

25Gb/s SFP28 DWDM Tunable LR 15km Transceiver SLT0SPLR025GDTLx

Features

- Up to 25.78125Gb/s data links
- Monolithically integrated full C-band tunable transmitter and APD receiver
- 50 GHz ITU channel spacing with integrated wavelength locker
- Up to 15km on 9/125μm SMF
- Smart Features: Self-Negotiation, Remote DDM, Remote WL Locking
- Hot-pluggable SFP+ footprint
- Duplex LC/UPC type pluggable optical interface
- RoHS-10 compliant and lead-free
- Support Digital Monitoring interface
- Single +3.3V power supply
- Compliant with SFF+MSA and SFF-8472 SFF-8431, SFF-8690 and G.698.1
- Metal enclosure, for lower EMI
- Case operating temperature
Commercial: 0 ~ +70°C
Extended: -10 ~ +85°C
Industrial: -40 ~ +85°C



Applications

- CPRI 9.8304Gb/s, 10.1376Gb/s, 24.33024Gb/s
- Ethernet 10.3125Gb/s, 25.78125Gb/s

Order Information

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Transmission Distance(km)	Temperature (°C) (Operating Case)
SLT0SPLR025GDTLC	25.78125	Refer to wavelength selection	15	0 ~ 70
SLT0SPLR025GDTLE	25.78125		15	-10 ~ 85
SLT0SPLR025GDTLI	25.78125		15	-40 ~ 85

Wavelength Selection: C-band λ_c Wavelength Guide Pin Descriptions

Channel (xx)	Wavelength (nm)	Frequency (THZ)	Channel (xx)	Wavelength (nm)	Frequency (THZ)
13	1567.13	191.30	37	1547.72	193.70
H3	1566.72	191.35	J7	1547.32	193.75
14	1566.31	191.40	38	1546.92	193.80
H4	1565.90	191.45	J8	1546.52	193.85
15	1565.50	191.50	39	1546.12	193.90
H5	1565.09	191.55	J9	1545.72	193.95
16	1564.68	191.60	40	1545.32	194.00
H6	1564.27	191.65	K0	1544.92	194.05
17	1563.86	191.70	41	1544.53	194.10
H7	1563.45	191.75	K1	1544.13	194.15
18	1563.05	191.80	42	1543.73	194.20
H8	1562.64	191.85	K2	1543.33	194.25
19	1562.23	191.90	43	1542.94	194.30
H9	1561.83	191.95	K3	1542.54	194.35
20	1561.42	192.00	44	1542.14	194.40
I0	1561.01	192.05	K4	1541.75	194.45
21	1560.61	192.10	45	1541.35	194.50
I1	1560.20	192.15	K5	1540.95	194.55
22	1559.79	192.20	46	1540.56	194.60
I2	1559.39	192.25	K6	1540.16	194.65
23	1558.98	192.30	47	1539.77	194.70
I3	1558.58	192.35	K7	1539.37	194.75
24	1558.17	192.40	48	1538.98	194.80
I4	1557.77	192.45	K8	1538.58	194.85

25	1557.36	192.50	49	1538.19	194.90
I5	1556.96	192.55	K9	1537.79	194.95
26	1556.55	192.60	50	1537.40	195.00
I6	1556.15	192.65	L0	1537.00	195.05
27	1555.75	192.70	51	1536.61	195.10
I7	1555.34	192.75	L1	1536.22	195.15
28	1554.94	192.80	52	1535.82	195.20
I8	1554.54	192.85	L2	1535.43	195.25
29	1554.13	192.90	53	1535.04	195.30
I9	1553.73	192.95	L3	1534.64	195.35
30	1553.33	193.00	54	1534.25	195.40
J0	1552.93	193.05	L4	1533.86	195.45
31	1552.52	193.10	55	1533.47	195.50
J1	1552.12	193.15	L5	1533.07	195.55
32	1551.72	193.20	56	1532.68	195.60
J2	1551.32	193.25	L6	1532.29	195.65
33	1550.92	193.30	57	1531.90	195.70
J3	1550.52	193.35	L7	1531.51	195.75
34	1550.12	193.40	58	1531.12	195.80
J4	1549.72	193.45	L8	1530.72	195.85
35	1549.32	193.50	59	1530.33	195.90
J5	1548.91	193.55	L9	1529.94	195.95
36	1548.51	193.60	60	1529.55	196.00
J6	1548.11	193.65	M0	1529.16	196.05
Non-ITU	Peak wavelength between 1529.16nm-1567.13nm				

Description

SLT0SPLR025GDTLx tunable transceiver is an integrated fiber optic transceiver that provides a high-speed serial link at signaling rates from 9.8304 Gb/s to 25.78125 Gb/s. The module complies with the 10 Gigabit Enhanced Small Form Factor Pluggable (SFP+) multisource agreement-MSA (SFF-8431) and SFF-8432 , SFF-8690 , SFF-8472. It complies with the ITU-T G.698.1 standard with 50 GHz channel spacing for SONET/SDH, IEEE DWDM 10GBASE-ZR for 80 km reach (Ethernet), and DWDM 10GFC for 80 km reach (Fiber Channel) applications.

The transceiver integrates the receiver and transmitter path on one module. The transceiver contains a C-band-tunable integrated Mach-Zehnder (MZ) laser, enabling data transmission over single-mode fiber through an industry-standard LC connector. On the receiver side, the 10 G/bps data stream is recovered from an APD/ trans-impedance amplifier, and passed to an output driver. This module features a hot-pluggable electrical interface.

SLT0SPLR025GDTLx transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP+ MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	VCC ₃	-0.5	-	+3.6	V	
Storage Temperature	T _s	-40	-	+85	°C	
Operating Humidity	RH	+5	-	+85	%	1
Receiver Damage Threshold per Lane	P _{IND}	0	-	-	dBm	

Note: 1 No condensation

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	TC	-40	-	+85	°C	
Power Supply Voltage	Vcc	3.14	3.3	3.47	V	
Power Supply Current	ICC	-		890	mA	

Data Rate	BR		25.78125		Gbps	
Link Distance (SMF)	D			15	km	

Pin Assignment and Pin Description

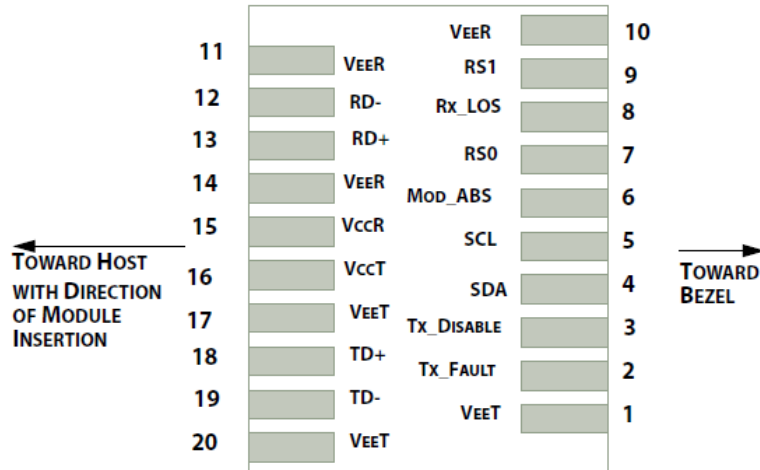


Figure 1. Diagram of host board connector block pin numbers and names

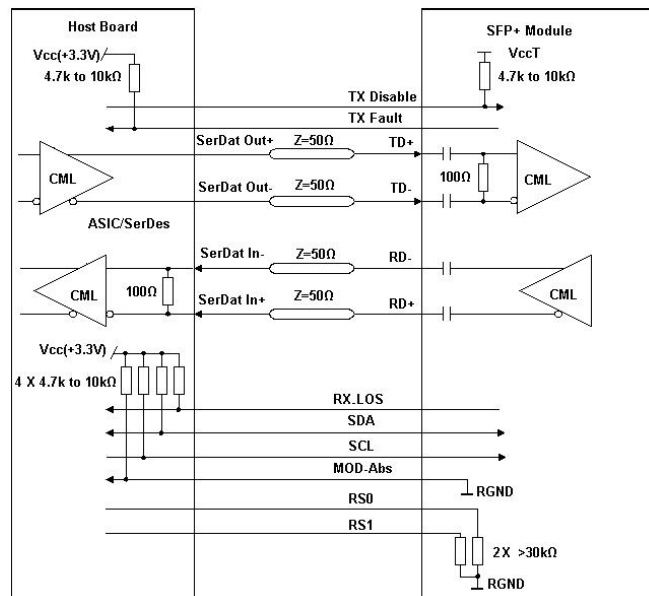
Pin	Symbol	Name/Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.	2
3	TDIS	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	

14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. TFAULT is an open collector/drain output, which should be pulled up with a 4.7kΩ-10kΩ resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. 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.
3. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
4. Should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Recommended Interface Circuit



Electrical Characteristics

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

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Power Consumption	p			2.8	W	
Supply Current	I _{cc}			890	mA	
Transmitter (each Lane)						
Input differential impedance	R _{in}		100		Ω	
Differential Termination Mismatch				10	%	
Differential Data Input Amplitude	V _{in, PP}	180		1000	mV	
FAULT and Disable	V _{IL}	-0.3		0.8	V	
	V _{IH}	2		V _{cc} +0.3	V	
Receiver						
Output differential impedance	R _{in}		100		Ω	
Differential Termination Mismatch				10	%	
Differential Data Output Amplitude	V _{out, PP}	300	600	850	mV	
LOS	V _{OL}	0		0.8	V	
	V _{OH}	2		V _{cc} +0.3	V	

Optical Characteristics

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

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength Range	λ _c	1529.16		1567.13	nm	1
Center Wavelength Spacing			50		GHz	
Average Optical Power	P _{AVG}	0		5	dBm	2

Side-mode suppression ratio	SMSR	30				
Spectral Width(-20dB)	$\Delta\lambda$			1	nm	
Optical Extinction Ratio	ER	6.0			dB	
Transmitter and Dispersion Penalty	TDP			3	dB	
Transmitter OFF Output Power	POff			-30	dBm	
Return Loss		12			dB	
Frequency stability (BOL)	-1.5			1.5	GHz	
Frequency stability (EOL)	-2.5			2.5	GHz	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-16	dBm	3
Receiver Sensitivity (EOL, 15km Fiber)	Sen.			-14	dBm	3
Input Saturation Power (overload)	Psat	0			dBm	
LOS Assert	LOSA	-27			dBm	
LOS De-assert	LOSD			-18	dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. corresponds to approximately 0.4 nm.
2. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
3. Measured with Light source 1529.16~1567.13nm, ER>6dB; BER≤5E-5 @PRBS=2³¹-1 NRZ.

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Symbol	Min.	Max	Unit	Range
Temperature monitor absolute error	DMI_Temp	-3	3	°C	

Supply voltage monitor absolute error	DMI_VCC	-3	3	%	
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor error	DMI_bias	-10	10	%	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Frequency and wavelength control

Frequency and wavelength control commands are detailed in the table below.

A2h Address	Bit	Name	Description
Bytes 144 (MSB) & 145 (LSB)	All	Channel Number Set	User input of wavelength channel # integer 1 to N (N=Number of channels)
Bytes 146 (MSB) & 147 (LSB)	All	Wavelength Set	User input of Wavelength setpoint. (Units of 0.05 nm)

Channel Number	Frequency (GHz)	Wavelength (nm)	Channel Number	Frequency (GHz)	Wavelength (nm)
1	191300	1567.13	49	193700	1547.72
2	191350	1566.72	50	193750	1547.32
3	191400	1566.31	51	193800	1546.92
4	191450	1565.90	52	193850	1546.52
5	191500	1565.50	53	193900	1546.12
6	191550	1565.09	54	193950	1545.72
7	191600	1564.68	55	194000	1545.32
8	191650	1564.27	56	194050	1544.92
9	191700	1563.86	57	194100	1544.53
10	191750	1563.45	58	194150	1544.13
11	191800	1563.05	59	194200	1543.73
12	191850	1562.64	60	194250	1543.33
13	191900	1562.23	61	194300	1542.94
14	191950	1561.83	62	194350	1542.54
15	191000	1561.42	63	194400	1542.14
16	192050	1561.01	64	194450	1541.75

Monitoring Specification

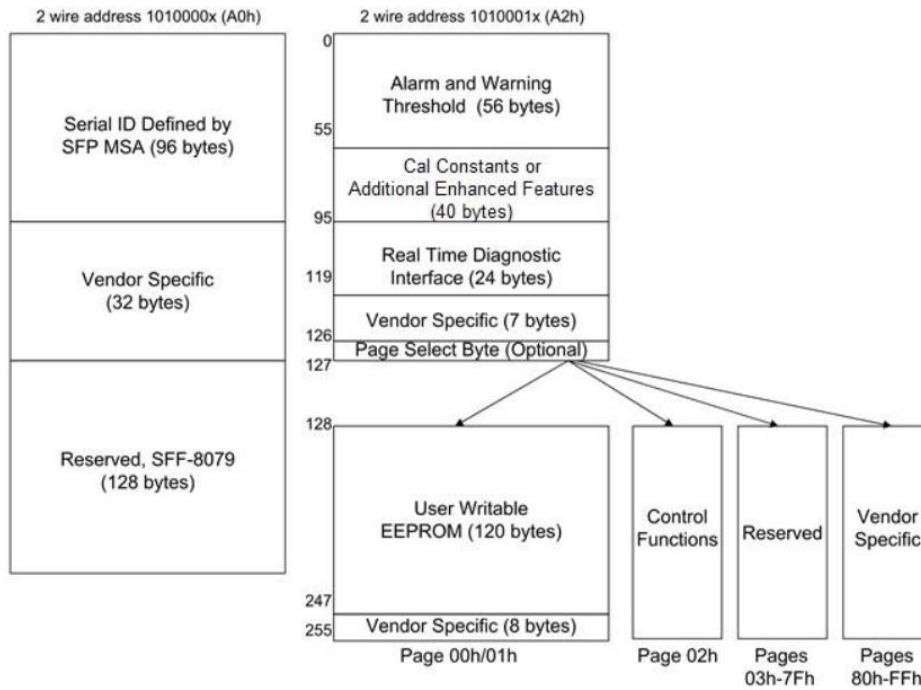


Figure 2, Memory Map

Mechanical Dimensions

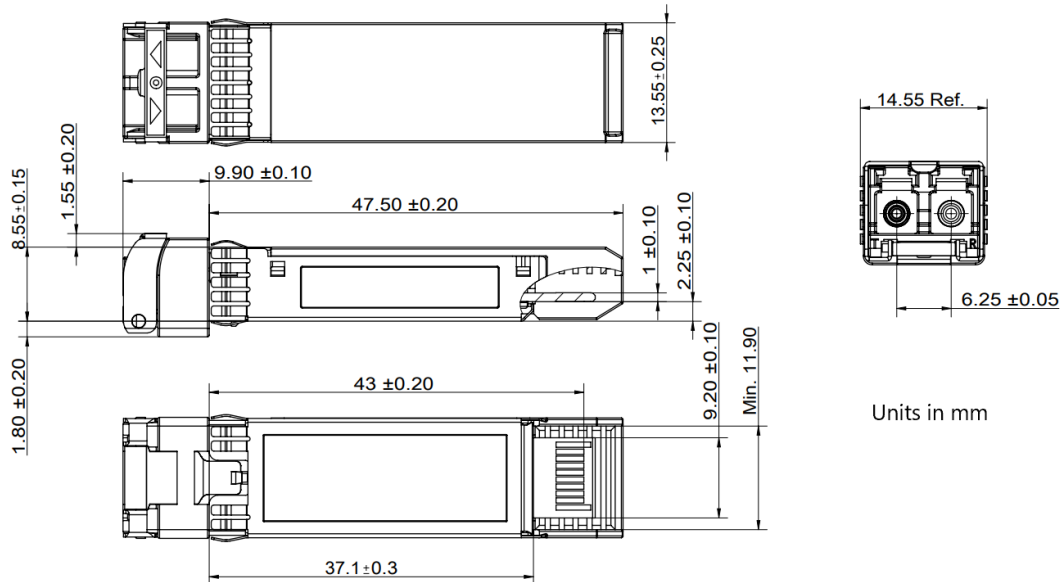


Figure3. Mechanical Outline

Revision History

Version	Initiated	Reviewed	Revision	Release Date
A0	Tony	Jack	New Release	2021-09-09

Warnings

Handling Precautions: This device 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: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Contact Information

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