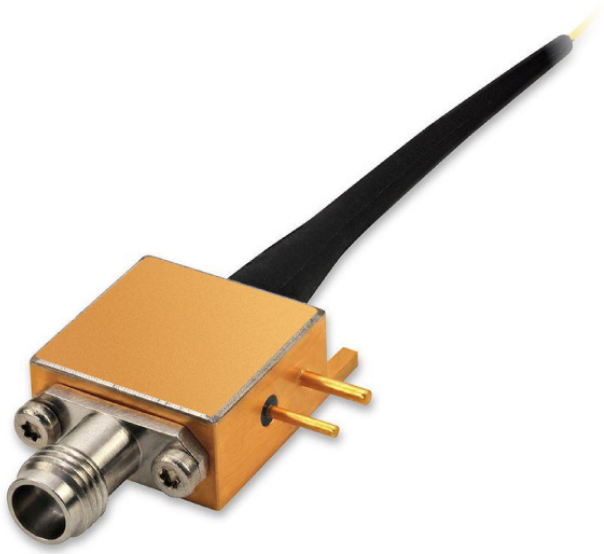
Optical Communications

ULTRAHIGH-POWER PHOTODETECTOR

VPDV2120

The VPDV2120 is a very compact, hermetically packaged optical detector module with an ultrahigh RF output power of >22 dBm at a frequency of 10 GHz. It offers a high responsivity of 0.55 A/W (1550 nm) and a very high saturation photocurrent of 150 mA at 10 GHz. The device exhibits high linearity, with typical OIP3 values above 30 dBm at a frequency of 10 GHz, and does not require any cooling. The device is using a modified uni-traveling carrier (MUTC) photodetector chip.
The VPDV2120 is not matched to 50 Ω. For applying a bias voltage of -6 V, an external bias tee is required.



FEATURES

- Ultrahigh RF output power of ≥22 dBm at 10 GHz
- High linearity (OIP3 > 30 dBm at 10 GHz)
- High responsivity of 0.55 A/W
- High saturation photocurrent of 150 mA at 10 GHz
- No cooling required
- Operational up to 20 GHz and beyond

APPLICATIONS

- Microwave photonics
- Analog photonic links
- Radio-over-fiber

COHERENT

Product Selection

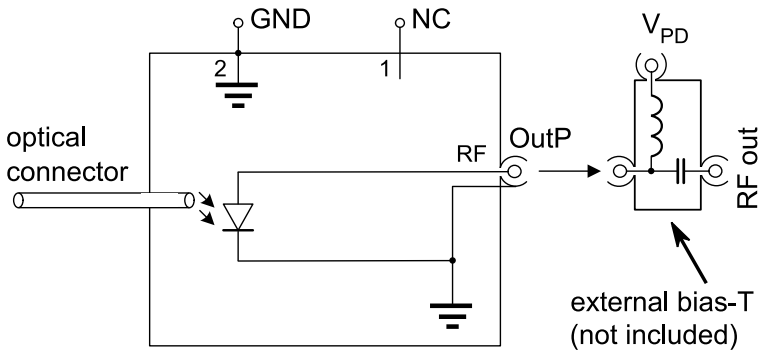
VPDV2120-VF-FA

VF	= V-connector, female
FA	= FC/PC connector (standard)

Pin Descriptions

# Pin	Symbol	Description
1	NC	Do not connect
2	GND	Case ground

Block Diagram



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 datasheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode Bias Voltage	V_{PD}		-6.5		0	V
Maximum Average Optical Input Power [1]	P_{opt}	Continuous wave (CW)			24	dBm
Maximum Peak Optical Input Power [1]	P_{peak}	Pulse < 1 ns			27	dBm
Photocurrent [1]	I_{PD}	DC	-120			mA
Electrostatic Discharge (ESD)	V_{ESD}	C = 100 pF, R = 1.5 kΩ HBM	-250		+250	V
Fiber Bend Radius			16			Mm

Notes:
1. Maximum ratings for photocurrent (IPD) and optical powers, pulsed (Ppeak) and continuous wave (Popt), are linked. None of the limits shall be exceeded, even if the other parameter limit is not reached yet.

Environmental Specifications

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Storage Temperature	T_{sto}	Non-condensing	-40		+85	°C
Operating Case Temperature	T_{case}		0		+50	°C
Relative Humidity Range	RH	Non-condensing	5		85	%

Operating Conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Wavelength Range	λ		1525		1575	nm
Optical Input Power	P_{OPT}				23.5	dBm
Photodiode Bias Voltage	V_{PD}		-6.0	-5.0	-4.0	V

Electro-Optical Specifications

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Photodiode DC Responsivity	R	Optimum polarization	0.4	0.55		A/W
Polarization-Dependent Loss	PDL			0.1	0.3	dB
Optical Return Loss	ORL		30	40		dB
Photodiode Dark Current	I_{dark}	T_{case} = 25 °C	-200	-10		nA
3 dB Cut-off Frequency	f_{3dB}	V_{PD} = -6.0 V, I_{PD} = -115 mA		12		GHz
RF Output Power	P_{out}	V_{PD} = -6.0 V, I_{PD} = -115 mA, 10 GHz		22		dBm
Output Third-Order Intercept Point	OIP3	V_{PD} = -6.0 V, I_{PD} = -115 mA, 10 GHz		33		dBm

Typical Performance Behavior

Fig. 1: Frequency response of the VPDV2120 measured with a heterodyne signal.

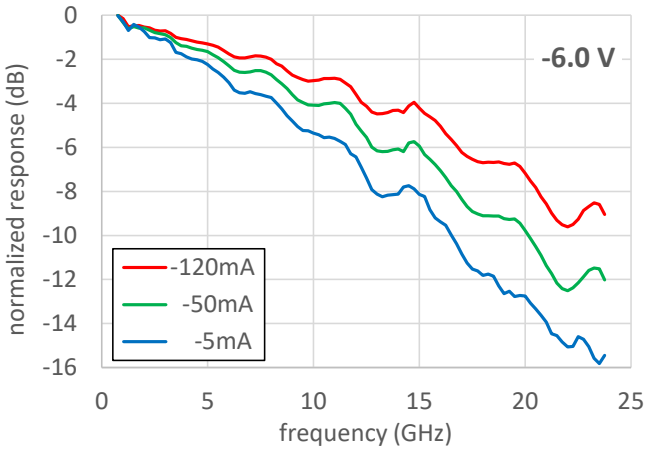


Fig. 2: RF output power as a function of the photocurrent.

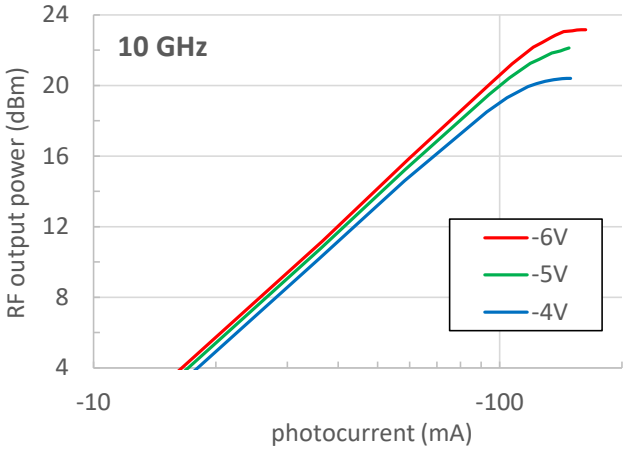
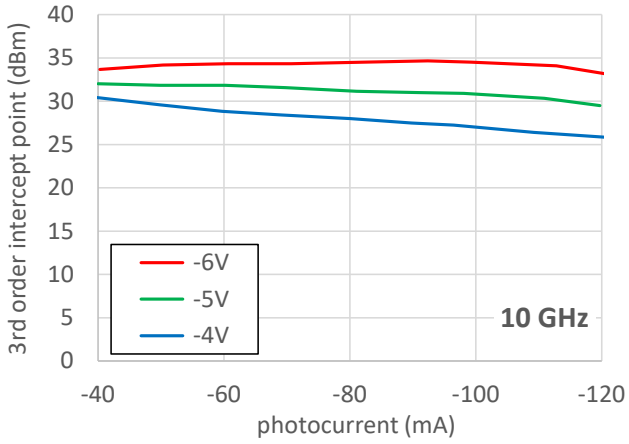
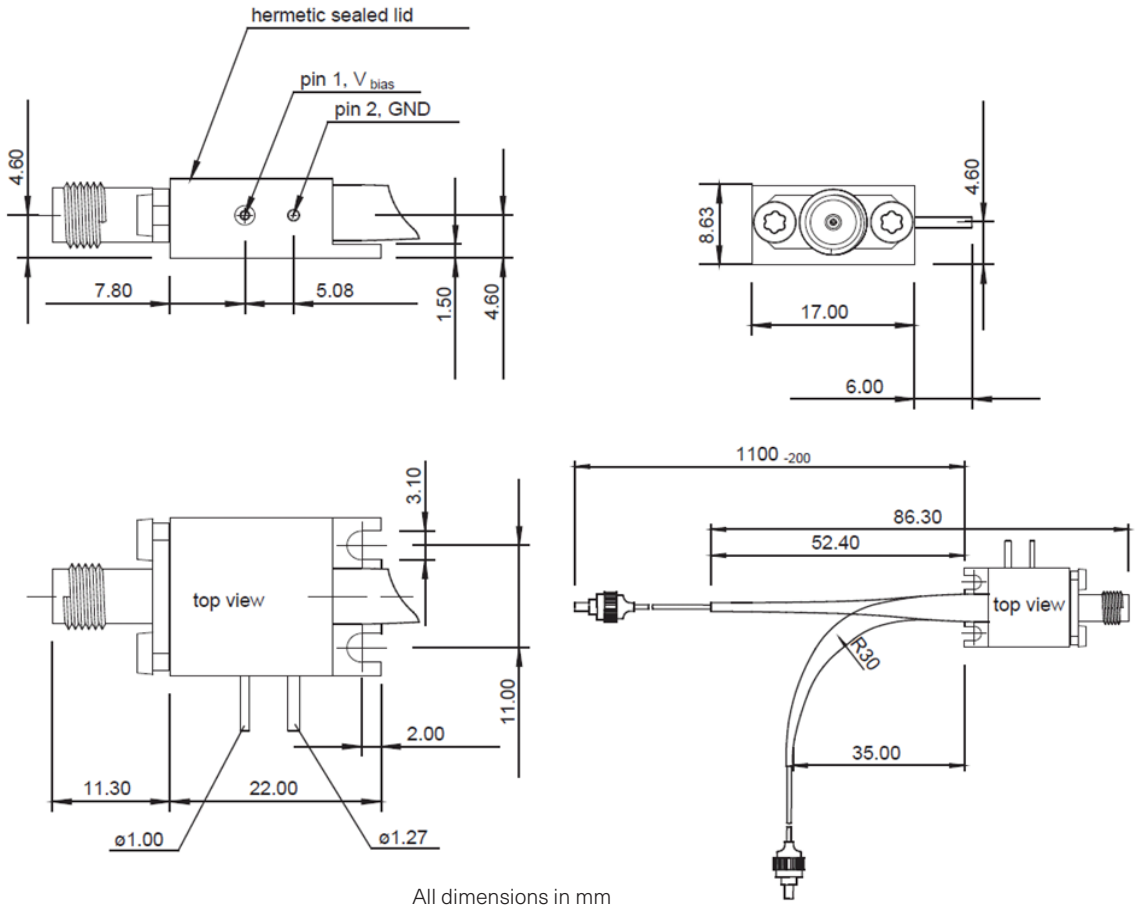


Fig. 3: Output IP3 versus photocurrent.



Mechanical Specifications



All dimensions in mm

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

Notes

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