

DATA SHEET

MODULETEK: SFP-FC32G-SW-C-C12

28.05Gb/s SFP Short Wavelength (850nm) Transceiver

Overview

SFP-FC32G-SW-C-C12 optical transceiver module is designed for fibre-optic links with data rates up to 28.05Gb/s on MMF. Compliant with FC-PI-6, SFF-8402, SFF-8419, SFF-8432 and SFF-8472. The product implements digital diagnostics via a 2-wire serial bus, compliant with the SFF-8472 standard.

Product Features

- Up to 28.05Gb/s bi-directional data links
- Compliant with FC-PI-6
- Compliant with SFF-8402
- Compliant with SFF-8419
- Compliant with SFF-8432
- Compliant with SFF-8472
- Hot-pluggable SFP footprint
- 850nm VCSEL laser transmitter
- Duplex LC connector
- Built-in digital diagnostic functions
- 70m over M5E MMF(50/125um OM3)
- 100m over M5E MMF(50/125um OM4)
- Single power supply 3.3V
- RoHS Compliant
- Operating temperature range (Case Temperature) : Commercial Level : 0°C to 70°C



Applications

- 8.5/14.025/28.05Gb/s Fibre Channel

Ordering Information

| Part Number | Product ID | Description | Color on Clasp |
|--|------------|---|----------------|
| SFP-FC32G-SW-C-C12 | M600404 | 32GFC SFP 850nm LC Connectors up to 70m(OM3) or 100m(OM4) on MMF, with DOM function | Black |
| <p>Notes: 1.Product ID is the abbreviated order number of our company's product standard model</p> | | | |
| <p>For More Information Or To Order The Above Products, Please Contact:</p> <p>Email: sales@moduletek.com</p> <p>ModuleTek Web: www.moduletek.com</p> | | | |

General Specifications

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|-----------------------|-----------|------|-----|------|------|---------|
| Operating Temperature | T_C | 0 | | 70 | °C | 1 |
| Storage Temperature | T_{STO} | -40 | | 85 | °C | 2 |
| Supply Current | I_{CC} | | 145 | 290 | mA | 3 |
| Input Voltage | V_{CC} | 3.15 | 3.3 | 3.46 | V | |
| Maximum Voltage | V_{MAX} | -0.5 | | 4 | V | 3 |
| Power Dissipation | P | | 550 | 700 | mW | |

Notes:

1. Case temperature
2. Ambient temperature
3. For electrical power interface

Link Distances

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|---|--------|-----|------------------------|---|------|-------------|
| Data rate | DR | | 8.5 14.025 28.05 | | Gbps | 1 |
| Bit error rate | BER | | | 1×10^{-12} 1×10^{-6} | | 2 3 |
| OM2 multimode fiber (bandwidth 500MHz*km) | L | | | 50 35 20 | m | 4 5 6 |
| OM3 multimode fiber (bandwidth 2000MHz*km) | L | | | 150 100 70 | m | 4 5 6 |
| OM4 multimode fiber (bandwidth 4700MHz*km) | L | | | 190 125 100 | m | 4 5 6 |

Notes:

1. FC-PI-6
2. PRBS 2⁷-1@8GFC, PRBS 2³¹-1@16GFC
3. FEC@32GFC
4. At 8.5Gb/s Fibre Channel data rate
5. At 14.025Gb/s Fibre Channel data rate
6. At 28.05Gb/s Fibre Channel data rate

Optical Characteristics – Transmitter

V_{CC}=3.15V to 3.46V, T_C=0°C to 70°C

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|--|-----------------|----------------------|-----|-----|------|---------|
| Average Output Optical Power 8.5Gb/s 14.025Gb/s 28.05Gb/s | P _{TX} | -8.2 -7.8 -6.7 | | 2.4 | dBm | |
| Optical Center Wavelength | λ _C | 840 | 850 | 860 | nm | |
| Optical Modulation Amplitude 8.5Gb/s 14.025Gb/s 28.05Gb/s | OMA | -5.2 -4.8 -3.2 | | | dBm | |

Optical Characteristics – Receiver

$V_{CC}=3.15V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|--|-------------|-----|-----|-------------------------|------|---------|
| Optical Center Wavelength | λ_C | 840 | 850 | 860 | nm | |
| Receiver Sensitivity OMA 8.5Gb/s 14.025Gb/s 28.05Gb/s | P_{RX} | | | -11.2 -10.5 -10.2 | dBm | |
| Optical Return Loss | ORL | 12 | | | dB | |
| LOS Assert | LOS_A | -30 | | | dBm | |
| LOS De-Assert | LOS_D | | | -13 | dBm | |
| LOS Hysteresis | LOS_H | 0.5 | | | dB | |

Electrical Characteristics – Transmitter

$V_{CC}=3.15V$ 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 | |
| Differential data input swing | V_{IN_PP} | 180 | | 1600 | mV | |
| Transmit Disable Voltage | V_D | 2 | | V_{CC} | V | |
| Transmit Enable Voltage | V_{EN} | V_{EE} | | $V_{EE}+0.8$ | V | |

Electrical Characteristics – Receiver

$V_{CC}=3.15V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks |
|---------------------------|---------------|----------|-----|----------------|------|---------|
| Differential output swing | V_{OUT_PP} | 370 | 600 | 850 | mV | |
| LOS Assert | LOS_A | 2 | | V_{CC_HOST} | V | |
| LOS De-Assert | LOS_D | V_{EE} | | $V_{EE}+0.8$ | V | |

Digital Diagnostic Functions

SFP-FC32G-SW-C-C12 supports the 2-wire serial communication protocol defined in SFF-8472, which accesses digital diagnostic information through a 2-wire interface with the address 0xA2. The digital diagnosis defaults to internal calibration, and the internal micro-control unit accesses the module operating parameters in real time, such as module temperature, laser bias current, emission power, received light power and module power supply voltage. The module realizes the alarm function of SFF-8472, which sets the alarm flag bit when the specific working parameters are out of the normal range, and cancels the alarm flag bit when the specific working parameters return to the normal range.

| Digital Diagnostic Threshold Range | | | | |
|------------------------------------|-----------------|-------------------|------------------|----------------|
| Parameter | High Alarm(HEX) | High Warning(HEX) | Low Warning(HEX) | Low Alarm(HEX) |
| Temperature(°C) | 75.00(0x4B00) | 70.00(0x4600) | 0.00(0x0000) | -5.00(0xFB00) |
| Voltage(V) | 3.63(0x8DCC) | 3.46(0x875A) | 3.10(0x7918) | 2.97(0x7404) |
| Bias Current(mA) | 10.00(0x1388) | 8.50(0x109A) | 3.00(0x05DC) | 2.00(0x03E8) |
| Tx Power(dBm) | 5.40(0x8771) | 2.40(0x43E2) | -9.10(0x04CE) | -13.10(0x01E9) |
| Rx Power(dBm) | 3.40(0x5575) | 2.40(0x43E2) | -11.00(0x031A) | -12.00(0x0276) |

A0h、A2h Write Protection

| Security Level 1 Password (Factory value) | | |
|---|------|--------------------|
| Password Entry ADDR | Size | Vaules(HEX) |
| Page A2h, 7Bh-7Eh | 4 | 00 00 10 11 |
| Change Security Level 1 Password | | |
| Change Password Entry ADDR | Size | Vaules(HEX) |
| Page A2h, Table F0h, 80h-83h | 4 | Programmed by User |

SFP-FC32G-SW-C-C12 has write protection functions of A0h and A2h, and users can enter the working state of security level 1 and write to the address of module device A0h and table 00h, table 01h and table F0h of A2h. The method to enter the working state of security level 1 is to write the security level 1 password in the 7Bh-7Eh register of the module A2h address in turn. After entering the security level 1, the user can directly write the contents of the A0h device address, or by modifying the contents of the 7Fh table selection register in the A2h address, write to table 00h or table 01h or table F0h. This version module supports users to modify the password of security level 1 by writing a new security level 1 password in the 80h-83h register in the device address F0h table of module A2h.

IIC Memory Map(Page A0 HEX, Unlisted Fields are Blank/Empty)

| IIC ADDR | Size | Name | Description | Vaules(HEX) |
|----------|------|-----------------|---|----------------------------|
| 0 | 1 | Identifier | SFP | 03 |
| 1 | 1 | Ext. Identifier | Two-wire Interface | 04 |
| 2 | 1 | Connector | Connector Type=LC | 07 |
| 3-10 | 8 | Transceiver | 32G FC SW | 00 00 00 00 60 40 04 68 |
| 11 | 1 | Encoding | Code for high speed serial encoding 64B/66B | 06 |
| 12 | 1 | BR,Nominal | Nominal Bit Rate 25.78Gbps | FF |

| | | | | |
|-------|----|---------------------|---|-----------------------|
| 13 | 1 | Rate Identifier | Type of rate select functionality | 0C |
| 14 | 1 | Length(9um)-km | Link Length in Thousands of Meters/SMF=NA | 00 |
| 15 | 1 | Length(9um)-100m | Link Length in Hundreds of Meters/SMF=NA | 00 |
| 16 | 1 | Length(50um)-10m | 50-micron MMF Link Length=20m | 02 |
| 17 | 1 | Length(62.5um)-10m | 62.5-micron MMF Link Length=NA | 00 |
| 18 | 1 | Length(OM4)-10m | 100m Link Length in OM4 MMF | 0A |
| 19 | 1 | Length(OM3)-10m | 70m Link Length in OM3 MMF | 07 |
| 20-35 | 16 | Vendor name | MODULETEK | ASCII Format |
| 36 | 1 | Transceiver | Unallocated | 00 |
| 37-39 | 3 | Vendor OUI | SFP Vendor IEEE Company ID | 00 00 00 |
| 40-55 | 16 | Vendor PN | Part number provided by SFP vendor | ASCII Format |
| 56-59 | 4 | Vendor rev | Revision level for part number provided by vendor | Programmed by Factory |
| 60-61 | 2 | Wavelength | Laser Wavelength=850nm | 03 52 |
| 62 | 1 | Reserved | Unallocated | 00 |
| 63 | 1 | CC_BASE | Check sum of bytes 0-62 | Programmed by Factory |
| 64 | 1 | Transceiver Options | BIT7=0 Reserved BIT6=0 Reserved BIT5=0 The module power level is 1(Less than 1.0w) BIT4=1 Paging implemented function BIT3=1 Retimer or CDR indicator BIT2=0 A uncooled laser transmitter implementation BIT1=0 The module power Level is 1(Less than 1.0w) BIT0=0 A conventional limiting receiver output | 18 |
| 65 | 1 | Transceiver Options | BIT7=0 Receiver decision threshold implemented is not realized BIT6=0 Tunable wavelength lasers are not used BIT5=1 RATE_SELECT functionality is realized BIT4=1 Have TX_DIS function BIT3=1 Have TX_Fault function BIT2=0 Loss of Signal is not realized BIT1=1 Have RX_LOS function BIT0=0 Reserved | 3A |
| 66 | 1 | BR,max | Maximum signal rate | 70 |
| 67 | 1 | BR,min | Maximum signal rate deviation | 00 |
| 68-83 | 16 | Vendor SN | Vendor SN | Programmed by Factory |
| 84-91 | 8 | Date code | Year,Month,Day | Programmed by Factory |

| | | | | |
|---------|-----|----------------------------|--|-----------------------|
| 92 | 1 | Diagnostic Monitoring Type | BIT7=0 Compatible with SFF-8472 requirements BIT6=1 Realize digital diagnostic function BIT5=1 Realized internal calibration function BIT4=0 Externally calibration is not realized BIT3=1 Received power is the averaged power BIT2=0 Don't need address change BIT1=0 Reserved BIT0=0 Reserved | 68 |
| 93 | 1 | Enhanced Options | BIT7=1 Have optional Alarm/Warning flags implementes function BIT6=1 Have soft TX_DIS monitor and control functions BIT5=1 Have soft TX_Fault monitor function BIT4=1 Have soft RX_LOS monitor function BIT3=1 Have software RATE_SEL monitor and control functions BIT2=0 The optional soft rate selection control funtion is not implemented by SFF-8079 BIT1=1 The optional soft rate selection control funtion is implemented by SFF-8431 BIT0=0 Reserved | FA |
| 94 | 1 | SFF-8472 Compliance | As defined by SFF8472 version 12.3 | 08 |
| 95 | 1 | CC_BASE | Check sum of bytes 64-94 | Programmed by Factory |
| 96-127 | 32 | Vendor Specific | Vendor Specific EEPROM | Programmed by Factory |
| 128-255 | 128 | Reserved | Vendor Specific | Programmed by Factory |

IIC Memory Map(Page A2 HEX LOW, Unlisted Fields are Blank/Empty)

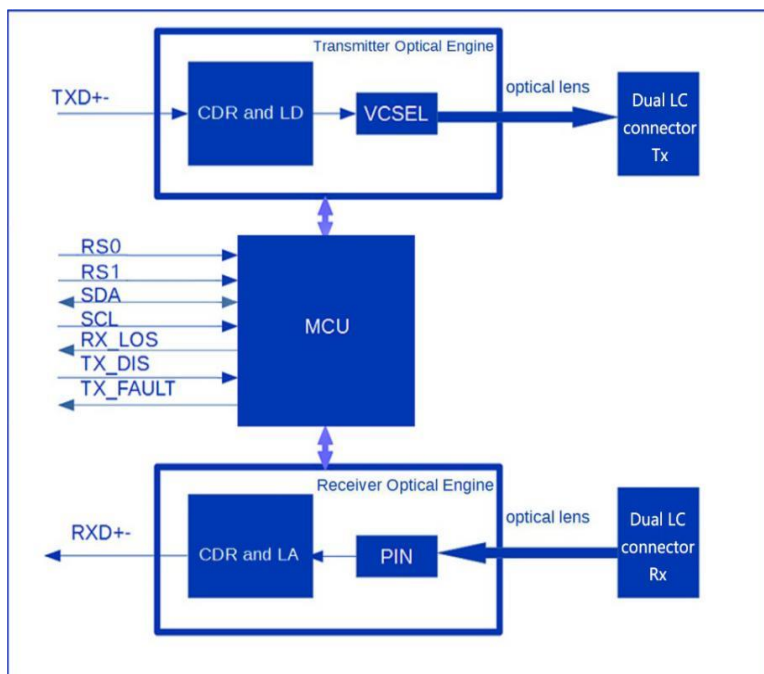
| IIC ADDR | Size | Name | Description | Vaules(HEX) |
|---------------------------------|------|--------------------|--------------------------|-------------------------------|
| Alarm/Warning Thresholds | | | | |
| 00-01 | 2 | Temp High Alarm | Temperature high alarm | See Table Of Threshold Ranges |
| 02-03 | 2 | Temp Low Alarm | Temperature low alarm | See Table Of Threshold Ranges |
| 04-05 | 2 | Temp High Warning | Temperature high warning | See Table Of Threshold Ranges |
| 06-07 | 2 | Temp Low Warning | Temperature low warning | See Table Of Threshold Ranges |
| 08-09 | 2 | Voltage High Alarm | Voltage high alarm | See Table Of Threshold Ranges |

| | | | | |
|---|----|-------------------------|--|-------------------------------|
| 10-11 | 2 | Voltage Low Alarm | Voltage low alarm | See Table Of Threshold Ranges |
| 12-13 | 2 | Voltage High Warning | Voltage high warning | See Table Of Threshold Ranges |
| 14-15 | 2 | Voltage Low Warning | Voltage low warning | See Table Of Threshold Ranges |
| 16-17 | 2 | Bias High Alarm | Bias current high alarm | See Table Of Threshold Ranges |
| 18-19 | 2 | Bias Low Alarm | Bias current low alarm | See Table Of Threshold Ranges |
| 20-21 | 2 | Bias High Warning | Bias current high warning | See Table Of Threshold Ranges |
| 22-23 | 2 | Bias Low Warning | Bias current low warning | See Table Of Threshold Ranges |
| 24-25 | 2 | TX Power High Alarm | TX power high alarm | See Table Of Threshold Ranges |
| 26-27 | 2 | TX Power Low Alarm | TX power low alarm | See Table Of Threshold Ranges |
| 28-29 | 2 | TX Power High Warning | TX power high warning | See Table Of Threshold Ranges |
| 30-31 | 2 | TX Power Low Warning | TX power low warning | See Table Of Threshold Ranges |
| 32-33 | 2 | RX Power High Alarm | RX power high alarm | See Table Of Threshold Ranges |
| 34-35 | 2 | RX Power Low Alarm | RX power low alarm | See Table Of Threshold Ranges |
| 36-37 | 2 | RX Power High Warning | RX power high warning | See Table Of Threshold Ranges |
| 38-39 | 2 | RX Power Low Warning | RX power low warning | See Table Of Threshold Ranges |
| 40-55 | 16 | Optional A/W Thresholds | Unrealized | – |
| Calibration Constant For External Calibration Option | | | | |
| 56-59 | 4 | RX-PWR(4) | The module only realizes internal correction funtion | 00 00 00 00 |
| 60-63 | 4 | RX_PWR(3) | The module only realizes internal correction funtion | 00 00 00 00 |

| | | | | |
|-----------------------------------|---|---------------------|--|-------------|
| 64-67 | 4 | RX_PWR(2) | The module only realizes internal correction funtion | 00 00 00 00 |
| 68-71 | 4 | RX_PWR(1) | The module only realizes internal correction funtion | 3F 80 00 00 |
| 72-75 | 4 | RX_PWR(0) | The module only realizes internal correction funtion | 00 00 00 00 |
| 76-77 | 2 | TX_I(Slope) | The module only realizes internal correction funtion | 01 00 |
| 78-79 | 2 | TX_I(Offset) | The module only realizes internal correction funtion | 00 00 |
| 80-81 | 2 | TX_PWR(Slope) | The module only realizes internal correction funtion | 01 00 |
| 82-83 | 2 | TX_PWR(Offset) | The module only realizes internal correction funtion | 00 00 |
| 84-85 | 2 | T(Slope) | The module only realizes internal correction funtion | 01 00 |
| 86-87 | 2 | T(Offset) | The module only realizes internal correction funtion | 00 00 |
| 88-89 | 2 | V(Slope) | The module only realizes internal correction funtion | 01 00 |
| 90-91 | 2 | V(Offset) | The module only realizes internal correction funtion | 00 00 |
| 92-94 | 3 | Unallocated | – | 00 00 00 |
| 95 | 1 | Checksum | Byte 95 contains the low order 8 bits of the sum of bytes 0-94 | – |
| A/D Values And Status Bits | | | | |
| 96-97 | 2 | Temperature MSB/LSB | Temperature measured value | Variable |
| 98-99 | 2 | Vcc MSB/LSB | Voltage measured value | Variable |
| 100-101 | 2 | Tx Bias MSB/LSB | Bias current measured value | Variable |
| 102-103 | 2 | TX Power MSB/LSB | Measured TX output power | Variable |
| 104-105 | 2 | RX Power MSB/LSB | Measured RX input power | Variable |
| 106-107 | 2 | Laser T/W MSB/LSB | Function not implemented | 00 00 |
| 108-109 | 2 | TEC current MSB/LSB | Function not implemented | 00 00 |
| 110 | 1 | Status/Control | BIT7 TX_Dis Pin States BIT6 Soft TX_Dis Pin States BIT5 RS(1) Pin States BIT4 RS0 Pin States BIT3 Soft RS0 control bit BIT2 TX_Fault Pin States BIT1 Rx_LOS Pin States BIT0 Data_Ready_Bar Pin States | Variable |
| 111 | 1 | Reserved | Reserved for SFF-8079 | 00 |
| 112 | 1 | Alarm Flags | BIT7 Temp High Alarm BIT6 Temp Low Alarm BIT5 Vcc High Alarm BIT4 Vcc Low Alarm BIT3 TX Bias High Alarm BIT2 TX Bias Low Alarm BIT1 TX Power High Alarm BIT0 TX Power Low Alarm | Variable |

| | | | | |
|---------------------------|---|-------------------------|--|--------------------------------|
| 113 | 1 | Alarm Flags | BIT7 RX Power High Alarm BIT6 RX Power Low Alarm BIT5-BIT2 Alarm bit not realized BIT1-BIT0 Reserved | Variable |
| 114 | 1 | Tx Input EQ Control | BIT7-BIT4 High-speed mode input equalization setting value; the default value for power-up is 3, which can be used to change the module input equalization value BIT3-BIT0 Low-speed mode input equalization setting value; the default value for power-up is 2, which can be used to change the module input equalization value | 32 |
| 115 | 1 | Rx Out Emphasis Control | BIT7-BIT4 High-speed mode output emphasis setting value; the default value for power-up is 3, which can be used to change the module output emphasis value BIT3-BIT0 Low-speed mode output emphasis setting value; the default value for power-up is 2, which can be used to change the module output emphasis value | 32 |
| 116 | 1 | Warning Flags | BIT7 Temp High Warning BIT6 Temp Low Warning BIT5 Vcc High Warning BIT4 Vcc Low Warning BIT3 TX Bias High Warning BIT2 TX Bias Low Warning BIT1 TX Power High Warning BIT0 TX Power Low Warning | Variable |
| 117 | 1 | Warning Flags | BIT7 RX Power High Warning BIT6 RX Power Low Warning BIT5-BIT2 Warning bit not realized BIT1-BIT0 Reserved | Variable |
| 118 | 1 | Ext Status/Control | BIT7-BIT4 BIT2 Reserved BIT3 Soft RS(1) control bit BIT1=0 The module power level is 1 (Less than 1.0w) BIT0=0 The module power level is 1 (Less than 1.0w) | The default for power-up is 00 |
| 119 | 1 | Ext Status/Control | BIT7-BIT5 Unallocated BIT4=0 Not Applicable BIT3=0 Not Applicable BIT2=0 Not Applicable BIT1 TX CDR status bit, a value of 0 indicates that the CDR is locked, whereas a value of 1 indicates loss of lock of the CDR BIT0 Rx CDR status bit, a value of 0 indicates that the CDR is locked, whereas a value of 1 indicates loss of lock of the CDR | Variable |
| General Use Fields | | | | |
| 120-122 | 3 | Reserved | Reserved | 00 00 00 |
| 123-126 | 4 | Security Level Password | Security level password input area, the written password can be displayed and the default value is 00 00 00 00 | 00 00 00 00 |
| 127 | 1 | Table Select | Table Select | 00 |

Block-Diagram-of-Transceiver



Functions Description

SFP-FC32G-SW-C-C12 module is manufactured using an advanced COB (Chip on Board) process. It consists of a microcontroller, a transmitter optical engine and a receiver optical engine.

Microcontrollers communicate with the host via a 2-wire serial communication interface, providing module control, status reporting and monitoring (DOM), which is SFF-8472 compliant.

The transmitter optical engine includes a transmitter clock data recovery circuit (CDR) and a laser driver circuit (LD), a VCSEL laser, and a detection photodiode (MPD). The high-speed differential electrical signal output by the host computer is restored and shaped by the CDR, which is amplified by the laser driver to drive the VCSEL laser to produce the optical signal, and the optical signal is coupled to the optical fiber through the optical lens. The optical engine integrates a photodiode for detection, which is used for output optical power detection.

The receiving optical engine includes a photodiode (PIN), a signal amplifier (TIA/LA) and a receiver clock data recovery circuit (CDR). The optical signal in the optical fiber is coupled to the receiving photodiode (PIN) through an optical lens and converted into photocurrent. After the photocurrent signal is enhanced by the amplifier, it is sent to the CDR circuit and the clock and data signal recovery is completed. Finally, it is output to the host in the form of high-speed differential signal. The microcontroller reads the signal strength (modulation amplitude) received by the photodiode and reports the loss of the received signal if it is lower than the set threshold.

Both the transmitter and receiver have the function of suppression. When there is a signal input at the transmitter, the waveform displayed by the transmitted light access oscilloscope is an eye graph shape, and when there is no signal input, the waveform displayed by the transmitted light access oscilloscope

is a straight line, and the actual measured optical power is lower than the normal optical power value, but not zero. When the incident light at the receiving has a signal input, the access oscilloscope shows that the waveform of the output electrical signal is an eye graph shape, and when there is no signal input, the oscilloscope shows that the waveform of the output electrical signal is a straight line.

Rate selection control: Rx and Tx rates are controlled by pins 7(RS0) and 9(RS1) respectively, and product rate selection functions are implemented in the following table:

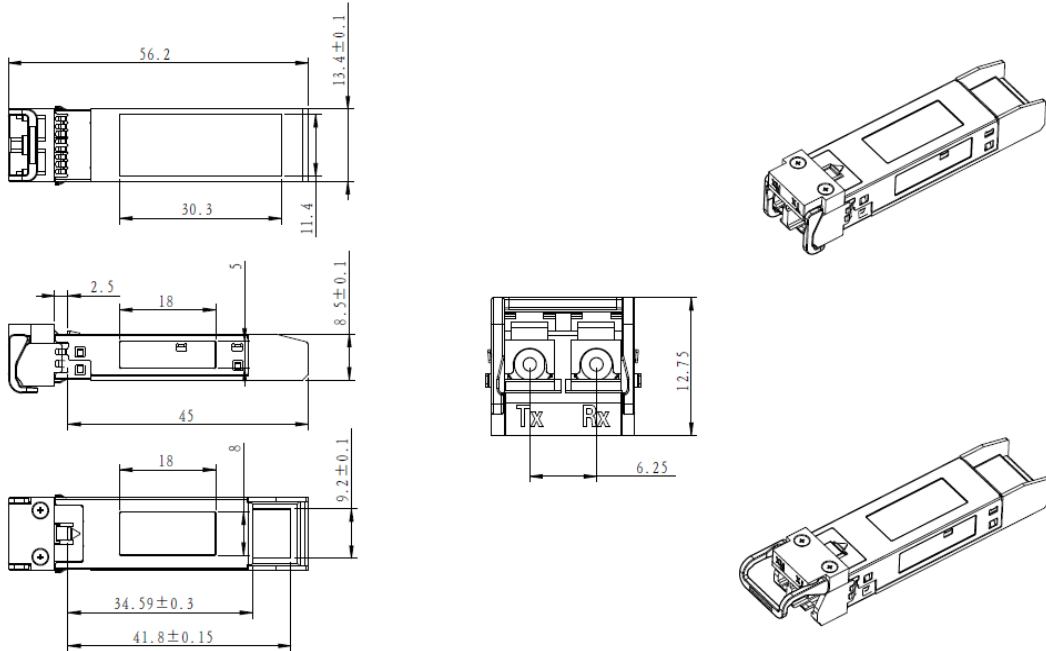
| RS0 Pin Level | A2h.110.bit3 | Logical OR of RS0 Pin and Bit110.3 of A2H | RX Signal Rate | Status of RX CDR |
|---------------|--------------|---|----------------|------------------|
| Low Level | 0 | 0 | 8.5Gb/s | CDR Bypassed |
| Low Level | 0 | 0 | 14.025Gb/s | CDR Engaged |
| Low Level | 1 | 1 | 28.05Gb/s | CDR Engaged |
| High Level | 0 | 1 | 28.05Gb/s | CDR Engaged |
| High Level | 1 | 1 | 28.05Gb/s | CDR Engaged |

| RS1 Pin Level | A2h.118.bit3 | Logical OR of RS1 Pin and Bit118.3 of A2H | TX Signal Rate | Status of TX CDR |
|---------------|--------------|---|----------------|------------------|
| Low Level | 0 | 0 | 8.5Gb/s | CDR Bypassed |
| Low Level | 0 | 0 | 14.025Gb/s | CDR Engaged |
| Low Level | 1 | 1 | 28.05Gb/s | CDR Engaged |
| High Level | 0 | 1 | 28.05Gb/s | CDR Engaged |
| High Level | 1 | 1 | 28.05Gb/s | CDR Engaged |

Dimensions

Module Weight: 16.0g

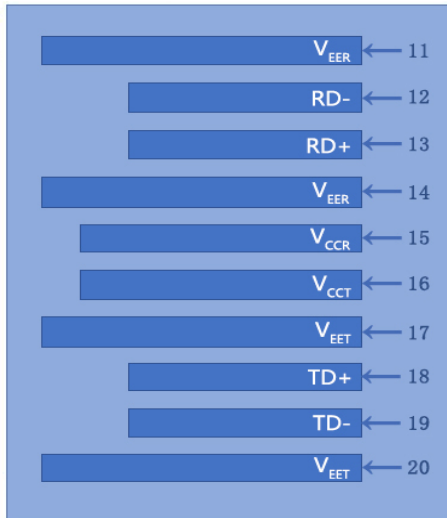
Dust Cap Weight: 0.95g



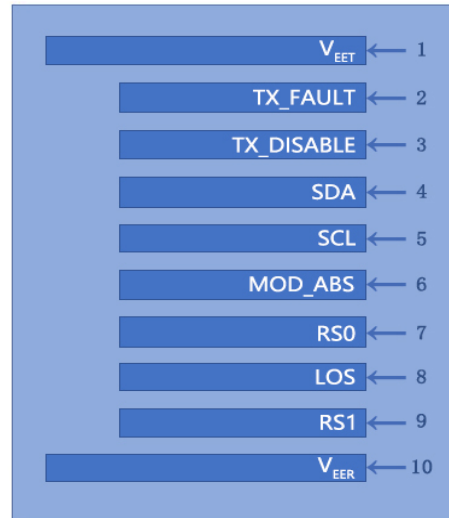
ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

Electrical Pad Layout

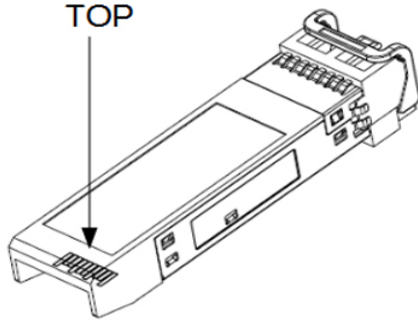
Top View Of Board



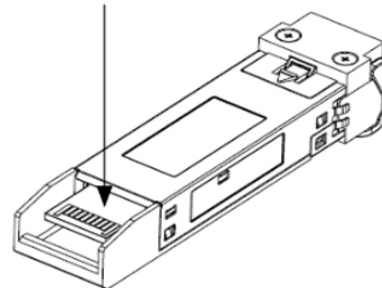
Bottom View Of Board



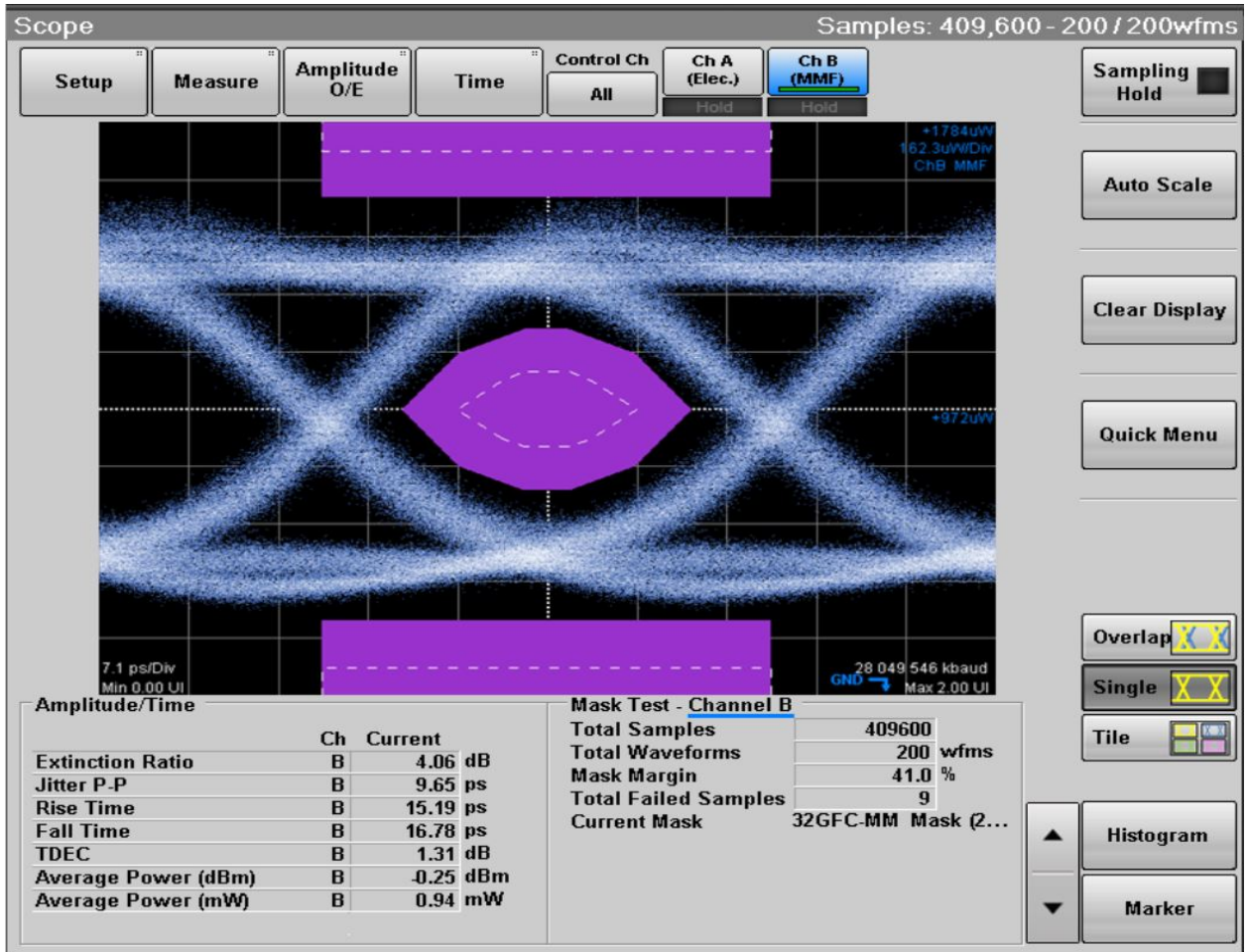
TOP



Bottom



Typical Eye Diagram



Pin Assignment

| PIN # | Symbol | Description | Remarks |
|-------|------------------|---|---------|
| 1 | V _{EET} | Transmitter ground (common with receiver ground) | 1 |
| 2 | TX_FAULT | Transmitter Fault | |
| 3 | TX_DISABLE | Transmitter Disable. Laser output disabled on high or open | 2 |
| 4 | SDA | 2-wire Serial Interface Data Line | 3 |
| 5 | SCL | 2-wire Serial Interface Clock Line | 3 |
| 6 | MOD_ABS | Module Absent. Grounded within the module | 3 |
| 7 | RS0 | Receiver rate selection: Open or Low level = 8.5 or 14.025Gb/s Fibre Channel (low bandwidth) High level = 28.05Gb/s Fibre Channel (high bandwidth) | |
| 8 | LOS | Loss of Signal indication. Logic 0 indicates normal operation | 4 |
| 9 | RS1 | Transmitter rate selection: Open or Low level = 8.5 or 14.025Gb/s Fibre Channel (low bandwidth) High level = 28.05Gb/s Fibre Channel (high bandwidth) | |
| 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.FIBRE CHANNEL Physical Interface-6(FC-PI-6).Rev3.10 October 25, 2013
- 2.SFF-8402 SFP+ 1X28 Gb/s Pluggable Transceiver Solution(SFP28).Rev1.1 September 13, 2014
- 3.SFF-8419 SFP+ Power and Low Speed Interface.Rev1.3 June 11, 2015
- 4.SFF-8432 SFP+ Module and Cage.Rev5.2a November 30, 2018
- 5.SFF-8472 Management Interface for SFP+.Rev12.3. July 29, 2018