

# Product Specification

## 100GHz Photodetector

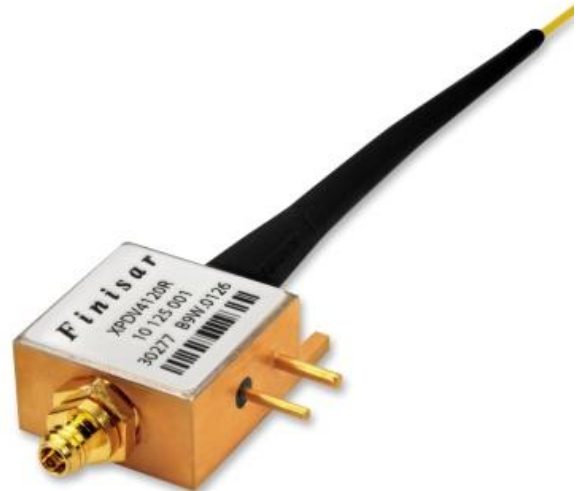
### XPDV412xR

#### PRODUCT FEATURES

- 100GHz typical electrical 3dB bandwidth
- Flat frequency response up to 100GHz
- Excellent pulse behavior
- Well matched 50Ω output
- Alternatively offered as 90GHz version

#### APPLICATIONS

- Communication systems up to 600Gb/s
- Microwave photonics up to 60GHz
- High speed Lightwave characterization
- Test & Measurement equipment



The XPDV412xR comprises an optimized 100GHz 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 3dB cut-off frequency and saves costs for internal bias-tees. The non-hermetic 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 0.5Vpp 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 70GHz sampling oscilloscope are used to measure the pulse response. The product is also offered as a more cost efficient 90GHz version.

#### PRODUCT SELECTION

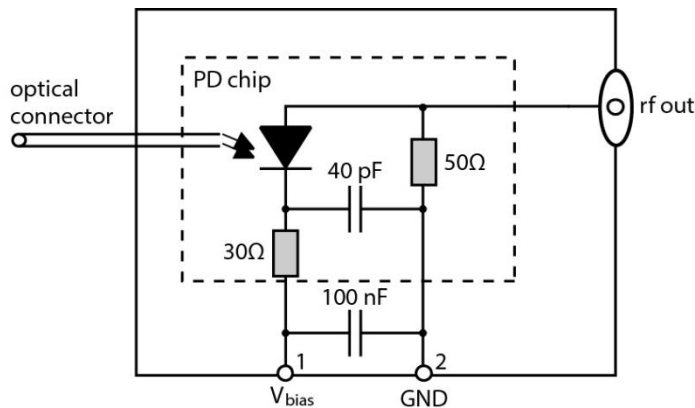
XPDV412xR-WF-zz

R:		= internal 50Ω termination, DC-coupled version
x:	1	= minimum 100GHz
	0	= minimum 90GHz
zz:	FP	= FC/PC (standard)
		other connectors available upon request

## I. Pin Descriptions

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

## 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	$V_{bias}$	—	0		3.50	V
Maximum Average Optical Input Power	$P_{opt}$	Continuous wave (CW)			16	dBm
		40Gb/s NRZ				
Maximum Peak Optical Input Power	$P_{peak}$	Pulse <25ps or 40Gb/s RZ			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
Operating Wavelength Range	$\lambda$		1525		1575	nm
Average Optical Input Power	$P_{OPT}$				10	dBm
Photodiode Bias Voltage	$V_{PD}$		1.5	2.0	2.8	V

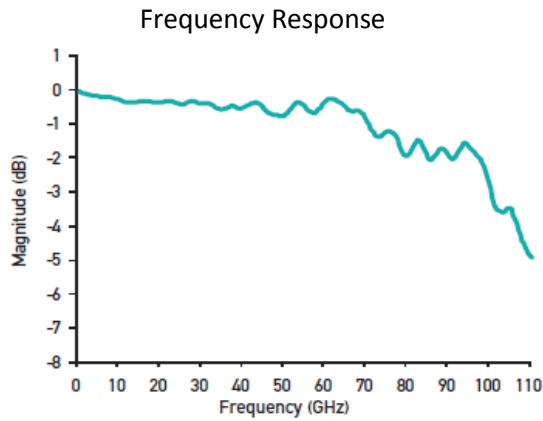
#### VI. Electro-Optical Specifications<sup>1</sup>

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode DC Responsivity	R	optimum polarization	0.4	0.6		A/W
Polarization Dependent Loss	PDL			0.3	0.6	dB
Optical Return Loss	ORL		27			dB
Photodiode Dark Current	$I_{dark}$			5	200	nA
3dB Cut-off Frequency <sup>2</sup>	$f_{3dB}$	XPDV4121R	96	100		GHz
		XPDV4120R	90	93		GHz
Output Reflection Coefficient	$S_{22}$	0.05 – 35 GHz		-15	-12	dB
		0.05 - 50 GHz		-10	-5	dB
		50 – 100 GHz		-5	-3	dB

Notes:

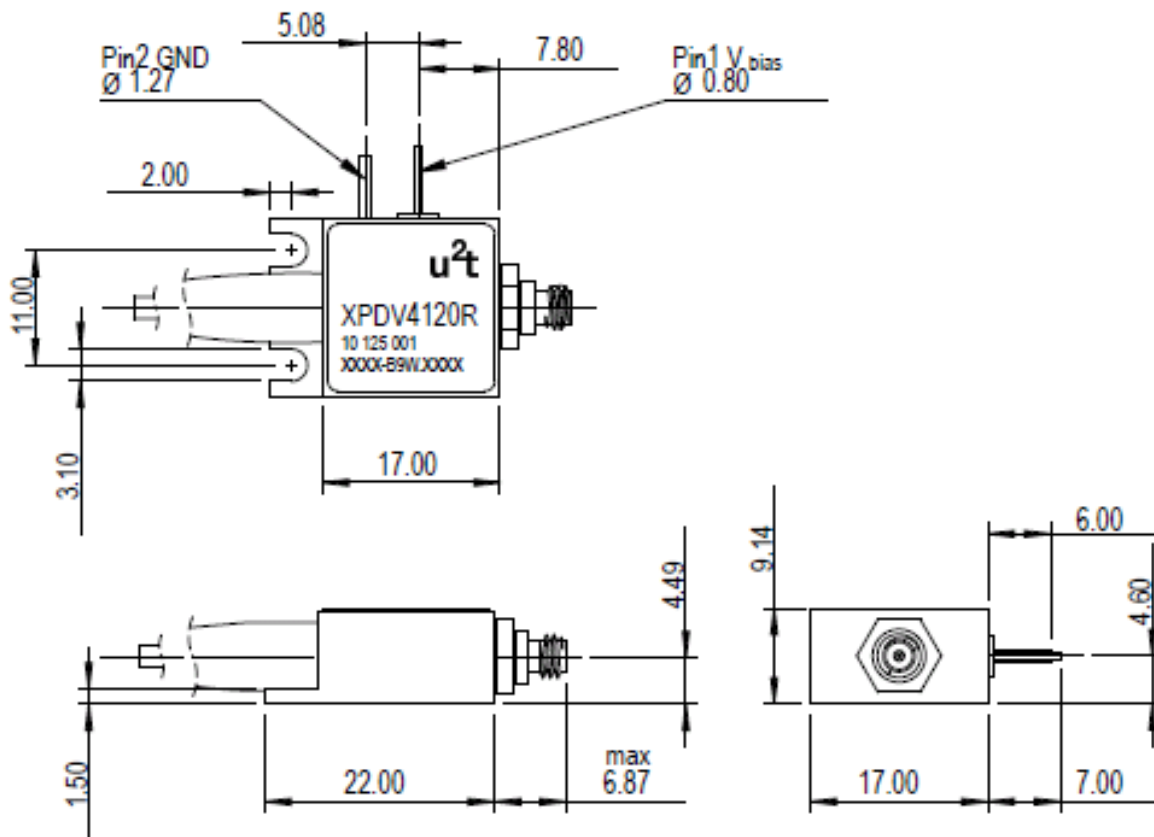
- $\lambda = 1550\text{nm}$ , optimum polarization,  $V_{bias} = 2.0\text{V}$ ,  $T_{case} = 25^\circ\text{C}$ ,  $P_{OPT} = -3\text{dBm}$
- Measured using Heterodyne measurement

### VII. Typical Performance



### VIII. Mechanical Specifications

All Dimensions in mm



Parameter	Description
Signal fiber	Standard SFM-28, 900µm loose buffer, yellow

## IX. Accessories

Usage of II-VI's individually accessible photodetector power supply (PPS) is recommended, in particular for optimized performance at high optical input levels. As a portable device it provides stable biasing voltage supply and a front display for review on photocurrent.

### ORDERING INFORMATION

#### PPS-03-X4

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



### Notes

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

## X. Revision History

Revision	Date	Description
A04	2020-01-30	Transition to II-VI template.
A05	2020-11-15	Adjusted bandwidth specification