

10Gbps 40km Range SFP+ CWDM Optical Transceiver

Optical Transceivers

Overview

ARIA's SFP+ER CWDM Transceiver is a "Limiting module", designed for 10GBASE-ER, and 2G/4G/ 8G/10G Fiber Channel applications.

The transceiver consists of the transmitter and the receiver. The transmitter section incorporates a cooled EML laser. The receiver section consists of a PIN photodiode integrated with a TIA.

This module satisfies class I laser safety requirements.

Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage.



Features

- Compliant with SFF-8431, SFF-8432 and IEE802.3ae
- 10GBASE-ER, and 2G/4G/ 8G/10G Fiber Channel applications.
- Wavelength selectable to ITU-T standards covering CWDM grid wavelengths
- Cooled EML transmitter and PIN receiver
- Low Power Dissipation 1.5W Maximum
- -5°C to 70°C Operating Case Temperature
- Diagnostic Performance Monitoring of module temperature, supply voltages, laser bias current, transmit optical power, receive optical power
- Link length up to 40km
- Single 3.3V power supply
- RoHS compliant and lead free



Applications

- 10GBASE-ER
- 10G Fiber Channel
- CWDM Network

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	3.8	V
Storage Temperature	Tst	-40	85	°C
Relative Humidity	Rh	0	85	%

10Gbps 40km Range SFP+ CWDM Optical Transceiver

Optical Transceivers

Page 2 of 7
DS-OT-1
Revision date 06/01/2017

Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	3.13	3.3	V
Supply Current	Icc	N/A	360	mA
Operating Case Temperature	Tca	-5	N/A	°C
Module Power Dissipation	Pm	N/A	1.2	W

Transmitter Specifications - Optical

Parameter	Symbol	Min	Typical	Max	Unit
Center Wavelength	λ_c	1464.5	N/A	1617.5	nm
Center Wavelength Stability	$\Delta\lambda_D$	-6.5	λ_c	6.5	nm
Spectral Width (-20dB)	$\Delta\lambda_{20}$	N/A	N/A	0.3	nm
Average Optical Power	Po	-1	N/A	+2	dBm
Side Mode Suppression Ratio	SMSR	30	N/A	N/A	dB
Optical Transmit Power (disabled)	PTX_DISABLE	N/A	N/A	-30	dBm
Extinction Ratio	ER	8.2	N/A	N/A	dB
Relative Intensity Noise	RIN	N/A	N/A	-128	dB/Hz
Optical Return Loss Tolerance	Orl	N/A	N/A	21	dB

Receiver Specifications - Optical

Parameter	Symbol	Min	Typical	Max	Unit
Input Operating Wavelength	λ	1260	N/A	1610	nm
Average Receive Power	Pavg	-15.8	N/A	-1.0	dBm
Receiver Sensitivity in 9.95~11.3Gbps(OMA)	Rsen1	N/A	N/A	-14.1	dBm
Stressed Receiver Sensitivity in 9.95~11.3Gbps(OMA)	Rsen2	N/A	N/A	-11.3	dBm
Dispersion Penalty(800ps/nm) PRBS 2 ³¹ -1@9.95~11.3Gbps	DP	N/A	N/A	2	dB
Reflectance	Rrx	N/A	N/A	-26	dB
LOS Asserted	Lsa	-28	N/A	N/A	dBm
LOS De-Asserted	Lda	N/A	N/A	-19	dBm
LOS De-Asserted	Lh	0.5	N/A	N/A	dB

10Gbps 40km Range SFP+ CWDM Optical Transceiver

Optical Transceivers

Transmitter Specifications - Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Data Rate	Mra	N/A	10.3	11.3	Gbps
Input differential impedance	Rim	N/A	100	N/A	Ω
Differential data Input	VtxDIFF	120	N/A	850	mV
Transmit Disable Voltage	VD	2.0	N/A	Vcc3+0.3	V
Transmit Enable Voltage	Ven	0	N/A	+0.8	V
Transmit Disable Assert Time	Vn	N/A	N/A	100	us

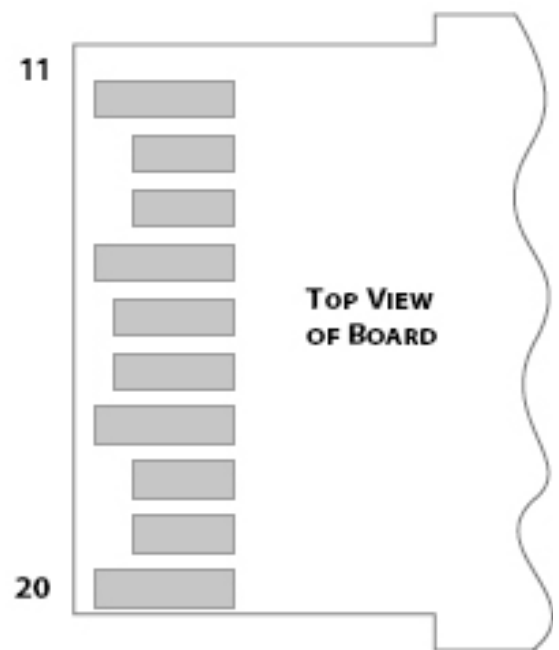
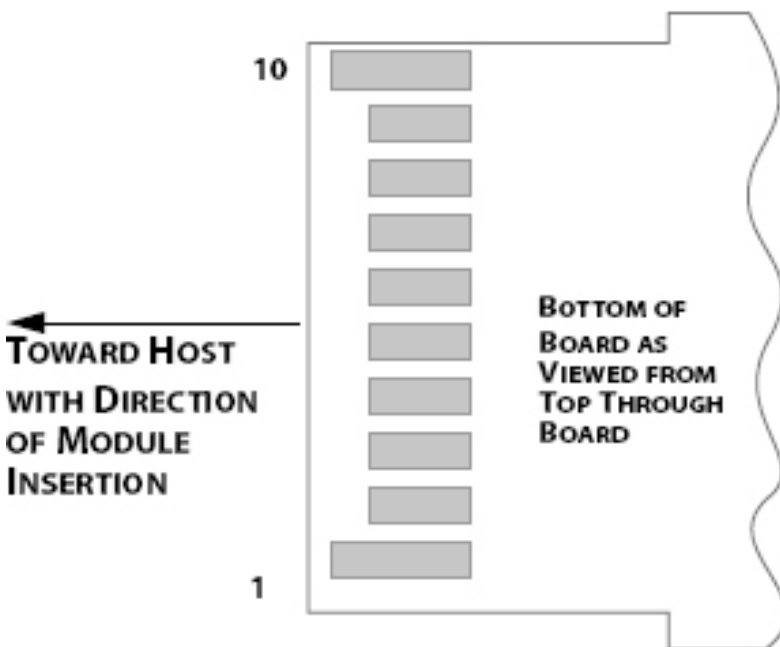
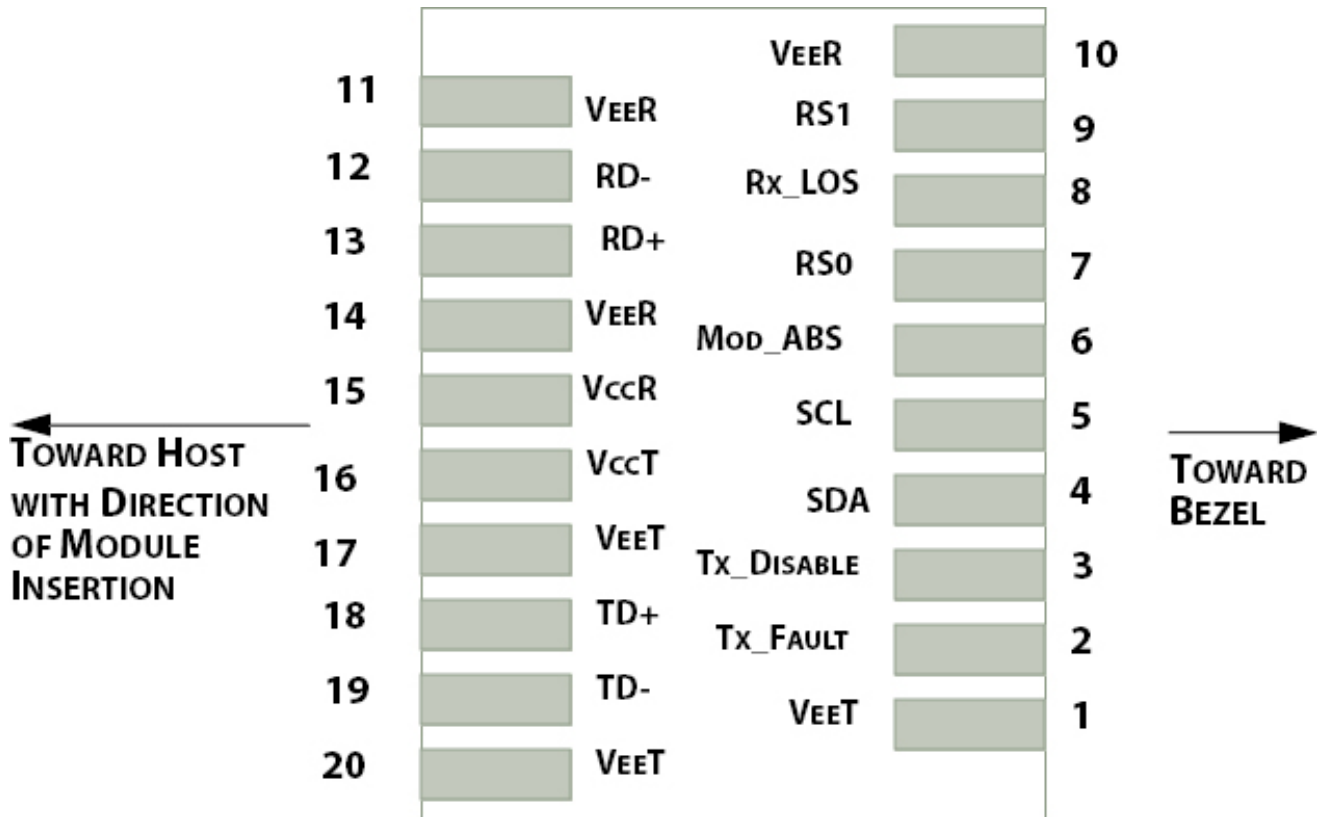
Receiver Specifications - Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Data Rate	Mra	N/A	10.3125	11.3	Gbps
Differential Output Swing	Vout P-P	350	N/A	850	mV
Rise/Fall Time	Tr / Tf	N/A	N/A	40	ps
Loss of Signal –Asserted	VOH	2	N/A	Vcc3+0.3	V
Loss of Signal –Negated	VOL	0	N/A	+0.4	V

Digital Diagnostic Functions

Parameter	Symbol	Min	Max	Unit	Notes
Accuracy					
Transceiver Temperature	DMI_Temp	-3	+3	degC	Over operating temp
TX Output optical power	DMI_TX	-3	+3	dB	-
RX Input optical power	DMI_RX	-3	+3	dB	0dBm to -18dBm range
Transceiver Supply voltage	DMI_VCC	-0.08	+0.08	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	-
Dynamic Range Accuracy					
Transceiver Temperature	DMI_Temp	-5	70	degC	-
TX Output optical power	DMI_TX	-1	+2	dBm	-
RX Input optical power	DMI_RX	-18	0	dBm	-
Transceiver Supply voltage	DMI_VCC	3.0	3.6	V	-
Bias current monitor	DMI_Ibias	0	100	mA	-

Electrical Pin-out Details



Pin Descriptions

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]	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	Rate Select 1
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 3.15V and 3.6V.

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

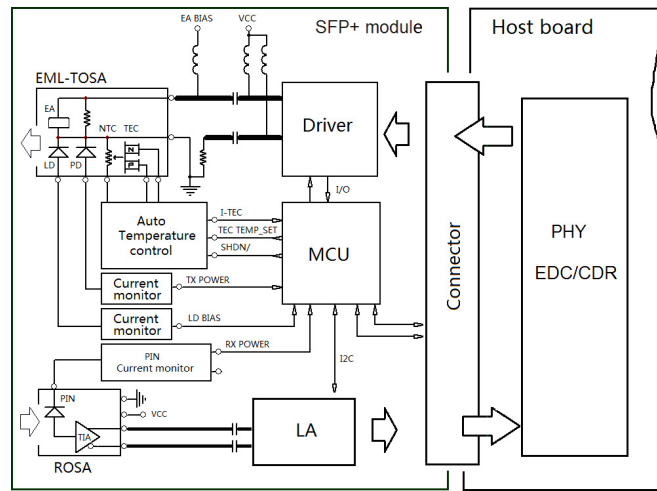
[4]Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

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

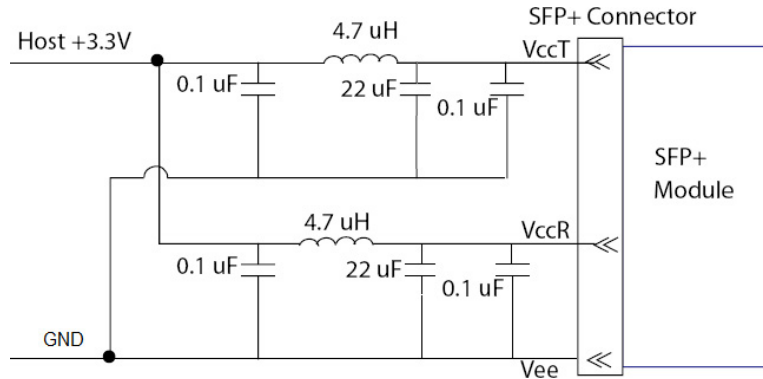
10Gbps 40km Range SFP+ CWDM Optical Transceiver

Optical Transceivers

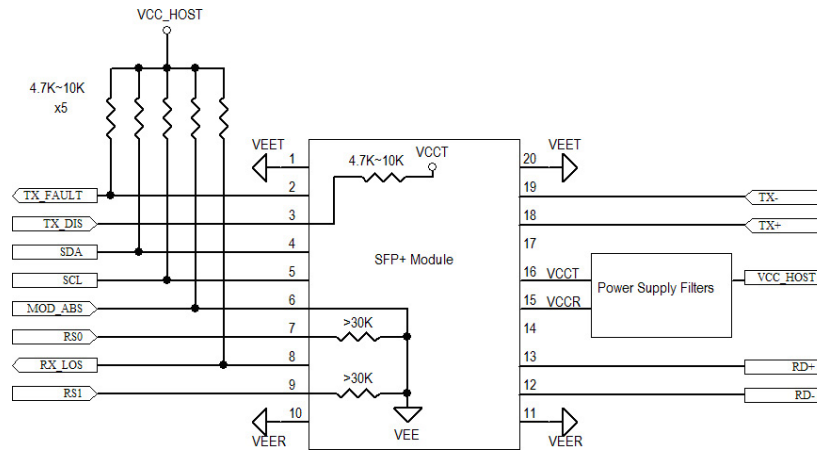
Module Block Diagram



Host Board Power Supply Filters Circuit



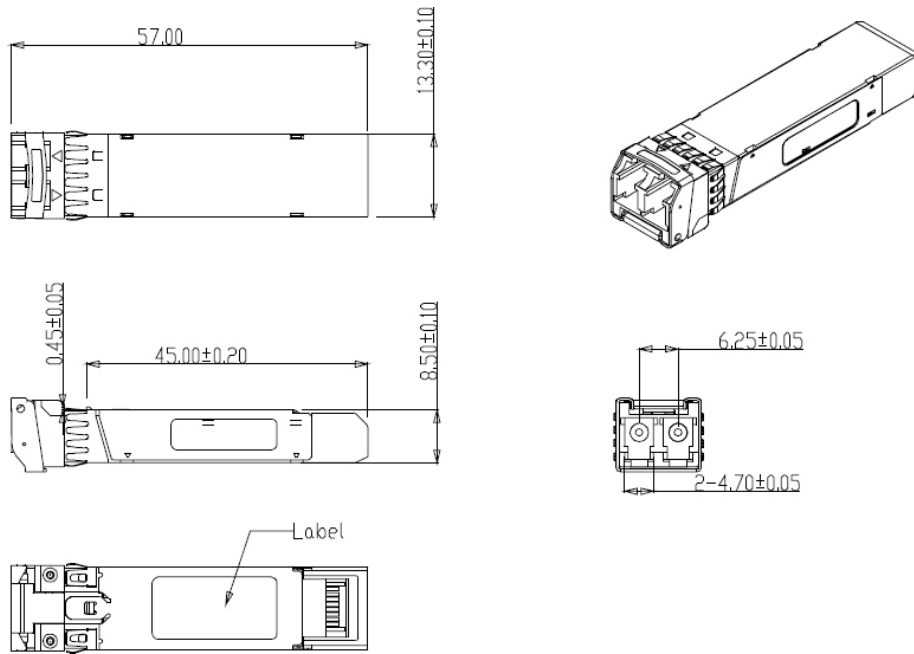
Host-Module Interface



10Gbps 40km Range SFP+ CWDM Optical Transceiver

Optical Transceivers

Mechanical Specifications



Regulatory Compliance

Feature	Agency	Standard
Laser Safety	FDA	CDRH 21 CFR 1040 and Laser Notice No. 50
Product Safety	UL	UL and CUL EN60950-2:2007
Environmental protection	SGS	RoHS Directive 2002/95/EC
EMC	WALTEK	EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003

Ordering Information

Part Number	Product Description
ATM-47192-04C	10Gbps, 1470nm SFP+ER 40km, -5°C ~ +70°C
ATM-49192-04C	10Gbps, 1490nm SFP+ER 40km, -5°C ~ +70°C
ATM-51192-04C	10Gbps, 1510nm SFP+ER 40km, -5°C ~ +70°C
ATM-53192-04C	10Gbps, 1530nm SFP+ER 40km, -5°C ~ +70°C
ATM-55192-04C	10Gbps, 1550nm SFP+ER 40km, -5°C ~ +70°C
ATM-57192-04C	10Gbps, 1570nm SFP+ER 40km, -5°C ~ +70°C
ATM-59192-04C	10Gbps, 1590nm SFP+ER 40km, -5°C ~ +70°C
ATM-61192-04C	10Gbps, 1610nm SFP+ER 40km, -5°C ~ +70°C