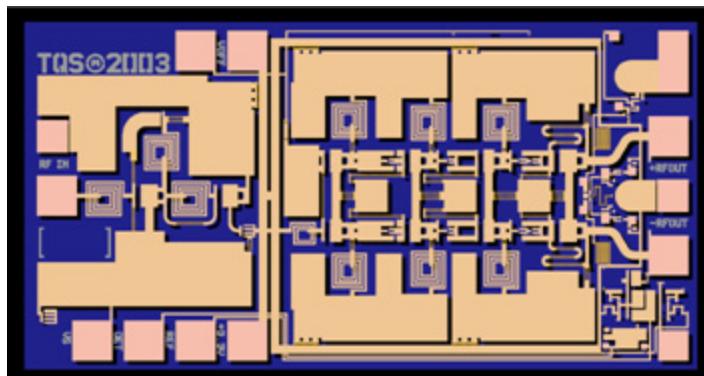


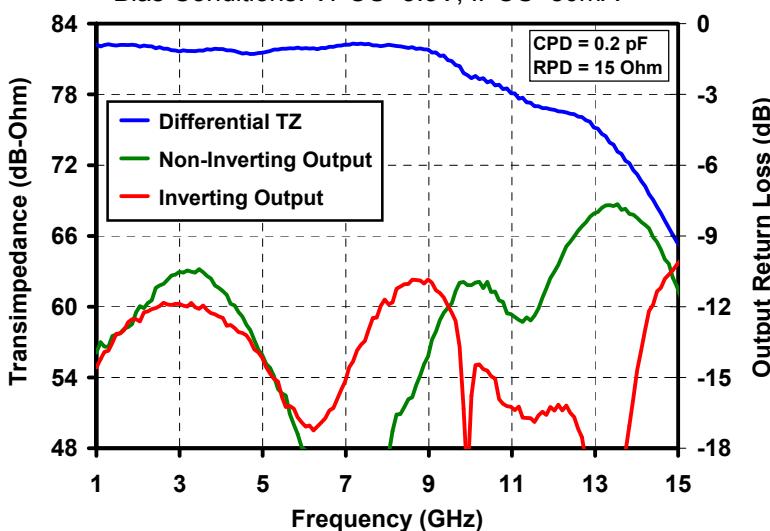
10Gb/s Differential TIA

TGA4815

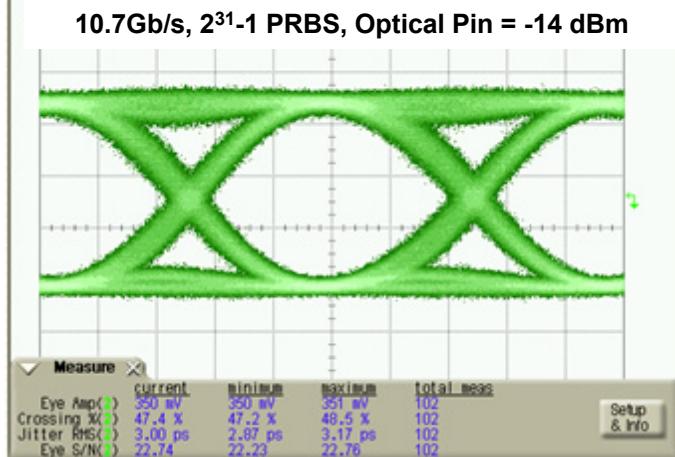


Preliminary Measured Performance

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



10.7Gb/s, $2^{31}-1$ PRBS, Optical Pin = -14 dBm



Note: Datasheet is subject to change without notice.

Key Features and Performance

- 6500Ω Single-Ended Transimpedance
- $>10\text{GHz}$ 3dB Bandwidth
- 1.7mA_{pp} Maximum Input Current
- $9\text{pA}/\sqrt{\text{Hz}}$ Input Noise Current
- Adjustable Output Offset
- Rx Signal Indicator (RSSI)
- $0.15\mu\text{m}$ 3MI pHEMT Technology
- Bias Conditions: 3.3V, 80mA
- Chip dimensions:
 $1.78 \times 0.96 \times 0.1 \text{ mm}$
 $(0.070 \times 0.038 \times 0.004 \text{ inches})$

Primary Applications

- OC-192/STM-64 Fiber Optic Systems

TABLE I
MAXIMUM RATINGS

Symbol	Parameter <u>1/</u>	Value	Notes
V _{POS}	Positive Supply Voltage	5.5 V	<u>2/</u>
I _{POS}	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 $^{\circ}$ C	<u>3/ 4/</u>
T _M	Mounting Temperature (30 Seconds)	320 $^{\circ}$ C	
T _{STG}	Storage Temperature	-65 to 150 $^{\circ}$ 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.

TABLE II
RF CHARACTERIZATION TABLE
 $(T_A = 25^\circ\text{C, Nominal})$
 $(VPOS = 3.3\text{V, IPOS} = 80\text{mA} \pm 5\%)$ 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.

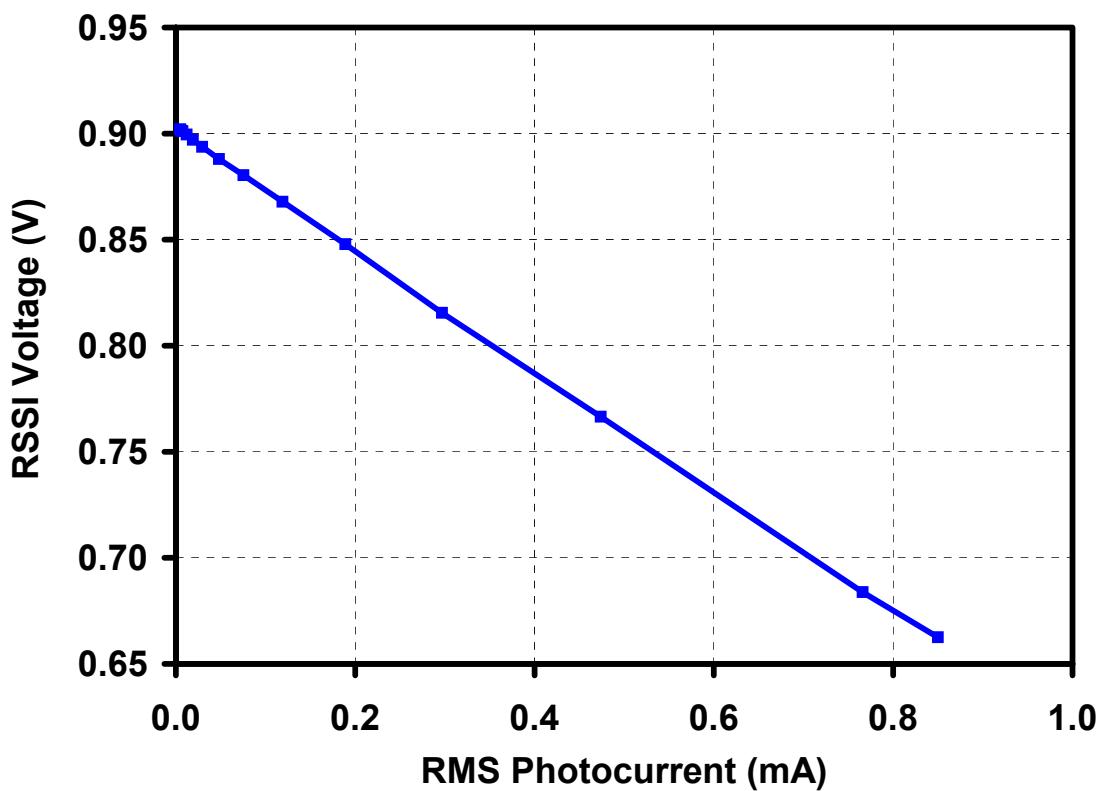
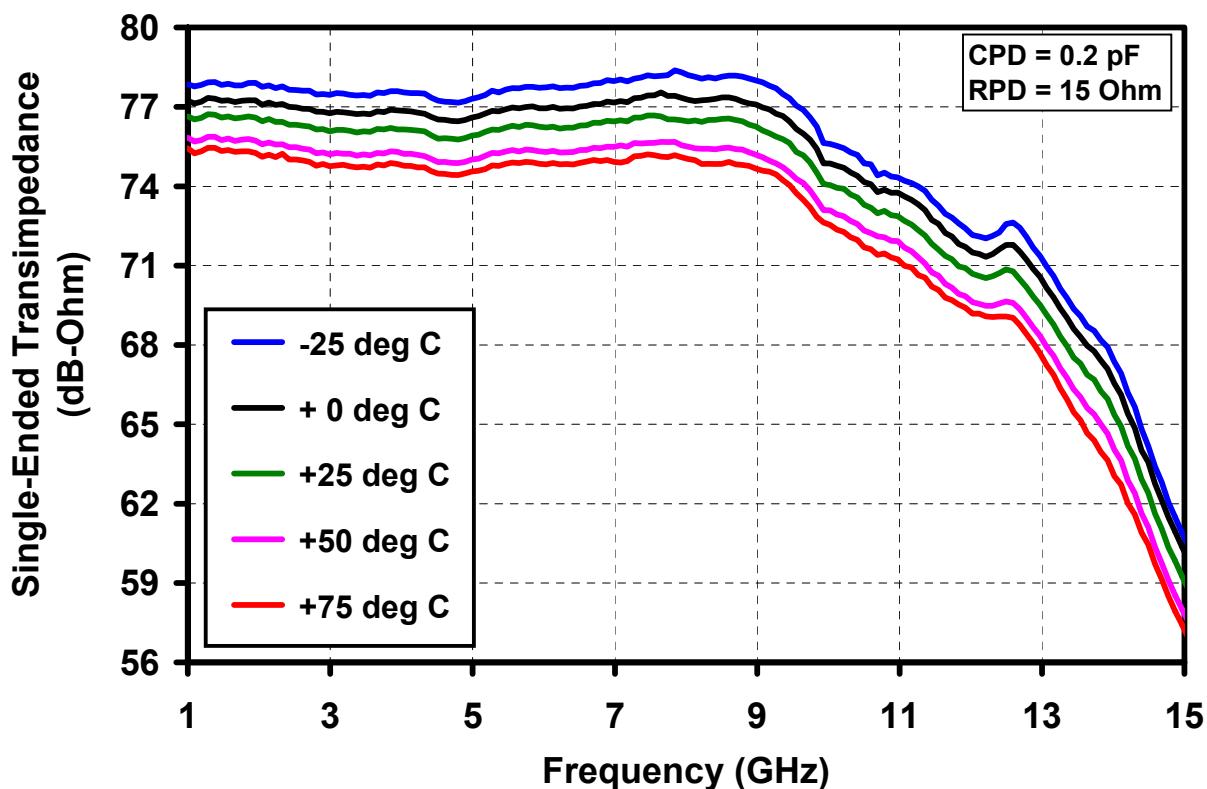
- 1/ 50 Ω Single-Ended Output Impedance
- 2/ Photodiode Model: CPD = 0.2pF, RPD = 15 Ω
- 3/ RF Interconnect Inductance: 0.42nH
- 4/ External Bypass Capacitors Required (see assembly drawing)

TABLE III
THERMAL INFORMATION

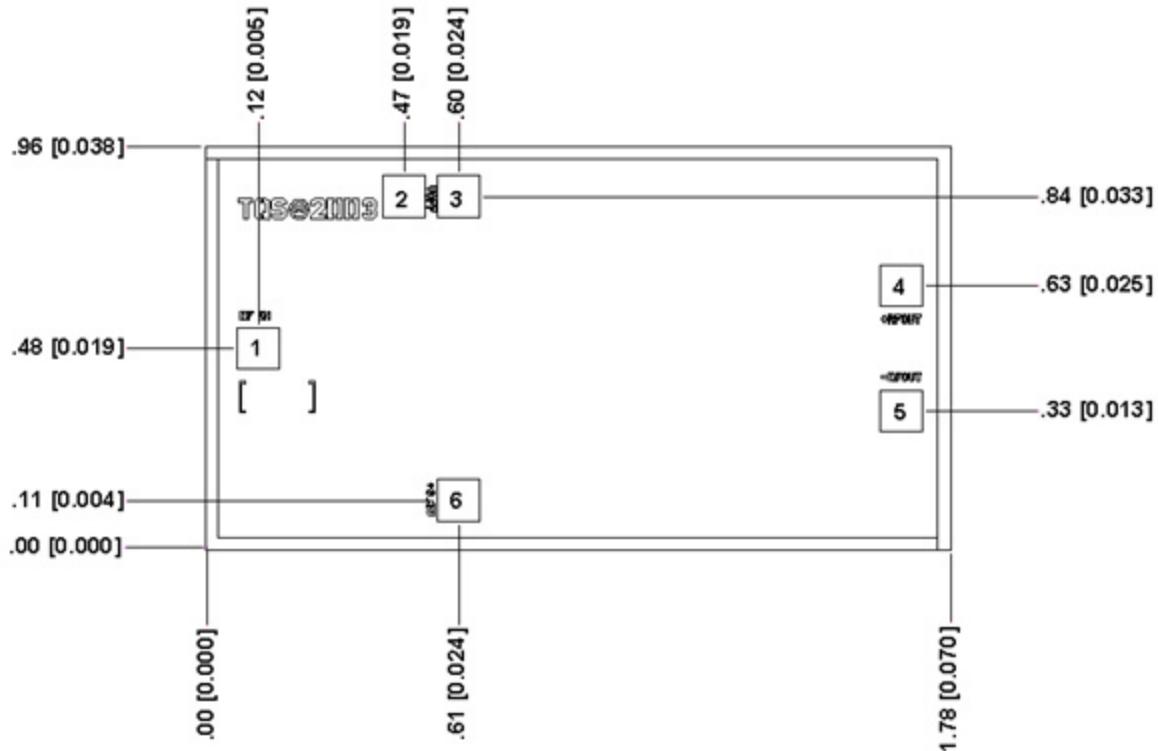
Parameter	Test Conditions	T_{CH} ($^\circ\text{C}$)	$R_{\theta\text{JC}}$ ($^\circ\text{C/W}$)	T_M (HRS)
$R_{\theta\text{JC}}$ Thermal Resistance (channel to backside of carrier)	$V^+ = 3.3\text{ V}$ $I^+ = 80\text{ mA}$ $P_{\text{diss}} = 0.264\text{ W}$	80	36.9	5.7 E+7

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



Mechanical Drawing



Units: millimeters [inches]

Thickness: 0.10 [0.004] (reference only)

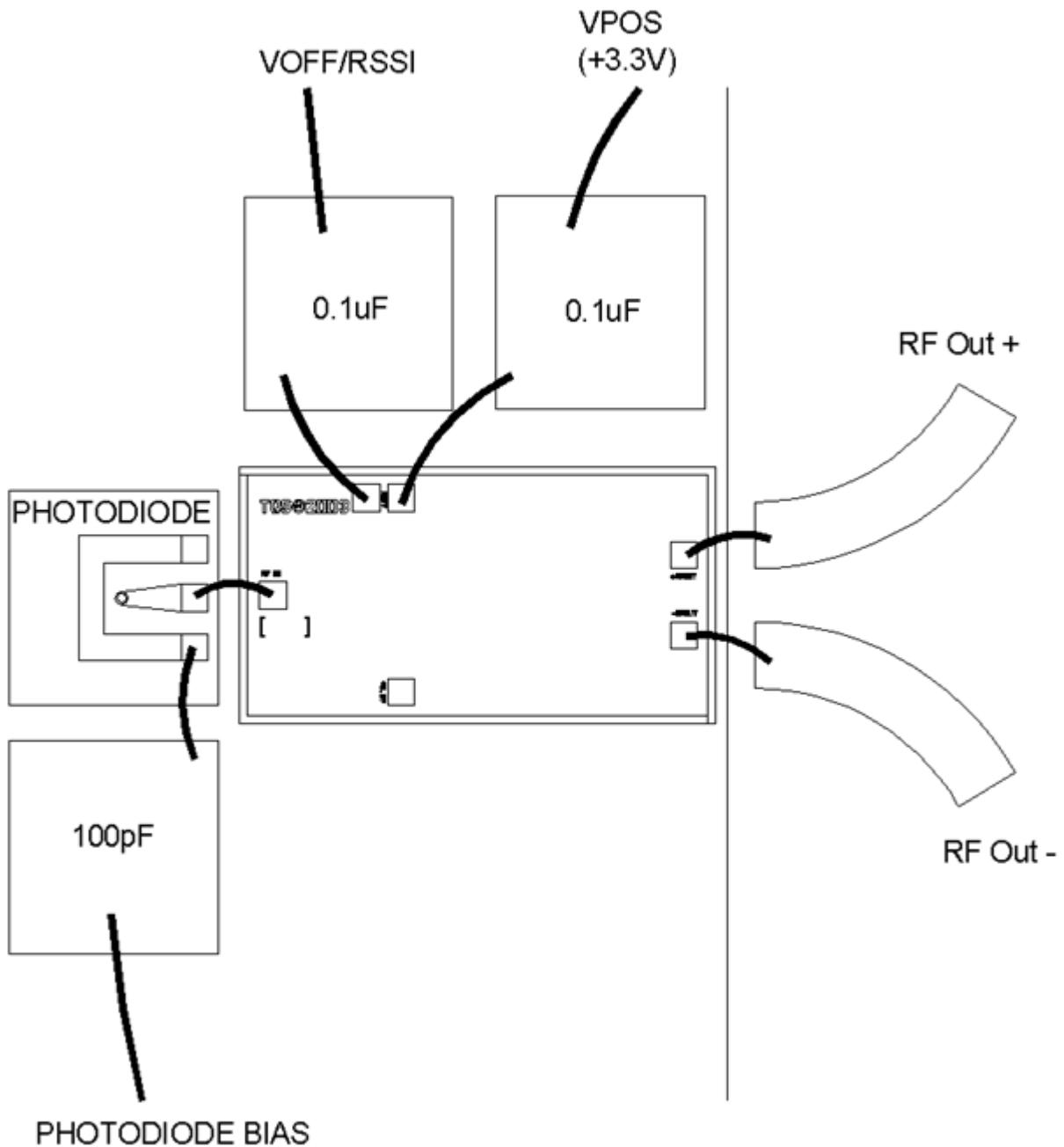
Chip edge to bond pad dimensions are shown to center of bond pads.

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]

Chip Assembly & Bonding Diagram



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

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.

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