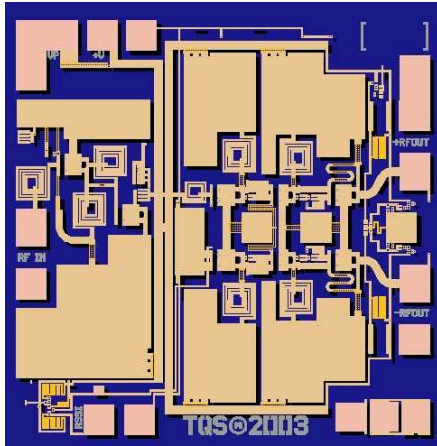


**10Gb/s Wide Dynamic Range Differential TIA TGA4817-EPU**

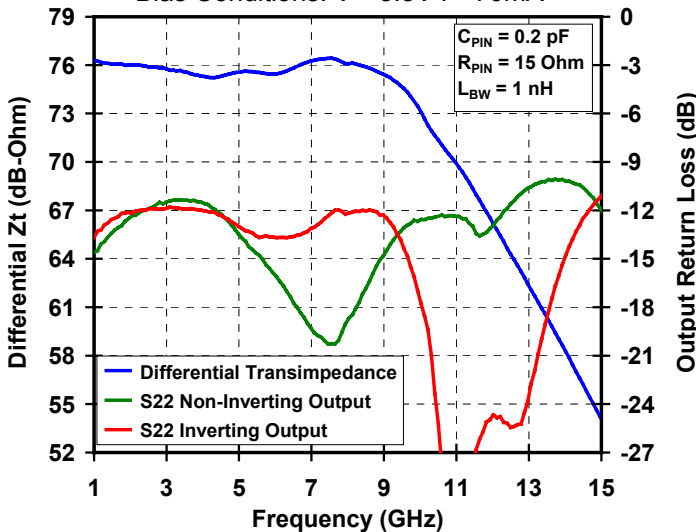


**Key Features and Performance**

- 3200Ω Single-Ended Transimpedance
- > 9 GHz 3dB Bandwidth
- > 1.6mA RMS Input Overload Current
- 11pA/√Hz Input Noise Current
- Rx Signal Indicator (RSSI)
- 0.15μm 3MI pHEMT Technology
- Bias Conditions: 3.3V, 70mA
- Chip dimensions: 1.20 x 1.20 x 0.10 mm (0.047 x 0.047 x 0.004 in)

**Preliminary Measured Performance**

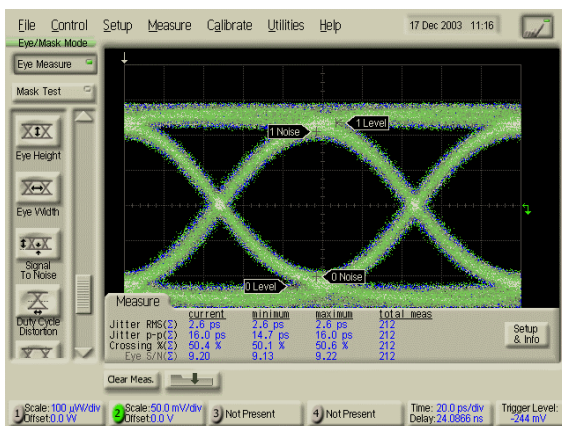
Bias Conditions: V+=3.3V I+=70mA



**Primary Applications**

- OC-192/STM-64 Fiber Optic Systems

10.0Gb/s, 2<sup>31</sup>-1 PRBS, I<sub>PD</sub> = 95 uA RMS



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.

**TABLE I  
MAXIMUM RATINGS**

Symbol	Parameter <u>1/</u>	Value	Notes
V <sup>+</sup>	Positive Supply Voltage	5.5 V	<u>2/</u>
I <sup>+</sup>	Positive Supply Current (Quiescent)	80 mA	<u>2/</u>
P <sub>IN</sub>	Input Continuous Wave Power	14.5 dBm	<u>2/</u>
P <sub>D</sub>	Power Dissipation	0.44 W	<u>2/</u>
T <sub>CH</sub>	Operating Channel Temperature	117 °C	4/ 5/
T <sub>M</sub>	Mounting Temperature (30 Seconds)	320 °C	
T <sub>STG</sub>	Storage Temperature	-65 to 117 °C	

- 1/ These ratings represent the maximum operable values for this device.
- 2/ Current is defined under no RF drive conditions. Combinations of supply voltage, supply current, input power, and output power shall not exceed P<sub>D</sub>.
- 3/ When operated at this power dissipation with a base plate temperature of 70 °C, the median life is 1 E+6 hours.
- 4/ These ratings apply to each individual FET.
- 5/ Junction operating temperature will directly affect the device median time to failure (T<sub>M</sub>). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

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**TABLE II**  
**RF CHARACTERIZATION TABLE**

( $T_A = 25^\circ\text{C}$ , Nominal)  
( $V^+ = 3.3\text{V}$ ,  $I^+ = 70\text{mA}$ ) 1/

Parameter	Typical	Unit	Notes
Single-Ended Transimpedance (1GHz)	3200	$\Omega$	<u>2/ 3/</u>
3dB Transimpedance Bandwidth	9	GHz	<u>2/ 3/</u>
Low Frequency 3dB Cut-Off	< 40	kHz	<u>4/</u>
Transimpedance Ripple (1 to 7GHz)	1.5	dBpp	<u>2/ 3/</u>
Group Delay Variation (1 to 7GHz)	$\pm 15$	ps	<u>2/ 3/</u>
Ave Eq. Noise Current (1 to 7GHz)	11	pA/ $\sqrt{\text{Hz}}$	<u>3/</u>
Output Return Loss (0.1 to F3dB)	12	dB	<u>2/ 3/</u>
Input Overload Current	1.6	mA RMS	<u>5/</u>
Sensitivity	10	$\mu\text{A}$ RMS	<u>5/</u>
Single-Ended Limited Output Voltage	600	mVpp	

- 1/ 50 $\Omega$  Single-Ended Output Impedance
- 2/ Photodiode& Bond Wire Model: CPD = 0.2pF, RPD = 15 $\Omega$ , LBW = 1.0 nH
- 3/ RF Output Interconnect Inductance: 0.42nH
- 4/ External Bypass Capacitors Required (see assembly drawing)
- 5/ 10Gbit/s,  $2^{31}-1$  PRBS, BER <  $10^{-12}$

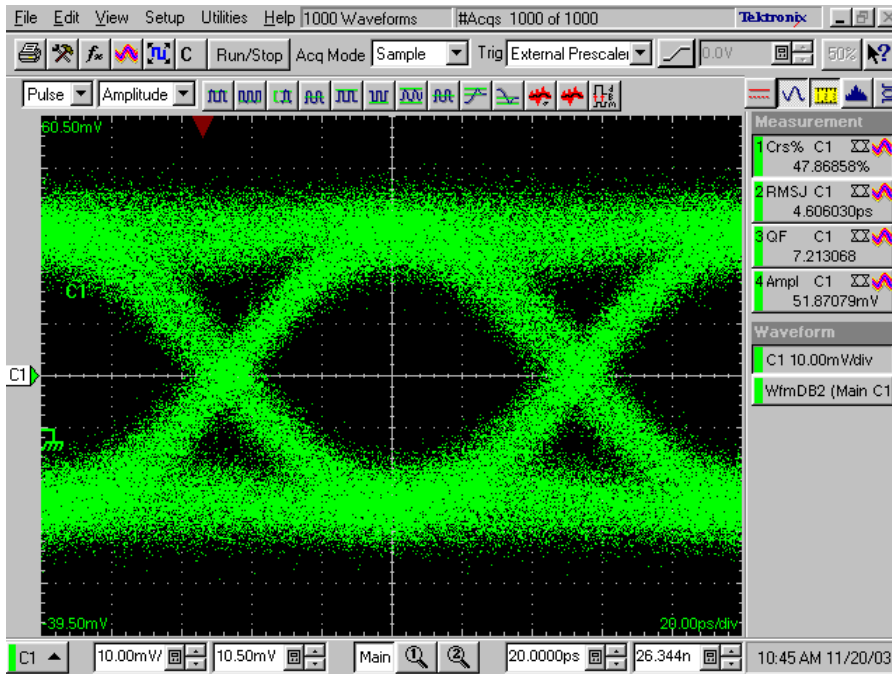
**TABLE III**  
**THERMAL INFORMATION**

Parameter	Test Conditions	$T_{CH}$ ( $^\circ\text{C}$ )	$R_{\theta JC}$ ( $^\circ\text{C/W}$ )	$T_M$ (HRS)
$R_{\theta JC}$ Thermal Resistance (channel to backside of carrier)	$V^+ = 3.3\text{V}$ $I^+ = 70\text{mA}$ $P_{diss} = 0.231\text{W}$	74	17.3	1.1 E+8

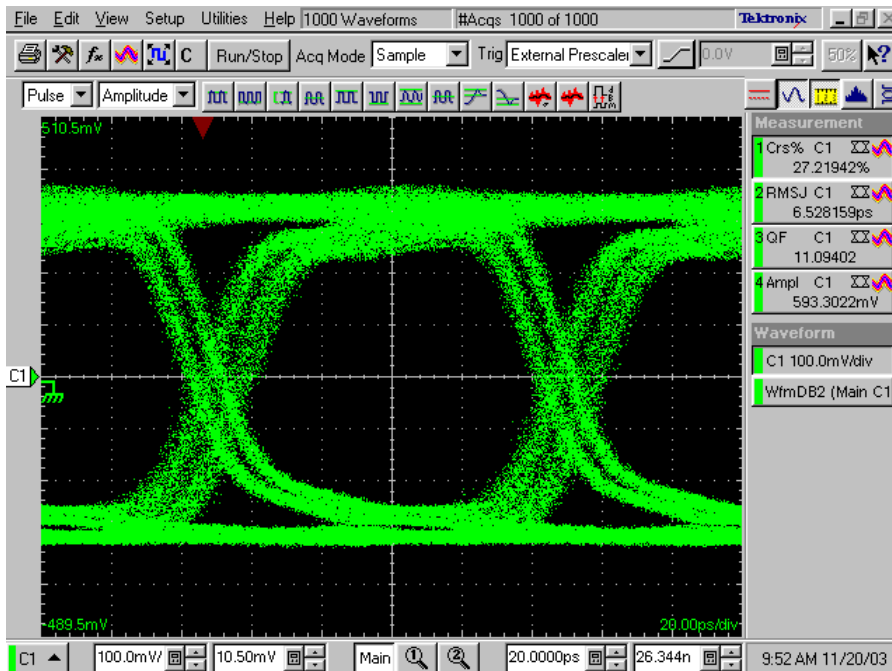
Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70 $^\circ\text{C}$  baseplate temperature.

*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 Fixtured Performance  
Optical Eye 10Gbps PRBS 2<sup>31</sup>-1**



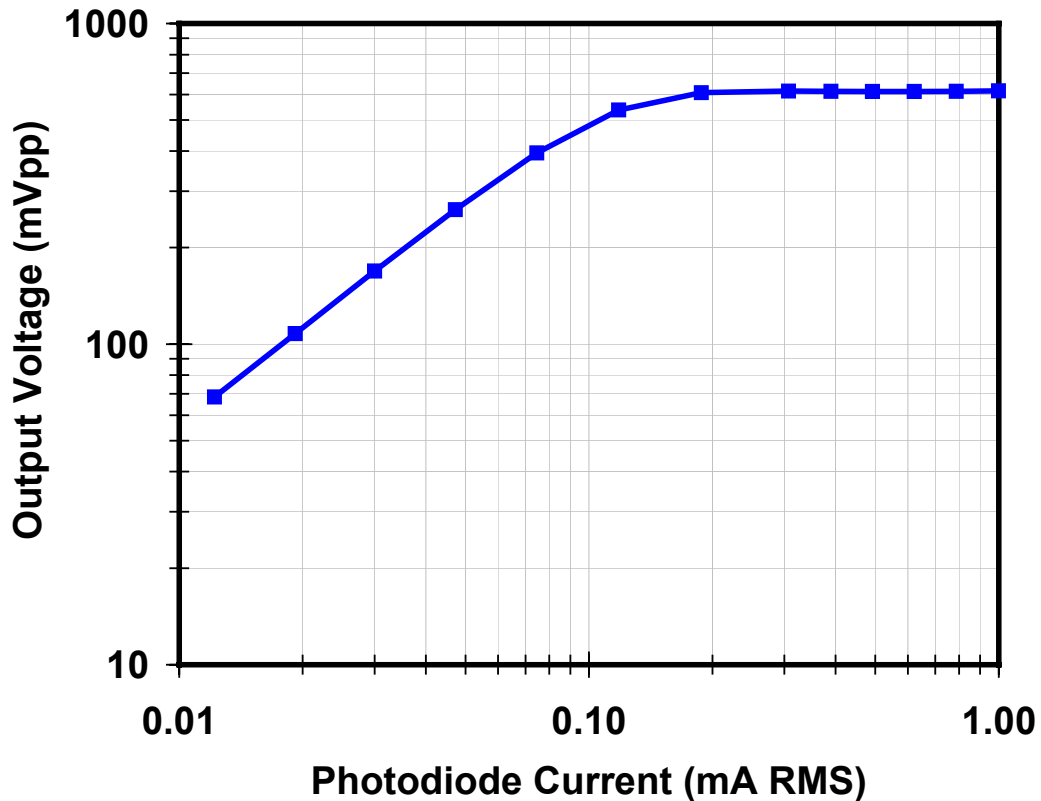
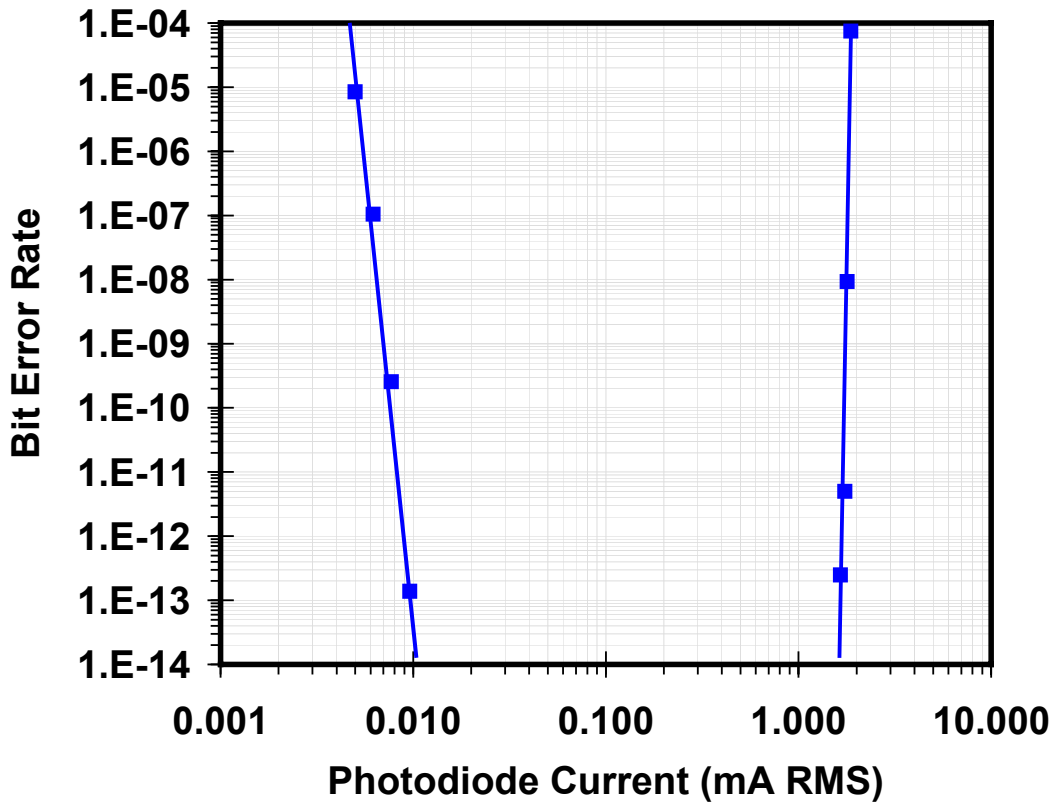
**Photodiode Current = 9.5 uA RMS**



**Photodiode Current = 1.5 mA RMS**

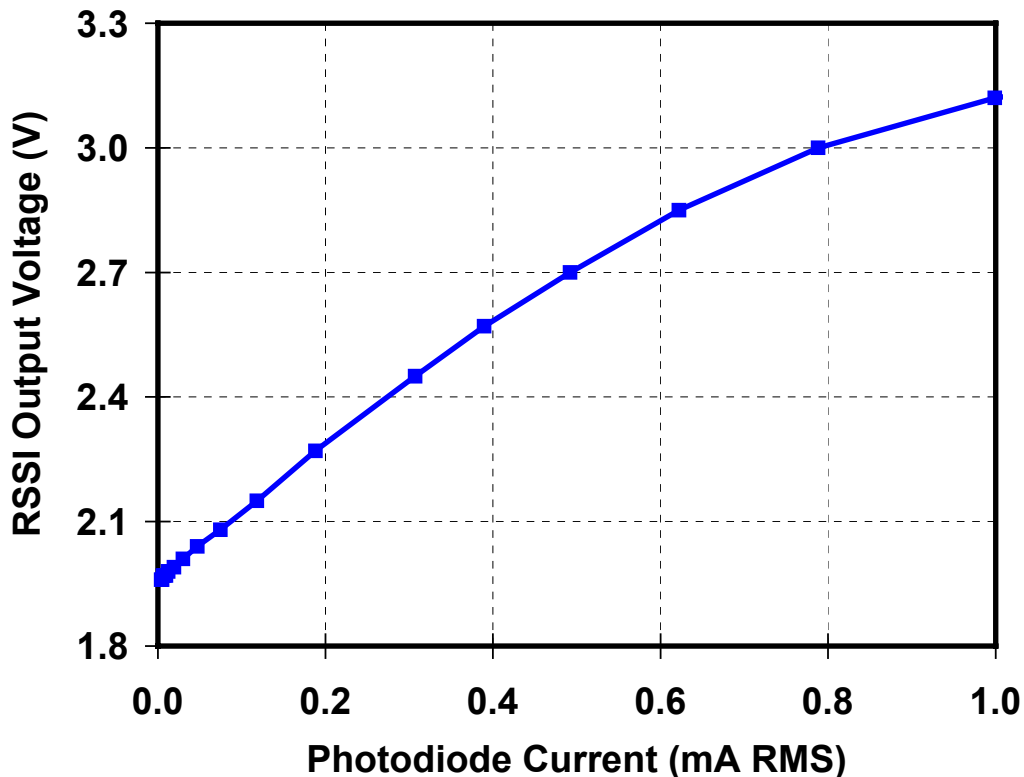
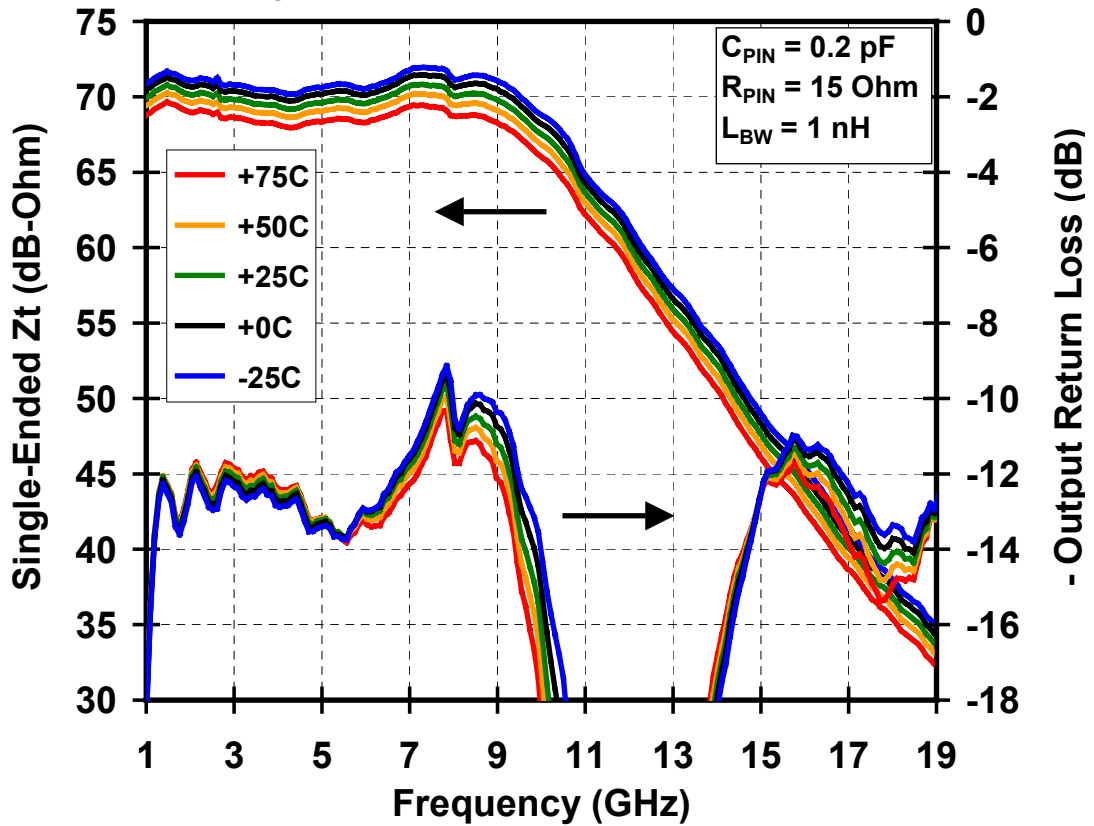
*Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.*

Typical Fixtured Performance



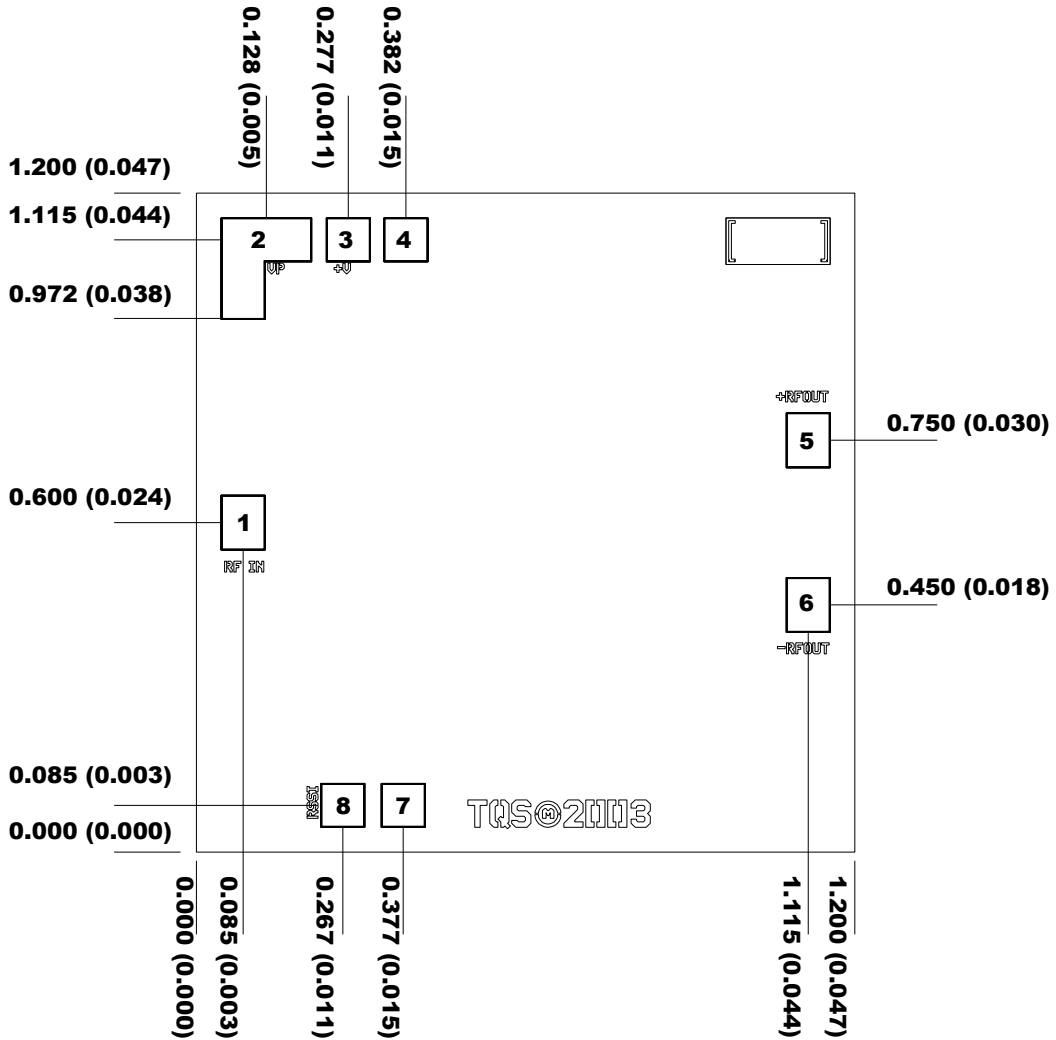
Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

Typical Fixtured Performance



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 Drawing**



**Units: millimeters (inches)**

**Thickness: 0.100 (0.004)**

**Chip edge to bond pad dimensions are shown to center of bond pad**

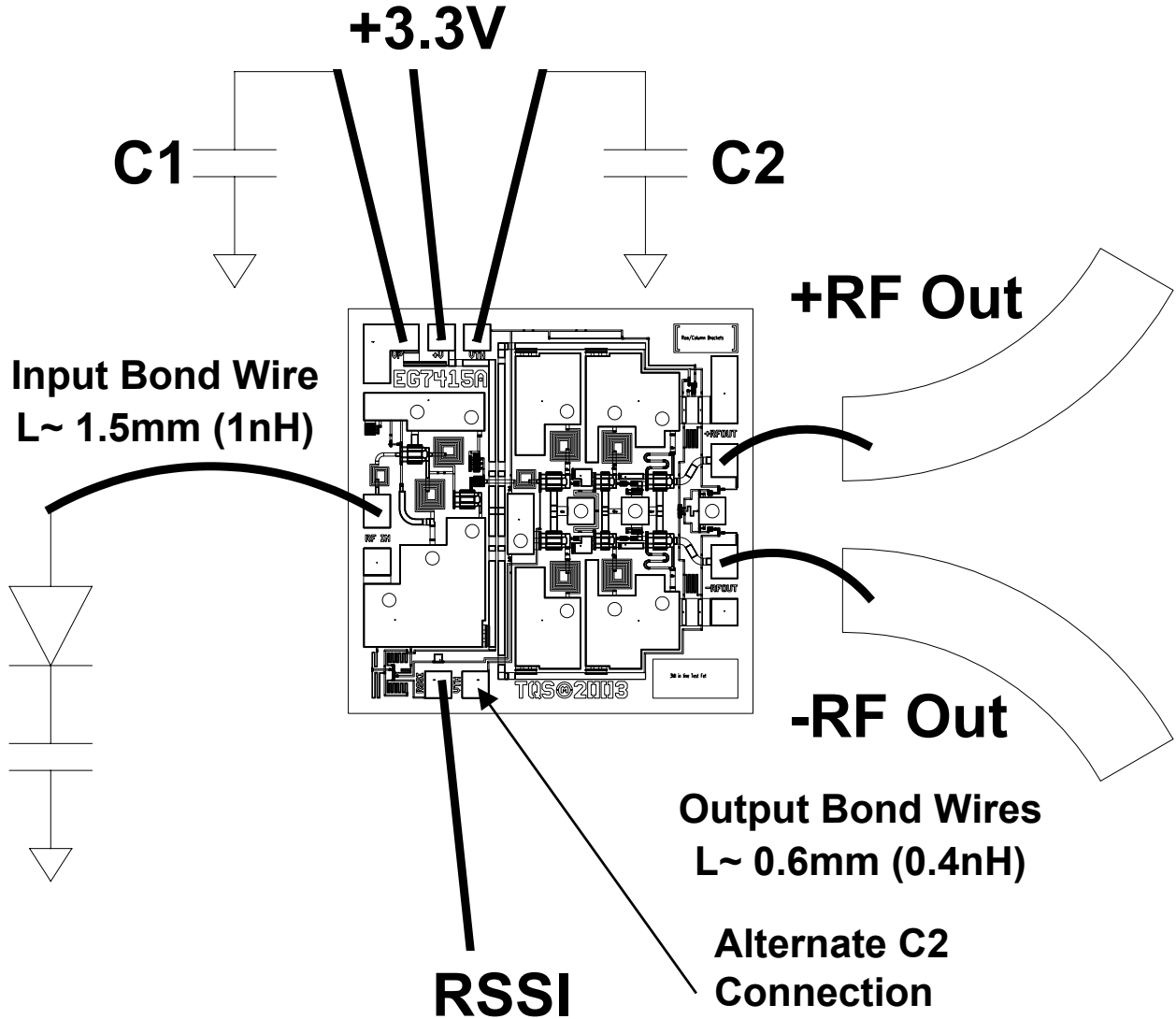
**Chip size tolerance: +/- 0.051 (0.002)**

**GND IS BACKSIDE OF MMIC**

<b>Bond pad #1</b>	<b>(RF In)</b>	<b>0.079 x 0.100 (0.003 x 0.004)</b>	
<b>Bond pad #2</b>	<b>(C Bypass)</b>	<b>0.160 x 0.180 (0.006 x 0.007)</b>	
<b>Bond pad #3</b>	<b>(V+)</b>	<b>0.079 x 0.079 (0.003 x 0.003)</b>	
<b>Bond pad #4</b>	<b>(FBIN)</b>	<b>0.079 x 0.079 (0.003 x 0.003)</b>	
<b>Bond pad #5</b>	<b>(+ RF Out)</b>	<b>0.079 x 0.100 (0.003 x 0.004)</b>	
<b>Bond pad #6</b>	<b>(- RF Out)</b>	<b>0.079 x 0.100 (0.003 x 0.004)</b>	
<b>Bond pad #7</b>	<b>(FBIN)</b>	<b>0.079 x 0.079 (0.003 x 0.003)</b>	<b>ALTERNATE</b>
<b>Bond pad #8</b>	<b>(RSSI)</b>	<b>0.079 x 0.079 (0.003 x 0.003)</b>	

*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 & Bonding Diagram**



**C1 - +3.3V Bypass Capacitor (>35nF)**

**C2 - Sets Low Frequency Corner (>35nF)**

**Recommended Components**

**C1,C2 AVX: 0402YC393KAT2A**

**C1,C2 Presidio: VL4040X7R363M16VH5**

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

*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.*



## **Assembly Process Notes**

### Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300 °C for 30 sec
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

### Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is 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.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is 200 °C.

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

*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.*