27.February.2002

| Approved | | Charged |
|---|---|---|
| H. Kiyosue | | KISHIDA |

| Customer Approval | Approved | |
|---|---|---|
| | | |

# Specification proposal

# (2.5Gbps. APD Preamp Module Vcc=+3.3V)

# FU-319SPA-6M20/V6M20/W6M20

***PRELIMINARY***

MITSUBISHI ELECTRIC CORP.

| A | B | C | D |
|---|---|---|---|
| | x | | |
| Date | | Approved | |
| 1.Mar.'02 | | H.Kiyosue | |

*PRELIMINARY*

**MITSUBISHI (OPTICAL DEVICES)**

# FU-319SPA-6M20/V6M20/W6M20

**InGaAs APD PREAMP MODULE FOR THE 1.31 μm AND 1.55 μm WAVELENGTH RANGE**

**DESCRIPTION**

FU-319SPA-6M20/V6M20/W6M20 is InGaAs avalanche photodiode module with SiGe preamplifier, designed for use in high-speed, long haul optical communication systems.
The coaxial package contains InGaAs avalanche photodiode coupled with single-mode fiber pigtail and SiGe preamplifier.

**FEATURES**

- High-sensitivity (-33dBm typ)
- 5pin coaxial package
- Single power supply voltage +3.3V.
- Differential output (50Ω)

**APPLICATION**

2.5Gbps.optical receiver (OC-48, STM-16)
Extended reach datacom and telecom applications
Long haul optical communication systems

**ABSOLUTE MAXIMUM RATINGS** (Tc=25°C)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| APD Reverse voltage | VPD | 0~Vbr | V |
| APD Reverse current (CW) | Ir | 2 | mA |
| APD Forward current (CW) | If | 2 | mA |
| Power supply voltage | VCC | -0.5~6 | V |
| Operating case temperature | Tc | -40~+85 | °C |
| Storage temperature | Tstg | -40~+85 | °C |

Vbr: APD breakdown voltage.

***PRELIMINARY***

**MITSUBISHI (OPTICAL DEVICES)**

# FU-319SPA-6M20/V6M20/W6M20

**InGaAs APD PREAMP MODULE FOR THE 1.31 μm AND 1.55 μm WAVELENGTH RANGE**

**ELECTRICAL/OPTICAL CHARACTERISTICS** (Tc=25°C,λ=1.55μm,VCC=3.3V, unless otherwise noted)

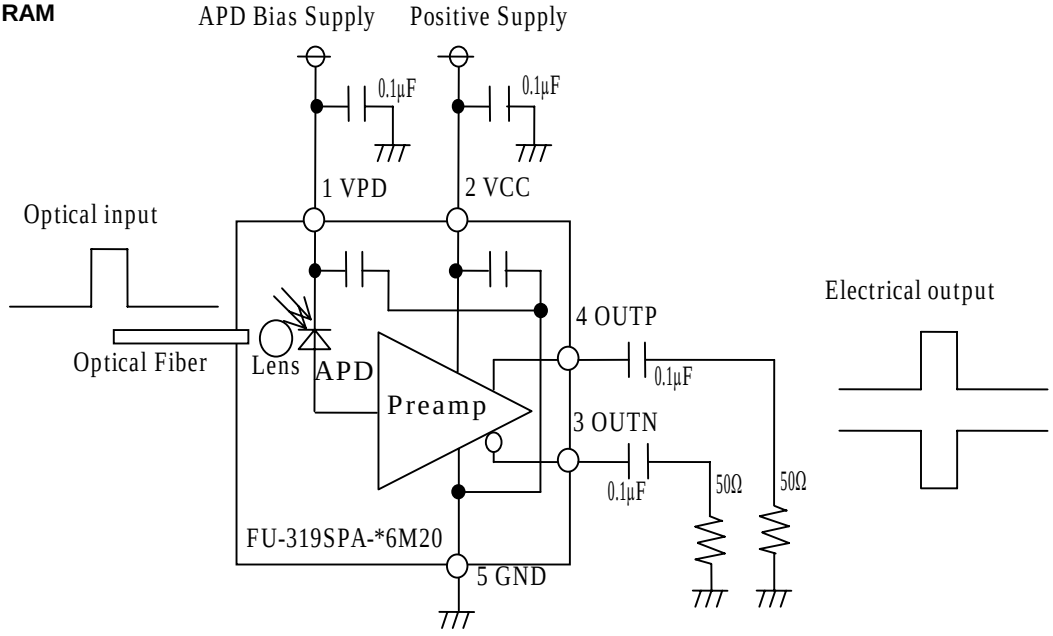
| Parameter | Symbol | Test Conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Detection range | - | - | 1000 | - | 1600 | nm |
| Responsivity | R13 | CW,λ=1.3μm,M=1 | 0.7 | 0.85 | - | A/W |
| | R15 | CW, λ=1.55μm,M=1 | 0.8 | 0.9 | - | |
| Breakdown voltage | Vbr | Id=100μA | 35 | - | 75 | V |
| Temp.coefficient of Vbr (Note 3) | γ | Id=100μA,Tc=-40~85°C | 0.07 | 0.12 | 0.16 | V/°C |
| Transimpedance | Zt | AC,f=200MHz,RL=50Ω, Pin=-27 dBm,M=10, Single end, (Note 1) | 1.0 | 1.37 | 1.75 | kΩ |
| Maximum output voltage | Vod_max | AC,RL=50Ω,Pin=-10dBm, M=10,Single end, | 75 | 150 | 310 | mV |
| Cutoff frequency(-3dB) | fc_High | AC,RL=50Ω,M=10 | 1.6 | 1.9 | - | GHz |
| | fc_Low | AC,RL=50Ω | - | 30 | 100 | kHz |
| Average input equivalent noise current density | in | AC,RL=50Ω,1MHz~1.6GHz | - | 10 | - | pA/√Hz |
| Output impedance | Zo | (Differential output) | - | 50 | - | Ω |
| Sensitivity | Pr | AC,RL=50Ω, λ=1.55μm, NRZ, 2.48832Gbps., PRBS=2^23-1,BER=10^-10, VPD=Optimum value (Note 2) | - | -33 | -31 | dBm |
| Over load power | Po | | -7 | -5 | - | |
| Power supply voltage | VCC | - | 3.1 | 3.3 | 3.5 | V |
| Power supply current | ICC | VCC=3.3V | - | 35 | 60 | mA |
| Optical return loss | Prtn | λ=1.55μm | 27 | - | - | dB |

Note 1. Zt=OUTN/Iin Iin:Preamp input current amplitude.
Note 2. Used post-amp bandwidth is 1.86GHz, Laser souse extinction ratio is 10dB.
Note 3. γ=(Vbr(25°C+ΔT)-Vbr(25°C))/ΔT [V/°C]

**OPTICAL FIBER SPECIFICATION**

| Parameter | Limits | | | Unit |
|---|---|---|---|---|
| | FU-319SPA-6M20 | FU-319SPA-V6M20 | FU-319SPA-W6M20 | |
| From of fiber end on delivery | Cut or ferrule | FC/PC connector | SC/PC connector | - |
| Type | SM | | | - |
| Mode filed dia. | 9.5±1 | | | μm |
| Cladding dia. | 125±2 | | | μm |
| Jacket dia. | 0.9 typ. | | | mm |
| Connector return loss | 40(min) | | | dB |

**BLOCK DIAGRAM**

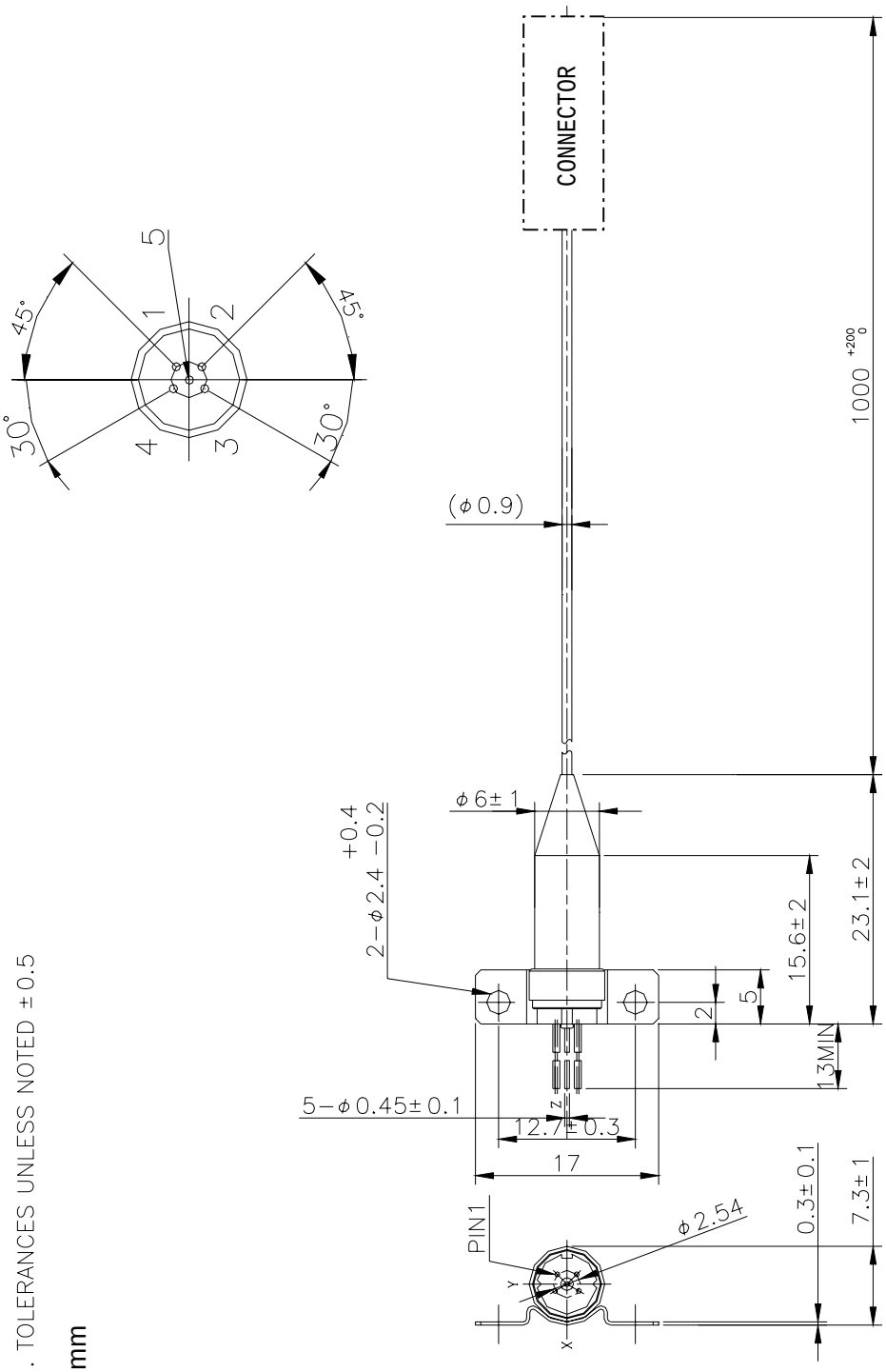


***PRELIMINARY***

**MITSUBISHI (OPTICAL DEVICES)**

# FU-319SPA-6M20/V6M20/W6M20

**InGaAs APD PREAMP MODULE FOR THE 1.31 μm AND 1.55 μm WAVELENGTH RANGE**




Note1. TOLERANCES UNLESS NOTED ±0.5

UNIT:mm

1:VPD
2:VCC
3:OUTN
4:OUTP
5:GND