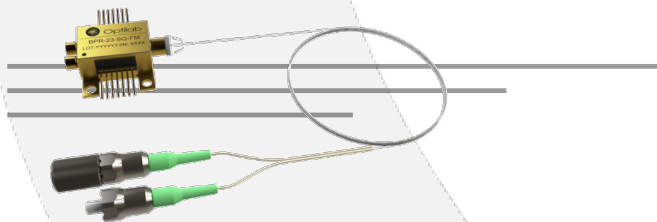


BPR-23-ST



DEVICE

23 GHz Linear Balanced Photoreceiver, Hermetically Sealed – Space Tested

OVERVIEW

The Optilab BPR-23-ST is a linear balanced photoreceiver with a configurable bandwidth up to 23 GHz. In a 14-pin mini-DIL package, BPR-23-ST integrates a dual balanced PIN-photodiode (PD) array on a single chip and a linear Trans-Impedance Amplifier (TIA). It can be operated in either Manual Gain Control (MGC) mode or Automatic Gain Control (AGC) mode. Featuring differential conversion gain of 1500 V/W, an imbalanced response of less than 0.5 dB and a differential output voltage swing of up to 1200 mVpp, BPR-23-ST is the idea receiver solution for DQPSK operating up to 48 Gbit/s or for low noise analog heterodyne detection. Excellent electrical and optical phase propagation is achieved by a total skew of lower than 5 ps between the balanced signal paths. This device has also been tested with qualification standards such as MIL-STD-883 and ESC 22900 for space applications.

FEATURES

- Adjustable bandwidth of 23 GHz
- Low skew, near ideal matching response
- Linear TIA with integrated VGA
- 14 pin mini-DILL package
- Dual GPPO for differential RF output
- MGC and AGC mode

USE IN

- Balanced linear receiver up to 23 GHz
- Low noise analog heterodyne detection
- 48 Gbit/s DQPSK systems
- Transponder and line card designs
- 23 GHz analog RFoF link

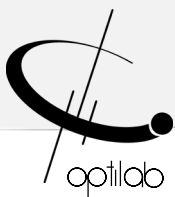
TESTS*

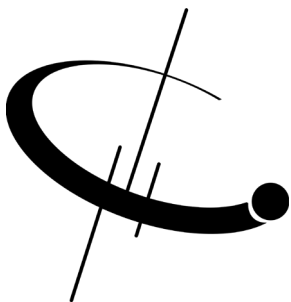
- Thermal Cycling
- Random Vibration
- Electro-Optical Measurement
- Radiographic Inspection
- Fine Leak Seal Tests
- Gross Leak Seal Tests
- Total Ionizing Dose
- Proton Displacement Damage

*Full Testing Report available upon request.

STANDARDS

- ESCC 22900
- MIL-STD-883





BPR-23-ST

SPECIFICATIONS

Optimized Operating Wavelength	950 nm to 1650 nm
Optical Input Level	+4 dBm max.
S21 3 dB Bandwidth	23 GHz typ.
Dark Current @ 25°C, 3.3 V	5 nA typ.
Conversion Gain	1500 V/W typ., 1300 V/W min.
Imbalance of Conversion Gain	0.3 dB typ.
Optical Return Loss	30 dB typ.
Optical PDL @ 1550 nm	0.25 dB max.
PD Reverse Bias Voltage	3.3 V ± 0.2 V
TIA Supply Voltage	3.3 V ± 0.2 V
Output Return Loss	8 dB @ 20 GHz
Differential Output Voltage	Up to 1200 mVpp
Impedance	50 Ω
Output Coupling	DC (external AC coupling required)
Impulse Response	22 ps typ.
Skew	5 ps typ., 20 ps max.
Equivalent Input Noise Density	100 pA/√Hz max.

GENERAL

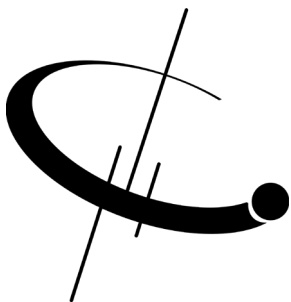
MECHANICAL

Operating Temperature	0°C to + 75°C
Storage Temperature	-40 °C to +85 °C
Operating Humidity	85% max.
Supply Current	87 mA typ., 93 mA max.
Power Consumption	275 mW typ., 307 mW max.
Housing Dimensions	18 mm x 22 mm x 8.5 mm
Fiber Connector	FC/APC or LC/APC
Optical Fiber	SMF-28
Package Type	14 pin butterfly min-DIL
RF Connector	Dual GPPD

ABSOLUTE MAXIMUM RATINGS

PD Reverse Bias Voltage	4.5 V
Input Optical Power	6 mW
Maximum Current	93 mA
Continuous Input Current	-1.5 mA to 5 mA
ESD, Input and Output Pins	1000 V min.
ESD, All Other Pins	2000 V min.
Latch Up	JESD78 Class 2
Humidity	85%





BPR-23-ST

RADIATION

Total Ionizing Dose

Source	Co-60 Gamma ray
Dose Rate	36 Gy/hr
Total Dose	1000 Gy

Proton Displacement Damage

Proton Energy	34.96±3.82 MeV
Flux	1x10 ⁸ particles/(s·cm ²)
Total Fluence	1x10 ¹¹ particles/cm ²

THERMAL CYCLE

Range	-55°C to +75°C
Cycles	2
Ramp Speed	1°C/min
Stability Period	10 min

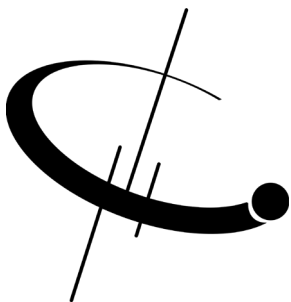
RANDOM VIBRATION

Power Spectral Density	0.3
Overall rms G	20.0
Test Duration	3min/axis

SEAL TESTS

Fine Leak	
Source	He tracer gas
Result	No leak
Gross Leak	
Source	Perfluorocarbon gas
Result	No Leak



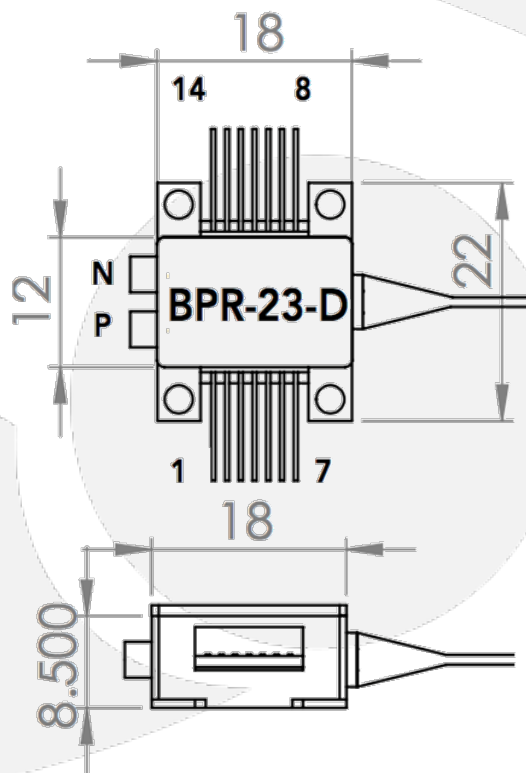


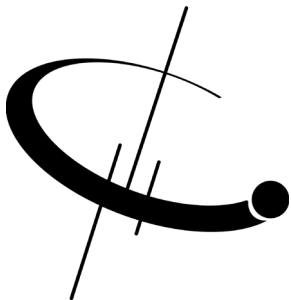
BPR-23-ST

14 PIN BUTTERFLY PACKAGE

Pin 1, 5, 10, 14	Vcc	+2.8 to 3.3 V, abs max current is 93 mA
Pin 2	BWM	Bandwidth Adjust, Sign.
Pin 3	BWA	Bandwidth Adjust, Magnitude.
Pin 4	OA	Output Amplitude Adjust. 0-3.3 VDC adjustment for AGC mode.
Pin 6, 9	GND	Ground
Pin 7	VPD1	PD1 Cathode Connection.
Pin 8	VPD2	PD2 Cathode Connection.
Pin 11	GC	Gain Control. 0-3.3 VDC adjustment for MGC mode. Set to FLT in AGC mode.
Pin 12	MC	Mode Control. GND: MGC mode; FLT: AGC mode; Vcc: Shutdown.
Pin 13	PKD	Peak Detector Output
	OUTP	Positive RF Output, DC coupled out
	OUTN	Negative RF Output, DC coupled out

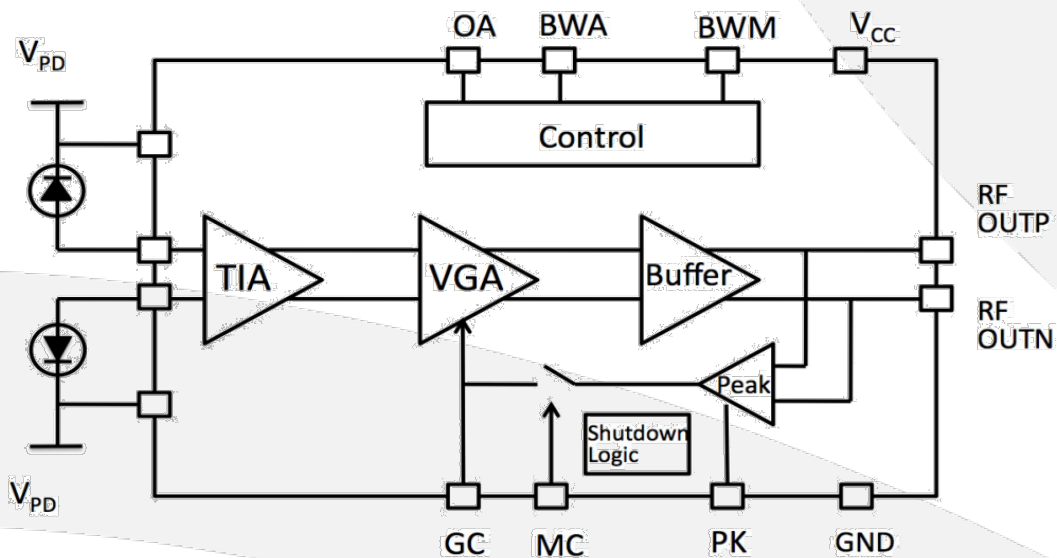
MECHANICAL DRAWING





BPR-23-ST

FUNCTIONAL DIAGRAM



DUAL CHANNEL S21 FREQUENCY RESPONSE

