

Product Specification

50 GHz High-Power Photodetector

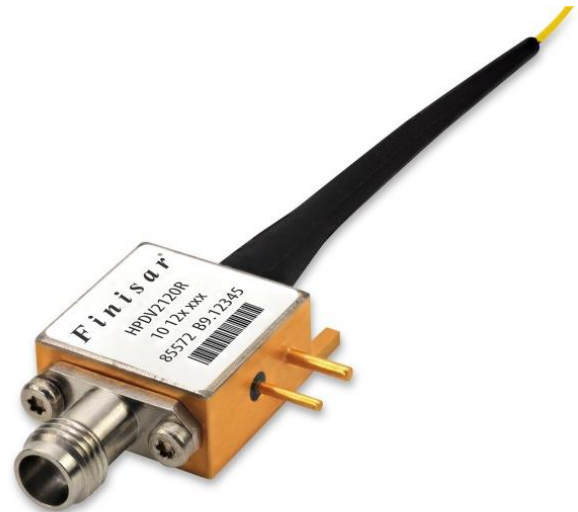
HPDV2120R

PRODUCT FEATURES

- 50GHz typical 3dB bandwidth
- 0dBm RF output power @ 50GHz
- 3dBm RF output power @ 20GHz
- High Linearity (25dBm OIP3 @ 40GHz)
- No additional cooling required

APPLICATIONS

- Microwave Photonics
- Analog Photonic links
- Radio-over-Fiber



The HPDV is a compact hermetic module that is based on an advanced waveguide photodetector chip integrated with a Bias-Tee. The HP-PD utilizes a mode-converting tapered waveguide for efficient fiber-to-chip coupling and a 1x4 Multi-Mode Interference (MMI) Coupler. The optical signal is split by the MMI coupler into 4 equal parts and then it is fed into an array of 4 photodiodes which are connected in-parallel. It has a responsivity of 0.5A/W @ 1550nm and a high saturation photocurrent of 30mA @ 20 GHz. The HP-PD is capable of delivering 6dBm RF output power @ 20GHz and 3dBm @ 50GHz. The device exhibits a high linearity with typical OIP3 values above 20dBm at a frequency of 40GHz.

PRODUCT SELECTION

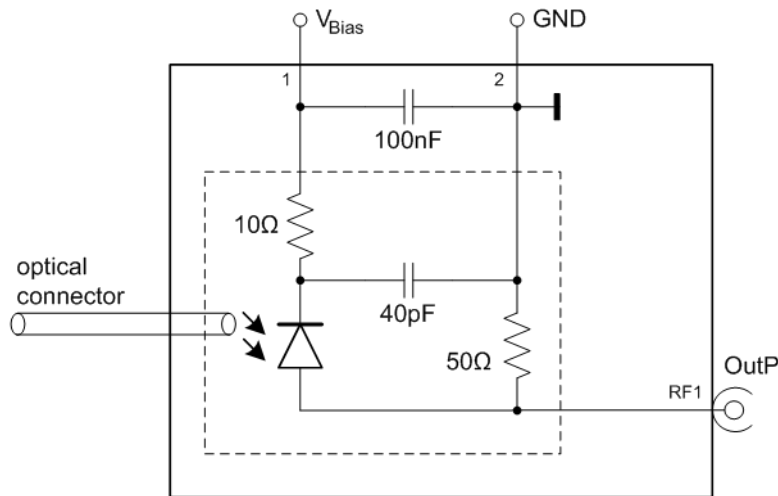
HPDV2120R-VF-zz

VF: VF = V-connector, female
 zz: FC = FC/PC connector (standard)
 Alternative options: FA = FC/APC connector on 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		5.2	V
Maximum Average Optical Input Power	P_{opt}	Continuous wave (CW)			18.5	dBm
		40Gb/s NRZ				
Maximum Peak Optical Input Power	P_{peak}	Pulse <25ps or 40Gb/s RZ			24	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		50	°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	P_{OPT}				18	dBm
Operating Wavelength Range	λ		1525		1575	nm
Photodiode Bias Voltage	V_{bias}		2.8	4.0	5.0	V

VI. Electro-Optical Specifications¹

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode DC responsivity	R	optimum polarization	0.35	0.45		A/W
Polarization dependent loss	PDL			0.3	0.7	dB
Optical return loss	ORL		27			dB
Photodiode dark current	I_{dark}			25	200	nA
3dB cut-off frequency	f_{3dB}^2		48	54		GHz
Output reflection coefficient	S_{22}	0...15 GHz 15...50 GHz		-15 -3	-10 -1	dB
Output 1dB compression	P_{1dB}	50 GHz, $V_{PD} = 4.0V$		0		dBm
Output 3 rd order intercept point	OIP3	50 GHz, $V_{PD} = 4.0V$		20		dBm
Notes:						
1. $\lambda = 1550nm$, $V_{PD} = 4.0V$, $T = 25^{\circ}C$, $P_{OPT} = -3dBm$						
2. Measured using Agilent N4373D 67GHz Lightwave component analyzer						

VII. Typical Performance Behavior

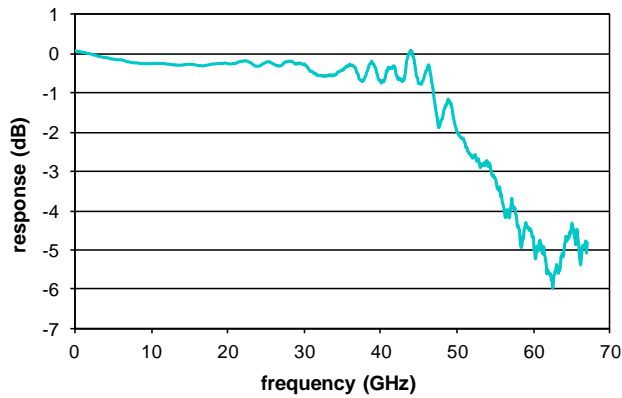


Fig. 1: Frequency response measured with a Lightwave Component Analyzer.

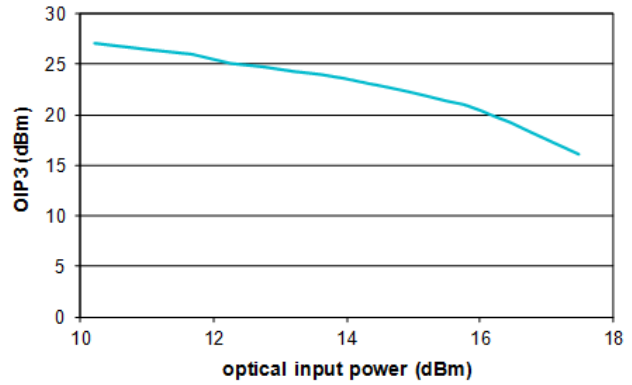


Fig. 2: Output IP3 at a frequency of 50GHz and at a bias voltage of 4V.

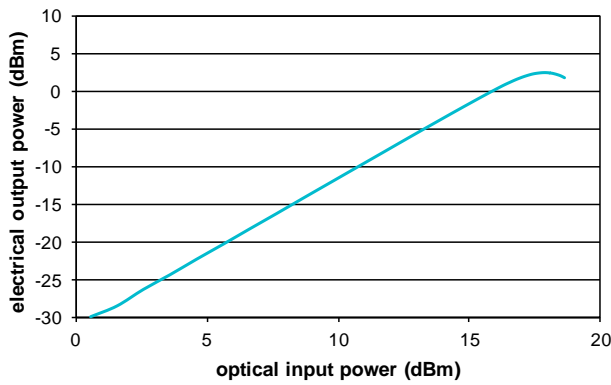


Fig. 3(a): RF output power as a function of the optical input power for a bias voltage of 4V at a frequency of 50GHz.

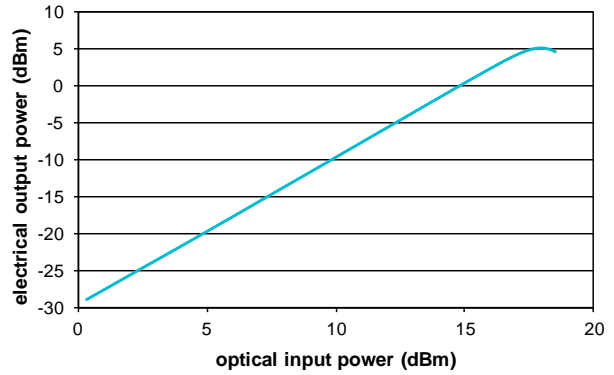
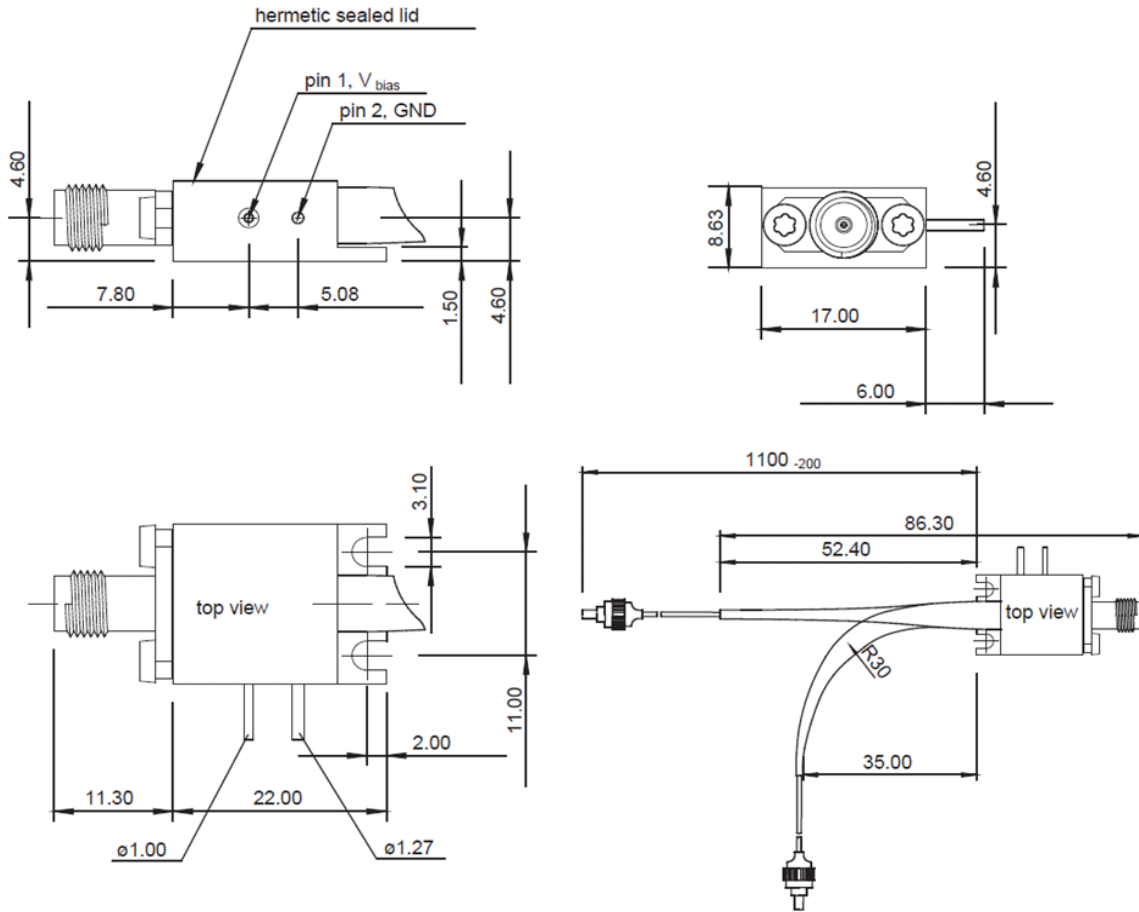


Fig. 3(b): RF output power as a function of the optical input power for a bias voltage of 4V at a frequency of 20GHz.

IX. Mechanical Specifications

All Dimensions in mm



Parameter	Description
Signal fiber	SMF-28, 900 loose buffer, yellow

Notes

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- 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