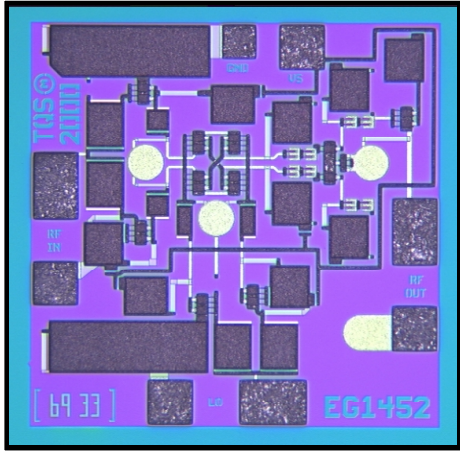


## 0.2 - 18 GHz Downconverter

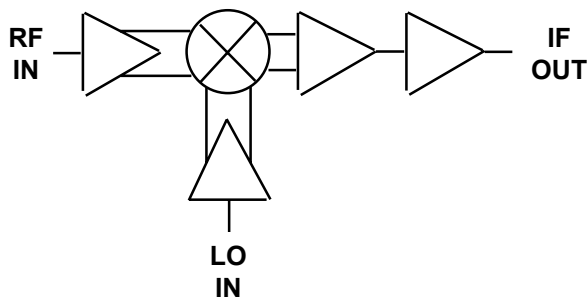
## TGC1452-EPU



The TriQuint TGC1452-EPU is a double balanced MMIC mixer design using TriQuint's proven 0.25  $\mu$ 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 TGC1452 may be operated from a single +3 V to +5 V power supply with typical current draw of 24 mA. The LO power requirement is -5 dBm to 0 dBm. The TGC1452 may also be operated as an up-converter.

The TGC1452 requires a minimum of off-chip components employing only a 0.01  $\mu$ F off-chip bypass capacitor for the power supply line. No additional off-chip RF matching components are required. Each device is 100% RF tested on-wafer to ensure performance compliance. The device is available in chip form.

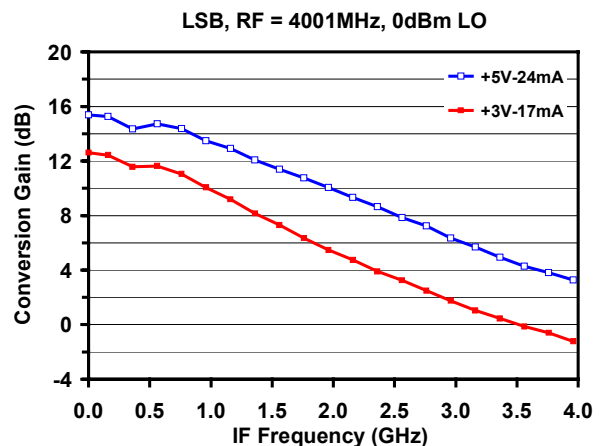
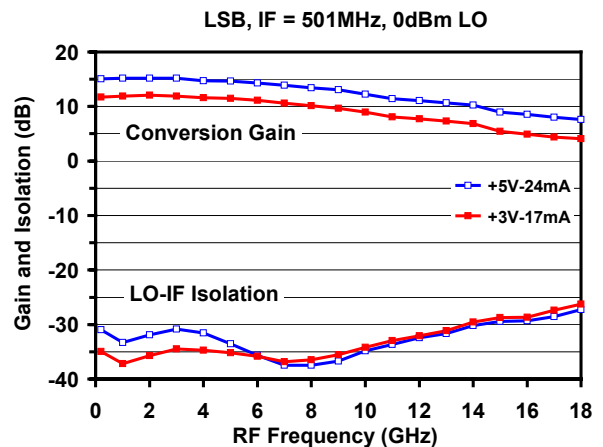


### Key Features and Performance

- 0.25 $\mu$ m pHEMT Technology
- 0.2-18 GHz RF/LO Frequency Range
- DC-4 GHz IF Frequency Range
- Nominal Conversion Gain of 12 dB
- Bias 3-5V @ 17-24 mA
- Chip Dimensions 1.0 mm x 1.0 mm

### Primary Applications

- Satellite Systems
- Point-to-Point Radio



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.

**Electrical Characteristics**

RECOMMENDED MAXIMUM RATINGS

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

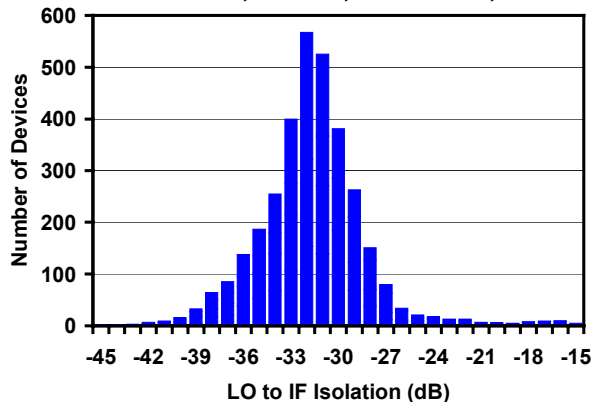
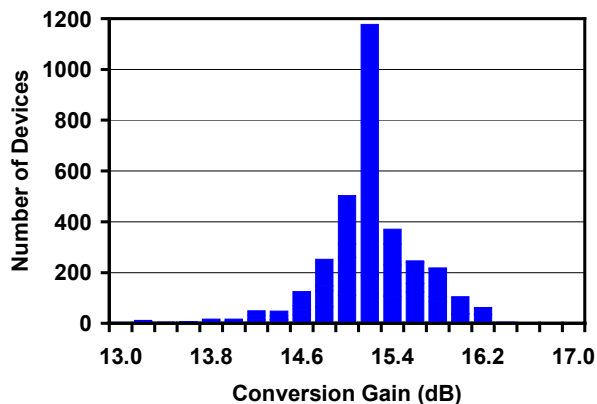
- 1/ These ratings apply to each individual FET
- 2/ Junction operating temperature will directly affect the device mean time to failure (MTTF). For maximum life it is recommended that junction temperatures be maintained at the lowest possible levels.
- 3/ Total current for the entire MMIC

ON-WAFER RF PROBE CHARACTERISTICS

(T<sub>A</sub> = 25 °C ± 5°C)

Symbol	Parameter	Test Condition V <sub>d</sub> =5V, LO=-5dBm	Limit			Units
			Min	Nom	Max	
G	Conversion Gain	F <sub>RF</sub> = 2.0 GHz F <sub>LO</sub> = 2.501 GHz	10	15	-	dB dB
ILO	LO Isolation	F <sub>LO</sub> = 2.501 GHz	-	-30	-25	dB
IDC	DC Current		20	25	35	mA

**RF-Probe Performance Summary**



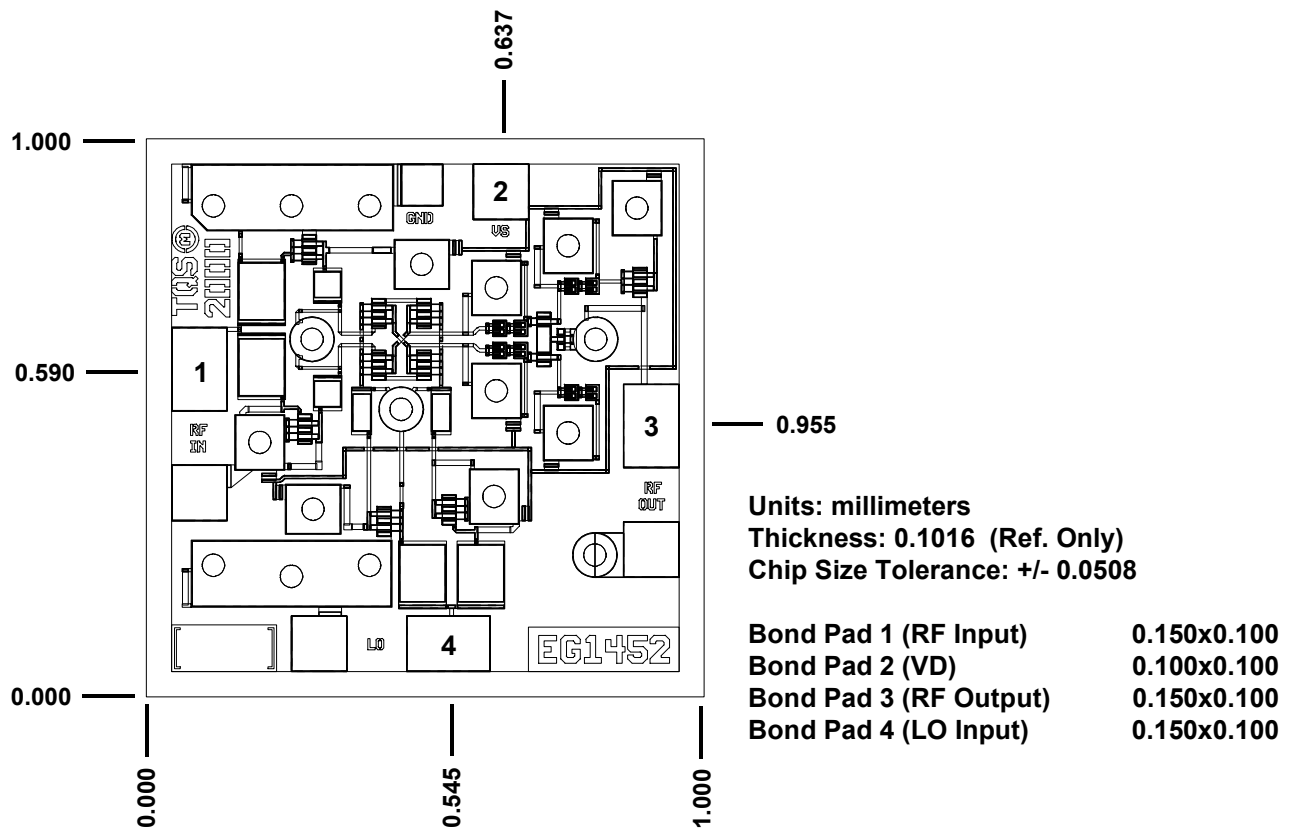
Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

Typical Performance

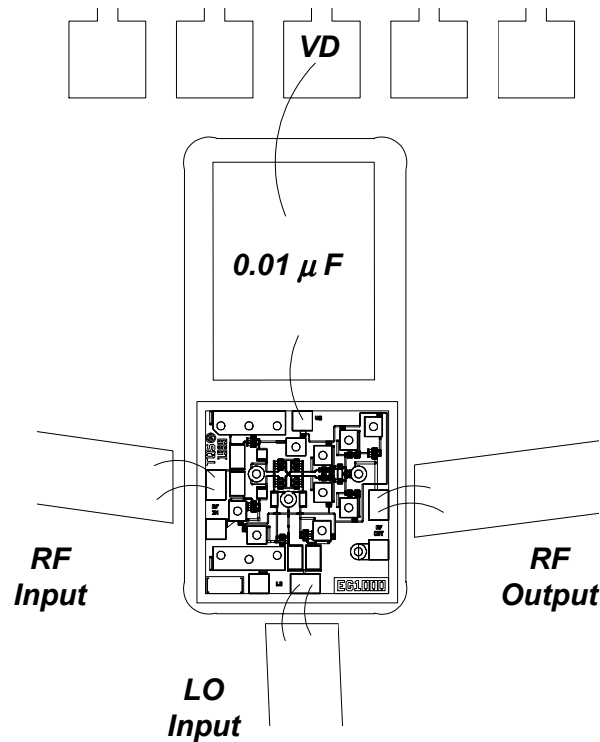
Measured Parameter	Units	+5V Measured			+3V Measured		
		2GHz	10GHz	18GHz	2GHz	10GHz	18GHz
Conversion Gain <sup>1</sup>	dB	14.8	9.5	5.5	12.0	7.5	2.5
Output P <sub>1dB</sub> <sup>1</sup>	dBm	-2.0	-2.3	-3.7	-7.5	-8.5	-10.0
SSB Noise Figure <sup>2</sup>	dB	9.8	12.5	18.5	10.2	13.0	19.0
Gain Temp. Coeff. <sup>1</sup>	dB/°	0.017	0.020	0.030	0.015	0.023	0.032
LO Isolation	dB	-30	-35	-28	-35	-35	-28
RF Return Loss	dB	-18	-9	-8	-18	-9	-8
IF Return Loss	dB	-12	-16	-18	-16	-21	-24
LO Return Loss	dB	-20	-10	-7	-19	-10	-7
Supply Current	mA	24			17		

- 1. IF = 501 MHz
- 2. IF = 201 MHz

Mechanical Characteristics



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°C
- 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°C

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