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**Data Sheet**
Rev 01.1220

# 100GBASE-SR4 850nm MMF 100m QSFP28 Optical Transceiver with Duplex MPO Connector

## 100GSRSFPCM

### DESCRIPTION

The 100GSRSFPCM QSFP28 100GBASE-SR4 optical transceiver is a new high-speed module with a MPO connector. This interconnecting module offers 4 channels and maximum bandwidth of 100Gbps. The TRxs utilize multimode fiber with 850-nm VCSELs and PIN PDs. This module provides high performance and excellent efficiency in the optical communication.

### FEATURES

- Compliant with 100G Ethernet IEEE 802.3bm 100GBASE-SR4 standards
- Compliant to SFF-8636 QSFP28 MSA
- QSFP footprint (Quad small form-factor, pluggable)
- Power consumption <3.5W
- Full Digital Diagnostics Monitor Interface
- Case Temperature Operating Range: 0$^{o}$C to 70$^{o}$C
- Hot pluggable electrical interface
- RoHS-6 Compliant
- Up to 70m over OM3 fiber
- Up to 100m over OM4 fiber

### APPLICATION

- 100GBASE-SR4 Ethernet links
- Infiniband EDR, FDR & QDR interconnects

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | MIN | MAX | UNIT |
|---|---|---|---|---|
| Storage Temperature | $T_S$ | -40 | 85 | °C |
| 3.3V Power Supply Voltage | $V_{CC}$ | -0.5 | 3.6 | V |
| Data Input Voltage – Single Ended | | -0.5 | $V_{CC}$+0.5 | V |
| Relative Humidity | RH | 5 | 85 | % |

**Note:** Exceeding these values may cause permanent damage. Function operation under these conditions is not implied.

## RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNIT |
|---|---|---|---|---|---|
| Case Operating Temperature | $T_C$ | 0 | | 70 | °C |
| 3.3V Power Supply Voltage | $V_{CC}$ | 3.14 | 3.3 | 3.46 | V |
| Signal Rate per Channel | B | | 25.78125 | | Gb/s |
| Control Input Voltage High | Vih | 2 | | $V_{CC}$+0.3 | V |
| Control Input Voltage Low | Vil | -0.3 | | 0.8 | V |
| Two Wire Serial (TWS) Interface Clock Rate | | | | 400 | KHz |
| Receiver Differential Data Output Load | $Z_d$ | | 100 | | Ohms |
| Power Supply Current | $I_{CC}$ | | | 1060 | mA |
| Power Consumption | P | - | | 3.5 | W |

## TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNIT | NOTES |
|---|---|---|---|---|---|---|
| Center Wavelength | $\lambda_C$ | 840 | | 860 | nm | |
| Spectral Width (RMS) | $\Delta\lambda$ | | | 0.6 | nm | |
| Average Output Power, each lane | $P_{out}$ | -8.4 | | +2.4 | dBm | |
| Optical Modulation Amplitude (OMA) | POMA | -6.4 | | +3 | dBm | |
| Launch power in OMA minus TDEC, each lane | | -7.3 | | | dBm | |
| Transmitter and dispersion eye closure (TDEC), each lane | TDEC | | | 4.3 | dB | |
| Optical Extinction Ratio | ER | 2 | | | dB | |
| Disabled Output Optical Power | PO_OFF | | | -30 | dBm | |
| Eye Mask Coordinates: X1, X2, X3; Y1, Y2, Y3 | | 0.3, 0.38, 0.45, 0.35, 0.41, 0.5 | | | UI | (1) |
| Optical Return Loss Tolerance | | | | 12 | dB | |
| Differential Data Input Voltage | $V_{DIFF}$ | 300 | | 900 | mV | |

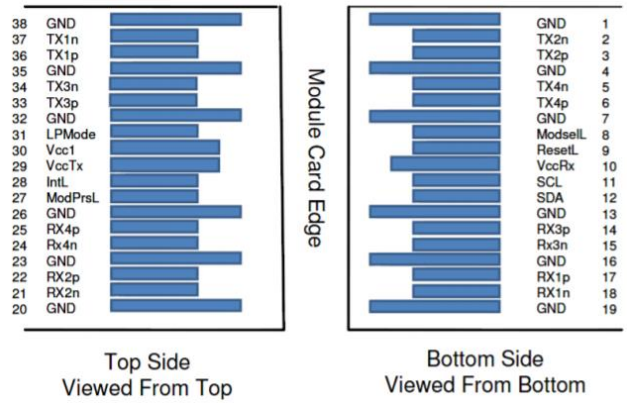
## RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNIT | NOTES |
|---|---|---|---|---|---|---|
| Center Wavelength, each lane | $\lambda_C$ | 840 | 850 | 860 | nm | |
| Damage Threshold | DTH | 3.4 | | | dBm | |
| Average Receiver Power, each lane | PIN_AVG | -10.3 | | +2.4 | dBm | (2) |
| Stressed Sensitivity (OMA) | PIN_s-oma | | | -5.2 | dBm | (3) |
| LOS Assert | $P_A$ | -30 | | | dBm | |
| LOS De-Assert | $P_D$ | | | -11 | dBm | |
| LOS Hysteresis | | 0.5 | | | dBm | |
| Rise & Fall Time (20%~80%) | Tr/Tf | | | 35 | ps | |
| Differential Data Output Voltage | $V_{out,pp}$ | 300 | | 900 | mV | |

**Notes:**

1. Hit ratio = $5x10^{-5}$ per sample
2. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
3. Measured with conformance test signal for BER=$5x10^{-5}$

## PAD ASSIGNMENT AND DESCRIPTION

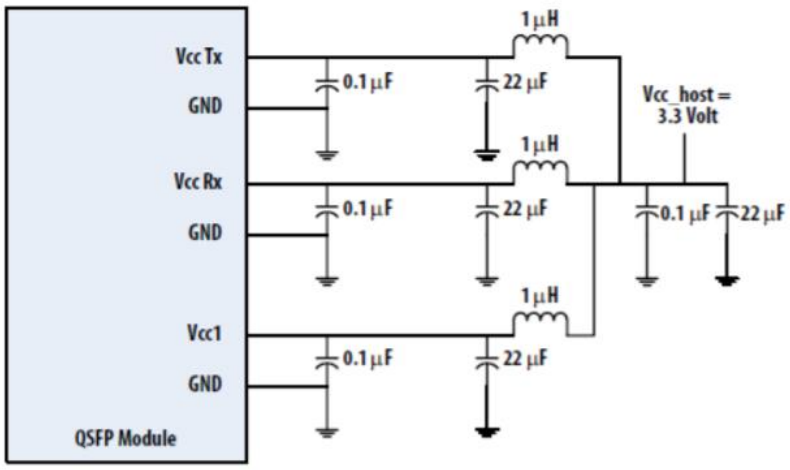



| PIN | LOGIC | SYMBOL | DESCRIPTION | PLUG SEQUENCE | NOTE |
|---|---|---|---|---|---|
| *1* | | GND | Ground | 1 | Note 1 |
| *2* | CML-I | Tx2n | Transmitter Inverted Data Input | 3 | |
| *3* | CML-I | Tx2p | Transmitter Non-Inverted Data Input | 3 | |
| *4* | | GND | Ground | 1 | Note 1 |
| *5* | CML-I | Tx4n | Transmitter Inverted Data Input | 3 | |
| *6* | CML-I | Tx4p | Transmitter Non-Inverted Data Input | 3 | |
| *7* | | GND | Ground | 1 | Note 1 |
| *8* | LVTTL-I | ModSelL | Module Select | 3 | |
| *9* | LVTTL-I | ResetL | Module Reset | 3 | |
| *10* | | Vcc Rx | +3.3V Power Supply Receiver | 2 | Note 2 |
| *11* | LVCMOS-I/O | SCL | 2-wire serial interface clock | 3 | |
| *12* | LVCMOS-I/O | SDA | 2-wire serial interface data | 3 | |
| *13* | | GND | Ground | 1 | Note 2 |
| *14* | CML-O | Rx3p | Receiver Non- Inverted Data Output | 3 | |
| *15* | CML-O | Rx3n | Receiver Inverted Data Output | 3 | |
| *16* | | GND | Ground | 1 | Note 1 |
| *17* | CML-O | Rx1p | Receiver Non- Inverted Data Output | 3 | |
| *18* | CML-O | Rx1n | Receiver Inverted Data Output | 3 | |
| *19* | | GND | Ground | 1 | Note 1 |
| *20* | | GND | Ground | 1 | Note 1 |
| *21* | CML-O | Rx2n | Receiver Inverted Data Output | 3 | |
| *22* | CML-O | Rx2P | Receiver Non- Inverted Data Output | 3 | |
| *23* | | GND | Ground | 1 | Note 1 |
| *24* | CML-O | Rx4n | Receiver Inverted Data Output | 3 | |
| *25* | CML-O | Rx4p | Receiver Non- Inverted Data Output | 3 | |
| *26* | | GND | Ground | 1 | Note 1 |
| *27* | LVTTL-O | ModPrsL | Module Present | 3 | |
| *28* | LVTTL-O | IntL | Interrupt | 3 | |
| *29* | LVCMOS-I/O | Vcc Tx | +3.3V Power Supply transmitter | 2 | Note 2 |
| *30* | | Vcc1 | +3.3V Power Supply | 2 | Note 2 |
| *31* | LVTTL-I | LPMode | Low Power Mode | 3 | |
| *32* | | GND | Ground | 1 | Note 1 |
| *33* | CML-I | Tx3p | Transmitter Non- Inverted Data Input | 3 | |
| *34* | CML-I | Tx3n | Transmitter Inverted Data Input | 3 | |
| *35* | | GND | Ground | 1 | Note 1 |
| *36* | CML-I | Tx1p | Transmitter Non- Inverted Data Input | 3 | |
| *37* | CML-I | Tx1n | Transmitter Inverted Data Input | 3 | |
| *38* | | GND | Ground | 1 | Note 1 |

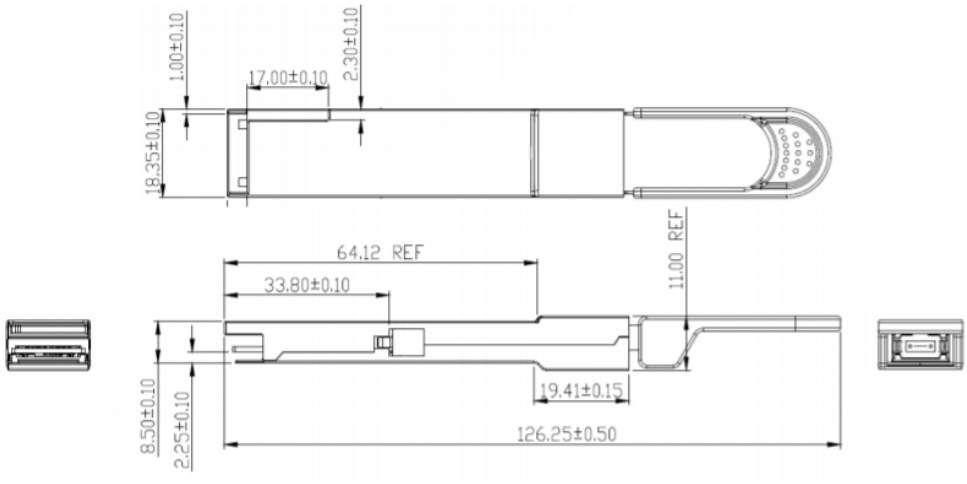
**Note 1:** GND is the symbol for signal and supply (power) common for the QSFP module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

**Note 2:** Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in Table. Recommended host board power supply filtering is shown in Host board power supply circuit. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP+ module in any combination. The connector pins are each rated for a maximum current of 500 mA.

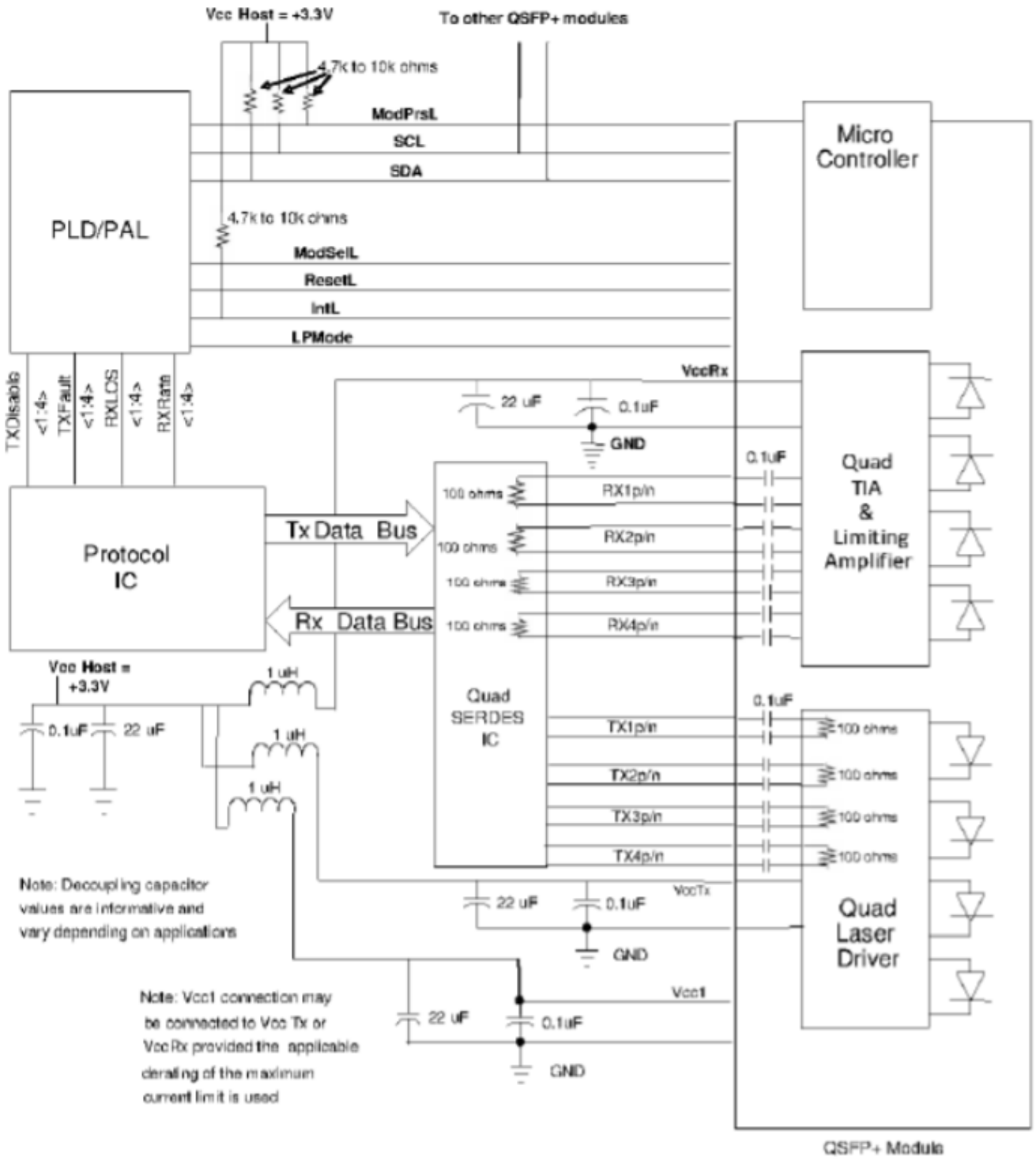
## HOST BOARD POWER SUPPLY CIRCUIT



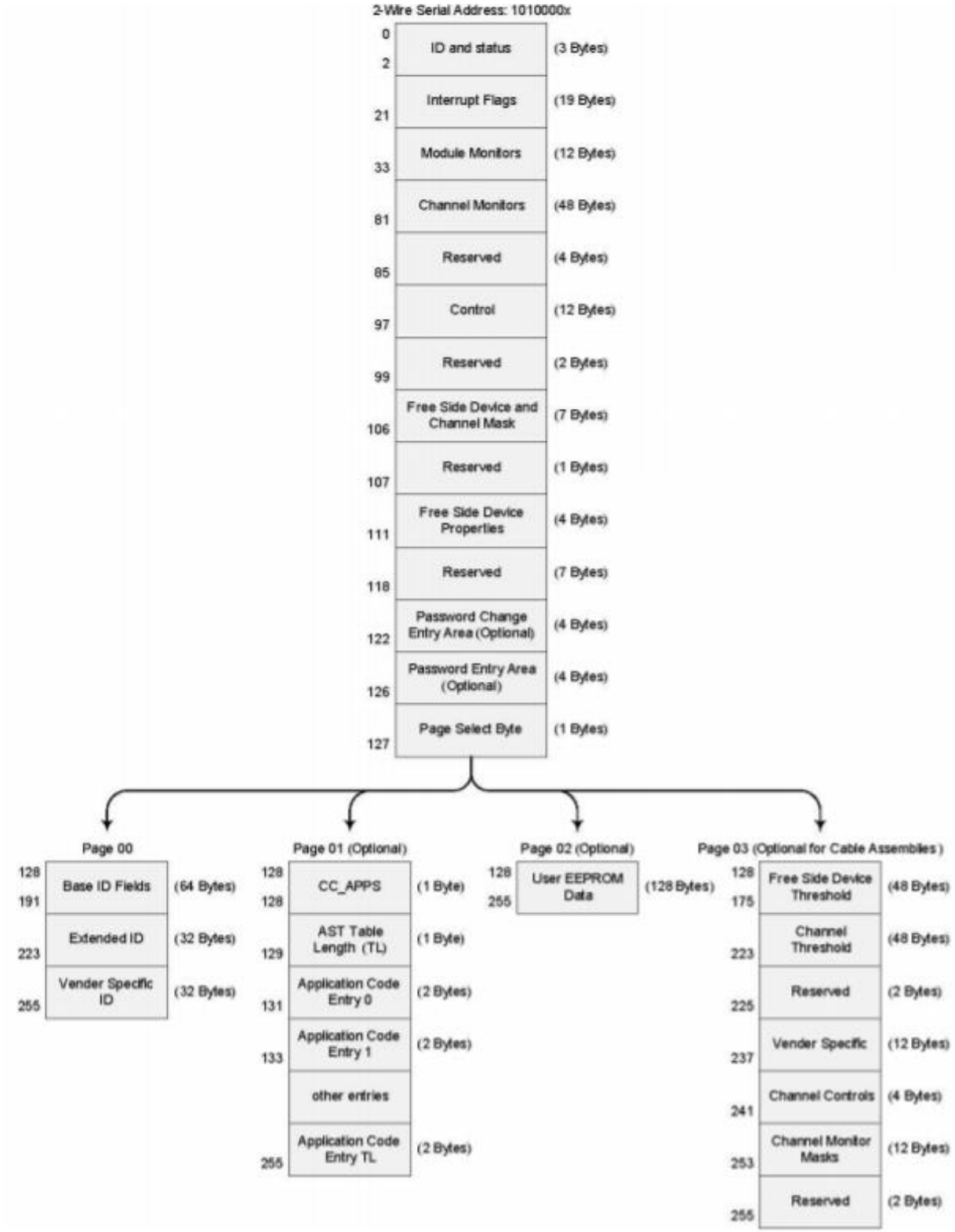

## DIMENSIONS (unit: mm)



## RECOMMENDED INTERFACE CIRCUIT



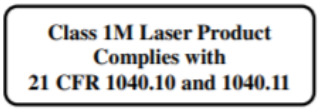
## MEMORY MAP


2-Wire Serial Address: 1010000x
0
2
ID and status
(3 Bytes)
21
Interrupt Flags
(19 Bytes)
33
Module Monitors
(12 Bytes)
81
Channel Monitors
(48 Bytes)
85
Reserved
(4 Bytes)
97
Control
(12 Bytes)
99
Reserved
(2 Bytes)
106
Free Side Device and Channel Mask
(7 Bytes)
107
Reserved
(1 Bytes)
111
Free Side Device Properties
(4 Bytes)
118
Reserved
(7 Bytes)
122
Password Change Entry Area (Optional)
(4 Bytes)
126
Password Entry Area (Optional)
(4 Bytes)
127
Page Select Byte
(1 Bytes)
Page 00
128
191
Base ID Fields
(64 Bytes)
223
Extended ID
(32 Bytes)
255
Vender Specific ID
(32 Bytes)
Page 01 (Optional)
128
128
CC_APPS
(1 Byte)
129
AST Table Length (TL)
(1 Byte)
131
Application Code Entry 0
(2 Bytes)
133
Application Code Entry 1
(2 Bytes)
other entries
255
Application Code Entry TL
(2 Bytes)
Page 02 (Optional)
128
255
User EEPROM Data
(128 Bytes)
Page 03 (Optional for Cable Assemblies)
128
175
Free Side Device Threshold
(48 Bytes)
223
Channel Threshold
(48 Bytes)
225
Reserved
(2 Bytes)
237
Vender Specific
(12 Bytes)
241
Channel Controls
(4 Bytes)
253
Channel Monitor Masks
(12 Bytes)
255
Reserved
(2 Bytes)

## EYE SAFETY MARK

The multimode transceiver is a class 1M laser product. It complies with EN 60825-1:2007 and FDA 21 CFR 1040.10 and 1040.11. In order to meet laser safety requirements, the transceiver shall be operated within the Absolute Maximum Ratings.

**Required Mark**




**[CAUTION]** All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part are required. Tampering with and modifying the performance of the device will result in voided product warranty.

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50.

## ADDITIONAL NOTES

- Avoid eye or skin exposure to laser radiations.
- The device is sensitive to electro-static discharge (ESD). The device should be handled with ESD proof tools. To assemble the device on PCB, proper grounding is required to prevent ESD.
- Specifications are subject to change without notice.

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