

## CFP-100G-ER4-AO

Cisco® CFP-100G-ER4 Compatible TAA 100GBase-ER4 CFP Transceiver (SMF, 1310nm, 40km, LC, DOM)

### Features

- CFP MSA 1.4 Compliance
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications

- 100GBase Ethernet
- Access and Enterprise

### Product Description

This Cisco® CFP-100G-ER4 compatible CFP transceiver provides 100GBase-ER4 throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Cisco® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

AddOn's transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



### Absolute Maximum Ratings

| Parameter                   | Symbol | Min. | Max. | Unit |
|-----------------------------|--------|------|------|------|
| Storage Temperature         | $T_s$  | -40  | +85  | °C   |
| Case Temperature            | $T_c$  | -5   | +75  | °C   |
| Supply Voltage              | Vcc    | -0.5 | 3.6  | V    |
| Operating Relative Humidity | RH     | 5    | 85   | %    |

### Recommended Operating Conditions

| Parameter                  | Symbol | Min. | Typ. | Max. | Unit |
|----------------------------|--------|------|------|------|------|
| Operating Case Temperature | $T_c$  | 0    |      | +70  | °C   |
| Power Supply Voltage       | VCC    | 3.2  | 3.3  | 3.4  | V    |
| Power Supply Current       | ICC    |      | 2700 |      | mA   |

### Electrical Characteristics

| Parameter                       | Symbol    | Min. | Typ. | Max. | Unit | Notes                |
|---------------------------------|-----------|------|------|------|------|----------------------|
| Transmitter                     |           |      |      |      |      |                      |
| Input Amplitude (Differential)  | Vin       |      |      | 1050 | mVpp | AC coupled inputs    |
| Input Impedance (Differential)  | Zin       | 80   | 100  | 120  | Ohms | Rin > 100 kohms @ DC |
| Receiver                        |           |      |      |      |      |                      |
| Output Amplitude (Differential) | Vout      | 360  |      | 770  | mVpp | AC coupled outputs   |
| Output Impedance (Differential) | Zout      | 80   | 100  | 120  | Ohms |                      |
| Output Rise/Fall Time           | $T_r/t_f$ | 24   |      |      | Ps   | 20%~80%              |

## Optical Characteristics

| Parameter                                                         | Symbol         | Min.              | Typ.    | Max.    | Unit |
|-------------------------------------------------------------------|----------------|-------------------|---------|---------|------|
| Transmitter                                                       |                |                   |         |         |      |
| Signaling Speed Per Lane                                          | $BR_{AVE}$     |                   | 27.95   |         | Gbps |
| Data Rate Variation                                               |                | -20               |         | 20      | Ppm  |
| Lane_0 Center Wavelength                                          | $\lambda_{C0}$ | 1294.53           | 1295.56 | 1296.59 | Nm   |
| Lane_1 Center Wavelength                                          | $\lambda_{C1}$ | 1299.02           | 1300.05 | 1301.09 | Nm   |
| Lane_2 Center Wavelength                                          | $\lambda_{C2}$ | 1303.54           | 1304.58 | 1305.63 | nm   |
| Lane_3 Center Wavelength                                          | $\lambda_{C3}$ | 1308.09           | 1309.14 | 1310.19 | Nm   |
| Total Average Output Power (Note 5&6)                             | $P_{O1}$       |                   |         | 8.9     | dBm  |
| Average Launch Power per Lane (Note 6)                            | $P_{each1}$    | -2.7              |         | 2.9     | dBm  |
| Maximum Channel Power Difference                                  |                |                   |         | 3.6     | dB   |
| Side Mode Suppression Ratio                                       | SMSR           | 30                |         |         | dB   |
| Optical Return Loss Tolerance                                     |                |                   |         | 20      | dB   |
| Extinction Ratio (Note 6)                                         | $ER_1$         | 8                 |         |         | dB   |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} (Note 6) |                | G.959.1 Compliant |         |         |      |
| TX Disable Assert Time                                            | $T_{off}$      |                   |         | 100     | Us   |
| Receiver                                                          |                |                   |         |         |      |
| Signaling Speed Per Lane                                          | $BR_{AVE}$     |                   | 27.95   |         | Gbps |
| Data Rate Variation                                               |                | -20               |         | 20      | Ppm  |
| Lane_0 Center Wavelength                                          | $\lambda_{C0}$ | 1294.53           | 1295.56 | 1296.69 | Nm   |
| Lane_1 Center Wavelength                                          | $\lambda_{C1}$ | 1299.02           | 1300.05 | 1301.09 | Nm   |
| Lane_2 Center Wavelength                                          | $\lambda_{C2}$ | 1303.54           | 1304.58 | 1305.63 | Nm   |
| Lane_3 Center Wavelength                                          | $\lambda_{C3}$ | 1308.09           | 1309.14 | 1310.19 | Nm   |
| Average Receive Power for Each Lane (Note 9)                      | $R_{pow1}$     | -20.7             |         | 4.5     | dBm  |
| Maximum Mean Total Input Power                                    |                |                   |         | 10.5    | dBm  |
| Equivalent Sensitivity per Lane (Note 11)                         | $P_{min1}$     |                   |         | -23.2   | dBm  |
| Maximum Channel Power Difference                                  |                |                   |         | 4.5     | dB   |

## 100GBase-ER4 Operation

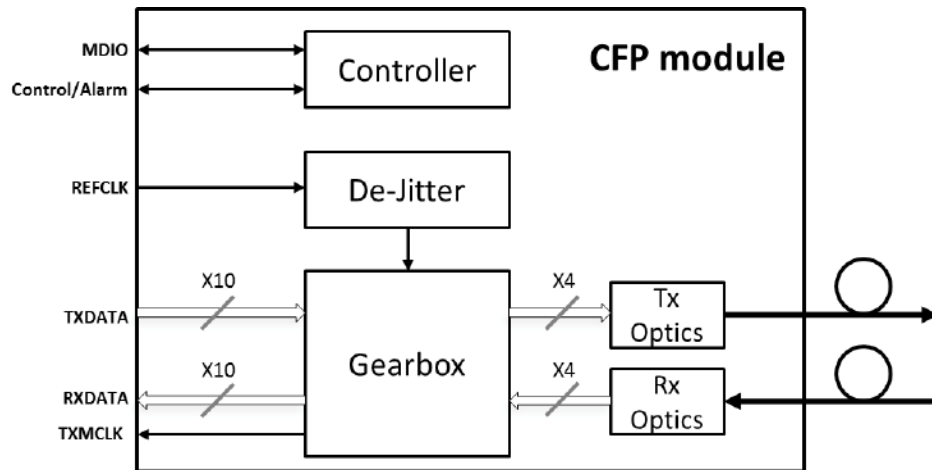
| Parameter                                                           | Symbol         | Min.                       | Typ.    | Max.    | Unit |
|---------------------------------------------------------------------|----------------|----------------------------|---------|---------|------|
| Transmitter                                                         |                |                            |         |         |      |
| Signaling Speed Per Lane                                            | $BR_{AVE}$     |                            | 25.78   |         | Gbps |
| Data Rate Variation                                                 |                | -100                       |         | 100     | Ppm  |
| Lane_0 Center Wavelength                                            | $\lambda_{C0}$ | 1294.53                    | 1295.56 | 1296.59 | Nm   |
| Lane_1 Center Wavelength                                            | $\lambda_{C1}$ | 1299.02                    | 1300.05 | 1301.09 | Nm   |
| Lane_2 Center Wavelength                                            | $\lambda_{C2}$ | 1303.54                    | 1304.58 | 1305.63 | nm   |
| Lane_3 Center Wavelength                                            | $\lambda_{C3}$ | 1308.09                    | 1309.14 | 1310.19 | Nm   |
| Total Average Output Power (Note 5&6)                               | $P_{O1}$       |                            |         | 8.9     | dBm  |
| Average Launch Power per Lane (Note 6)                              | $P_{each2}$    | -2.9                       |         | 2.9     | dBm  |
| Optical Modulation Amplitude                                        | OMA            | 0.1                        |         | 4.5     | dB   |
| Side Mode Suppression Ratio                                         | SMSR           | 30                         |         |         | dB   |
| Optical Return Loss Tolerance                                       |                |                            |         | 20      | dB   |
| Extinction Ratio (Note 6)                                           | $ER_2$         | 8                          |         |         | dB   |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} (Note 8)   |                | IEEE802.3ba-2010 Compliant |         |         |      |
| TX Disable Assert Time                                              | $T_{off}$      |                            |         | 100     | Us   |
| Receiver                                                            |                |                            |         |         |      |
| Signaling Speed Per Lane                                            | $BR_{AVE}$     |                            | 25.78   |         | Gbps |
| Data Rate Variation                                                 |                | -100                       |         | 100     | Ppm  |
| Lane_0 Center Wavelength                                            | $\lambda_{C0}$ | 1294.53                    | 1295.56 | 1296.59 | Nm   |
| Lane_1 Center Wavelength                                            | $\lambda_{C1}$ | 1299.02                    | 1300.05 | 1301.09 | Nm   |
| Lane_2 Center Wavelength                                            | $\lambda_{C2}$ | 1303.54                    | 1304.58 | 1305.63 | Nm   |
| Lane_3 Center Wavelength                                            | $\lambda_{C3}$ | 1308.09                    | 1309.14 | 1310.19 | Nm   |
| Average Receive Power for Each Lane (Note 9)                        | $R_{pow2}$     | -20.9                      |         | 4.5     | dBm  |
| Receiver Power (OMA)                                                | $P_{ovl}$      |                            |         | 4.5     | dBm  |
| Difference in Receive Power Between Any Two Lanes (Average and OMA) |                |                            |         | 4.5     | dB   |
| Receive Sensitivity (OMA) per Lane (Note 12)                        | $P_{min2}$     |                            |         | -21.4   | dBm  |
| Stressed Sensitivity (OMA) per lane                                 | SRS            |                            |         | -17.9   | dBm  |

### Notes:

1. Output is coupled into a 9/125μm single-mode fiber.
2. Filtered, measured with a PRBS  $2^{31}-1$  test pattern @ 27.95Gbps

3. High speed I/O, internally AC coupled
4. Filtered, measured with a PRBS  $2^{31}-1$  test pattern @ 25.78Gbps
5. CFP transceiver works in OTU4 4I1-9C1F mode
6. CFP transceiver works in 100GBase-ER4 mode
7. Measured at BER less than  $1E-12$ , with a  $2^{31}-1$  PRBS@ 27.95Gbps (W/ FEC)
8. Measured at BER less than  $1E-12$ , with a  $2^{31}-1$  PRBS@ 25.78Gbps

### Functional Description of Transceiver



## Pin Descriptions

### Part A: Bottom Row Pin Function Definition

| Pin | Symbol     | Type            | I/O | Description                                                                                                                                                    |
|-----|------------|-----------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | 3.3V_GND   | GND             |     | 3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal Ground                                                                  |
| 2   | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 3   | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 4   | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 5   | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 6   | 3.3V       | VCC             |     | 3.3V Module Supply                                                                                                                                             |
| 7   | 3.3V       | VCC             |     |                                                                                                                                                                |
| 8   | 3.3V       | VCC             |     |                                                                                                                                                                |
| 9   | 3.3V       | VCC             |     |                                                                                                                                                                |
| 10  | 3.3V       | VCC             |     |                                                                                                                                                                |
| 11  | 3.3V       | VCC             |     |                                                                                                                                                                |
| 12  | 3.3V       | VCC             |     |                                                                                                                                                                |
| 13  | 3.3V       | VCC             |     |                                                                                                                                                                |
| 14  | 3.3V       | VCC             |     |                                                                                                                                                                |
| 15  | 3.3V       | VCC             |     |                                                                                                                                                                |
| 16  | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 17  | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 18  | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 19  | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 20  | 3.3V_GND   | GND             |     |                                                                                                                                                                |
| 21  | NC         |                 | I/O | Do not use                                                                                                                                                     |
| 22  | NC         |                 | I/O | Do not use                                                                                                                                                     |
| 23  | GND        | GND             |     |                                                                                                                                                                |
| 24  | (TX_MCLKn) | CML             | O   | Do not use                                                                                                                                                     |
| 25  | (TX_MCLKp) | CML             | O   | Do not use                                                                                                                                                     |
| 26  | GND        | GND             |     |                                                                                                                                                                |
| 27  | NC         |                 | I/O | Do not use                                                                                                                                                     |
| 28  | NC         |                 | I/O | Do not use                                                                                                                                                     |
| 29  | NC         |                 | I/O | Do not use                                                                                                                                                     |
| 30  | PRG_CTL1   | LVC MOS<br>w/PU | I   | Programmable Control 1 set via MDIO, MSA default: TRXIC_RSTn-TX & RX IC reset. "0"=reset, "1" or NC = enabled or not used                                      |
| 31  | PRG_CTL2   | LVC MOS<br>w/PU | I   | Programmable Control 2 set via MDIO, MSA default: Hardware power Interlock LSB, "00" = <8W, "01" = <16W, "10" < 24W, "11" or NC = >24W or not used             |
| 32  | PRG_CTL3   |                 |     | Programmable Control 3 set via MDIO, MSA default: Hardware power Interlock MSB, "00" = <8W, "01" = <16W, "10" < 24W, "11" or NC = >24W or not used             |
| 33  | PRG_ALARM1 | LVC MOS         | O   | Programmable Alarm 1 set via MDIO, Reflex default: HIPWR_ON, Module power on indicator. "1" = Module high power up completed, "0" = Module not high powered up |
| 34  | PRG_ALARM2 | LVC MOS         | O   | Programmable Alarm 2 set via MDIO, Reflex default: MOD_READY, module initialization complete, "1" = complete, "0" = not complete                               |

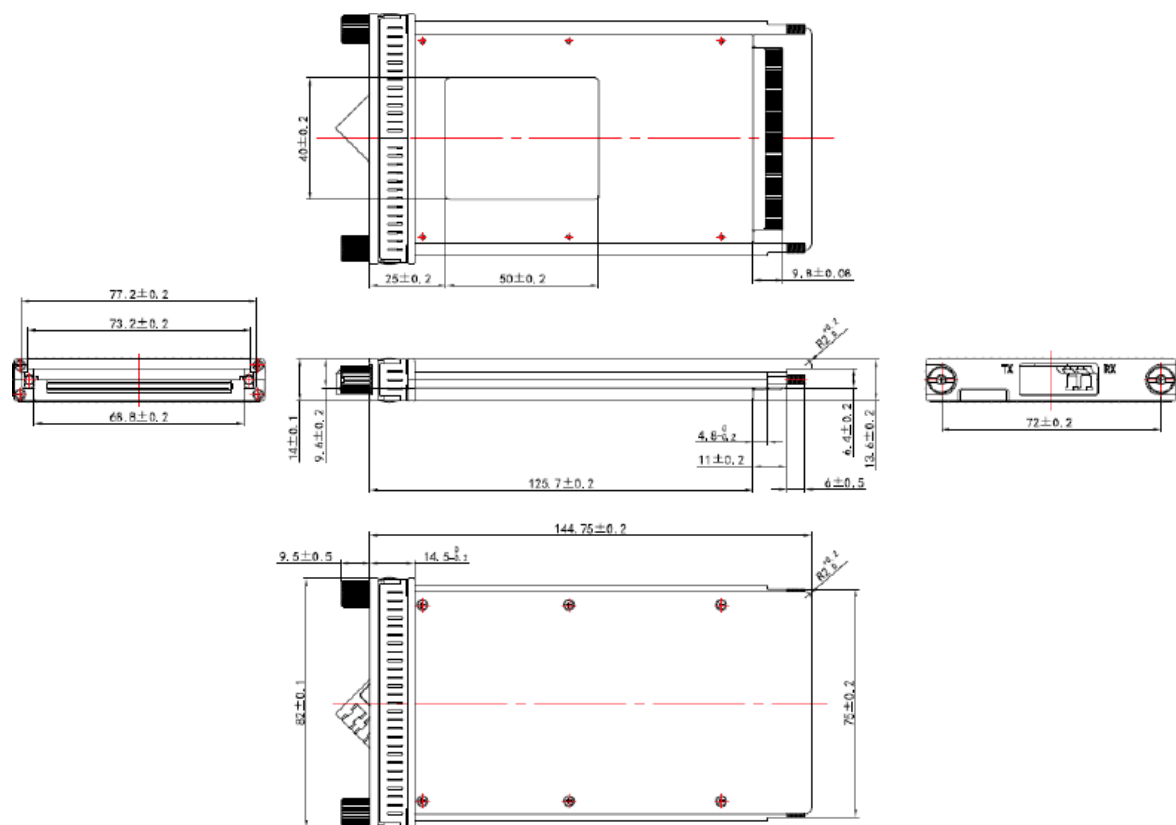
|    |            |              |     |                                                                                                                  |
|----|------------|--------------|-----|------------------------------------------------------------------------------------------------------------------|
| 35 | PRG_ALARM3 | LVC MOS      | O   | Programmable Alarm 3 set via MDIO, Reflex default: MOD_FAULT, module fault detected, “1” = fault, “0” = no fault |
| 36 | TX_DIS     | LVC MOS w/PU | I   | Transmitter Disable for all channels, “1” or NC = transmitter disabled, “0” = transmitter enabled                |
| 37 | MOD_LOPW   | LVC MOS w/PU | I   | Module low power mode. “1” or NC = module in low power (safe) mode, “0” = power-on enabled                       |
| 38 | MOD_ABS    | GND          | O   | Module Absent. “1” or NC = Module absent, “0” = module present. Pull-up resistor on Host                         |
| 39 | MOD_RSTn   | LVC MOS w/PD | I   | Module Reset. “0” = reset the module, “1” or NC = module enabled, Pull Down resistor in module                   |
| 40 | RX_LOS     | LVC MOS      | O   | Receiver loss of optical signal on any channel, “1” = loss of signal, “0” = normal condition                     |
| 41 | GLB_ALRMn  | LVC MOS      | O   | Global Alarm. “0” = alarm condition in any MDIO alarm register, “1” = no alarm                                   |
| 42 | PRTADR4    | 1.2V CMOS    | I   | MDIO port address bit 4                                                                                          |
| 43 | PRTADR3    | 1.2V CMOS    | I   | MDIO port address bit 3                                                                                          |
| 44 | PRTADR2    | 1.2V CMOS    | I   | MDIO port address bit 2                                                                                          |
| 45 | PRTADR1    | 1.2V CMOS    | I   | MDIO port address bit 1                                                                                          |
| 46 | PRTADR0    | 1.2V CMOS    | I   | MDIO port address bit 0                                                                                          |
| 47 | MDIO       | 1.2V CMOS    | I/O | Management Data I/O bi-directional data (electrical specs as per 802.3ae)                                        |
| 48 | MDO        | 1.2V CMOS    | I   | Management data clock (electrical specs as per 802.3ae)                                                          |
| 49 | GND        | GND          |     |                                                                                                                  |
| 50 | NC         |              | I/O | Do not use                                                                                                       |
| 51 | NC         |              | I/O | Do not use                                                                                                       |
| 52 | GND        | GND          |     |                                                                                                                  |
| 53 | NC         |              | I/O | Do not use                                                                                                       |
| 54 | NC         |              | I/O | Do not use                                                                                                       |
| 55 | 3.3V_GND   | GND          |     | 3.3V Module Supply Voltage Return Ground, can be separate or tied together with Signal Ground                    |
| 56 | 3.3V_GND   | GND          |     |                                                                                                                  |
| 57 | 3.3V_GND   | GND          |     |                                                                                                                  |
| 58 | 3.3V_GND   | GND          |     |                                                                                                                  |
| 59 | 3.3V_GND   | GND          |     |                                                                                                                  |
| 60 | 3.3V       | VCC          |     | 3.3V Module Supply                                                                                               |
| 61 | 3.3V       | VCC          |     |                                                                                                                  |
| 62 | 3.3V       | VCC          |     |                                                                                                                  |
| 63 | 3.3V       | VCC          |     |                                                                                                                  |
| 64 | 3.3V       | VCC          |     |                                                                                                                  |
| 65 | 3.3V       | VCC          |     |                                                                                                                  |
| 66 | 3.3V       | VCC          |     |                                                                                                                  |
| 67 | 3.3V       | VCC          |     |                                                                                                                  |
| 68 | 3.3V       | VCC          |     |                                                                                                                  |
| 69 | 3.3V       | VCC          |     |                                                                                                                  |
| 70 | 3.3V_GND   | GND          |     |                                                                                                                  |
| 71 | 3.3V_GND   | GND          |     |                                                                                                                  |
| 72 | 3.3V_GND   | GND          |     |                                                                                                                  |

|           |          |     |  |  |
|-----------|----------|-----|--|--|
| <b>73</b> | 3.3V_GND | GND |  |  |
| <b>74</b> | 3.3V_GND | GND |  |  |

#### Part B: Top Row Pin Function Definition

| Pin        | Symbol   | Pin | Symbol | Pin | Symbol | Pin | Symbol   | Pin | Symbol   |
|------------|----------|-----|--------|-----|--------|-----|----------|-----|----------|
| <b>148</b> | GND      | 136 | GND    | 124 | GND    | 112 | GND      | 100 | RX7p     |
| <b>147</b> | Not used | 135 | TX7n   | 123 | TX3n   | 111 | GND      | 99  | GND      |
| <b>146</b> | Not used | 134 | TX7p   | 122 | TX3p   | 110 | Not used | 98  | RX6n     |
| <b>145</b> | GND      | 133 | GND    | 121 | GND    | 109 | Not used | 97  | RX6p     |
| <b>144</b> | Not used | 132 | TX6n   | 120 | TX2n   | 108 | GND      | 96  | GND      |
| <b>143</b> | Not used | 131 | TX6p   | 119 | TX2p   | 107 | RX9n     | 95  | RX5n     |
| <b>142</b> | GND      | 130 | GND    | 118 | GND    | 106 | RX9p     | 94  | RX5p     |
| <b>141</b> | TX9n     | 129 | TX5n   | 117 | TX1n   | 105 | GND      | 93  | GND      |
| <b>140</b> | TX9p     | 128 | TX5p   | 116 | TX1p   | 104 | RX8n     | 92  | RX4n     |
| <b>139</b> | GND      | 127 | GND    | 115 | GND    | 103 | RX8p     | 91  | RX4p     |
| <b>138</b> | TX8n     | 126 | TX4n   | 114 | TX0n   | 102 | GND      | 90  | GND      |
| <b>137</b> | TX8p     | 125 | TX4p   | 113 | TX0p   | 101 | RX7n     | 89  | RX3n     |
| <b>88</b>  | RX3p     | 85  | RX2p   | 82  | RX1p   | 79  | RX0p     | 76  | Not used |
| <b>87</b>  | GND      | 84  | GND    | 81  | GND    | 78  | GND      | 75  | GND      |
| <b>86</b>  | RX2n     | 83  | RX1n   | 80  | RX0n   | 77  | Not used |     |          |

## Mechanical Specifications



## About AddOn Networks

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is ingrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.



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