

# High Q Capacitors - Q(MS) & U ranges

The "Q(MS)" and "U" ranges offers a very stable High Q material system that provides excellent, low loss, performance in systems below 3GHz. Optimised for lowest possible ESR, this range of high frequency capacitors is suitable for many applications where economical, high performance is required.

Available in 0402 to 3640 case sizes (0603 & 0805 case sizes only available in the "U" range) with various termination options including FlexiCap™.

CapCad™ capacitor modelling software is now available and has been developed with an easy to use and readily accessible comparison tool for choosing the best MLCC to suit the customer's needs. Please consult the Knowles website to launch the software.

## Operating Temperature

-55°C to +125°C

## Temperature Coefficient (Typical)

0 ± 30 ppm/°C (COG/NPO)

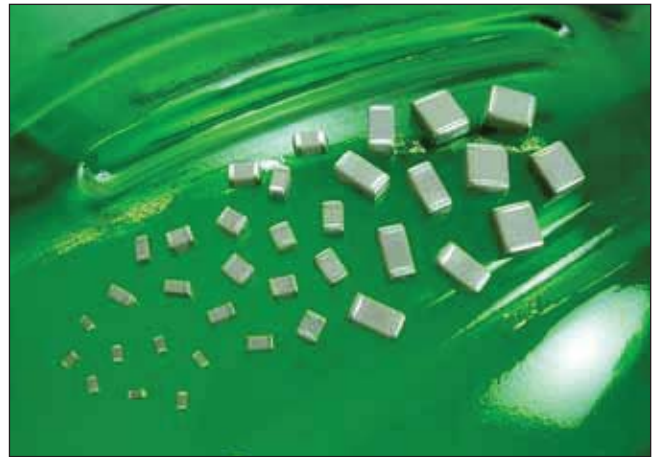
## Insulation resistance

MS range: >100GΩ at +25°C; >10GΩ +125°C

U range: 100GΩ or 1000s (whichever is the least)

## Q Factor

>2000 @ 1MHz



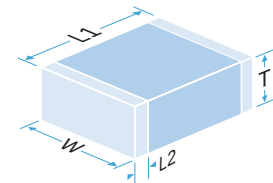
0603 S-parameter downloads are available from:

<http://www.knowlesc capacitors.com/syfer/en/products/mlc-capacitors/ultra-low-esr-capacitors> and the Syfer MVP page on the Modelithics website. Please visit the Syfer MVP page for more information at: <http://www.modelithics.com/mvp/syfer>

## Minimum / maximum capacitance values - Q(MS) & U ranges - High Q capacitors

| Chip Size       | 0402*                                                                                                                        | 0603†        | 0505         | 0805†        | 1206         | 1111         | 1210         | 1812          | 2220          | 2225          | 3640          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|
| Min Cap         | 0.1pF                                                                                                                        | 0.1pF        | 0.2pF        | 0.2pF        | 0.5pF        | 0.3pF        | 0.3pF        | 1.0pF         | 2.0pF         | 2.0pF         | 4.0pF         |
| 50V 63V         | 33pF                                                                                                                         | -            | 330pF        | -            | 2.2nF        | -            | -            | -             | -             | -             | -             |
| 100V            | 22pF                                                                                                                         | -            | 220pF        | -            | 1.5nF        | 3.3nF        | 3.3nF        | 6.8nF         | 15nF          | 18nF          | -             |
| 150V            | 18pF                                                                                                                         | -            | 180pF        | -            | 1.2nF        | 2.7nF        | 2.7nF        | 4.7nF         | 12nF          | 15nF          | -             |
| 200V250V        | 15pF                                                                                                                         | 100pF        | 150pF        | 240pF        | 1.0nF        | 2.2nF        | 2.2nF        | 3.9nF         | 10nF          | 10nF          | -             |
| 300V            | -                                                                                                                            | -            | 100pF        | -            | 680pF        | 1.5nF        | 1.5nF        | 3.3nF         | 6.8nF         | 8.2nF         | -             |
| 500V            | -                                                                                                                            | -            | -            | -            | 330pF        | 820pF        | 820pF        | 2.2nF         | 4.7nF         | 5.6nF         | 15nF          |
| 630V            | Below 1pF capacitance values are available in 0.1pF steps ~ above 1pF capacitance values are available in E24 series values. |              |              | -            | 150pF        | 390pF        | 390pF        | 1.0nF         | 2.2nF         | 3.3nF         | 6.8nF         |
| 1000V           |                                                                                                                              |              |              | -            | 82pF         | 220pF        | 220pF        | 680pF         | 1.5nF         | 2.2nF         | 4.7nF         |
| 2000V           |                                                                                                                              |              |              | -            | 18pF         | 68pF         | 68pF         | 150pF         | 470pF         | 560pF         | 1.5nF         |
| 3000V           | -                                                                                                                            | -            | -            | -            |              |              |              | 68pF          | 150pF         | 220pF         | 470pF         |
| Tape quantities | 7" reel 5000                                                                                                                 | 7" reel 4000 | 7" reel 2500 | 7" reel 3000 | 7" reel 2500 | 7" reel 1000 | 7" reel 2000 | 7" reel 500   | 7" reel 500   | 7" reel 500   | 13" reel only |
|                 | 13" reel quantities available on request                                                                                     |              |              |              |              |              |              | 13" reel 2000 | 13" reel 2000 | 13" reel 2000 |               |

\*0402 size and other values (inc. values < than 0.3pF) and taping quantities may be available on request, consult the Sales Office.  
†0603 and 0805 sizes only available in the "U" range and not Q(MS)



## Dimensions

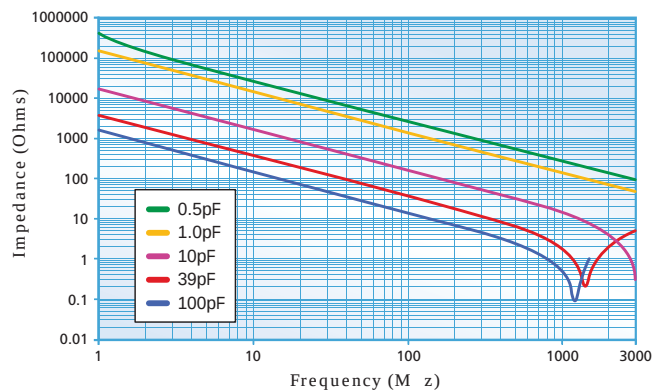
| Range | Case Size | Length (L1)<br>mm ~ inches           | Width (W)<br>mm ~ inches    | Max. Thickness (T)<br>mm ~ inches | Termination Band (L2)<br>mm ~ inches |              |
|-------|-----------|--------------------------------------|-----------------------------|-----------------------------------|--------------------------------------|--------------|
|       |           |                                      |                             |                                   | min                                  | max          |
| MS    | 0402      | 1.0 ± 0.10 ~ 0.04 ± 0.006            | 0.50 ± 0.10 ~ 0.02 ± 0.003  | 0.60 ~ 0.031                      | 0.10 ~ 0.004                         | 0.40 ~ 0.015 |
| U     | 0603      | 1.6 ± 0.2 ~ 0.063 ± 0.008            | 0.8 ± 0.2 ~ 0.032 ± 0.008   | 0.80 ~ 0.032                      | 0.10 ~ 0.004                         | 0.40 ~ 0.016 |
| MS    | 0505      | 1.4 +0.35 -0.25 ~ 0.055 +0.014 -0.01 | 1.4 ± 0.25 ~ 0.055 ± 0.01   | 1.27 ~ 0.05                       | 0.13 ~ 0.005                         | 0.5 ~ 0.02   |
| U     | 0805      | 2.0 ± 0.3 ~ 0.079 ± 0.012            | 1.25 ± 0.20 ~ 0.049 ± 0.008 | 1.3 ~ 0.051                       | 0.13 ~ 0.005                         | 0.75 ~ 0.03  |
| MS    | 1206      | 3.2 ± 0.3 ~ 0.126 ± 0.012            | 1.6 ± 0.20 ~ 0.063 ± 0.008  | 1.6 ~ 0.063                       | 0.25 ~ 0.01                          | 0.75 ~ 0.03  |
| MS    | 1111      | 2.79 +0.51 -0.25 ~ 0.11 +0.02 -0.01  | 2.79 ± 0.38 ~ 0.113 ± 0.015 | 1.78 ~ 0.07                       | 0.13 ~ 0.005                         | 0.63 ~ 0.025 |
| MS    | 1210      | 3.2 ± 0.3 ~ 0.126 ± 0.012            | 2.5 ± 0.3 ~ 0.10 ± 0.012    | 2.0 ~ 0.08                        | 0.25 ~ 0.01                          | 0.75 ~ 0.03  |
| MS    | 1812      | 4.5 ± 0.35 ~ 0.18 ± 0.014            | 3.2 ± 0.3 ~ 0.126 ± 0.012   | 2.5 ~ 0.10                        | 0.25 ~ 0.01                          | 1.0 ~ 0.04   |
| MS    | 2220      | 5.7 ± 0.40 ~ 0.225 ± 0.016           | 5.0 ± 0.40 ~ 0.197 ± 0.016  | 4.2 ~ 0.16                        | 0.25 ~ 0.01                          | 1.0 ~ 0.04   |
| MS    | 2225      | 5.7 ± 0.40 ~ 0.225 ± 0.016           | 6.30 ± 0.40 ~ 0.25 ± 0.016  | 4.2 ~ 0.16                        | 0.25 ~ 0.01                          | 1.0 ~ 0.04   |
| MS    | 3640      | 9.2 ± 0.50 ~ 0.36 ± 0.02             | 10.16 ± 0.50 ~ 0.40 ± 0.02  | 2.5 ~ 0.10                        | 0.50 ~ 0.02                          | 1.5 ~ 0.06   |

Should be ordered as Syfer parts.

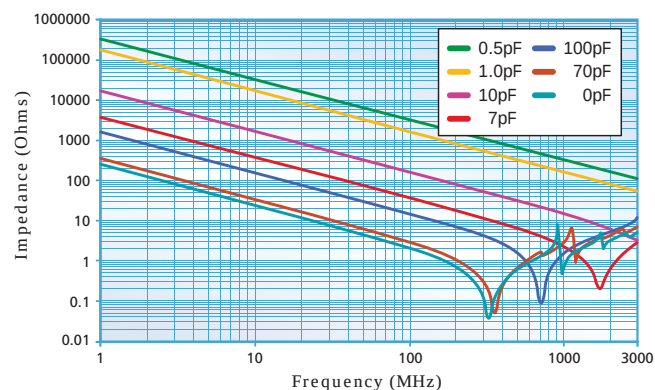
[www.knowlesc capacitors.com](http://www.knowlesc capacitors.com)

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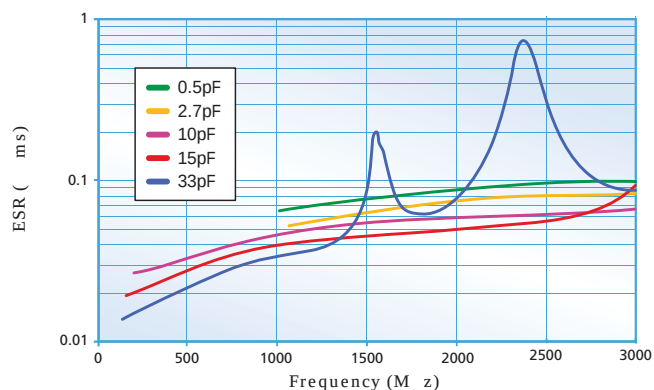
Q(MS) Series - Impedance vs. Frequency - Case size 0505



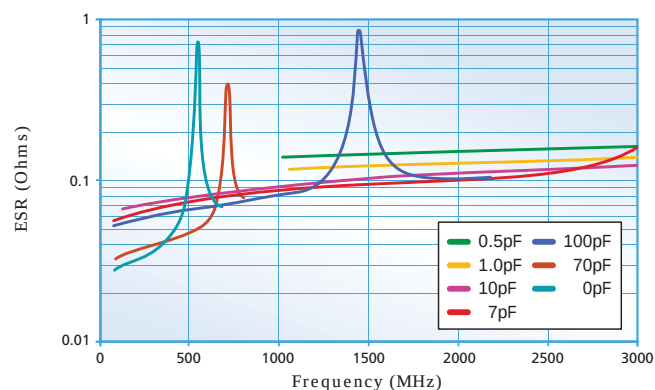
Q(MS) Series - Impedance vs Frequency - Case size 0505



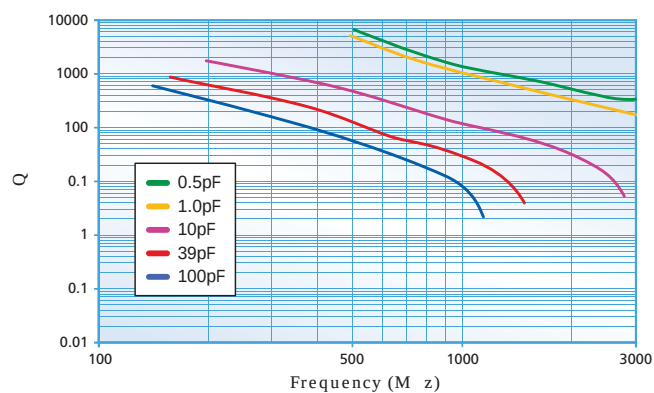
Q(MS) Series - ESR vs. Frequency - Case size 0505



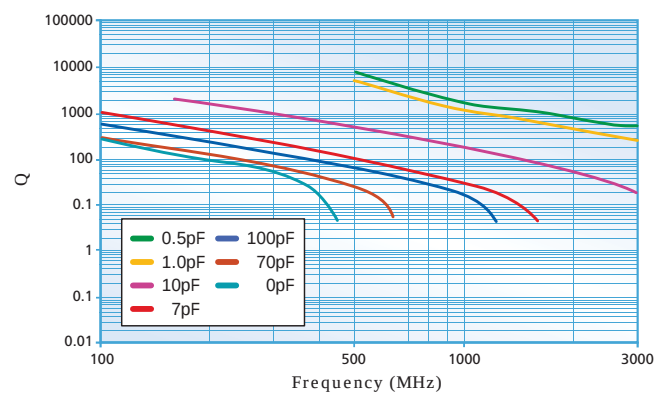
Q(MS) Series - ESR vs Frequency - Case size 0505



Q(MS) Series Q vs. Frequency - Case size 0505



Q(MS) Series Q vs Frequency - Case size 0505



All performance curves are based on measurements taken with Boonton 34A resonant tube, Agilent E4991A impedance analyser and Agilent 16197A test fixture. Different test methods or fixtures may give different results. Data is typical and is supplied for indication only.

