10Gb/s SFP+ LR 1310nm 20km Optical Transceiver

Features

- Up to 20km on 9/125μm SMF
- Up to 11.3Gb/s data links
- 1310nm DFB and PIN receiver
- SFI electrical interface
- 2-wire interface for integrated Digital Diagnostic monitoring
- Duplex LC/UPC type pluggable optical interface
- RoHS-10 compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Hot pluggable
- Metal enclosure, for lower EMI
- Meet ESD requirements, resist 8KV direct contact voltage
- +3.3V power supply
- Operating case temperature: 0~+70°C

Applications

- 10GBASE-LR/LW & 10G Ethernet
- SDH STM64
- Other Optical Links

Compliance

- Compliant with IEEE 802.3ae-2002
- Compliant with MSA SFF-8472
- Compliant with MSA SFF-8431

Description

The SFP-10G-LR-20 transceivers are designed for use in 10-Gigabit Ethernet links up to 20km over single mode fiber. The module consists of 1310 DFB Laser, PIN 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.

SFP-10G-LR-20 transceivers 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. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP+ MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

Absolute Maximum Ratings

Table1-Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	℃
Supply Voltage	Vcc	0	3.6	V
Relative Humidity (non-condensation)	RH	5	95	%
Damage Threshold	TH_d	5		dBm

Recommended Operating Conditions and Power Supply Requirements

Table2-Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T_{op}	0		+70	℃	
Power Supply Voltage	VCC	3.14	3.3	3.47	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			20	km	9/125um

Electrical Characteristics

Table3-Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Power Consumption	p			1.2	W	
Supply Current	Icc			360	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	180		700	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	300		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

Notes:

[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

Table4-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter						
Center Wavelength	λ_C	1260	1310	1355	nm	1
Optical Spectral Width	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P_{AVG}	-5.2		3	dBm	2

Optical Extinction Ratio	ER	3.5			dB	
Transmitter OFF Output Power	Poff			-30	dBm	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ_C	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-15	dBm	3
Input Saturation Power (overload)	Psat	0.5			dBm	
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD			-17	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 1310nm, ER=3.5dB; BER =＜10^-12 @10.3125Gbps, PRBS=2^31-1 NRZ.

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. For external calibration mode please contact our sales staff.

Table5-Digital diagnostic specification table

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_ Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI _VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_ bias	-10%	10%	mA	
Measured TX bias current	DMI_Ibias	-10	10	%	

Pin Description

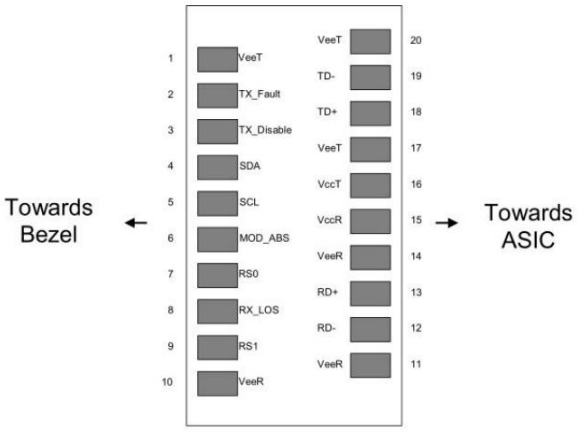

Figure1 Pin view

Pin Function Definitions

Table6-Pin Function Definitions

PIN	Symbol	Name / Description	Note
1	VeeT	Module Transmitter Ground	1
2	TX_Fault	Module Transmitter Fault	2
3	TX_Dis	Transmitter Disable. Laser output disabled on high or open	3
4	SDA	2-Wire Serial Interface Data Line	4
5	SCL	2-Wire Serial Interface Clock	4
6	MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	4
7	RS0	Not used	5
8	RX_LOS	Receiver Loss of Signal Indication Active High	6
9	RS1	Not used	
10	VeeR	Module Receiver Ground	1
11	VeeR	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Data Output	
14	VeeR	Module Receiver Ground	1
15	VccR	Module Receiver 3.3 V Supply	
16	VccT	Module Receiver 3.3 V Supply	
17	VeeT	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	VeeT	Module Transmitter Ground	1

[1] Circuit ground is internally isolated from chassis ground.

[2] TFAULT is an open collector/drain output, which should be pulled up with a 4.7k -10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to ＜0.8V.

[3] Laser output disabled on TDIS＞2.0V or open, enabled on TDIS ＜0.8V.

[4] Should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.

[5] Internally pulled down per SFF-8431 Rev 4.1.

[6] LOS is open collector output. It should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Mechanical Dimensions

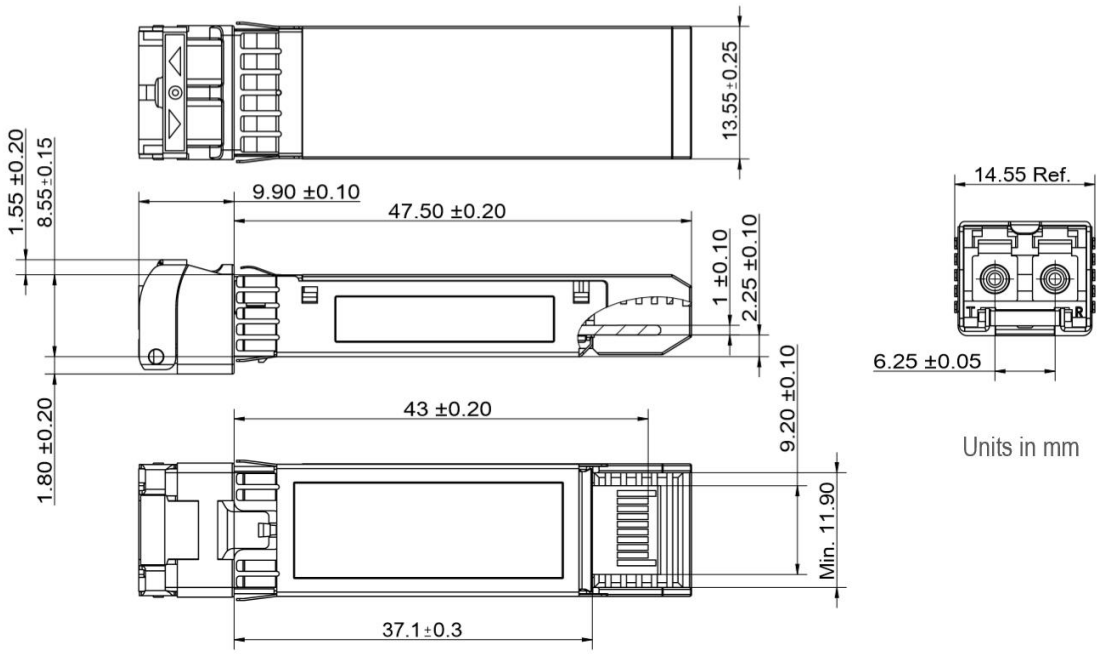

Figure2 Map Mechanical Outline

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Disclaimer

1. We are committed to continuous product improvement and feature upgrades, and the contents contained in this manual are subject to change without notice.

2. Nothing herein should be construed as constituting an additional warranty.

3. NADDOD assumes no responsibility for the use or reliability of equipment or software not provided by NADDOD.