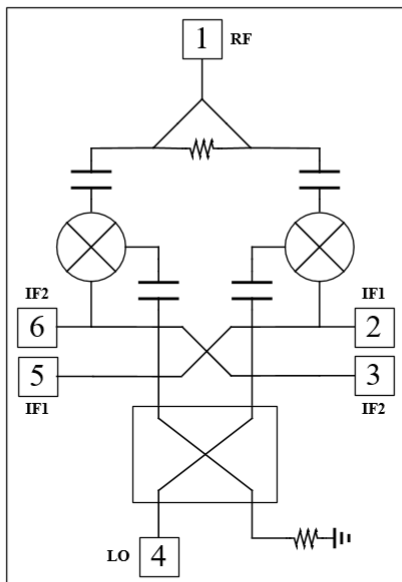
Product Overview

The ASM0001 is a compact I/Q MMIC mixer which can be used as either an Image Reject Mixer or a Single Sideband Up converter. The chip utilizes two standard double balanced mixer cells and a 90 degree hybrid fabricated in a GaN process. All data shown below is taken with the chip mounted in a 50 Ohm test fixture and includes the effects of 1 mil diameter and 20 mil length bond wires on each port. A low frequency quadrature hybrid was used to produce a 1 GHz IF output. This product is a much smaller alternative to hybrid style Image Reject Mixers and Single Sideband Up converter assemblies.

Key Features

1. Fully Integrated, High Performance I/Q Mixer
2. RF/LO Bandwidth: 5.5 GHz to 9.5 GHz
3. Wide IF Bandwidth: 0.5 to 1.5 GHz
4. Image Rejection: 25 dB
5. LO to RF Isolation: 50 dB
6. High Input IP3: +21 dBm
7. 50 Ohm Matched Input/output
8. Die Size: 3.0 x 1.0 x 0.1 mm

Functional Block Diagram



Applications

1. Point-to-Point and Point-to-Multi-Point Radio
2. VSAT

Absolute Maximum Rating

RF/IF Input	+33 dBm
LO Drive	+33 dBm
Channel Temperature	175 °C
Continuous Pdiss(T = 85 °C)	0.55 W
Thermal Resistance (channel to ground pad)	55 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

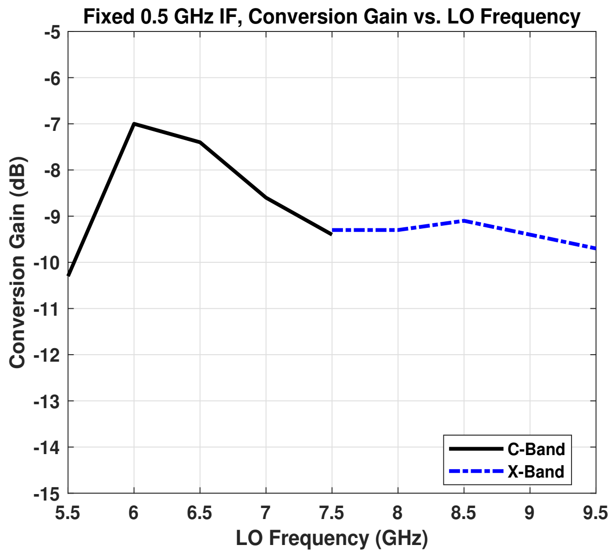
ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS

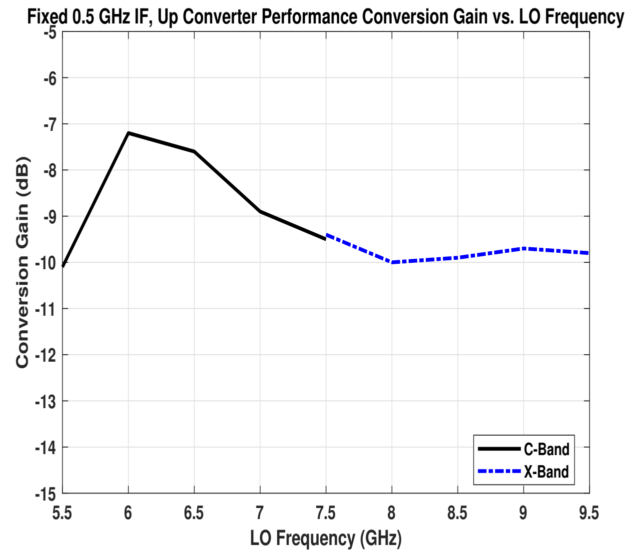
Electrical Specifications

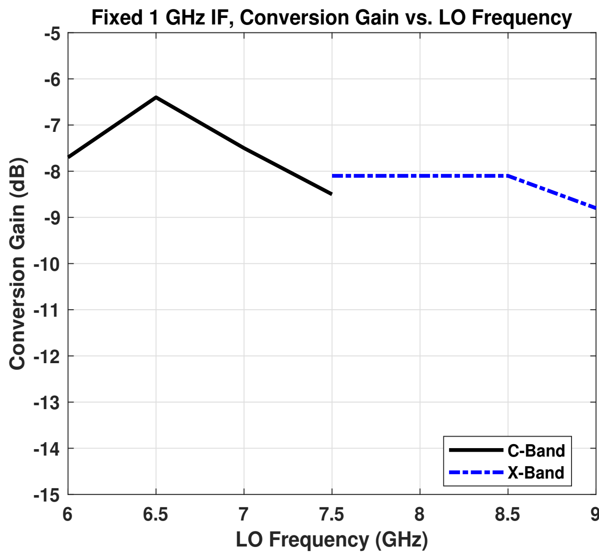
Parameter	Min.	Typ.	Max.	Units
Frequency Range, RF/LO	-	5.5 – 9.5	-	GHz
Frequency Range, IF	-	0.5 – 1.5	-	GHz
Conversion Loss (As IRM)	-	8	10	dB
Image Rejection	17	25	-	dB
1 dB Compression (Input)	-	20	-	dBm
LO to RF Isolation	50	55	-	dB
LO to IF Isolation	50	55	-	dB
IP3 (Input)	-	21	-	dBm
Amplitude Balance	-	0.5	-	dB
Phase Balance	-	5	-	Deg

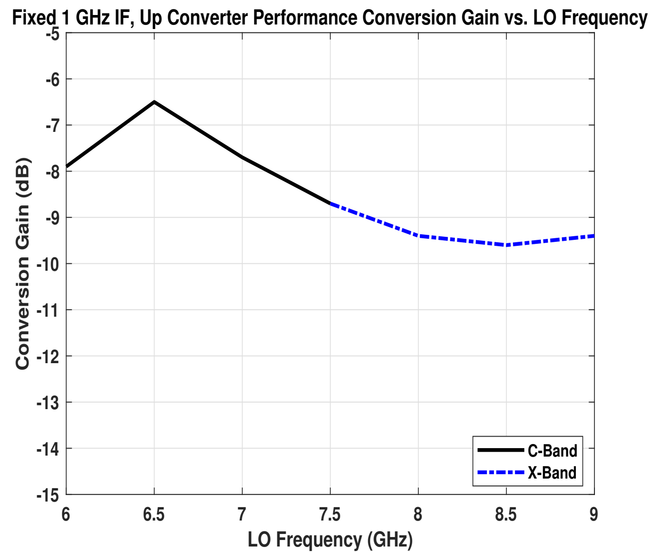
Test conditions unless otherwise noted:TA=+25 °C, LO=+21 dBm

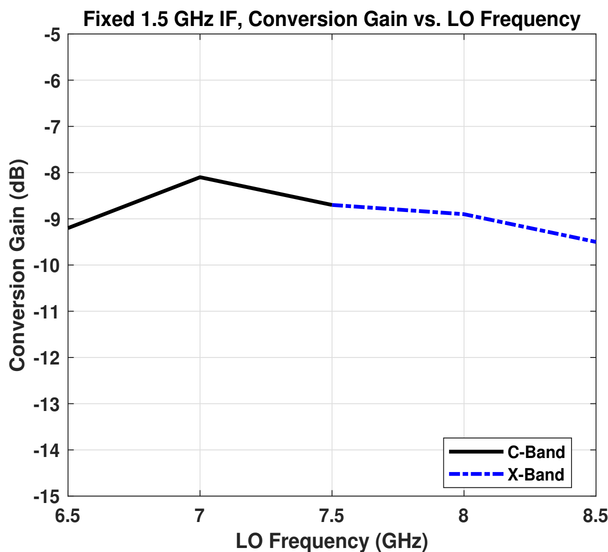
Quadrature Channel Data Taken Without IF Hybrid

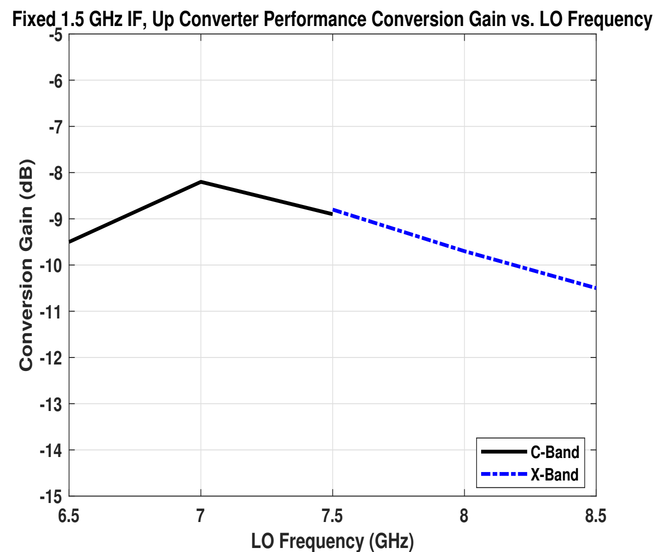




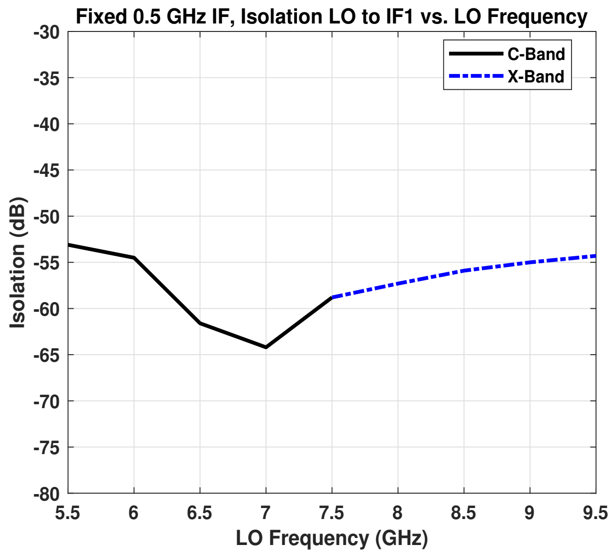


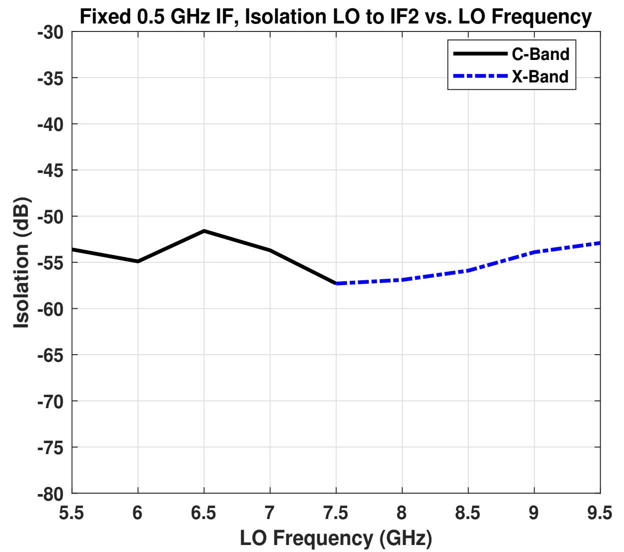


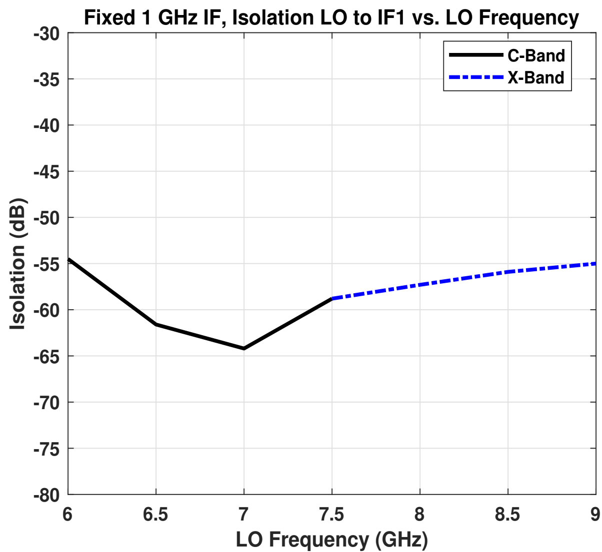


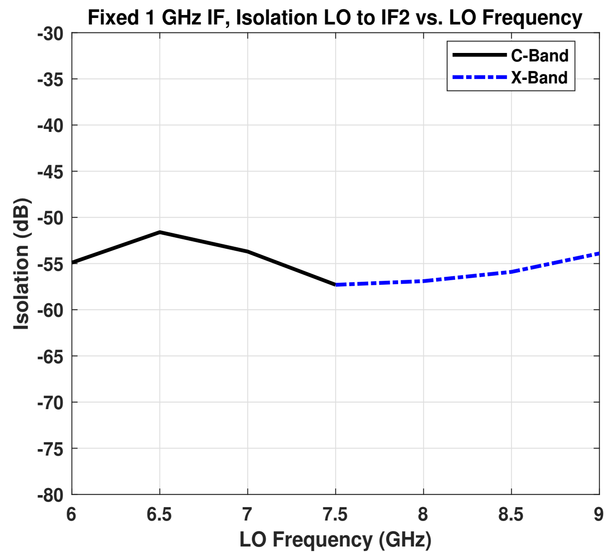


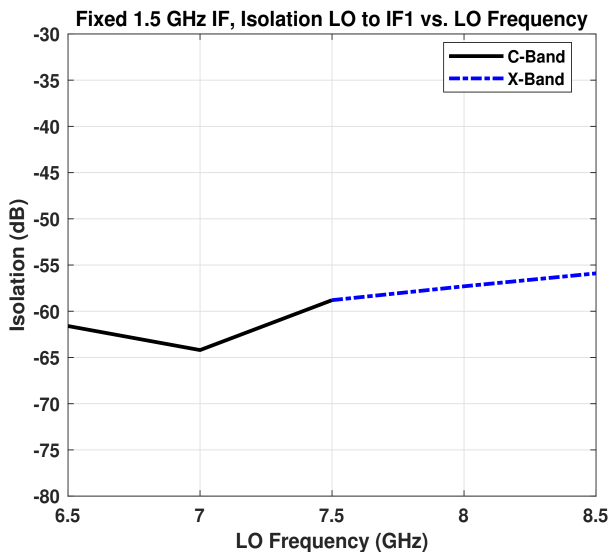
Quadrature Channel Data Taken Without IF Hybrid

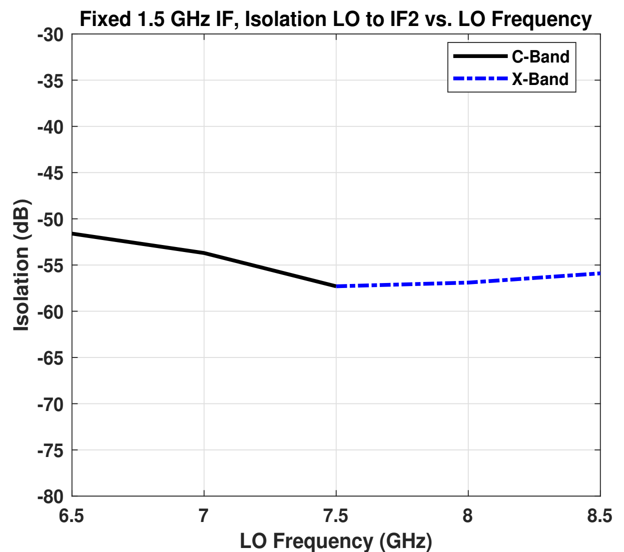




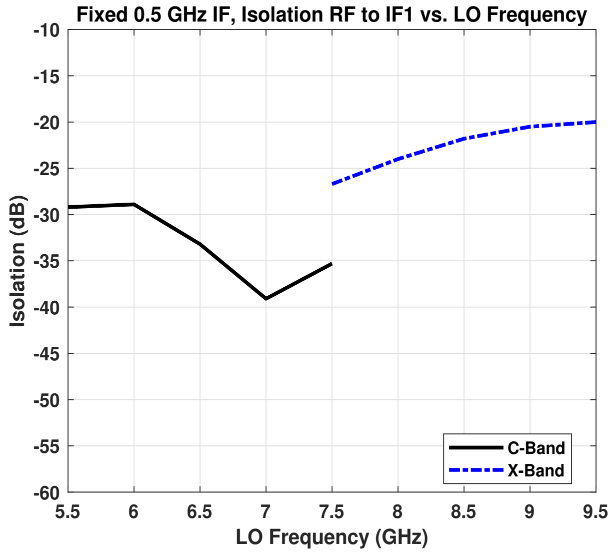


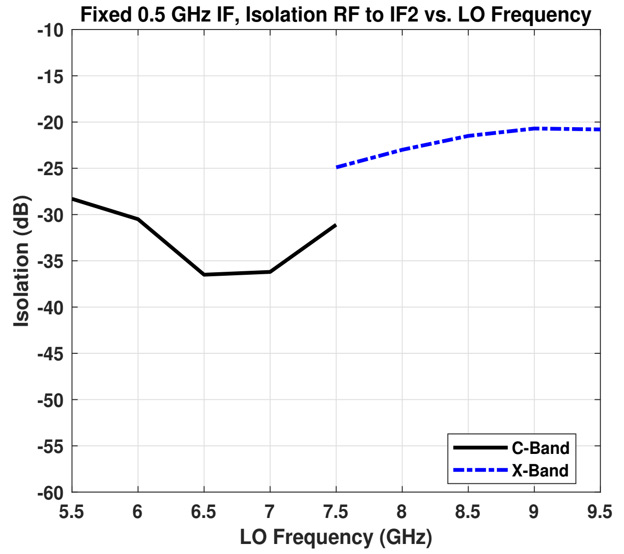


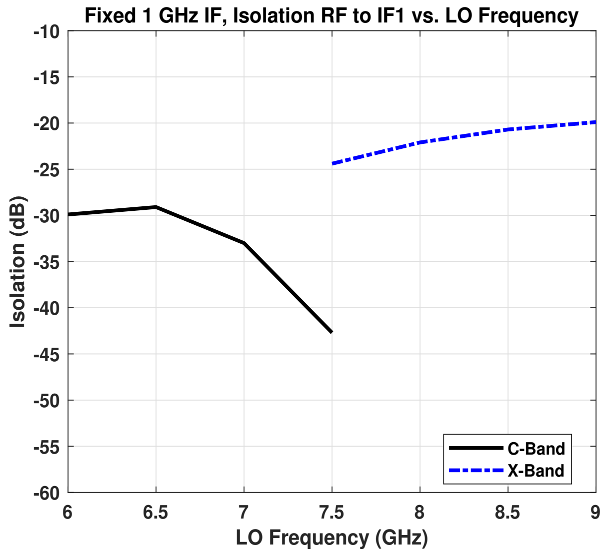


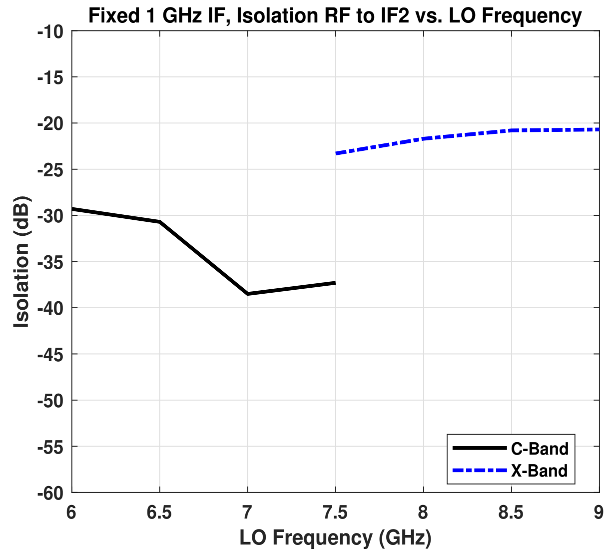


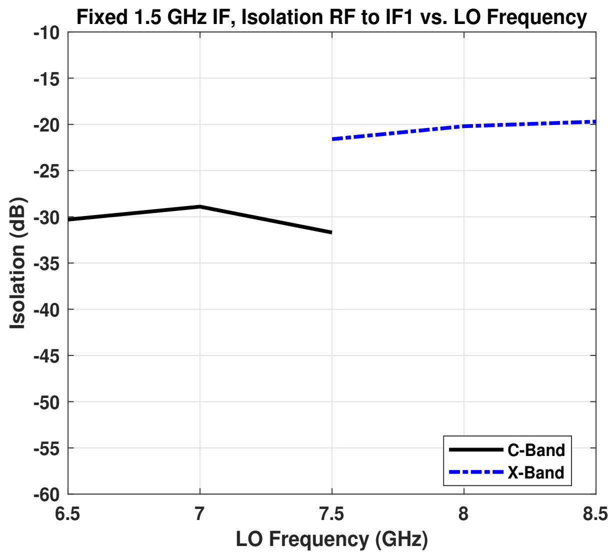
Quadrature Channel Data Taken Without IF Hybrid

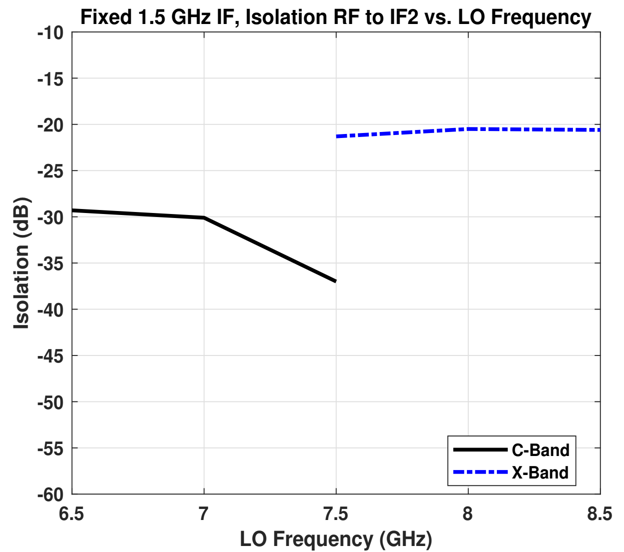




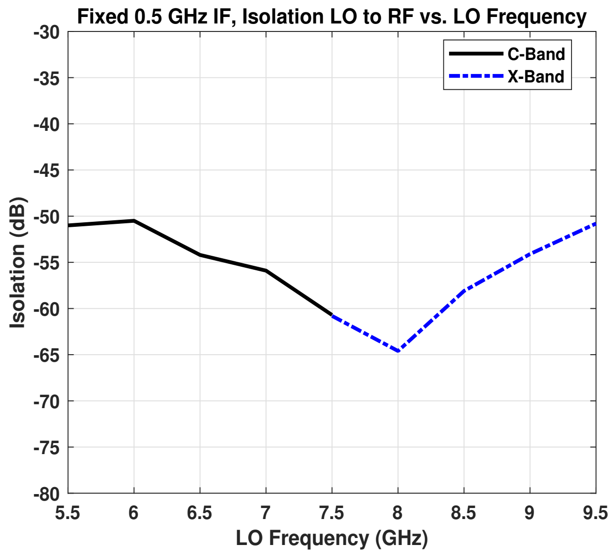


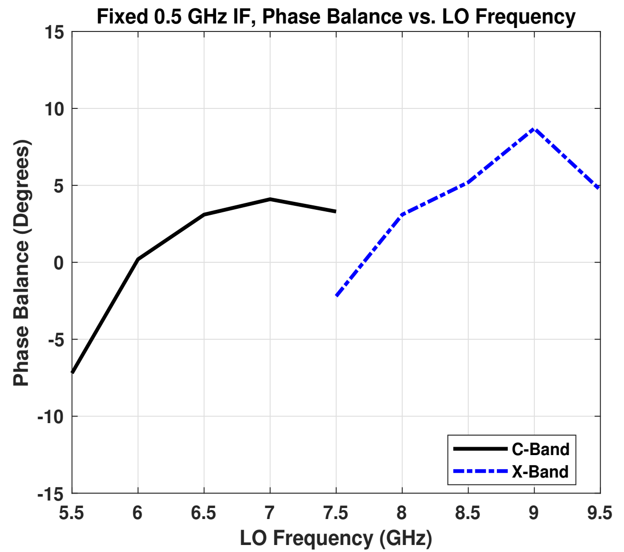


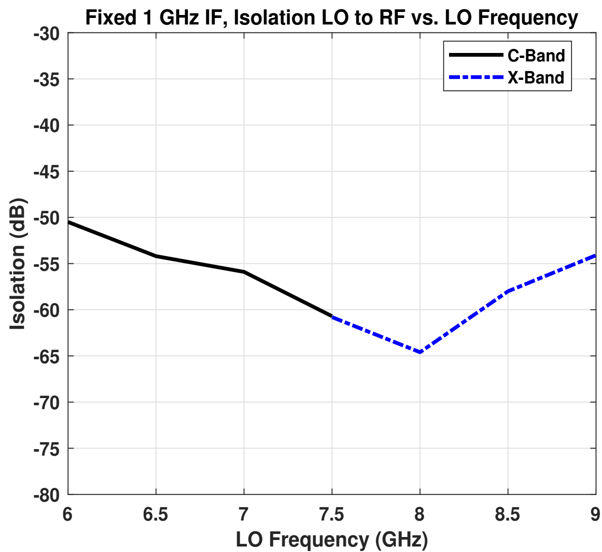


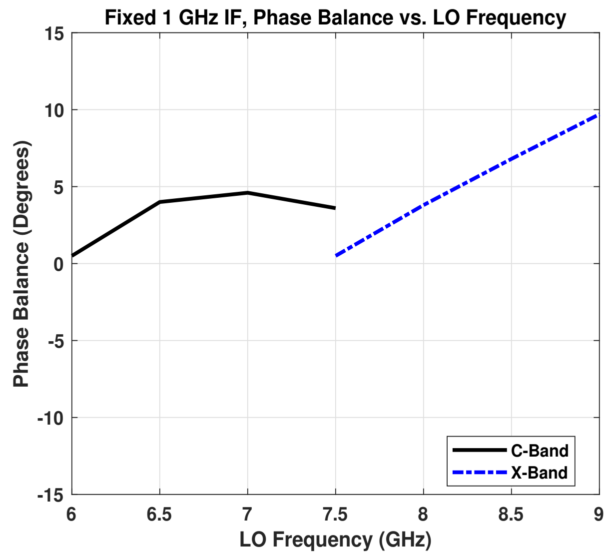


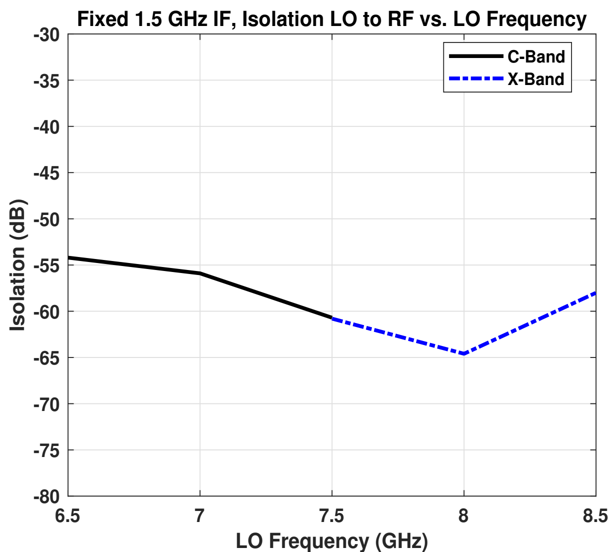
Quadrature Channel Data Taken Without IF Hybrid

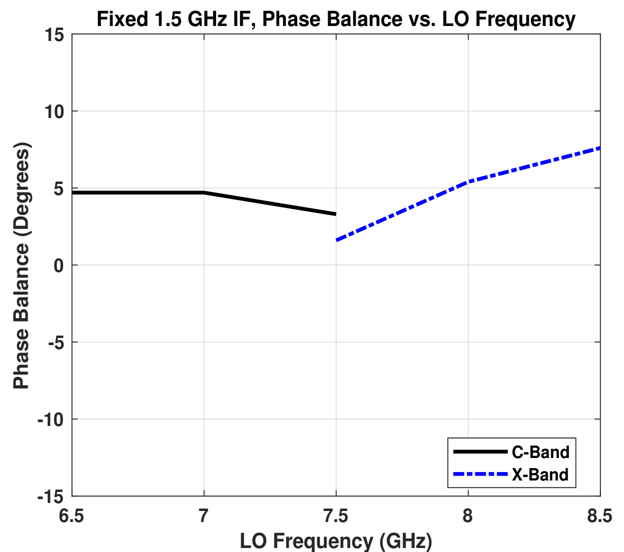




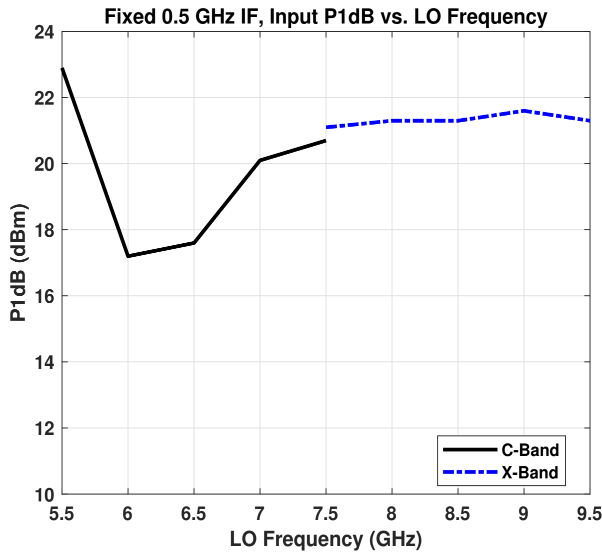


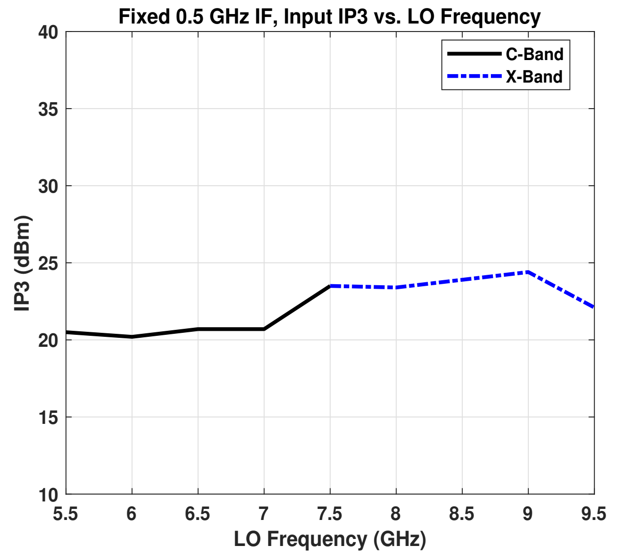


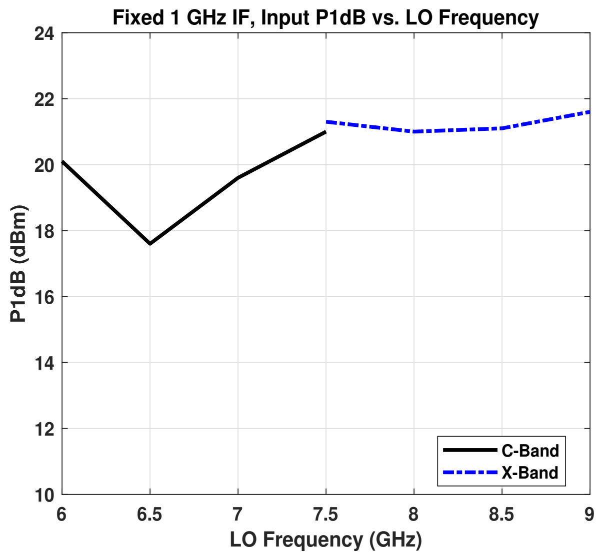


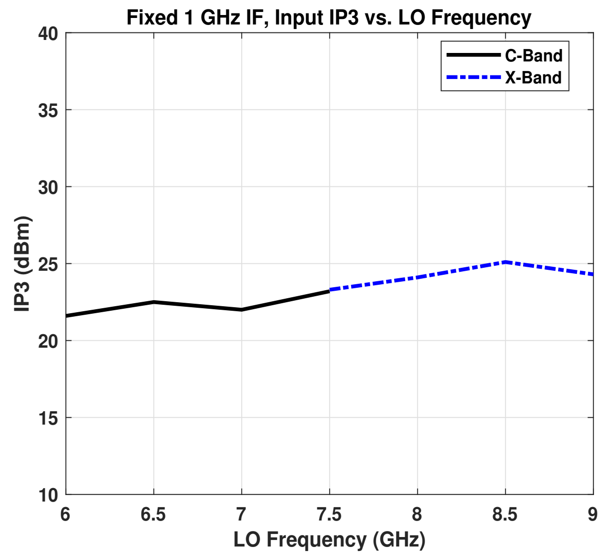


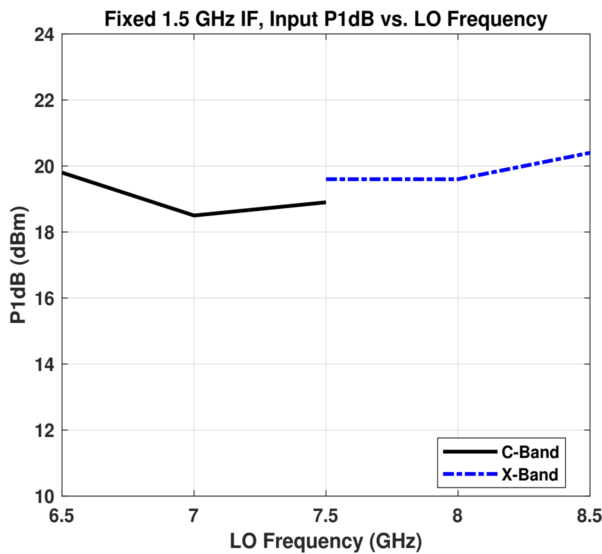
Quadrature Channel Data Taken Without IF Hybrid

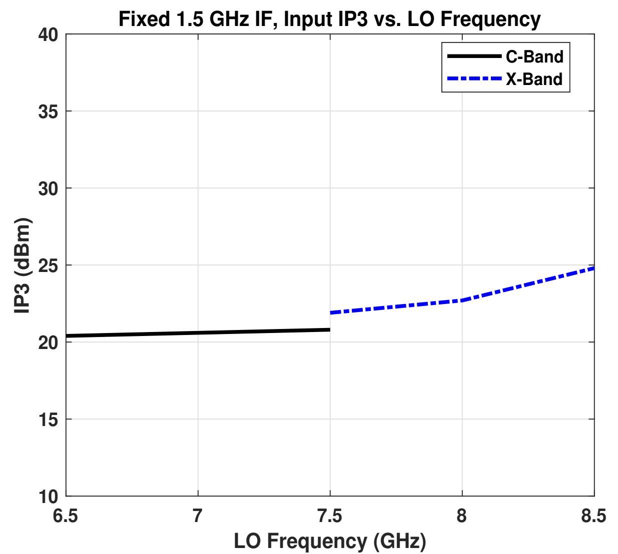




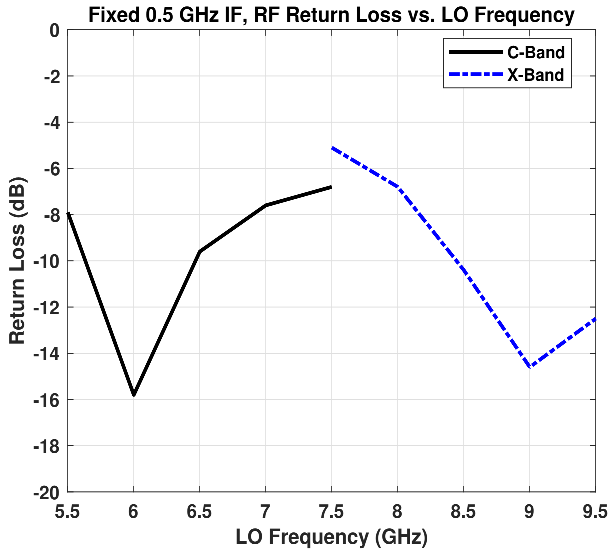


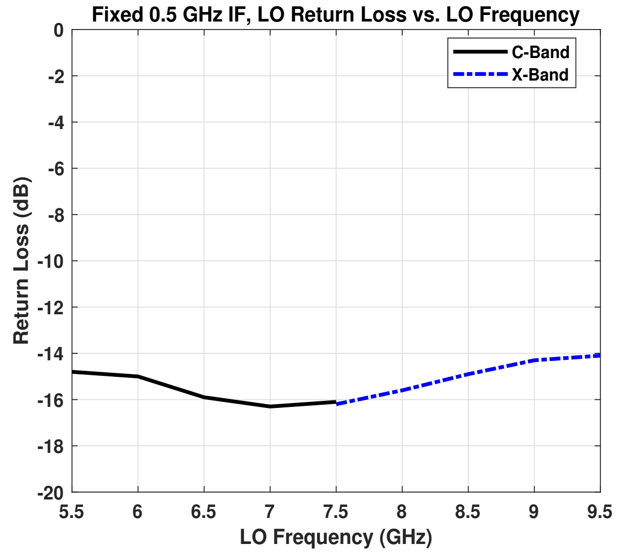


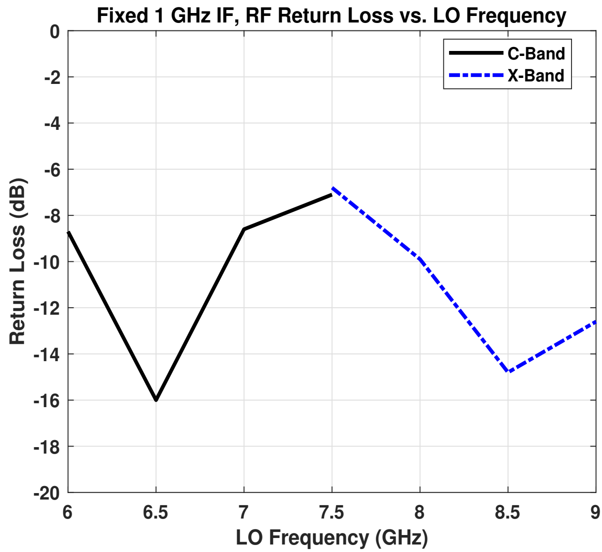


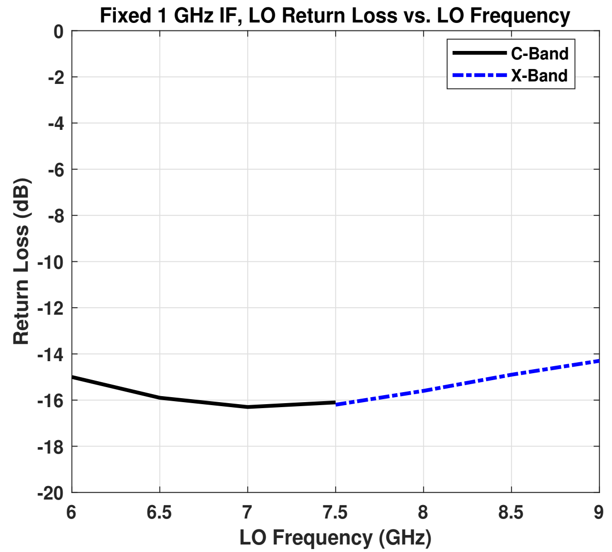


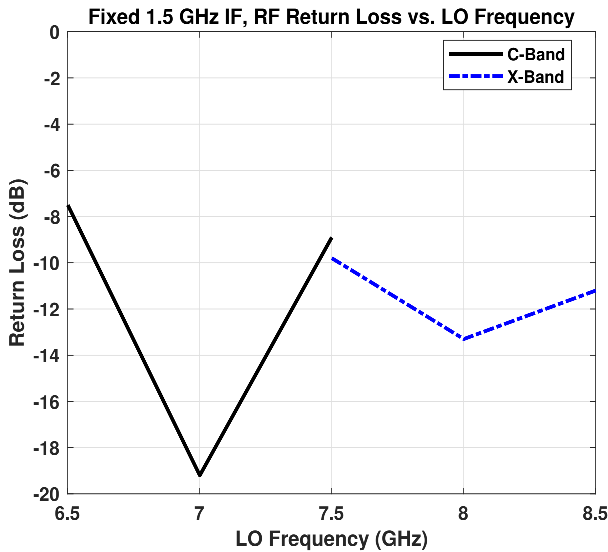
Quadrature Channel Data Taken Without IF Hybrid

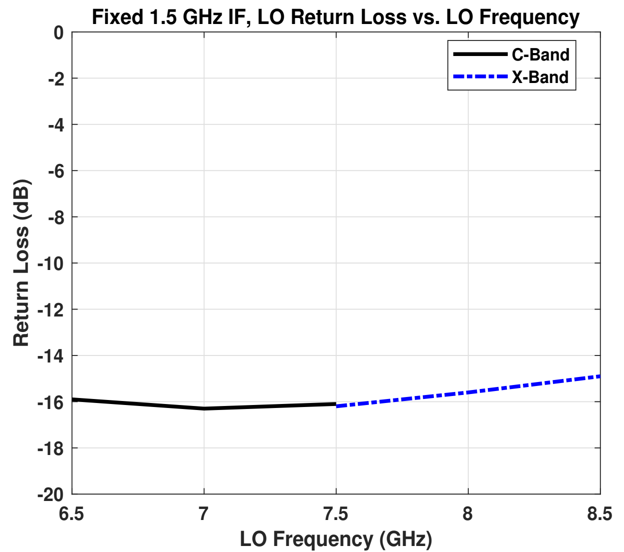




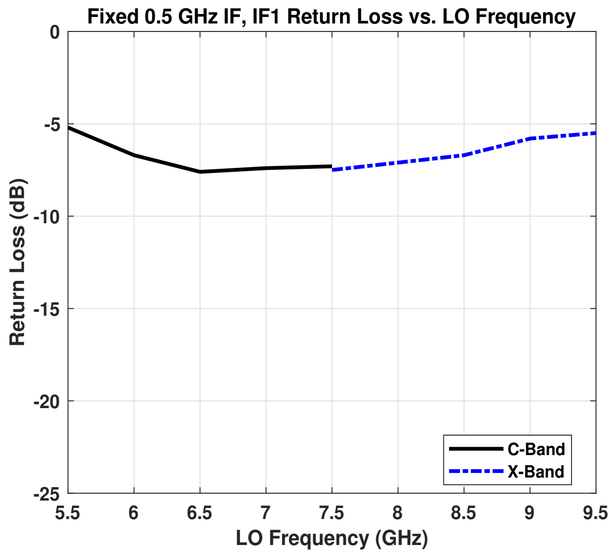


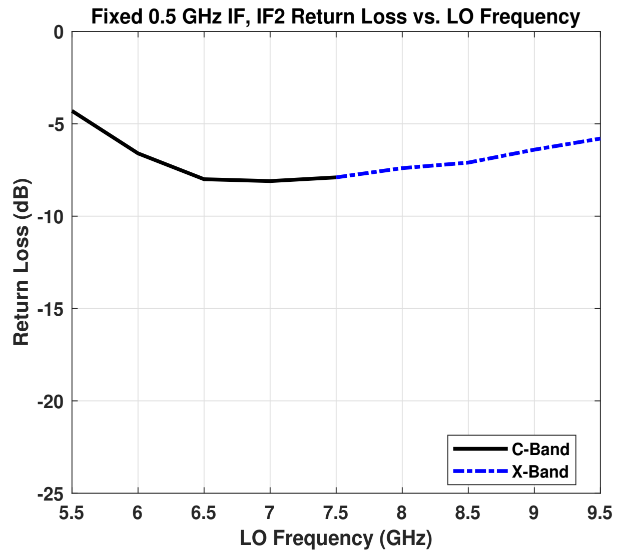


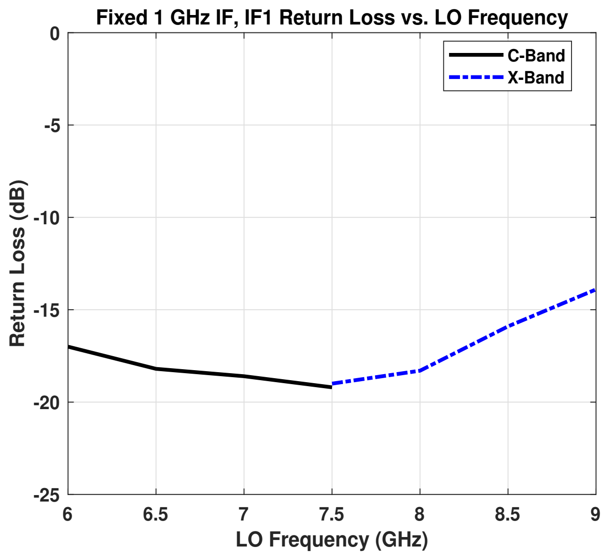


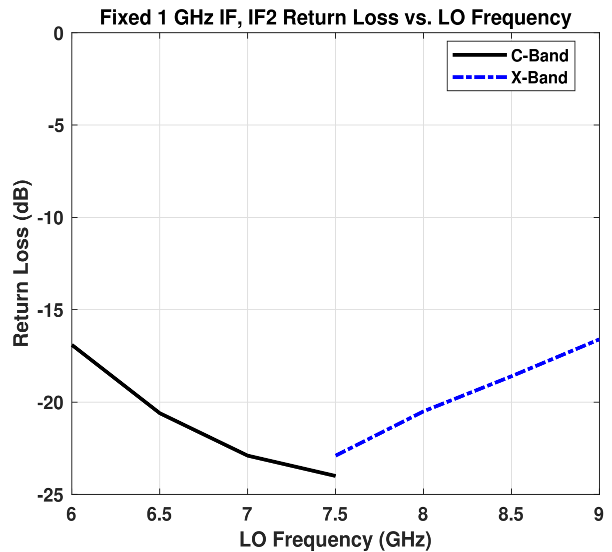


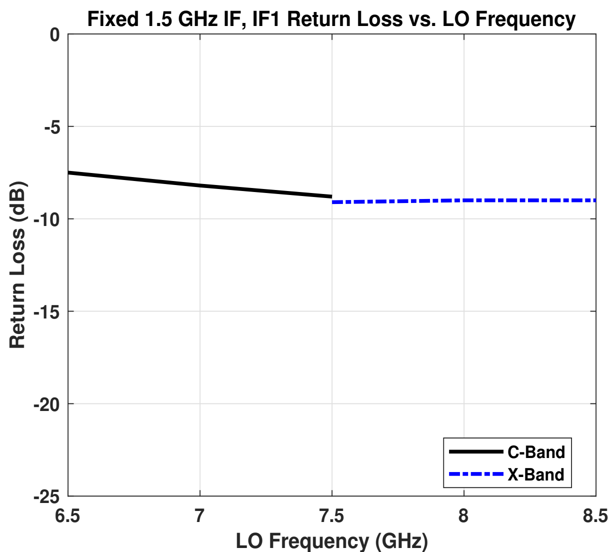
Quadrature Channel Data Taken Without IF Hybrid

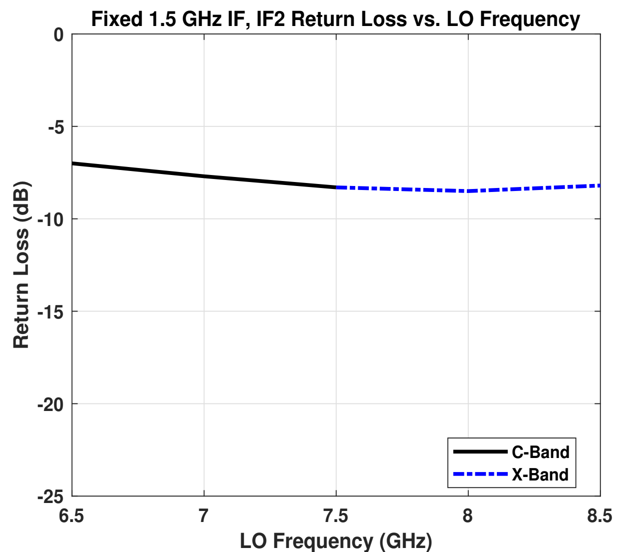




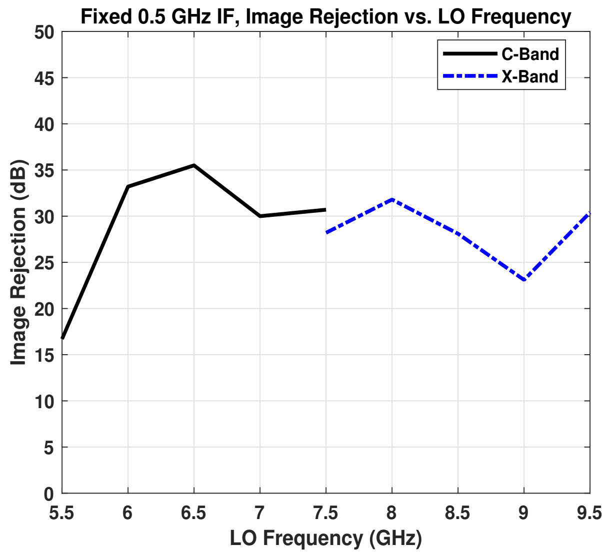


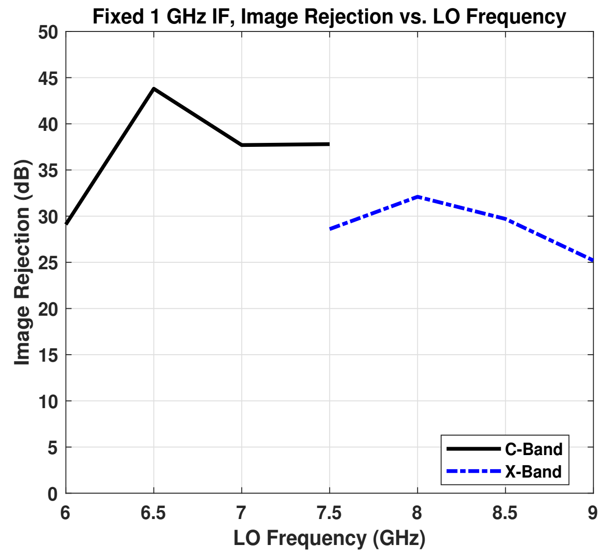


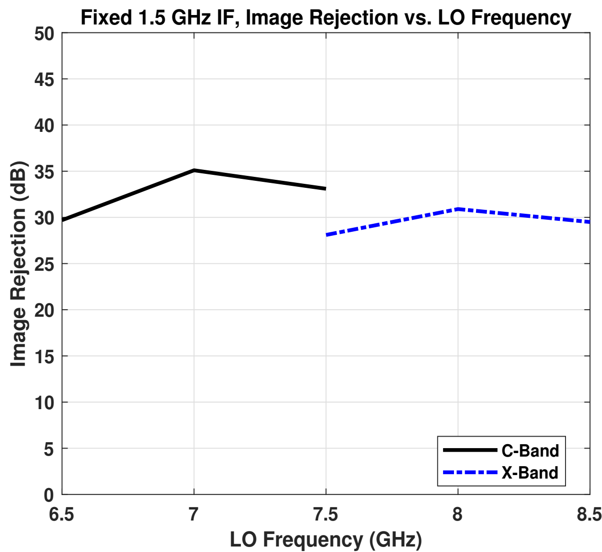




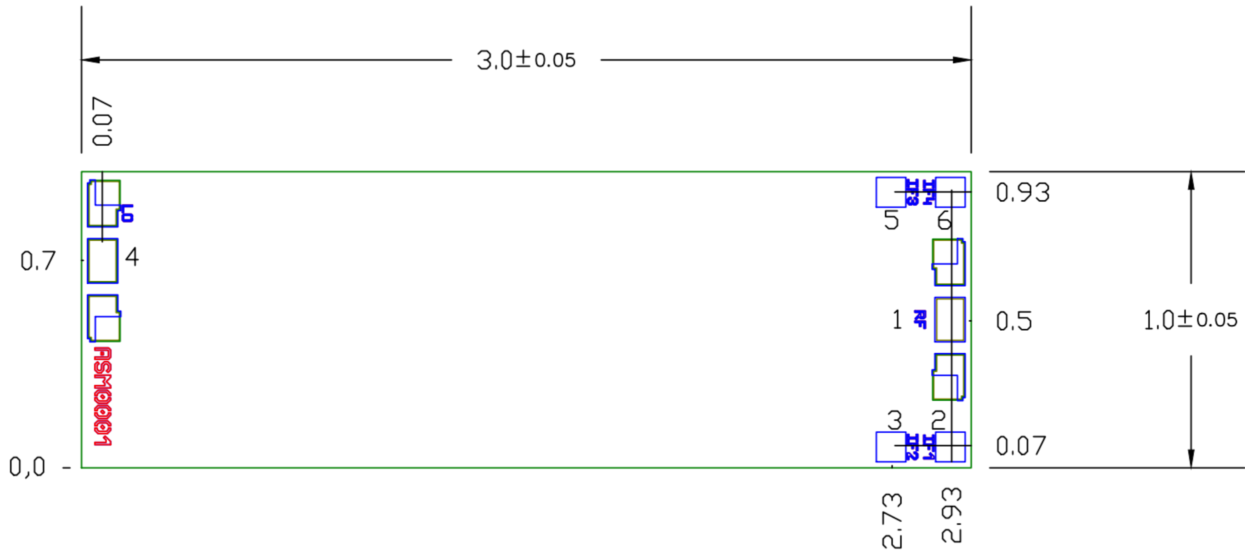
Data taken as IRM with External IF Hybrid







Mechanical Information



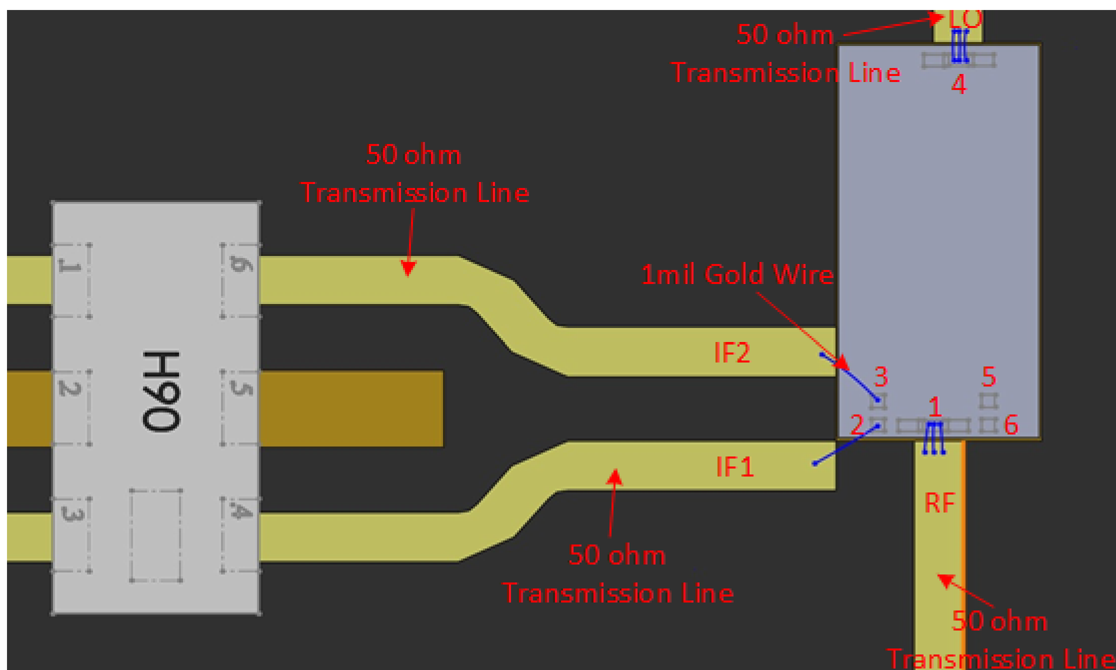
NOTES:

1. ALL DIMENSIONS IN MILLIMETERS
2. DIE THICKNESS IS 100 µm
3. TYPICAL BOND PAD IS 0.01 mm2
4. BACKSIDE METALLIZATION: GOLD
5. BACKSIDE METAL IS GROUND
6. BOND PAD METALLIZATION: GOLD
7. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS
8. Die Size: OVERALL DIE SIZE ±50 µm

Bond Pad Description

1	RF	This pad is AC coupled and matched to 50 Ohm from 5.5 to 9.5 GHz.
4	LO	This pad is AC coupled and matched to 50 Ohm from 5.5 to 9.5 GHz.
2,5	IF1	This pad is DC coupled. For applications not requiring operating to DC, this port should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. For operation to DC, this pad must not source/sink more than 3mA of current or die non-function and possible die failure will result. Pads 5 and 6 are alternative IF ports.
3,6	IF2	This pad is DC coupled. For applications not requiring operating to DC, this port should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. For operation to DC, this pad must not source/sink more than 3mA of current or die non-function and possible die failure will result. Pads 5 and 6 are alternative IF ports.
-	GND	The backside of the die must be connected to RF/DC ground.

Assembly Diagram



Assembly Notes

Component Placement and Adhesive Attachment Assembly Notes:

1. Use vacuum collet to pick up the die.
2. The force should be controlled during placement and mounting specially no force should be applied to air bridges.

Reflow process assembly notes:

1. Use CMC or MoCu carrier to decrease thermal expansion mechanical stress
2. Use AuSn (80/20) solder and limit exposure to temperatures above 300 °C to 3-4 minutes, maximum.
3. An alloy station or conveyor furnace with reducing atmosphere should be used.
4. Do not use any kind of flux.
5. Devices must be stored in a dry nitrogen atmosphere.
6. Use Au bond wire.

Contact Information

For the latest specifications, additional product information:
Web: www.abba-semi.com
Email: info@abba-semi.com