10Gb/s SFP+ Transceiver
HSFP10-0551-120
EML/APD, 120km

Features

- Up to 11.3Gb/s data links
- 1550nm EML transmitter and APD receiver
- Up to 120km on 9/125μm SMF
- Hot-pluggable SFP+ footprint
- Support Digital Monitoring interface
- Single +3.3V power supply
- Compliant with SFF+MSA and SFF-8472
- Metal enclosure, for lower EMI
- Case operating temperature
  Commercial: 0 ~ +70°C

Applications

- 10GBASE-120km & 10G Ethernet
- SDH STM64
- Other Optical Links

HSFP10-0551-120 transceiver is designed for use in 10-Gigabit Ethernet links up to 120km over single mode fiber. The module consists of 1550nm EML Laser, APD and Preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

It 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.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	T_S	-40	85	°C	
Power Supply Voltage	V_{CC}	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	TH_d	0		dB	

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operate temp		0		70		commercial
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate			10.3125		Gb/s	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			120	km	9/125um

Pin Assignment and Pin Description

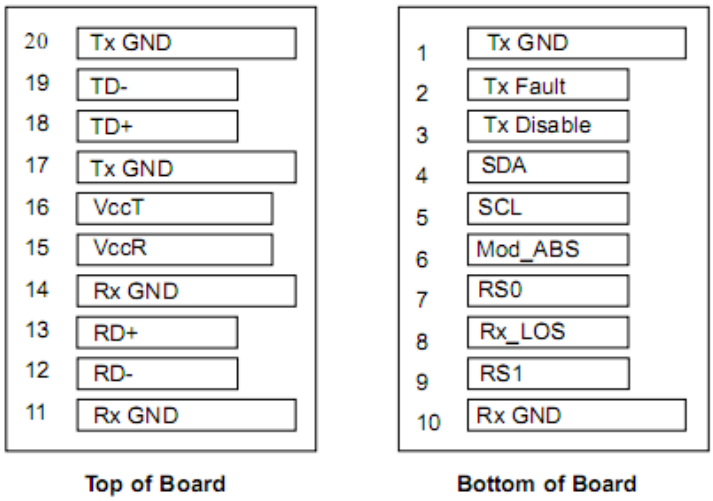

Figure1. Diagram of host board connector block pin numbers and names

Pin Assignment

Parameter	Logic	Symbol	Name/Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTL-I	TX_Disable	Transmitter Disable; Turns off transmitter laser output	3
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line	
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock	
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	4
7	LVTTL-I	RS0	Receiver Rate Select，Not used	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active High	2
9	LVTTL-I	RS1	Transmitter Rate Select，Not used	
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

Notes:
[1] The module signal ground pins, VeeR and VeeT, shall be isolated from the module case.
[2] This pin is an open collector/drain output pin and shall be pulled up with 4.7k-10kohms to Host_Vcc on the host board. Pull ups can be connected to multiple power supplies, however the host board design shall ensure that no module pin has voltage exceeding module VccT/R + 0.5 V.
[3] This pin is an open collector/drain input pin and shall be pulled up with 4.7k-10kohms to VccT in the module.
[4] This pin shall be pulled up with 4.7k-10kohms to Host_Vcc on the host board.

Electrical Characteristics

Electrical	Symbol	Min.	Typ.	Max	Unit	Notes
Power Consumption	p			2	W	
Supply Current	Icc			630	mA	
Transmitter						
Single-ended Input Voltage Tolerance	Vcc	-0.3		4.0	V	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing	Vin,pp	120		820	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee		Vee +0.8	V	2
Receiver						
Differential Output Voltage Swing	Vout,pp	350		850	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	3
Data output rise/fall time	Tr/Tf	28			ps	4
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	5
LOS De-assert Voltage	VlosL	Vee		Vee +0.8	V	5
Power Supply Rejection	PSR	100			mVpp	6

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Input 100 ohms differential termination.
4. These are unfiltered 20-80% values.
5. Loss of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λ	1530	1550	1565	nm	1
Optical Spectral Width	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	PAVG	2		6	dBm	2
Optical Extinction Ratio	ER	8.2			dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Transmitter OFF Output Power	POff			-30	dBm	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-26	dBm	3
Input Saturation Power (overload)	Psat	-8			dBm	
LOS Assert	LOSA	-35			dBm	
LOS De-assert	LOSD			-27	dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Launched power (avg.) is power coupled into a single mode fiber with master connector (Before of Life).
3. Measured with Light source 1550nm, ER=8.2dB; BER≤1E-12 @10.3125Gbps, PRBS=2^{31} -1NRZ.

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode.

Parameter	Symbol	Min.	Max	Unit
Temperature monitor absolute error	DMI_Temp	-3	3	°C
Laser power monitor absolute error	DMI_TX	-3	3	dBm
RX power monitor absolute error	DMI_RX	-3	3	dBm
Supply voltage monitor absolute error	DMI_VCC	-0.17	0.17	V
Bias current monitor	DMI_Ibias	-10%	10%	mA

Mechanical Dimensions

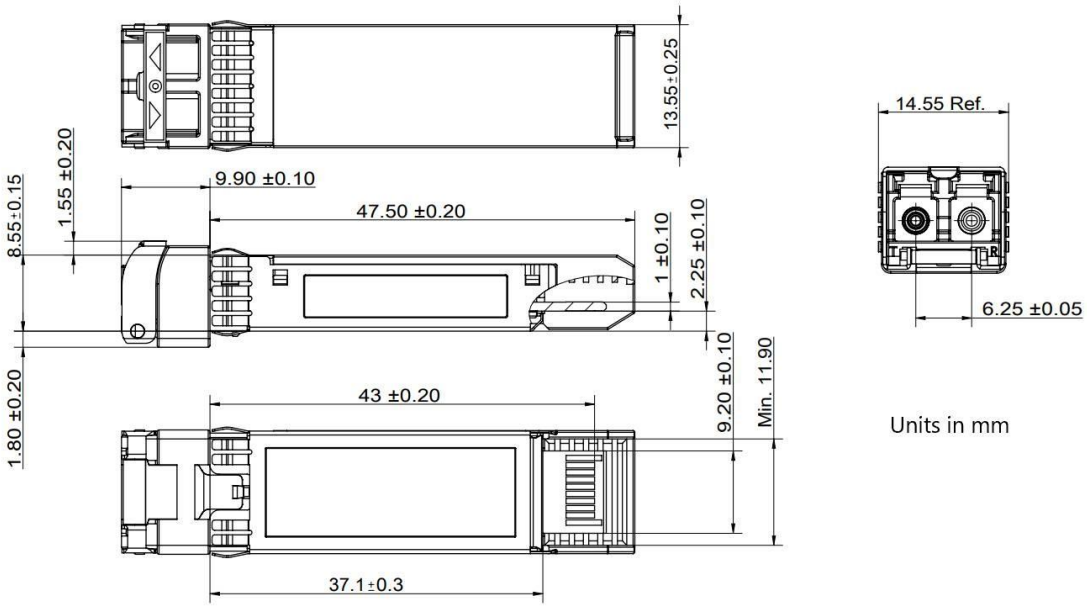

Figure2. Mechanical Outline