

BROADBAND AND ULTRA-BROADBAND CAPACITORS:

What They Are and Where They're Used

Passive Plus, Inc. (PPI) has developed a series of Broadband and Ultra-Broadband capacitors: the 0402BB103, 0402BB104, and the 0201BB104. These capacitors are intended primarily for coupling RF signals or, occasionally, for bypassing them to ground, while blocking DC. The applications for which they are intended require small, surface-mountable devices that provide low RF impedances, i.e., low insertion losses and reflections, across extremely large RF bandwidths and temperatures typically ranging from -55 to +85 °C.

Small, single-layer capacitors, apart from not being surface-mountable, usually do not have sufficiently large capacitance values to cover the required frequency range, which may extend from the tens or hundreds of kilohertz to the tens of gigahertz. Ordinary multi-layer capacitors, when operated over these ranges, display “parallel resonances,” narrow frequency bands over which they have high impedances and insertion losses. The Passive Plus “BB” series overcomes these objections to achieve bandwidths as high as -- in the case of the 0201BB104 -- a remarkable 16 KHz to >50 GHz.

Applications for the BB series are primarily found in the so-called “signal integrity” market:

- Optoelectronics/high- speed data
- ROSA/TOSA (Transmit/Receive optical subassemblies)
- SONET(Synchronous Optical Networks)
- Broadband test equipment
- Broadband microwave and millimeter wave amplifiers and oscillators

In general, best results are achieved by capacitors that are close in width to that of the transmission line trace. Most trace widths on commonly used substrates that must function well above 12 GHz lie in the 8- to 24-mil range, and so 0402 and 0201 SMT devices are well suited to the applications.

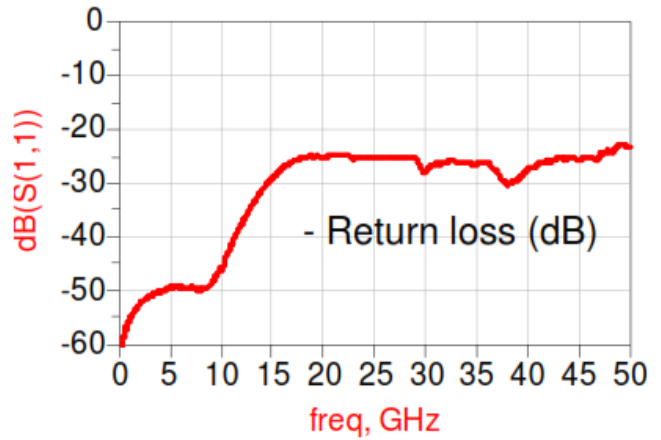
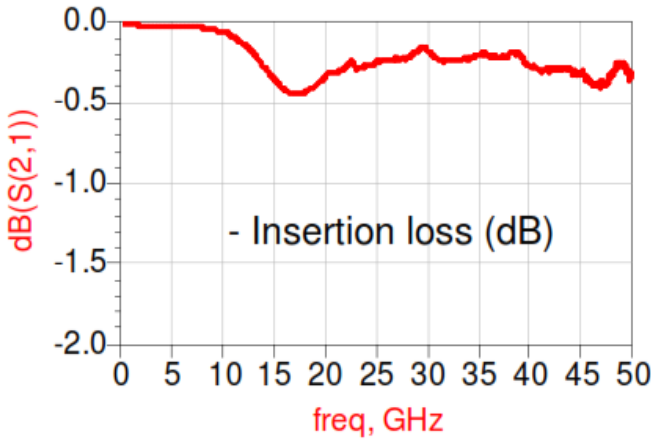
To reiterate, customers requiring surface-mountable, 10 nF or 100 nF X7R capacitors that provide resonance-free, low insertion loss, low reflection operation over extremely large RF bandwidths will be well served by Passive Plus's BB series.

PPI 0201BB104

100 nF Resonance-Free Ultra-Broadband Capacitor

Features:

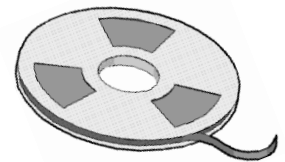
- Typical operating frequency range: 16 KHz (-3 dB point) to > 50 GHz
- Case size 0201 (.020" x .010")
- Insertion Loss: < 1 db, typical



Typical responses for sample placed across a 4-mil air gap between two 10-mil-thick alumina substrates. Measurements de-embedded to sample edges using TRL calibration procedures.

Electrical Specifications:

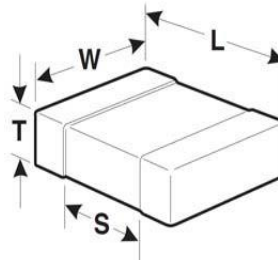
- Capacitance: 100 nF
- Operating Temperature Range: -55°C to +125°C
- Temperature Coefficient of Capacitance (TCC): ±15% (-55°C to +125°C)
- Rated Voltage: 16 WVDC
- Dielectric Withstanding Voltage (DWV): 250% of rated WVDC for 5 secs.
- Insulation Resistance: 10¹¹Ω min. @ +25°C @ rated WVDC



15K pcs/reel

Mechanical Dimensions:

- L = 0.020 in. ±0.004 in. (1.016mm ±0.102mm)
- W = 0.010 in. ±0.004 in. (0.508 mm ±0.102 mm)
- T = 0.024 in. MAX. (0.610 mm MAX.)
- S = 0.016 in. MIN. (0.406 mm MIN.)



Passive Plus 0201BB Series Part Number Code:

0201 BB 10 4 K W 16

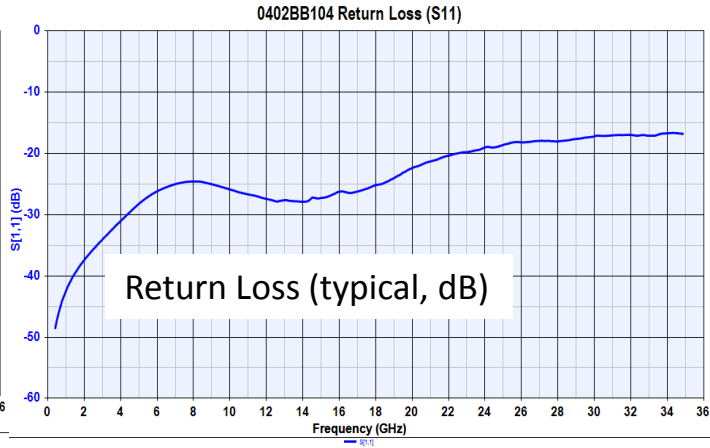
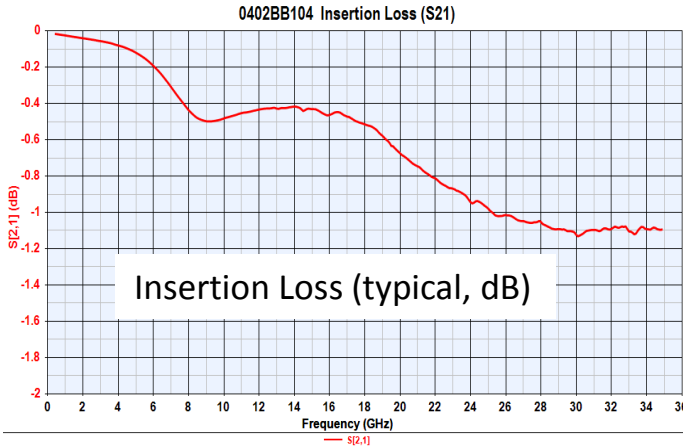


PPI 0402BB104

100 nF Resonance-Free Broadband Capacitor

Features:

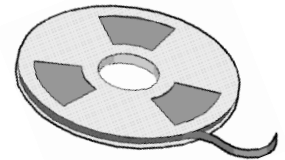
- Typical operating frequency range: 16 KHz (-3 dB point) to **35 GHz**
- Case size 0402 (.040" x .020")
- Insertion Loss: < 1.2 db, typical
- 16 WVDC



Typical responses for samples placed on a 10-mil-thick Rogers 4350B microstrip board, sample spanning a 10-mil gap in the 20-mil-wide center trace. All measurements made using TRL de-embedding procedures.

Electrical Specifications:

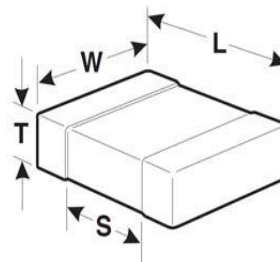
- Capacitance: 100 nF
- Operating Temperature Range: -55°C to +125°C
- Temperature Coefficient of Capacitance (TCC): ±15% (-55°C to +125°C)
- Rated Voltage: 16 WVDC
- Dielectric Withstanding Voltage (DWV): 250% of rated WVDC for 5 secs.
- Insulation Resistance: 10¹¹Ω min. @ +25°C @ rated W



10K pcs/reel

Mechanical Dimensions:

- L = 0.040 in. ±0.004 in. (1.016mm ±0.102mm)
- W = 0.020 in. ±0.004 in. (0.508 mm ±0.102 mm)
- T = 0.024 in. MAX. (0.610 mm MAX.)
- S = 0.016 in. MIN. (0.406 mm MIN.)



Passive Plus 0402BB Series Part Number Code:

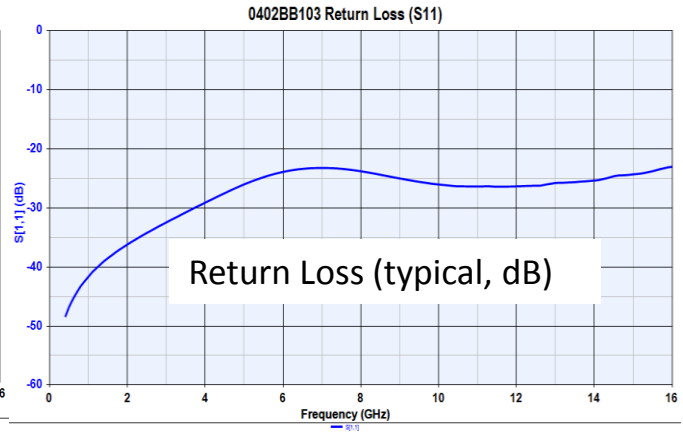
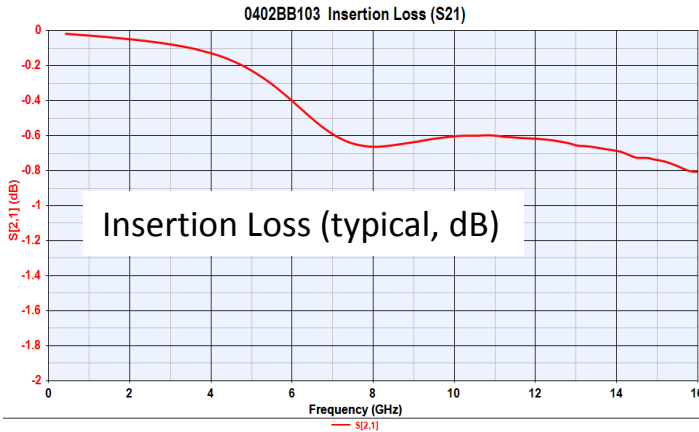


PPI 0402BB103

10 nF Resonance-Free Broadband Capacitor

Features:

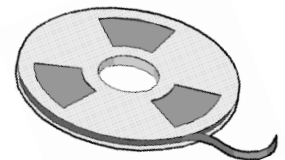
- Typical operating frequency range: 16 KHz (-3 dB point) to **16 GHz**
- Case size 0402 (.040" x .020")
- Insertion Loss: < 1 db, typical
- 16 WVDC



Typical responses for sample placed on a 10-mil-thick Rogers 4350B microstrip board, sample spanning a 10-mil gap in the 20-mil-wide center trace. All measurements made using TRL de-embedding procedures.

Electrical Specifications:

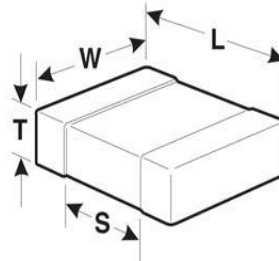
- Capacitance: 10 nF
- Operating Temperature Range: -55°C to +125°C
- Temperature Coefficient of Capacitance (TCC): ±15% (-55°C to +125°C)
- Rated Voltage: 16 WVDC
- Dielectric Withstanding Voltage (DWV): 250% of rated WVDC for 5 secs.
- Insulation Resistance: 10¹¹Ω min. @ +25°C @ rated WVDC



10K pcs/reel

Mechanical Dimensions:

- L = 0.040 in. ±0.004 in. (1.016mm ±0.102mm)
- W = 0.020 in. ±0.004 in. (0.508 mm ±0.102 mm)
- T = 0.024 in. MAX. (0.610 mm MAX.)
- S = 0.016 in. MIN. (0.406 mm MIN.)



Passive Plus 0402BB Series Part Number Code:

0402 BB 10 3 K W 16

