

RoHS Compliant 100Gb/s CFP ER4 30km Optical Transceiver

PRODUCT FEATURES

- Hot-pluggable CFP form factor
- Supports 103.1Gb/s and 112Gb/s aggregate bit rates
- Power dissipation < 12W
- RoHS-6 compliant (lead-free)
- Commercial case temperature range of 0°C to 70°C
- Single 3.3V power supply
- Maximum link length of 10km on Single Mode Fiber (SMF)
- 4x25Gb/s DFB-based LAN-WDM transmitter
- 10x10G MLD electrical interface
- Duplex LC receptacles
- MDIO management interface

APPLICATIONS

- 100GBASE-ER4 100G Ethernet
- Other Optical link

PRODUCT DESCRIPTIONS

HOLS-CFPLW30-LD-CE 100GE CFP transceiver modules are designed for use in 100 Gigabit Ethernet links over single mode fiber. They are compliant with the CFP MSA. Digital diagnostics functions are available via the MDIO interface, as specified by CFP MSA;

Absolute Maximum Ratings

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|-------------------------------------|-------------------|------|-----|-----|------|------|
| Maximum Supply Voltage | V _{cc} | -0.5 | | 4.0 | V | |
| Storage Temperature | T _s | -40 | | 85 | °C | |
| Case Operating Temperature | T _{OP} | -5 | | 75 | °C | |
| Relative Humidity | RH | 5 | | 85 | % | |
| Receiver Damage Threshold, per Lane | P _{Rdmg} | 5.5 | | | dBm | |

Notes:

1. Module performance is not guaranteed beyond the operating range.
2. Exceeding the limits below may damage the transceiver module permanently.

General Specifications

| Parameter | Symbol | Min | Typ | Max | Units | Ref. |
|-------------------------------------|-------------------|-----|-------|-------------------|-------|------|
| Bit Rate (all wavelengths combined) | BR | | 103.1 | | Gb/s | 1 |
| Bit Error Ratio @25.78Gb/s | BER1 | | | 10 ⁻¹² | | 2 |
| Maximum Supported Distances | | | | | | |
| Fiber Type | | | | | | |
| SMF per G.652 | L _{max1} | | | 30 | km | |

Notes:

1. Supports 100GBASE-ER4 per IEEE 802.3ba.
2. Tested with a 2³¹ – 1 PRBS.

Environmental Specifications

| Parameter | Symbol | Min | Typ | Max | Units | Ref. |
|----------------------------|------------------|-----|-----|-----|-------|------|
| Case Operating Temperature | T _{op} | 0 | | 70 | °C | |
| Storage Temperature | T _{sto} | -40 | | 85 | °C | |

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. | |
|---|----------------------|--|----------------------------|------|----------|------|--|
| Supply Voltage | V _{cc} | 3.2 | | 3.4 | V | | |
| Supply Current | I _{cc} | | | 5 | A | | |
| Module total power | P | | | 16 | W | | |
| Transmitter | | | | | | | |
| Signaling rate per lane | | | | 11.2 | Gb/s | | |
| Input differential impedance | R _{in} | | 100 | | Ω | | |
| Differential data input swing per lane | V _{in,pp} | | | 760 | mV | | |
| Data input rise time tolerance | t _r | 24 | | | ps | 1 | |
| Data input rise time tolerance | t _f | 24 | | | ps | 1 | |
| Electrical input eye mask definition | {X1, X2} {Y1, Y2} | | {0.31, 0.5} {42.5, 425} | | UI mV | | |
| Receiver | | | | | | | |
| Signaling rate per lane | | | | 11.2 | Gb/s | | |
| Differential data output swing per lane | V _{out,pp} | | | 760 | mV | | |
| Data output rise time | t _r | 24 | | | ps | 1 | |
| Data output fall time | t _f | 24 | | | ps | 1 | |
| Electrical output eye mask definition | {X1, X2} {Y1, Y2} | | {0.2, 0.5} {136, 380} | | UI mV | | |
| Power Supply Noise Tolerance | V _{rip} | Per Table 4-1 in the CFP MSA Specification | | | | | |

Notes:

1.20% to 80%

Optical Characteristics (EOL, T_{OP} = 0 to 70°C, V_{CC} = 3.2 to 3.4 Volts)

| Parameter | Symbol | Min | Typ | Max | Unit | Ref. |
|--|-----------------------------|--|-----|-------|-------|------|
| Transmitter | | | | | | |
| Signaling Speed per Lane | | 25.78 | | 25.78 | Gb/s | 1 |
| Lane center wavelengths (range) | | 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19 | | | nm | |
| Total Average Launch Power | P _{OUT} | | | 10.5 | dBm | |
| Transmit OMA per Lane | T _{xOMA} | -1.0 | | 4.5 | dBm | |
| Average Launch Power per Lane | T _{xP_x} | -2.9 | | 4.5 | dBm | 2 |
| Optical Extinction Ratio | ER | 8.2 | | | dB | |
| Sidemode Suppression ratio | SSR _{min} | 30 | | | dB | |
| Average launch power of OFF transmitter, per lane | | | | -30 | dBm | |
| Relative Intensity Noise | RIN | | | -130 | dB/Hz | |
| Optical Return Loss Tolerance | | | | 20 | dB | |
| Transmitter Reflectance | | | | -12 | dB | |
| Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} | | {0.25, 0.4, 0.45, 0.25, 0.28, 0.4} | | | | |

| Receiver | | | | | | |
|--|------------------|--|---|-------|-----|-----|
| Signaling Speed per Lane | | 25.78 | | 25.78 | GBd | 3 |
| Lane center wavelengths (range) | | 1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19 | | | nm | |
| Receive Power (OMA) per Lane | RxOMA | | | 4.5 | dBm | |
| Average Receive Power per Lane | RXP _x | -20.9 | | 4.5 | dBm | 4 |
| Receiver Sensitivity (OMA) per Lane | Rxsens | | | -18 | dBm | 5 |
| Stressed Receiver Sensitivity (OMA) per Lane | SRS | | | -16 | dBm | 6,7 |
| Return Loss | RL | -20 | | | dB | |
| Vertical eye closure penalty, per lane | | | | 2.5 | dB | |
| Receive electrical 3 dB upper cutoff frequency, per lane | | | | 31 | GHz | |
| LOS De-Assert | LOS _D | | | -19 | dBm | |
| LOS Assert | LOS _A | | | - 21 | dBm | |
| LOS Hysteresis | | | 1 | | dBm | |

Notes:

1. Transmitter consists of 4 lasers operating at 25.78Gb/s each.
2. Minimum value is informative.
3. Receiver consists of 4 photodetectors operating at 25.78Gb/s each.
4. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss.
5. Receiver sensitivity(OMA),each lane(MAX)is informative.
6. Measured with conformance test signal at TP3 BER=10⁻¹²
7. Conditions of stressed receiver sensitivity test: Vertical eye closure penalty for each lane is 1.8dB,stressed eye J2 jitter for each lane is 0.3UI;stressed eye J9 jitter for each lane is 0.47UI.

Pin Descriptions

| | Top Row | | Bottom Row |
|-----|---------|----|------------|
| 148 | GND | 1 | 3.3V_GND |
| 147 | REFCLKn | 2 | 3.3V_GND |
| 146 | REFCLKp | 3 | 3.3V_GND |
| 145 | GND | 4 | 3.3V_GND |
| 144 | N.C. | 5 | 3.3V_GND |
| 143 | N.C. | 6 | 3.3V |
| 142 | GND | 7 | 3.3V |
| 141 | TX9n | 8 | 3.3V |
| 140 | TX9p | 9 | 3.3V |
| 139 | GND | 10 | 3.3V |
| 138 | TX8n | 11 | 3.3V |
| 137 | TX8p | 12 | 3.3V |
| 136 | GND | 13 | 3.3V |
| 135 | TX7n | 14 | 3.3V |
| 134 | TX7p | 15 | 3.3V |
| 133 | GND | 16 | 3.3V_GND |
| 132 | TX6n | 17 | 3.3V_GND |
| 131 | TX6p | 18 | 3.3V_GND |
| 130 | GND | 19 | 3.3V_GND |
| 129 | TX5n | 20 | 3.3V_GND |
| 128 | TX5p | 21 | VND_IO_A |
| 127 | GND | 22 | VND_IO_B |
| 126 | TX4n | 23 | GND |
| 125 | TX4p | 24 | TX_MCLKn |
| 124 | GND | 25 | TX_MCLKp |
| 123 | TX3n | 26 | GND |
| 122 | TX3p | 27 | VND_IO_C |
| 121 | GND | 28 | VND_IO_D |
| 120 | TX2n | 29 | VND_IO_E |
| 119 | TX2p | 30 | PRG_CNTL1 |
| 118 | GND | 31 | PRG_CNTL2 |
| 117 | TX1n | 32 | PRG_CNTL3 |
| 116 | TX1p | 33 | PRG_ALARM1 |
| 115 | GND | 34 | PRG_ALARM2 |
| 114 | TX0n | 35 | PRG_ALARM3 |
| 113 | TX0p | 36 | TX_DIS |
| 112 | GND | 37 | MOD_LOPWR |

| | Top Row | | Bottom Row |
|-----|----------|----|------------|
| 111 | GND | 38 | MOD_ABS |
| 110 | N.C. | 39 | MOD_RSTn |
| 109 | N.C. | 40 | RX_LOS |
| 108 | GND | 41 | GLB_ALRMn |
| 107 | RX9n | 42 | PRTADR4 |
| 106 | RX9p | 43 | PRTADR3 |
| 105 | GND | 44 | PRTADR2 |
| 104 | RX8n | 45 | PRTADR1 |
| 103 | RX8p | 46 | PRTADR0 |
| 102 | GND | 47 | MDIO |
| 101 | RX7n | 48 | MDC |
| 100 | RX7p | 49 | GND |
| 99 | GND | 50 | VND_IO_F |
| 98 | RX6n | 51 | VND_IO_G |
| 97 | RX6p | 52 | GND |
| 96 | GND | 53 | VND_IO_H |
| 95 | RX5n | 54 | VND_IO_J |
| 94 | RX5p | 55 | 3.3V_GND |
| 93 | GND | 56 | 3.3V_GND |
| 92 | RX4n | 57 | 3.3V_GND |
| 91 | RX4p | 58 | 3.3V_GND |
| 90 | GND | 59 | 3.3V_GND |
| 89 | RX3n | 60 | 3.3V |
| 88 | RX3p | 61 | 3.3V |
| 87 | GND | 62 | 3.3V |
| 86 | RX2n | 63 | 3.3V |
| 85 | RX2p | 64 | 3.3V |
| 84 | GND | 65 | 3.3V |
| 83 | RX1n | 66 | 3.3V |
| 82 | RX1p | 67 | 3.3V |
| 81 | GND | 68 | 3.3V |
| 80 | RX0n | 69 | 3.3V |
| 79 | RX0p | 70 | 3.3V_GND |
| 78 | GND | 71 | 3.3V_GND |
| 77 | RX_MCLKn | 72 | 3.3V_GND |
| 76 | RX_MCLKp | 73 | 3.3V_GND |
| 75 | GND | 74 | 3.3V_GND |

Bottom Row Pin Descriptions

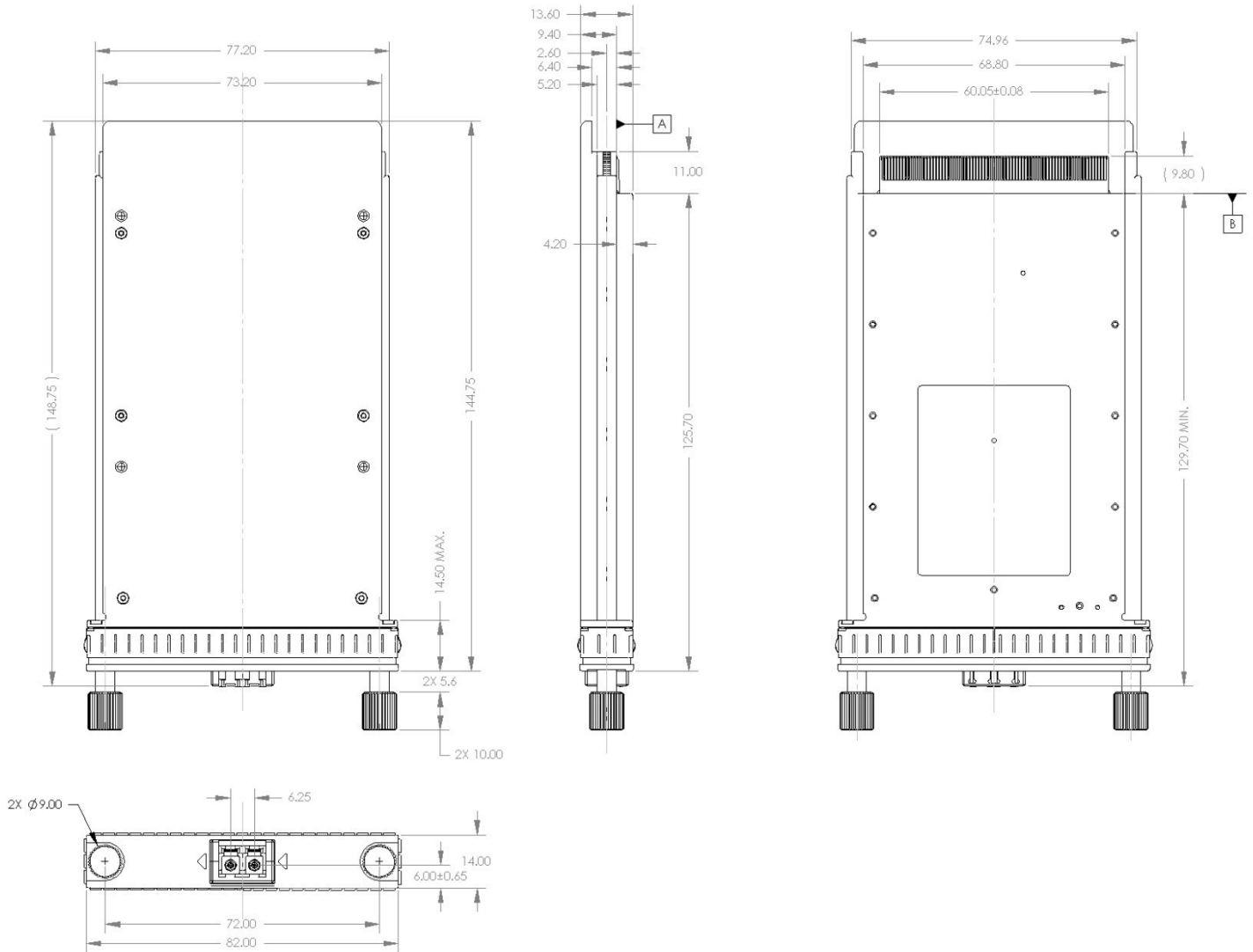
| PIN # | Name | I/O | Logic | Description |
|-------|------------|-----|----------------|--|
| 1 | 3.3V GND | | | 3.3V Module Supply Voltage Return Ground, internally connected to Signal Ground |
| 2 | 3.3V GND | | | |
| 3 | 3.3V GND | | | |
| 4 | 3.3V GND | | | |
| 5 | 3.3V GND | | | |
| 6 | 3.3V | | | 3.3V Module Supply Voltage |
| 7 | 3.3V | | | |
| 8 | 3.3V | | | |
| 9 | 3.3V | | | |
| 10 | 3.3V | | | |
| 11 | 3.3V | | | |
| 12 | 3.3V | | | |
| 13 | 3.3V | | | |
| 14 | 3.3V | | | |
| 15 | 3.3V | | | |
| 16 | 3.3V GND | | | 3.3V Module Supply Voltage Return Ground, internally connected to Signal Ground |
| 17 | 3.3V GND | | | |
| 18 | 3.3V GND | | | |
| 19 | 3.3V GND | | | |
| 20 | 3.3V GND | | | |
| 21 | VND IO A | I/O | | Module Vendor I/O A. Do Not Connect! |
| 22 | VND IO B | I/O | | Module Vendor I/O B. Do Not Connect! |
| 23 | GND | | | |
| 24 | TX MCLKn | O | | Freq = Optical rate/32. Utilized for optical waveform testing. Not for normal use. |
| 25 | TX MCLKp | O | | Freq = Optical rate/32. Utilized for optical waveform testing. Not for normal use. |
| 26 | GND | | | |
| 27 | VND IO C | I/O | | Module Vendor I/O C. Do Not Connect! |
| 28 | VND IO D | I/O | | Module Vendor I/O D. Do Not Connect! |
| 29 | VND IO E | I/O | | Module Vendor I/O E. Do Not Connect! |
| 30 | PRG_CNTL1 | I | LVC MOS w/ PUR | Programmable Control 1 set over MDIO, Default: TRXIC_RSTn, TX & RX ICs reset, "0": reset; "1" or NC: enabled (i.e., not used). |
| 31 | PRG_CNTL2 | I | LVC MOS w/ PUR | Programmable Control 2 set over MDIO, Default: Hardware Interlock LSB, "00": ≤8W; "01": ≤16W; "10": ≤24W; "11" or NC: ≤32W (i.e., not used). |
| 32 | PRG_CNTL3 | I | LVC MOS w/ PUR | Programmable Control 3 set over MDIO, Default: Hardware Interlock MSB, "00": ≤8W; "01": ≤16W; "10": ≤24W; "11" or NC: ≤32W (i.e., not used). |
| 33 | PRG_ALARM1 | O | LVC MOS | Programmable Alarm 1 set over MDIO, Default: HIPWR_ON, "1": module power up completed; "0": module not high powered up. |
| 34 | PRG_ALARM2 | O | LVC MOS | Programmable Alarm 2 set over MDIO, Default: MOD_READY, "1": Ready; "0": not Ready. |
| 35 | PRG_ALARM3 | O | LVC MOS | Programmable Alarm 3 set over MDIO, Default: MOD_FAULT, fault detected, "1": Fault; "0": No Fault. |
| 36 | TX DIS | I | LVC MOS w/ PUR | Transmitter Disable for all lanes, "1" or NC = transmitter disabled, "0" = transmitter enabled |
| 37 | MOD_LOPWR | I | LVC MOS w/ PUR | Module Low Power Mode. "1" or NC: module in low power (safe) mode, "0": power-on enabled |
| 38 | MOD_ABS | O | GND | Module Absent. "1" or NC: module absent, "0": module present, Pull Up Resistor on Host |
| 39 | MOD_RSTn | I | LVC MOS w/ PDR | Module Reset. "0" resets the module, "1" or NC = module enabled, Pull Down Resistor in Module |
| 40 | RX LOS | O | LVC MOS | Receiver Loss of Optical Signal, "1": low optical signal, "0": normal condition |
| 41 | GLB_ALARMn | O | LVC MOS | Global Alarm. "0": alarm condition in any MDIO Alarm register, "1": no alarm condition, Open Drain, Pull Up Resistor on Host |
| 42 | PRTADR4 | I | 1.2V CMOS | MDIO Physical Port address bit 4 |
| 43 | PRTADR3 | I | 1.2V CMOS | MDIO Physical Port address bit 3 |
| 44 | PRTADR2 | I | 1.2V CMOS | MDIO Physical Port address bit 2 |
| 45 | PRTADR1 | I | 1.2V CMOS | MDIO Physical Port address bit 1 |
| 46 | PRTADR0 | I | 1.2V CMOS | MDIO Physical Port address bit 0 |
| 47 | MDIO | I/O | 1.2V CMOS | Management Data I/O bi-directional data (electrical specs as per 802.3ae and ba) |
| 48 | MDC | I | 1.2V CMOS | Management Data Clock (electrical specs as per 802.3ae and ba) |
| 49 | GND | | | |
| 50 | VND IO F | I/O | | Module Vendor I/O F. Do Not Connect! |
| 51 | VND IO G | I/O | | Module Vendor I/O G. Do Not Connect! |
| 52 | GND | | | |



100Gb/s 4x LWDM Channel CFP ER4 TRx, 10km
HOLS-CFPLW30-LD-CE

| | | | | |
|----|----------|-----|--|--|
| 53 | VND_IO_H | I/O | | Module Vendor I/O H. Do Not Connect! |
| 54 | VND_IO_J | I/O | | Module Vendor I/O J. Do Not Connect! |
| 55 | 3.3V_GND | | | 3.3V Module Supply Voltage Return Ground, internally connected to Signal Ground |
| 56 | 3.3V_GND | | | |
| 57 | 3.3V_GND | | | |
| 58 | 3.3V_GND | | | |
| 59 | 3.3V_GND | | | |
| 60 | 3.3V | | | 3.3V Module Supply Voltage |
| 61 | 3.3V | | | |
| 62 | 3.3V | | | |
| 63 | 3.3V | | | |
| 64 | 3.3V | | | |
| 65 | 3.3V | | | |
| 66 | 3.3V | | | |
| 67 | 3.3V | | | |
| 68 | 3.3V | | | |
| 69 | 3.3V | | | |
| 70 | 3.3V_GND | | | 3.3V Module Supply Voltage Return Ground, internally connected to Signal Ground |
| 71 | 3.3V_GND | | | |
| 72 | 3.3V_GND | | | |
| 73 | 3.3V_GND | | | |
| 74 | 3.3V_GND | | | |

Mechanical Dimensions



ORDERING INFORMATION

| Part Number | Description |
|--------------------|---------------------------------------|
| HOLS-CFPLW30-LD-CE | 100G CFP ER4 30Km 25G per lane,0-70 C |