


ETU-LINK

Optical Communication System

SFP28 Series

SFP28

ES2Dxx2X-3LCD15

25.78Gbps SFP28 DWDM Transceiver, 15km Reach for SMF

- Supports up to 25.78Gbps bit rates
- Hot-pluggable SFP+ footprint
- 100GHz ITU, C Band DWDM Cooled EML laser and PIN photodiode,
- Up to 15km for SMF transmission
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Single +3.3V power supply
- Power dissipation <2.3W
- Real Time Digital Diagnostic Monitoring
- Operating case temperature:
Standard: 0 to +70°C



Applications

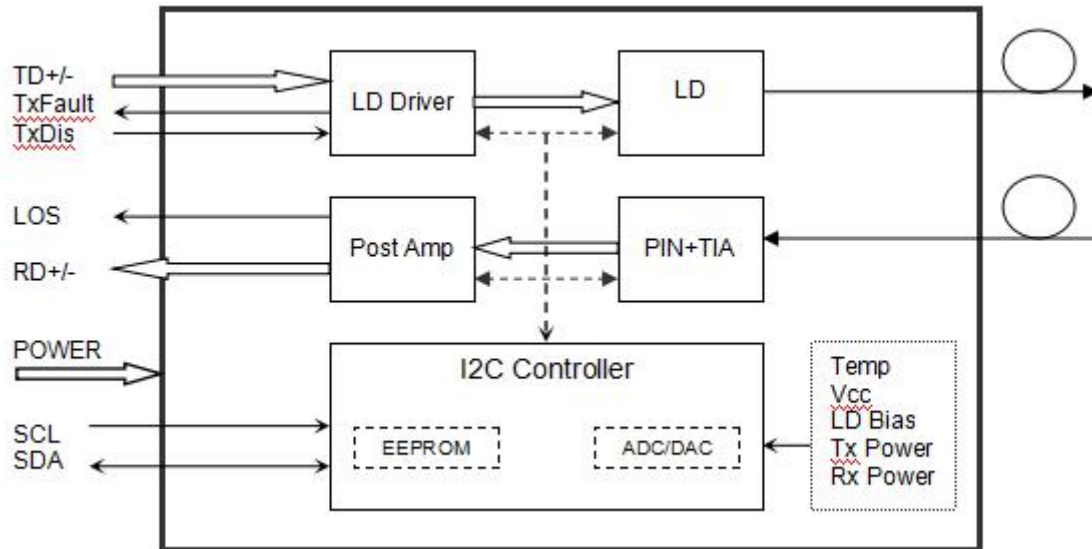
- 25G Ethernet
- CPRI 10

Description

The SFP28 transceivers are high performance, cost effective modules supporting data rate of 25.78Gbps and 15km transmission distance with SMF.

The transceiver consists of three sections: a Cooled EML laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.



Transceiver functional diagram

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	Vcc	3.135	3.30	3.465	V
Power Supply Current	Icc			700	mA
Data Rate			25.78		Gbps

Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λ_c	1528.77		1563.05	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30	-		dB	
Average Output Power	P_{out}	-1		+6	dBm	1
Extinction Ratio	ER	6			dB	
Data Input Swing Differential	V_{IN}	180		850	mV	2
Input Differential Impedance	Z_{IN}	90	100	110	Ω	
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	
Receiver						
Centre Wavelength	λ_c	1510		1570	nm	
Receiver Sensitivity				-15	dBm	3
Receiver Overload		2			dBm	3
LOS De-Assert	LOS_D			-16	dBm	
LOS Assert	LOS_A	-35			dBm	
LOS Hysteresis		0.5			dB	
Data Output Swing Differential	V_{out}	300		900	mV	4
LOS	High		2.0	V_{cc}	V	
	Low			0.8	V	

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS $2^{31}-1$ test pattern @25.78Gbps, BER $\leq 5E-5$.
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	μs
Time To Initialize, including Reset of Tx Fault	t _{init}			300	ms
Tx Fault Assert Time	t _{fault}			100	μs
Tx Disable To Reset	t _{reset}	10			μs
LOS Assert Time	t _{loss_on}			100	μs
LOS De-assert Time	t _{loss_off}			100	μs
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 _L			0.8	V

Diagnostic

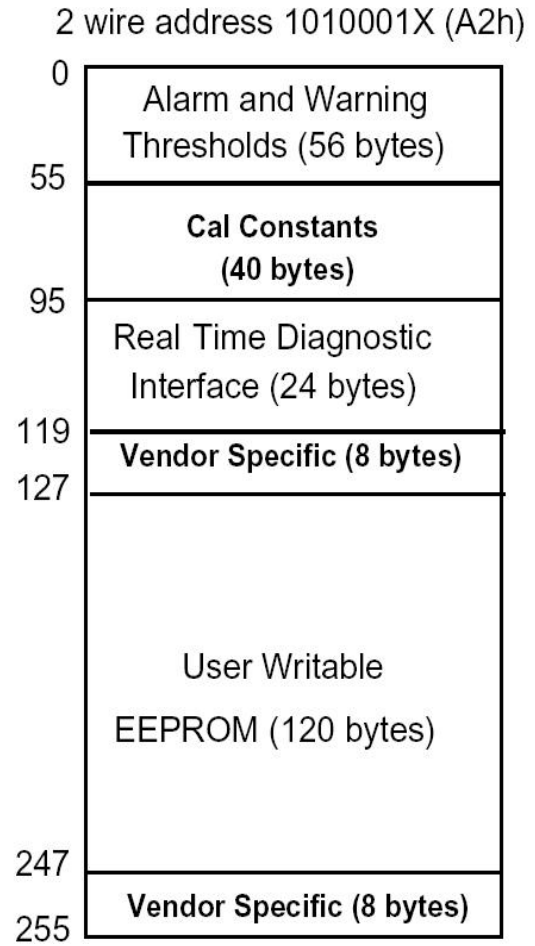
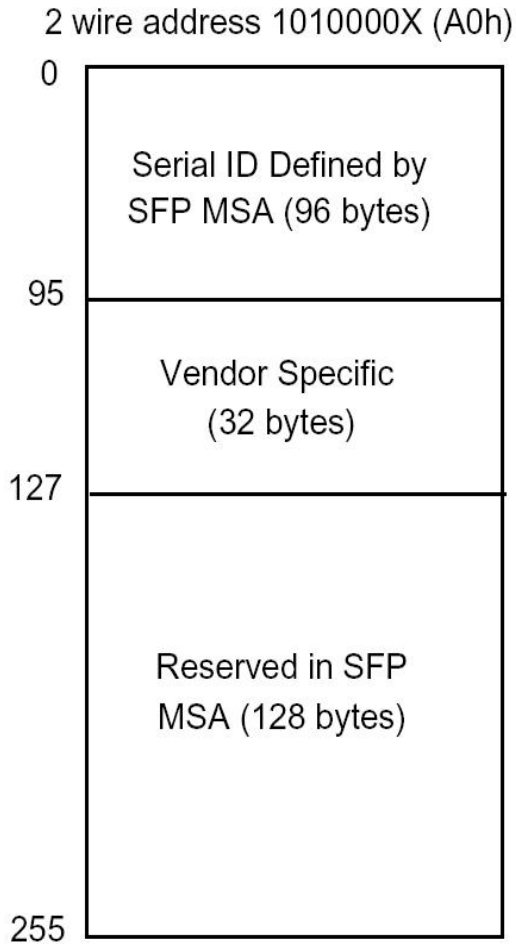
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal
Voltage	3.0 to 3.6	V	±3%	Internal
Bias Current	0 to 120	mA	±10%	Internal
TX Power	-1 to +6	dBm	±3dB	Internal
RX Power	-15 to 2	dBm	±3dB	Internal

Digital Diagnostic Memory Map

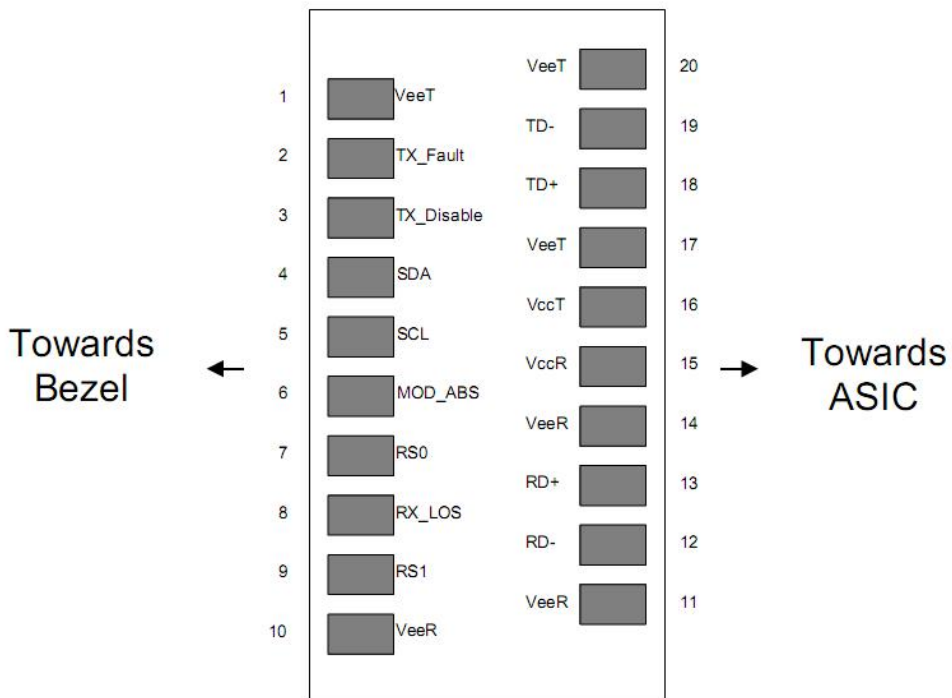
The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

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 Descriptions



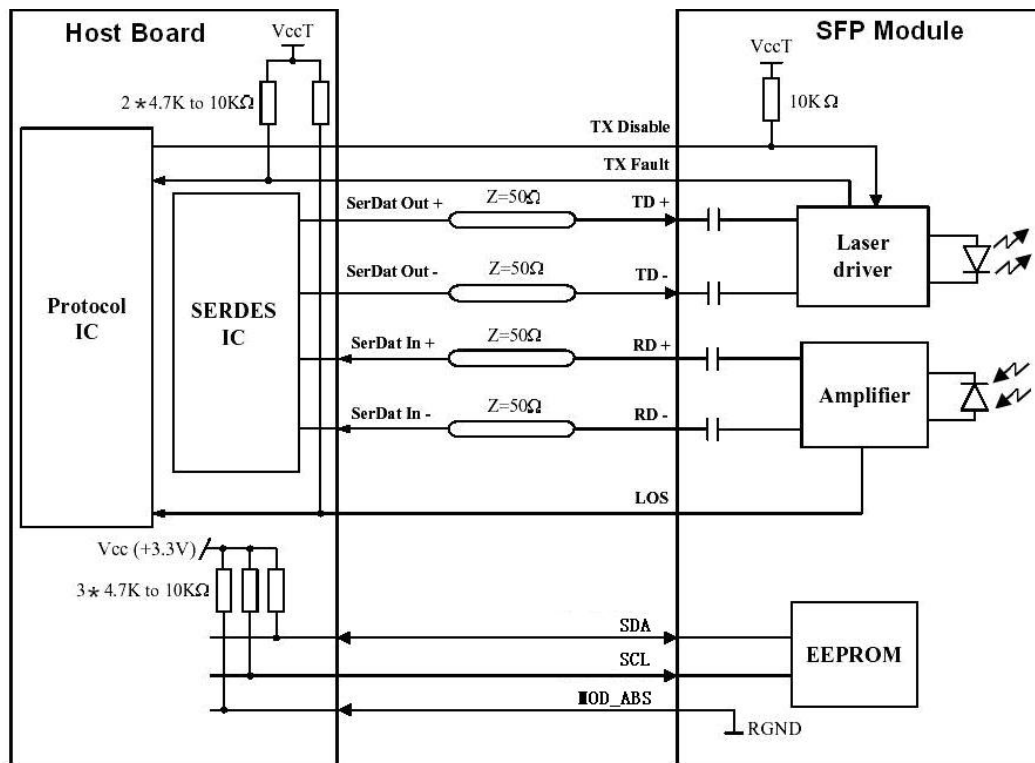
Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected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

Notes:

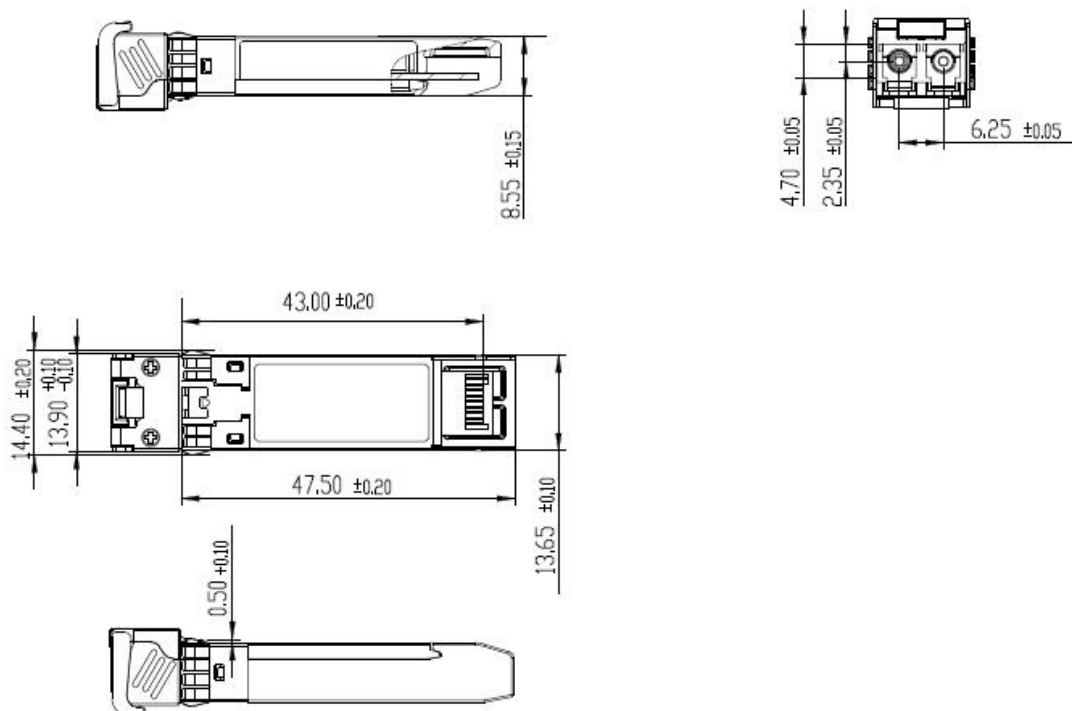
Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V_{cc}+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- 2) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- 3) LOS is open collector output. Should be pulled up with 4.7k~10kΩ 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 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 5) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



Mechanical Dimensions



Ordering information

Part Number	Product Description
ES2Dxx2X-3LCD15	1528.77~1563.05nm DWDM, 15km, DDM, 0°C~+70°C

AC Wavelength Guide

ITU Channel Product Code	Frequency(THz)	Wavelength	ITU Channel Product Code	Frequency(THz)	Wavelength
18	191.8	1563.05	40	194.0	1545.32
19	191.9	1562.23	41	194.1	1544.53
20	192.0	1561.42	42	194.2	1543.73
21	192.1	1560.61	43	194.3	1542.94
22	192.2	1559.79	44	194.4	1542.14
23	192.3	1558.98	45	194.5	1541.35
24	192.4	1558.17	46	194.6	1540.56
25	192.5	1557.36	47	194.7	1539.77
26	192.6	1556.55	48	194.8	1538.98
27	192.7	1555.75	49	194.9	1538.19
28	192.8	1554.94	50	195.0	1537.40
29	192.9	1554.13	51	195.1	1536.61
30	193.0	1553.33	52	195.2	1535.82
31	193.1	1552.52	53	195.3	1535.04
32	193.2	1551.72	54	195.4	1534.25
33	193.3	1550.92	55	195.5	1533.47
34	193.4	1550.12	56	195.6	1532.68
35	193.5	1549.32	57	195.7	1531.90
36	193.6	1548.51	58	195.8	1531.12
37	193.7	1547.72	59	195.9	1530.33
38	193.8	1546.92	60	196.0	1529.55
39	193.9	1546.12	61	196.1	1528.77

Compatibility Test

In order to ensure the product compatibility, our products will be tested on the switch before shipment. Our modules can compatible with many mainstream brand switches, such as Cisco, Juniper, Extreme, Brocade, IBM, H3C, HP, Huawei, D-Link, Mikrotik, ZTE, TP-Link...

Our test equipment: VOLKTEK MEN-4110, HP 2530-8G, CRS226-24G-25+RM, Catalyst 2960G Series, Catalyst 3850 XS 10G SFP+, Catalyst 3750-E Series, HUAWEI S5700Series, H3C S3100V2 Series, Juniper-EX4200, etc.



Cisco Catalyst 3850



HUAWEI S5700



H3C S3100V2



HP J9264AR



Juniper EX 4200



Alcatel 6850E-U24X



Mikrotik CR5226-24G-25+RM



Cisco Catalyst 2960G



Volktek MEN-4110

Product Production Process

Quality Assurance

Continuous introduction of new equipment, produced by strict standards, strict quality inspection, to guarantee the high quality standard of each product.



**Standardized
Production Line**



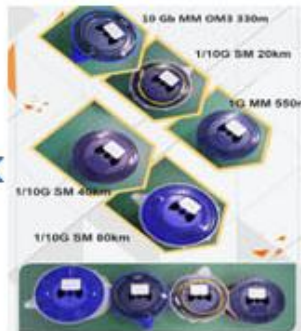
**Professional
Welding**



Assembling



Aging Testing



Distance Testing



Cleaning end face



Product Initial Test



Switch Testing



Product Final Test

Packaging

ETU-Link provides two kinds of packaging, 10pcs/Tray and individual package.



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