



MMA2L20-AR-ER-I-OPC

Mellanox® MMA2L20-AR-ER Compatible TAA 25GBase-ER SFP28 Transceiver (SMF, 1310nm, 40km, LC, DOM, -40 to 85C)

Features

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Industrial Temperature -40 to 85 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



Applications:

- 25GBase-ER Ethernet
- Access, Metro and Enterprise

Product Description

This Mellanox® MMA2L20-AR-ER compatible SFP28 transceiver provides 25GBase-ER throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is capable of withstanding rugged environments and can operate at temperatures between -40 and 85C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Mellanox®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

OptioConnect's transceivers are RoHS compliant and lead-free.

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		4.0	V	
Storage Temperature	TS	-40		85	°C	
Operating Case Temperature	Tc	-40	25	85	°C	
Operating Humidity	RH	5		95	%	
Receiver Power	Rmax			-4	dBm	
Data Rate			24.33 25.78		Gbps	
Bit Error Rate	BER			5×10^{-5}		1
Supported Link Length on 9/125um SMF, 25.78Gb/s	L		40		km	2

Notes:

1. Tested with a PRBS 2³¹-1 test pattern for 25.78Gb/s operation.
2. Distances are based on FC-PI-6 Rev. 3.1 and IEEE 802.3 standards.

Electrical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		V _{cc}	3.135	3.30	3.465	V	
Power Supply Current		I _{cc}			545	mA	
Power Dissipation		PD			1800	mW	
Transmitter							
Differential data input swing		V _{in,pp}	180		700	mVp-p	
Input differential impedance		Z _{in}		100		Ω	
TX_FAULT	Transmitter Fault	VOH	2.0		VCCHOST	V	
	Normal Operation	VOL	0		0.8	V	
TX_DISABLE	Transmitter Disable	VIH	2.0		VCCHOST	V	
	Transmitter Enable	VIL	0		0.8	V	
Receiver							
Differential data output swing		V _{out, pp}	300		850	mVp-p	1
Output differential impedance		Z _o		100		Ω	
Data Output Rise Time, Fall Time		t _r , t _f	15			ps	2
RX_LOS	Loss of signal (LOS)	VOH	2.0		VCCHOST	V	3
	Normal Operation	VOL	0		0.8	V	3

Notes:

1. Internally AC coupled but requires an external 100Ω differential load termination.
2. 20 – 80 %.
3. LOS is an open collector output. Should be pulled up with 4.7kΩ on the host board.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Launch Optical Power (average)	Pavg	0		+6	dBm	1
Extinction Ratio	ER	4.0			dB	
Center Wavelength Range	λ_c	1295		1310	nm	
Transmitter and Dispersion Penalty	TDP			2.7	dB	
Spectral Width	$\Delta\lambda$			1	nm	2
RIN20OMA (max)	RIN			-130	dB/Hz	
Optical Return Loss Tolerance	ORLT			20	dB	
Pout @TX-Disable Asserted	Poff			-30	dBm	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} Hit ratio 5×10-5 hits per sample.		{0.31, 0.4, 0.45, 0.34, 0.38, 0.4}				
Receiver						
Center Wavelength	λ_c	1295	1310	1325	nm	
Receiver Sensitivity(average)	RxSENS1			-21	dBm	3
Receiver Sensitivity (OMA)	RxSENS2			-19	dBm	3
Receiver Overload	POL	-4			dBm	
Optical Return Loss	ORL	26			dB	
LOS De-Assert	LOS _D			-21	dBm	
LOS Assert	LOS _A	-35			dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.
2. 20dB spectral width.
3. Measured @25.78Gbps, with PRBS $2^{31}-1$ at 5×10^{-5} BER.

Pin Description

PIN	Symbol	Name / Description	Notes
1	VeeT	Transmitter Ground	1
2	TX_Fault	Transmitter Fault (LVTTTL-O) - High indicates a fault condition	2
3	TX_Disable	Transmitter Disable (LVTTTL-I) – High or open disables the transmitter	3
4	SDA	Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)	4
5	SCL	Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1)	4
6	MOD_ABS	Module Absent (Output), connected to VeeT or VeeR in the module	5
7	RS0	NA	6
8	RX_LOS	Receiver Loss of Signal (LVTTTL-O)	2
9	RS1	NA	6
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Inverse Received Data out (CML-O)	
13	RD+	Received Data out (CML-O)	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power - +3.3V	
16	VccT	Transmitter Power - +3.3 V	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Data In (CML-I)	
19	TD-	Inverse Transmitter Data In (CML-I)	
20	VeeT	Transmitter Ground	1

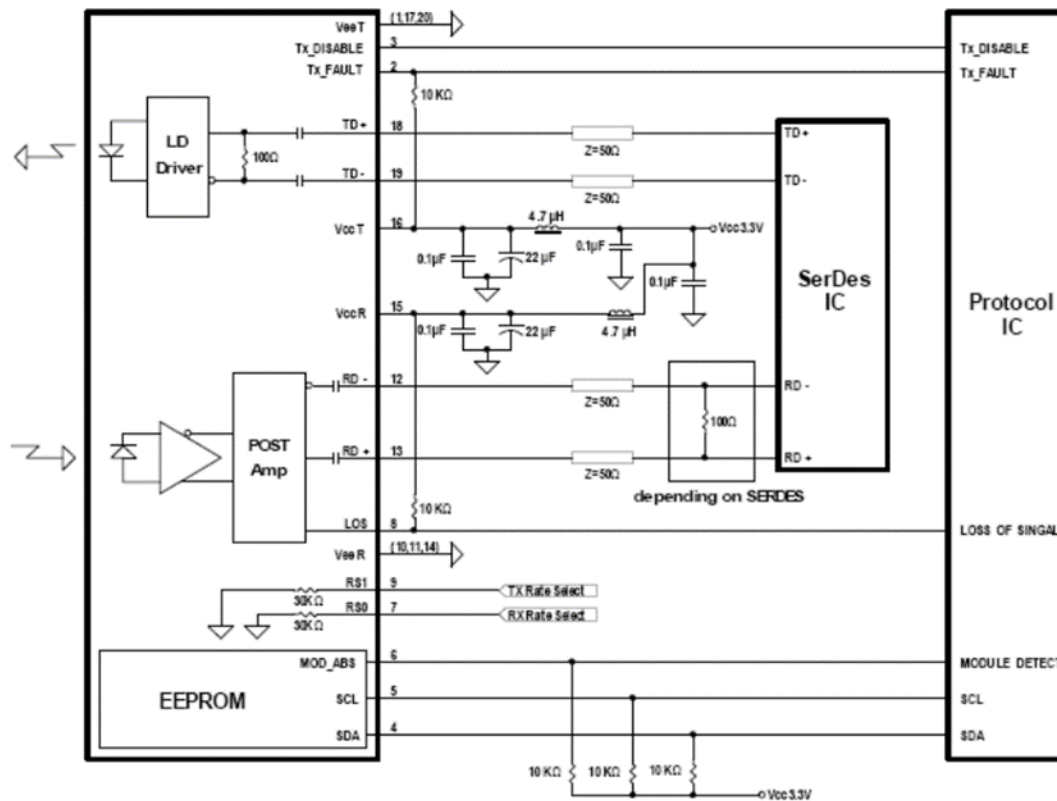
Notes:

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.
3. This input is internally biased high with a 4.7KΩ to 10KΩ pull-up resistor to VccT.
4. Two-Wire Serial interface clock and data lines require an external pull-up resistor dependent on the capacitance load.
5. This is a ground return that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.
6. Rate select can also be set through the 2-wire bus in accordance with SFF-8472 v. 12.1, Rx Rate Select is set at Bit 3, Byte 110, Address A2h. Tx Rate Select is set at Bit 3, Byte 118, Address A2h.
Note: writing a “1” selects maximum bandwidth operation. Rate select is the logic OR of the input state of Rate Select Pin and 2-wire bus.



Pin-out of connector Block on Host board

Recommended Circuit Schematic



Mechanical Specifications

Small Form Factor Pluggable (SFP) transceivers are compatible with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



EEPROM Information

EEPROM memory map specific data field description is as below:

2 wire address 1010000X (A0h)		2 wire address 1010001X (A2h)	
0	Serial ID Defined by SFP MSA (96 bytes)	0	Alarm and Warning Thresholds (56 bytes)
55		55	Cal Constants (40 bytes)
95		95	Real Time Diagnostic Interface (24 bytes)
119	Vendor Specific (32 bytes)	119	Vendor Specific (8 bytes)
127		127	User Writable EEPROM (120 bytes)
	Reserved, SFF8079 (128 bytes)		
247		247	
255		255	Vendor Specific (8 bytes)

OptioConnect

Innovation for the Future of High-Speed Networking

Who We Are

OptioConnect is reshaping the landscape of communication and high-speed networking through intelligent technology. With a core focus on cutting edge technology, we deliver smarter fiber optic solutions for enterprise networks, data centers, and next-gen telecom infrastructures.

What We Do

At OptioConnect, we fuse advanced engineering with intelligent automation to drive the future of networking. Our AI-integrated solutions are designed to optimize performance and streamline operations with:

- Superior Performance
- Network and traffic optimization
- Intelligent energy management
- Seamless OEM compatibility
- Scalable cost-efficiency

Smarter Networks by Design

Innovation isn't just a goal—it's our process. We embed AI and machine learning across our R&D and product lines, enabling adaptive performance, automated tuning, and faster deployment cycles. The result? Networks that don't just work—they learn, evolve, and outperform.

Our Team

Our engineers, data scientists, and network architects bring decades of experience and a future-focused mindset. We provide hands-on support with intelligent insights that turn complex challenges into simple solutions.

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To deliver AI-enhanced connectivity that reduces cost, increases speed, and maximizes efficiency—empowering our partners to operate at the forefront of a rapidly evolving digital world.

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