40GHz Balance Photoreceiver Module

Analog up to 38 GHz bandwidth

DATASHEET

Return to the Webpage

The BPRM is a turnkey High Speed Balanced Photoreceiver is designed for high-speed analog and digital light detection, offering exceptional performance with a differential gain of approximately 2800 V/W and a bandwidth of up to 40 GHz. It features two waveguide-integrated PIN photodiodes and a limiting delivers a differential output voltage swing of approximately 600 mV. The BPRM achieves excellent electrical and optical phase propagation with a total skew of less than 5 ps between balanced signal paths and 10 ps total skew for all fiber pairs. Each amplifier path includes a threshold control at the linear amplification stage to optimize the differential output signal. The BPRM includes a low-noise power supply for simple, plug-and-play operation. This photoreceiver is ideal for applications requiring high sensitivity and high-speed balanced detection.

Features

- 100kHz to 35 GHz Bandwidth
- Contains 2 Balanced PIN/LA
- Hermetically Sealed Package
- Very Low Skew
- Dual Optical Fiber Inputs with Length Matched
- AC-Coupled output with Threshold Control

Applications

- High Speed Sensing
- Transponder Linear Receiver up to 30 GHz
- 30 GHz Analog RFoF Link

Specifications [1]

Parameter		Min	Typical	Max	Unit
Differential conversion gain [2], [3]		2000	2800		V/W
Photodiode DC responsivity		0.5	0.6	0.75	A/W
Polarization dependent loss			0.4	0.6	dB
Optical return loss		27	30		dB
Bit rate			43		Gbit/s
3dB cut-off frequency [3]		27	31		GHz
Lower frequency cut off				100	kHz
Electrical output reflexion coefficient	f = 0.5 to 15 [3]			-10	dB
	f = 15 to 50 GHz [3]			0	
Differential output voltage swing (P_{opt} ≥ 0dBm) [2]			600		mV
$Skew_{Rx}$			1	5	ps
$Skew_{Set}$				10	ps
Equivalent input noise density				80	pA/√Hz
Sensitivity [2], [4]			-10	-5	dBm
Amplifier supply current			85	100	mA
Photodiode dark current			5	300	nA
Power consumption			0.45	0.6	W
Operation Conditions					
Operating case temperature range		0		+75	°C
Relative humidity range		5		85	%
Operating wavelength range		1530		1620	nm
Average optical input power range		-10		4	dBm
Photodiode bias voltage		2.0	2.25	2.75	V
Amplifier supply voltage		-5.3	-5.2	-4.8	V
Absolute Maximum Ratings					
Storage Temperature		-40		+85	°C
Photodiode bias voltage		0		+3.5	V
Amplifier supply voltage		-5.5		+0.3	V
Amplifier adjustment voltage		-5.5		+0.3	V
Amplifier threshold control voltage		-7.0		+7.0	V
Maximum average optical input power				9	dBm
Electro static discharge		-500		500	V
Fiber bend radius		16			mm

Notes:

[1]. $V_{PD1} = V_{PD2} = \pm 2.25$ V, V_{EE} = -5.2V; $V_{adj}2$ = -2.4 V, λ = 1550 nm, T = 25°C

[2]. Measurements performed in single ended conditions

[3]. Measured using 860330A 50 GHz Lightwave component analyzer

[4]. Evaluated from NRZ eye diagram and BER measurement at 40Gbit/s (BER 10^{-12}, PRBS 2^{31}-1, back to back)

Rev 07/04/25

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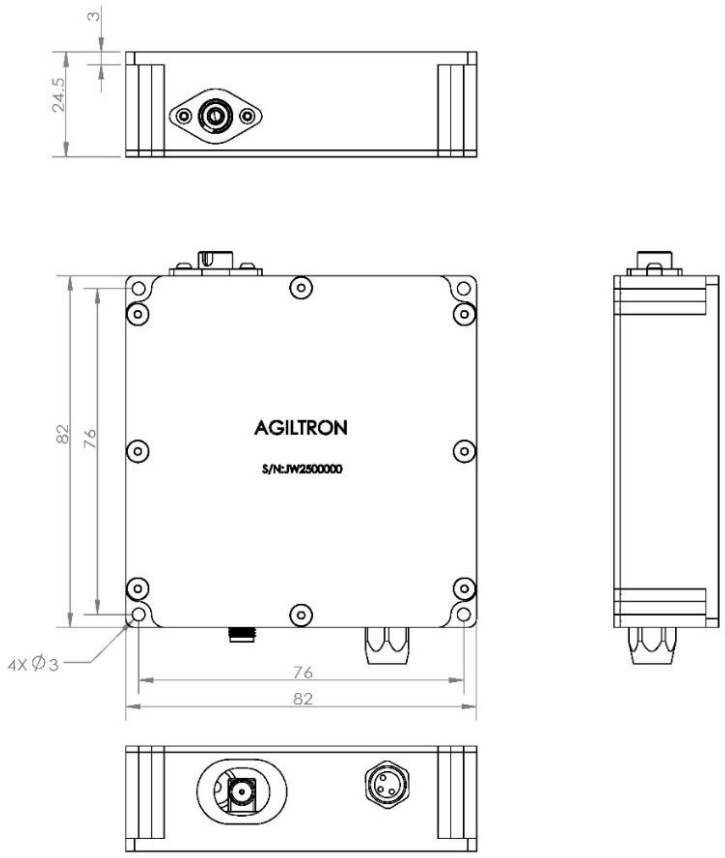
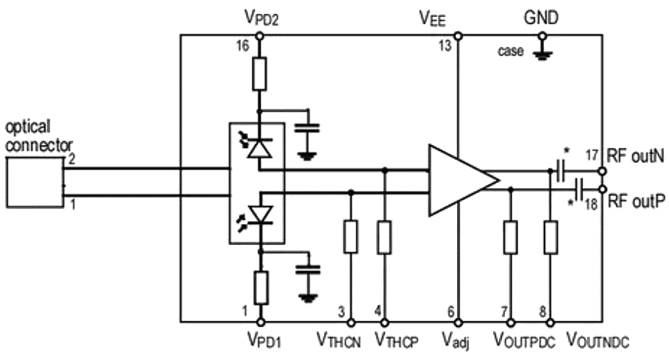
DATASHEET

Mechanical Dimensions (mm)



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Block Diagram



* optional blocking capacitor

Pin	Symbol	Description
1	V_{PD1}	Photodiode 1 supply
3	V_{THCN}	Amplifier threshold control negative
4	V_{THCP}	Amplifier threshold control positive
6	V_{adj}	Amplifier adjustment control
7	V_{OUTPDC}	DC voltage monitor on OUTP
8	V_{OUTNDC}	DC voltage monitor on OUTN
16	V_{PD2}	Photodiode 2 supply
17	outN	Rf-output negative – connector
18	outP	Rf-output positive – connector
9, 10, 11, 12	N/C	Not connected
13	V_{EE}	Amplifier supply voltage
2, 5, 14, 15	GND	Ground

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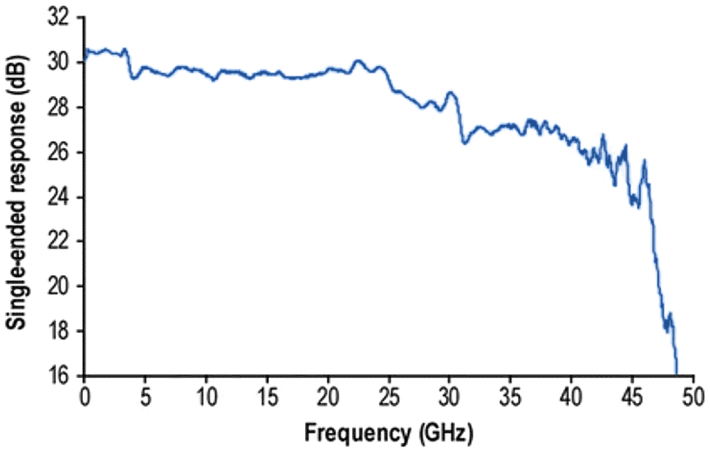
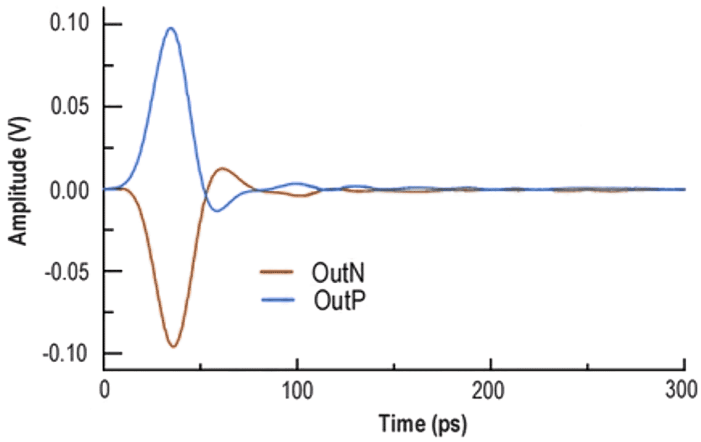
Typical Performance

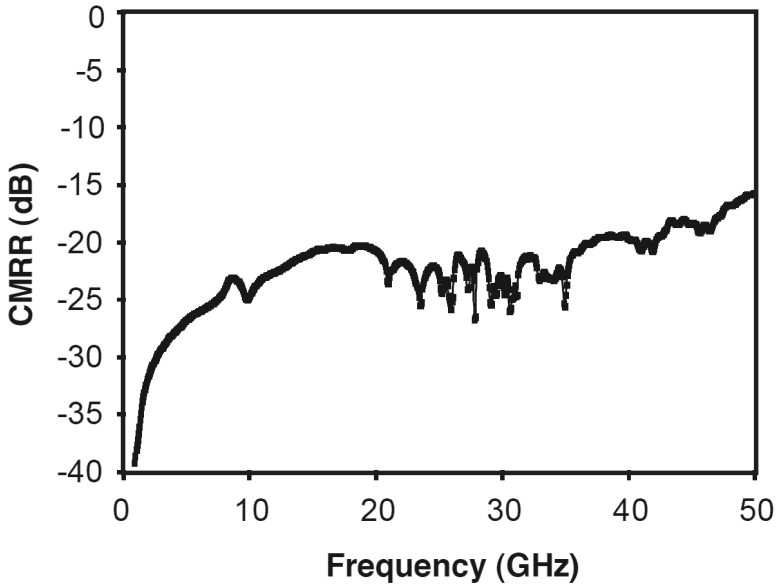
Frequency Response



Pulse Response



Common Mode Rejection Ratio



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Ordering Information

	1	1	38	1	2	22	3
Prefix	**Detector Type**	**Wavelength Range**	**Bandwidth**	**Coupling**	**Module ***	**Configuration**	**Connector**
BPRM-	PIN = 1	1200-1600nm = 1	38GH = 38		Non = 1 Yes = 2	Balance = 22	FC/APC = 3 Special = 0

* Module contains driver and power supply.

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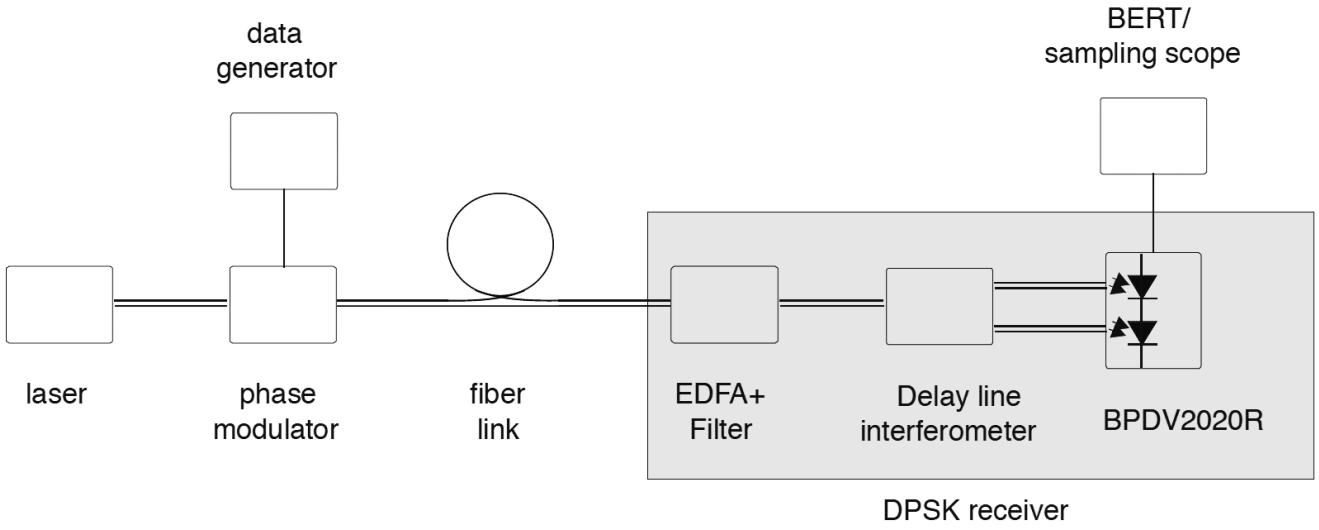
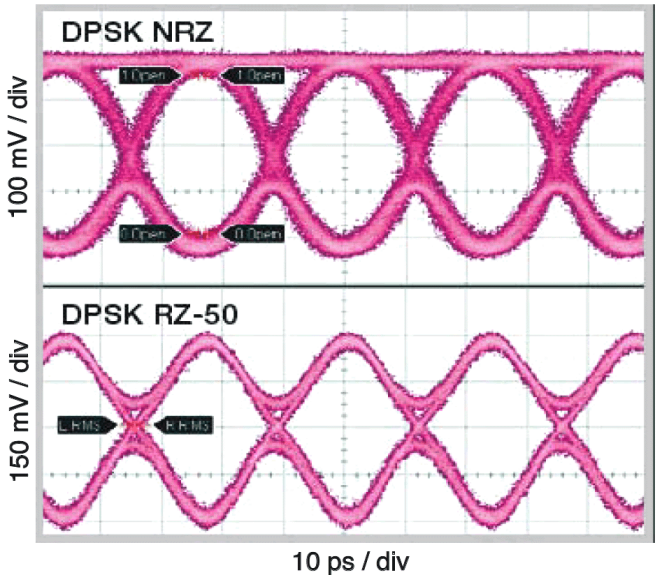
Applications

DPSK (Differential Phase Shift Keying) modulation has two advantages compared to conventional amplitude modulation: Higher sensitivity and better spectral efficiency.

Typical DPSK Set-up



43 Gbit/s DPSK Eye Diagram



by courtesy of W. Idler, Alcatel

Notes:
I_{PD} = 3 mA
22 dB OSNR
(0.1 nm, BER 10^{-9}, PRBS 2^{23}-1)

Notes:
I_{PD} = 3 mA
18 dB OSNR
(0.1 nm, BER 10^{-9}, PRBS 2^{23}-1)

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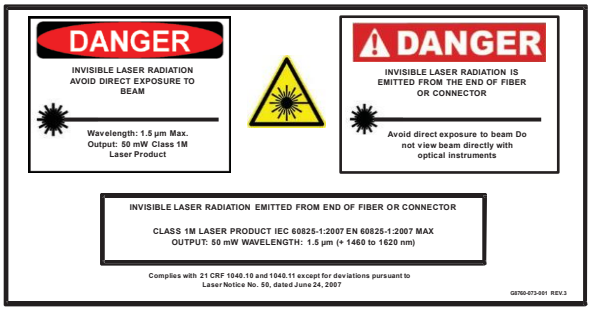
Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5 µm.

Maximum power = 30 mW.



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