

Approved		Charged
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Customer Approval	Approved	

Specification for 10Gb/s APD and Preamp module

FU-321SPA-*7

A	B	C	D
	x		
Date		Approved	
29.Jan.'02		T.Nambara	

mitsubishi electric corp.

MITSUBISHI (OPTICAL DEVICES)

FU-321SPA-*7

APD PREAMP MODULE FOR THE 1.55 μm WAVELENGTH RANGE

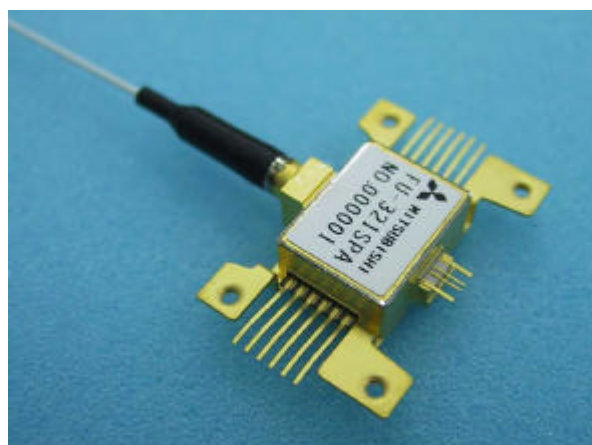
DESCRIPTION

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 $1\text{k}\Omega$ typical($R_L=50\Omega$)
- Transimpedance amp with limiting amp and differential output (50Ω)



APPLICATION

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

Extended reach datacom and telecom applications

Long haul optical communication systems

ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$)

Parameter	Symbol	Conditions	Rating	Unit
APD Reverse voltage	Vpd	-	Vbr	V
APD Reverse current (CW)	I _r	-	0.5	mA
APD Forward current (CW)	I _f	-	2	mA
Power supply voltage	V _{ss}	-	-6.0~0.2	V
Operating case temperature	T _c	-	0~+70	°C
Storage temperature	T _{stg}	-	-40~+85	°C

FU-321SPA-*7**APD PREAMP MODULE FOR THE 1.55 μm WAVELENGTH RANGE****ELECTRICAL/OPTICAL CHARACTERISTICS**(Tc=25°C, $\lambda=1.55\mu\text{m}$, Vss=-5.2V unless otherwise noted)

Parameter	Symbol	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
Responsivity(Note 1)	R	CW,M=1	0.7	0.8	-	A/W
APD Brakedown voltage	Vbr	Id=100 μA	20	-	40	V
Temperature coefficient of Vbr	γ	Tc=0 to 70°C	-	0.05	-	V/°C
Transimpedance	Zt	AC,f=200MHz,RL=50 Ω	-	1	-	k Ω
Cutoff frequency(-3dB)	fc High	AC,RL=50 Ω ,M=9	-	7	-	GHz
	fc Low	AC,RL=50 Ω ,M=9	-	-	100	kHz
Average input equivalent noise current density	in	AC,RL=50 Ω ,1MHz~7.5GHz	-	15	-	pA/ $\sqrt{\text{Hz}}$
Output impedance	Zo	Single end (Note 2)	-	50	-	Ω
Output return loss	S22	10MHz<f<8GHz	-	10	-	dB
		8GHz<f<12GHz	-	8	-	dB
Phase delay	Pd	200MHz<f<8GHz	-	40	-	ps
Sensitivity	Pr	AC,RL=50 Ω ,NRZ, 9.95328Gbps.,	-	-25	-23	dBm
Over load power	Po	PRBS=2 ³¹ -1, BER=10 ⁻¹² , Vpd=Vopt (Note 1)	-8	-	-	
Output voltage	Vo	AC,RL=50 Ω ,Pin=-8dBm,M=9	-	350	550	mVpp
Power supply voltage	Vss	-	-4.94	-5.2	-5.46	V
Power supply current	Iss	Vss=-5.2V	-	-	150	mA
Optical return loss	Prtn	-	27	-	-	dB

Note 1. Used post-amp bandwidth is 7.5GHz, Laser source extinction ratio is 10dB.

Note 2. Please use output by AC coupling. Differential output.

OPTICAL FIBER SPECIFICATION

Parameter	Limits	Unit
Type	SM	-
Mode field dia.	9.5 $\pm$ 1	μm
Cladding dia.	125 $\pm$ 2	μm
Jacket dia.	0.9 typ.	mm
Fiber length (L) (Note3)	1000~1200	mm

Note 3. See OUTLINE DIAGRAM

CONNECTOR OPTION

Type number	Connector type	Connector return loss
FU-321SPA-W7	SC connector	40dB(min.)
FU-321SPA-V7	FC/PC connector	40dB(min.)
FU-321SPA-7	With out connector	-

mitsubishi (optical devices)

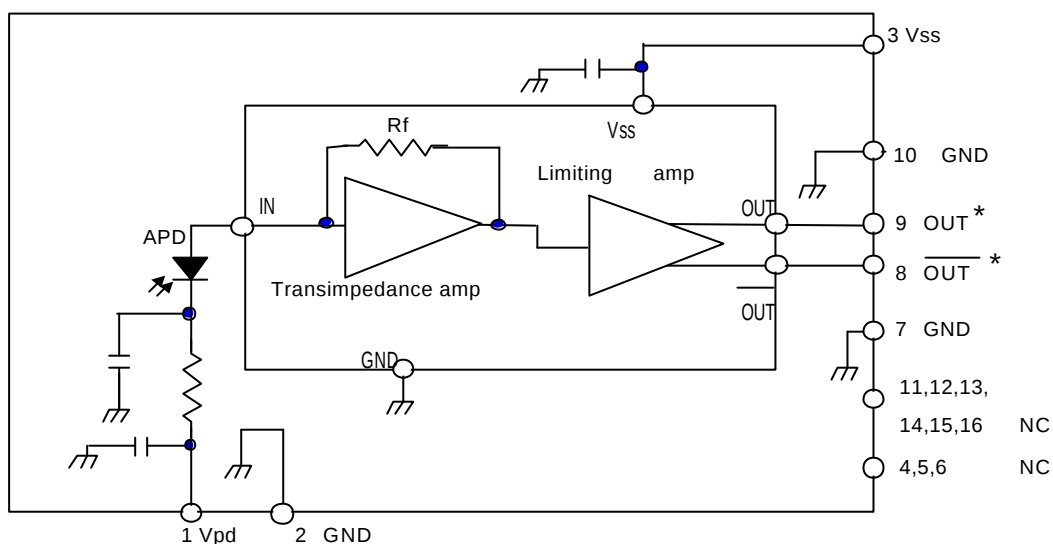
FU-321SPA-*7

APD PREAMP MODULE FOR THE 1.55 μm WAVELENGTH RANGE

DOCUMENTATION

Parameter	Symbol	Test conditions (Vss=-5.2V,Tc=25degC.)
Responsivity	R	CW,M=1
APD Brakedown voltage	Vbr	Id=100 μA
Cutoff frequency(-3dB)	fc High	AC,RL=50 Ω ,M=9
Sensitivity	Pr	AC,RL=50 Ω ,NRZ,9.95328Gbps.,PRBS=2 ³¹ -1, BER=10 ⁻¹² ,Vpd=Vopt
Power supply current	Iss	-

BLOCK DIAGRAM

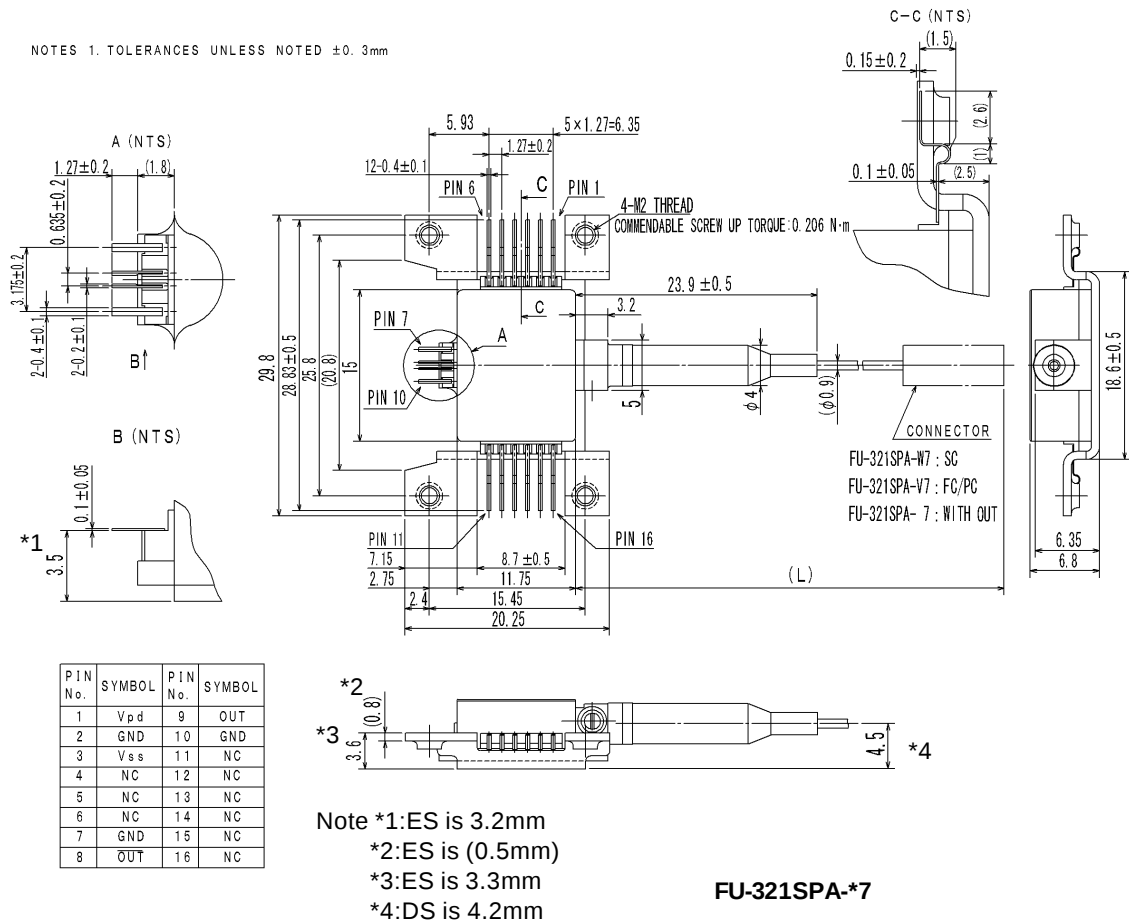


*Please use output by AC coupling.

MITSUBISHI (OPTICAL DEVICES)

FU-321SPA-*7**APD PREAMP MODULE FOR THE 1.55 μm WAVELENGTH RANGE****OUTLINE DIAGRAM**

(Unit : mm)

NOTES 1. TOLERANCES UNLESS NOTED $\pm 0.3\text{mm}$ **SAMPLE MOUNTING**