

M E L
B Y
E

RAYCORE

Q3-S249 V2.1E

Specification of XFP 10G BIDI LC SMF
10km/20km/40km/60km Transceiver

Part Number: ATRG-8gxx-xxSDD-00



BIDI TX1270nm



BIDI TX1330nm

The **ATRG-89xx-xxSDD-00** series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-LR/LW & 10GBASE-ER/EW defined by IEEE 802.3ae. It is with the XFP footprint to allow hot plug capability.

The ATRG-89xx-xxSDD-00 module is designed for single mode fiber and operates at a nominal wavelength of 1270nm or 1330nm; the transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825.

For the 10/20/40km XFP receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

Features

- Supports 9.95Gb/s to 10.3Gb/s data rates
- Simplex LC Connector Bi-Directional XFP Optical Transceiver
- Hot-pluggable XFP footprint
- Single 3.3V, +1.8V Supply
- Power dissipation <2W
- No reference clock required
- Loop Back Support.
- Built-in digital diagnostic functions
- RoHS compliant and Lead Free
- A:1270nm DFB Laser transmitter, 1330nm receiver
- B:1330nm DFB Laser transmitter, 1270nm receiver
- Up to 10km on 9/125μm SMF for ATRG-89xx-LxSDD-00
- Up to 20km on 9/125μm SMF for ATRG-89xx-MxSDD-00
- Up to 40km on 9/125μm SMF for ATRG-89xx-DxSDD-00
- Up to 60km on 9/125μm SMF for ATRG-89xx-XxSDD-00
- Compliant with IEEE 802.3ae 10GBASE-LR and 10GBASE-LW for ATRG-89xx-LxSDD-00 & ATRG-89xx-MxSDD-00



- Compliant with IEEE 802.3ae 10GBASE-ER and 10GBASE-EW for ATRG-89xx-DxSDD-00 & ATRG-89xx-XxSDD-00
- Operating case temperature: Standard: 0 to 70°C, Industry: -40 to +85°C

Applications

- 10GBASE-LR at 10.3125Gbps & 10GBASE-LW at 9.953Gbps for ATRG-89xx-LxSDD-00 & ATRG-89xx-MxSDD-00
- 10GBASE-ER at 10.3125Gbps & 10GBASE-EW at 9.953Gbps for ATRG-89xx-DxSDD-00 & ATRG-89xx-XxSDD-00
- Other Optical Links

Specifications

Absolute Maximum Ratings

Parameter		Symbol	Min	Max	Unit	Ref.
Storage Ambient Temperature Range			-40	+85	°C	
Powered case Temperature Range	Standard	T_c	0	+70	°C	
	Industry		-40	85		
Operating Relative Humidity		RH		85	%	
Supply Voltage Range @ 3.3V		Vcc3	0	3.6	V	
Supply Voltage Range @ 1.8V			0	1.98	V	

Any stress beyond the maximum ratings can result in permanent damage.

The device specifications are guaranteed only under the recommended operating conditions.



Specifications

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note	
Operating Case Temperature Range	Standard	0		+70	°C		
	Industry	-40		85			
Power Supply Voltage @ 3.3V	Vcc3	3.13	3.3	3.47	V		
Power Supply Voltage @ 1.8V		1.62	1.8	1.98	V		
Module total power	P			2	W		
Transmitter							
Input differential impedance	Rin		100		Ω	1	
Differential data input swing	Vin,pp	120		820	mV		
Transmit Disable Voltage	VD	2.0		Vcc	V		
Transmit Enable Voltage	VEN	0		0.8	V		
Transmit Disable Assert Time				10	μs		
Receiver							
Differential data output swing	Vout,pp	340		850	mV		
Data output rise time	t _r			38	ps	2	
Data output fall time	t _f			38	ps	2	
Loss of Signal Fault	V _{LOS fault}	Vcc – 0.5		Vcc _{HOST}	V	3	
Loss of Signal Normal	V _{LOS norm}	GND		GND+0.5	V	3	
Power Supply Rejection	PSR	See Note 3 below					4

Notes:

1. After internal AC coupling.
2. 20 – 80 %
3. Loss of Signal is open collector to be pulled up with a 4.7k – 10kohm resistor to 3.15 – 3.6V.
Logic 0 indicates normal operation; logic 1 indicates no signal detected.
4. Per Section 2.7.1. in the XFP MSA Specification.



ATRG-8923-LxSDD-00: (DFB and PIN/TIA, TX: 1270nm/RX: 1330nm, 10km SMF Reach)

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.	
Transmitter							
Optical Wavelength	λ	1260	1270	1280	nm		
Optical output Power	P	-5		0	dBm		
Side Mode Suppression Ratio	SMSR	30			dB		
Optical Extinction Ratio	ER	3.5			dB	1	
Average Launch power of OFF transmitter	POFF	-30			dBm		
Tx Jitter	Tx _j	Compliant with each standard requirements					
Receiver							
Optical Center Wavelength	λ_c	1320		1340	nm		
Receiver Sensitivity	RSENS			-14	dBm	2	
Receiver Sensitivity in OMA	RSENS			-12.5	dBm	2	
Maximum Input Power	P _{MAX}			+0.5	dBm		
Loss of Signal De-Assert	LOS _D			-18	dBm		
Loss of Signal Assert	LOS _A	-30			dBm		
Loss of Signal Hysteresis		1		5	dB		

Notes:

- Notes:
- PRBS 2³¹-1 test pattern @10.3125Gbps.
- PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



ATRG-8932-LxSDD-00: (DFB and PIN/TIA, TX: 1330nm/RX: 1270nm, 10km SMF Reach)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.	
Transmitter							
Optical Wavelength	λ	1320	1330	1340	nm		
Optical output Power	P	-5		0	dBm		
Side Mode Suppression Ratio	SMSR	30			dB		
Optical Extinction Ratio	ER	3.5			dB	1	
Average Launch power of OFF transmitter	POFF	-30			dBm		
Tx Jitter	Tx _j	Compliant with each standard requirements					
Receiver							
Optical Center Wavelength	λ_c	1260		1280	nm		
Receiver Sensitivity	RSENS			-14	dBm	2	
Receiver Sensitivity in OMA	RSENS			-12.5	dBm	2	
Maximum Input Power	P _{MAX}			+0.5	dBm		
Loss of Signal De-Assert	LOS _D			-18	dBm		
Loss of Signal Assert	LOS _A	-30			dBm		
Loss of Signal Hysteresis		1		5	dB		

Notes:

1. PRBS 2³¹-1 test pattern @10.3125Gbps.
2. PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



ATRG-8923-MxSDD-00: (DFB and PIN/TIA, TX: 1270nm/RX: 1330nm, 20km SMF Reach)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.	
Transmitter							
Optical Wavelength	λ	1260	1270	1280	nm		
Optical output Power	P	-2		2	dBm		
Side Mode Suppression Ratio	SMSR	30			dB		
Optical Extinction Ratio	ER	3.5			dB	1	
Average Launch power of OFF transmitter	POFF	-30			dBm		
Tx Jitter	T _{xj}	Compliant with each standard requirements					
Receiver							
Optical Center Wavelength	λ_c	1320		1340	nm		
Receiver Sensitivity	RSENS			-14	dBm	2	
Receiver Sensitivity in OMA	RSENS			-12.5	dBm	2	
Maximum Input Power	P _{MAX}			+0.5	dBm		
Loss of Signal De-Assert	LOS _D			-18	dBm		
Loss of Signal Assert	LOS _A	-30			dBm		
Loss of Signal Hysteresis		1		5	dB		

Notes:

1. PRBS 2³¹-1 test pattern @10.3125Gbps.
2. PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



ATRG-8932-MxSDD-00: (DFB and PIN/TIA, TX: 1330nm/RX: 1270nm, 20km SMF Reach)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.	
Transmitter							
Optical Wavelength	λ	1320	1330	1340	nm		
Optical output Power	P	-2		2	dBm		
Side Mode Suppression Ratio	SMSR	30			dB		
Optical Extinction Ratio	ER	3.5			dB	1	
Average Launch power of OFF transmitter	POFF	-30			dBm		
Tx Jitter	T _{xj}	Compliant with each standard requirements					
Receiver							
Optical Center Wavelength	λ_c	1260		1280	nm		
Receiver Sensitivity	RSENS			-14	dBm	2	
Receiver Sensitivity in OMA	RSENS			-12.5	dBm	2	
Maximum Input Power	P _{MAX}			+0.5	dBm		
Loss of Signal De-Assert	LOS _D			-18	dBm		
Loss of Signal Assert	LOS _A	-30			dBm		
Loss of Signal Hysteresis		1		5	dB		

Notes:

1. PRBS 2³¹-1 test pattern @10.3125Gbps.
2. PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



ATRG-8923-DxSDD-00: (DFB and PIN/TIA, TX: 1270nm/RX: 1330nm, 40km SMF Reach)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.	
Transmitter							
Optical Wavelength	λ	1260	1270	1280	nm		
Optical output Power	P	0		+4	dBm		
Side Mode Suppression Ratio	SMSR	30			dB		
Optical Extinction Ratio	ER	3.5			dB	1	
Average Launch power of OFF transmitter	POFF	-30			dBm		
Tx Jitter	Tx _j	Compliant with each standard requirements					
Receiver							
Optical Center Wavelength	λ_c	1320		1340	nm		
Receiver Sensitivity	RSENS			-14	dBm	2	
Receiver Sensitivity in OMA	RSENS			-12.5	dBm	2	
Maximum Input Power	P _{MAX}			+0.5	dBm		
Loss of Signal De-Assert	LOS _D			-18	dBm		
Loss of Signal Assert	LOS _A	-30			dBm		
Loss of Signal Hysteresis		1		5	dB		

Notes:

1. PRBS 2³¹-1 test pattern @10.3125Gbps.
2. PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



ATRG-8932-DxSDD-00: (DFB and PIN/TIA, TX: 1330nm/RX: 1270nm, 40km SMF Reach)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λ	1320	1330	1340	nm	
Optical output Power	P	0		+4	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	3.5			dB	1
Average Launch power of OFF transmitter	POFF	-30			dBm	
Tx Jitter	T _{xj}	Compliant with each standard requirements				
Receiver						
Optical Center Wavelength	λ_c	1260		1280	nm	
Receiver Sensitivity	RSENS			-14	dBm	2
Receiver Sensitivity in OMA	RSENS			-12.5	dBm	2
Maximum Input Power	P _{MAX}			+0.5	dBm	
Loss of Signal De-Assert	LOS _D			-18	dBm	
Loss of Signal Assert	LOS _A	-30			dBm	
Loss of Signal Hysteresis		1		5	dB	

Notes:

1. PRBS 2³¹-1 test pattern @10.3125Gbps.
2. PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



ATRG-8923-XxSDD-00: (DFB and PIN/TIA, TX: 1270nm/RX: 1330nm, 60km SMF Reach)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λ	1260	1270	1280	nm	
Optical output Power	P	+2		+7	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	3.5			dB	1
Average Launch power of OFF transmitter	POFF	-30			dBm	
Tx Jitter	T _{xj}	Compliant with each standard requirements				
Receiver						
Optical Center Wavelength	λ_c	1320		1340	nm	
Receiver Sensitivity	RSENS			-20	dBm	2
Receiver Sensitivity in OMA	RSENS			-18	dBm	2
Maximum Input Power	P _{MAX}			-7	dBm	
Loss of Signal De-Assert	LOS _D			-25	dBm	
Loss of Signal Assert	LOS _A	-28			dBm	
Loss of Signal Hysteresis		1		5	dB	

Notes:

1. PRBS 2³¹-1 test pattern @10.3125Gbps.
2. PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



ATRG-8932-XxSDD-00: (DFB and PIN/TIA, TX: 1330nm/RX: 1270nm, 60km SMF Reach)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.	
Transmitter							
Optical Wavelength	λ	1320	1330	1340	nm		
Optical output Power	P	+2		+7	dBm		
Side Mode Suppression Ratio	SMSR	30			dB		
Optical Extinction Ratio	ER	3.5			dB	1	
Average Launch power of OFF transmitter	POFF	-30			dBm		
Tx Jitter	Tx _j	Compliant with each standard requirements					
Receiver							
Optical Center Wavelength	λ_c	1260		1280	nm		
Receiver Sensitivity	RSENS			-20	dBm	2	
Receiver Sensitivity in OMA	RSENS			-18	dBm	2	
Maximum Input Power	P _{MAX}			-7	dBm		
Loss of Signal De-Assert	LOS _D			-25	dBm		
Loss of Signal Assert	LOS _A	-28			dBm		
Loss of Signal Hysteresis		1		5	dB		

Notes:

1. PRBS 2³¹-1 test pattern @10.3125Gbps.
2. PRBS 2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹².



Pin Descriptions

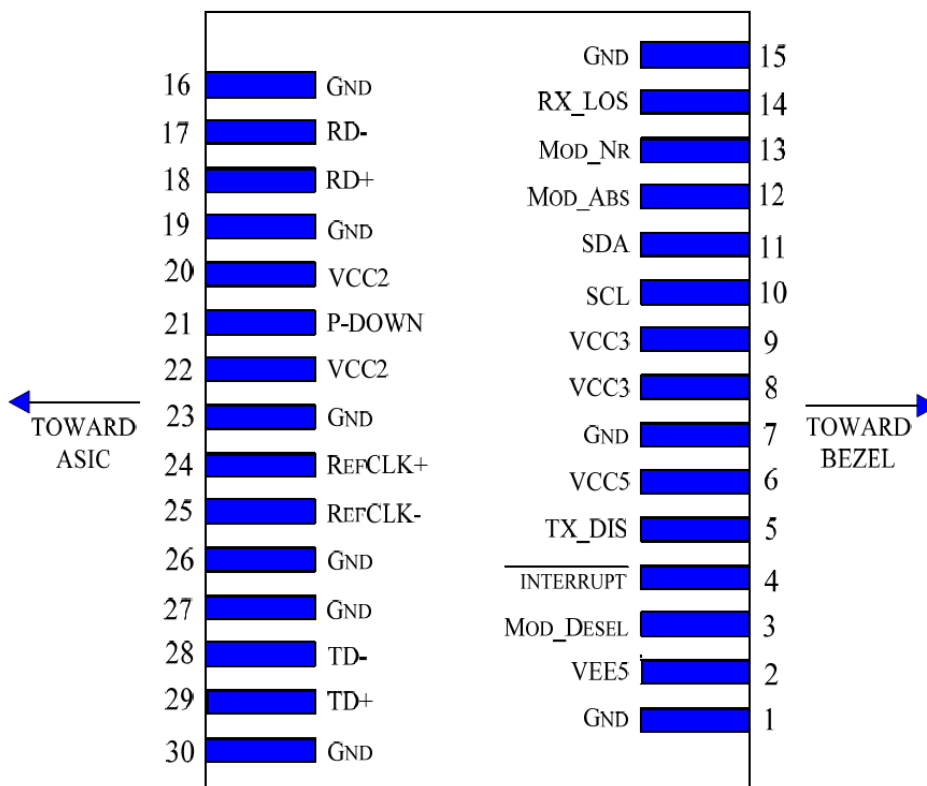
Pin	Logic	Symbol	Name/Description	Ref
1		GND	Module Ground	1
2		VEE5	Optional -5.2 Power Supply- Not required	
3	LVTTTL-I	Mod-Desel	Module De-select; When held low allows the module to, respond to 2-wire serial interface commands	
4	LVTTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	LVTTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6		VCC5	+5 Power Supply- Not required	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTTL-I	SCL	Serial 2-wire interface clock	2
11	LVTTTL- I/O	SDA	Serial 2-wire interface data line	2
12	LVTTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	LVTTTL-O	Mod_NR	Module Not Ready;	2
14	LVTTTL-O	RX_LOS	Receiver Loss of Signal indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver inverted data output	
18	CML-O	RD+	Receiver non-inverted data output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply	
21	LVTTTL-I	P_Down/R ST	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board – Not required	3
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter inverted data input	
29	CML-I	TD+	Transmitter non-inverted data input	
30		GND	Module Ground	1

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required.



Host Board Connector Pin-out



General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate	BR	9.95		10.3	Gb/s	
Bit Error Ratio	BER			10^{-12}		1
Max. Supported Link Length	L_{MAX}		10/20/40/60		km	

Notes:

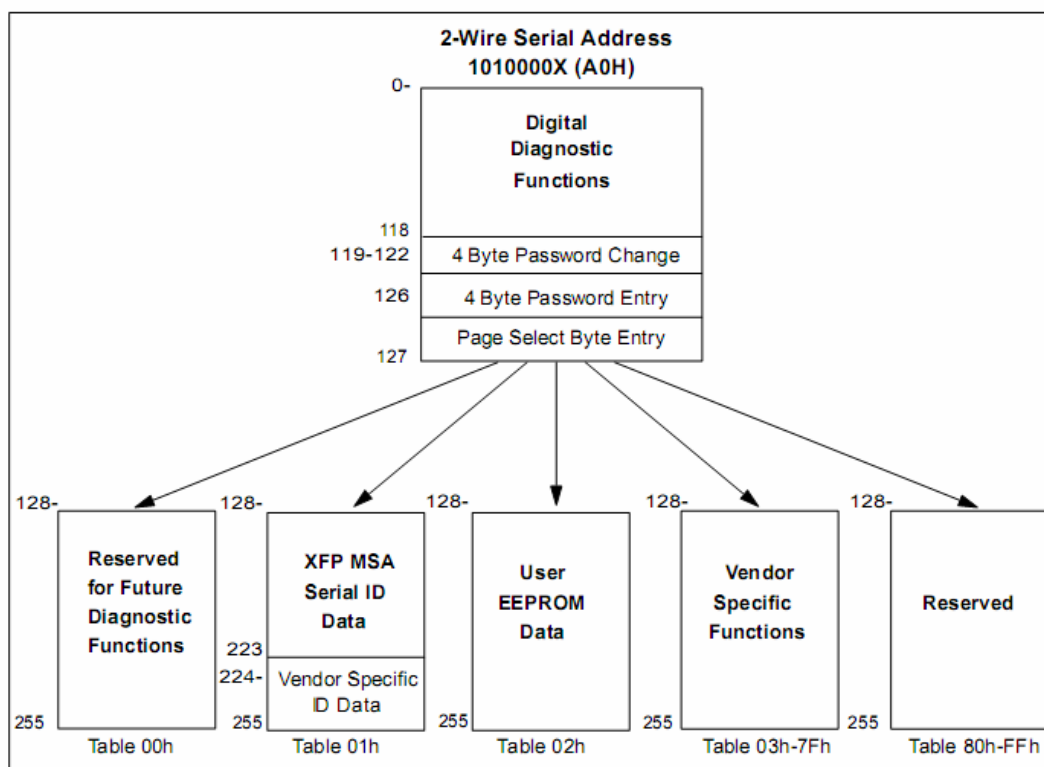
1. Tested with a $2^{31} - 1$ PRBS



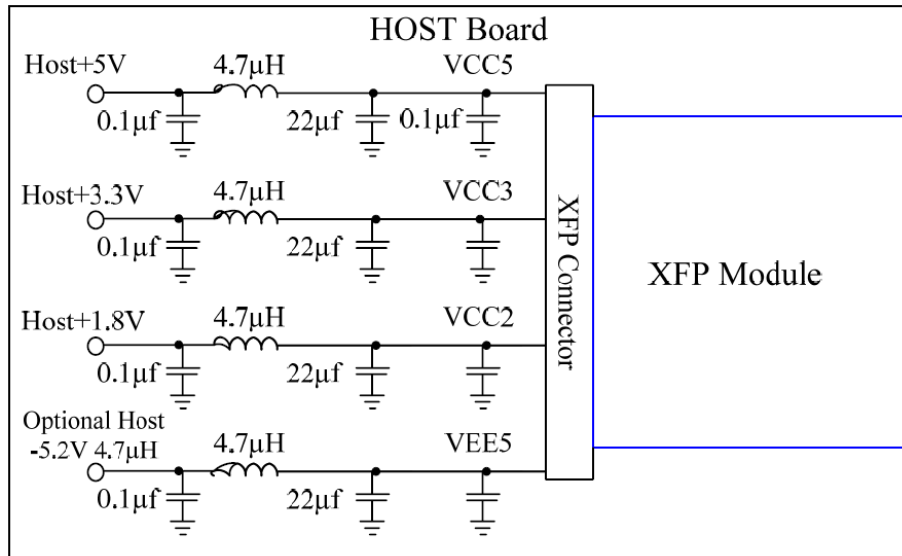
Management Interface

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

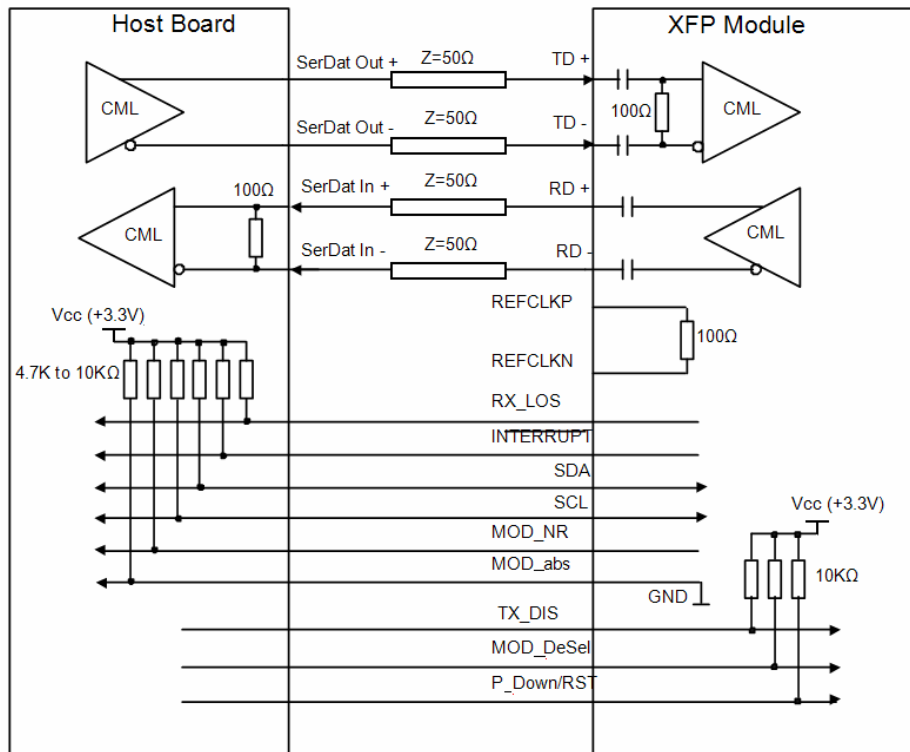
The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The digital diagnostic memory map specific data field defines as following.



Recommended Host Board Power Supply Circuit



Recommended High-speed Interface Circuit



M E L
B Y
E

Ordering information

Part Number	Product Description
ATRG-8923-LxSDD-00	XFP BIDI LC 10G-LR SMF 10km TX-1270nm/RX-1330nm Transceiver
ATRG-8932-LxSDD-00	XFP BIDI LC 10G-LR SMF 10km TX-1330nm/RX-1270nm Transceiver
ATRG-8923-MxSDD-00	XFP BIDI LC 10G-LR SMF 20km TX-1270nm/RX-1330nm Transceiver
ATRG-8932-MxSDD-00	XFP BIDI LC 10G-LR SMF 20km TX-1330nm/RX-1270nm Transceiver
ATRG-8923-DxSDD-00	XFP BIDI LC 10G-ER SMF 40km TX-1270nm/RX-1330nm Transceiver
ATRG-8932-DxSDD-00	XFP BIDI LC 10G-ER SMF 40km TX-1330nm/RX-1270nm Transceiver
ATRG-8923-XxSDD-00	XFP BIDI LC 10G-ER SMF 60km TX-1270nm/RX-1330nm Transceiver
ATRG-8932-XxSDD-00	XFP BIDI LC 10G-ER SMF 60km TX-1330nm/RX-1270nm Transceiver

RAYCORE

Raycore is a fiber optic product brand name of Melbye Skandinavia AS.
This Specification is subject to change without notice. Please visit our website www.melbye.com.tw for most
update information and specification. Copyright © 2012 Melbye Raycore Taiwan Co., Ltd. All rights reserved.

