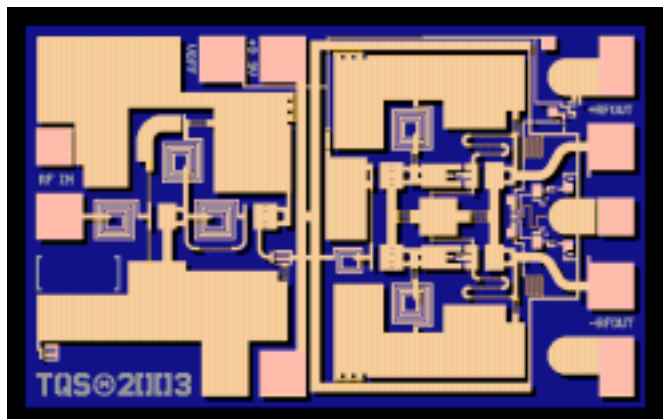


## 10Gb/s Differential TIA

## TGA4816-EPU

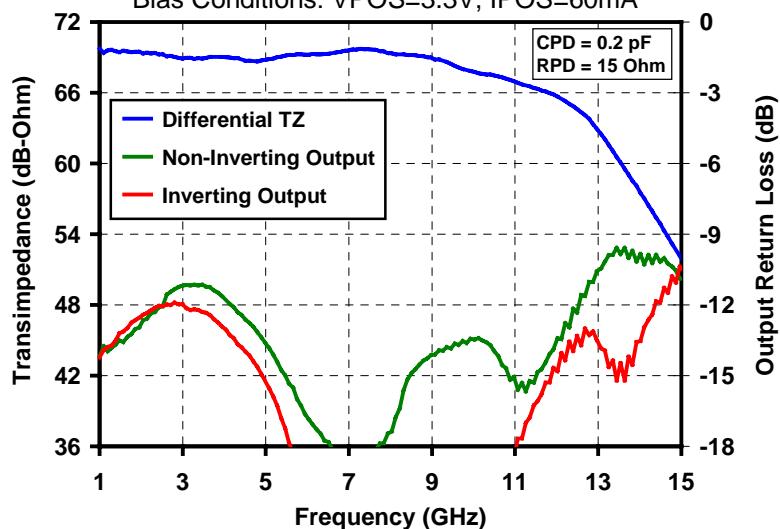


### Key Features and Performance

- 1500Ω Single-Ended Transimpedance
- >10GHz 3dB Bandwidth
- 1.6mA<sub>pp</sub> Maximum Input Current
- 8pA/√Hz Input Noise Current
- Adjustable Output Offset
- Rx Signal Indicator (RSSI)
- 0.15μm 3MI pHEMT Technology
- Bias Conditions: 3.3V, 60mA
- Chip dimensions:  
1.42 x 0.91 x 0.1 mm  
(0.056 x 0.036 x 0.004 inches)

### Preliminary Measured Performance

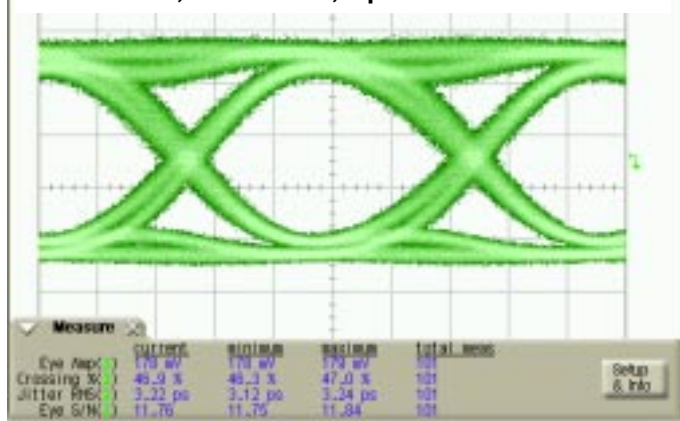
Bias Conditions: VPOS=3.3V, IPOS=60mA



### Primary Applications

- OC-192/STM-64 Fiber Optic Systems

10.7Gb/s, 2<sup>31</sup>-1 PRBS, Optical Pin = -10 dBm



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)	70 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/</u> <u>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<sub>A</sub> = 25°C, Nominal)  
 (VPOS = 3.3V, IPOS = 60mA ±5%) 1/

Parameter	Notes	Typical	Unit
Single-Ended Transimpedance (1GHz)		1500	Ω
3dB Transimpedance Bandwidth	<u>2/ 3/</u>	11	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>	±15	ps
Ave Eq. Noise Current (0.1 to 8GHz)	<u>2/ 3/</u>	8	pA/√Hz
Output Return Loss (0.1 to F3dB)	<u>2/ 3/</u>	12	dB
Input Overload Current (BER = 10 <sup>-12</sup> )		1.6	mApp
Input Sensitivity (BER = 10 <sup>-12</sup> )		-21	dBm
Single-Ended Limited Output Voltage		500	mVpp

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

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

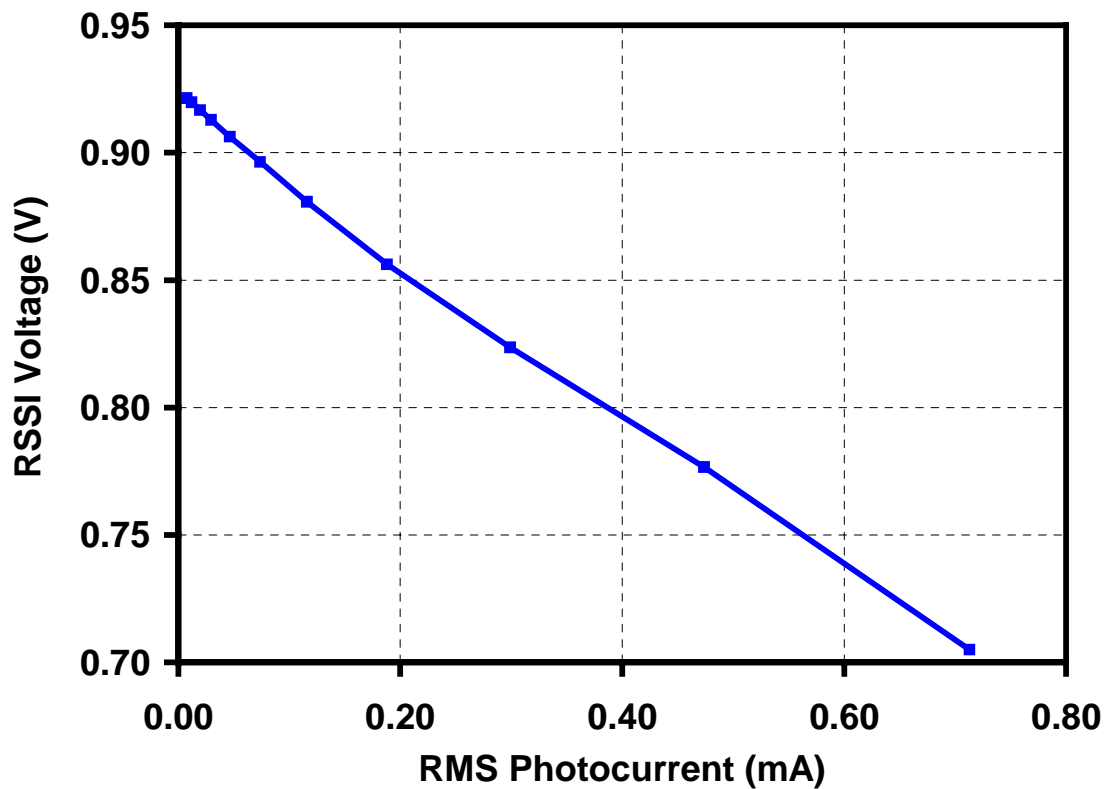
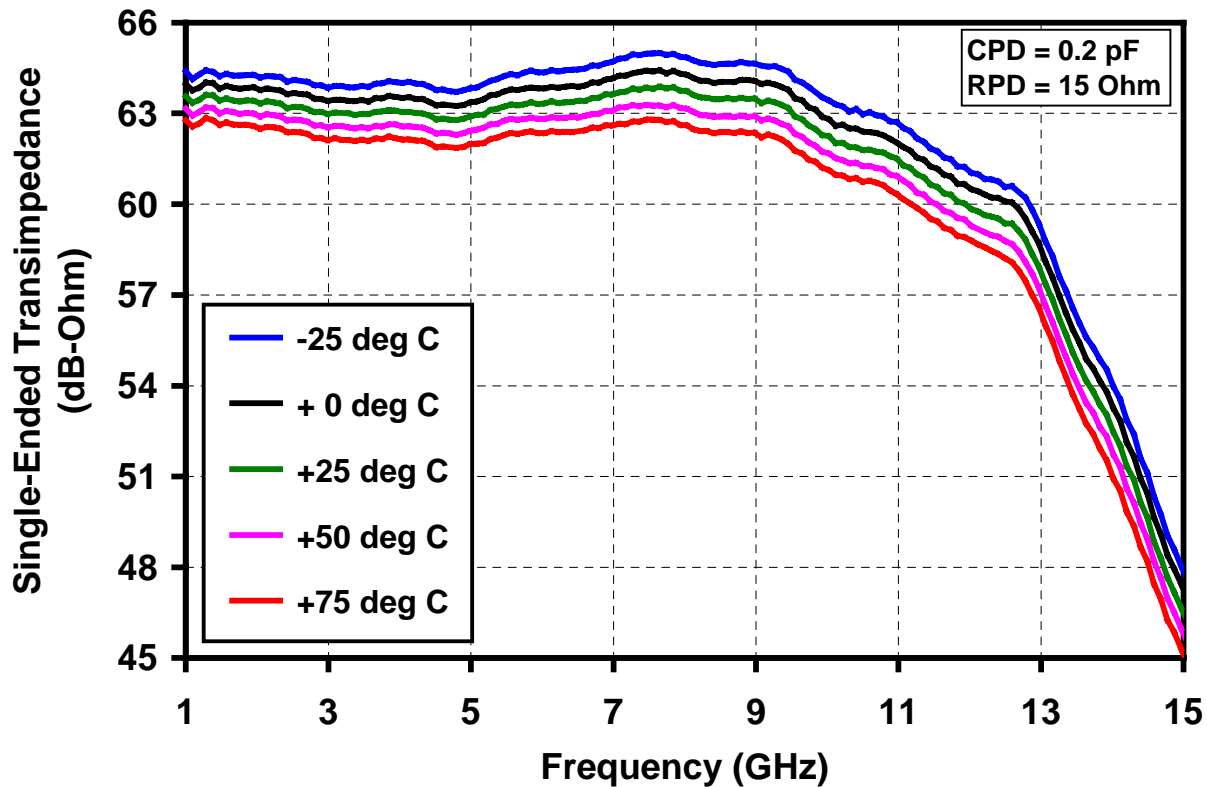
**TABLE III**  
**THERMAL INFORMATION**

Parameter	Test Conditions	T <sub>CH</sub> (°C)	R <sub>θJC</sub> (°C/W)	T <sub>M</sub> (HRS)
R <sub>θJC</sub> Thermal Resistance (channel to backside of carrier)	V <sup>+</sup> = 3.3 V I <sup>+</sup> = 60 mA P <sub>diss</sub> = 0.198 W	82	59.7	4.5 E+7

Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70°C baseplate temperature.

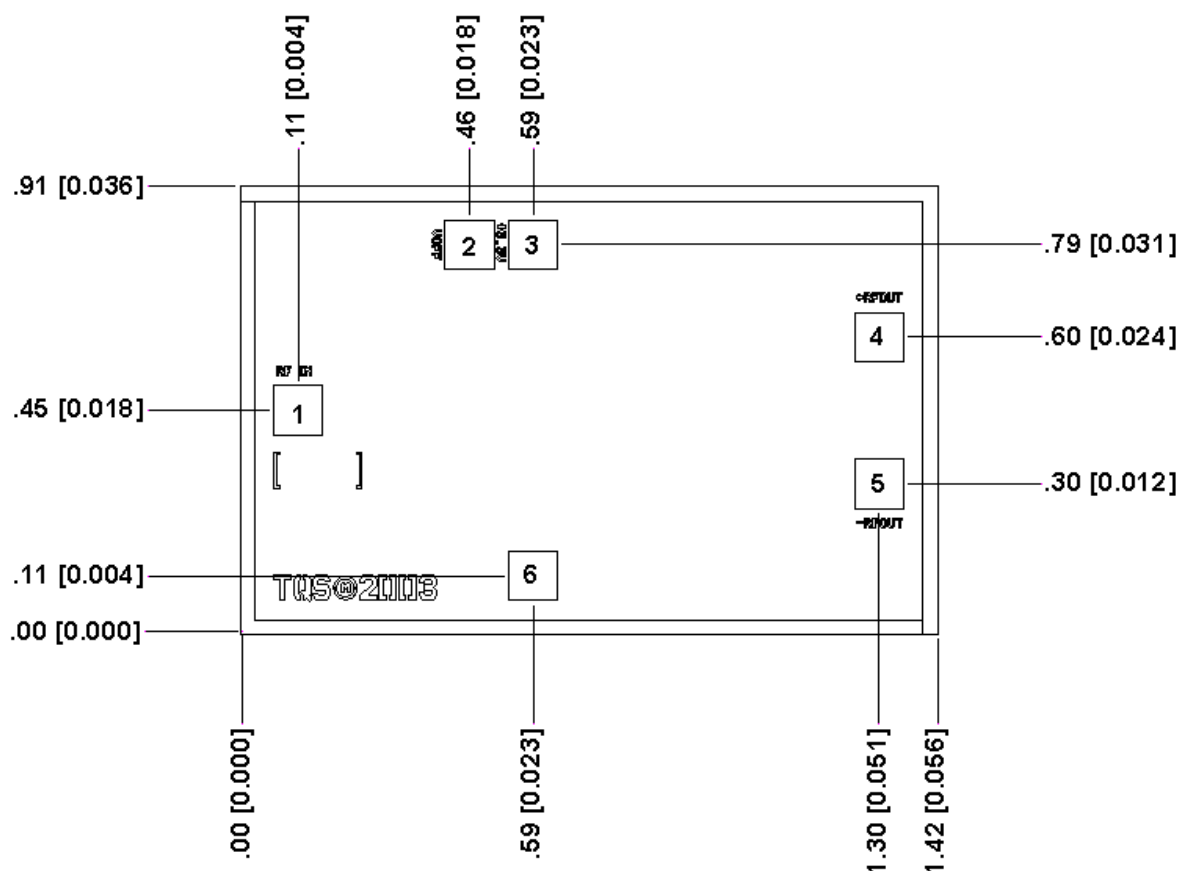
*Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.*

# Typical Fixtured Performance



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.

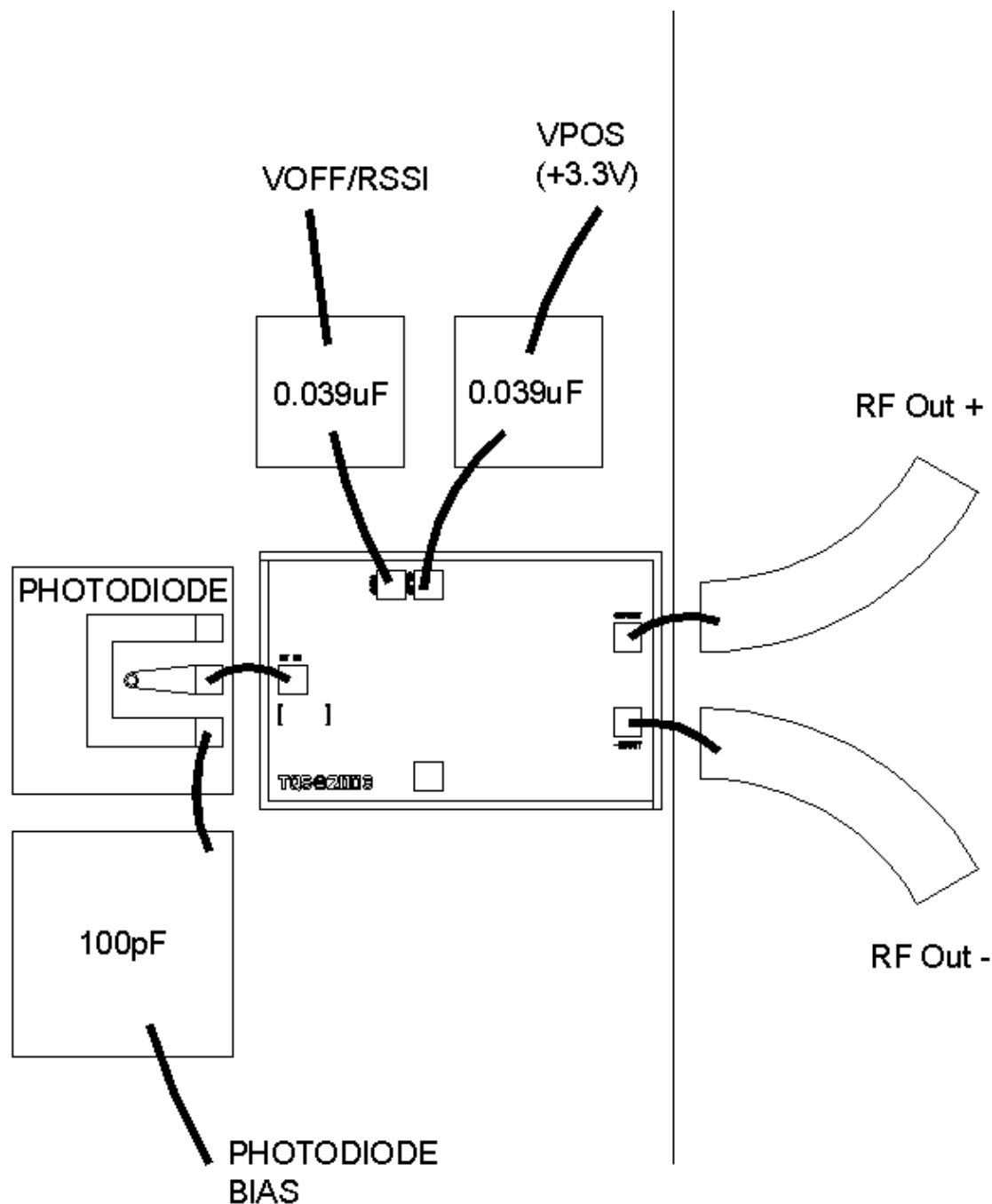
Chip size tolerance: ±0.05 [0.002]

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.*