XM1003-BD

Image Reject Mixer
32.0-42.0 GHz

Rev. V1

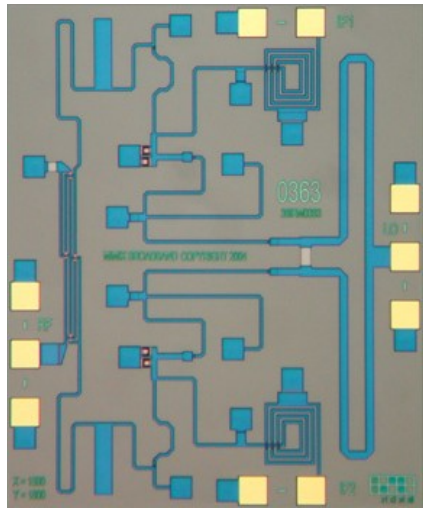
Features
- Sub-harmonic Image Reject Mixer
- GaAs HBT Technology
- 9.0 dB Conversion Loss
- 18.0 dB Image Rejection
- 100% On-Wafer RF Testing
- 100% Visual Inspection to MIL-STD-883 Method 2010
- RoHS* Compliant and 260°C Reflow Compatible

Description
M/A-COM Tech's 32.0-42.0 GHz GaAs MMIC sub-harmonic image reject mixer can be used as an up- or down-converter. The device has a conversion loss of 9.0 dB with 18.0 dB image rejection across the band. I and Q mixer outputs are provided and an external 90 degree hybrid is required to select the desired sideband. This MMIC uses M/A-COM Tech's GaAs HBT device model technology, and is based upon electron beam lithography to ensure high repeatability and uniformity. The chip has surface passivation to protect and provide a rugged part with backside via holes and gold metallization to allow either a conductive epoxy or eutectic solder die attach process. This device is well suited for Millimeter-wave Point-to-Point Radio, LMDS, SATCOM and VSAT applications.

Ordering Information

Part Number	Package
XM1003-BD-000V	"V" - vacuum release gel paks
XM1003-BD-EV1	evaluation module

Chip Device Layout



Absolute Maximum Ratings

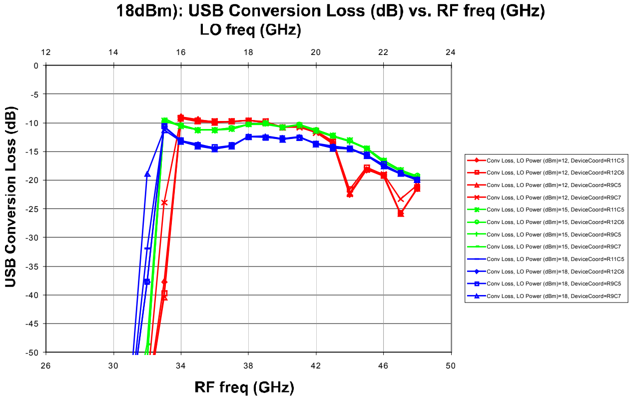
Parameter	Absolute Max.
Input Power (RF Pin)	+20.0 dBm
Input Power (IF Pin)	+20.0 dBm
Storage Temperature (Tstg)	-65 °C to +165 °C
Operating Temperature (Ta)	-55 °C to +125 °C

Electrical Specifications: 34-42 GHz (Upper Side Band) (Ambient Temperature T = 25°C)

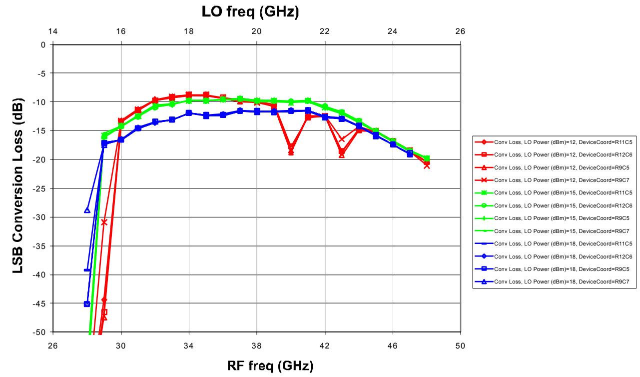
Parameter	Units	Min.	Typ.	Max.
Frequency Range (RF) Lower Side Band	GHz	32.0	-	42.0
Frequency Range (LO)	GHz	15.0	-	23.0
Frequency Range (IF)	GHz	DC	-	4.0
RF Return Loss (S11)	dB	-	10.0	-
IF1/IF2 Return Loss (S22)	dB	-	TBD	-
LO Return Loss (S33)	dB	-	TBD	-
Conversion Loss (S21)	dB	-	9.0	-
LO Input Drive (P_{LO})	dBm	-	+12.0	-
Image Rejection	dBc	-	18.0	-
Isolation LO/RF	dBc	-	-40.0	-
Isolation LO/IF	dB	-	TBD	-
Isolation RF/IF	dB	-	TBD	-
Input Third Order Intercept (IIP3)	dBm	-	+14.0	-

Typical Performance Curves (Down Conversion)

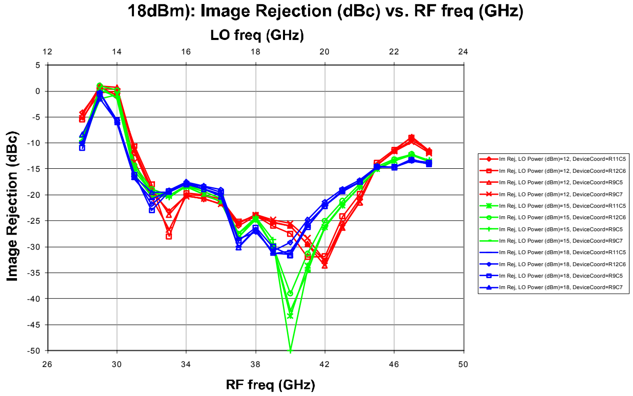
XM1003-BD (USB, down conversion, IF=2GHz, PRF=-20dBm, PLO=+12,15 & 18dBm): USB Conversion Loss (dB) vs. RF freq (GHz)



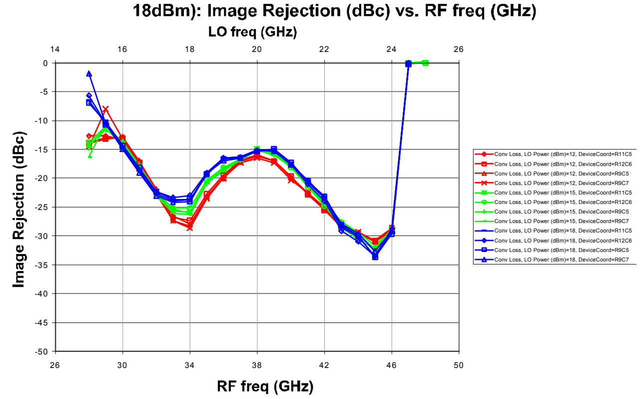
XM1003-BD (LSB, down conversion, IF=2GHz, PRF=-20dBm, PLO=+12,15 & 18dBm): LSB Conversion Loss (dB) vs. RF freq (GHz)



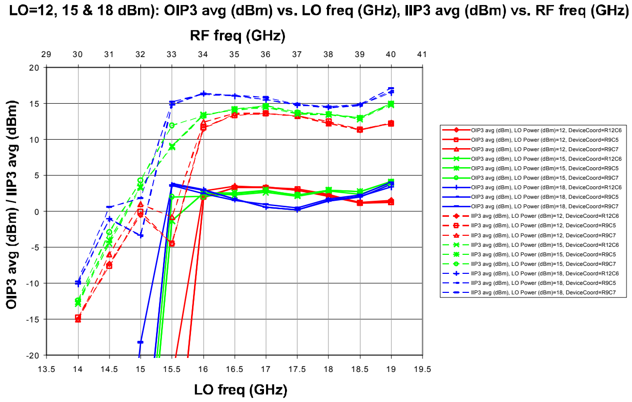
XM1003-BD (USB, down conversion, IF=2GHz, PRF=-20dBm, PLO=+12,15 & 18dBm): Image Rejection (dBc) vs. RF freq (GHz)



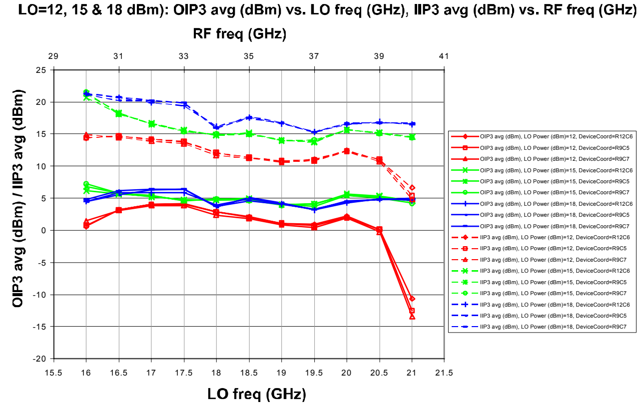
XM1003-BD(LSB, down conversion, IF=2GHz, PRF=-20dBm, PLO=+12,15 & 18dBm): Image Rejection (dBc) vs. RF freq (GHz)



XM1003-BD (USB, Down Conversion, IF=2GHz, IF1-IF2=100MHz, PRF=-15dBm, LO=12, 15 & 18 dBm): OIP3 avg (dBm) vs. LO freq (GHz), IIP3 avg (dBm) vs. RF freq (GHz)

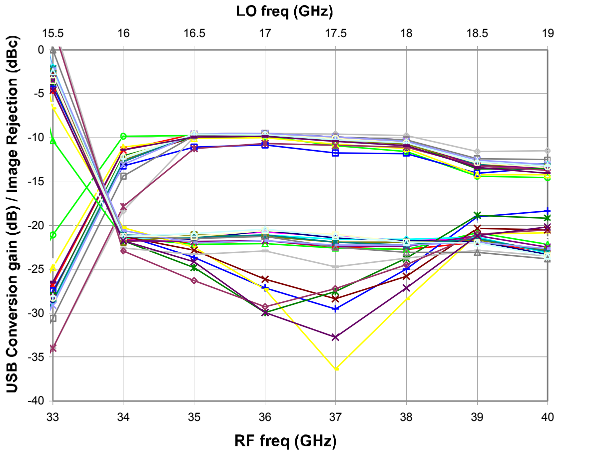


XM1003-BD (LSB, Down Conversion, IF=2GHz, IF1-IF2=100MHz, PRF=-15dBm, LO=12, 15 & 18 dBm): OIP3 avg (dBm) vs. LO freq (GHz), IIP3 avg (dBm) vs. RF freq (GHz)

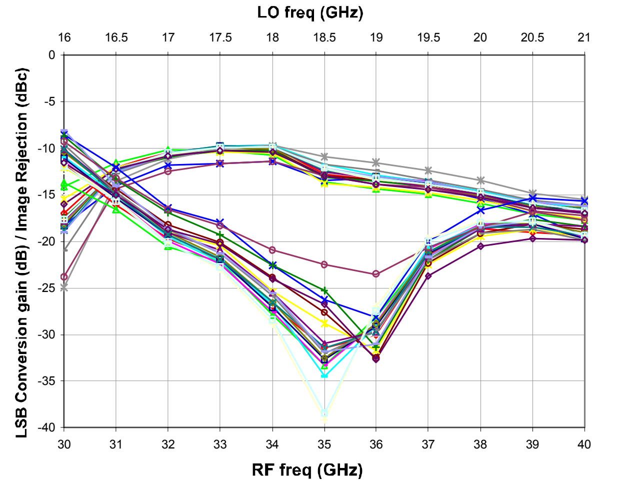


Typical Performance Curves (Up Conversion)

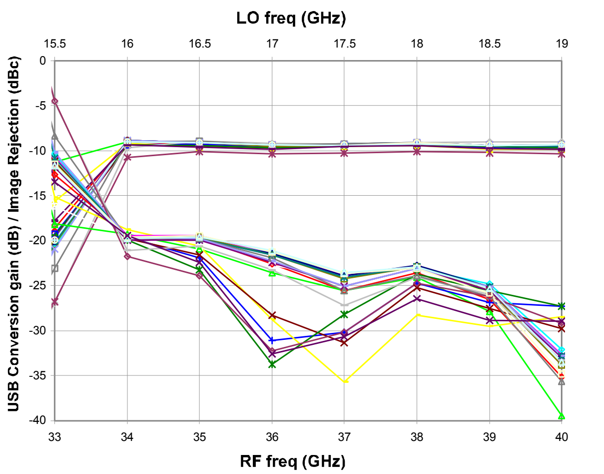
XM1003-BD (Up conversion, PIF=-15dBm, IF=2GHz, USB, PLO=+9dBm):
USB Conversion gain (dB) & Image Rejection (dBc) vs. RF freq (GHz) & LO freq (GHz)



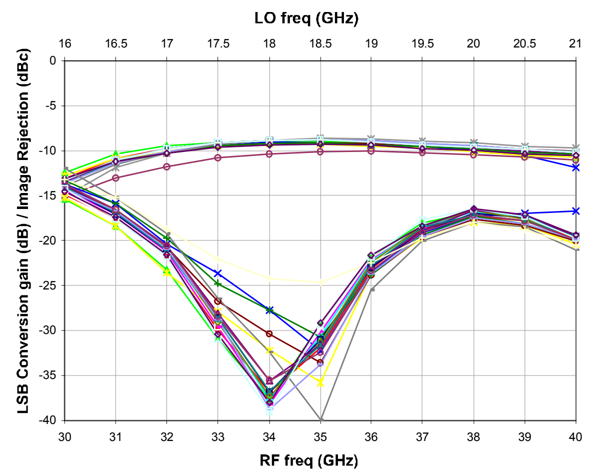
XM1003-BD (Up conversion, PIF=-15dBm, IF=2GHz, LSB, PLO=+9dBm):
USB Conversion gain (dB) & Image Rejection (dBc) vs. RF freq (GHz) & LO freq (GHz)



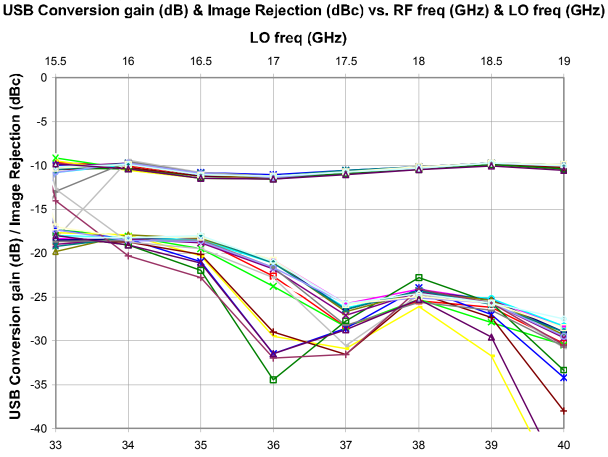
XM1003-BD (Up conversion, PIF=-15dBm, IF=2GHz, USB, PLO=+12dBm):
USB Conversion gain (dB) & Image Rejection (dBc) vs. RF freq (GHz) & LO freq (GHz)



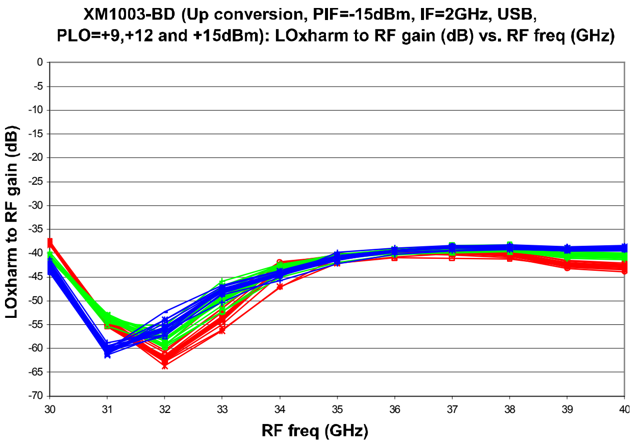
XM1003-BD (Up conversion, PIF=-15dBm, IF=2GHz, LSB, PLO=+12dBm):
USB Conversion gain (dB) & Image Rejection (dBc) vs. RF freq (GHz) & LO freq (GHz)

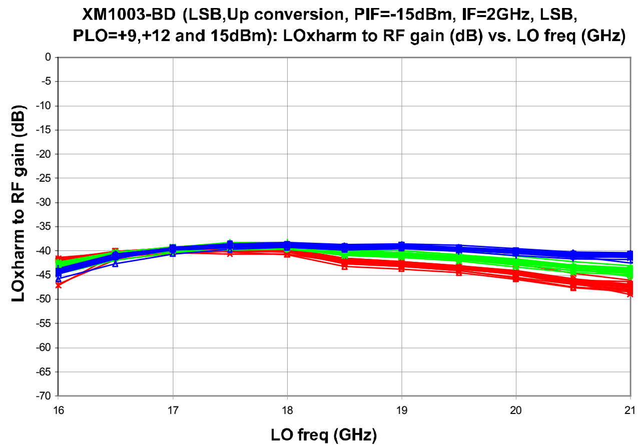


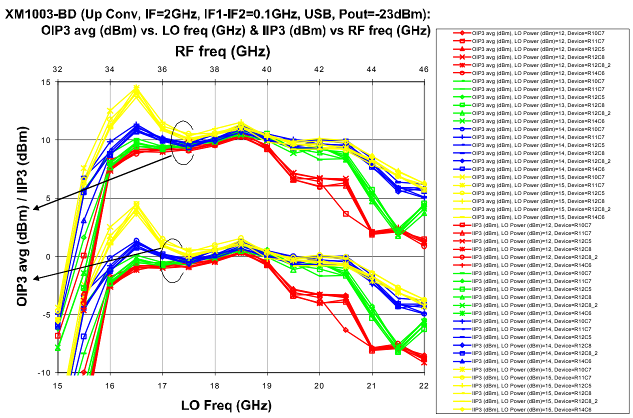
XM1003-BD (Up conversion, PIF=-15dBm, IF=2GHz, USB, PLO=+15dBm):
USB Conversion gain (dB) & Image Rejection (dBc) vs. RF freq (GHz) & LO freq (GHz)

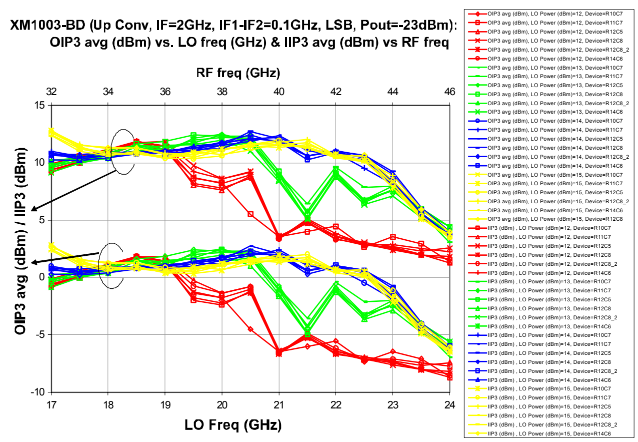


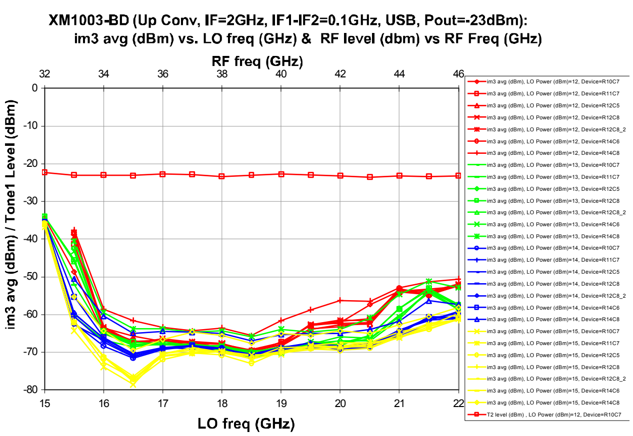
Typical Performance Curves (Up Conversion) (cont.)

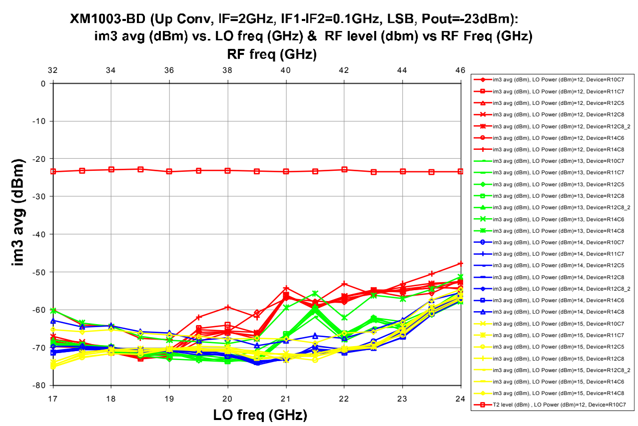




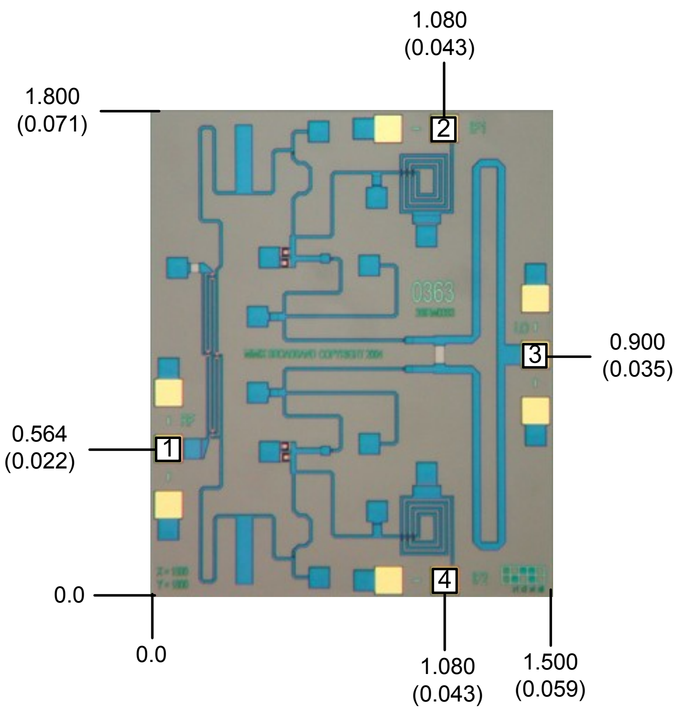








Mechanical Drawing

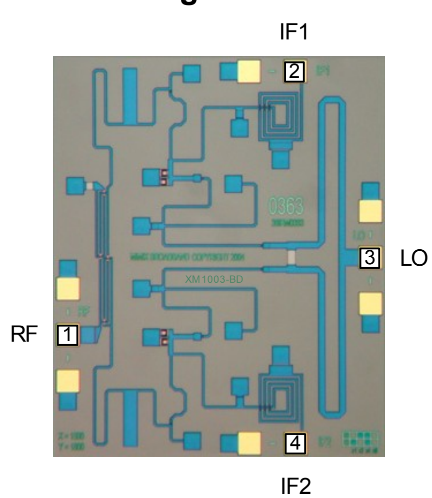


(Note: Engineering designator is 38IRM0363)

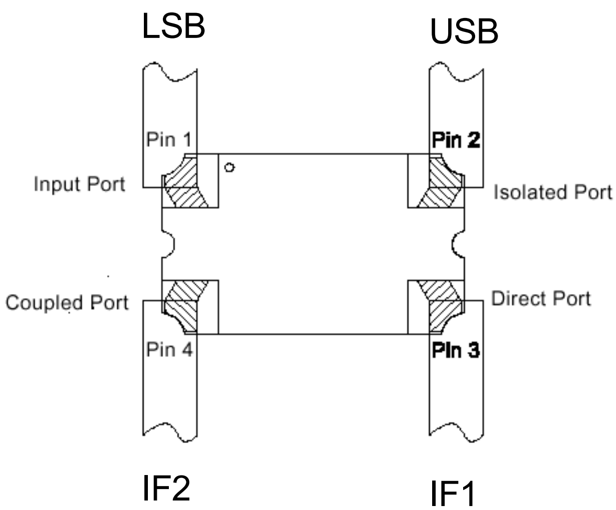
Units: millimeters (inches) Bond pad dimensions are shown to center of bond pad.
Thickness: 0.110 +/- 0.010 (0.0043 +/- 0.0004), Backside is ground, Bond Pad/Backside Metallization: Gold
All Bond Pads are 0.100 x 0.100 (0.004 x 0.004).
Bond pad centers are approximately 0.109 (0.004) from the edge of the chip.
Dicing tolerance: +/- 0.005 (+/- 0.0002). Approximate weight: 1.674 mg.

Bond Pad #1 (RF)	Bond Pad #3 (LO)
Bond Pad #2 (IF1)	Bond Pad #4 (IF2)

Bias Arrangement



App Note [1] USB/LSB Selection -

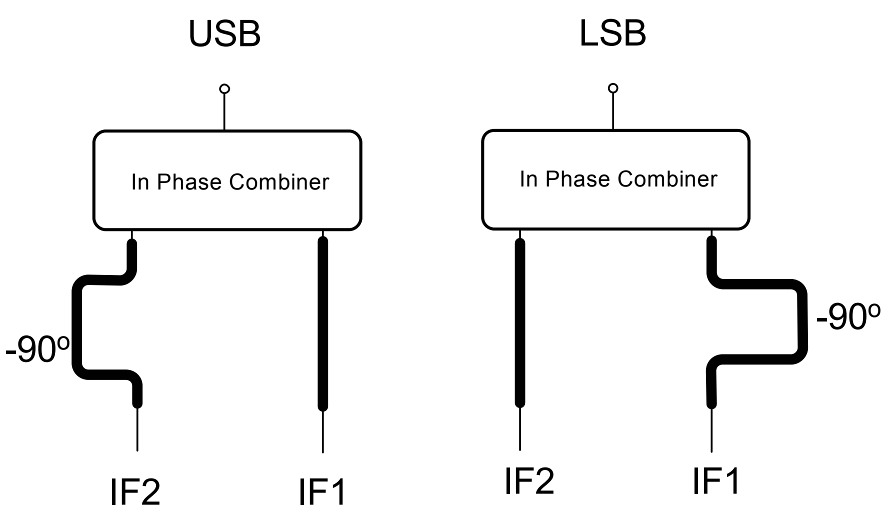


For Upper Side Band Operation (USB): With IF1 and IF2 connected to the direct port (0º) and coupled port (90º) respectively as shown in the diagram, the USB signal will reside on the isolated port. The input port must be loaded with 50 ohms.

For Lower Side Band Operation (LSB): With IF1 and IF2 connected to the direct port (0º) and coupled port (90º) respectively as shown in the diagram, the LSB signal will reside on the input port. The isolated port must be loaded with 50 ohms.

Note: The coupled port can be used as an alternative input but the port location of the Coupled and Direct ports reverse.

An alternate method of Selection of USB or LSB:



Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these class 2 devices.