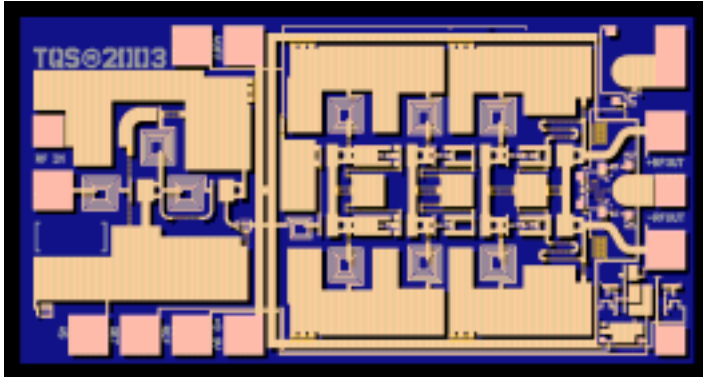


**10Gb/s Differential TIA**

**TGA4815-EPU**

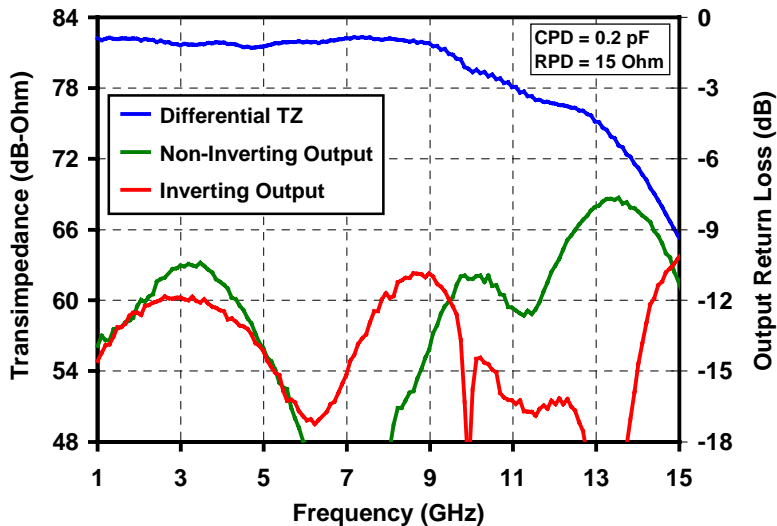


**Key Features and Performance**

- 6500Ω Single-Ended Transimpedance
- >10GHz 3dB Bandwidth
- 1.7mA<sub>pp</sub> Maximum Input Current
- 9pA/√Hz Input Noise Current
- Adjustable Output Offset
- Rx Signal Indicator (RSSI)
- 0.15μm 3MI pHEMT Technology
- Bias Conditions: 3.3V, 80mA
- Chip dimensions: 1.78 x 0.96 x 0.1 mm (0.070 x 0.038 x 0.004 inches)

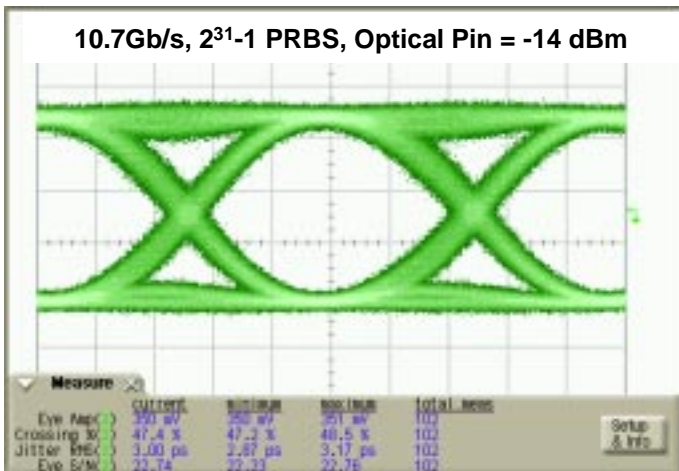
**Preliminary Measured Performance**

Bias Conditions: VPOS=3.3V, IPOS=80mA



**Primary Applications**

- OC-192/STM-64 Fiber Optic Systems



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
VPOS	Positive Supply Voltage	5.5 V	<u>2/</u>
IPOS	Positive Supply Current (Quiescent)	90 mA	<u>2/</u>
P <sub>IN</sub>	Input Continuous Wave Power	14.5 dBm	<u>2/</u>
P <sub>D</sub>	Power Dissipation	TBD	<u>2/</u>
T <sub>CH</sub>	Operating Channel Temperature	150 °C	<u>3/ 4/</u>
T <sub>M</sub>	Mounting Temperature (30 Seconds)	320 °C	
T <sub>STG</sub>	Storage Temperature	-65 to 150 °C	

- 1/ These ratings represent the maximum operable values for this device.
- 2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P<sub>D</sub>.
- 3/ These ratings apply to each individual FET.
- 4/ 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)  
(VPOS = 3.3V, IPOS = 80mA  $\pm 5\%$ ) 1/

Parameter	Notes	Typical	Unit
Single-Ended Transimpedance (1GHz)		6500	$\Omega$
3dB Transimpedance Bandwidth	<u>2/ 3/</u>	10	GHz
Low Frequency 3dB Cut-Off	<u>4/</u>	30	kHz
Transimpedance Ripple (1 to 8GHz)	<u>2/ 3/</u>	0.3	dBpp
Group Delay Variation (0.1 to 8GHz)	<u>2/ 3/</u>	$\pm 15$	ps
Ave Eq. Noise Current (0.1 to 8GHz)	<u>2/ 3/</u>	9	pA/ $\sqrt{\text{Hz}}$
Output Return Loss (0.1 to F3dB)	<u>2/ 3/</u>	12	dB
Input Overload Current		1.7	mApp
Input Sensitivity (BER = $10^{-12}$ )		-20	dBm
Single-Ended Limited Output Voltage		600	mVpp

Note: Table II Lists the RF Characteristics of typical devices as determined by fixtured measurements.

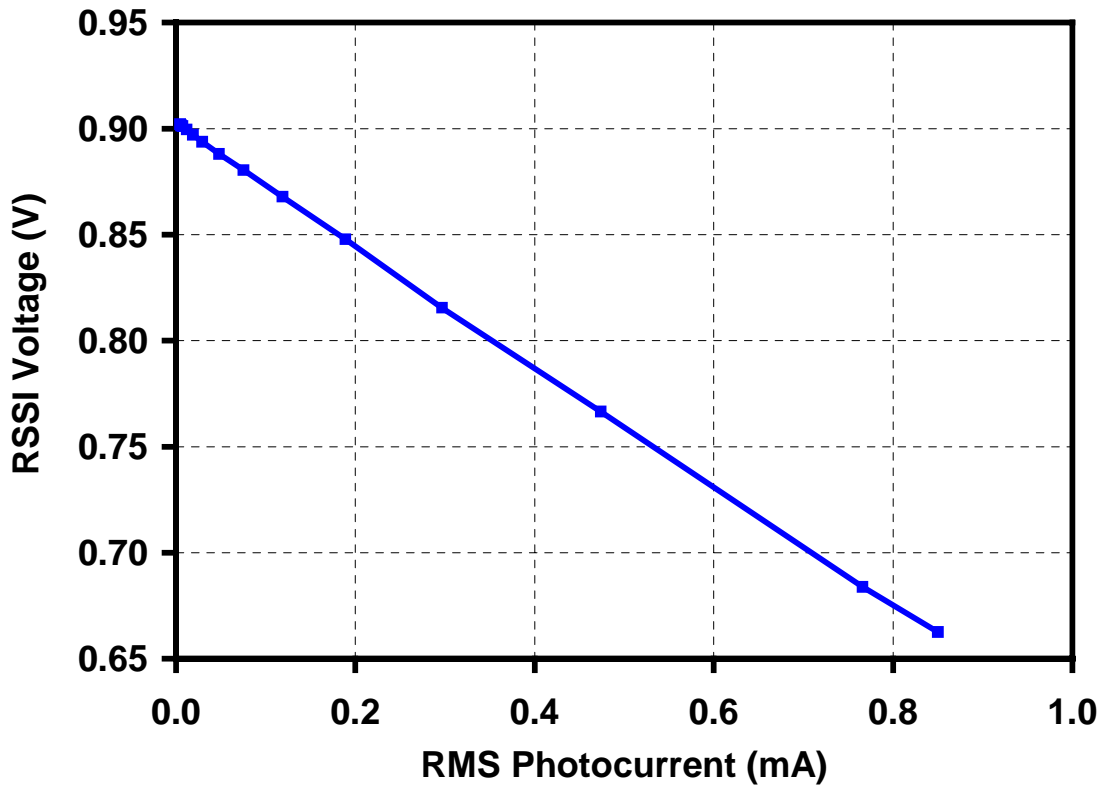
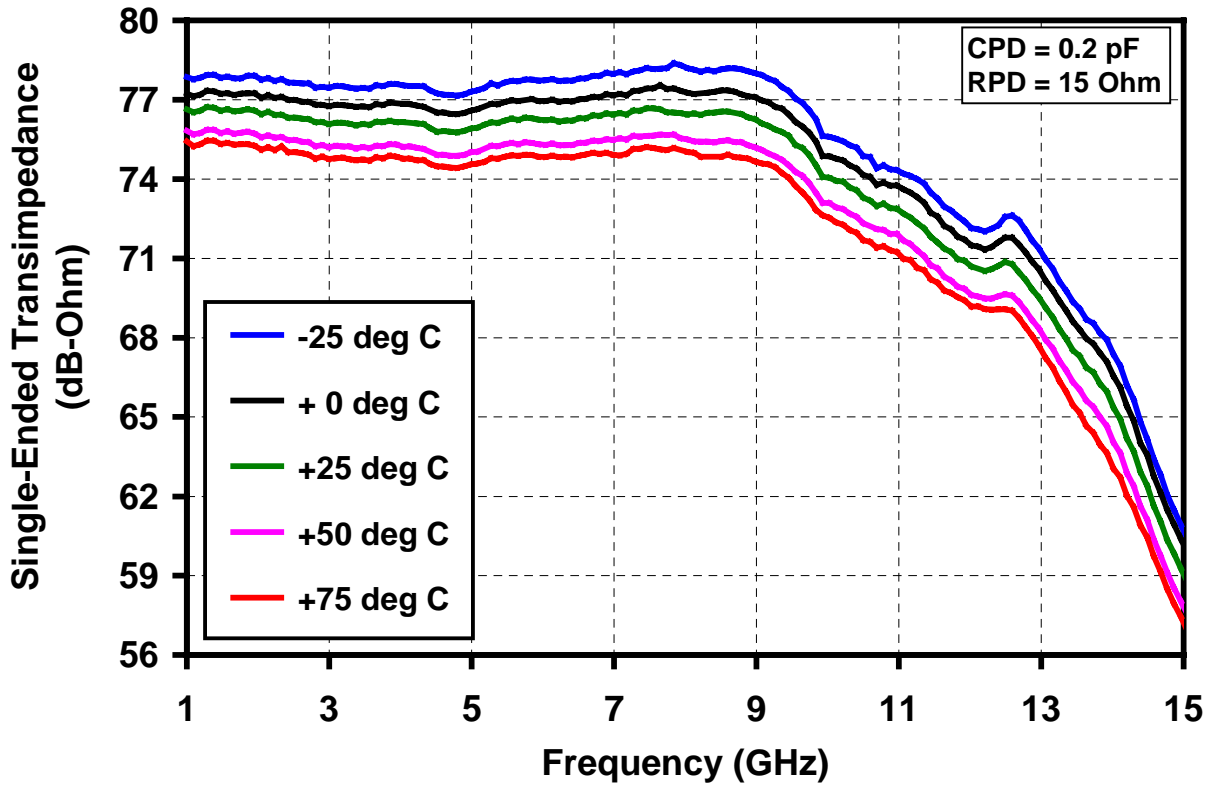
- 1/ 50  $\Omega$  Single-Ended Output Impedance
- 2/ Photodiode Model: CPD = 0.2pF, RPD = 15 $\Omega$
- 3/ RF Interconnect Inductance: 0.42nH
- 4/ External Bypass Capacitors Required (see assembly drawing)

**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)	$V^+ = 3.3\text{ V}$ $I^+ = 80\text{ mA}$ $P_{diss} = 0.264\text{ W}$	80	36.9	5.7 E+7

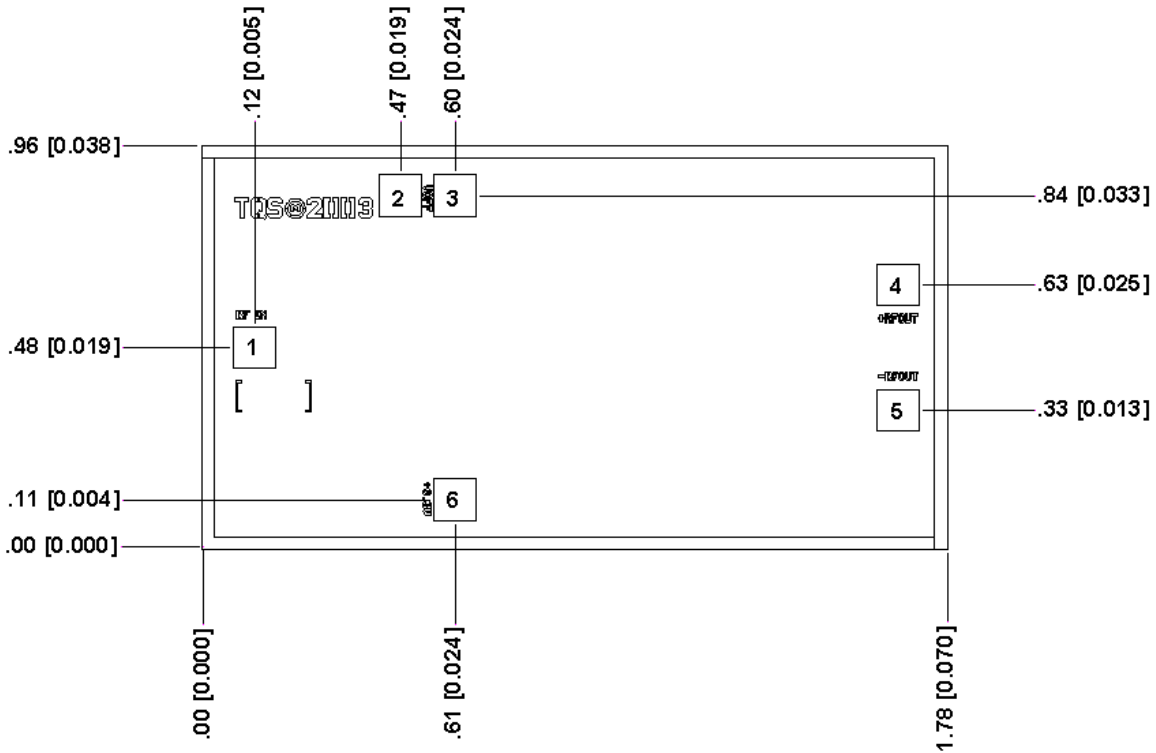
Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70 $^\circ\text{C}$  baseplate temperature.

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: 0.10 [0.004] (reference only)

Chip edge to bond pad dimensions are shown to center of bond pads.

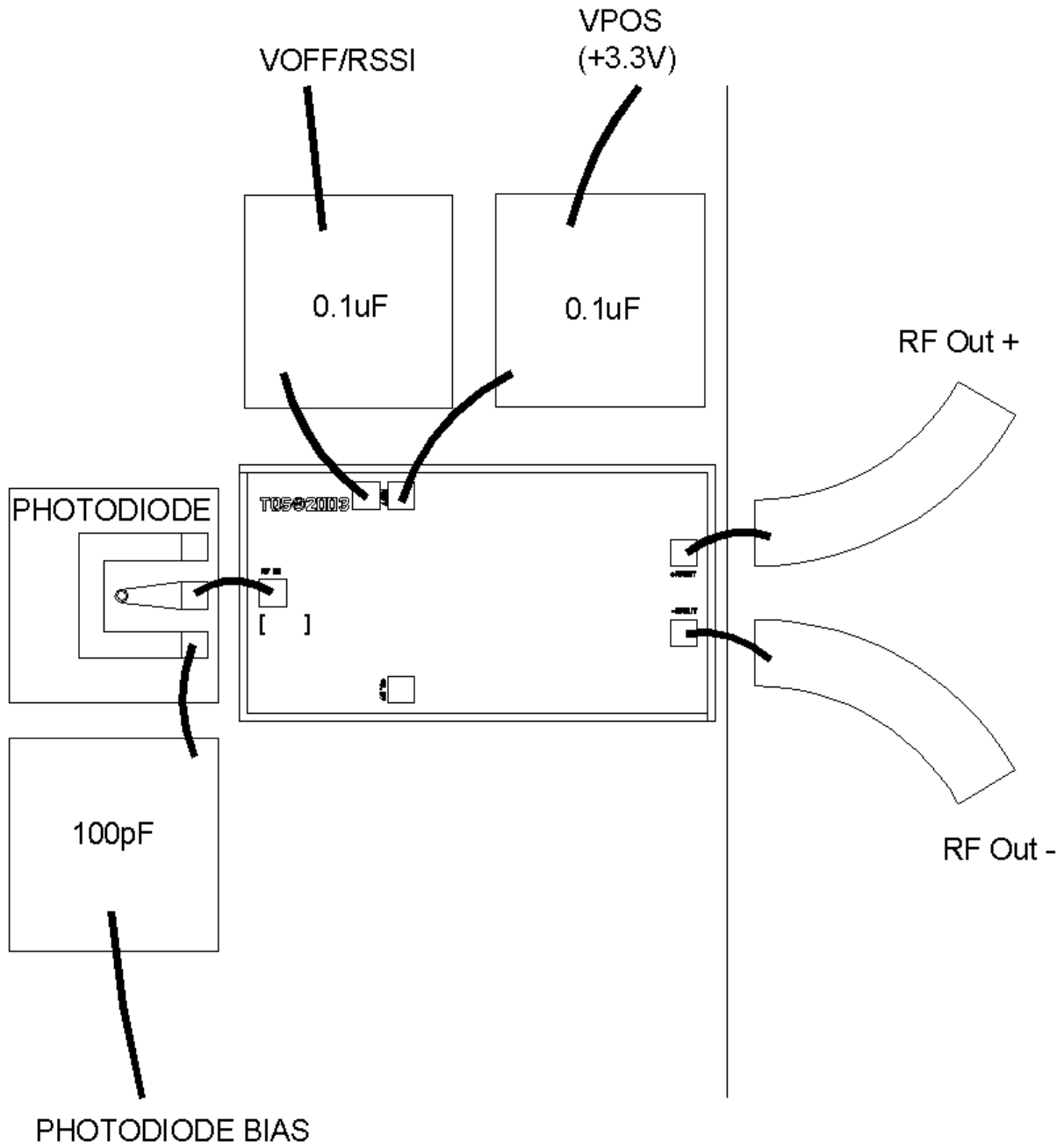
Chip size tolerance: ±0.05 [0.002]

RF ground through backside

Bond Pad #1	RF In	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #2	VOFF/RSSI	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #3	VPOS	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #4	RF Out +	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #5	RF Out -	0.10 x 0.10	[0.004 x 0.004]
Bond Pad #6	VPOS	0.10 x 0.10	[0.004 x 0.004]

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**



**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. (30 seconds maximum)
- 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.
- 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.*