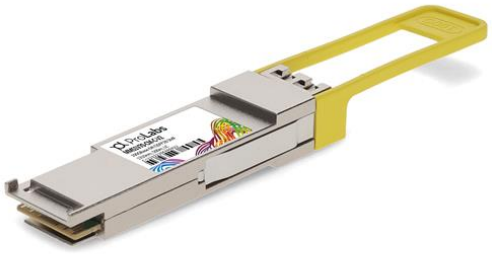
MMS1V70-CM-C-V2

Mellanox® MMS1V70-CM Compatible TAA Compliant 100GBase-DR QSFP28 Single Lambda Transceiver (SMF, 1310nm, 500m, LC, DOM, with FEC)

Features:

- QSFP28 MSA Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead-Free



Applications:

- 100GBase-DR Ethernet
- Access and Enterprise

Product Description

This Mellanox® MMS1V70-CM compatible QSFP28 transceiver provides 100GBase-DR throughput up to 500m over single-mode fiber (SMF) using a wavelength of 1310nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Mellanox® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow 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.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."

TAA COMPLIANT

Rev. 012025

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		3.6	V	
Storage Temperature	Tstg	-40		+85	℃	
Operating Case Temperature	Tc	0		70	℃	
Relative Humidity (Non-Condensing)	RH	0		85	%	
Damage Threshold	THd	5			dBm	
Data Input Voltage Differential (Pk-Pk)	Vpp	100		900	mV	
Power Supply Noise	Vn			66	mV	
Electrical Data Rate Per Lane (NRZ)			25.78125		Gbps	
Optical Data Rate (PAM4)			53.125		GBd	
Data Rate Accuracy		-100		100	ppm	
Pre-FEC Bit Error Ratio				$2.4x10^{-4}$		
Post-FEC Bit Error Ratio				$1x10^{-12}$		1
Control Input Voltage - High		2		Vcc	V	
Control Input Voltage - Low		0		0.8	V	
Link Distance with G.652	D	.002		500	m	2

Notes:

1. FEC feature is embedded in the module.

2. FEC is required to be turned on to support the maximum transmission distance.

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Power Consumption				3.5	W	
Supply Current	Icc			1.06	A	
Power Supply Ripple				15	mV	
Transmitter (Per Lane)						
Overload Differential Voltage (Pk-Pk)	TP1a	900			mV	
Common-Mode Voltage (Vcm)	TP1	-350		2850	mV	1
Differential Termination Resistance Mismatch	TP1			10	%	At 1MHz
Differential Return Loss (SDD11)	TP1			See CEI- 28G-VSR Equation 13-19	dB	
Common-Mode to Differential Conversion and Differential to Common-Mode Conversion (SDC11, SCD11)	TP1			See CEI- 28G-VSR Equation 13-20	dB	
Stressed Input Test	TP1a	See CEI- 28G-VSR Section 3.3.11.2.1				
Input AC Coupling Capacitor	TP1a		0.1		µF	
Receiver (Per Lane)						
Differential Voltage (Pk-Pk)	TP4			900	mV	
Differential Load	TP4		100		Ω	
Common-Mode Voltage (Vcm)	TP4	-350		2850	mV	1
Common-Mode Noise (RMS)	TP4			17.5	mV	
Differential Termination Resistance Mismatch	TP4			10	%	At 1MHz
Differential Return Loss (SDD22)	TP4			See CEI- 28G-VSR Equation 13-19	dB	
Common-Mode to Differential Conversion and Differential to Common-Mode Conversion (SDC22, SCD22)	TP4			See CEI- 28G-VSR Equation 13-21	dB	
Common-Mode Return Loss (SCC22)	TP4			-2	dB	2
Transition Time (20-80%)	TP4	12			ps	
Vertical Eye Closure (VEC)	TP4			5.5	dB	
Eye Width at 10^{-15} Probability (EW15)	TP4	0.57			UI	
Eye Height at 10^{-15} Probability (EH15)	TP4	228			mV	
Output AC Coupling Capacitor	TP4		0.1		µF	

Notes:

1. Vcm is generated by the host. Specification includes the effects of ground offset voltage.
2. From 250MHz to 30GHz.

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Center Wavelength	λT	1304.5		1317.5	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Average Launch Power	P_{avg}	-2.4		4	dBm	1
Outer Optical Modulation Amplitude (OMAouter)	POMA	-0.8		4.2	dBm	2
Launch Power in OMA_{outer} Minus TDECQ **For ER≥5dB** **For ER<5dB**		 -2.2 -1.9			dBm	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ)	TDECQ			3.4	dB	
TDECQ – $10*log_{10}(C_{eq})$				3.4	dB	3
Extinction Ratio	ER	3.5			dB	
$RIN_{15.5}OMA$	RIN			-136	dB/Hz	
Optical Return Loss Tolerance	TOL			15.5	dB	
Transmitter Reflectance	R_T			-26	dB	
Transmitter Transition Time				17	ps	
Average Launch Power of Off Transmitter	Poff			-15	dBm	
LOS Assert Level	LOSA		50		mV	4
LOS De-Assert Level	LOSD		100		mV	
Receiver						
Center Wavelength	λR	1304.5		1317.5	nm	
Damage Threshold	TH_d	5			dBm	5
Average Receive Power		-5.9		4	dBm	6
Receive Power (OMA_{outer})				4.2	dBm	
Receiver Sensitivity (OMA_{outer})	SEN			Equation (1)	dBm	7
Stressed Receiver Sensitivity (OMA_{outer})	SRS			-1.9	dBm	8
Receiver Reflectance	R_R			-26	dB	
LOS Assert	LOSA	-15			dBm	9
LOS De-Assert	LOSD			-8.9	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Conditions of Stressed Receiver Sensitivity Test (Note 8)						
Stressed Eye Closure for PAM4 (SECQ)			3.4		dB	
SECQ – $10*log_{10}(C_{eq})$				3.4	dB	

Notes:

1. Average launch power (minimum) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
2. Even if the TDECQ<1.4dB for an extinction ratio of ≥5dB or TDECQ<1.1dB for an extinction ratio of <5dB, the OMAouter (minimum) must exceed the minimum value specified here.
3. Ceq is a coefficient defined in IEEE Std 802.3-2018 Clause 121.8.5.3 which accounts for reference equalizer noise enhancement.
4. Average receive power (minimum) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
5. The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input signal having this power level on one lane. The receiver does not have to operate correctly at this input power.
6. Receiver sensitivity (OMAouter) (maximum) is informative and is defined for a transmitter with a value of SECQ up to 3.4dB. It should meet Equation (1), which is illustrated in the figure below:

$$RS = \max(-3.9, SECQ - 5.3)\ dBm \quad (1)$$

Where:

RS is the receiver sensitivity, and
SECQ is the SECQ of the transmitter used to measure the receiver sensitivity.

7. Measured with conformance test signal at TP3 for the BER equal to 2.4×10^{-4}.
8. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

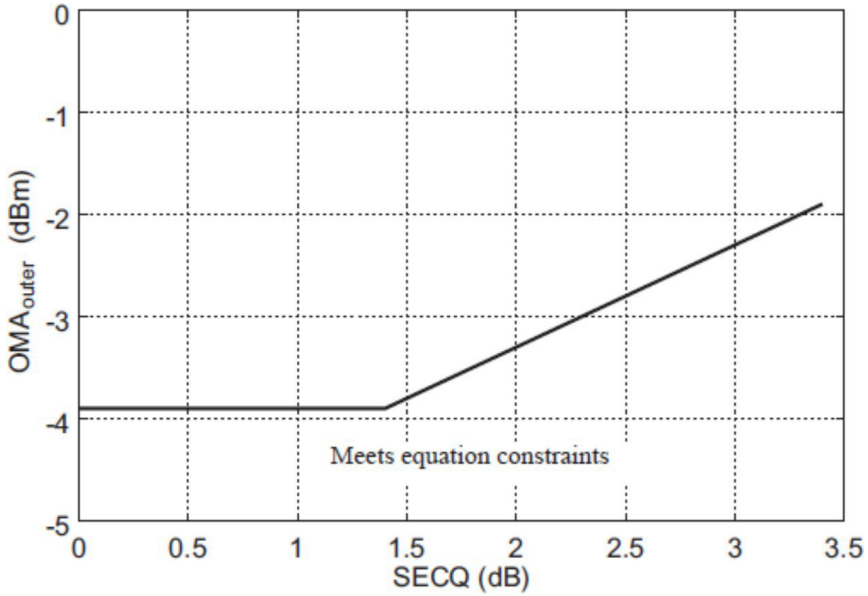


Illustration of Receiver Sensitivity Mask for 100G-DR

Pin Descriptions

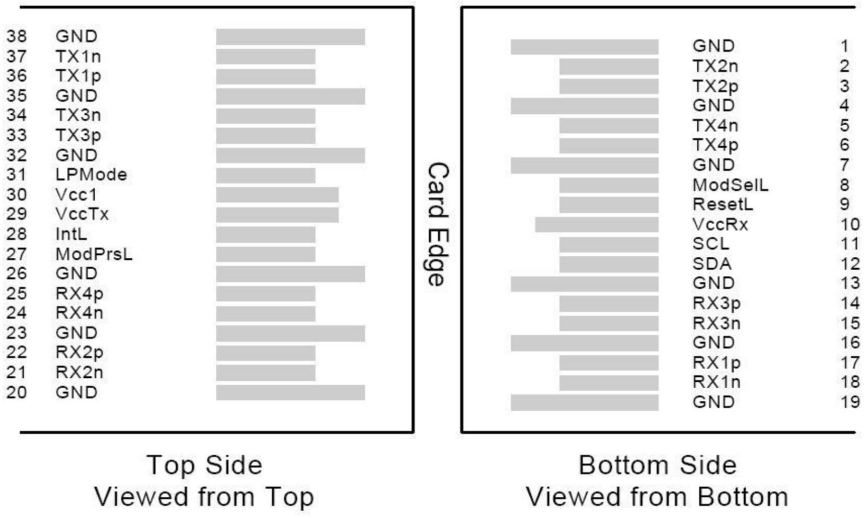
Pin	Logic	Symbol	Name/Description	Notes
1		GND	Module Ground.	1
2	CML-I	Tx2-	Transmitter Inverted Data Input.	
3	CML-I	Tx2+	Transmitter Non-Inverted Data Input.	
4		GND	Module Ground.	1
5	CML-I	Tx4-	Transmitter Inverted Data Input.	
6	CML-I	Tx4+	Transmitter Non-Inverted Data Input.	
7		GND	Module Ground.	1
8	LVTTL-I	ModSelL	Module Select.	
9	LVTTL-I	ResetL	Module Reset.	
10		VccRx	+3.3V Receiver Power Supply.	2
11	LVCMOS-I	SCL	2-Wire Serial Interface Clock.	
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data.	
13		GND	Module Ground.	1
14	CML-O	Rx3+	Receiver Non-Inverted Data Output.	
15	CML-O	Rx3-	Receiver Inverted Data Output.	
16		GND	Module Ground.	1
17	CML-O	Rx1+	Receiver Non-Inverted Data Output.	
18	CML-O	Rx1-	Receiver Inverted Data Output.	
19		GND	Module Ground.	1
20		GND	Module Ground.	1
21	CML-O	Rx2-	Receiver Inverted Data Output.	
22	CML-O	Rx2+	Receiver Non-Inverted Data Output.	
23		GND	Module Ground.	1
24	CML-O	Rx4-	Receiver Inverted Data Output.	
25	CML-O	Rx4+	Receiver Non-Inverted Data Output.	
26		GND	Module Ground.	1
27	LVTTL-O	ModPrsL	Module Present. Internally pulled down to the GND.	
28	LVTTL-O	IntL	Interrupt Output. Should be pulled up on the host board.	
29		VccTx	+3.3V Transmitter Power Supply.	2
30		Vcc1	+3.3V Power Supply.	2
31	LVTTL-I	LPMode	Low-Power Mode.	
32		GND	Module Ground.	1
33	CML-I	Tx3+	Transmitter Non-Inverted Data Input.	
34	CML-I	Tx3-	Transmitter Inverted Data Input.	
35		GND	Module Ground.	1

36	CML-I	Tx1+	Transmitter Non-Inverted Data Input.	
37	CML-I	Tx1-	Transmitter Inverted Data Input.	
38		GND	Module Ground.	1

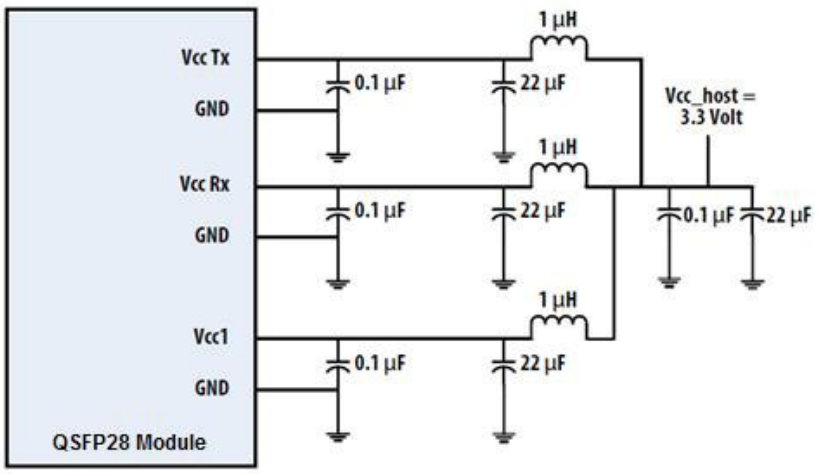
Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module, and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane. Open collector. Should be pulled up with 4.7kΩ to 10kΩ on the host board to a voltage between 3.15V and 3.6V.
2. VccRx, Vcc1, and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. VccRx, Vcc1, and VccTx may be internally connected within the QSFP28 module in any combination. The connector pins are each rated for a maximum current of 1000mA.

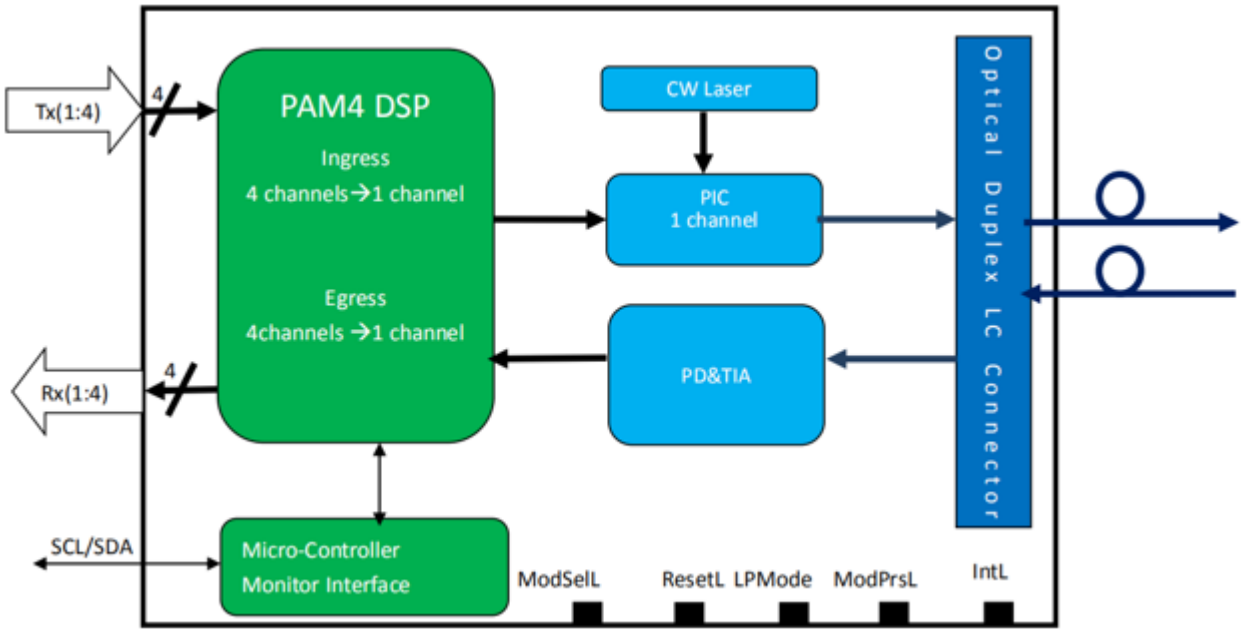
Electrical Pin-Out Details



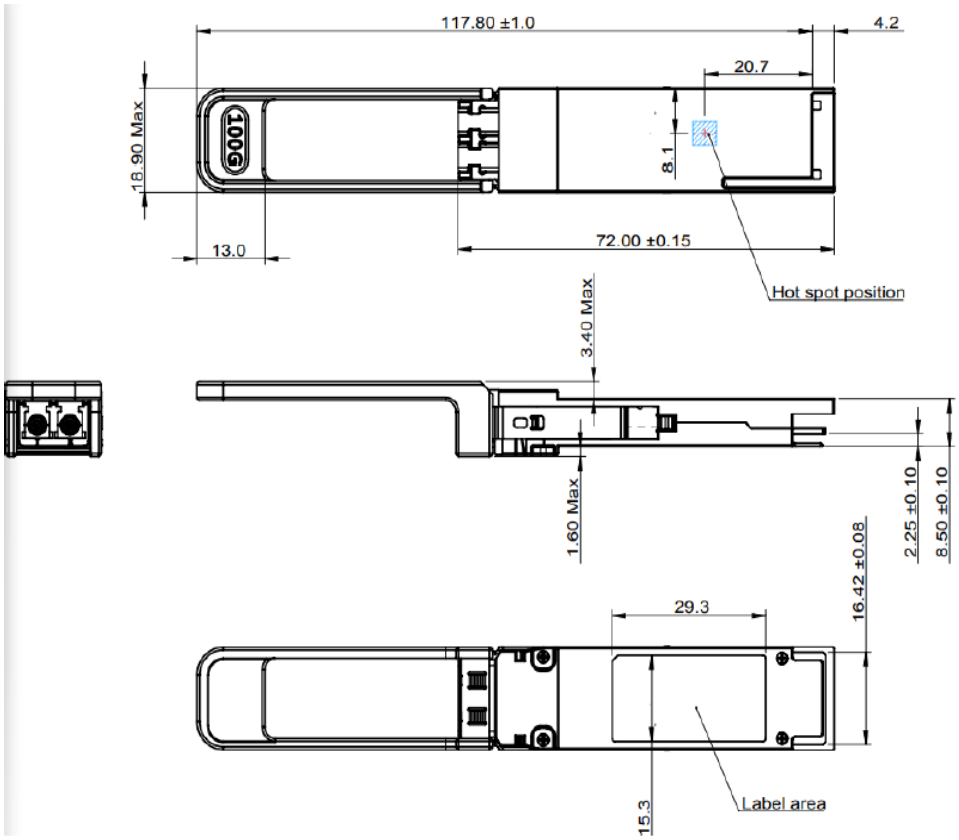
Recommended Power Supply Filter



Transceiver Block Diagram



Mechanical Specifications



About ProLabs

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.

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