25G SFP28 Transceiver MTRA-3E30A

Preliminary Datasheet

Features

- Up to 10KM transmission distance
- Support Multi Rate 9.953-25.78Gbps
- 1310nm DFB and PIN receiver
- SFI electrical interface
- 2-wire interface for integrated Digital Diagnostic monitoring
- SFP+ MSA package with duplex LC connector
- Hot pluggable
- Very low EMI and excellent ESD protection
- +3.3V power supply
- Power consumption less than 1.5W
- Operating case temperature: 0~70°C

Applications

- 25Gbps Ethernet

Compliance

- Compliant with IEEE 802.3-2012
- Compliant with FCC 47 CFR Part 15, Class B
- Compliant with MSA SFF-8472
- Compliant with MSA SFF-8431

Description

MTRA-3E30A is a high performance, cost effective modules, which is supporting Multi Rate 9.953-25.78Gbps, and transmission distance up to 10km on SM fiber. The transceiver consists of two sections: The transmitter section incorporates a 1310nm DFB Laser, a driver and a CDR. The receiver section consists of a PIN photodiode integrated with a transimpedance preamplifier (TIA), a Limitting Amplifier and CDR. The module is hot pluggable into the 20-pin connector. The high-speed electrical interface is base on low voltage logic, with nominal 100 Ohms differential impedance and AC coupled in the module.

The optical output can be disabled by LVTTL logic high-level input of TX_DIS. Transmit Fault (Tx_Fault) is provided to indicate that the module transmitter has detected a fault condition related to laser operation or safety. Loss of signal (RX_LOS) output is provided to indicate the loss of an input optical signal of receiver.

A serial EEPROM in the transceiver allows the user to access transceiver monitoring and configuration data via the 2-wire SFP Management Interface. Digital diagnostics function are available via a 2-wire serial interface, as specified in SFF-8472.

Specification

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	85	℃
Supply Voltage（no damaged）	V_{CC3}	-0.5	3.6	V
Relative Humidity(non-condensing)	RH	5	95	%
RX Input OMA Power	Pmax		5	dBm

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	T_C	0	25	70	℃
Power Supply Voltage	V_{CC3}	3.135	3.3	3.465	V
	I_{CC3}			400	mA
Power Dissipation	P_D		1.2	1.5	W
Data Rate(NRZ)		24.33	25.78		Gbps
Transmission Distance				10	Km

Transmitter Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Centre Wavelength	λ_C	1295	1310	1325	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Laser Off Power	Poff			-30	dBm	
Average Optical Power	Pavg	-7		2	dBm	
Extinction Ratio	ER	3.5			dB	
Transmitter Dispersion Penalty				2.7	dB	
Relative Intensity Noise	Rin			-130	dB/Hz	
Optical Return Loss Tolerance		12			dB	
Operating Data Rate		24.33	25.78		Gbps	Note1
Optical Eye Mask	>5% (Compatible 100GBASE-LR4)					Note 2
Common mode voltage tolerance		15			mV	
Tx Input Diff Voltage	VI	200	500	900	mV	
Tx Fault	VOL			0.4	V	At 0.7mA
	VOH	VccT-0.4				Note3

Notes:

[1]Under CDR bypass mode, CPRI option 7 compatibility
[2]1000 consecutive snapshots at typical rate and room temperature
[3] Measured with a 4.7k Ohm load pulled up to Vcc

Receiver Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Center Wavelength	λr	1295	1310	1325	nm	
Receiver Sensitivity(OMA)				-13.3	dBm	Note 1
LOS Assert	LosA	-30			dBm	
LOS Dessert	LosD			-16	dBm	
LOS Hysteresis	LosH	0.5			dB	
Overload (OMA)	Pin	2.2			dBm	
Receiver Reflectance				-26	dB	
Operating Data Rate		24.33	25.78		Gbps	Note 2
Rx Output Diff Voltage	Vo		500	900	mV	
Rx Output Rise and Fall Time	Tr/Tf	9.5			ps	20% to 80%

Notes:
[1] Measured with 25.78125Gb/s, PRBS-31 NRZ, ER>4dB, 1260~1360nm, BER 5E-5
[2]Under CDR bypass mode, CPRI option 7 compatibility

Control and Status I/O Timing Characteristics

Parameter	Symbol	Min.	Max.	Unit	Note
TX Disable Assert Time	t_off		100	μs	Note1
TX Disable Negate Time	t_on		2	ms	Note2
Time to initialize including reset of TX_Fault	t_init		300	ms	Note3
TX Fault Assert Time	t_fault		1	ms	Note4
TX Disable to reset	t_reset	10		μs	Note5
LOS Assert Time	t_loss_on		100	μs	Note6
LOS Deassert Time	t_loss_off		100	μs	Note7
Rate-Select Change Time	t_ratesel		10	μs	Note8
Serial ID Clock Rate	f_serial_clock	0.001	400	kHz	

Notes:

[1] Time from rising edge of TX Disable to when the optical output falls below 10% of nominal

[2] Time from falling edge of TX Disable to when the modulated optical output rises above 90% of nominal

[3] From power on or negation of TX Fault using TX Disable

[4] Time from fault to TX fault on

[5] Time TX Disable must be held high to reset TX_fault

[6] Time from LOS state to RX LOS assert

[7] Time from non-LOS state to RX LOS deassert.

[8] Time from rising or falling edge of Rate Select input until receiver bandwidth is in conformance with appropriate specification

Pin-out Definition

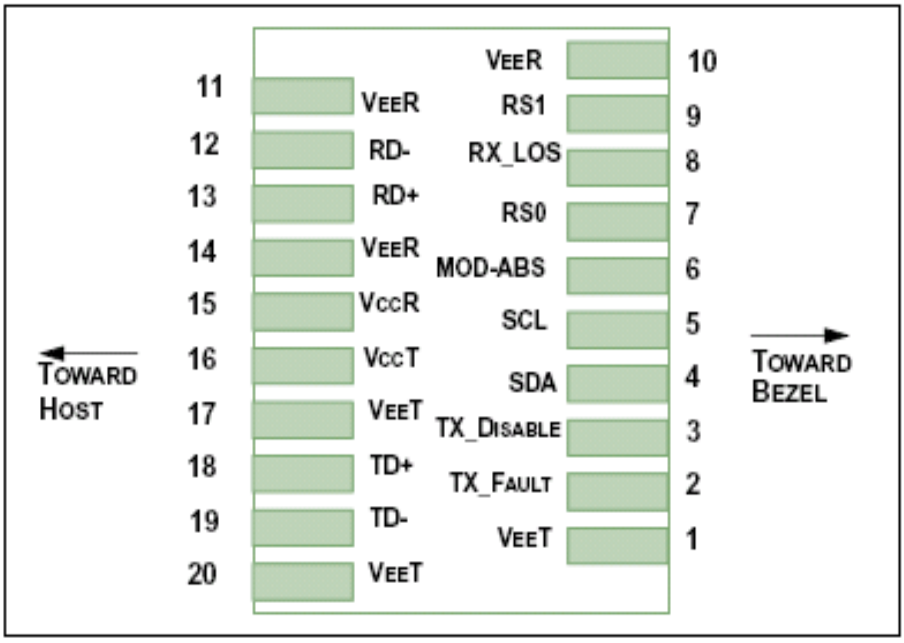


Figure1

Pin Assignment

Pin	Logic	Symbol	Name/Description	Note
1		VeeT	Module Transmitter Ground	Note1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	Note2
3	LVTTL-I	TX_Disable	Transmitter Disable; Turns off transmitter laser output	Note3
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i)	Note4
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock (Same as MOD-DEF1 as defined in the INF-8074i)	Note4
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	Note5
7	LVTTL-I	RS0	Not used	
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)	Note2
9	LVTTL-I	RS1	Not used	
10		VeeR	Module Receiver Ground	Note1
11		VeeR	Module Receiver Ground	Note1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		VeeR	Module Receiver Ground	Note1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module Transmitter Ground	Note1

18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	Note1

Notes:

[1] The module signal ground pins, VeeR and VeeT, shall be isolated from the module case.

[2] This pin is an open collector/drain output pin and shall be pulled up with 4.7k-10kohms 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 + 0.5 V.

[3] This pin is an open collector/drain input pin and shall be pulled up with 4.7k-10kohms to VccT in the module.

[4] See SFF-8431 4.2 2-wire Electrical Specifications .

[5] This pin shall be pulled up with 4.7k-10kohms to Host_Vcc on the host board.

Block Diagram of Transceiver

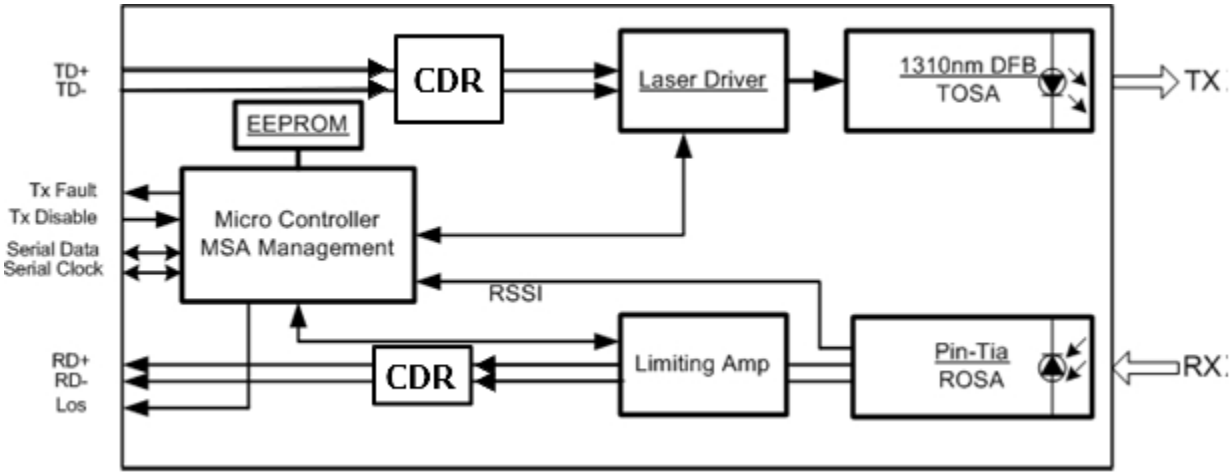


Figure2

Transmitter Section

The transmitter converts 25.78Gbit/s serial PECL or CML electrical data into serial optical data compliant with the 25G Ethernet. An open collector compatible Transmit Disable (Tx_Dis) is provided. A logic "1," or no connection on this pin will disable the laser from transmitting. A logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (Tx_Fault) is provided. TX_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault

condition related to laser operation or safety. The TX_Fault output contact is an open drain/collector and shall be pulled up to the Vcc_Host in the host with a resistor in the range 4.7-10 kΩ. TX_Disable is a module input contact. When TX_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor. Per the requirements of performance, internal clock and data recovery circuits (CDR) are present on electrical input of this transceiver module..

Receiver Section

The receiver converts 25.78Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx_LOS contact is an open drain/collector output and shall be pulled up to Vcc_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. The Rx_LOS signal is intended as a preliminary indication to the system in which the SFP+ is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable. *Per the requirements of performance, internal clock and data recovery circuits (CDR) are present on electrical output of this transceiver module.*

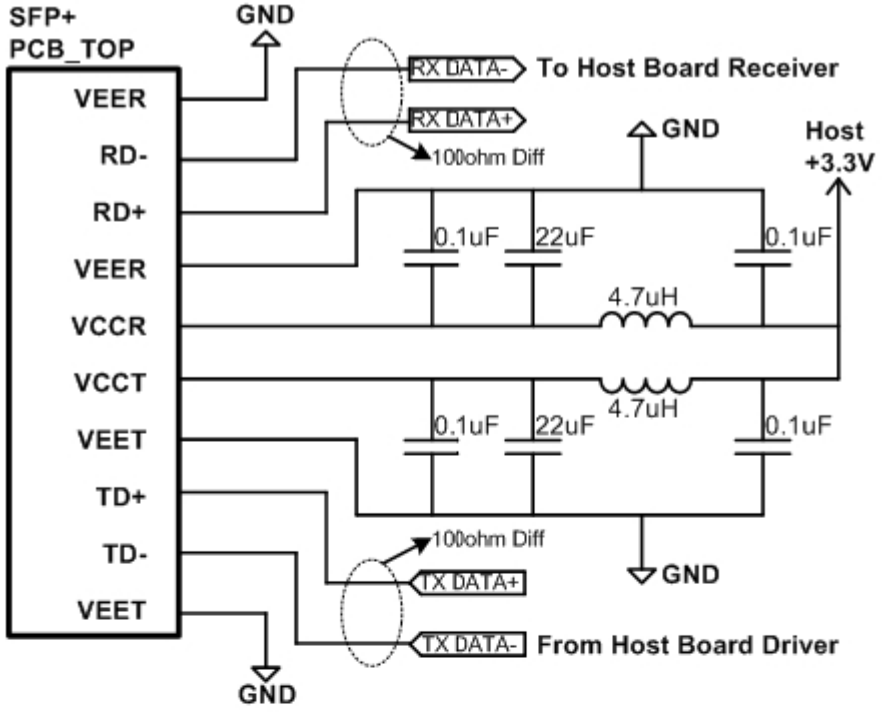
TX Equalization Control

Tx input equalization control can be accessed through 2-wire serial interface at byte address 114(A2h). Tx input equalization control for 25GE is located at the upper 4 bits of byte 114 (A2h).

RX Emphasis Control

Rx output emphasis control can be accessed through 2-wire serial interface at byte address 115(A2h). Rx output emphasis control for 25GE is located at the upper 4 bits of byte 115 (A2h).

Recommended Interface Circuit



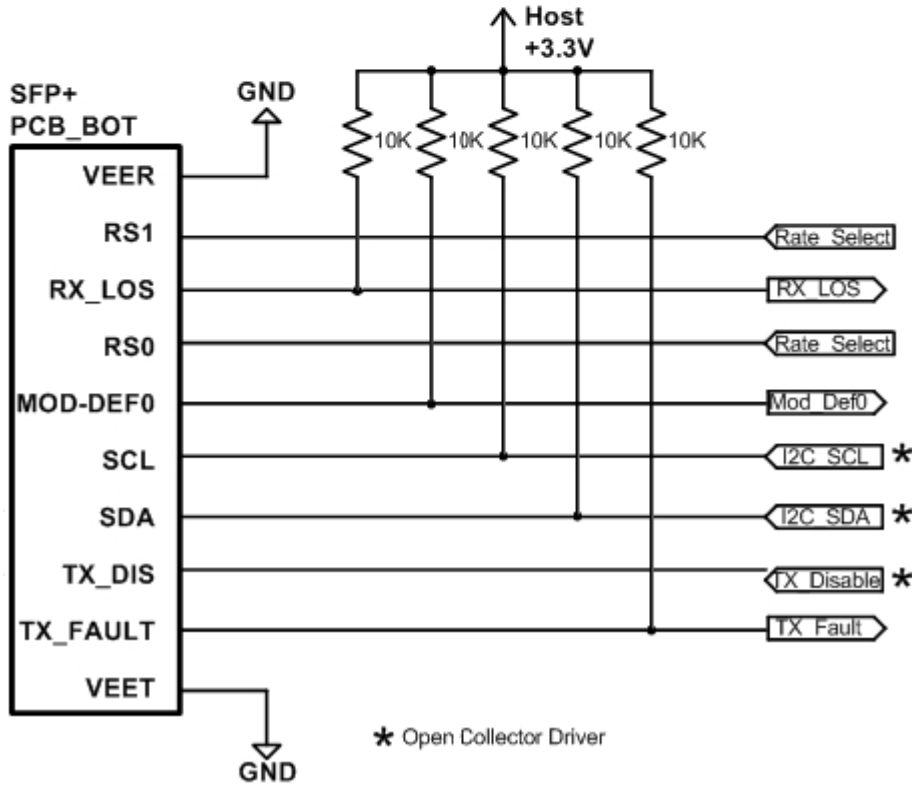
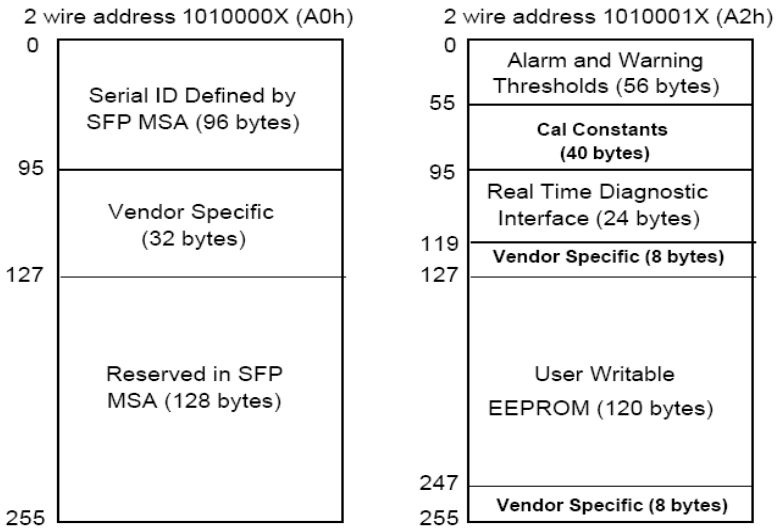


Figure3

Digital Diagnostic Memory Map



EEPROM Information (A0h)

Serial ID Memory Contents(A0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
0	1	Identifer	03	SFP
1	1	Ext. Identifier	04	SFP function is defined by serial ID only
2	1	Connector	07	LC Connector
3-10	8	Transceiver	00 00 00 00 00 00 00 00	10G Ethernet Compliance Codes: 10G Base-LR
11	1	Encoding	03	NRZ
12	1	BR, Nominal	FF	255*100MBd
13	1	Rate Identifier	00	Unspecified
14	1	Length (9um) km	0A	Transceiver transmit distance,10km
15	1	Length (9um) 100m	00	Transceiver transmit distance,100*100m
16	1	Length (50um)10m	00	Transceiver transmit distance
17	1	Length (62.5um) 10m	00	Transceiver transmit distance
18	1	Length (Copper)	00	Not compliant
19	1	Length (50um OM3)	00	Not compliant
20-35	16	Vendor name	48 47 20 47 45 4E 55 49 4E 45 20 20 20 20 20 20	“HG GENUINE” Vendor Name(ASCII)
36	1	Reserved	03	100GBASE-LR4
37-39	3	Vendor OUI	00 00 00	

40-55	16	Vendor PN	4D 54 52 41 2D 33 45 33 30 41 20 20 20 20 20 20	“MTRA-3E30A”Part No.(ASCII)
56-59	4	Vendor rev	31 2E 30 20	“1.0” (ASCII)
60-61	2	Wavelength	05 1E	Transceiver wavelength
62	1	Reserved	00	
63	1	CC_BASE	A6	Check code for Base ID Fields
64-65	2	Options	0A 1A	a conventional uncooled laser Power Level 2 a conventional limiting output the transceiver has an internal retimer or CDR TX_DISABLE TX_FAULT Rx_LOS
66	1	BR,MAX	00	Not Specified
67	1	BR,MIN	00	Not Specified
68-83	16	Vendor SN	SN(Variable)	Serial Number of transceiver(ASCII).
84-91	8	Date code	DC(Variable)	Manufactory Date Code.
92	1	Diagnostic Monitoring Type	68	Digital diagnostic monitoring implemented, “internally calibrated” is implemented
93	1	Enhanced Options	B0	Alarm/warning flags soft TX_FAULT soft RX_LOS
94	1	SFF_8472 Compliance	08	Includes functionality described in Rev12.0 SFF-8472
95	1	CC_EXT	CF(Variable)	Check sum for Extended ID Field.
96-127	32	Vendor Specific	Read only	Depends on customer information Filled by zero
128-255	128	Reserved	Read only	Filled by zero

Ordering Information

Part No.	Specification								
	Pack	Rate	Tx	Pout	Rx	Sens.	Top	Reach	Others
MTRA-3E30A	SFP28	25.78Gbps	1310nm DFB	-7~2 dBm	PIN	＜-13.3dBm	0～70℃	10km	DDM/RoHS

Contact Information

Wuhan Huagong Genuine Optics Technology Co., Ltd

Address: Science & Technology Region of HUST, Donghu High-Tech Zone
Wuhan, Hubei Province, 430223, China

- **Tel: +86-27-87180102**
- **Fax: +86-27-87180220**

Email: market@genuine-opto.com

Website: http://www.genuine-opto.com

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