SFP-25DWTU-15C

15km 25G DWDM TSFP28 Optical Transceiver Module

Product features

- SFP28 MSA compliant
- 25G electrical interface (OIF CEI-28G-VSR)
- 48 channels (191.4~196.1 THz)
- 100GHz channel spacing
- Maximum power consumption 2.5 W
- LC duplex connector
- Supports 24.33024G, 25.78125 Gbps (with FEC); 9.8304G, 10.1376G, 10.3125 Gbps
- Up to 15 km transmission on single mode fiber
- Operating case temperature: -20 to 85°C, cold start at -40°C
- Single 3.3 V power supply
- RoHS 2 compliant
- Wavelength Auto-tuning, Remote-Tuning and Remote-DDMI

Applications

- CPRI/eCPRI: 24.33024G/25.78125 Gbps; 9.8304G/10.1376G/10.3125 Gbps
- 10G/25G Ethernet switches and routers

Function Description

AscentOptics' SFP-25DWTU-15C is a tunable transceiver module designed for 15 km optical communication applications, and it is compliant to SFP28 MSA standard. This module can convert a 25 Gbps electrical data to 25 Gbps optical signals. Similarly, it can convert a 25 Gbps optical input signal to 25 Gbps serial electrical data. It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. The module offers very high functionality and feature integration, accessible via a two-wire serial interface. The module supports Auto-tuning, Remote-Tuning and Remote-DDMI.

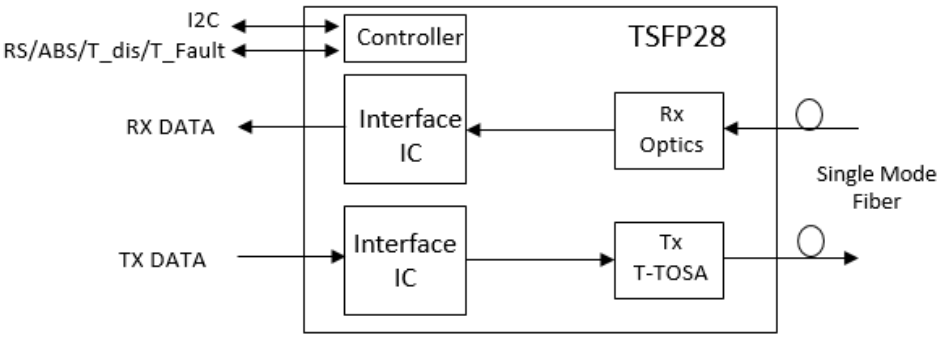

Figure 1 Transceiver block diagram

Pin Descriptions

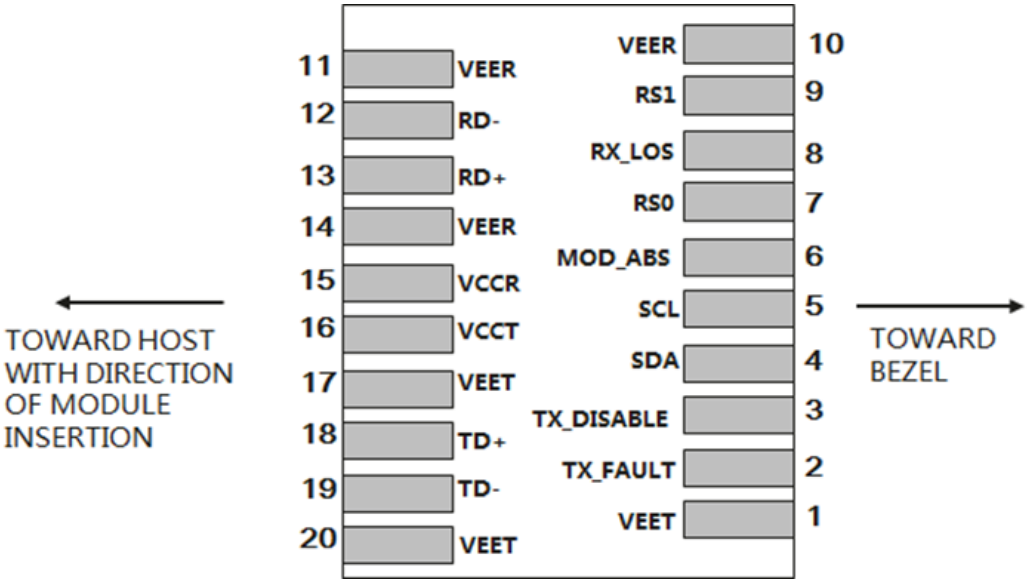

Figure 2 MSA compliant connector

Pin	Symbol	Description	Notes
1	VEET	Transmitter ground	1
2	TX_FAULT	Transmitter fault indication	
3	TX_DISABLE	Disables the transmitter or laser output	2
4	SDA	Data line for an I2C series interface	2
5	SCL	Clock line for an I2C series interface	2
6	MOD_ABS	Indicates the module online state (this pin is connected to the VeeT or VeeR pin)	
7	RS0	Selects a rate for the module (this pin is connected to the 33 kiloohm resistor)	
8	RX_LOS	Indicates a loss of received signals	2
9	RS1	Selects a rate for the module (this pin is connected to the 33 kiloohm resistor)	

10	VEER	Receiver ground	1
11	VEER	Receiver ground	1
12	RD-	Inverse received data output	
13	RD+	Received data output	
14	VEER	Receiver ground	1
15	VCCR	3.3 V receiver power	1
16	VCCT	3.3 V transmitter power	1
17	VEET	Transmitter ground	1
18	TD+	Transmit data input	
19	TD-	Inverse transmit data input	
20	VEET	Transmitter ground	1

Note
1. The ground of the module (operating module ground) and that of the module shell are separate from each other.
2. 4.7–10 kiloohm resistor is used on the module to pull the output up to 3.15–3.45 V.

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	Typ	Max	Unit	Notes
Maximum supply voltage	Vcc	0	3.3	3.6	V	
Storage temperature	Ts	-40		85	°C	
Relative humidity	RH	0		85	%	Non-condensing
Damage threshold, each lane	THd	0			dBm	

Operating Environments

Electrical and optical characteristics below are defined under this operating environment, unless otherwise specified.

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Supply voltage	Vcc	3.135	3.3	3.465	V	
Case temperature	Top	-20		85	°C	1
Data rate		24.33024		25.78125	Gbps	
		9.8304		10.3125		
Data rate accuracy		-100		100	ppm	
Link distance with G.652				15	km	

Note
1. Operating case temperature: -20 to 85°C，cold start at -40°C.

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Power dissipation				2.5	W	
Supply current	Icc			0.76	A	
Transmitter						
Data rate		24.33024		25.78125	Gbps	
		9.8304		10.3125		1
Differential voltage pk-pk	Vpp	180		900	mV	
Tx differential input impendence	ZIN		100		Ω	
Transmitter disable voltage	VD	2.0		Vcc+0.3	V	
Transmitter enable voltage	VEN	0		0.8	V	
Receiver						
Data rate		24.33024		25.78125	Gbps	
		9.8304		10.3125		1
Differential voltage pk-pk	Vpp	450	600	900	mV	
Rx differential ouput impendence	Zout		100		Ω	
LOS assert voltage	VLOSA	2.4		Vcc	V	
LOS de-assert voltage	VLOSD	Vee		Vee+0.4	V	
Eye height	EH15	228			mV	
Eye width	EW15	0.57			UI	
Vertical eye closure	VEC			5.5	dB	

Note
1. CDR bypass

Optical Characteristics

Parameters	Unit	Min	Type	Max	Notes
Transmitter					
Output average power	dBm	0		4	
Data rate	Gbps	24.33024		25.78125	
		9.8304		10.3125	1
Data rate accuracy	ppm	-100		100	
Wavelength range	THz	191.4		196.1	
Wavelength accuracy	GHz	-12.5		12.5	
channel spacing	GHz		100		
Extinction ratio (ER)	dB	7			

Side-mode suppression ratio (SMSR)	dB	30			
RIN20OMA	dB/Hz			-130	
Optical return loss tolerance	dB			20	
Transmitter reflectance	dB			-26	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		{0.31, 0.4, 0.45, 0.34, 0.38, 0.4} Hit ratio 5×10-5 hits per sample			
Receiver					
Data rate	Gbps	24.33024		25.78125	
		9.8304		10.3125	
Wavelength range	THz	191.4		196.1	
Saturation power	dBm	-2			
Receiver sensitivity	dBm			-19.5 (5e-5 FEC)	
Receiver reflectance	dB			-26	
LOS assert	dBm	-35			
LOS deassert	dBm			-24	
LOS hysteresis	dB	0.5			

Note
1. CDR bypass

Wavelength Auto-tuning，Remote-Tuning and Remote-DDMI

The module adds low-frequency pilot-tone signals to obtain out-of-band channel. DDMI and Ack/Handshake information carried in the channels simplifies optical-layer management.

Based on the out-of-band channel, auto-tuning/ remote-tuning is supported in the fronthaul network to implement automatic wavelength distribution. The modules can be plug-and-play without manual intervention.

The module can automatically configure wavelength within 180 seconds when the fiber network is configured.

DDMI information can also be transmitted from the far-end module to the near-end module through the out-of-band channel.

EEPROM Definitions

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Address	Name of Field	Description	Value (Hex)	Notes
0	Identifier	Type of transceiver	0B	DWDM
1	Ext. Identifier	Extended identifier of type of transceiver	04	two-wire interface ID module
2	Connector	Code for connector type	07	LC Receptical
3	Transceiver	10G Ethernet Compliance Codes Infiniband Compliance Codes	00	
4		ESCON Compliance Codes SONET Compliance Codes	00	
5		SONET Compliance Codes	00	

6		Ethernet Compliance Codes	00	
7		Fibre Channel Link Length Fibre Channel Technology	10	
8		Fibre Channel Technology SFP+ Cable Technology	10	
9		Fibre Channel Transmission Media	00	
10		Fibre Channel Speed	00	
11	Encoding	Code for high speed serial encoding algorithm	03	NRZ
12	BR, Nominal	Nominal signalling rate, units of 100MBd. (see details for rates > 25.4Gbps)	FF	>25.4Gbps, addresses 66 and 67 determine bit rate
13	Rate Identifier	Type of rate select functionality	00	
14	Length (SMF,km)	Link length supported for single mode fiber, units of km	0F	15KM
15	Length (SMF)	Link length supported for single mode fiber, units of 100 m	96	15KM
16	Length (50um)	Link length supported for 50 um OM2 fiber, units of 10 m	00	
17	Length (62.5um)	Link length supported for 62.5 um OM1 fiber, units of 10 m	00	
18	Length (OM4 or copper cable)	Active Cable Link Length, units of m	00	
19	Length (OM3)	Link length supported for 50 um OM3 fiber, units of 10 m	00	
20-35	Vendor name	SFP vendor name (ASCII)	48 49 53 49 4C 49 43 4F 4E 20 20 20 20 20 20 20	AscentOptics
36	Transceiver	Code for electronic or optical compatibility	00	
37-39	Vendor OUI	SFP vendor IEEE company ID	00 00 00	
40-55	Vendor PN	Part number provided by SFP vendor (ASCII)	4F 4D 36 33 35 33 4C 45 32 30 30 20 20 20 20 20	SFP-25DWTU-15C
56-59	Vendor rev	Revision level for part number provided by vendor (ASCII)	41 20 20 20	A
60-61	Wavelength	Laser wavelength (Passive/Active Cable Specification Compliance)	00 00	Tunable
62	Unallocated		00	
63	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)	Programmed by Factory	
64	Options	Indicates which optional transceiver signals are implemented	3C	Retimer or CDR indicator, Cooled Transceiver, Power Level 3, Limit Receiver Output；
65	Options	Indicates which optional transceiver signals are implemented	7A	Tunable，Rate_select,TX_DISABLE, TX_FAULT, Rx_LOS
66	BR, max	Upper bit rate margin, units of % (see details for rates > 25.4Gb/s)	67	25.78125Gbps
67	BR, min	Lower bit rate margin, units of % (see details for rates > 25.4Gb/s)	00	
68-83	Vendor SN	Serial number provided by vendor (ASCII)	Programmed by Factory	

84-91	Date code	Vendor's manufacturing date code	Programmed by Factory	
92	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any) in the transceiver	68	Received power measurement type is average power Internally calibrated DDM implemented
93	Enhanced Options	Indicates which optional enhanced features are implemented (if any) in the transceiver	F8	These functions implemented: Soft TX_DISABLE Control Soft TX_FAULT monitoring Soft RX_LOS monitoring Soft RATE_SELECT control
94	SFF-8472 Compliance	Indicates which revision of SFF- 8472 the transceiver complies with	08	SFF-8472
95	CC_EXT	Check code for the Extended ID Fields (addresses 64 to 94)	Programmed by Factory	
96-127	Vendor Specific	Vendor Specific EEPROM	Programmed by Factory	

Digital Diagnostic Monitoring Functions

SFP-25DWTU-15C support the I2C-based Diagnostic Monitoring Interface (DMI) defined in document SFF-8472. The host can access real-time performance of transmitter and receiver optical power, temperature, supply voltage and bias current.

Performance Item	Related Bytes (A2H memory)	Monitor Error	Notes
Module temperature	96 to 97	+/-3°C	1, 2
Module voltage	98 to 99	< 3%	2
LD bias current	100 to 101	< 10%	2
Transmitter optical power	102 to 103	< 3 dB	2
Receiver optical power	104 to 105	< 3 dB	2

Note
1. Actual temperature test point is fixed on module case around Laser.
2. Full operating temperature range.

Alarm and Warning Thresholds

SFP-25DWTU-15C support alarms function, indicating the values of the preceding basic performance are lower or higher than the thresholds.

Performance Item	Alarm Threshold Bytes (A2H memory)	Unit	Low Threshold	High Threshold
Temp alarm	00 to 03	°C	-30	95
Temp warning	04 to 07	°C	-20	85
Voltage alarm	08 to 11	V	2.97	3.63
Voltage warning	12 to 15	V	3.135	3.465
Bias alarm	16 to 19	mA	1	70

Bias warning	20 to 23	mA	2	60
TX power alarm	24 to 27	dBm	-3	8
TX power warning	28 to 31	dBm	0	5
RX power alarm	32 to 35	dBm	-22.5	1
RX power warning	36 to 39	dBm	-19.5	-2

Mechanical Specifications

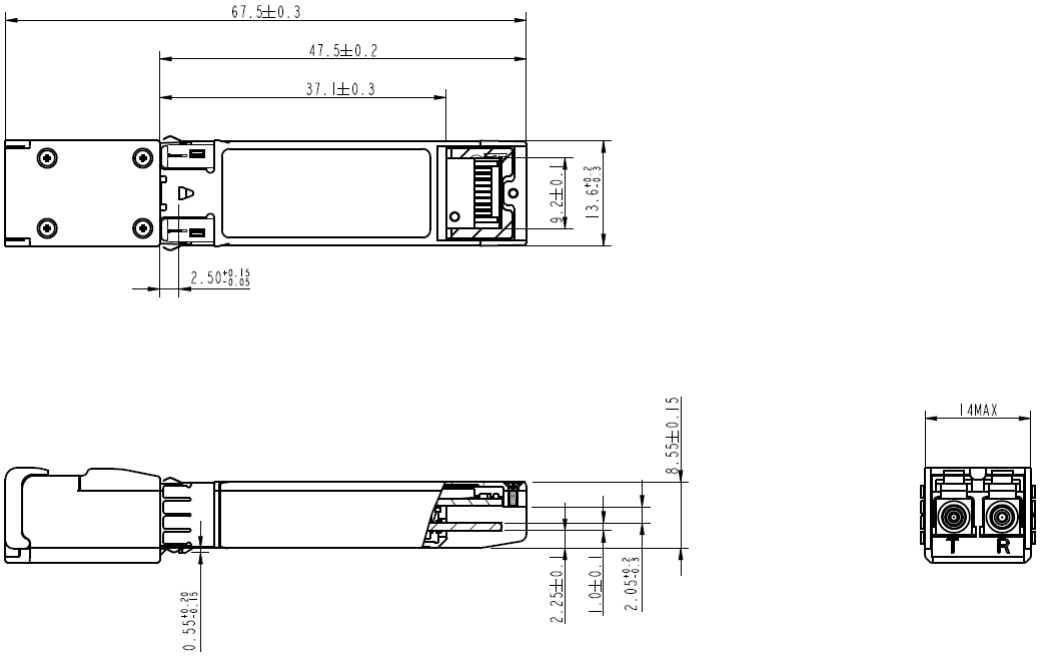

Figure 3 Mechanical dimensions

Regulatory Compliance

TBD

ESD Design

Normal ESD precautions are required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and otherwise handled in an ESD protected environment utilizing standard grounded benches, floor mats, and wrist straps.

Parameter	Threshold value	Notes
ESD of high-speed pins	1 kV	Human body model
ESD of low-speed pins	2 kV	Human body model
Air discharge during operation	15 kV	
Direct contact discharges to the case	8 kV	

Safety Specification Design

⚠ CAUTION

Do not look into fiber end faces without eye protection using an optical meter (such as magnifier and microscope) within 100 mm, unless you ensure that the laser output is disabled. When
operating an optical meter, observe the operation requirements.
CAUTION–Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
Attention–L'utilisation des commandes ou réglages ou l'exécution des procédures autres que celles spécifiées dans les présentes exigences peuvent être la cause d'une exposition à un rayonnement dangereux.

Ordering Information

Part Number	Description
SFP-25DWTU-15C	SFP28-25G-15 km-C Band-Tunable

Nameplate information

TBD

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