4x / 2x / 1x Fiber Channel Applications,
850nm Micro Module
4.25 / 2.125 / 1.0625 GBaud

Key Features & Benefits

- 4.25 GBaud Fiber Channel Compliant
- 2.125 GBaud Fiber Channel Compliant
- 1.0625 GBaud Fiber Channel Compliant
- 100Ω differential DC coupled inputs/outputs
- Industry Standard LC Connector Interface
- Metal housing
- Single +3.3V Power Supply
- RoHS Compliant

Product Overview

The **Emerson Network Power Connectivity Solutions** RJS-ST31 transceiver module is a high performance integrated full duplex data link for bi-directional communication over multimode optical fiber. It has been designed for use in space constrained applications, and offers the mandatory FC compliance commonly provided by SFF and SFP transceivers. This optoelectronic transceiver module is a Class 1 Laser product compliant with FDA Radiation Performance Standards, 21 CFR Subchapter J. This component is also Class 1 Laser compliant according to International Safety Standard IEC-825-1/EN 60825.

Ordering Information

RJ	S	-	ST3	1

Communications Protocol
S=4XFC / 2XFC / 1XFC
4.25 / 2.125 / 1.0625 GBaud

Wavelength
1=850nm
(multimode)

Short Wavelength Optics

The use of short wavelength VCSELs (Vertical Cavity Surface Emitting Lasers) supports high performance data links. The transmitter input is driven with LVPECL logic levels, and its output can be shut down through the use of the Transmit Disable (TX_DIS) input. The optical receiver consists of a PIN and preamplifier assembly and CMOS limiting post-amplifier. Outputs from the receiver are CML logic level differential data, and an LVTTL signal detect output. The RX data outputs are squelched (JAM) when Signal Detect is inactive.

Absolute Maximum Ratings

Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided each limiting parameter is in isolation and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time.

Parameter	Symbol	MIN	Typical	MAX	Unit
Storage Temperature	T_{STG}	-40		+85	°C
Supply Voltage	$V_{CC}T$, $V_{CC}R$			+4.5	VDC
Data AC Voltage (Differential)	TX+, TX-			2.2	Vpp
Data DC Voltage	TX+, TX-	-0.5		V_{CC}	Vpk

Recommended Operating Conditions

Parameter	Symbol	MIN	Typical	MAX	Unit
Operating Case Temperature	Tc	0		+70	°C
Supply Voltage	$V_{DD}T$, $V_{DD}R$	+3.135	+3.3	+3.465	VDC
Baud Rate	BRate	1.0625		4.25	GBaud

Module Specifications – Electrical: 0°C<Tc<+70°C, +3.135<Vcc<+3.465V

Parameter	Sym	MIN	Typ	MAX	Unit	Notes
Supply Current			125	195	mA	0°C<Tc<+70°C, +3.135<Vcc<+3.465V
Transmitter						
Input Swing (Differential)	Vin	500		2200	mVpp	
Input Impedance (Differential)	Rin		100		Ω	Internally terminated
TX_DISABLE Input Voltage – High	ViH	2		3.465	V	
TX_DISABLE Input Voltage – Low	ViL	0		0.8	V	
Receiver						
Output Swing (Differential)		300		1200	mVpp	
Output Impedance (Differential)	Rout		100		Ω	
Single Detect Output Voltage – High	VroH	Vcc-0.5		Vcc+0.3	V	Io = 400μA; Host Vcc
Single Detect Output Voltage – Low	VroL	0		0.8	V	Io = -4.0mA

Module Specifications – Optical: 0°C<Tc<+70°C, +3.135<Vcc<+3.465V

Parameter	Sym	MIN	Typ	MAX	Unit	Notes
Transmission Distance						
50μm Core Diameter MMF		150	250		M	BER<1.0E-12 @ 4.25 GBaud
		300	500			BER<1.0E-12 @ 2.125 GBaud
		550	1000			BER<1.0E-12 @ 1.25/1.0625 GBaud
62.5μm Core Diameter MMF		70	150		M	BER<1.0E-12 @ 4.25 GBaud
		150	300			BER<1.0E-12 @ 2.125 GBaud
		300	500			BER<1.0E-12 @ 1.25/1.0625 GBaud
Transmitter						
Optical Center Wavelength	λ	830	850	860	nm	
Spectral Width	Δλ			0.85	nm	RMS
Optical Transmit Power	Popt	-9		-3	dBm	Average @ 850nm
Optical Modulation Amplitude	OMA	247			μW	Pk-pk @ 4.25 GBaud
		196			μW	Pk-pk @ 2.125 GBaud
		156			μW	Pk-pk @ 1.0625 GBaud
Relative Intensity Noise	RIN			-118	dB/Hz	Measured with -12dB optical return loss
Output Eye	Complies with ANSI FC-PI Specification and Class 1 Laser Eye Safety					
Receiver						
Optical Input Wavelength	λ	830		860	nm	
Optical Input Power	Pr	-15		0	dBm	BER<1.0E-12 @ 4.25 GBaud
		-18		0		BER<1.0E-12 @ 2.125 GBaud
		-20		0		BER<1.0E-12 @ 1.25/1.0625 GBaud
Optical Modulation Input	OMA	61			μW	Pk-pk @ 4.25 GBaud
		49				Pk-pk @ 2.125 GBaud
		31				Pk-pk @ 1.0625 GBaud
Optical Return Loss	ORL	12			dB	
SD – Deasserted	Pd	-29			dBm	
SD – Asserted	Pa			-15	dBm	4.25 GBaud
				-18		2.125 GBaud
				-20		1.25/1.0625 GBaud
SD – Hysteresis	Pa-Pd		2.25	3.5	dB	

Application Schematic

TDIS input is LVTTL compatible and has an internal 4.7K Ω pull-down

TD+/- inputs are internally terminated (100Ω) and self-biased to Vterm.

RD+/- outputs are internally biased through 50Ω to Vcc (3.3V)
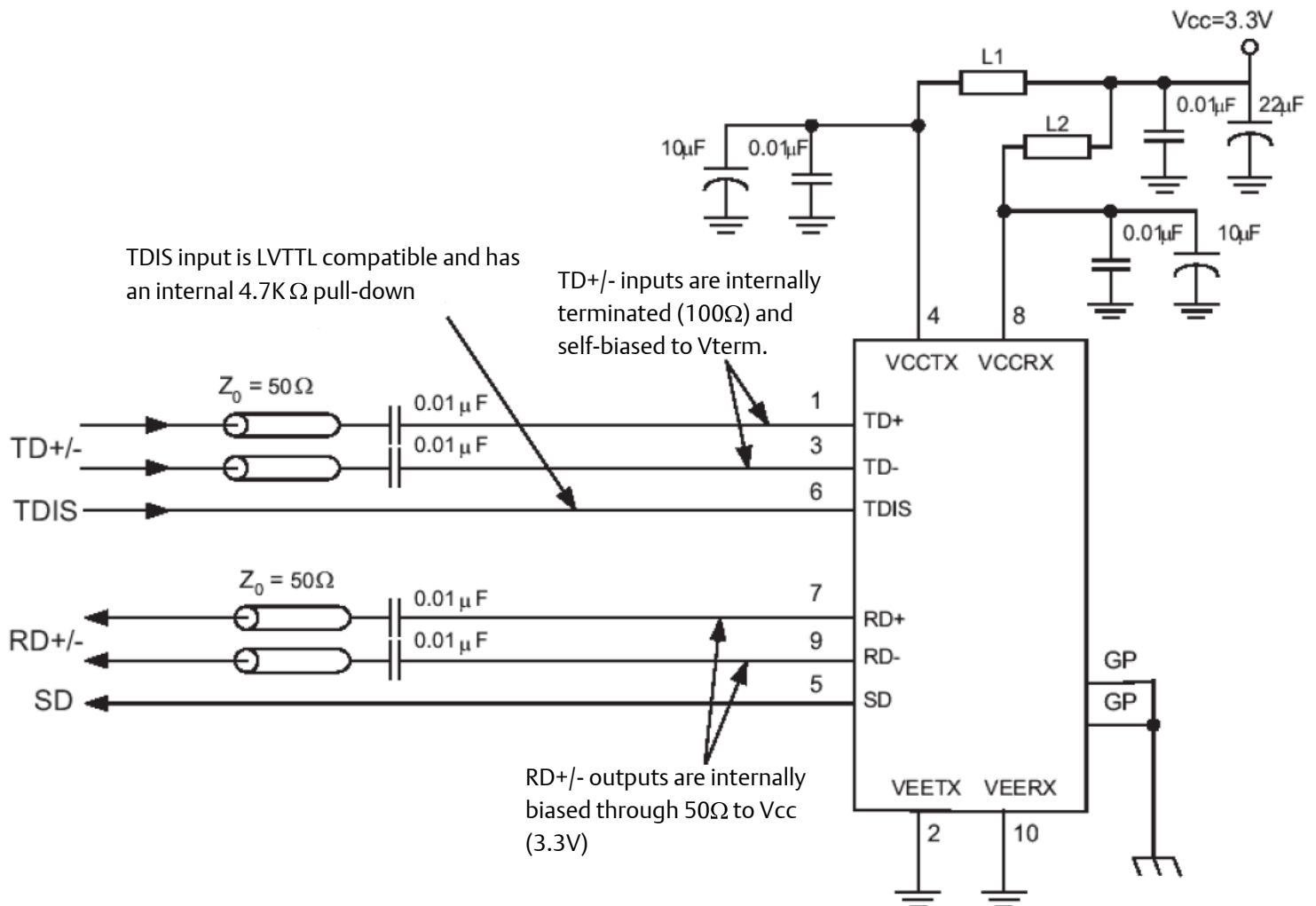
Notes:

1) L1 and L2 = MuRata BLM21A601S or equivalent (600Ω at 100MHz or better).

2) Route the differential pairs (TD+/- and RD+/-) together using 50Ω impedance matched traces.

3) Use separate power supply filtering for VCCTX and VCCRX, as shown.

4) Use low ESR capacitors such as NPO or COG for AC Coupling of the TD+/- and RD+/- data signals.

5) Ground Posts (GP) are isolated from Signal Ground (Vee), and may be connected to Chassis Ground (as shown) or to Signal Ground if a Chassis Ground is not available.

Data I/O Detail Diagrams

TD+/- LVPECL Input Stage

RD+/- CML Output Stage
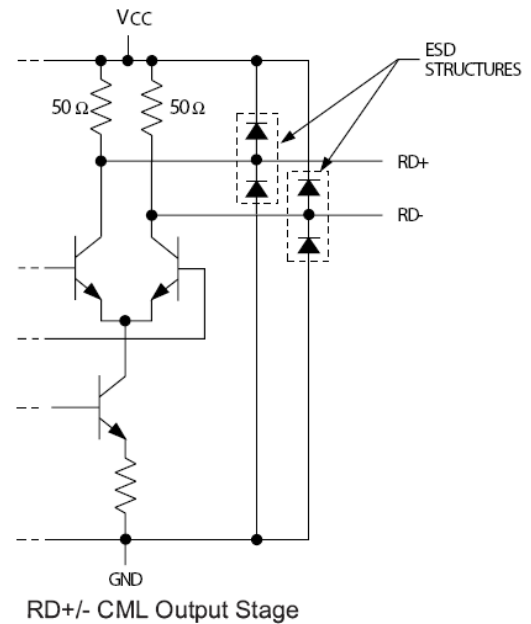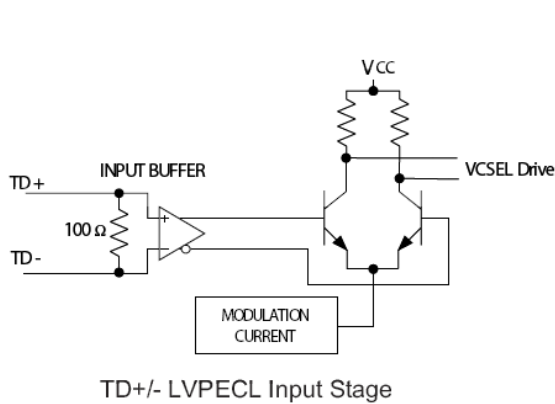
Low Profile Optical Transceiver
Top View Shown

TX Optical

RX Optical
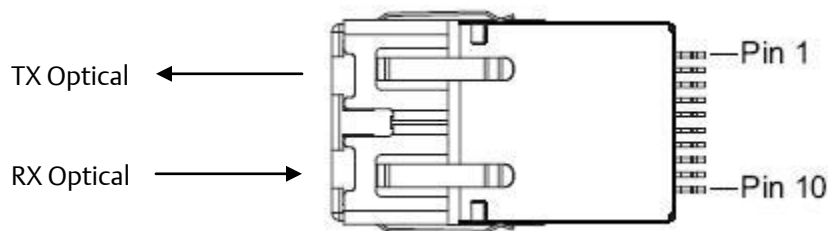
Pin Functions

Pin Number	Symbol	Description	Logic Family
1	TD+	Transmitter Data Non-Inverted Differential Input	LVPECL
2	TX_GND	Transmitter Ground	N/A
3	TD-	Transmitter Data Inverted Differential Input	LVPECL
4	Vcc_TX	Transmitter 3.3V Supply	N/A
5	SD	Optical Signal Detect. Logic 1 = Valid Input Level	LVTTL
6	TX_DIS	Transmitter Disable Logic 1 = Transmitter Disabled	LVTTL
7	RD+	Receiver Data Non-Inverted Differential Output	CML
8	Vcc_RX	Receiver 3.3V Supply	N/A
9	RD-	Receiver Data Inverted Differential Output	CML
10	RX_GND	Receiver Ground	N/A
Attaching Posts		The attaching posts are at case potential and may be connected to Chassis Ground	N/A

Mechanical Dimensions