23–33 GHz GaAs MMIC Fundamental Up/Down Converter Mixer

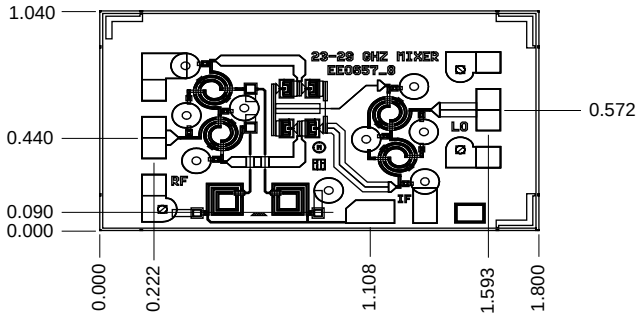
SKYWORKS

AM026S1-00

Features

- Low Conversion Loss, 8.0 dB
- High LO to RF Isolation, 26 dB
- High LO to IF Isolation, 28 dB
- Final Production Size (1.6 mm x 0.95 mm)
- No DC Bias Required
- Ideal for Point to Point, Point to Multi-point and SatCom Applications

Chip Outline



Description

Alpha's single balanced fundamental mixer IC has a typical conversion loss of 8 dB at an LO power level as low as 12 dBm over the band 23–33 GHz. 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 or solder die attach process. All chips are screened for DC diode parameters and lot samples are RF measured to guarantee performance

Absolute Maximum Ratings

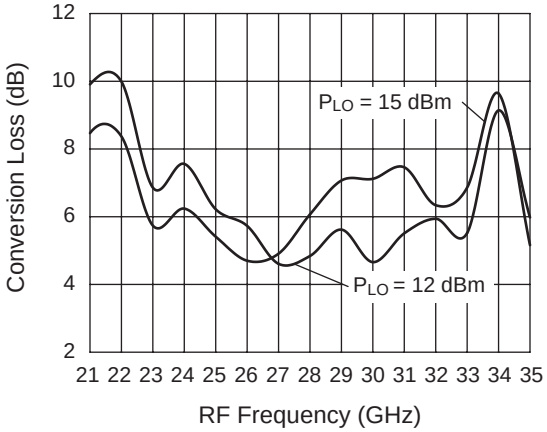
Characteristic	Value
Operating Temperature	-55°C to +125°C
Storage Temperature	-65°C to +150°C
Total Input Power (RF + LO)	20 dBm
ESD Level Per ANSI	TBD

Electrical Specifications at 25°C

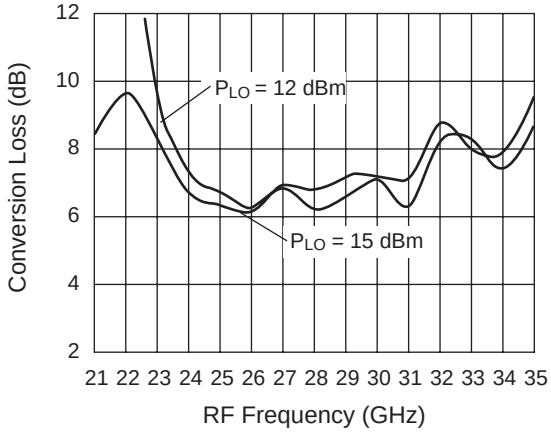
Parameter	Condition	Symbol	Min.	Typ.[2]	Max.	Unit
RF and LO Frequency Range		F_{RF}, F_{LO}	23		33	GHz
IF Frequency Range		F_{IF}	0.5		4	GHz
LO Power Level[1]	F_{RF}, F_{LO} = 23–33 GHz, F_{IF} = 0.5–3 GHz	P_{LO}	12	15		dBm
Conversion Loss (Up and Down Conversion)[1]	F_{RF}, F_{LO} = 23–33 GHz, F_{IF} = 0.5–3 GHz	L_C		8		dB
LO Return Loss[1]	F_{RF}, F_{LO} = 23–33 GHz, F_{IF} = 0.5–3 GHz	RL_{LO}		7		dB
RF Return Loss[1]	F_{RF}, F_{LO} = 23–33 GHz, F_{IF} = 0.5–3 GHz	RL_{RF}		9		dB
LO to RF Isolation[1]	F_{RF}, F_{LO} = 23–33 GHz, F_{IF} = 0.5–3 GHz	ISO_{LO-RF}		26		dB
LO to IF Isolation[1]	F_{RF}, F_{LO} = 23–33 GHz, F_{IF} = 0.5–3 GHz	ISO_{LO-IF}		28		dB
RF Input 1 dB Compression Point[1]	F_{RF}, F_{LO} = 23–33 GHz, F_{IF} = 0.5–3 GHz	$P_{1\ dB}$		6		dBm
IP3 (Input)	F_{RF} = 28 GHz, F_{LO} = 27 GHz P_{LO} = 15 dBm, Two-tone = 10 dBm	IP3		17		dBm
Two Parallel Diode Series Resistance		R_S			1.5	Ω

1. Not measured on a 100% basis.
2. Typical represents the median parameter value across the specified frequency range for the median chip.

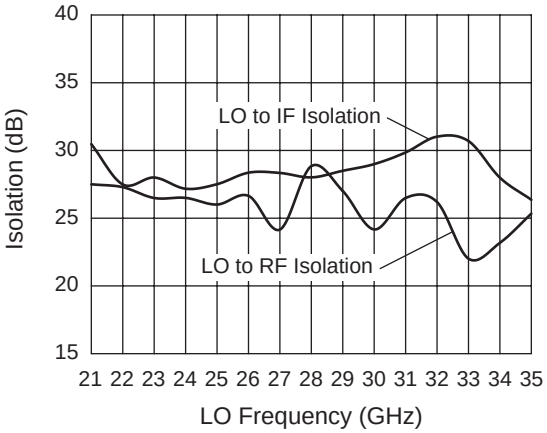
Typical Performance Data



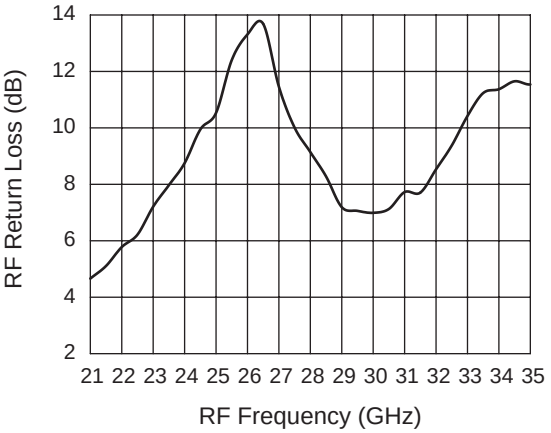
Conversion Loss vs. RF Frequency (Down Converter)
$F_{LO} = F_{RF}$ - 1 GHz, P_{RF} = -10 dBm



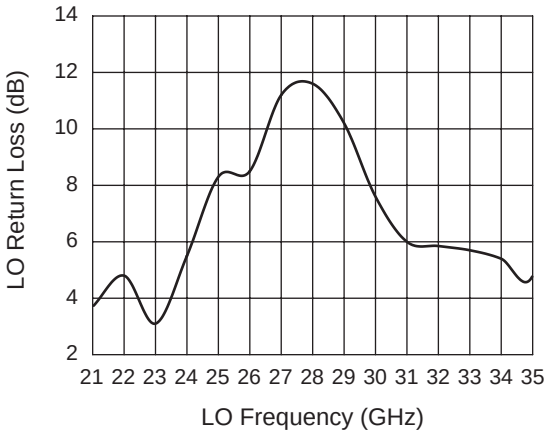
Conversion Loss vs. RF Frequency (Up Converter)
$F_{LO} = F_{RF}$ - 1 GHz, P_{IF} = -10 dBm



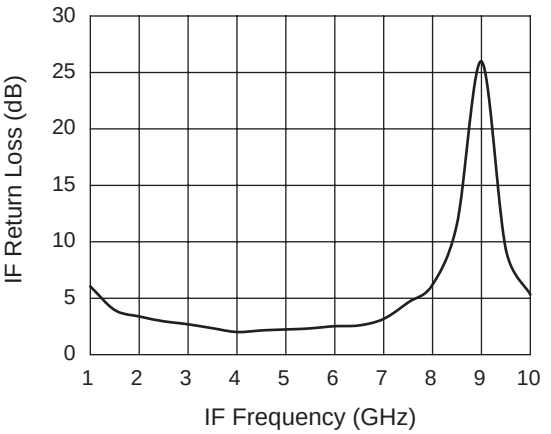
Isolation vs. LO Frequency
P_{LO} = 12 dBm



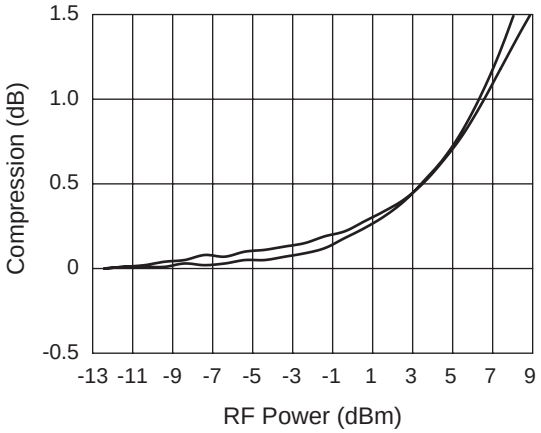
RF Return Loss vs. RF Frequency
F_{LO} = 28 GHz, P_{LO} = 12 dBm



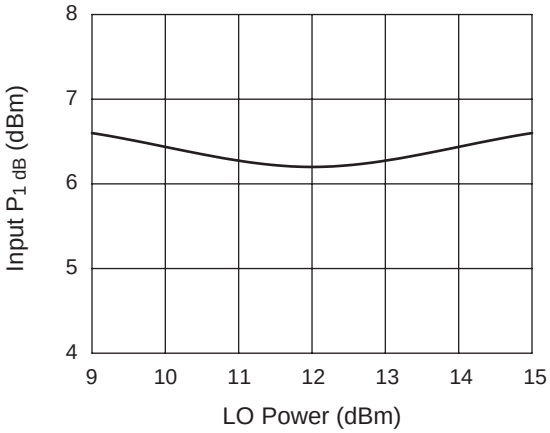
LO Return Loss vs. LO Frequency
P_{LO} = 12 dBm



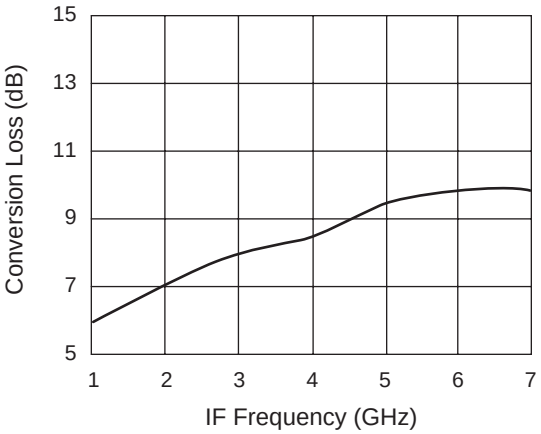
IF Return Loss vs. IF Frequency
F_{LO} = 28 GHz, P_{LO} = 12 dBm



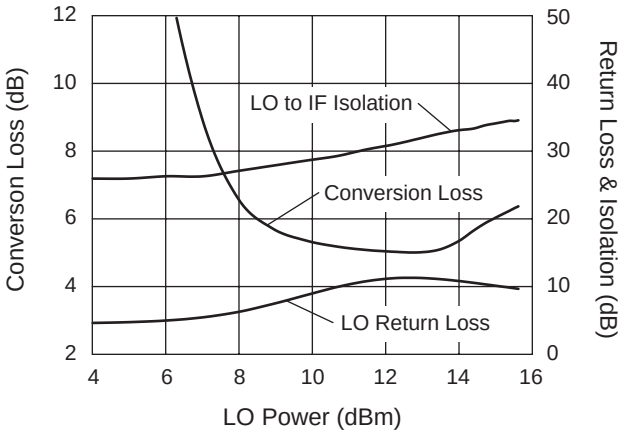
Compression vs. RF Power
F_{RF} = 28 GHz, F_{LO} = 27 GHz,
P_{LO} = 12 & 15 GHz



Input $P_{1\ dB}$ vs. LO Power
F_{LO} = 27 GHz, F_{RF} = 28 GHz

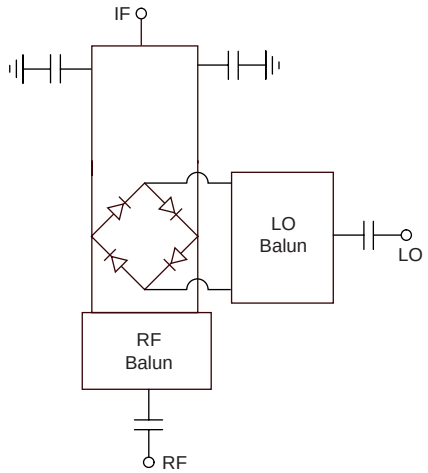


Converson Loss vs. IF Frequency
F_{LO} = 24 GHz, F_{RF} = F_{LO} + F_{IF},
P_{RF} = -10 dBm, P_{LO} = 12 dBm



Converson Loss vs. LO Power
F_{RF} = 28 GHz, F_{LO} = 27 GHz, P_{RF} = -10 dBm

Circuit Schematic



Wire Bonding Configurations