

40GHz Balance Photoreceiver Module

850-1620 nm, Analog up to 40 GHz bandwidth



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Features

- 100kHz to 40 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 40 GHz
- 40 GHz Analog RFoF Link



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.

BPRM balanced photodetector is biased to operate with both optical inputs simultaneously and at similar power levels. If only one input is applied, the detector will saturate for input powers above -13 dBm.

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	f = 0.5 to 15 ^[3]			-10	dB
reflexion coefficient	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/VHz
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
RF Connector		2.92 mm, Female (K/SMA Compatible), GPPO			
Operation Conditions					
Operating case temperature range		0		+75	°C
Relative humidity range		5		85	%
Operating wavelength range		850	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]. $V_{PD1} = V_{PD2} = \pm 2.25\text{ V}$, $V_{EE} = -5.2\text{ V}$; $V_{adj2} = -2.4\text{ V}$, $\lambda = 1550\text{ nm}$, $T = 25^\circ\text{C}$

[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 04/21/26

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Technical drawing of the AGILTRON S/Nt: JW2500000, showing front, top, and side views with dimensions.

Front View (Top): Shows a rectangular profile with a central circular feature. Dimensions include a total height of 24.5 and a central feature height of 3.

Top View (Middle): Shows a square footprint with dimensions 82 (overall) and 76 (inner). It features 4x Ø3 mounting holes. The text "AGILTRON" and "S/Nt: JW2500000" are printed on the surface.

Side View (Right): Shows the profile of the device, indicating a height of 24.5.

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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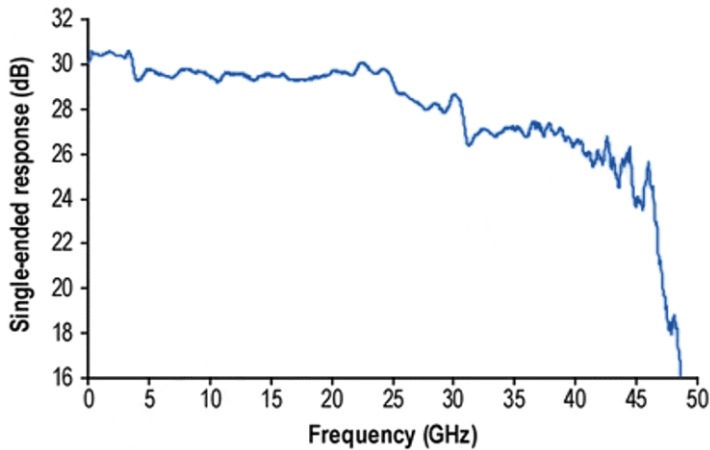
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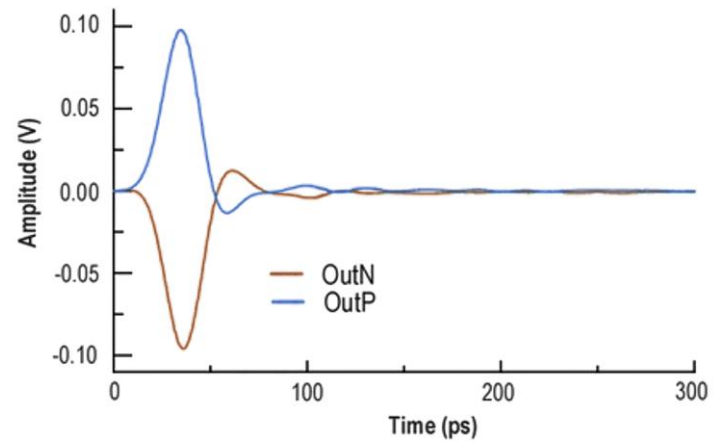
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Typical Performance

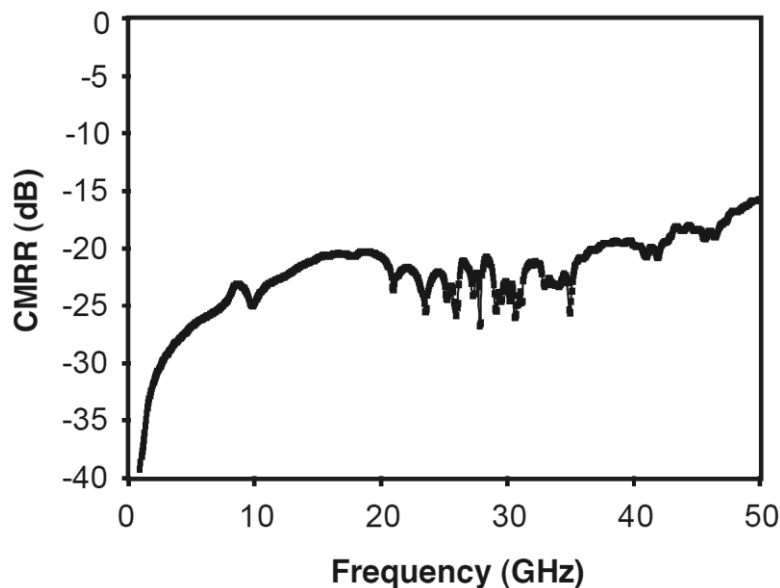
Frequency Response



Pulse Response



Common Mode Rejection Ratio



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Ordering Information (Part Number)

	1	1	40	1	2	22	3	☐
Prefix	Detector Type	Wavelength Range	Bandwidth	Coupling	Module ^[1]	Configuration	Connector ^[2]	RF Connector
BPRM-	PIN = 1	1200-1600nm = 1	40GHz = 40		Non = 1 Yes = 2	Balance = 22	FC/APC = 3 Special = 0	GPPO = G K = 2

[1]. Module contains driver and power supply.

[2]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

Operation Instructions

1. Connect the optical fiber input ports to the signal source. **Must apply both inputs at the same time with similar power levels.**
2. Connect the RF output port to the readout instrument. The detector can work with only one RF output.
3. Plug in the provided power supply to power the device. The LED will turn on.
4. The unit will operate with the performance specified in the test report.
5. If the device is not working, contact us via the sales email. **Do not open the enclosure** — doing so will invalidate the one-year warranty.

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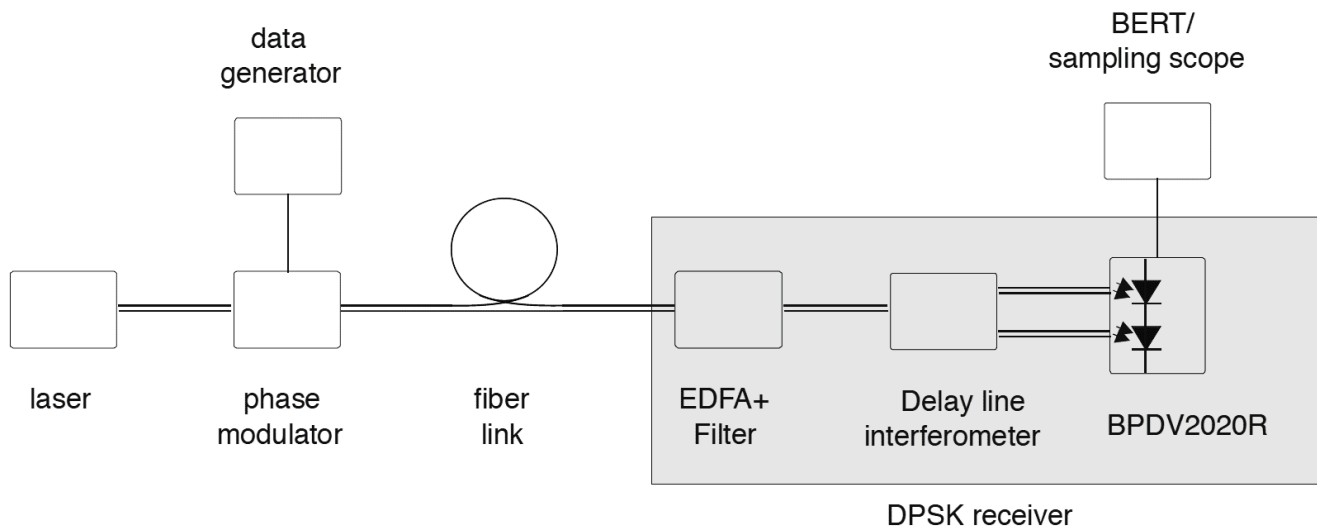


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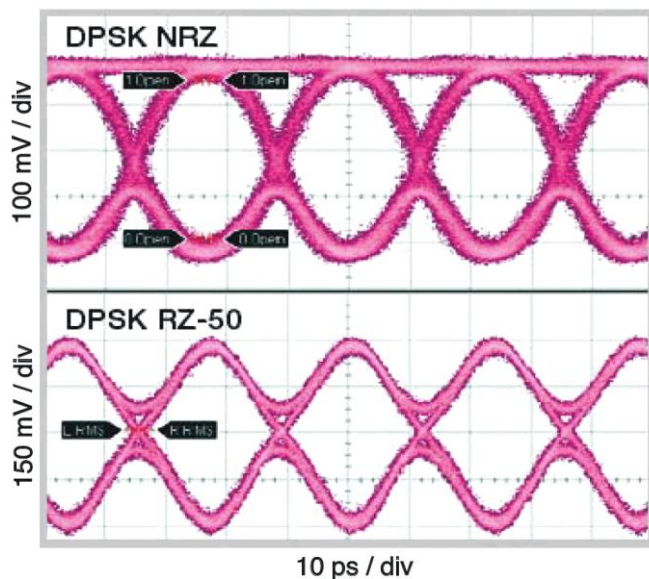
Applications

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:

$I_{PD} = 3 \text{ mA}$

22 dB OSNR

(0.1 nm, BER 10^{-9} , PRBS $2^{23}-1$)

Notes:

$I_{PD} = 3 \text{ mA}$

18 dB OSNR

(0.1 nm, BER 10^{-9} , PRBS $2^{23}-1$)

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Internal Bias Adjustment

Without optical inputs, the DC output voltages at P+ and N- (pins 7 and 8) should be adjusted to equal magnitude (approximately 0.33 V in this case) and 180 degrees out of phase. The DC outputs, Voutpdc and Voutndc, can be balanced by slightly adjusting (pins 3 and 4).

Caution Electrostatic Sensitivity



- Never touch laser diode and the module using hands
- Always use protections when handle a photodiode
- Recommend mounting the laser diode using an ionic gun and ESD finger cots



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