NEC

25Gbps WDM Transceiver

OD-BP1035ZL1001
OD-BP1036ZL1001

25Gbps 1.289μm/1.314μm WDM Bi-directional SFP Transceiver

1. Features

- Single fiber Bi-directional Optical Transceiver Consists of
  - -Transmitter and Receiver with 3R function (from 24.3 to 25.78Gbps)
  - -Transmitter input equalizer compensates channel loss (Continuous Time Linear Equalizer).
  - -Receiver output driver's programmable deemphasis compensates channel loss.
  - 1.289/1.314um WDM function
- Digital Diagnostic Monitoring Function (SFF–8472 rev12.3)
- 24.3 to 25.78Gbps Data Rate (9.8 to 10.31 Gbps: CDR Bypassed : Multi-Rate function)
- Up to 40km over SMF (ITU-T G.652)
- Loss of Signal (LOS) function
- Transmitter disable (TX_DISABLE) function
- Single Power Supply Voltage of +3.3V
- Hot-pluggable electrical interface
- Serial identification
- LC receptacle
- Lead-Free and RoHS Compliant

Applications

25G BASE-BR40(25.78125Gb/s)　CPRI　Application (24.33024Gb/s)

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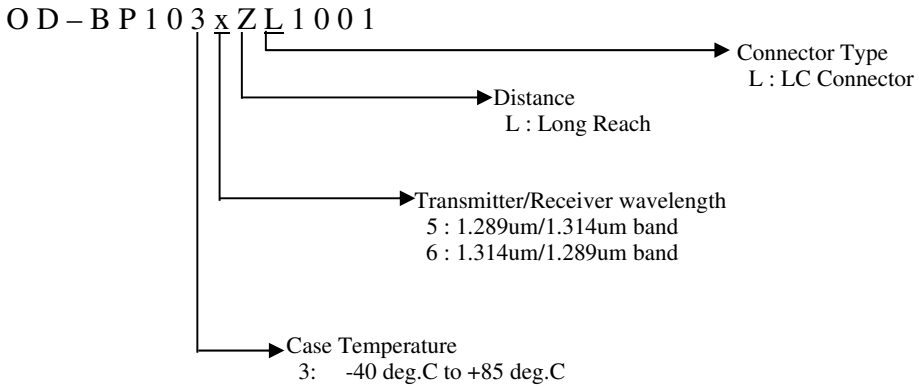
2. Product Number Information



3. Absolute Maximum Ratings

Item No	Parameter	Unit	Specification			Remarks
			Min	Typ.	Max	
Ab-1	Storage Temperature(Ta)	deg.C	-40	-	+85	
Ab-2	Supply Voltage (VccT, VccR)	V	-0.3	-	3.63	
Ab-3	Voltage on LVTTL Input	V	-0.3	-	Vcc+0.3	
Ab-4	Tx Input Data Signal Levels (AC coupled)	Vppd		-	1.5	
Ab-5	Relative Humidity (non-condensing)	%	5	-	85	non-condensing
Ab-6	Static Discharge Voltage HBM per JEDEC JESD22-A224-B	V	-1000	-	1000	For Electrical pad of TD+/-, RD+/-
Ab-7			-2000	-	2000	For Electrical pad except for TD+/-, RD+/-
Ab-8	Peak Optical Input Power	dBm		-	-3	

4. Operating Conditions

Item No	Items	Unit	Min.	Typ.	Max.	Remarks
Oc-1	Data Rate	Gbps	24.33024	-	25.78125	+/- 100ppm(CDR ON)
Oc-2	Modulation Type		64B / 66B			
Oc-3	Transmission Cable		SMF (ITU-T G.652)			
Oc-4	Case Temperature(Tc)	°C	-40	-	+85	
Oc-5	Ambient humidity	%	5	-	85	
Oc-6	Power supply voltage (Vcc)	V	+3.135	+3.300	+3.465	
Oc-7	Power Consumption	W			2.1	

5. Block Diagram

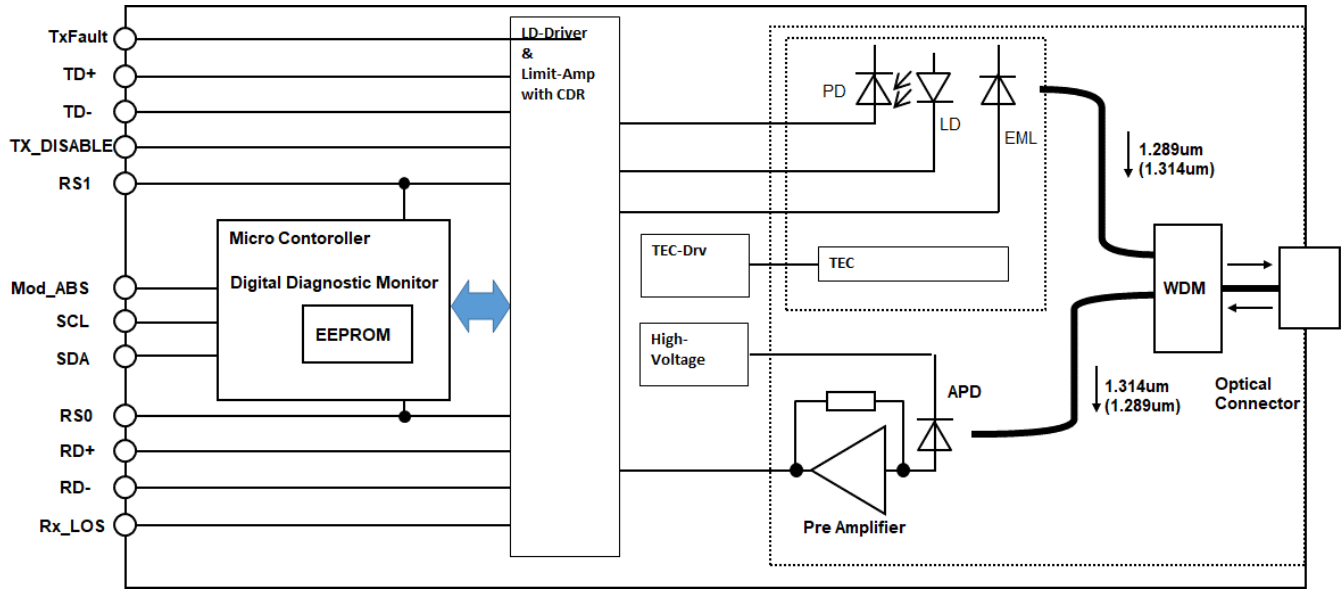


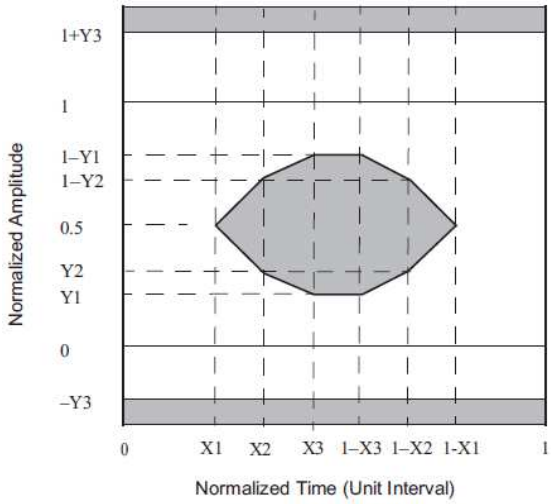
Figure 5-1. Block Diagram

6. Optical Interface

6.1 Transmitter Section

Item No	Parameter	Symbol	Min.	Typ.	Max.	Units	Remarks
TO-1	Center wavelength range	WL_{tx}	1281	1289	1297	nm	OD-BP1035ZL1001
TO-2			1306	1314	1322	nm	OD-BP1036ZL1001
TO-3	Side mode suppression ratio	SMSR	30	-	-	dB	
TO-4	Average Launch Power	Po_ave	-3.0	-	+6.0	dBm	Note 3
TO-5	Optical Modulation Amplitude	Po_oma	0.0	-	+6.0	dBm	
TO-6	Launch Power in OMA minus TDP	Po_oma	-1			dBm	
TO-7	Transmitter and dispersion penalty	TDP			2.7	dB	@BER=5e-5
TO-8	Average launch power of Tx Disable	Po_dis			-35	dBm	Un-modulated signal
TO-9	Extinction ratio	ER	4	-	-	dB	
TO-10	Optical return loss tolerance	ORL			20	dB	
TO-11	Transmitter reflectance	TR			-26	dB	
TO-12	Transmitter eye mask		Fig.2 Transmitter eye mask				Note 1

Note 1. 25.78125Gb/s, PRBS31 NRZ, 25G-BASE BR40 mask and filter, at least 500waveform, HT, RT, LT must be satisfied. **Hit Ratio** meet the standard of **5E-5** under margin.
(HT: High Temperature, RT: Room Temperature, LT: Low Temperature)



{X1,X2,X3,Y1,Y2,Y3} = {0.31, 0.40, 0.45, 0.34, 0.38, 0.40}

Figure 6-1. Transmitter eye mask

6.2 Receiver Section

Item No	Parameter	Symbol	Min.	Typ.	Max.	Units	Remarks
RO-1	Center wavelength range	WL_{tx}	1306	1314	1322	nm	OD-BP1035ZL1001
RO-2			1281	1289	1297	nm	OD-BP1036ZL1001
RO-3	Average receiver power	Pr_avg	-21.0	-	-4.0	dBm	Note 2, Note 3
RO-4	Unstressed receiver sensitivity (OMA)	Pr_oma_uns	-	-	-19.0	dBm	
RO-5	Receiver reflectance	RR	-	-	-26	dB	
RO-6	LOS Assert Level	LOSA	-35	-	-	dBm	@Pr_avg
RO-7	LOS Deassert Level	LOSD	-	-	-22	dBm	@Pr_avg
RO-8	LOS Hysteresis	LOSH	0.5	-	-	dB	

Note 2. Measured with 25.78125G, PRBS-31 NRZ, ER>4dB, BER=5E-5. (Back to Back)

Note 3. Average receive power (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

7. Electrical Interface

7.1 Low Speed electrical Interface Specifications

Item No	Parameter	Symbol	Min.	Max.	Units	Remarks
LE-1	Tx_Fault , RX_LOS	V_{OL}	-0.3	0.4	V	at 0.7mA [1]
LE-2		I_{OH}[1]	-50	37.5	uA	at 4.7kohm
LE-3	Tx_Disable, RS0, RS1	V_{IL}	-0.3	0.8	V	
LE-4		V_{IH}	2.0	VccT+0.3	V	

1 Positive values indicate current flowing into the module.

2 Tx_Fault is an open collector/drain output, which should be pulled up to Vcc_Host of between 2.38 to 3.46V with a 4.7k-10kohm resister on the host board. When high, output indicates that the module transmitter has detected a fault condition related to laser operation or safety. Low indicates normal operation. Latched under fault condition and LASER turned off.

3 Rx_LOS is an open collector/drain output, which should be pulled up to Vcc_Host of between 2.38V to 3.46V with a 4.7k-10kohm resister on the host board. When high, this output indicates an optical signal level below that specified in the relevant standard. Low indicates normal operation.

4 TX disable is an input that is used to shutdown the transmitter LASER output. It is pulled up within the module with a 4.7k-10kohm resister. When Tx_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. When Tx_Disable is asserted low or grounded the module transmitter is operating normally.

5 RS0 and RS1 are module inputs and are pulled low to VeeT with > 30kohms resistors in the module. RS0 and RS1 function are implemented.

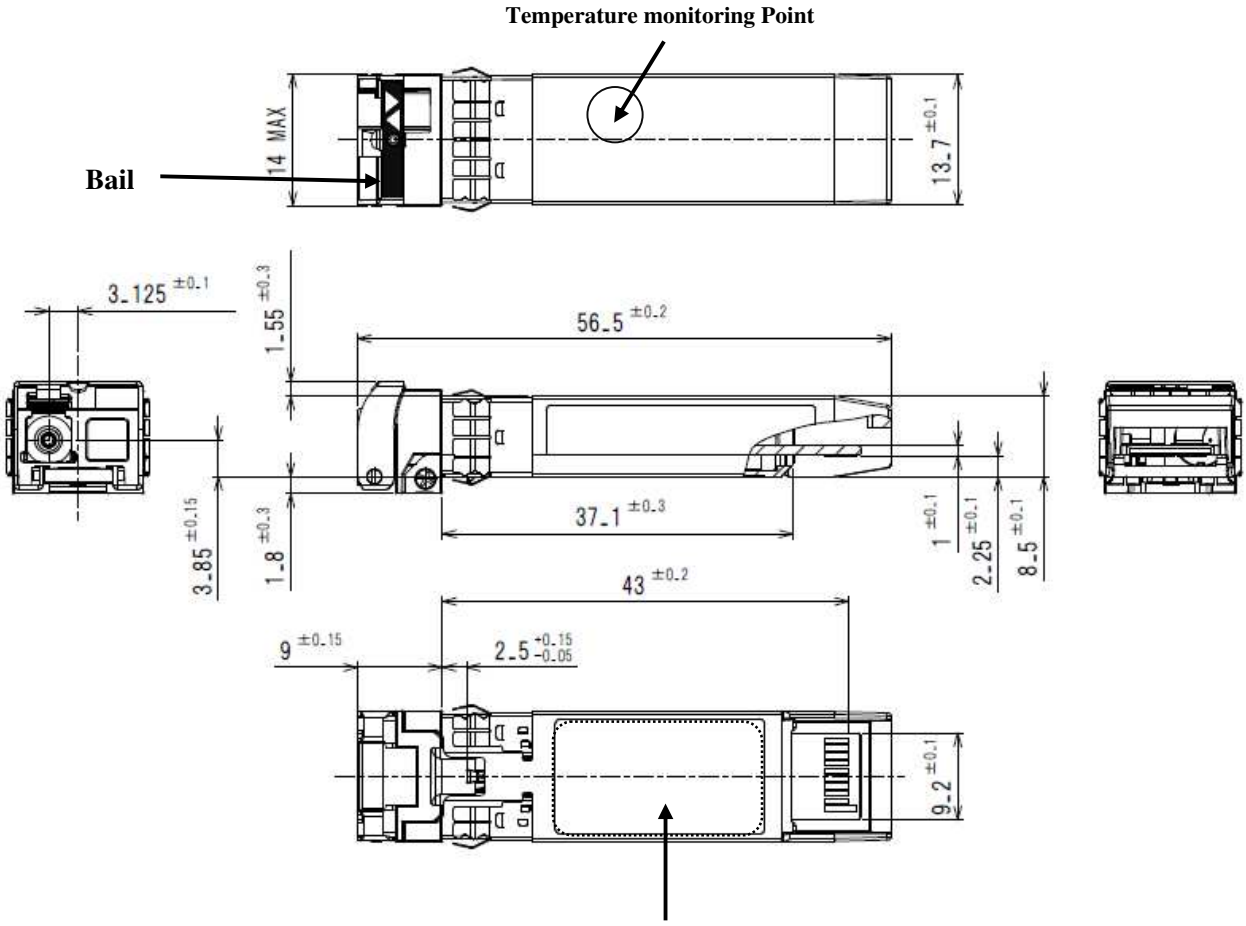
7.2 High Speed electrical Interface Section

Items	Specifications			Unit	Remarks
	Min.	Typ.	Max.		
Differential Voltage pk-pk of Tx Electrical Input Signal	200	-	900	mVp-p	Note 1
Differential Voltage pk-pk of Rx Electrical Output Signal	200	-	900	mVp-p	

Note 1. When the Tx Electrical Input Signal is loss, the Optical output waveform is unspecified.

8. Outline Drawings

8.1 Package Outline



(Unit: mm)

Figure 8-1. Transceiver outline

(*) Color of Bail

Part number	Bail Color
OD-BP1035ZL1001	BLACK
OD-BP1036ZL1001	BLUE

8.2 Printed Circuit Board Connector Layout

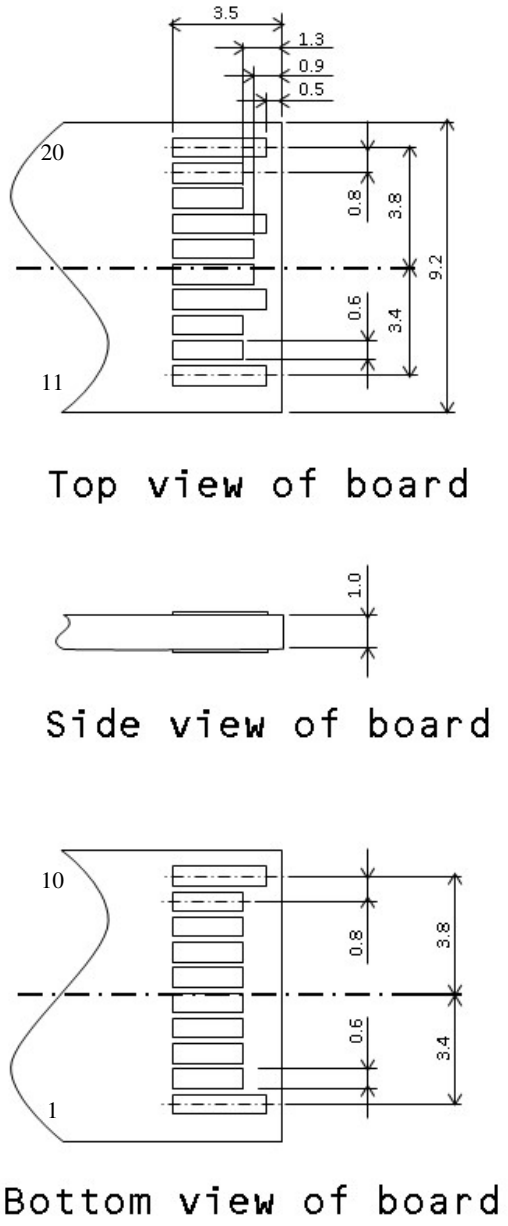


Figure 8-2. Pattern Layout for SFP Printed Circuit Board

9. Pin Configuration

Table 9-1. Pin description

Pin No.	Symbol	Function	Plug Seq.	Remarks
case	case	Module case	-	Note 1
1	VeeT	Transmitter Ground	1st	Note 2
2	Tx_Fault	Transmitter Fault Indication	3rd	Described in Section 7.1
3	Tx_Disable	Transmitter Disable	3rd	Described in Section 7.1
4	SDA	2-wire Serial Interface Data Line	3rd	Note 3
5	SCL	2-wire Serial Interface Clock Line	3rd	Note 3
6	Mod-ABS	Module Absent.	3rd	Note 3
7	RS0	Rate Select 0, optionally controls SFP28 module receiver	3rd	Described in Section 7.1
8	Rx_LOS	Receiver Loss of Signal Indication	3rd	Described in Section 7.1
9	RS1	Rate Select 1, optionally controls SFP28 module transmitter	3rd	Described in Section 7.1
10	VeeR	Receiver Ground	1st	Note 2
11	VeeR	Receiver Ground	1st	Note 2
12	RD-	Receiver Inverted Data Output	3rd	Note 6
13	RD+	Receiver Non-Inverted Data Output	3rd	Note 6
14	VeeR	Receiver Ground	1st	Note 2
15	VccR	Receiver 3.3V Supply	2nd	3.3 (+/-) 5% , Note 4
16	VccT	Transmitter 3,3V Supply	2nd	3.3 (+/-) 5% , Note 4
17	VeeT	Transmitter Ground	1st	Note 2
18	TD+	Transmiter Non-Inverted Data Input	3rd	Note 5
19	TD-	Transmitter Inverted Data Input	3rd	Note 5
20	VeeT	Transmitter Ground	1st	Note 2

Plug Seq.: Pin engagement sequence during hot plugging.

1) The case makes electrical contact to the cage before any of the board edge contacts are made.

2) The module signal ground contacts, VeeR and VeeT should be isolated from the module case.

3) SCL, SDA and Mod-ABS should be pulled up with a 4.7k – 10kohm resistor on the host board.
The pull-up voltage shall be VccT or VccR.
SCL is the clock line of two wire serial interface for serial ID
SDA is the data line of two wire serial interface for serial ID
Mod-ABS is grounded by the module to indicate that the module is present.

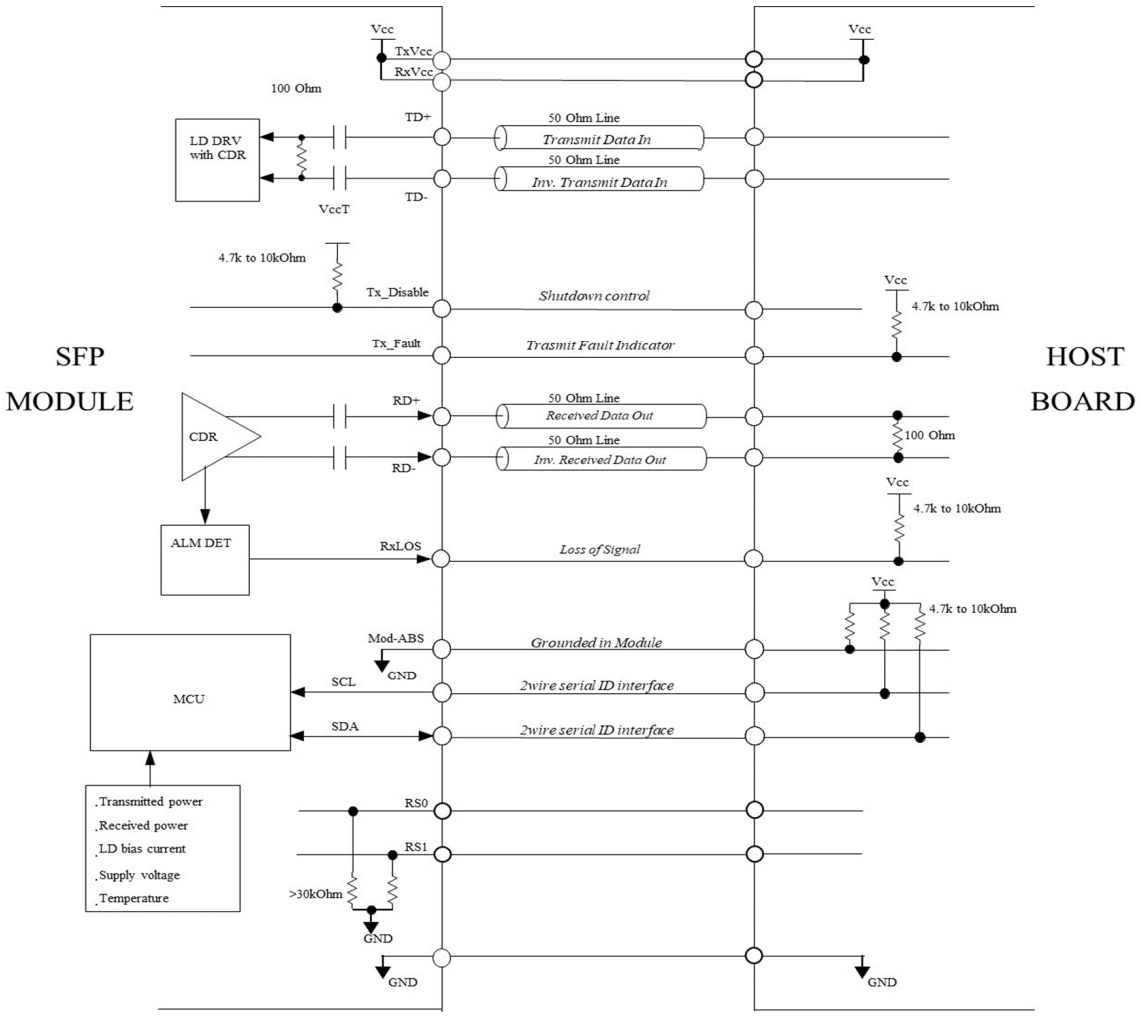
4) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP connector pin. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1uH should be used to maintain the required voltage at the SFP input pin.

5) TD- and TD+ are the differential transmitter inputs. They are AC-coupled, differential lines with 100ohm differential termination inside the module. See Section 7.2 for detail electrical specification.

6) RD- and RD+ are the differential receiver outputs. They are AC coupled 100ohm differential lines which should be terminated with 100ohm (differential) at the host. See Section 7.2 for detail electrical specification.

7)

10. Recommended interface circuit



Note: The pins which is not used should be terminated with some resistor to GND or Vcc .

Figure 10-1. Recommended Interface Circuit

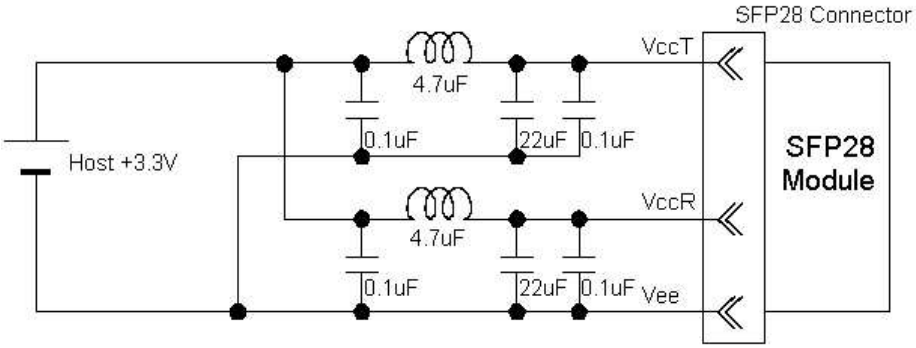


Figure 10-2. Recommended Host Board Supply Filtering Network

11. Timing Diagrams

Table 11-1. Timing Specification of Control & Status I/O

Parameter	Symbol	Min	Max	Unit	Condition
Tx_Disable Assert Time	t_off	-	100	us	Rising edge of Tx_Disable to fall of output signal below 10% of nominal.
Tx_Disable Negate Time	t_on	-	2	ms	Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start up or fault recovery.
Time to initialize cooled module and time to power up a cooled module to Power Level II	t_start_up _cooled	-	90	s	From power on or hot plug, or Tx disable negated during power up or Tx_Fault recovery, until cooled power level I part (or cooled power level II part during fault recovery) is fully operational. Also, from stop bit low-to-high SDA transition enabling Power Level II until cooled module is fully operational
Tx_Fault assert for cooled module	Tx_Fault_on_ cooled	-	50	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault Reset	t_reset	10	-	us	Time Tx_Disable must be held high to reset Tx_Fault
RS0, RS1: Rate select timing for Low input.	t_RS0_L, t_RS1_L		24	ms	From assertion till stable output
RS0, RS1: Rate select timing for High input.	t_RS0_H, t_RS1_H		24	ms	From assertion till stable output
Rx_LOS assert delay	t_los_on	-	100	us	From occurrence of loss of signal to assertion of Rx_LOS
Rx_LOS negate delay	t_los_off	-	100	us	From occurnce of presence of signal to negation of Rx_LOS.

Note: VccT and VccR shall be reached to +3.13V within 10ms during Power up.

Table 11-2. Timing Specification of 2-wire I/O

Parameter	Symbol	Min	Max	Unit	Remarks
Clock frequency	f_{SCL}	0.1	400	KHz	
Clock pulse width low	t_{LOW}	1.3		us	
Clock pulse width High	t_{HIGH}	0.6		us	
START Hold Time	$t_{HD:STA}$	0.6		us	
START Set-up Time	$t_{SU:STA}$	0.6		us	
Data In Hold Time	$t_{HD:DAT}$	0		ns	
Data In Set-up Time	$t_{SU:DAT}$	100		ns	
Input Rise Time(100KHz) From ($V_{IL,MAX}$ - 0.15) to ($V_{IH,MIN}$ + 0.15)	$T_{r,100}$		1000	ns	
Input Rise Time(400KHz) From ($V_{IL,MAX}$ - 0.15) to ($V_{IH,MIN}$ + 0.15)	$T_{r,400}$		300	ns	
Input Fall Time(100KHz) From ($V_{IH,MIN}$ + 0.15) to ($V_{IL,MAX}$ - 0.15)	$T_{f,100}$		300	ns	
Input Fall Time(400KHz) From ($V_{IH,MIN}$ + 0.15) to ($V_{IL,MAX}$ - 0.15)	$T_{f,400}$	-	300	ns	
STOP Set-up Time	$t_{SU:STO}$	0.6	-	us	
Time bus free before new transmission can start	t_{BUF}	20	-	us	
Time to initialize	t_init		300	ms	
Clock stretching	T_clock_hold		500	us	
Complete Single or Sequential Write up to 4 Byte	t_{WR}		40	ms	
Complete Sequential Write of 5-8 Byte	t_{WR}		80	ms	
Endurance of User Writable EEPROM (Write Cycles)		10k		cycle	

Note: This module don't have the management interface reset indicated by SFF-8431.

So we recommend the following procedure for management interface reset.

1) Clock up to 9 cycles.

2) Look for SDA high in each cycle while SCL is high.

3) Create a START condition as SDA is high.

4) (Dummy access) Please send 1byte random read command at some address and discard it.

(NACK may return and interface is cleared certainly.)

Table 11-3. Specification of Rate Select

Logic OR of RS0 pin and RS0 bit	**Logic OR of RS1 pin and RS1 bit**	**Receiver retimer/CDR**	**Transmitter retimer/CDR**	**Rate**
Low/0	Low/0	CDR Bypass	CDR Bypass	Tx and Rx: Bypass
Low/0	High/1	CDR Bypass	CDR Lock at High Data Rate	Tx: From 24.33024Gbps or 25.78125Gbps. Rx: Bypass
High/1	Low/0	CDR Lock at High Data Rate	CDR Bypass	Tx: Bypass Rx: From 24.33024Gbps or 25.78125Gbps.
High/1	High/1	CDR Lock at High Data Rate	CDR Lock at High Data Rate	Tx and Rx: From 24.33024Gbps or 25.78125Gbps. .

The period of rate selection ≤100ms (From the module receives the rate selection configuration to Completes the rate selection).

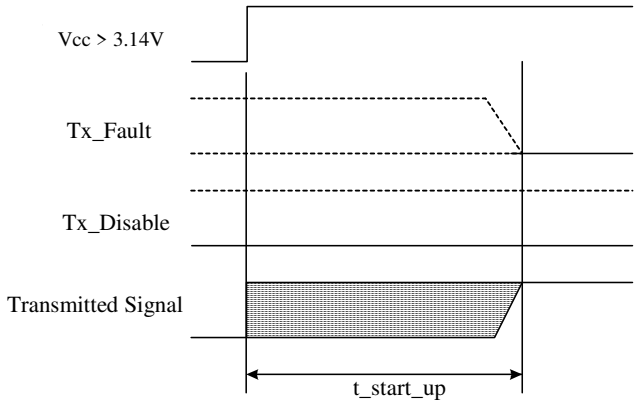


Figure 11-1. Power on Initialization of module, Tx_Disable negated

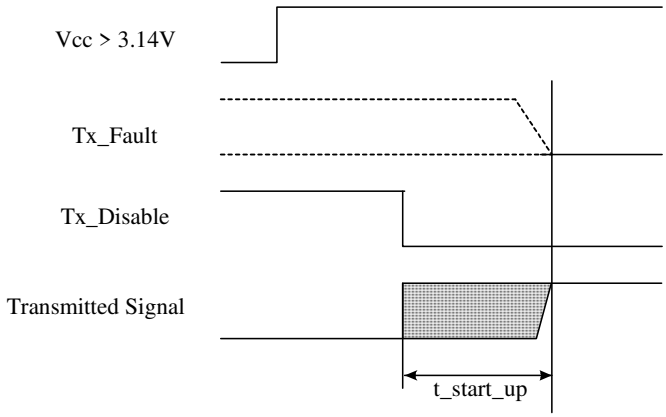


Figure 11-2. Power on Initialization of module, Tx_Disable asserted

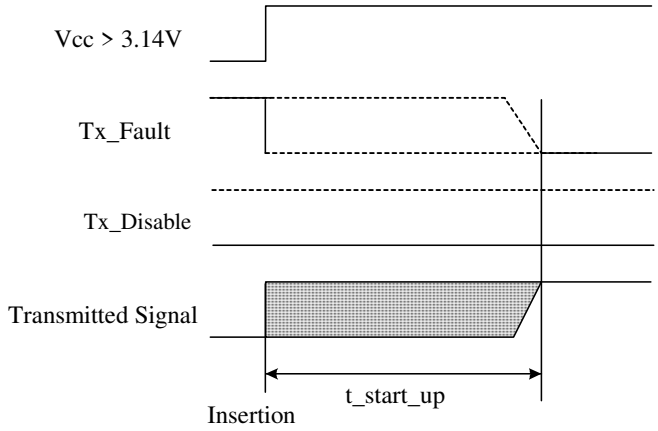


Figure 11-3. Example of Initialization during Hot Plugging, Tx_Disable negated

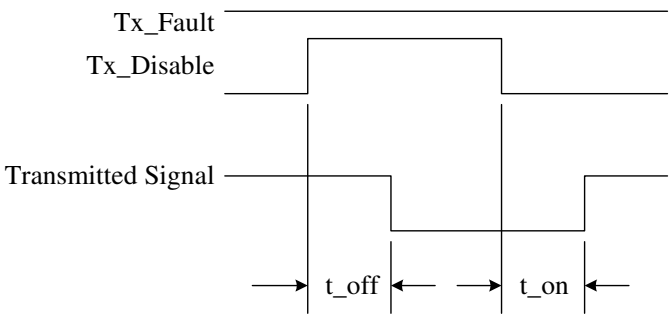


Figure 11-4. Management of module during normal operation, Tx_Disable implemented

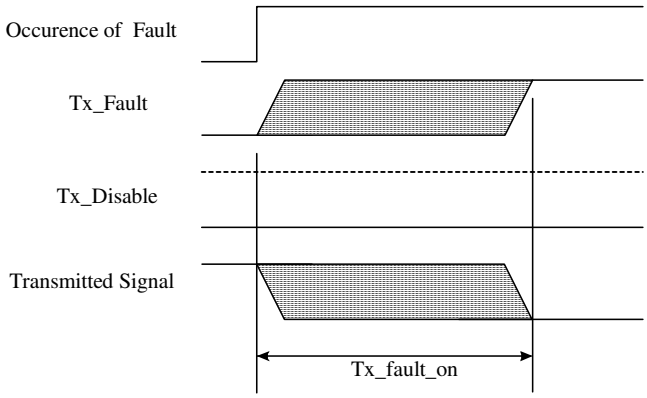


Figure 11-5. Occurrence of condition generating Tx_Fault

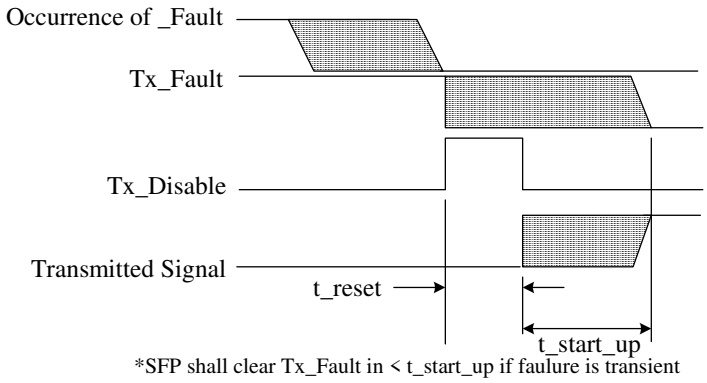


Figure 11-6. Successful Recovery from Transient Safety Fault Condition

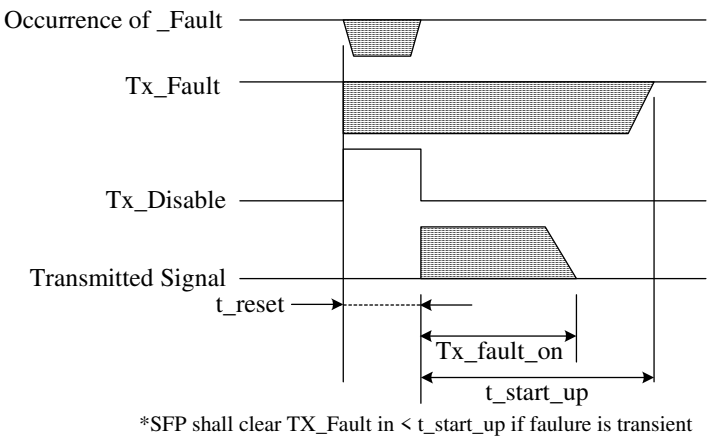


Figure 11-7. Unsuccessful Recovery from Safety Fault Condition

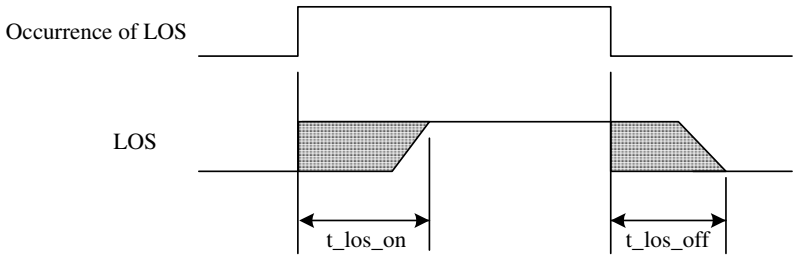


Figure 11-8. Timing of LOS Detection

12. Memory map

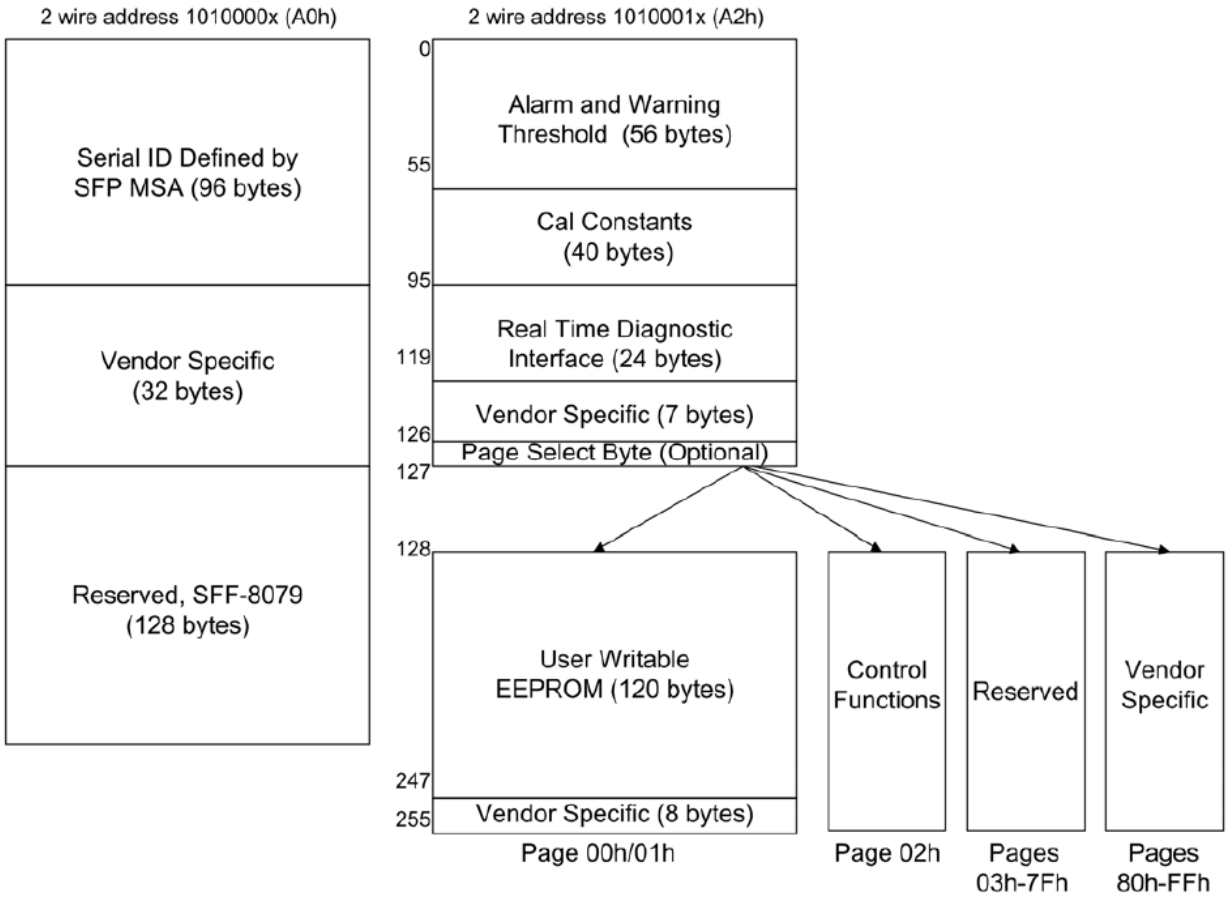


Figure 12-1. Memory map

Note.1 Current Address Read sequence is not supported. Please use Random Read sequence, or Sequential Address Read starting with Random Read to read A0h and A2h EEPROM address.

13. EEPROM Information

(1) 2 wire address 1010000x (A0h) memory

Table 13-1. EEPROM Serial ID Memory Contents

Address	Name of Field	Hex	Description
BASE ID FIELDS			
0	Identifier	03	SFP28
1	Ext. Identifier	04	SFP28
2	Connector	07	LC
3-10	Transceiver	00 00 00 00 00 00 00 00	Not compliant
11	Encoding	06	64B/66B
12	BR, Nominal	FF	>25.0Gbps
13	Rate Identifier	00	unspecified
14	Length(9um)-km	28	40km
15	Length (9um)	FF	40000m
16	Length (50um)	00	Not support
17	Length (62.5um)	00	Not support
18	Length (Copper)	00	Not support
19	Length (OM3)	00	Not support
20-35	Vendor name	4E 45 43 20 43 4F 52 50 4F 52 41 54 49 4F 4E 20	NEC CORPORATION
36	Transceiver	38	BR
37-39	Vendor OUI	00 00 4C	NEC OUI code
40-55	Vendor PN	4F 44 2D 42 50 31 30 33 35 4C 4C 31 30 30 31 20	OD-BP1035ZL1001
		4F 44 2D 42 50 31 30 33 36 4C 4C 31 30 30 31 20	OD-BP1036ZL1001
56-59	Vendor rev	xx xx xx xx	Note 1
60-61	Wavelength	05 09 (1289nm)	OD-BP1035ZL1001
		05 22 (1314nm)	OD-BP1036ZL1001
62	Reserved	00	
63	CC_BASE	xx	Note 2
EXTENDED ID FIELDS			
64	Options	3C	Paging, CDR, Cooled laser, Power level 3
65	Options	3A	RS, TxDIS, TxFAULT, RXLOS
66	BR, max	67	25.78Gbps (@ RS0/RS1=High)
67	BR, min	61	24.33Gbps (@ RS0/RS1=High)
68-83	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	Note 3
84-91	Date code	xx xx xx xx xx xx xx xx	Note 4
92	Diagnostic Monitoring Type	68	DDM implemented. Internal Cal., Average Power
93	Enhanced Options	FA	ALM/WARNING, TxDIS, TxFAULT, Rx LOS, Rate_Select, Soft RS
94	SFF-8472	08	Rev.12.3
95	CC_EXT	xx	Note 2
96-127	Vendor Specific	xx	MSA-defined, Vendor-specific, read only

Note 1. Addresses 56-59 specify module revision level.

Note 2. Addresses 63 and 95 are checksums. Address 63 is the checksum for bytes 0-62, and address 95 is the checksum for bytes 64-94.

Note 3. Addresses 68-83 specify a unique device serial number.

Note 4. Addresses 84-91 specify the date code in the form of two-digit year, two-digit month, and two-digit day of the month

(2) 2 wire address 1010001x (A2h) memory

Table 13-2. Alarm and Warning Threshold

Address	Bytes	Name	Hex	Description
00-01	2	Temp High Alarm	55 00	+85 deg. C
02-03	2	Temp Low Alarm	D8 00	- 40 deg. C
04-05	2	Temp High Warning	55 00	+85 deg. C
06-07	2	Temp Low Warning	D8 00	- 40 deg. C
08-09	2	Vcc High Alarm	8D CC	+ 3.63 V
10-11	2	Vcc Low Alarm	74 04	+ 2.97 V
12-13	2	Vcc High Warning	87 5A	+ 3.465 V
14-15	2	Vcc Low Warning	7A 76	+ 3.135 V
16-17	2	Bias High Alarm	C3 50	100 mA
18-19	2	Bias Low Alarm	00 32	0.1 mA
20-21	2	Bias High Warning	C3 50	100 mA
22-23	2	Bias Low Warning	01 F4	1 mA
24-25	2	Tx Power High Alarm	9B 82	+6 dBm
26-27	2	Tx Power Low Alarm	13 93	-3 dBm
28-29	2	Tx Power High Warning	9B 82	+6 dBm
30-31	2	Tx Power Low Warning	13 93	-3 dBm
32-33	2	Rx Power High Alarm	0F 8D	-4 dBm
34-35	2	Rx Power Low Alarm	00 4F	-21 dBm
36-37	2	Rx Power High Warning	0F 8D	-4 dBm
38-39	2	Rx Power Low Warning	00 4F	-21 dBm
40-55	16	Reserved	00	

Table 13-3. A/D monitor value

Address	Bytes	Name	Description
96	1	Temperature MSB	Internally measured module temperature (Refer to the Internal Calibration)
97	1	Temperature LSB	
98	1	Vcc MSB	Internally measured supply voltage in transceiver (Refer to the Internal Calibration)
99	1	Vcc LSB	
100	1	TX Bias MSB	Internally measured TX Bias Current (Refer to the Internal Calibration)
101	1	TX Bias LSB	
102	1	Tx Power MSB	Measured TX output power (Refer to the Internal Calibration)
103	1	Tx Power LSB	
104	1	Rx Power MSB	Measured RX input power (Refer to the Internal Calibration)
105	1	Rx Power LSB	
106	1	MSB	Reserved
107	1	LSB	
108	1	MSB	Reserved
109	1	LSB	

- Internal Calibration -

Measurements are calibrated over vendor specified operating temperature and voltage and should be interpreted as defined below.
Alarm and warning threshold values should be interpreted in the same manner as real time 16 bit data.

1)Internally measured transceiver temperature. Represented as a 16 bit signed twos complement value in increments of 1/256 degrees Celsius, yielding a total range of -128C to +128C.
2) Internally measured transceiver supply voltage. Represented as a 16 bit unsigned integer with the voltage defined as the full 16 bit value (0-65535) with LSB equal to 100 uVolt, yielding a total range of 0 to +6.55 Volts.
3)Measured TX bias current in uA. Represented as a 16 bit unsigned integer with the current defined as the full 16 bit value (0-65535) with LSB equal to 2 uA, yielding a total range of 0 to 131 mA.
4)Measured TX output power in mW. Represented as a 16 bit unsigned integer with the power defined as the full 16 bit value (0-65535) with LSB equal to 0.1 uW, yielding a total range of 0 to 6.5535 mW. Data is assumed to be based on measurement of laser monitor photodiode current. When the transmitter is disabled, DDM report 0.1uW. 5) Measured RX received optical power in mW. Value can represent average received power. Represented as a 16 bit unsigned integer with the power defined as the full 16 bit value (0-65535) with LSB equal to 0.1 uW, yielding a total range of 0 to 6.5535 mW (~ -40 to +8.2 dBm). When Rx no receive power, DDM report 0.1uW.

Table 13-4. Status bit

Address	#Bit	Name	Description
110	7	TX Disable state	Digital state of the TX Disable output pin
	6	Soft TX Disable command	
	5	RS(1) State	Digital state of SFP input pin RS(1) per SFF-8431.
	4	Rate select state(RS(0))	Digital state of the RX rate select input pin
	3	Soft RX rate select Command(RS(0))	Read/write bit that allows software rate select control. Writing '1' selects full bandwidth operation. (Initial Value=0)
	2	TX Fault state	Digital state of the TX Fault output pin.
	1	LOS state	Digital state of the LOS output pin.
	0	Data Ready Bar	Indicates transceiver has achieved power up and data is ready. Bit remains high until data is ready to be read at which time the device sets the bit low.
111	7-0	Reserved	00

Table 13-5. Real time diagnostic monitor

Address	#Bit	Name	Description
112	7	Temp High Alarm	Set when internal temperature exceeds high alarm level
	6	Temp Low Alarm	Set when internal temperature is below low alarm level
	5	Vcc High Alarm	Set when internal supply voltage exceeds high alarm level
	4	Vcc Low Alarm	Set when internal supply voltage is below low alarm level
	3	TX Bias High Alarm	Set when TX Bias current exceeds high alarm level
	2	TX Bias Low Alarm	Set when TX Bias current is below low alarm level
	1	TX Power High Alarm	Set when TX output power exceeds high alarm level
	0	TX Power Low Alarm	Set when TX output power is below low alarm level
113	7	RX Power High Alarm	Set when RX receiving power exceeds high alarm level
	6	RX Power Low Alarm	Set when RX receiving power is below low alarm level
	5-0	Reserved	
114	7-4	Tx input equalization control RATE=HIGH	Input equalization level control Initial Value: RATE=HIGH: 0
	3-0	Tx input equalization control RATE=LOW	Input equalization level control Initial Value: RATE=LOW: 0

115	7-4	Rx output equalization control RATE=HIGH	Output equalization level control Initial Value: RATE=HIGH: 0
	3-0	Rx output equalization control RATE=LOW	Output equalization level control Initial Value: RATE=LOW: 0
116	7	Temp High Warning	Set when internal temperature exceeds high warning level
	6	Temp Low Warning	Set when internal temperature is below low warning level
	5	Voltage High Warning	Set when internal supply voltage exceeds high warning level
	4	Voltage Low Warning	Set when internal supply voltage is below low warning level
	3	TX Bias High Warning	Set when TX Bias current exceeds high warning level
	2	TX Bias Low Warning	Set when TX Bias current is below low warning level
	1	TX Power High Warning	Set when TX output power exceeds high warning level
	0	TX Power Low Warning	Set when TX output power is below low warning level
117	7	RX Power High Warning	Set when RX receiving power exceeds high warning level
	6	RX Power Low Warning	Set when RX receiving power is below low warning level
	5-0	Reserved	
118	4-7	Reserved	
	3	Soft TX rate select Command(RS(1))	Read/write bit that allows software rate select control. Writing '1' selects full bandwidth operation. (Initial Value=0)
	0-2	Reserved	
119	7-2	Reserved	
	1	Tx CDR unlocked	If the CDR is in bypass mode this bit is set to 0. If the CDR is in CDR locked mode and when CDR is locked. this bit is set to 0.
	0	Rx CDR unlocked	

Table 13-6. The others

Address	Bytes	Name	Description
120-126	7	Vendor specific (Password Area)	User can use this area by writing the password to access the User's EEPROM(Page 00h/01h). If user would like to write the data to EEP- ROM, please write the User's password to the address from 120 to 126d. And if user would like to guard the EEPROM data, please write the different data to address from 120 to 126d.
127	1	Page Select	Please select the page(00h/01h) to access the User's EEPROM.

Table 13-7. User Writable EEPROM Area

Page00h

Address	Bytes	Name	Description
128-247	120	User writable EEPROM	Initial Value: FFh
248-255	8	Vendor specific	This area used for internal control

Page01h

Address	Bytes	Name	Description
128-247	120	User writable EEPROM	Initial Value: FFh
248-255	8	Vendor specific	This area used for internal control

14. Digital Diagnostic Monitor Accuracy

Table 14-1. DDM Accuracy

Parameter	Unit	Accuracy
Tx Optical Power (Average)	dB	+/– 3 (-3.0 to +6.0dBm)
Rx Optical Power (Average)	dB	+/– 3 (-21.0 to -4.0dBm)
Bias Current	%	+/– 10
Power Supply Voltage	%	+/– 3 (Vcc=+3.135 to +3.465V
Temperature (Case) *1	deg. C	+/– 3 (Tc = -40 to +85C)

Note 1: Temperature monitoring point is defined in Section 8.1

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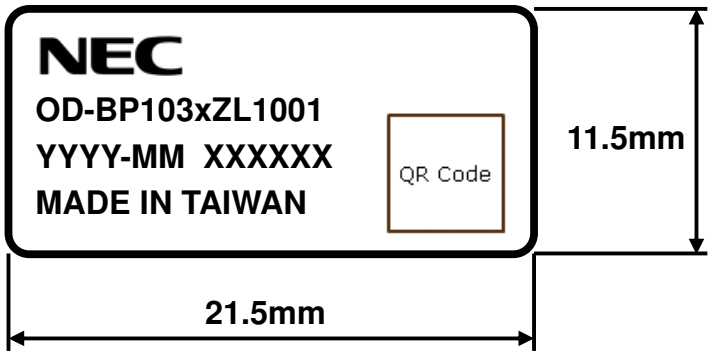
15. Label



Label size : 11.5mm x 21.5mm
Line 1 : NEC Logo
Line 2 : Part Number
Line 3 : Year, Month of Manufacture and 6-digit Serial Number
Line 4 : Country of Manufacture (TAIWAN)
Right side : 2D Barcode (Part Number, Year and Month of manufacture, and Serial Number)

16. Ordering Information

Part Number	Fiber Optical Connector	Tx wavelength	Case Temperature
OD-BP1035ZL1001	LC	1.289 um	-40 to +85 deg.C
OD-BP1036ZL1001		1.314 um	

- Revision history -

Revision	Date	Contents
1.0	18th April 2024	First Release

Areas of caution in the handling of laser diode products.

● This product complies with IEC 60825-1:2014, IEC 60825-1:2007 and 21 CFR 1040.10, which correspond to the category “Class 1 Laser Product” under IEC regulation and “Class I Laser product” under FDA regulation.

●During operations, the laser diode discharges red beams and infrared beams invisible to the eye. Since it is very hazardous if these beams directly, or bypassing through a lens, get in one’s eyes, please try to avoid this.

● Take proper Electrostatic-discharge (ESD) precautions while handling the device. The device is sensitive to ESD.

● May cause of damage if drop or subject to shock. This product includes optical parts.

●Caution-use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Areas of caution in handling GaAs.

There are some products in our catalogue that use GaAs. Please strictly adhere to the caution items appearing below, in order to prevent dangerous situations.

○Do not put the product in your mouth.

○Do not turn the product into a vaporous or powdered form through burning, grinding or chemical processing.

○When disposing of the product, follow related laws, and your company’s internal waste control regulations.

Areas of caution in handling optical fiber products.

●Be careful not to pierce your skins as the tips of optical fibers are extremely sharp. Especially you must attention in case of hazardous if they pierce one’s eyes.

● Do not apply extreme stress to optical fiber, or it may cause deterioration of characteristics or disconnection. The force of pull should be less than 200gf, and a radius for bending should be larger than R30 mm

● Do not hold only optical fiber or module package, because extreme stress is easy to apply to the optical fiber edge of the module

In generally, failure occurs in electronic components with a certain probability. We at NEC work to improve the quality and reliability of industrial electronic components, but it is impossible to reduce such probability to zero. This being the case, users of NEC industrial electronic components are requested to provide redundant design, counterburning design, malfunction prevention design and other safety design to prevent failures that may cause possible accidents involving injuries of death, fire, social damages, etc.

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Special level: Transportation machinery (automobiles, trains, ships, etc.), traffic signal equipment, disaster/crime prevention devices, various safety devices, and medical equipment not directly intended for life support.

Specific level: Aeronautical equipment, aerospace equipment, submarine relay equipment, nuclear control system, and medical equipment, devices or systems for life support.

NEC does not manufacture, as standard items, products recommendable to such “specific” applications as aerospace equipment, submarine relay equipment, nuclear control system and life-support medical equipment, which all require a very high levels of reliability. Customers planning to use our products for the above-mentioned applications or those planning to use our products of “standard” or “special” quality level for other application than intended by us, are requested to contact in addition, please note that NEC industrial electronic components listed in catalogs, data sheets, data books and other materials published by NEC without the indication of their quality level are all of the standard quality level.

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