25G SFP28 CWDM 10Km DDM

SLSSC-25XX-10

Overview

SLSSC-25XX-10, this CWDM DFB 25Gb/s SFP28 LR transceiver is designed to transmit and receive optical data over single mode optical fiber.

The module optical connection is duplex LC and shall be compatible with 25G SFP28 pluggable and backward compatible with legacy 10G SFP+ pluggable. The SFP28 LR CWDM module is a dual directional device with a transmitter and receiver plus a control management interface (2-wire interface) in the same physical package. 2-wire interface is used for serial ID, digital diagnostics and module control function.

The SFP28 LR CWDM module electrical interface is compliant to OFI CEI-VSR-28G-VSR. It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference.

Features

- Compliant to IEEE802.3cc 25GBASE-LR
- Up to 25.78Gb/s data links
- CWDM DFB transmitter, PIN photo-detector
- Duplex LC Connector
- 25G electrical interface (OIF CEI-28G-VSR)
- 2-wire interface for management specifications compliant with SFF-8472 digital diagnostic monitoring interface for optical transceivers
- All-metal housing for superior EMI performance
- Maximum power consumption 1.5W
- Operating case temperature:
  Standard: 0 to +70°C
  Industrial: -40 to +85°C
- Advanced firmware allow customer system encryption information to be stored in transceiver
- RoHS compliant

Applications

- High-speed storage area networks
- Computer cluster cross-connect
- 25GE Ethernet
- eCPRI and CPRI

Ordering Information

Part Number	Product Description
SLSSC-25XX-10	SFP28 CWDM 25Gbps, 1270/1290/1310/1330/1350/1370nm, 10km, 0ºC ~ +70ºC
SLSSC-25XX-10T	SFP28 CWDM 25Gbps, 1270/1290/1310/1330/1350/1370nm, 10km, -40ºC ~ +85ºC

Notes:

1. XX = the wavelength support, available from 1270 (27) ~ 1370 (37) nm

Module Block Diagram

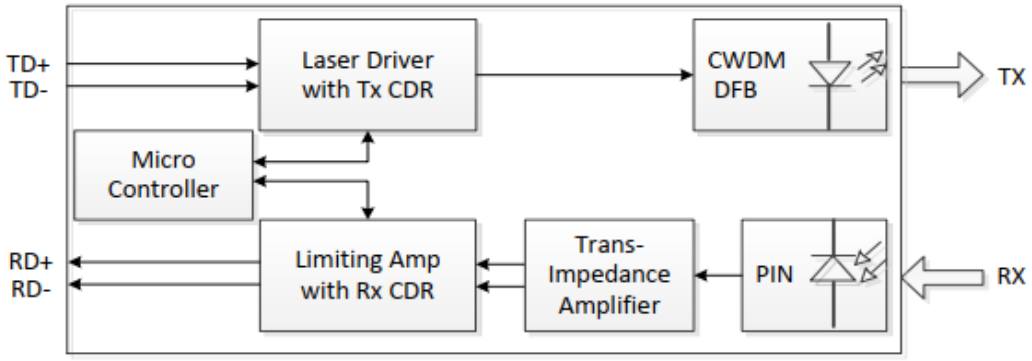

Figure 1: Transceiver Block Diagram

Absolute Maximum Rating

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameters		Symbol	Min.	Max.	Unit
Power Supply Voltage		V_{CC}	0	3.6	V
Storage Temperature		Tc	-40	85	°C
Operating Case Temperature	Standard	Tc	0	70	°C
	Industrial		-40	85	°C
Relative Humidity		RH	5	95	%
Damage Threshold		Pmax	3.5		dBm

Recommended Operating Condition

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter		Symbol	Min.	Typical	Max	Unit	Note
Operating Case Temperature	Standard	Tc	0		70	°C	
	Industrial		-40		85	°C	
Power Supply Voltage		V_{CC}	3.135	3.3	3.465	V	
Data Rate				25.78125		Gb/s	
Data Rate Operating Range			-100		100	ppm	
Control Input Voltage High			2		V_{CC}	V	
Control Input Voltage Low			0		0.8	V	
Link Distance with G.652		D	0.002		10	Km	1

Notes:

1. When the long distance is used, it is recommended to use FEC to guarantee the link budget

Transceiver Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Minimum	Typical	Maximum	Unit	Notes
Transmitter						
Center Wavelength	λt	Refer to ordering information			nm	
Center Wavelength Stability	ΔλD	-6.5		6.5	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	Pavg	-4		+2	dBm	1
Laser Off Power	Poff			-30	dBm	
Optical Modulation Amplitude	OMA	-4		+2.5	dBm	2
Launch power in OMA minus TDP	OMA-TDP	-5			dBm	
Extinction Ratio	ER	3.5			dB	
Transmitter Optical Eye Mask	{X1, X2, X3, Y1, Y2, Y3}	{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}				3
Optical Return Loss Tolerance	OTL			26	dB	
Transmitter Reflectance	T_R			-26	dB	
Relative Intensity Noise	$Rin_{20}OMA$			-130	dB/Hz	
Receiver						
Center Wavelength	λr	1260		1390	nm	
Damage Threshold	THd	3			dBm	4
Average Receive Power		-13.3		2.5		5
Receiver Sensitivity	Sens			-13.3	dBm	6
Receive overload				2		6
LOS Assert	LOSA	-30			dBm	
LOS Deassert	LOSD			-13	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Receiver Reflectance	R_R			-26	dB	

Notes:

1. Average optical power shall be measured using the methods specified in TIA/EIA-455-95.
2. Even if the TDP < 1 dB, the OMA (min) must exceed this value.
3. Hit ratio 5 x 10^{-5} hits per sample.
4. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.
5. Average receive power (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
6. Measured with a PRBS 231-1 test pattern @25.78Gps, BER ≤5×10-5.

Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Test Point	Minimum	Typical	Maximum	Unit	Notes
Power Consumption				1.5	W	
Supply Current	Icc			450	mA	
Transmitter						
Overload Differential Voltage pk-pk	TP1a	900			mV	
Common Mode Voltage (Vcm)	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential Conversion and Differential to Common Mode Conversion (SDC11, SCD11)	TP1			See CEI-28G-VSR Equation 13-20	dB	
Stressed Input Test	TP1a	See CEI-28G-VSR Section 13.3.11.2.1				
Receiver						
Differential Voltage, pk-pk	TP4			900	mV	
Common Mode Voltage (Vcm)	TP4	-350		2850	mV	1
Common Mode Noise, RMS	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1MHz
Differential Return Loss (SDD22)	TP4			See CEI-28G-VSR Equation 13-19	dB	
Common Mode to Differential Conversion and Differential to Common Mode Conversion (SDC22, SCD22)	TP4			See CEI-28G-VSR Equation 13-20	dB	
Common Mode Return Loss (SCC22)	TP4			-2	dB	2
Transition Time, 20 to 80%	TP4	9.5			ps	
Vertical Eye Closure (VEC)	TP4			5	dB	
Eye Width at 10^{-15} probability (EW15)	TP4	0.57			UI	
Eye Height at 10^{-15} probability (EH15)	TP4	228			mV	

Notes:

1. Vcm is generated by the host. Specification includes effects of ground offset voltage.
2. From 250MHz to 30GHz

Pin Definition

The SFP28 LR CWDM modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. Its connector and cage shall be compatible with 25G SFP28 pluggable (SFP28, SFF-8402) and backward compatible with legacy 10G SFP+ 10Gb/s (SFF-8083) pluggable, or stacked connector with equivalent electrical performance. Host PCB contact assignment is shown in Figure 2 and contact definitions are given in the PIN description table. SFP28 module contacts mate with the host in the order of ground, power, followed by signal as illustrated by Figure 3 and the contact sequence order listed in the PIN description table.

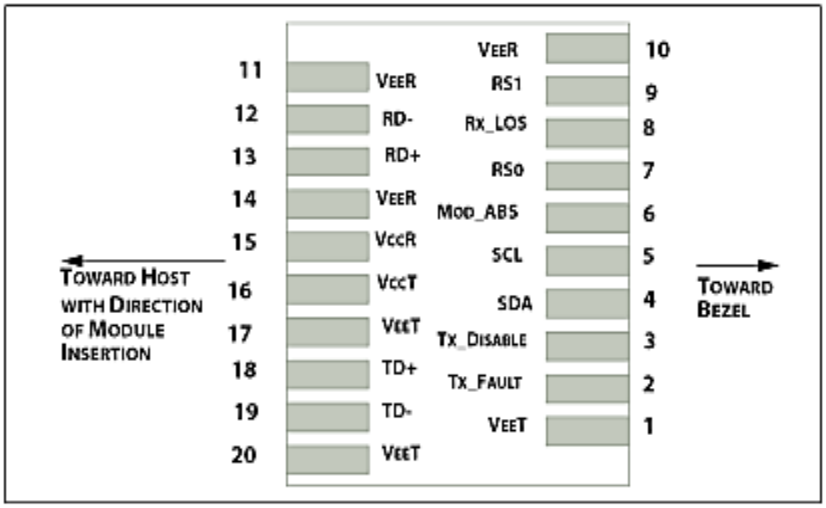

Figure 2: Interface to Host PCB

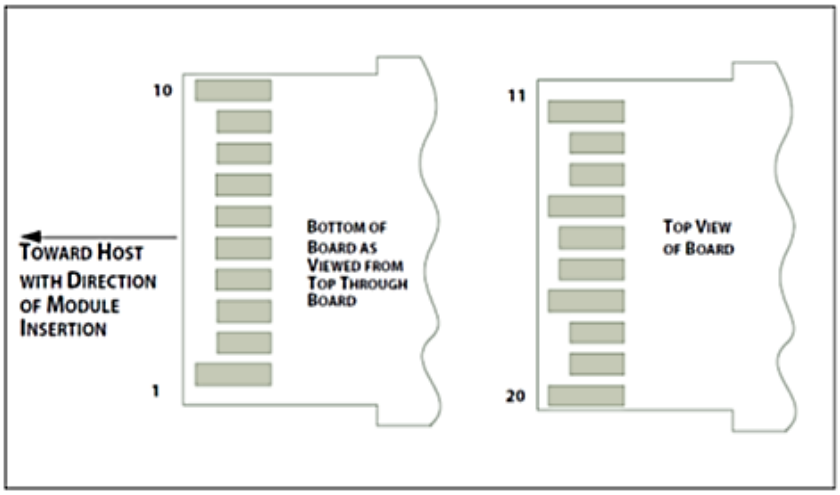

Figure 3: Module Contact Assignment

Pin Description

Pin	Logic	Symbol	Name/Description	Note
1		VEET	Transmitter Ground	1
2	LVTTL-O	TX_Fault	Transmitter Fault	
3	LVTTL-I	TX_Disable	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	Two wire serial interface Data Line	2
5	LVTTL-I	SCL	Two wire serial interface Clock	2
6		MOD_ABS	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTL-I	RS1	Transmitter Rate Select (not used)	
10		VeeR	Receiver Ground	1
11		VeeR	Receiver Ground	1
12	CML-O	RD-	Inverse Received Data output	
13	CML-O	RD+	Received Data output	
14		VeeR	Receiver Ground	1
15		VccR	Receiver Power 3.3V	
16		VccT	Transmitter Power 3.3 V	
17		VEET	Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Inverse Transmitter Data Input	
20		VEET	Transmitter Ground	1

Notes:

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up the voltage between 3.15V and 3.47V with 4.7K – 10Kohms on the host board.

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev12 with internal calibration mode.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	°C	Over operating temp
Laser power monitor absolute error	DMI_TX	-2	2	dB	1
RX power monitor absolute error	DMI_RX	-2	2	dB	1
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	

Notes:

1. Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

Control and Status I/O Timing Characteristics

Timing characteristics of control and status I/O are compatible with SFF-8431-MSA.

Parameter	*Symbol*	*Min.*	*Max.*	*Unit*	*Conditions*
Tx_Disable assert time	t_off		100	µs	Rising edge of Tx_Disable to fall of output signal below 10% of nominal
Tx_Disable negate time	t_on		2	ms	Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start up or fault recovery.
Time to initialize 2-wire interface	t_2w_start_up		300	ms	From power on or hot plug after the supply meeting SFF8431
Time to initialize	t_start_up		300	ms	From power supplies meeting SFF8431 or hot plug or Tx disable negated during power up, or Tx_Fault recovery, until non-cooled power level I part (or non-cooled power level II part already enabled at power level II for Tx_Fault recovery) is fully operational.
Time to initialize cooled module and time to power up a cooled module to Power Level II	t_start_up_cooled		90	s	From power supplies meeting SFF8431 or hot plug, or Tx disable negated during power up or Tx_Fault recovery, until cooled power level I part (or cooled power level II part during fault recovery) is fully operational. Also, from stop bit low-to-high SDA transition enabling Power Level II until cooled module is fully operational
Time to Power Up to Level II	t_power_level2		300	ms	From stop bit low-to-high SDA transition enabling power level II until non-cooled module is fully operational
Time to Power Down from Level II	t_power_down		300	ms	From stop bit low-to-high SDA transition disabling power level II until module is within power level I requirements
Tx_Fault assert	Tx_Fault_on		1	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault assert for cooled module	Tx_Fault_on_cooled		50	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault Reset	t_reset	10		µs	Time Tx_Disable must be held high to reset Tx_Fault
RS0, RS1 rate select timing for PC	t_RS0_PC, t_RS1_PC		500	µs	From assertion till stable output
RS0, RS1 rate select timing non PC	t_RS0, t_RS1		24	ms	From assertion till stable output
Rx_LOS assert delay	t_los_on		100	µs	From occurrence of loss of signal to assertion of Rx_LOS
Rx_LOS negate delay	t_los_off		100	µs	From occurrence of presence of signal to negation of Rx_LOS

Mechanical Specifications

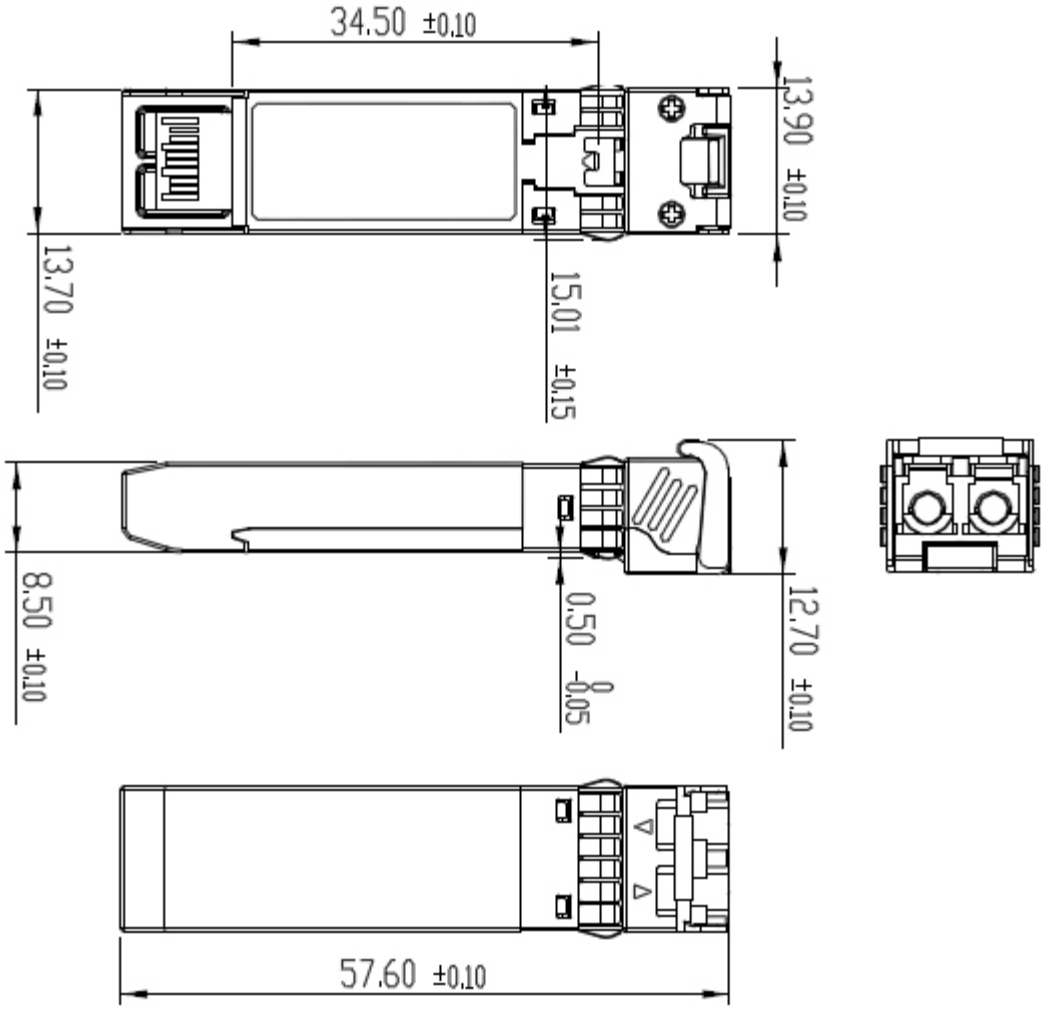

Figure4. Mechanical Specifications

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