

**NU-33B54B-R / NU-33B54B-P / NU-33B54B-R / NU-33B54B-P**  
**155 Mbps 1310 nm Burst Mode TX / 622 Mbps 1490 nm Continuous-Mode RX**  
**3.3V, 2X5 SFF Package, Class B B-PON ONU Transceiver**

**FEATURES**

- | Optical Network Unit (ONU) for ITU-T G.983.3 Class B B-PON
- | 1-Fiber Bi-directional WDM SM Transceiver
- | 155 Mbps / 1310 nm Burst-Mode Transmitter
- | 622 Mbps / 1490 nm Continuous-Mode Receiver with 2R Output
- | 2x5 Package with SC Receptacle: NU-33B54B-R
- | 2x5 Package with SC/PC Pigtail: NU-33B54B-P
- | 0 to 70°C Operating Temperature: NU-33B54B-R
- | -40 to 85°C Operating Temperature: NU-33B54B-R-A
- | Single +3.3 V Power Supply
- | LVPECL Differential Inputs and Outputs
- | LVTTTL TX Shutdown Input
- | LVTTTL RX Loss Signal Output
- | Wave Solderable and Aqueous Washable
- | Class 1 Laser International Safety Standard IEC 60825 Compliant

**APPLICATIONS**

- | Fast Ethernet PON System
- | Broadband PON System
- | ATM PON System

**DESCRIPTION**

NU-33B54B series is optical network unit (ONU) for ITU-T G.983.3 B-PON with 622 Mbps in downstream and 155 Mbps in upstream. The NU-33B54B series is high performance module for Point-to-Multi-Point (M2MP) system by using 1310 nm burst-mode transmitter and 1490 nm continuous-mode receiver. The transmitter section uses a 1310 nm multiple quantum well laser and is a class 1 laser compliant according to International Safety Standard IEC 60825. The receiver section uses an integrated 1490 nm / 1550 nm detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC. LVPECL interface is used for differential inputs and outputs. A LVTTTL logic interface simplifies interface to external circuitry.

**LASER SAFETY**

This single mode transceiver is a Class 1 laser product. It complies with IEC 60825 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated within the specified temperature and voltage limits. The optical ports of the module shall be terminated with an optical connector or with a dust plug.

**ORDER INFORMATION**

P/No.	TX				RX					Temp. (°C)	PIN	Package
	Type	Speed (Mb/s)	λ (nm)	Power (dBm)	Type	Speed (Mb/s)	λ (nm)	Sens. (dBm)	Sat. (dBm)			
NU-33B54B-R	BM	155	1310	2 to -4	CNT, 2R	622	1490/1550	-29	-5	0 to 70	2X5	SFF Rec.
NU-33B54B-R-A	BM	155	1310	2 to -4	CNT, 2R	622	1490/1550	-29	-5	-40 to 85	2X5	SFF Rec.
NU-33B54B-P	BM	155	1310	2 to -4	CNT, 2R	622	1490/1550	-29	-5	0 to 70	2X5	SFF Pig.
NU-33B54B-P-A	BM	155	1310	2 to -4	CNT, 2R	622	1490/1550	-29	-5	-40 to 85	2X5	SFF Pig.

NOTE: 1. XX-XXXXXX-K, K=R, SC RECEPTACLE, K=P, SC/PC PIGTAIL WITH FIBER LENGTH 50 CM.

3. BM: Burst Mode; CNT: Continuous Mode; SFF: Small Form Factor Package.

Absolute Maximum Ratings					
Parameter	Symbol	Min.	Max.	Unit	Notes
Power Supply Voltage	Vcc	0	4	V	
Input Voltage		GND	Vcc	V	
Output Current	Iout	0	30	mA	
Operating Temperature	Topr	0	70	°C	With air flow 1m/sec
Storage Temperature	Tstg	-40	85	°C	
Soldering Temperature			260	°C	10 seconds on leads only
Bending Radius of Fiber		30		mm	For pigtail product

Stress in excess of the maximum absolute ratings can cause permanent damage to the module.

Recommended Operating Conditions					
Parameter	Symbol	Min.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.13	3.47	V	
Power Supply Current	Icc TX+RX		250	mA	
Operating Temperature	Topr	0	70	°C	With air flow 1m/sec

Transmitter Specifications ( 0°C < Topr < 70°C, 3.13V < Vcc < 3.47V )						
Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
<b>Optical</b>						
Optical Transmit Power	Po	-4		2	dBm	1
Output Center Wavelength	$\lambda$	1260	1310	1360	nm	
Output Spectrum Width	$\Delta \lambda_{RMS}$			4	nm	RMS ( $\sigma$ )
Extinction Ratio	ER	10			dB	
Background Light	BDL			-35	dBm	Without Input to Transmitter
Data Rate			155	170	Mb/s	
Optical Rise Time			1.0	2.0	ns	10% to 90% Values
Optical Fall Time			1.0	2.0	ns	10% to 90% Values
Relative Intensity Noise	RIN			-120	dB/Hz	
Total Jitter				1	ns	
<b>Electrical</b>						
Data Input Current – Low		-350			$\mu$ A	
Data Input Current – High				350	$\mu$ A	
Differential Input Voltage	V <sub>IH</sub> - V <sub>IL</sub>	300		1600	mV	
Data Input Voltage – Low	V <sub>IL</sub> - V <sub>CC</sub>	-2.0		-1.58	V	3
Data Input Voltage -- High	V <sub>IH</sub> - V <sub>CC</sub>	-1.1		-0.74	V	3
Shutdown Input Voltage -- Low	V <sub>TSHDN,L</sub>	0		0.8	V	TX Output Disable
Shutdown Input Voltage -- High	V <sub>TSHDN,H</sub>	2.0		Vcc	V	TX Output Enable
Shut Off Time for Tx Shutdown	t <sub>DIS</sub>			30	$\mu$ s	

1. Output power is power coupled into a 9/125  $\mu$ m single mode fiber.
2. These inputs are compatible with 10K, 10KH and 100K ECL and LVPECL inputs.

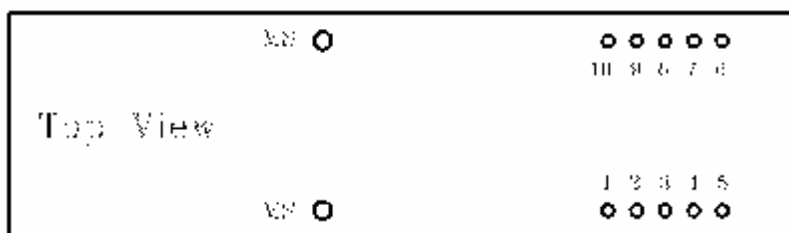
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**Receiver Characteristics ( 0°C < Topr < 70°C, 3.13V < Vcc < 3.47V )**

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
<b>Optical</b>						
Sensitivity	Sen			-29	dBm	4
Saturation Optical Power	Sat	-5				4
Wavelength of Operation		1480		1500	nm	5,6
Signal Detect Assert Level	Pa			-29		
Signal Detect Deassert Level	Pd	-40				
Signal Detect Hysteresis		1.0		4.0	dB	
Data Rate			622	650	Mb/s	
Optical Return Loss		14			dB	
<b>Electrical</b>						
Data Output Voltage – Low	V <sub>OL</sub> - V <sub>CC</sub>	-2.0		-1.58	V	7
Data Output Voltage – High	V <sub>OH</sub> - V <sub>CC</sub>	-1.1		-0.74	V	7
SD Output Voltage -- Low	V <sub>OL</sub> - V <sub>CC</sub>			0.8	V	
SD Output Voltage -- High	V <sub>OH</sub> - V <sub>CC</sub>	2.0			V	
Signal Detect Assert Time	AS <sub>MAX</sub>			100	µs	OFF to ON
Signal Detect Deassert Time	ANS <sub>MAX</sub>			300	µs	ON to OFF

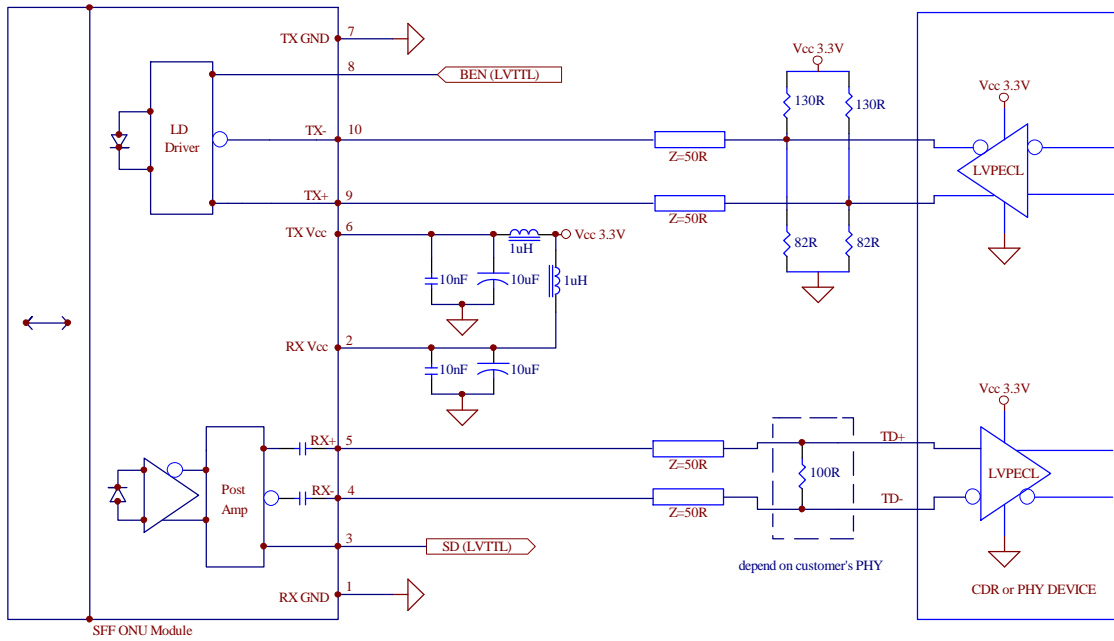
4. Sensitivity and saturation levels at BER 1E-10 for a 2<sup>23</sup>-1 PRBS @ER=10.
5. At least 30 dB optical isolation for the wavelength 1260 to 1360 nm.
- 6.
7. These inputs are compatible with 10K, 10KH and 100K ECL and LVPECL outputs.

**CONNECTION DIAGRAM**



PIN	I/O	Symbol	Notes
1		RXGND	Directly connect this pin to the receiver ground plane
2		RXVCC	+3.3V dc power for the receiver section
3	O	LOS	Loss Signal Output. Active “Low” indicates a loss of receiving optical signal.
4	O	RD-	Receiver Dataout Bar. See recommended circuit schematic
5	O	RD+	Receiver Dataout. See recommended circuit schematic
6		TXVCC	+3.3V dc power for the transmitter section
7		TXGND	Directly connect this plan to the transmitter ground plane
8	I	TX SHUT	Transmitter Shutdown Input. Active Low. Connect this pin to +3.3V TTL logic “0” to disable TX. This pin is internally pulled to “High”.
9	I	TD+	Transmitter Data In. See recommended circuit schematic
10	I	TD-	Transmitter Data In Bar. See recommended circuit schematic
MS		MS	Mounting Studs. Connect to Chassis Ground

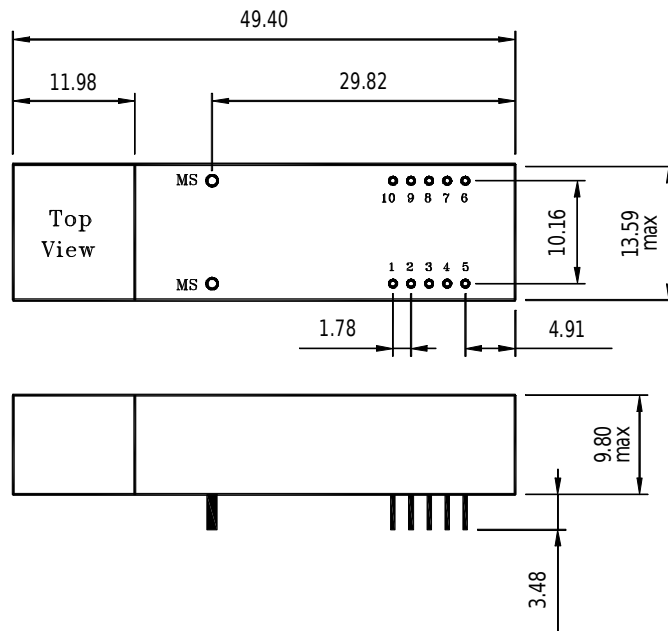
## RECOMMENDED CIRCUIT SCHEMATIC



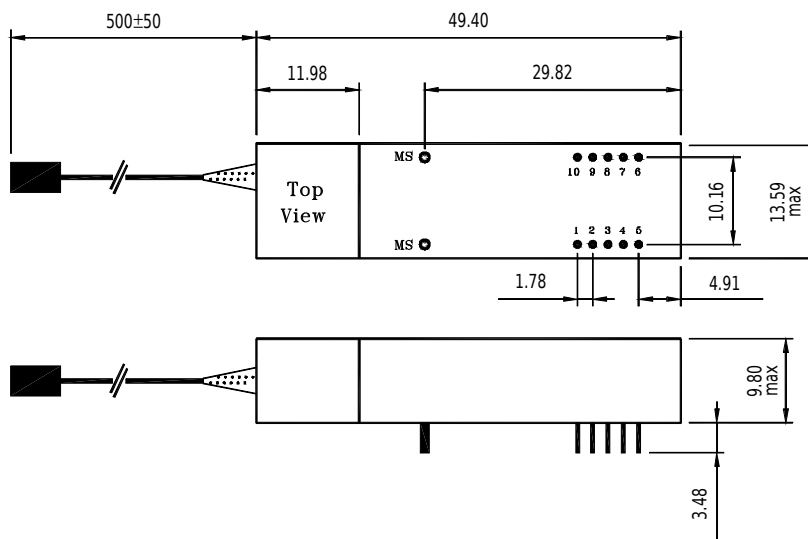
## PACKAGE DIAGRAM

Units in mm

### 1) SC Receptacle



## 2) Pigtail



**Note:** Specifications subject to change without notice.