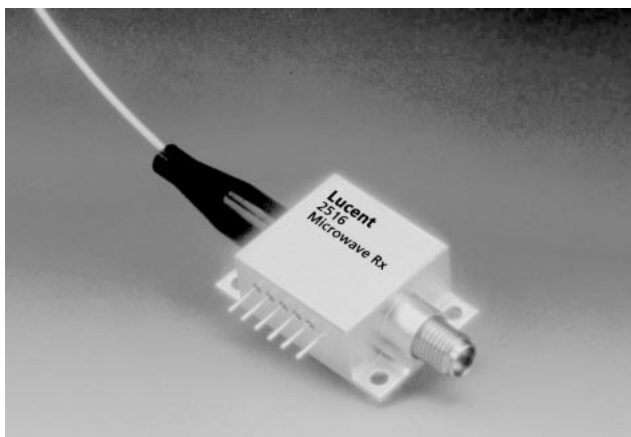




Microwave Photodiode Receivers



Features

- Wide-band analog signal reception
- Single-mode fiber pigtail
- High optical return loss
- Up to 20 GHz bandwidth
- 1310 nm and 1550 nm sensitivity

Applications

- Antenna remoting
- Cellular and PCS networks
- Military triband communications
- TT and C

Description

The family of microwave photodiode receivers are 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.

Description (continued)

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 Lucent's System 10000 rack-mountable chassis and power supplies. Electronics within flange-mount and plug-in receivers provide a reverse bias for the photodiodes and monitor the dc level of the optical input power, thus providing a fully integrated microwave product.

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
Operating Temperature Range: Modules and Flange-mount Plug-ins	TOP	-40 0	70 50	°C °C
Storage Temperature Range: Modules and Flange-mount Plug-ins	Tstg	-40 -20	85 65	°C °C
Input Power: 2510A/B, 2515A/B, 1516A/B/C 2518A/B	PIN	2.0 (typ) 15	2.5 16	mW mW
Maximum Power for 60 s: 2510A/B, 2515A/B, 1516A/B/C 2518A/B	P _{MAX}	— —	4 16	mW mW
dc Current: 2510A/B, 2515A/B, 1516A/B/C 2518A/B	I _{dc}	— —	2 12	mA mA

Characteristics**Table 1. Optical Characteristics**

Package Type	Device Code			
Module	2510A/B ¹	2515A/B ¹	2516A/B/C ¹	2518A/B
Flange-Mount Receiver	4510A/B ¹	4515A/B ¹	4516A/B/C ¹	4518A/B
Plug-in Receiver, for 19 in. rack system	10450A/B ¹	10455A/B ¹	10456A/B/C ¹	10458A/B
Parameters	Specifications			
dc Photodiode Responsivity at 1310 nm, 25 °C	>0.75 A/W	>0.75 A/W	>0.65 A/W	>0.70 A/W
RF Receiver Efficiency (typ) at 1 GHz ²	>0.38	>0.38	>0.33	>0.35
Optical Return Loss ³	>45 dB			
Pigtail Fiber Type (where applicable)	>1 m, 9 μm/125 μm single-mode SMF-28 ⁴ or equivalent			

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

2. The photodiode RF current splits evenly between the internal matching resistor and the external load. (See Lucent's *System Designer's Guide to RF and Microwave Fiber Optics*.)

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

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

Characteristics (continued)

Table 2. RF Characteristics

Package Type	Device Code			
Module	2510A/B	2515A/B	2516A/B/C	2518A/B
Flange-Mount Receiver	4510A/B	4515A/B	4516A/B/C	4518A/B
Plug-in Receiver (for 19 in. rack system)	10450A/B	10455A/B	10456A/B/C	10458A/B
Parameters	Specifications			
Maximum Frequency:				
A Version	3 GHz	10 GHz	20 GHz	15 GHz
B Version	6 GHz	12 GHz	18 GHz	10 GHz
C Version	—	—	15 GHz	—
Minimum Frequency	0.1 GHz	0.1 GHz	1 GHz	0.5 GHz
Output Coupling	dc	ac	ac	ac
Amplitude Flatness ¹	±2.0 dB	±2.0 dB	±2.0 dB	±2.0 dB
Output VSWR, Max				
2.0:1	0.1—6 GHz	0.1 GHz—10 GHz	1 GHz—18 GHz	0.5 GHz—15 GHz
2.5:1	—	10 GHz—12 GHz	18 GHz—20 GHz	—
Output Impedance	50 Ω			
RF Connector for Module	SMA (F)	SMA (F)	<i>K-connector</i> ²	<i>K-connector</i> ²
RF Connector for Flange-Mount and Plug-in	SMA (F)			

1. Relative to value at 1 GHz.

2. *K-connector* is a trademark of Anritsu Company. It is a high-speed and SMA-compatible connector.

Table 3. dc Power for Flange-mount and Plug-ins (45xx and 104xx Receivers)

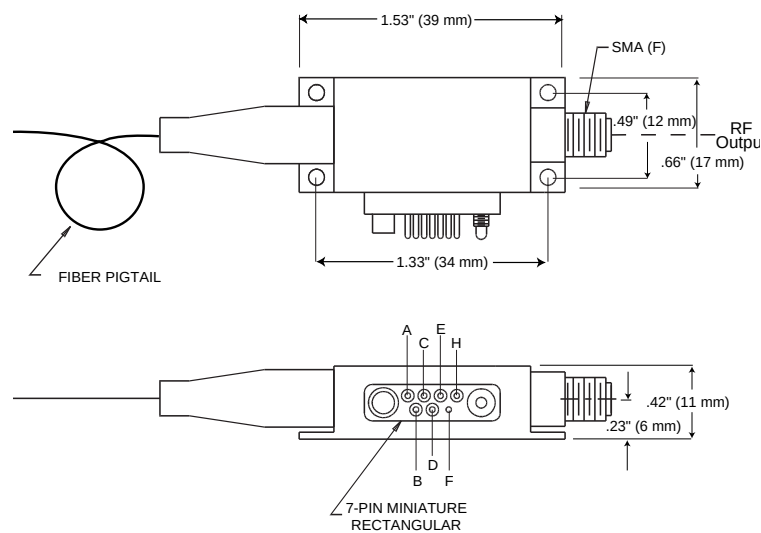
Parameter	Symbol	Min	Typ	Max	Unit
dc Power for Flange-mount and Plug-ins (Models 45xx and 104xx) ¹ : Pin 1	P _{dc}	—	15 nominal at 0.2 A max	—	V

1. For photodiode module CDC requirements, contact a Lucent account manager for OEM data sheet.

2510A/B, 2515A/B Microwave Photodiode Receivers

Outline Diagram

Dimensions are in inches and (millimeters).



Pin Information

Table 4. Seven-pin Connector

Pin No.	Description
A	NC
B	NC
C	NC
D	NC
E	Bias
F	Ground
H	NC

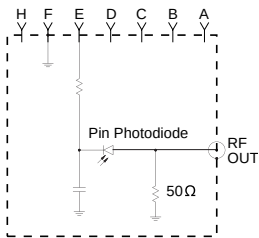


Figure 1. 2510A/B Electrical Schematic

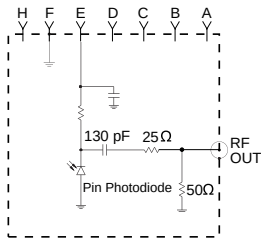
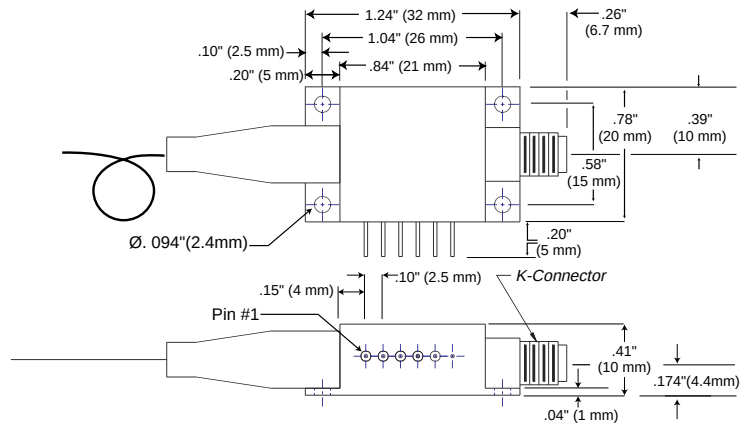


Figure 2. 2515A/B Electrical Schematic

2516A/B, 2518A/B Microwave Photodiode Receivers

Outline Diagram

Dimensions are in inches and (millimeters).



Pin Information

Table 5. Six-pin Connector

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

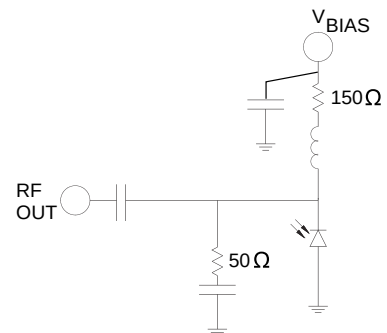
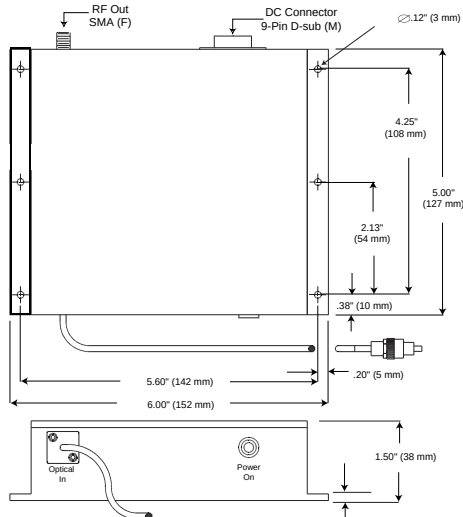


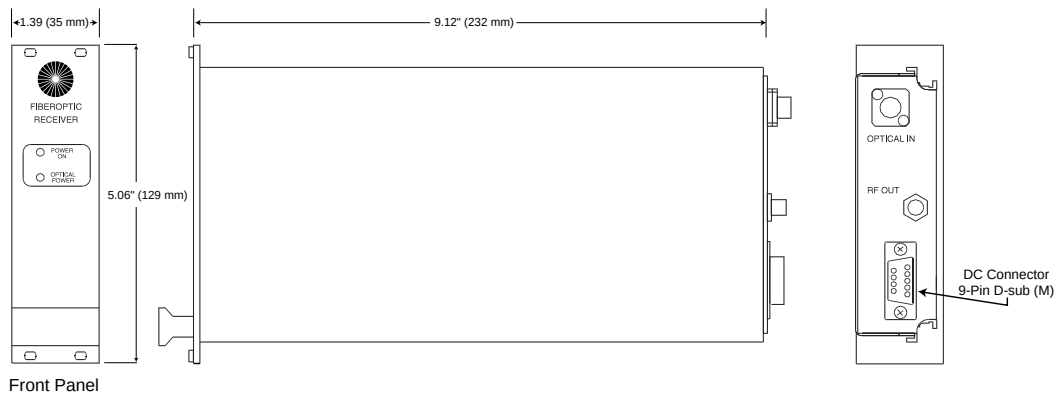
Figure 3. 2516A/B, 2518A/B Electrical Schematic

45xx, 104xx Microwave Photodiode Receivers

45xx Outline Diagram (Dimensions are in inches and (millimeters).)



104xx Outline Diagram (Dimensions are in inches and (millimeters).)



Pin Information

Table 6. Nine-Pin D-sub Connector

Pin No.	Description
1	15 Vdc
2	NC
3	NC
4	Power Ground
5	Ref. Ground
6	Optical Current Monitor
7	Low Optical Power Alarm ¹
8	NC
9	NC

1. Open collector outputs.

Front Panel LEDs

- Power on
- Optical power received (plug-ins only)

dc Monitor Voltages

- dc photocurrent (Pin 6): 1 V/mA

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.

Ordering Information

Table 7. Microwave Photodiode Receiver Options

Option No.	Connector/Pigtail	Package Type		
		Module	Flange	Plug-in
-020	FC/APC Bulkhead Optical Connector	—	x	x
-021	FC/SPC Bulkhead Optical Connector ¹	—	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 μ m Buffered Fiber Pigtail	x	—	—
-031	FC/PC Optical Connector/900 μ m Buffered Fiber Pigtail	x	—	—
-032	FC/APC Optical Connector/900 μ m Buffered Fiber Pigtail	x	—	—

1. FC/SPC connectors are a higher grade version of FC/PC connectors and are compatible with them.

Table 8. Ordering Information¹

Device Code	Description	Package Type	Comcode
2510A	Microwave Photodiode Receiver	Module	TBD
2510B		Module	TBD
2515A		Module	TBD
2515B		Module	TBD
2516A		Module	TBD
2516B		Module	TBD
2516C		Module	TBD
2518A		Module	TBD
2518B		Module	TBD
4510A		Flange-Mount	TBD
4510B		Flange-Mount	TBD
4515A		Flange-Mount	TBD
4515B		Flange-Mount	TBD
4516A		Flange-Mount	TBD
4516B		Flange-Mount	TBD
4516C		Flange-Mount	TBD
4518A		Flange-Mount	TBD
4518B		Flange-Mount	TBD
10450A		Plug-in, for 19 in. Rack System	TBD
10450B		Plug-in, for 19 in. Rack System	TBD
10455A		Plug-in, for 19 in. Rack System	TBD
10455B		Plug-in, for 19 in. Rack System	TBD
10456A		Plug-in, for 19 in. Rack System	TBD
10456B		Plug-in, for 19 in. Rack System	TBD
10456C		Plug-in, for 19 in. Rack System	TBD
10458A		Plug-in, for 19 in. Rack System	TBD
10458B		Plug-in, for 19 in. Rack System	TBD

1. For additional ordering information, please contact a Lucent account manager at Microelectronics Group, Optoelectronics Division, OPTO West, 1-800-362-3891 (for sales staff, please press option 2).

For additional information, contact your Microelectronics Group Account Manager or the following:

INTERNET: **<http://www.lucent.com/micro>**, or for Optoelectronics information, **<http://www.lucent.com/micro/opto>**
E-MAIL: **docmaster@micro.lucent.com**
N. AMERICA: Microelectronics Group, Lucent Technologies Inc., 555 Union Boulevard, Room 30L-15P-BA, Allentown, PA 18109-3286
1-800-372-2447, FAX 610-712-4106 (In CANADA: **1-800-553-2448**, FAX 610-712-4106)
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