10Gb/s SFP+ BIDI TX-1550nm/RX-1490nm 100km Optical Transceiver

Features

- Up to 11.1Gbps data rate

- BIDI LC/UPC type pluggable optical interface

- 1550nm EML laser and APD receiver

- 2-wire interface with integrated Digital Diagnostic monitoring

- Hot- pluggable

- Up to 100km on 9/125μm SMF

- RoHS-10 compliant and lead-free

- Single +3.3V power supply

- Meet ESD requirements, resist 8KV direct contact voltage

- Maximum power consumption 1.8W

- Compliant with SFF-8472

- Case operating temperature： 0 ~ +70℃

Applications

- Switch to Switch interface

- 10GBASE-ZR/ZW

- 10G Ethernet

- Router/Server interface

- Other optical transmission systems

Compliance

- SFP MSA

- SFF-8472

- IEEE802.3z

- RoHS

Description

The SFP-10G-D100-54 series single-mode transceivers are designed for use in 10-Gigabit Ethernet links up to 100km over single mode fiber. The module consists of 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.

The SFP-10G-D100-54 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	Symbols	Min.	Max.	Unit	Notes
Storage Temperature	T_S	-40	85	°C	
Power Supply Voltage	V_{CC}	-0.3	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	TH_d	0		dBm	

Recommended Operating Conditions and Power Supply Requirements

Table2-Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T_{OP}	0		+70	°C	
Power Supply Voltage	V_{CC}	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			100	km	9/125um

Electrical Characteristic

Tested under recommended operating conditions, unless otherwise noted

Table3-Electrical Characteristic

Parameter	Symbols	Min.	Typical	Max.	Unit	Notes
Power Consumption	P			1.8	W	

Supply Current	Icc			520	mA	
Transmitter						
Single-ended Input Voltage Tolerance	V$_{CC}$	-0.3		4.0	V	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing	Vin,pp	180		1200	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 Characteristic

Table4-Optical Characteristic						
Parameter	**Symbols**	**Min.**	**Typical**	**Max.**	**Unit**	**Notes**
Transmitter						
Center Wavelength	λ_C	1540	1550	1560	nm	
Optical Spectral Width	$\Delta\lambda$			0.3	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P$_{AVG}$	1		6	dBm	
Optical Extinction Ratio	ER	8.2			dB	
Average Launched Power(Laser Off)	POff			-30	dBm	

Transmitter Eye Mask	Compliant with 802.3ae(class 1 laser safety)					
Receiver						
Center Wavelength	λ_C	1480	1490	1500	nm	
Receiver Sensitivity (Average Power)	Sen.			-25	dBm	1
Input Saturation Power (overload)	Psat	-8			dBm	
LOS Assert	LOSA	-38			dBm	
LOS De-assert	LOSD			-26	dBm	
LOS Hysteresis	LOSH	0.5			dB	

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Notes:

[1] Measured with Light source 1490nm @1550nm, ER=8.2dB; 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.

Table5-Digital Diagnostic Functions					
Parameter	**Symbols**	**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	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Pin Description
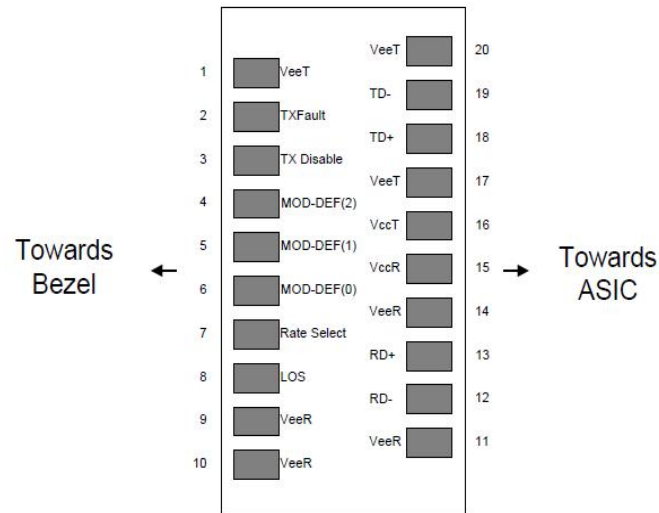
Figure1 Pin view

Pin Function Definitions

PIN	Name	Description	Notes
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.Open Drain. Logic "0" indicates normal operation.	
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required.	4
8	LOS	Loss of Signal indication. Open Drain. Logic "0" indicates normal operation.	5
9	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out(CML). AC Coupled	
13	RD+	Receiver Non-inverted DATA out(CML). AC Coupled	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Table6-Pin Function Definitions

Notes:

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

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

[3] Should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF (0) pulls line low to indicate module is plugged in.

[4] This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates).If implemented, the input will be internally pulled down with＞30kΩ resistor. The input states are:

1) Low (0 – 0.8V): Reduced Bandwidth

2) (＞0.8, ＜2.0V): Undefined

3) High (2.0 – 3.465V): Full Bandwidth

4) Open: Reduced Bandwidth

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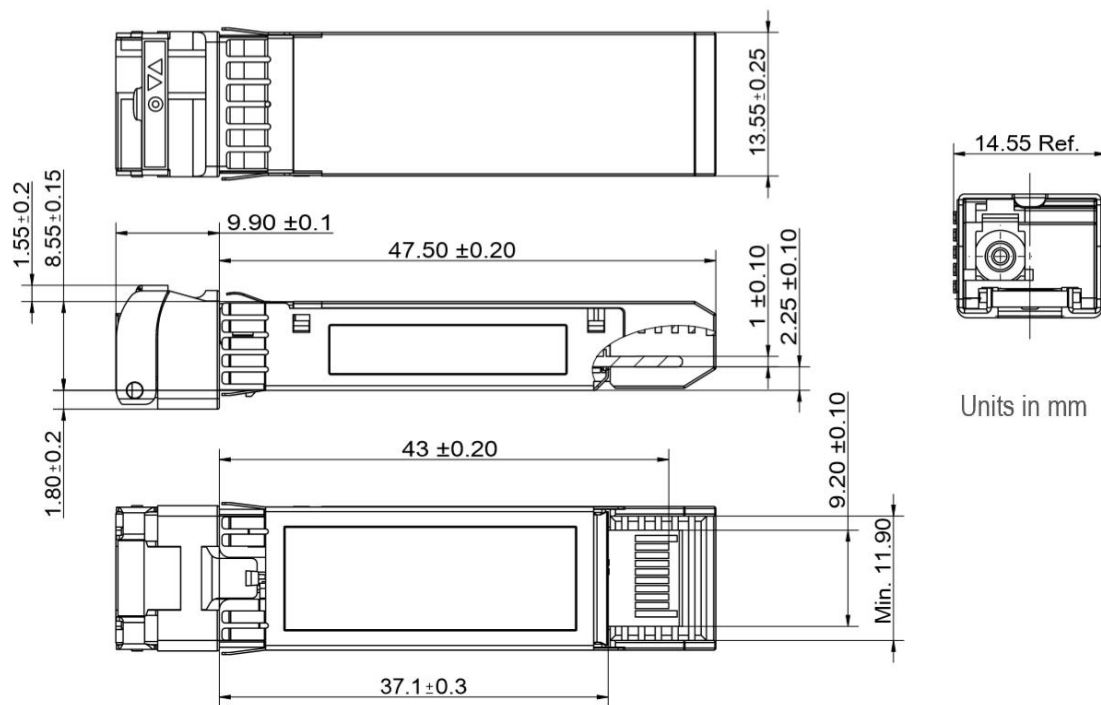
Mechanical Dimensions

Figure2 Mechanical Outline

Precautions

a. This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

b. Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

Further Information：

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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.

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