



### Features

- Single 3.3V Supply
- Data Rate 1.062 to 1.25 Gb/s
- 60km Reach
- 22dB Minimum Link Budget
- 1550nm DFB Laser
- Commercial Temperature Available
- Industrial Temperature Available
- SFP MSA SFF-8074i Compliant
- Digital Diagnostic SFF-8472 Compliant
- Telcordia GR-468 Compliant
- Color Coded Bail Latch Tube: Green
- RoHS Compliant

**Table 1 – General Operating**

| Parameter                    | Symbol          | Min.  | Typical | Max.  | Unit  | Notes |
|------------------------------|-----------------|-------|---------|-------|-------|-------|
| Supply Voltage               | V <sub>cc</sub> | 3.135 | 3.3     | 3.465 | V     |       |
| Total Current                | I <sub>cc</sub> | -     | -       | 300   | mA    |       |
| Power Supply Noise Rejection | PSR             | 100   | -       | -     | mVp-p | 1     |
| Operating Temperature (-CxA) | T <sub>op</sub> | -5    | -       | 70    | °C    | 2     |
| Operating Temperature (-TxA) | T <sub>op</sub> | -40   | -       | 85    | °C    | 2     |
| Storage Temperature          | T <sub>st</sub> | -40   | -       | 85    | °C    |       |
| Data Rate GbE                | DR              | -     | 1250    | -     | Mbps  |       |
| Date Rate FC                 | DR              | -     | 1062.5  | -     | Mbps  |       |

Note 1: 20Hz to 155MHz

Note 2: Please refer to order information

**Table 2 – Transmitter Specifications (Optical)**

| Parameter                    | Symbol                         | Min.              | Typical | Max. | Unit  | Notes |
|------------------------------|--------------------------------|-------------------|---------|------|-------|-------|
| Optical Power                | P <sub>op</sub>                | -2                | +0.5    | +3   | dBm   |       |
| Average Launch Power Tx_Off  | P <sub>off</sub>               | -                 | -       | -45  | dBm   |       |
| Extinction Ratio (Dynamic)   | ER                             | 9                 | -       | -    | dB    |       |
| Eye Mask                     |                                | 802.3ah Compliant |         |      |       |       |
| Total Jitter                 | TJ                             | -                 | -       | 200  | ps    |       |
| Optical Rise/Fall Time       | t <sub>r</sub> /t <sub>f</sub> | -                 | -       | 260  | ps    | 3     |
| Mean Wavelength              | λ                              | 1500              | 1550    | 1580 | nm    |       |
| Spectral Width (20dB)        | Δ λ                            | -                 | -       | 1    | nm    |       |
| Side Mode Suppression Ratio  | SMSR                           | 30                | -       | -    | dB    |       |
| Optical Path Penalty at 60Km | dp                             | -                 | 1       | 2    | dB    | 4     |
| Relative Intensity Noise     | RIN                            | -                 | -       | -120 | dB/Hz |       |
| Reflection Tolerance         | rp                             | -24               | -       | -    | dB    | 5     |

Note 3: 20%~80% values

Note 4: Measured at BER of  $10^{-12}$  BER, PRBS  $2^7-1$ , at eye center

Note 5: 1dB degradation of receiver sensitivity

**Table 3 – Transmitter Specifications (Electrical)**

| Parameter                          | Symbol        | Min. | Typical | Max.      | Unit     | Notes |
|------------------------------------|---------------|------|---------|-----------|----------|-------|
| Input Differential Impedance       | $R_{in}$      | 80   | 100     | 120       | $\Omega$ |       |
| PECL Single Ended Data Input Swing | $V_{in, p-p}$ | 250  | -       | 1200      | mV       |       |
| TxFault_Fault                      | $V_{fault}$   | 2    | -       | $V_{cc}$  | V        |       |
| TxFault_Normal                     | $V_{normal}$  | Vee  | -       | Vee + 0.5 | V        |       |
| TxDisable_Disable                  | $V_d$         | 2    | -       | $V_{cc}$  | V        |       |
| TxDisable_Enable                   | $V_{en}$      | Vee  | -       | Vee + 0.8 | V        |       |

**Table 4 – Receiver Specifications (Optical)**

| Parameter                       | Symbol           | Min. | Typical | Max. | Unit | Notes |
|---------------------------------|------------------|------|---------|------|------|-------|
| Receiver Power Low              | $R_{sens,low}$   | -    | -26     | -24  | dBm  | 6     |
| Receiver Power High             | $R_{sens,high}$  | -3   | -       | -    | dBm  | 6     |
| Damage Threshold For Receiver   | $P_{in, damage}$ | -    | -       | 6    | dBm  |       |
| Wavelength                      | $\lambda$        | 1200 | -       | 1625 | nm   |       |
| Maximum Reflectance of Receiver | $RX_r$           | -    | -       | -12  | dB   |       |
| LOS Assert                      | -                | -38  | -       | -    | dBm  |       |
| LOS De-Assert                   | -                | -    | -       | -24  | dBm  |       |
| LOS Hysteresis                  | -                | 0.5  | -       | -    | dB   |       |

Note 6:  $10^{-12}$  BER at nominal wavelength

**Table 5 – Receiver Specifications (Electrical)**

| Parameter                           | Symbol        | Min. | Typical | Max. | Unit | Notes |
|-------------------------------------|---------------|------|---------|------|------|-------|
| PECL Single Ended Data Output Swing | $V_{out,p-p}$ | 185  | -       | 800  | mV   |       |
| Data Output Rise/Fall Time          | $t_r/t_f$     | -    | -       | 260  | ps   |       |

Table 6 – Timing and Electrical

| Parameter                                       | Symbol                    | Min.            | Typical | Max.                  | Unit | Notes |
|-------------------------------------------------|---------------------------|-----------------|---------|-----------------------|------|-------|
| Tx Disable Negate Time                          | t <sub>on</sub>           | -               | -       | 1                     | ms   |       |
| Tx Disable Assert Time                          | t <sub>off</sub>          | -               | -       | 10                    | μs   |       |
| Time to Initialize, Including Reset of Tx Fault | t <sub>init</sub>         | -               | -       | 300                   | ms   |       |
| Tx Fault Assert Time                            | t <sub>fault</sub>        | -               | -       | 100                   | μs   |       |
| Tx Disable to Reset                             | t <sub>reset</sub>        | 10              | -       | -                     | μs   |       |
| LOS Assert Time                                 | t <sub>loss_on</sub>      | -               | -       | 100                   | μs   |       |
| LOS De-Assert Time                              | t <sub>loss_off</sub>     | -               | -       | 100                   | μs   |       |
| Serial ID Clock Rate                            | f <sub>serial_clock</sub> | -               | -       | 100                   | kHz  |       |
| RX_LOS Voltage (High)                           | Rx_LOS <sub>H</sub>       | 2               | -       | -                     | V    |       |
| RX_LOS Voltage (Low)                            | Rx_LOS <sub>L</sub>       | -               | -       | 0.8                   | V    |       |
| LOS Output Voltage-Fault                        | V <sub>LOS fault</sub>    | 2               | -       | V <sub>cc</sub>       | V    |       |
| LOS Output Voltage-Normal                       | V <sub>LOS normal</sub>   | V <sub>ee</sub> | -       | V <sub>ee</sub> + 0.5 | V    |       |
| MOD_DEF (0:2)-High                              | V <sub>H</sub>            | 2               | -       | V <sub>cc</sub>       | V    |       |
| MOD_DEF (0:2)-Low                               | V <sub>L</sub>            | V <sub>ee</sub> | -       | V <sub>ee</sub> + 0.5 | V    |       |

Table 7 – Diagnostics

| Parameter         | Range                | Accuracy | Unit | Calibration | Formula                                                                  |
|-------------------|----------------------|----------|------|-------------|--------------------------------------------------------------------------|
| Temperature(-CDA) | -5 to 70             | ±3       | °C   | External    | Tc(C) = Tslope*Tad(16 bit signed twos complement value) + Toffset        |
| Temperature(-TDA) | -40 to 85            | ±3       | °C   | External    | Tc(C) = Tslope*Tad(16 bit signed twos complement value) + Toffset        |
| Voltage           | 0 to V <sub>cc</sub> | 0.1      | V    | External    | V(Volts) = Vslope*Vad (16 bit unsigned integer) + Voffset                |
| Bias Current      | 0 to 120             | ±5       | mA   | External    | I(mA) = Islope * Iad(16 bit unsigned integer) + Ioffset                  |
| Tx Power          | -2 to +3             | ±3       | dBm  | External    | Tx_PWR(μW) = Tx_PWRslope*Tx_PWRad (16 bit unsigned integer)+Tx_PWRoffset |
| Rx Power          | -24 to -3            | ±3       | dBm  | External    | Rx_PWR(μW) =<br>A0+A1*x+A2*x^2+A3*x^3+A4*x^4                             |

Table 8 – EEPROM Serial ID (A0h)

| Name of Field   | Description of Field                                       | Address | Hex | ASCII   |
|-----------------|------------------------------------------------------------|---------|-----|---------|
| Identifier      | Type of serial transceiver                                 | 0       | 03  |         |
| Ext. Identifier | Extended identifier of type of serial transceiver          | 1       | 04  |         |
| Connector       | Code for connector type                                    | 2       | 07  |         |
| Transceiver     | Code for electronic compatibility or optical compatibility | 3       | 00  |         |
|                 |                                                            | 4       | 00  |         |
|                 |                                                            | 5       | 00  |         |
|                 |                                                            | 6       | 02  |         |
|                 |                                                            | 7       | 00  |         |
|                 |                                                            | 8       | 00  |         |
|                 |                                                            | 9       | 00  |         |
|                 |                                                            | 10      | 00  |         |
| Encoding        | Code for serial encoding algorithm                         | 11      | 01  |         |
| BR.Nominal      | Units of 100 Mbits/sec.                                    | 12      | 0D  |         |
| Reserved        | Reserved                                                   | 13      | 00  |         |
| Length (9µm,km) | 9/125 µm fiber, units of km                                | 14      | 3C  |         |
| Length (9µm)    | 9/125 µm fiber, units of 100 m                             | 15      | FF  |         |
| Length (50µm)   | 50/125 µm fiber, units of 10 m                             | 16      | 00  |         |
| Length (62.5µm) | 62.5/125 µm fiber, units of 10 m                           | 17      | 00  |         |
| Length (Copper) | Units of meters                                            | 18      | 00  |         |
| Reserved        | Reserved                                                   | 19      | 00  |         |
| Vendor Name     | SFP vendor name (ASCII)                                    | 20      | 53  | S       |
|                 |                                                            | 21      | 4F  | O       |
|                 |                                                            | 22      | 55  | U       |
|                 |                                                            | 23      | 52  | R       |
|                 |                                                            | 24      | 43  | C       |
|                 |                                                            | 25      | 45  | E       |
|                 |                                                            | 26      | 50  | P       |
|                 |                                                            | 27      | 48  | H       |
|                 |                                                            | 28      | 4F  | O       |
|                 |                                                            | 29      | 54  | T       |
|                 |                                                            | 30      | 4F  | O       |
|                 |                                                            | 31      | 4E  | N       |
|                 |                                                            | 32      | 49  | I       |
|                 |                                                            | 33      | 43  | C       |
|                 |                                                            | 34      | 53  | S       |
|                 |                                                            | 35      | 20  | [Space] |

**Table 8 – EEPROM Serial ID (A0h)**

| Name of Field | Description of Field                                            | Address | Hex | ASCII   |
|---------------|-----------------------------------------------------------------|---------|-----|---------|
| Reserved      | Reserved                                                        | 36      | 00  |         |
| Vendor OUI    | IEEE vendor OUI code for<br>Source Photonics Inc.               | 37      | 00  |         |
|               |                                                                 | 38      | 1F  |         |
|               |                                                                 | 39      | 22  |         |
| Vendor P/N    | Part number in ASCII, e.g.<br>SPGBYXCDA                         | 40      | 53  | S       |
|               |                                                                 | 41      | 50  | P       |
|               |                                                                 | 42      | 47  | G       |
|               |                                                                 | 43      | 42  | B       |
|               |                                                                 | 44      | 59  | Y       |
|               |                                                                 | 45      | 58  | X       |
|               |                                                                 | 46      | 43  | C       |
|               |                                                                 | 47      | 44  | D       |
|               |                                                                 | 48      | 41  | A       |
|               |                                                                 | 49      | 20  | [Space] |
|               |                                                                 | 50      | 20  | [Space] |
|               |                                                                 | 51      | 20  | [Space] |
|               |                                                                 | 52      | 20  | [Space] |
|               |                                                                 | 53      | 20  | [Space] |
|               |                                                                 | 54      | 20  | [Space] |
|               |                                                                 | 55      | 20  | [Space] |
| Vendor Rev.   | Revision level for part number provide by<br>vendor (ASCII)     | 56      | 41  | A       |
|               |                                                                 | 57      | 20  | [Space] |
|               |                                                                 | 58      | 20  | [Space] |
|               |                                                                 | 59      | 20  | [Space] |
| Wavelength    | 1550nm                                                          | 60      | 06  |         |
|               |                                                                 | 61      | 0E  |         |
| Reserved      | Reserved                                                        | 62      | 00  |         |
| CC_BASE       | Check code for Base ID Fields<br>(addresses 0 to 62)            | 63      | xx  |         |
| Options       | Indicates which optional transceiver signals<br>are implemented | 64      | 00  |         |
|               |                                                                 | 65      | 1A  |         |

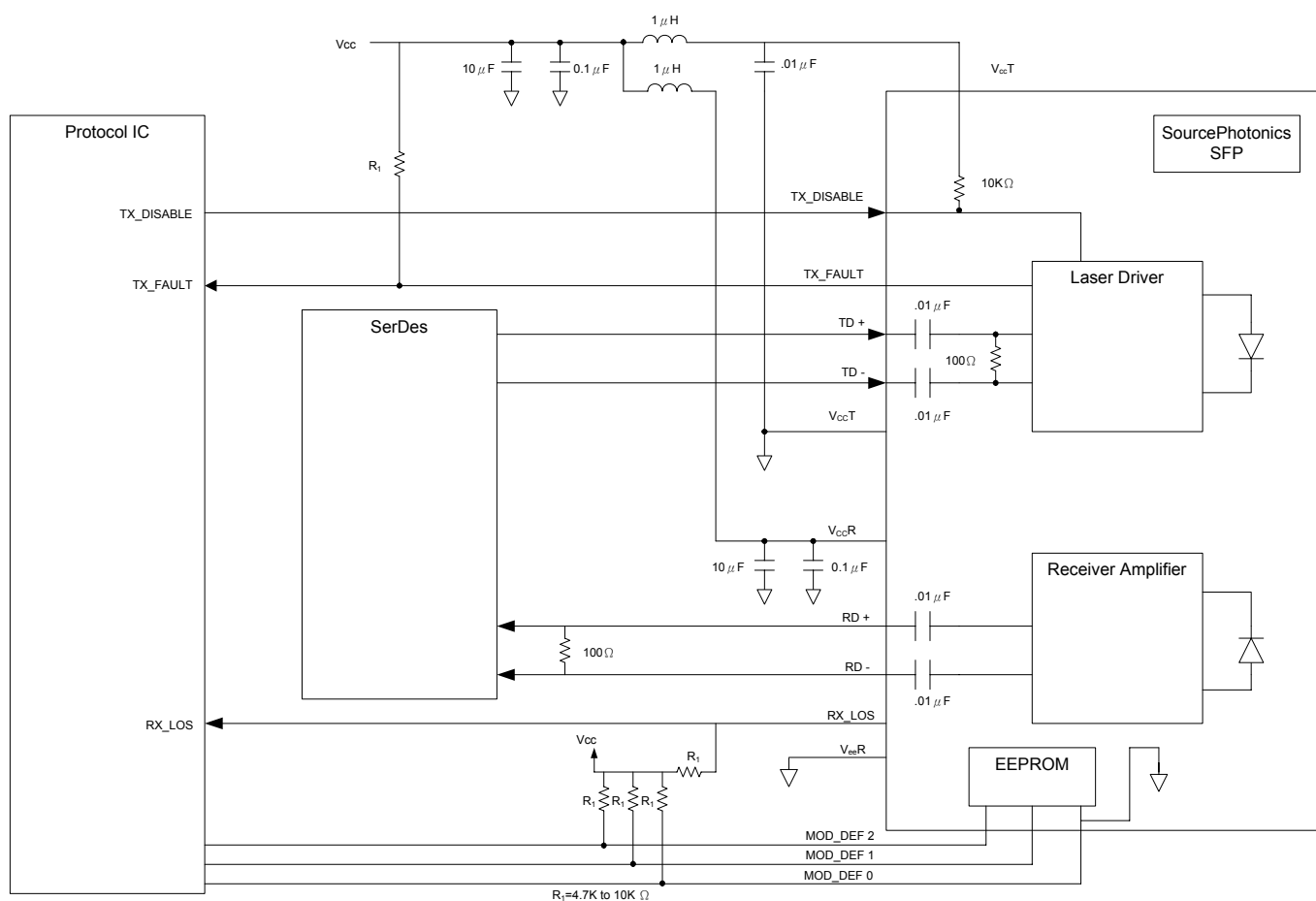
**Table 8 – EEPROM Serial ID (A0h)**

| Name of Field              | Description of Field                                                            | Address | Hex | ASCII |
|----------------------------|---------------------------------------------------------------------------------|---------|-----|-------|
| BR, max                    | Upper bit rate margin, unit of %                                                | 66      | 00  |       |
| BR, min                    | Lower bit rate margin, unit of %                                                | 67      | 00  |       |
|                            |                                                                                 |         |     |       |
| Vendor S/N                 | Serial number                                                                   | 68-83   | xx  |       |
|                            |                                                                                 |         |     |       |
| Date Code                  | Vendor's manufacturing date code                                                | 84-91   | xx  |       |
|                            |                                                                                 |         |     |       |
| Diagnostic Monitoring Type | Indicates which type of diagnostic monitoring is implemented in the transceiver | 92      | 58  |       |
| Enhanced Options           | Indicates which optional enhanced features are implemented in the transceiver   | 93      | B0  |       |
| SFF-8472 Compliance        | Indicates which revision of SFF-8472 the transceiver complies with              | 94      | 02  |       |
|                            |                                                                                 |         |     |       |
| CC_EXT                     | Check code for Extended ID Fields (addresses 64 to 94)                          | 95      | xx  |       |
|                            |                                                                                 |         |     |       |
| Vendor Specific            | Vendor Specific EEPROM                                                          | 96-127  | xx  |       |

**Table 9 – Pin Definitions**

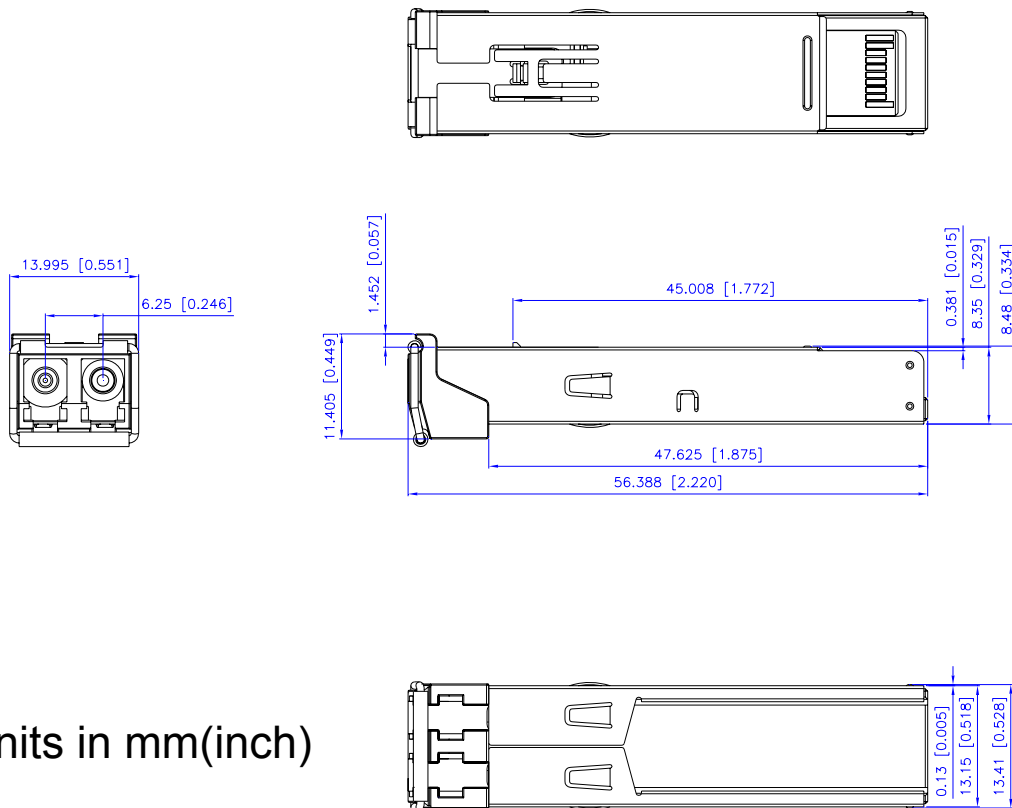
| Pin | Unit       | Notes                  |
|-----|------------|------------------------|
| 1   | VeeT       | TX GND                 |
| 2   | TX_FAULT   | Open Collector         |
| 3   | TX_DISABLE | Internally Pulled High |
| 4   | MOD_DEF2   | Serial Data Input      |
| 5   | MOD_DEF1   | Serial Clock Input     |
| 6   | MOD_DEF0   | Internally Grounded    |
| 7   | NC         | Not Connected          |
| 8   | LOS        | Open Collector         |
| 9   | VeeR       | RX Ground              |
| 10  | VeeR       | RX Ground              |
| 11  | VeeR       | RX Ground              |
| 12  | RXD-       | RX Data Negative       |
| 13  | RXD+       | RX Data Positive       |
| 14  | VeeR       | RX GND                 |
| 15  | VCCR       | RX Power               |
| 16  | VCCT       | TX Power               |
| 17  | VeeT       | TX GND                 |
| 18  | TXD+       | TX Data Positive       |
| 19  | TXD-       | TX Data Negative       |
| 20  | VeeT       | TX GND                 |

## Recommended Interface Circuit





## Mechanical Diagram



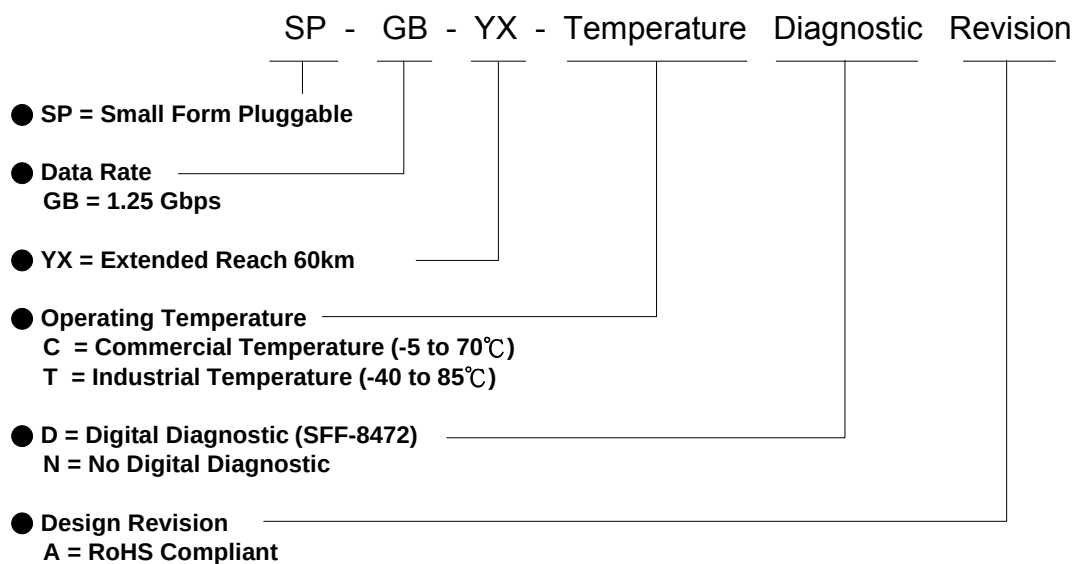
Units in mm(inch)

## Order Information

Table 10 – Order Information

| Part No.     |
|--------------|
| SP-GB-YX-CNA |
| SP-GB-YX-CDA |
| SP-GB-YX-TNA |
| SP-GB-YX-TDA |

### Part Numbering Definition:



## Warnings

**Handling Precautions:** 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.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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