

# TIA Series Optical to Electrical Converters

## Technical Specifications



## INTRODUCTION

The TIA-525, 527 and 952 series have BNC outputs for direct connection to your oscilloscope or digitizer. The TIA-1200, 2000 and 3000 use a type K SMA female output connector. The TIA525 offers a free space option. Patch cords and adapters can be supplied to mate with various fiber optic connectors. The TIA-525 and 527 have dual power capability, battery and external universal power supply.

## FEATURES AND BENEFITS

- 400 nm to 1700 nm wavelengths
- Battery or External AC Operation
- Bandwidth to 20 GHz
- Compact Size

## SPECIFICATIONS

Model/BW	Detector	Wavelength	Power	AC/DC Coupling	Conversion Gain @ Peak Wavelength
TIA-525S (125 MHz)	Silicon	400 -1000 nm	9 V Lithium Battery*/ Univ. Power Supply	Selectable	100,000 V/W
TIA-525I (125 MHz)	InGaAs	850 - 1700 nm	9 V Lithium Battery*/ Univ. Power Supply	Selectable	100,000 V/W
TIA-527 (125 MHz)	Matched InGaAs	850 - 1700 nm	9 V Lithium Battery*/ Univ. Power Supply	Selectable	100,000 V/W
TIA-952 (750 MHz)	InGaAs	850 - 1700 nm	Universal Power Supply	AC	2500 V/W
TIA-1200 (12 GHz Typ.)	InGaAs	900 - 1700 nm	Universal Power Supply	DC	0.8 A/W
TIA-3000 (10 GHz)	InGaAs	900 - 1700 nm	Universal Power Supply	AC	450 V/W

See last page for full specifications\*

## TIA-525

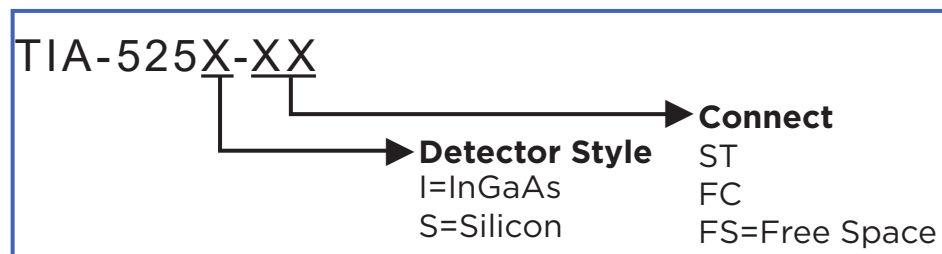
The TIA-525 optical receiver is a convenient, easy to use O/E converter. It is extremely useful in a variety of laboratory and field service situations where a quick check of the operation of a laser source, optical transmitter, or the output of a fiber optic communications link is required. The unit conveniently mounts directly on the vertical input BNC connector of your oscilloscope, digitizer, or other readout device.

Both Silicon and Indium-Gallium-Arsenide detectors are available to cover respectively the 400 to 1000 nm or the 900 to 1700 nm spectral regions. Gains are selectable and provide peak responsivity values of approximately 1000 to 100,000 volts per watt. AC coupling between stages may be introduced in order to examine weak high frequency optical signals in the presence of a strong DC optical component. The TIA-525 electrical bandwidth exceeds 125 MHz in the low and medium gain configurations and exceeds 35 MHz in the highest gain configuration.

The unit's output stage is fully capable of driving a 50 ohm coaxial cable terminated in its characteristic impedance. Fiber connector options include either ST or FC receptacles. An unmounted detector is optionally available so that the unit may be used with free space beams. Powered by an internal 9V Lithium battery, or its universal power supply, the TIA-525 is handy to use and store.

The ease of use and convenience of this instrument are matched only by the high performance-to-price ratio that is typical of products from TREND Networks. It is also backed by our standard two year warranty and guarantee of satisfaction.

### To Order:



## **TIA-527**

The TIA-527 balanced optical to electrical converter operates by subtracting the photo currents from two well-matched Indium Gallium Arsenide detectors. The result is then amplified and presented to the output port. Each of the optical signals causes the output to move with a different sense. Common mode signals (e.g. laser RIN noise) are effectively cancelled out.

With selectable gain settings and a bandwidth of DC to 125 MHz this receiver is useful for coherent heterodyne detection applications, differential polarization or phase shifted keying modulation systems, spectroscopy, and similar applications for which the ability to discern small variations in signal strength in two optical paths is critical.

Use of this converter can greatly simplify signal processing requirements downstream from the experiment. Gains of 1400 V/W, 14 000 V/W and 140 000 V/W may be selected as well as selectable AC inter-stage coupling.

The unit is designed to be conveniently mounted on an oscilloscope input BNC connector and may be powered by its internal battery or with the universal wall-mount supply that is provided with each unit.

## **TIA-952**

The TIA-952 optical receiver is a convenient, easy to use O/E converter. It is extremely useful in a variety of laboratory, factory, and field service situations where a quick check of the operation of a laser source, optical transmitter, or the throughput of a fiber optic communications link is required. The unit conveniently mounts directly on the vertical input BNC connector of your oscilloscope, digitizer, or other readout device.

The large area Indium-Gallium-Arsenide detector provided is optimized for use with both single mode and multi mode fibers and covers the 900 to 1700 nm spectral region. Gains are switch selectable and provide peak responsivity values of approximately 500 and 2500 volts per watt. The electrical bandwidth of the TIA-952 exceeds 800 MHz using the low gain setting and exceeds 300 MHz in the high gain mode.

The units output stage is fully capable of driving a 50 ohm coaxial cable terminated in its characteristic impedance. Fiber connector options include either ST or FC receptacles. Powered by a universal wall mount power supply (90 - 260 VAC, 50-60 Hz with four mains adaptors), the TIA-952 is handy to use and store.

The ease of use and convenience of this instrument are matched only by the high performance-to-price ratio that is typical of products from TREND Networks. It is also backed by our standard two year warranty and guarantee of satisfaction.

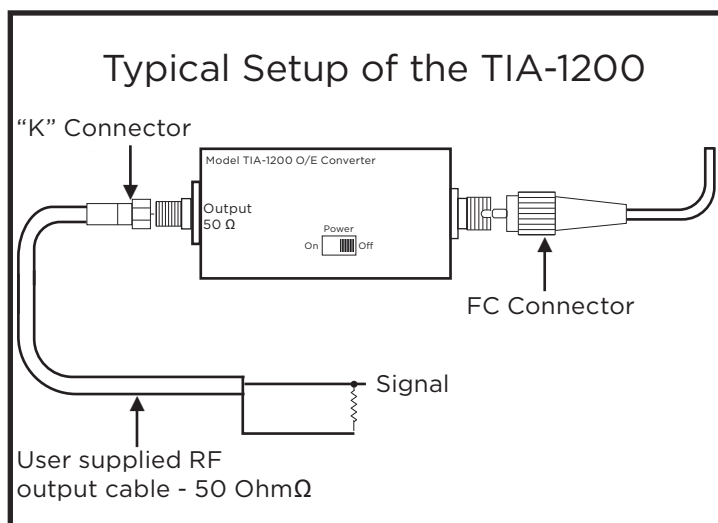
## TIA-1200

The TIA-1200 Optical to Electrical Converter is a wide-band detection system for fiber optic applications. With a typical bandwidth of DC to 12 GHz (min 10 GHz), it accurately provides an electrical replica of the optical signal presented to it. It is intended to drive a 50 ohm cable terminated in its characteristic impedance.

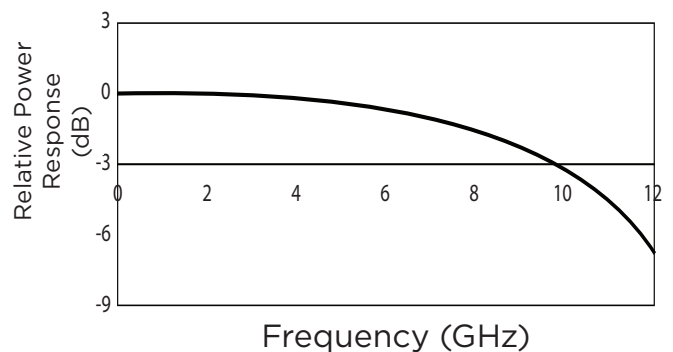
The unit is equipped with an InGaAs/InP detector that is responsive in the wavelength range of 900 - 1700 nm. The TIA-1200 is provided with an FC or FC/APC fiber optic receptacle. The output signal is presented to a type K SMA female connector.

The TIA-1200 detector is 50 microns in diameter. Optionally, it may be ordered with a 50 micron fiber, thus allowing both single mode and multimode sources to be tested without incurring excessive coupling losses.

Typical optical return loss is 35 dB and is caused primarily by the FC/PC connector employed. If higher return loss is needed, The unit may be optionally equipped with single mode angled PC connectors for ORLs of around 52 dB.



Typical Frequency Response Curve



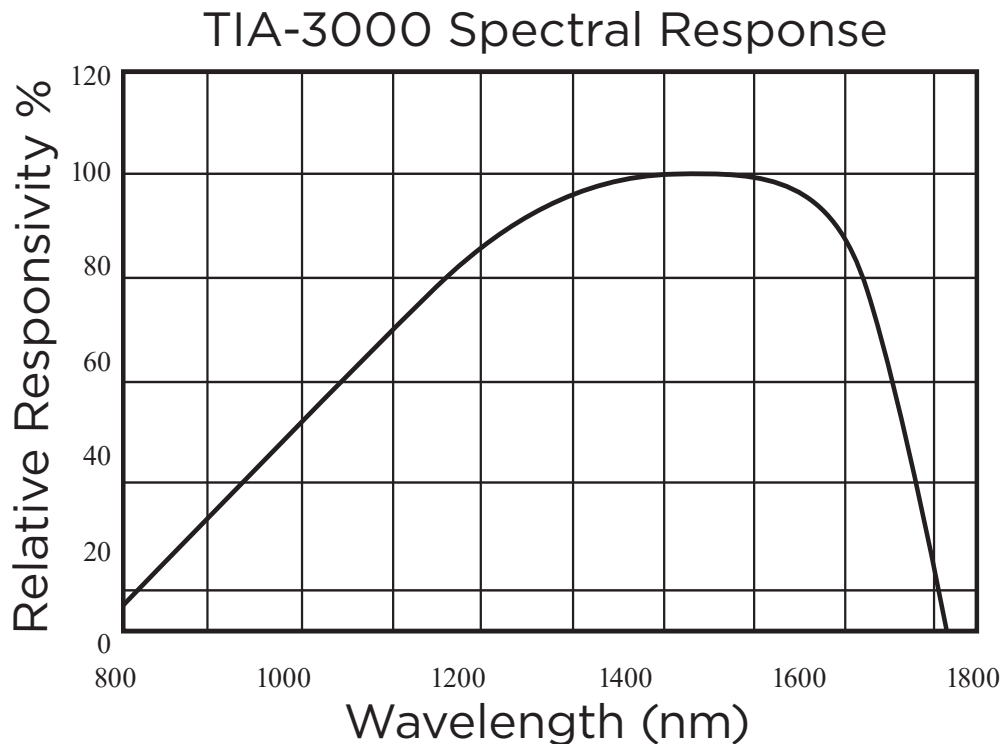
## TIA-3000

The TIA-3000 is a versatile Optical to Electrical converter for laboratory or field use. This low profile O/E converter will faithfully reproduce an optical signal on a wide range of oscilloscopes and digitizers.

The unit is equipped with an InGaAs/InP detector that is responsive in the wavelength range of 900 - 1700 nm. The TIA-3000 bandwidth ranges from 30KHz to 10GHz (-3dB).

Applications for this converter include the General purpose testing of fiber optic components, data links and transmitter testing, LIDAR and analog RF-over-fiber links.

The TIA-3000 like other TREND Networks TIA O/E devices are shipped in a hard case with universal power supply that has interchangeable AC plugs.





# O/E Converter Selection Chart

	TIA-525	TIA-527	TIA-952	TIA-1200	TIA-3000
Detector Types	Silicon(400-1000nm) InGaAs (850 -1700nm)	Matched InGaAs InGaAs (850 -1700nm)	InGaAs (850-1700nm)	InGaAs (900 -1700nm)	InGaAs (900 -1700nm)
Transimpedance Ranges	1.4 K, 14 K	1.4 K, 14 K	1.2 K	50 Ohm internal in parallel, user supplied load	$V_R = 450$ V/W
Current Responsivity	N/A	N/A	N/A	0.8 A./W @ 1550nm Typ.	N/A
Post Amplifier Gain	1.0, 10.0 selectable	1.0, 10.0 selectable	1.0, 5.0 selectable	Not amplified	NA
Max. Linear Input Power	1.2 mW	1.2 mW	2 mW	3 mW	1.25 mW
Max. Input w/o Damage	10 mW	10 mW	15 mW	10 mW	2.5 mW
Bandwidth (-3 dB) 50 Ohms	DC - 125 MHz Tr =1.4K DC - 35 MHz Tr = 14K	DC - 125 MHz Tr =1.4K DC - 35 MHz Tr = 14K	30KHz - 800 MHz Gain 1.0 30KHz - 300 MHz Gain 5.0	DC to 12GHz Typ. 10 GHz Min.	40 KHz to 11 GHz (typ) 8.5 GHz (min.)
Output Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Output Connector	Male BNC	Male BNC	Male BNC	SMA Type K Female	SMA Type K Female
F. O. Input Connector	ST, FC or Free-Space	FC	FC or ST	FC/UPC or FC/APC	FC/UPC or FC/APC
Input Numeric Aperture	0.29	0.29	0.29	0.11 9 $\mu$ m Singlemode	0.11 9 $\mu$ m Singlemode
Inter-Stage Coupling	AC or DC selectable	AC or DC selectable	AC	DC	AC
Output Offset Voltage	+/- .1V at Max Gain	+/- .1V at Max Gain	N/A	0	NA
Max Output Voltage	4 V pk-pk, no load, 2 V pk-pk 50 ohm load	4 V pk-pk, no load, 2 V pk-pk 50 ohm load	2 V pk-pk 50 ohm load	0.1 V	0.65 V into 50 Ohms
Noise Level	3 pW/Hz <sup>1/2</sup>	3.6 pW/Hz <sup>1/2</sup>	9.5 pW/Hz <sup>1/2</sup>	Dark Current <1.0 nA	15pW/Hz <sup>1/2</sup>
Power Required	9 V Lithium Battery or Univ. Power Supply	9 V Lithium Battery or Univ. Power Supply	Universal Power Supply	Univ. Power Supply	Universal Power Supply
Dimensions	1.2W, 2.5L, 1.35H inches 30.5W, 63L, 33H mm	1.2W, 2.5L, 1.5H inches 30.5W, 63L, 32H	1.2W, 2.5L, 1.35H inches 30.5W, 63L, 33H mm	1.2W, 2.5L, 1.35H inches 30.5W, 63L, 33H mm	1.2W, 2.5L, 1.35H inches 30.5W, 63L, 33H mm
Weight	4 oz, 114 g	5.6 oz, 160 g	4 oz, 114 g	2.8 oz, 80g	2.8 oz, 80 g
Operating Temperature	0 to 40 C	0 to 40 C	0 to 40 C	0 to 40 C	0 to 40 C
Limited Warranty	2 yrs from date of receipt	2 yrs from date of receipt	2 yrs from date of receipt	2 yrs from date of receipt	2 yrs from date of receipt



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