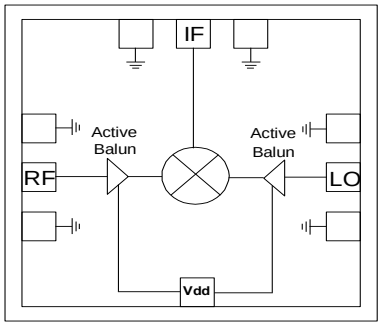
2–18GHz Double Balanced Ring Mixer

Features

- **RF/LO Frequency: 2–18GHz**
- **IF bandwidth: DC–750MHz**
- **Nominal LO drive of 7-13dBm**
- **Low Conversion Loss: 4dB**
- **High Port to Port Isolation**
- **High IIP3**
- **Nominal bias: 5V @100mA**
- **0.15-µm InGaAs pHEMT Technology**
- **Chip Size : 3 mm x 2.4 mm x 0.100 mm**

Functional Diagram



Typical Applications

- **Military and Space systems**
- **Microwave Point to Point Radio**
- **Automotive Radars & EW**
- **Local Multipoint Distribution System (LMDS)**
- **Test Equipment**

Description

ASL7000 is a double balanced ring mixer which exhibits down conversion capabilities for RF, LO frequencies ranging from 2–18GHz and an IF bandwidth of DC–750MHz. RF & LO Baluns are realized using differential amplifier topology. Each of these active baluns biased at 5V, consumes a current of around 45mA. The mixer operates in a high side rejection mode i.e., LO frequency is kept above the RF frequency band with the LO drive level varying from 7–13dBm and an RF power level of -20dBm. The design fits on a 3mm x 2.4mm die and is fabricated using 0.15 microns Low Noise Process on GaAs. These MMIC mixers are much smaller and more reliable than hybrid diode mixers in VSAT & point to point radio applications.

Absolute Maximum Ratings (1)

Parameter	Absolute Maximum	Units
RF input power	+17	dBm
LO input power	+23	dBm
Drain bias	6	V
Operating Temperature	-55 to +85	°C
Storage Temperature	-65 to +150	°C

1. Operation beyond these limits may cause permanent damage to the component

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Electrical Specifications [1], [2] @ T_A = 25°C, Z_o =50Ω, Vd1=Vd2=5V

Parameter	Min.	Typ.	Max.	Units
Frequency Range, RF & LO	2		18	GHz
Frequency Range, IF	DC		0.75	GHz
LO Power	7		13	dBm
Conversion loss		4.5		dB
LO-RF Isolation		30		dB
RF-IF Isolation		40		dB
LO-IF Isolation		45		dB
Input P_{1dB}		2		dBm
Input IP3 [3]		10		dBm
IF Return losses		15		dB
Current		100		mA

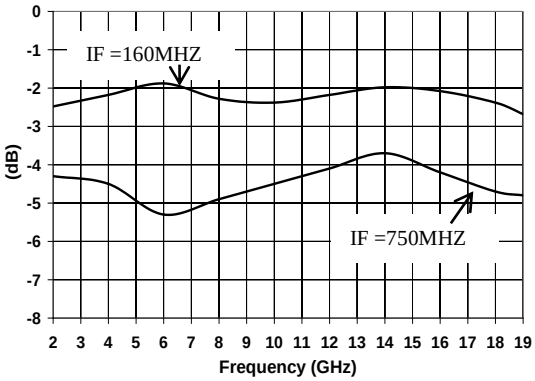
Note:

1. Electrical specifications as measured in a test fixture.
2. Specifications measured at an RF Power level of -20dBm, LO Power level of 10dBm and IF frequency of 750MHz.
3. Input IP3 is simulated value.

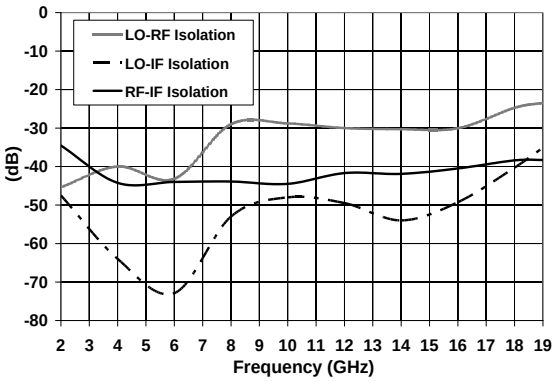
Test fixture data

Vd1=Vd2 =5V, Total Current =100mA, T_A = 25 °C

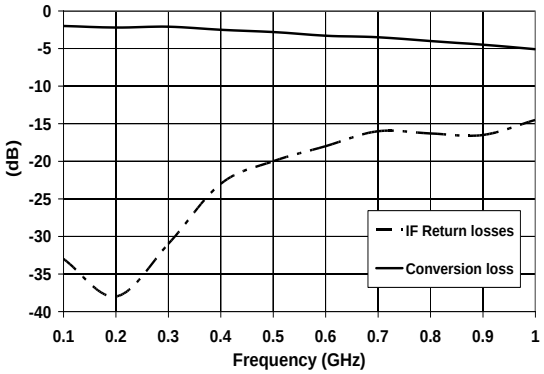
Conversion Loss @ LO = 10dBm



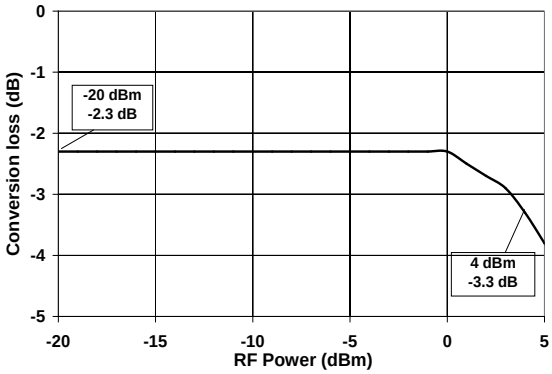
Isolation @ LO = 10dBm, IF = 750MHz



IF Bandwidth @ LO=10dBm, RF=10GHz



Input P_{1dB} @ LO=10dBm, RF=10GHz, IF=500MHz



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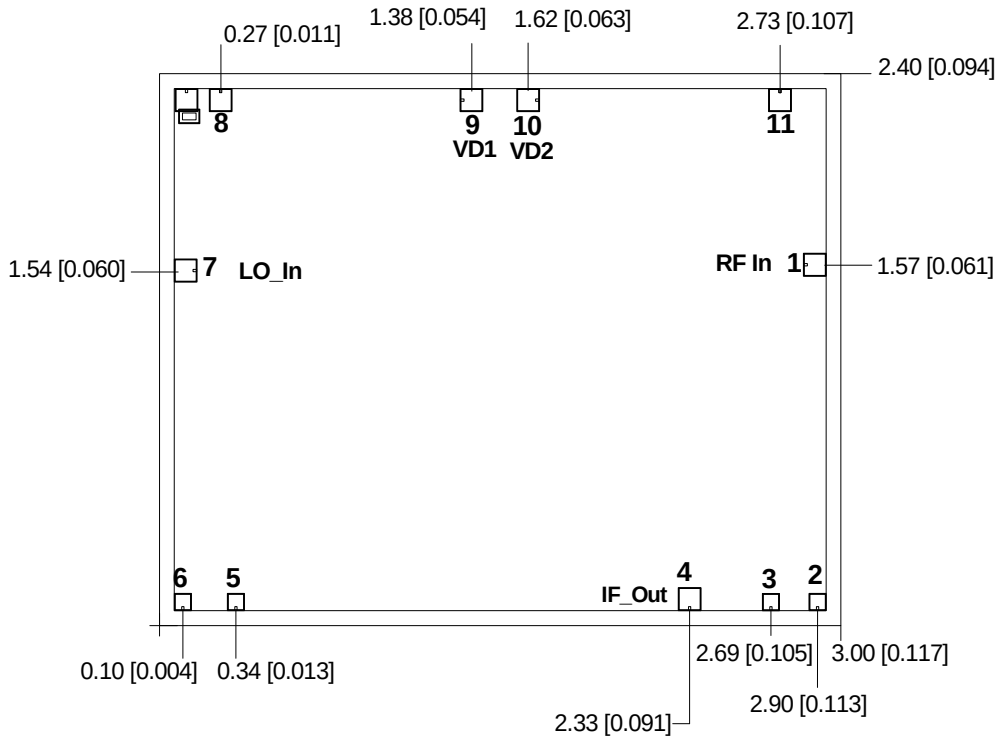
Mechanical Characteristics

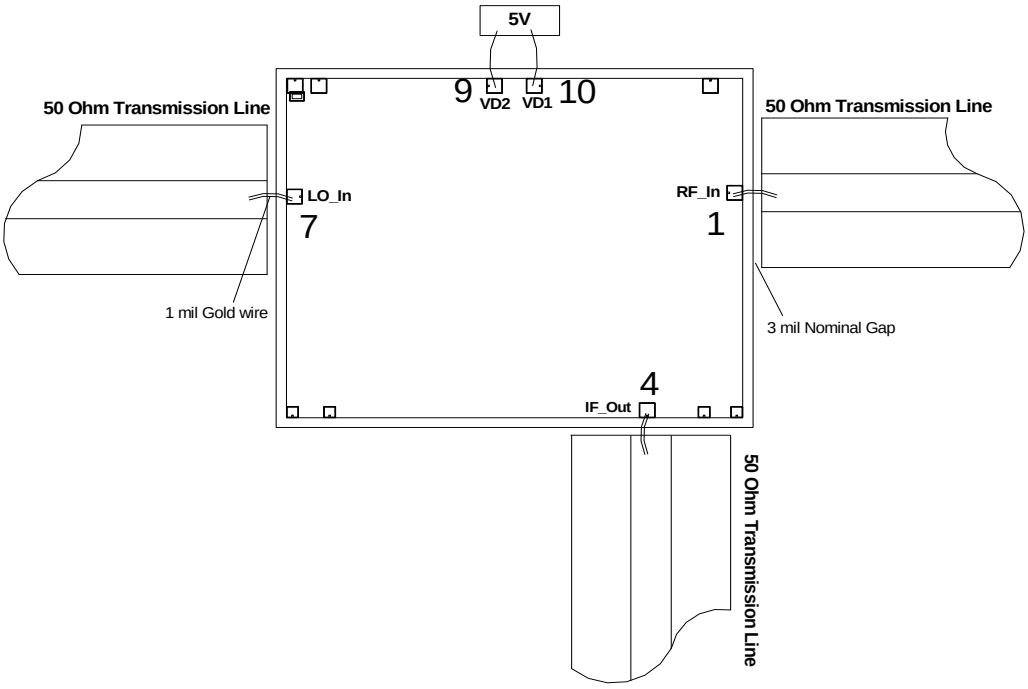


Units: millimeters (inches)

Note:

1. Bond Pads numbered 1, 4, 7, 8, 9, 10 & 11 are 100µm x 100µm
2. Bond Pads numbered 2, 3, 5 & 6 are 75µm x 75µm
3. Pad no. 1 : RF In
4. Pad no. 4 : IF Out
5. Pad no. 7 : LO In
6. Pad no. 9 : Vd1
7. Pad no.10 : Vd2

Recommended Assembly Diagram



Note:

1. Two 1 mil (25.4µm) bond wires of minimum length should be used for RF inputs & output.
2. For reliable operation, 0.1µF capacitors should be used at the voltage supply.

Die attach: For Epoxy attachment, use of a two-component conductive epoxy is recommended. An epoxy fillet should be visible around the total die periphery. If Eutectic attachment is preferred, use of fluxless AuSn (80/20) 1-2 mil thick preform solder is recommended. Use of AuGe preform should be strictly avoided.

Wire bonding: For DC pad connections use either ball or wedge bonds. For best RF performance, use of 150 - 200µm length of wedge bonds is advised. Single Ball bonds of 250-300µm though acceptable, may cause a deviation in RF performance.

GaAs MMIC devices are susceptible to Electrostatic discharge. Proper precautions should be observed during handling, assembly & testing

All information and Specifications are subject to change without prior notice

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