MHSDC-8-8-X Fibre Channel --- +5V
Media Interface Adapter ---- 2.125GBaud

ORDERING INFORMATION

MHSDC - 8 - 8 - X

WAVELENGTH
1 - 850 nm (multimode)
2 - 1300 nm (single mode) - 10 Km

PROTOCOL
8 - Fibre Channel, 2.125 GBaud
6 - Fibre Channel, 1.0625 GBaud

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Features

- 2.125Gbps Fibre Channel Performance
- LC Duplex Optical Interface
- HSSDC Electrical Interface
- 75Ω AC coupled PECL level Input / Output
- Single +5V Power Supply
- Class 1 Laser Safety Compliance
- UL 1950 Approved

PRODUCT OVERVIEW

The MHSDC-8-8-X Extender module is a high performance integrated duplex data link for bi-directional communication over single mode or multimode optical fiber in Fibre Channel and other applications.The MHSDC-8 MIAS are provided with the LC receptacle that is compatible with the industry standard LC connector. The MHSDC-8 Fiber Optic Extender is specifically designed to connect to electrical high speed data communications links that require extended distance performance. The previous limit of 25m in copper connections can be easily be extended to 300m with multimode optical fiber and over 10km with single mode optical fiber. The typical link length is in excess of 20km.

SHORT WAVELENGTH LASER

The use of short wavelength lasers and high volume production processes has resulted in a low cost, high performance product which communicates reliably at distances of 500 m over multimode optical fiber with data transfer rates of 2.125 GBaud. The MHSDC-8-8-1 permits replacement of copper cable to provide a solution for systems requiring increased media interconnect distance or secure transmission lines.

LONG WAVELENGTH LASER

The MHSDC-8-8-2 is provided with single mode optics. The 1300nm laser provides highly reliable single mode communication which meets or exceeds the Fibre Channel requirements.

MODULE SPECIFICATIONS - ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTES
Storage Temperature	Tstg	-40	85	°C	
Supply Voltage	Vcc		6.25	V	Vcc - ground
Data AC Voltage	Tx+, Tx-		2.6	Vpp	Differential
Data DC Voltage	Tx+, Tx-	-10	10	Vpk	V (Tx+ or Tx-) - ground

MODULE SPECIFICATION - RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Ambient Operating Temperature	Ta	0		70	°C	
Supply Voltage	Vcc	4.5	5.00	5.5	VDC	
Baud Rate	BRate		2.125		GBaud	±100ppm

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PERFORMANCE SPECIFICATIONS - ELECTRICAL **Ta = 25° C, Vcc = 5.0 V**

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Bit Error Rate	BER			1E-12		Errors/Bit
Supply Current	Icc		165	180	mA	Ta = 25°C, Vcc = 5.0 V
	Icc			200	mA	0° C <Ta< 70°C, 4.5 V< Vcc <5.5 V
In Rush Current				4	A	50 microsecond duration - maximum
TRANSMITTER						
PECL Input (Differential)		350	720	1600	mVpp	AC coupled inputs
Input Impedance (Differential)	Zin	135	150	165	ohms	Rin > 100 kohms @ DC
ODIS Input Voltage - High	ViH	2		Vcc	V	
ODIS Input Voltage - Low	ViL	0		0.8	V	
RECEIVER						
PECL Output (Differential)		400	750	930	mVpp	AC coupled outputs
Output Impedance (Differential)	Zout	135	150	165	ohms	
FAULT- Output Voltage - High	VoH	2.4	3.0	Vcc	V	Io = 400µA
FAULT- Output Voltage - Low	VoL	0	0.25	0.5	V	Io = 4.0mA
Total Jitter[2]	TJ			85	ps	

PERFORMANCE SPECIFICATIONS - OPTICAL 850 nm Laser Multimode **Ta = 25° C, Vcc = 5.0 V**

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
FIBER LENGTH						
50 mm Core Diameter MMF		300	500		m	BER < 1.0E-12 @ 2.125GBaud
62.5 mm Core Diameter MMF		200[1]	300		m	BER < 1.0E-12 @ 2.125GBaud
TRANSMITTER						
Optical Transmit Power	Popt	-10		-4	dBm	average @ 850 nm
Optical Center	λ	830	850	860	nm	
Spectral Width	Δλ			0.85	nm	RMS
Extinction Ratio	ER	6			dB	P1/P0
Optical Modulation Amplitude	OMA	200			µW	pk-pk
Relative Intensity Noise	RIN			-117	dB/Hz	
Total Jitter[2]	TJ			105	ps	
Output Rise, Fall Time	t_R, t_F			160	ps	20% - 80%
RECEIVER						
Optical Input	λ	770		860	nm	
Optical Input Power	Pr	-17		0	dBm	BER < 1.0E-12 See Note
Optical Modulation Amplitude	OMA	50			µW	pk-pk
Optical Return Loss	ORL	12	30		dB	
Link Fault - Asserted	Pa			-17	dBm	measured on transition - high to low
Link Fault - Deasserted	Pd	-29			dBm	measured on transition - low to high
Link Fault - Hysteresis	Pa - Pd		1.5	5.0	dB	

Note[1] - This is the link length for at least 95% of the installed fiber base.
Note[2] - Measured with 2^7 -1 pseudorandom bit sequence.

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MHSDC-8-6-2 PERFORMANCE SPECIFICATIONS - OPTICAL 1300 nm Laser Single Mode **Ta = 25° C, Vcc = 5.0 V**

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
FIBER LENGTH						
9.0 µm Core Diameter SMF		10	20		km	BER < 1.0E-12 @ 2.125 GBaud
TRANSMITTER						
Optical Center		1285	1310	1355	nm	
RMS Spectral Width				3	nm	RMS
Optical Transmit Power	Popt	-12		-3	dBm	Average @ 1310nm
Optical Modulation Amplitude	OMA	150			µW	pk-pk
RECEIVER						
Optical Input Power	Pr	-20		-3	dBm	Average power for BER < 1.0E-12
Optical Modulation Amplitude	OMA	15			µW	pk-pk

ELECTRICAL INTERFACE - PIN DESCRIPTIONS

PIN 1	TX+	Non-inverted data into the MIA transmit input. The electrical signal should be PECL swing. The module is internally AC coupled and terminated to a 75 ohm resistor.
PIN 2	GND	This is the circuit ground connection for the module and is not connected to the chassis ground via the MHSDC-8 case.
PIN 3	TX-	Inverted data into the MIA transmit input. The electrical signal should be PECL swing. The module is internally AC coupled and terminated to a 75 ohm resistor.
PIN 4	FAULT-	Receiver Signal Detect TTL level output. Active high on this line indicates a received optical signal.
PIN 5	ODIS	Active high optical output disable signal. This signal is driven by the host. While asserted, the MIA module disables all laser light output. This pin is internally pulled up to Vcc through 10 Kohm resistor for short wavelength and a 5.1Kohm resistor for long wavelength. ODIS must be pulled low or connected to circuit ground by the host to enable the MIA output.
PIN 6	RX-	Inverted AC coupled output data from the MIA. The electrical signal is PECL levels.
PIN 7	Vcc	Regulated +5V power supply provided by the host. The host will fuse this power output.
PIN 8	RX+	Non-Inverted AC coupled output data from the MIA. The electrical signal is PECL levels.
	SHIELD	Metalized plastic housing at chassis ground potential

INTERFACE TIMING VALUES

Description	Symbol	Min	Typ	Max	Units
Minimum ODIS assertion time to clear a module fault condition	Tpw_fault_reset	100			nsec
Delay from laser over power fault detect to FAULT- assertion	Tpd_modfault_on			1	msec
Laser on time from deassertion of ODIS	Tpd_ON			2	msec
Laser off time from assertion of ODIS	Tpd_OFF			2	msec
Delay from deassertion of Loss of Light condition to deassertion of FAULT-	Tpd_LOL_OFF			2	msec
Delay from assertion of Loss of Light condition to assertion of FAULT-	Tpd_LOL_ON			2	msec
Delay from assertion of ODIS to clear FAULT-	Tpd-FAULT-_reset			1	µsec

TYPICAL INTERFACE OPERATION FOR MODULE FAULT CONDITION

Figure 2: Illustrates typical interface operation for the event of a module fault condition.

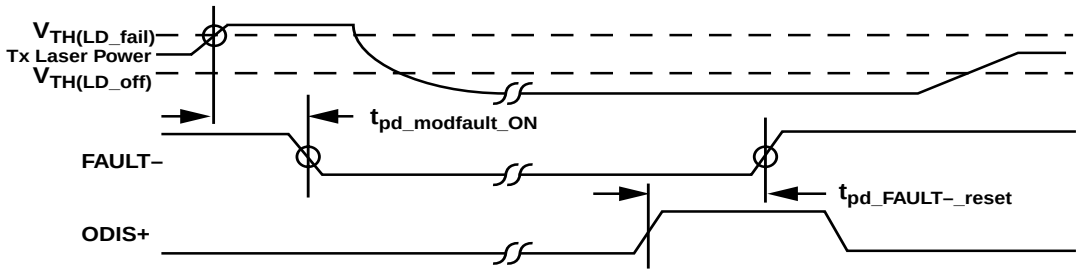


Figure 2: Module Fault Interface Example

TYPICAL INTERFACE OPERATION FOR LINK FAULT CONDITION

Figure 3: Illustrates interface operation for a typical link fault condition

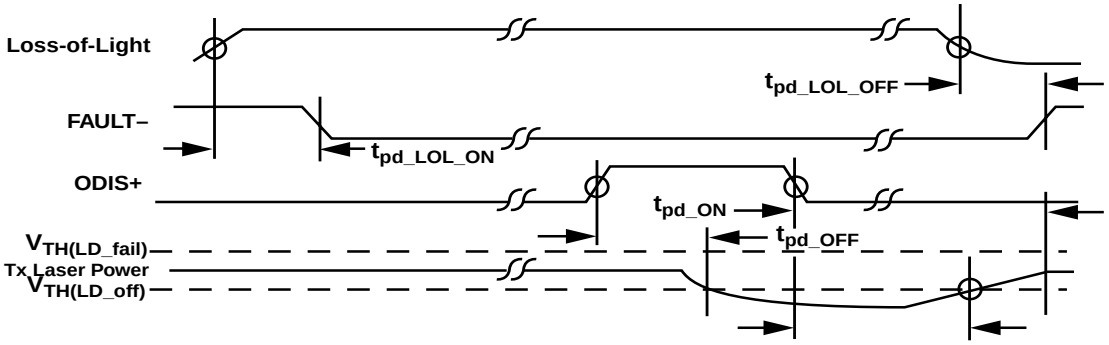


Figure 3: Typical Interface Operation for Link FAULT– Event

TYPICAL INTERFACE OPERATION - COMBINED MODULE AND LINK FAULT

Figure 4: Illustrates the operational scenario for the event of a combined module and link fault

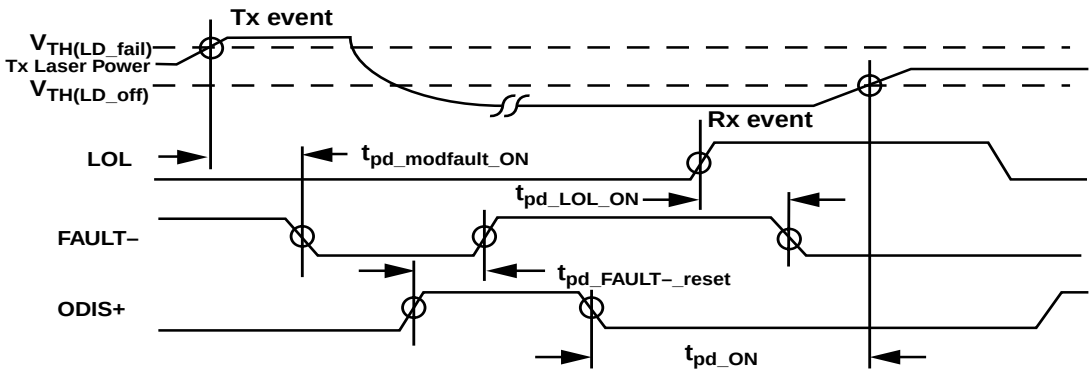
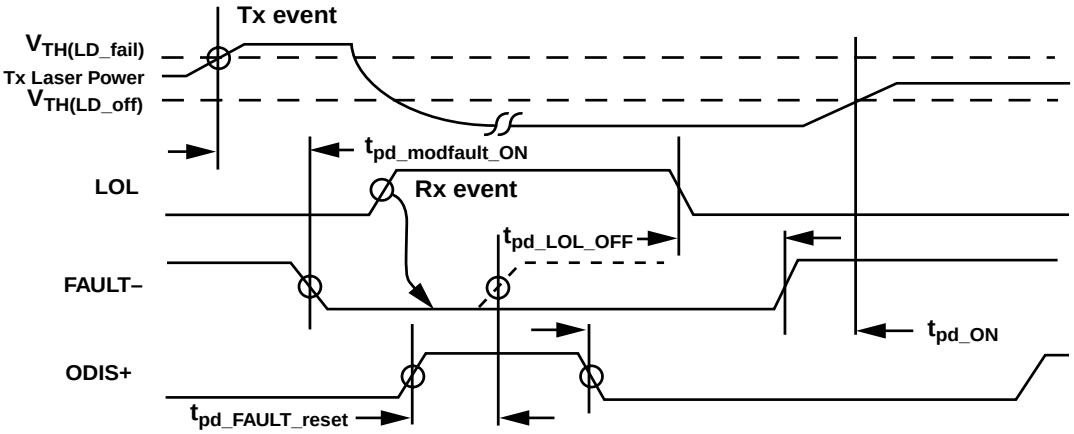


Figure 4: Typical operation – Combined module and link fault event

TYPICAL INTERFACE OPERATION FOR MODULE FAULT CONDITION



note: the assertion of ODIS clears only the module fault condition. FAULT - will remain asserted until the LOL condition is cleared

Figure 5: Typical operation - Pre-existing module fault followed by link fault (LOL) condition

TYPICAL INTERFACE OPERATION – POWER ON EVENT

Figure 5 Illustrates typical interface operation during power on and hot plugging events

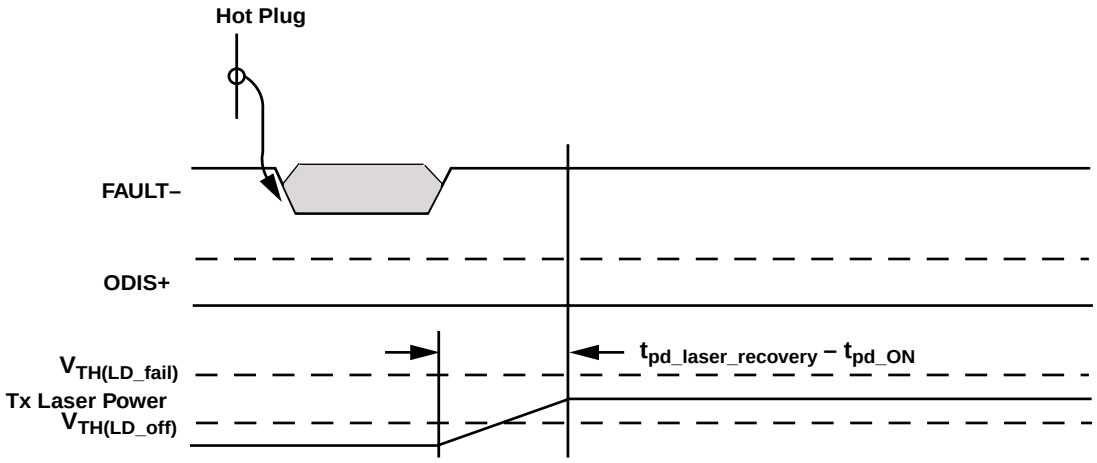


Figure 6: Power on and Hot Plug Operation

TERMINATION CIRCUITS

Input to the transmitter section of the MHSDC-8-6-X is AC coupled with an internal termination of 75 ohms to ground (See TRANSMIT Termination). Any variation in the impedance of the module can be attributed to parasitic contributions of the module pins or interface connector. The input requires a transmitter signal with at least a 0.4 V peak-to-peak signal swing. Output from the receiver section of the module is also AC coupled and is expected to drive into a 75 ohm load (See RECEIVE Termination).

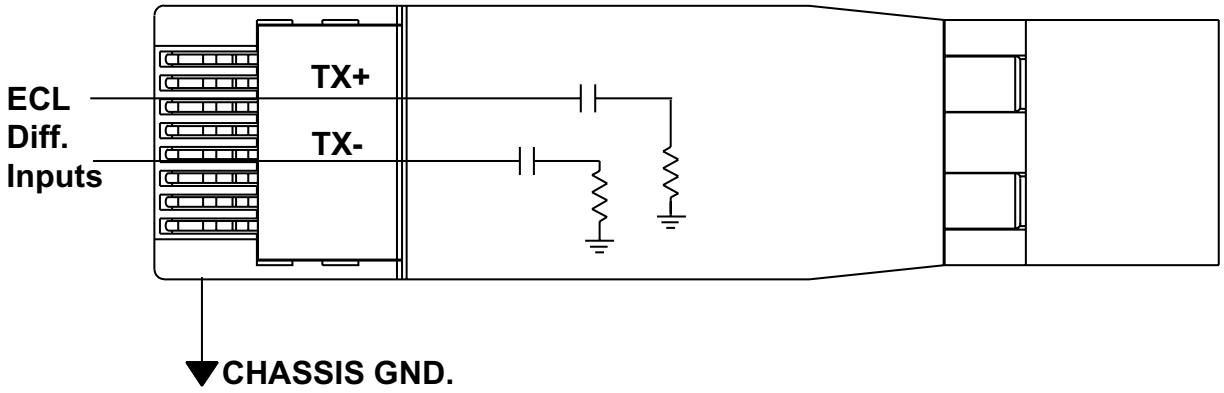


Figure 1 : TRANSMIT Termination

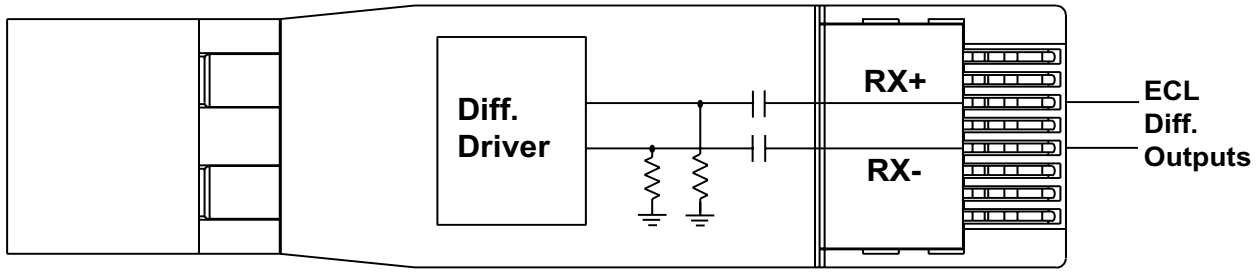


Figure 2: RECEIVE Termination

A suggested termination for the FAULT- pin is shown in Figure 3. Zero on this pin (Active Low) indicates the absence of the optical input signal or a laser fault. The host shall provide a pull-up resistor to Vcc of 4.7 to 10 K ohms.

POWER COUPLING

A suggested circuit for external power supply filtering is given in Figure 4. Bypass capacitors should be placed as close to the HSSDC connector as possible. The host shall provide a fused power link to the MIA. The fuse shall be capable of handling a 4 amp inrush current for 50 microseconds.

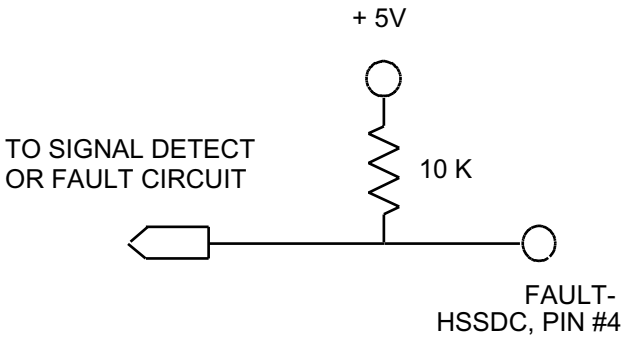


Figure 3. Host Card "FAULT-" Termination

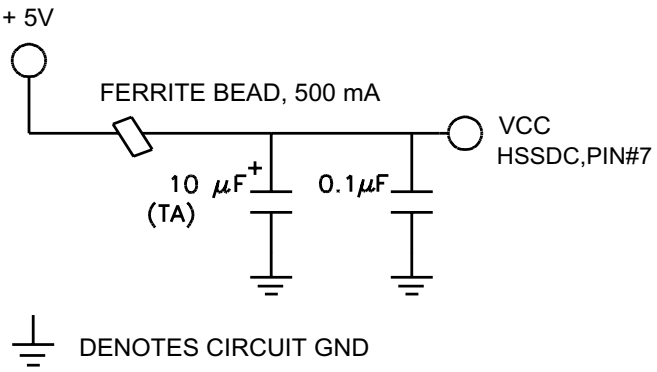
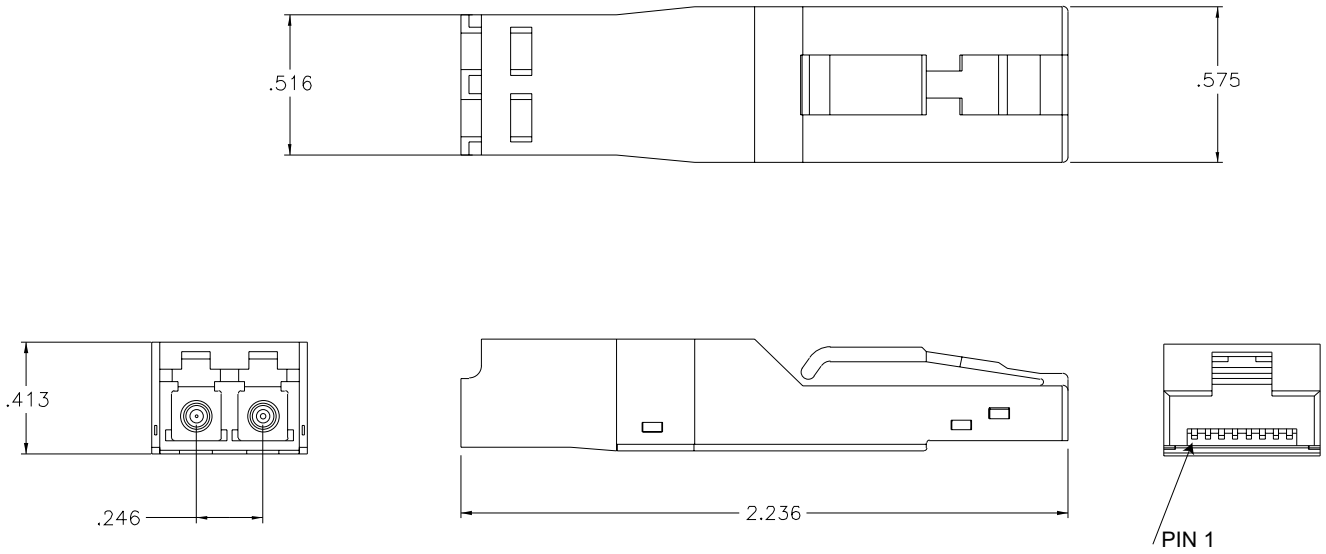


Figure 4. Suggested Power Coupling

PHYSICAL DESCRIPTION

The MHSDC-8-6-X features a compact design with a standard LC duplex connector for fiber optic connections. The HSSDC connector provides the electrical connection for all operation.



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REGULATORY COMPLIANCE

The Stratos Lightwave MHSDC-8 module offers a metalized case and ground clip which is connected to chassis ground when installed on the host device.

The following advisory is required by FCC regulation:

Tested to comply with FCC standards FOR HOME OR OFFICE USE

Important Information to the user:

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

— Reorient or relocate the receiving antenna.

— Increase the separation between the equipment and the receiver.

— Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

— Consult the dealer or an experienced radio/TV technician for help.

By law, changes or modifications not expressly approved by Stratos Lightwave could void the user's authority to operate the MHSDC-8-6-X Fibre Channel Media Interface Adapter.

LASER SAFETY REGULATORY COMPLIANCE

This optoelectronic transceiver module is a Class 1 Laser product complying with FDA Radiation Performance Standards, 21 CFR, Chapter 1, Subchapter J. This component is also Class 1 Laser compliant according to International Standard IEC825-1.

Operating this module outside of specifications or altering the module from the manufacturer's original design may result in hazardous radiation exposure and may be considered new manufacturing of a laser product by government regulations. Persons performing such an act are required by law to re-certify and re-identify this product.

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