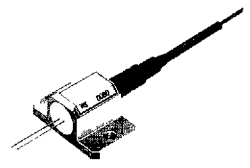
FPD15U51JT

InGaAs
AVALANCHE PHOTODIODE

DESCRIPTION

The FPD15U51JT is an InGaAs avalanche photodiode (APD) with a multi-mode fiber pigtail designed for use in optical transmission systems operating at a high-bit-rate and a long distance. The APD chip has a photosensitive area diameter of 50μm. Fujitsu's advanced InGaAs/InP material technology realizes a high reliability planar structure device with low dark current, low excess noise, and high quantum efficiency. A multi-mode fiber is aligned to a hermetically sealed APD through a lens and the optical alignment system has a high coupling stability. The device characteristics provide a dynamic sensitivity improvement of the optical transmission systems. The device is designated by the specified wavelength of 1550nm.



FEATURES

Multi-mode fiber pigtail:	GI 50/125 (core diameter 50±3μm, clading diameter 125±3μm)
Photosensitive diameter:	50μm
High quantum efficiency:	70% at 1.55μm
Cut-off frequency:	1.5GHz
Low dark current:	20nA
Low multiplied dark current:	3nA
Low excess noise factor:	5 at M=10

- High reliability planar structure with a guard ring based in on advanced
- InGaAs/InP material technology.

APPLICATIONS

- High-bit-rate optical transmission system up to 1.0Gb/s.

ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

Parameter	Symbol	Ratings	Unit
Storage Temperature	T_{stg}	-20 to +70	°C
Operating Temperature	T_{op}	-10 to +60	°C
Forward Current	I_F	10	mA
Reverse Current	I_R	0.5	mA

OPTICAL AND ELECTRICAL CHARACTERISTICS (T_a = 25°C)

Parameter	Symbol	Test Conditions		Limits			Unit
				Min.	Typ.	Max.	
Quantum Efficiency (Responsivity)	η (R)	λ = 1550nm M = 1		65 (0.81)	70 (0.88)	–	% (A/W)
Breakdown Voltage	V_B	I_D = 10μA		60	80	100	V
Temperature Coefficient of V_B	γ			–	0.15	–	%/°C
Dark Current	I_D	V_R = 0.9V_B		–	20	50	nA
Multiplied Dark Current	I_{DM}	M = 1		–	3	10	nA
Excess Noise Factor	F	λ = 1550nm, M = 10 f=30MHz, B=1MHz I_{po} = 2μA		–	5	6.3	–
	X			–	0.7	0.8	–
Cut-off Frequency	f_c	λ=1550nm, R_L =50Ω, -3dB from 500KHz	M=5	1.0	1.5	–	GHz
			M=10	1.0	1.5	–	
			M=20	–	1.0	–	
Capacitance	C_t	f=1MHz, V_R=0.9V_B		–	0.7	0.8	pF
Max. Multiplication Factor	M_{max}	λ=1550nm, I_{po} = 2μA		30	40	–	–

TYPICAL CHARACTERISTICS

Fig. 1 Spectral Response (η vs. λ)

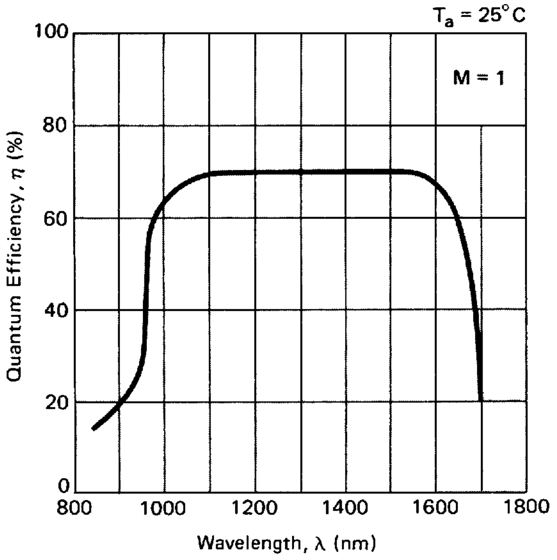


Fig. 2 Spectral Response (R vs. λ)

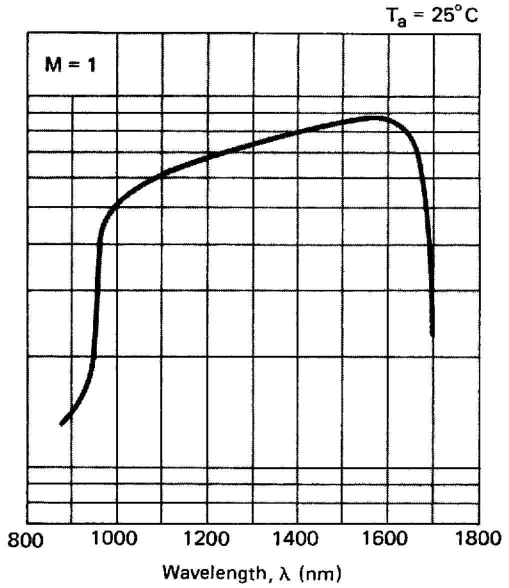


Fig. 3 Temperature Dependence of Responsivity

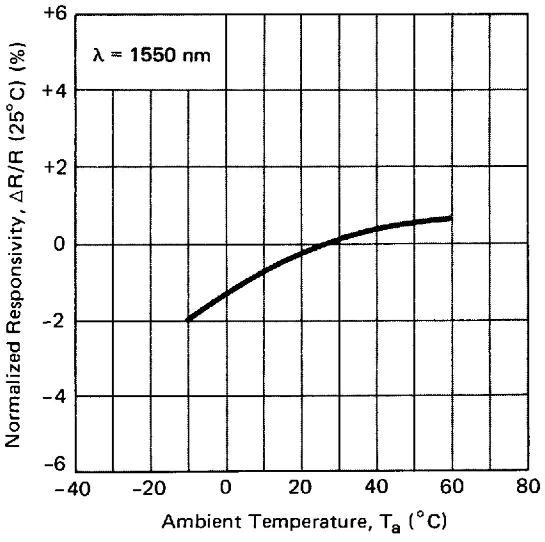


Fig. 4 Dark current vs. Reverse Voltage

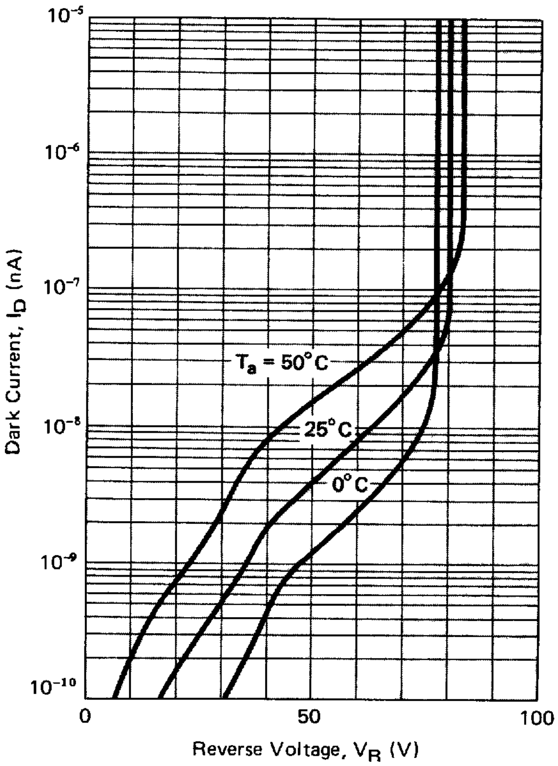


Fig. 5 Temperature Dependence of Dark Current and Multiplied Dark Current

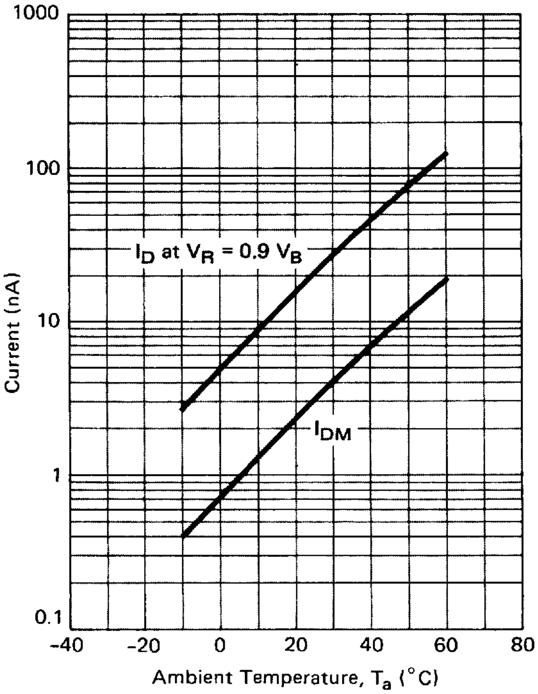


Fig. 6 Multiplication Characteritics

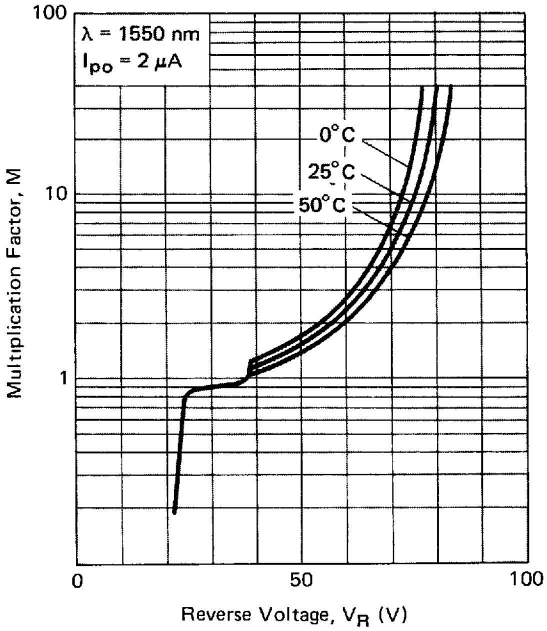


Fig. 7 Multiplication Factor vs. Photocurrent at M = 1

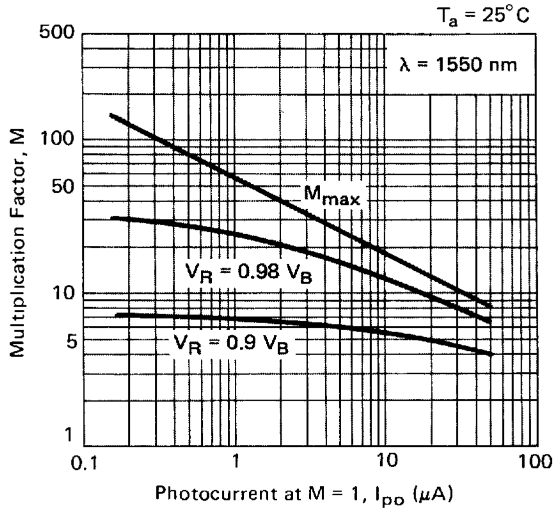


Fig. 8 Frequency Response

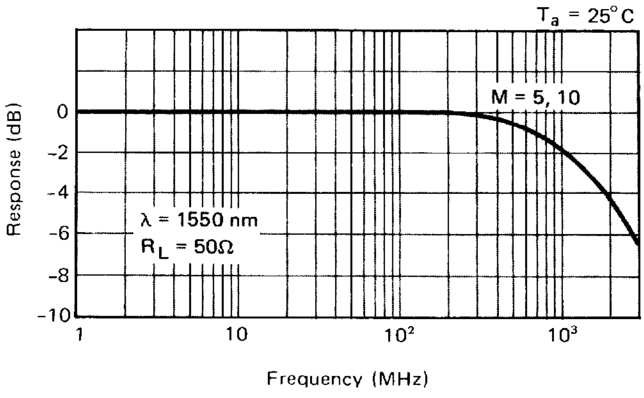


Fig. 9 Cutoff Frequency vs. Multiplication Factor

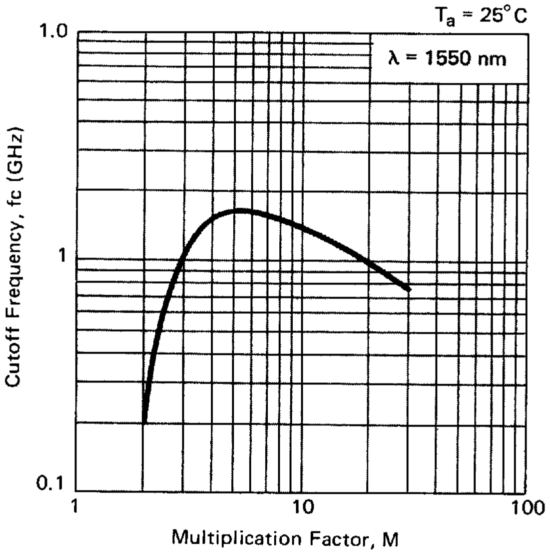


Fig. 10 Excess Noise Factor vs. Multiplication Factor

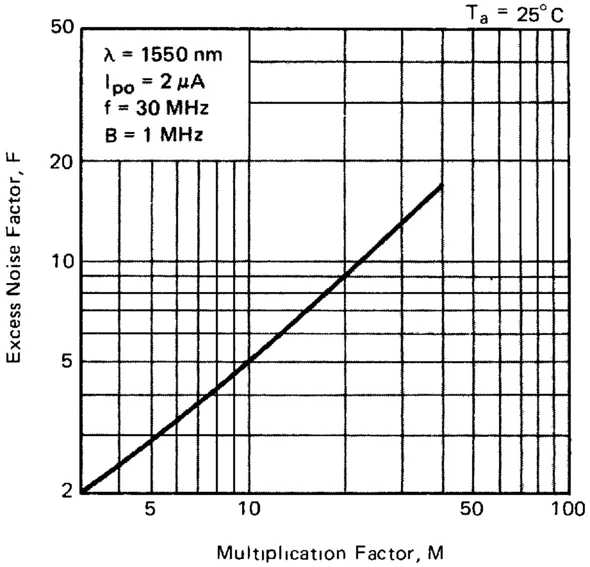


Fig. 11 Capacitance vs. Reverse Voltage