Product Specification

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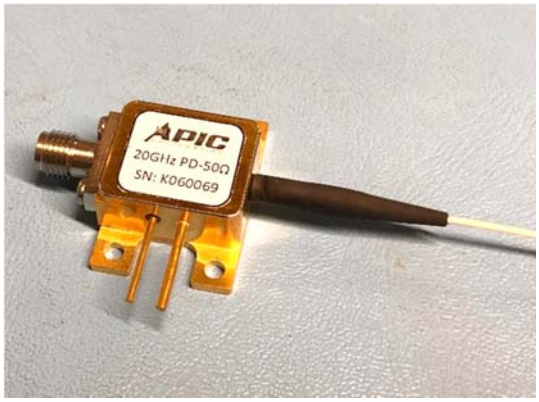
20 GHz High Power, High Linearity Photodiode

Part #ARX20-50-*zz*-*C*-*FL*-*FC*

PRODUCT FEATURES

- High responsivity, high optical power handling capability, and high linearity
- 50Ω on-chip impedance matching option, eliminating need for bias T at the output
- Laser welded assembly
- Hermetically sealed for reliability and harsh environment operation
- K-connector for RF interface (compatible with 2.92 mm and 3.5 mm SMA) (F is standard)



APPLICATIONS

- RF over fiber analog communication links requiring high gain, high dynamic range, and low noise figure
- RFoF optical communications links requiring operation in harsh environments
- Multi-level modulation communication receivers

DESCRIPTION

This product is a packaged, InGaAs photodiode (PD) that is optimized for high optical input power, output current linearity, and sufficient bandwidth for operation at RF frequencies up to 20 GHz. This PD is designed for RF over fiber links that require high dynamic range, low noise figure, and high RF signal throughput. The internal components are soldered and laser welded for long-term reliability and performance stability under harsh temperature, vibration, and other environmental conditions. For impedance matching and reduced standing wave ratio (VSWR), the photodiode can be delivered with a 50 Ohm on-chip termination and a DC coupled output. Otherwise, a non-impedance matched version for use with an external bias T is also available.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Minimum	Maximum	Units	Condition/Comments
Photodiode Voltage	V_{pd}	0	+5.5	V	No illumination
Maximum optical input power	P_{max}		50	mW	At 3 V bias
Fiber bend radius		10		mm	

ELECTRO-OPTICAL SPECIFICATIONS

Parameter	Symbol	Min.	Typ.	Max.	Units	Condition/Comments
Wavelength range	λ	1,530		1,620	nm	
Responsivity	R	0.7	0.8		A/W	For 20 GHz standard PD
Polarization Dependent Loss	PDL		0.2	0.3	dB	Variation in detected signal over all polarization states
Optical Saturation Power	P_{sat}		17		dBm	Limit for linear operation of the photodiode (50 mW)
RF Bandwidth	$F_{3\ dB}$	15	20		GHz	Measured at 3 dB point
Dark Current	I_{dark}		5	200	nA	At 25ºC ambient
PD Bias	V_{PD}	3	4	5	V	Do not exceed 5.5 V
Optical Return Loss	ORL	-27	-30		dB	
Output Reflection Coefficient	S_{22}	-7	-10		dB	0.1 to 20 GHz (impedance-matched version only)
RF Output Termination	R_{term}		50		Ω	Applicable to impedance-matched version only

MECHANICAL SPECIFICATIONS

Parameter	Symbol	Minimum	Maximum	Units	Condition/Comments
Height	H		9.2	mm	
Area (Length x Width)	A		19 x 15	mm^2	Mounting tabs, RF connector, and fiber snout excluded
RF Connector					K-connector (2.92mm) F (standard)
Packaging					Hermetically sealed by laser welding
Package Heat Flow					Heat sink on bottom surface
Fiber Pigtail Length		0.95	1	m	SMF28 Fiber; Custom lengths by special order
Pigtail Termination					FC/APC; others by special order

ENVIRONMENTAL SPECIFICATIONS

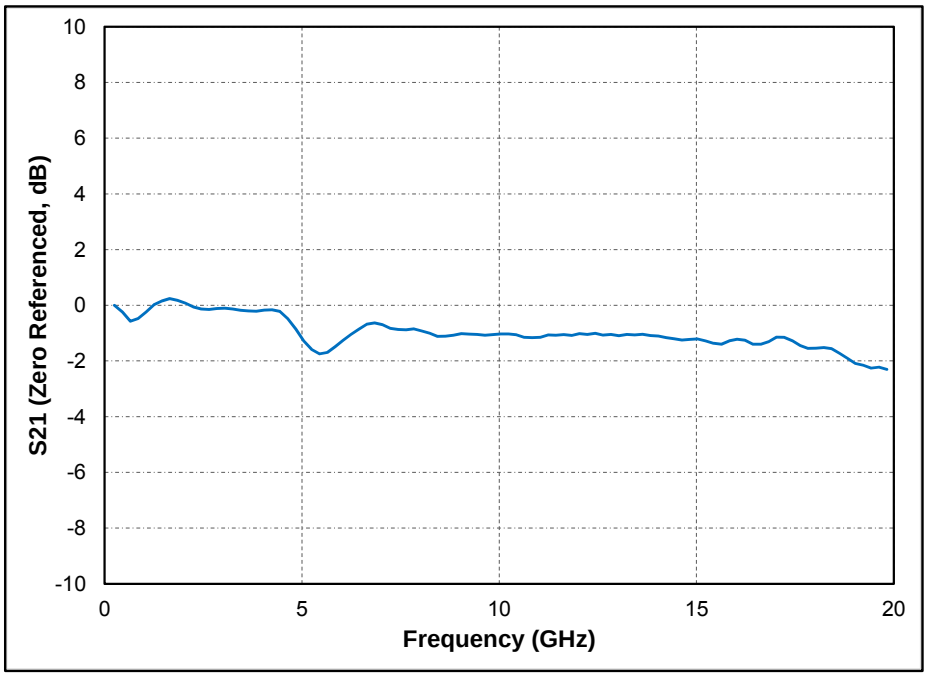
Parameter	Minimum	Maximum	Units	Condition/Comments
Operating Temperature	-40	+85	°C	Case temperature
Storage Temperature	-55	+95	°C	Non-operating
Operating Humidity	0	90	% RH	
Shock	50 g amplitude and 11 ms duration, three shocks each axis, each direction			MIL-STD-810G Method 516.6, Procedure I, Operational.
Operational Vibration	3.56 Grms one hour each axis			MIL-STD-810G Method 514.6, Category 12.
Endurance Vibration	8.25 Grms one hour each axis			MIL-STD-810G Method 514.6, Category 12.
Reliability Performance	40,000		hours	

ELECTROMAGNETIC SPECIFICATIONS (Preliminary, Qualification in Progress)

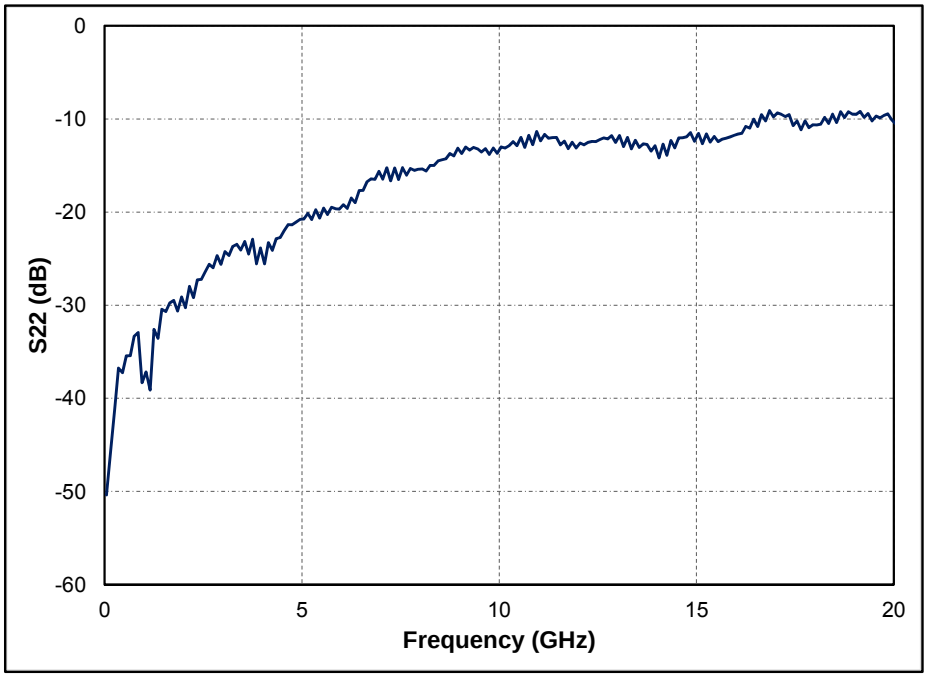
Parameter	Minimum	Maximum	Units	Condition/Comments
Radiated Emission	0.002	18	GHz	Meets MIL-STD-461F, RE102, Helicopters case (<70 dBµV/m)

TYPICAL MEASURED PERFORMANCE

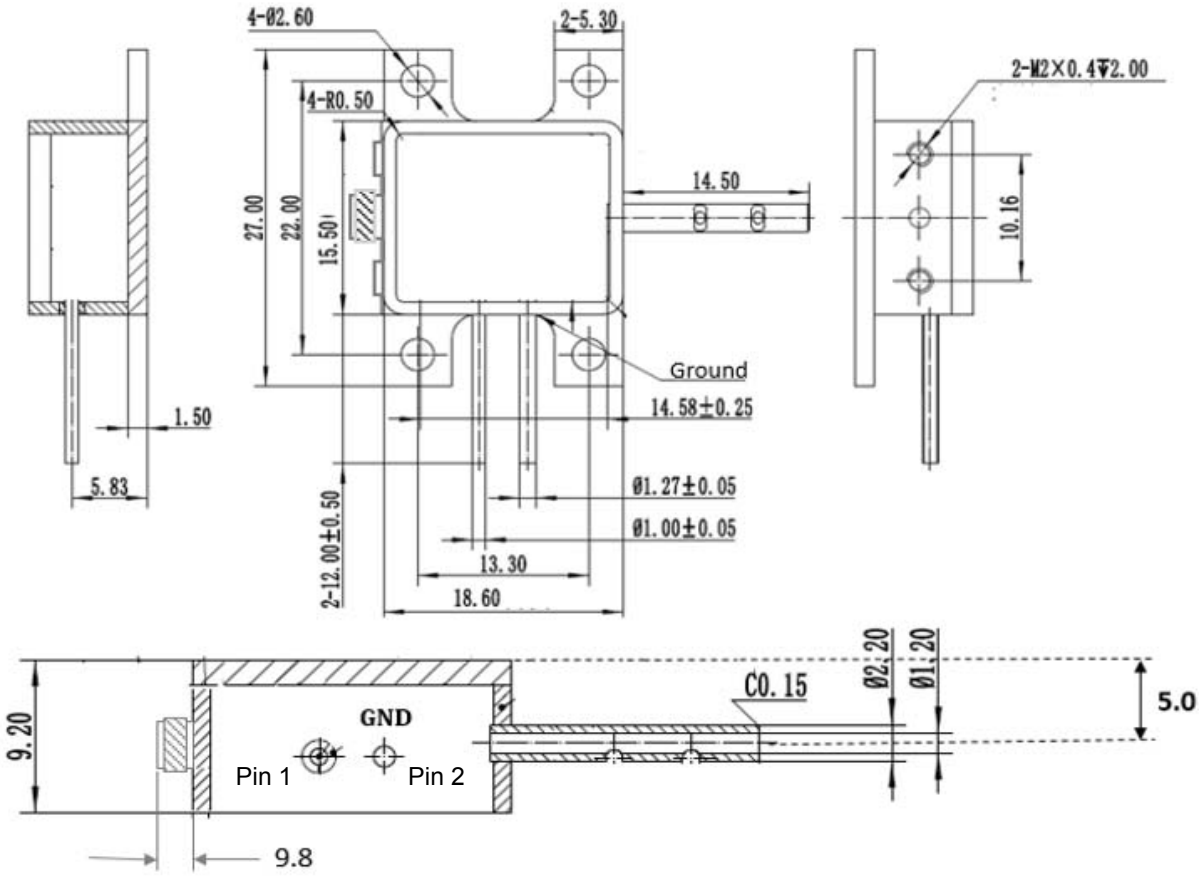
Bandwidth versus Photocurrent (S21)



Back-Reflection from Electrical RF Output (S22), Impedance Matched Version



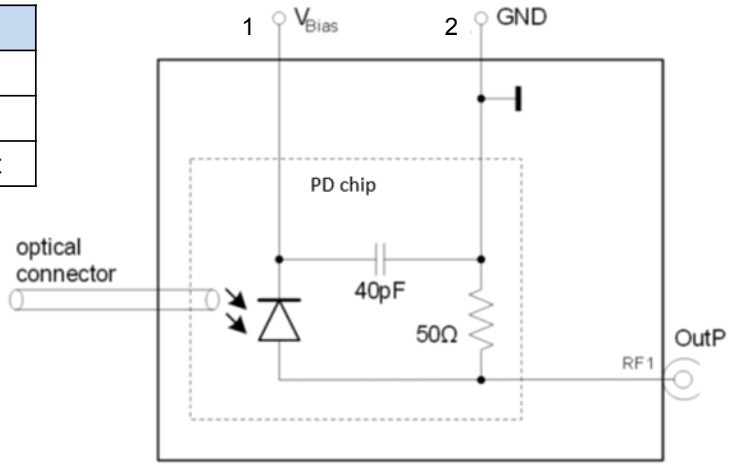
MECHANICAL DRAWING



Dimensions in mm

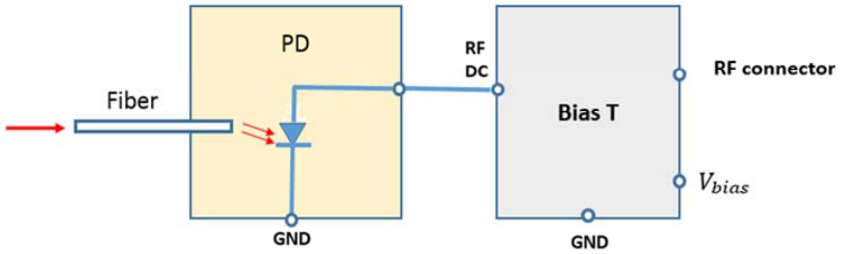
PIN CONNECTIONS (Impedance Matched Version)

Pin #	Symbol	Description
1	DC	DC bias (+)
2	Gnd	Case Ground
RF	RF	RF signal output



PIN CONNECTIONS (Non-Impedance Matched Version)

Pin #	Symbol	Description
1,3,4,5,6,8	DC	Not Connected
2 and 7	Gnd	Case Ground
RF	RF	RF signal output and DC bias (-) through external bias T



ORDERING INFORMATION

ARX*nn-P-zz-C-FL-FC*

- FC = Fiber Connector Type (APC = FC/APC is standard)
- FL = Fiber Length; 1 ± 0.05 m standard
- C = Connector Type: KF = Female “K” (standard); KM = Male “K”
- zz = Impedance: 50 = 50Ω Match; N = None
- P = Maximum Optical Power (e.g. 25 mA)
- nn = Frequency Bandwidth (e.g. 20 or 40 GHz)
- ARX = Analog Receiver Component Module

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