Fixed Attenuators
DC - 40 GHz

MAAT-01102x Series
Rev. V1

Features

- Wide Bandwidth Fixed Attenuation up to 40 GHz
- 2, 3, 4, 6, 10, and 15 dB Values
- Thru Line Available
- 50 Ω Impedance
- Power Handling: 29 dBm
- Bidirectional
- 6 Lead 1.5 x 1.2 mm DFN Package
- RoHS* Compliant

Applications

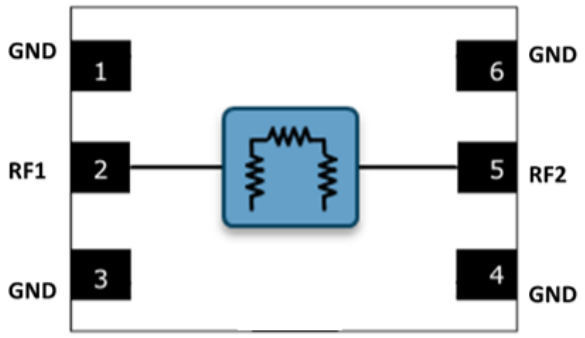
- Test and Measurement
- Telecom Infrastructure
- Fiber Optics
- Sensors
- Satellite Communications
- Microwave Radio
- General Purpose

Description

The MAAT-01102x series is a set of broadband bidirectional, fixed attenuator values including 0, 2, 3, 4, 6, 10, and 15 dB.

The MAAT-01102x attenuators are well suited for many applications that require a small SMT attenuators with flat attenuation and good return losses.

Functional Schematic



Pin Names[1,2]

Pin #	Name	Function
1,3,4,6	GND	Ground
2	RF1	RF Input/Output
5	RF2	RF Input/Output

1. Ground Pins 1, 3, 4, and 6 are internally connected to the exposed backside pad.
2. The exposed pad centered on the package bottom must be connected to RF, DC and thermal ground.

Ordering Information[3,4]

Part Number	Description
MAAT-011022-TR1000	Thru Line
MAAT-011024-TR1000	2 dB Attenuator
MAAT-011025-TR1000	3 dB Attenuator
MAAT-011026-TR1000	4 dB Attenuator
MAAT-011027-TR1000	6 dB Attenuator
MAAT-011028-TR1000	10 dB Attenuator
MAAT-011029-TR1000	15 dB Attenuator
MAAT-01102x-SMB	Sample Board

3. Reference Application Note M513 for reel size information.
4. The x on SMB PN denotes the specific Attenuator PN desired. Please select the appropriate option when ordering.

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Pin Description

Pin #	Name	Description
1	GND	Ground
2	RF1	RF Input/Output (DC coupled, Do not apply external Vdc)
3	GND	Ground
4	GND	Ground
5	RF2	RF Input/Output (DC coupled, Do not apply external Vdc)
6	GND	Ground

Electrical Specifications: T_C = 25°C[5], Z_0 = 50 Ω

Part Number	Attenuation 6 GHz 22 GHz 40 GHz			In/Out Return Loss 6 GHz 22 GHz 40 GHz	Input IP3 22 GHz
	dB			dB	dBm
	Min.	Typ.	Max.	Typ.	Typ.
MAAT-011022	— — —	0.0 0.8 1.8	0.2 — —	22 18 10	—
MAAT-011024	1.7 — —	1.9 2.8 3.8	2.1 — —	22 18 10	51
MAAT-011025	2.8 — —	3.0 3.8 4.8	3.2 — —	22 18 10	52
MAAT-011026	4.0 — —	4.2 4.8 5.8	4.4 — —	22 18 10	53
MAAT-011027	5.7 — —	6.3 6.8 7.8	6.9 — —	20 18 10	54
MAAT-011028	10.1 — —	10.3 10.8 11.8	10.5 — —	22 18 10	55
MAAT-011029	15.0 — —	15.3 15.8 16.8	15.6 — —	22 18 10	56

5. Tc is defined as the case temperature of the backside ground paddle.

Maximum Operating Conditions

Parameter	Maximum
Input Power	29 dBm
Operating Temperature	-40ºC to +85ºC

Absolute Maximum Ratings[6,7]

Parameter	Absolute Maximum
Input Power	30 dBm
Storage Temperature	-65ºC to +150ºC

6. Exceeding any one or combination of these limits may cause permanent damage to this device.
7. MACOM does not recommend sustained operation near these survivability limits.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

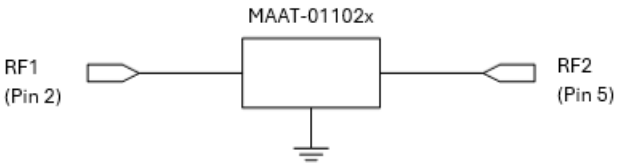
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1C and CDM Class C3 devices.

Application Information

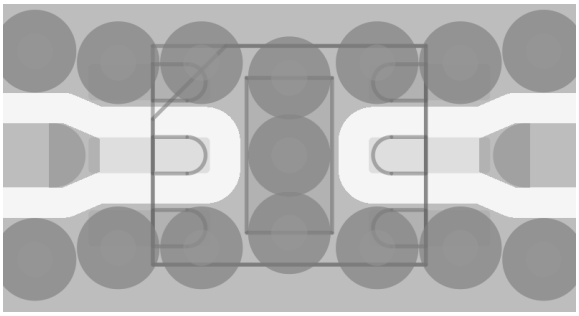
The MAAT-01102x series is designed to deliver high performance and to be easy to use.

No external components are needed. The RF connections required by the MAAT-01102x are shown in a schematic below.

The MAAT-01102x attenuator series is bidirectional. Pins 2 and 5 should be connected to the RF lines on the printed circuit board (PCB). The third required connection is that to the RF ground. The exposed metal paddle on the backside of the package must be connected to the RF ground of the PCB housing the attenuator. This can be accomplished by using conductive via holes. It is important to ensure that the parasitic inductance associated with the connection between the attenuator and the RF ground is as small as possible.



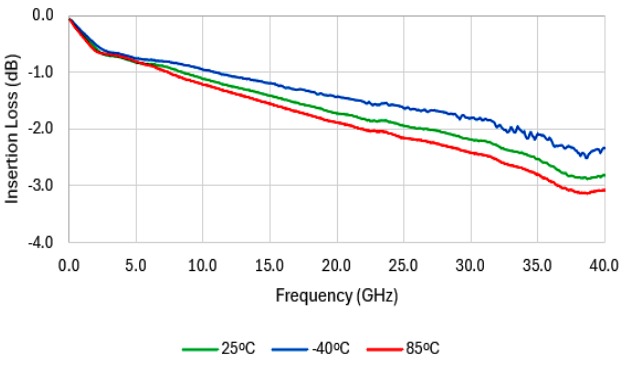
Recommended PCB Configuration



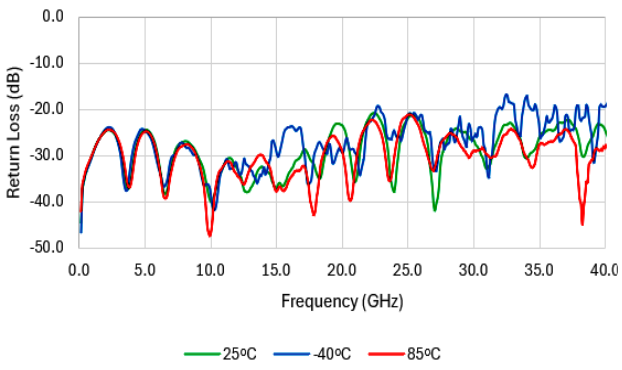
Evaluation Board

An evaluation board for the MAAT-01102x series attenuators with loose samples is available. The kit consists of a PCB with 2.4 mm connectors along with loose samples. MACOM suggests a Rogers 4003 dielectric of 0.008" (0.20 mm) with 1 ounce copper. Proper grounding is always important; we suggest using 8 mil (0.20 mm) vias placed generously underneath the part.

Thru Line on Evaluation Board Insertion Loss

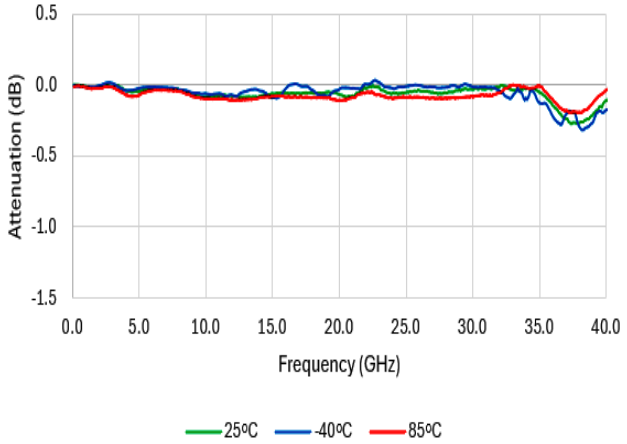


Thru Line on Evaluation Board Return Loss

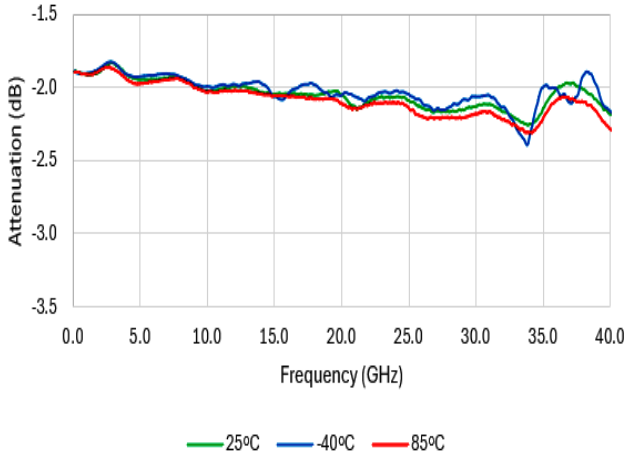


Typical Performance Curves

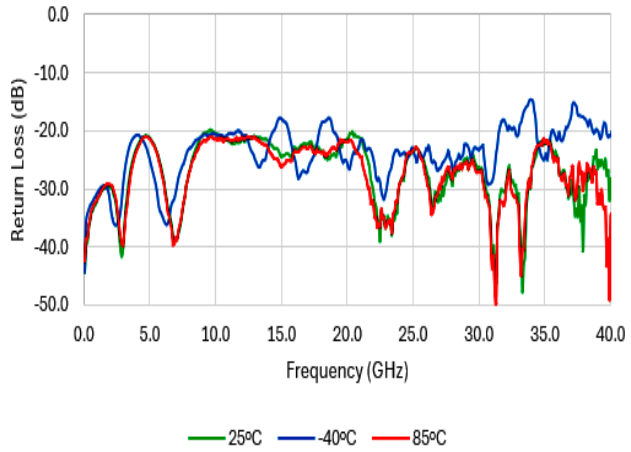
MAAT-011022 Attenuation (Thru)



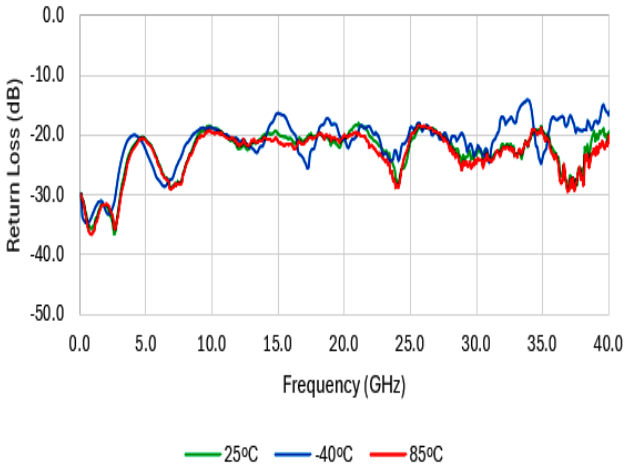
MAAT-011024 Attenuation (2 dB)



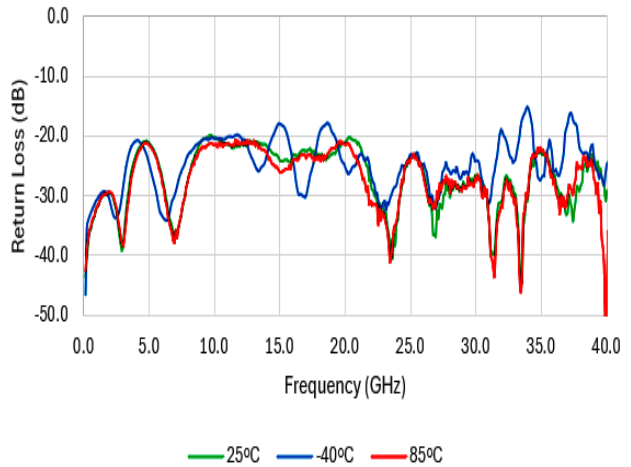
MAAT-011022 Input Return Loss



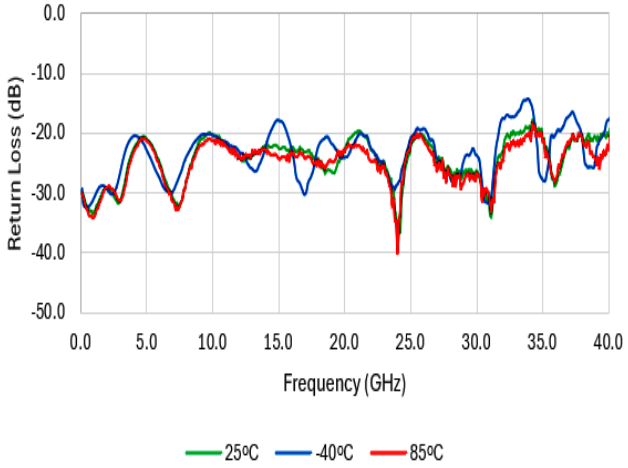
MAAT-011024 Input Return Loss



MAAT-011022 Output Return Loss

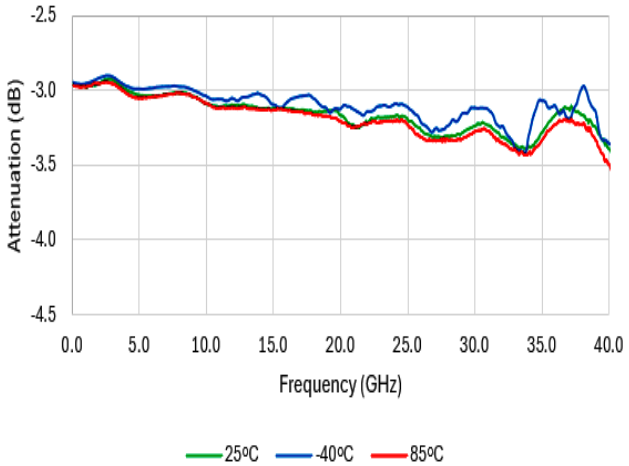


MAAT-011024 Output Return Loss

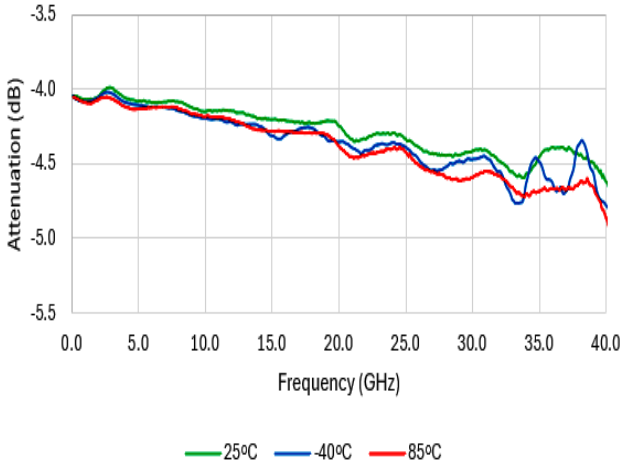


Typical Performance Curves

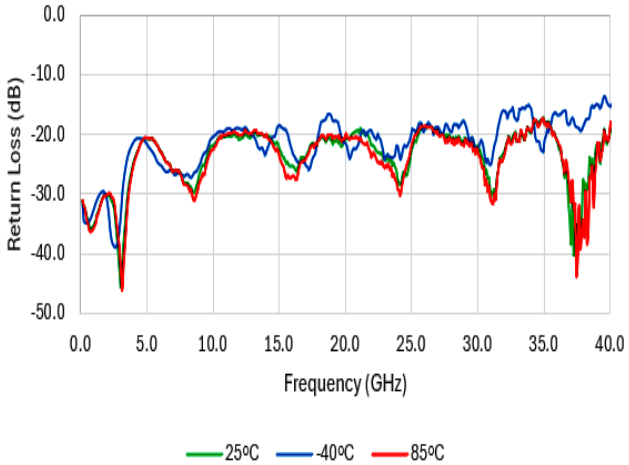
MAAT-011025 Attenuation (3 dB)



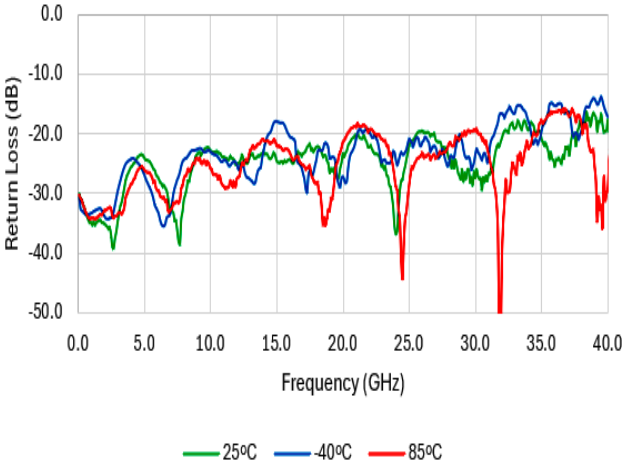
MAAT-011026 Attenuation (4 dB)



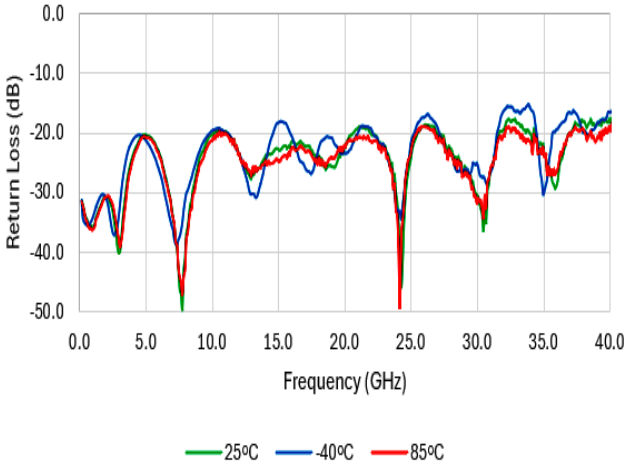
MAAT-011025 Input Return Loss



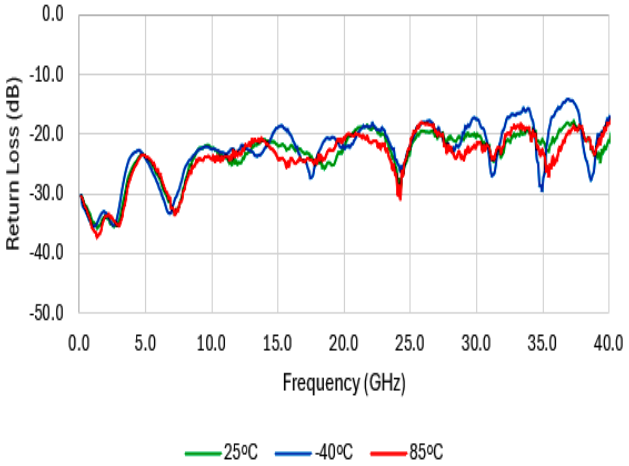
MAAT-011026 Input Return Loss



MAAT-011025 Output Return Loss

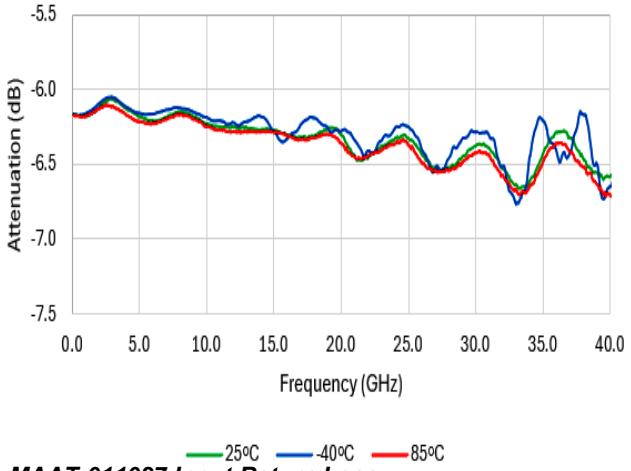


MAAT-011026 Output Return Loss

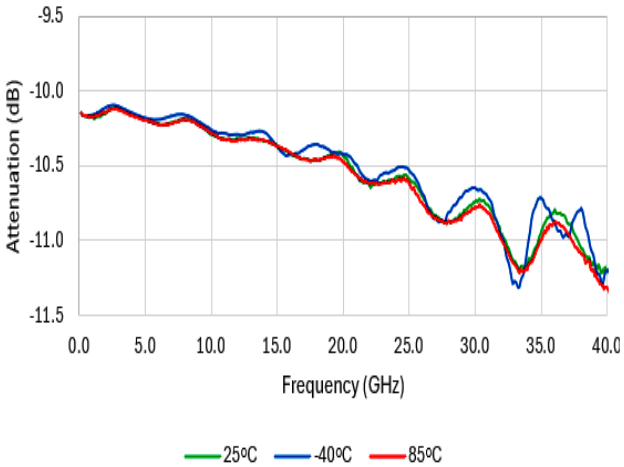


Typical Performance Curves

MAAT-011027 Attenuation (6 dB)

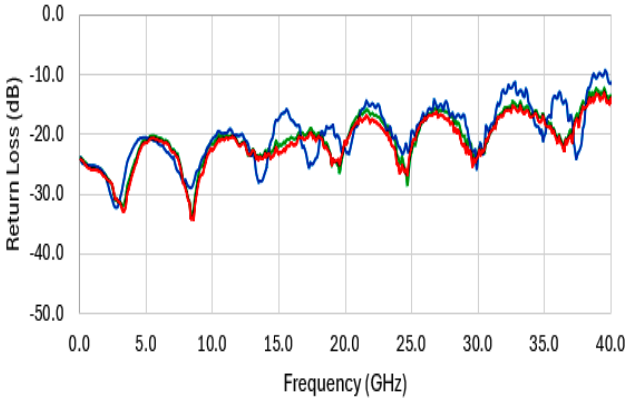


MAAT-011028 Attenuation (10 dB)

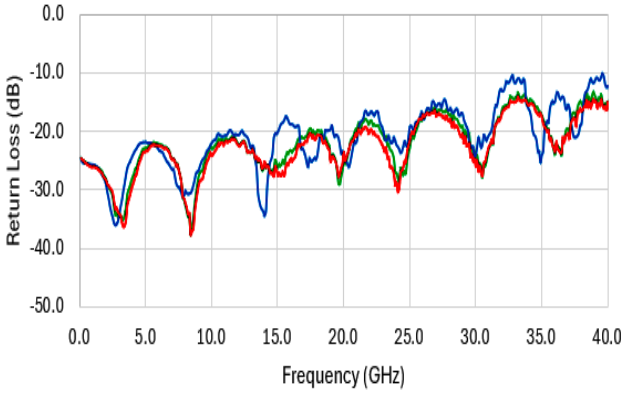


25°C -40°C 85°C

MAAT-011027 Input Return Loss

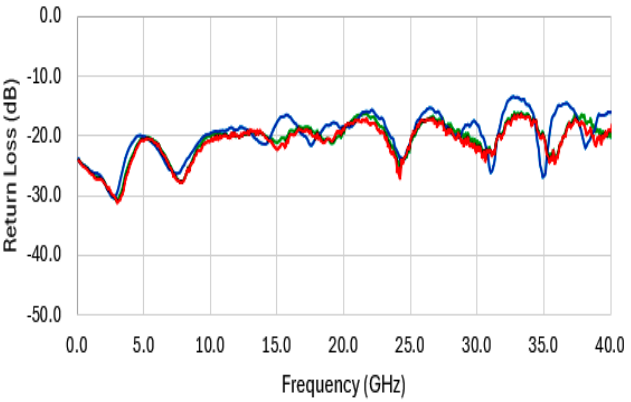


MAAT-011028 Input Return Loss

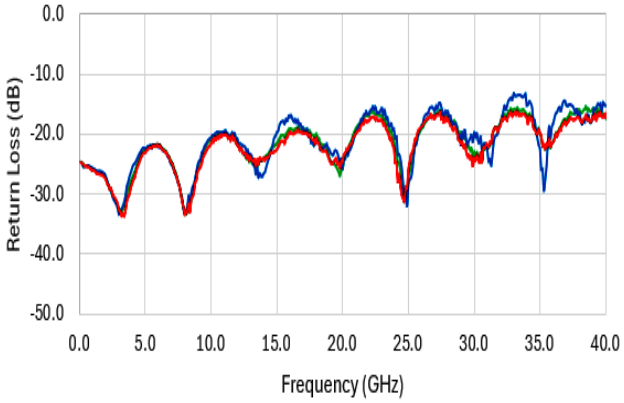


25°C -40°C 85°C

MAAT-011027 Output Return Loss



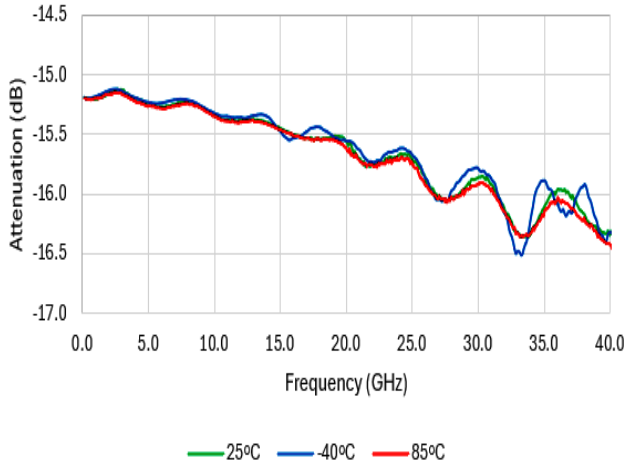
MAAT-011028 Output Return Loss



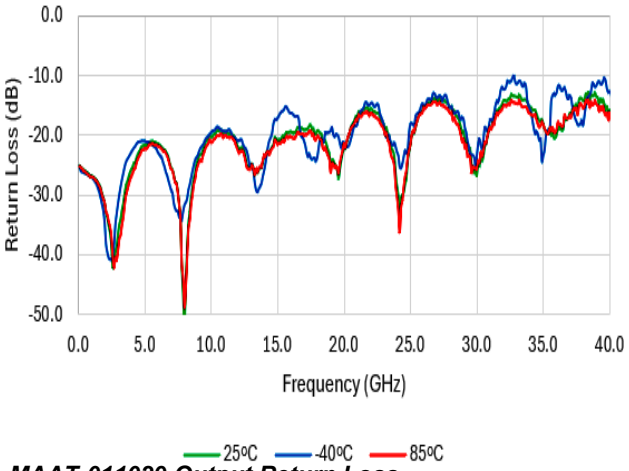
25°C -40°C 85°C

Typical Performance Curves

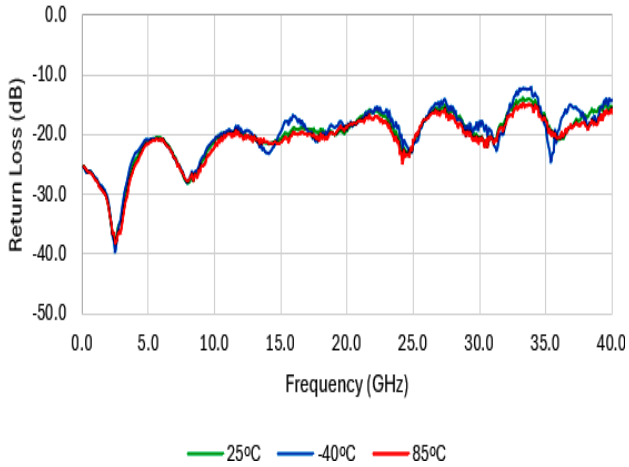
MAAT-011029 Attenuation (15dB)



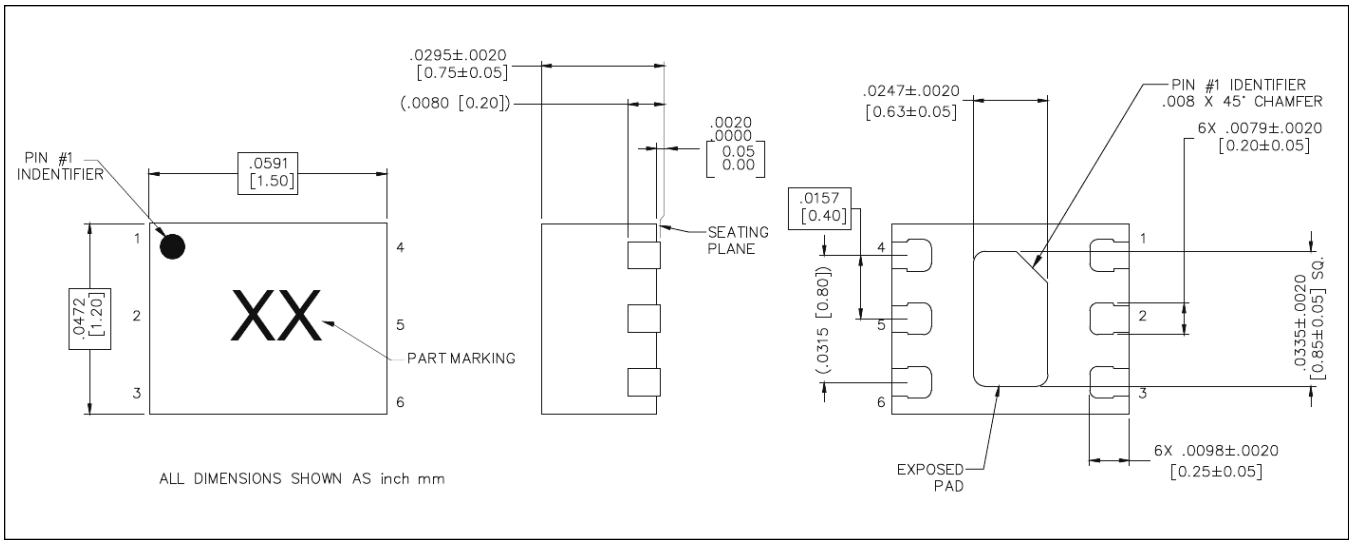
MAAT-011029 Input Return Loss



MAAT-011029 Output Return Loss



Lead-Free 1.5 x 1.2 mm 6-Lead



† Reference Application Note S2083 for lead-free solder reflow recommendations.
Plating is NiPdAuAg.

Revision history

Rev	Date	Change description
V1	March 2025	Production release