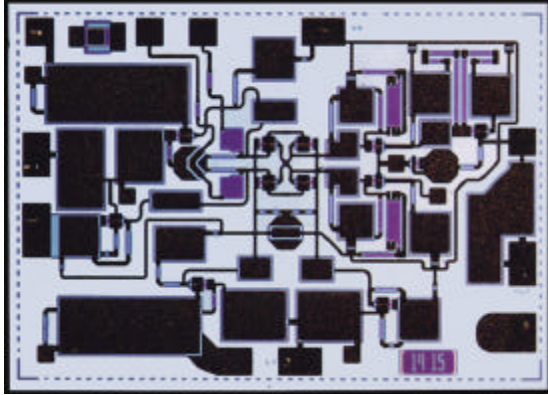


0.3 - 10 GHz Downconverter

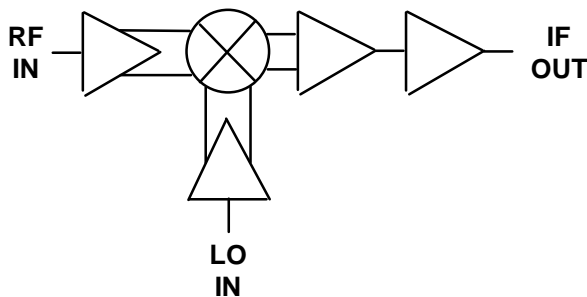
TGC1411-EPU



The TriQuint TGC1411-EPU is a double balanced MMIC mixer design using TriQuint's proven 0.25 μ m Power pHEMT process to support a variety of communication system applications including satellite.

The double balanced design consists of an integrated Gilbert cell mixer core, RF/LO baluns, differential combiner, and output driver amplifier. The TGC1411 may be operated from a single +3 V to +5 V power supply with typical current draw of 26 mA. The nominal LO power requirement is -5 dBm. The TGC1411 may also be operated as an up-converter.

The TGC1411 requires a minimum of off-chip components employing only a 100 pF off-chip bypass capacitor for the power supply line. No additional off-chip RF matching components are required. Each device is 100% DC and RF tested on-wafer to ensure performance compliance. The device is available in chip form.



Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

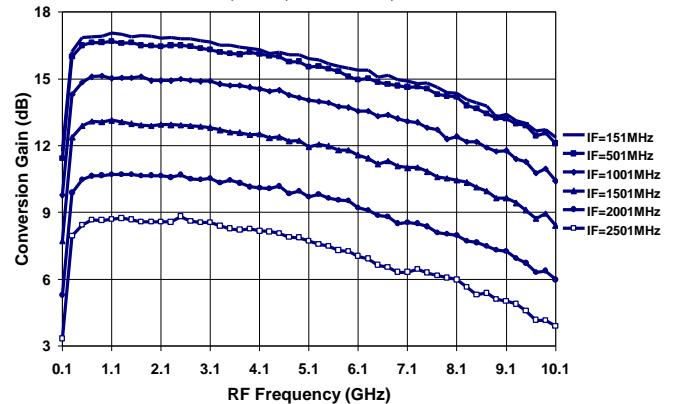
Key Features and Performance

- 0.25 μ m pHEMT Technology
- 0.3-10 GHz RF/LO Frequency Range
- 0.15-2.5 GHz IF Frequency Range
- Nominal Conversion Gain of 12 dB
- Bias 3-5V @ 26 mA
- Chip Dimensions 1.8 mm x 2.6mm

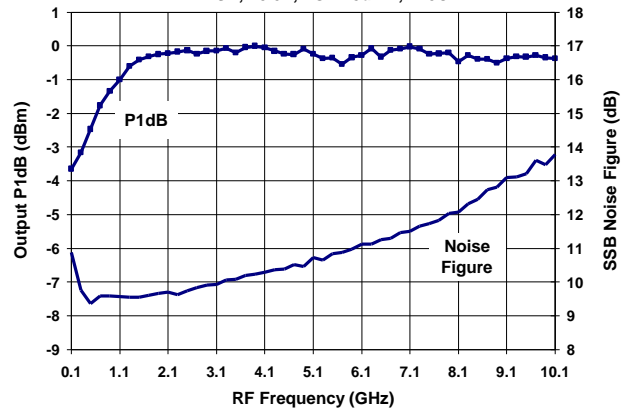
Primary Applications

- Satellite Systems
- Point-to-Point Radio

TGC 1411 **Typical Down-Conversion Gain**
LSB, +5.0V, LO = -5dBm, +25C



TGC 1411 **Typical P1dB and SSB Noise Figure**
LSB, +5.0V, LO = -5dBm, +25C



Electrical Characteristics

RECOMMENDED MAXIMUM RATINGS

Symbol	Parameter	Value	Notes
V ⁺	Positive Supply Voltage	8 V	
I ⁺	Positive Supply Current	80 mA	3/
P _D	Power Dissipation	0.64 W	
P _{IN}	Input Continuous Wave Power	14 dBm	
T _{CH}	Operating Channel Temperature	150 °C	1/, 2/
T _M	Mounting Temperature (30 seconds)	320 °C	
T _{STG}	Storage Temperature	-65 °C to 150 °C	

- 1/ These ratings apply to each individual FET
- 2/ Junction operating temperature will directly affect the device mean time to failure (MTTF). For maximum life it is recommended that junction temperatures be maintained at the lowest possible levels.
- 3/ Total current for the entire MMIC

DC PROBE TESTS

(T_A = 25 °C ± 5°C)

Symbol	Parameter	Minimum	Maximum	Value
V _{P Test FET}	Pinch-off Voltage	-1.5	-0.5	V
BV _{Test FET}	Breakdown Voltage gate-source	-30	-8	V
BV _{Test FET}	Breakdown Voltage gate-drain	-30	-8	V

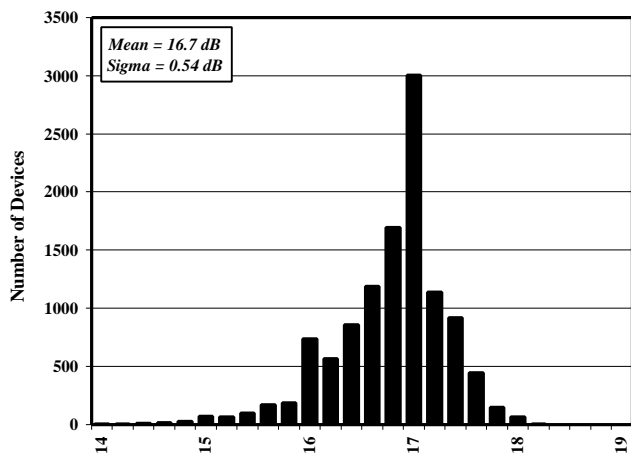
ON-WAFER RF PROBE CHARACTERISTICS

(T_A = 25 °C ± 5°C)

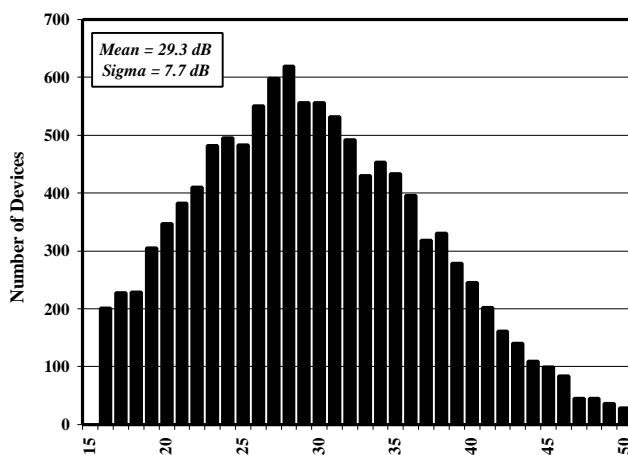
Symbol	Parameter	Test Condition V _d =5V, LO=-5dBm	Limit			Units
			Min	Nom	Max	
G	Conversion Gain	F _{RF} = 1.0 GHz	13	16	20	dB
		F _{LO} = 1.6 GHz				dB
ILO	LO Isolation	F _{LO} = 1.6 GHz	-	-30	-20	dB
P1dB	Output P1dB	F _{RF} = 1.0 GHz	-5	-1	-	dBm
		F _{LO} = 1.6 GHz				
IDC	DC Current		-	26	35	mA

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

RF-Probe Performance Summary



Down-Conversion Gain



LO-IF Isolation

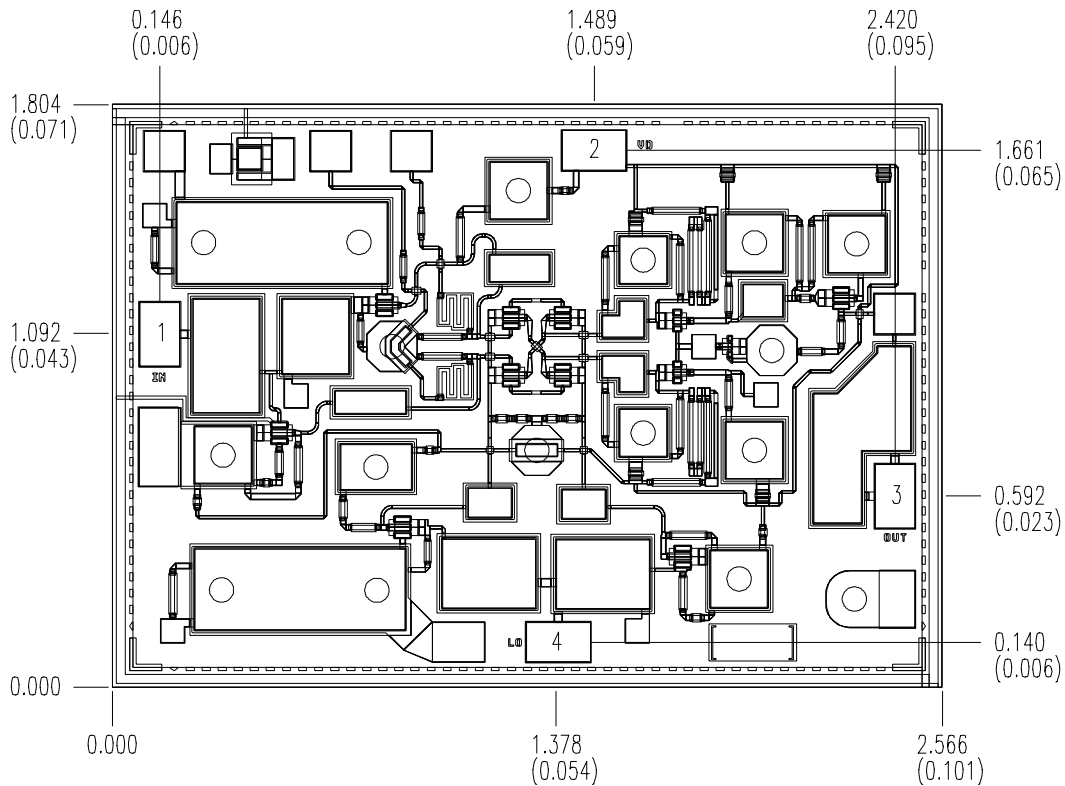
Typical Performance

Parameter	Units	+5V Supply	+3V Supply
RF Frequency	GHz	0.3 - 10.0	0.3 - 10.0
IF Frequency	GHz	0.15 - 2.5	0.15 - 2.5
LO Frequency	GHz	0.45 - 12.5	0.45 - 12.5
LO Power	dBm	-5	-5
Conversion Gain*	dB	15	13
Output P _{1dB} *	dBm	-1	-8
SSB Noise Figure*	dB	11	11
LO Isolation	dB	-30	-30
Input Port Return Loss	dB	-12	-12
Output Port Return Loss	dB	-12	-12
LO Port Return Loss	dB	-12	-12
Supply Current	mA	26	22

* IF = 501 MHz

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

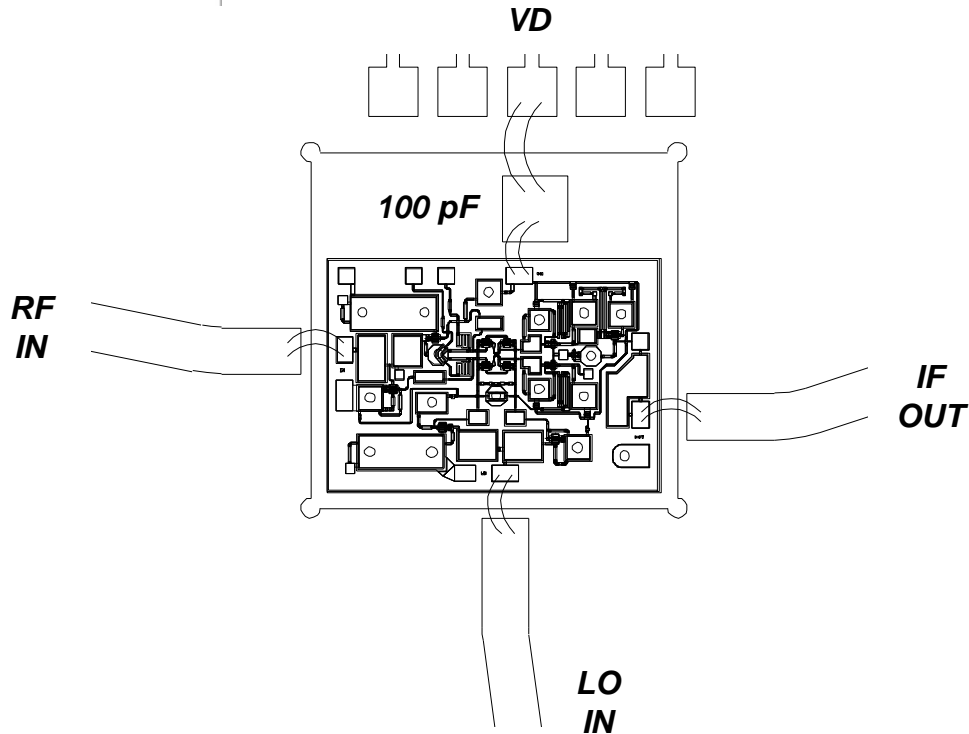
Mechanical Characteristics



Units: millimeters (inches)
 Thickness: 0.1524 (0.006) (reference only)
 Chip edge to bond pad dimensions are shown to center of bond pad.
 Chip size tolerance: +/- 0.0508 (0.002)

Bond Pad #1 (RF Input)	0.125 x 0.200	(0.0049 x 0.0079)
Bond Pad #2 (VD)	0.125 x 0.200	(0.0049 x 0.0079)
Bond Pad #3 (RF Output)	0.125 x 0.200	(0.0049 x 0.0079)
Bond Pad #4 (LO Input)	0.125 x 0.200	(0.0049 x 0.0079)

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.



Chip Assembly and Bonding Diagram

Reflow process assembly notes:

- AuSn (80/20) solder with limited exposure to temperatures at or above 300_μC
- alloy station or conveyor furnace with reducing atmosphere
- no fluxes should be utilized
- coefficient of thermal expansion matching is critical for long-term reliability
- storage in dry nitrogen atmosphere

Component placement and adhesive attachment assembly notes:

- vacuum pencils and/or vacuum collets preferred method of pick up
- avoidance of air bridges during placement
- force impact critical during auto placement
- organic attachment can be used in low-power applications
- curing should be done in a convection oven; proper exhaust is a safety concern
- microwave or radiant curing should not be used because of differential heating
- coefficient of thermal expansion matching is critical

Interconnect process assembly notes:

- thermosonic ball bonding is the preferred interconnect technique
- force, time, and ultrasonics are critical parameters
- aluminum wire should not be used
- discrete FET devices with small pad sizes should be bonded with 0.0007-inch wire
- maximum stage temperature: 200_μC

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.