

### 3HE15378AA-40-C

Alcatel-Lucent Nokia® 3HE15378AA-40 Compatible TAA 25GBase-BX SFP28 Transceiver (SMF, 1270nmTx/1310nmRx, 40km, LC, DOM, -40 to 85C)

#### Features:

- SFF-8402 and SFF-8472 Compliance
- Simplex LC Connector
- Single-mode Fiber
- Industrial Temperature -40 to 85 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection



#### Applications:

- 25GBase Ethernet
- Access and Enterprise

#### Product Description

This Alcatel-Lucent Nokia® 3HE15378AA-40 compatible SFP28 transceiver provides 25GBase-BX throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1270nmTx/1310nmRx via an LC connector. It is guaranteed to be 100% compatible with the equivalent Alcatel-Lucent Nokia® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.3		4.0	V	
Storage Temperature	TS	-40		85	°C	
Operating Case Temperature	Tc	-40	25	85	°C	
Relative Humidity	RH	5		95	%	
Data Rate	BR		24.33 25.78		Gb/s	
Bit Error Rate	BER			$5 \times 10^{-5}$		1
Supported Link Length on 9/125umSMF, 25.78Gb/s	L		40		km	2

### Notes:

1. Tested with a PRBS  $2^{31}-1$  test pattern for 25.78Gb/s operation.
2. Distances are based on FC-PI-6 Rev. 3.1 and IEEE 802.3 standards, with FEC.

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes	
Power Supply Voltage	VCC	3.135	3.3	3.465	V		
Module Supply Current	I <sub>cc</sub>			450	mA		
Power Dissipation	PD			1500	mW		
<b>Transmitter</b>							
Input Differential Impedance	Z <sub>IN</sub>		100		Ω		
Differential Data Input Swing	V <sub>IN</sub> , P-P	180		700	mVP-P		
TX_FAULT	Transmitter Fault	VOH	2.0		VCCHOST	V	
	Normal Operation	VOL	0		0.8	V	
TX_DISABLE	Transmitter Disable	VIH	2.0		VCCHOST	V	
	Transmitter Enable	VIL	0		0.8	V	
<b>Receiver</b>							
Output Differential Impedance	Z <sub>O</sub>		100		Ω		
Differential Data Output Swing	V <sub>OUT</sub> , P-P	300		850	mVP-P	1	
Data Output Rise Time, Fall Time	t <sub>r</sub> , t <sub>f</sub>			15	ps	2	
RX_LOS	Loss of signal (LOS)	VOH	2.0		VCCHOST	V	3
	Normal Operation	VOL	0		0.8	V	3

### Notes:

1. Internally AC coupled, but requires an external 100Ω differential load termination.
2. 20–80%.
3. LOS is an open collector output. Should be pulled up with 4.7kΩ on the host board.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Launch Optical Power	P <sub>o</sub>	0		+5	dBm	1
Center Wavelength Range	λ <sub>c</sub>	1300	1310	1320	nm	
Extinction Ratio	EX	3.5			dB	2
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Rise/Fall Time @25.78Gb/s	tr/tf	15			ps	3
Optical Return Loss Tolerance	ORLT			12	dB	
Pout @TX-Disable Asserted	P <sub>off</sub>			-30	dBm	1
<b>Receiver</b>						
Center Wavelength	λ <sub>c</sub>	1260	1270	1280	nm	
Receiver OMA Sensitivity	RxSENS			-18	dBm	4
Receiver Overload (P <sub>avg</sub> )	POL	-5			dBm	
Optical Return Loss	ORL	26			dB	
LOS De-Assert	LOSD			-19	dBm	
LOS Assert	LOSA	-35			dBm	
LOS Hysteresis		0.5			dB	

### Notes:

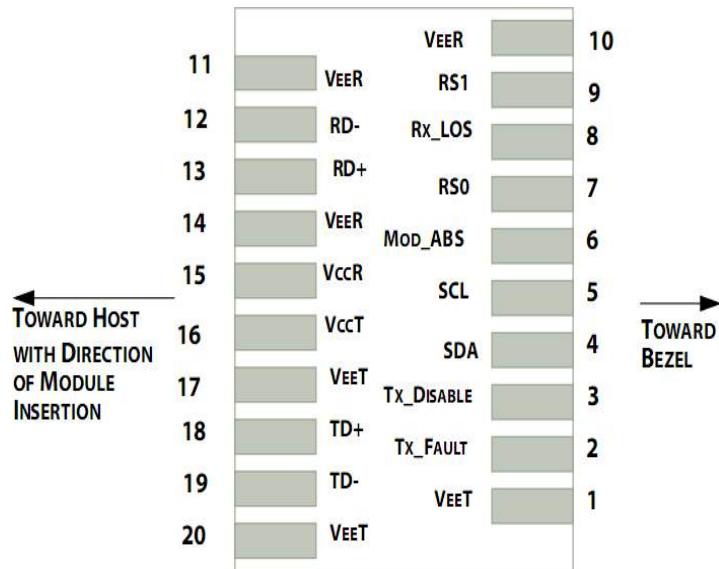
1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. 20dB spectral width.
3. Unfiltered, 20-80%
4. Measured with PRBS 2<sup>31</sup>-1 at 5×10<sup>-5</sup> BER.

## Pin Descriptions

Pin	Symbol	Name/Descriptions	Notes
1	VeeT	Transmitter Ground	1
2	TX_Fault	Transmitter Fault (LVTTTL-O) - High indicates a fault condition	2
3	TX_Disable	Transmitter Disable (LVTTTL-I) – High or open disables the transmitter	3
4	SDA	Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)	4
5	SCL	Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1)	4
6	MOD_ABS	Module Absent (Output), connected to VeeT or VeeR in the module	5
7	RS0	NA	6
8	RX_LOS	Receiver Loss of Signal (LVTTTL-O)	2
9	RS1	NA	6
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out (CML-O)	
13	RD+	Received Data out (CML-O)	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power - +3.3V	
16	VccT	Transmitter Power - +3.3 V	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Data In (CML-I)	
19	TD-	Inverse Transmitter Data In (CML-I)	
20	VeeT	Transmitter Ground	1

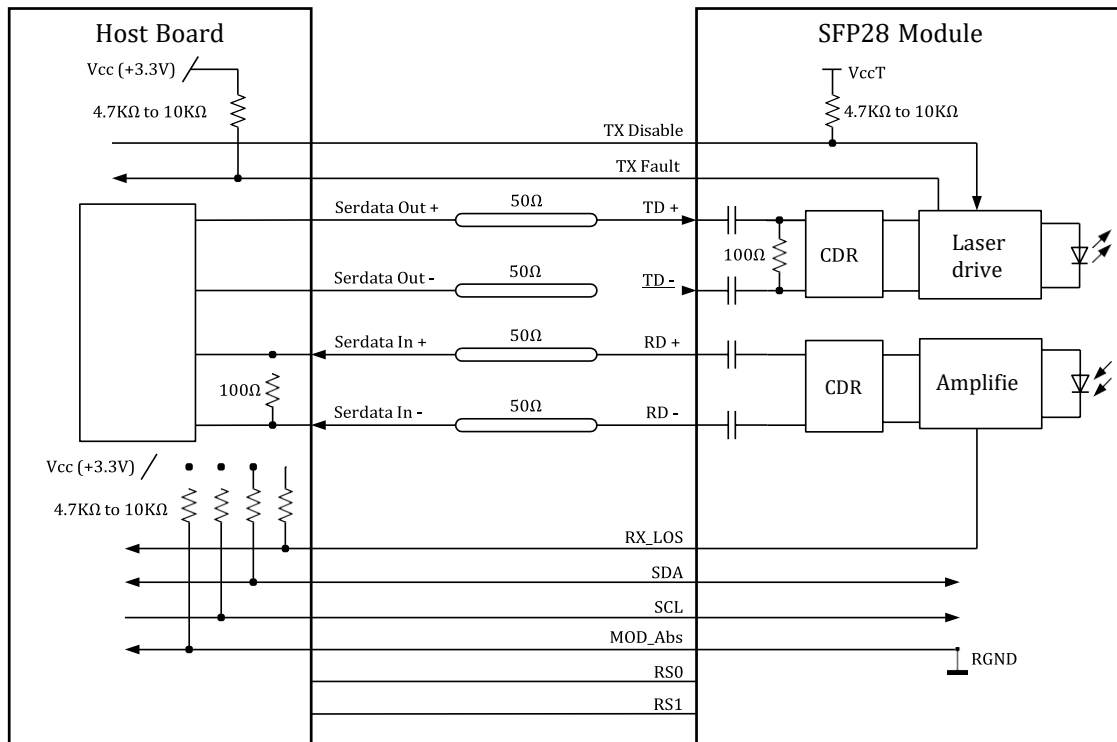
### Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.
3. This input is internally biased high with a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccT.
4. Two-Wire Serial interface clock and data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that on the host board requires a 4.7K $\Omega$  to 10K $\Omega$  pull-up resistor to VccHost.
6. Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 12.1, Rx Rate Select is set at Bit 3, Byte 110, Address A2h. Tx Rate Select is set at Bit 3, Byte 118, Address A2h.  
Note: writing a “1” selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.

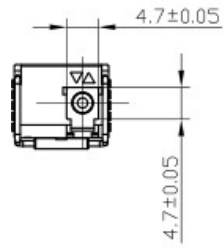


Pin-out of connector Block on Host board

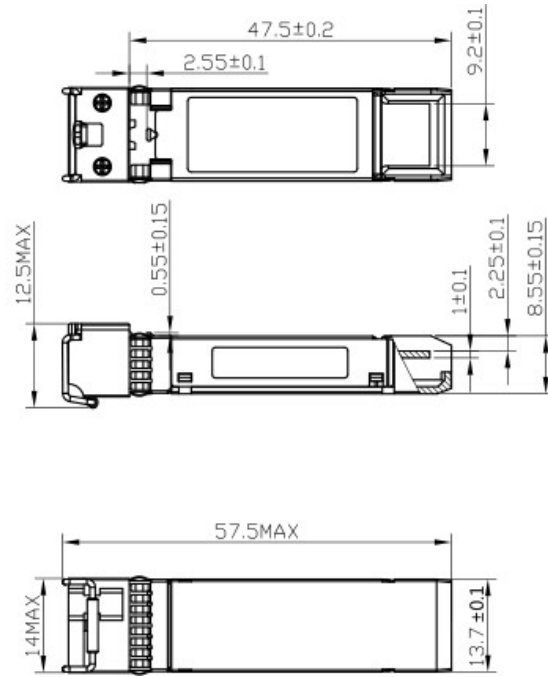
### Recommended Application Interface Block Diagram



# Mechanical Specifications



Unit:mm



## **About ProLabs**

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

## **Complete Portfolio of Network Solutions**

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## **Trusted Partner**

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.

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