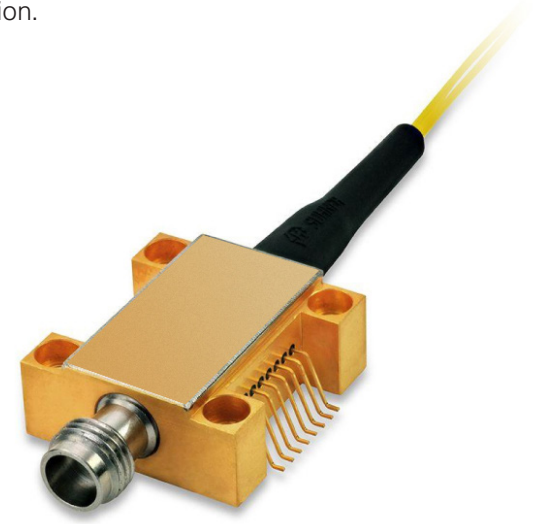
Optical Communications

70 GHz DUAL-WINDOW BALANCED PHOTODETECTOR

BPDV3320R

The BPDV3320R balanced photodetector consists of two optimized 70 GHz waveguide-integrated photodiodes on a single chip. As a single balanced photodetector, this configuration ensures an excellent uniformity of the paired photodiodes and is biased via an integrated biasing network. Due to the optimized combination of waveguide and photodiode design, even at high optical powers, a linear frequency response can be guaranteed at both 1310 nm as well as 1550 nm. The integrated 50 Ω termination allows an excellent match of the electrical output signal.
Tailored configurations are available, such as BPDV dual pair and quad sets, including connector customization and fiber-matching to enable coherent detection.



FEATURES

- 70 GHz typical bandwidth
- Unsurpassed high-power capability
- Detection of 64 Gbaud x-QAM signals
- Support of 1310 nm and 1550 nm
- Unique on-chip biasing network

APPLICATIONS

- Transmission systems up to 1 Tbps
- Coherent test and measurement systems
- Research and development systems
- Microwave photonics

COHERENT

Product Selection

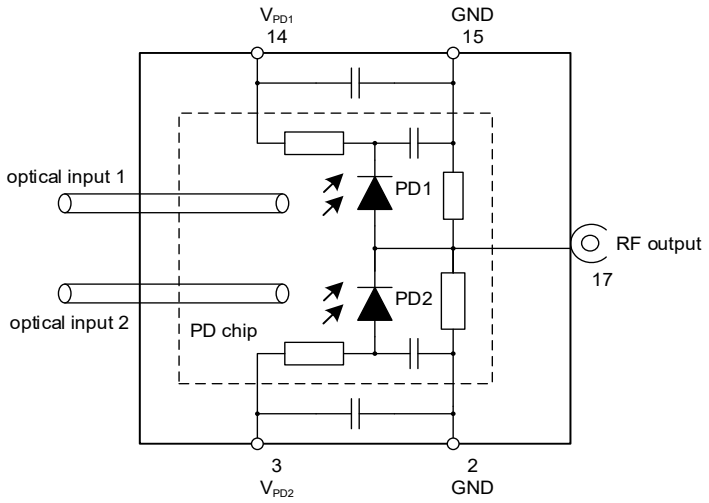
BPDV3320Rx-Vy-zz

Rx	R	= single balanced detector
	RM	= dual pair of balanced detectors
	RQ	= quad set of balanced detectors
Vy	VF	= female V-connector (standard)
	VM	= male V-connector
zz	FP	= FC/PC connector (standard)
		Other available choices are: FA-FC/APC

Pin Descriptions

# Pin	Symbol	Description
3	VPD2	PD2 supply input
2/15	GND	Ground = case ground
14	VPD1	PD1 supply input

Block Diagram



Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the datasheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode Bias Voltage	V_{PD1} V_{PD2}	—	0 -4.0		4.0 0	V
Maximum Average Optical Input Power	P_{opt}	Continuous wave (cw) or 40 Gbps NRZ, per channel			16	dBm
Maximum Peak Optical Input Power	P_{peak}	Pulse < 25 ps or RZ at 40 Gbps, per channel			19	dBm
Electrostatic Discharge (ESD)	V_{ESD}	C = 100 pF, R = 1.5 kΩ HBM	-250		+250	V
Fiber Bend Radius			16			mm

Environmental Specifications

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Case Temperature	T_{case}		0		75	°C
Relative Humidity	RH	Non-condensing	5		85	%
Storage Temperature	T_{sto}		-40		85	°C

Operating Conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Wavelength Range	λ		1300		1330	nm
			1525		1575	
Average Optical Input Power Range	P_{OPT}	For each diode	-20		10	dBm
Photodiode Bias Voltage	V_{PD1}		2.0	2.8	3.3	V
	V_{PD2}		-3.3	-2.8	-2.0	

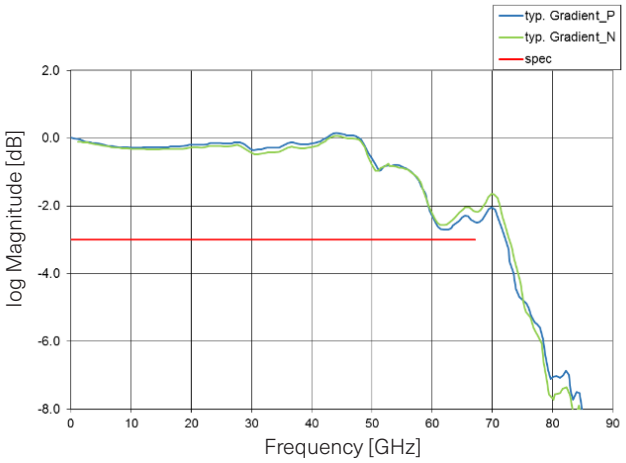
Electro-Optical Specifications [1]

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode DC Responsivity	R	1310 nm 1550 nm optimum polarization	0.35 0.45	0.45 0.6		A/W
Imbalance of Responsivity	Imb	Imb = $\|10*\log10(R_{PD1}/R_{PD2})\|$		0.15	0.5	dB
Polarization-Dependent Loss	PDL	1310 nm 1550 nm		0.6 0.4	0.9 0.8	dB
Photodiode Dark Current	I_{dark}			5	200	nA
Optical Return Loss	ORL	1550 nm	27			dB
3 dB Cut-off Frequency [2]	f_{3dB}		59	69		GHz
RF Common Mode Rejection Ratio	CMRR	CMRR = $20*\log10\|(S_{21} - S_{31})/(S_{21} + S_{31})\|$		15		dB
Output Reflection Coefficient	S_{22}	0...15 GHz		-15	-10	dB
		15...30 GHz		-10	-7	
		30...67 GHz		-2.6	-1.5	
Skew					2	ps
Skew (Inter Detector Module)		RM & RQ version			10	ps

Notes:
1. λ = 1550 nm, V_{PD} = ±2.8 V, T = 25 °C, P_{OPT} = -3 dBm.
2. Measured using Agilent 86030A 67 GHz Lightwave component analyzer.

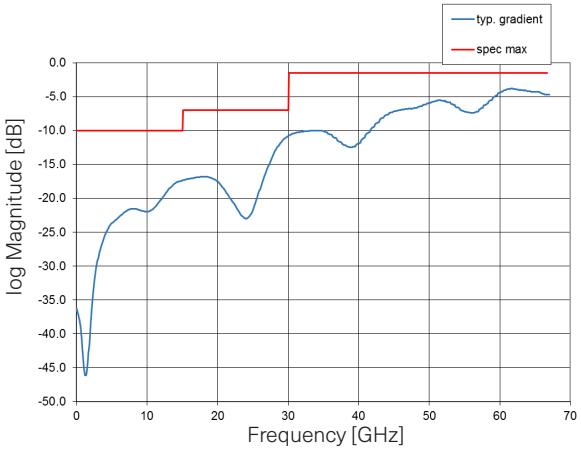
Typical Performance

O/E Bandwidth Log Magnitude Plot



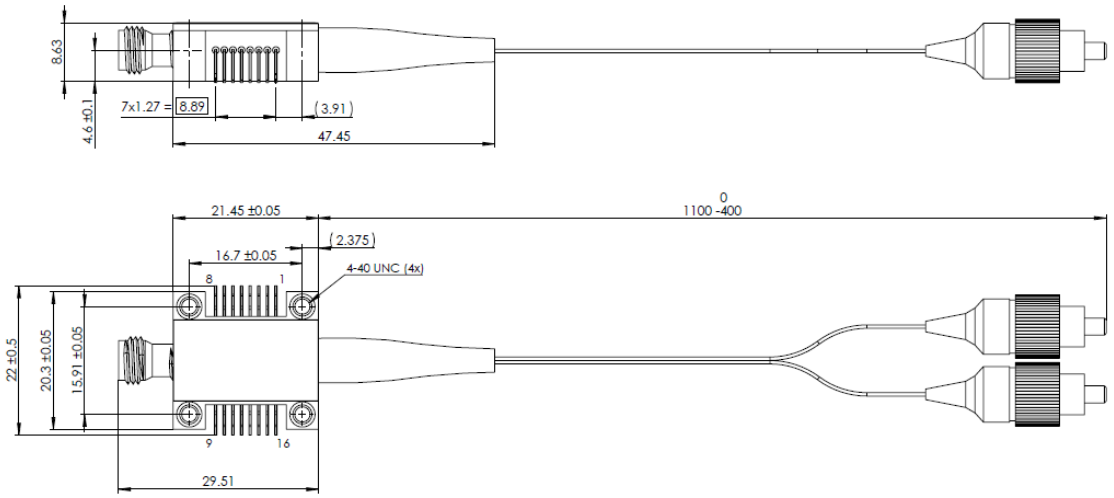
Typical s21Plot with heterodyne system up to 90GHz

S22 Log Magnitude Plot



Typical s22 Plot measured with LCA limited to 67GHz

Mechanical Specifications



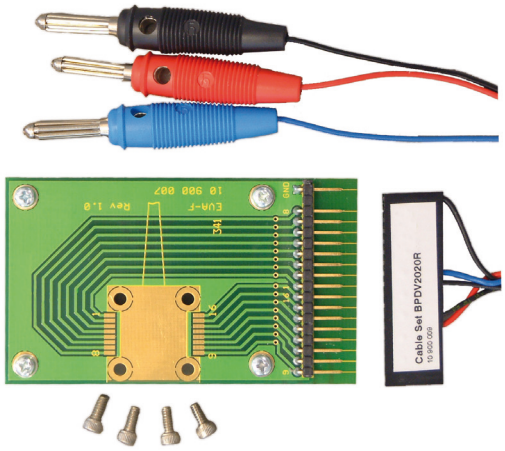
All dimensions in mm

Parameter	Description
Signal fiber PD1	SMF-28, 900 µm loose buffer, white
Signal fiber PD2	SMF-28, 900 µm loose buffer, yellow

Accessories

A. Evaluation Kit
The kit serves as an easy-to-use utility to characterize the balanced photodetector under laboratory conditions and consists of a printed circuit board (PCB), four screws to establish removable connectivity between photodetector and board, and one DC cable to ensure the photodiode bias voltage.

Ordering Information
EVA-BPDV
Evaluation board for all balanced detectors; includes 1x PCB, 1x DC cable set, and 4x socket-head screws 4-40 UNC.



B. Photodetector Power Supply
We recommend usage of our individually accessible photodetector power supply (PPS), in particular for optimized performance at high optical input levels. As a portable device, it provides a stable bias voltage supply and a front display for review of photocurrent.

Ordering Information
PPS-03-B
Photodetector power supply for all balanced detectors; includes 2x PPS, 1x cable set B-type. The PPS is compatible with EVA board (specified scheme applicable to RM & RQ version). PPS units include 2x 1.5 V batteries.

Notes

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