J16A SERIES
GERMANIUM AVALANCHE PHOTODIODES
Operating Instructions

TELEDYNE
JUDSON TECHNOLOGIES
A Teledyne Technologies Company

PB 1630
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DESCRIPTION

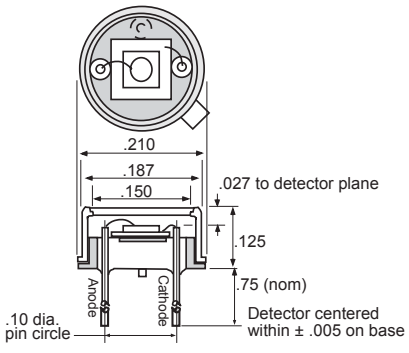
The J16A series Germanium Avalanche Photodiodes (APDs) are designed for high-speed applications at 800 and 1300 nm. Teledyne Judson APDs offer low dark currents and bandwidths up to 1.5GHz with active sizes of 100µm and 300µm diameter.

The J16A series APDs have undergone extensive reliability testing. Reliability has been demonstrated to be better than 10 FITs corresponding to less than 1% failure rate over 20 years service. Reliability data available upon request.

APPLICATIONS

- Local Area Networks
- OTDRs
- Transmission Systems

Figure 1
J16A-18A Package



MULTIPLICATION CHARACTERISTICS

An internal gain mechanism makes the J16A the solid state counterpart of he photomultiplier tube. This internal gain is known as the Multiplication Factor (M) and is a function of the reverse bias voltage VR applied to the diode (Fig. 2).

BREAKDOWN VOLTAGE AND DARK CURRENT

The avalanche breakdown voltage VB is the reverse bias voltage at which the diode's dark current becomes infinite. In practice, the dark current used to define breakdown voltage is 100µA (Fig. 3).

CUTOFF FREQUENCY

The cutoff frequency fc is the frequency at which the output signal power is down by 3dB. In the high multiplication region, the product of M and bandwidth becomes a constant called the gain-bandwidth product and cutoff frequency decreases with increasing M (Fig. 4).

Figure 2
Multiplication Characteristics

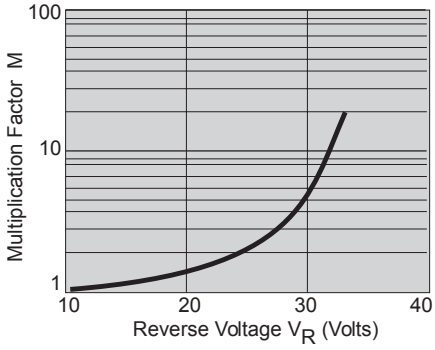


Figure 3
Dark Current and Reverse Voltage

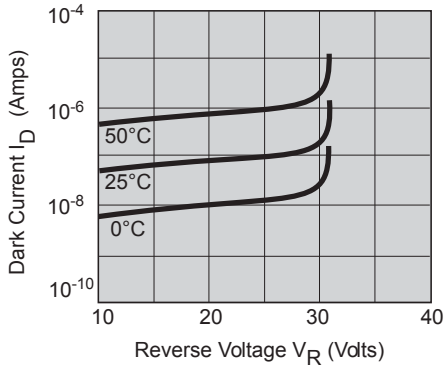
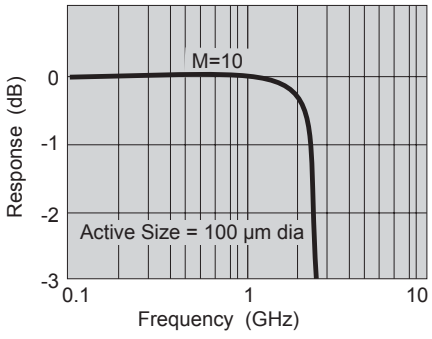


Figure 4
Frequency Response



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Parameter		Test Conditions	J16A-18A-R100U Active Size 100µm dia.			J16A-18A-R300U Active Size 300µm dia.			Units
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Quantum Efficiency		= 1300nm	60	70	--	60	70	--	%
Responsivity	R	M = 1	0.63	0.73	--	0.63	0.73	--	A/W
Breakdown Voltage	V_B	I_D = 100µA	20	25	40	20	25	40	V
Temp Coefficient of V_B			0.1	--	--	0.1	--		%/°C
Dark Current	I_D	$V_R = 0.9\ V_B$	--	0.3	0.5	--	1.4	3	µA
Multiplied Dark Current	I_{DM}	M = 1	--	100	150	--	300	400	nA
Cutoff Frequency (-3dB)	f_c	= 1300nm, M = 10, RL = 50	1000	1500	--	300	500	--	MHz
Excess Noise Factor	F	= 300nm, f = 30MHz	--	9	--	--	9	--	--
Excess Noise Figure	x	BW = 1MHz, M = 10, I_{ph} = 2µA	--	0.95	--	--	0.95	--	--
Capacitance	C	f = 1MHz, M = 10	--	1.5	2	--	8	10	pF
Forward Current	I_f	Maximum Rating			100			100	mA
Reverse Current	I_R	Maximum Rating			1			3	mA

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