

## NT-SFP28-25G-LR

25GBASE-LR SFP28 Transceiver Module, Singlemode, 1310nm, 10km Reach

### Features

- Supports 25.78125Gb/s serial optical interface
- Up to 10km transmission on SMF
- 1310nm DFB laser and PIN receiver
- Hot-pluggable SFP28 footprint
- Built-in digital diagnostic functions
- Single +3.3V power supply
- Power consumption less than 1.2 W
- Internal CDR on both transmitter and receiver channel
- Support CDR bypass
- SFP28 MSA package with Duplex LC connector
- ROHS compliant and lead-free
- Operating Temperature: Standard 0~70°C, Industrial -40~85°C



### Applications

- 25GBASE-LR 25G Ethernet
- 25.78125 Gb/s single lane 100GE LR4
- Other optical links

### Description

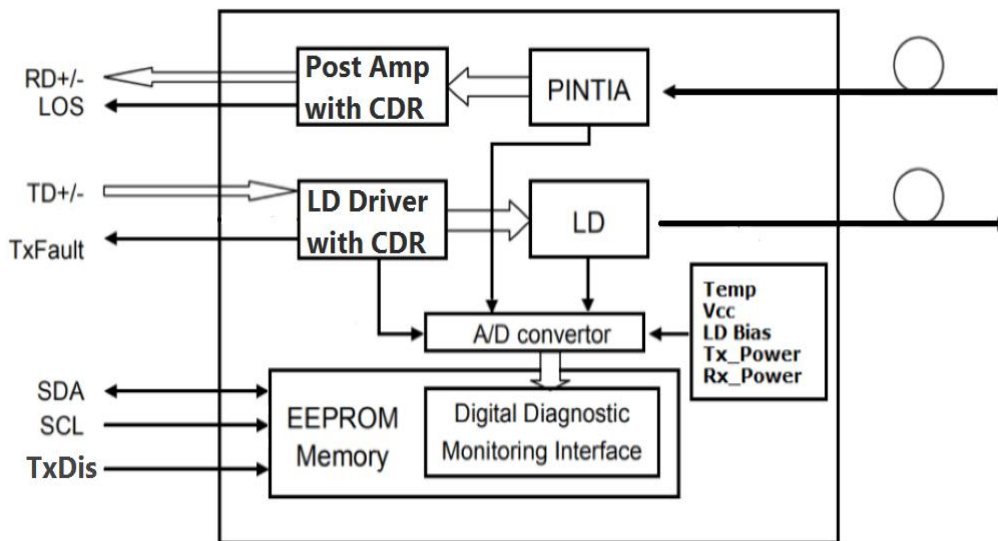
Netiks SFP28-25G-LR is a high performance and cost effective SFP28 LR optical transceiver module for 25 Gigabit Ethernet long reach application. This SFP28 LR optics module features a highly reliable 1310nm DFB transmitter and PIN photo-detector into duplex LC optical connector, providing links up to 10km over single mode fiber.

The SFP28 LR transceiver optics complies with current specifications of IEEE 802.3, SFF-8472, SFF-8402, SFF-8432 and SFF-8431. It's suitable for use with 25GbE Ethernet switches, routers, network interface cards (NICs) and storage networking equipment. The SFP28 LR optics offers the most power efficient way to meet the growing needs of the next-generation data center networking environment.

Additionally, the SFP28 LR transceiver optics has been integrated with digital diagnostic monitoring interface (DDMI) per SFF-8472, which provides real-time monitoring of the transceiver temperature, laser bias current, optical power, received optical power and transceiver supply voltage. All SFP28 transceiver optics are Class 1 laser products comply with FDA/CDRH and IEC-60825 standards.

There are two versions of the series 25GBASE-LR SFP28 transceiver for different applications. The Standard grade (0~70°C) is for commonly commercial application, the Industrial grade (-40~85°C) is made with robust and reliable components to meet the needs of Industrial Ethernet application under harsh environmental conditions. Industrial optical transceivers have an "IND" suffix in the PN.

### Transceiver functional diagram



## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	T <sub>s</sub>	-40	85	°C	
Operating Humidity	RH	5	85	%	

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			350	mA	
Case Operating Temperature	T <sub>c</sub>	0		70	°C	Standard
		-10		85	°C	Extended
		-40		85	°C	Industrial
Data Rate	BR		25.78125		Gbps	
<b>Maximum Supported Distances</b>						
OS2	T <sub>D</sub>			10	km	1

**Note :** 1: Measured with ITU-T G.652 SMF

## Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	λ <sub>c</sub>	1290	1310	1330	nm	

Spectral Width (RMS)		$\Delta\lambda$		1.0	nm	
Side-Mode Suppression Ratio		SMSR	30	-	dB	
Average Output Power		$P_{out}$	-7.0	+2.0	dBm	1
Extinction Ratio		ER	3.5		dB	
Data Input Swing Differential		$V_{IN}$	180	1200	mV	2
Input Differential Impedance		$Z_{IN}$	90	100	$\Omega$	
TX Disable	Disable		2.0	$V_{cc}$	V	
	Enable		0	0.8	V	
TX Fault	Fault		2.0	$V_{cc}$	V	
	Normal		0	0.8	V	
<b>Receiver</b>						
Centre Wavelength		$\lambda_c$	1260	1620	nm	
Receiver Sensitivity				-12.0	dBm	3
Receiver Overload			0.5		dBm	3
LOS De-Assert		$LOS_D$		-15.0	dBm	
LOS Assert		$LOS_A$	-25		dBm	
LOS Hysteresis			0.5	5	dB	
Data Output Swing Differential		$V_{out}$	300	850	mV	4
LOS	High		2.0	$V_{cc}$	V	
	Low			0.8	V	

#### Note :

1. The optical power is launched into MMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with worst ER=2.0dB, RPBS 2^31-1 test pattern @25.78125Gbps BER=<5E-5.
4. Internally AC-coupled.

#### Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	$t_{on}$			1	ms
Tx Disable Assert Time	$t_{off}$			10	$\mu s$
Time To Initialize, including Reset of Tx Fault	$t_{init}$			300	ms
Tx Fault Assert Time	$t_{fault}$			100	$\mu s$
Tx Disable To Reset	$t_{reset}$	10			$\mu s$
LOS Assert Time	$t_{loss_{on}}$			100	$\mu s$
LOS De-assert Time	$t_{loss_{off}}$			100	$\mu s$
Serial ID Clock Rate	$f_{serial\_clock}$		100	400	KHz
MOD_DEF (0:2)-High	$V_H$	2		$V_{cc}$	V

MOD_DEF (0:2)-Low	V <sub>L</sub>			0.8	V
-------------------	----------------	--	--	-----	---

## Diagnostics

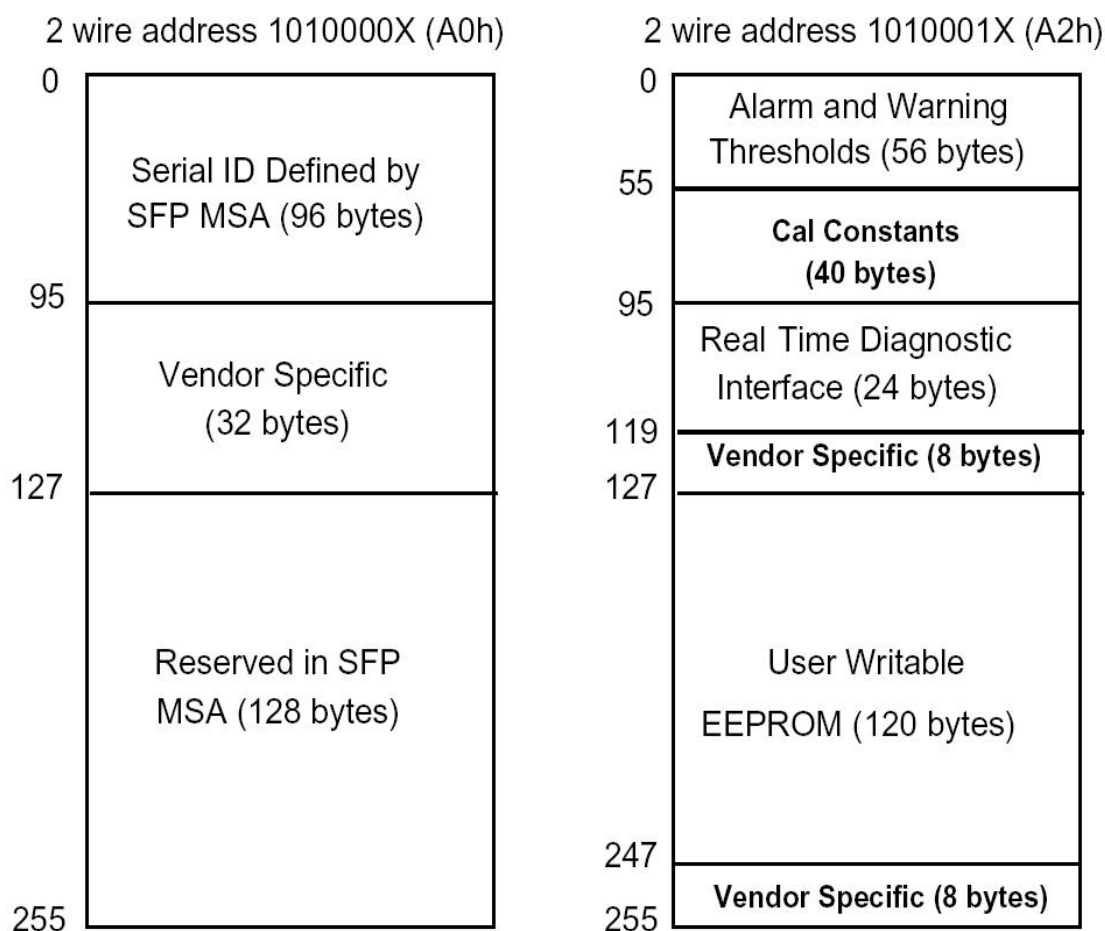
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal
	-10 to +85			
	-40 to +85			
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 90	mA	±10%	Internal
TX Power	-7.0 to +3.0	dBm	±3dB	Internal
RX Power	-14 to +3.0	dBm	±3dB	Internal

## Digital Diagnostic Memory Map

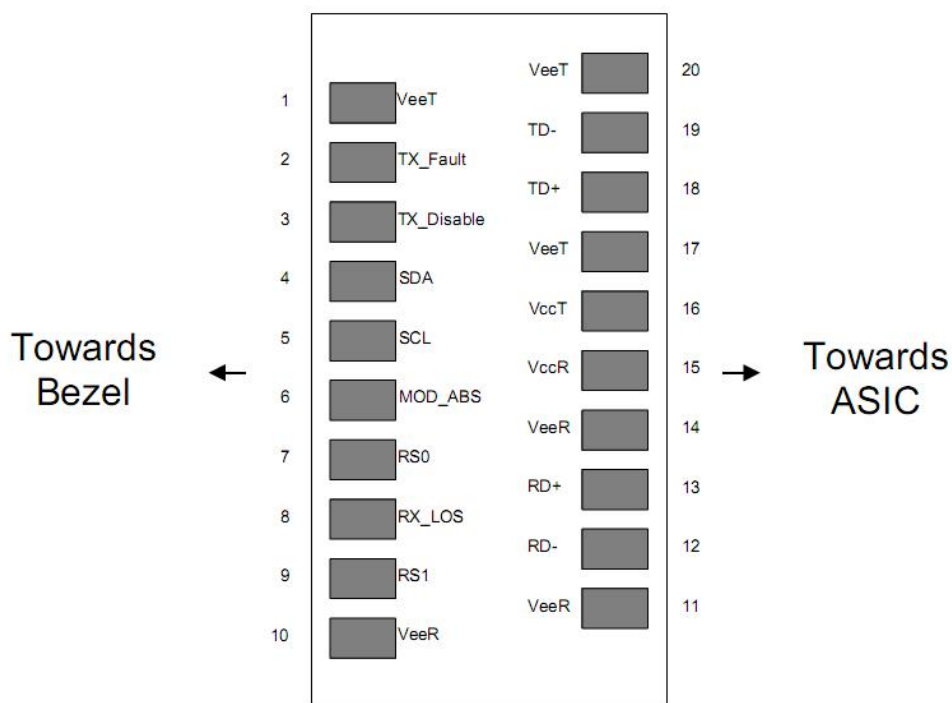
The 25GBASE-LR SFP28 transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



## Pin Definitions



## Pin Descriptions

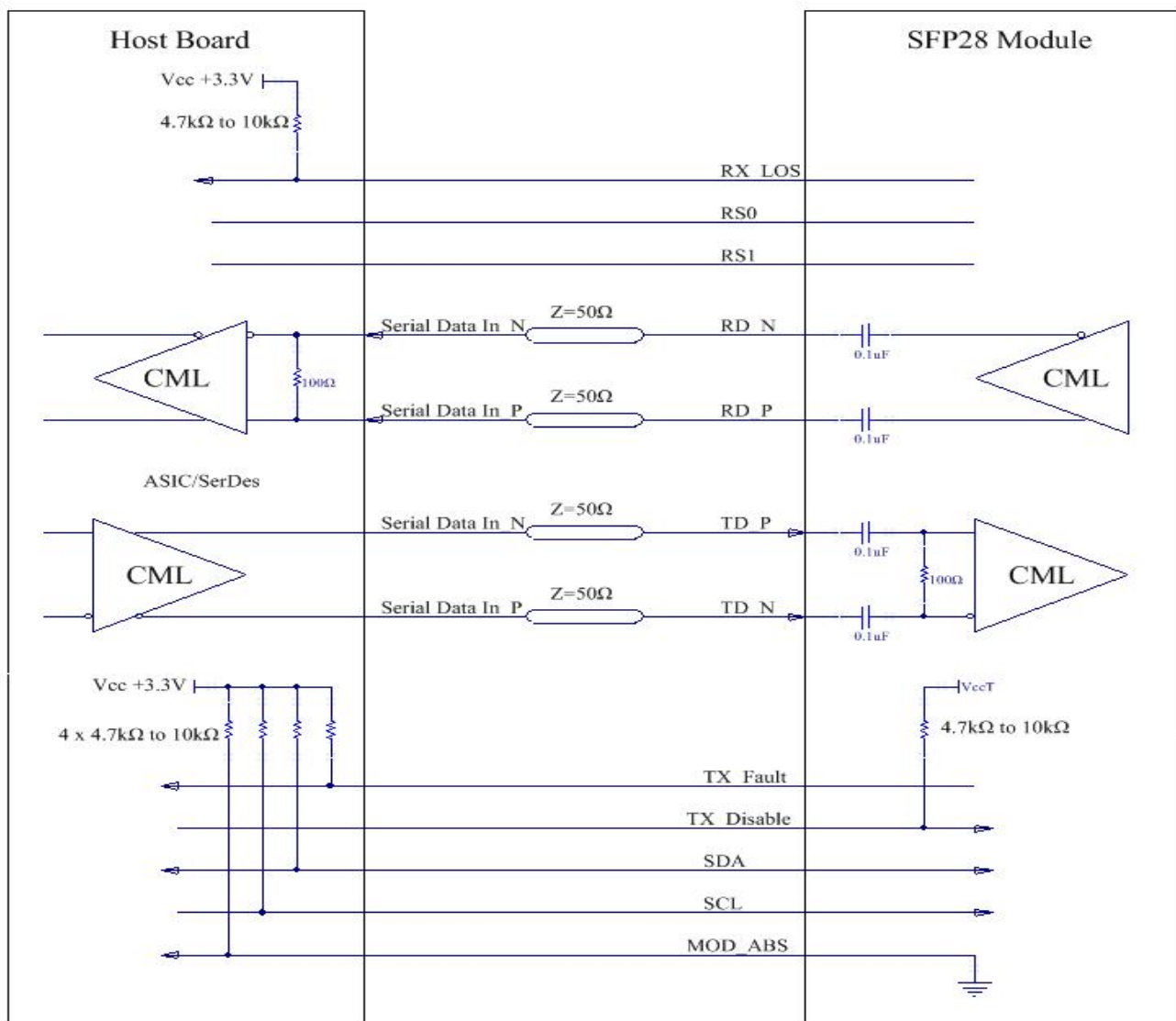
Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	V <sub>EET</sub>	Transmitter Ground	1	

## Notes:

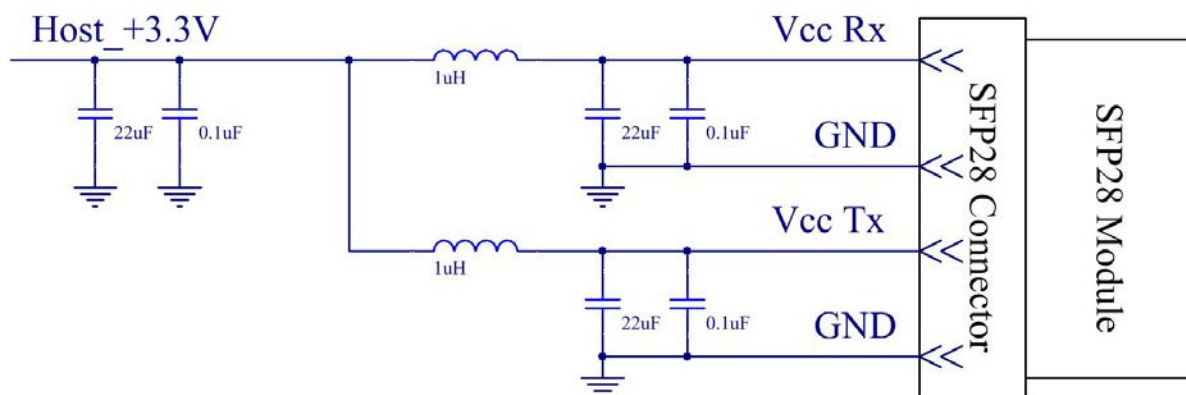
Plug Seq.: Pin engagement sequence during hot plugging.

1. Open collector/drain output, which should be pulled up with a 4.7k $\Omega$  to 10k $\Omega$  resistor on the host board if intended for use. Pull up voltage should be between 2.0V to 3.6V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
2. Laser output disabled on Tx\_Disable >2.0V or open, enabled on Tx\_Disable <0.8V.
3. LOS is open collector output. Should be pulled up with 4.7k $\Omega$  to 10k $\Omega$  on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
4. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 $\Omega$  differential lines which should be terminated with 100 $\Omega$  (differential) at the user SERDES.
5. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100 $\Omega$  differential termination inside the module.

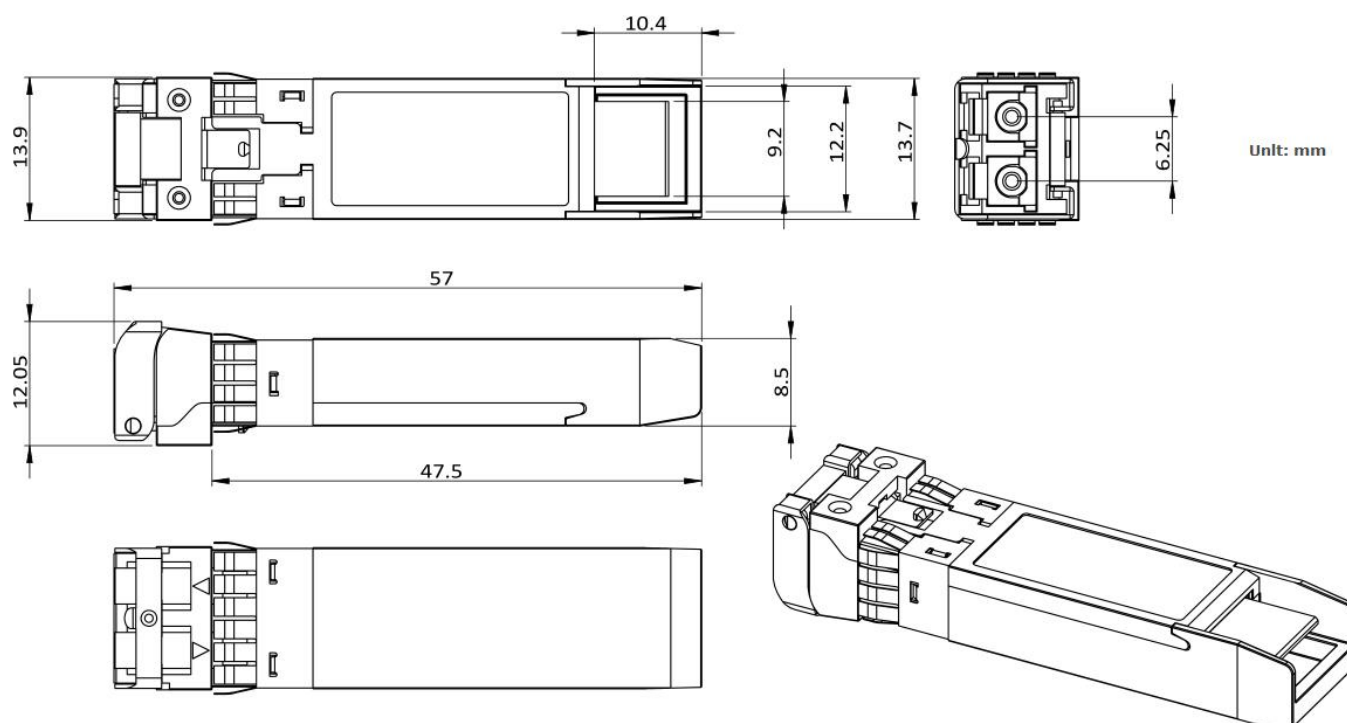
## Recommended Interface Circuit



## Recommended Host Board Power Supply Circuit



## Mechanical Dimensions



## Ordering information

Part number	Description
NT-SFP28-25G-LR	25GBASE-LR SFP28 Transceiver, Multi-mode, 1310nm, 10km, LC, DDM, 0°C~+70°C
NT-SFP28-25G-LR-IND	25GBASE-LR SFP28 Industrial TR, Multi-mode, 1310nm, 10km, LC, DDM, -40°C~+85°C

## Warnings

### **Process plug**

The transceiver optics is supplied with a dust cover. This plug protects the transceiver optics during standard manufacturing processes by preventing contamination from air borne particles. It is recommended that the dust cover remain in the transceiver whenever an optical fiber connector is not inserted.

### **Handling Precautions**

The transceiver optics is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

### **Laser Safety**

The transceiver optics is a Class 1 laser product per international standard IEC 60825-1. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

## Standards

Netiks optical transceivers comply with the requirements set out in the Council Directive relating to Electromagnetic Compatibility Directive on (2014/30/EU). For the evaluation regarding the EMC, the following standards were applied:

**EN 55032 (2012+AC: 2013)**

**EN 61000-3-2 (2014)**

**EN 61000-3-3 (2013)**

**EN 55024 (2010)**

For more product information, visit us on the web at [www.netiks.rs](http://www.netiks.rs)



Copyright © 2021 Netiks. All rights reserved. NT-SFP and Netiks logo are registered trademarks of Netiks Co., Ltd. All other brands, product names, or trademarks mentioned are the property of their respective owners. Specifications and product availability are subject to change without notice. Netiks assumes no responsibility for inaccuracies contained herein.

