

DATA SHEET

MODULETEK: SFP-GE-LX40-C10

1.25Gb/s SFP (Small Form Pluggable) Long Wavelength (1310nm) Transceiver

SFP-GE-LX40-C10 Overview

ModuleTek's SFP-GE-LX40-C10 SFP optical transceivers are based on the Gigabit Ethernet IEEE 802.3 standard and Fibre Channel FC-PI Rev.5.0, providing a fast and reliable interface for GE/FC applications. The product implements digital diagnostics via a 2-wire serial bus, compliant with the INF-8074i Small Form Factor Pluggable Multi-Source Agreement (MSA) and SFF-8472 standard.

Product Features

- Up to 1.25 Gb/s bi-directional data links
- Compliant with IEEE 802.3z Gigabit Ethernet
- Compliant with SFP MSA
- Hot-pluggable SFP footprint
- Uncooled 1310nm DFB laser transmitter
- Duplex LC connector
- Built-in digital diagnostic functions
- Up to 40km on 9/125um SMF
- Single power supply 3.3V
- RoHS Compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range: 0°C to 70°C

Applications

- 1.25 Gb/s Gigabit Ethernet
- 1.063 Gb/s Fiber Channel

Ordering Information

Part Number	Description	Color on Clasp
SFP-GE-LX40-C10	GE/FC SFP 1310nm LC Connectors 40km on SMF, with DOM function	Blue
For More Information: ModuleTek Limited Web: www.moduletek.com Email: sales@moduletek.com		

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR		1.25		Gb/s	1
	DR		1.062		Gb/s	2
Bit Error Rate	BER			10^{-12}		
Operating Temperature	T _C	0		70	°C	3
Storage Temperature	T _{STO}	-40		85	°C	4
Supply Current	I _{CC}		200	300	mA	5
Input Voltage	V _{CC}	3.14	3.3	3.46	V	
Maximum Voltage	V _{MAX}	-0.5		4	V	5

Notes:

1. IEEE 802.3
2. FC-PI-2 Rev 5
3. Case temperature
4. Ambient temperature
5. For electrical power interface

Optical – Characteristics – Transmitter

$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P_{TX}	0		5	dBm	1
Optical Center Wavelength	λ_C	1270		1360	nm	
Optical Modulation Amplitude	OMA	174			uW	2
Extinction Ratio	ER	9			dB	
Side Mode Suppression Ratio	SMSR	30			dB	
Spectral Width (- 20 dB)	$\Delta\lambda$			1	nm	
Optical Rise/Fall Time(20%-80%)	t_r/t_f			180	ps	
Relative Intensity Noise	RIN			- 120	dB/Hz	
Deterministic Jitter Contribution	DJ			60	ps	
Total Jitter Contribution	TJ			130	ps	

Notes:

1. Class 1 Product
2. Equivalent extinction ratio specification for FC

Optical – Characteristics – Receiver

$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Max Input Power	P_{RX}	0			dBm	
Optical Center Wavelength	λ_C	1270		1600	nm	
Receiver Sensitivity@1.062Gb/s	R_{X_SEN1}			-27	dBm	1
Receiver Sensitivity @ 1.25Gb/s	R_{X_SEN2}			-27	dBm	2
Optical Return Loss	ORL	12			dB	
Receiver Electrical 3dB Upper cutoff frequency				1500	MHz	
LOS Assert	LOS_A	-35			dBm	
LOS De-Assert	LOS_D			-27	dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Notes:

1. FC-PI- Rev.5
2. IEEE 802.3

Electrical – Characteristics – Transmitter

$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R_{IN}		100		Ω	
Single ended data input swing	V_{IN_PP}	250		1200	mV	
Transmit disable voltage	V_D	$V_{CC}-1.3$		V_{CC}	V	
Transmit enable voltage	V_{EN}	V_{EE}		$V_{EE}+0.8$	V	
Transmit disable assert time				10	us	

Electrical – Characteristics – Receiver

$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

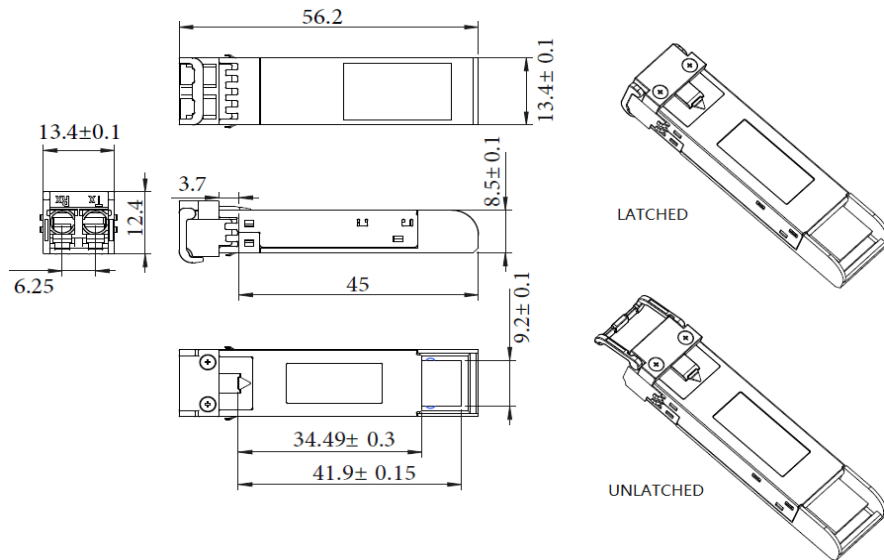
Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Single ended data output swing	V_{OUT_PP}	300	400	800	mV	
Data output rise/fall time (20%-80%)	t_r / t_f		100	175	ps	
LOS Assert	V_{LOS_A}	$V_{CC}-0.5$		V_{CC_HOST}	V	
LOS De-Assert	V_{LOS_D}	V_{EE}		$V_{EE}+0.5$	V	

Digital Diagnostic Functions

SFP-GE-LX40-C10 supports the 2-wire serial communication protocol as defined in SFP MSA. Digital diagnostic information is accessible over the 2-wire interface at the address 0xA2. Digital diagnostics for SFP-GE-LX40-C10 are internally calibrated by default. The internal micro control unit accesses the device operating parameters in real time, Such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. The module implements the alarm function of the SFP MSA, alerts the user when a particular operating parameter exceeds the factory-set normal range.

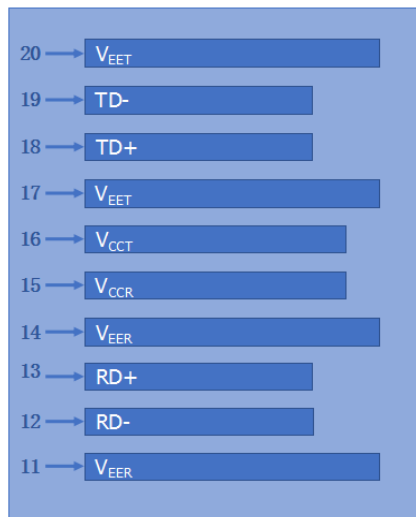
Parameter	Symbol	Accuracy	Units	Report Range		Unit	Remarks
Internal Calibration							
Temperature	Temp	± 3	$^{\circ}C$	-40	95	$^{\circ}C$	
Voltage	V_{CC}	± 0.1	V	2.7	3.9	V	
Bias Current	I _{bias}	± 10	%	1	80	mA	
Tx Power	P _{TX}	± 3	dB	-5	5	dBm	
Rx Power	P _{RX}	± 3	dB	-30	0	dBm	

Dimensions

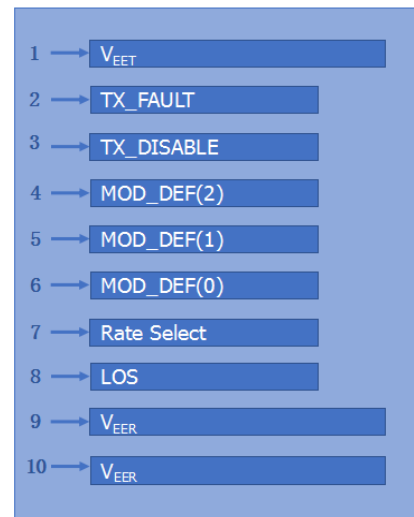


ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

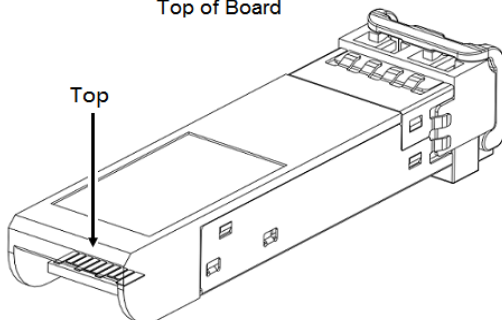
Electrical Pad Layout



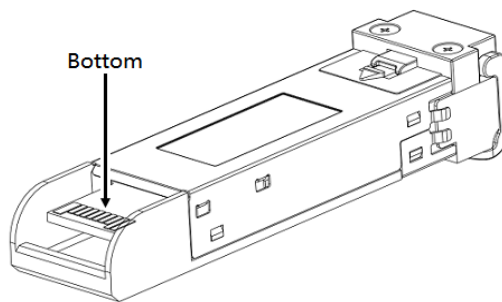
Top of Board



Bottom of Board



Top



Bottom

Pin Assignment

PIN #	Symbol	Description	Remarks
1	V _{EET}	Transmitter ground (common with receiver ground)	1
2	TX_FAULT	Transmitter Fault. Not supported	
3	TX_DISABLE	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	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	4
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. AC coupled	
13	RD+	Receiver Non-inverted DATA out. 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

Notes:

1. Circuit ground is isolated from chassis ground
2. Disabled: T_{DIS} > 2V or open, Enabled: T_{DIS} < 0.8V
3. Should Be pulled up with 4.7k – 10k ohm on host board to a voltage between 2V and 3.6V
4. LOS is open collector output

References

1. IEEE standard 802.3. IEEE Standard Department, 2002.
2. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), INT-8074i.
3. Fiber Channel Draft Physical Interface Specification (FC-PI-2 Rev.5).
4. Digital Diagnostics Monitoring Interface for Optical Transceivers – SFF-8472.
5. Fiber Channel Physical and Signaling Interface (FC-PH/PH2/PH3).