

Approved		Charged
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Customer Approval	Approved	

Preliminary

Specification for 10Gb/s
APD Receiver module

FU-322SPA-*7

A	B	C	D
	x		
Date		Approved	
5 Sep. '02		T.Nambara	

MITSUBISHI (OPTICAL DEVICES)

FU-322SPA-*7

APD RECEIVER MODULE FOR THE 1.55 μ m WAVELENGTH RANGE

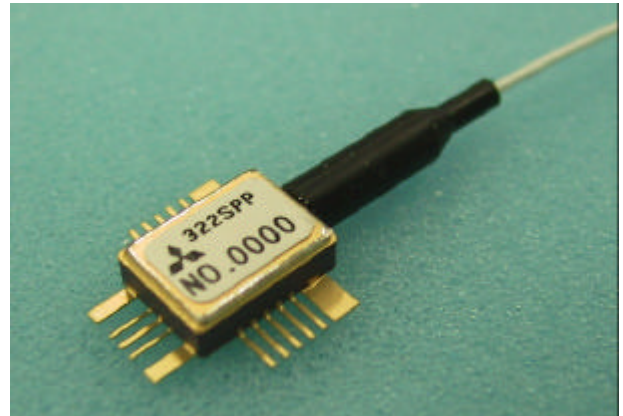
DESCRIPTION

FU-321SPA-*7 are avalanche photodiode module with preamplifier, designed for use in high-speed, long haul optical communication systems.

The butterfly package contains an avalanche photodiode coupled with single-mode fiber pigtail and preamplifier.

FEATURES

- High-sensitivity (-25dBm typ)
- 16pin butterfly package
- Single power supply voltage (-5.2V)
- Transimpedance 1k Ω typical(RL=50 Ω)
- Transimpedance amp with limiting amp and differential output (Zo=50 Ω ,each output)



APPLICATION

10Gbps.optical receiver (OC-192, STM-64)

Extended reach datacom and telecom applications

Long haul optical communication systems

ABSOLUTE MAXIMUM RATINGS (Tc=25°C)

Parameter	Symbol	Conditions	Rating	Unit
APD reverse voltage	Vpd	-	Vbr	V
APD reverse current (CW)	Ir	-	2	mA
APD forward current (CW)	If	-	2	mA
Power supply voltage	Vee	-	-6.0~0.2	V
	Vcc	-	-0.2~4	
Operating case temperature	Tc	-	0~+70	°C
Storage temperature	Tstg	-	-40~+85	°C

MITSUBISHI (OPTICAL DEVICES)

FU-322SPA-*7**APD RECEIVER MODULE FOR THE 1.55 μ m WAVELENGTH RANGE****ELECTRICAL/OPTICAL CHARACTERISTICS**(Tc=25°C, λ =1.55 μ m, Vee=-5.2V, Vcc=+3.3V unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
APD responsivity(Note 1)	R	CW, M=1	0.7	0.8	-	A/W
APD brake down voltage	Vbr	Id=100 μ A	20	-	40	V
Temperature coefficient of Vbr	γ	Tc=0 to 70°C	-	0.05	-	V/°C
Transimpedance	Zt	f=200MHz, RL=50 Ω , Single end	-	1	-	k Ω
Bandwidth (-3dB)	BW	RL=50 Ω , M=9, Single end	7	-	-	GHz
	fc_L	RL=50 Ω , M=9, Single end	-	-	100	kHz
Average input equivalent noise current density	in	RL=50 Ω , 1MHz~7GHz	-	11	-	pA/ $\sqrt{\text{Hz}}$
Output impedance	Zo	Single end	-	50	-	Ω
Electrical return loss	S22	1GHz<f<7GHz	-	-	-7	dB
Receiver sensitivity	Pr	RL=50 Ω , Single end, NRZ, 9.95328Gbps., PRBS=2 ³¹ -1, BER=10 ⁻¹⁰ , Vpd=Vopt (Note 1)	-	-	-24	dBm
Receiver over load	Po		-4	-	-	
Differential output at overload	Vomax	RL=50 Ω , Pin=-7dBm	-	-	2000	mVpp
Differential output sensitivity	Vomin	RL=50 Ω , Pin=-24dBm	15	-	-	mVpp
Amplifier voltage supply	Vee	-	-5.46	-5.2	-4.94	V
	Vcc	-	+3.135	+3.3	+3.456	
Power supply current	lee	Vee=-5.2V	-	-	150	mA
	lcc	Vcc=3.3V	-	-	150	
Optical return loss	Prtn	-	27	-	-	dB
Thermistor resistance	Rth	Tc=25°C, Vee=0V, Vcc=0V	9.5	10	10.5	k Ω
Thermistor B constant	B	Vee=0V, Vcc=0V	3800	3900	4000	K

Note 1. Used post-amp bandwidth is 8GHz, Laser source extinction ratio is 10dB.

OPTICAL FIBER SPECIFICATION

Parameter	Limits	Unit
Type	SM	-
Mode field dia.	9.5 \pm 1	μ m
Cladding dia.	125 \pm 2	μ m
Jacket dia.	0.9 typ.	mm
Fiber length	1000~1200	mm

CONNECTOR OPTION

Type number	Connector type	Connector return loss
FU-322SPA-W7	SC connector	40dB(min.)
FU-322SPA-V7	FC/PC connector	40dB(min.)
FU-322SPA-7	With out connector	-

DOCUMENTATION

Parameter	Symbol	Test conditions (Vee=-5.2V, Tc=25°C, λ =1.55 μ m)
APD responsivity	R	CW, M=1
APD brake down voltage	Vbr	Id=100 μ A
Bandwidth (-3dB)	BW	RL=50 Ω , M=9, Single end
Receiver sensitivity	Pr	RL=50 Ω , Single end, NRZ, 9.95328Gbps., PRBS=2 ³¹ -1, BER=10 ⁻¹⁰ , Vpd=Vopt
Power supply current	lee, lcc	-

MITSUBISHI (OPTICAL DEVICES)

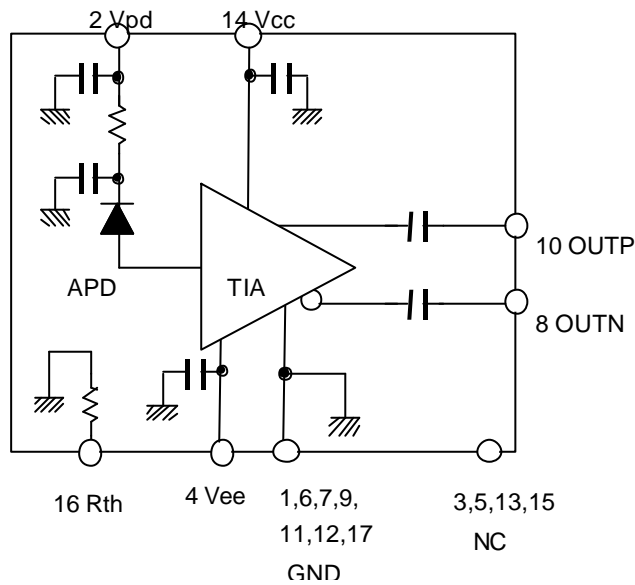
FU-322SPA-*7

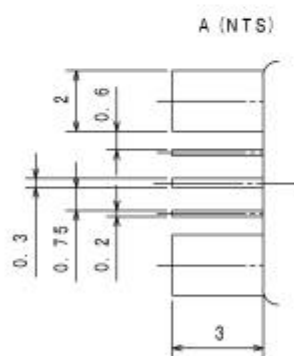
APD RECEIVER MODULE FOR THE 1.55 μm WAVELENGTH RANGE

PIN ASSIGNMENTS

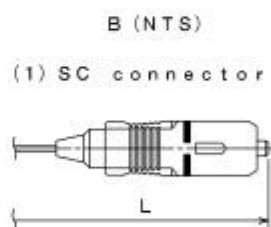
Pin#	Symbol	Parameter	Pin#	Symbol	Parameter
1	GND	Case Ground	10	Out_P	Positive Output
2	Vpd	APD Bias	11	GND	Case Ground
3	NC	No Connection	12	GND	Case Ground
4	Vee	Power Supply(-5.2V)	13	NC	No Connection
5	NC	No Connection	14	Vcc	Power Supply(3.3V)
6	GND	Case Ground	15	NC	No Connection
7	GND	Case Ground	16	Rth	Thermistor
8	Out_N	Negative Output	17	GND	Case Ground
9	GND	Case Ground			

BLOCK DIAGRAM



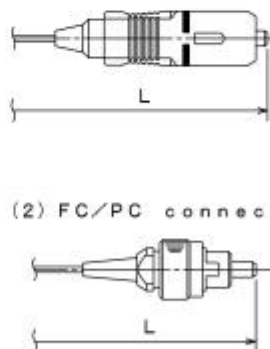


A (NTS)

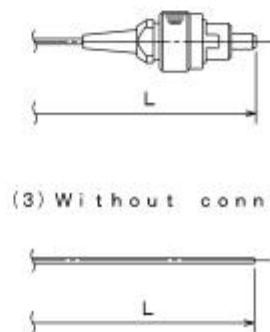


B (NTS)

(1) SC connector



(2) FC/PC connector



(3) Without connector