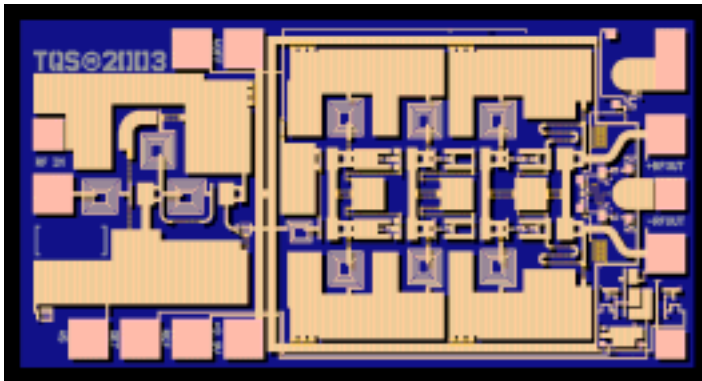


10Gb/s Differential TIA

TGA4815-EPU

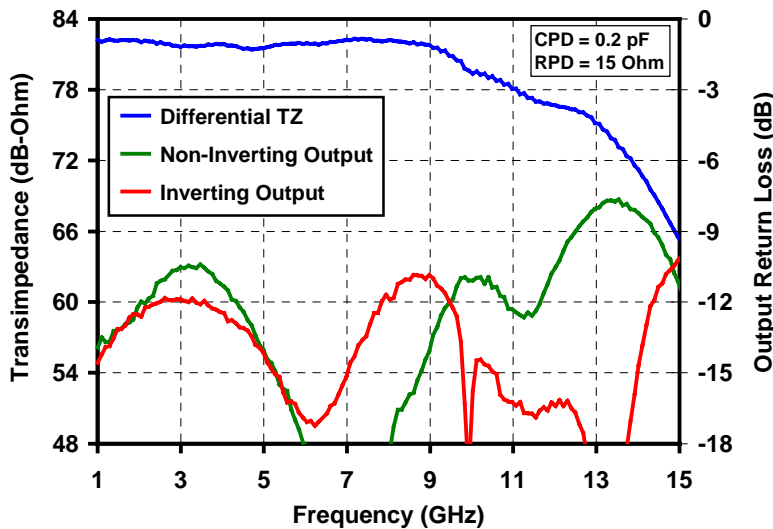


Key Features and Performance

- 6500Ω Single-Ended Transimpedance
- >10GHz 3dB Bandwidth
- 1.7mA_{pp} 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

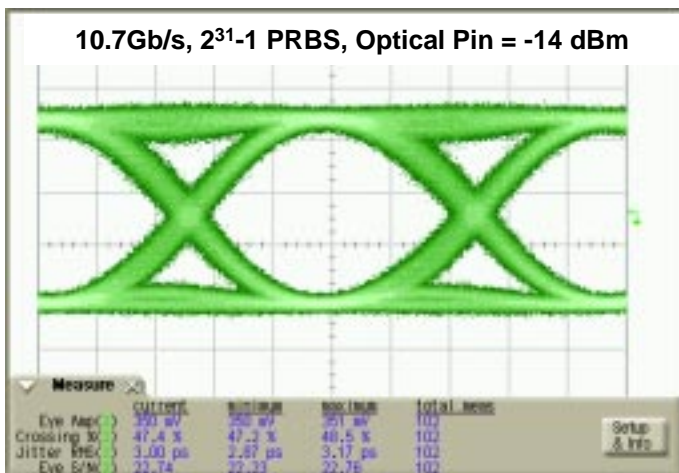
Bias Conditions: VPOS=3.3V, IPOS=80mA



Primary Applications

- OC-192/STM-64 Fiber Optic Systems

10.7Gb/s, 2³¹-1 PRBS, Optical Pin = -14 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)	90 mA	<u>2/</u>
P _{IN}	Input Continuous Wave Power	14.5 dBm	<u>2/</u>
P _D	Power Dissipation	TBD	<u>2/</u>
T _{CH}	Operating Channel Temperature	150 °C	<u>3/</u> <u>4/</u>
T _M	Mounting Temperature (30 Seconds)	320 °C	
T _{STG}	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_D.
- 3/ These ratings apply to each individual FET.
- 4/ Junction operating temperature will directly affect the device median time to failure (T_M). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

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 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	Ω
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>	± 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.

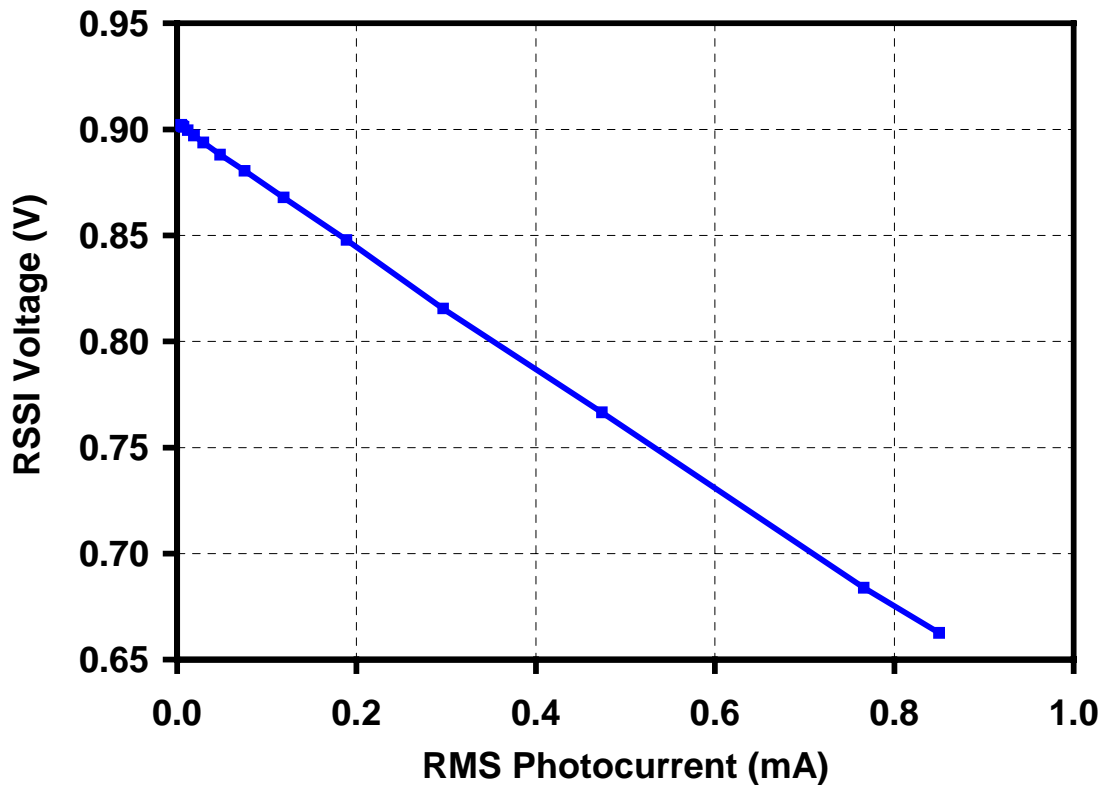
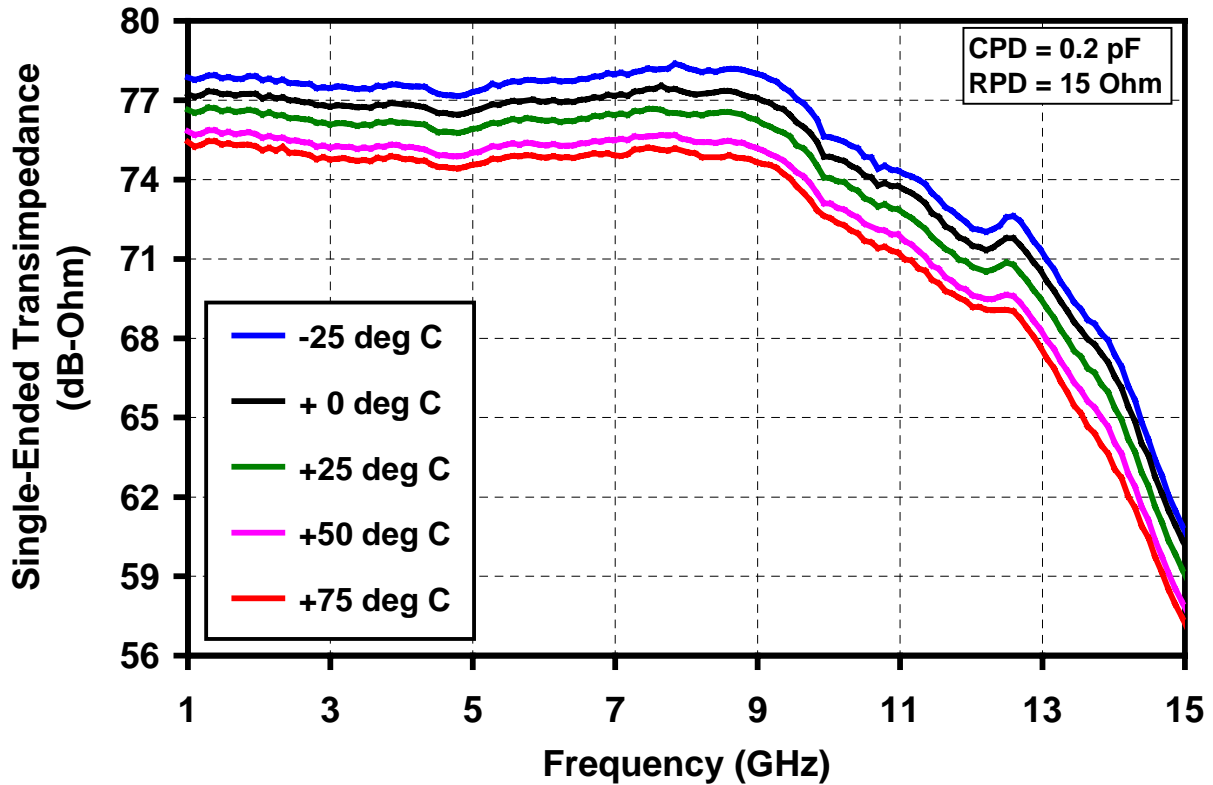
- 1/ 50 Ω Single-Ended Output Impedance
- 2/ Photodiode Model: CPD = 0.2pF, RPD = 15 Ω
- 3/ RF Interconnect Inductance: 0.42nH
- 4/ External Bypass Capacitors Required (see assembly drawing)

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

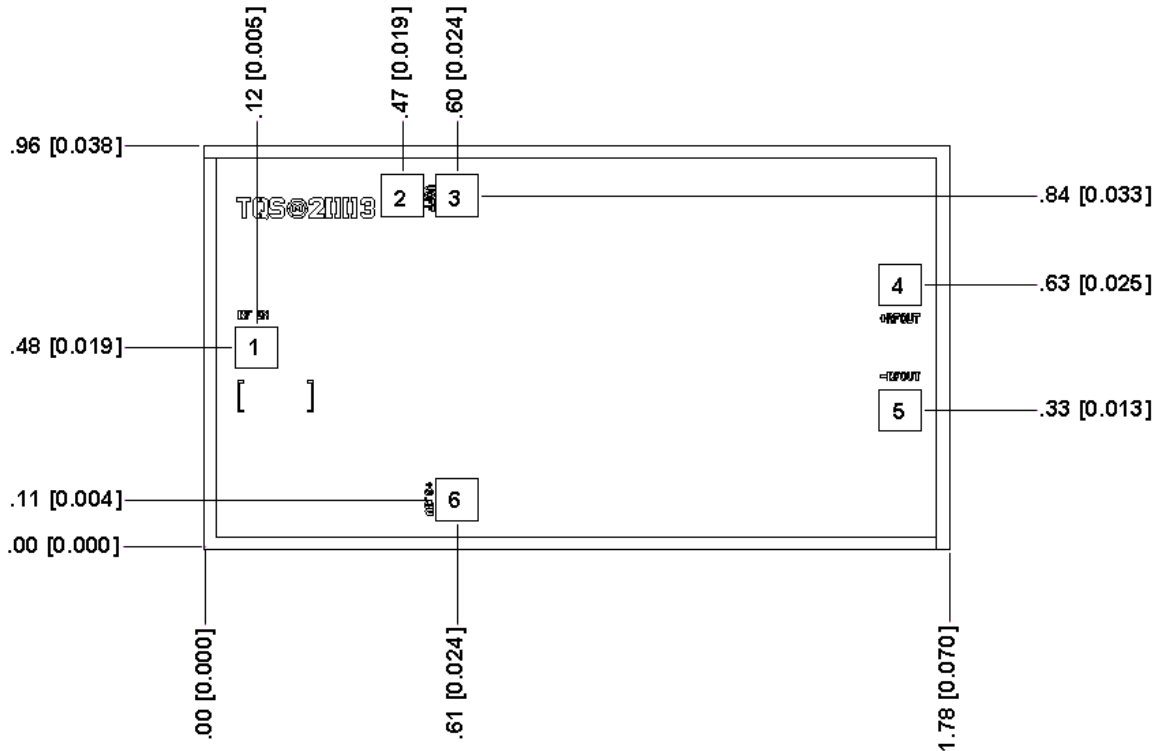
Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70 $^\circ\text{C}$ baseplate temperature.

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.

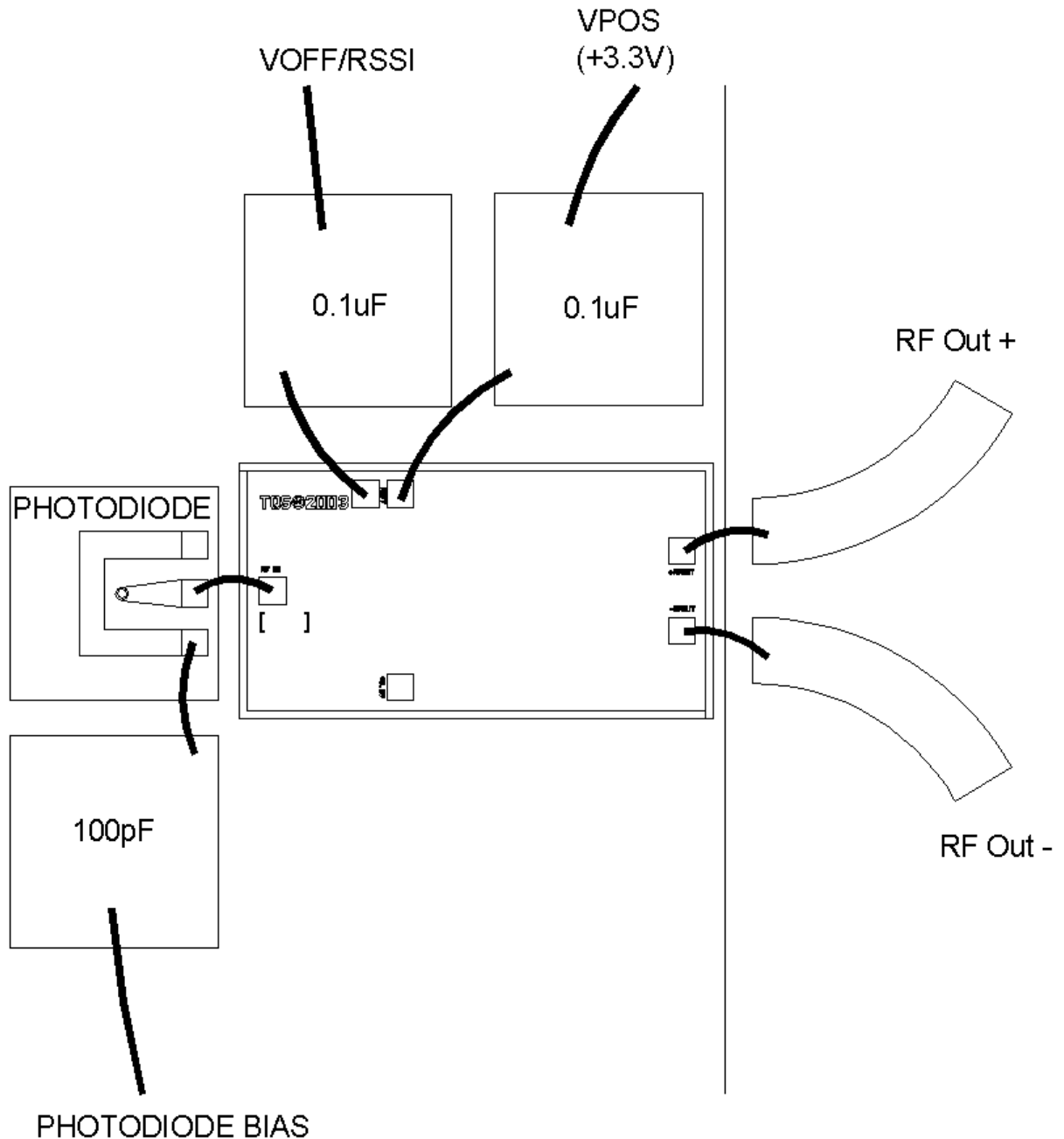
Chip size tolerance: ± 0.05 [0.002]

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.