10GBASE-LRM SFP+ Multimode 1310nm 220m Transceiver

P/N: AE-SFP+-LRM

Features

- Supports up to 10.7Gbps bit rates
- Hot-pluggable SFP+ footprint
- Compliant with SFP+ MSA and SFF-8472
- 1310nm FP laser transmitter, PIN photodiode
- Distance up to 220m transmission on OM3 MMF
- Duplex LC connector
- Built-in digital diagnostic functions
- Single +3.3V power supply
- Metal enclosure for lower EMI
- ROHS compliant and lead-free
- Operating Temperature: Standard 0~70ºC, Extended -10~85ºC, Industrial -40~85ºC

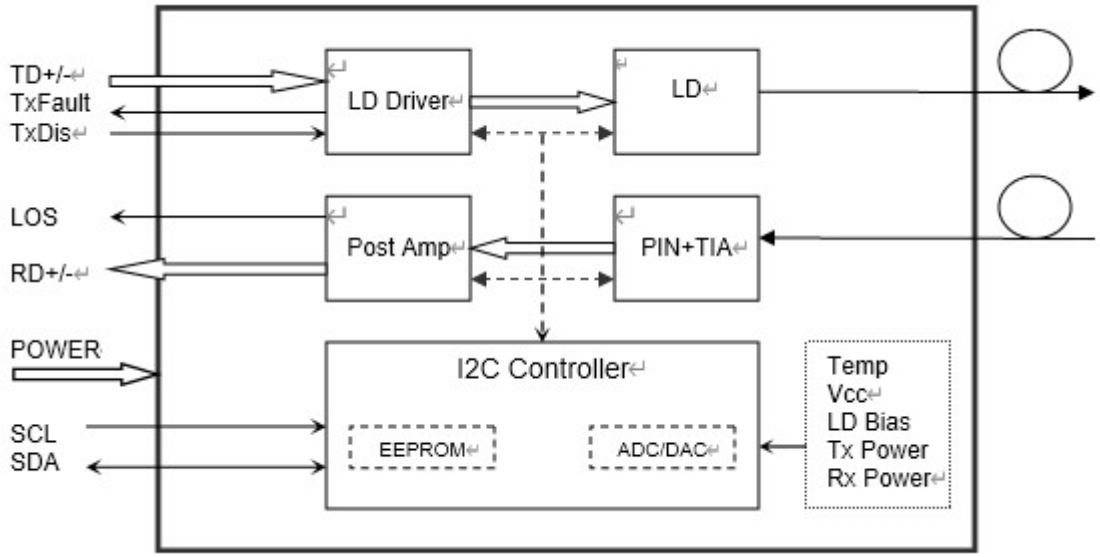
Applications

- 10GBASE-LRM at 10.3125Gbps
- 10G Fibre Channel
- 10G Data Center Switches and Routers
- 10G Network interface cards and Fiber Media Converters
- LTE systems
- Other Optical Links

Description

AERECH's AE-SFP+-LRM is a high performance and cost-effective 10GBASE-LRM SFP+ transceiver module for 10 Gigabit Ethernet links up to 220m over multimode fiber. The transceiver features a highly reliable 1310nm FP transmitter and PIN photo-detector into duplex LC optical connector. It complies with SFP+ MSA specifications(SFF-8431, SFF-8432), 10 Gigabit Ethernet specifications (10GBASE-LRM per IEEE 802.3ae), and 10G Fibre Channel (1200-MX-SN-I). It's suitable for use in 10G Ethernet switches, routers, network interface cards (NICs), fiber media converters and storage networking equipment.

Functional Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5	4.5	V	
Storage Temperature	T_S	-40	85	°C	
Operating Humidity	RH	5	85	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc			290	mA	
Case Operating Temperature	Tc	0		70	°C	Standard
		-10		85	°C	Extended
		-40		85	°C	Industrial
Data Rate			10.3	10.7	Gbps	
Maximum Link Length	L_{MAX}			220	m	OM3 MMF

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λc	1270	1310	1350	nm	
Spectral Width（-20dB）	Δλ			4	nm	

Side-Mode Suppression Ratio		SMSR	-	-		dB	
Average Output Power		Pout	-6.0		0	dBm	1
Extinction Ratio		ER	3.5			dB	
Data Input Swing Differential		VIN	180		850	mV	2
Input Differential Impedance		ZIN	90	100	110	Ω	
TX Disable	Disable		2.0		Vcc	V	
	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	
Receiver							
Centre Wavelength		λc	1260		1600	nm	
Receiver Sensitivity					-9.0	dBm	3
Receiver Overload			0.5			dBm	3
LOS De-Assert		LOS_D			-11	dBm	
LOS Assert		LOS_A	-30			dBm	
LOS Hysteresis			0.5			dB	
Data Output Swing Differential		V_{out}	300		900	mV	4
LOS		High	2.0		Vcc	V	
		Low			0.8	V	

Note :

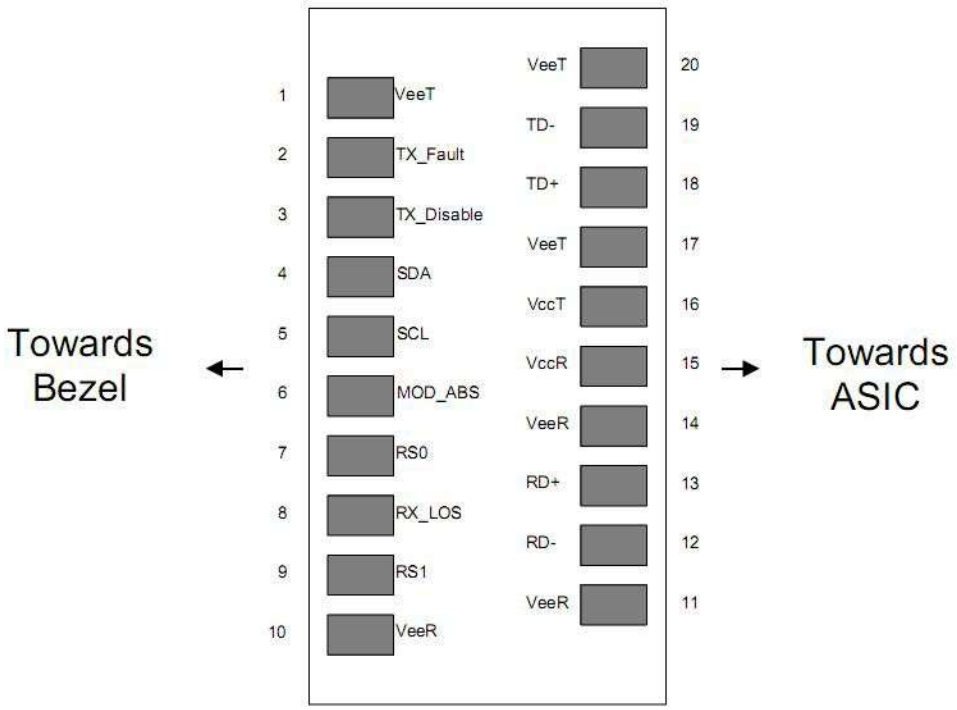
1. The optical power is launched into MMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 231-1 test pattern @10312Mbps, BER ≤1×10-12.
4. Internally AC-coupled.

Timing and Electrical

Parameter	Symbol	Min	Typical	Max	Unit
Tx Disable Negate Time	t_on			1	ms
Tx Disable Assert Time	t_off			10	μs
Time To Initialize, including Reset of Tx Fault	t_init			300	ms
Tx Fault Assert Time	t_fault			100	μs
Tx Disable To Reset	t_reset	10			μs
LOS Assert Time	t_loss_on			100	μs
LOS De-assert Time	t_loss_off			100	μs
Serial ID Clock Rate	f_serial_clock		100	400	KHz

MOD_DEF (0:2)-High	V_H	2		Vcc	V
MOD_DEF (0:2)-Low	V_L			0.8	V

Pin Definitions



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V_{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V_{EER}	Receiver ground	1	
11	V_{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4

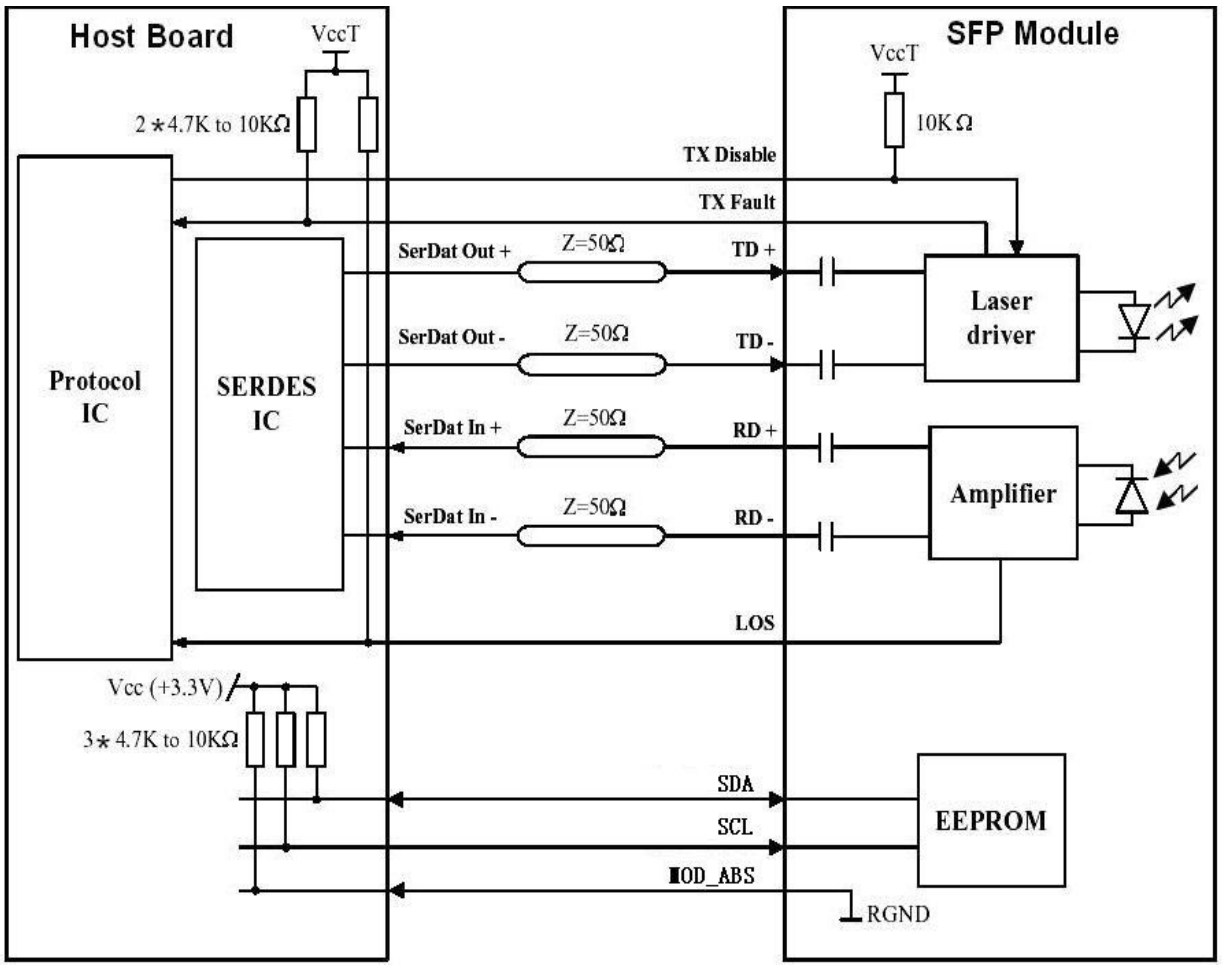
14	V_{EER}	Receiver ground	1	
15	V_{CCR}	Receiver Power Supply	2	
16	V_{CCT}	Transmitter Power Supply	2	
17	V_{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	V_{EET}	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
4. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
5. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



Ordering information

Part number	Description
AE-SFP+-LRM	10GBASE-LRM SFP+ Transceiver Multimode 1310nm 220m LC DDM 0ºC~+70ºC
AE-SFP+-LRMI	10GBASE-LRM SFP+ Transceiver Multimode 1310nm 220m LC DDM -20ºC~+85ºC