

# 10Gbps Bi-Di SFP+ Optical Transceiver, 40km Reach

**AMS3435-7A-2**

## 1. Applications

- High - speed Storage Area Networks
- 10GBASE - ER at 10.3125Gbps
- 10GBASE - EW at 9.953Gbps
- Other optical links

## 2. Features

- One Fiber Bi - Di SFP+ Optical Transceiver
- Up to 10.3 Gbps Bi - directional Data Links
- Optical Interface Compliant to IEEE802.3ae 10GBASE - ER
- Up to 40km Transmission on SMF
- 1270nm DFB Transmitter and 1330nm PIN Photo - detector
- SFP+ (Small Form - factor Pluggable Plus) SFF - 8431 Compliant
- SFP+ Package with single LC Connector
- Digital Diagnostic SFF - 8472 Compliant
- Single 3.3V Power Supply
- Hot Pluggable
- Operating Case Temperature: - 40 to 85 °C
- All - metal Housing for Superior EMI Performance
- Telcordia GR - 468 Compliant
- Class 1 Laser International Safety Standard IEC 60825 Compliant
- RoHS Compliant

### 3. Description

AMS3435-7A-2 Bi-Di SFP+ transceiver is designed for bi-directional 10G serial optical data communications. This transceiver is include a DFB Laser transmitter and a PIN receiver comply with SFP+ (Small Form-factor Pluggable Plus) SFF-8431 MSA, and can support Multi-rate from 9.9Gbps to 11.1Gbps for Ethernet LAN(10.325Gb/s) and WAN(9.95Gb/s) applications on 40km SMF. Digital diagnostics functions are available via I2C which is Compliant with SFF-8472.

### 4. Performance Specifications

#### 4.1 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.

**Table.1 Absolute maximum ratings**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Tst	-40		85	°C	-
Storage Relative Humidity	RH	5		95	%	-
Power Supply Voltage	VCC	0		4	V	-
Maximum Optical Input Power	Pin	-		4	dBm	-

#### 4.2 Recommended Operating Conditions

**Table.2 Recommended Operating Conditions**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	Tc	-40		85	°C	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Power Supply Current	ICC			400	mA	
Power Dissipation	PD		0.9	1.5	W	

Data Rate	DR	8.0		11.1	Gbps	
Transmission Distance	TD			40	km	SMF-28

### 4.3 Transmitter Specification

**Table.3 Transmitter Specification (Optical)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note	
Average Output Power	Po	1	2.0	3	dBm		
Disable Power	Poff			-30	dBm		
Extinction Ratio	ER	3.0	4.5		dB		
Output Centre Wavelength	$\lambda_c$	1257.5	1270	1282.5	nm		
Spectral Width (-20dB)	$\Delta\lambda$	-		1	nm		
Side Mode Suppression Ratio	SMSR	30			dB		
Dispersion tolerance				800	ps/nm		
Eye Mask Margin	MM	5			%		
Dispersion penalty	DP			2	dB	1	
Optical Return Loss	ORL	21			dB		
Optical Eye Mask	MM	Compliant to IEEE802.3ae					2

Note :1. Measured at BER 10-12, 10.3Gbps, PRBS2<sup>31</sup>-1, 40km SMF; 2. Measured at 10.3Gbps, PRBS2<sup>31</sup>-1, NRZ

**Table.4 Transmitter Specification (Electrical)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Differential Data Input Voltage Swing	V <sub>in,p-p</sub>	180		800	mV	
Input Differential Impedance	R <sub>in</sub>	80	100	120	$\Omega$	
Input HIGH Voltage (Tx_Disable)	V <sub>IH</sub>	2		VCC	V	
Input LOW Voltage (Tx_Disable)	V <sub>IL</sub>	0		+0.8	V	

Output HIGH Voltage (Tx_Fault)	VOH	2		VCC	V	
Output LOW Voltage (Tx_Fault)	VOL	0		+0.8	V	

#### 4.4 Receiver Specification

**Table.5 Receiver Specification (Optical)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Minimum Sensitivity	SEN			-15.8	dBm	3
Overload power	Psat	3.0			dBm	3
Input Centre Wavelength	$\lambda$	1317.5	1330	1342.5	nm	
LOS Assert	LosA	-28			dBm	
LOS De-assert	LosD			-16	dBm	
LOS Hysteresis		0.5		4	dBm	
Reflectance Tolerance				-26	dB	
Jitter Tolerance		GR-253-CORE/ITU-T G.783				

Note :3. Measured at BER 10-12, 10.3Gbps, PRBS2<sup>31</sup>-1, NRZ

**Table.6 Receiver Specification (Electrical)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Differential Data Output Voltage Swing	Vout,p-p	300	650	1000	mV	
Output Differential Impedance	Rout		100		$\Omega$	
Output HIGH Voltage (LOS)	VOH	2		VCC	V	
Output LOW Voltage (LOS)	VOL	0		+0.8	V	

### 4.5 Pin definition

The SFP+ modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP+ host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8083, or stacked connector with equivalent with equivalent electrical performance. Host PCB contact assignment is shown in Figure 1 and contact definitions are given in Table below. SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 2.

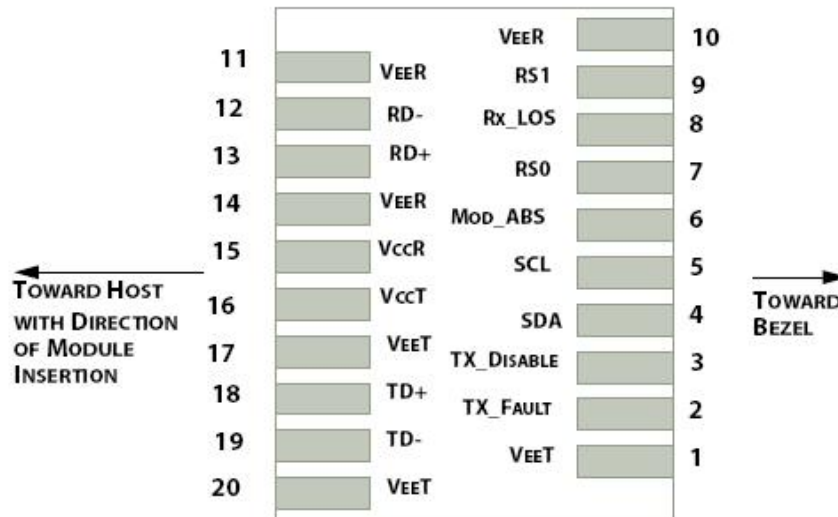


Figure 1: Interface to Host PCB

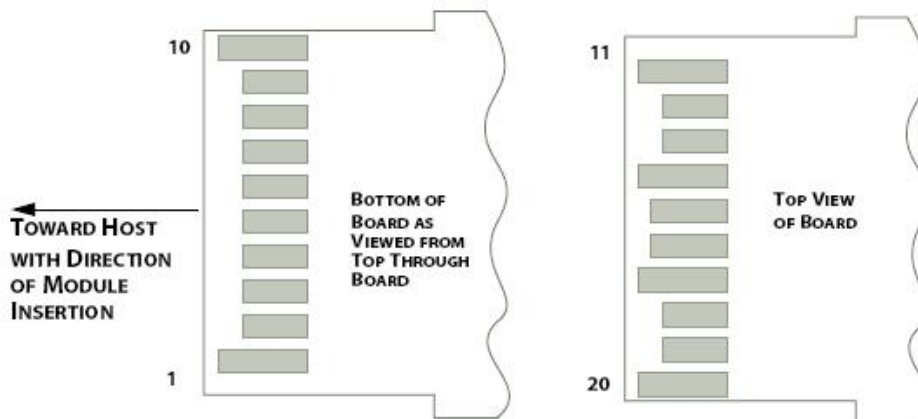


Figure 2: Module Contact Assignment

Pin	Logic	Symbol	Name/Description
1		VeeT	Module Transmitter Ground
2	LVTTL-O	TX_FAULT	Module Transmitter Fault
3	LVTTL-I	TX_DISABLE	Transmitter Disable; Turns off transmitter laser output
4	LVTTL-I/O	SDA	2-wire Serial Interface Data line(Same as MOD-DEF2 in the INF-8074i)
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock(Same as MOD-DEF1 in the INF-8074i)
6		MOD_ABS	Module Absent, connected to GND in the module
7	LVTTL-I	RS0	Rate Select 0, optionally controls SFP+ module receiver, internal 30k resistance pull down.
8	LVTTL-O	Rx_LOS	Receiver Loss of Signal Indication (In FC designated as Rx_LOS and in Ethernet designated as Signal Detect)
9	LVTTL-I	RS1	Rate Select 1, optionally controls SFP+ module transmitter, internal 30k resistance pull down.
1		VeeR	Module Receiver Ground
1		VeeR	Module Receiver Ground
1	CML-O	RD-	Receiver Inverted Data Output
13	CML-O	RD+	Receiver Non-Inverted Data Output
1		VeeR	Module Receiver Ground
1		VccR	Module Receiver 3.3V Supply
1		VccT	Module Transmitter 3.3V Supply
1		VeeT	Module Transmitter Ground
18	CML-I	TD+	Transmitter Non-Inverted Data Input
1	CML-I	TD-	Transmitter Inverted Data Input
2		VeeT	Module Transmitter Ground

#### 4.6 Timing Electrical Interface

Parameter	Symbol	Min	Max	Units	Conditions
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	Tx_Disable negate time. 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	t_start_up		300	ms	From power supplies or hot plug or Tx disable negated during power up, or Tx_Fault recovery, until non-cooled power level I is fully operational.
Tx_Fault Assert Time	Tx_Fault		1	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault to Reset	t_reset	10		us	Time Tx_Disable must be held high to reset Tx_Fault
Rx_LOS Assert Time	t_los_on		100	us	From occurrence of loss of signal to assertion of Rx_LOS
Rx_LOS De-Assert Time	t_los_off		100	us	From occurrence of presence of signal to negation of Rx_LOS

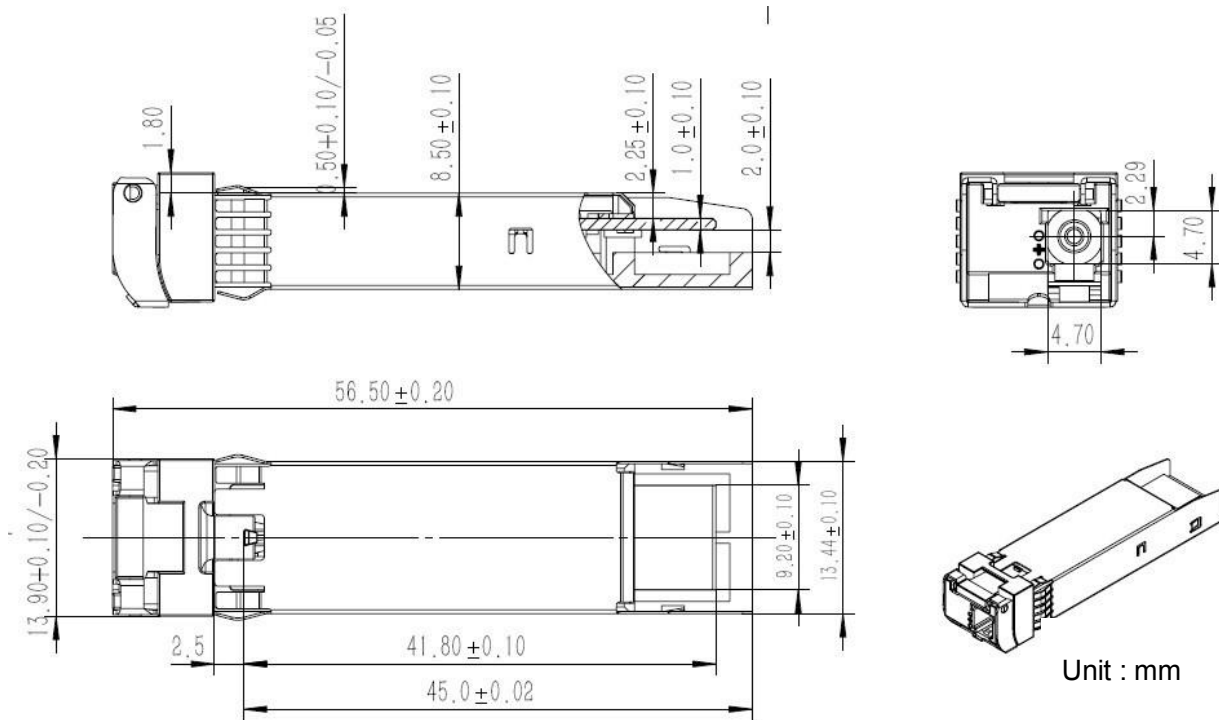
#### 4.7 DDM requirements

Parameter	Range	Accuracy	Unit
Temperature	-40 to 85	±3	°C
Supply Voltage	0 to Vcc	±0.1	V
Bias Current	0 to 100	±10%	mA
Tx Power	0 to 3.0	±1.5	dBm
Rx Power	-17 to 3	±2	dB

#### 4.8 2 - wire Management Interface

The transceivers provide management two-wire interface similar to I2C as define by SFF-8431, the management memory map is specified by SFF-8472.

5. Mechanical



Key Mechanical Dimensions

6. Application Cautions

6.1 ESD

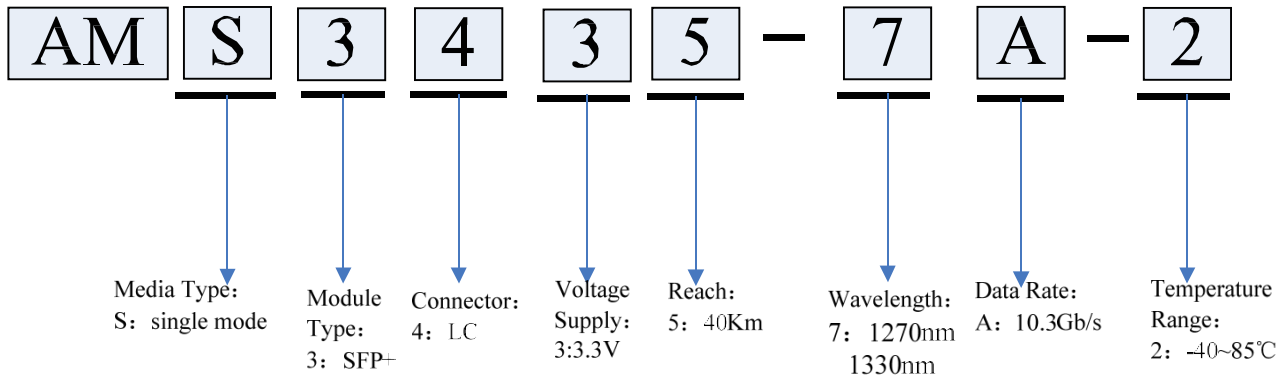
This transceiver is specified as ESD threshold 1kV for high speed pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

6.2 LASER SAFTY

This is a Class 1 Laser Product according to IEC 60825-1:1993:+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001).



6. Order Information



Further Information

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