

## Product Specification

### Ultra-Fast 100 GHz Photodetector

#### XPDV412xR

#### PRODUCT FEATURES

- 100 GHz electrical 3 dB bandwidth
- Flat response of up to 100 GHz
- Excellent pulse behavior
- Well matched 50  $\Omega$  output

#### APPLICATIONS

- High-speed lightwave characterization
- 100 Gb/s communication systems
- Microwave photonics



The XPDV412xR comprises an optimized 100 GHz waveguide-integrated photodiode, which shows an extremely flat frequency response in both, power and phase. The on-chip integrated bias network with an optimized RF design in particular, ensures an undisturbed frequency response from DC to the 3 dB cut-off frequency and saves costs for internal bias-tees. The module is especially designed for optimal RF performance; therefore the pulse response reveals virtually no ringing. 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 0.5 Vpp can be achieved for short pulses without any degradation of the pulse response. Each photodetector module is characterized in the frequency domain by using a heterodyne technique. In the time domain, a femto-second pulse source and a 70 GHz sampling oscilloscope are used to measure the pulse response.

#### ORDERING INFORMATION

##### XPDV412xR-WF-zz

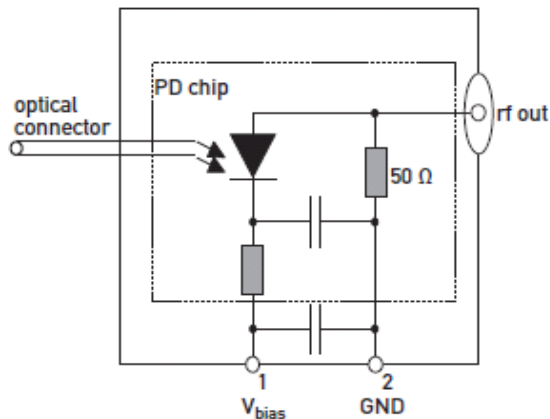
x:	1	= minimum 100 GHz
	0	= minimum 90 GHz
zz:	FP	= FC/PC (standard)

Customized connectorization available upon request

## I. Pin Description

# Pin	Symbol	Description
1	$V_{bias}$	PD bias supply, typical 2.0 V
2	GND	case ground

## II. Block Diagram



## III. Absolute Maximum Ratings

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode Bias Voltage	$V_{PD}$				3.5	V
Maximum Average Optical Input Power	$P_{OPT}$	NRZ			16	dBm
Maximum Output Peak Voltage	$V_{Peak}$				1.5	V
Electro Static Discharge	$V_{ESD}$	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	$T_{Case}$		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
Operating Wavelength Range	$\lambda$		1480		1620	nm
Average Optical Input Power Range	$P_{OPT}$		-20		10	dBm
Photodiode Bias Voltage	$V_{PD}$		1.5	2.0	2.8	V

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

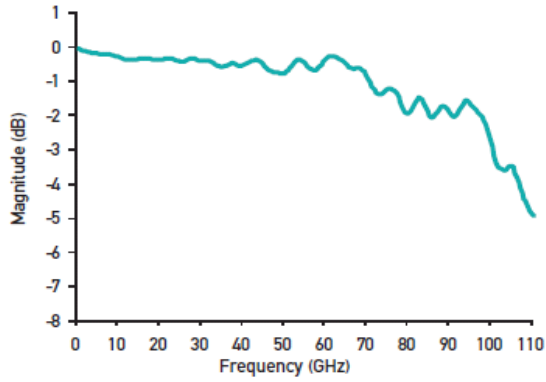
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode DC Responsivity	R	optimum polarization		0.5		A/W
Polarization Dependent Loss	PDL			0.5		dB
Optical Return Loss	ORL		27			dB
3dB Cut-off Frequency <sup>2</sup>	$f_{3dB}$	XPDV4121R	100	110		GHz
		XPDV4120R	90	95		GHz
Output Reflection Coefficient	$S_{22}$	0.05 - 50 GHZ		-10	-8	dB
		50 - 100 GHZ		-5		
Overload	$P_{OVERL}$			10		dBm
Photodiode Dark Current	$I_{dark}$			5	200	nA
Pulse Width <sup>3</sup>				7.5	8	Ps

## Notes:

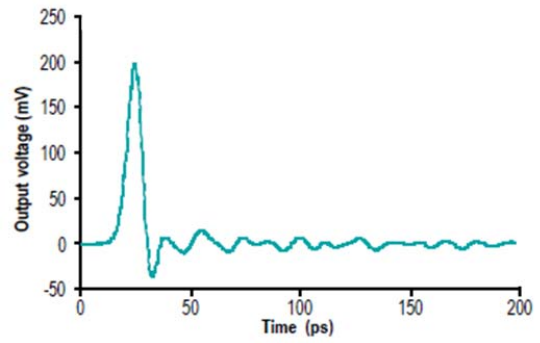
- $V_{PD} = 2.8$  V,  $T_{case} = 25$  °C, 1550 nm
- measured using a heterodyne measurement system
- measured utilizing Tektronix Scope with 70 GHz sampling head

## VII. Typical Performance Curves

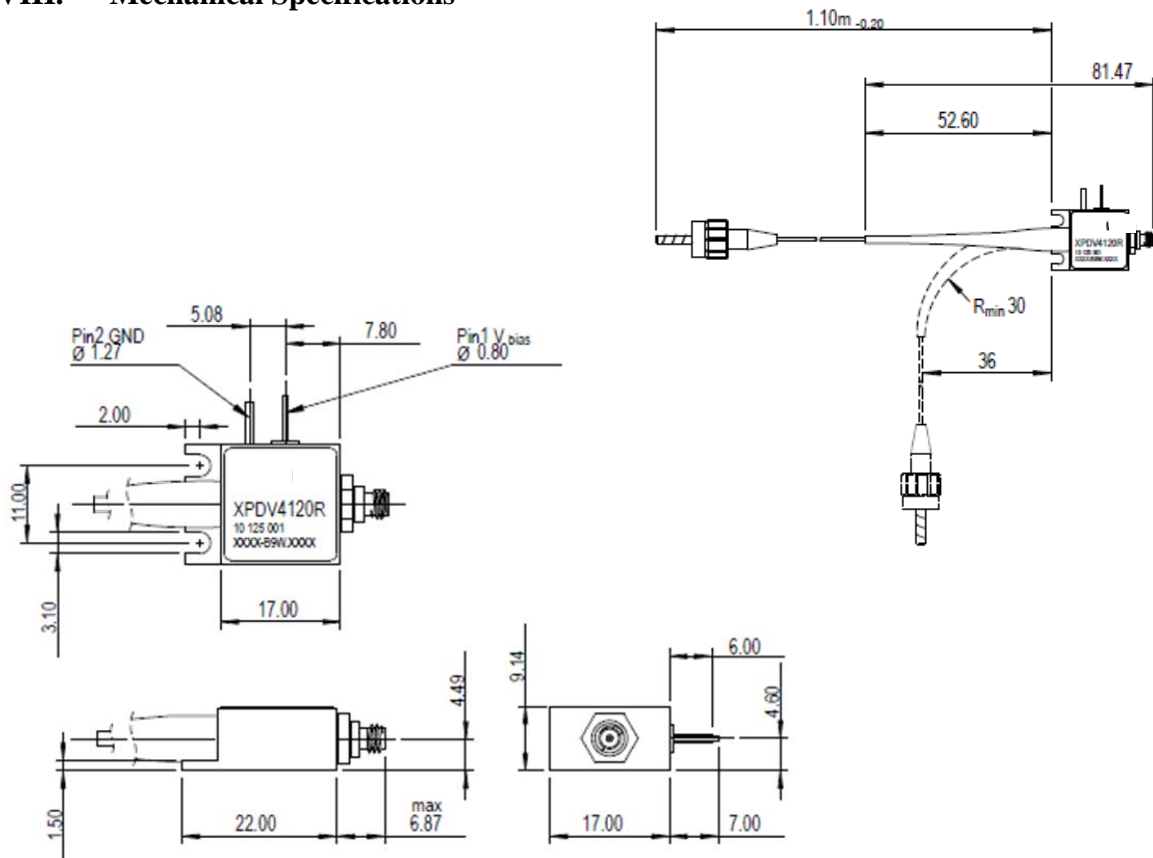
Frequency Response



Pulse Response



## VIII. Mechanical Specifications



All dimensions in mm.

**IX. Accessories**

For optimum performance, in particular at high optical input levels, we recommend the use of our separately available photodetector power supply.

**ORDERING INFORMATION****PPS-03-X4**

X4: Power supply for XPDV412xR series  
Consists of 1x PPS and 1x cable X-type,  
all PPS versions include two 1.5 V batteries  
and a BNC-to-female connector plug cable

**X. Revision History**

Revision	Date	Description
A1	04/09/2014	• Document created.

**Notes**

- Any trademarks used in this document are properties of their respective owners.
- Finisar Corporation reserves the right to make changes without notice.

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