CSM-SP10TG-S55-80

10.3 Gbps SFP+ Transceiver, Single-Mode, 80 km Reach

Description

The SFP+ transceivers are high-performance, cost-effective modules supporting data rates up to 10.7 Gbps and transmission distances up to 80 km over SMF.

These modules consist of three sections: a cooled EML laser transmitter, an APD photodiode integrated with a transimpedance preamplifier (TIA), and an MCU control unit.

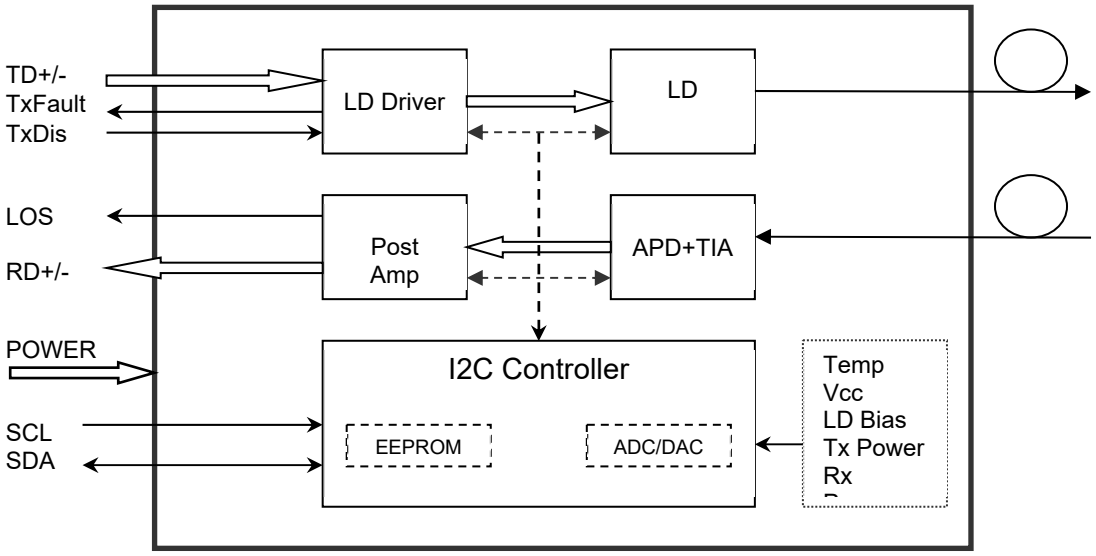
All modules satisfy Class 1 laser safety requirements and comply with the SFP+ Multi-Source Agreement (MSA) and the SFF-8472 digital diagnostics interface.

Features

- Supports data rates up to 10.7 Gbps
- Hot-pluggable SFP+ footprint
- 1550 nm cooled EML laser and APD photodiode, supporting transmission distances of up to 80 km over SMF
- Compliant with SFP+ MSA and SFF-8472, with a duplex LC receptacle
- RoHS compliant
- Single +3.3 V power supply
- Real-time Digital Diagnostic Monitoring
- Operating case temperature:
  Standard: 0 °C to +70 °C

Applications

- 10 Gbps optical systems
- 10GBASE-ZR at 10.3125 Gbps
- 10GBASE-ZW at 9.953 Gbps
- LTE systems
- Other optical links



Transceiver Functional Block Diagram

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	-0.5	4.5	V
Storage Temperature	Ts	-40	+85	°C
Operating Relative Humidity, non-condensing	RH	5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	V_{CC}	3.135	3.30	3.465	V
Power Supply Current	I_{CC}			600	mA
Data Rate		1.0	10.3	10.7	Gbps

Optical and Electrical Specifications

Parameter		Symbol	Min	Typical	Max	Unit	Notes
Transmitter							
Center Wavelength		λc	1530	1550	1565	nm	
Spectral Width (-20 dB)		Δλ			1	nm	
Side-Mode Suppression Ratio		SMSR	30			dB	
Average Output Power		P_{out}	0		+4	dBm	1
Extinction Ratio		ER	8.2			dB	
Differential Data Input Swing		V_{IN}	180		850	mV	2
Input Differential Impedance		Z_{IN}	90	100	110	Ohm	
TX Disable Input	Disable		2.0		V_{CC}	V	
	Enable		0		0.8	V	
TX Fault Output	Fault		2.0		V_{CC}	V	
	Normal		0		0.8	V	
Receiver							
Center Wavelength		λc	1260		1600	nm	
Receiver Sensitivity					-24	dBm	3
Receiver Overload			-7			dBm	3
LOS De-Assert		LOS_D			-25	dBm	
LOS Assert		LOS_A	-35			dBm	
LOS Hysteresis			0.5		4	dB	
Differential Data Output Swing		V_{OUT}	300		900	mV	4
LOS Output		High	2.0		V_{CC}	V	
		Low	0		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 at 10.3125 Gbps, BER ≤1×10^{-12}.
4. Internally AC-coupled.

Timing Specifications

Parameter	Symbol	Min	Typical	Max	Unit
TX Disable Negate Time	t_on			2	ms
TX Disable Assert Time	t_off			100	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

Digital Diagnostic Monitoring Specifications

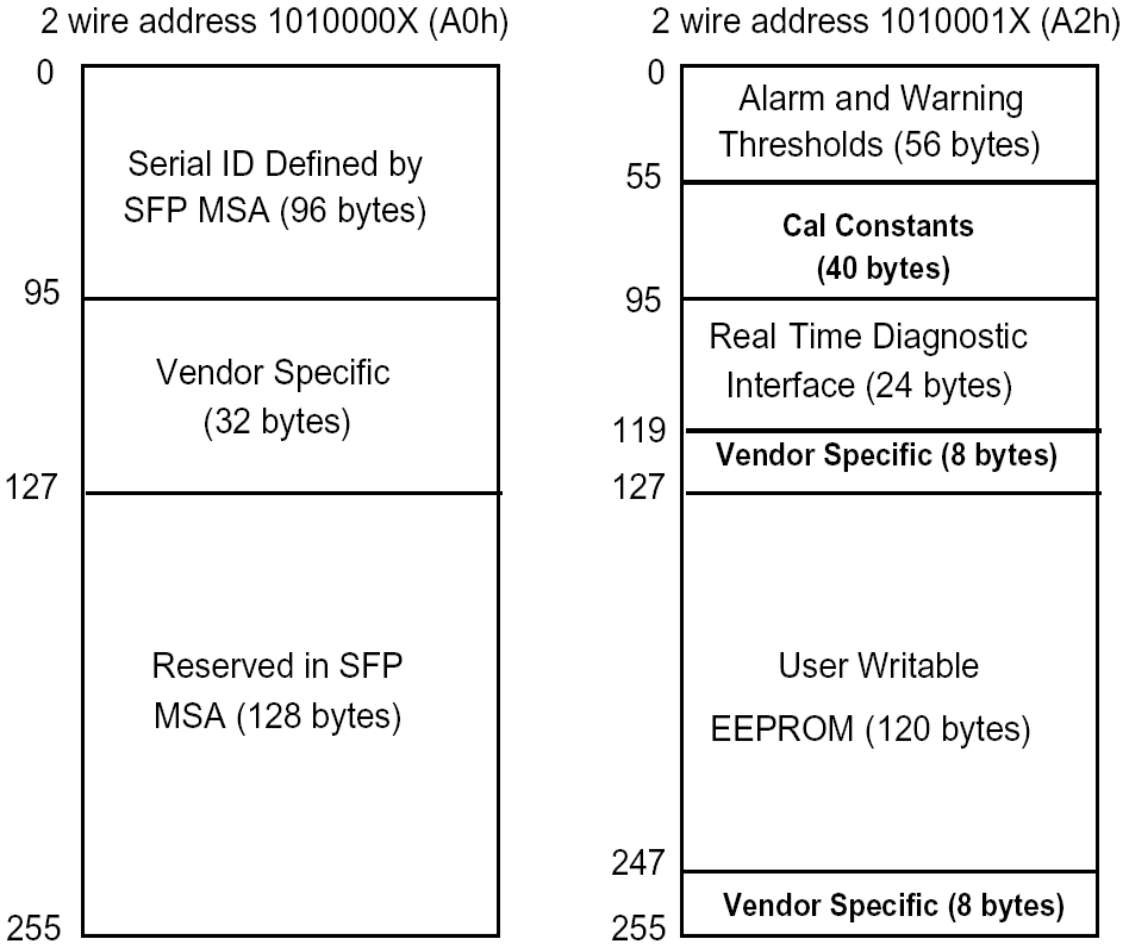
Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 °C to +70 °C	±3	°C	Internal
Voltage	3.0 to 3.6	±3 %	V	Internal
Bias Current	0 to 100	±10 %	mA	Internal
TX Optical Power	-1 to +4	±3 dB	dBm	Internal
RX Optical Power	-23 to -6	±3 dB	dBm	Internal

Digital Diagnostic Memory Map

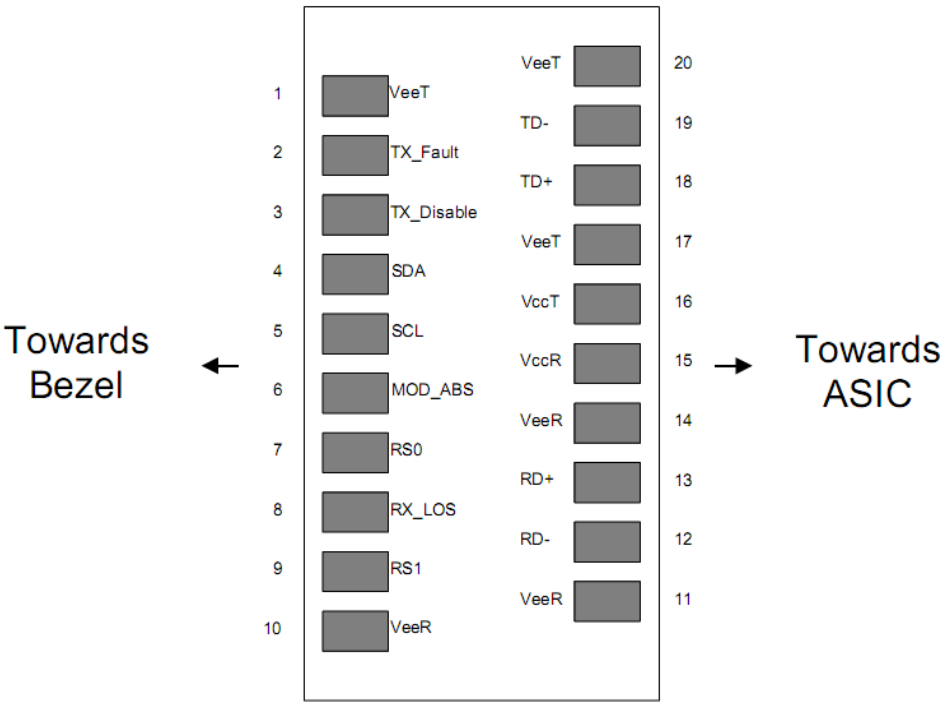
The transceivers provide serial ID memory contents and diagnostic information about current operating conditions via the 2-wire serial interface (SCL, SDA).

The diagnostic functions are implemented with internal calibration to monitor received optical power, transmitted optical power, bias current, supply voltage, and temperature.

The specific data fields of the digital diagnostic memory map are defined as follows.


2 wire address 1010000X (A0h)
0
Serial ID Defined by SFP MSA (96 bytes)
95
Vendor Specific (32 bytes)
127
Reserved in SFP MSA (128 bytes)
255
2 wire address 1010001X (A2h)
0
Alarm and Warning Thresholds (56 bytes)
55
Cal Constants (40 bytes)
95
Real Time Diagnostic Interface (24 bytes)
119
Vendor Specific (8 bytes)
127
User Writable EEPROM (120 bytes)
247
Vendor Specific (8 bytes)
255

Pin Diagram


Towards Bezel
1 VeeT
2 TX_Fault
3 TX_Disable
4 SDA
5 SCL
6 MOD_ABS
7 RS0
8 RX_LOS
9 RS1
10 VeeR
VeeT 20
TD- 19
TD+ 18
VeeT 17
VccT 16
VccR 15
VeeR 14
RD+ 13
RD- 12
VeeR 11
Towards ASIC

Pin Descriptions

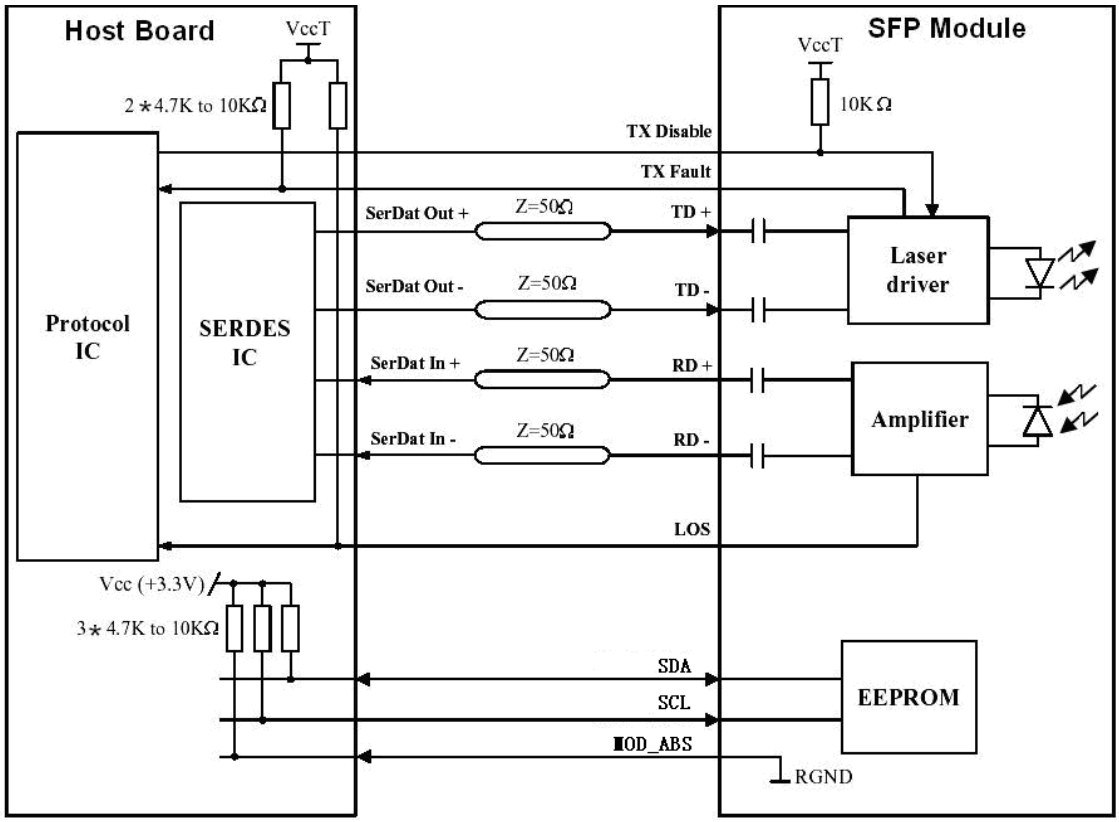
Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable	3	2
4	SDA	Serial Data	3	
5	SCL	Serial Clock	3	
6	MOD_ABS	Module Absent; grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	3
9	RS1	Not Connected	3	
10	V_{EER}	Receiver Ground	1	
11	V_{EER}	Receiver Ground	1	
12	RD-	Inverted Received Data Output	3	4
13	RD+	Received Data Output	3	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 Input	3	5
19	TD-	Inverted Transmit Data Input	3	5
20	V_{EET}	Transmitter Ground	1	

Notes:

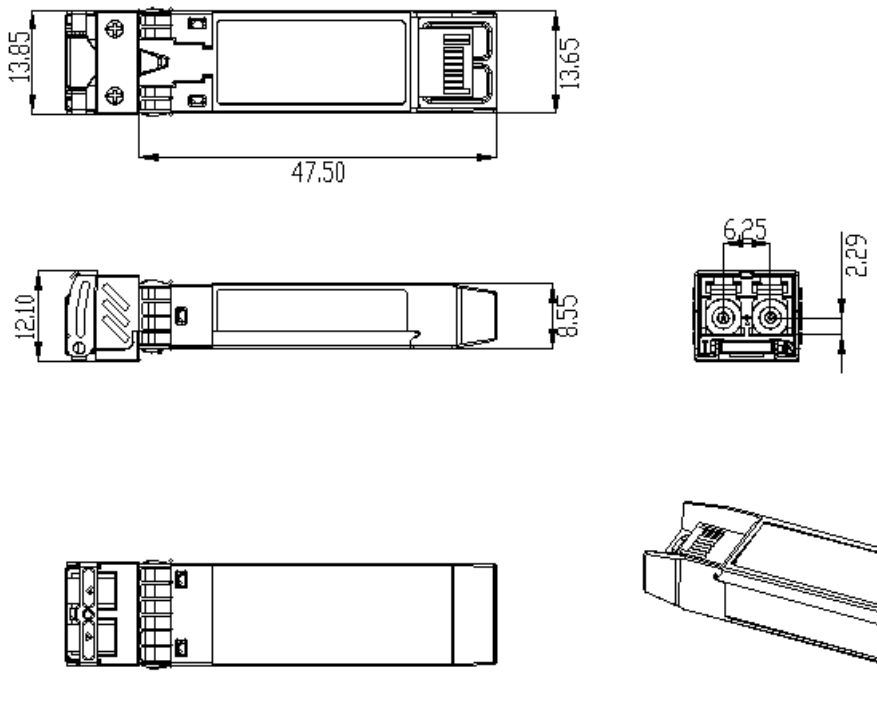
Plug Seq.: Pin engagement sequence during hot plugging.

1. TX Fault is an open-collector output that should be pulled up with a 4.7 kOhm to 10 kOhm resistor on the host board to a voltage between 2.0 V and Vcc + 0.3 V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault. In the low state, the output is pulled to less than 0.8 V.
2. The laser output is disabled when TX Disable is > 2.0 V or left open, and is enabled when TX Disable is < 0.8 V.
3. LOS is an open-collector output that should be pulled up with a 4.7 kOhm to 10 kOhm resistor on the host board to a voltage between 2.0 V and 3.6 V. Logic 0 indicates normal operation, while Logic 1 indicates loss of signal.
4. RD-/RD+: These are the differential receiver outputs. They are internally AC-coupled 100 Ohm differential lines that must be terminated with a 100 Ohm differential load at the host SERDES.
5. TD-/TD+: These are the differential transmitter inputs. They are internally AC-coupled 100 Ohm differential lines with internal differential termination inside the module.

Recommended Interface Circuit



Mechanical Dimensions



Unit: mm

Ordering Information

Part Number	Product Description
CSM-SP10TG-S55-80	1550 nm, 10.3 Gbps, LC, 80 km, 0 °C to +70 °C, with DDM

For More Information

Tel: +886-2-8227 1877
E-mail: sales@cosmo-ic.com
Web: http://www.cosmo-ic.com