



#### Applications

- Antenna Remoting
- Cellular and PCS networks
- Military triband communications
- Tracking, Telemetry and Control (TT&C)

#### Features

- High dynamic range
- Long distance communications
- 10 MHz to 20 GHz bandwidth
- Dual 1310 nm/1550 nm window
- Y2K compliant, CE certified

# **Microwave PIN Photodiode Receivers**

The Ortel family of microwave photodiode receivers is ideally suited for use in analog fiber-optic communications. With their wide bandwidth and flat response, these devices are used 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 the 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 bias the photodiodes and monitor the dc level of the optical input power, thus providing a fully integrated microwave product.

# Performance Highlights

	Min	Typical	Max	Units
Wavelength	1290	-	1580	nm
Optical Input Power				
Standard	-	-	2	mW
High Power	-	-	15	mW
Total Operating Current				
Standard	-	-	100	mA
High Power				
Temperature Range	-40	-	+65	°C
Frequency Range	10	-	20000	MHz

See following pages for complete specifications and conditions.



*For more information on this and other products:* Contact Sales at Ortel 626-293-3400, or visit www.emcore.com.

# 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	Condition	Min	Max	Units
Operating Temperature Range of Baseplate: Module and Flange Mount Plug-in	T <sub>OP</sub>	continuous	-40 0	+65 +50	ဂံ ဂံ
Storage Temperature Module and Flange Mount Plug-in	T <sub>STG</sub>	-	-40 -20	+85 +65	°C ℃
Optical Input Power 2510A/B, 2515A/B, 2516A/B/C 2518A/B	P <sub>IN</sub>	-	-	2.5 16	mW mW
dc Current 2510A/B, 2515A/B, 2516A/B/C 2518A/B	I <sub>DC</sub>	-	-	2 12	mA mA

# **Electrical/Optical Characteristics**

#### Optical

Parameter	Specifications				
Model Number					
Module	2510A/B <sup>1</sup>	2515A/B <sup>1</sup>	2516A/B/C <sup>1</sup>	2518A/B	
Flange-mount Rx	4510A/B <sup>1</sup>	4515A/B <sup>1</sup>	4516A/B/C <sup>1</sup>	4518A/B	
Plug-in Rx	10450A/B <sup>1</sup>	10455A/B <sup>1</sup>	10456A/B/C <sup>1</sup>	10458A/B	
dc Responsivity					
at 1310 nm, 25°C	>0.75 A/W	>0.75 A/W	>0.65 A/W	>0.70 A/W	
at 1550 nm, 25°C	>0.85 A/W	>0.85 A/W	>0.75 A/W	>0.80 A/W	
RF Receiver Efficiency (typ) at 1 GHz <sup>2</sup>					
at 1310 nm	>0.38	>0.38	>0.33	>0.35	
at 1550 nm	>0.42	>0.42	>0.38	>0.40	
Optical Return Loss <sup>3</sup>	>45 dB				
Optical Input Power	2 mW	2 mW	2 mW	15 mW	
Pigtail Fiber Type (where applicable)	>1 m, 9 $\mu$ m/125 $\mu$ m single-mode SMF-28 <sup>4</sup> or equivalent				

1. Specified for < 2mW optical power, < 50% modulation depth

2. The photodiode RF current splits evenly between the internal matching resistor and the external load.

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

3. Optical return loss specified for APC connectors or fusion splices only. Other connection methods can degrade optical return loss.

4. SMF-28 is a trademark of Corning Incorporated.

# **RF** Characteristics

Parameter	Specifications				
Model Number					
Module	2510A/B	2515A/B	2516A/B/C	2518A/B	
Flange-mount Rx	4510A/B	4515A/B	4516A/B/C	4518A/B	
Plug-in Rx	10450A/B	10455A/B	10456A/B/C	10458A/B	
Maximum Frequency					
A	3 GHz	10 GHz	20 GHz	15 GHz	
В	6 GHz	12 GHz	18 GHz	10 GHz	
С	-	-	15 GHz	-	
Minimum Frequency	0.1 GHz	0.1 GHz	1 GHz	0.5 GHz	
Output Coupling	DC	AC	AC	AC	
Amplitude Flatness <sup>1</sup>	$\pm$ 2.0 dB	+1, -3 dB	$\pm$ 2.0 dB	+1, -3 dB	
Output VSWR					
2.0:1	0.1 – 6 GHz	0.1 – 10 GHz	1 – 18 GHz	0.5 – 15 GHz	
2.5:1	-	10 <b>–</b> 12 GHz	18 <b>–</b> 20 GHz	-	
Output Impedance	50 Ω				

1. Relative to value at 1 GHz

# **Connector Options**

Parameter	Specifications				
Model Number					
Module	2510A/B	2515A/B	2516A/B/C	2518A/B	
Flange-mount Rx	4510A/B	4515A/B	4516A/B/C	4518A/B	
Plug-in Rx	10450A/B	10455A/B	10456A/B/C	10458A/B	
RF Connector					
Laser Module	SMA (f)	SMA (f)	k-conn (f) <sup>1</sup>	k-conn (f) <sup>1</sup>	
Flange Mount	SMA (f)	SMA (f)	SMA (f)	SMA (f)	
Plugin	SMA (f)	SMA (f)	SMA (f)	SMA (f)	

1. K-connector is a trademark of Anritsu Company. K-connectors are SMA compatible

# DC (Photodiode Module)

Parameter	Symbol	Condition	Min	Тур	Max	Unit
Photodiode Bias	la a	25°C	_	_	2	m۸
2518A/B	IDC	25 0	-	-	12	mA
Forward Voltage 2510A/B, 2515A/B, 2518A/B 2516A/B/C	VF	-	-	10 5	-	V V

# DC (Flange-mount / Rack-mount)

Pin Number	Min	Тур	Max	Max Ripple	Current
1	4	15V	16	100 mV p-p	0.2 A max

#### **Electrical Schematic**



### Pin Information: 2510A/B, 2515A/B

Pin No.	Description		
A	NC		
В	NC		
С	NC		
D	NC		
E	Bias		
F	Ground		
Н	NC		

# 2516A/B/C, 2518A/B





# Pin Information: 2516A/B/C, 2518A/B

Pin No.	Description
1	NC
2	NC
3	NC
4	Bias
5	NC
6	Ground

Outline Diagram Dimensions are in inches.

2510A/B, 2515A/B Receivers



#### 2516A/B/C, 2518A/B Receivers



# 10450A/B, 10455A/B, 10456A/B/C, 10458A/B Receivers



#### 4510A/B, 4515A/B, 4516A/B/C, 4518A/B Receivers



#### Pin/Package Information

Nine-Pin D-sub Connector (10450A/B, 10455A/B, 10456A/B/C, 10458A/B, and 4510A/B, 4515A/B, 4516A/B/C, 4518A/B Receivers)

Pin No.	Description
1	+15 Vdc
2	NC
3	NC
4	Power Ground
5	Reference Ground
6	Optical Current Monitor
7	Low Optical Power Alarm <sup>1</sup>
8	NC
9	NC

1. Open collector outputs

#### Front Panel LEDs

- Power on
- Optical Power Received (plug-ins only)

#### dc Monitor Voltages

- dc Photocurrent, pin6
  - $\circ~$  1V/mA ±2% accuracy (into 1 M $\Omega$  load). Proportional to laser output power

#### **Alarm Circuits**

- The alarms are open-collector outputs capable 20 mA when active and withstanding 15V when off.
- Low optical Power, pin-7
  - $\circ~$  Sinks current when power drops below approximately 0.1 mW.

### **Ordering Information**

Ontion Connector/Pigtail			Package Type	•
Option	Connector/rigtain		Flange	Plug-in
-020	FC/APC Bulkhead Optical Connector	-	Х	Х
-021	FC/SPC Bulkhead Optical Connector*	-	Х	Х
-022	FC/APC Optical Connector/ 3mm Fiber Pigtail	-	Х	Х
-023	FC/SPC Optical Connector/ 3mm Fiber Pigtail	-	Х	Х
-026	FC/PC Bulkhead Optical Connector	-	Х	Х
-028	FC/PC Optical Connector/ 3mm Fiber Pigtail	-	Х	Х
-030	No Optical Connector/900 $\mu m$ Buffered Fiber	Х	-	-
-031	FC/PC Optical Connector/900 $\mu m$ Buffered Fiber	х	-	-
-032	FC/APC Optical Connector/900 µm Buffered Fiber	Х	-	-

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