

TITLE: 10G SFP+ CWDM 20km Transceiver	DOC No.	DTRX-2020305
	REVISION : 01	AUTHORIZED BY : Mike Sun
	DATE : 2022.03.11	CLASSIFICATION : Optical Transceiver

1. SCOPE

SFP+ CWDM Transceiver is designed for 10GBASE-LR/LW, and 8.5G/10G Fiber-Channel applications. The transceiver consists of two sections: The transmitter section incorporates a DFB laser. And the receiver section consists of a PIN photodiode integrated with a TIA. All modules satisfy class I laser safety requirements. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472, which allows real-time access to device operating parameters such as transceiver

2. PRODUCT FEATURES

- Electrical interface specifications per SFF-8431
- Management interface specifications per SFF-8431 and SFF-8472
- SFP+ MSA package with duplex LC connector
- CWDM DFB Transmitter
- Up to 11.3Gb/s bi-directional data links
- Single +3.3V power supply
- Class 1 laser safety certified
- Operating Case Temperature: Standard: 0 to +70°C / Industrial: -40 to +85°C
- Up to 20km on 9/125µm SMF
- RoHS Compliant

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PRODUCT SPECIFICATION

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3. APPLICABLE DOCUMENTS AND SPECIFICATIONS

- 10G BASE-LR/LW (with/without FEC)
- 10G Fiber Channel (with/without FEC)

4. PRODUCT DESCRIPTION

4.1 PRODUCT NAME AND SERIES NUMBER(S)

10G SFP+ CWDM 20km Transceiver

Part Number	Data Rate	Wavelength (nm)	Distance	Media	Power (dBm)	Sen. (dBm)	Connector	Tem.
P58000BECZ2001	10G	1270nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2001	10G	1270nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2002	10G	1290nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2002	10G	1290nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2003	10G	1310nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2003	10G	1310nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2004	10G	1330nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2004	10G	1330nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2005	10G	1350nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2005	10G	1350nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2006	10G	1370nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2006	10G	1370nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2007	10G	1390nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2007	10G	1390nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2008	10G	1410nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2008	10G	1410nm	20Km	SMF	0 ~ 6	-14.4	LC	I

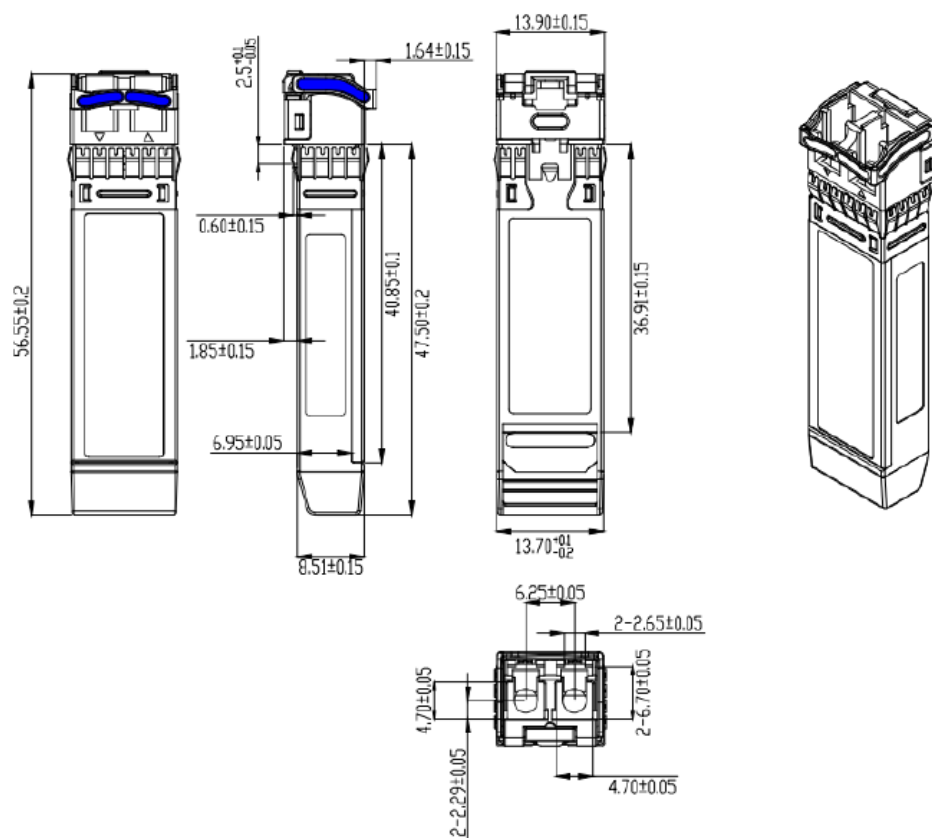
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P58000BECZ2009	10G	1430nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2009	10G	1430nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2010	10G	1450nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2010	10G	1450nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2011	10G	1470nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2011	10G	1470nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2012	10G	1490nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2012	10G	1490nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2013	10G	1510nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2013	10G	1510nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2014	10G	1530nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2014	10G	1530nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2015	10G	1550nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2015	10G	1550nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2016	10G	1570nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2016	10G	1570nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2017	10G	1590nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2017	10G	1590nm	20Km	SMF	0 ~ 6	-14.4	LC	I
P58000BECZ2018	10G	1610nm	20Km	SMF	0 ~ 6	-14.4	LC	C
P58000BEIZ2018	10G	1610nm	20Km	SMF	0 ~ 6	-14.4	LC	I

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4.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING



5. Absolute Maximum Ratings & Recommended Operating Conditions

Absolute Maximum Ratings				
Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	+85	°C
Supply Voltage	VCC3	-0.5	4.0	V
Relative Humidity (Non-condensing)	RH	5	95	%

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Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature(C-temp)	TC	0	-	70	°C
Operating Case Temperature(I-temp)	TI	-40	-	85	°C
Power Supply Voltage	VCC3	3.1	3.3	3.5	V
	ICC3	-	-	350	mA
Power Dissipation for C Temp	P _D	-	-	1.1	W
Power Dissipation for I Temp	P _D	-	-	1.2	W
Data Rate	-	8.5	10.3125	11.3	Gbps
Transmission Distance	TD	-	-	20	Km

Transmitter Operating Characteristic-Optical, Electrical

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Center Wavelength	λ_c	$\lambda-6.5$	λ	$\lambda+6.5$	nm	1
Ave. output power (Enabled)	Pavg	0	-	6	dBm	
Extinction Ratio	ER	3.5	-	-	dB	2
Pout @TX-Disable Asserted	Poff			-30	dBm	
Relative Intensity Noise	RIN12OMA	-	-	-128	dB/Hz	
Side Mode Suppression Ratio	SMSR	30			dB	2
Optical Return Loss Tolerance	ORLT	-	-	21	dB	

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Receiver Operating Characteristic-Optical, Electrical

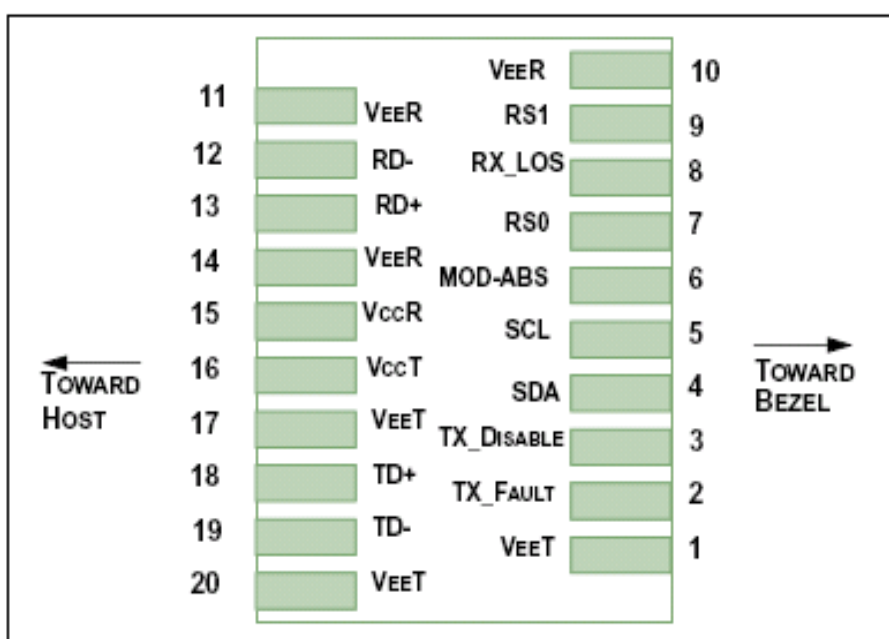
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Center Wavelength	λ_r	1260		1620	nm	
Receiver Sensitivity	PSEN1	-	-	-14.4	dBm	
LOS Assert	Pa	-35	-	-	dBm	
LOS De-assert	Pd	-	-	-15	dBm	
LOS Hysteresis	Pd-Pa	0.5	-	-	dB	
Receiver Overload (Pavg)	P _{oL}	-1			dBm	
Optical Return Loss	ORL	26			dB	

Electrical Characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Input Differential Impedance			100		Ω	
Differential Data Input Swing		180		700	mV	
Differential Data Output Swing		300		850	mV	
Tx_Fault LOS Output Voltage	High	2.0		V _{CCHOST}	V	
	Low	0		0.8	V	
Tx_Disable	VIH	2.0		V _{CCHOST}	V	
	VIL	0		0.8	V	

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6. Applications Note:



Pin Definitions

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	Rate Select 0, optionally controls SFP+ module receiver.	Note6
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 as Signal Detect)	Note2
9	LVTTL-I	RS1	Rate Select 1, optionally controls SFP+ module transmitter	Note6

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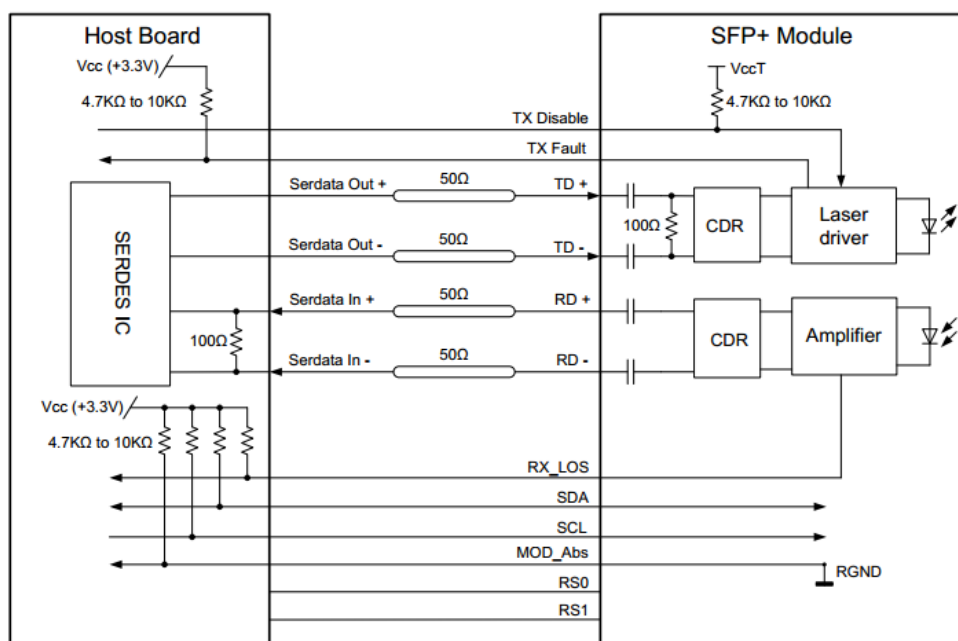
10		VeeR	Module Receiver Ground	Note1
11		VeeR	Module Receiver Ground	Note1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		VeeR	Module Receiver Ground	Note1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module 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:

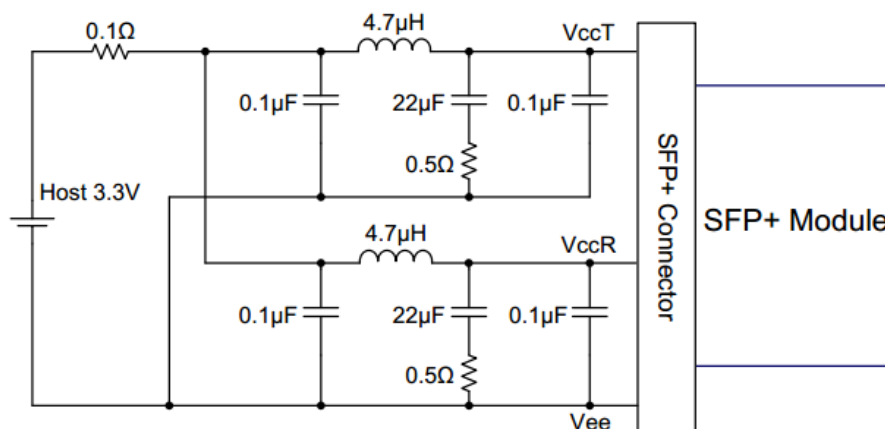
- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT/R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.*
- TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7K – 10 KΩ resistor. Its states are: Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined High (2.0 – 3.465V): Transmitter Disabled Open: Transmitter Disabled*
- Module Absent, connected to VeeT or VeeR in the module.*
- LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT/ R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.*
- The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.*
- RD-/+ : These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 350 and 700 mV differential (175 – 350 mV single ended) when properly terminated.*

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Recommended Interface Block Diagram

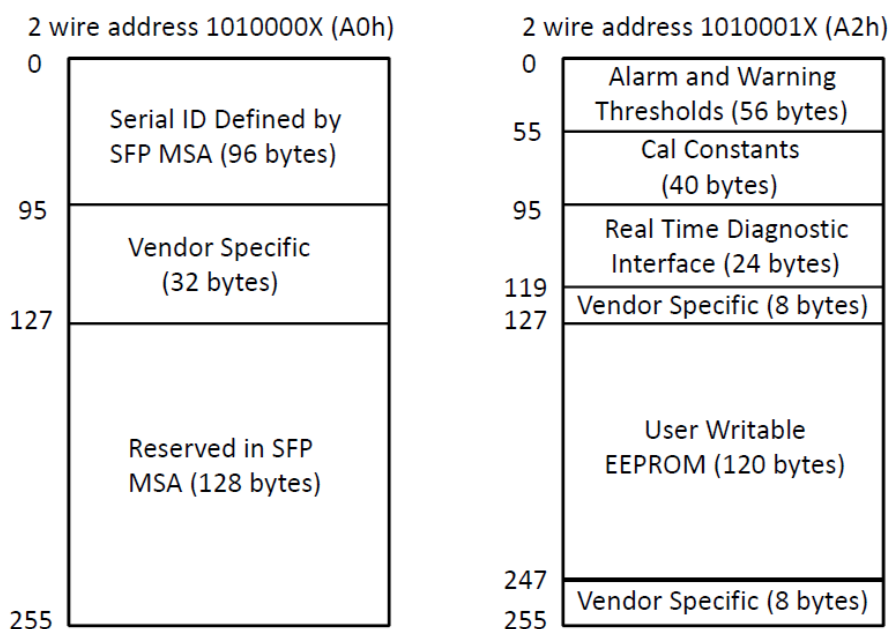


Recommended Host Board Power Supply Circuit



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7. Digital Diagnostic Memory Map



8. Modification History

Rev.	Comments	Date	Originator	Approval
01	Preliminary Draft	2022.03.11	Mike Sun	Ray Yang

