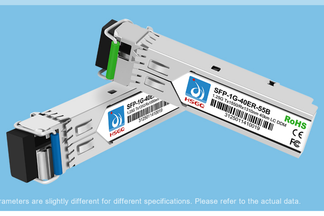
HSGQ-SFP 1G BIDI Modle



The blue text is a variable. The parameters are slightly different for different specifications. Please refer to the actual data.

Product Specification

Package	Model	Data Rate	Distance	Wavelength	Interface	Working Temperature	Receiving Sensitivity
SFP	SFP-1G-3LR-31A	1.25Gbps	3KM	1310/1550nm	LC/SC	0~70℃ or -40~85℃	<=-24dBm
	SFP-1G-3LR-55B						
SFP	SFP-1G-10LR-31A	1.25Gbps	10KM	1310/1550nm	LC/SC		<=-24dBm
	SFP-1G-10LR-55B						
SFP	SFP-1G-20LR-31A	1.25Gbps	20KM	1310/1550nm	LC/SC		<=-24dBm
	SFP-1G-20LR-55B						
SFP	SFP-1G-40ER-31A	1.25Gbps	40KM	1310/1550nm	LC/SC		<=-24dBm
	SFP-1G-40ER-55B						
SFP	SFP-1G-60ER-49A	1.25Gbps	60KM	1490/1550nm	LC/SC		<=-25dBm
	SFP-1G-60ER-55B						
SFP	SFP-1G-80ZR-49A	1.25Gbps	80KM	1490/1550nm	LC/SC		<=-26dBm
	SFP-1G-80ZR-55B						
SFP	SFP-1G-100ZR-49A	1.25Gbps	100KM	1490/1550nm	LC/SC		<=-30dBm
	SFP-1G-100ZR-55B						
SFP	SFP-1G-120ZR-49A	1.25Gbps	120KM	1490/1550nm	LC/SC		<=-30dBm
	SFP-1G-120ZR-55B						
SFP	SFP-1G-160ZR-49A	1.25Gbps	160KM	1490/1550nm	LC/SC		<=-33dBm
	SFP-1G-160ZR-55B						

Product Features

- Uncooled Laser Diode with MQW Structure
- InGaAs PIN-TIA Photodiode Receiver
- Reach 40 km Transmission Distance on 9/125μm SMF
- BIDI Single Mode Transceiver SFP Footprint
- LC or SC Optical Interface
- Compliant With SFP MSA(INF8074I)、SFF-8472、ITU-T G.957
- Digital Diagnostic Monitoring Interface
- Single +3.3V Power Supply
- CML Differential Inputs and Outputs
- LVTTL Signal Detection Output
- Compliant With RoHS and Lead Free
- Metal Enclosure for Lower EMI
- Operating Case Temperature: Standard: 0 ~ +70°C; Extend: -20 ~ +85°C; Industrial: -40 ~ +85°C

Absolute Maximum Rating

Parameter	Symbol	Min	Max	Unit
Storage Temperature	Vcc	-40	+85	℃
Operating Temperature	Tc	0	+70	℃
		-20	+85	℃
		-40	+85	℃
Input Voltage	/	GND	Vcc	V
Power Supply Voltage	Vcc-VEE	0	+3.6	V

Note: 1.Exceeding any of these values may immediately damage the device.

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Storage Temperature	Ts	-40		+85	℃
Operating Case Temperature	Tc	0		+70	℃
		-20		+85	℃
		-40		+85	℃
Power Supply Voltage	Vcc	3.1	3.3	3.5	V
Power Supply Current	Icc			300	mA
Data Rate	DR		1250		Mbps

Electrical Specification

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Input Differential Impedance	ZIN	90	100	110	Ω	
Input Swing Differential Voltage	VIN	500		1600	mV	2
TX-Disable Voltage	Disable	/	2.0	Vcc	V	
	Enable	/	0	0.8	V	
TX-Fault Voltage	Fault	/	2.0	Vcc	V	
	Normal	/	0	0.8	V	
Receiver						
Output Swing Differential Voltage	VOUT	600		1600	mV	3
LOS Voltage	High	/	2.0	Vcc	V	
	Low	/	0	0.8	V	

Note: 1. The current excludes the output load current;
2. PECL input, internally AC-coupled and terminated;
3. Internally AC-coupled.

Diagnostics Specification

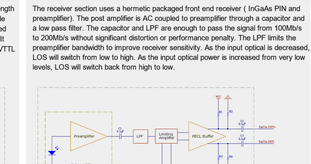
Parameter	Range	Accuracy	Unit	Calibration
Temperature	0~+70	±3	℃	Internal/External
	-40~+85			Internal/External
Voltage	3.0~3.6	±3%	V	Internal/External
Bias Current	0~100	±10%	mA	Internal/External
TX Power	-8~2	±3	dBm	Internal/External
RX Power	-26~-3	±3	dBm	Internal/External

General Description

The SFP transceivers are high performance, cost effective modules supporting data-rate of 1.25Gbps and 40km transmission distance on 9/125μm SMF.

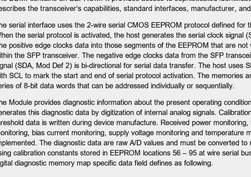
The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and DDMI control unit. All modules satisfy class I laser safety requirements.

The transceivers are compliant with the Small Form-Factor Pluggable (SFP) Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.



Transmitter Section

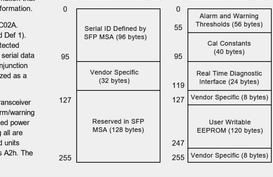
Transmitter is designed for single mode fiber and operates at a nominal wavelength of 1490nm, 1310nm or 1550nm. The transmitter module uses a DFB laser diode and full IEC825 and CDRH class 1 eye safety. The output power can be disabled via the single TX-disable pin. Logic LVTTL HIGH level disables the transmitter. It contains APC function, temperature compensation circuit, PECL data inputs, LVTTL TX-disable input and TX-fault Output interface.



Transmitter Block Diagram

Receiver Section

The receiver section uses a hermetic packaged front end receiver (InGaAs PIN and preamplifier). The post amplifier is AC coupled to preamplifier through a capacitor and a low pass filter. The capacitor and LPF are enough to pass the signal from 100Mb/s to 200Mb/s without significant distortion or performance penalty. The LPF limits the preamplifier bandwidth to improve receiver sensitivity. As the input optical is decreased, LOS will switch from low to high. As the input optical power is increased from very low levels, LOS will switch back from high to low.



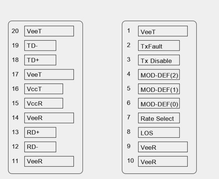
Receiver Block Diagram

DDMI Section

The DDMI contains an EEPROM. It provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

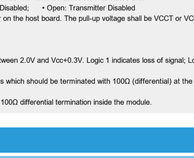
The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the FT24C02A. When the serial protocol is activated, the host generates the serial clock signal (SCL, Mod Def 1). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2h. The digital diagnostic memory map specific data field defines as following.



Pin Definition

Pin	Name	Description	Note
1	VEET	Transmitter Ground	Note 1
2	TX FAULT	Transmitter Fault Indication	Note 2
3	TX DISABLE	Transmitter Disable	Note 3
4	MOD_DEF(2)	SDA Serial Data Signal	Note 3
5	MOD_DEF(1)	SCL Serial Clock Signal	Note 3
6	MOD_DEF(0)	Module Absent. Grounded within the module	
7	Rate Select	Not Connected	Note 4
8	LOS	Loss of Signal	
9	VEER	Receiver ground	
10	VEER	Receiver ground	
11	VEER	Receiver ground	Note 5
12	RD-	Inv. Received Data Out	Note 5
13	RD+	Received Data Out	
14	VEER	Receiver ground	3.3V±5%
15	VccR	Receiver Power Supply	3.3V±5%
16	VccT	Transmitter Power Supply	
17	VEET	Transmitter Ground	Note 6
18	TD+	Transmit Data In	Note 6
19	TD-	Inv. Transmit Data In	
20	VEET	Transmitter Ground	



Top of Board

Bottom of Board (as viewed thru top of board)

Note:
1.TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2.TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with 4.7k~10kΩ resistor. Its states are:
• Low (0 to 0.8V): Transmitter on; • (>0.8V, < 2.0V): Undefined, • High (2.0 to 3.465V): Transmitter Disabled; • Open: Transmitter Disabled
3.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 VCC.
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.
4.LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
5.RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES.
6.TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Optical Specification

Transmitter						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Center Wavelength	λc	1291	1310	1330	nm	
		1480	1490	1510		
		1531	1550	1570		
Spectral Width	Δλ			1	nm	DFB
Side Mode Suppression Ratio	SMSR	30			dB	DFB
Average Optical Output Power	Po	-3		2	dBm	1310nm
		-8		0		1490nm
Extinction Ratio	ER	9			dB	1550nm
Optical Rise/Fall Time(20%-80%)	Tr/Tf			0.28	ns	
Output Eye Diagram	Compliant with IEEE802.3					

Receiver						
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operate Wavelength	λc	1291	1310	1330	nm	
		1480	1490	1510		
		1531	1550	1570		
Receiver Sensitivity	RSENS			-24	dBm	1
Receiver Saturation	PRS	-3			dBm	1
LOS Assert	/	-35			dBm	Alarm: High-level
LOS De-Assert	/			-24	dBm	
LOS Hysteresis	/	0.5		5	dBm	

Note: 1、Minimum Sensitivity and saturation levels for a 223-1 PRBS test pattern @1.25Gbps.