

3G SDI CWDM SFP 40km Single-Mode (ASFP19-40-SXX-XX)

- Data-rate up to 3Gbps
- Duplex SFP Transceiver, single transmitter or receiver available
- CWDM wavelength 20nm ITU-T grid

**Features:**

- HD-SDI SFP Transceiver available
- SD-SDI SFP Transceiver available
- 3G-SDI SFP Transceiver available
- SMPTE 297-2006 Compatible.
- Metal enclosure for Lower EMI
- Data-rate of 3Gbps operation
- 18 CWDM DFB wavelengths laser and PIN photodetector for 40km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring:
 - Internal Calibration or External Calibration
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
 - Standard : 0 to +70°C

Applications:

- SMPTE 297-2006 Compatible Electrical-to-Optical Interfaces.
- HDTV/SDTV Service Interfaces

Description

The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 3Gbps and 40km transmission distance with SMF. The transceiver consists of three sections: a DFB 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 (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Absolute Maximum Ratings

Absolute Maximum Ratings are those values, beyond which, some damages may occur to the devices. Exposure to conditions above the Absolute Maximum Ratings listed in Table 1 may negatively impact the reliability of the products.

Table 1 - Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Operating Humidity	HOP	5	90	%
Power Supply Voltage	T _{CC}	0	+3.6	V

Recommended Operating Environment:
Table 2 - Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	V _{CC}	+3.13	+3.3	+3.47	V
Power Supply Current	I _{CC}			380	mA
Operating Temperature	T _{OP}	0	-	+70	°C
Data Rate		270M	3G		bps

Optical and Electrical Characteristics
Table 3 - Transmitter Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Output Center Wavelength	λ_c	1260		1610	nm	20nm grid
Output Spectral Width	$\Delta\lambda$		-	1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Channel space	Δf		20		nm	
Deviation From Central Frequency @ EOL		-6.5		+6.5	nm	
Average Output Power(BOL)	P _o	-2	-	+3	dBm	1
Extinction Ratio	E.R.	8.2	-	-	dB	2
Rise/Fall Time (20%-80%)	R/TF			160	ps	3
TX_Disable Assert Time	t _{off}			10	us	
Data Input Differential Swing	V _{IN}	400		1800	mVpp	4
Input Differential Impedance	Z _{in}	85	100	115	Ω	

Note 1: Launched into 9/125um Single Mode Fiber.

Note 2: Measured with PRBS 31-1 test pattern @2.5 Gbit/s.

Note 3: Measured with the Bessel-Thompson filter OFF.

Note 4: Compatible with LVPECL input, AC coupled internally.

Table 4 - Receiver Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Wavelength		1260		1620	nm	

Receive Sensitivity	P_{min}	-	-20	-18	dBm	1
Saturation	P_{MAX}	-3			dBm	1
Receiver Threshold Settling Time	TSET			400	ps	
LOS Assert Level	PLOSA	-29	-		dBm	2
LOS Deassert Level	PLOSD		-	-22	dBm	3
LOS Hysteresis		1		4	dB	
Data Output Differential Swing	VOUT	370	800	1800	mV	4
Output Differential Impedance	Zout	85	100	115	Ω	

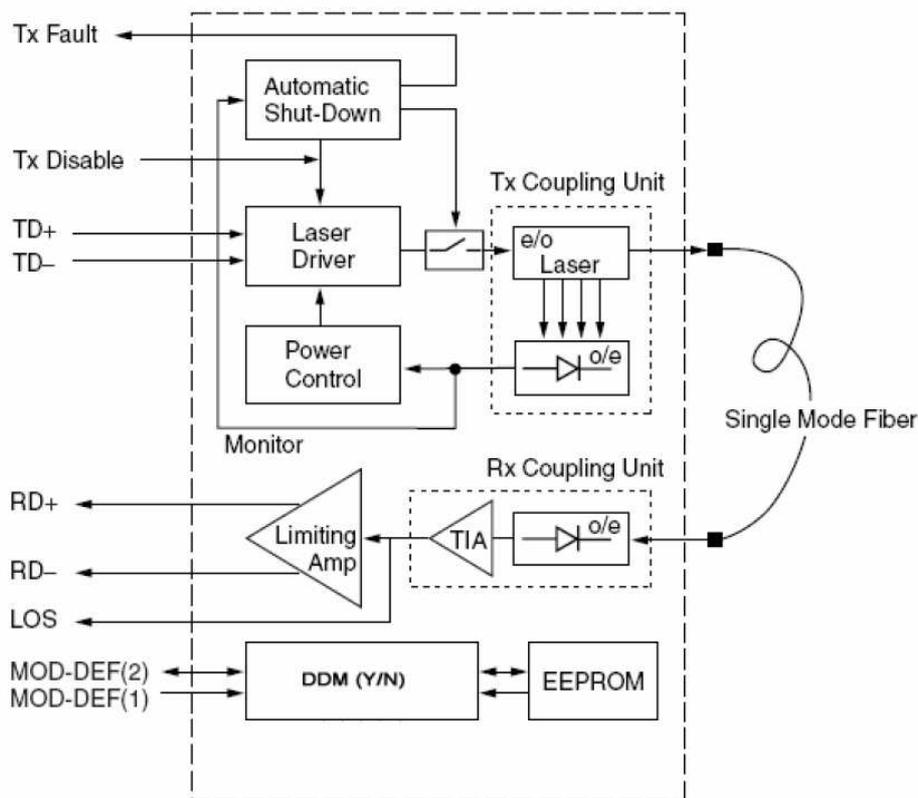
Note 1: Measured with a PRBS 31-1 test pattern @2.5Gbit/s, BER =10⁻¹².

Note 2: An increase in optical power above the specified level will cause Loss of Single (LOS) output to switch from a high state to a low state.

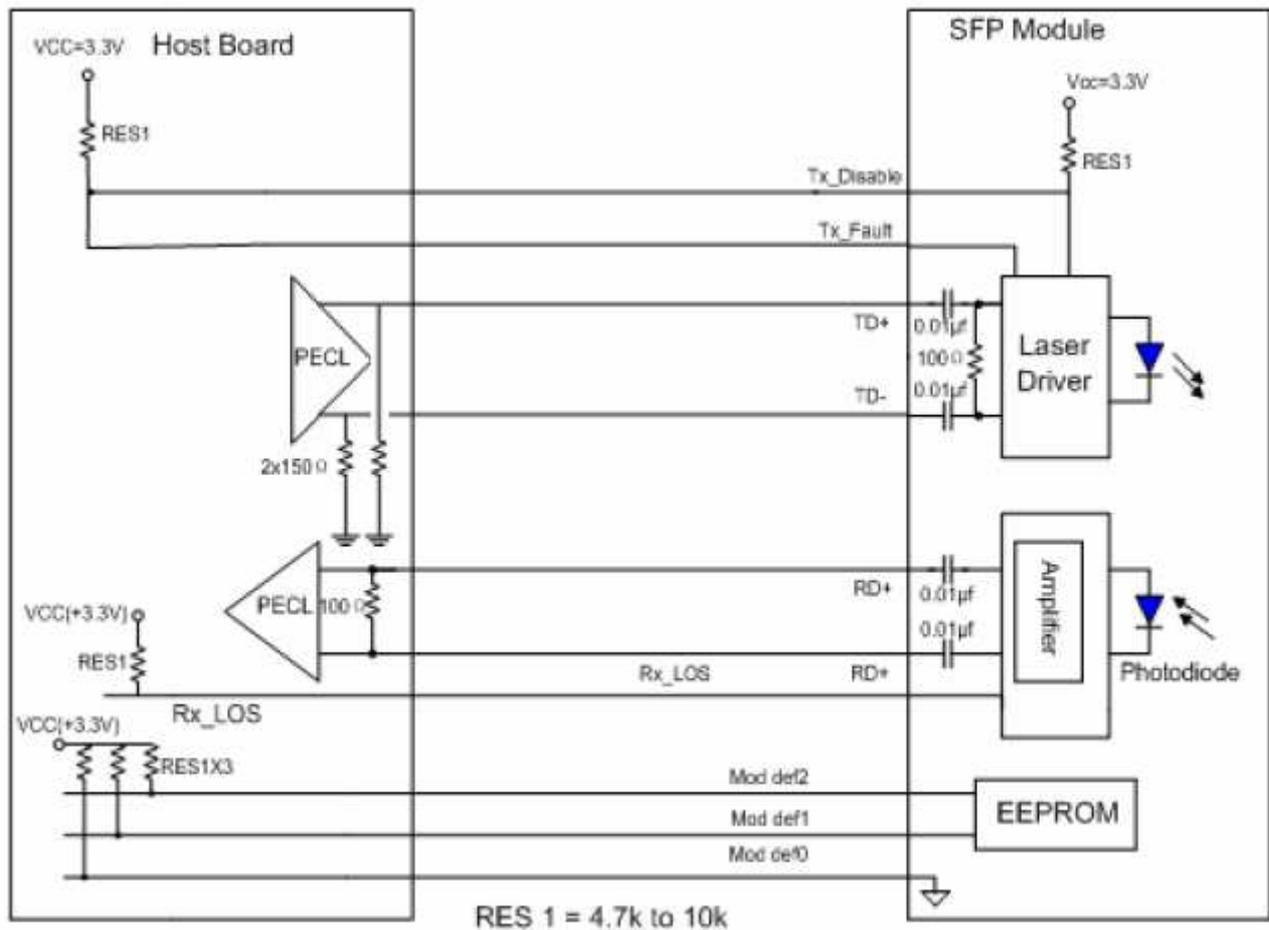
Note 3: A decrease in optical power below the specified level will cause Loss of Single (LOS) output to switch from a low state to a high state.

Note 4: LVPECL output, DC coupled internally, guaranteed in the full range of input optical power (-6dBm to -30dBm) (See Recommended Interface Circuit)

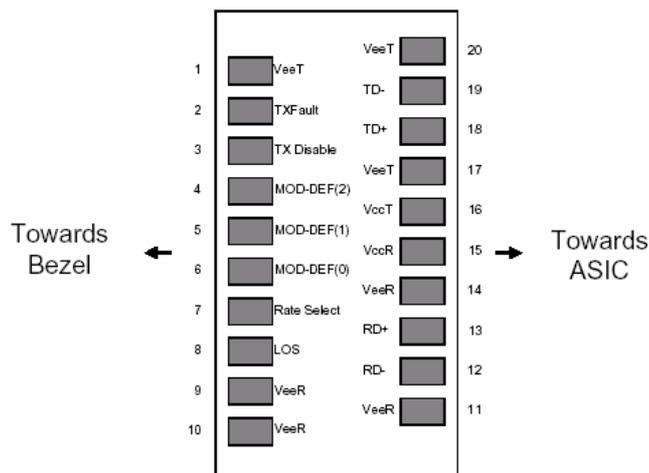
Block Diagram:



Recommend Circuit Schematic



Pin Assignment:



Pin Description:

Pin#	Name	Function	Notes
1	VeeT	Transmitter Ground	-
2	TX_Fault	Transmitter Fault Indication	Note 1
3	TX_DIS	Transmitter Disable	Note 2, Module disables on high or open
4	MOD-DEF2	Module Definition 2	Note 3, 2 wire serial ID interface
5	MOD-DEF1	Module Definition 1	Note 3, 2 wire serial ID interface
6	MOD-DEF0	Module Definition 0	Note 3, Grounded in Module
7	RSSI_TRI		
8	LOS	Loss of Signal	Note 4
9	VeeR	Receiver Ground	Note 5
10	VeeR	Receiver Ground	Note 5
11	VeeR	Receiver Ground	Note 5
12	RD-	Inv. Received Data Out	Note 6
13	RD+	Received Data Out	Note 6
14	VeeR	Receiver Ground	Note 5
15	VccR	Receiver Power	Note 7, 3.3V± 5%
16	VccT	Transmitter Power	Note 7, 3.3V± 5%
17	VeeT	Transmitter Ground	Note 5
18	TD+	Transmit Data In	Note 8
19	TD-	Inv. Transmit Data In	Note 8
20	VeeT	Transmitter Ground	Note 5

Notes:

- TX_Fault is an open collector/drain output, which should be pulled up with a 4.7K–10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.
- TX_DIS is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7–10 KΩ resistor. Its states are:
 Low (0 – 0.8V): Transmitter on
 (>0.8, < 2.0V): Undefined
 High (2.0 – 3.465V): Transmitter Disabled
 Open: Transmitter Disabled
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10KΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.
 Mod-Def 0 is grounded by the module to indicate that the module is present
 Mod-Def 1 is the clock line of two wire serial interface for serial ID
 Mod-Def 2 is the data line of two wire serial interface for serial ID
- LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

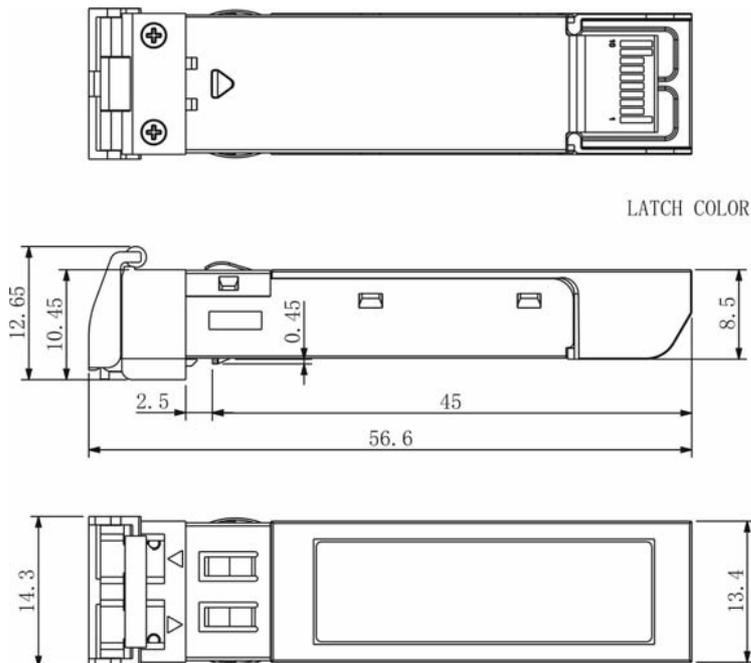
5. VeeR and VeeT may be internally connected within the SFP module.
6. RD-/+ : These are the differential receiver outputs. They are DC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES.
7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V 5% at the SFP connector pin. Maximum supply current is 400mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
8. TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

Serial Communication Protocol

The serial interface uses the 2-wire serial communication protocol to provide module ID information as outlined in the SFP MSA1. These SFPs use an Atmel AT24C01A 128 byte E2PROM with an address of A0h. The SFPs also support diagnostic features as described in SFF-84728, “Digital Diagnostic Monitoring Interface for Optical Transceivers”. A controller IC that monitors system parameters such as laser current, module temperature, transmitter power, and received power is accessible at address A2H. Digital diagnostic accuracy and digital diagnostic range can be found in the table below.

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	-5 to 2	dBm	±3dB	Internal / External
RX Power	-23 to -3	dBm	±3dB	Internal / External

Mechanical Dimensions:



Ordering Guide:

Par Number	Product description
ASFP19-40-Sxx-C	CWDM, 3G-SDI SFP, 40km, 0°C ~ +70°C
ASFP19-40-Sxx-CD	CWDM, 3G-SDI SFP, 40km, 0°C ~ +70°C, with Digital Diagnostic Monitoring

Note: See table3 below for “xx” definition in Part Number

λC Wavelength Guide											
Code	λc	Unit	Code	λc	Unit	Code	λc	Unit	Code	λc	Unit
27	1270	nm	37	1370	nm	47	1470	nm	57	1570	nm
29	1290	nm	39	1390	nm	49	1490	nm	59	1590	nm
31	1310	nm	41	1410	nm	51	1510	nm	61	1610	nm
33	1330	nm	43	1430	nm	53	1530	nm			
35	1350	nm	45	1450	nm	55	1550	nm			

Revision History

Revision	Initiated	Reviewed	Revision History	Date
V1.0	David.Deng	Harry.Lee	Creation	Mar21 2009
V2.0	David.Deng	Harry.Lee	Update EEPROM	Nov 07 2009

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