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RAYCORE

Q3-S235 V2.4E

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

Part Number: ATRG-79xx-xxSDD-00

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The ATRG-79xx-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 SFP+ 20-pin connector to allow hot plug capability.

The ATRG-79xx-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 SFP+ receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

For the 60km SFP+ receiver section consists of a APD photodiode integrated with a TIA.

Features

- Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- Single 3.3V Supply
- Up to 10km on 9/125μm SMF for ATRG-79xx-LxSDD-00
- Up to 20km on 9/125μm SMF for ATRG-79xx-MxSDD-00
- Up to 40km on 9/125μm SMF for ATRG-79xx-DxSDD-00
- Up to 60km on 9/125μm SMF for ATRG-79xx-XxSDD-00
- A:1270nm DFB Laser transmitter,1330nm receiver
- B:1330nm DFB Laser transmitter,1270nm receiver
- Compliant with IEEE 802.3ae 10GBASE-LR and 10GBASE-LW for ATRG-79xx-LxSDD-00 & ATRG-79xx-MxSDD-00
- Compliant with IEEE 802.3ae 10GBASE-ER and 10GBASE-EW for ATRG-79xx-DxSDD-00 & ATRG-79xx-XxSDD-00
- SFP+ MSA SFF-8431 Compliant
- Digital Diagnostic SFF-8472 Compliant
- RoHS compliant and Lead Free
- 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-79xx-LxSDD-00 & ATRG-79xx-MxSDD-00
- 10GBASE-ER at 10.3125Gbps & 10GBASE-EW at 9.953Gbps for ATRG-79xx-DxSDD-00 & ATRG-79xx-XxSDD-00
- Other Optical Links

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Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameter		Symbol	Min	Max	Unit
Supply Voltage		V_{CC}	-0.5	+3.6	V
Storage Temperature		Tc	-40	+85	°C
Operating Case Temperature	Standard	Tc	0	+70	°C
	Industry		-40	+85	
Relative Humidity		RH	0	85	%

Specifications

Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Supply Voltage		Vcc	3.0	3.3	3.6	V
Supply Current		Icc		200	300	mA
Operating Case Temperature	Standard	T_C	0		+70	°C
	Industry		-40		+85	
Module Power Dissipation		Pm		0.7	1.1	W

Notes:
[1] Supply current is shared between VCCTX and VCCRX.
[2] In-rush is defined as current level above steady state current requirements.

Electrical characteristics (VCC = 3.0 to 3.6 Volts)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref
Supply Voltage	V_{CC}	3.00		3.60	V	1
Supply Current	I_{cc}		200	300	mA	1
Transmitter						
Input differential impedance	R_{in}		100		Ω	2
Single ended data input swing	$V_{in,pp}$	150		1200	mVpp	
Transmit Disable Voltage	V_D	2		V_{CC}	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+0.8	V	3
Receiver						
Output differential impedance	R_{out}		100		Ω	2
Single ended data output swing	Vout,pp	300		700	mV	4
LOS Fault	$V_{LOS\ fault}$	2		VCC_{HOST}	V	5
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+0.8	V	5

Notes:
1. Module power consumption never exceeds 1W.
2. AC coupled.
3. Or open circuit.
4. Into 100ohm differential termination.
5. LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

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Optical characteristics (Vcc = 3.0 to 3.6 Volts)

ATRG-7923-LxSDD-00: (DFB and PIN/TIA, TX: 1270nm/RX: 1330nm, 10km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	1260	1270	1280	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	-8.2		0.5	dBm	1
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-14.1	dBm	1,2
Receiver Overload	P_{MAX}			+0.5	dBm	
Centre Wavelength	λC	1320		1340	nm	
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
2. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, $BER \leq 10^{-12}$

ATRG-7932-LxSDD-00: (DFB and PIN/TIA, TX: 1330nm/RX: 1270nm, 10km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	1320	1330	1340	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	-8.2		0.5	dBm	1,2
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-14.1	dBm	2,3
Receiver Overload	P_{MAX}			+0.5	dBm	
Centre Wavelength	λC	1260		1270	nm	
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Output is coupled into a 9/125μm SMF.
2. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
3. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, $BER \leq 10^{-12}$

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ATRG-7923-MxSDD-00: (DFB and PIN/TIA, TX: 1270nm/RX: 1330nm, 20km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	1260	1270	1280	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	-2		2	dBm	1
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-14.1	dBm	1,2
Receiver Overload	P_{MAX}			+0.5	dBm	
Centre Wavelength	λC	1320		1340	nm	
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
2. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, $BER \leq 10^{-12}$

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ATRG-7932-MxSDD-00: (DFB and PIN/TIA, TX: 1330nm/RX: 1270nm, 20km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	1320	1330	1340	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	-2		2	dBm	1,2
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-14.1	dBm	2,3
Receiver Overload	P_{MAX}			+0.5	dBm	
Centre Wavelength	λC	1260		1270	nm	
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Output is coupled into a 9/125μm SMF.
2. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
3. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, BER≤10^{-12}

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ATRG-7923-DxSDD-00: (DFB and PIN/TIA, TX: 1270nm/RX: 1330nm, 40km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	126	1270	1280	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	1		5	dBm	1
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-15	dBm	1,2
Receiver Overload	P_{MAX}			+0.5	dBm	
Centre Wavelength	λC	132		1340	nm	
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
2. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, $BER \leq 10^{-12}$

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ATRG-7932-DxSDD-00: (DFB and PIN/TIA, TX: 1330nm/RX: 1270nm, 40km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	1320	1330	1340	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	1		5	dBm	1,2
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-15	dBm	2,3
Receiver Overload	P_{MAX}			+0.5	dBm	
Centre Wavelength	λC	1260		1270	nm	
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Output is coupled into a 9/125μm SMF.
2. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
3. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, $BER \leq 10^{-12}$

ATRG-7923-XxSDD-00: (DFB and APD/TIA, TX: 1270nm/RX: 1330nm, 60km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	1260	1270	1280	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	2		7	dBm	1
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-20	dBm	1,2
Receiver Overload	P_{MAX}			-7	dBm	
Centre Wavelength	λC	1320		1340	nm	
LOS De-Assert	LOS_D			-25	dBm	
LOS Assert	LOS_A	-28			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
2. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, BER≤10^{-12}

ATRG-7932-XxSDD-00: (DFB and APD/TIA, TX: 1330nm/RX: 1270nm, 60km SMF Reach)

Parameter	Symbol	Min.	Typical	Max	Unit	Ref.
Transmitter						
Optical Wavelength	λc	1320	1330	1340	nm	
Side Mode Suppress Ratio	SMSR	30			dB	
Spectral Width(-20dB)	Δλ			1	nm	
Average Output Power	P_{op}	2		7	dBm	1,2
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Average Power of OFF Transmitter				-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Average Receiver Power	RSENS			-22	dBm	2,3
Receiver Overload	P_{MAX}			-7	dBm	
Centre Wavelength	λC	1260		1270	nm	
LOS De-Assert	LOS_D			-25	dBm	
LOS Assert	LOS_A	-28			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Output is coupled into a 9/125μm SMF.
2. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
3. Measured with a $PRBS2^{31}$-1 test pattern @10.3125Gbps, $BER \leq 10^{-12}$

Pin Descriptions

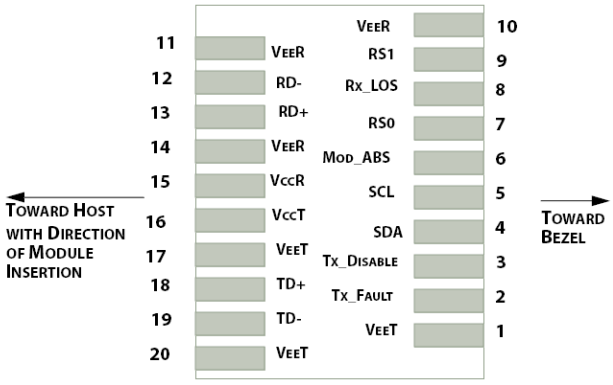

Figure1.Electrical Pin-out Details

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	RS0 for Rate Select: Open or Low = Module supports ≤4.25Gbps High = Module supports 9.95 Gb/s to 10.3125 Gb/s
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	No connection required
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

Notes:

[1] Module circuit ground is isolated from module chassis ground within the module.

[2] Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15Vand 3.6V.

[3] Tx_Disable is an input contact with a 4.7k ohms to 10 k ohms pullup to VccT inside the module.

[4] Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 k ohms to10 k ohms. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 k ohms resistors in the module.

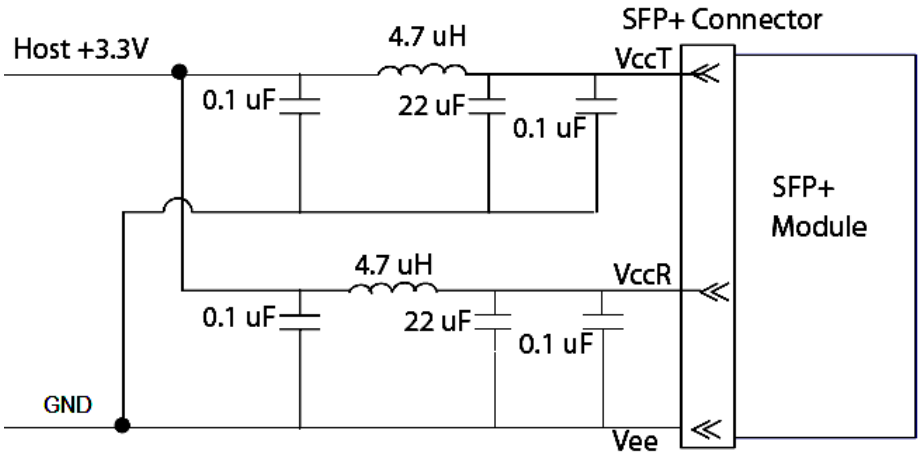

Figure2. Host Board Power Supply Filters Circuit

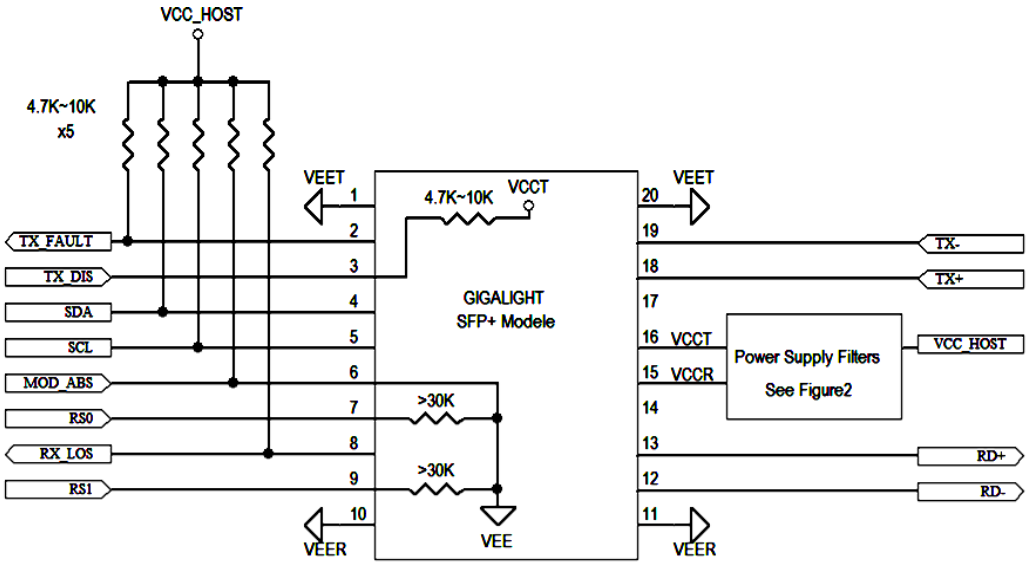

Figure3. Host-Module Interface

BIDI TX1270nm

BIDI TX1330nm

Figure4. Product Picture

Ordering information

Part Number	Product Description
ATRG-7923-LxSDD-00	SFP+ BIDI LC 10G-LR SMF 10km TX-1270nm/RX-1330nm Transceiver
ATRG-7932-LxSDD-00	SFP+ BIDI LC 10G-LR SMF 10km TX-1330nm/RX-1270nm Transceiver
ATRG-7923-MxSDD-00	SFP+ BIDI LC 10G-LR SMF 20km TX-1270nm/RX-1330nm Transceiver
ATRG-7932-MxSDD-00	SFP+ BIDI LC 10G-LR SMF 20km TX-1330nm/RX-1270nm Transceiver
ATRG-7923-DxSDD-00	SFP+ BIDI LC 10G-ER SMF 40km TX-1270nm/RX-1330nm Transceiver
ATRG-7932-DxSDD-00	SFP+ BIDI LC 10G-ER SMF 40km TX-1330nm/RX-1270nm Transceiver
ATRG-7923-XxSDD-00	SFP+ BIDI LC 10G-ER SMF 60km TX-1270nm/RX-1330nm Transceiver
ATRG-7932-XxSDD-00	SFP+ BIDI LC 10G-ER SMF 60km TX-1330nm/RX-1270nm Transceiver

* X mean is Operating Temperature:

C: Standard: 0 to 70°C,

M: Industry: -40 to +85°C