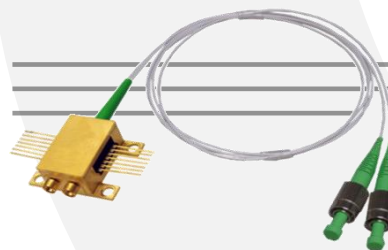


# BPR-23-ST



## DEVICE

## 23 GHz Linear Balanced Photo Receiver, 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\*

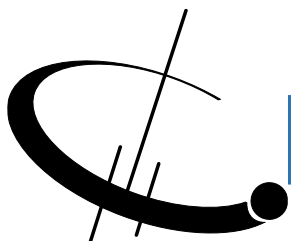
- Thermal Cycling
- Random Vibration
- Electro-Optical Measurement
- Radiographic Inspection
- Fine Leak Seal Tests
- Gross Leak Seal Tests
- Total Ionizing Dose
- Proton Displacement Damage

\*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, 3.3V	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 ± 0.2V
TIA Supply Voltage	3.3 V ± 0.2V
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.
Noise Equivalent Power Density	100 pW/ √ Hz max.

## GENERAL

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 Dimension	18 mm x 22 mm x 8.5 mm
Fiber Connector	FC/APC or Optional QFC
Optical Fiber	SMF-28
Package Type	14 pin butterfly min-DIL
RF Connector	Dual GPPD

## MECHANICAL

PD Reverse Bias Voltage	4.5 V
Input Optical Power	6 mW
Maxium 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%

## MAX RATINGS



## 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 <sup>8</sup> particles/(s·cm <sup>2</sup> ).
Total Fluence	1x10 <sup>11</sup> particles/cm <sup>2</sup>

## 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 Curation	3min/axis

## SEAL TESTS

### Fine Leak

Source	He tracer gas
Result	No Leak

### Gross Leak

Source	Perfluorocarbon gas
Result	No Leak

# BPR-23-ST

## PIN-OUT

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

## FUNCTION DIAGRAM

