Ferrite Beads

# Signal Line Multilayer Ferrite Chip Beads Z-SMS

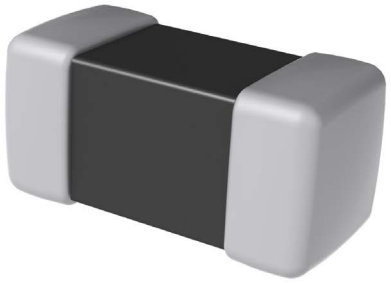
## Overview

KEMET Z-SMS Signal Line Multilayer Ferrite Chip Beads are ideal for high frequency noise countermeasures for digital product clock lines and general signal lines. The small size of this ferrite bead makes it suitable for mobile equipement that requires tight space both in dimension and in height. The internal silver printed layer structure creates a closed magnetic circuit which acts as a magnetic shield to minimize heat generation and crosstalk.

Using different type of materials enables to further specialize the function and characteristics of the chip bead:
1) Material “A” for broadband noise suppression. Low R-XL frequency cross point and large resistance part work as damping function, suppress unnecessary resonance and keep signal integrity.
2) Material “B” for noise suppression above 20 MHz, with increased attenuation. For general use especially effective for video signal lines.
3) Material “C” for high frequency noise suppression above 100 MHz. For high speed signal line, effective for clock line.
4) Material “D” for noise suppression around 200 MHz, effective for EMC regulations.
5) Material “E” for strongly suppressing unnecessary resonance from low frequency range, due to lower R-XL frequency cross point compared to material “A”.
6) Material “F” for noise countermeasures around LSI power supplies. This is a low DC resistance version of material “A”.

## Applications

- PC, tablet, peripherals
- Interfaces, harness connectors
- Mobile and portable equipment





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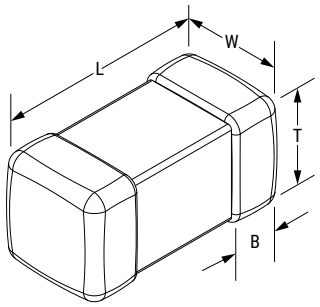
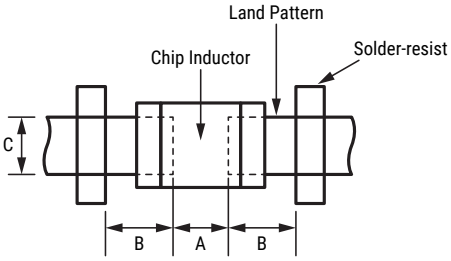
## Benefits

- Miniature and low profile
- No grounding needed for flexible circuit design
- Prevents interference between circuits in mobile systems
- Broad range of impedance values
- Impedance value from 10 – 2,500 Ω
- Rated current range from 0.1 – 1.5 A
- Operating temperature range from –55°C to +125°C

## Part Number System

| Z | 0201 | C | 800 | A | SMS | T |
|---|---|---|---|---|---|---|
| Ferrite Bead | EIA Case Size (L" x W") | Specification | Impedance Value (Ω) at 100 MHz | Material | Series | Packaging |
| | 0201 (0603 in mm)<br>0402 (1005 in mm)<br>0603 (1608 in mm)<br>0805 (2012 in mm) | C = Commercial | The first two digits represent the impedance value. The third digit inidcates the number of zeros to be added.<br><br>Examples:<br>800 = 80 Ω<br>101 = 100 Ω<br>102 = 1000 Ω | A = for broadband noise suppression<br>B = for noise suppression above 20 MHz, with increased attenuation<br>C = for high frequency noise suppression above 100 MHz<br>D = for noise suppression around 200 MHz<br>E = for strongly suppressing unnecessary resonance from low frequency range, lower R-XL frequency cross point version of A<br>F = for noise countermeasures around LSI power supplies, low DCR version of A | SMS = Signal Line Multilayer Ferrite Chip Beads | T = Tape & Reel |

## Dimensions – Millimeters (Inches)

| Dimensions - Millimeters (Inches) | | | | | | Land Pattern - Millimeters | | |
|---|---|---|---|---|---|---|---|---|
|  | | | | | |  | | |
| **EIA Size Code** | **Metric Size Code** | **L Length** | **W Width** | **T Thickness** | **B Bandwidth** | **A** | **B** | **C** |
| 0201 | 0603 | 0.60 (0.024) ±0.03 (0.001) | 0.30 (0.012) ±0.03 (0.001) | 0.30 (0.012) ±0.03 (0.001) | 0.15 (0.006) ±0.05 (0.002) | 0.20 ~ 0.30 | 0.20 ~ 0.30 | 0.25 ~ 0.40 |
| 0402 | 1005 | 1.00 (0.039) ±0.05 (0.002) | 0.50 (0.020) ±0.05 (0.002) | 0.50 (0.020) ±0.05 (0.002) | 0.25 (0.010) ±0.10 (0.004) | 0.45 ~ 0.55 | 0.40 ~ 0.50 | 0.45 ~ 0.55 |
| 0630 | 1608 | 1.60 (0.063) ±0.15 (0.006) | 0.80 (0.031) ±0.15 (0.006) | 0.80 (0.031) ±0.15 (0.006) | 0.30 (0.012) ±0.20 (0.008) | 0.80 ~ 1.00 | 0.60 ~ 0.80 | 0.60 ~ 0.80 |
| 0805 | 2012 | 2.00 (0.079) +0.30/-0.10 (+0.012/-0.004) | 1.25 (0.049) ±0.20 (0.008) | 0.85 (0.033) ±0.2 (0.008)<br>1.25 (0.049) ±0.2 (0.008) | 0.50 (0.020) ±0.30 (0.012) | 0.80 ~ 1.20 | 0.80 ~ 1.20 | 0.90 ~ 1.60 |

## Performance Characteristics

| Item | Performance Characteristics |
|---|---|
| Impedance Range at 100 MHz | 10 – 2,500 Ω |
| Impedance Tolerance at 100 MHz | ±25% |
| Rated Current Range | 0.1 – 1.5 A maximum |
| Rated DC Resistance Range | 0.03 – 1.5 Ω maximum |
| Operating Temperature Range | –55°C to +125°C (includes self temperature rise) |

## Environmental Compliance

All KEMET Ferrite Beads are RoHS and REACH Compliant.







## Table 1 – Ratings & Part Number Reference

| Part Number | Impedance (Ω) at 100 MHz | Impedance Tolerance | Rated Current (A) Maximum | DC Resistance (Ω) Maximum |
|---|---|---|---|---|
| Z0201C220ASMST | 22 | ± 25 % | 0.500 | 0.065 |
| Z0201C330ASMST | 33 | ± 25 % | 0.500 | 0.070 |
| Z0201C800ASMST | 80 | ± 25 % | 0.200 | 0.400 |
| Z0201C121ASMST | 120 | ± 25 % | 0.200 | 0.450 |
| Z0201C241ASMST | 240 | ± 25 % | 0.200 | 0.650 |
| Z0201C601ASMST | 600 | ± 25 % | 0.150 | 1.200 |
| Z0201C600BSMST | 60 | ± 25 % | 0.200 | 0.250 |
| Z0201C121BSMST | 120 | ± 25 % | 0.200 | 0.400 |
| Z0201C241BSMST | 240 | ± 25 % | 0.200 | 0.800 |
| Z0201C471BSMST | 470 | ± 25 % | 0.100 | 1.050 |
| Z0201C100CSMST | 10 | ± 25 % | 0.200 | 0.250 |
| Z0201C220CSMST | 22 | ± 25 % | 0.200 | 0.450 |
| Z0201C330CSMST | 33 | ± 25 % | 0.150 | 0.550 |
| Z0201C470CSMST | 47 | ± 25 % | 0.150 | 0.700 |
| Z0201C560CSMST | 56 | ± 25 % | 0.100 | 1.000 |
| Z0201C121CSMST | 120 | ± 25 % | 0.100 | 1.500 |
| Z0402C680ESMST | 68 | ± 25 % | 0.500 | 0.170 |
| Z0402C121ESMST | 120 | ± 25 % | 0.450 | 0.240 |
| Z0402C241ESMST | 240 | ± 25 % | 0.400 | 0.310 |
| Z0402C431ESMST | 430 | ± 25 % | 0.350 | 0.500 |
| Z0402C601ESMST | 600 | ± 25 % | 0.300 | 0.600 |
| Z0402C100ASMST | 10 | ± 25 % | 1.000 | 0.030 |
| Z0402C330ASMST | 33 | ± 25 % | 0.700 | 0.060 |
| Z0402C680ASMST | 68 | ± 25 % | 0.700 | 0.100 |
| Z0402C800ASMST | 80 | ± 25 % | 0.700 | 0.100 |
| Z0402C121ASMST | 120 | ± 25 % | 0.500 | 0.200 |
| Z0402C241ASMST | 240 | ± 25 % | 0.400 | 0.300 |
| Z0402C431ASMST | 430 | ± 25 % | 0.350 | 0.450 |
| Z0402C601ASMST | 600 | ± 25 % | 0.300 | 0.550 |
| Z0402C102ASMST | 1,000 | ± 25 % | 0.300 | 0.580 |
| Z0402C121BSMST | 120 | ± 25 % | 0.300 | 0.180 |
| Z0402C241BSMST | 240 | ± 25 % | 0.300 | 0.300 |
| **Part Number** | **Impedance** | **Impedance Tolerance** | **Rated Current** | **DC Resistance** |

## Table 1 – Ratings & Part Number Reference cont.

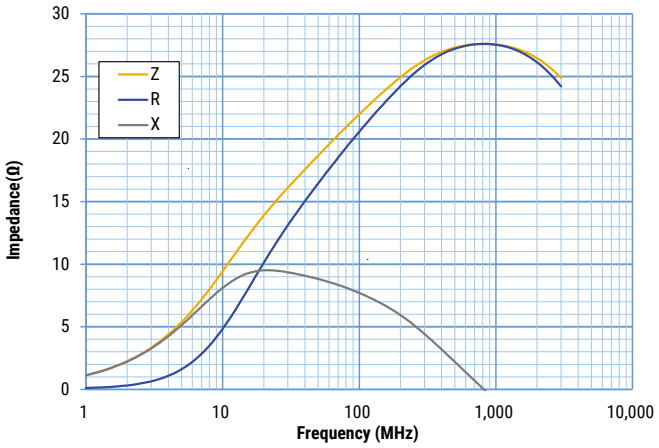
| Part Number | Impedance (Ω) at 100 MHz | Impedance Tolerance | Rated Current (A) Maximum | DC Resistance (Ω) Maximum |
|---|---|---|---|---|
| Z0402C471BSMST | 470 | ± 25 % | 0.250 | 0.450 |
| Z0402C601BSMST | 600 | ± 25 % | 0.250 | 0.500 |
| Z0402C102BSMST | 1,000 | ± 25 % | 0.150 | 0.700 |
| Z0402C100CSMST | 10 | ± 25 % | 0.500 | 0.110 |
| Z0402C220CSMST | 22 | ± 25 % | 0.400 | 0.180 |
| Z0402C330CSMST | 33 | ± 25 % | 0.400 | 0.250 |
| Z0402C470CSMST | 47 | ± 25 % | 0.350 | 0.330 |
| Z0402C680CSMST | 68 | ± 25 % | 0.400 | 0.310 |
| Z0402C121CSMST | 120 | ± 25 % | 0.350 | 0.450 |
| Z0402C181CSMST | 180 | ± 25 % | 0.300 | 0.500 |
| Z0402C241CSMST | 240 | ± 25 % | 0.250 | 0.700 |
| Z0402C182DSMST | 1,800 | ± 25 % | 0.120 | 0.900 |
| Z0603C121ESMST | 120 | ± 25 % | 0.600 | 0.150 |
| Z0603C241ESMST | 240 | ± 25 % | 0.450 | 0.250 |
| Z0603C431ESMST | 430 | ± 25 % | 0.400 | 0.300 |
| Z0603C601ESMST | 600 | ± 25 % | 0.300 | 0.400 |
| Z0603C220ASMST | 22 | ± 25 % | 1.500 | 0.050 |
| Z0603C330ASMST | 33 | ± 25 % | 1.200 | 0.080 |
| Z0603C470ASMST | 47 | ± 25 % | 0.900 | 0.100 |
| Z0603C600ASMST | 60 | ± 25 % | 0.800 | 0.100 |
| Z0603C800ASMST | 80 | ± 25 % | 0.600 | 0.100 |
| Z0603C121ASMST | 120 | ± 25 % | 0.500 | 0.180 |
| Z0603C241ASMST | 240 | ± 25 % | 0.400 | 0.250 |
| Z0603C601ASMST | 600 | ± 25 % | 0.350 | 0.450 |
| Z0603C102ASMST | 1,000 | ± 25 % | 0.300 | 0.600 |
| Z0603C121BSMST | 120 | ± 25 % | 0.350 | 0.200 |
| Z0603C241BSMST | 240 | ± 25 % | 0.300 | 0.350 |
| Z0603C471BSMST | 470 | ± 25 % | 0.250 | 0.450 |
| Z0603C601BSMST | 600 | ± 25 % | 0.250 | 0.600 |
| Z0603C102BSMST | 1,000 | ± 25 % | 0.200 | 0.700 |
| Z0603C300CSMST | 30 | ± 25 % | 0.500 | 0.200 |
| Z0603C470CSMST | 47 | ± 25 % | 0.400 | 0.300 |
| Z0603C560CSMST | 56 | ± 25 % | 0.400 | 0.300 |
| Z0603C680CSMST | 68 | ± 25 % | 0.300 | 0.350 |
| Z0603C121CSMST | 120 | ± 25 % | 0.300 | 0.500 |
| Z0603C181CSMST | 180 | ± 25 % | 0.250 | 0.650 |
| Z0603C241CSMST | 240 | ± 25 % | 0.250 | 0.800 |
| Z0603C331CSMST | 330 | ± 25 % | 0.200 | 0.850 |
| Z0603C431CSMST | 430 | ± 25 % | 0.200 | 0.850 |
| Z0603C511CSMST | 510 | ± 25 % | 0.200 | 0.900 |
| Z0603C681CSMST | 680 | ± 25 % | 0.150 | 1.000 |
| Z0603C751DSMST | 750 | ± 25 % | 0.300 | 0.600 |
| Z0603C152DSMST | 1,500 | ± 25 % | 0.250 | 0.750 |
| Z0603C182DSMST | 1,800 | ± 25 % | 0.200 | 0.850 |
| Z0603C252DSMST | 2,500 | ± 25 % | 0.200 | 1.100 |
| Z0603C431FSMST | 430 | ± 25 % | 0.400 | 0.273 |
| **Part Number** | **Impedance** | **Impedance Tolerance** | **Rated Current** | **DC Resistance** |

## Table 1 – Ratings & Part Number Reference cont.

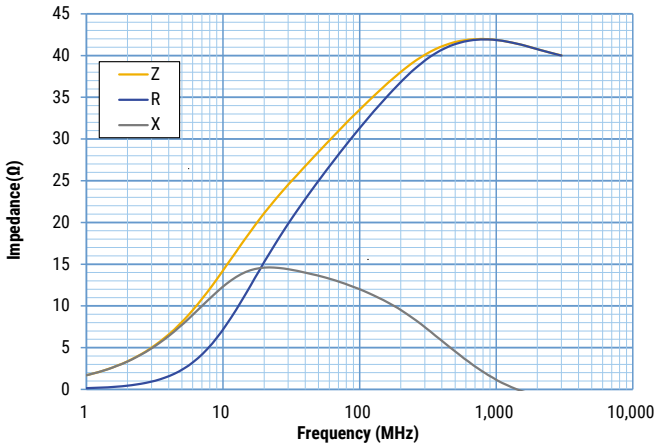
| Part Number | Impedance (Ω) at 100 MHz | Impedance Tolerance | Rated Current (A) Maximum | DC Resistance (Ω) Maximum |
|---|---|---|---|---|
| Z0603C601FSMST | 600 | ± 25 % | 0.350 | 0.351 |
| Z0603C102FSMST | 1,000 | ± 25 % | 0.300 | 0.390 |
| Z0805C150ASMST | 15 | ± 25 % | 1.200 | 0.050 |
| Z0805C220ASMST | 22 | ± 25 % | 1.200 | 0.050 |
| Z0805C330ASMST | 33 | ± 25 % | 1.200 | 0.050 |
| Z0805C470ASMST | 47 | ± 25 % | 1.000 | 0.050 |
| Z0805C750ASMST | 75 | ± 25 % | 1.000 | 0.100 |
| Z0805C101ASMST | 100 | ± 25 % | 0.900 | 0.100 |
| Z0805C121ASMST | 120 | ± 25 % | 0.800 | 0.150 |
| Z0805C241ASMST | 240 | ± 25 % | 0.600 | 0.200 |
| Z0805C431ASMST | 430 | ± 25 % | 0.500 | 0.250 |
| Z0805C601ASMST | 600 | ± 25 % | 0.500 | 0.300 |
| Z0805C102ASMST | 1,000 | ± 25 % | 0.300 | 0.400 |
| Z0805C121BSMST | 120 | ± 25 % | 0.800 | 0.150 |
| Z0805C241BSMST | 240 | ± 25 % | 0.600 | 0.200 |
| Z0805C471BSMST | 470 | ± 25 % | 0.500 | 0.250 |
| Z0805C601BSMST | 600 | ± 25 % | 0.500 | 0.250 |
| Z0805C102BSMST | 1,000 | ± 25 % | 0.400 | 0.350 |
| Z0805C560CSMST | 56 | ± 25 % | 0.600 | 0.200 |
| Z0805C121CSMST | 120 | ± 25 % | 0.400 | 0.300 |
| Z0805C241CSMST | 240 | ± 25 % | 0.300 | 0.350 |
| Z0805C751DSMST | 750 | ± 25 % | 0.400 | 0.300 |
| Z0805C152DSMST | 1,500 | ± 25 % | 0.400 | 0.350 |
| Z0805C182DSMST | 1,800 | ± 25 % | 0.300 | 0.450 |
| Z0805C252DSMST | 2,500 | ± 25 % | 0.200 | 0.750 |
| **Part Number** | **Impedance** | **Impedance Tolerance** | **Rated Current** | **DC Resistance** |

## Frequency Characteristics

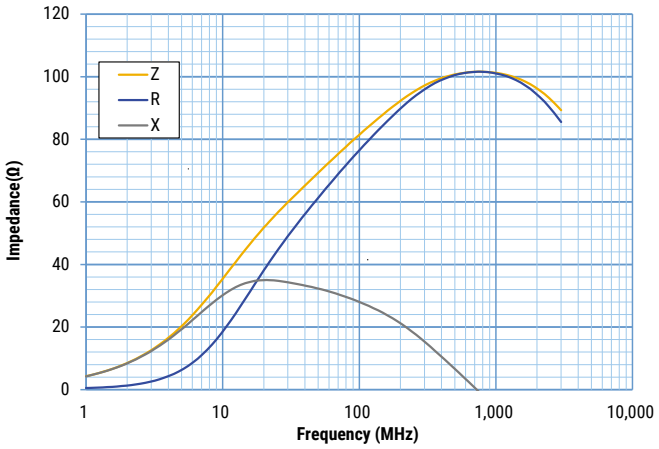
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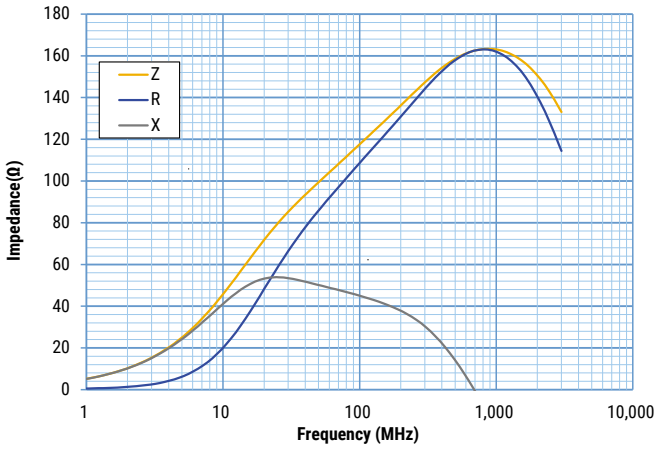

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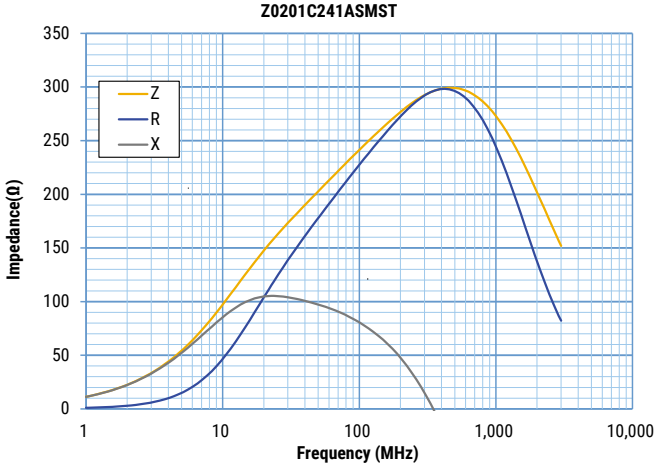

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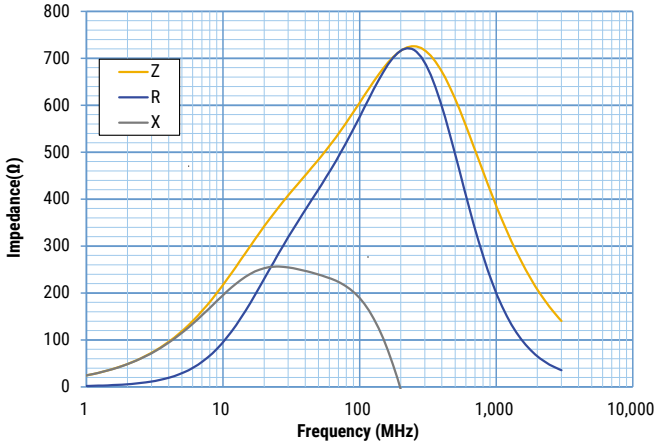

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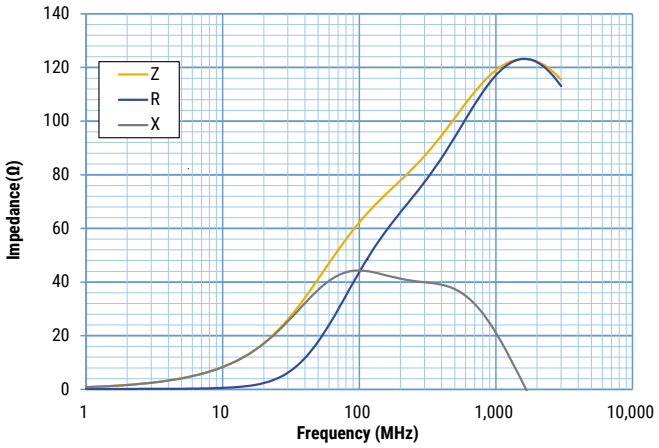



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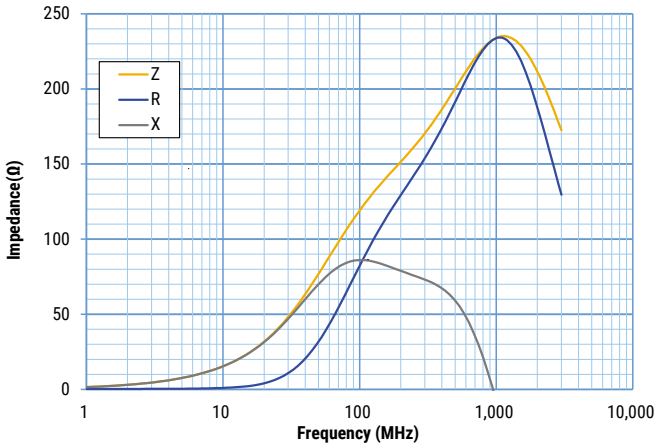


## Frequency Characteristics cont.

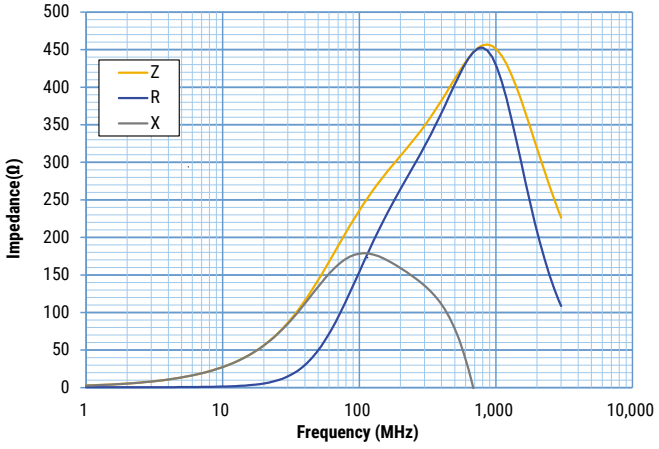
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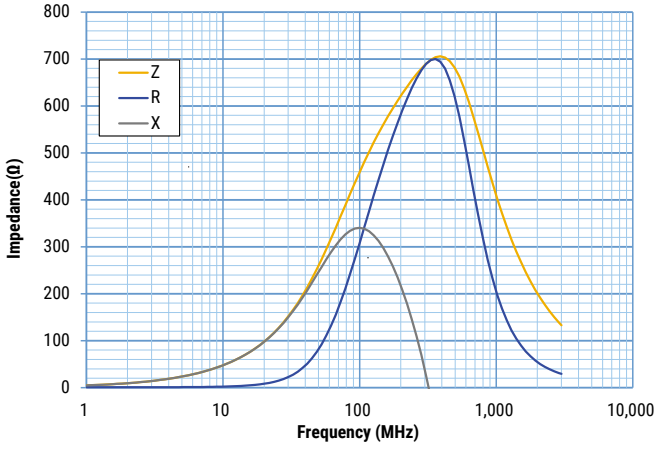

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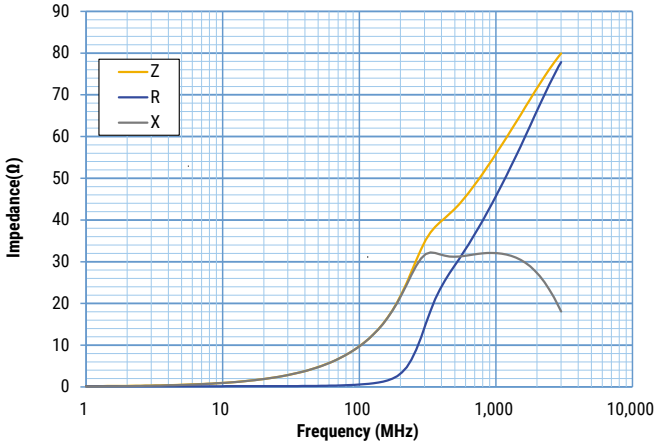

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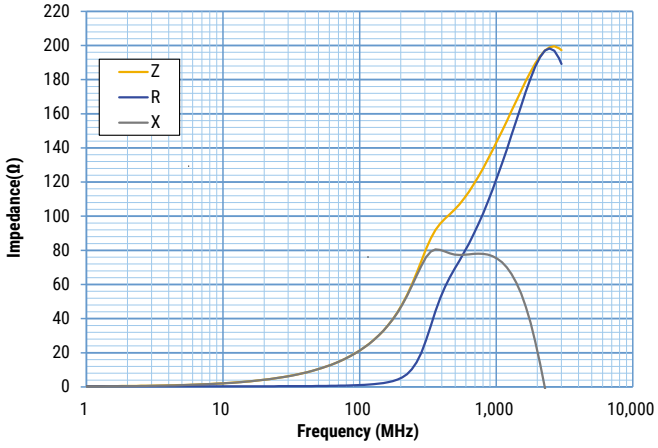

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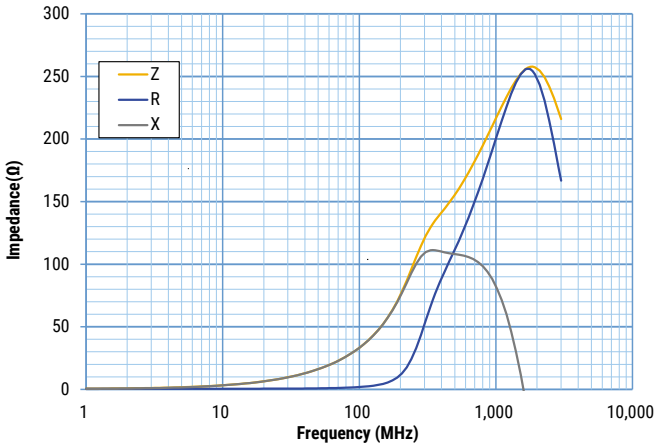



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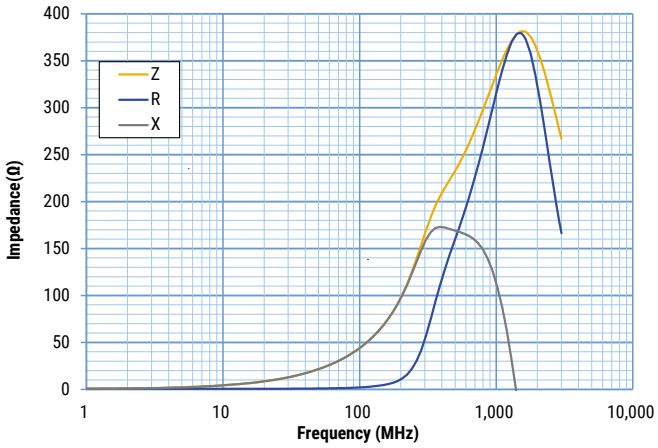


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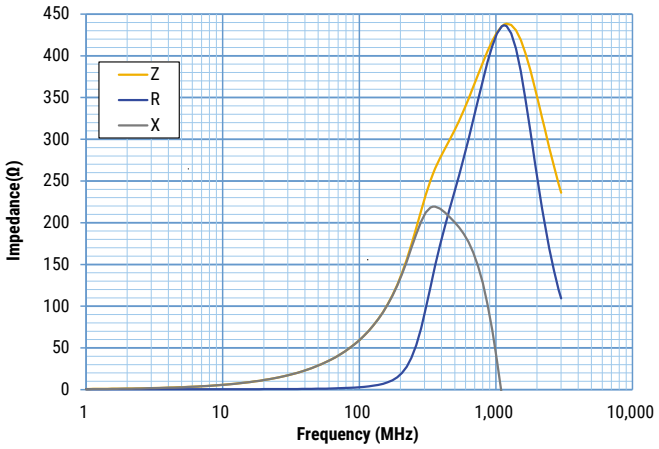
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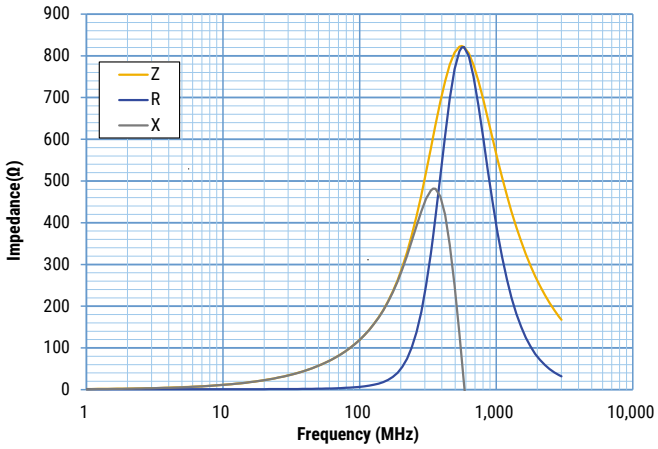

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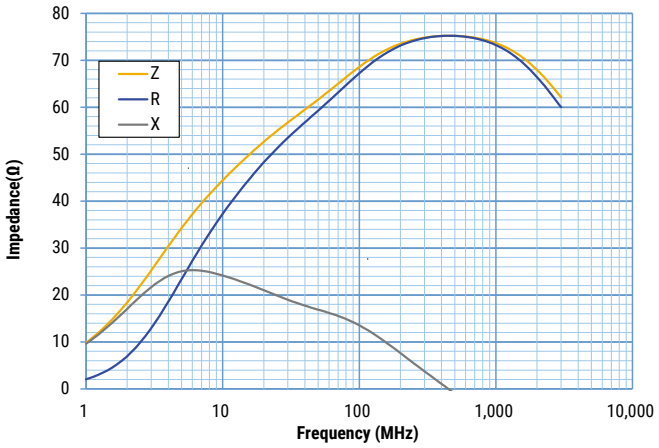

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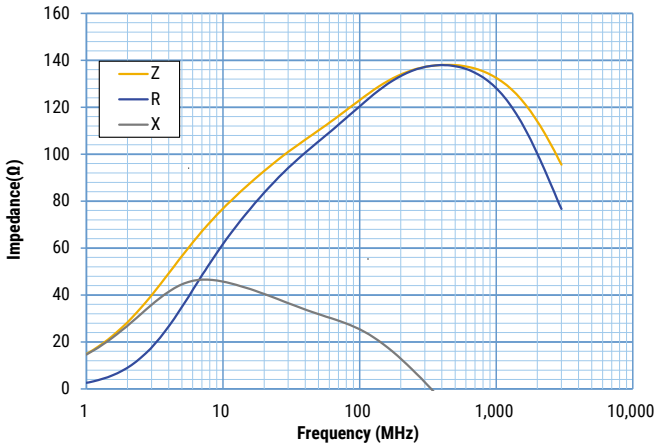

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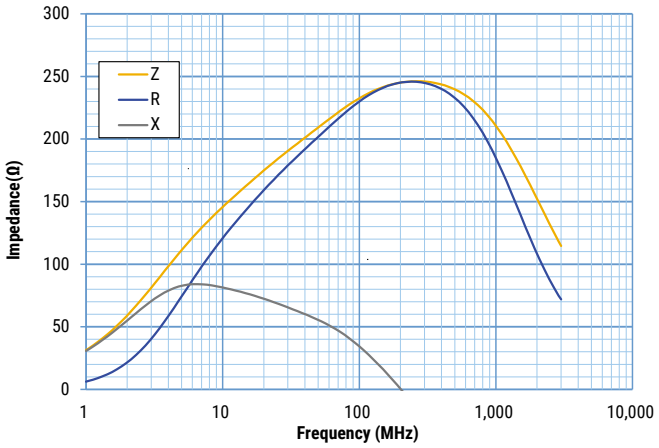



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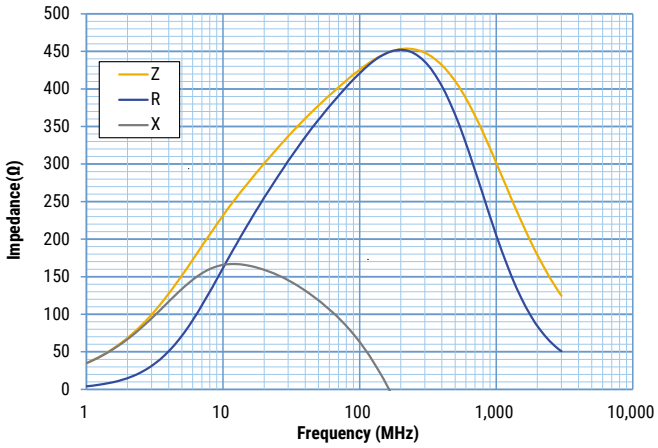


## Frequency Characteristics cont.

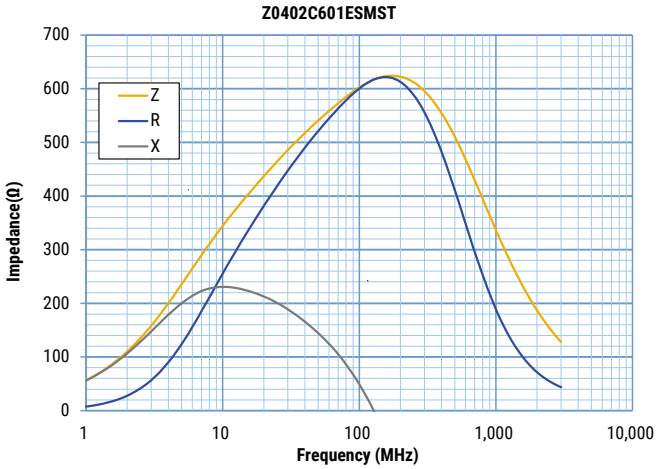
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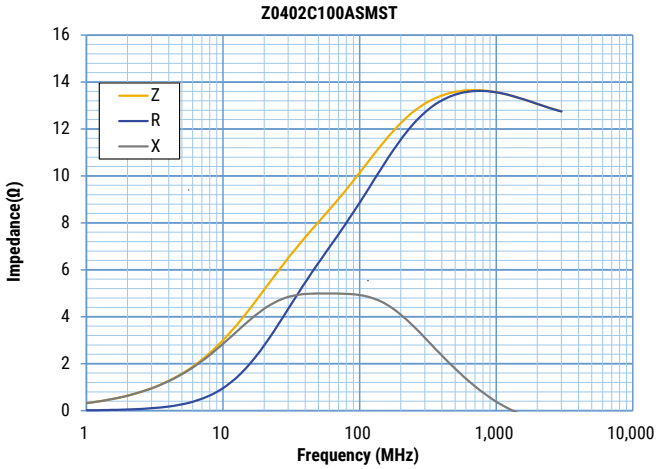

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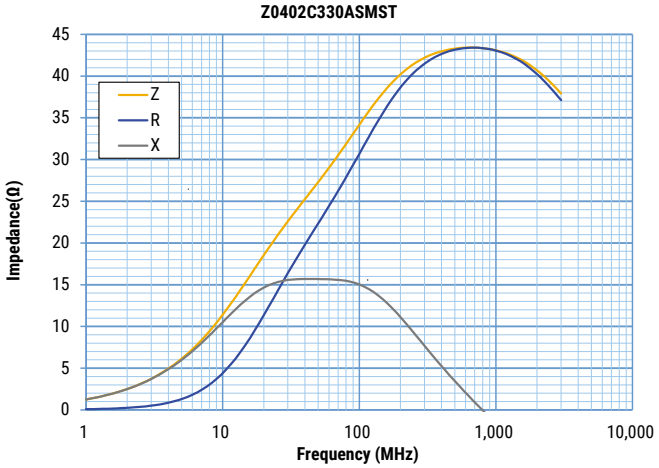

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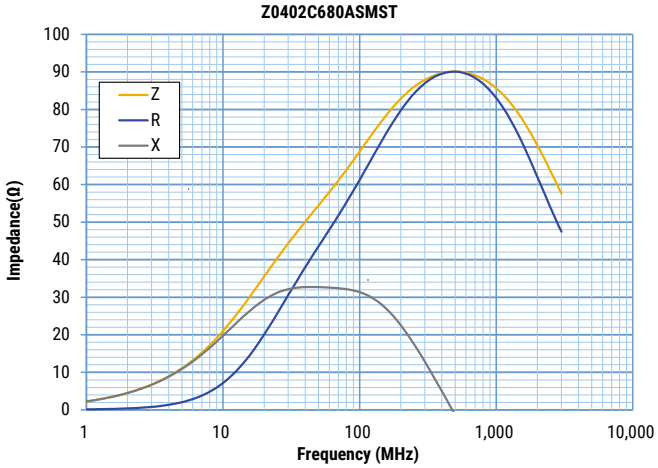

Z0402C100ASMST




Z0402C330ASMST

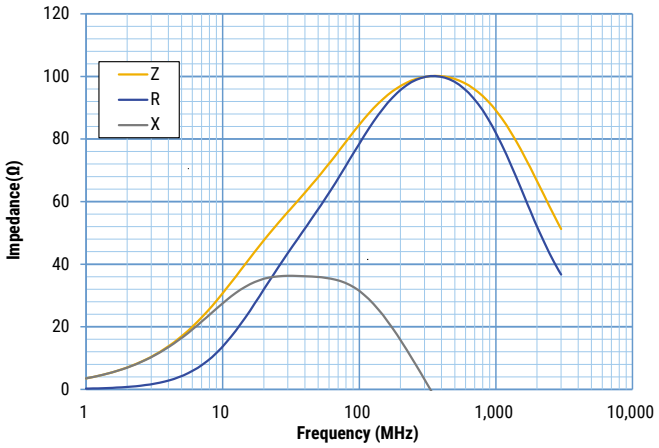



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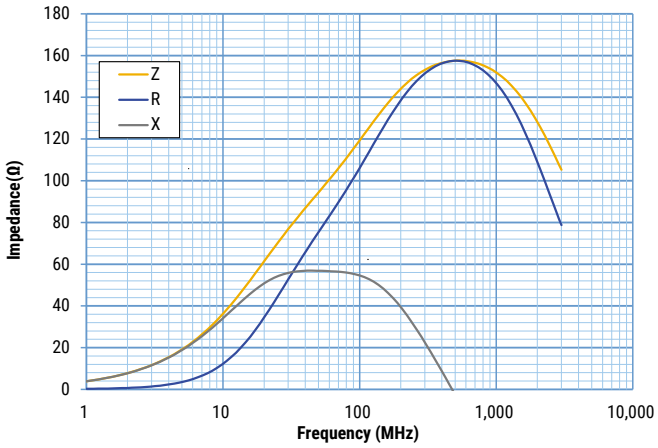


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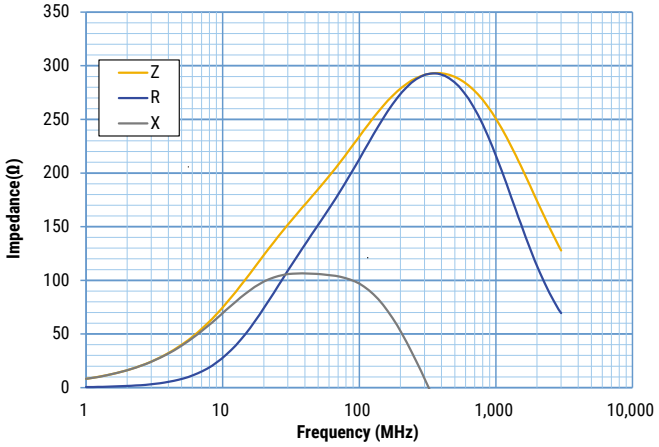
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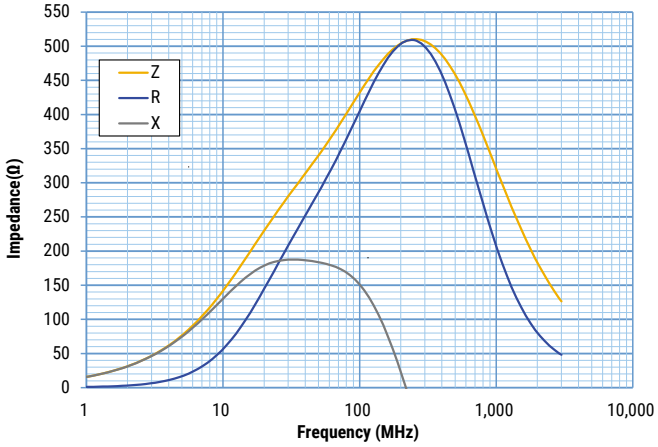

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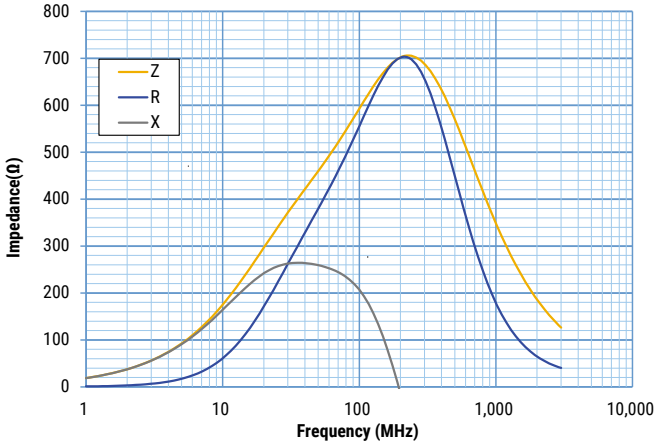

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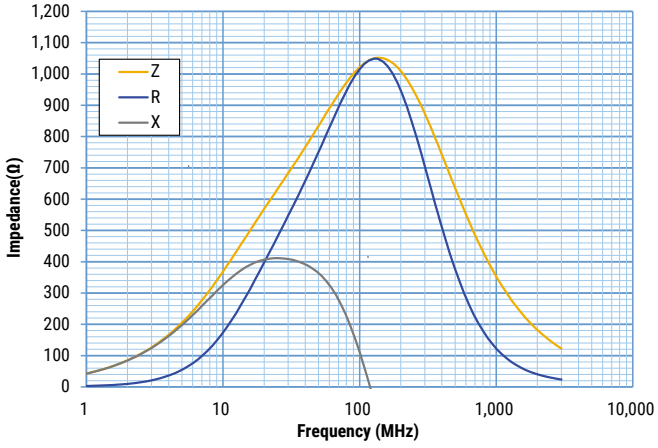

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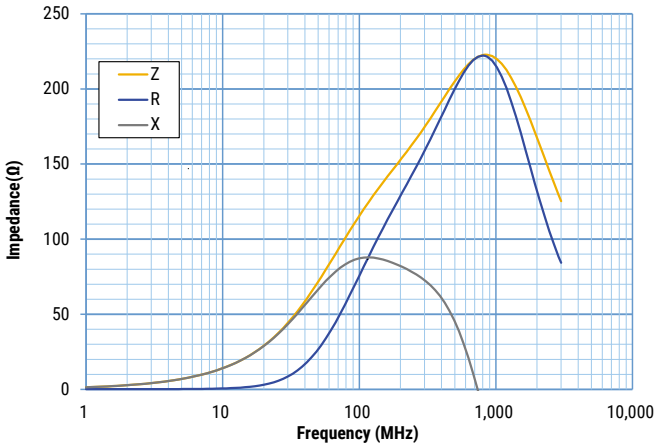



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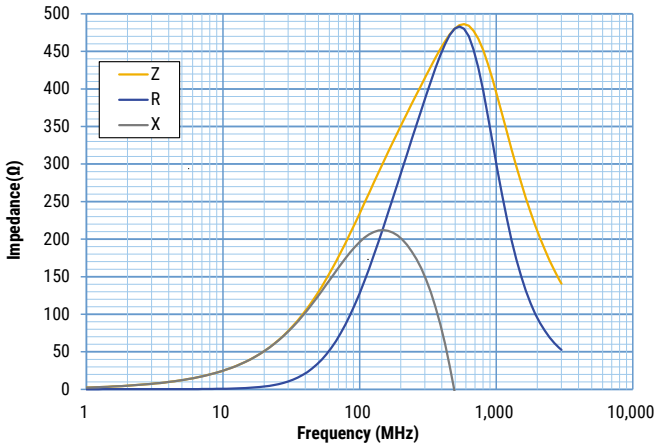


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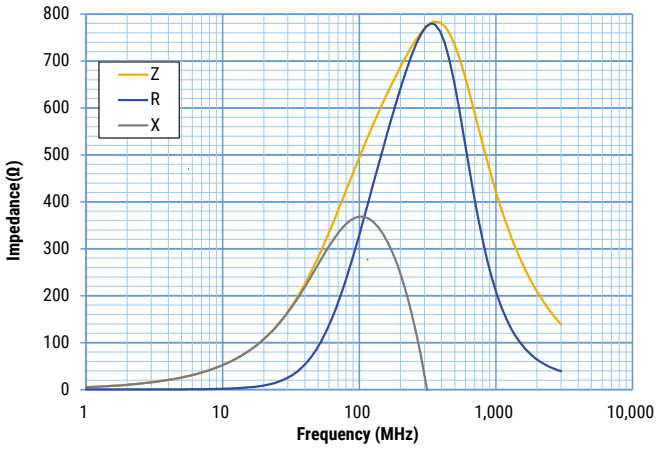
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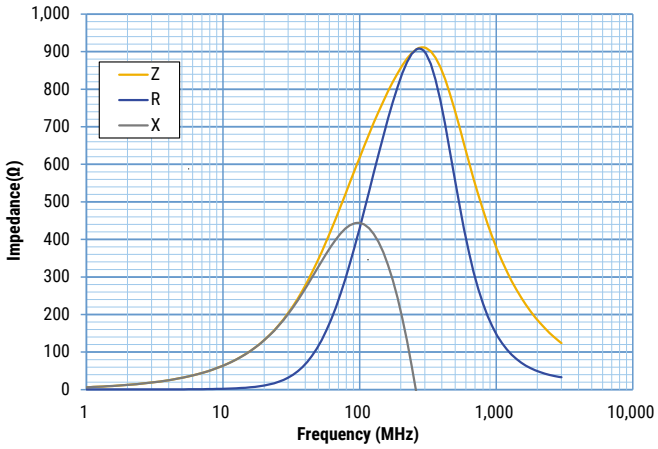

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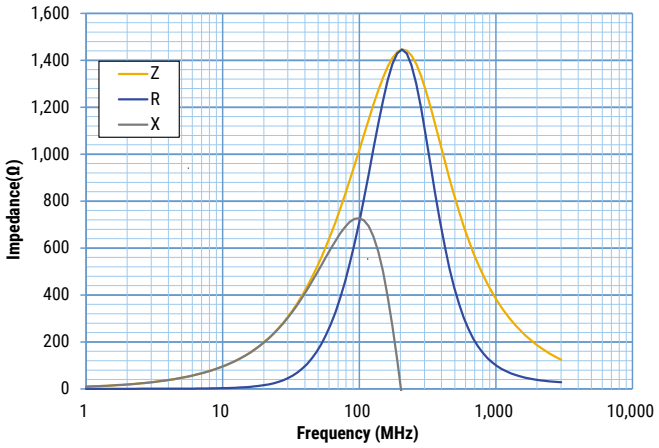

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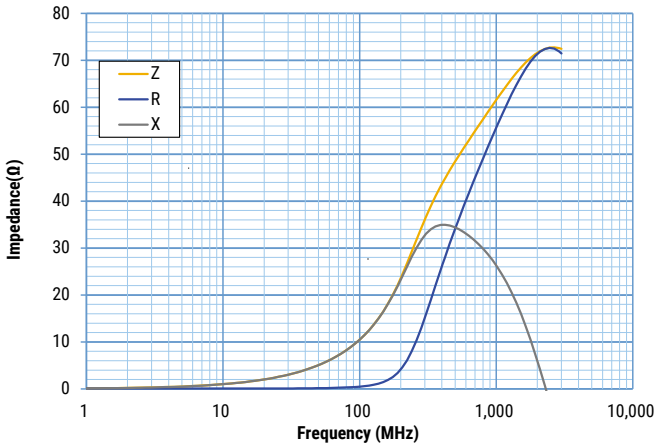

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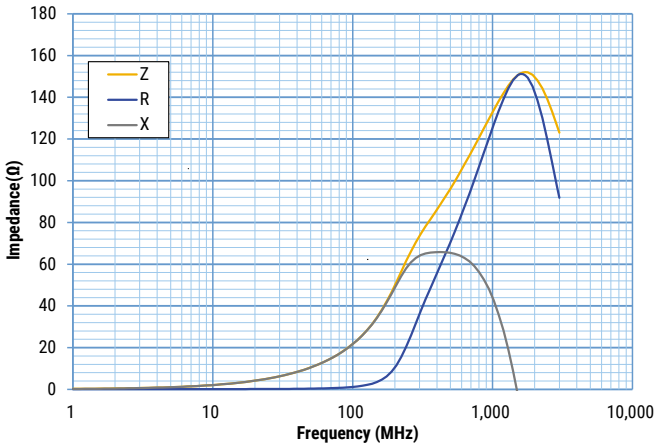



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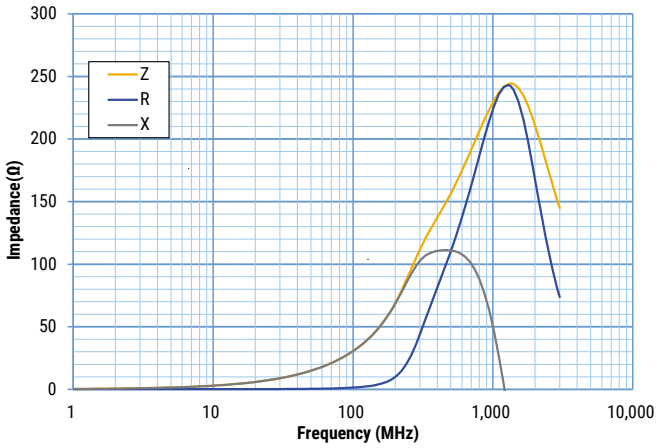


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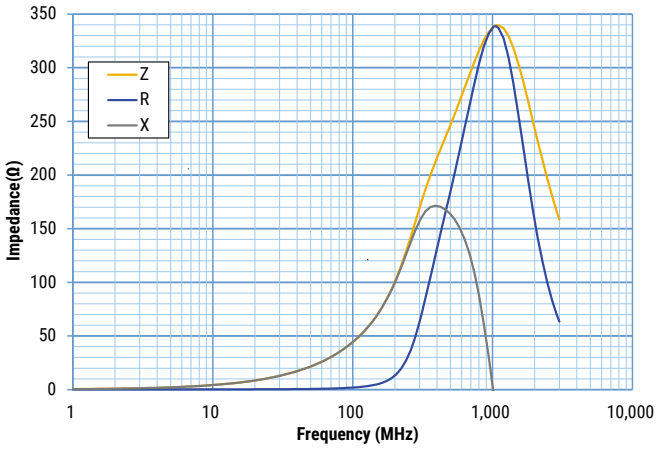
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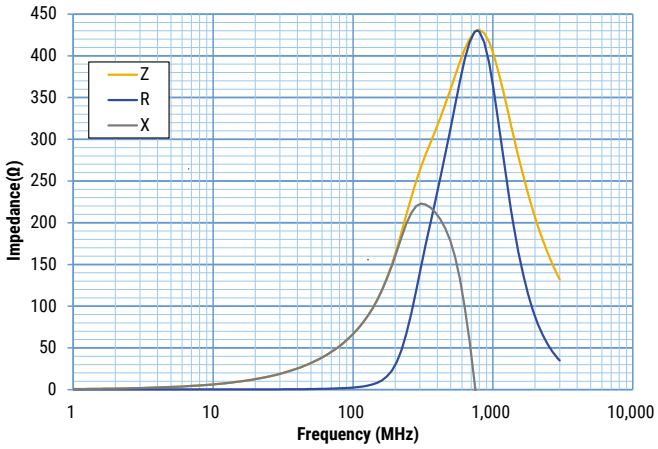

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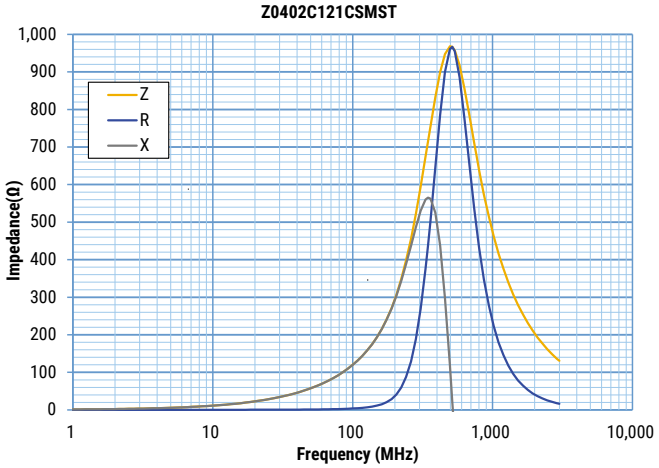

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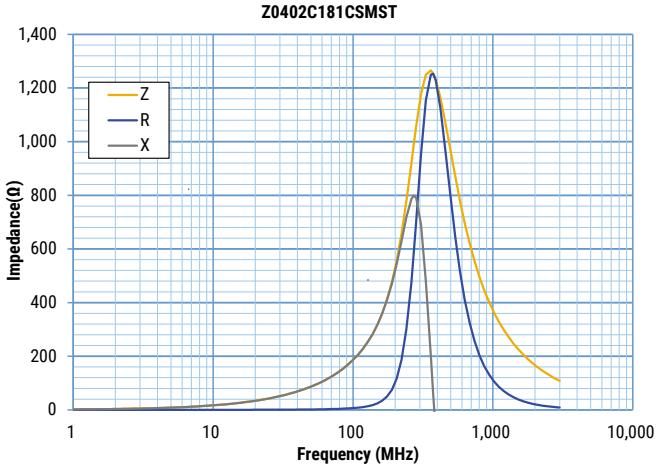

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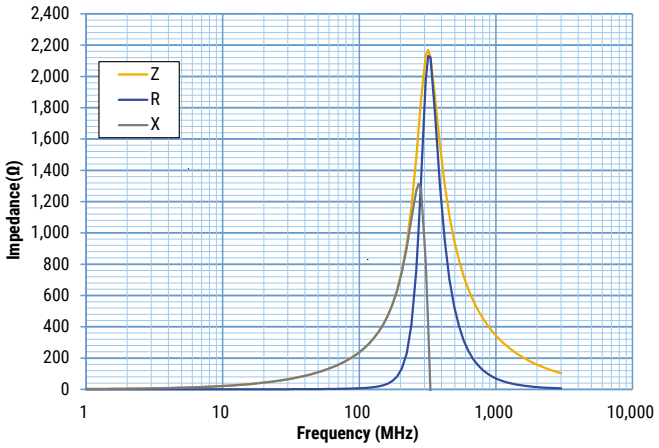



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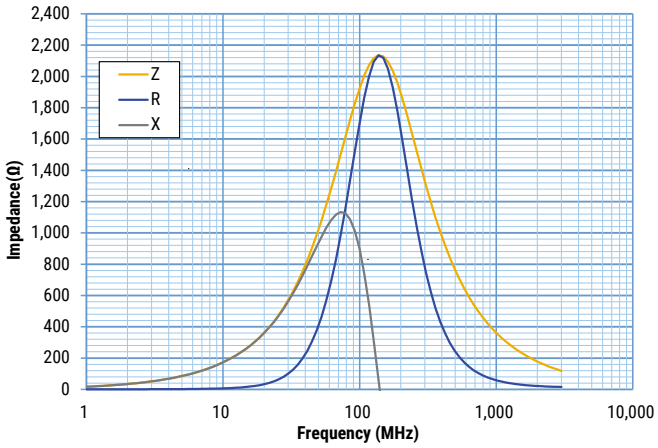


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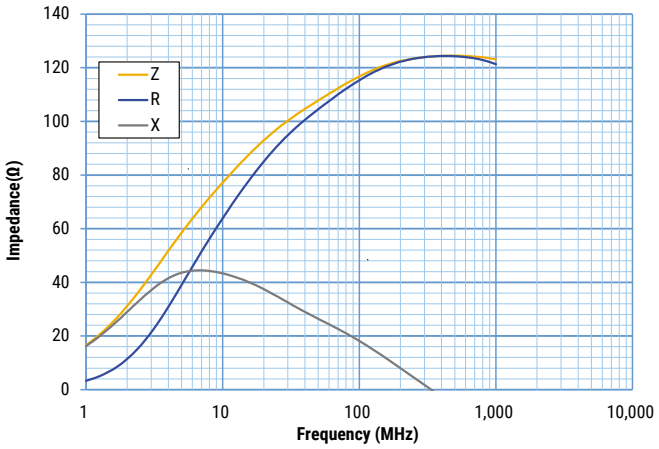
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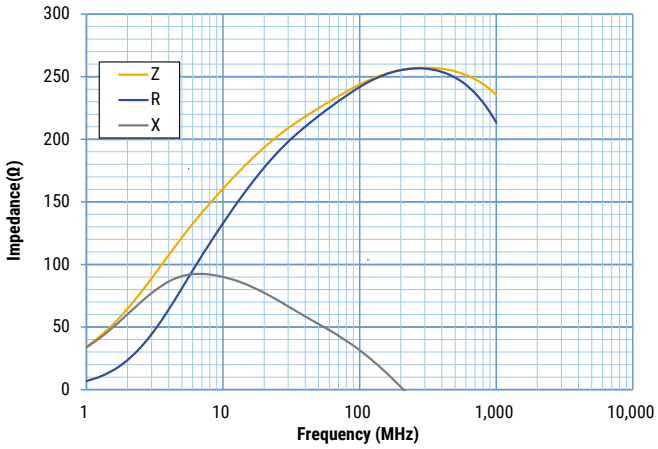

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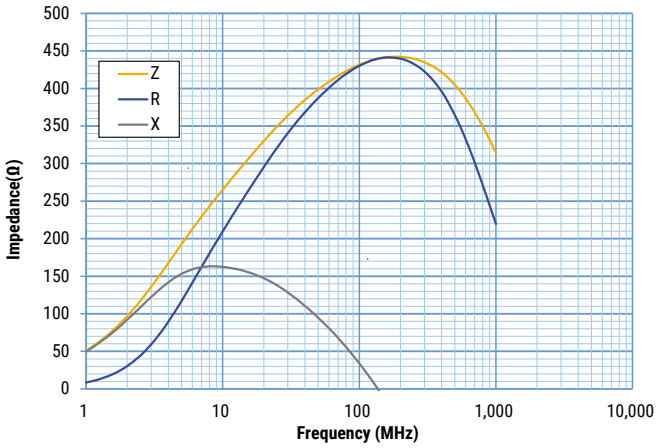

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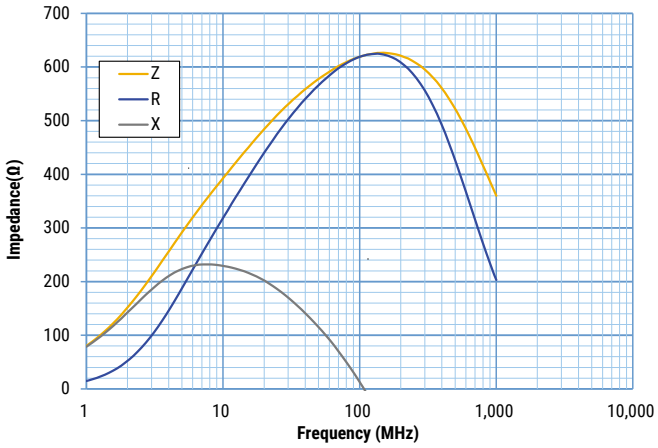

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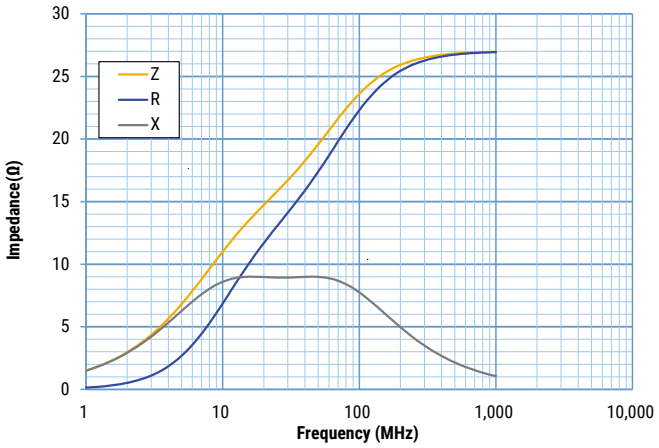



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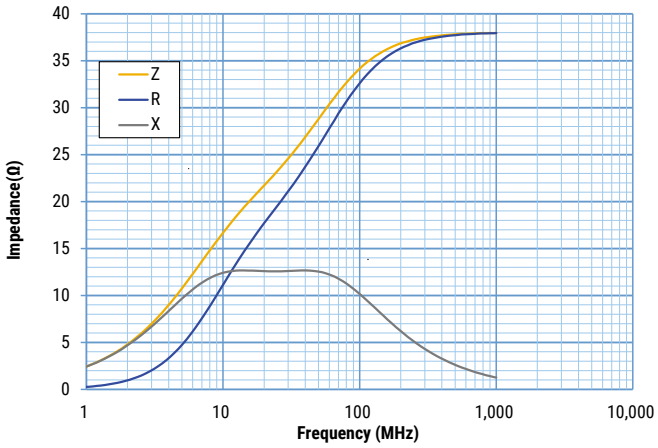


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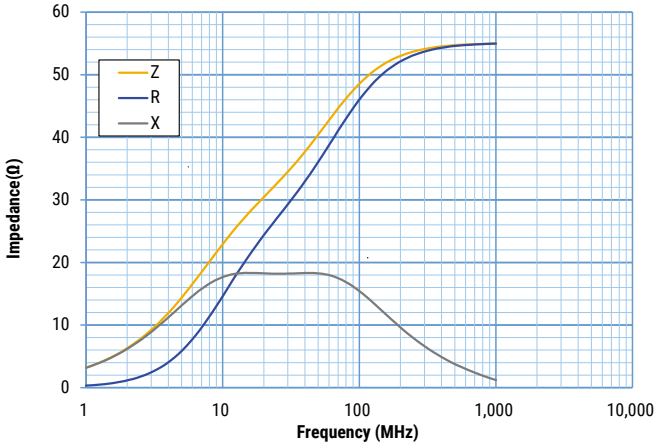
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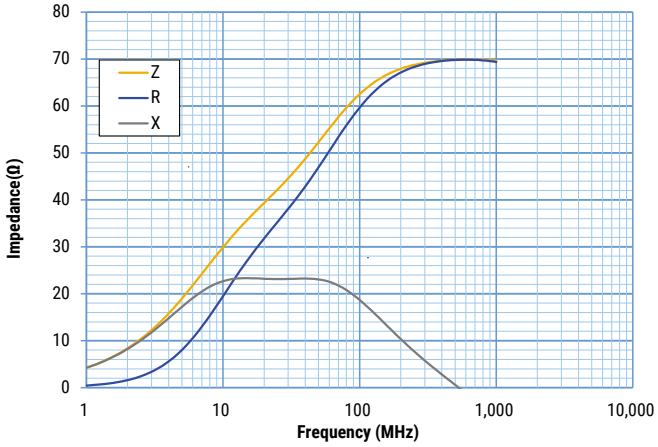

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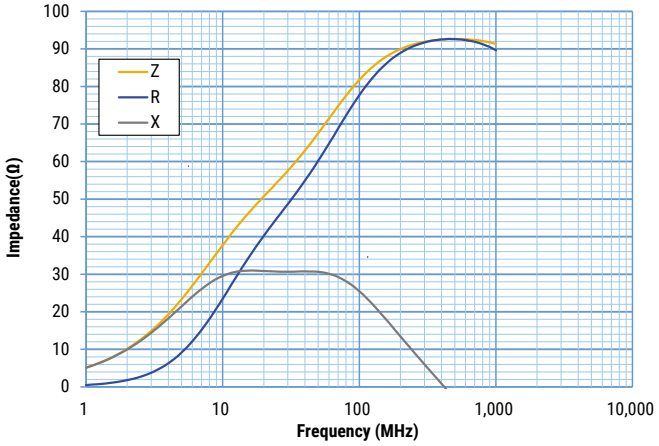

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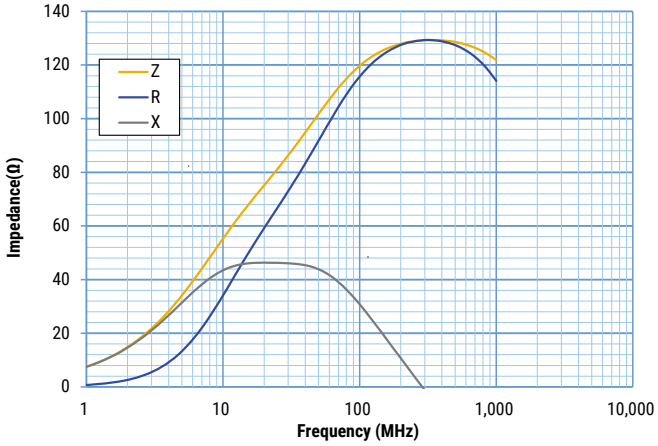

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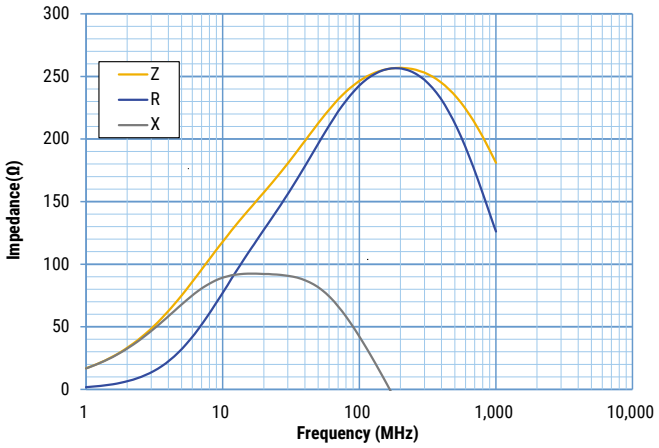



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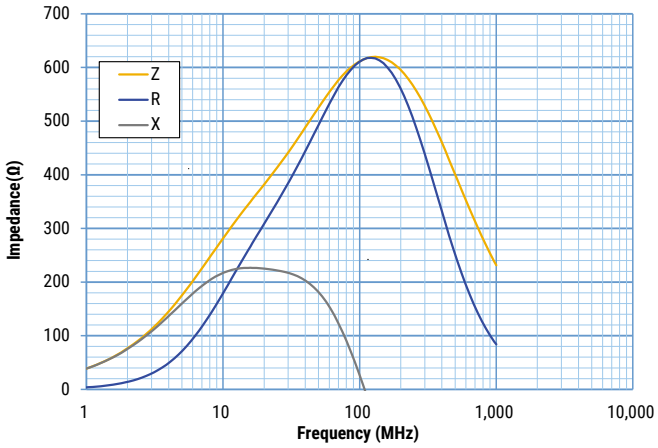


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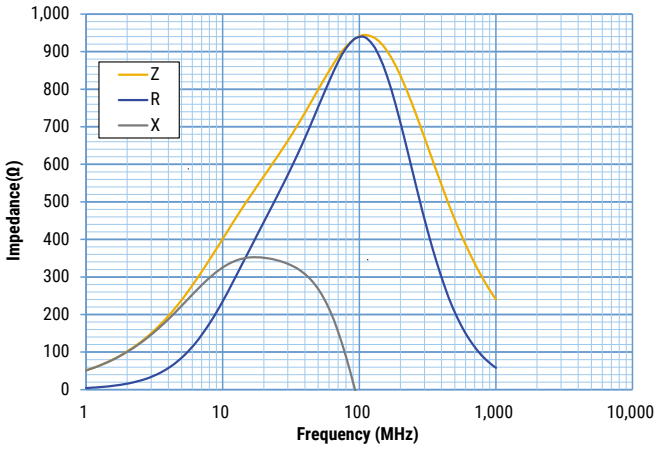
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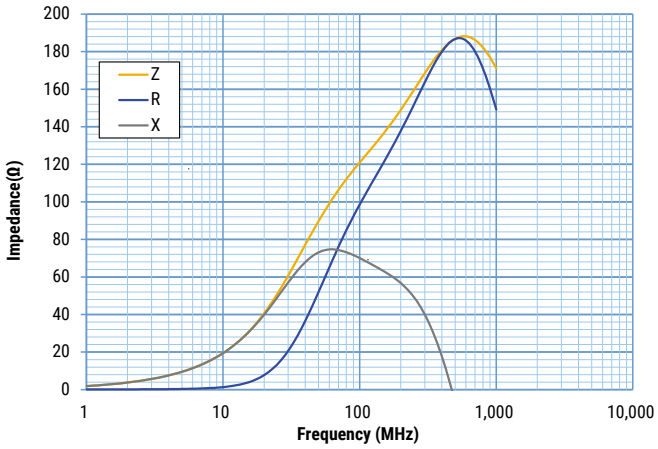

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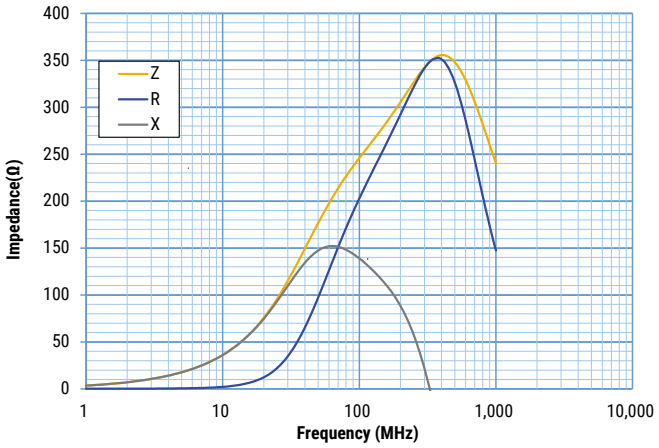

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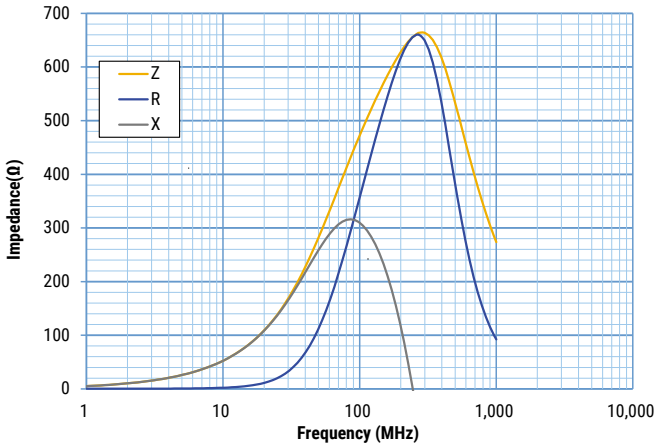

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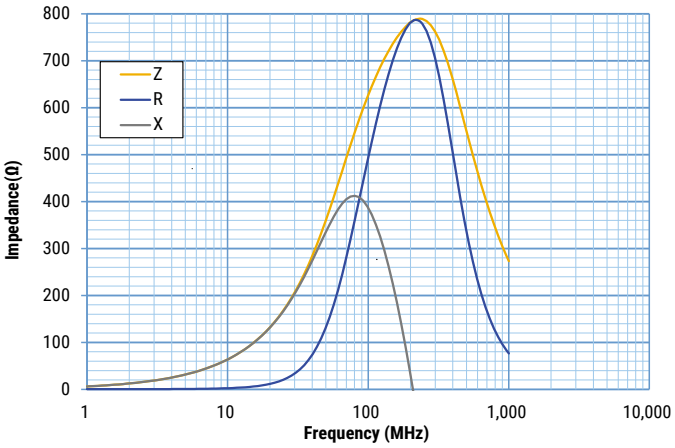



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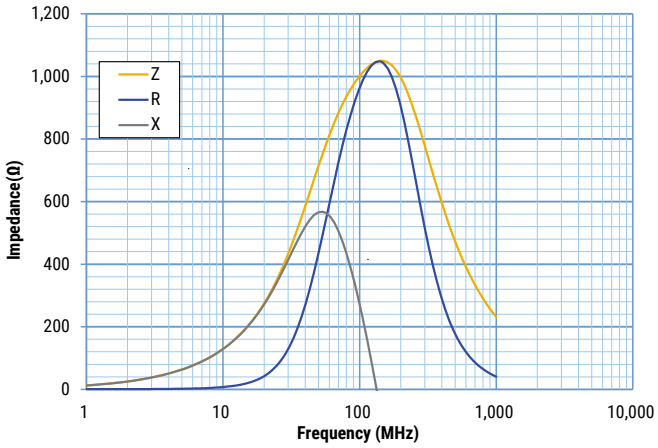


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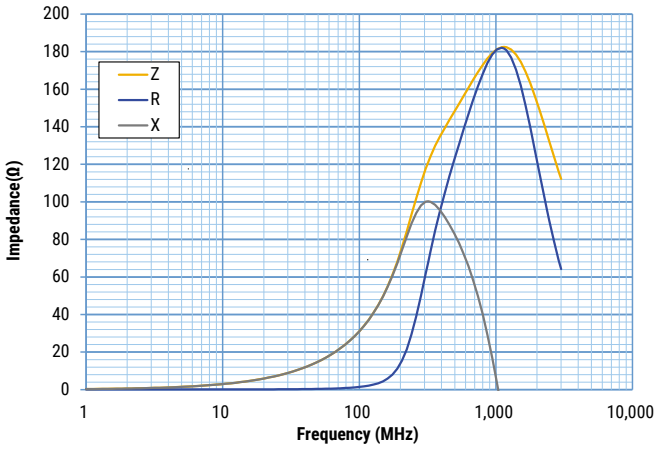
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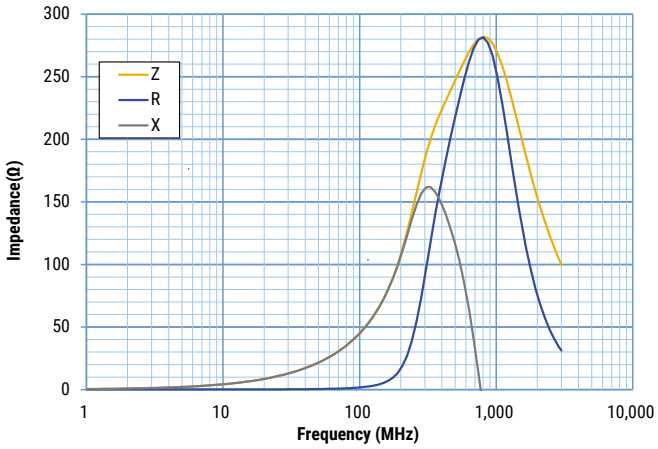

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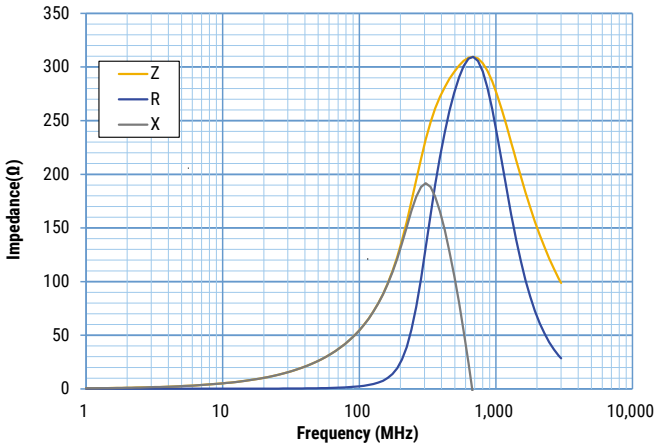

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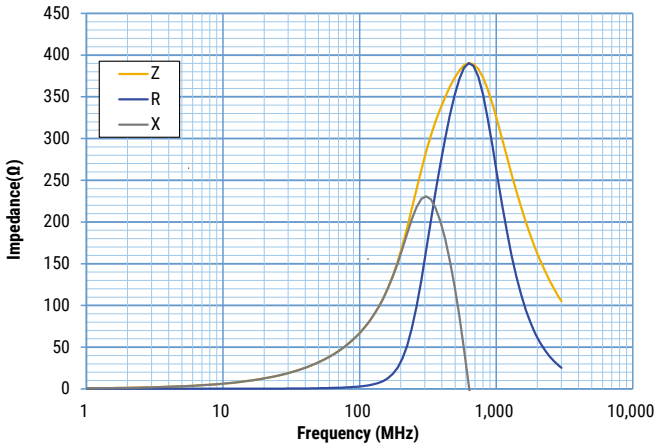

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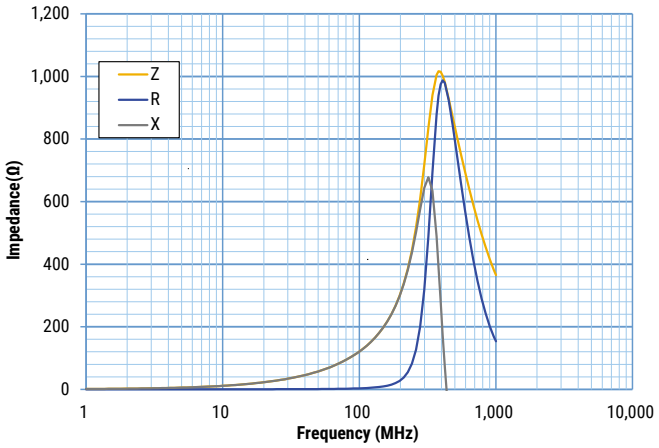



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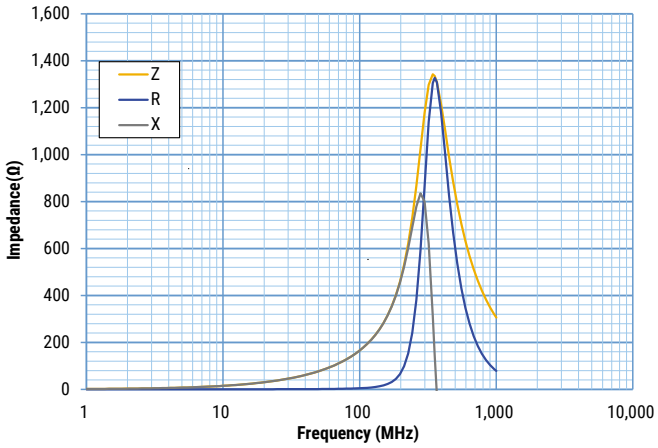


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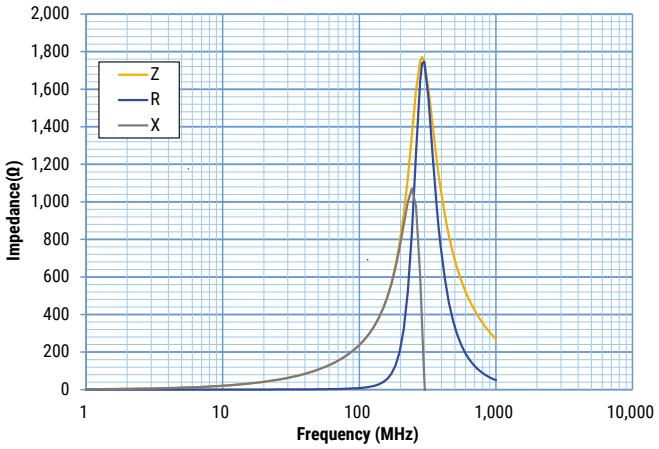
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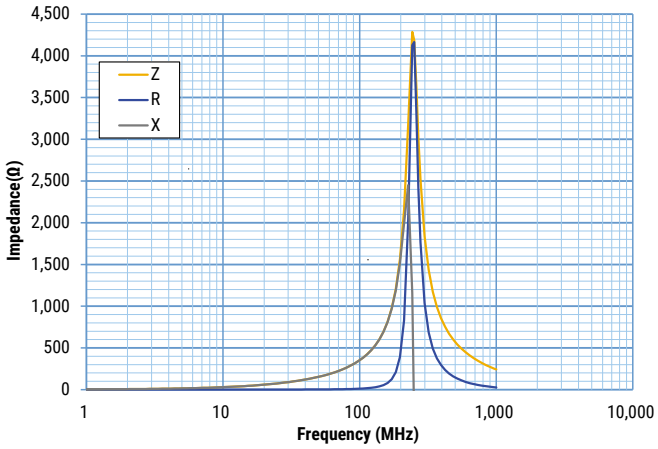

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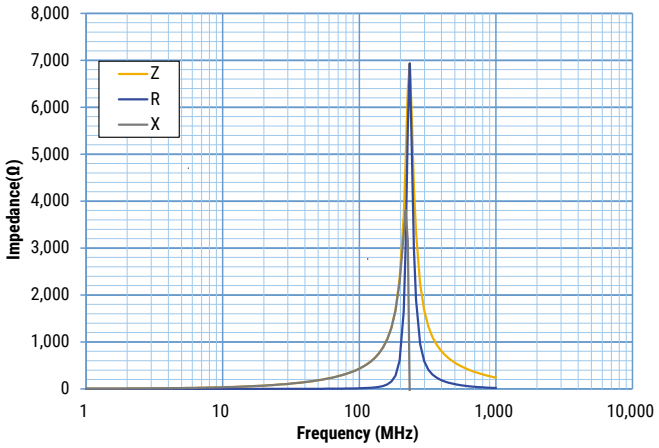

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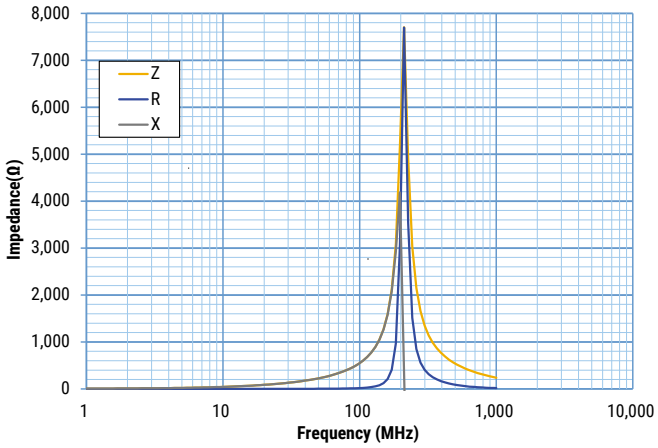

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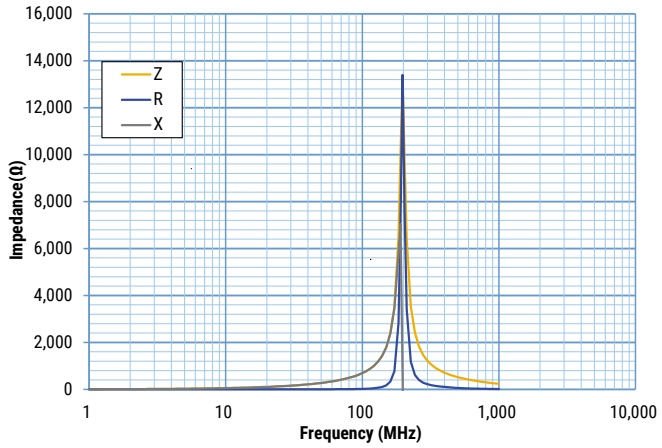



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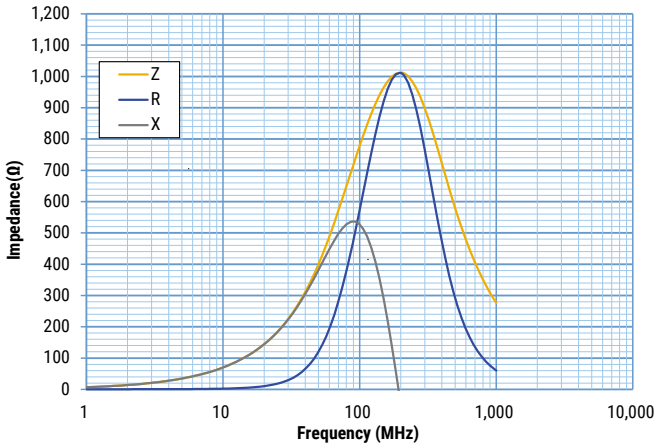


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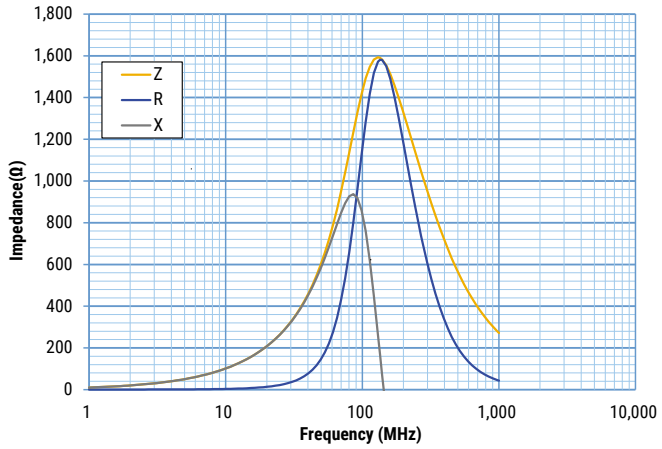
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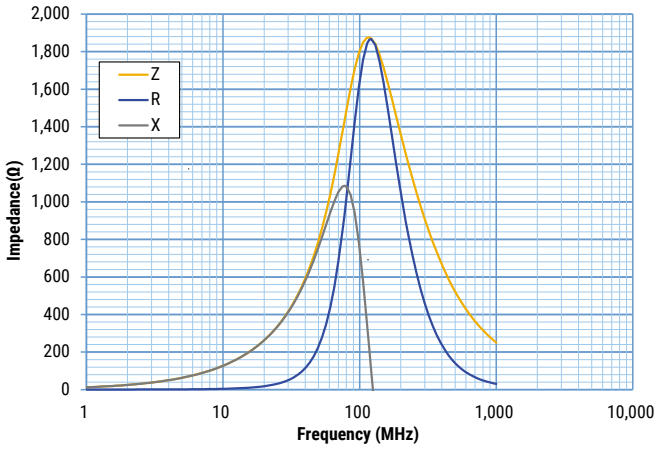

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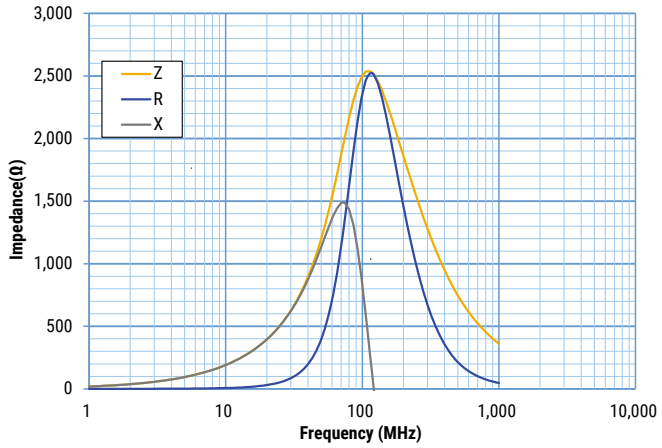

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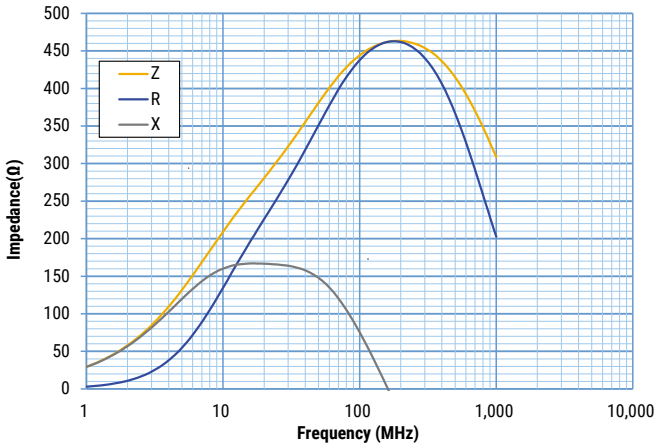

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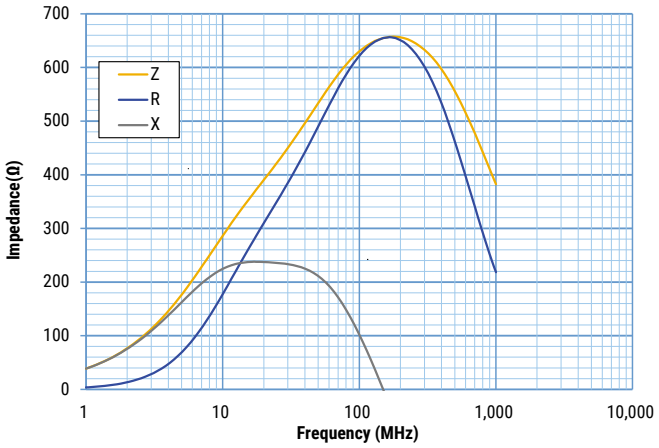



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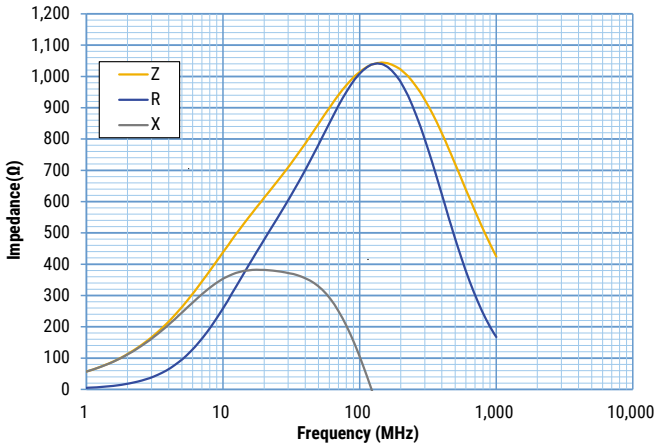


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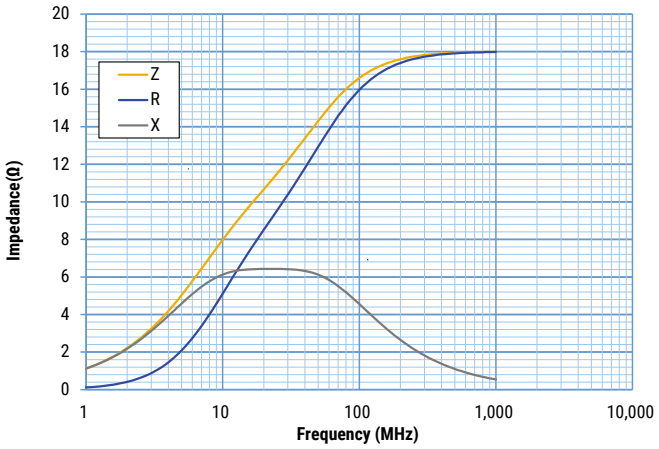
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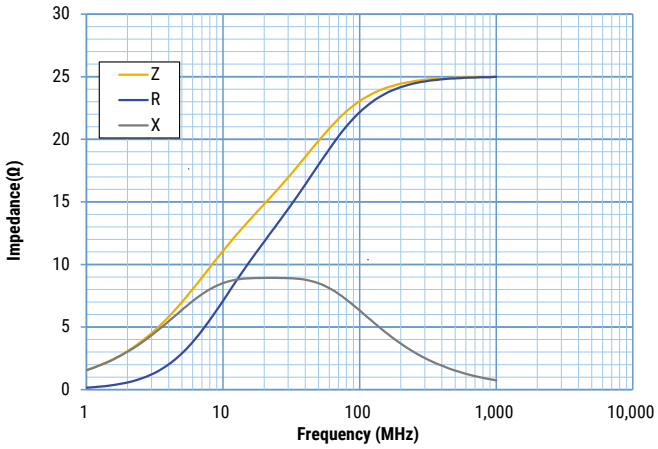

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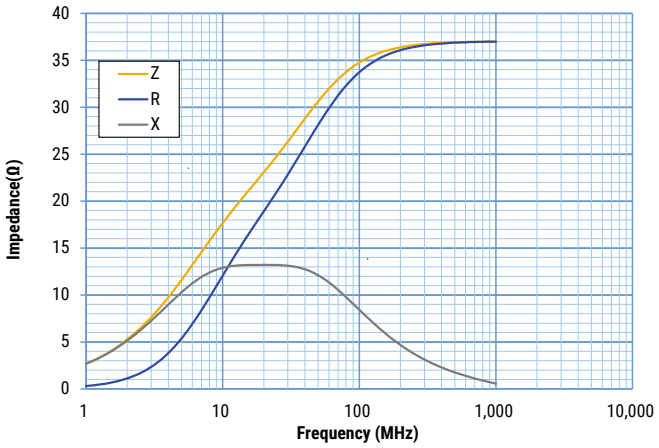

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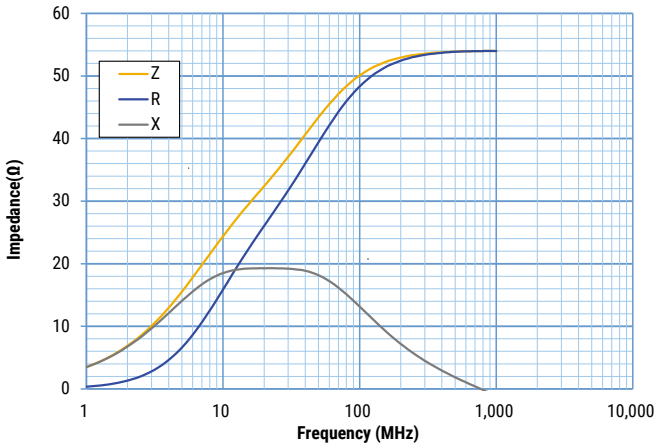

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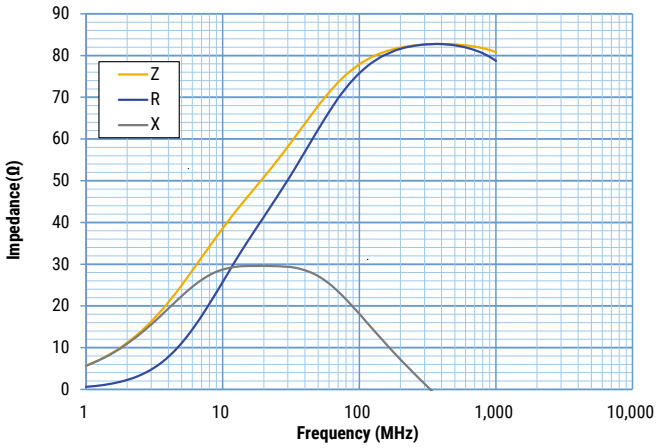



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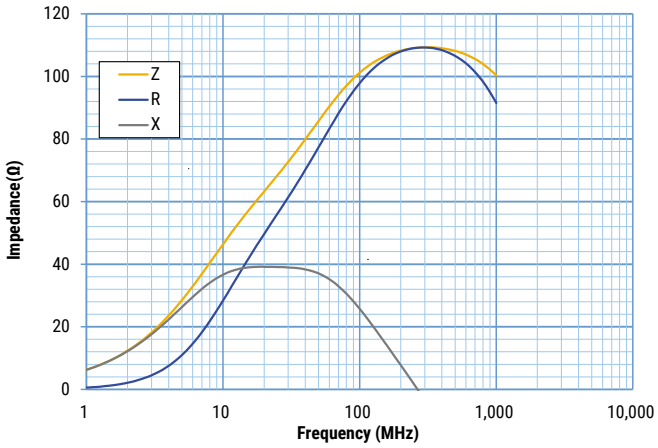


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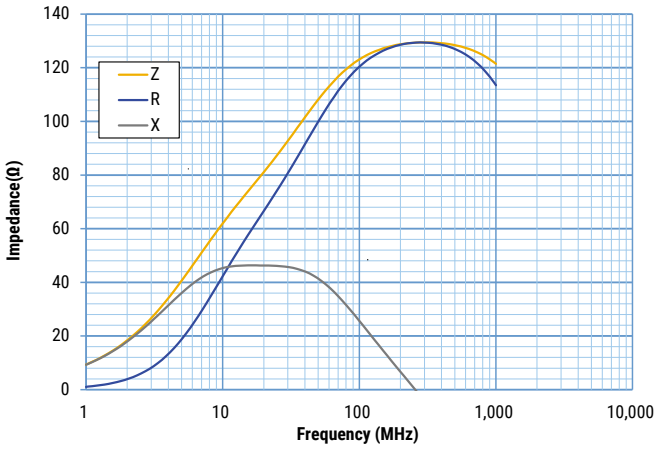
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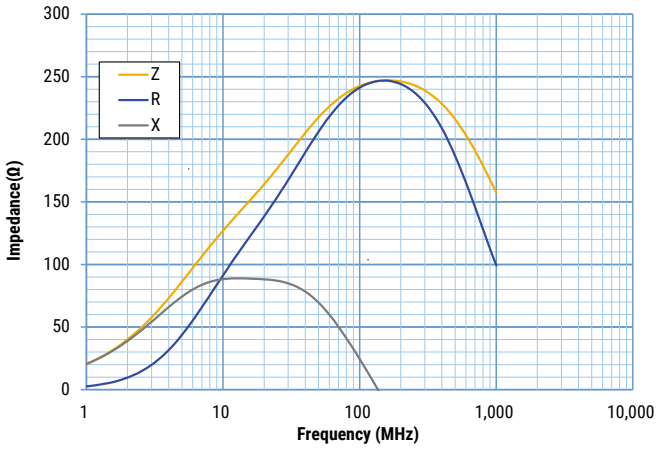

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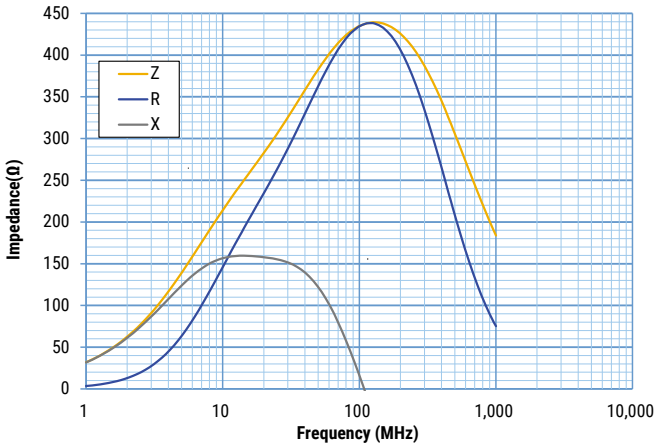

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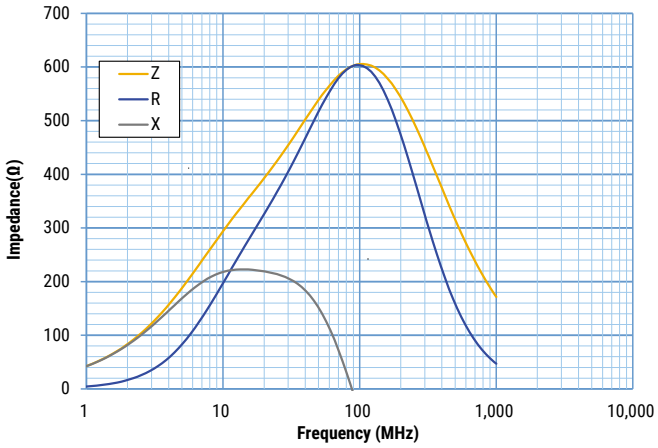

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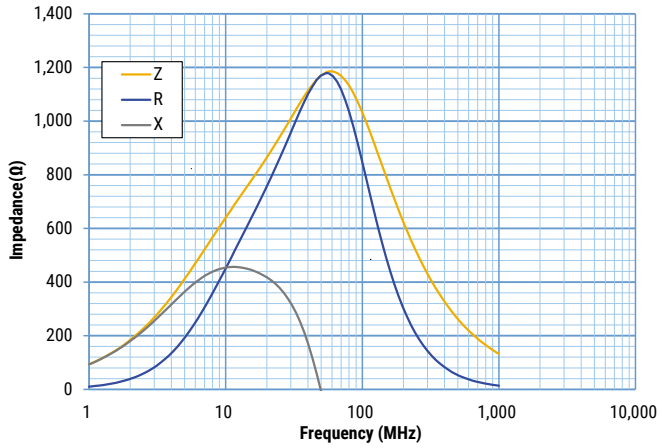



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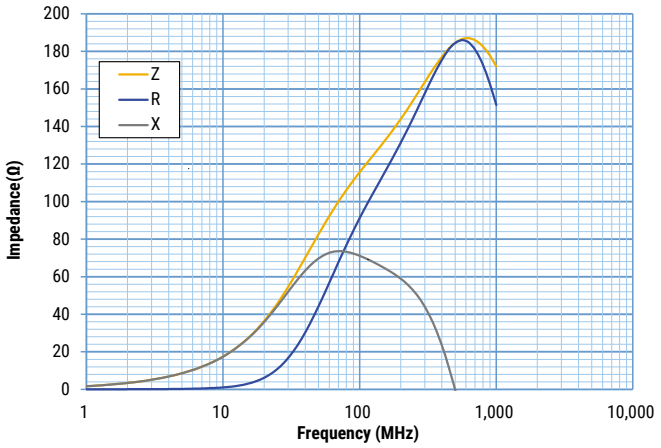


## Frequency Characteristics cont.

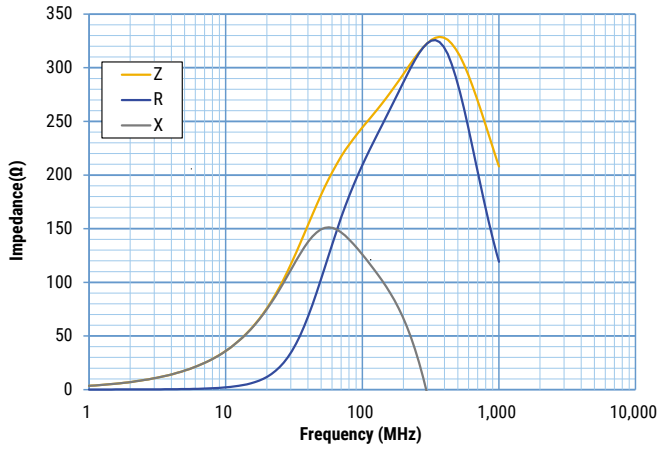
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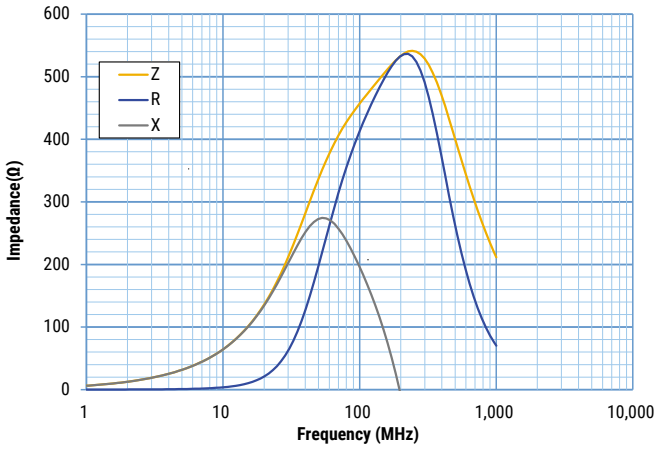

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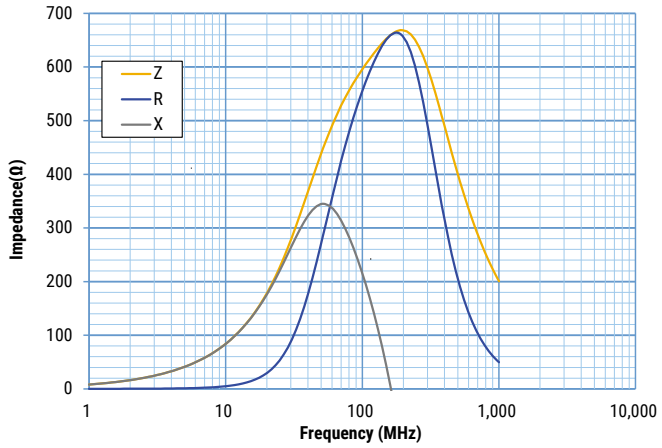

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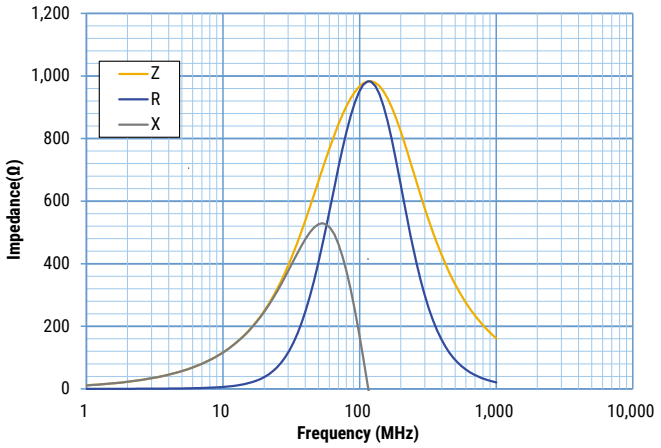

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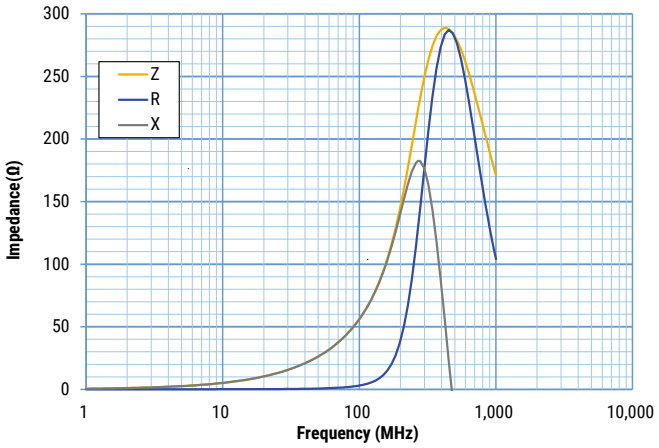



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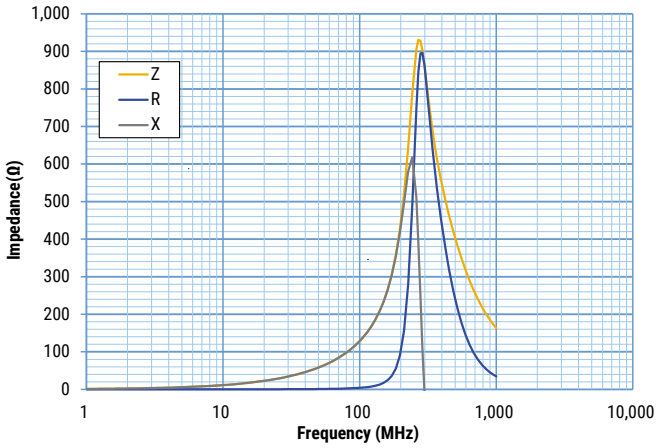


## Frequency Characteristics cont.

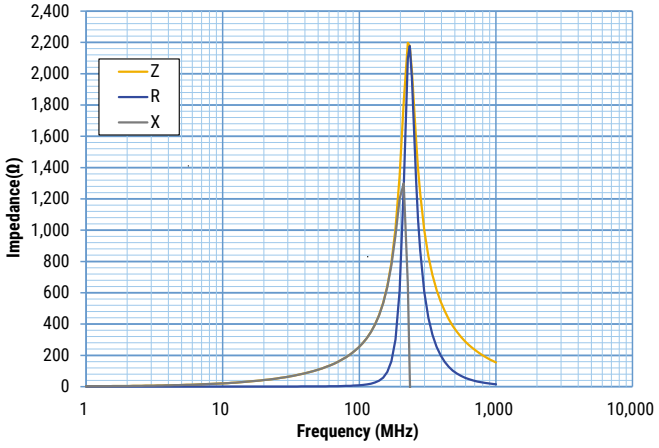
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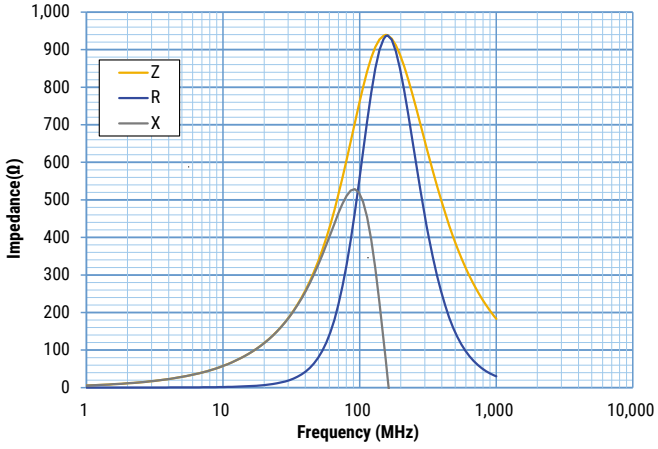

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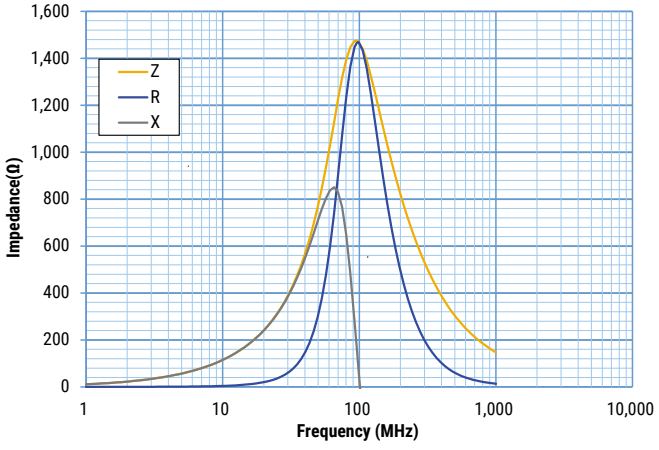

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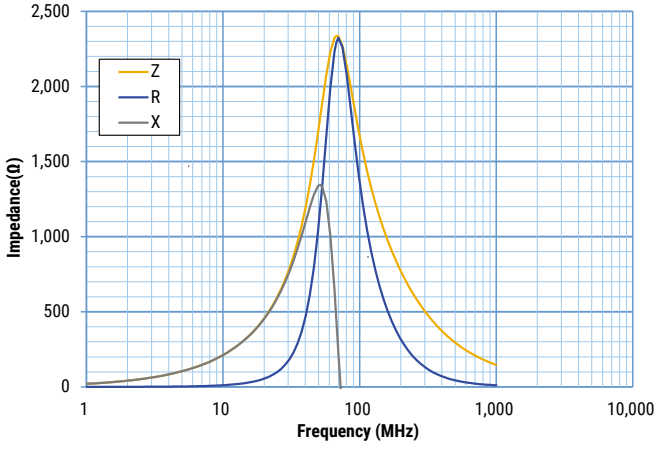

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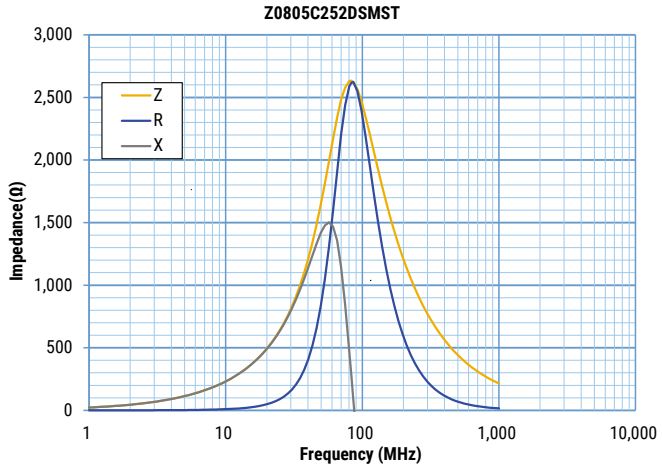

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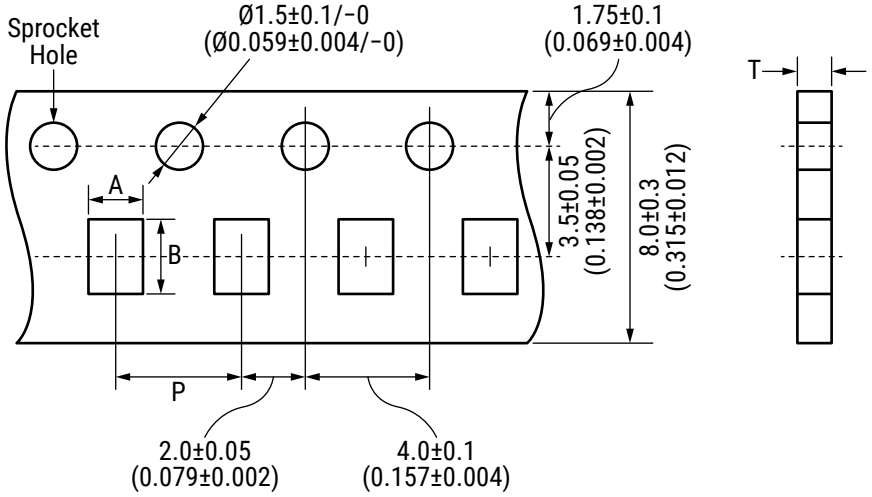


## Frequency Characteristics cont.




## Taping Specifications - Millimeters (Inches)

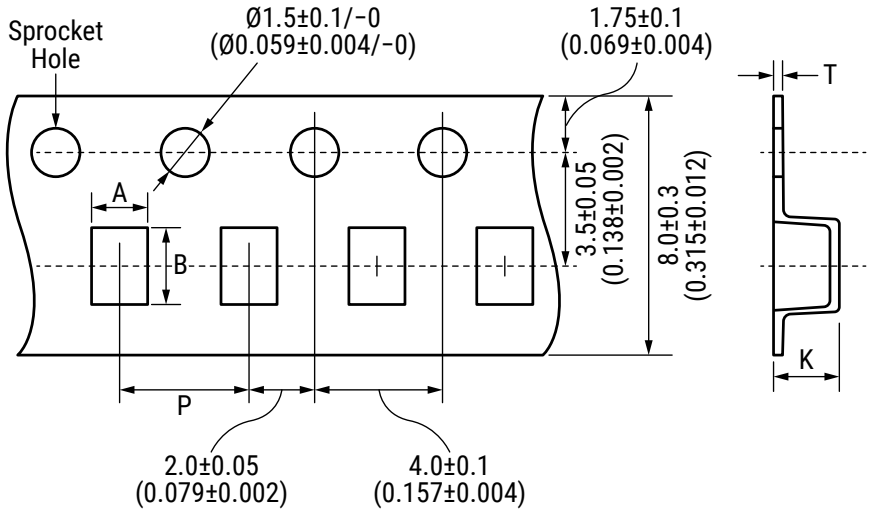
### Paper Tape 8mm Width




| EIA Case Size | Metric Case Size | Height | Reel Quantity | | Cavity | | Pitch | Thickness |
|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | P | T |
| 0201 | 0603 | 0.30 | 15,000 | Nominal | 0.4 | 0.7 | 2.0 | 0.45 |
| | | | | Tolerance | ±0.06 | ±0.06 | ±0.05 | Maximum |
| 0402 | 1005 | 0.50 | 10,000 | Nominal | 0.65 | 1.15 | 2.0 | 0.8 |
| | | | | Tolerance | ±0.1 | ±0.1 | ±0.05 | Maximum |
| 0603 | 1608 | 0.80 | 4,000 | Nominal | 1.0 | 1.8 | 4.0 | 1.1 |
| | | | | Tolerance | ±0.2 | ±0.2 | ±0.1 | Maximum |
| 0805 | 2012 | 0.85 | 4,000 | Nominal | 1.5 | 2.3 | 4.0 | 1.1 |
| | | | | Tolerance | ±0.2 | ±0.2 | ±0.1 | Maximum |

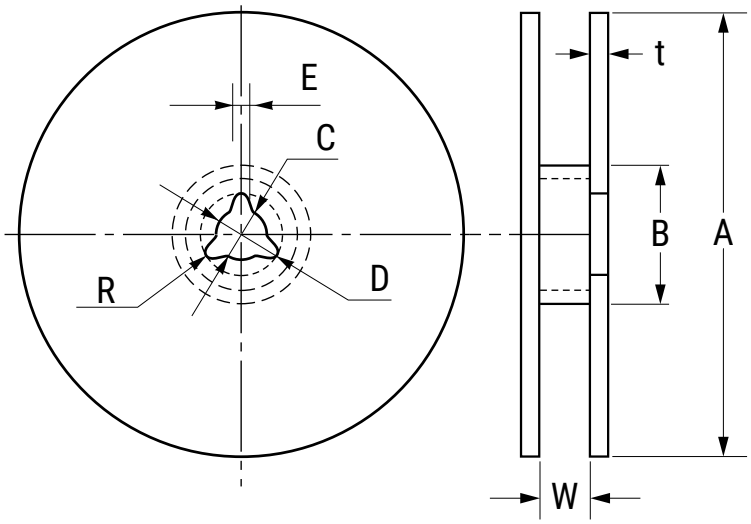
## Taping Specifications - Millimeters (Inches) cont.

### 0805 1.25 mm Height Embossed (Plastic) Tape 8 mm Width



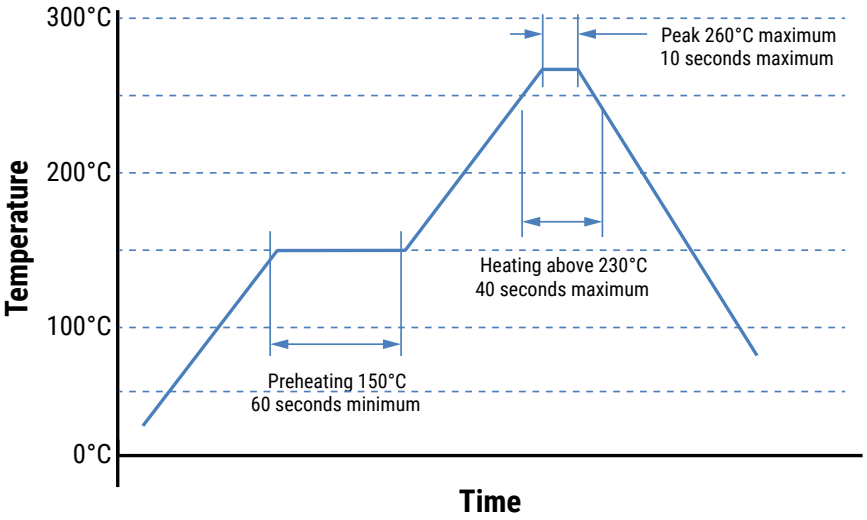

| EIA Case Size | Metric Case Size | Height | Reel Quantity | | Cavity | | Pitch | Thickness | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | P | T | K |
| 0805 | 2012 | 1.25 | 2,000 | Nominal | 1.5 | 2.3 | 4.0 | 0.3 | 2.0 |
| | | | | Tolerance | ±0.2 | ±0.2 | ±0.1 | Maximum | Maximum |

## Reel Specifications - Millimeters




| EIA Size Code | | Dimensions - Millimeters | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | R | t | W |
| 0402<br>0630<br>0805 | Nominal | ø178.0 | ø60.0 | ø13.0 | ø21.0 | 2.0 | 1.0 | 2.5 | 10.0 |
| | Tolerance | ±2.0 | Minimum | ±0.2 | ±0.8 | ±0.5 | | Maximum | ±1.5 |

## Recommended Reflow Soldering Profile




## Handling Precautions

Ferrite chip beads should be stored in normal working environments. While these beads themselves are quite robust in other environments, exposure to high temperatures, high humidity, corrosive atmospheres, and long-term storage degrades solderability.

KEMET recommends that maximum storage temperature not exceed 40°C and maximum storage humidity not exceed 70% relative humidity. Atmospheres should be free of chlorine-bearing and sulfur-bearing compounds. Temperature fluctuations should be minimized to avoid condensation on the parts.

For optimized solderability, ferrite chip beads stock should be used promptly, preferably within six months of receipt."

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