

33–43 GHz GaAs MMIC Image Rejection Balanced Mixer



AM038R1-00

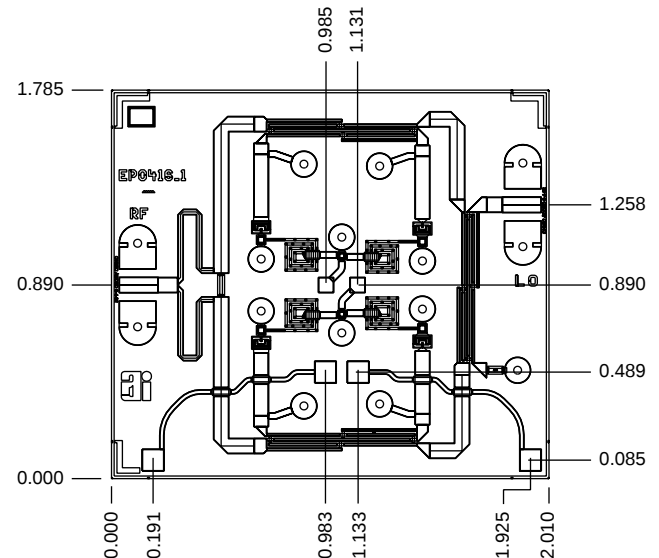
Features

- Low Conversion Loss, 9 dB
- Low LO Power Requirement, 8 dBm
- Image Rejection, 18 dB
- No DC Bias Required
- Requires External IF 90° Hybrid

Description

Alpha's image rejection balanced GaAs Schottky diode mixer has a typical conversion loss of 9 dB at an LO power level as low as 8 dBm over the band 33–43 GHz. An external 90° IF hybrid is required to combine the IF₁ and IF₂ signals at the desired IF frequency. The chip uses Alpha's proven Schottky diode technology, and is based upon MBE layers for the highest uniformity and repeatability. The diodes employ surface passivation to ensure a rugged, reliable part with through-substrate via holes and gold-based backside metallization to facilitate an epoxy die attach process. All chips are screened for DC diode parameters and lot samples are RF measured to guarantee performance. This device is recommended for applications requiring down conversion.

Chip Outline



Dimensions indicated in mm.
All pads are ≥ 0.07 mm wide.
Chip thickness = 0.1 mm.

Absolute Maximum Ratings

Characteristic	Value
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Total Input Power (RF + LO)	23 dBm

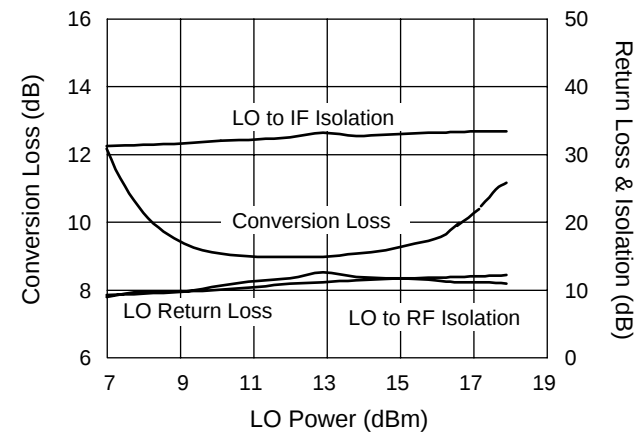
Electrical Specifications at 25°C

Parameter	Symbol	Min.	Typ. ²	Max.	Unit
RF and LO Frequency Range	F_{RF}, F_{LO}		33–43		GHz
IF Frequency Range	F_{IF}		0–3		GHz
LO Power Level	P_{LO}		8–14		dBm
Conversion Loss ¹	L_C		9		dB
Image Rejection ¹	IR		18		dB
RF and LO Return Loss ¹	RL_{RF}, RL_{LO}		12		dB
LO to RF Isolation ¹	ISO_{LO-RF}		12		dB
LO to IF Isolation ¹	ISO_{LO-IF}		23		dB
RF Input 1 dB Compression Point ¹	$P_{1\text{ dB}}$		7		dBm
Individual Diode Series Resistance	R_S			3.0	Ω

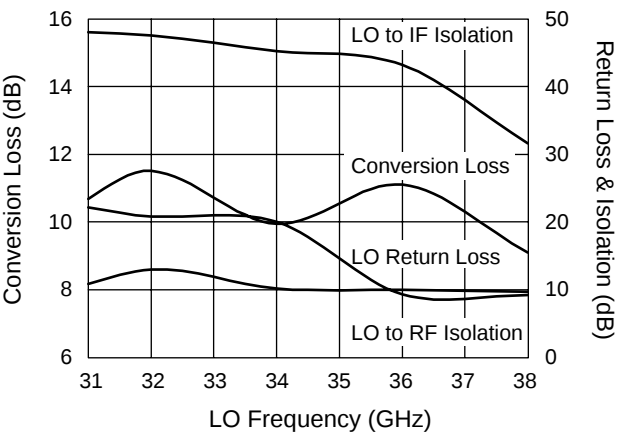
1. Not measured on a 100% basis.

2. Typical represents the median parameter value across the specified frequency range for the median chip.

Typical Performance Data



Performance vs. LO Power
 $F_{RF} = 40\text{ GHz}$, $F_{LO} = 38\text{ GHz}$, $P_{RF} = -10\text{ dBm}$



Performance vs. LO Frequency
 $F_{RF} = F_{LO} + 2\text{ GHz}$, $P_{LO} = 10\text{ dBm}$

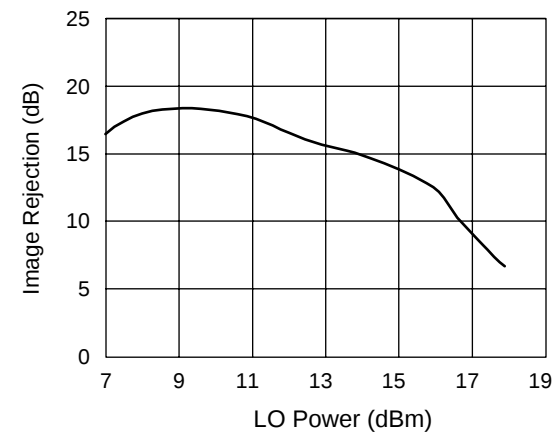


Image Rejection vs. LO Power
 $F_{RF} = 40\text{ GHz}$, $F_{LO} = 38\text{ GHz}$, $P_{RF} = -10\text{ dBm}$
Image Frequency = 36 GHz

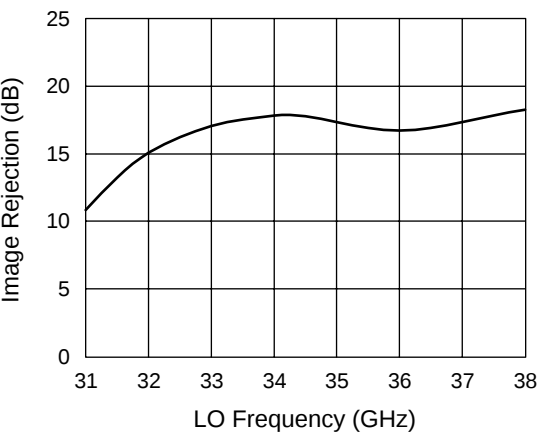
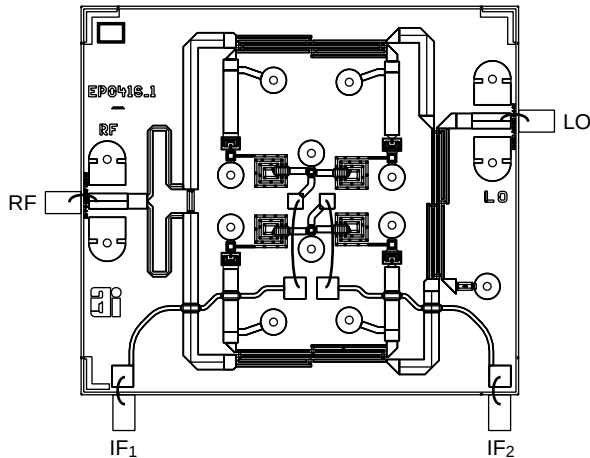


Image Rejection vs. LO Frequency
 $F_{RF} = F_{LO} + 2\text{ GHz}$, $P_{LO} = 10\text{ dBm}$
Image Frequency = $F_{LO} - 2\text{ GHz}$

Wire Bonding Configuration



IF ports bonded to IF hybrid.

Circuit Schematic

