

Features

- Hot Pluggable SFP+ form factor
- Operating data rate 10.3125Gbps
- Single +3.3V power supply
- duplex LC connector
- Max power dissipation <1.5W
- 1550nm cooled EML transmitter with TEC
- Up to 40km transmission distance
- PIN receivers
- Built-in digital diagnostic function
- Commercial temperature range 0°C to 70°C

Compliance

- SFP MSA
- Compliant with SFP+ Electrical MSA SFF-8431
- Compliant with SFP+ Mechanical MSA SFF-8432
- SFF-8472
- IEEE 802.3ae
- RoHS

Applications

- Switches with SFP+ ports
- Router with SFP+ Ports
- Server or Network Adapter Card
- Optical Transmission System
- Other devices with SFP+ Ports



Description

The 10G-SFP-ER is a high-performance SFP+ transceiver designed for extended-range 10-Gigabit Ethernet applications over single-mode fiber (SMF). It supports data rates of up to 10Gbps and achieves transmission distances of up to 40 kilometers, making it ideal for use in metropolitan area networks (MANs), wide area networks (WANs), and enterprise network backbones. The module integrates a high-quality 1550nm DFB laser and PIN photodiode in a compact optical sub-assembly, ensuring reliable and efficient performance. Compliant with the SFP+ Multi-Source Agreement (MSA) and IEEE 802.3ae standards, it supports advanced digital diagnostics monitoring (DDM) for real-time access to critical operating parameters.

The 10G-SFP-ER features an enhanced digital diagnostic interface, providing real-time monitoring of transceiver temperature, laser bias current, transmitted and received optical power, and supply voltage. It also includes a sophisticated system of alarm and warning flags to alert users when operating parameters fall outside predefined ranges. With its hot-pluggable design and low power consumption, the transceiver ensures easy installation and energy efficiency. Whether deployed in telecommunications, data center interconnects, or enterprise networks, the 10G-SFP-ER delivers a reliable and cost-effective solution for high-speed, long-distance connectivity.

Product performance Specifications

1. Basic Product Characteristics

Parameter	Symbol	Min	Тур.	Max	Unit
Storage Temperature	Ts	-40	-	+85	°C
Supply Voltage	Vcc	0	-	+4	V
Relative Humidity	RH	5	-	85	%
Operating Case Temperature	Tc	0	25	70	°C
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Power Supply Current	Icc			450	mA
Power Dissipation	PD	-	-	1500	mW
Data Rate	DR		10.3125		Gb/s



2. Product Optical and Electrical Characteristics

Parameter	Symbol	Min	Тур.	Max	Unit
		Transmitter			
Output Center Wavelength	λς	1530	1550	1565	nm
RMS Spectral Width	σ			0.45	nm
Optical Power for TX DISABLE	Poff			-30	dBm
Output average power	Pavg	-1		4	dBm
Optical Modulation Amplitude	OMA		-1.5		dBm
Extinction Ratio	ER	3			dB
Relative Intensity Noise	RIN			-128	dB/Hz
Optical Return Loss Tolerance	ORL			12	dB
Transmitter Dispersion Penalty	TDP			3.9	dB
Optical Eye Mask		Comp	oliant with IEEE 802	2.3ae	
Tx Input Diff Voltage	VI	180		700	mV
Tx Fault	VoL	-0.3		0.4	V
rx rault	loH	-50		37.5	uA
Tx_Disable	VIL	-0.3		0.8	V
TX_DISABle	VIH	2		VCC+0.3	V
		Receiver			
Center Wavelength	λς	840	850	860	nm
Receiver Sensitivity ₁	Rsens			-9.9	dBm
Los Assert	LosA	-30			dBm
Los Dessert	LosD			-11	dBm
Los Hysteresis	LosH	0.5			dB
Overload	Pin	-1			dBm
Receiver Reflectance				-16	dB
Operating Data Rate			10.3125		Gbps
Rx Output Diff Voltage	Vo	300		850	mV
Rx_LOS ₂	VoL	-0.3		0.4	V
1.W_EOO2	loH	-50		37.5	uA
RS0 and RS1	VIL	-0.3		0.8	V
1.00 and 1.01	VIH	2		VCC+0.3	V

Note1: Receiver sensitivity is informative. shall be measured with conformance test signal for BER=1x10-12.

Note2: Measured with a 4.7 k Ω load pulled up to Vcc.



Recommended Host Board Power Supply Circuit

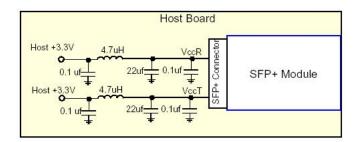


Figure 1:Recommended Host Board Power Supply Circuit

Recommended Interface Circuit

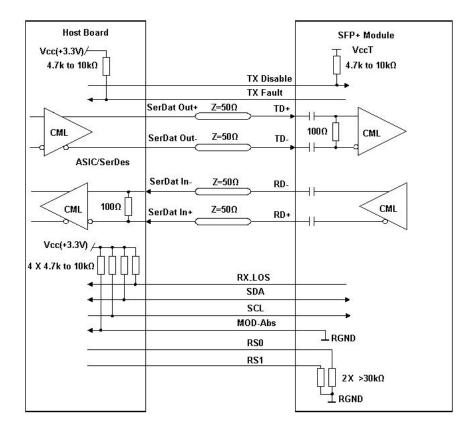


Figure2:Recommended Interface Circuit



Pin-out Definition

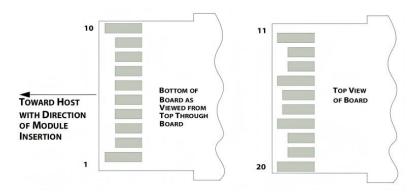


Figure3:Pin view

Pin Function Definitions

Pin	Logic	Symbol	Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTL-I	TX_Disable	Transmitter Disable; Turns off transmitter laser output	3
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i)	4
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock (Same as MOD-DEF1 as defined in the INF-8074i)	4
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	5
7	LVTTL-I	RS0	Adaptive multi-rate operation	6
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication (In FC designated as RX_LOS, in SONET designated as LOS, and in Ethernet designated at Signal Detect)	2
9	LVTTL-I	RS1	Adaptive multi-rate operation	6
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1



Note1: The module signal ground pins, VeeR and VeeT, shall be isolated from the module case.

Note2: This pin is an open collector/drain output pin and shall be pulled up with $4.7k\Omega-10k\Omega$ to Host_Vcc on the host board. Pull ups can be connected to multiple power supplies, however the host board design shall ensure that no module pin has voltage exceeding module VccT/R + 0.5V.

Note3: This pin is an open collector/drain input pin and shall be pulled up with $4.7k\Omega-10k\Omega$ to VccT in the module.

Note4: See SFF-8431 4.2 2-wire Electrical Specifications.

Note5: This pin shall be pulled up with $4.7k\Omega-10k\Omega$ to Host_Vcc on the host board.

Note6: Connect with $30k\Omega$ load pulled down to GND in the module.

Monitoring Specification

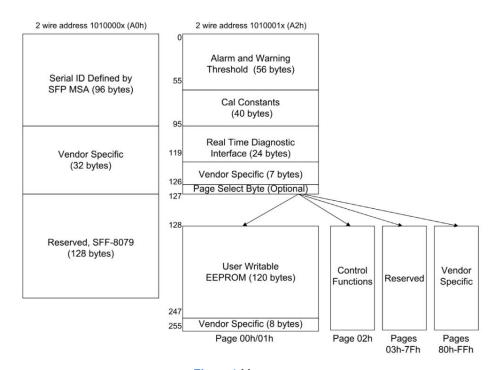


Figure4:Memory map

Memory map Table

A0h	Bytes	Name	Description			
		A	0h ID Fields			
0	1	Identifier	Type of transceiver			
1	1	Ext. Identifier	Extended identifier of type of transceiver			
2	1	Connector	Code for connector type			
3-10	8	Transceiver	Code for electronic or optical compatibility			
11	1	Encoding	Code for high speed serial encoding algorithm			
12	1	Signaling Rate, Nominal	Nominal signaling rate, units of 100 MBd.			
13	1	Rate Identifier	Type of rate select functionality			
14	1	Length (SMF,km) or Copper Cable	Link length supported for single-mode fiber, units of km, or copper			



Attenuation cable attenuation in dB at 12.9 GHz Length (SMF) or Copper Cable Attenuation cable attenuation in dB at 12.9 GHz Link length supported for single-mode fiber, units of 100 m, or copper cable attenuation in dB at 25.78 GHz Length (50 um, OM2) Link length supported for 50 um OM2 fiber, units of 10 m Length (62.5 um, OM1) Link length supported for 62.5 um OM1 fiber, units of 10 m Length (OM4 or copper cable) Length (OM3) or Cable length, additional Length (OM3) or Cable length, additional Length (OM3) or Cable length, additional Length vendor name SFP vendor name (ASCII) SFP vendor name (ASCII) Vendor OUI SFP vendor name (ASCII) Vendor PN Part number provided by SFP vendor (ASCII) Vendor rev Revision level for part number provided by vendor (ASCII) Laser wavelength (Passive/Active Cable Specification Compliance) Transceiver's Fibre Channel speed 2 Transceiver's Fibre Channel speed capabilities CC_BASE Check code for Base ID Fields (addresses 0 to 62) Link length supported for 50 um OM3 fiber, units of 10 m Alternatively, copper or direct attach cable multiplier and base value SFP vendor name (ASCII) Code for electronic or optical compatibility SFP vendor name (ASCII) SFP vendor IEEE company ID Vendor PN Part number provided by SFP vendor (ASCII) Easer wavelength (Passive/Active Cable Specification Compliance) CC_BASE Check code for Base ID Fields (addresses 0 to 62) CC_BASE Check code for Base ID Fields (addresses 0 to 62) Lindicates which optional transceiver signals are implemented Diagnaling Rate, min Lower signaling rate margin, units of % Easer wavelength (Passive/Active Cable Specification Compliance) Diagnostic Monitoring Type Indicates which optional enhanced features are implemented (if any) in the transceiver Indicates which optional enhanced features are implemented (if any) in the transceiver Indicates which revision of SFF-8472 the transceiver complies with.
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02-03 2 Temp Low Alarm MSB at low address
04-05 2 Temp High Warning MSB at low address
06-07 2 Temp Low Warning MSB at low address
08-09 2 Voltage High Alarm MSB at low address
10-11 2 Voltage Low Alarm MSB at low address
12-13 2 Voltage High Warning MSB at low address
14-15 2 Voltage Low Warning MSB at low address
14-152Voltage Low WarningMSB at low address16-172Bias High AlarmMSB at low address

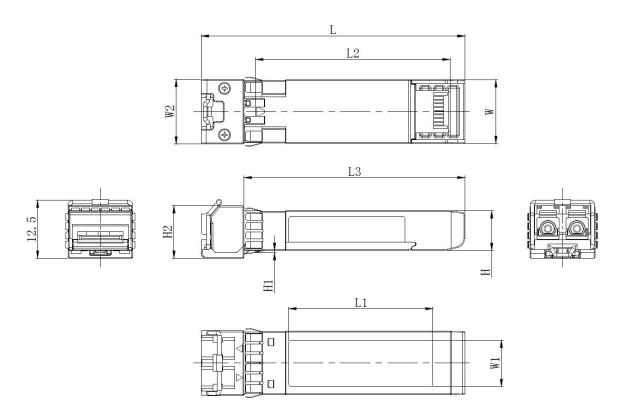


22-23 2 Bias Low Warning MSB at low address 24-25 2 TX Power High Alarm MSB at low address 26-27 2 TX Power Low Alarm MSB at low address 30-31 2 TX Power High Warning MSB at low address 30-31 2 TX Power High Warning MSB at low address 32-33 2 RX Power High Alarm MSB at low address 34-35 2 RX Power High Warning MSB at low address 36-37 2 RX Power High Warning MSB at low address 38-39 2 RX Power Low Alarm MSB at low address 38-39 2 RX Power Low Warning MSB at low address 38-39 2 RX Power Low Warning MSB at low address 40-41 2 Optional Laser Temp High Alarm MSB at low address 40-41 2 Optional Laser Temp Low Alarm MSB at low address 44-45 2 Optional Laser Temp Low Alarm MSB at low address 44-45 2 Optional Laser Temp Low Alarm MSB at low address 44-49 2 Optional Ecc Current High Alarm MSB at low address 48-49 2 Optional TEC Current Low Alarm MSB at low address 48-49 2 Optional TEC Current High Warning MSB at low address 48-50 2 Optional TEC Current High Warning MSB at low address 48-51 2 Optional TEC Current Low Alarm MSB at low address 48-52 3 2 Optional TEC Current Low Warning MSB at low address 48-53 2 Optional TEC Current Low Warning MSB at low address 48-54 5 2 Optional TEC Current High Warning MSB at low address 48-55 4 5 2 Optional TEC Current Low Warning MSB at low address 48-6-56 5 2 Optional TEC Current Low Warning MSB at low address 48-6-57 5 2 Optional TEC Current Low Warning MSB at low address 48-6-58 6 Ext Cal Constants or Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 49-94 3 Reserved 40-10 Diagnostics Diagnostic Fields (addresses 0 to 94) 40-10 Diagnostics Diagnostics Monitor Data (internally or externally calibrated) 40-10 Diagnostics Diagnostics Monitor Data (internally or externally calibrated) 40-10 Diagnostics Diagnostics Monitor Data (internally or externally calibrated) 40-10 Diagnostics Diagnostics Picture Pictur				
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30-31 2 TX Power Low Warning MSB at low address 32-33 2 RX Power High Alarm MSB at low address 34-35 2 RX Power High Alarm MSB at low address 36-37 2 RX Power High Warning MSB at low address 38-39 2 RX Power High Warning MSB at low address 38-39 2 RX Power Low Warning MSB at low address 40-41 2 Optional Laser Temp High Alarm MSB at low address 42-43 2 Optional Laser Temp High Warning MSB at low address 44-46 2 Optional Laser Temp Low Alarm MSB at low address 48-49 2 Optional Laser Temp Low Warning MSB at low address 48-49 2 Optional Laser Temp Low Warning MSB at low address 48-49 2 Optional EC Current High Alarm MSB at low address 48-55 2 Optional TEC Current Low Warning MSB at low address 59-51 2 Optional TEC Current Low Warning MSB at low address 59-52 3 Optional TEC Current Low Warning MSB at low address 59-53 2 Optional TEC Current Low Warning External Calibration constants for optional External Calibration if External Calibration bit, A0h, byte 92, bit 4 is 0 58-91 36 Ext Cal Constants or Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 59-94 3 Reserved 59-95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 59-105 10 Diagnostics Diagnostics Monitor Data (internally or externally calibrated) 59-106 10 Diagnostics Monitor Data for Optional Laser temperature and TEC current Optional Status and Control Bits 59-50 10 Diagnostics Marming Flag Status Bits 59-50 10 Diagnostics Diagnostic Alarm Flag Status Bits 59-50 10 Diagnostic Alarm Flag Status Bits 59-50 10 Diagnostic Price Product To Input equalization level control Control To Table Select Optional Page Select 59-50 10 Diagnostic Marming Flag Status Bits 59-50 10 Diagnostic Marming Flag Status Bits 59-50 10 Diagnostic Warning Flag Status Bits 59-50 10 Di	26-27	2	TX Power Low Alarm	MSB at low address
32-33 2 RX Power High Alarm MSB at low address 34-35 2 RX Power Low Alarm MSB at low address 36-37 2 RX Power Low Alarm MSB at low address 38-39 2 RX Power High Warning MSB at low address 40-41 2 Optional Laser Temp High Alarm MSB at low address 42-43 2 Optional Laser Temp High Alarm MSB at low address 44-45 2 Optional Laser Temp High Warning MSB at low address 46-47 2 Optional Laser Temp High Warning MSB at low address 46-47 2 Optional TEC Current High Alarm MSB at low address 46-49 2 Optional TEC Current High Alarm MSB at low address 46-40 2 Optional TEC Current High Warning MSB at low address 46-41 2 Optional TEC Current High Warning MSB at low address 46-45 2 Optional TEC Current High Warning MSB at low address 46-46 2 Optional TEC Current High Warning MSB at low address 46-47 3 Optional TEC Current High Warning MSB at low address 46-48 2 Optional TEC Current High Warning MSB at low address 46-49 36 Ext Cal Constants or Additional Enhanced Features Diagnostic calibration constants for optional External Calibration if External Calibration bit, A0h, byte 92, bit 4 is 1 46-49 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 492-94 3 Reserved 40 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 40 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 40 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 40 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 41 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 41 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 41 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 42 Diagnostics Monitor Data (internally or externally calibrated) 43 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 44 Optional Pages Diagnostic Monitor Data (internally or externally calibrated) 45 Diagnostic Monitor Data (internally or externally ca	28-29	2	TX Power High Warning	MSB at low address
34-35 2 RX Power Low Alarm MSB at low address 36-37 2 RX Power Low Warning MSB at low address 38-39 2 RX Power Low Warning MSB at low address 40-41 2 Optional Laser Temp High Alarm MSB at low address 42-43 2 Optional Laser Temp Low Alarm MSB at low address 44-45 2 Optional Laser Temp Low Alarm MSB at low address 48-47 2 Optional TEC Current High Warning MSB at low address 48-49 2 Optional TEC Current High Alarm MSB at low address 50-51 2 Optional TEC Current High Alarm MSB at low address 52-53 2 Optional TEC Current High Warning MSB at low address 52-53 2 Optional TEC Current High Warning MSB at low address 52-53 2 Optional TEC Current High Warning MSB at low address 52-53 2 Optional TEC Current High Warning MSB at low address 52-53 2 Optional TEC Current Low Warning MSB at low address 52-54 2 Optional TEC Current High Warning MSB at low address 52-55 2 Optional TEC Current High Warning MSB at low address 52-56 10 Optional TEC Current High Warning MSB at low address 52-57 2 Optional TEC Current High Warning MSB at low address 52-58 2 Optional TEC Current Low Warning MSB at low address 52-59 3 Reserved 55-50 2 Optional TEC Current Low Warning MSB at low address 56-691 36 Ext Cal Constants or Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 1 56-91 External Calibration bit, A0h, byte 92, bit 4 is 1 56-91 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 57 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 58-10 Diagnostics Monitor Data (internally or externally calibrated) 59 Diagnostic Monitor Data (internally or externally calibrated) 50-10 Diagnostics Monitor Data (internally or externally calibrated) 50-10 Diagnostic Monitor Data (internally or externally calibrated) 50-10 Diagnostics Monitor Data (inte	30-31	2	TX Power Low Warning	MSB at low address
38-37 2 RX Power High Warning MSB at low address 38-39 2 RX Power Low Warning MSB at low address 40-41 2 Optional Laser Temp High Alarm MSB at low address 42-43 2 Optional Laser Temp High Alarm MSB at low address 44-45 2 Optional Laser Temp High Warning MSB at low address 46-47 2 Optional Laser Temp High Warning MSB at low address 48-49 2 Optional Laser Temp Low Warning MSB at low address 50-51 2 Optional TEC Current High Alarm MSB at low address 50-52 3 2 Optional TEC Current High Warning MSB at low address 54-55 2 Optional TEC Current High Warning MSB at low address 56-91 36 Ext cal Constants or Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostics Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Triput EQ control Tx Input Eq control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 117 1 Table Select Optional Page Select 127 1 Table Select Optional Page Select 128-247 120 User EEPROM User without addresses 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 128-129 2 Reserved Reserved for future receiver controls	32-33	2	RX Power High Alarm	MSB at low address
38-39 2 RX Power Low Warning MSB at low address	34-35	2	RX Power Low Alarm	MSB at low address
40-41 2 Optional Laser Temp High Alarm 42-43 2 Optional Laser Temp Low Alarm 44-45 2 Optional Laser Temp High Warning 46-47 2 Optional Laser Temp High Warning 46-47 2 Optional TEC Current High Alarm MSB at low address 46-49 2 Optional TEC Current High Alarm MSB at low address 50-51 2 Optional TEC Current High Warning 50-51 2 Optional TEC Current High Warning 52-53 2 Optional TEC Current Low Alarm MSB at low address 52-53 2 Optional TEC Current Low Warning 56-91 36 Ext Cal Constants or Additional Enhanced Features Ext Cal Constants or Additional Enhanced Features MSB at low address Diagnostic calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select 128-247 120 User EEPROM User writable non-volatile memory Vendor specific control addresses A2h Page 00-01h User exception controls	36-37	2	RX Power High Warning	MSB at low address
42-43 2 Optional Laser Temp Low Alarm 44-45 2 Optional Laser Temp High Warning 46-47 2 Optional Laser Temp Low Warning 48-49 2 Optional TEC Current High Alarm 50-51 2 Optional TEC Current High Alarm 50-51 2 Optional TEC Current High Warning 52-53 2 Optional TEC Current Low Alarm 52-55 2 Optional TEC Current Low Warning 54-55 2 Optional TEC Current Low Warning 55-51 36 Ext Cal Constants or Additional 56-91 36 Ext Cal Constants or Additional 56-91 Additional Enhanced Features 57-50 1 External Calibration bit, A0h, byte 92, bit 4 is 1 58-50 2 C_DMI Check code for Base Diagnostic Fields (addressed to 94) 59-94 3 Reserved 59-95 1 CC_DMI Check code for Base Diagnostic Fields (addressed to 94) 59-10 Diagnostics 50-50 Diagnostic Monitor Data (internally or externally calibrated) 50-610 10 Diagnostics 50-610 Diagnostic Monitor Data (internally or externally calibrated) 51-610 Diagnostics 51-610 Diagnostic Monitor Data for Optional Laser temperature and TEC current 51-610 Diagnostic Monitor Data (internally or externally calibrated) 5	38-39	2	RX Power Low Warning	MSB at low address
44-45 2 Optional Laser Temp High Warning 46-47 2 Optional Laser Temp Low Warning 48-49 2 Optional TEC Current High Alarm 50-51 2 Optional TEC Current Low Alarm 50-51 2 Optional TEC Current Low Alarm 52-53 2 Optional TEC Current Low Warning 54-55 2 Optional TEC Current Low Warning 56-91 36 Ext Cal Constants or Additional Enhanced Features 56-91 36 Ext Cal Constants or Additional Enhanced Features 56-91 37 External Calibration constants for optional External Calibration if External Calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 115 1 Rx Out Emphasis control Rx Out Emphasis Control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	40-41	2	Optional Laser Temp High Alarm	MSB at low address
46-47 2 Optional Laser Temp Low Warning 48-49 2 Optional TEC Current High Alarm 50-51 2 Optional TEC Current Low Alarm 50-51 2 Optional TEC Current Low Alarm 52-53 2 Optional TEC Current High Warning 54-55 2 Optional TEC Current Low Warning 55-51 2 Optional TEC Current Low Warning 55-52 3 Optional TEC Current Low Warning 56-91 36 Ext Cal Constants or Additional Enhanced Features 56-91 36 Ext Cal Constants or Additional Enhanced Features 57-59 1 CC_DMI 58-10 1 Diagnostics 58-10 2 Optional Diagnostics 58-10 2 Optional Diagnostics 59-10 2 Optional Diagnostics 59-11 2 Optional Diagnostics 59-12 3 Reserved 59-13 CC_DMI 59-14 3 Reserved 59-15 10 Diagnostics 59-16 10 Diagnostics 59-16 10 Diagnostics 59-17 CC_DMI 59-18 10 Diagnostics 59-19 10 Diagnostics 59-10 10 10 10 10 10 10 10 10 10 10 10 10 1	42-43	2	Optional Laser Temp Low Alarm	MSB at low address
48-49 2 Optional TEC Current High Alarm 50-51 2 Optional TEC Current Low Alarm 50-51 2 Optional TEC Current Low Alarm 52-53 2 Optional TEC Current High Warning 54-55 2 Optional TEC Current Low Warning 56-91 36 Ext Cal Constants or Additional Enhanced Features Diagnostic calibration constants for optional External Calibration if External Calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 115 1 RX Out Emphasis control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 01-11 128-129 2 Reserved Reserved for Future receiver controls	44-45	2	Optional Laser Temp High Warning	MSB at low address
So-51 2	46-47	2	Optional Laser Temp Low Warning	MSB at low address
S2-53 2	48-49	2	Optional TEC Current High Alarm	MSB at low address
54-55 2 Optional TEC Current Low Warning Basel Iow address Diagnostic calibration constants for optional External Calibration if External Calibration if External Calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 115 1 Rx Out Emphasis control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	50-51	2	Optional TEC Current Low Alarm	MSB at low address
Diagnostic calibration constants for optional External Calibration if External Calibration if External Calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 115 1 Control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	52-53	2	Optional TEC Current High Warning	MSB at low address
Ext Cal Constants or Additional Enhanced Features External Calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 116-117 1 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory Vendor specific control addresses A2h Page 02h Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	54-55	2	Optional TEC Current Low Warning	MSB at low address
Enhanced Features Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0 92-94 3 Reserved 95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control Rx Out Emphasis control Rx Output emphasis level control 116-117 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h User writable non-volatile memory Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) Reserved for future receiver controls				Diagnostic calibration constants for optional External Calibration if
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95 1 CC_DMI Check code for Base Diagnostic Fields (addresses 0 to 94) 96-105 10 Diagnostics Diagnostic Monitor Data (internally or externally calibrated) 106-109 4 Optional Diagnostics Monitor Data for Optional Laser temperature and TEC current 110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 115 1 Rx Out Emphasis control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls				External Calibration bit, A0h, byte 92, bit 4 is 0
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110 1 Status/Control Optional Status and Control Bits 111 1 Reserved Reserved (was assigned to SFF-8079) 112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 115 1 Rx Out Emphasis control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	96-105	10	Diagnostics	Diagnostic Monitor Data (internally or externally calibrated)
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112-113 2 Alarm Flags Diagnostic Alarm Flag Status Bits 114 1 Tx Input EQ control Tx Input equalization level control 115 1 Rx Out Emphasis control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	110	1	Status/Control	Optional Status and Control Bits
114 1 Tx Input EQ control Tx Input equalization level control 115 1 Rx Out Emphasis control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	111	1	Reserved	Reserved (was assigned to SFF-8079)
115 1 Rx Out Emphasis control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	112-113	2	Alarm Flags	Diagnostic Alarm Flag Status Bits
115 1 control Rx Output emphasis level control 116-117 2 Warning Flags Diagnostic Warning Flag Status Bits 118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	114	1	Tx Input EQ control	Tx Input equalization level control
118-119 2 Ext Status/Control Extended module control and status bytes 120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	115	1	·	Rx Output emphasis level control
120-126 7 Vendor Specific Vendor specific memory addresses 127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	116-117	2	Warning Flags	Diagnostic Warning Flag Status Bits
127 1 Table Select Optional Page Select A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	118-119	2	Ext Status/Control	Extended module control and status bytes
A2h Page 00-01h 128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	120-126	7	Vendor Specific	Vendor specific memory addresses
128-247 120 User EEPROM User writable non-volatile memory 248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	127	1	Table Select	Optional Page Select
248-255 8 Vendor Control Vendor specific control addresses A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls			A2h	n Page 00-01h
A2h Page 02h 128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	128-247	120	User EEPROM	User writable non-volatile memory
128-129 2 Reserved Reserved for SFF-8690 (Tunable Transmitter) 130 1 Reserved Reserved for future receiver controls	248-255	8	Vendor Control	Vendor specific control addresses
130 1 Reserved Reserved for future receiver controls			A	2h Page 02h
	128-129	2	Reserved	Reserved for SFF-8690 (Tunable Transmitter)
131 1 Rx Decision RDT value setting	130	1	Reserved	Reserved for future receiver controls
	131	1	Rx Decision	RDT value setting



		Threshold	
132-172	41	Reserved	Reserved for SFF-8690
173-255	83	Reserved	Reserved

Mechanical Dimension



Unit: mm

	L	L1	L2	L3	W	W1	W2	Н	H1	Н2
MAX	56. 9	31. 2	41. 95	47.7	13.8	10. 2	14.0	8.6	0.6	11. 5
Typical	56. 7	31. 0	41.80	47. 5	13.7	10.0	-	8. 5	0.5	11. 3
MIN	56. 5	30.8	41. 65	47. 3	13. 5	9.8	-	8.4	0.4	11. 1



Test Center

1. Performance Testing

Every fiber optic transceiver is thoroughly tested by the LSOLINK Assurance Program, which is equipped with the world's most advanced analytical equipment to ensure that our transceivers meet the industry's international public protocol standards while still functioning flawlessly in your facility.



Optical Spectrum Inspection

Using the industry's leading optical spectrum analyser to check in real time that the parameters of the optical transceiver's laser comply with industry standards.

- Peak: Peak wavelength and peak level
- > 2nd Peak: Side-mode wavelength and level
- > Mean WI: Center wavelength
- Total Power: Total power of spectrum
- SMSR: Side-Mode Suppression Ratio



Optical Signal Quality Inspection

Using highly efficient sampling oscilloscopes and BERT testers, equipped with an automated test platform to accurately test the signal quality of the transceiver, test records are kept for up to 5 years to ensure the traceability of each transceiver.

- Eye Mask Margin(NRZ)
- > TDECQ(PAM4):transmitter dispersion eye closure
- > OMA: Optical modulation amplitude
- **BER:** Bit error rate
- ER: Extinction Ratio



Flow Pressure Test

Using multi-protocol network traffic analyser with various brands of switches to test the transceiver's ability to transmit at full speed.

- **Bandwidth:** Actual transceiver bandwidth on the port
- Packet Loss
- ➤ Packet Errors:CRC Errors/PCS Errors/Symbol Errors
- LinkDown Counts
- > latency

Aboveis part of our test bed network equipment. For more information, Please click <u>download</u> for optical transceiver performance test report.



2. Quality Control

We adopt advanced quality management solutions. Each transceiver is self-inspected, including:20x microscope inspection, 200x microscope inspection, and QC process inspection.



visual inspection



Microscopic inspection: 20X



Microscopic inspection: 200X



Reliability Verification



Optical endface inspection

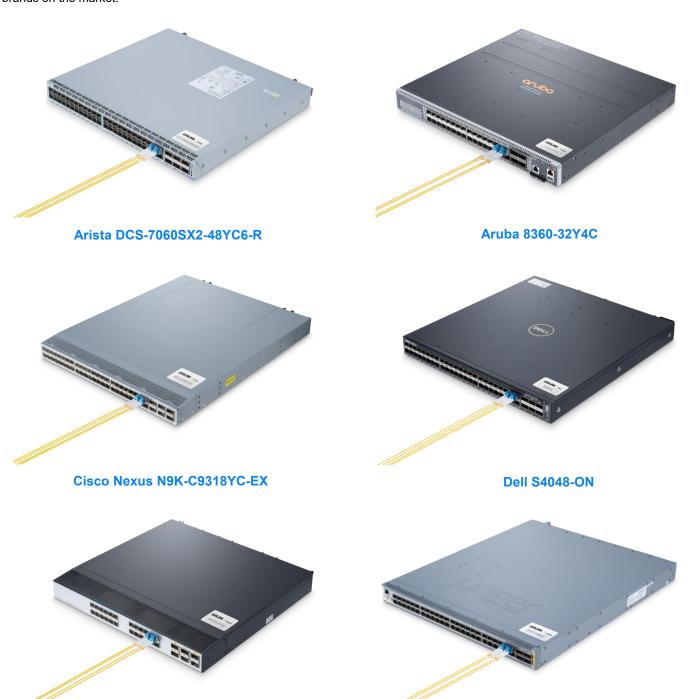


OQC Inspection



3. Compatibility Testing

Each optical transceiver is tested in LSOLINK's library of compatibility test equipment to ensure perfect compatibility with multiple brands on the market.



Aboveis part of our test bed network equipment. For more information, Please click <u>download</u> to get the compatibility test report of each brand of optical transceiver.

Juniper QFX5110-48S-4C

Huawei S6720-30L-HI-24S



Order Information

Part Number	Description
10G-SFP-T-30	10GBASE-T SFP+Cooper RJ45 30m Transceiver Module
10G-SFP-T-80	10GBASE-T SFP+Cooper RJ45 80m Transceiver Module
10G-SFP-SR	10GBASE-SR SFP+850nm 300m DOM LC MMF Transceiver Module
10G-SFP-IR	10GBASE-IR SFP+ 1310nm 2km DOM LC SMF Transceiver Module
10G-SFP-LR	10GBASE-LR SFP+1310nm 10km DOM LC SMF Transceiver Module
10G-SFP-ER	10GBASE-ER SFP+1550nm 40km DOM LC SMF Transceiver Module
10G-SFP-ZR	10GBASE-ZR SFP+1550nm 80km DOM LC SMF Transceiver Module
10G-SFP-SR-I	10GBASE-SR SFP+ 850nm 300m DOM LC MMF Industrial-Temp Transceiver Module
10G-SFP-LR-I	10GBASE-LR SFP+ 1310nm 10km DOM LC SMF Industrial-Temp Transceiver Module
10G-SFP-ER-I	10GBASE-ER SFP+ 1550nm 40km DOM LC SMF Industrial-Temp Transceiver Module



Further Information

Lighting the Path to Global Links

- Web | www.lsolink.com
- ☑ Email | For Sales@lsolink.com

Disclaimer

- We are committed to continuous product improvement and feature upgrades, and the contents cont ained in this manual are subject to change without notice.
- 2. Nothing herein should be construed as constituting an additional warranty.
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