



## **25Gbps 1310nm SMF 40km SFP28 Optical Transceiver with Duplex LC Connector**

**CS13-25GF-3L-Tx-L**



### **DESCRIPTION**

The CS13-25GF-3L-Tx-L SFP28 optical transceivers are designed for use in Ethernet links up to 25.78Gb/s data rate and provide up to 40km transmission distance over single-mode fiber at nominal wavelength of 1310nm. They are compliant with SFF-8472 diagnostic monitoring interface and compatible with SFP+ MSA SFF-8431. The optical transceiver is RoHS compliant.

### **FEATURES**

- Up to 25.78 Gb/s data links
- Compliant with SFP+ MSA SFF-8431
- Compliant with SFF8472 diagnostic monitoring interface
- Duplex LC connector
- Single power supply 3.3V
- Hot pluggable
- EML laser and APD receiver
- Support CPRI line bit rate option 10: 24330.24 Mbit/s
- Class 1 laser product compliant with EN 60825-1
- Link distance up to 40km single mode fiber
- Input/Output: AC/AC

### **APPLICATIONS**

- 25GBASE-ER

### **PRODUCT OVERVIEW**

<b>PART NUMBER</b>	<b>OPERATING TEMPERATURE</b>
CS13-25GF-3L-TC-L	0°C to 70°C
CS13-25GF-3L-TI-L	-40°C to 85°C

**DIAGNOSTICS**

PARAMETER	RANGE	ACCURACY	UNIT	CALIBRATION
Internal Transceiver Temperature	-40 to 85	±3	°C	Internal
Internal Transceiver Voltage	3.14 to 3.46	±0.1	V	
Bias Current	0 to 120	±10%	mA	
TX Power	-1 to +6	±3	dB	
RX Average Power	-5 to -19	±3	dB	

**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	MIN	MAX	UNIT
Storage Temperature	$T_s$	-40	85	°C
Supply Voltage	$V_{CC}$	-0.4	3.6	V
Operating Relative Humidity	RH	5	85	%

**RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTES
Case Operating Temperature	$T_c$	0	70	°C	CS13-25GF-3L-TC-L
		-40	85		CS13-25GF-3L-TI-L
Supply Voltage	$V_{CC}$	3.14	3.46	V	CS13-25GF-3L-TC-L
Supply Current @ 3.3V	$I_{TX} + I_{RX}$		462	mA	CS13-25GF-3L-TI-L
			578		
Power Consumption @ 3.3V	P		1.6	W	CS13-25GF-3L-TC-L
			2		CS13-25GF-3L-TI-L

**TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS ( $V_{CC} = 3.14V$  to  $3.46V$ ,  $T_c = 0^\circ C$  to  $70^\circ C$ ,  $-40^\circ C$  to  $85^\circ C$ )**

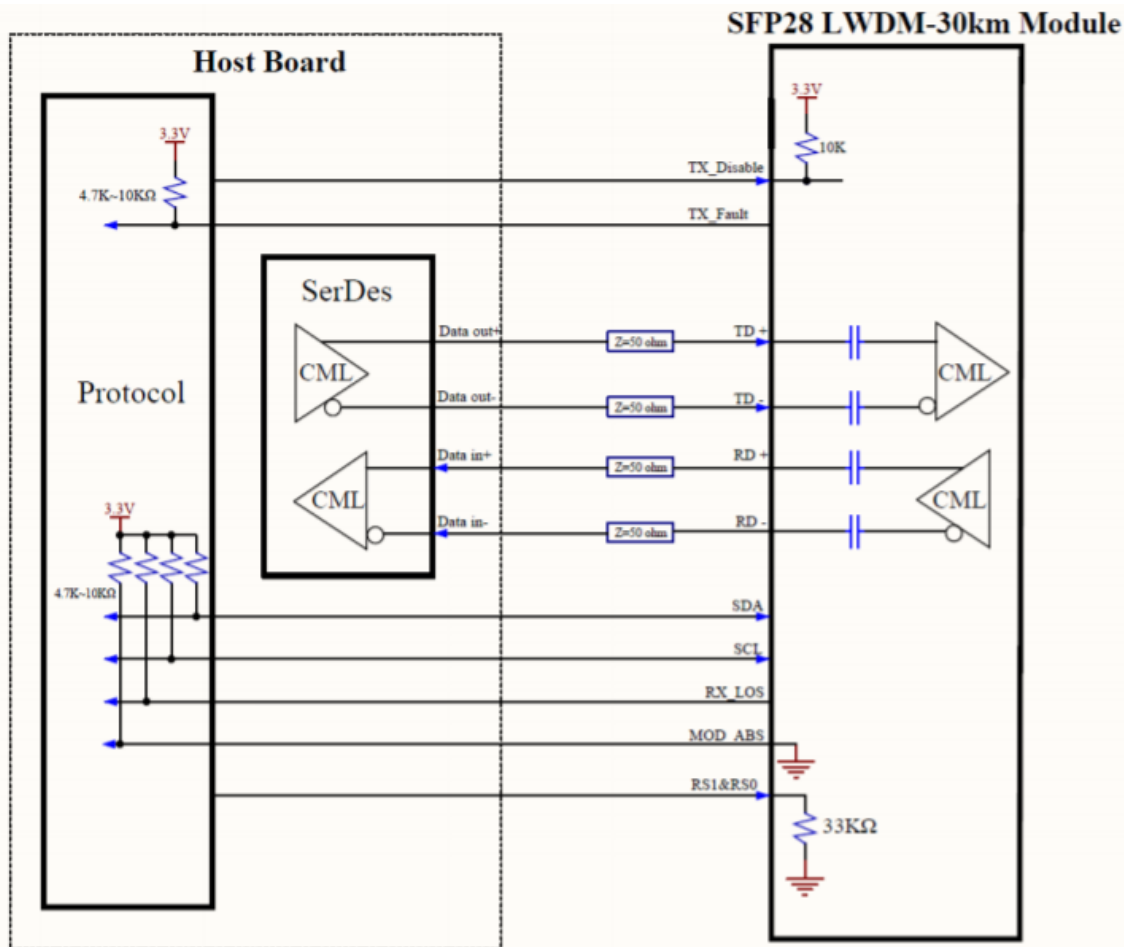
PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT
Data Rate	B	24	25.78	26.5	Gbps
Average Launch Power	$P_{IN}$	-1	-	+6	dBm
Optical Modulation Amplitude (OMA)	$P_{oma}$	0		+6	dBm
Extinction Ratio	ER	6.5			dB
Center Wavelength	$\lambda_c$	1300	1310	1320	nm
Spectral Width (-20dB)	$\Delta\lambda$	-	-	1	nm
Side Mode Suppression Ratio	SMSR	30			dB
Max. $P_{out}$ TX-DISABLE Asserted	$P_{OFF}$	-	-	-45	dBm
Transmitter and Dispersion Penalty	TDP			2.7	dB
OMA-TDP		-1			dBm
Differential Input Voltage	$V_{DIFF}$	200		1000	mV
Transmit Fault Output-Low	$TX\_FAULT_L$	0.0	-	0.5	V
Transmit Fault Output-High	$TX\_FAULT_H$	2.4	-	$V_{CC}$	V
TX_DISABLE Assert Time	$t_{off}$	-	-	100	μs
TX_DISABLE Negate Time	$t_{on}$	-	-	2	ms
Time to Initialize, include reset of TX_FAULT	$t_{init}$	-	-	300	ms
TX_FAULT assert for cooled module	$t_{fault}$	-	-	50	ms
TX_DISABLE Time to start reset	$t_{reset}$	10	-	-	μs

RECEIVER ELECTRO-OPTICAL CHARACTERISTICS ( $V_{CC} = 3.14V$  to  $3.46V$ ,  $T_C = 0^{\circ}C$  to  $70^{\circ}C$ ,  $-40^{\circ}C$  to  $85^{\circ}C$ )

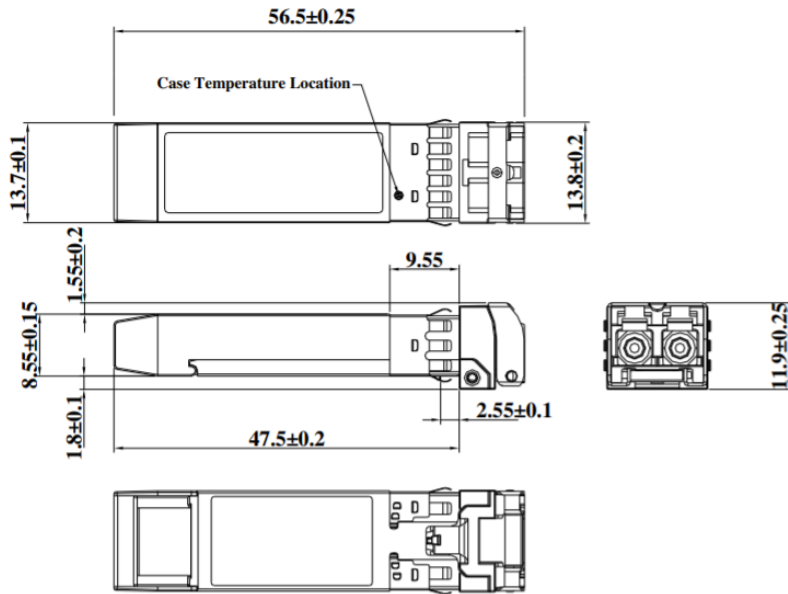
PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTES
Data Rate	B	24	25.78	26.5	Gbps	
Optical Input Power-Maximum	$P_{IN}$	-5	-	-	dBm	
Receiver Sensitivity (OMA)	$P_{IN}$	-	-	-19	dBm	@BER=5E-5
Stressed Receiver Sensitivity (OMA)	$P_{IN}$	-	-	-6.8	dBm	
Operating Center Wavelength	$\lambda_C$	1270	-	1330	nm	
Optical Return Loss	ORL	26	-	-	dB	
Channel Insertion Loss				18	dB	(1)
Loss of Signal-Asserted	$P_A$	-35	-	-	dBm	
Loss of Signal-Deasserted	$P_D$	-	-	-20	dBm	
Differential Output Voltage	$V_{DIFF}$	500	-	1000	mV	
Receiver Loss of Signal Output Voltage-Low	RX_LOS <sub>L</sub>	0	-	0.5	V	
Receiver Loss of Signal Output-High	RX_LOS <sub>H</sub>	2.4	-	$V_{CC}$	V	
Receiver Loss of Signal Assert Time (off to on)	$t_{A,RX\_LOS}$	-	-	100	$\mu s$	
Receiver Loss of Signal Assert Time (on to off)	$t_{D,RX\_LOS}$	-	-	100	$\mu s$	
Time to initialize	$t_{start\_up}$			10	s	

**Note (1):** Attenuation for such links needs to be less than the worst case for cables containing IEC 60793-2-50 type B1.1, type B1.3, or type B6\_a single-mode cabled optical fiber.

BLOCK DIAGRAM OF TRANSCEIVER

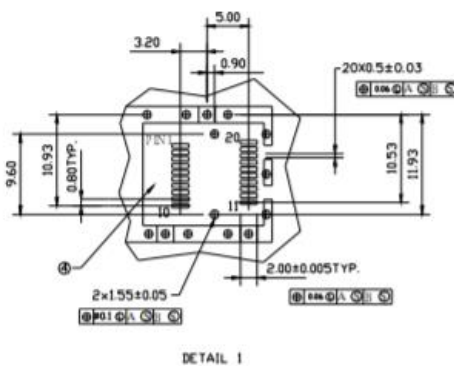
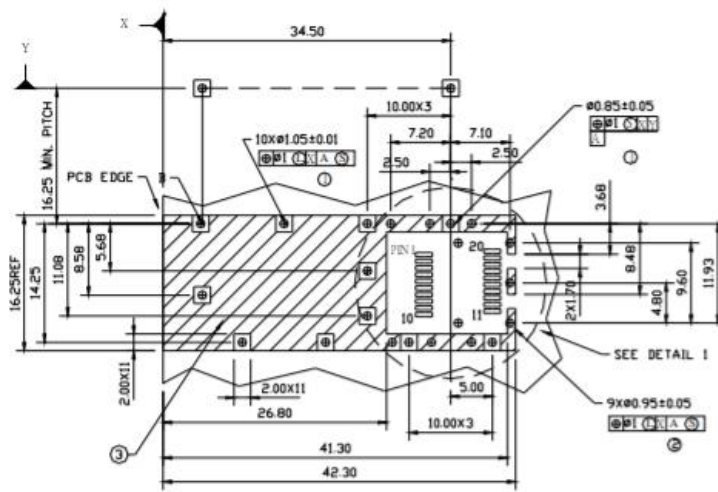


**DIMENSIONS (unit: mm)**



\*\*The bail color is red.

**SFP HOST BOARD MECHANICAL LAYOUT**



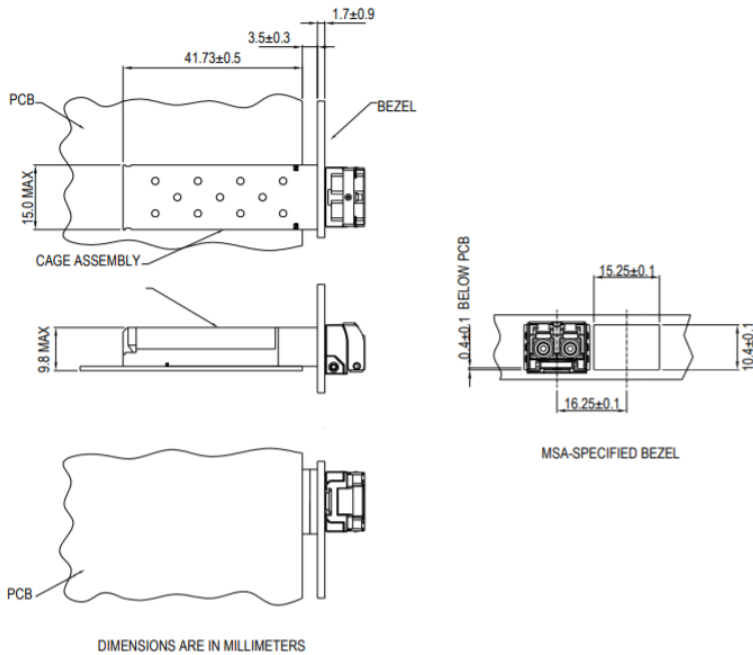
**LEGEND**

- 1. PADS AND VIAS ARE CHASSIS GROUND
- 2. THROUGH HOLES, PLATING OPTIONAL
- 3. HATCHED AREA DENOTES COMPONENT AND TRACE KEEPOUT (EXCEPT CHASSIS GROUND)
- 4. AREA DENOTES COMPONENT KEEPOUT (TRACES ALLOWED)

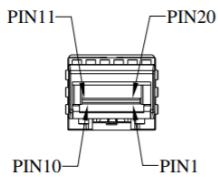
DIMENSIONS ARE IN MILLIMETERS

Unit: mm

**ASSEMBLY DRAWING**



**PIN ASSIGNMENT**



PIN	SIGNAL NAME	DESCRIPTION	PIN	SIGNAL NAME	DESCRIPTION
1	T <sub>GND</sub>	Transmit Ground	11	R <sub>GND</sub>	Receiver Ground
2	TX_FAULT	Transmit Fault	12	RX-	Receive Data Bar, ac coupled
3	TX_DISABLE	Transmit Disable	13	RX+	Receive Data, ac coupled
4	SDA	SDA Serial Data Signal	14	R <sub>GND</sub>	Receiver Ground
5	SCL	SCL Serial Clock Signal	15	V <sub>CCR</sub>	Receiver Power Supply
6	MOD_ABS	Internal connected to ground	16	V <sub>CCT</sub>	Transmitter Power Supply
7	RS0	Rate select 0, not used (2)	17	T <sub>GND</sub>	Transmitter Ground
8	RX_LOS	Receiver Loss of Signal, LVTTTL High, open collector	18	TX+	Transmit Data, ac coupled
9	RS1	Rate select 1, not used (2)	19	TX-	Transmit Data Bar, ac coupled
10	R <sub>GND</sub>	Receiver Ground	20	T <sub>GND</sub>	Transmitter Ground

Note (2): RS0 and RS1 are module inputs and are pulled low to VeeT with >30kΩ resistors in the module.

**ADDITIONAL NOTES**

- Avoid eye or skin exposure to laser radiations.
- The device is sensitive to electro-static discharge (ESD). The device should be handled with ESD proof tools. To assemble the device on PCB, proper grounding is required to prevent ESD.
- Specifications are subject to change without notice.



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