

## Product Specification

### 70GHz Balanced Photodetector

#### BPDV3120R

#### PRODUCT FEATURES

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

#### APPLICATIONS

- Transmission systems up to 1Tb/s
- Coherent Test- & Measurement systems
- Research- and Development systems
- Microwave photonics



The BPDV3120R consists of two optimized 70GHz, waveguide-integrated photodiodes on a single chip, which show an extremely flat frequency response, both in power and in phase. II-VI's on-chip integrated bias network with an optimized RF-design ensures an undisturbed frequency response from DC to the 3dB cut-off frequency and saves costs for an external bias-tee. The hermetic module is especially designed for use in the optical window at 1550nm and optimal RF-performance. The pulse response reveals virtually no ringing. It is best suited for Test & Measurement or Microwave photonics applications up to 60GHz. A further advantage of the waveguide structure is the unbeatable high power behavior. The photodetector shows a linear response up to an optical input power of 10dBm. An output voltage swing of more than 0.5V<sub>pp</sub> can be achieved for short pulses, without any degradation of the pulse response.

Tailored configurations are available, such as BPDV dual pair -and quad sets, including connector customization and fiber matching to enable coherent detection.

#### PRODUCT SELECTION

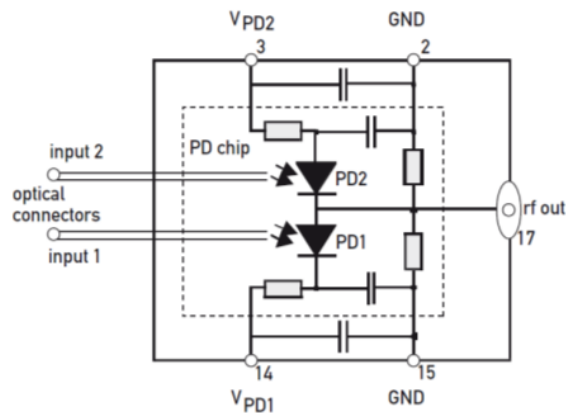
##### BPDV3120Rx-Vy-zz

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

## I. Pin Descriptions

# Pin	Symbol	Description
3	$V_{PD2}$	PD2 bias supply
2/15	GND	ground= case ground
14	$V_{PD1}$	PD1 bias supply

## II. Block Diagram



## III. 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 data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

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

#### IV. 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

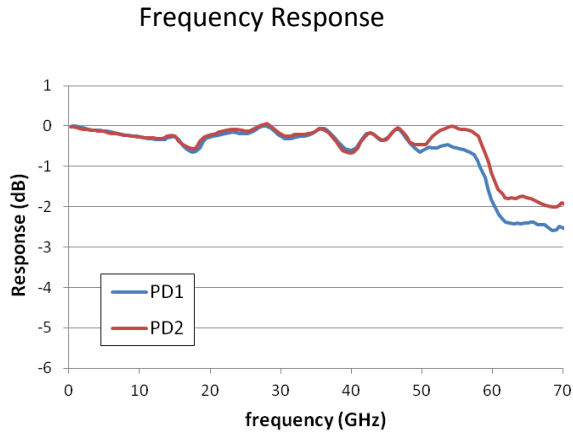
#### V. Operating Conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Average Optical Input Power Range	$P_{OPT}$	for each diode			10	dBm
Wavelength Range	$\lambda$		1525	1550	1575	nm
Photodiode Bias Voltage	$V_{PD1}$		2.0	2.8	3.3	V
	$V_{PD2}$		-3.3	-2.8	-2.0	V

#### VI. Electro-Optical Specifications<sup>1</sup>

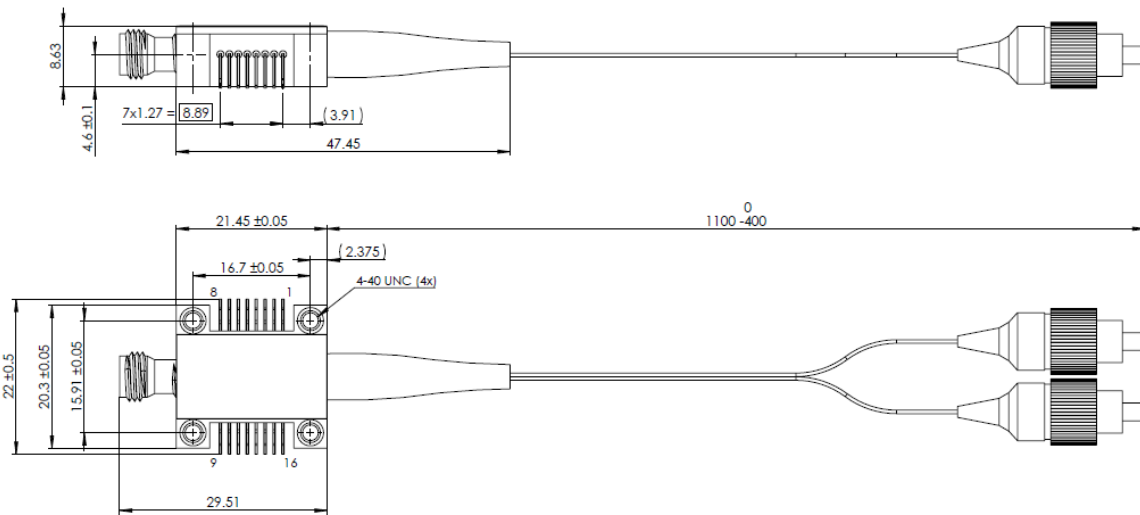
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode DC Responsivity	R	optimum polarization	0.4	0.6		A/W
Imbalance of Responsivity	Imb	$Imb =  10 * \log_{10}(R_{PD1}/R_{PD2}) $		0.15	0.5	dB
Polarization Dependent Loss	PDL			0.4	0.8	dB
Photodiode Dark Current	$I_{dark}$			5	200	nA
Optical Return Loss	ORL		27			dB
3dB Cut-off Frequency <sup>2</sup>	$f_{3dB}$		65			GHz
RF Common Mode Rejection Ratio	CMRR	$CMRR = 20 * \log_{10}  (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. $\lambda = 1550\text{nm}$ , $V_{PD} = \pm 2.8\text{V}$ , $T = 25^\circ\text{C}$ , $P_{OPT} = -3\text{dBm}$						
2. Measured using Agilent 86030A 67GHz Lightwave component analyzer						

### VII. Typical Performance



### VIII. Mechanical Specifications

All Dimensions in mm

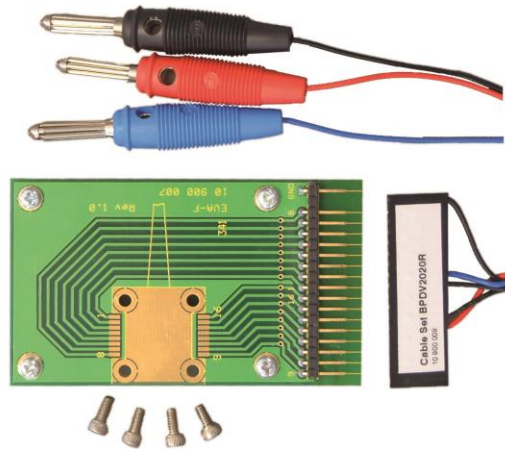


Parameter	Description
Signal fiber PD1	SMF-28, 900µm loose buffer, yellow, label "1"
Signal fiber PD2	SMF-28, 900µm loose buffer, yellow, label "2"

**IX. Accessories**

**A. Evaluation Kit**

The kit serves as easy-to-use utility to characterize the balanced photodetector under laboratory conditions and contents of a printed circuit board (PCB), four screws to establish removable connectivity between photodetector and board, as 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 portable device it provides stable biasing voltage supply and a front display for review on 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 1.5V batteries

**Notes**

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- II-VI Incorporated reserves the right to make changes without notice.

**X. Revision History**

Revision	Date	Description
A04	2020-02-06	Transition to II-VI template adjusted specification for R and PDL