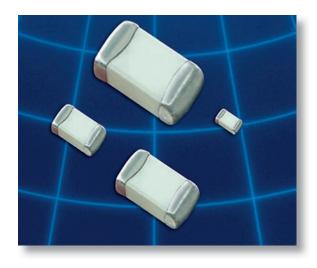
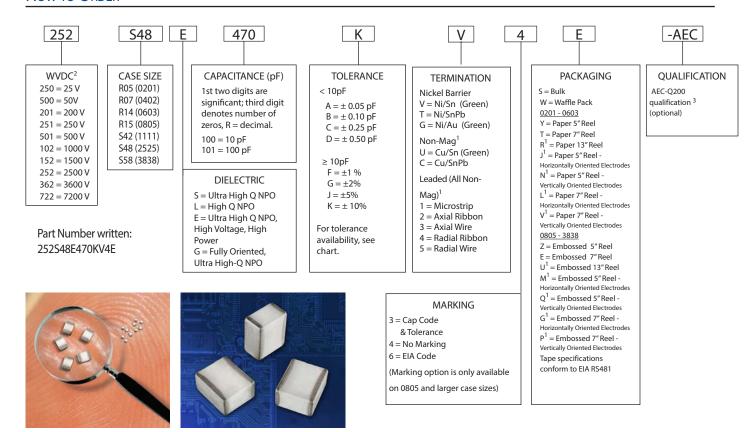
Multi-Layer High-O Capacitors



These lines of multilayer capacitors have been developed for High-Q and microwave applications.

- The S-Series (R07S, R14S, R15S) capacitors give an ultrahigh Q performance, and exhibit NP0 temperature characteristics.
- The L-Series (R05L) capacitors give mid-high Q performance, and exhibit NP0 temperature characteristics.
- The E-Series (S42E, S48E, S58E) capacitors give excellent high-Q performance from HF to Microwave frequencies. Typical uses are high voltage, high current applications. They are offered in chip (Ni barrier or Non-Magnetic Pt.-Ag) or in Non-Magnetic leaded form.
- RoHS compliance is standard for all unleaded parts (see termination options box).
- Automotive versions (AEC-Q200) of R05L, R07S, R14S, R15S, and S42E series are available on request

How to Order



- 1 Not available for all MLCC Call factory for info.
- ² WVDC Working Voltage DC.
- ³ -Qualification required for automotive application, Not available for all series Call factory for info.

LOW ESR / HIGH-Q CAPACITOR SELECTION CHART

	FIA C							RF Pc	wer App	lications			
	EIA Size			(R05)	0402	0603	0805	0805	11	11	2525	38	38
Cap. Va	Cap. Value		NPO (R05L)	NPO (R05G)	(R07S)	(R14S)	(R15S)	(R15L)	(S42E)		(S48E)	(S58E)	
Capac pF	citance Code												
0.1	OR1		25/50 V	25 V	50/250 V	250 V							
0.2	0R2		25/50 V	25 V	50/250 V	250 V			500V	1500V			
0.3	OR3		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V			
0.4	0R4		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V			
0.5	OR5		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V		
0.6	0R6		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
0.7	OR7		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
0.8	OR8		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
0.9	OR9		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
1.0	1R0		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
1.1	1R1		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
1.2	1R2	Α	25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
1.3	1R3	_	25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V 1500V	3600V	3600V	7200V
1.4 1.5	1R4 1R5	В	25/50 V 25/50 V	25 V 25 V	50/250 V 50/250 V	250 V 250 V	250 V 250 V		500V 500V	1500V	3600V 3600V	3600V 3600V	7200V 7200V
1.6	1R6		25/50 V 25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V 7200V
1.7	1R7	C	25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V 7200V
1.8	1R8		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
1.9	1R9	D	25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
2.0	2R0		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
2.1	2R1		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
2.2	2R2		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
2.4	2R4		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
2.7	2R7		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
3.0	3R0		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
3.3	3R3		25/50 V	25 V	50/250 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
3.6	3R6		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
3.9	3R9		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
4.3	4R3		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
4.7	4R7		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
5.1	5R1	A**	25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
5.6	5R6		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
6.2 6.8	6R2 6R8	В	25/50 V 25/50 V	25 V 25 V	50/200 V 50/200 V	250 V 250 V	250 V 250 V		500V 500V	1500V 1500V	3600V 3600V	3600V 3600V	7200V 7200V
7.5	7R5	C	25/50 V 25/50 V	25 V	50/200 V 50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V 7200V
8.2	8R2		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V 7200V
9.1	9R1	D	25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
10	100		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
11	110		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
12	120	_	25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
13	130	F	25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
15	150		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
16	160	G	25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
18	180		25/50 V	25 V	50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
20	200	J	25/50 V		50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
22	220		25/50 V		50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
24	240	K	25/50 V		50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
27	270	- 1	25/50 V		50/200 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
30	300		25/50 V		50 V	250 V	250 V		500V	1500V	3600V	3600V	7200V
33	330		25/50 V		50 V	250 V	250 V		500V	1500V	3600V	3600V	7200V

Consult factory for Non-Standard values.

^{**}A tolerance only available for R07S (0402) and R14S(0603) caps



LOW ESR / HIGH-Q CAPACITOR SELECTION CHART

	EIA Size					RF Power Applications							
			0201	(R05)	0402	0603	0805	0805	1111		2525	38	38
Cap. Value		NPO NPO (R05L) (R05G)		(R07S)	(R14S)	(R15S)	(R15L)	(S42E)		(S48E)	(S58E)		
Capacit pF	ance Code	Toler- ance											
36	360		25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
39	390	-	25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
43	430		25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
47	470		25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
51	510		25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
56	560		25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
62	620	-	25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
68	680	-	25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
75	750		25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
82	820	F	25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
91	910	•	25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
100	101		25/50 V			250 V	250 V		500V	1500V	3600V	3600V	7200V
110	111	G					250 V		300V	1500V	2500V	3600V	7200V
120	121						250 V		300V	1000V	2500V	3600V	7200V
130	131	J					250 V		300V	1000V	2500V	3600V	7200V
150	151						250 V		300V	1000V	2500V	3600V	7200V
160	161	K					250 V		300V	1000V	2500V	3600V	7200V
180	181	- 1					250 V		300V	1000V	2500V	3600V	7200V
200	201	-					250 V		300V	1000V	2500V	3600V	72001
220	221	-					250 V		200V	1000V	2500V	3600V	
240	241	-					230 V	500V	200V	600V	2500V	3600V	
270	271	-						500V	200V	600V	2500V	3600V	
300	301	-						500V	200V	600V	1500V	3600V	
330	331	-						500V	200V	600V	1500V	3600V	
360	361	-						500V	200V	600V	1500V	3600V	
390	391	-						500V	200V	500V	1500V	3600V	
430	431							500V	200V	500V	1500V	2500V	
470	471	-						500V	200V	500V	1500V	2500V	
510	511	-						100V	200V	500V	1000V	2500V	
560	561	-						100V	200V	500V	1000V	2500V	
620	621							100V	200V	500V	1000V	2500V	
680	681	-						50V	200V	3001	1000V	2500V	
750	751							50V	200V		1000V	2500V	
820	821							50V	200V		1000V	2500V	
910	911	G						50V	200V		1000V	1000V	
1000	102							50V	200V		1000V	1000V	
1200	122	J						50V	2000		1000V	1000V	
1500	152							50V			500V	1000V	
1800	182	K						50V			500V	1000V	
2200	222							50V			300V	1000V	
2700	272							337			300V	500V	
3300	332										3004	500V	
3900	392											500V	
4700	472											500V	
5100	512											500V	
10000	103											300V	

Consult factory for Non-Standard values.

DIELECTRIC CHARACTERISTICS

NPO

TEMPERATURE COEFFICIENT: 0 ± 30 ppm /°C, -55 to 150°C

QUALITY FACTOR / DF: Q > 1,000 @ 1KHz (C>1,000pF), Typical 10,000 (C<1,000 pF)

INSULATION RESISTANCE: $>100 \text{ G}\Omega @ 25^{\circ}\text{C,WVDC}^{1}$;

125°C IR is 10% of 25°C rating

TEST PARAMETERS: 1MHz ±50kHz, 1.0±0.2VRMS for capacitance values ≤ 1,000pF

1kHZ ±50Hz, 1.0±0.2VRMS for capacitance values > 1,000pF

DIELECTRIC STRENGTH: $500 \text{ V} \le 2.5 \text{ X WVDC}^1 \text{ Min., } 25^{\circ}\text{C}, 50 \text{ mA max}$

 $1000 \text{ V} \le 1.5 \text{ X WVDC}^{\text{1}} \text{ Min., } 25^{\circ}\text{C}, 50 \text{ mA max}$ > $1500 = 1 \text{ X WVDC}^{\text{1}} \text{ Min., } 25^{\circ}\text{C}, 50 \text{ mA max}$

AVAILABLE CAPACITANCE:

 Size 0201:
 0.2 - 100 pF
 Size 1111:
 0.2 - 1000 pF

 Size 0402:
 0.2 - 33 pF
 Size 2525:
 1.0 - 2700 pF

 Size 0603:
 0.2 - 100 pF
 Size 3838:
 1.0 - 5100 pF

Size 0805: 0.3 - 220 pF

ADHESION:

LIFE TEST:

MECHANICAL & ENVIRONMENTAL CHARACTERISTICS

SPECIFICATION TEST PARAMETERS

SOLDERABILITY: Solder coverage ≥ 90% of metalized areas Preheat chip to 120°-150°C for 60 sec., dip terminals in rosin flux

No termination degradation then dip in Sn62 solder @ 240°±5°C for 5±1 sec

RESISTANCETO

No mechanical damage

Preheat device to 80°-100°C for 60 sec.

SOLDERING HEAT:

Capacitance change: ±2.5% or 0.25pF

followed by 150°-180°C for 60 sec.

Q>500 I.R.>10 G Ohms

Dip in 260°±5°C solder for 10±1 sec.

DWV²: 2.5 x WVDC¹

Measure after 24±2 hour cooling period

TERMINAL Termination should not pull off. Linear pull force³ exerted on axial leads soldered to each terminal.

Ceramic should remain undamaged.

Capacitance change: 5% or

PCB DEFLECTION: No mechanical damage. Glass epoxy PCB: 2 mm deflection

0.5pF whichever is greater.

MIL-STD-202, Method 108I Applied voltage: 200% of WVDC¹ for capacitors rated at 500 volts DC or less.

No mechanical damage 100% of WVDC¹ for capacitors rated at 1250 volts DC or less.

Capacitance change: ±3.0% or 0.3 pF

Temperature: 125°±3°C

Q>500 I.R. >1 G Ohms Test time: 1000+48-0 hours

 DWV^2 : 2.5 x $WVDC^1$

THERMAL CYCLE: No mechanical damage. 5 cycles of: 30±3 minutes @ -55°+0/-3°C,

Capacitance change: ±2.5% or 0.25pF 2-3 min. @ 25°C, 30±3 min. @ +125°+3/-0°C, Q>2000 I.R. >10 G Ohms 2-3 min. @ 25°C

DWV²: 2.5 x WVDC¹ Measure after 24±2 hour cooling period

HUMIDITY, No mechanical damage. Relative humidity: 90-95% STEADY STATE: Capacitance change: ±5.0% or 0.50pF max. Temperature: 40°±2°C

 $\label{eq:capacitance change: $\pm 5.0\% \text{ or } 0.50 \text{pF max.} \\ Q>300 \text{ I.R.} \geq 1 \text{ G-Ohm} \\ \\ \text{Test time: } 500 + 12/-0 \text{ Hours} \\$

DWV 2 : 2.5 x WVDC 1 Measure after 24±2 hour cooling period HUMIDITY, No mechanical damage. Applied voltage: 1.5 VDC, 50 mA max.

LOW VOLTAGE: Capacitance change: ±5.0% or 0.50pF max. Relative humidity: 85±2% Temperature: 40°±2°C Q>300 I.R. = 1 G-Ohm min. Test time: 240 +12/-0 Hours

DWV²: 2.5 x WVDC¹ Measure after 24±2 hour cooling period

VIBRATION:

No mechanical damage.

Capacitance change: ±2.5% or 0.25pF

Cycle performed for 2 hours in each of three perpendicular directions

Q>1000 I.R. \geq 10 G-Ohm Frequency range 10Hz to 55 Hz to 10 Hz traversed bWV²: 2.5 x WVDC¹ in 1 minute. Harmonic motion amplitude: 1.5mm

¹ - WVDC - Working Voltage DC.

² - DWV - Dielectric Withstanding Voltage.

 3 - 0402 \geq 2.0lbs, 0603 \geq 4.0lbs (min).

AEC-Q200: Qualification required for automotive application - Not available for all series - Call factory for info.

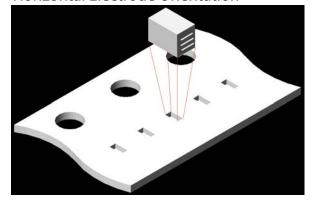


MECHANICAL CHARACTERISTICS

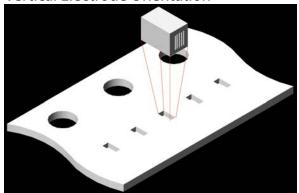
Size	Units	Length	Width	Thickness	End Band	
EIA 0201	In	.024 ±.001	.012 ±.001	.012 ±.001	.008 Max.	
Metric (0603)	mm	(0.60 ±0.03)	(0.30 ±0.03)	(0.30 ±0.03)	(0.20 Max.)	
EIA 0402	In	.040 ±.004	.020 ±.004	.020 ±.004	.010 ±.006	
Metric (1005)	mm	(1.02 ±0.1)	(0.51 ±0.1)	(0.51 ±0.1)	(0.25 ±.15)	
EIA 0603	In	.062 ±.006	.032 ±.006	.030 +.005/003	.014 ±.006	
Metric (1608)	mm	(1.57 ±0.15)	(0.81 ±0.15)	(0.76 +.1308)	(0.35 ±.15)	
EIA 0805	In	.080 ±.008	.050 ±.008	.040 ±.006	.020 ±.010	
Metric (2012)	mm	(2.03 ±0.20)	(1.27 ±0.20)	(1.02 ±.15)	$(0.50 \pm .25)$	

HORIZONTAL AND VERTICLE ORIENTED CAPACITORS

Horizontal Electrode Orientation



Vertical Electrode Orientation



APPLICATIONS & FEATURES

Size: EIA 0201, 0805, 1111

Performance: SRF's up to 20 GHz, Ultra High Q, Tight tolerance, Ultralow ESR

Termination: Ni/Au, Ni/Sn, Ni/SnPb

Applications: High Frequency Wireless Communications, Portable Wireless Products, Battery Powered

Products

RoHS Compliant

BENIFITS OF USING ORIENTED CAPACITORS

- Consistent Orientation Improved repeatability of production circuits.
- Consistent Orientation More consistent filter performance.
- Vertical Orientation The elimination of parallel frequencies.
- Vertical Orinetation Lower inductance for a given capacitor.
- Horizontal Orientation Lower coupling between adjacent capacitors.

E-SERIES TERMINATIONS AND LEADS

CHIP DIMENSIONS

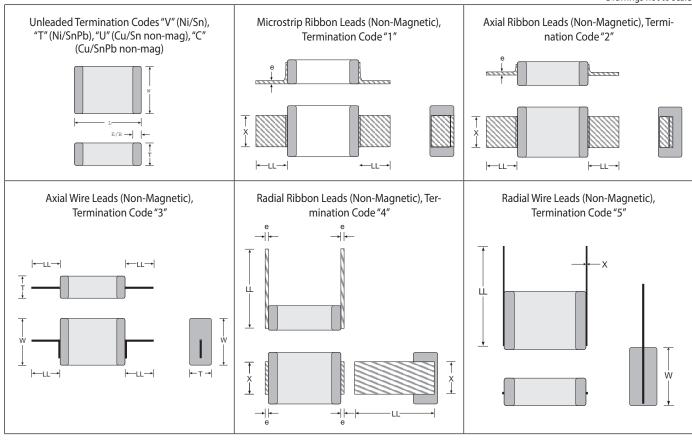
Termination	Size	Units	L	Tol	W	Tol	Т	E/B	Tol
	CADE	In	0.110	+.020010	0.110	+/015	0.102 Max.	0.015 Typ.	+/- 0.008
	S42E	mm	2.79	+0.51 -0.25	2.79	+/- 0.38	2.59 Max.	0.38 Typ.	+/- 0.20
V,T	S48E	In	0.230	+.025010	0.250	+/015	0.150 Max.	0.025 Typ.	
U,C	340E	mm	5.84	+0.63 -0.25	6.35	+/- 0.38	3.81 Max.	0.63 Typ.	
","	СГОГ	In	0.380	+.015010	0.380	+/010	0.170 Max.	0.025 Typ.	
	S58E	mm	9.65	+0.38 -0.25	9.65	+/- 0.25	4.32 Max.	0.63 Typ.	

For all E-Series Models:

OPERATING TEMP.: -55 to +125°C INSULATION RESISTANCE: >10G Ω @ 25°C TEMPERATURE COEFFICIENT: 0 \pm 30ppm /°C, -55 to 125°C

DISSIPATION FACTOR (TYP.): < 0.05% @ 1 MHz

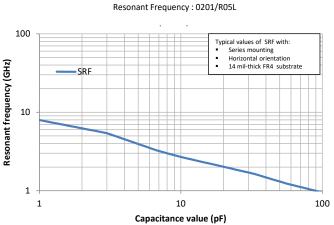
Drawings not to scale

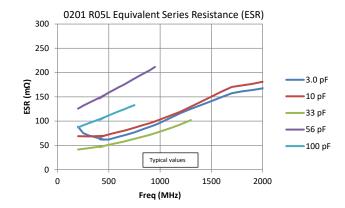


Land	C:	II (maim)	V	Tal		a Tal		
Lead	Size	LL(min)	Х	Tol	е	e-Tol		
	S42E	0.25	0.093	+/-0.005	0.004	+/- 0.002		
	342L	6.40	2.36	+/- 0.13	0.102	+/- 0.051		
1	CAOE	0.394	0.217	0.217 +/- 0.02 0.009 - 0		- 0.0019/+ 0.0031		
'	S48E	10.0	5.5	+/- 0.50	0.220	- 0.050/+ 0.080		
	S58E	0.748	0.35	+/- 0.02	0.010	- 0.0019/+ 0.0039		
	SORE	19.00	8.90	+/- 0.50	0.250	- 0.050/+ 0.100		
	S42E	0.25	0.093	+/-0.005	0.004	+/- 0.002		
	342E	6.40	2.36	+/- 0.13	0.102	+/- 0.051		
2	S48E	0.394	0.217	+/- 0.02	0.009	- 0.0019/+ 0.0031		
2		10.00	5.50	+/- 0.50	0.220	- 0.050/+ 0.080		
	S58E	0.748	0.35	+/- 0.02	0.010	- 0.0019/+ 0.0039		
		19.00	8.90	+/- 0.50	0.25	- 0.050/+ 0.100		
	S42F	0.25						
	342E	6.40	0.020in (0.511) diameter wire					
2	C40F	0.394						
3	S48E	10.00						
	CEOE	0.748						
	S58E	19.00						

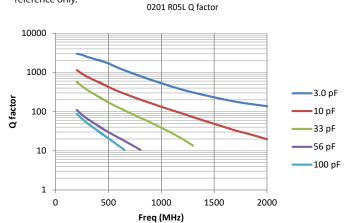
Lead	Size	LL(min)	Χ	Tol	е	e-Tol			
	S42E	0.352	0.093	+/-0.005	0.004	+/- 0.002			
	342E	8.90	2.36	+/- 0.13	0.102	+/- 0.051			
4	CAOE	0.501	0.217	+/- 0.02	0.009	- 0.0019/+ 0.0031			
4	S48E	12.70	5.50	+/- 0.50	0.220	- 0.050/+ 0.080			
	CEOE	0.886	0.35	+/- 0.02	0.010	- 0.0019/+ 0.0039			
	S58E	22.50	8.90	+/- 0.50	0.25	- 0.050/+ 0.100			
	S42E	0.25							
	34ZE	6.40							
5	S48E	0.394	0.020; (0.511) diamatamatina						
5		10.00	0.020in (0.511) diameter wire						
	CEOE	0.748							
	S58E	19.00							

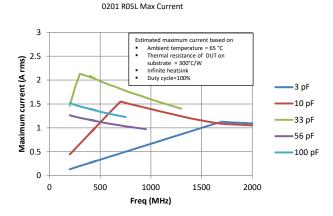
RF CHARACTERISTICS - 0201 R05L SERIES More data at: https://jtisoft.johansontechnology.com



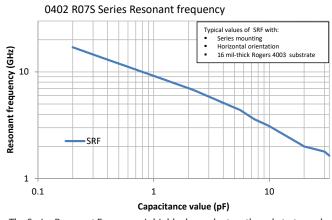


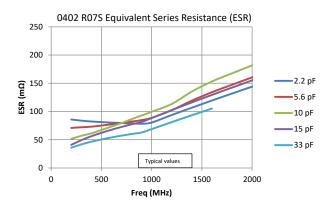
The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.



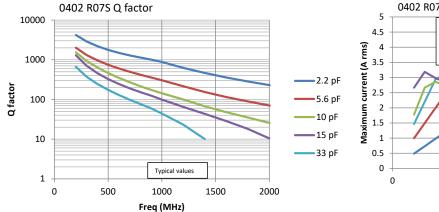


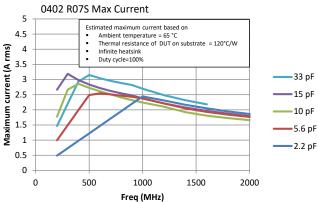
RF CHARACTERISTICS - 0402 R07S SERIES More data at: https://jtisoft.johansontechnology.com



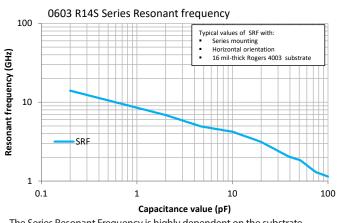


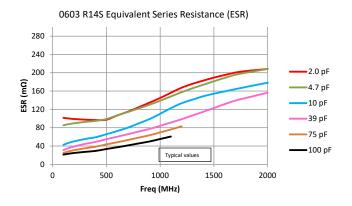
RF CHARACTERISTICS 0402 R07S SERIES More data at: https://jtisoft.johansontechnology.com

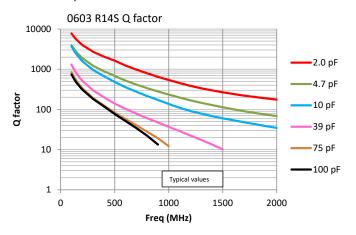


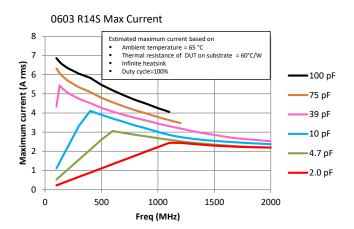


RF CHARACTERISTICS 0603 R14S SERIES More data at: https://jtisoft.johansontechnology.com

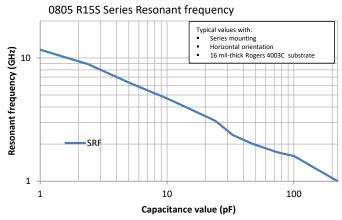


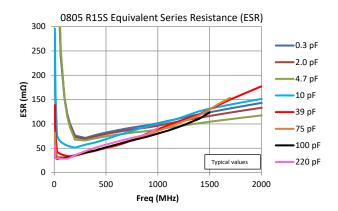




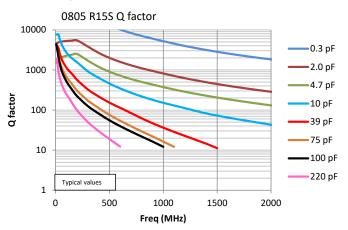


RF CHARACTERISITCS - 0805 R15S SERIES More data at: https://jtisoft.johansontechnology.com

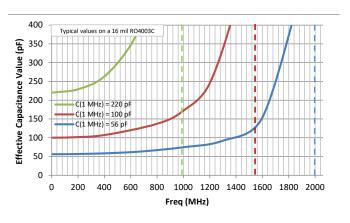


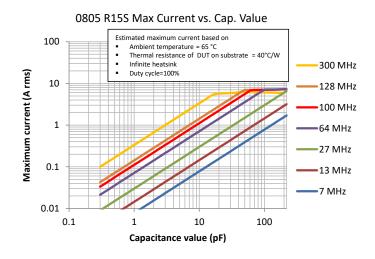


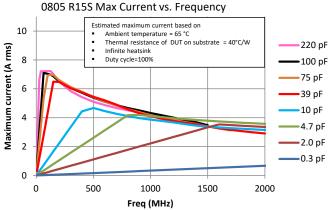
The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.



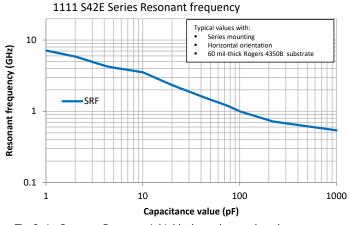
Effective capacitance value: 0805/R15S

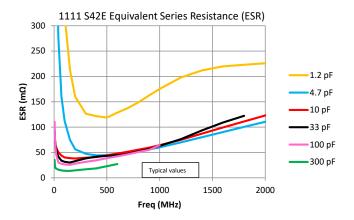


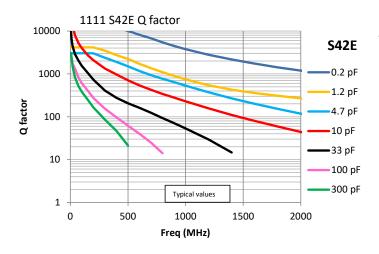


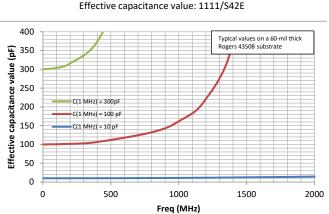


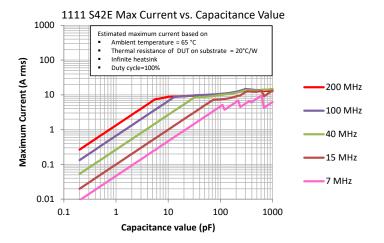
RF CHARACTERISTICS - 1111 S24E SERIES More data at: https://jtisoft.johansontechnology.com

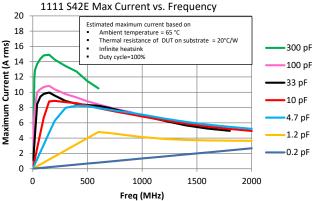




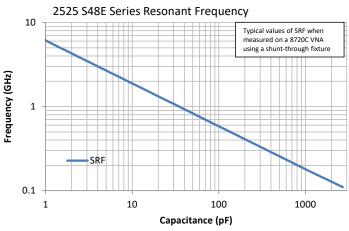


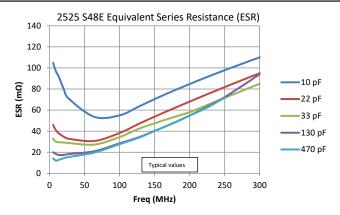


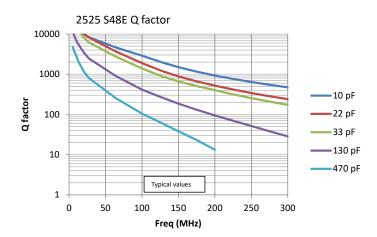


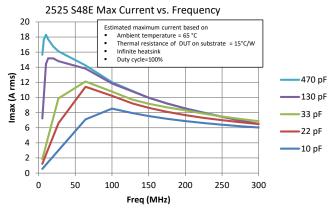


RF CHARACTERISTICS - 2525 S48E SERIES More data at: https://jtisoft.johansontechnology.com

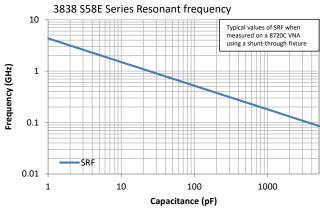








RF CHARACTERISTICS - 3838 S58E SERIES



The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.

