

## Product Specification

### 43 GHz Balanced Photodetector

#### BPDV21x0R

#### PRODUCT FEATURES

- 43 GHz bandwidth with flat response
- Excellent pulse behavior
- Unsurpassed high-power handling capability
- Integrated 50  $\Omega$  termination
- Unique on-chip integrated bias network



#### APPLICATIONS

- 40/43 Gb/s DQPSK optical communication systems
- Advanced Test & Measurement systems
- High speed optical sensing

The balanced photodetector consists of two optimized, waveguide-integrated photodiodes on one single chip. As a single balanced photodetector, this configuration ensures an excellent uniformity of the paired photodiodes and is biased via integrated biasing network. Due to optimized combination of waveguide and PD design, even at high optical powers, a linear frequency response can be guaranteed. The integrated 50  $\Omega$  termination allows an excellent match of the electrical output signal. Customized configurations are available, such as BPDV dual pair -and quad sets, including fiber matching and connector customization.

#### ORDERING INFORMATION

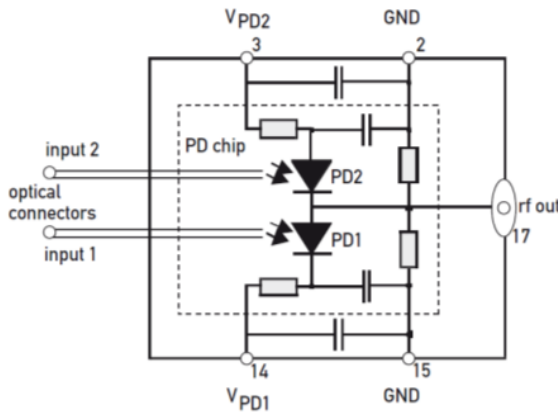
##### BPDV21x0Rv-Vy-zz

x:	2	= standard PDL
	5	= low PDL
Rv:	R	= single balanced detector
	RM	= dual pair of balanced detectors
	RQ	= quad set of balanced detectors
Vy:	VF	= female V <sup>®</sup> connector (standard)
	VM	= male V <sup>®</sup> connector
zz:	FP	= FC/PC connector (standard)
		Customized configurations upon request

## I. Pin Description

# Pin	Symbol	Description
3	$V_{PD2}$	PD2 supply input
2/15	GND	ground= case ground
14	$V_{PD1}$	PD1 supply input
17	rf out	RF output V <sup>o</sup> connector

## II. Block Diagram



## III. Absolute Maximum Ratings

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode Bias Voltage	$V_{PD1}$		0		4	V
	$V_{PD2}$		-4.0		0	V
Maximum Average Optical Input Power	$P_{opt}$	NRZ, per channel			16	dBm
Maximum Output Peak Voltage	$V_{Peak, PD1}$				+1.5	V
	$V_{Peak, PD2}$				-1.5	V
Electro Static Discharge (ESD)	$V_{ESD}$	C= 100 pF, R= 1.5 kΩ HBM	-250		+250	V
Fiber Bend Radius			16			mm



### Notice

Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operations section for extended periods of time may affect reliability. The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation to equipment, take normal ESD precautions when handling this product.

#### IV. Environmental Conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Case Temperature	T <sub>Case</sub>		0		75	°C
Relative Humidity	RH	non condensing	5		85	%
Storage Temperature	T <sub>sto</sub>		-40		85	°C

#### V. Operating Conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Average Optical Input Power Range	P <sub>OPT</sub>	for each diode			10	dBm
Wavelength Range	λ		1480	1550	1620	nm
Photodiode Bias Voltage	V <sub>PD1</sub>		+2.8	+3.3	+3.8	V
	V <sub>PD2</sub>		-3.8	-3.3	-2.8	V

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

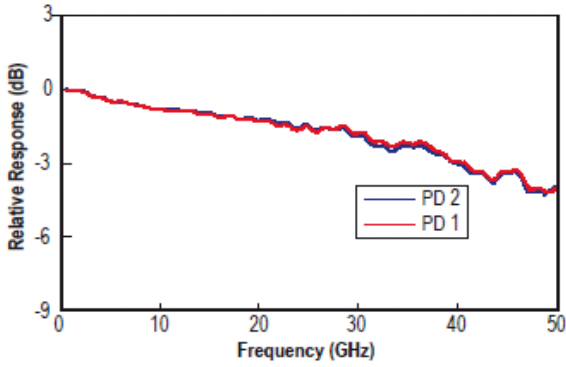
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode DC Responsivity	R	optimum polarization	0.45			A/W
Imbalance of Responsivity	l <sub>mb</sub>	l <sub>mb</sub> =  10*log <sub>10</sub> (R <sub>PD1</sub> /R <sub>PD2</sub> )		0.15	0.5	dB
Polarization Dependent Loss	PDL	BPDV2120		0.4	0.8	dB
		BPDV2150		0.2	0.3	dB
Photodiode Dark Current	I <sub>dark</sub>			5	200	nA
Optical Return Loss	ORL		27			dB
Pulse Width		measured with Tektronix oscilloscope 50 GHz sampling head		11	12	ps
3dB Cut-off Frequency	f <sub>3dB</sub>		37	42		GHz
RF Common Mode Rejection Ratio	CMRR	CMRR= 20*log <sub>10</sub>  (S <sub>21</sub> - S <sub>31</sub> )/(S <sub>21</sub> +S <sub>31</sub> )		15		dB
Output Reflection Coefficient	S <sub>22</sub>	0...50 GHz		-5	-3	dB
Skew					2	ps
Skew (Inter Detector Module)		RM & RQ version			10	ps

Notes:

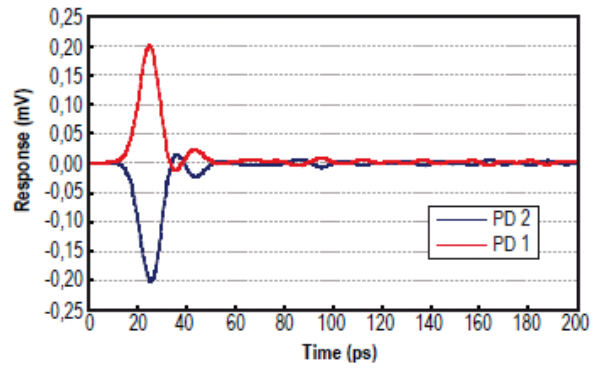
- λ = 1550 nm, V<sub>PD</sub> = ± 3.3 V, T = 25°C, P<sub>OPT</sub> = +3dBm

## VII. Typical Performance Curves

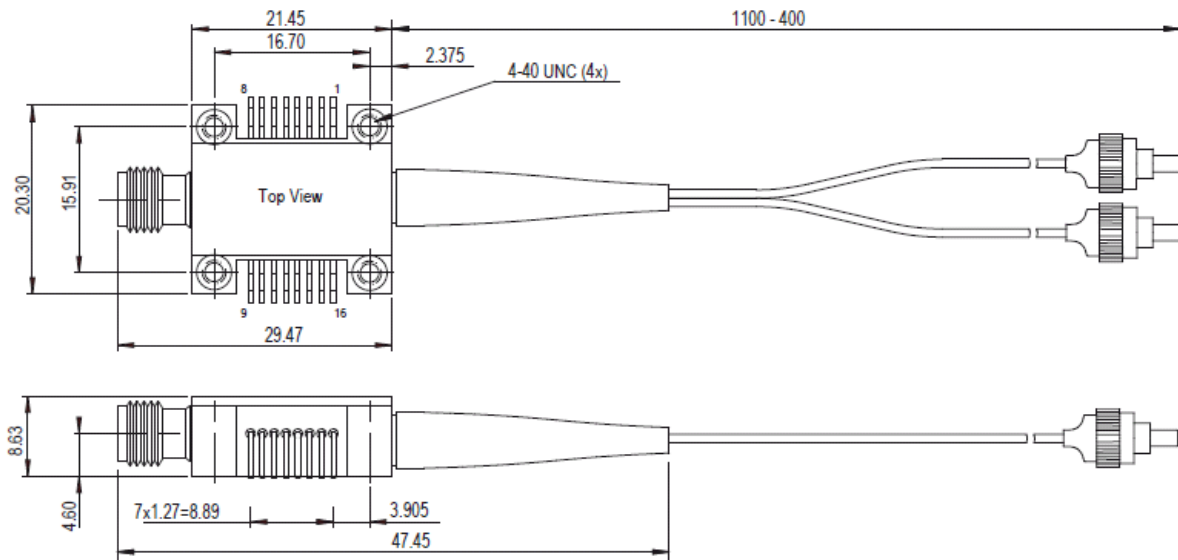
Frequency Response



Pulse Response



## VIII. Mechanical Specifications

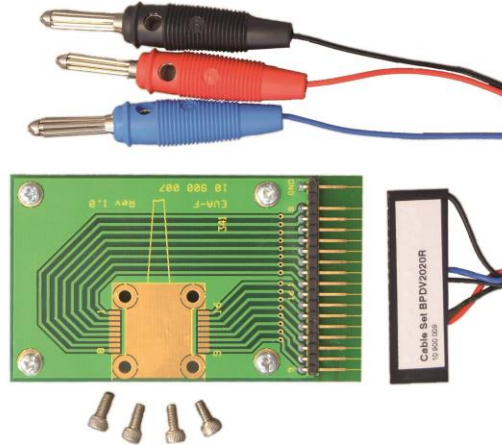


All Dimensions in mm

**IX. Accessories**

**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

**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

**X. Revision History**

<b>Revision</b>	<b>Date</b>	<b>Description</b>
A1	04/09/2014	<ul style="list-style-type: none"><li>• Document created</li></ul>
A2	10/12/2014	<ul style="list-style-type: none"><li>• Adjusted information on photodiode bias voltage</li></ul>

**Notes**

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