



**RoHS Compliant
DWDM Single-mode Transceiver
Small Form Pluggable (SFP+), with Diagnostic Monitoring
10G BASE-EW/ER Ethernet**



Features

- Compliant with SFF8472 diagnostic monitoring interface Duplex LC connector
- Single power supply 3.3V
- Hot Pluggable
- Up to 40km transmission on SMF
- 1550nm EML laser and PIN receiver
- Class 1 laser product complies with EN 60825-1
- Support CPRI line bit rate option 7: 9830.4 Mbit/s

Ordering Information

TC:For C-Temp:0~70°C

| Channel | PART NUMBER | Frequency(THz) | Center Wavelength(nm) |
|---------|-------------------|----------------|-----------------------|
| 17 | LE48-H3L-TC-ND-17 | 191.7 | 1563.86 |
| 18 | LE48-H3L-TC-ND-18 | 191.8 | 1563.05 |
| 19 | LE48-H3L-TC-ND-19 | 191.9 | 1562.23 |
| 20 | LE48-H3L-TC-ND-20 | 192.0 | 1561.42 |
| 21 | LE48-H3L-TC-ND-21 | 192.1 | 1560.61 |
| 22 | LE48-H3L-TC-ND-22 | 192.2 | 1559.79 |
| 23 | LE48-H3L-TC-ND-23 | 192.3 | 1558.98 |
| 24 | LE48-H3L-TC-ND-24 | 192.4 | 1558.17 |
| 25 | LE48-H3L-TC-ND-25 | 192.5 | 1557.36 |
| 26 | LE48-H3L-TC-ND-26 | 192.6 | 1556.55 |
| 27 | LE48-H3L-TC-ND-27 | 192.7 | 1555.75 |
| 28 | LE48-H3L-TC-ND-28 | 192.8 | 1554.94 |
| 29 | LE48-H3L-TC-ND-29 | 192.9 | 1554.13 |
| 30 | LE48-H3L-TC-ND-30 | 193.0 | 1553.33 |
| 31 | LE48-H3L-TC-ND-31 | 193.1 | 1552.52 |
| 32 | LE48-H3L-TC-ND-32 | 193.2 | 1551.72 |



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| 33 | LE48-H3L-TC-ND-33 | 193.3 | 1550.92 |
| 34 | LE48-H3L-TC-ND-34 | 193.4 | 1550.12 |
| 35 | LE48-H3L-TC-ND-35 | 193.5 | 1549.32 |
| 36 | LE48-H3L-TC-ND-36 | 193.6 | 1548.51 |
| 37 | LE48-H3L-TC-ND-37 | 193.7 | 1547.72 |
| 38 | LE48-H3L-TC-ND-38 | 193.8 | 1546.92 |
| 39 | LE48-H3L-TC-ND-39 | 193.9 | 1546.12 |
| 40 | LE48-H3L-TC-ND-40 | 194.0 | 1545.32 |
| 41 | LE48-H3L-TC-ND-41 | 194.1 | 1544.53 |
| 42 | LE48-H3L-TC-ND-42 | 194.2 | 1543.73 |
| 43 | LE48-H3L-TC-ND-43 | 194.3 | 1542.94 |
| 44 | LE48-H3L-TC-ND-44 | 194.4 | 1542.14 |
| 45 | LE48-H3L-TC-ND-45 | 194.5 | 1541.35 |
| 46 | LE48-H3L-TC-ND-46 | 194.6 | 1540.56 |
| 47 | LE48-H3L-TC-ND-47 | 194.7 | 1539.77 |
| 48 | LE48-H3L-TC-ND-48 | 194.8 | 1538.98 |
| 49 | LE48-H3L-TC-ND-49 | 194.9 | 1538.19 |
| 50 | LE48-H3L-TC-ND-50 | 195.0 | 1537.40 |
| 51 | LE48-H3L-TC-ND-51 | 195.1 | 1536.61 |
| 52 | LE48-H3L-TC-ND-52 | 195.2 | 1535.82 |
| 53 | LE48-H3L-TC-ND-53 | 195.3 | 1535.04 |
| 54 | LE48-H3L-TC-ND-54 | 195.4 | 1534.25 |
| 55 | LE48-H3L-TC-ND-55 | 195.5 | 1533.47 |
| 56 | LE48-H3L-TC-ND-56 | 195.6 | 1532.68 |
| 57 | LE48-H3L-TC-ND-57 | 195.7 | 1531.90 |
| 58 | LE48-H3L-TC-ND-58 | 195.8 | 1531.12 |
| 59 | LE48-H3L-TC-ND-59 | 195.9 | 1530.33 |
| 60 | LE48-H3L-TC-ND-60 | 196.0 | 1529.55 |
| 61 | LE48-H3L-TC-ND-61 | 196.1 | 1528.77 |



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| 28 | LE48-H3L-TI-ND-28 | 192.8 | 1554.94 |
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| 36 | LE48-H3L-TI-ND-36 | 193.6 | 1548.51 |
| 37 | LE48-H3L-TI-ND-37 | 193.7 | 1547.72 |
| 38 | LE48-H3L-TI-ND-38 | 193.8 | 1546.92 |
| 39 | LE48-H3L-TI-ND-39 | 193.9 | 1546.12 |
| 40 | LE48-H3L-TI-ND-40 | 194.0 | 1545.32 |
| 41 | LE48-H3L-TI-ND-41 | 194.1 | 1544.53 |
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| 47 | LE48-H3L-TI-ND-47 | 194.7 | 1539.77 |
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| 55 | LE48-H3L-TI-ND-55 | 195.5 | 1533.47 |
| 56 | LE48-H3L-TI-ND-56 | 195.6 | 1532.68 |
| 57 | LE48-H3L-TI-ND-57 | 195.7 | 1531.90 |
| 58 | LE48-H3L-TI-ND-58 | 195.8 | 1531.12 |
| 59 | LE48-H3L-TI-ND-59 | 195.9 | 1530.33 |
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Diagnostics

| Parameter | Range | Accuracy | Unit | Calibration |
|----------------------------------|--------------|----------|------|-------------|
| Internal Transceiver Temperature | -40 to 85 | ± 3 | °C | Internal |
| Internal Transceiver Voltage | 3.14 to 3.46 | ± 0.1 | V | |
| Bias Current | 0 to 120 | ± 10% | mA | |
| TX Power | -4.7 to +4.7 | ± 3 | dB | |
| RX average Power | -1 to -16 | ± 3 | dB | |

Absolute Maximum Ratings

| PARAMETER | SYMBOL | MIN | MAX | UNITS | NOTE |
|-----------------------------|----------|-----|----------|-------|------|
| Storage Temperature | T_S | -40 | 85 | °C | |
| Operating Relative Humidity | RH | 0 | 85 | % | |
| Supply Voltage | V_{CC} | 0 | 3.6 | V | |
| Input Voltage | V_{in} | 0 | V_{CC} | V | |

Recommended Operating Conditions

| PARAMETER | SYMBOL | MIN | MAX | UNITS | NOTE |
|----------------------------|-------------------|------|------|-------|-------------------|
| Case operating Temperature | T_C | 0 | 70 | °C | LE48-H3L-TC-ND-xx |
| | | -40 | 85 | | LE48-H3L-TI-ND-xx |
| Supply Voltage | V_{CC} | 3.14 | 3.46 | V | |
| Supply Current | $I_{TX} + I_{RX}$ | | 390 | mA | LE48-H3L-TC-ND-xx |
| | | | 450 | | LE48-H3L-TI-ND-xx |
| Power Consumption | P | | 1.3 | W | LE48-H3L-TC-ND-xx |
| | | | 1.5 | | LE48-H3L-TI-ND-xx |



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Transmitter Electro-optical Characteristics

Vcc = 3.14 V to 3.46 V, Over Operating Case Temperature.

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNITS | NOTE |
|------------------------------------|-----------------------------|-------|----------------------------|-----------------|----------|---------------------------------|
| Data Rate | <i>B</i> | | 10.3125 | | Gbps | |
| Output Optical Power | <i>P_{out}</i> | -4.7 | --- | +4.0 | dBm | |
| Extinction Ratio | <i>ER</i> | 6 | | | dB | |
| Central Wavelength Spacing | | | 100 | | G | |
| Central Wavelength-EOL | | X-100 | X | X+100 | pm | X = specified center wavelength |
| Spectrum Width | $\Delta \lambda$ | | | 1 | nm | |
| Side mode Suppression ratio | <i>SSR_{min}</i> | 30 | | | dB | |
| Transmitter and Dispersion Penalty | <i>TDP</i> | | | 2 | dB | |
| Relative Intensity Noise | <i>RIN</i> | --- | --- | -128 | dB/Hz | |
| Optical Return Loss | <i>ORL</i> | 21 | --- | --- | dB | |
| Output Eye | | | Compliant with IEEE802.3ae | | | |
| Differential Input Impedance | <i>Z_d</i> | | 100 | | Ω | |
| Differential Input Voltage Swing | <i>V_{DIFF}</i> | 300 | | 1000 | mVpp | |
| Transmit Fault Output-Low | <i>TX_FAULT_L</i> | 0.0 | --- | 0.5 | V | |
| Transmit Fault Output-High | <i>TX_FAULT_H</i> | 2.4 | --- | V _{CC} | V | |
| TX_DISABLE Assert Time | <i>t_{off}</i> | --- | --- | 100 | μ s | |
| TX_DISABLE Negate Time | <i>t_{on}</i> | --- | --- | 2 | ms | |
| Tx_Fault assert for cooled module | <i>t_{fault}</i> | --- | --- | 50 | ms | |
| TX_DISABLE time to start reset | <i>t_{reset}</i> | 10 | --- | --- | μ s | |



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Receiver Electro-optical Characteristics

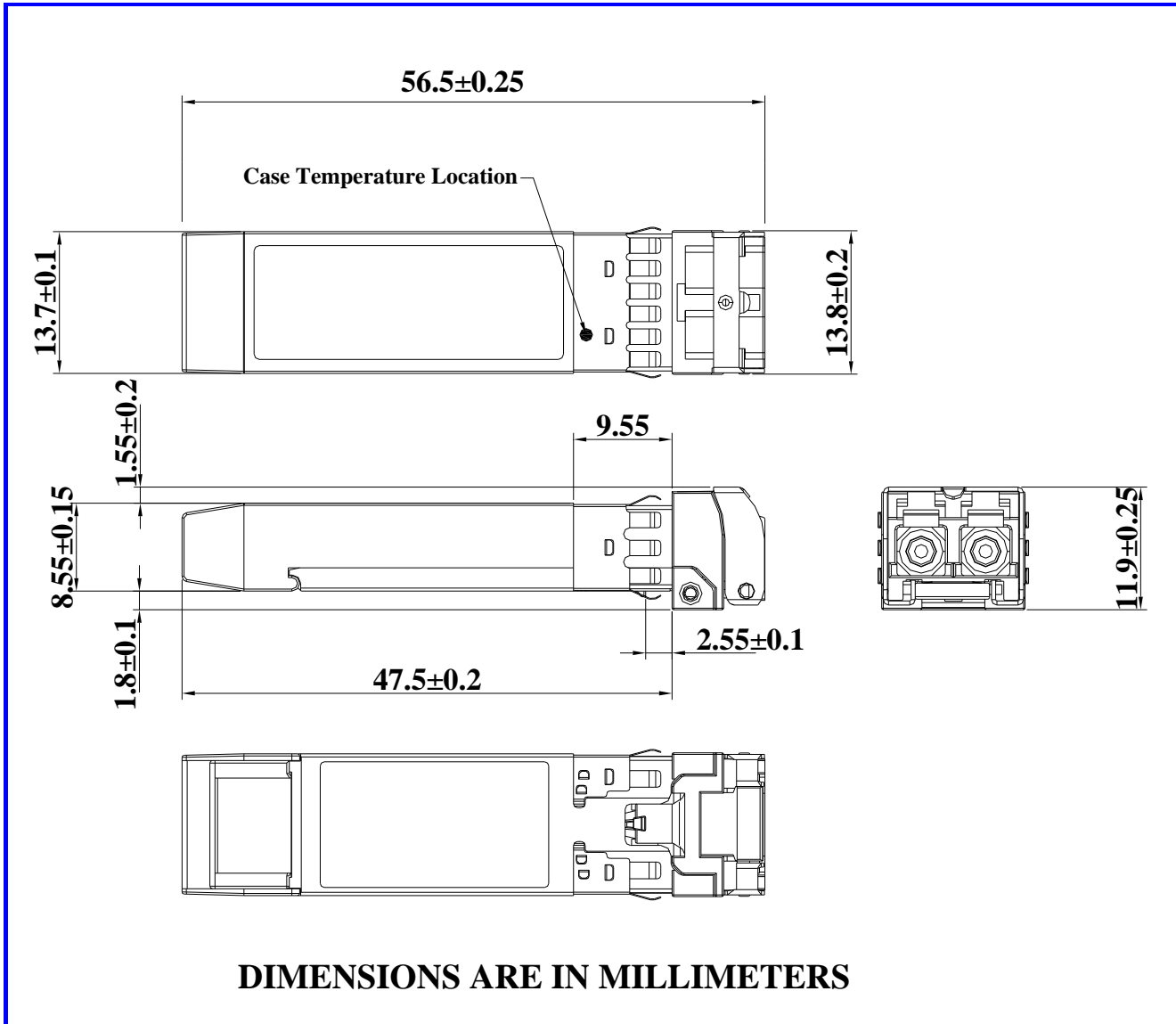
V_{CC} = 3.14 V to 3.46 V, Over Operating Case Temperature.

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNITS | NOTE |
|---|--------------------------------------|------|---------|-----------------------|-------|-------------------------|
| | L | | | | | |
| Data Rate | <i>B</i> | | 10.3125 | | Gbps | |
| Optical Input Power-maximum | <i>P_{IN}</i> | -1.0 | --- | --- | dBm | BER < 10 ⁻¹² |
| Receiver Sensitivity@10.3125Gbps | <i>P_{IN}</i> | --- | --- | -15.8 | dBm | BER < 10 ⁻¹² |
| Receiver Sensitivity(OMA) | <i>P_{IN}</i> | --- | --- | -14.1 | dBm | BER < 10 ⁻¹² |
| Stressed Receiver Sensitivity(OMA) | <i>P_{IN}</i> | --- | --- | -11.3 | dBm | BER < 10 ⁻¹² |
| Receiver Reflectance | <i>Ref</i> | --- | --- | -26 | dB | |
| Operating Center Wavelength | <i>λ_C</i> | 1530 | --- | 1565 | nm | |
| Loss of Signal-Asserted | <i>P_A</i> | -30 | --- | --- | dBm | |
| Loss of Signal-Deasserted | <i>P_D</i> | --- | --- | -18 | dBm | |
| Differential Output Impedance | <i>Z_d</i> | --- | 100 | --- | Ω | |
| Differential Output Voltage | <i>V_{DIFF}</i> | 300 | --- | 800 | mVpp | |
| Receiver Loss of Signal Output Voltage-Low | <i>RX_LO</i> <i>S_L</i> | 0 | --- | 0.5 | V | |
| Receiver Loss of Signal Output Voltage-High | <i>RX_LO</i> <i>S_H</i> | 2.4 | --- | <i>V_{CC}</i> | V | |
| Receiver Loss of Signal Assert Time (off to on) | <i>t_{A,RX_LOS}</i> | --- | --- | 100 | μs | |
| Receiver Loss of Signal Assert Time (on to off) | <i>t_{D,RX_LOS}</i> | --- | --- | 100 | μs | |

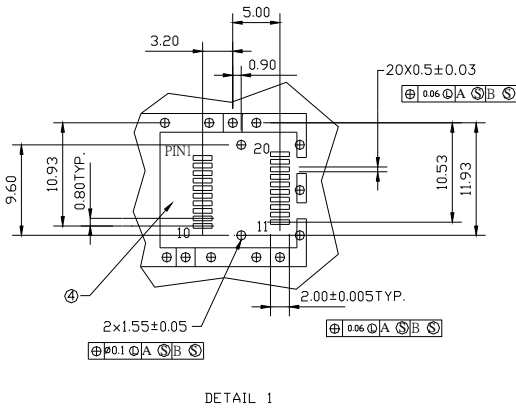
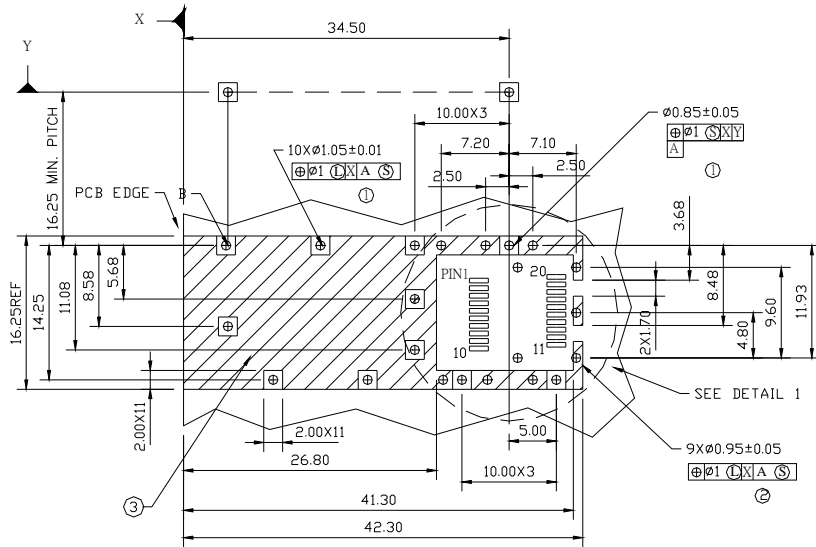
Timing Parameters

| PARAMETER | SYMBOL | MIN | TYP. | MAX | UNITS | NOTE |
|----------------------------------|-----------------------------|-----|------|-----|-------|------|
| Time to initialize cooled module | <i>t_{start_up}</i> | | | 10 | s | |

Dimensions



SFP host board mechanical layout



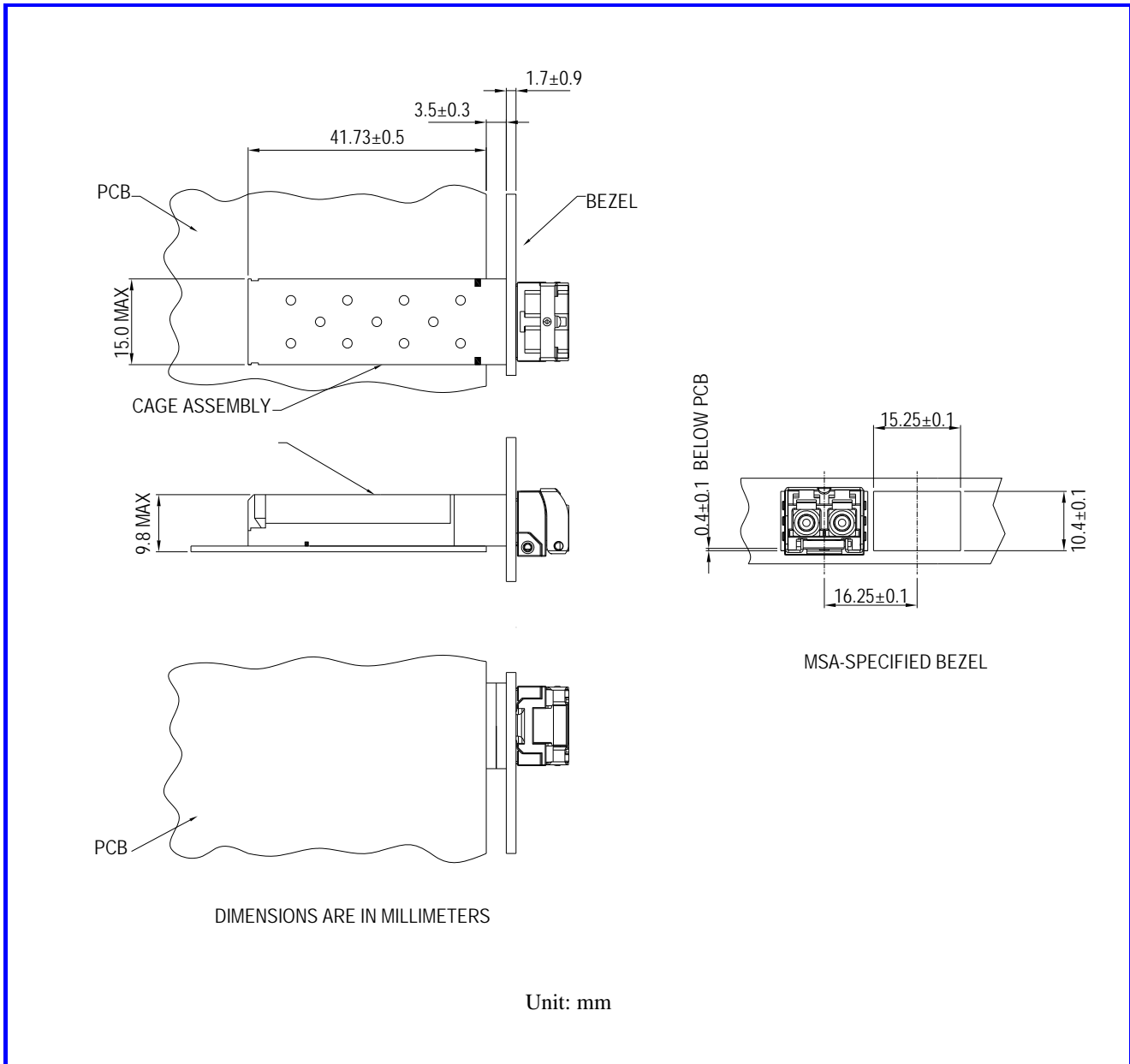
LEGEND

- 1.PADS AND VIAS ARE CHASSIS GROUND
- 2.THROUGH HOLES, PLATING OPTIONAL
- 3.HATCHED AREA DENOTES COMPONENT AND TRACE KEEP-OUT(EXCEPT CHASSIS GROUND)
- 4.AREA DENOTES COMPONENT KEEP-OUT (TRACES ALLOWED)

DIMENSIONS ARE IN MILLIMETERS

Unit: mm

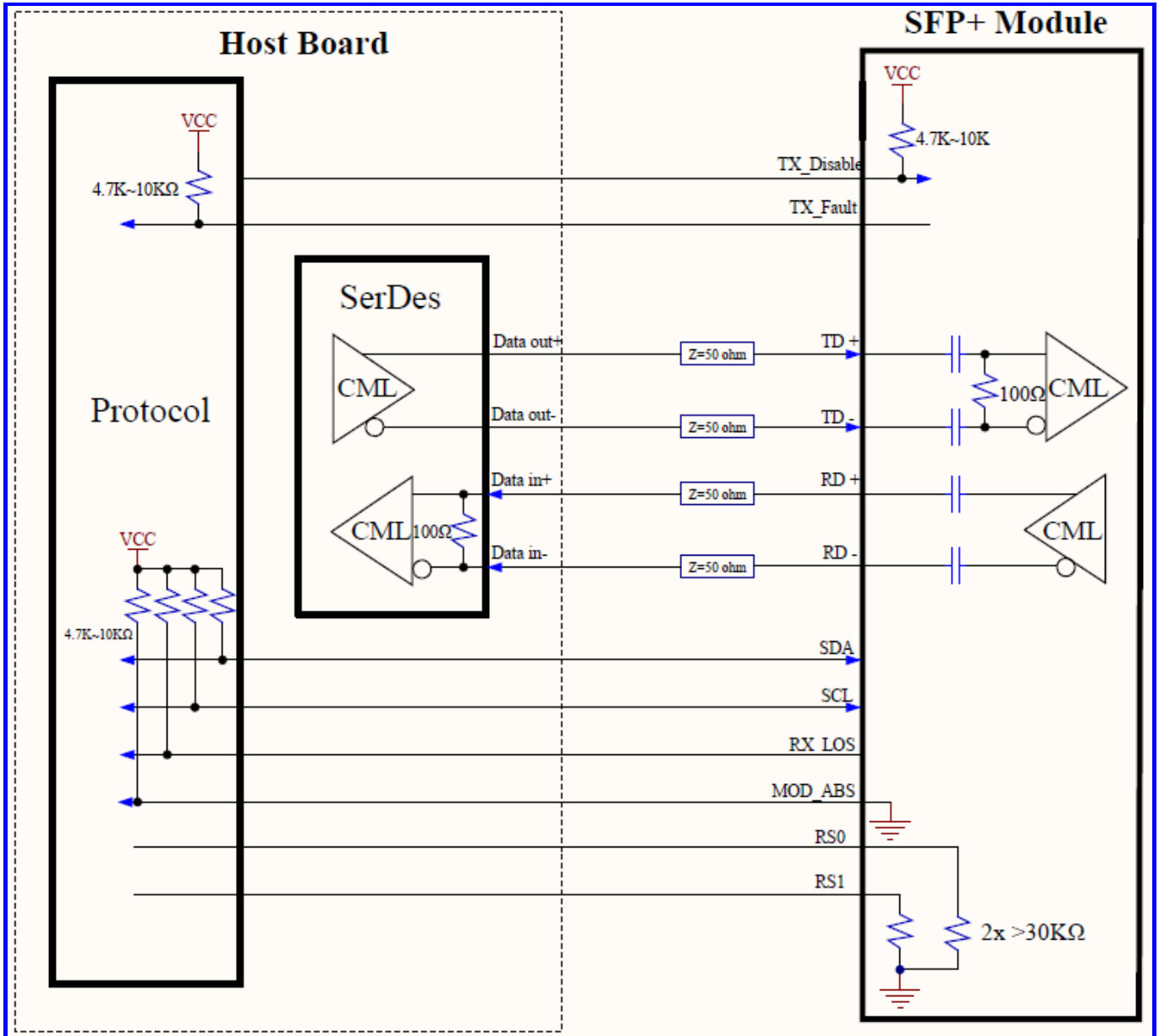
Assembly Drawing





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Recommended Interface Circuit

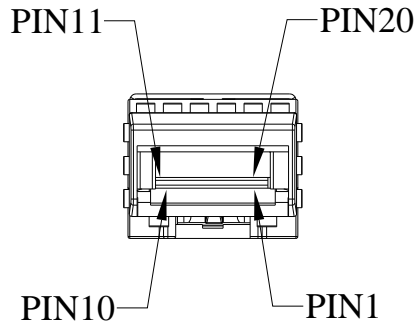




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Pin Assignment

Pin-Out



| Pin | Signal Name | Description |
|-----|----------------|---|
| 1 | T_{GND} | Transmit Ground |
| 2 | TX_FAULT | Transmit Fault |
| 3 | $TX_DISABLE$ | Transmit Disable |
| 4 | $MOD_DEF (2)$ | SDA Serial Data Signal |
| 5 | $MOD_DEF (1)$ | SCL Serial Clock Signal |
| 6 | $MOD_DEF (0)$ | TTL Low |
| 7 | $RS0$ | RX Rate Select, No function implemented |
| 8 | RX_LOS | Receiver Loss of Signal, TTL High, open collector |
| 9 | $RS1$ | TX Rate Select, No function implemented |
| 10 | R_{GND} | Receiver Ground |
| 11 | R_{GND} | Receiver Ground |
| 12 | $RX-$ | Receive Data out Bar, ac coupled |
| 13 | $RX+$ | Receive Data out, ac coupled |
| 14 | R_{GND} | Receiver Ground |
| 15 | V_{CCR} | Receiver Power Supply |
| 16 | V_{CCT} | Transmitter Power Supply |
| 17 | T_{GND} | Transmitter Ground |
| 18 | $TX+$ | Transmit Data in, ac coupled |
| 19 | $TX-$ | Transmit Data in Bar, ac coupled |
| 20 | T_{GND} | Transmitter Ground |

Note : All information contained in this document is subject to change without notice.