	1500	240	F, G, J, K	200	600
0.5	B, C, D	500	1500	3.9	B, C, D	500	1500	33	F, G, J, K	500	1500	270	F, G, J, K	200	600
0.6	B, C, D	500	1500	4.3	B, C, D	500	1500	36	F, G, J, K	500	1500	300	F, G, J, K	200	600
0.7	B, C, D	500	1500	4.7	B, C, D	500	1500	39	F, G, J, K	500	1500	330	F, G, J, K	200	600
0.8	B, C, D	500	1500	5.1	B, C, D	500	1500	43	F, G, J, K	500	1500	360	F, G, J, K	200	600
0.9	B, C, D	500	1500	5.6	B, C, D	500	1500	47	F, G, J, K	500	1500	390	F, G, J, K	200	600
1.0	B, C, D	500	1500	6.2	B, C, D	500	1500	51	F, G, J, K	500	1500	430	F, G, J, K	200	600
1.1	B, C, D	500	1500	6.8	B, C, J, K	500	1500	56	F, G, J, K	500	1500	470	F, G, J, K	200	600
1.2	B, C, D	500	1500	7.5	B, C, J, K	500	1500	62	F, G, J, K	500	1500	510	F, G, J, K	100	300
1.3	B, C, D	500	1500	8.2	B, C, J, K	500	1500	68	F, G, J, K	500	1500	560	F, G, J, K	100	300
1.4	B, C, D	500	1500	9.1	B, C, J, K	500	1500	75	F, G, J, K	500	1500	620	F, G, J, K	100	300
1.5	B, C, D	500	1500	10	F, G, J, K	500	1500	82	F, G, J, K	500	1500	680	F, G, J, K	50	300
1.6	B, C, D	500	1500	11	F, G, J, K	500	1500	91	F, G, J, K	500	1500	750	F, G, J, K	50	300
1.7	B, C, D	500	1500	12	F, G, J, K	500	1500	100	F, G, J, K	500	1500	820	F, G, J, K	50	300
1.8	B, C, D	500	1500	13	F, G, J, K	500	1500	110	F, G, J, K	300	1000	910	F, G, J, K	50	300
1.9	B, C, D	500	1500	15	F, G, J, K	500	1500	120	F, G, J, K	300	1000	1000	F, G, J, K	50	300
2.0	B, C, D	500	1500	16	F, G, J, K	500	1500	130	F, G, J, K	300	1000				
2.2	B, C, D	500	1500	18	F, G, J, K	500	1500	150	F, G, J, K	300	1000				
2.4	B, C, D	500	1500	20	F, G, J, K	500	1500	160	F, G, J, K	300	1000				

TABLE V: TC: A (0±30PPM/°C)

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

TABLE VI: TC: C (±15%)

Cap. pF	Cap. Tol.	WVDC STD	Cap. pF	Cap. Tol.	WVDC STD	Cap. pF	Cap. Tol.	WVDC STD
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			

\*STD = Standard voltage rating; HV = High voltage rating



**RF/Microwave Capacitors**  
**RF/Microwave Multilayer Capacitors (MLC)**  
**SQ Series Ultra Low ESR MLC**



Typical ESR SQCA



Typical ESR SQCB







**MOUNTING PAD DIMENSIONS:**

inches (millimeters)

Case	A min	B min	C min	D min
SQCA	0.082 (2.083)	0.051 (1.295)	0.032 (0.813)	0.130 (3.302)
SQCB	0.131 (3.327)	0.051 (1.295)	0.074 (1.880)	0.177 (4.496)
SQCS	0.038 (0.965)	0.043 (1.092)	0.025 (0.635)	0.112 (2.845)
SQCF	0.059 (1.499)	0.051 (1.295)	0.024 (0.610)	0.125 (3.175)

**SQCA & SQCB DESIGN KITS**

PN	Series	Diel	Term	Range	Different Values	# per value
KITSQ100LF	SQCA	P90	100% Tin RoHS	.1 to 2pF	16	15
KITSQ400LF	SQCA	COG	100% Tin RoHS	.1 to 2pF	16	15
KITSQ200LF	SQCA	P90	100% Tin RoHS	1 to 10pF	16	15
KITSQ500LF	SQCA	COG	100% Tin RoHS	1 to 10pF	16	15
KITSQ300LF	SQCA	P90	100% Tin RoHS	10 to 100pF	16	15
KITSQ600LF	SQCA	COG	100% Tin RoHS	10 to 100pF	16	15
KITSQ700LF	SQCA	COG	100% Tin RoHS	100 to 1000pF	16	15
KITSQ800LF	SQCB	P90	100% Tin RoHS	1 to 10pF	16	15
KITSQ1100LF	SQCB	COG	100% Tin RoHS	1 to 10pF	16	15
KITSQ900LF	SQCB	P90	100% Tin RoHS	10 to 100pF	16	15
KITSQ1200LF	SQCB	COG	100% Tin RoHS	10 to 100pF	16	15
KITSQ1000LF	SQCB	P90	100% Tin RoHS	100 to 1000pF	16	15
KITSQ1300LF	SQCB	COG	100% Tin RoHS	100 to 1000pF	16	15
KITSQ1400LF	SQCB	COG	100% Tin RoHS	1000 to 5100 pF	11	15

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- ✓ Obsolete Management
- ✓ Cost Control Management
- ✓ Shortage Management
- ✓ Alternative Solution
- ✓ Excess Inventory Management