

Microwave Photodiode Receivers



2510A, 2510B	4510A, 4510B	10450A, 10450B
2515A, 2515B	4515A, 4515B	10455A, 10455B
2516A	4516A	10456A

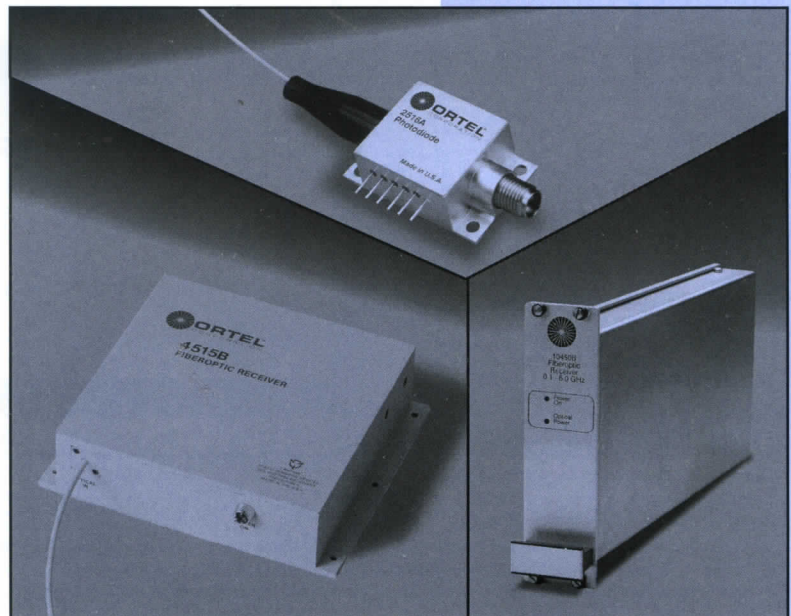
Ortel microwave photodiode receivers are ideally suited for use in analog fiberoptic communications. With their wide bandwidth and flat response, these devices have found use in a wide array of applications, including antenna remoting, timing and reference signal distribution, measurement, delay lines, and two way communications.

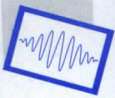
Several packaging styles are available for these microwave photodiodes. The most basic package, the photodiode module, contains the photodiode chip, optical fiber pigtail, and impedance matched electrical connections in a hermetically sealed unit. Of particular note is their high optical return loss, which enables high quality noise performance for sensitive optical links.

In most cases, the basic photodiode module is integrated into a complete receiver, packaged either as a flange-mount for extreme environments, or as a plug-in for integration with Ortel's System 10000 rack-mountable chassis and power supplies. Electronics within flange-mount and plug-in receivers reverse bias the photodiodes and monitor the DC level of the optical input power, thus providing a fully integrated microwave product.

DATA SHEET

- Wideband analog signal reception
- Singlemode fiber pigtail
- High optical return loss
- Up to 20 GHz bandwidth
- 1310 nm & 1550 nm sensitivity





Microwave Photodiode Receivers

4510A/B, 4515A/B, 4516A

Front Panel LEDs

- Power On
- Optical Power Received (*plug-ins only*)

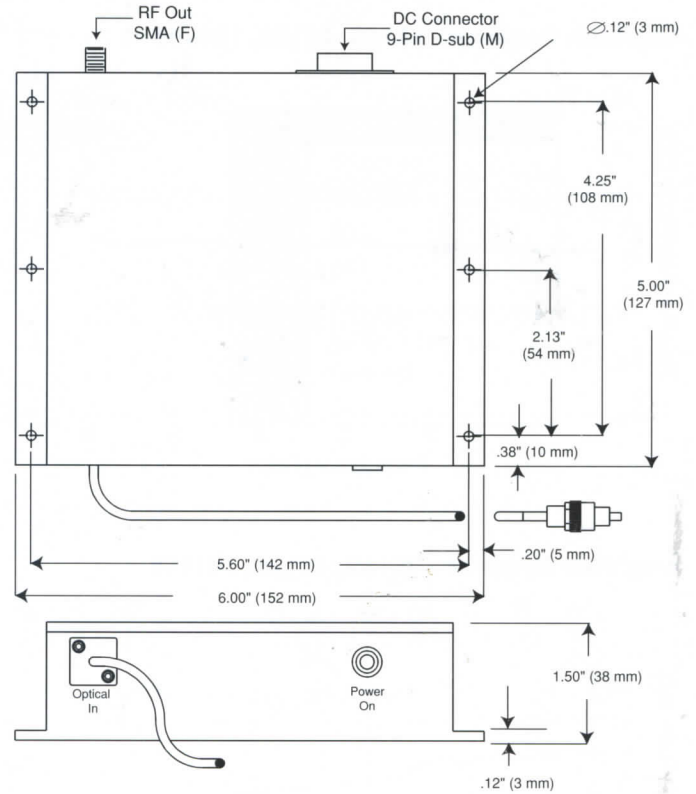
DC Monitor Voltages

DC Photocurrent - Pin 6: 1 V/mA, $\pm 2\%$ accuracy

Alarm Circuits

The alarm is an open collector output capable of sinking 20 mA when active and withstanding 15 V when off. It can be used for remote drive of relays or LEDs.

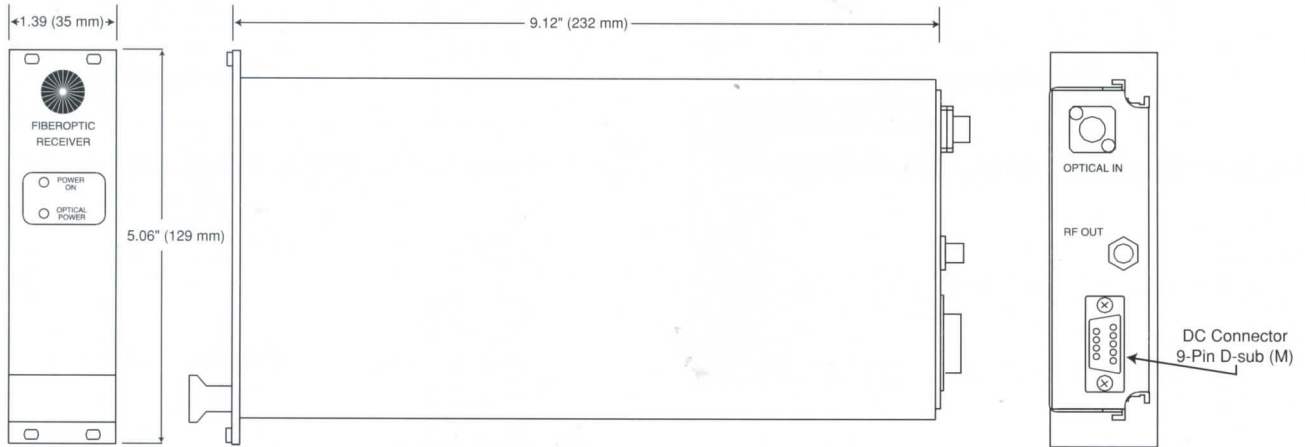
Low Optical Power - Pin 7: sinks current when received optical power drops below setpoint (factory set at 100 μ W).



9 Pin D-sub Connector

Pin	Function	Pin	Function
1	+15 VDC	6	optical current monitor
2	NC	7	low optical power alarm*
3	NC	8	NC
4	power ground	9	NC
5	ref. ground		*Open collector outputs.

10450A/B, 10455A/B, 10456A



Front Panel

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Microwave Photodiode Receivers

Package Styles		Model Numbers				
Module		2510A	2510B	2515A	2515B	2516A
Flange-mount Receiver		4510A	4510B	4515A	4515B	4516A
Plug-in Receiver		10450A	10450B	10455A	10455B	10456A
RF Parameters ¹						
Maximum Frequency, f_c		3 GHz	6 GHz	10 GHz	12 GHz	20 GHz
Minimum Frequency		0.1 GHz	0.1 GHz	0.1 GHz	0.1 GHz	1 GHz
Amplitude Flatness ²		± 2.0 dB	± 2.0 dB	+1.0, -3.0 dB	+1.0, -3.0 dB	± 2.0 dB
Options -003 & -004, 0.01 to f_c				± 2.0 dB	± 2.0 dB	
Output VSWR, max		2.0 : 1	2.0 : 1	2.0 : 1	2.5 : 1	2.0 : 1
18 to 20 GHz						2.5 : 1
Output Impedance		50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
RF connector for module		SMA (F)	SMA (F)	SMA (F)	SMA (F)	K-connector ^{TM3}
for flange-mount and plug-in		SMA (F)	SMA (F)	SMA (F)	SMA (F)	SMA (F)
Optical Parameters ¹						
DC Photodiode Responsivity, min. (mA/mW)		0.75 mA/mW				0.65 mA/mW
1310 nm +/- 30 nm, min.						0.70 mA/mW
1310 nm, 0 to +25°C, typ.						0.85 mA/mW
1550 nm, 0 to +25°C, typ.						
Variation with temperature, typ.		+/- 10%				
RF receiver efficiency/DC photod. resp., ⁴ typ.		50% (6 dB RF loss)				
Optical return loss ⁵ , min.		45 dB				
Fiber		Singlemode (9/125)				
Pigtail length (when applicable)		> 1 meter				
DC Parameters for Modules						
		2510 A	2510B	2515A	2515B	2516A
Dark Current		<200 nA @ +20°C 40 nA (typ.) @ +20°C < 2 μ A @ +70°C				<50 nA @ +25°C 10 nA (typ.) @ +25°C <1 μ A @ +70°C
Bias Voltage		> 10 V 12 V (typ.)				5 V
Max. safe level		20 V				10 V
Forward Current, max. safe level		10 mA				5mA
DC Power for Flange-mounts & Plug-ins						
Pin 1		+15 V nom. @ 0.2 A max.				

1. Specified for <2 mW Optical Power, <50% modulation depth.

2. Relative to value at 1 GHz.

3. K-connectorTM is a Wiltron Company trademark.

4. The photodiode current splits evenly between the internal matching resistor and the external load, except in options -003 and -004.

(See Ortel's *System Designer's Guide to RF and Microwave Fiber Optics*.)

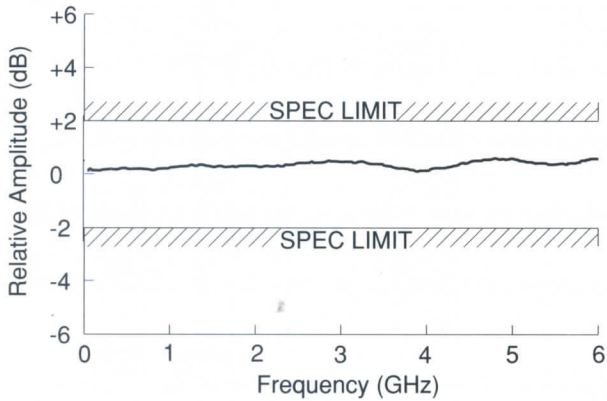
5. For FC-APC fiber connector or fusion splices. Other connection types may degrade optical return loss.

Specifications describe warranted performance. Typical values, indicated by "typ.", provide expected levels of performance, but are not guaranteed.

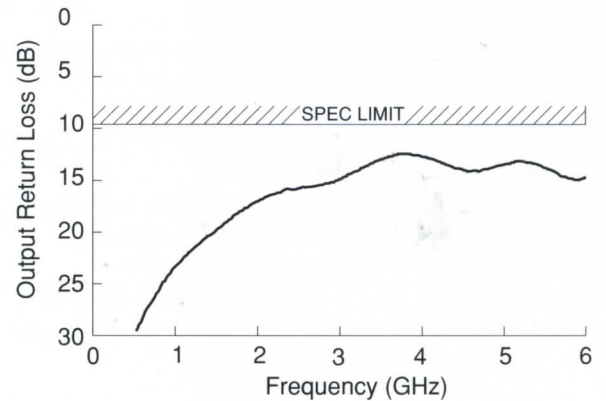


The following operating characteristics are intended for estimating the performance of a typical unit. For more detailed calculations, see the *Linear Fiberoptic Products Selection Guide* and *A System Designer's Guide to RF and Microwave Fiber Optics*, both published by Ortel, or contact Ortel.

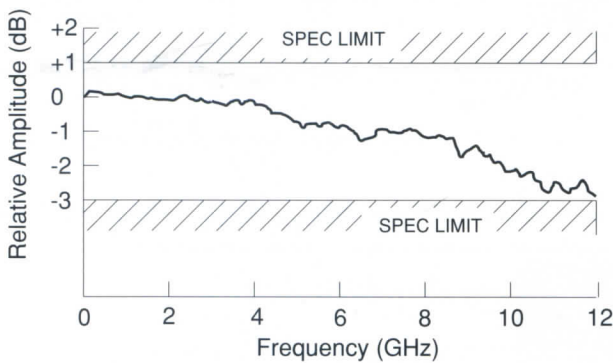
Amplitude Response - 2510B, 4510B, 10450B



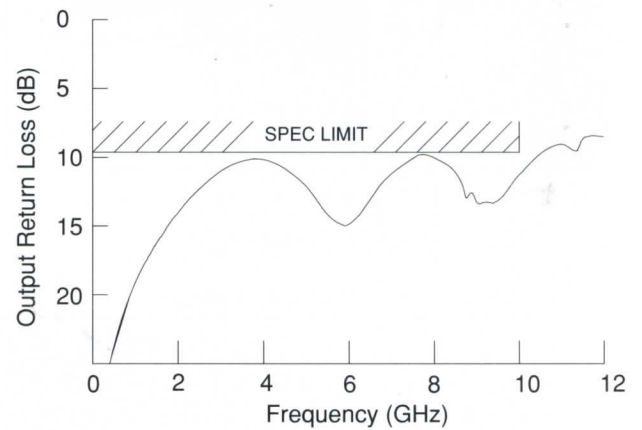
Output Match - 2510B, 4510B, 10450B



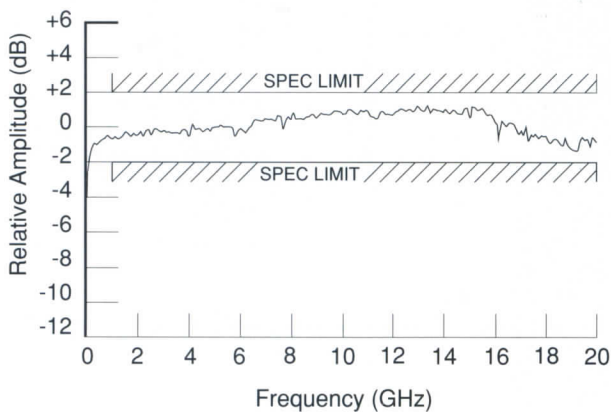
Amplitude Response - 2515B, 4515B, 10455B



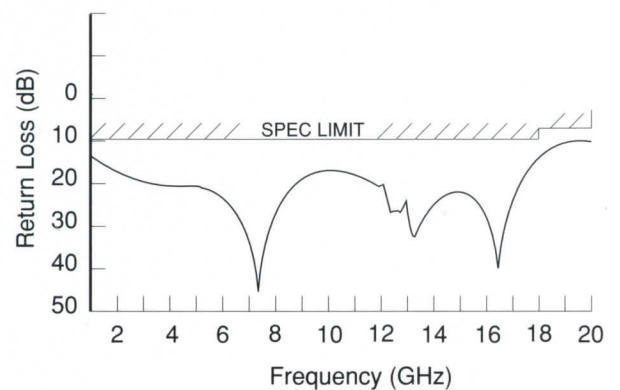
Output Match - 2515A, 4515A, 10455A



Amplitude Response - 2516A, 4516A, 10456A



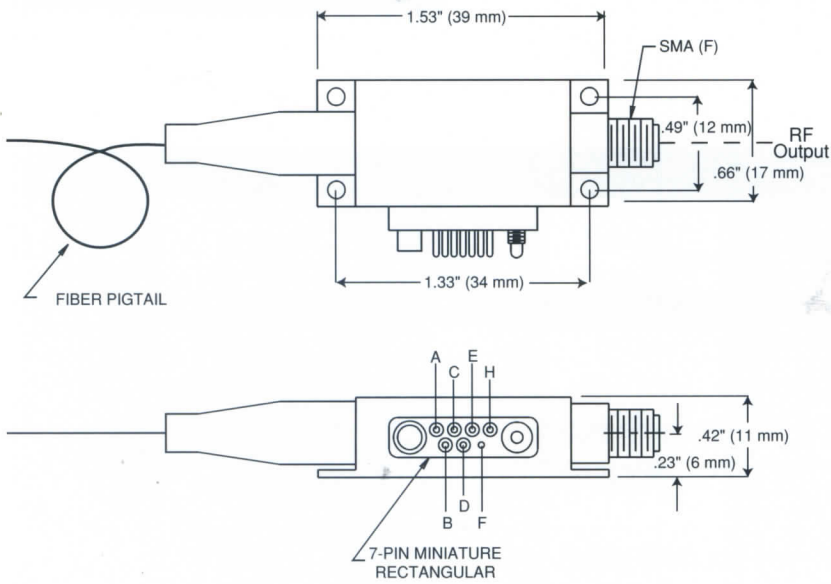
Output Match - 2516A, 4516A, 10456A



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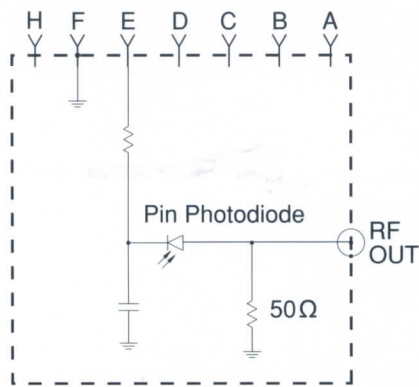
2510A/B, 2515A/B



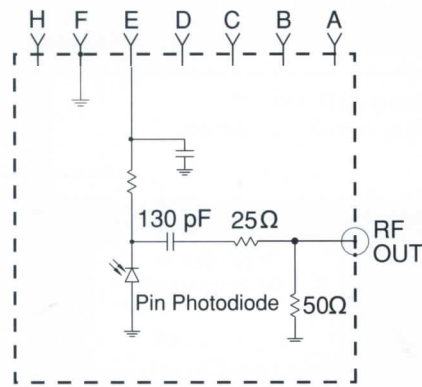
7 Pin Connector

Pin	Function
A	NC
B	NC
C	NC
D	NC
E	Bias
F	Ground
H	NC

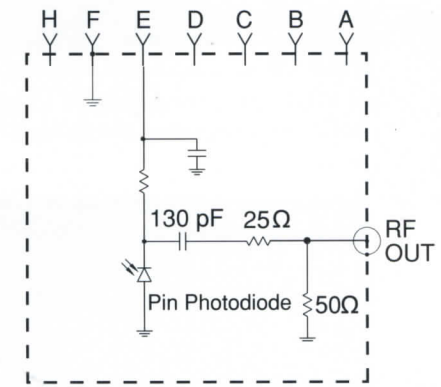
2510 A/B



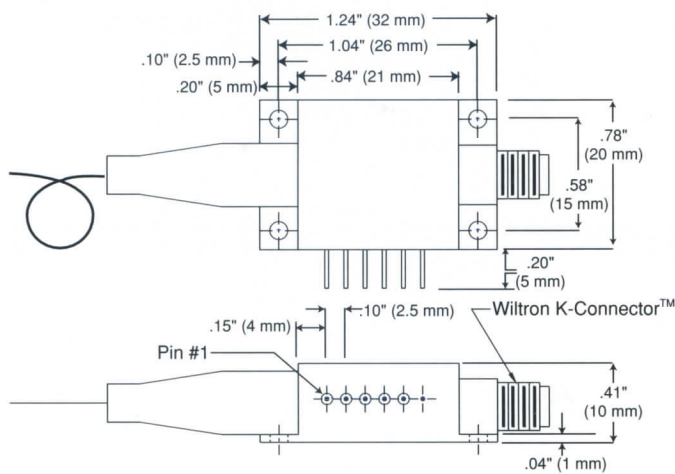
2515 A/B



2515 A/B -003

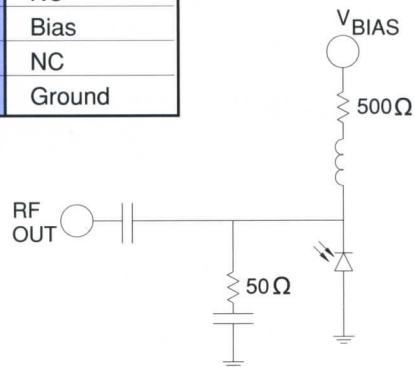


2516A

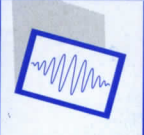


6 Pin Connector

Pin	Function
1	NC
2	NC
3	NC
4	Bias
5	NC
6	Ground



Microwave Photodiode Receivers



Receiver Options		module	flange	plug-in
-003	No internal matching resistor, AC-coupled ⁶	x	x	x
-004	No internal matching resistor, DC-coupled ^{6,7}	x	x	x
-020	FC/APC bulkhead optical connector		x	x
-021	FC/SPC bulkhead optical connector		x	x
-022	FC/APC optical connector, 3 mm fiber cable pigtail		x	
-023	FC/SPC optical connector, 3 mm fiber cable pigtail		x	
-026	FC/PC bulkhead optical connector		x	x
-028	FC/PC optical connector, 3 mm fiber cable pigtail		x	
-030	no optical connector, 900 μm buffered fiber pigtail	x		
-031	FC/PC optical connector, 900 μm buffered fiber pigtail	x		
-032	FC/APC optical connector, 900 μm buffered fiber pigtail	x		

6. VSWR spec. not applicable for options -003 and -004.

7. DC-coupling not available for 2516A, 4516A, or 10456A.

Maximum Ratings		
	Modules & Flange-mounts	Plug-ins
Operating Temperature of Baseplate	-40 to +70°C	0 to +50°C
Storage Temperature	-40 to +85°C	-20 to +65°C
Optical Input Power	2 mW CW, 4 mW/60 sec.	

