



# NEC's SUPERLATTICE APD MODULE WITH INTERNAL PREAMPLIFIER FOR 10 Gb/s APPLICATIONS

## NR4270MU-CC

### FEATURES

- SUPERLATTICE AVALANCHE PHOTO DIODE
- INTERNAL GaAs TRANSIMPEDANCE PREAMPLIFIER
- RECEIVER FOR 10 Gb/s TRANSMISSION  
(STM-4, OC-192)
- MINIMUM RECEIVER SENSITIVITY  
 $P_r = -24$  dBm MAX
- TRANSIMPEDANCE  
 $Z_t = 60$  dB  $\Omega$  MIN
- 17-PIN MINI-BUTTERFLY PACKAGE WITH SINGLE MODE FIBER
- AC COUPLED-DIFFERENTIAL OUTPUT
- WITH SC-UPC CONNECTOR

### DESCRIPTION

NEC'S NR4270MU-CC is a 10 Gb/s superlattice avalanche photo diode (APD) receiver in a 17-pin mini-butterfly package with an internal preamplifier. This module is ideal as a receiver for SONET OC-192 and Synchronous Digital Hierarchy (SDH) systems, STM-64, and ITU-T recommendations.

### ELECTRO-OPTICAL CHARACTERISTICS ( $T_c = 25^\circ\text{C}$ , $V_{ss} = -5.2$ V, $\lambda = 1550$ nm, unless otherwise specified)

PART NUMBER				NR4270MU-CC		
SYMBOLS	PARAMETERS AND CONDITIONS		UNITS	MIN	TYP	MAX
$V_{BR}$	Reverse Breakdown Voltage, $I_D = 10 \mu\text{A}$		V	16	-	32
$\delta^1$	Temperature Coefficient of Reverse Breakdown Voltage, $T_c = 0$ to $+70^\circ\text{C}$		mV/ $^\circ\text{C}$	5	-	40
$I_D$	Dark Current, $V_R = V_{BR} \times 0.9$		$\mu\text{A}$	-	-	1.2
S	Sensitivity, $M = 1$		A/W	0.63	-	-
$P_r$	Minimum Receiver Sensitivity,	PRBS = $2^{31}-1$ , 10 Gb/s, NRZ, BER = $10^{-12}$	$M = M_{opt}$	-	-25	-24
$P_O$		Overload,	$M = 3$	-8	-7	-
$f_c$	Cut-off Frequency, $R_L = 50 \Omega$ , $M = 9$ , $P_{IN} = -20$ dBm		GHz	7.0	8.0	-
$S_{22}$	RF OutputReturn Loss,	to 6 GHz	dB	-	-	10
		6 to 8 GHz	dB	-	-	8
$Z_t$	Transimpedance, $R_L = 50 \Omega$		dB $\Omega$	60	-	-
$P_D$	IC Power Dissipation		mW	-	500	600
ORL	Optical Return Loss		dB	-	-	27
$R_{th}$	Thermistor Resistance		k $\Omega$	9.5	10	10.5

Note:

$$1. \delta = \frac{\Delta V_{BR}}{\Delta T_c}$$

**ABSOLUTE MAXIMUM RATINGS<sup>1</sup>**

(T<sub>C</sub> = 25°C, unless otherwise specified)

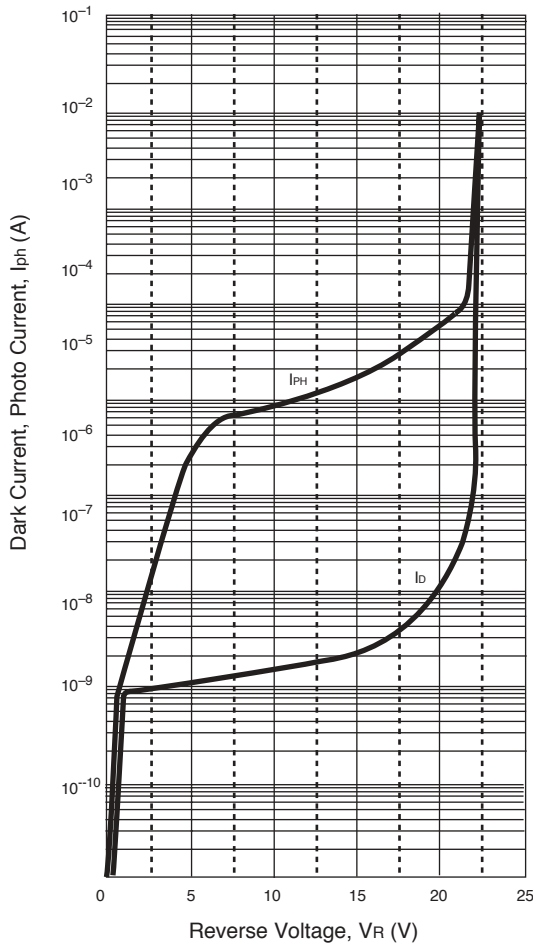
SYMBOLS	PARAMETERS	UNITS	RATINGS
I <sub>F</sub>	APD Forward Current	mA	5
V <sub>R</sub>	APD Reverse Voltage	V	V <sub>BR</sub>
I <sub>R</sub>	APD Reverse Current	mA	1.0
V <sub>SS</sub>	IC Supply Voltage	V	-6 to 0
T <sub>C</sub>	Operating Case Temperature	°C	0 to +70
T <sub>STG</sub>	Storage Temperature	°C	-40 to +85
T <sub>SLD</sub>	Lead Soldering Temperature	°C	350 (3 sec.)

Note:

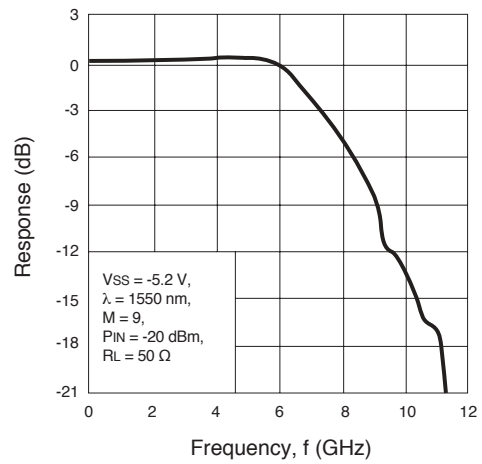
1. Operation in excess of any one of these parameters may result in permanent damage.

**TYPICAL PERFORMANCE CURVES (T<sub>C</sub> = 25°C)**

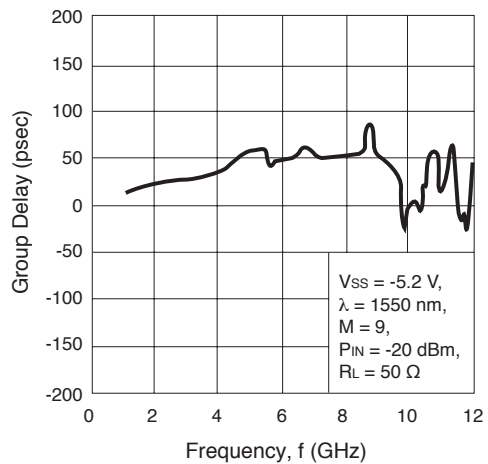
**DARK CURRENT AND PHOTO CURRENT vs. REVERSE VOLTAGE**



**FREQUENCY RESPONSE**

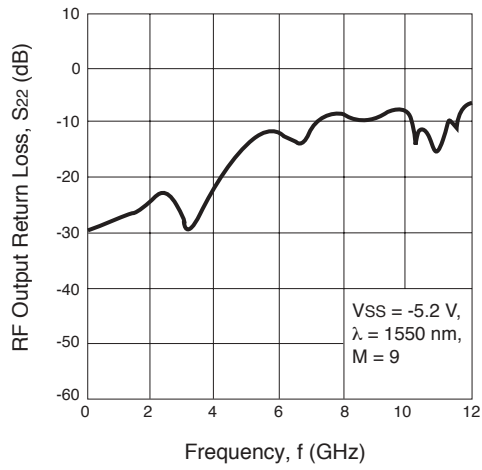


**GROUP DELAY vs. FREQUENCY**

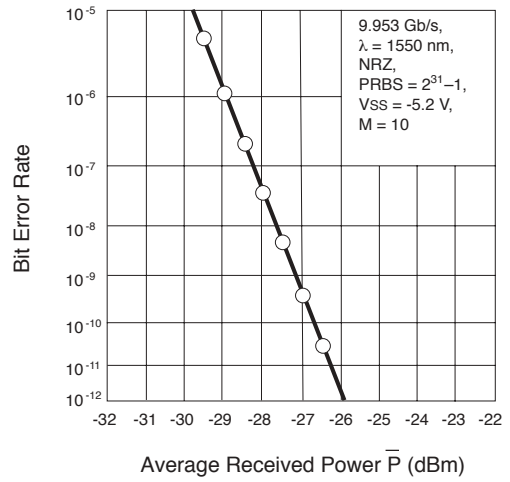


**TYPICAL PERFORMANCE CURVES** ( $T_c = 25^\circ\text{C}$ )

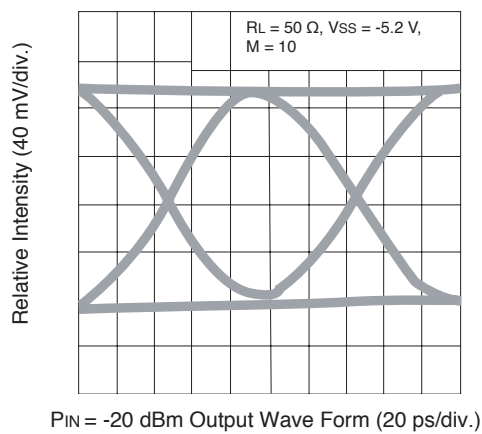
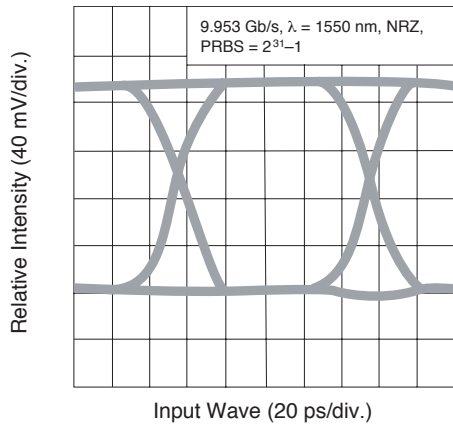
RF OUTPUT RETURN LOSS vs. FREQUENCY



ERROR RATE CHARACTERISTICS

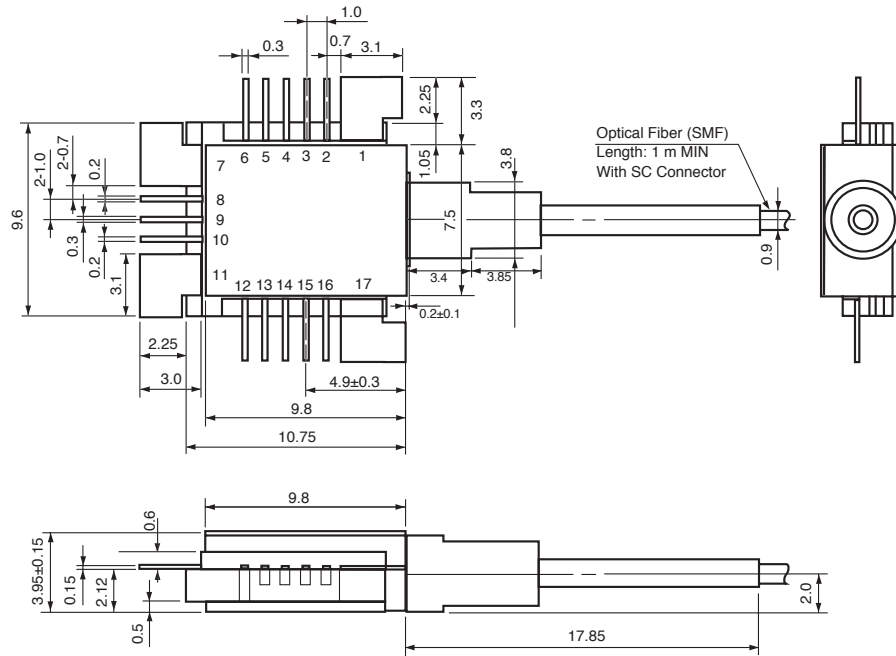


EYE DIAGRAM



Remark: The graphs indicate nominal characteristics.

**OUTLINE DIMENSIONS** (Units in mm, ±0.2 mm unless otherwise specified)



**PIN CONNECTIONS**

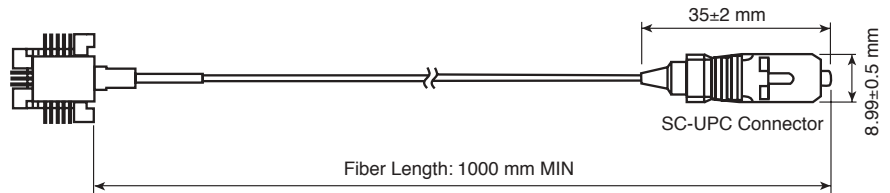
PIN No.	SYMBOL	FUNCTION	PIN No.	SYMBOL	FUNCTION	PIN No.	SYMBOL	FUNCTION
1	GND	Ground (0.0V)	8	OUT	OUTPUT (INVERT)	15	Thm	THERMISTOR
2	Vapd	APD CATHODE	9	GND	GROUND (0.0V)	16	Thm	THERMISTOR
3	NC	NC	10	OUT	OUTPUT (NON-INVERT)	17	GND	GROUND (0.0 V)
4	Vss	POWER SUPPLY (-5.2V)	11	GND	GROUND (0.0V)			
5	NC	NC	12	GND	GROUND (0.0V)			
6	GND	GROUND (0.0V)	13	NC	NC			
7	GND	GROUND (0.0V)	14	NC	NC			

**OPTICAL FIBER CHARACTERISTICS**

PARAMETER	SPECIFICATION	UNIT
Mode Field Diameter	9.5±1	µm
Cladding Diameter	125±2	µm
Maximum Cladding Noncircularity	2	%
Maximum Core/Cladding Concentricity	1.6	%
Outer Diameter	0.9±0.1	mm
Cut-off Wavelength	1100 to 1270	nm
Minimum Fiber Bending Radius	30	mm
Fiber Length	1000 MIN	mm
Flammability	ULT1581 VW-1	

**ORDERING INFORMATION**

Part Number	Available Connector
NR4270MU-CC	With SC-UPC Connector



**Life Support Applications**

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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