GTP-NS21-40xD7

GPON OLT SFP C++++(I) Transceiver

Features

- Single fiber bi-directional data links asymmetric TX 2488Mbps/RX1244Mbps application
- 1490nm continuous-mode DFB laser transmitter and 1310nm burst-mode APD-TIA receiver
- Small Form Factor Pluggable package with SC/UPC Connector
- Single 3.3V power supply
- DDMI function available with internally calibrated mode
- Digital burst RSSI function to monitor the input optical power level
- LVPECL compatible data input/output interface
- LVTTL transmitter disable control
- LVTTL transmitter laser fault alarm
- Fast LVTTL receiver Signal Detect (SD) indication response
- Low EMI and excellent ESD protection
- International Class1 laser safety certified
- Operating temperature range:
  Commercial: -5°C~70°C
  Industrial: -40°C~85°C
- RoHS6 Compliance

Application

- Gigabit-capable Passive Optical Networks (GPON)

Standard

- Complies with SFP Multi-Source Agreement (MSA) SFF-8074i
- Complies with ITU-T G.984.2 Amendment 1
- Complies with FCC 47 CFR Part 15, Class B
- Complies with FDA 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007
- Complies with SFF-8472
- Compatible with TR-NWT-000870 4.1 ESD sensitivity classification Class2.
- Compatible with Telcordia GR-468-CORE

Specification

Absolute Maximum Ratings				
Parameter	**Symbol**	**Min**	**Max**	**Unit**
Storage Ambient Temperature	T_{STG}	-40	85	°C
Storage Humidity	H_S	5	90	%
Operating Humidity	H_O	5	85	%
Power Supply Voltage	V_{CC}	0	3.6	V
Receiver Damaged Threshold		+4		dBm

Recommended Operating Conditions						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Operating Case Temperature	T_C	-5		70	°C	GTP-NS21-40CD7
		-40		85		GTP-NS21-40ID7
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V	
Power Consumption	P_W			1.65	W	
Data Rate			TX 2.488 / RX 1.244		Gbps	

Electrical Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Total Supply Current	I_{CC}			500	mA	
Transmitter						
Transmitter Differential Input Voltage		400		2400	mV	
Tx_Fault Output Voltage - High	V_{OH}	2.4		Vcc	V	LVTTL
Tx_Fault Output Voltage - Low	V_{OL}	0		0.4	V	LVTTL
Tx_Disable Input Voltage - High	V_{IH}	2		Vcc	V	LVTTL
Tx_Disable Input Voltage - Low	V_{IL}	0		0.8	V	LVTTL
Input Differential Impedance	Z_{IN}	85	100	115	Ω	
Receiver						
Receiver Differential Output Voltage		600		1600	mV	LVPECL, DC Coupled
SD Output Voltage - High	V_{OH}	2.4		Vcc	V	LVTTL
SD Output Voltage - Low	V_{OL}	0		0.4	V	LVTTL
Reset Input Voltage - High	V_{IH}	2.0		Vcc	V	LVTTL
Reset Input Voltage - Low	V_{IL}	0		0.8	V	LVTTL
RSSI Trigger Input Voltage - High	V_{IH}	2.0		Vcc	V	LVTTL
RSSI Trigger Input Voltage - Low	V_{IL}	0		0.8	V	LVTTL
Output Differential Impedance	Z_{OUT}	90	100	110	Ω	

Optical Transmitter Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Average Output Power	P_{OUT}	+7		+10	dBm	
Center Wavelength	λ_C	1480		1500	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30				
Extinction Ratio	ER	8.2			dB	PRBS 2^{23}-1+72CID @2.488Gbit/s
Transmitter and Dispersion Penalty	TDP			1	dB	Transmit on 40km SMF
Transmitter OFF Power	P_{OFF}			-39	dBm	
Output Eye Diagram	Compliant with ITU-T G.984.2					
Transmitter Reflectance				-10	dB	

Optical Receiver Characteristics						
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**	**Notes**
Center Wavelength	λ_C	1260		1360	nm	
Receiver Sensitivity	SEN			-33	dBm	
Input Saturation Power (Overload)	SAT	-15			dBm	
SD Assert Level	SDA			SEN-1	dBm	
SD De-assert Level	SDD	-45			dBm	
SD Hysteresis	HYS	0.5		6	dBm	
Dynamic Range		15			dB	Figure 1
Receiver Reflectance				-15	dB	

Note 1: PRBS 2^{23}-1+72CID@1244Mbps, transmitter is operating, BER ≤1×10^{-10}

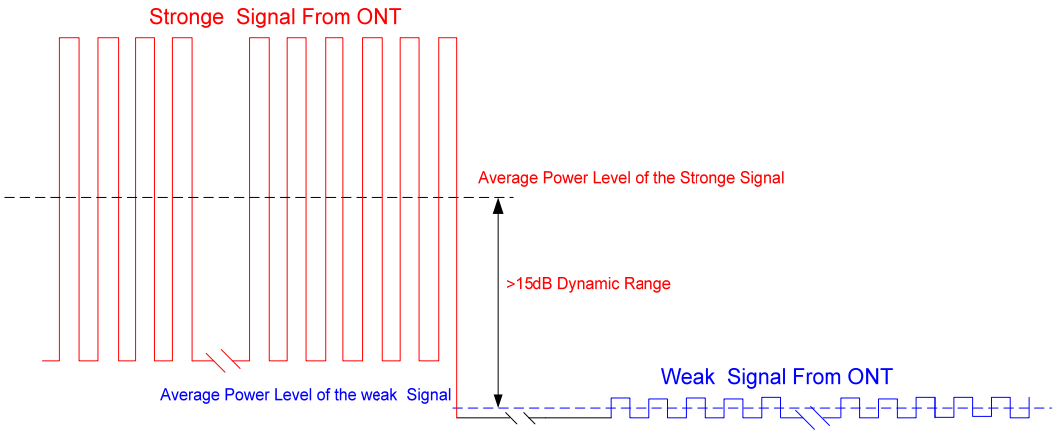


Figure 1 Burst Mode Receiver Dynamic Range in GPON System

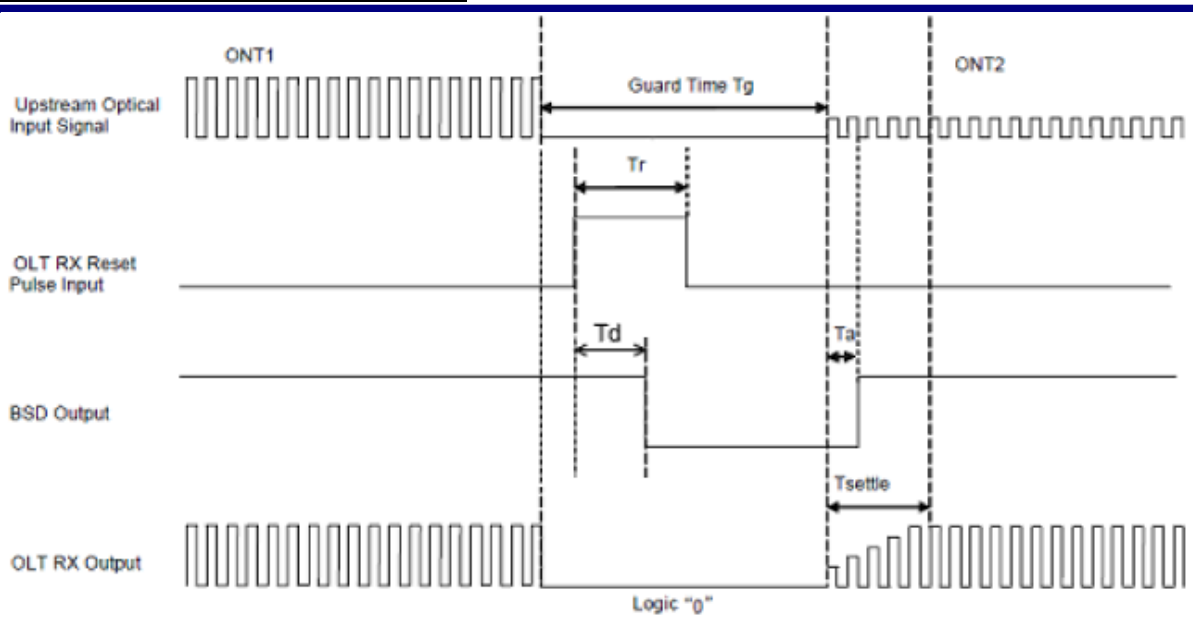


Figure 2.1 Burst Receiver Timing Sequence

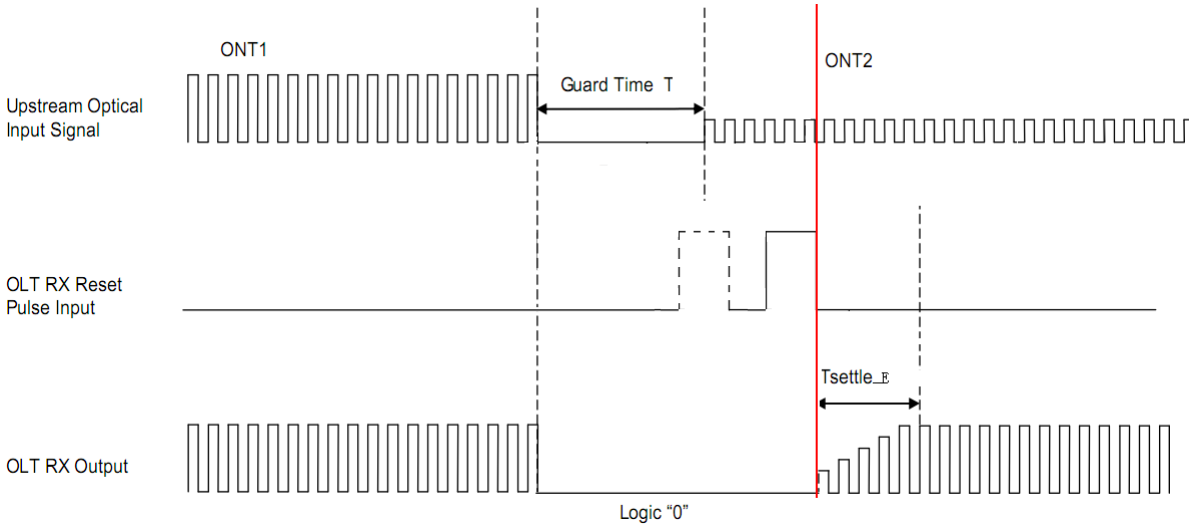


Figure 2.2 Burst Receiver Timing Sequence

Receiver Timing Characteristics						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
Guard Time	T_G	32			bit	
Reset Pulse Width(1)	T_R		16		bit	
Receiver Amplitude Recovery Time(2)	T_{SETTLE}			24	bit	
	T_{SETTLE_E}			16	bit	
Signal Detect Assert Time	T_A			25	ns	
Signal Detect De-assert Time	T_D			10	ns	

(1) Reset Pulse support 2 modes in Figure2.

(2) SD signal pulls down immediately after Reset signal, and pulls up while detected RX burst signal till the next Reset signal.

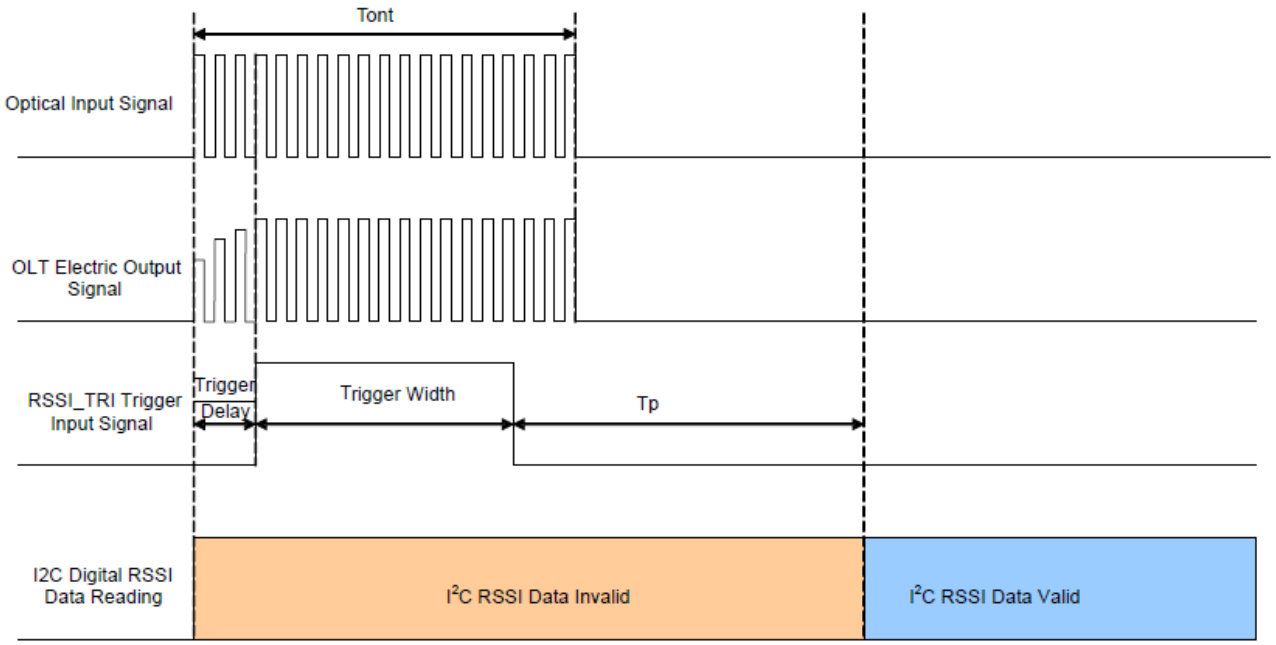
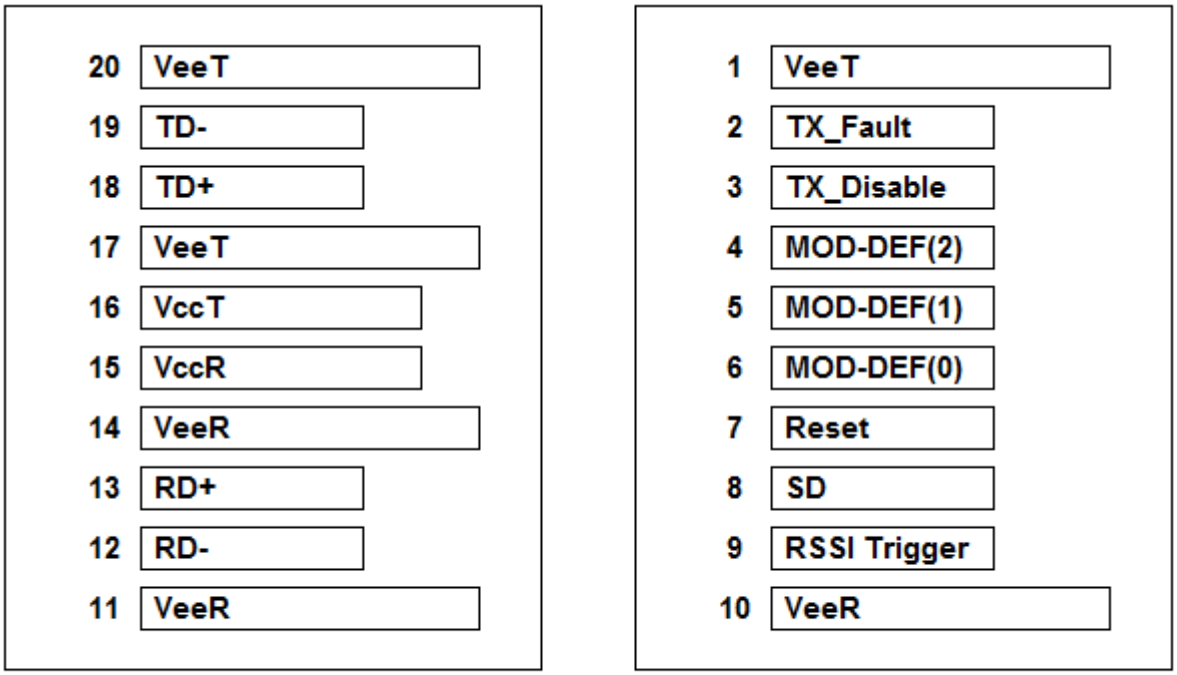


Figure 3 RSSI TIMING SEQUENCE

RSSI Characteristics						
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**	**Notes**
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
RSSI Trigger Delay	T_D	0		3000	ns	
Optical Signal During Time	T_{ONT}	300			ns	
RSSI Trigger width	T_W	300		T_{ONT} - T_D	ns	
I2C Access Prohibited Time	Tp			500	μs	

Pin Definition



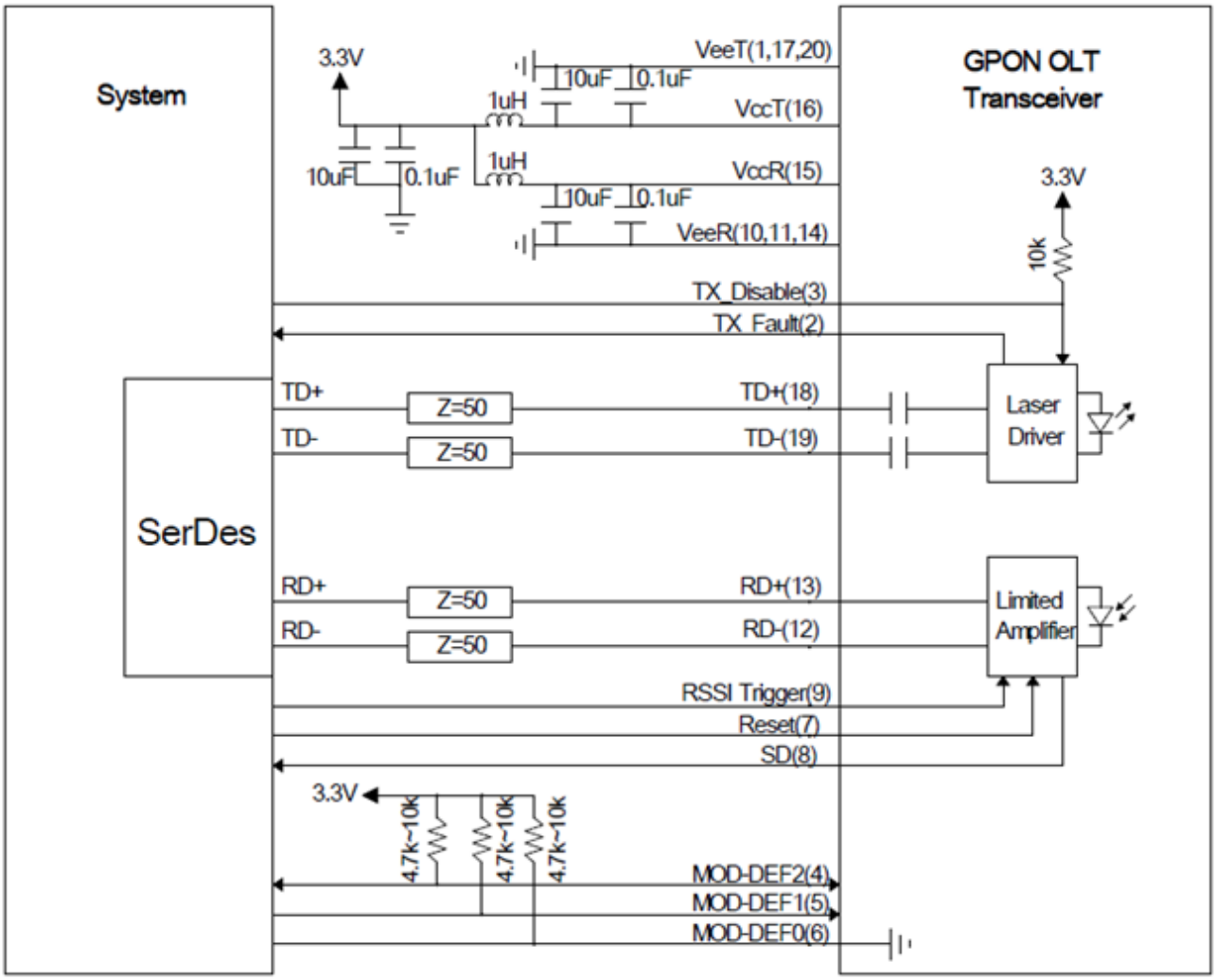
Top Of Board **Bottom Of Board**

As Viewed Through Top of Board

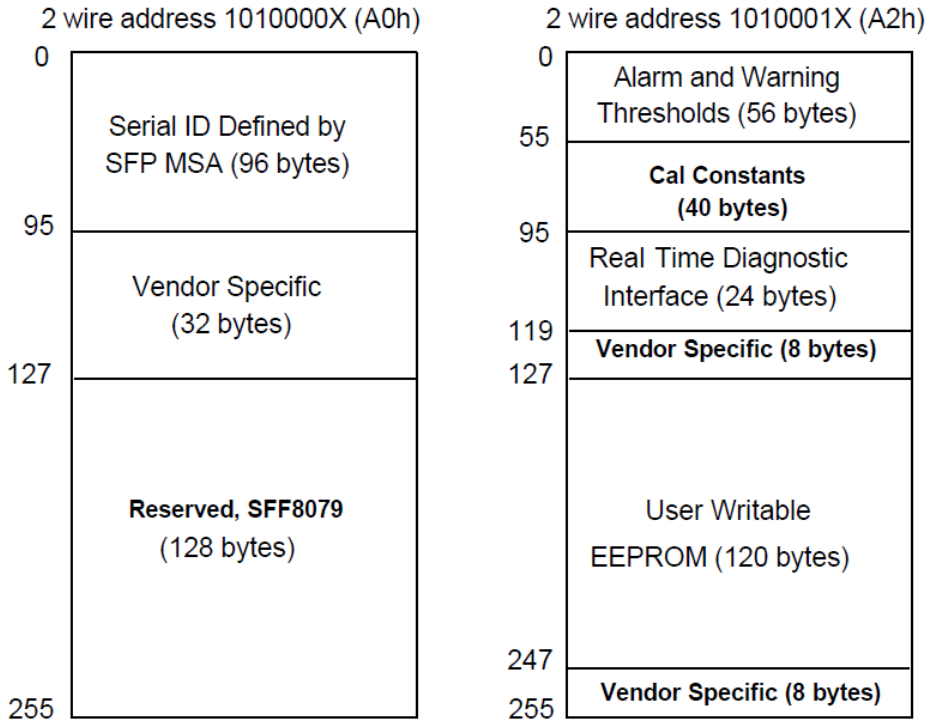
Pin No	Symbol	Name/Description	Power Seq.	Note
1	$V_{EE}T$	Transmitter Ground	1st	
2	TX_Fault	Transmitter Fault Indication	3rd	High: abnormal; Low: normal
3	TX_Disable	Transmitter Disable	3rd	High: transmitter disable; Low: transmitter enable. Internally 4.7k-10kΩpull-up.
4	MOD-DEF2	Module Definition 2	3rd	The data line of two wire serial interface
5	MOD-DEF1	Module Definition 1	3rd	The clock line of two wire serial interface
6	MOD-DEF0	Module Definition 0	3rd	Connected to Ground in the transceiver
7	Reset	Receiver Reset	3rd	High: reset the receiver
8	SD	Signal Detect	3rd	High: signal detected; Low: loss of signal;
9	RSSI Trigger	RSSI Trigger for Transceiver A/D Conversion	3rd	High: enable RSSI A/D conversion
10	$V_{EE}R$	Receiver Ground	1st	
11	$V_{EE}R$	Receiver Ground	1st	
12	RD-	Inv. Receiver Data Out	3rd	LVPECL logic output, DC coupled
13	RD+	Receiver Data Out	3rd	LVPECL logic output, DC coupled
14	$V_{EE}R$	Received Ground	1st	
15	$V_{CC}R$	Receiver Power	2nd	
16	$V_{CC}T$	Transmitter Power	2nd	
17	$V_{EE}T$	Transmitter Ground	1st	

18	TD+	Transmit Data In	3rd	LVPECL logic input, AC coupled
19	TD-	Inv. Transmit Data In	3rd	LVPECL logic input, AC coupled
20	$V_{EE}T$	Transmitter Ground	1st	

Typical Application Circuit



Digital Diagnostic Memory Map



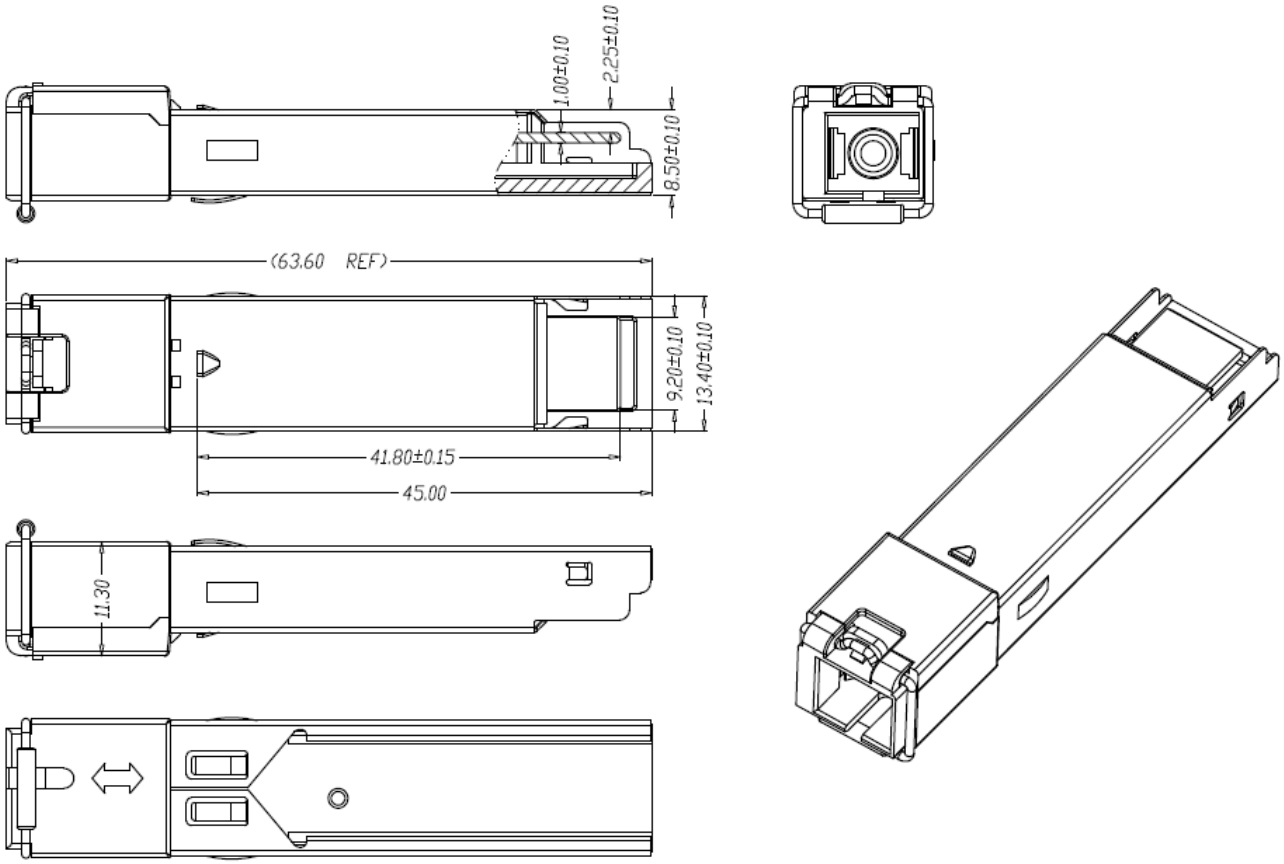
EEPROM Serial ID Memory Contents

The optical transceiver contains an EEPROM. It provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information. When the serial protocol is activated, the host generates the serial clock signal (SCL, Mod Def 1). The positive edge clocks data into those segments of the EEPROM that are not writing protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 - 95 at wire serial bus address A2h. The digital diagnostic memory map specific data fields define as following.

Package Outline

Dimensions are in millimeters. All dimensions are ±0.1mm unless otherwise specified. (Unit: mm)



Ordering Information

Part Number	Specifications				
	Package	Data Rate (Gbps)	Wavelength (nm)	Reach (km)	Temperature (°C)
GTP-NS21-40CD7	SFP SC	Tx:2.488/Rx:1.244	Tx:1490/Rx:1310	40	-5~70
GTP-NS21-40ID7	SFP SC	Tx:2.488/Rx:1.244	Tx:1490/Rx:1310	40	-40~85

Version History

Date	Version	Description
2025.3.5	V1.1	First Release