

R194T 10 Gbits/s Surface-Mount PIN-TIA Receiver



Description

The R194T receiver integrates a 10 Gbits/s PIN and TIA into a true surface-mount package. It is part of the industry's first multisource agreement (MSA) to standardize surface-mount 10 Gbits/s receivers. These compact receivers can be mounted directly to a printed circuit board, thus avoiding the space, routing, and EMI problems of a mechanical cutout.

The R194T provides features optimized for VSR, SR, and IR applications, most notably, high gain, 3.3 V power supply, and low power consumption.

Features

- 3.3 V TIA and PIN supply
- High data-rate capability, 10.7 Gbits/s
- -18 dBm typical sensitivity
- 2 dBm overload typical
- High gain, 7000 Ω differential
- Very small, surface-mount form factor
- 0.15 W typical power dissipation
- Wide operating case temperature range of -5 °C to +80 °C

Applications

- VSR, SR, and IR applications up to 10.7 Gbits/s
- SONET and 10 Gbit Ethernet transponders
- Very dense line cards

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
Storage Case Temperature Range	T _{stg}	−40	85	°C
TIA Supply Voltage	V _{CC}	−0.5	4.0	V
Photodiode Bias Voltage	V _{PD}	GND	20	V
Optical Input Power	P _{IN}	—	6	dBm
ESD-susceptibility, All Pins*	—	—	500 (target)	V

* Based on human-body model of R = 1500 Ω and C = 100 pF. In general, ESD precautions should be taken to avoid damage to the device.

Recommended Operating Conditions

Table 1. Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	T _{OP}	−5	25	80	°C
TIA Supply Voltage	V _{CC}	3.1	3.3	3.5	V
Photodiode Bias Voltage	V _{PD}	3.1	3.3	5.5	V
Optical Wavelength	λ	1280	—	1580	nm

Electrical/Optical Characteristics

Specified characteristics apply for the recommended operating conditions at beginning of life, unless noted otherwise.

Table 2. Electrical/Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Sensitivity ¹	—	10 ⁻¹² BER, PRBS 2 ³¹ - 1, 9.953 Gbits/s, NRZ	—	-18	-17	dBm
Overload ¹	—	10 ⁻¹² BER, PRBS 2 ³¹ - 1, 9.953 Gbits/s, NRZ	1	2	—	dBm
Responsivity	R	-5 °C to +80 °C Case 25 °C Case	0.65 0.7	0.75 0.8	— —	A/W
Dark Current	I _D	25 °C Case	—	—	1.0	nA
Output Voltage (differential) at Overload ¹	V _{OUT}	Extinction Ratio = 12 dB, PRBS 2 ³¹ - 1	280	360	600	mVp-p
Transimpedance, Small Signal ² (differential)	Z _t	P _{IN} = -20 dBm	4200	7000	—	Ω
Bandwidth, Small Signal ²	f _{3dB}	P _{IN} = -20 dBm, -3 dB Relative to 300 MHz	7.5	9	11	GHz
Low-frequency Cutoff ²	—	P _{IN} = -20 dBm, -3 dB Relative to 1 MHz	—	25	40	kHz
Output Return Loss ² (Data and $\overline{\text{Data}}$)	S ₂₂	100 MHz to 8 GHz	—	—	-8	dB
Supply Current, V _{CC}	I _{CC}	—	—	36	50	mA
Optical Return Loss	RL	Not Including Connector	27	—	—	dB

1. Test transmitter:

A. External modulator, BW > 10 GHz, λ = 1550 nm ± 30 nm, extinction ratio > 12 dB (e.g., Agilent® Model 83433).

B. DML, λ = 1310 nm ± 30 nm, extinction ratio > 8.2 dB.

2. For 25 °C and nominal bias voltage.

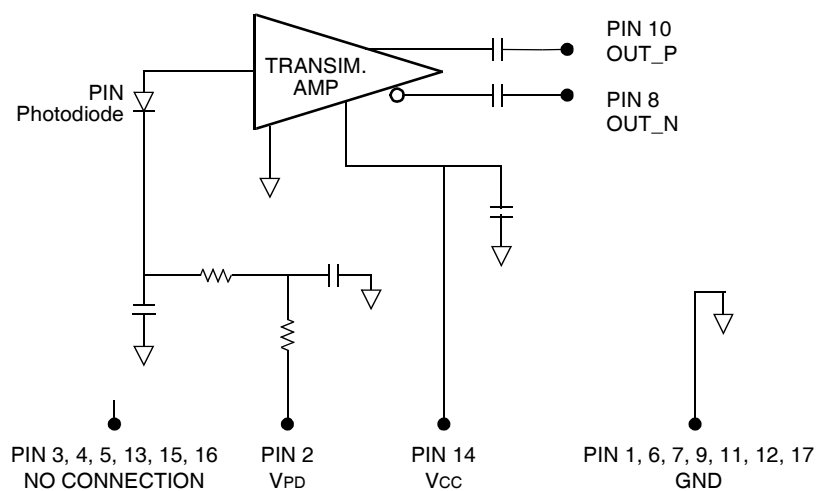
Note: Accuracy of optical powers in test condition column is ± 0.2 dB.

Pin Information

Table 3. Pin Information

Pin	Symbol	Function
1	GND	Case Ground
2	VPD	Photodiode Bias
3	NC	No Connection
4	NC	No Connection
5	NC	No Connection
6	GND	Case Ground
7	GND	Case Ground
8	OUT_N	$\overline{\text{Data}}$ Output
9	GND	Case Ground
10	OUT_P	Data Output
11	GND	Case Ground
12	GND	Case Ground
13	NC	No Connection
14	Vcc	TIA Bias
15	NC	No Connection
16	NC	No Connection
17	GND	Case Ground

Block Diagram



Characteristic Curves

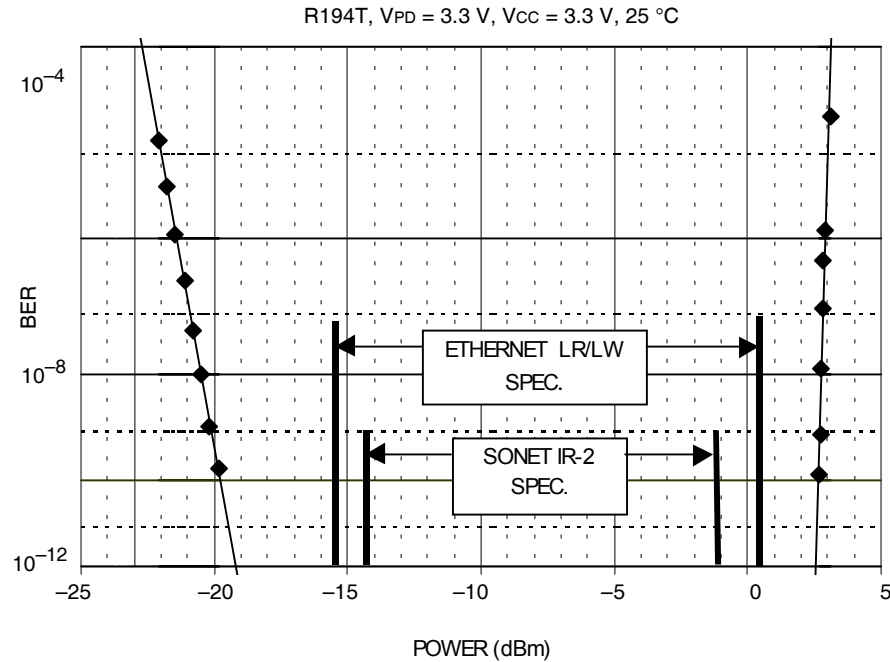


Figure 1. BER: 9.953 Gbits/s, $2^{31} - 1$ PRBS, 1550 nm, ER = 11.8 dB

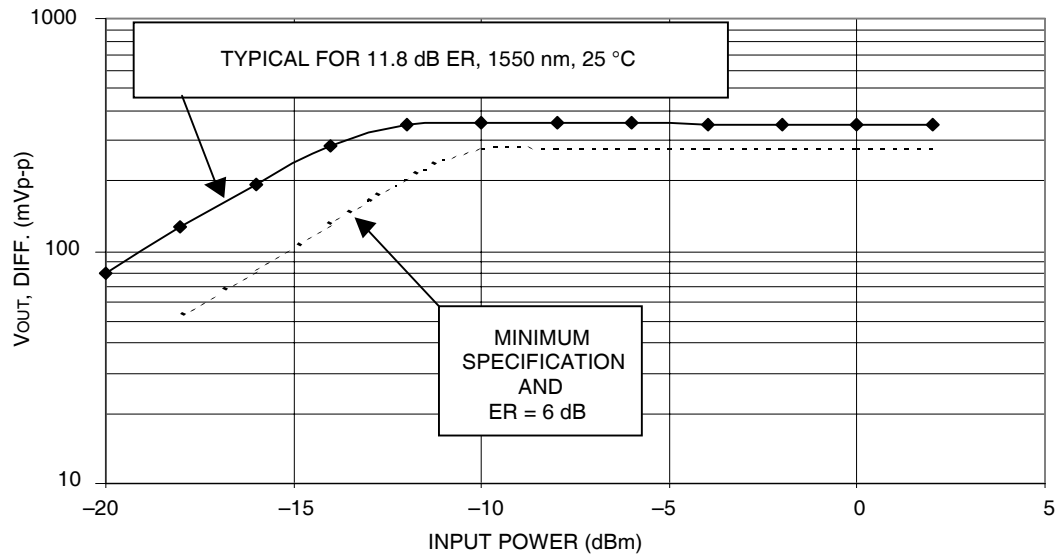


Figure 2. V_{OUT} vs. Input Power: 9.953 Gbits/s, $2^{31} - 1$ PRBS, 1550 nm, ER = 11.8 dB

Characteristic Curves (continued)

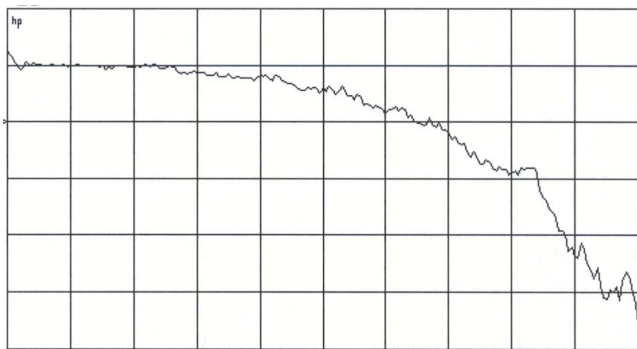


Figure 3. Small Signal Response (S21): 0.05 GHz to 12 GHz, 3 dB/Div, $P_{IN} = -20$ dBm

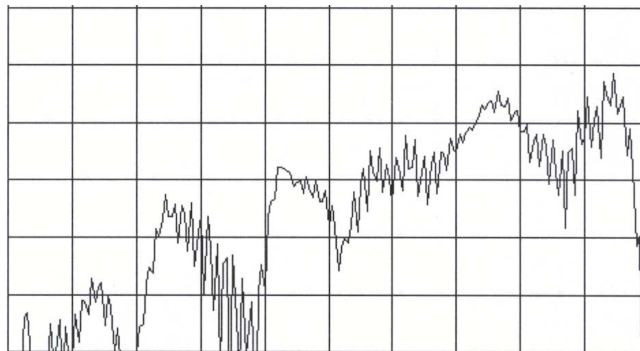


Figure 4. RF Return Loss (S22): 0.05 GHz to 12 GHz, 5 dB/Div, Top Line = 0 dB

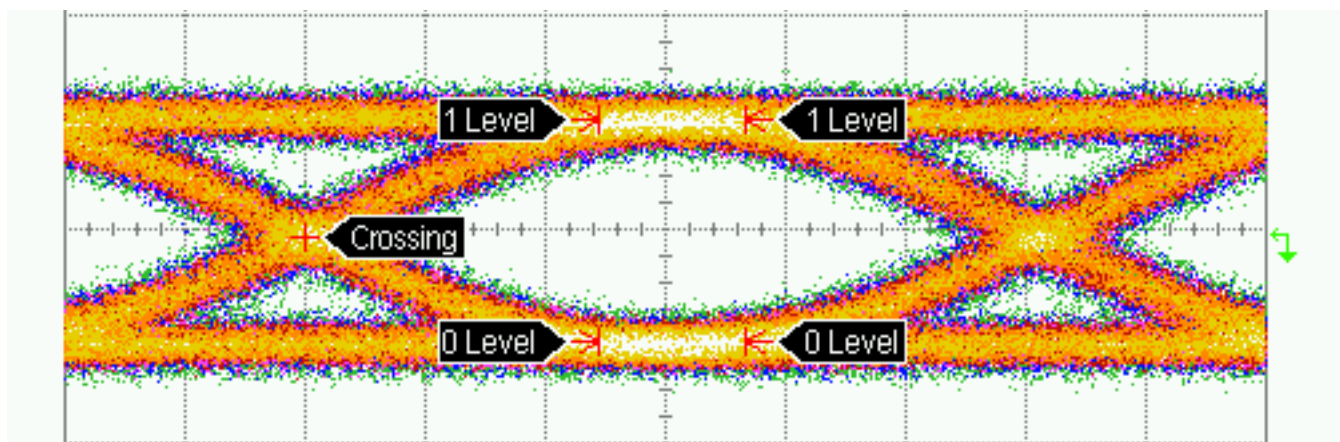


Figure 5. Eye Pattern: $P_{IN} = -18$ dBm, 9.953 Gbits/s, $2^{31} - 1$ PRBS

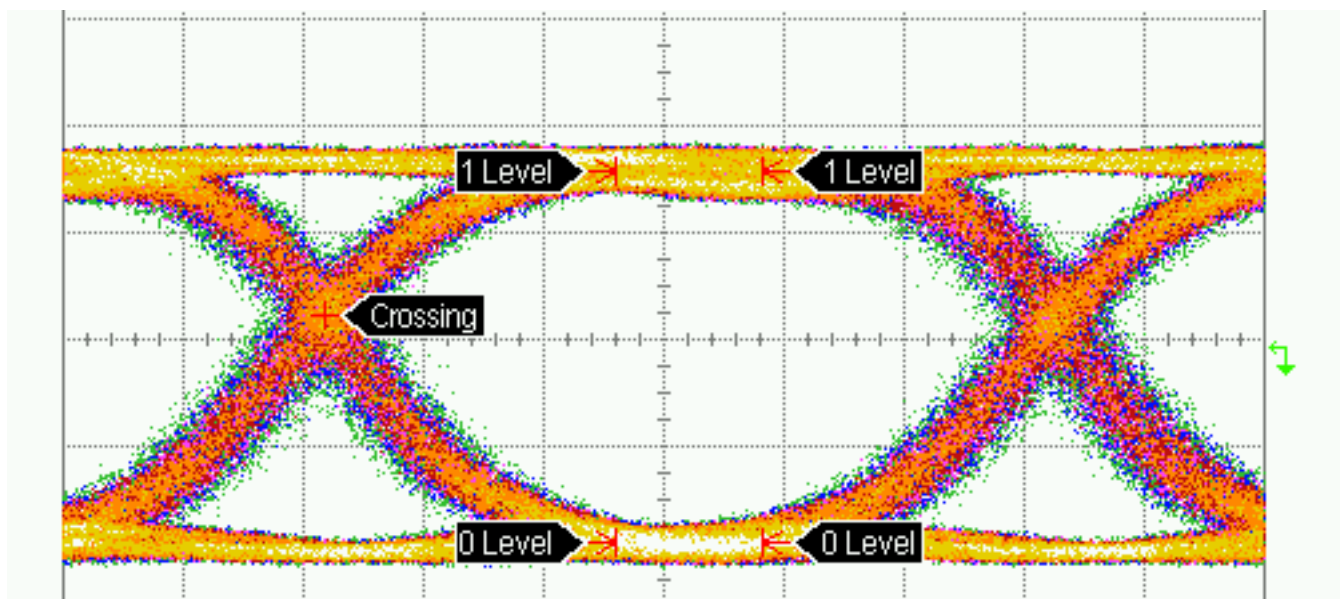
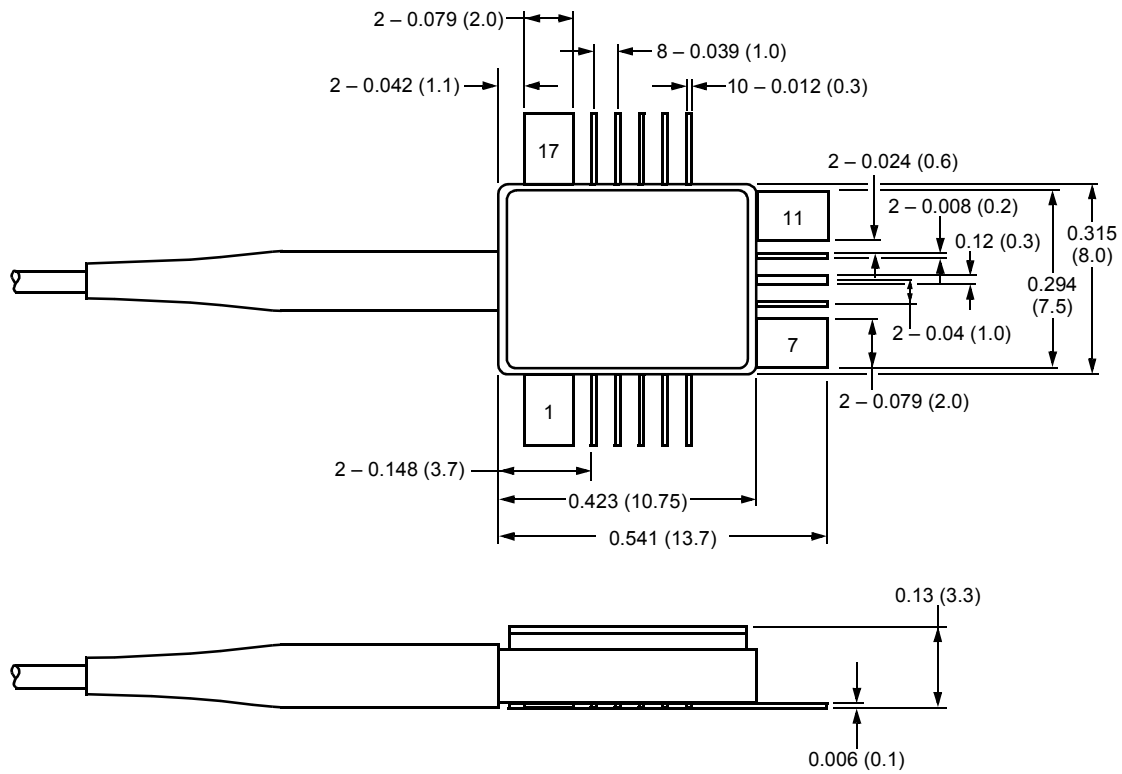


Figure 6. Eye Pattern: $P_{IN} = 2$ dBm, 9.953 Gbits/s, $2^{31} - 1$ PRBS

Outline Diagram

Dimensions are in inches and (millimeters). .



Ordering Information

For ordering information, please contact an account manager at OPTO West, Agere Systems Inc., 1-800-362-3891 (for sales staff, press option 2).

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