

10G SFP+ Transceiver

MTRS-1S60-01



Features

- Up to 40km transmission distance
- Support Multi Rate 9.95 to 11.3Gbps bit rates
- 1550nm cooled EML transmitter with TEC, PIN receiver
- SFI electrical interface
- 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface for optical transceivers
- Hot pluggable
- SFP+ MSA package with duplex LC connector
- Very low EMI and excellent ESD protection
- +3.3V power supply
- Power consumption less than 1.5W
- Operating case temperature: 0~+70°C

Applications

- 10GBASE-ER/EW
- 10GBASE-ER/EW + FEC
- 10G Storage system

Compliance

- Compliant with IEEE 802.3ae-2002 10G Base-ER
- Compliant with SFF-8431 & SFF-8432 & SFF-8472

Description

MTRS-1S60-01 is a high performance, cost effective modules, which is supporting Multi Rate 9.95 to 11.3Gbps, and transmission distance up to 40km on SM fiber. The transceiver consists of two sections: The transmitter section incorporates a EML laser driver and a 1550nm DFB laser. The receiver section consists of a PIN photodiode integrated with a transimpedance preamplifier (TIA) and a Limiting Amplifier. The module is hot plug gable 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 LVTTTL 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

Table1-Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	°C
Operating Case Temperature	Tc	-5	+75	°C
Supply Voltage	Vcc	0	+4	V
Relative Humidity(Non-condensing)	RH	+5	+85	%
Rx max Input Average Power	Pmax	-	0	dBm

Table2-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	Tc	0	25	+70	°C
Power Supply Voltage	Vcc3	3.135	3.3	3.465	V
Power Supply Current	Icc3	-	-	450	mA
Power Consumption		-	-	1500	mW

Table3-Transmitter Operating Characteristic-Optical

Parameter	Symbol	Min	Typical	Max	Unit	Note
Operating Data Rate	DR	9.95	10.3125	11.3	Gb/s	
Output Center Wavelength	λ_c	1530	1550	1565	nm	
Side Mode Suppression Ratio	SMSR	30		-	dB	
Spectral Width	-	-	-	1	nm	
Average Output Power	Po	-4.7		+4	dBm	
Optical Modulation Amplitude	OMA	-1.7		-		
Disabled Power	Poff	-		-30	dBm	
Extinction Ratio	ER	3		-	dB	
Eye Mask	-		5		%	
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	
Operating Distance	-	40	-	-	km	
Transmitter and dispersion penalty	-	-	-	3	dB	
Optical return loss tolerance	-			21	dB	

Table4-Receiver Operating Characteristic-Optical

Parameter	Symbol	Min	Typical	Max	Unit	Note
Operating Data Rate	-	9.95	10.3125	11.3	Gb/s	
Input Center Wavelength	λ_{rc}	1530		1565	nm	
Overload	Rovl	-1	-	-	dBm	

Sensitivity	Rsen	-	-	-15.8	dBm	
Sensitivity(OMA)	-	-	-	-14.1	dBm	
Stressed Receiver Sensitivity (OMA)	-	-	-	-11.3	dBm	
RX_LOS Assert Level	RLOSa	-30	-	-	dBm	
RX_LOS De-assert Level	RLOSd	-	-	-17	dBm	
RX_LOS Hysteresis	RLOSh	0.5	-	-	dB	
Optical Return Loss	ORL	-	-	-16	dB	

Table 5- Electrical characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Note
Input differential impedance	-		100		Ω	
Differential data input swing	VI	190		700	mV	
Differential data output swing	VO	300		850	mV	
Tx Fault, LOS Output Voltage	High	-	2.0		VCC	V
	Low	-	VEE		VEE+ 0.8	V
Tx Disable, RS0,RS1	Low	VIL	2.0		VCC	V
	High	VIH	VEE		VEE+ 0.8	V

DITITAL DIAGNOSTIC FUNCTIONS

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Table 6- Digital diagnostic specification table

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	$^{\circ}\text{C}$	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	
RX power monitor absolute error	DMI_RX	-3	3	dB	-1dBm to -16dBm range
Supply voltage monitor absolute error	DMI_VCC	-3	3	%	Full operating range
Bias current monitor	DMI_Ibias	-10	10	%	

Pin-out Definition

The SFP+ modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP+ host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8431, or stacked connector with equivalent electrical performance. Host PCB contact assignment is shown in Figure 1 and contact definitions are given in Table 7. SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 2 and the contact sequence order listed in Table 7.

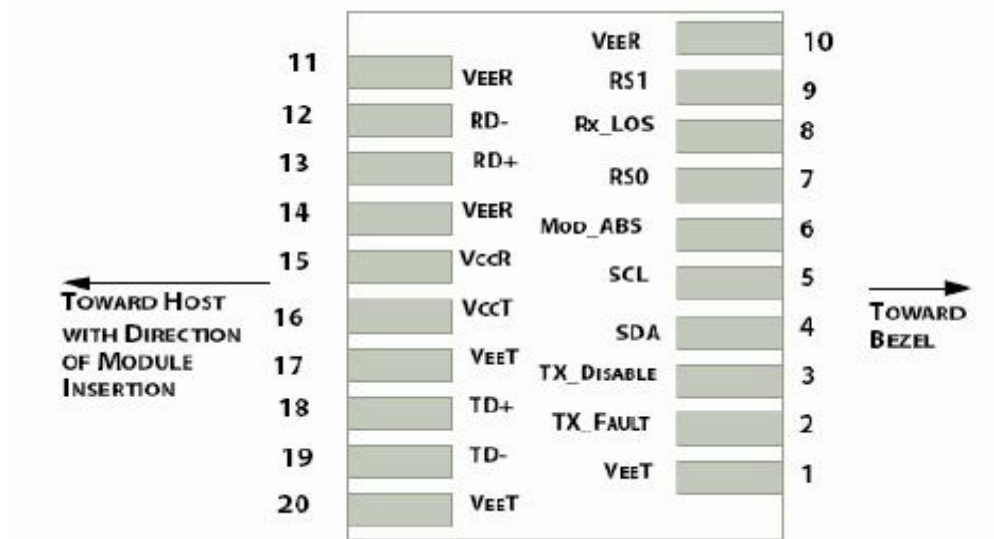


Figure1: Module Interface to Host

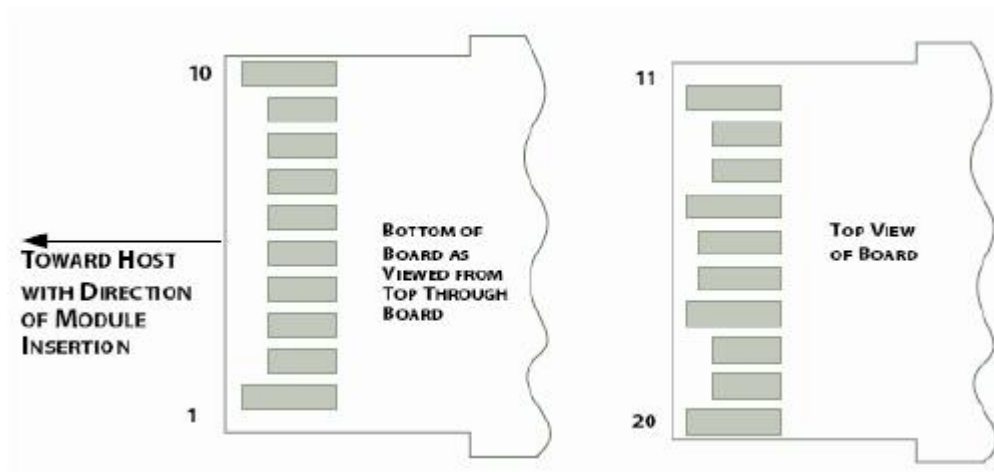


Figure2: Module Contact Assignment

Pin Assignment

Table 7-SFP+ Module PIN Definition					
PIN	Logic	Symbol	Name / Description	Power Sequence Order	Note
1		VeeT	Module Transmitter Ground	1st	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	3rd	2
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	3rd	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	3rd	
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	3rd	
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	3rd	2
7	LVTTL-I	RS0	Receiver Rate Select	3rd	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active High	3rd	2
9	LVTTL-I	RS1	Transmitter Rate Select	3rd	
10		VeeR	Module Receiver Ground	1st	1
11		VeeR	Module Receiver Ground	1st	1
12	CML-O	RD-	Receiver Inverted Data Output	3rd	
13	CML-O	RD+	Receiver Data Output	3rd	
14		VeeR	Module Receiver Ground	1st	1
15		VccR	Module Receiver 3.3 V Supply	2nd	
16		VccT	Module Receiver 3.3 V Supply	2nd	
17		VeeT	Module Transmitter Ground	1st	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	3rd	
19	CML-I	TD-	Transmitter Inverted Data Input	3rd	
20		VeeT	Module Transmitter Ground	1st	1

Notes:

[1]Module ground pins GND are isolated from the module case.

[2]Shall be pulled up with 4.7K-10Kohms to a voltage between 3.13V and 3.47V on the host board.

Block Diagram of Transceiver

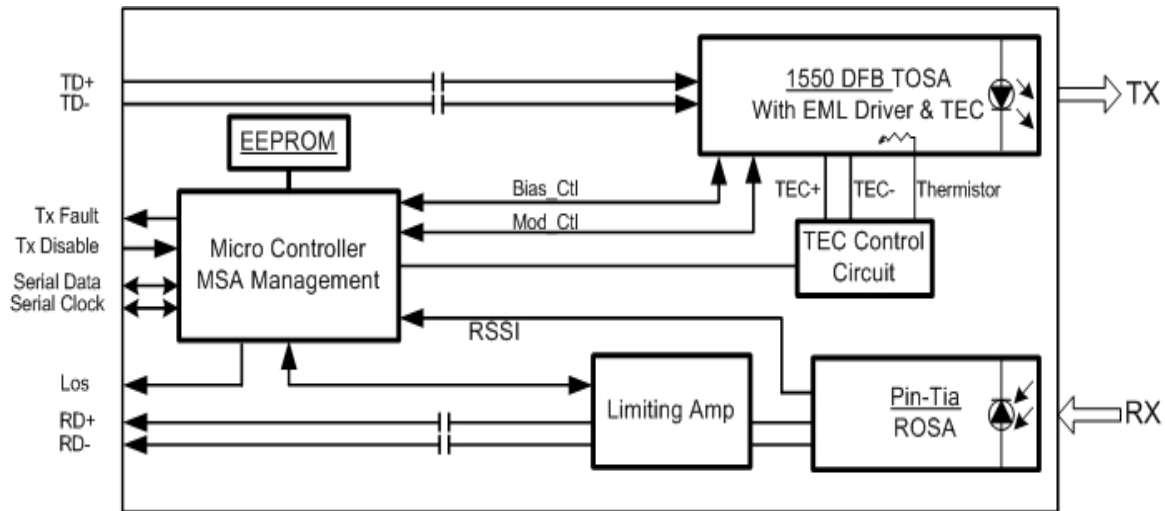


Figure3

Transmitter Section

The transmitter converts 10Gbit/s serial CML electrical data into serial optical data compliant with the 10GBASE-ER standard. 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 k Ω . 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.

Receiver Section

The receiver converts 10Gbit/s serial optical data into serial 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 k Ω , or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. 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.

Recommended Interface Circuit

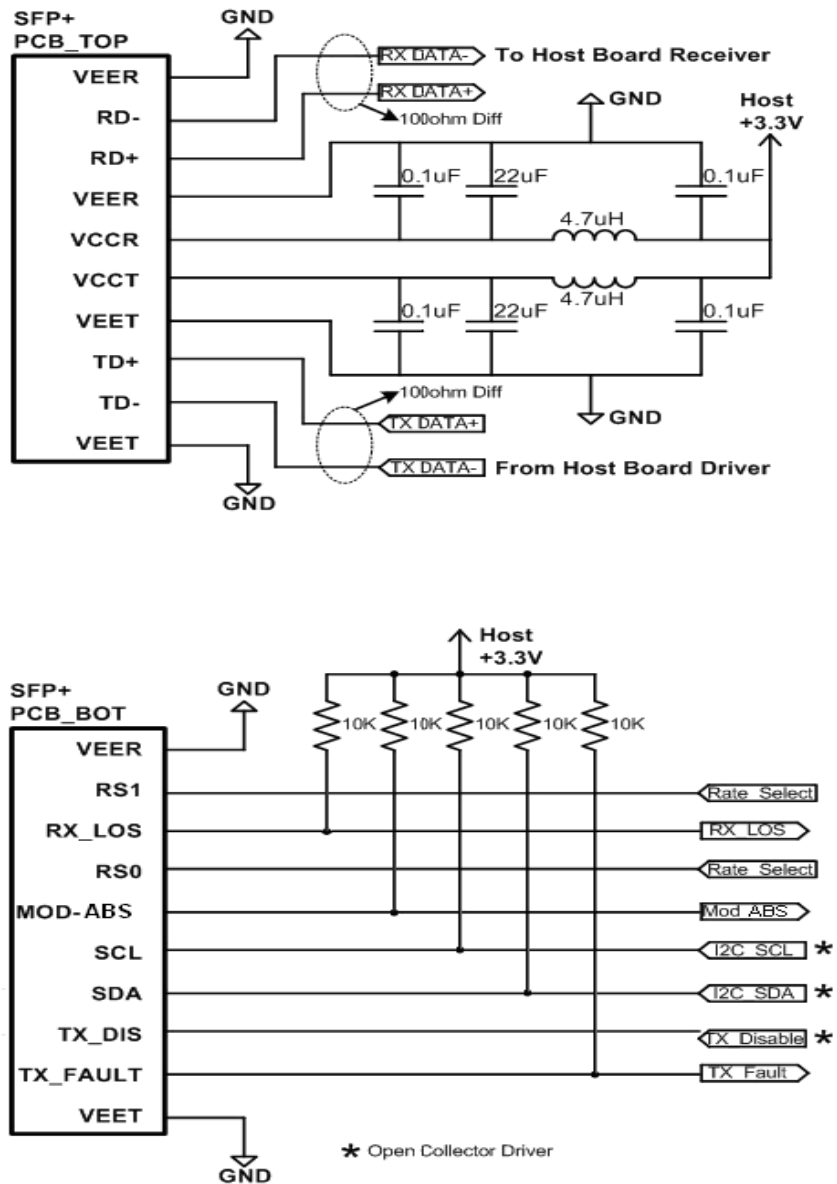


Figure4

Dimensions

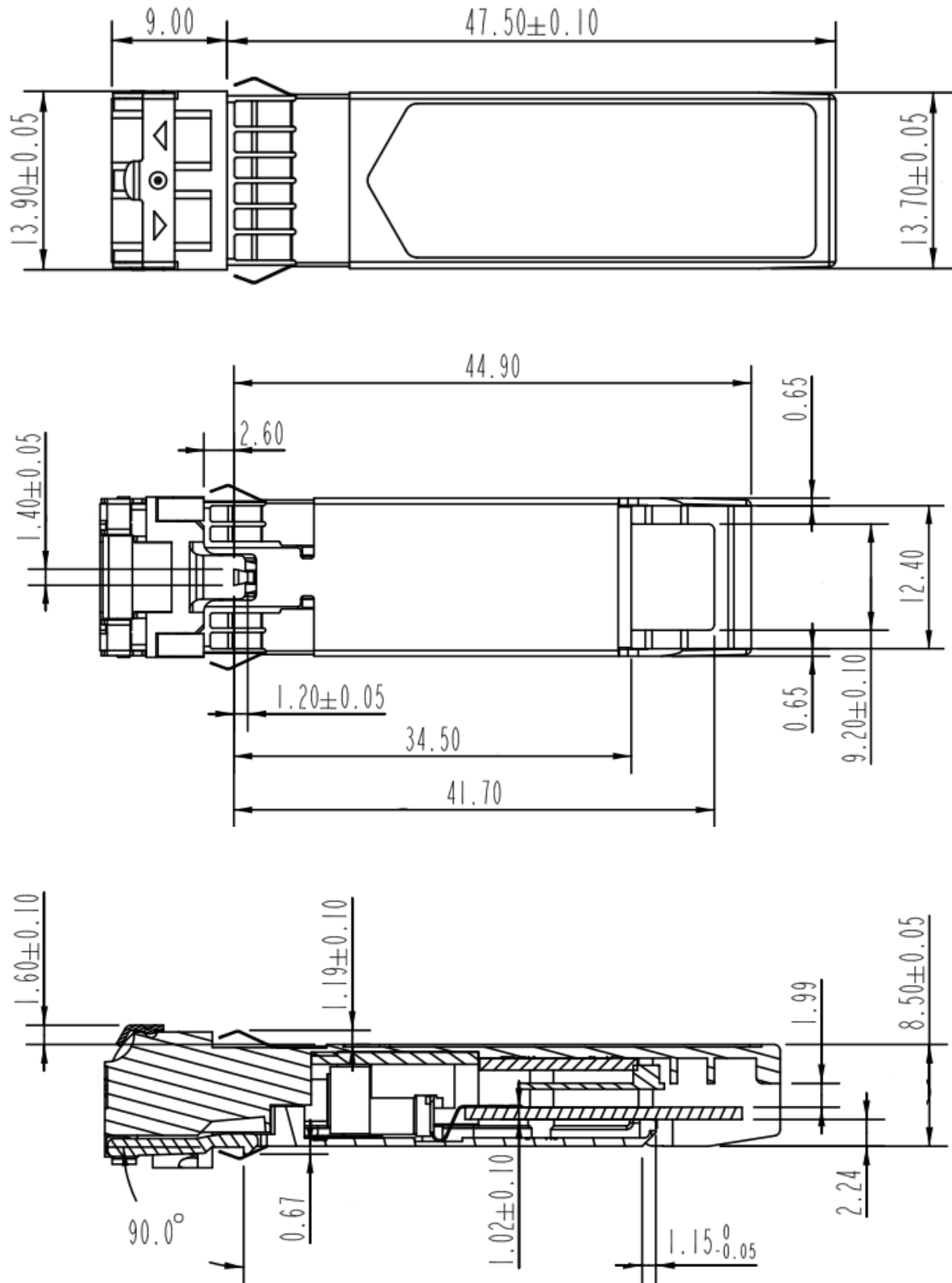
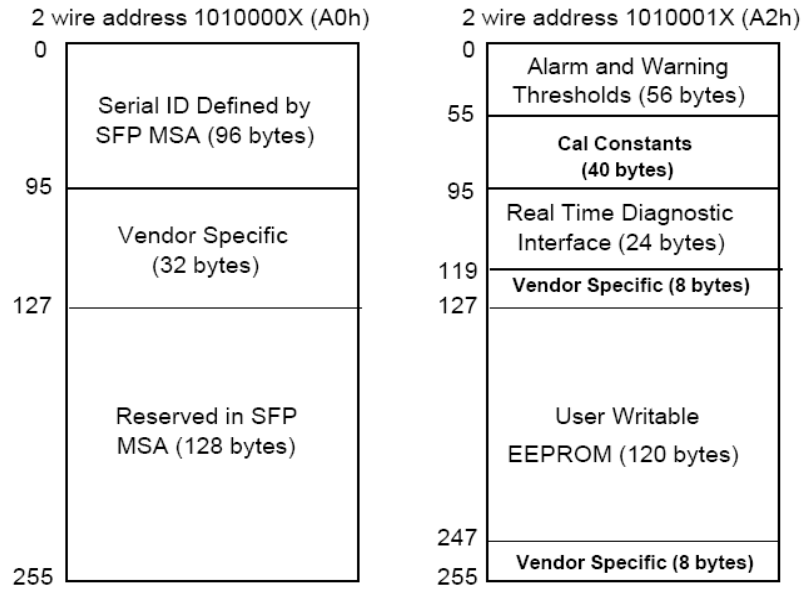


Figure5

Digital Diagnostic Memory Map



Ordering Information

Part No.	Specification								
	Pack	Rate	Tx	Pout	Rx	S	Top	Reach	Others
MTRS-1S60-01	SFP+	10G	1550nm DFB	-4.7~+4dBm	PIN-TIA	≤-15.8dBm	0~70℃	40km	DDM/RoHS

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