QDFB

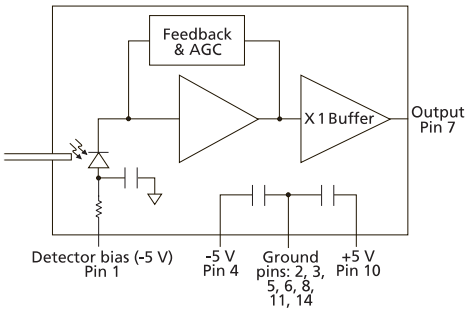
Wide Dynamic Range pinFET Receiver

- *Telecom access and junction applications*
- *Transimpedance amplifier with AGC*
- *High sensitivity*
- *Wide dynamic range >32 dB*
- *1300 and 1550 nm operation*

Description

The QDFB is a fiber-optic transimpedance receiver used in long-wavelength applications. Excellent sensitivity and a wide dynamic range are achieved by the use of an automatic gain control circuit (AGC). The QDFB features a buffered output stage which increases the drive capabilities. Packaged in the industry-standard, low-profile 14-pin DIL package, the hermetic package is pigtailed with multimode fiber. Connector selection is optional.

BLOCK DIAGRAM *Capacitors are 0.01 µF*



Applications

The QDFB pinFET is designed to operate in digital fiber-optic systems running at data rates up to 155 Mb/s. The pinFET reduces system engineering time by eliminating performance matching between the detector, amplifier, and an automatic gain control loop while maintaining stability.

Power Supply Internal 0.01 µf power supply decoupling capacitors are used to improve performance in noisy conditions. Additionally, external bypass capacitors with short leads should be used at the supply pins. Capacitor values depend on system conditions. The QDFB requires a single +5 and two -5 volt supplies, one for the detector and the other for the amplifier. Pin 1 is dedicated to the detector and allows the photodiode current to be monitored.

Output Loading Considerations An output buffer enables the QDFB to drive capacitive loads. Nevertheless, output loading should still be kept to a minimum; excessive reactive loads can cause ringing and overshoot. Also, the output is generally AC-coupled to the next stage to isolate post-amplification circuitry from shifts in pinFET dc output voltage.

Maximum Overload Power The maximum overload is defined as the input power needed to cause a 1 volt peak-to-peak output voltage. Operation above this level is possible because the QDFB does not start clipping until about 2.5 volts peak-to-peak, or at approximately 0 dBm optical input power.

Sensitivity The sensitivity of every module is determined before shipment. The sensitivity calculated is the input power needed to maintain better than 10^{-9} Bit Error Rate. The calculation is based on an RMS noise measurement under “no light” conditions.

Manufacturing Information The QDFB is subjected to a battery of processes including active burn-in, temperature cycling, fine and gross leak test, and visual inspections.

All devices are tested before shipment; test results are included with each unit.

Specifications *Contact Corning Lasertron regarding special requirements.*

(at 25°C, ±5 V, unless otherwise noted)

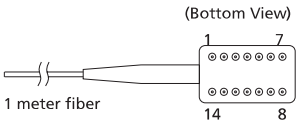
	QDFB-005		QDFB-010		QDFB-040		QDFB-100	
	Min	Max	Min	Max	Min	Max	Min	Max
Electrical Characteristics								
Sensitivity (dBm)*		-54		-52		-45		-39
Sensitivity over operating temperature (dBm)		-52		-50		-43.5		-37.5
Maximum overload (dBm)	-5		-5		-5		-5	
Peak-to-peak voltage at max overload (V_{pp})		1		1		1		2
Bandwidth at -3 dB (MHz)	5		10		40		100	
Gain flatness (dB)		±1		±1		±1		±1
Output impedance (Ohms)		50		50		50		50
Transimpedance (K Ohms)	800		400		85		30	

**Noise filter used to test sensitivity for the QDFB-005 is a 4 MHz, 3-pole filter; QDFB-010 is an 8.5 MHz, 3-pole filter; QDFB-040 is a 40 MHz, 3-pole filter; and QDFB-100 is a 110 MHz, 3-pole filter.*

	Min	Max
Common Specifications (all QDFB models)		
Detector responsivity (A/W)	0.75	
Photodiode dark current (nA)		5
Wavelength range (nm)	1200	1600
Storage temperature (°C)	-40	85
Operating temperature (°C)	-20	70
Positive supply voltage (V)	4.75	5.25
Negative supply voltage (V)	-5.25	-4.75
Power consumption (mW)		250

Pin Connections

1 Detector Bias (-5 V)
2 NC
3 Case Ground
4 -5 V
5 Case Ground
6 NC
7 Output
8 Case Ground
9 NC
10 +5 V
11 NC
12 NC
13 NC
14 NC



Absolute Maximum Ratings	
Fiber-coupled power (mW)	5
Reverse photocurrent (mA)	5
Reverse detector bias voltage (V)	-15
Forward current (mA)	2
Lead soldering temperature (°C)	260
Lead soldering duration (sec)	10
Fiber yield strength (N, min)	10
Fiber bend radius (mm, min)	30
Positive power supply (V)	7
Negative power supply (V)	-7

Ordering Information

	Suffix		
Base Model	**No Connector**	**FC/PC**	**ST**
QDFB-005	-001	-050	-052
QDFB-010	-001	-050	-052
QDFB-040	-001	-050	-052
QDFB-100	-001	-050	-052