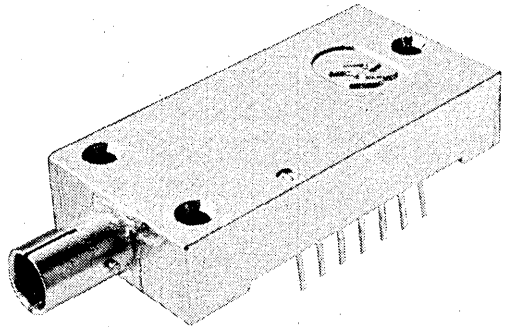
National Semiconductor

ADVANCE INFORMATION

FOR100B Fiber-Optic Receiver

General Description

The FOR100B is a general-purpose fiber-optic receiver. It contains a low-capacitance pin photodiode, FET-input transimpedance preamplifier and a comparator with hysteresis. An integral self-aligning bayonet-style connector simplifies and ensures reliable optical coupling. The low profile metal package is ideal for direct PC board mounting with 0.5" board-to-board spacing. When used with the FOT180B fiber-optic transmitter, the pair will provide a complete fiber-optic data link capable of 5 Mbits/s NRZ data rate with only 2 μW peak optical power input at the receiver. Connectors are available from Amphenol™.



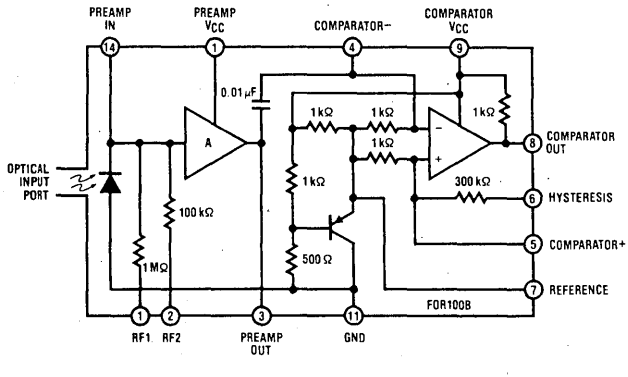
Features

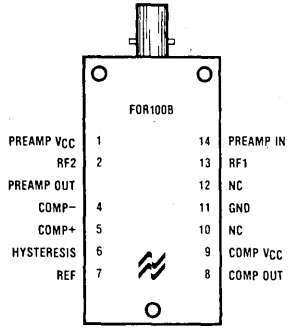
- Single 4.5V to 12V supply
- DC to 5 Mbits/s NRZ data bandwidth
- $<10^{-9}$ bit error rate
- Low capacitance silicon pin photodiode
- Pin selectable sensitivity
- CMOS/TTL compatible logic output
- >21 dB dynamic range (see Note 1, page 2)
- Quickly demountable bayonet-type Amphenol connector
- Separate analog and digital outputs
- 14-pin low-profile (0.3") package for direct PC board mounting

Applications

- Data communication networks
- Secure communications
- Peripheral control/communications
- Video transmission
- Optical modems
- Fiber-optic repeater
- Industrial machine control

Schematic and Connection Diagrams





TOP VIEW
(The 3 mounting holes are tapped for 4—40 screws)

Order Number FOR100B
See NS Package F014A

Amphenol is a trademark of Amphenol Division, Bunker Ramo Corp.

Absolute Maximum Ratings

V_{CC}	Supply Voltage	+15V
T_{STG}	Storage Temperature	−25°C to +85°C
T_A	Operating Temperature Range	−25°C to +85°C
	Lead Temperature (Soldering, 10 seconds)	300°C

Electrical and Optical Characteristics $V_{CC} = +5V$, $T_A = 25°C$

Parameter		Conditions		Typ.	Units
	Preamp Responsivity	$R_F = 1M\Omega$,	$\lambda = 660nm$	430	mV/μW
			$\lambda = 820nm$	600	
		$R_F = 100k\Omega$,	$\lambda = 660nm$	43	
			$\lambda = 820nm$	60	
BW	Data Rate (NRZ)	$R_F = 1M\Omega$, See Fig. 1	$P_{IN} = 350nW$ Peak	1.0	Mbits/s
		$R_F = 100k\Omega$, See Fig. 2	$P_{IN} = 2\mu W$ Peak	5.0	
	Optical Port Diameter			500	μm
NA	Numerical Aperture			0.5	
V_Q	Preamp Quiescent Voltage	No Optical Input		2.1	V
V_{OL}	Comparator Output Low Voltage	$I_{OL} = 3.2mA$		0.3	
V_{OH}	Comparator Output High Voltage	$I_{OH} = -1mA$		4.0	
I_{CC}	Supply Current	Comparator Output High		30	mA
		Comparator Output Low		35	
t_{pd}	Propagation Delay:				ns
	Optical Input to Analog Output	At Pin 3,	$R_F = 100k\Omega$	40	
	Optical Input to TTL Output	At Pin 6		150	

Note 1: With the circuit configuration in Figure 2, the minimum detectable input and maximum allowable inputs are 300nW and 41μW peak respectively, this translates to >21dB dynamic range. This is based on a photodiode responsivity of 0.60A/W @ $\lambda = 820nm$.

Applications Information

The front end of the FOR100B fiber-optic receiver is a wideband transimpedance amplifier, thus good supply bypassing is required. A 3.3μF tantalum capacitor in parallel with a 0.1μF ceramic disc placed as close as possible to device pins is recommended. Also, the metal case should be grounded. The mounting holes are tapped for 4—40 screws.

The FOR100B contains all the components required to function as an optical in/TTL out receiver. No external components are required if the basic receiver configurations are used.

Figure 1 shows the high sensitivity configuration capable of 1Mbit/s NRZ data rate with only 350nW of peak optical power input. Figure 2 shows the low sensitivity circuit capable of 5Mbits/s NRZ operation with only 2μW of optical input.

In applications where external components are required, it is important that the following techniques be considered:

- Make overall layout compact.
- Keep all component lead lengths as short as possible.
- Route the comparator output away from the preamp and comparator inputs.
- Separate preamp input and comparator output lead by a ground or supply trace where possible.

Applications Circuits

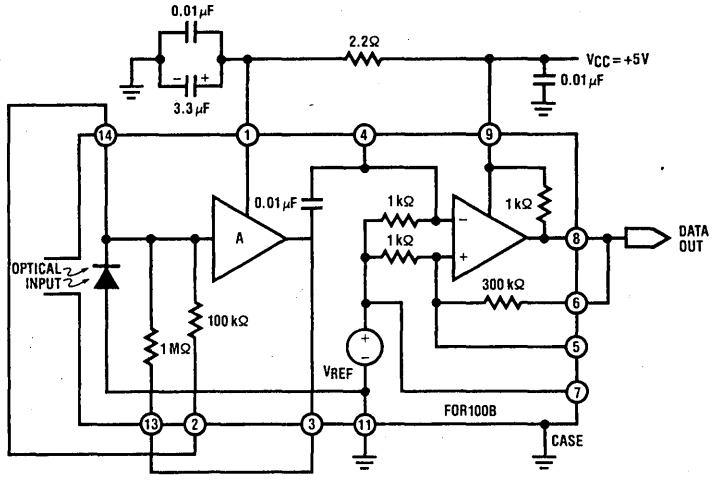


Figure 1. Fiber-Optic Receiver—High Sensitivity: 30nW

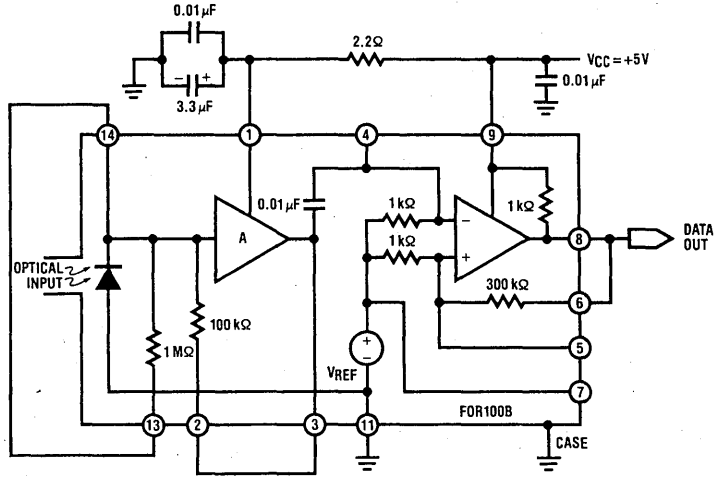


Figure 2. Fiber-Optic Receiver—Low Sensitivity: 300nW

Ordering Information

Bayonet Connector	Part No.	Fiber Diameter
	905-143-5001	125 microns
	905-143-5002	140 microns
	905-143-5003	200 microns
	905-143-5004	230 microns
	905-143-5005	400 microns
	905-143-5006	600 microns
Order from Amphenol Division, Bunker Ramo Corp., Denbury, Connecticut	905-143-5007	1 millimeter