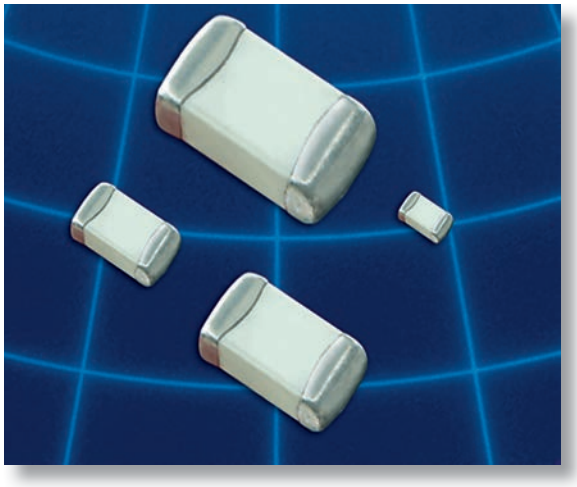
# MULTI-LAYER HIGH-Q CAPACITORS



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

• The **S-Series** (R07S, R14S, R15S) capacitors give an ultra-high 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

| 252 | S48 | E | 470 | K | V | 4 | E | -AEC |
|---|---|---|---|---|---|---|---|---|

**WVDC[2]**
250 = 25 V
500 = 50V
201 = 200 V
251 = 250 V
501 = 500 V
102 = 1000 V
152 = 1500 V
252 = 2500 V
362 = 3600 V
722 = 7200 V

**CASE SIZE**
R05 (0201)
R07 (0402)
R14 (0603)
R15 (0805)
S42 (1111)
S48 (2525)
S58 (3838)

**CAPACITANCE (pF)**
1st two digits are significant; third digit denotes number of zeros, R = decimal.
100 = 10 pF
101 = 100 pF

**DIELECTRIC**
S = Ultra High Q NPO
L = High Q NPO
E = Ultra High Q NPO, High Voltage, High Power
G = Fully Oriented, Ultra High-Q NPO

**TOLERANCE**
< 10pF
A = ± 0.05 pF
B = ± 0.10 pF
C = ± 0.25 pF
D = ± 0.50 pF

≥ 10pF
F = ±1 %
G = ±2%
J = ±5%
K = ± 10%

For tolerance availability, see chart.

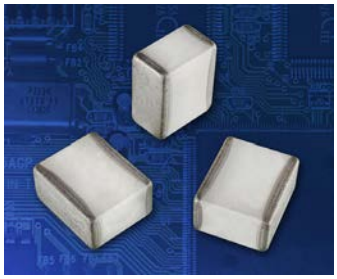
**TERMINATION**
**Nickel Barrier**
V = Ni/Sn (Green)
T = Ni/SnPb
G = Ni/Au (Green)
**Non-Mag[1]**
U = Cu/Sn (Green)
C = Cu/SnPb
**Leaded (All Non-Mag)[1]**
1 = Microstrip
2 = Axial Ribbon
3 = Axial Wire
4 = Radial Ribbon
5 = Radial Wire

**MARKING**
3 = Cap Code & Tolerance
4 = No Marking
6 = EIA Code
(Marking option is only available on 0805 and larger case sizes)

**PACKAGING**
S = Bulk
W = Waffle Pack
0201 - 0603
Y = Paper 5" Reel
T = Paper 7" Reel
R[1] = Paper 13" Reel
J[1] = Paper 5" Reel - Horizontally Oriented Electrodes
N[1] = Paper 5" Reel - Vertically Oriented Electrodes
L[1] = Paper 7" Reel - Horizontally Oriented Electrodes
V[1] = Paper 7" Reel - Vertically Oriented Electrodes
0805 - 3838
Z = Embossed 5" Reel
E = Embossed 7" Reel
U[1] = Embossed 13" Reel
M[1] = Embossed 5" Reel - Horizontally Oriented Electrodes
Q[1] = Embossed 5" Reel - Vertically Oriented Electrodes
G[1] = Embossed 7" Reel - Horizontally Oriented Electrodes
P[1] = Embossed 7" Reel - Vertically Oriented Electrodes
Tape specifications conform to EIA RS481

**QUALIFICATION**
AEC-Q200 qualification [3] (optional)

Part Number written:
**252S48E470KV4E**



[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

| Cap. Value \ EIA Size | | | RF Power Applications | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0201 (R05) | | 0402 | 0603 | 0805 | 0805 | 1111 | | 2525 | 3838 | |
| | | | NPO (R05L) | NPO (R05G) | (R07S) | (R14S) | (R15S) | (R15L) | (S42E) | | (S48E) | (S58E) | |
| Capacitance pF | Code | | | | | | | | | | | | |
| 0.1 | 0R1 | | | | | | | | | | | | |
| 0.2 | 0R2 | | 25/50 V | 25 V | 50/250 V | 250 V | | | 500V | 1500V | | | |
| 0.3 | 0R3 | | 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 | 0R5 | | 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 | 0R7 | | 25/50 V | 25 V | 50/250 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 0.8 | 0R8 | | 25/50 V | 25 V | 50/250 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 0.9 | 0R9 | | 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 | A | 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 | 3600V | 3600V | 7200V |
| 1.4 | 1R4 | B | 25/50 V | 25 V | 50/250 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 1.5 | 1R5 | | 25/50 V | 25 V | 50/250 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 1.6 | 1R6 | | 25/50 V | 25 V | 50/250 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 1.7 | 1R7 | C | 25/50 V | 25 V | 50/250 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 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 | | 25/50 V | 25 V | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 5.6 | 5R6 | A** | 25/50 V | 25 V | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 6.2 | 6R2 | B | 25/50 V | 25 V | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 6.8 | 6R8 | | 25/50 V | 25 V | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 7.5 | 7R5 | C | 25/50 V | 25 V | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 8.2 | 8R2 | | 25/50 V | 25 V | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 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 | | 25/50 V | | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 30 | 300 | | 25/50 V | | 50/200 V | 250 V | 250 V | | 500V | 1500V | 3600V | 3600V | 7200V |
| 33 | 330 | | 25/50 V | | 50/200 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*

| Cap. Value \ EIA Size | | | 0201 (R05) | | 0402 | RF Power Applications | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NPO (R05L) | NP0 (R05G) | (R07S) | 0603 (R14S) | 0805 (R15S) | 0805 (R15L) | 1111 (S42E) | | 2525 (S48E) | 3838 (S58E) | |
| Capacitance pF | Code | Tolerance | | | | | | | | | | | |
| 36 | 360 | F G J K | 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 | | 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 | | | | | | 250 V | | 300V | 1500V | 2500V | 3600V | 7200V |
| 120 | 121 | | | | | | 250 V | | 300V | 1000V | 2500V | 3600V | 7200V |
| 130 | 131 | | | | | | 250 V | | 300V | 1000V | 2500V | 3600V | 7200V |
| 150 | 151 | | | | | | 250 V | | 300V | 1000V | 2500V | 3600V | 7200V |
| 160 | 161 | | | | | | 250 V | | 300V | 1000V | 2500V | 3600V | 7200V |
| 180 | 181 | | | | | | 250 V | | 300V | 1000V | 2500V | 3600V | 7200V |
| 200 | 201 | | | | | | 250 V | | 300V | 1000V | 2500V | 3600V | |
| 220 | 221 | | | | | | 250 V | | 200V | 1000V | 2500V | 3600V | |
| 240 | 241 | | | | | | | 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 | G J K | | | | | | 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 | | 1000V | 2500V | |
| 750 | 751 | | | | | | | 50V | 200V | | 1000V | 2500V | |
| 820 | 821 | | | | | | | 50V | 200V | | 1000V | 2500V | |
| 910 | 911 | | | | | | | 50V | 200V | | 1000V | 1000V | |
| 1000 | 102 | | | | | | | 50V | 200V | | 1000V | 1000V | |
| 1200 | 122 | | | | | | | 50V | | | 1000V | 1000V | |
| 1500 | 152 | | | | | | | 50V | | | 500V | 1000V | |
| 1800 | 182 | | | | | | | 50V | | | 500V | 1000V | |
| 2200 | 222 | | | | | | | 50V | | | 300V | 1000V | |
| 2700 | 272 | | | | | | | | | | 300V | 500V | |
| 3300 | 332 | | | | | | | | | | | 500V | |
| 3900 | 392 | | | | | | | | | | | 500V | |
| 4700 | 472 | | | | | | | | | | | 500V | |
| 5100 | 512 | | | | | | | | | | | 500V | |
| 10000 | 103 | | | | | | | | | | | | |

**Consult factory for Non-Standard values.**

## *Dielectric Characteristics* — *NPO*

| | |
|---|---|
| **TEMPERATURE COEFFICIENT:** | 0 ± 30ppm /°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 GΩ @ 25°C,WVDC[1];<br>125°C IR is 10% of 25°C rating |
| **DIELECTRIC STRENGTH:** | 500 V ≤ 2.5 X WVDC[1] Min., 25°C, 50 mA max<br>1000 V ≤ 1.5 X WVDC[1] Min., 25°C, 50 mA max<br>> 1500 = 1 X WVDC[1] Min., 25°C, 50 mA max |
| **TEST PARAMETERS::** | 1MHz ±50kHz, 1.0±0.2 VRMS, 25°C |

**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 | | |

## *Mechanical & Environmental Characteristics*

| | SPECIFICATION | TEST PARAMETERS |
|---|---|---|
| **SOLDERABILITY:** | Solder coverage ≥ 90% of metalized areas<br>No termination degradation | Preheat chip to 120°-150°C for 60 sec., dip terminals in rosin flux<br>then dip in Sn62 solder @ 240°±5°C for 5±1 sec |
| **RESISTANCE TO SOLDERING HEAT:** | No mechanical damage<br>Capacitance change: ±2.5% or 0.25pF<br>Q>500 I.R. >10 G Ohms<br>DWV[2]: 2.5 x WVDC[1] | Preheat device to 80°-100°C for 60 sec.<br>followed by 150°-180°C for 60 sec.<br>Dip in 260°±5°C solder for 10±1 sec.<br>Measure after 24±2 hour cooling period |
| **TERMINAL ADHESION:** | Termination should not pull off.<br>Ceramic should remain undamaged. | Linear pull force[3] exerted on axial leads soldered to each terminal. |
| **PCB DEFLECTION:** | No mechanical damage.<br>Capacitance change: 5% or<br>0.5pF whichever is greater. | Glass epoxy PCB: 2 mm deflection |
| **LIFE TEST:** | MIL-STD-202, Method 108I<br>No mechanical damage<br>Capacitance change: ±3.0% or 0.3 pF<br>Q>500 I.R. >1 G Ohms<br>DWV[2]: 2.5 x WVDC[1] | Applied voltage: 200% of WVDC[1] for capacitors rated at 500 volts DC or less.<br>100% of WVDC[1] for capacitors rated at 1250 volts DC or less.<br>Temperature: 125°±3°C<br>Test time: 1000+48-0 hours |
| **THERMAL CYCLE:** | No mechanical damage.<br>Capacitance change: ±2.5% or 0.25pF<br>Q>2000 I.R. >10 G Ohms<br>DWV[2]: 2.5 x WVDC[1] | 5 cycles of: 30±3 minutes @ -55°+0/-3°C,<br>2-3 min. @ 25°C, 30±3 min. @ +125°+3/-0°C,<br>2-3 min. @ 25°C<br>Measure after 24±2 hour cooling period |
| **HUMIDITY, STEADY STATE:** | No mechanical damage.<br>Capacitance change: ±5.0% or 0.50pF max.<br>Q>300 I.R. ≥ 1 G-Ohm<br>DWV[2]: 2.5 x WVDC[1] | Relative humidity: 90-95%<br>Temperature: 40°±2°C<br>Test time: 500 +12/-0 Hours<br>Measure after 24±2 hour cooling period |
| **HUMIDITY, LOW VOLTAGE:** | No mechanical damage.<br>Capacitance change: ±5.0% or 0.50pF max.<br>Q>300 I.R. = 1 G-Ohm min.<br>DWV[2]: 2.5 x WVDC[1] | Applied voltage: 1.5 VDC, 50 mA max.<br>Relative humidity: 85±2% Temperature: 40°±2°C<br>Test time: 240 +12/-0 Hours<br>Measure after 24±2 hour cooling period |
| **VIBRATION:** | No mechanical damage.<br>Capacitance change: ±2.5% or 0.25pF<br>Q>1000 I.R. ≥ 10 G-Ohm<br>DWV[2]: 2.5 x WVDC[1] | Cycle performed for 2 hours in each of three perpendicular directions<br>Frequency range 10Hz to 55 Hz to 10 Hz traversed<br>in 1 minute. Harmonic motion amplitude: 1.5mm |

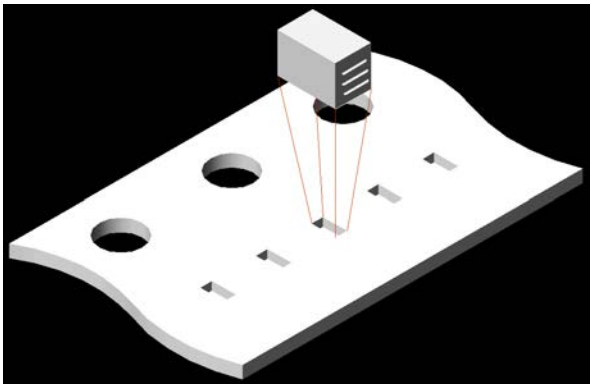
[1] - WVDC - Working Voltage DC.
[2] - DWV - Dielectric Withstanding Voltage.
[3] - 0402 ≥ 2.0lbs, 0603 ≥ 4.0lbs (min).
[4] - Whichever is less.
AEC-Q200: Qualification required for automotive application - Not available for all series - Call factory for info.

## Mechanical Characteristics

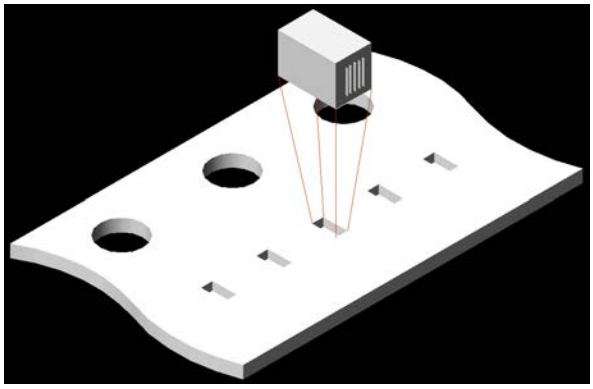
| Size | Units | Length | Width | Thickness | End Band |
|---|---|---|---|---|---|
| EIA 0201 | In | .024 ±.001 | .012 ±.001 | .012 ±.001 | .008 Max. |
| Metric (0603) | mm | (0.60 ±0.03) | (0.30 ±0.03) | (0.30 ±0.03) | (0.20 Max.) |
| EIA 0402 | In | .040 ±.004 | .020 ±.004 | .020 ±.004 | .010 ±.006 |
| 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 +.13-.08) | (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 ±.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

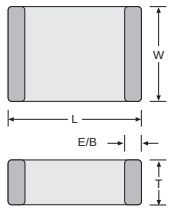
| Termination | Size | Units | L | Tol | W | Tol | T | E / B | Tol |
|---|---|---|---|---|---|---|---|---|---|
| V,T U,C | S42E | In | 0.110 | +.020 -.010 | 0.110 | +/- .015 | 0.102 Max. | 0.015 Typ. | +/- 0.008 |
| | | mm | 2.79 | +0.51 -0.25 | 2.79 | +/- 0.38 | 2.59 Max. | 0.38 Typ. | +/- 0.20 |
| | S48E | In | 0.230 | +.025 -.010 | 0.250 | +/- .015 | 0.150 Max. | 0.025 Typ. | |
| | | mm | 5.84 | +0.63 -0.25 | 6.35 | +/- 0.38 | 3.81 Max. | 0.63 Typ. | |
| | S58E | In | 0.380 | +.015 -.010 | 0.380 | +/- .010 | 0.170 Max. | 0.025 Typ. | |
| | | mm | 9.65 | +0.38 -0.25 | 9.65 | +/- 0.25 | 4.32 Max. | 0.63 Typ. | |

**For all E-Series Models:**

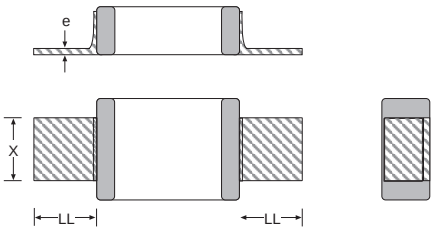
| | |
|---|---|
| OPERATING TEMP. : | -55 to +125°C |
| INSULATION RESISTANCE: | >10G Ω @ 25°C |
| TEMPERATURE COEFFICIENT: | 0 ± 30ppm /°C, -55 to 125°C |
| DISSIPATION FACTOR (TYP.): | < 0.05% @ 1 MHz |

Drawings not to scale

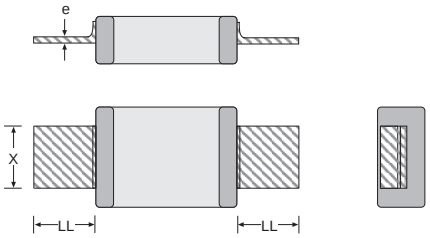
Unleaded Termination Codes “V” (Ni/Sn), “T” (Ni/SnPb), “U” (Cu/Sn non-mag), “C” (Cu/SnPb non-mag)



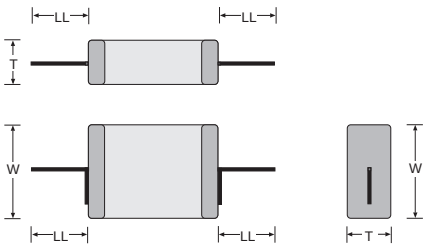

Microstrip Ribbon Leads (Non-Magnetic), Termination Code “1”



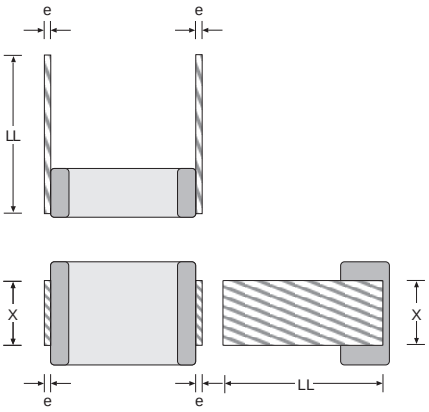

Axial Ribbon Leads (Non-Magnetic), Termination Code “2”



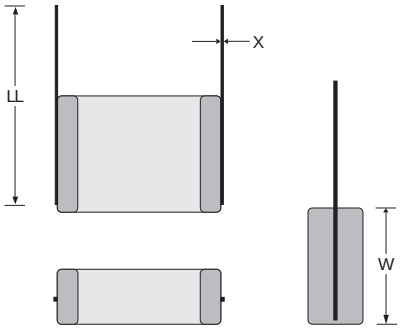

Axial Wire Leads (Non-Magnetic), Termination Code “3”




Radial Ribbon Leads (Non-Magnetic), Termination Code “4”




Radial Wire Leads (Non-Magnetic), Termination Code “5”

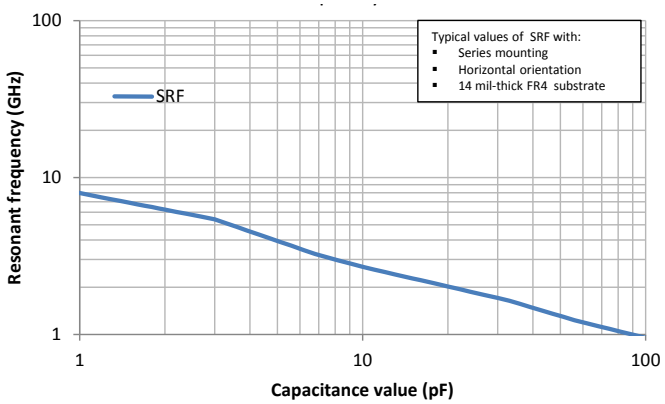



| Lead | Size | LL(min) | X | Tol | e | e-Tol |
|---|---|---|---|---|---|---|
| 1 | S42E | 0.25 | 0.093 | +/-0.005 | 0.004 | +/- 0.002 |
| | | 6.40 | 2.36 | +/- 0.13 | 0.102 | +/- 0.051 |
| | S48E | 0.394 | 0.217 | +/- 0.02 | 0.009 | - 0.0019/+ 0.0031 |
| | | 10.0 | 5.5 | +/- 0.50 | 0.220 | - 0.050/+ 0.080 |
| | S58E | 0.748 | 0.35 | +/- 0.02 | 0.010 | - 0.0019/+ 0.0039 |
| | | 19.00 | 8.90 | +/- 0.50 | 0.250 | - 0.050/+ 0.100 |
| 2 | S42E | 0.25 | 0.093 | +/-0.005 | 0.004 | +/- 0.002 |
| | | 6.40 | 2.36 | +/- 0.13 | 0.102 | +/- 0.051 |
| | S48E | 0.394 | 0.217 | +/- 0.02 | 0.009 | - 0.0019/+ 0.0031 |
| | | 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 |
| 3 | S42E | 0.25 | 0.020in (0.511) diameter wire | | | |
| | | 6.40 | | | | |
| | S48E | 0.394 | | | | |
| | | 10.00 | | | | |
| | S58E | 0.748 | | | | |
| | | 19.00 | | | | |

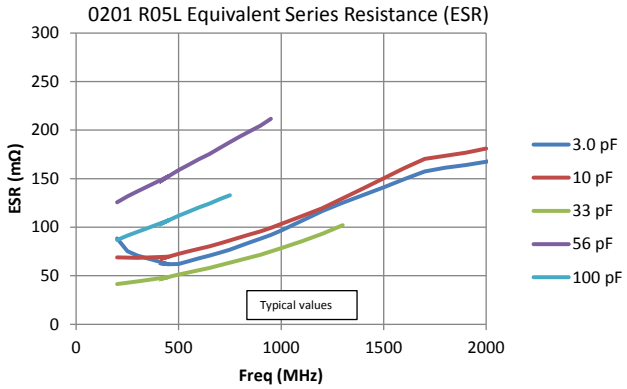
| Lead | Size | LL(min) | X | Tol | e | e-Tol |
|---|---|---|---|---|---|---|
| 4 | S42E | 0.352 | 0.093 | +/-0.005 | 0.004 | +/- 0.002 |
| | | 8.90 | 2.36 | +/- 0.13 | 0.102 | +/- 0.051 |
| | S48E | 0.501 | 0.217 | +/- 0.02 | 0.009 | - 0.0019/+ 0.0031 |
| | | 12.70 | 5.50 | +/- 0.50 | 0.220 | - 0.050/+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

## RF Characteristics - 0201 R05L Series *More data at: https://jtisoft.johansontechnology.com*

Resonant Frequency : 0201/R05L

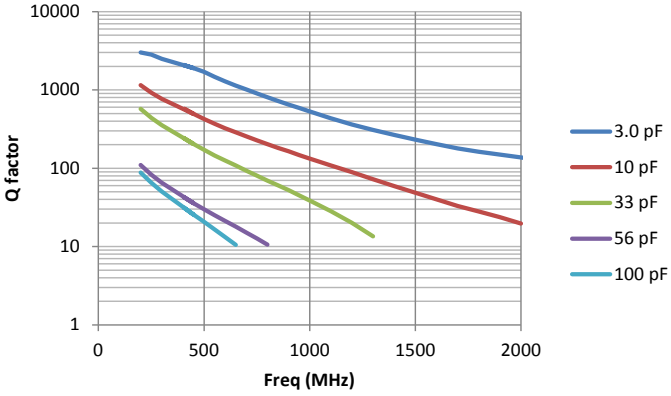



0201 R05L Equivalent Series Resistance (ESR)

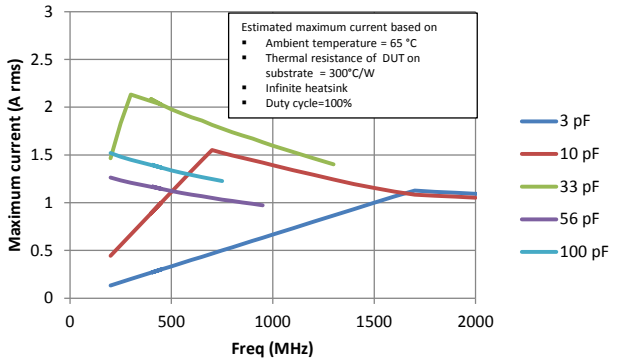



The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.

0201 R05L Q factor

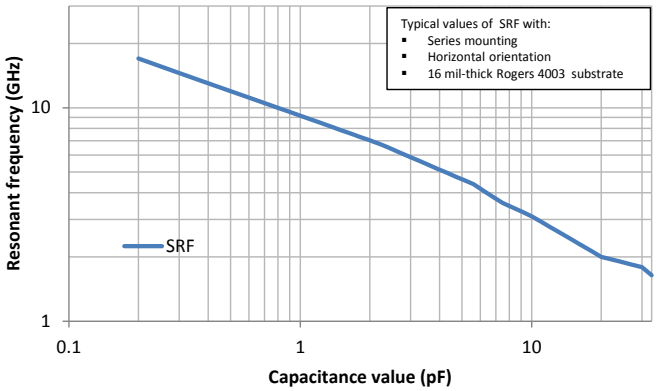



0201 R05L Max Current

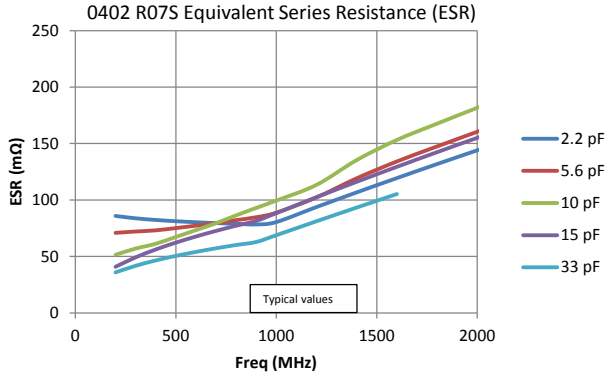



## RF Characteristics - 0402 R07S Series *More data at: https://jtisoft.johansontechnology.com*

0402 R07S Series Resonant frequency

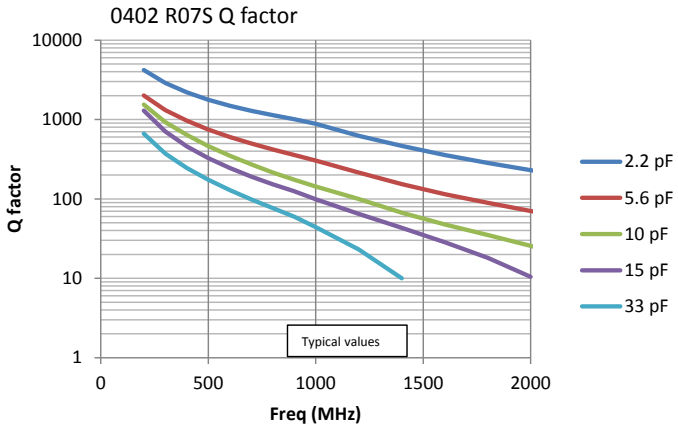


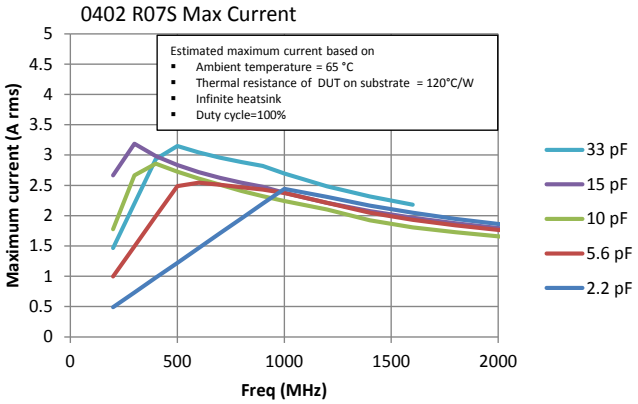

0402 R07S Equivalent Series Resistance (ESR)



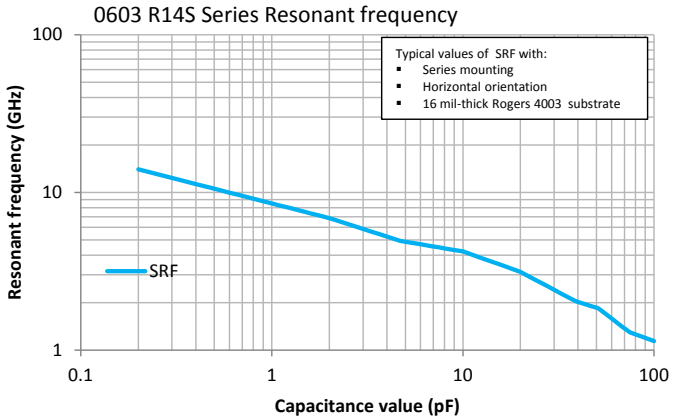

The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.

## RF Characteristics 0402 R07S Series *More data at: https://jtisoft.johansontechnology.com*

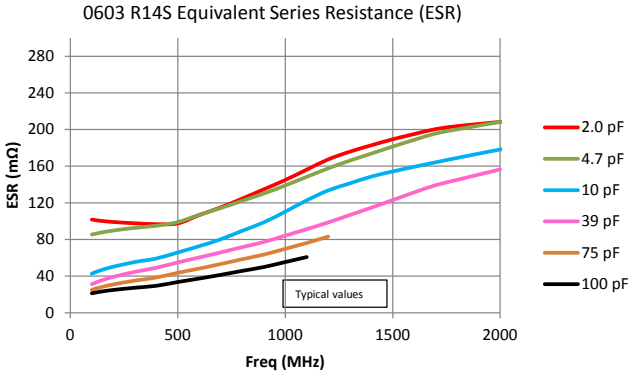


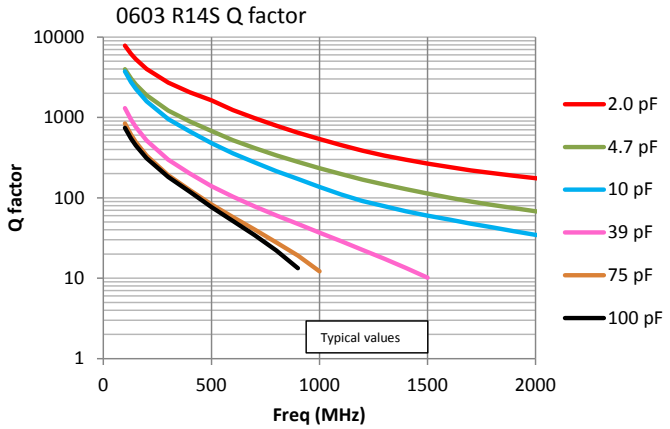



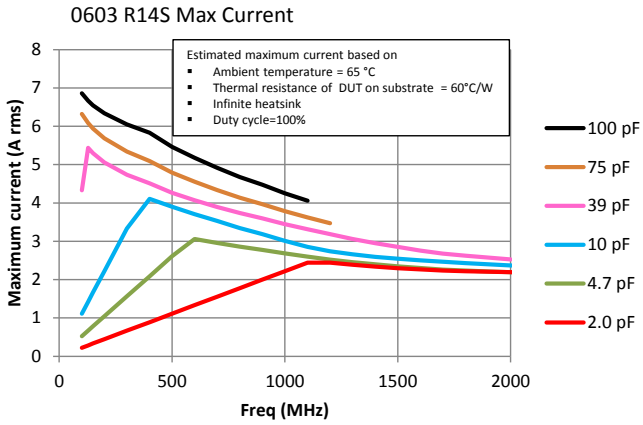

## RF Characteristics 0603 R14S Series *More data at: https://jtisoft.johansontechnology.com*

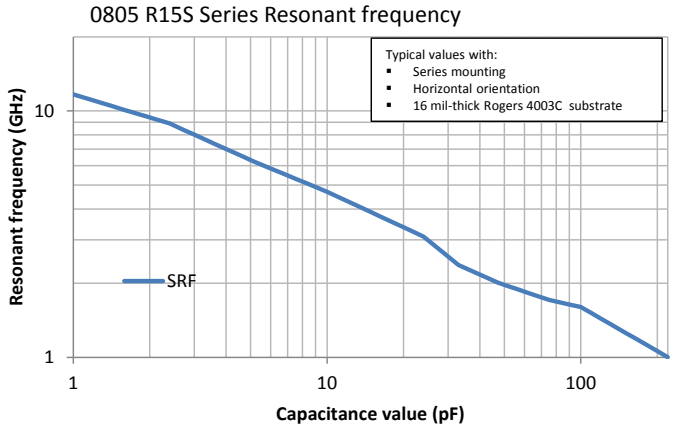



The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.

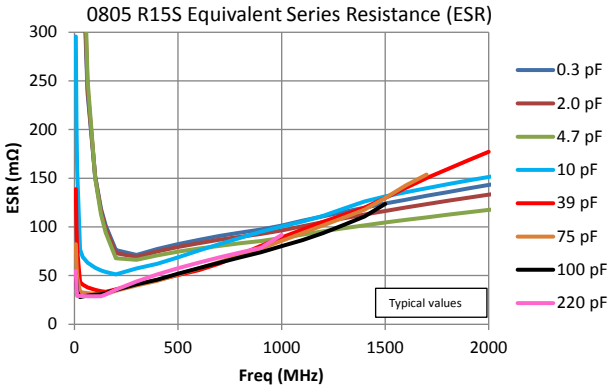


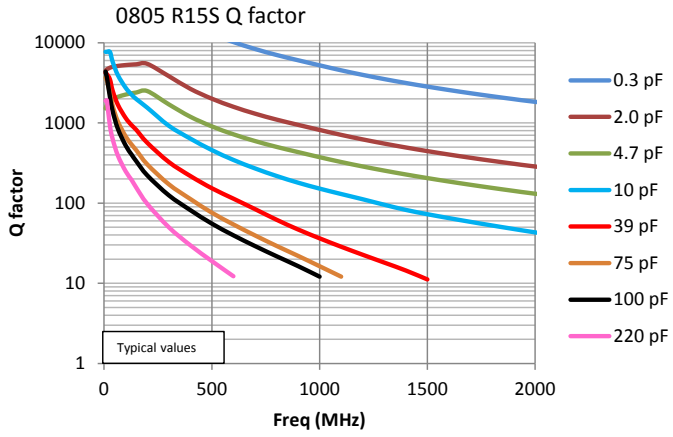



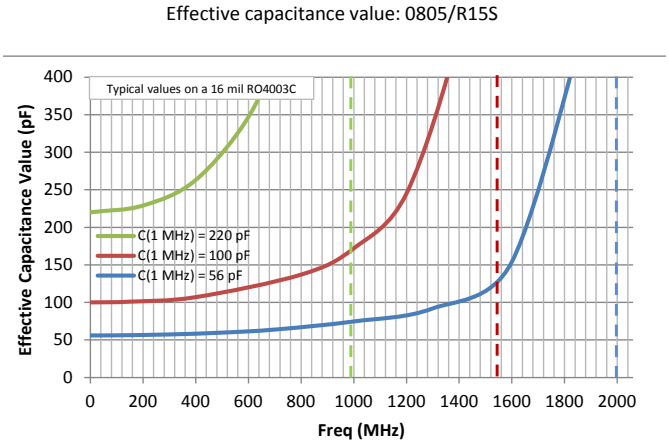



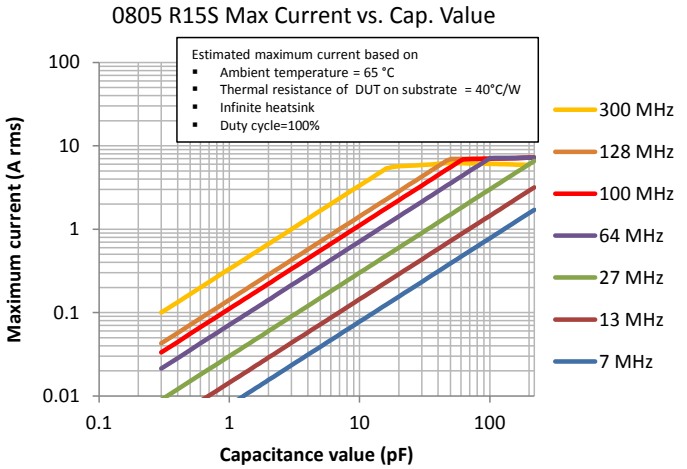


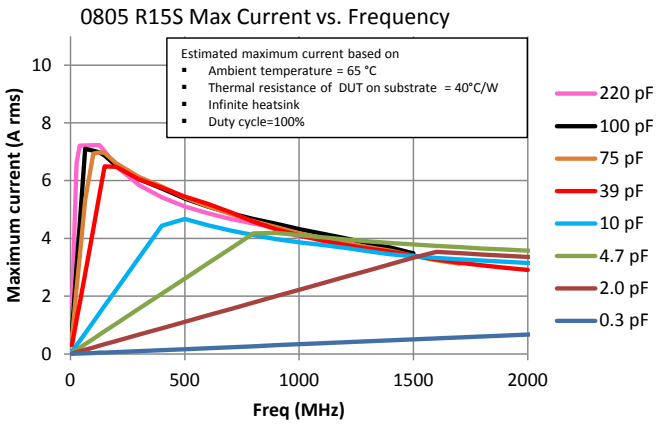

The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.

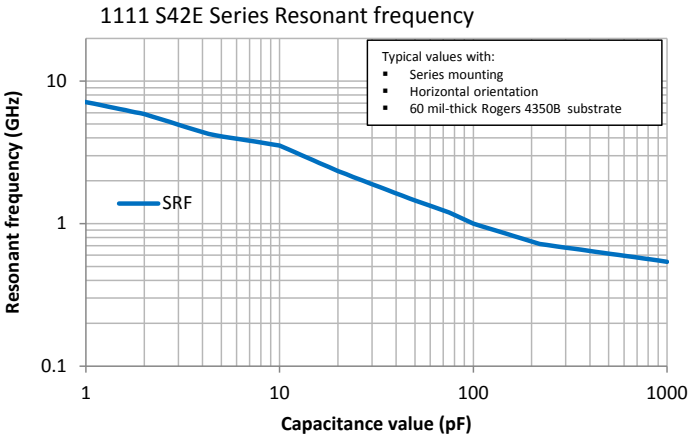


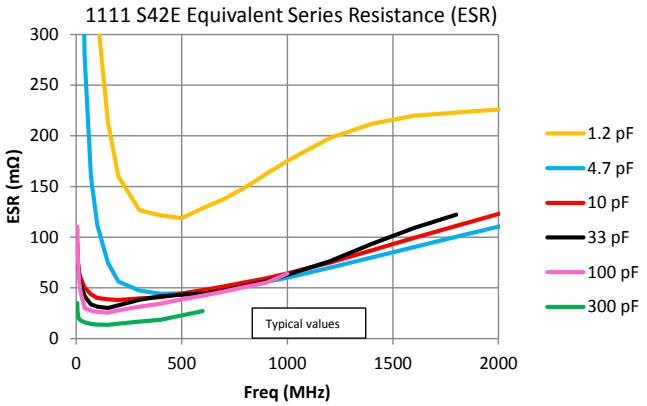



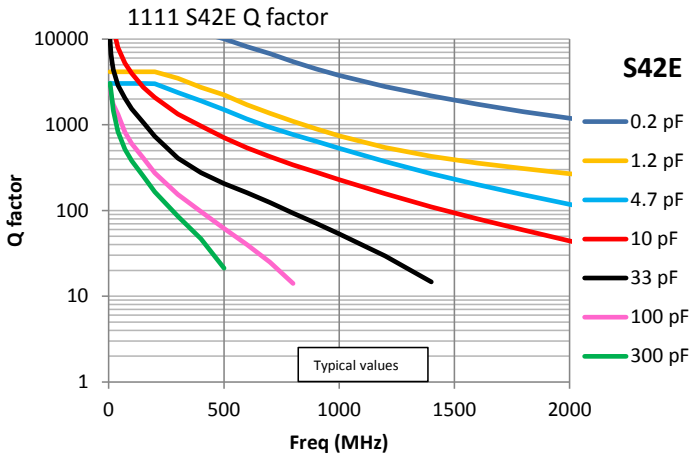



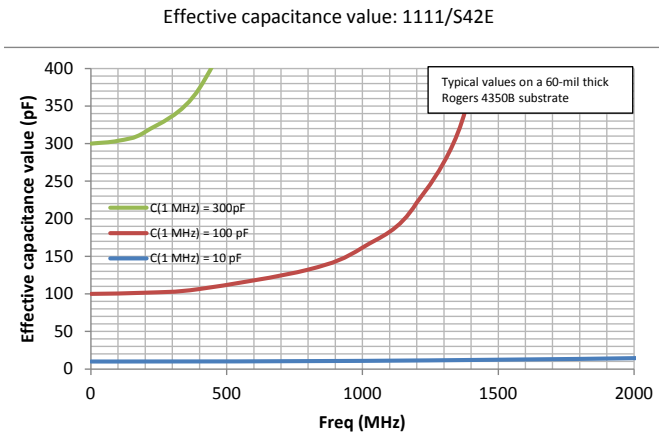



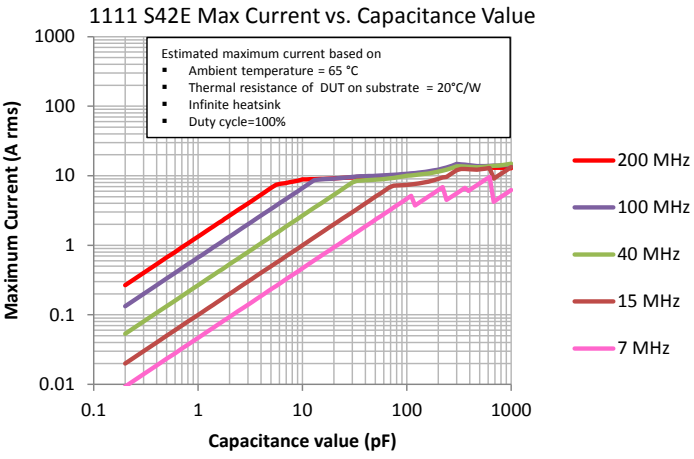


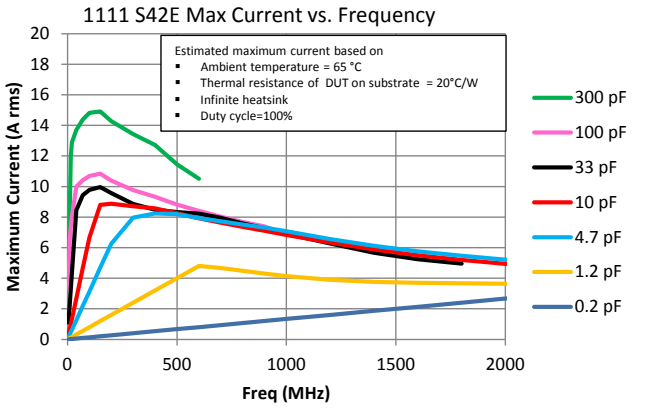

The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.

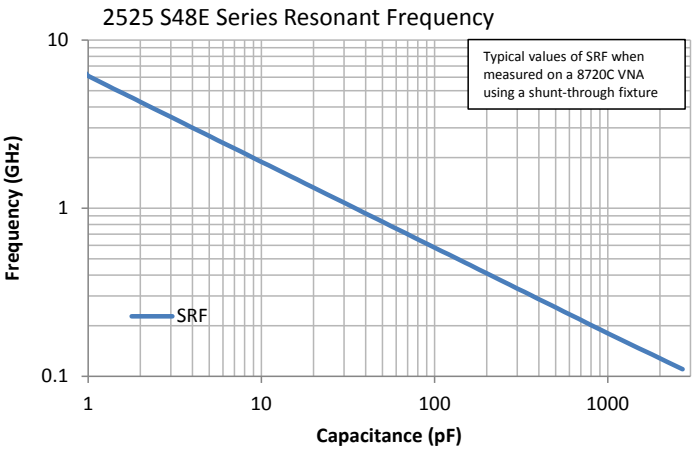


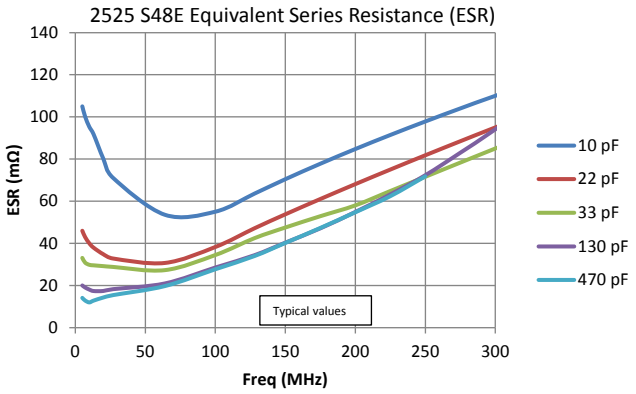



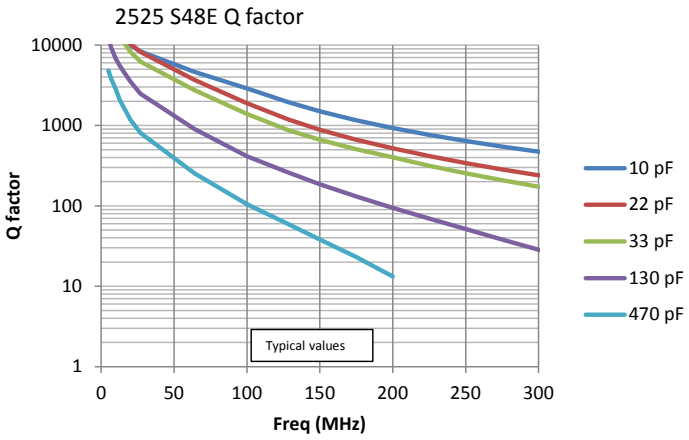



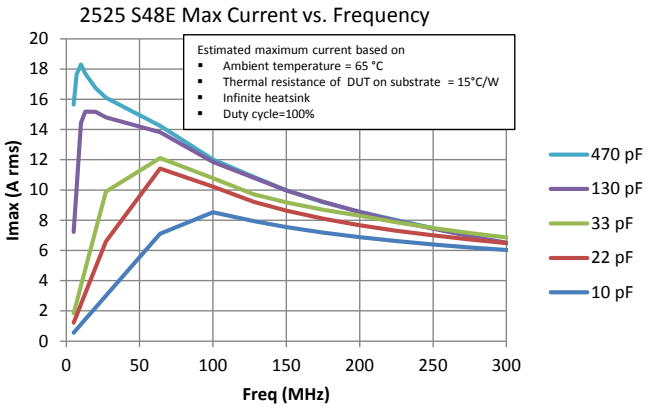



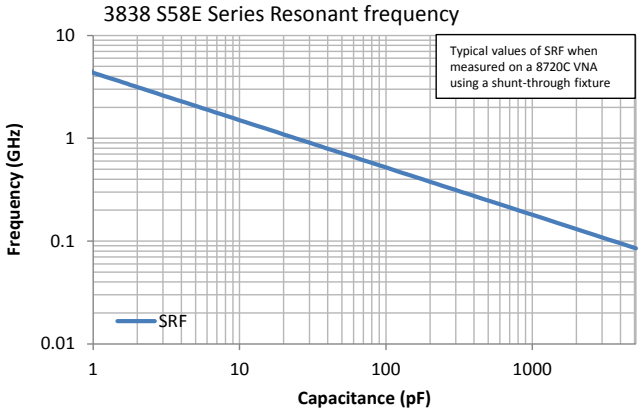


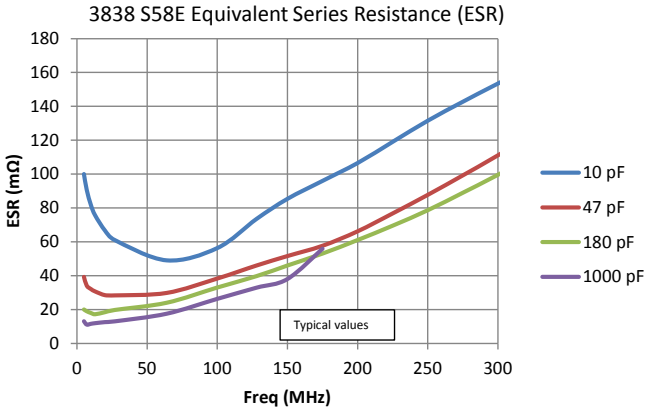

The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.



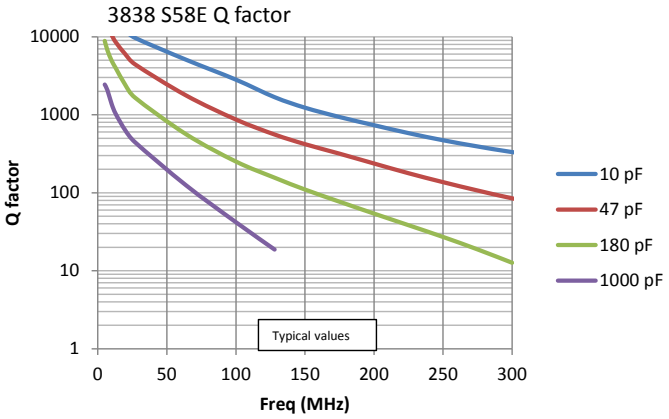



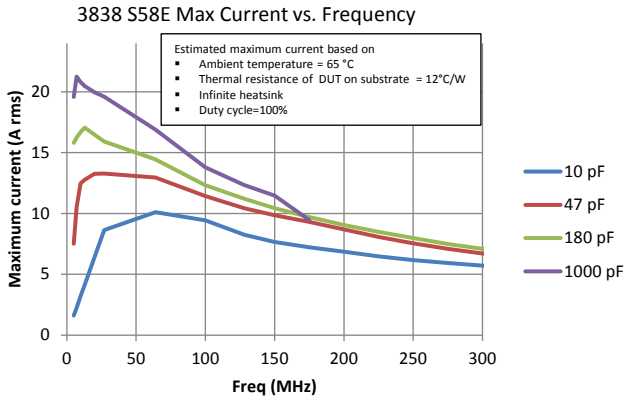






The Series Resonant Frequency is highly dependent on the substrate, pad dimensions, and measurement method. The above chart is for reference only.



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250R05L1R8BV4T 500R07S100FV4T 500R07S2R0BV4T 251R14S2R2BV4T 251R14S0R6BV4T 500R07S0R4AV4T 500R07S0R3BV4T 500R07S150FV4T 251R14S1R8BV4T 250R05L1R0BV4T 251R14S1R2BV4T 251R14S2R0BV4T 251R14S1R0BV4T 250R05L1R5BV4T 500R07S1R2BV4T 500R07S3R0BV4T 500R07S4R7BV4T 251R14S3R0BV4T 500R07S100GV4T 500R07S270JV4T 500R07S0R9BV4T 251R14S3R9BV4T 500R07S2R2BV4T 250R05L3R6CV4T 500R07S5R6BV4T 251R14S0R5BV4T 500R07S2R7BV4T 500R07S1R3BV4T 500R07S100JV4T 500R07S2R4BV4T 251R14S120GV4T 500R07S5R6CV4T 500R07S1R2AV4T 250R05L1R2BV4T 500R07S1R5BV4T 500R07S6R8CV4T 251R14S330GV4T 500R07S0R7BV4T 500R07S0R4BV4T 500R07S200GV4T 500R07S1R0BV4T 500R07S3R9BV4T 500R07S3R3BV4T 500R07S1R8BV4T 251R14S0R8BV4T 500R07S0R8BV4T 251R14S1R5BV4T 251R14S150JV4T 251R14S100GV4T 251R14S430JV4T 251R14S470JV4T 251R14S270JV4T 251R14S6R8CV4T 500R07S8R2CV4T 500R07S0R5BV4T 500R07S1R5AV4T 251R14S3R3BV4T 500R07S0R5AV4T 251R14S180JV4T 250R05L5R1DV4T 500R07S1R7BV4T 301S42E111JV4E 251R15S2R0DV4E 251R15S820KV4E 251R14S1R3CV4T 251R14S470KV4T 250R05L180JV4T 251R15S131JV4E 500S42E751JV4E 201S42E241FV4E 251R15S120GV4E 250R05L5R6DV4T 250R05L6R2CV4T 251R14S510GV4T 250R05L120JV4T 251R15S221GV4E 500R07S7R5BV4T 251R14S3R3DV4T 201R07S2R1DV4T 251R15S101FV4E 251R14S160KV4T 500R07S8R2BV4T 201R07S2R1AV4T 250R05L4R3CV4T 251R15S820FV4E 250R05L160KV4T 500R07S1R1AV4T 251R14S470FV4T 201S42E471KV4E 251R15S161JV4E 251R15S3R0BV4E 250R05L1R9BV4T 251R14S1R9AV4T 250R05L8R2BV4T 251R14S240JV4T 251R14S680JV4T 201S42E361FV4E 500R07S2R1CV4T 500R07S2R0CV4T 301S42E161JV4E