

10G BASE BX-10 SFP+ Transceiver modules (With DDM Function) WST-SFP+BX1-xxC Series



10GBase BX10 -D



10GBase BX10 -U

Applications:

- 10GBASE-BX at 10.3125
- 10GBASE-BX at 9.953

Standards:

- Compliant with SFF-8472 SFP+ MSA
- Compliant with IEEE802.3ae 10GBASE-LR
- Compliant to SFP+SFF-8431 and SFF-8432

Features:

- Up to 11.1Gbps Data Links
- Up to 10km transmission on SMF
- Power dissipation < 1W
- 1270/1330 DFB laser and PIN receiver
- EEPROM with Serial ID functionality
- 2-Wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable
- Single Mode LC receptacle BI-directional Transceiver
- Compliant with SFP+MSA with LC connector
- Single +3.3V Power Supply
- Operating temperature range:
Commercial version: -5C~ +70C
Industrial version : -40C~ +85C
- Compliant with RoHS

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	T _s	°C	-40	+85
Relative Humidity	RH	%	5	95
Power Supply Voltage	V _{cc}	V	-0.3	+4
Signal Input Voltage		V	V _{cc} -0.3	V _{cc} +0.3

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Temperature Range	T _c	°C	-5		+70
			-40		+85
Power Supply Voltage	V _{cc}	V	3.14		3.47
Data rate		Gbps		10.3125	

Specifications (tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Launched Power	PO	-6	-	-1	dBm	
Average Launched Power(Laser Off)	POUT-OFF	-	-	-30	dBm	Note (1)
Center Wavelength Range	λ C	1320	1330	1340	nm	BX10-D
		1260	1270	1280		BX10-U
Side mode suppression ratio	SMSR	30	-	-	dB	
Spectrum Bandwidth(-20dB)	σ	-	-	1	nm	
Extinction Ratio	ER	3.5		-	dB	Note (2)
Output Eye Mask	Compliant with IEEE 0802.3ae					Note (2)
Receiver						
Input Optical Wavelength	λ IN	1260	1270	1280	nm	BX10-D
		1320	1330	1340		BX10-U
Receiver Sensitivity in average	PIN	-	-	-15	dBm	Note (3)
Input Saturation Power (Overload)	PSAT	0.5	-	-	dBm	Note (3)
LOS -Assert Power	PA	-30	-	-	dBm	
LOS -Deassert Power	PD	-	-	-17	dBm	
LOS -Hysteresis	PHys	0.5	-	5	dB	

Note1, The optical power is launched into SMF

Note2, Measured with RPBS 2^31-1 test pattern @10.3125Gbs

Note3, Measured with RPBS 2^31-1 test pattern @10.3125Gbs BER=<10^-12

Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Total power supply current	Icc	-	230	300	mA	
Transmitter						
Differential Data Input Voltage	VDT	180	-	700	mVp-p	
Differential line input Impedance	RIN	85	100	115	Ohm	
Transmitter Fault Output-High	VFaultH	2.4	-	Vcc	V	
Transmitter Fault Output-Low	VFaultL	-0.3	-	0.8	V	
Transmitter Disable Voltage- High	VDisH	2	-	Vcc+0.3	V	
Transmitter Disable Voltage- low	VDisL	-0.3	-	0.8	V	
Receiver						
Differential Data Output Voltage	VDR	300	-	850	mVp-p	
Differential line Output Impedance	ROUT	80	100	120	Ohm	
Receiver LOS Pull up Resistor	RLOS	4.7	-	10	KOhm	
Data Output Rise/Fall time	tr/ff		-	38	ps	
LOS Output Voltage-High	VLOSH	2	-	Vcc	V	
LOS Output Voltage-Low	VLOSL	-0.3	-	0.4	V	

EEPROM Serial ID Memory Contents

Accessing Serial ID Memory uses the 2 wire address 1010000X(A0h). Memory Contents of Serial ID are shown in below Table .

Data Address	Size (Bytes)	Name of Field	Contents(Hex)	Description
BASE ID FIELDS				
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	GBIC/SFP function is defined by two-wire interface ID only
2	1	Connector	07	LC Connector
3-10	8	Transceiver	20 00 00 00 00 00 00 00	10GBASE-LR
11	1	Encoding	06	64B/66B
12	1	BR-Normal	67	10.3Gbps
13	1	Rate Identifier	00	unspecified
14	1	Length (9um)-km	0A	10km
15	1	Length (9um)	64	10km
16	1	Length(50um)	00	not support MMF
17	1	Length(62.5um)	00	not support MMF
18	1	Length (Copper)	00	not support copper
19	1	Length(OM3)	00	not support MMF
20-35	16	Vendor name	43 49 53 43 4F 2D 57 53 54 20 20 20 20 20 20 20	CISCO-WST
36	1	Channel Spacing	00	
37-39	3	Vendor OUI	00 0F 0E	
40-55	16	Vendor PN	57 53 54 2D 53 46 50 2B 42 58 31 2D 55 49 43 20 57 53 54 2D 53 46 50 2B 42 58 31 2D 44 49 43 20	WST-SFP+BX1-UIC/ WST-SFP+BX1-DIC
56-59	4	Vendor rev	31 2E 30 20	
60-61	2	Wavelength	00H 00H/00H 00H	Transceiver wavelength
62	1	DWDM Wavelength	00	
63	1	CC Base	xx	Check add. 0 to 62
64-65	2	Options	00 1A	TxDisable, TxFault, LOS implemented

66	1	BR,max	00	
67	1	BR,min	00	
68-83	16	Vendor SN	XXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXX	
84-91	8	Data code	XXXXXXXXXXXXXXXXXX	
92	1	Diagnostic Monitoring Type	68	Internal cal., Average power
93	1	Enhanced Options	F0	Alarm/Warning flags, Soft TxDisable, Soft TxFault, Soft RxLOS implemented
94	1	SFF-8472 Compliance	03	Rev. 10.0
95	1	CC_EXT	xx	Check add. 64 to 94
96-127	32	Vendor Specific		Vendor Specific EEPROM
128-255	128	Reserved	00H	

A2H

Data Address	Name of Field	Value (Hex)	Description
Alarm and Warning Thresholds			
0	Temp High Alarm	5A	90.0°C
1		00H	
2	Temp Low Alarm	D3H	-45.0°C
3		00H	
4	Temp High Warning	55H	85.0°C
5		00H	
6	Temp Low Warning	D8H	-40.0°C
7		00H	
8	Voltage High Alarm	8DH	3.63V
9		CCH	
10	Voltage Low Alarm	74H	2.97V
11		04H	
12	Voltage High Warning	87H	3.465V
13		5AH	
14	Voltage Low Warning	7AH	3.135V

15		76H	
16	Bias High Alarm	AFH	90mA
17		C8H	
18	Bias Low Alarm	0FH	8mA
19		A0H	
20	Bias High Warning	A4H	84mA
21		10H	
22	Bias Low Warning	12H	9.6mA
23		C0H	
24	TX Power High Alarm	57H	3.5dBm
25		73H	
26	TX Power Low Alarm	02H	-12.20dBm
27		5BH	
28	TX Power High Warning	2BH	0.50dBm
29		D4H	
30	TX Power Low Warning	05H	-8.20dBm
31		EAH	
32	RX Power High Alarm	57H	3.5dBm
33		73H	
34	RX Power Low Alarm	00H	-18.4dBm
35		91H	
36	RX Power High Warning	2BH	0.5dBm
37		D4H	
38	RX Power Low Warning	01H	-14.4dBm
39		6BH	
40-55	Reserved	00H	Reserved for future monitored quantities
Calibration Constants			
56	Rx_PWR(4)	00H	0
57		00H	
58		00H	
59		00H	
60	Rx_PWR(3)	00H	0
61		00H	
62		00H	
63		00H	

64	Rx_PWR(2)	00H	0
65		00H	
66		00H	
67		00H	
68	Rx_PWR(1)	3FH	1
69		80H	
70		00H	
71		00H	
72	Rx_PWR(0)	00H	0
73		00H	
74		00H	
75		00H	
76	Tx_I(Slope)	01H	1
77		00H	
78	Tx_I(Offset)	00H	0
79		00H	
80	Tx_PWR(Slope)	01H	1
81		00H	
82	Tx_PWR(Offset)	00H	0
83		00H	
84	T (Slope)	01H	1
85		00H	
86	T (Offset)	00H	0
87		00H	
88	V (Slope)	01H	1
89		00H	
90	V (Offset)	00H	0
91		00H	
92-94	Reserved	00H	Reserved
95	Checksum	Check Sum(Variable)	The low order 8 bits of the sum of bytes 0 – 94.
Real Time A/D Values			
96	Temperature MSB	XX	Internally measured transceiver temperature.
97	Temperature LSB	XX	
98	Vcc MSB	XX	Internally measured supply voltage in transceiver.
99	Vcc LSB	XX	

100	TX Bias Current MSB	XX	Internally measured TX bias current.	
101	TX Bias Current LSB	XX		
102	TX Power MSB	XX	Measured TX optical output power.	
103	TX Power LSB	XX		
104	RX Power MSB	XX	Measured RX optical input power.	
105	RX Power LSB	XX		
106-109	Reserved	00	Reserved	
Status/Control Bits				
	Name	Bit	Binary	Optional Staus/Control Bits
110	TX Disable State	7	X	Digital state of the TX Disable Input Pin
	Soft TX Disable Command	6	0	Read/write bit that allows software disable of laser. Writing '1' disables laser.
	Reserved	5	0	Reserved
	RX Rate Select State	4	not support	Digital state of the SFP RX Rate Select Input Pin
	Soft RX Rate Select Command	3	not support	Read/write bit that allows software RX rate select. Writing '1' selects full bandwidth operation. This bit is "OR'd with the hard RX RATE_SELECT pin value.
	TX Fault	2	X	Digital state of the TX Fault Output Pin.
	LOS	1	X	Digital state of the LOS Output Pin.
	Data_Ready_Bar	0	X	Indicates transceiver has achieved power up and data is ready when this bit set low.
111	Reserved	00H	Reserved	
Alarm and Warning Flag Bits				
	Name	Bit	Binary	Optional Staus/Control Bits
112	Temp High Alarm	7	X	Set when temperature monitor value exceeds high alarm level.
	Temp Low Alarm	6	X	Set when temperature monitor value exceeds low alarm level.
	Vcc High Alarm	5	X	Set when Vcc monitor value exceeds high alarm level.
	Vcc Low Alarm	4	X	Set when Vcc monitor value exceeds Low alarm level.
	TX Bias High Alarm	3	X	Set when TX bias monitor value exceeds high alarm level.

	TX Bias Low Alarm	2	X	Set when TX bias monitor value exceeds low alarm level.
	TX Power High Alarm	1	X	Set when TX power monitor value exceeds high alarm level.
	TX Power Low Alarm	0	X	Set when TX power monitor value exceeds low alarm level.
113	RX Power High Alarm	7	X	Set when RX power monitor value exceeds high alarm level.
	RX Power Low Alarm	6	X	Set when RX power monitor value exceeds low alarm level
	Reserved Alarm	5-0	0	Reserved
114	Reserved	00H	Reserved	
115	Reserved	00H	Reserved	
116	Temp High Warning	7	X	Set when temperature monitor value exceeds high Warning level.
	Temp Low Warning	6	X	Set when temperature monitor value exceeds low Warning level.
	Vcc High Warning	5	X	Set when Vcc monitor value exceeds high Warning level.
	Vcc Low Warning	4	X	Set when Vcc monitor value exceeds Low Warning level.
	TX Bias High Warning	3	X	Set when TX bias monitor value exceeds high Warning level.
	TX Bias Low Warning	2	X	Set when TX bias monitor value exceeds low Warning level.
	TX Power High Warning	1	X	Set when TX power monitor value exceeds high Warning level.
	TX Power Low Warning	0	X	Set when TX power monitor value exceeds low Warning level.
117	RX Power High Warning	7	X	Set when RX power monitor value exceeds high Warning level.
	RX Power Low Warning	6	X	Set when RX power monitor value exceeds low Warning level
	Reserved Warning	5-0	0	Reserved
118	Extended	00H	Bit0: Power Level Select	

	Control/Status		Bit1: Class2 Operation State Bit2: Reserved Bit3: Soft RS(1) Select
119-122	Reserved	00H	Reserved
Vendor Specific and User Accessible			
123	Password entry	00H	Don't care value. Cisco requires NO password on SFP+. Writing any values to these locations must not otherwise affect device.
124		00H	
125		00H	
126		00H	
127	Table select	00H	Don't care value. Cisco requires NO Table or Offset Select on SFP+. No "write" should be needed for subsequent reads/writes to address 128 to 247, A2h. Writing any values to these locations must not otherwise affect device.
128	User EEPROM(CLEI Code)	49H/49H	CLEI code. 10 Characters, alphanumeric represented as ASCII. The CLEI is IPUIBWMRAA/ IPUIBWLRAA
129		50H/50H	
130		55H/55H	
131		49H/49H	
132		42H/42H	
133		57H/57H	
134		4DH/4CH	
135		52H/52H	
136		41H/41H	
137		41H/41H	
138	User EEPROM (Cisco Part Number)	31H/31H	Cisco Part Number, alphanumeric represented as ASCII .The Part number is 10-2951-01/10-2952-01
139		30H/30H	
140		2DH/2DH	
141		32H/32H	
142		39H/39H	
143		35H/35H	
144		31H/32H	
145		2DH/2DH	
146		30H/30H	
147		31H/31H	

148	User EEPROM (Cisco VID)	56H	Cisco Version ID (VID) stored as ASCII characters or Vxx <space>, where xx = last 2 digits of Cisco PN. The VID is V01
149		30H	
150		31H	
151		20H	
152	User EEPROM (Temp range)	03H	Operating (case) temperature range of the device 00h = unknown or unspecified 01h = COM, commercial 0C to 70C 02h = EXT, extended -5C to 85C 03h = IND, industrial -40C to 85C
153	User EEPROM	D8H	Minimum operating temperature, Signed 2's complement integer temperature (-40 to +125C).
154	User EEPROM	55H	Maximum operating temperature, Signed 2's complement integer temperature (-40 to +125C).
155	Lgrid	00H	Laser's minimum supported grid spacing (GHz*10), i.e., in units of 0.1 GHz, Not Applicable
156			
157	Reserved	00H	Reserved
158			
159	User EEPROM (CC_USER)	Check Sum(Variable)	Check code for the user EEPROM fields from address 128 to 158, inclusive.
160	User EEPROM (Transceiver)	00H	Transceiver Codes: Compatible Rates for multiple rate SFP+s. All single rate SFP+ shall set these values to 0. · 10GE – Single rate · 8GFC – 2/4/8G (Bytes 160, 164-167 reserved for compatibility with infiniband and fiber channel). · 16GFC – 4/8/16G (Bytes 160, 164-167 reserved for compatibility with infiniband and fiber channel).
161		00H	
162		00H	
163		00H	
164		00H	
165		00H	
166		00H	
167		00H	
168	User EEPROM (LBC_SCALE_NEG40C)	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC.
169			If -40C operation is supported, otherwise 0 if not. Unsigned fixed-point temperature adjustment

			data for LBC & LBC[0] at -40C. Byte 168 is MSB. Byte 169 is LSB.
170	User EEPROM (LBC_SCALE_NEG5C)	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC.
171			Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at -5C. Byte 170 is MSB. Byte 171 is LSB.
172	User EEPROM (LBC_SCALE_20C)	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC.
173			Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at 20C. Byte 172 is MSB. Byte 173 is LSB.
174	User EEPROM (LBC_SCALE_45C)	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC.
175			Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at 45C. Byte 174 is MSB. Byte 175 is LSB.
176	User EEPROM (LBC_SCALE_70C)	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC.
177			Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at 70C. Byte 176 is MSB. Byte 177 is LSB.
178	User EEPROM (LBC_SCALE_85C)	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC.
179			If 85C operation is supported, otherwise 0 if not. Unsigned fixed-point temperature adjustment data for LBC & LBC[0] at 85C. Byte 178 is MSB. Byte 179 is LSB.
180	User EEPROM (TEMP[0])	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC.
181			This is the value of the internal transceiver temperature measured at BOL (time of manufacturing) and under nominal conditions. Represented as 16 bit , signed twos complement value in increments of 1/256

			degrees Celsius. Accuracy shall be within +/- 3C.
182			Reserved for Sonet applications. Optional for GE/FC.
183	User EEPROM (LBC[0])	00H(not support Sonet)	This is the value of Laser Bias Current in μA measured at BOL (time of manufacturing) and under nominal conditions at transceiver temperature of TEMP[0]. Stored as a 16 bit unsigned integer with current defined as full 16 bit value (0-65535), with LSB equal to $2\mu\text{A}$.
184			Reserved for Sonet applications. Optional for GE/FC.
185	User EEPROM (OPT[0])	00H(not support Sonet)	This is the value of the Tx output power measured at BOL (time of manufacturing) and under nominal conditions. Stored as a 16 bit unsigned integer, defined as full 16 bit value (0- 65535) with the LSB equal to $0.1\mu\text{W}$. This yields a total measurement range from 0 to 6.5535mW (~ -40 to $+8.2\text{dBm}$). Accuracy shall be within +/-1dB
186	User EEPROM (Data Provided)	00H(not support Sonet)	Reserved for Sonet applications. Optional for GE/FC. BOL Calibration constants provided. XXXXxxx1 = LBC_SCALE[] (bytes 168-179) XXXXxx1x = TEMP[0] (bytes 180-181) XXXXx1xx = LBC[0] (bytes 182-183) XXXX1xxx = OPT[0] (bytes 184-185)
187	User EEPROM CC_Vendor	Check Sum(Variable)	Check code for Extended ID fields from addresses 160 to 186, inclusive.
188		00H	Reserved for Sonet applications. Optional for GE/FC.
189	User EEPROM (OPR[0]) Read/Write Access required.	00H	Module vendor shall write 0x0h into these bytes at time of manufacturing. These bytes may subsequently be written to by

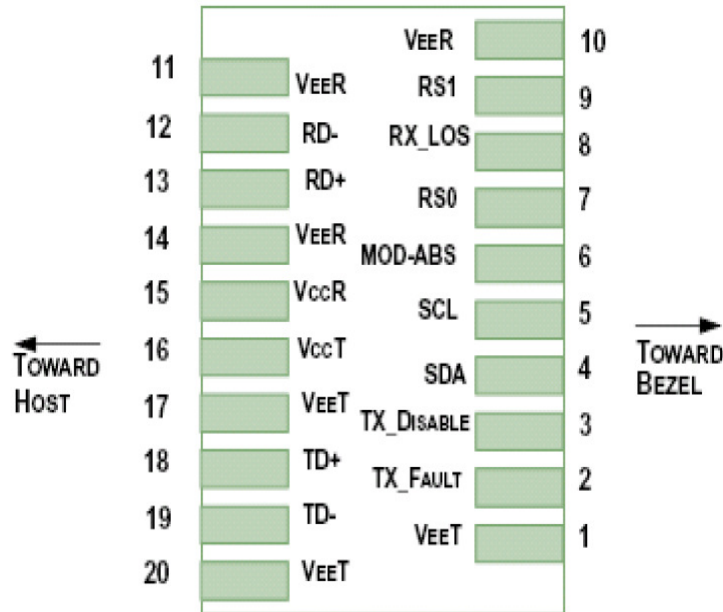
			Cisco software and used to store the initial Rx optical power value when a system is first turned up in the field (to enable end customers to track Rx optical power level changes over time) Stored as a 16 bit unsigned integer, defined as full 16 bit value (0- 65535) with the LSB equal to 0.1µW. This yields a total measurement range from 0 to 6.5535mW (~ -40 to +8.2dBm)
190	User EEPROM Read/Write Access required	AAH	Reserved. The AAh indicates read/write access to 188 to 191 and provides non-zero checksum. This byte may also be written for other customer purposes.
191	User EEPROM Read/Write Access required	Check Sum(Variable)	Check code for Extended ID fields from addresses 188 to 190, inclusive.
192	User EEPROM Read/Write Access required (PID)	53H/53H	Product ID. The text for this field shall be supplied by Cisco. The information shall be left justified starting at address 192, with any unused upper address locations filled by 0x20h (corresponding to the ASCII space character).The PID is SFP-10G-BXU-I/SFP-10G-BXD-I
193		46H/46H	
194		50H/50H	
195		2DH/2DH	
196		31H/31H	
197		30H/30H	
198		47H/47H	
199		2DH/2DH	
200		42H/42H	
201		58H/58H	
202		55H/44H	
203		2DH/2DH	
204		49H/49H	
205		20H	
206	20H		
207	20H		
208	20H		
209	20H		
210	20H		
211	20H		
212	Cisco SFP+ Spec Revision Number	34H	The Revision number of Cisco SFP+

213		30H	specification of EDCS-553508 with which the module complies. The actual number is XX, such as 11, means version 11.
214-222	User EEPROM Read/Write Access required	00H	Reserved.
223	User EEPROM CC_VENDOR Read/Write Access required.	Check Sum(Variable)	Check code for user EEPROM fields from addresses 192 to 222, inclusive.
224	Post Emphasis for Case 1	1E	1.6 inches trace (10GE only)
225	Post Emphasis for Case 2	20	2 inches trace (10GE only)
226	Post Emphasis for Case 3	2A	4 inches trace (10GE only)
227	Post Emphasis for Case 4	2A	5 inches trace (10GE only)
228	Post Emphasis for Case 5	31	6 inches trace (10GE only)
229	Post Emphasis for Case 6	34	8 inches trace (10GE only)
230	Post Emphasis for Case 7	29	4 double stack (10GE only)
231	Post Emphasis for Case 8	36	8 double stack (10GE only)
232	Post Emphasis for Case 9	00H	1.6 inches trace (10GE only)
233	Post Emphasis for Case 10	00H	1.6 inches trace (10GE only)
234	0-2 bit:Electrical Output Emphasis for step settings; bit 6 :Adjustment type; bit 7:Control bit	00H	0-2 bitFor 16GFC only. See the note. The default value is "0."; bit6 :The value "0" = step adjustment. The value "1" = adaptive adjustment. It is read only bit for Cisco. For 16GFC only. See the note.type;7 bit :The value (default) "0" = function disabled. The value "1" = function enabled. For 16GFC only. See the note.
235	0-2 bit:Electrical Output Emphasis for step settings; bit 6 :Adjustment type; bit 7:Control bit	00H	0-2 bitFor 16GFC only. See the note. The default value is "0."; bit6 :The value "0" = step adjustment. The value "1" = adaptive adjustment. It is read only bit for Cisco. For 16GFC only. See the note.type;7 bit :The value (default) "0" = function disabled. The value "1" = function enabled. For 16GFC only. See the note.
236	bit 0: Electrical Loopback control bit	00H	The value "0" (default) = loopback disabled. The value "1" = loopback enabled. See the note.
237-238	LFL1 (T-SFP+ only)	00H	Lasers First Frequency (THz). 237 MSB, 238

				LSB
239-240	LFL2 (T-SFP+ only)	00H		Lasers First Frequency (GHz*10), in units of 0.1 GHz. 239 MSB, 240 LSB
241-242	LFH1 (T-SFP+ only)	00H		Lasers Last Frequency (THz). 241 MSB, 242 LSB
243-244	LFH2 (T-SFP+ only)	00H		Lasers Last Frequency (GHz*10), in units of 0.1 GHz 243 MSB, 244 LSB
245	User EEPROM (CC_USER)	Check Sum(Variable)		Check code for fields from addresses 224 to 244, inclusive.
246-247	Channel Number Set (T-SFP+ only)	00H		User input of wavelength channel # integer 1 to N (N=Number of channels) 246 MSB, 247 LSB
248	Mask Temp High Alarm	7	1	Masking bit for Temp High Alarm interrupt source.
	Mask Temp Low Alarm	6	1	Masking bit for Temp Low Alarm interrupt source.
	Mask Vcc High Alarm	5	1	Masking bit for Vcc High Alarm interrupt source.
	Mask Vcc Low Alarm	4	1	Masking bit for Vcc Low Alarm interrupt source.
	Mask TX Bias High Alarm	3	1	Masking bit for TX Bias High Alarm interrupt source.
	Mask TX Bias Low Alarm	2	1	Masking bit for TX Bias Low Alarm interrupt source.
	Mask TX Power High Alarm	1	1	Masking bit for TX Power High Alarm interrupt source.
	TX Power Low Warning	0	1	Masking bit for TX Power Low Alarm interrupt source.
249	Mask Rx Power High Alarm	7	1	Masking bit for RX Power High Alarm interrupt source.
	Mask Rx Power Low Alarm	6	1	Masking bit for RX Power Low Alarm interrupt source.
	Reserved	5	1	
	Reserved	4	1	
	Reserved	3	1	
	Reserved	2	1	
	Reserved	1	1	

	Reserved	0	1	
250	Mask Temp High Alarm	7	1	Masking bit for Temp High Alarm interrupt source.
	Mask Temp Low Alarm	6	1	Masking bit for Temp Low Alarm interrupt source.
	Mask Vcc High Alarm	5	1	Masking bit for Vcc High Alarm interrupt source.
	Mask Vcc Low Alarm	4	1	Masking bit for Vcc Low Alarm interrupt source.
	Mask TX Bias High Alarm	3	1	Masking bit for TX Bias High Alarm interrupt source.
	Mask TX Bias Low Alarm	2	1	Masking bit for TX Bias Low Alarm interrupt source.
	Mask TX Power High Alarm	1	1	Masking bit for TX Power High Alarm interrupt source.
	TX Power Low Warning	0	1	Masking bit for TX Power Low Alarm interrupt source.
251	Mask Rx Power High Alarm	7	1	Masking bit for RX Power High Alarm interrupt source.
	Mask Rx Power Low Alarm	6	1	Masking bit for RX Power Low Alarm interrupt source.
	Reserved	5	1	
	Reserved	4	1	
	Reserved	3	1	
	Reserved	2	1	
	Reserved	1	1	
	Reserved	0	1	
252	Current status (T-SFP+ only)	00H		Current status register
253	Latched status (T-SFP+ only)	00H		Latched status register
254-255	Reserved	00H		Reserved

Pin Description



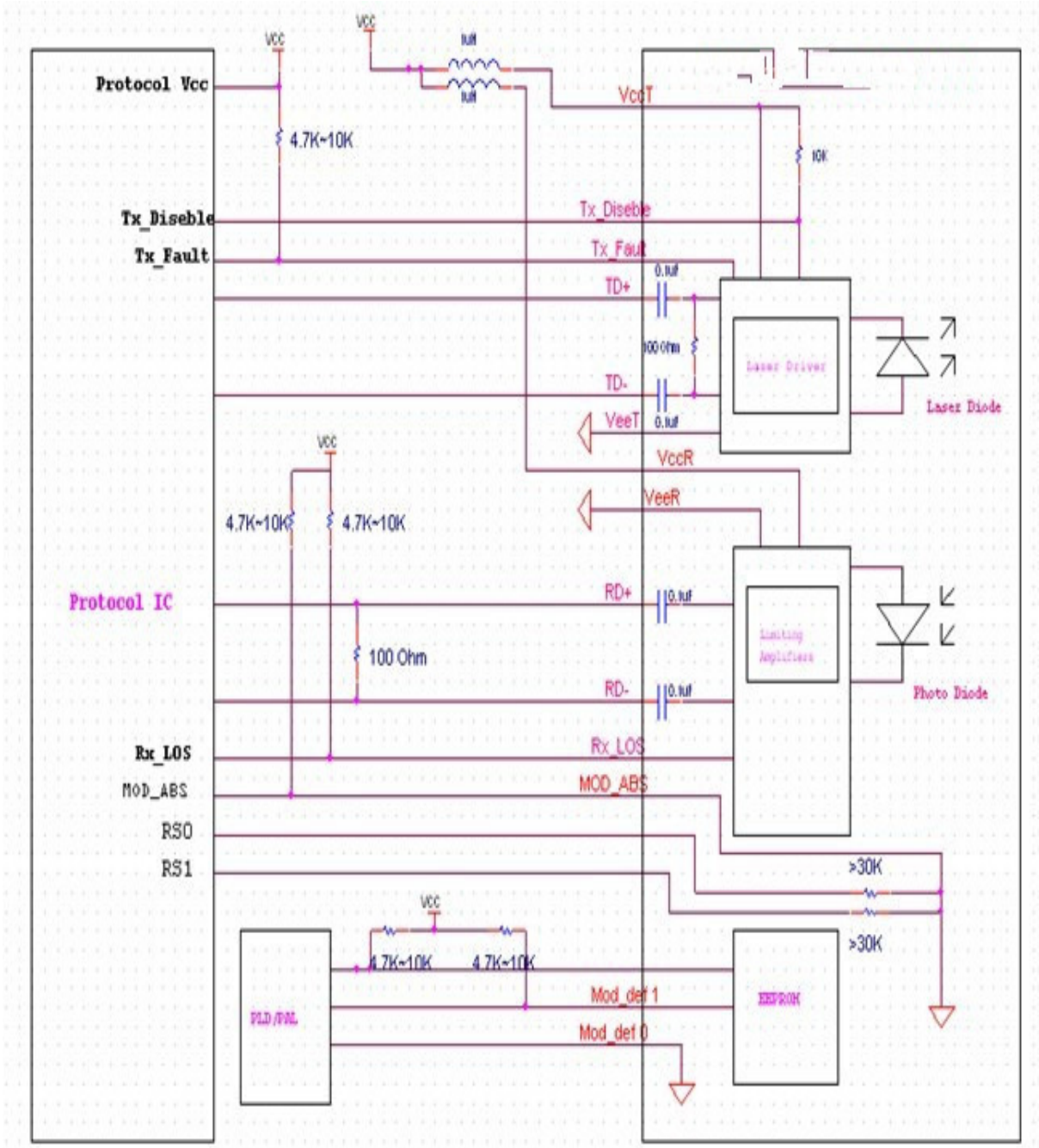
Pin	Symbol	Name/Description	Ref.
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault.	2
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	1
10	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	

16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1

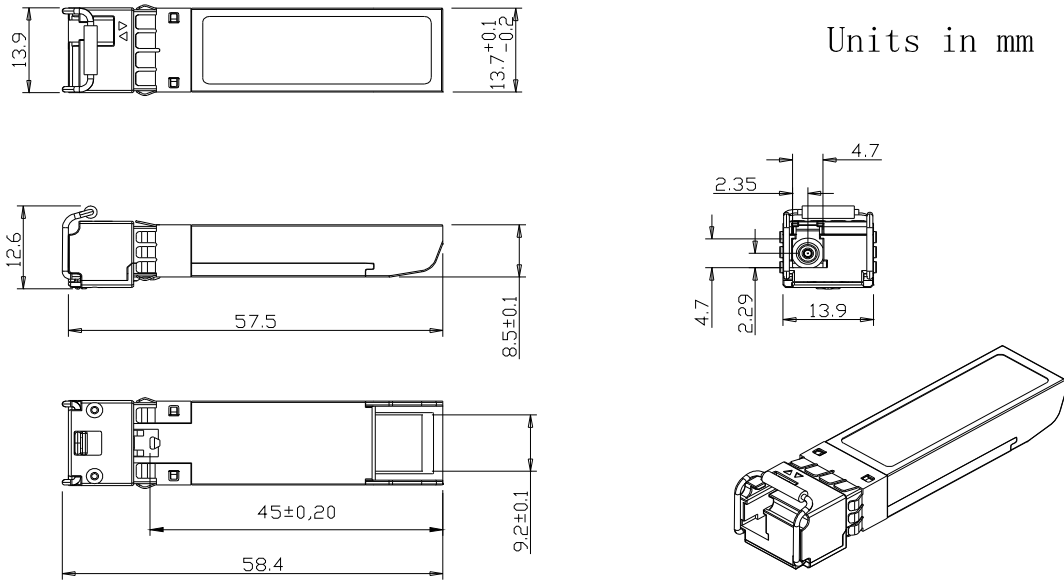
Notes:

- 1, Circuit ground is internally isolated from chassis ground.
- 2, T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to V_{CC} + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
- 3, Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
- 4, Should be pulled up with 4.7kΩ- 10kΩ host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- 5, Internally pulled down per SFF-8431 Rev 4.1.
- 6, LOS is open collector output. It should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal

Typical Application Circuit



Mechanical Dimension



Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950 , UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

Ordering Information

Part No	Specification									
	Pack age	Data rate	Laser	Optical Power	Detector	Sensitivity	Temp	Reach	Other	Application code
WST-SFP+B X1-UCC	SFP+	10.3125 Gbps	1270nm DFB	-6 ~ -1 dBm	PIN	-15 dBm	-5~70 °C	10km	DDM; RoHS	10GBASE-BX-U
WST-SFP+B X1-UIC	SFP+	10.3125 Gbps	1270nm DFB	-6 ~ -1 dBm	PIN	-15 dBm	-40~85 °C	10km	DDM; RoHS	10GBASE-BX-U
WST-SFP+B X1-DCC	SFP+	10.3125 Gbps	1330nm DFB	-6 ~ -1 dBm	PIN	-15 dBm	-5~70 °C	10km	DDM; RoHS	10GBASE-BX-D
WST-SFP+B X1-DIC	SFP+	10.3125 Gbps	1330nm DFB	-6 ~ -1 dBm	PIN	-15 dBm	-40~85 °C	10km	DDM; RoHS	10GBASE-BX-D

Modification History

Revision	Date	Description	Originator	Review	Approved
V1	26-June-2013	Released with our PN for Cisco	Min Liu	Wayne Liao	Wayne Liao
V1.1	14-May-2015	Revised eeprom as Cisco required	Min Liu	Wayne Liao	Wayne Liao



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