

155M SFP Transceiver

Features:

- Hot-pluggable capability
- Digital diagnostic monitoring
- MQW FP Structure or DFB Laser or VCSEL
- Duplex LC connector
- Single +3.3V supply & LVPECL data interface
- LVTTTL logic level RX LOS
- Class 1 Laser Safety Compliance
- Detailed product information in EEPROM
- Excellent EMI & ESD protection
- Qualified to meet the intent of Bellcore reliability practices
- Compliant with SFP MSA specification
- Links of narrow 、 intermediate or long reach with single or Multi-mode fiber

Applications:

- ATM
- SONT/SDH/PDH
- FDDI
- Fiber Channel

Function description :

The BE- serial SFP (Small Form Factor Pluggable) transceivers is compliant with SFP MSA (Multi-Source Agreement). All modules satisfy Class I Laser Safety requirements in accordance with the international IEC-825 standards.

The transmit and receive functions are contained in a SFP 20 pin package with a Duplex LC or SC connector interface. The transmitter incorporates a highly reliable 1310 nm or 1550 nm Laser (FP laser for narrow、 Intermediate distance and DFB laser for long distance) and a driver circuit which converts data to light with APC function. The output power can be disable via he single TX_Disable pin. Logic LVTTTL HIGH level disables the transmitter. The receiver incorporates an efficient InGaAs/InP PIN or APD photodiode receiver converting the light signal into an electrical current which is amplified and regenerated into data. The transimpedance amplifier IC has internal AGC for wide dynamic range. The postamplifier is AC coupled to preamplifier through a capacitor and a low pass filter. It can be enough to pass the signal from 155Mb/s without significant sensitivity. A Signal Detect status output flag is also provided.

The transceiver operates from a single +3.3V power supply over an operating temperature range of 0 to +70°C. The transceiver uses the SFP 20-pin connector to allow hot plug capability. Detailed product information in EEPROM and digital diagnostic monitoring is offered

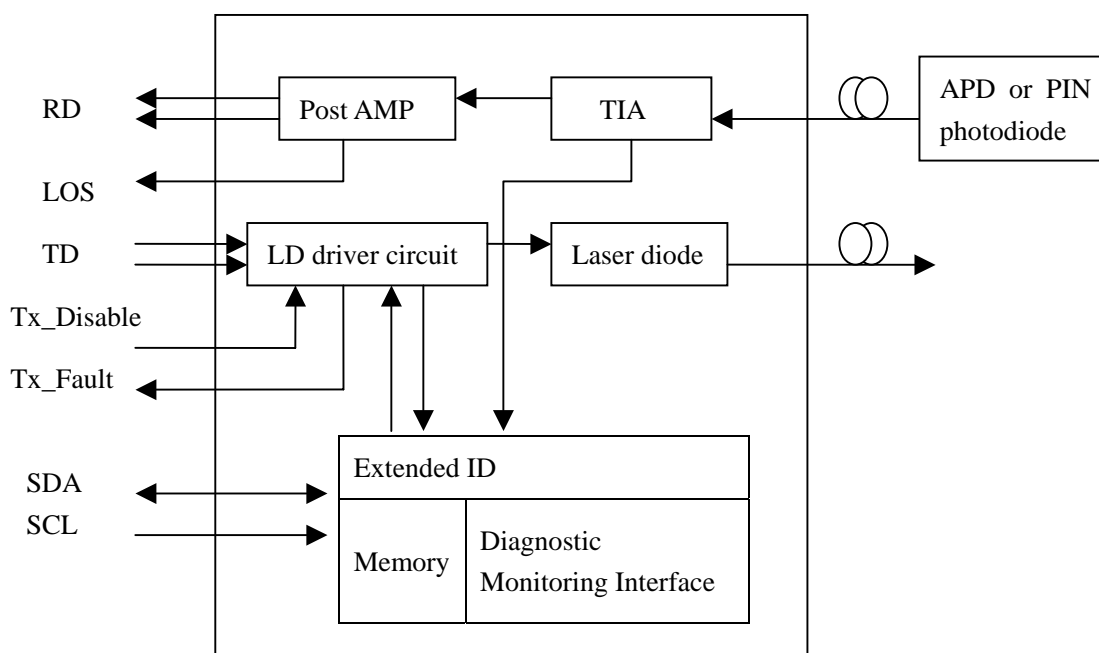


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Function Block Diagram:**Specifications:**

Absolute Maximum Ratings						
Parameter	Symbol	Min	Max	Unit		
Supply Voltage	VCC	0	+3.6	V		
Operating Temperature	T _{OP}	-40	+85			
Recommended Operating Conditions						
Parameter	Symbol	Min	Max	Unit		
Supply Voltage	VCC	+3.1	+3.6	V		
Operating Temperature	T _{OP}	0	+70			
Optical characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	
Transmitter						
Optical output	P ₀	1	0	+1	+3	dBm
		2	-5	-3	0	
		3	-8	-6	-5	
		4	-15	-10	-8	
Extinction ratio	ER	13	-	-	dB	
Optical wavelength		1 [*]	1270	1310	1340	nm
		2 [*]	1530	1550	1570	
		3 [*]	820	850	860	



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Spectral width		FP	-	-	4	nm
		DFB	-	-	1	
Spectral width		vcSEL			1	nm
Rise time	Tr		-	-	2	ns
Fall time	Tf		-	-	2	ns
Transmitter outout eye	compliant with Eye Mask Defined in 802.3z standard					
Receiver						
Sensitivity	Sen	1*	-	-36	-34	dBm
Saturation			-3	-	-	dBm
Optical wavelength		1-2*	1100	-	1600	nm
		3*	770	850	860	
Signal detect asserted	P _A		-	-	-34	dBm
Signal detect deasserted	P _D		-48	-	-	dBm
Electrical characteristics						
Parameter	Symbol	Min	Typical	Max	Unit	
Transmitter						
Data rate (NRZ)	B	-	155	-	Mb/s	
Supply voltage	V _{CCT}	+3.1	+3.3	+3.6	V	
Supply current	I _{CCT}	-	70	130	mA	
Input HIGH Voltage	V _{IH}	V _{CCT} -1.165	-	V _{CCT} -0.700	V	
Input LOW Voltage	V _{IL}	V _{CCT} -1.890	-	V _{CCT} -1.475	V	
Transmitter Enable voltage	V _{EN}	-	-	0.8	V	
Transmitter Disable voltage	V _D	2	-	-	V	
Receiver						
Data rate (NRZ)	B	-	155	-	Mb/s	
Supply voltage	V _{CCR}	+3.1	+3.3	+3.6	V	
Suplly current	I _{CCR}	-	80	150	mA	
Data Output High	V _{OH}	V _{CCR} -1.025	-	V _{CCR} -0.880	V	
Data Output LOW	V _{OL}	V _{CCR} -1.810	-	V _{CCR} -1.620	V	
LOS Low Voltage	V _{LOUT}	-	-	0.8	V	
LOS High Voltage	V _{HOUT}	2.0	-	-	V	

(Sensitivity and saturation levels for a $2^{23}-1$ PRBS with 72 ones and 72 zeros inserted over temperature)



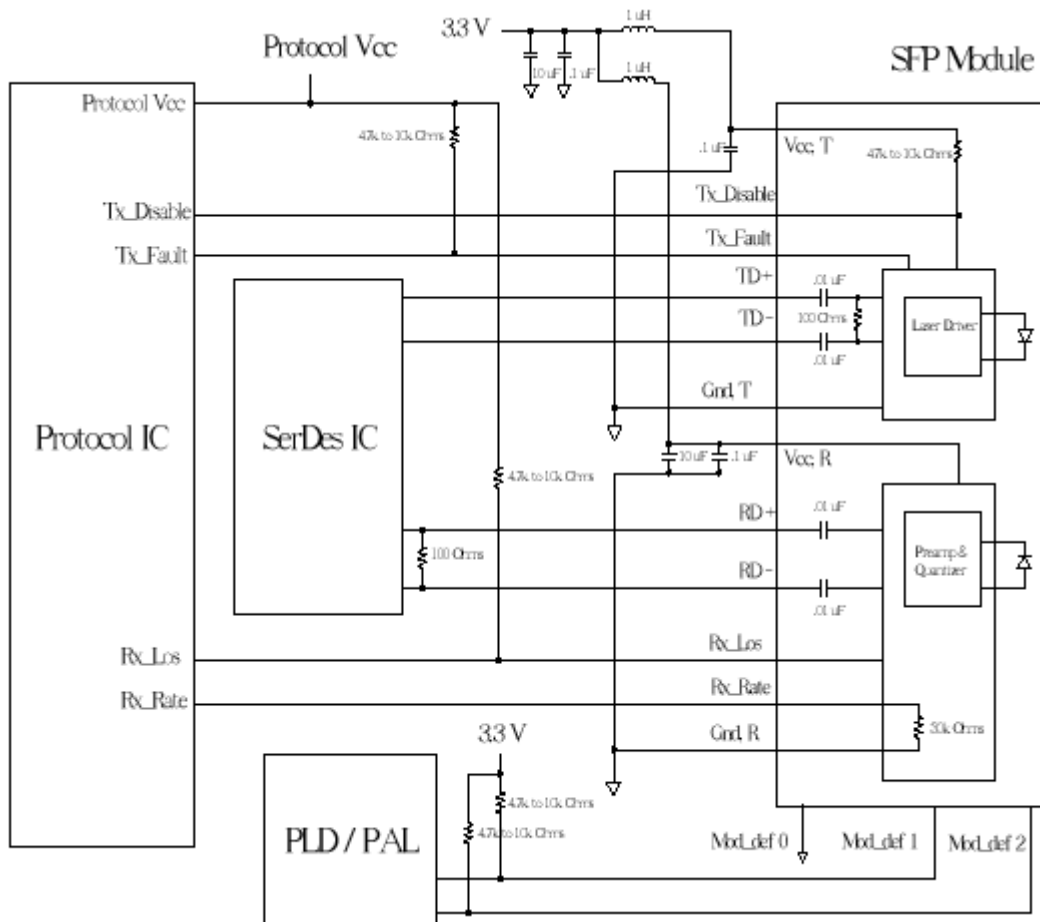
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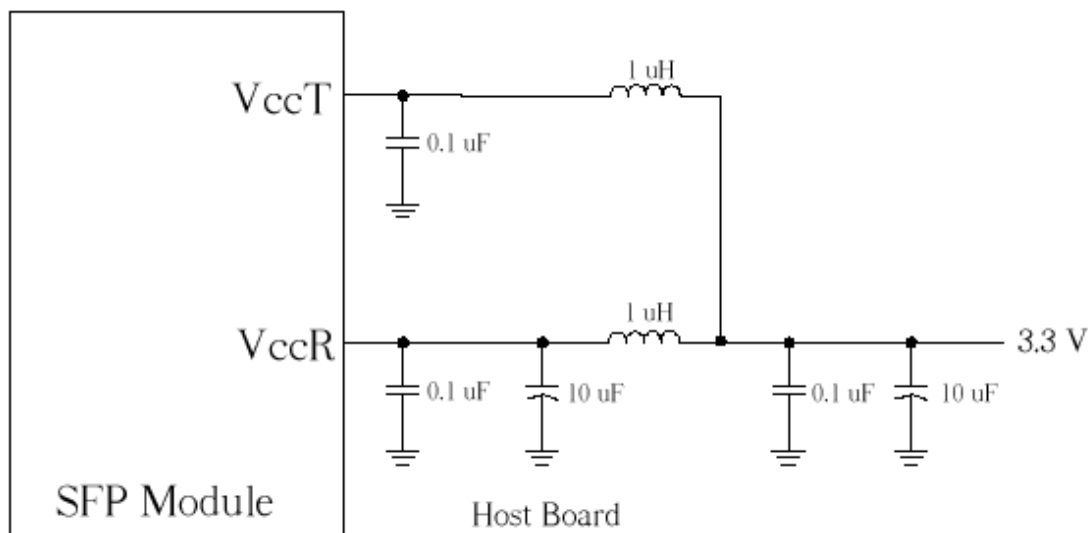
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Recommended Circuit :



Example SFP Host Board Schematic



Recommended Host Board Supply Filtering Network



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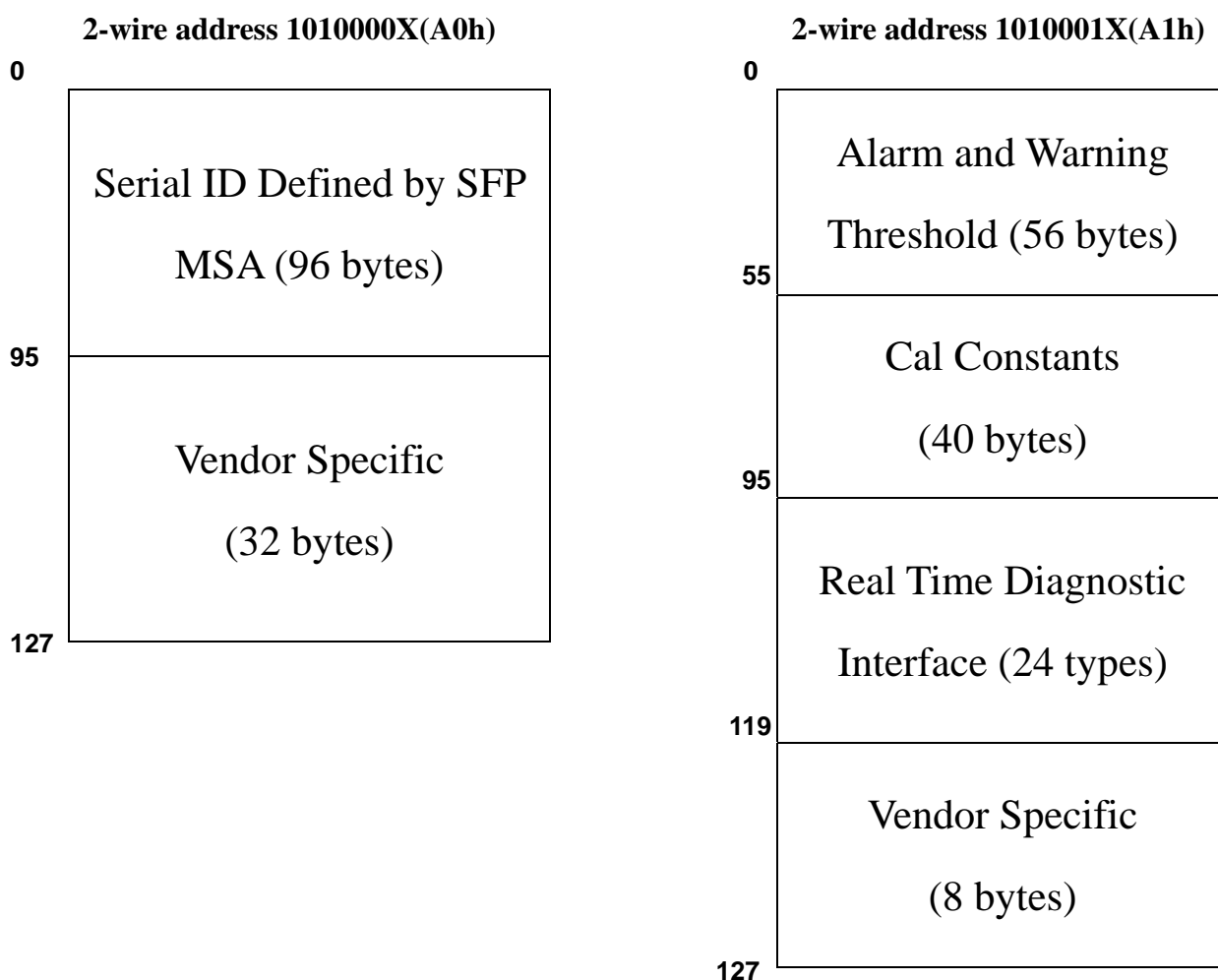
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EEPROM Description:

The SFP module contains an EEPROM. It provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, and manufacturer. The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C01A/02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL MOD_DEF1). The positive edge clocks data into those segments of the EEPROM that are not write-protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA MOD_DEF2) is bi-directional for serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

The module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56-95 at wire serial bus address A2h. The digital diagnostic memory map specific data field define ad following.



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PIN description:

Pin Name	PIN	Name/Function
GNDR	9、10、11、14	Receiver Ground
VCCR	15	Receiver Supply Voltage. They are defined as $+3.3V \pm 5\%$ at the SFP connector pin. Recommended host board power supply filtering is shown below. The DC resistance of inductor is less than 1Ω , which result in maintaining the required voltage at the SFP input pin with $+3.3V$ supply voltage.
RD-	12	Receiver Data, Differential Output. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω 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 370mV and 2000mV differential when properly terminated.
RD+	13	Receiver Data, Differential Output. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω 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 370mV and 2000mV differential when properly terminated.
LOS	8	Receiver Loss of Signal, logic high, open collector compatible, 4.7K to 10K Ohm pull up to VCCR on host
Rate Select	7	NC.
GNDT	1、17、20	Transmitter Ground
VCCT	16	Transmitter Supply Voltage. They are defined as $+3.3V \pm 5\%$ at the SFP connector pin. Recommended host board power supply filtering is shown below. The DC resistance of inductor is less than 1Ω , which result in maintaining the required voltage at the SFP input pin with $+3.3V$ supply voltage.
TD+	18	Transmit Data, Differential Input. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω inside the module. The AC coupling is done inside the module and is thus not required on the host board.
TD-	19	Transmit Data, Differential Input. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω inside the module. The AC coupling is done inside the module and is thus not required on the host board.
TX_Disable	3	Transmitter Disable, logic high, open collector compatible, 4.7K to 10K Ohm pull up to VCCT on SFP. The pin is used to shut down the transmitter optical output. High is transmitter Disabled, Low is transmitter on.
TX_Fault	2	Transmitter Fault, logic high, open collector compatible, 4.7K to 10K Ohm pull up to VCCT on host. When high, output indicates a laser fault of some kind. Low indicates normal operation.
MOD_DEF0	6	SFP module definition and presence, bit 0, 4.7K to 10K Ohm pull up to VCCT on host. The pin is grounded by the module to indicate that the module is present.



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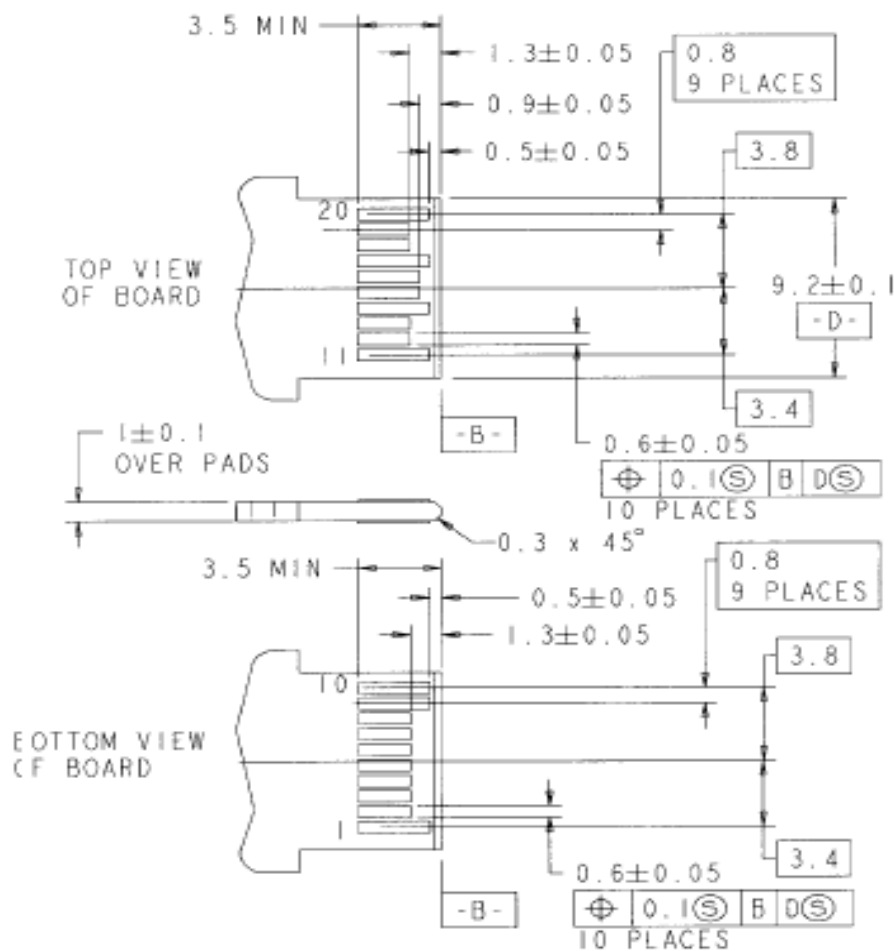
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MOD_DEF1	5	SFP module definition and presence, bit 1, 4.7K to 10K Ohm pull up to VCCT on host. The pin is the clock line of two wire serial interface for serial ID
MOD_DER2	4	SFP module definition and presence, bit 2, 4.7K to 10K Ohm pull up to VCCT on host. The pin is the data line of two wire serial interface for serial ID.

Pattern Layout of SFP Printed Circuit Board: (Unit: mm)



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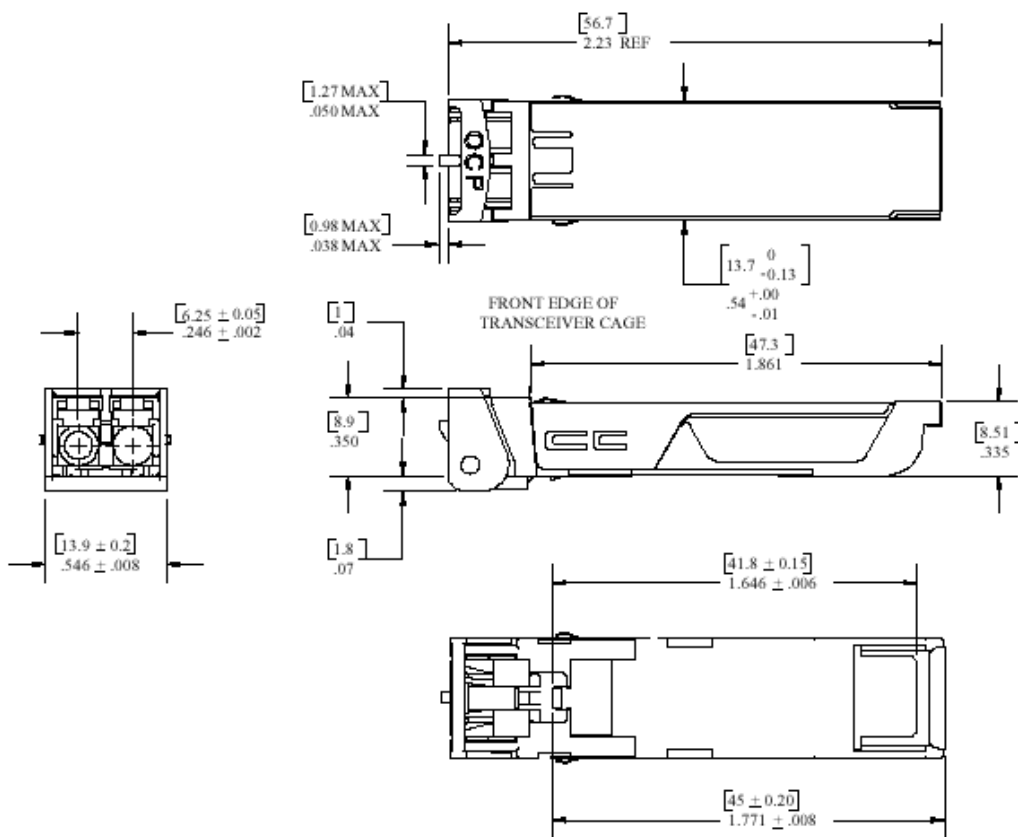
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Dimensions configuration :

Package Outline Unit: [mm] inch



Ordering Information :

Model	Rate	Optical source	Receptacle	Voltage	Distance
T					()
T=Transceiver	155=155Mbs	V8=850nm VCSEL	SC=SC	3v=3.3v	550=550m
	125=1.25Gbs	E3=1310nm LED	FC=FC	5v=5v	02=2Km
		F3=1310nmFP LD	ST=ST	XX=3.3v/5v	20=20Km
		F5=1550nmFP LD	BS=SC Bi-Di		40=40Km
		D3=1310nmDFB LD	BL=LC SFP Bi-Di		60=60Km
		D5=1550nmDFB LD	GB=SC GBIC		80=80Km
			LC=SFP LC		100=100Km

For example : T125-F3-LC-3V-20



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