DATA SHEET

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850 nm VCSEL SC Transceivers

Description

Opticis M3-xxx-Syz is a fibre optic transceiver which meets the specifications defined in Gbit Ethernet and Fibre Channel. The transceiver offers a simple and convenient way to interface for Gbit Ethernet switch system running up to 2.5Gbps and Fibre Channel system running up to 2.125Gbps with multimode fibre optic cables.

All modules satisfy Class I Laser Eye Safety requirements in accordance with the US FDA/CDRH and international IEC-825 standards.

The transmitter and receiver functions are contained in a one-row, 9-pin (1x9) mezzanine package with a Duplex SC receptacle. The transmitter employs a high performance 850 nm Vertical Cavity Surface Emitting Laser (VCSEL) with a driver circuit, which converts Positive Emitter Coupled Logic (PECL) data to light. The receiver incorporates a GaAs PIN photodiode converting the light signal into an electrical current, which is amplified and regenerated into PECL-compatible data. A Signal Detect status output is also provided.

The transceiver is operated by dual +3.3V & +5.0V power supply over 0°C to +70°C. The transceiver package is made of metal (Duplex-SC version) for good EMI shielding.

Features

- Comply with IEEE802.3z Gigabit Ethernet and Fibre Channel Std.
- VCSEL (vertical cavity surface emitting laser) is adopted
- IEC 60825-1 Class 1 Laser Eye Safety
- Industry Standard 1x9 mezzanine package style
- Duplex SC connector
- Dual +3.3V & +5.0V Power Supply Operation with PECL logic data interface
- Compatible with commercial Gigabit Ethernet and Fibre Channel PHY transceiver chipsets
- Metallic package is employed to reduce EMI
- Operating range is 250 meters with 50/125μm and 125 meters with 62.5/125μm

Equipments

- Switches
- Hubs
- Routers
- Media converters and Repeaters

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Applications

- Switch to switch Interface
- Switch to server links

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	T_{stg}	- 40	+ 85	°C
Supply Voltage	V_{CC}	- 0.3	+ 5.5	V
Input Voltage	V_{in}	-0.3	V_{CC}	V
Relative Humidity	RH	5	85	%
Lead Soldering Temperature & Time	-	-		260°C, 10 sec

Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Units
Ambient Operating Temperature	T_A	0		+ 70	°C
Data Output Load	R_{LD}		50		Ω
Power Supply Rejection[1]	PSR		50		mV_{pp}
Supply Voltage	V_{CC}	+3 +4.5	+3.3 +5.0	+3.6 +5.5	V

1 Tested with a 50mV_{p-p} sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V_{CC} supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

Transmitter Electrical Interface (over Operating Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Data Input Load	T_{LD}		50		Ω
Differential Input Voltage Swing	V_{ID}	0.4		1.6	V

Receiver Electrical Interface (over Operating Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Data Output Voltage Swing (Peak-to-Peak)	V_{Op-p}	0.6	-	0.8	V
Output High Voltage	V_{OH}	V_{CC}-1.1		V_{CC}-0.9	V
Output Low Voltage	V_{OL}	V_{CC}-1.84		V_{CC}-1.6	V

Electrical Power Supply Characteristics (over Operating Temperature Range)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Supply Voltage		V_{CC}	3.1 4.5	3.3 5.0	3.5 5.5	V
Supply Current	TX	I_{CT}	-	60	70	mA
	RX	I_{CR}	-	90	100	mA

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Transmitter Performance Characteristics (over Operating Temperature)

50μ/125, 62.5μ/125 multi mode GOF

Parameter	Symbol	Minimum	Typical	Maximum	Units
Data Rate[1]	B	-	-	2.5	Gb/s
Average launch Power[2]	P_o	-9.5	-	-	dBm
Wavelength	λ_c	840	850	860	nm
Spectral Width (RMS)	$\Delta\lambda$ RMS	-	-	0.85	nm
Coupled Power Ratio[3]	CPR	9	-	-	dB
Extinction Ratio		9	10	-	dB
Output Rise Time[4]	T_{TLH}	-	-	125	ps
Output Fall Time[4]	T_{THL}	-	-	130	ps
Relative Intensity Noise	RIN	-	-	-117	dB/Hz

1 Transmitter is shut off when transmitting continuous "zero". Power supply does not need to be reset to reactivate the transmitter. Transmitter is also shut off when transmitting continuous "one". However, power supply needs to be reset to reactivate the transmitter.
2 The maximum launch power shall be the lesser of the class 1 Eye safety limit as defined by IEEE Std 802.3z.
3 CPR measured per TIA/EIA OFSTP-14A with valid 8B/10B data pattern
4 Measured from 20% to 80% levels on rising and falling edge of transmitted waveform.

Receiver Performance Characteristics (over Operating Temperature)

50μ/125, 62.5μ/125 multi mode GOF

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	-	2.5	-	Gb/s
Receive Sensitivity (10^{-12} BER)		-	-22	-20	-17	dBm
Average Receive Power		-	-	-	0	dBm
Stressed Receiver Sensitivity	50um Fiber	-	-13.5	-	-	dBm
	62.5um Fiber	-	-12.5	-	-	dBm
Output Rise Time[1]		T_{RLH}	-	-	100	ps
Output Fall Time[1]		T_{RHL}	-	-	100	ps
Wavelength of Operation		λ	600	850	900	nm
Return Loss[2]		-	12	-	-	dB

1 Measured from 20% to 80% levels on rising and falling edge of received waveform
2 Return loss is defined as the minimum attenuation (dB) of received optical power for energy reflected back into the optical fiber.

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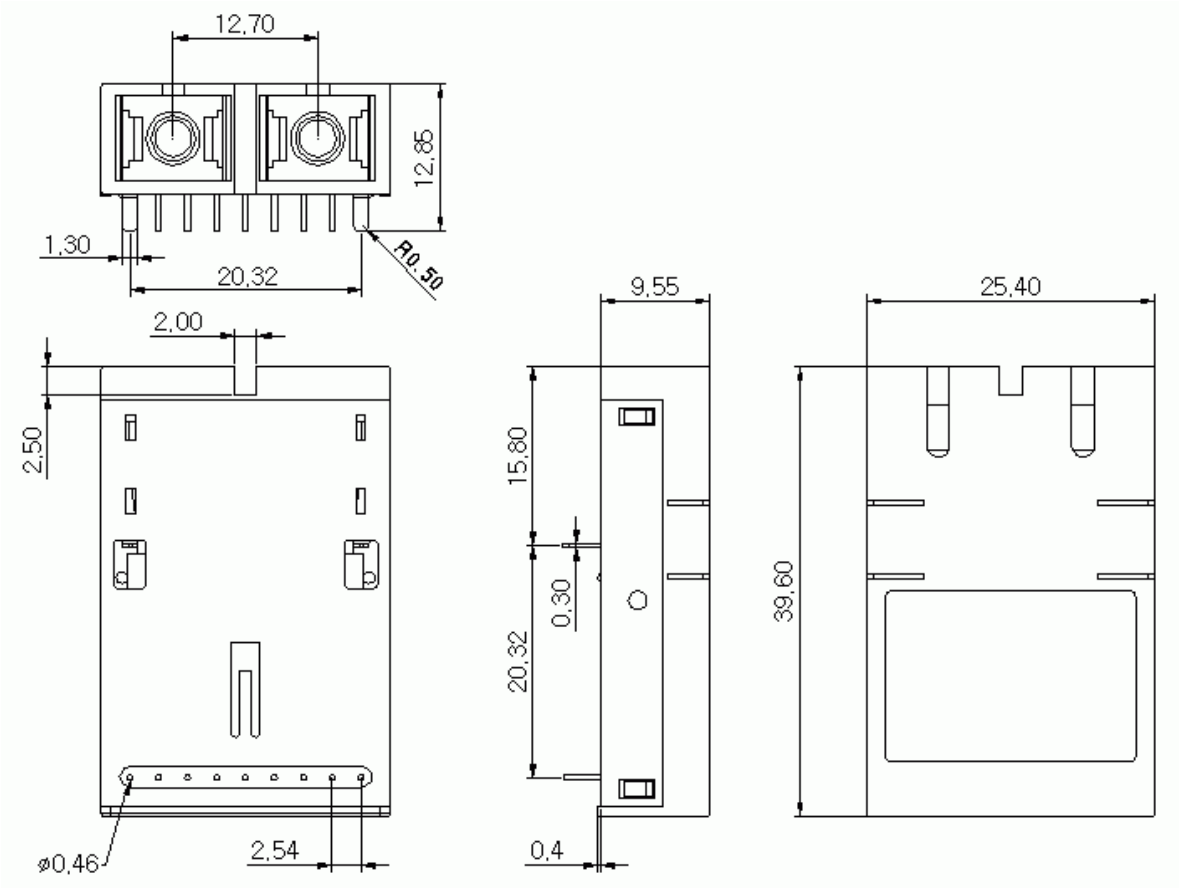
Mechanical Dimensions [mm]



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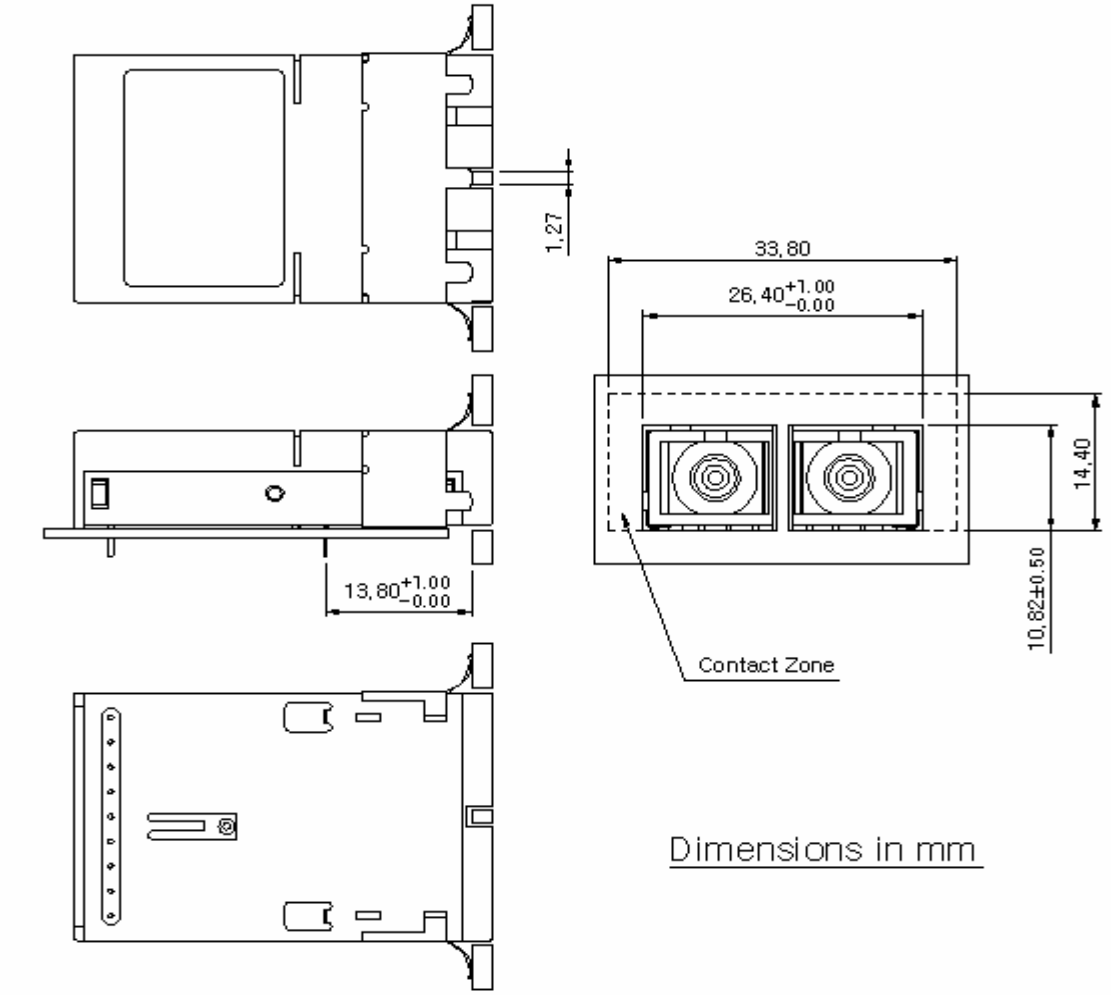
♦ **Shield with Forward Springs – called F type**



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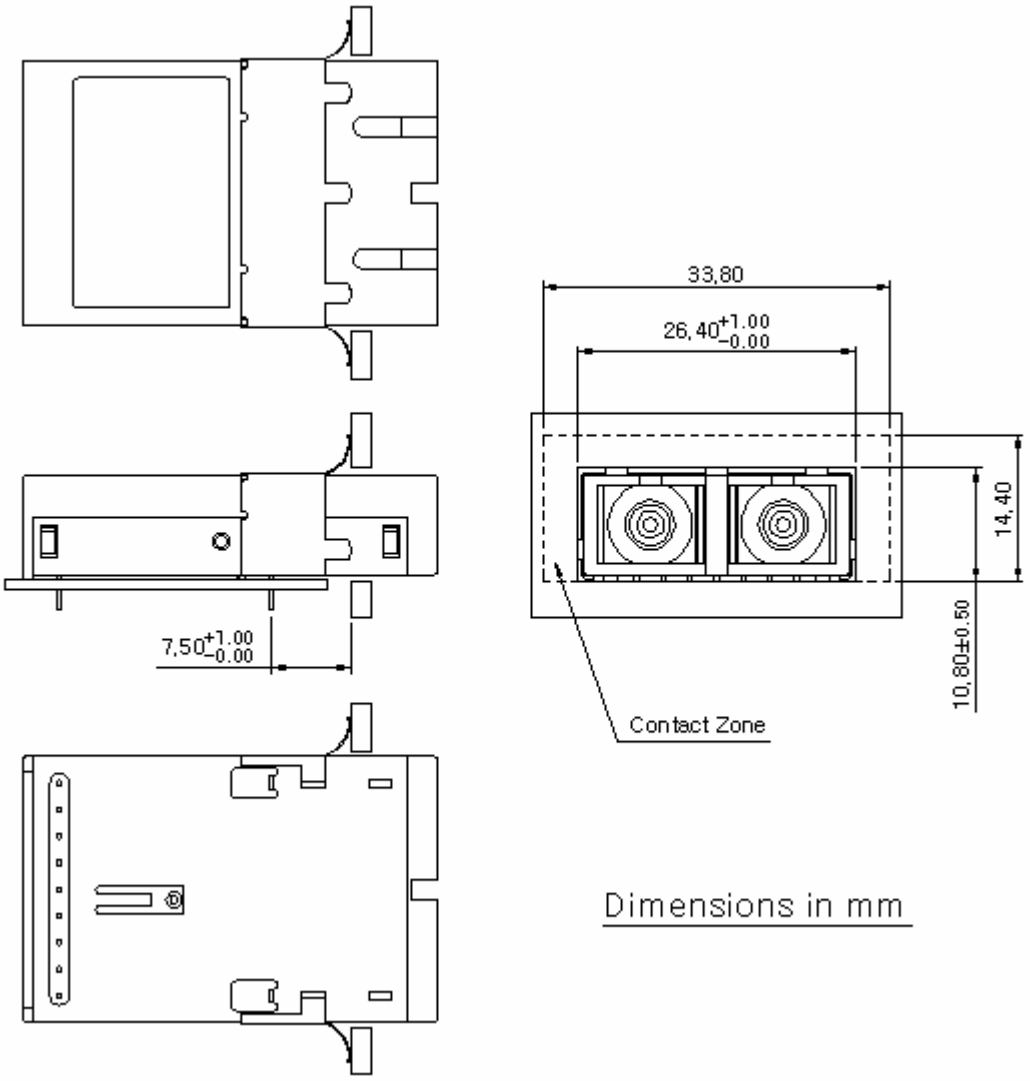
♦ **Shield with Backward Springs – called B type**



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Pin Assignments

Pin	Symbol	Functional Description
1	V_{EER}	Receiver Signal Ground Directly connect this pin to receiver signal ground plane.
2	RD+	Receiver Data Out AC coupled - PECL compatible
3	RD–	Receiver Data Out-Bar AC coupled - PECL compatible
4	SD	Signal Detect Signal Detect is a single-ended TTL/LVTTL output. (ECL output available) Normal optical input levels to the receiver result in a logic “1” output, VOH, asserted. Low input optical levels to the receiver result in a fault condition indicated by a logic “0” output VOL, de-asserted. If Signal Detect output is not used, leave it open-circuited.
5	V_{CCR}	Receiver Power Supply Provide +5.0V or +3.3V via the recommended receiver power supply filter circuit. Locate the power supply filter circuit as close as possible to the V_{CCR} pin.
6	V_{CCT}	Transmitter Power Supply Provide +5.0V or +3.3V via the recommended transmitter power supply filter circuit. Locate the power supply filter circuit as close as possible to the V_{CCT} pin.
7	TD–	Transmitter Data In-Bar AC coupled - PECL compatible
8	TD+	Transmitter Data In AC coupled - PECL compatible
9	V_{EET}	Transmitter Signal Ground Directly connect this pin to the transmitter signal ground plane.

Ordering Information

M3-XXX-ABC

XXX: **212** and **250** stand for 2.125Gbit data rate for Fibre Channel and 2.5Gbit data rate for Gbit Ethernet, respectively.

A : Connector style, that is, **S** for SC and **L** for LC and M for MTRJ.

B : Receiver termination, that is, **A** for AC coupling and **D** for DC coupling

C : Signal Detect Level, that is, **P** for PECL and **T** for TTL

* Shield with Forward Springs – **F type**

* Shield with Backward Springs – **B type**

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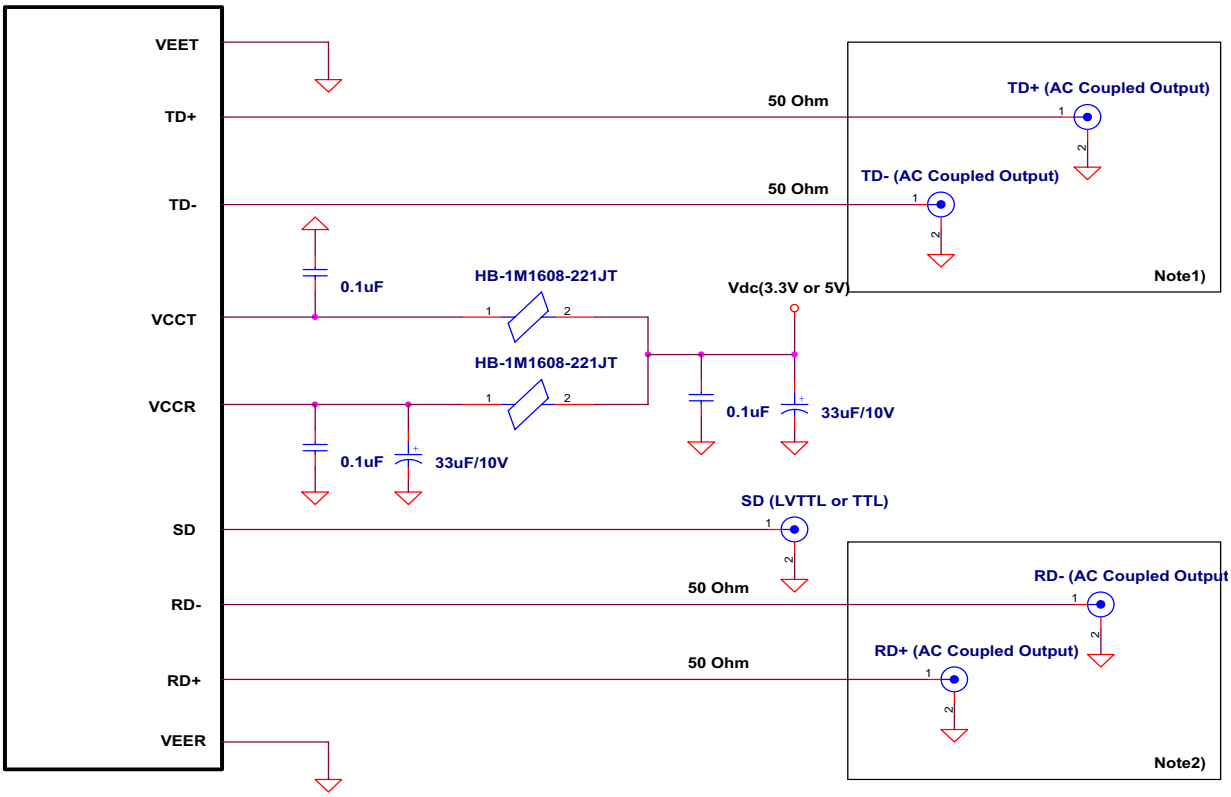
Application Notes

Transmitter: When the DATA+ input is at logic HIGH and DATA- input is at logic LOW, the LD is ON, and vice versa. Transmitter input is AC coupled. The centre value for the input voltage is set by the user and can be ECL, PECL, etc.

Receiver: Both differential DATA+ and DATA- outputs are AC coupled. For optimum performance, both outputs should be terminated in the same manner, even if only one is used. The Signal Detect circuit monitors the level of the incoming optical signal and generates a logic LOW signal when insufficient photocurrent is produced.

Interface circuit: The power supply line should be well filtered. All 0.1 μF power supply bypass capacitors should be as close to the M3-125-SAT transceiver modules as possible (Opticis 1X9 evaluation board recommended). The two front GND posts should be grounded to Circuit Ground.

Transceiver



Note1) In case of interfacing with system, Opticis M3 Transceiver Tx part doesn't need any termination component except only the load resistors for system IC out port. TD+ and TD- are AC coupled input ports.

Note2) In case of interfacing with system, Opticis M3 Transceiver Rx part doesn't need external capacitors for AC coupling except only the input bias termination component for system IC input port. RD+ and RD- are AC coupled output ports.

*** SD is LVTTL (3.3V) or TTL (5V) output.
This pin doesn't need any load or pull-down resistor.

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