MAM1Q00A-QSA28 NVIDIA DynamiX QSA™ QSA28, QSFP28 to SFP28 Adapter Product Specifications

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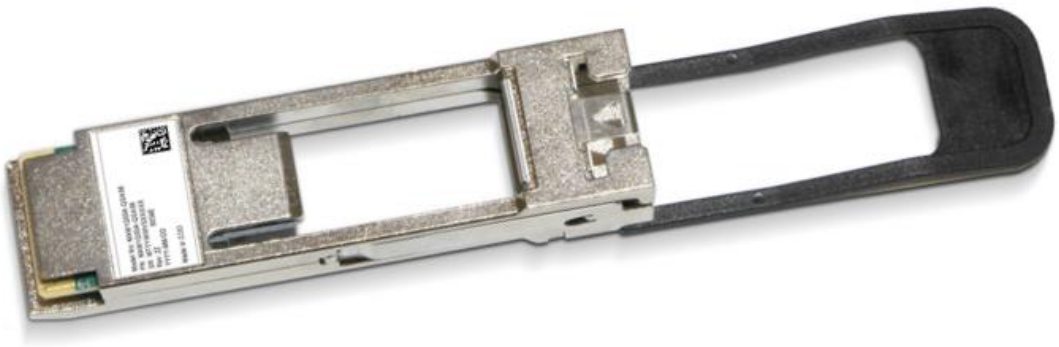
1 Introduction

NVIDIA® DynamiX QSA™ QSA28, QSFP28 to SFP28 adapter, enables smooth, cost effective connections between a single lane

transceiver/cable and a quad lane port. The QSA28 allows connecting an SFP28/SFP+/SFP transceiver or cable to a QSFP28 port of an Nx100 Gbps switch or network interface card (NIC).

The QSA28 should be installed into a QSFP28 port, and is intended to either connect a switch QSFP28 port to a NIC SFP28 port or connect a NIC QSFP28 port to a switch SFP28 port. For example, an SFP28-based cable can be connected to 100GbE ConnectX®-4 NIC and to the 32 x 100GbE SN2700 Ethernet switch. The QSA28 conforms to the SFF-8402 for the SFP28 side and to SFF-8665 for the QSFP28 standards and is thoroughly tested to meet strict quality requirements. The adapter has a QSFP28 form factor with a receptacle for SFP28 transceiver/ AOC/DAC connector. The QSA28 provides a solution for integrating systems using different vendors' equipment, it is vendor agnostic and provides a direct path to the SFP unit's memory. The QSA28 interoperates with all major optical module and direct attach copper cables vendors.

Its design assures minimum loss on the conversion path between the QSFP28 cage and the SFP28 receptacle. The RF (high speed data) channel of the SFP28 receptacle is connected to lane 1 of the QSFP28 connector. The 3 remaining RF channels on the QSFP28 connector are not connected. The QSA28 is qualified for 10GbE SFP+ and 1GbE SFP transceivers meeting the Small Form Factor Pluggable (SFP) Transceiver Multi-source Agreement (MSA).



Images are for illustration purposes only. Product labels, colors, and lengths may vary.

1.1 Key Features

- Industry-leading price and performance
- Trouble-free installation and network bring-up
- Compliant to industry standards
- QSFP28 MSA SFF-8665
- SFP28 MSA SFF-8402
- Low insertion loss
- Registered US patent 7,934,959

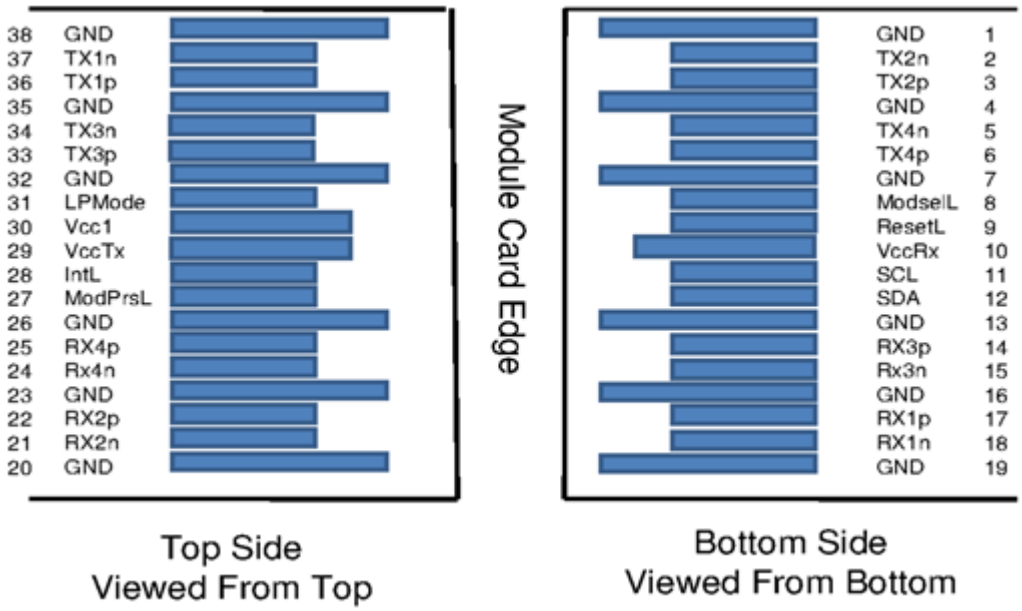
- Matched impedance
- Secure latching mechanism
- Built-in EEPROM for product identification
- RoHS compliant

2 Pin Descriptions

2.1 QSFP28 Pin Description

Pin	Symbol	Description	Pin	Symbol	Description
1	GND	Ground	20	GND	Ground
2	Tx2n	Transmitter Inverted Data Input	21	Rx2n	Receiver Inverted Data Output
3	Tx2p	Transmitter Non-Inverted Data Input	22	Rx2p	Receiver Non-Inverted Data Output
4	GND	Ground	23	GND	Grounds
5	Tx4n	Transmitter Inverted Data Input	24	Rx4n	Receiver Inverted Data Output
6	Tx4p	Transmitter Non-Inverted Data Input	25	Rx4p	Receiver Non-Inverted Data Output
7	GND	Ground	26	GND	Ground
8	ModSelL	Module Select	27	ModPrsL	Module Present
9	ResetL	Module Reset	28	IntL	Interrupt
10	Vcc Rx	+3.3V Power Supply Receiver	29	Vcc Tx	+3.3V Power Supply Transmitter
11	SCL	2-wire Serial Interface Clock	30	Vcc1	+3.3V Power Supply
12	SDA	2-wire Serial Interface Data	31	LPMode	Low Power Mode
13	GND	GND	32	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output	33	Tx3p	Transmitter Non-Inverted Data Input
15	Rx3n	Receiver Inverted Data Output	34	Tx3n	Transmitter Inverted Data Input
16	GND	Ground	35	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output	36	Tx1p	Transmitter Non-Inverted Data Input
18	Rx1n	Receiver Inverted Data Output	37	Tx1n	Transmitter Inverted Data Input
19	GND	Ground	38	GND	Ground

2.1.1 QSFP28 Module Pad Layout



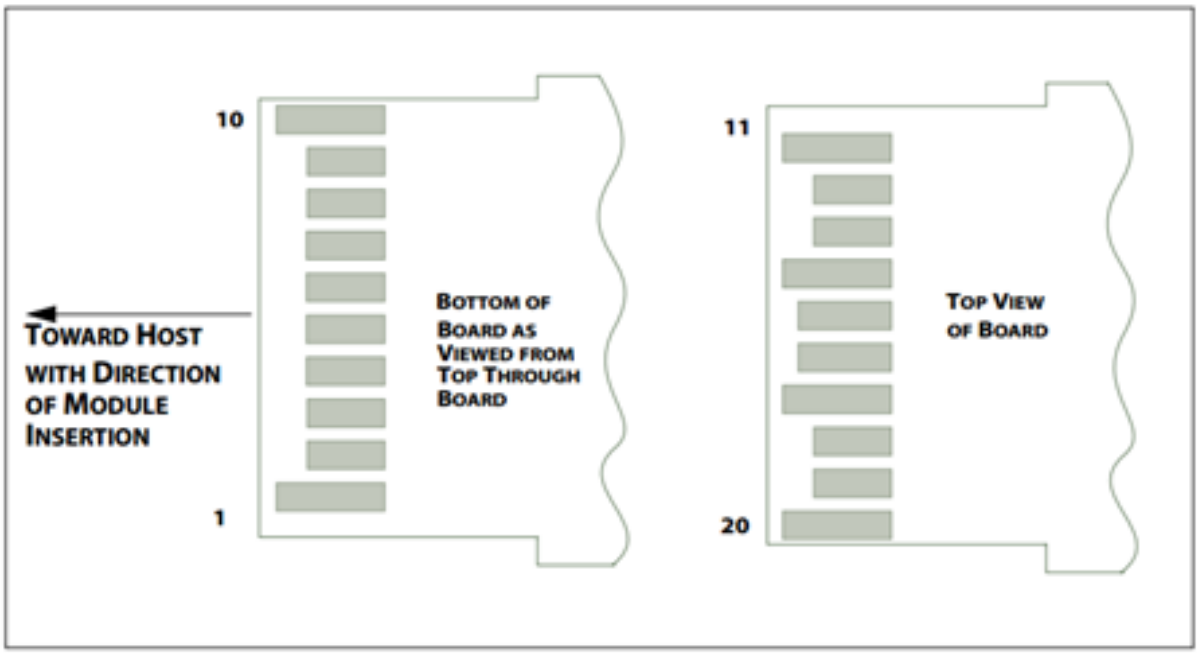
Top Side
Viewed From Top

Bottom Side
Viewed From Bottom

2.2 SFP28 Pin Description

Pin	Connector Pin Name	Port A Signal Name
1	VeeT	Module Transmitter Ground
2	Tx_Fault	Module Transmitter Fault
3	Tx_Disable	Transmitter Disable. Turns off transmitter laser output
4	SDA	2-wire Serial Interface Data Line
5	SCL	2-wire Serial Interface Clock
6	Mod_ABS	Module Absent. Grounded within the module
7	RS0	Rate Select 0, optionally controls SFP+ module receiver
8	Rx_LOS	Receiver Loss of Signal Indication
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter
10	VeeR	Module Receiver Ground
11	VeeR	Module Receiver Ground
12	RD-	Receiver Inverted Data Output
13	RD+	Receiver Non-Inverted Data Output
14	VeeR	Module Receiver Ground
15	VccR	Module Receiver Power Supply
16	VccT	Module Transmitter Power Supply
17	VeeT	Module Transmitter Ground
18	TD+	Transmitter Non-Inverted Data Input. AC coupled
19	TD-	Transmitter Inverted Data Input. AC coupled
20	VeeT	Module Transmitter Ground

2.2.1 SFP28 Module Pad Layout



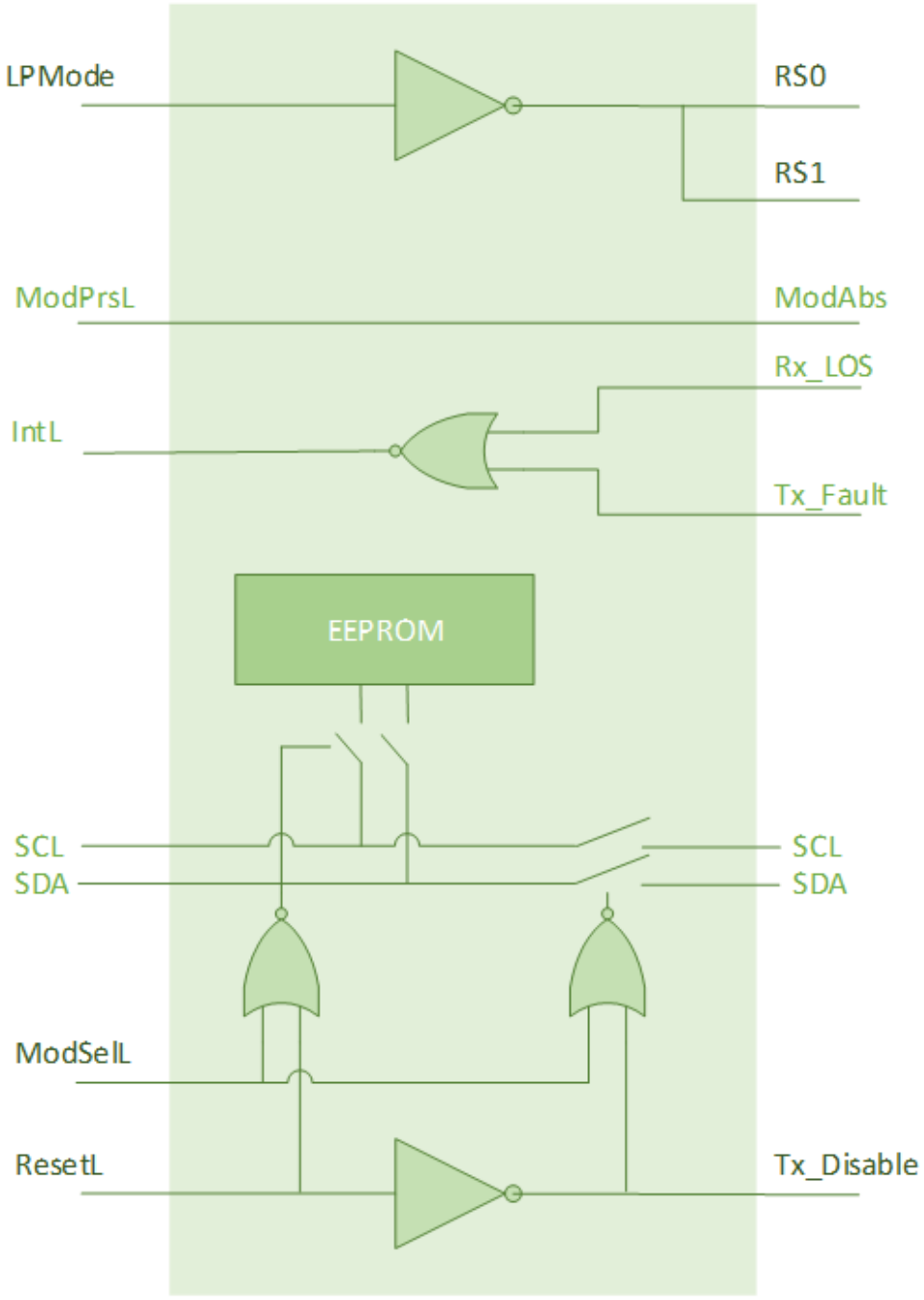
2.3 SFP to QSFP Pin Description

The below details the status/control signals interconnection between QSFP and the SFP connectors.

SFP to QSFP Status/Control Signals

QSFP Signal	SFP Signal	Description of Function
ModPrsL	ModAbs	Connected to Vee inside the SFP transceiver.
IntL	Rx_LOS	Inverted logic: IntL = Rx_LOS OR Tx_FAULT
	Tx_Fault	
ModSelL		Used for encoding of the mutual exclusive SCL/SDA switch enable logic as shown below.
LPMode	RS0	Inverted logic: RS0 = RS1 = NOT LPMode
	RS1	
ResetL	Tx_Disable	Inverted logic: Tx_Disable = NOT ResetL
SCL	SCL	Connected to mutual exclusive bidirectional switches using the encoding shown in below.
SDA	SDA	Connected to mutual exclusive bidirectional switches using the encoding shown in below.

SFP to QSFP (Patented U.S. Pat. 7,934,959)



The mutually exclusive SDA/SCL connections to the QSA EEPROM and SFP module are controlled by the ModSelL and ResetL signals:

ModSelL	ResetL	QSA EEPROM Access	SFP Access
0	0	Yes	No
0	1	No	Yes
1	0	No	No
1	1	No	No

3 Specifications

3.1 Absolute Maximum Specifications

Absolute maximum ratings are those beyond which the device may be damaged.

Parameter	Min	Max	Units
Supply voltage	-0.3	3.6	V
Data input voltage	-0.3	3.6	V
Control input voltage	-0.3	3.6	V

3.2 Environmental Specifications

This table shows the environmental specifications for the product.

Parameter	Min	Max	Units
Storage temperature	-40	85	°C

3.3 Operational Specifications

This section shows the range of values for normal operation.

Parameter	Min	Typ	Max	Units
Supply voltage (V_{CC})	3.135	3.3	3.465	V
Power consumption	---	---	0.1	W
Operating case temperature for MAM1Q00A-QSA28_E	-10		85	°C
Operating relative humidity	5		85	%

3.4 Electrical Specifications

Parameter	Min	Typ	Max	Units
Characteristic Impedance	90	100	110	Ω

3.5 Memory Map

The QSA28 adapter is used to connect an SFP28 module in a QSFP28 port. The QSA28 includes an EEPROM that can be accessed using I2C address 0x50. The EEPROM is selected when both the ResetL and the ModSelL control signals are asserted. The EEPROM main usage is to identify the QSA technology, the supported rates, and to distinguish between the QSA28 (25GbE) and QSA (10GbE).

The EEPROM is not write protected like the copper cables and the host needs to make sure not to write wrong data to the QSA.

The SFP EEPROM access is unchanged, ResetL is de-asserted, ModSelL is asserted, and using I2C address 0x50.

Memory Map QSFP28

Page 00h Byte Address	Register Name	Value	Description
0	Identifier	0xFF	
1-3	Signature	"QSA"	
4	Memory map revision	0	
5	QSA device ID	0x1	0x0: QSA10 0x1: QSA28
6-7	Reserved	0	
8	Supported link modes	0x07	b0: 10Gbd NRZ / SDR-QDR, supported b1: 14Gbd NRZ / FDR, supported b2: 25Gbd NRZ / EDR, supported b3: 25Gbd PAM4 / HDR, not supported
9	Supported link modes	0x00	Reserved
10-15	Reserved for future link codes	0	
24-25	Nominal baud rate	257	25.7GBd, in 100MBd units
26-27	Max baud rate	281	28.1GBd, in 100MBd units
28	Max case temp	70/85	70ºC: MAM1Q00A-QSA28 85ºC: MAM1Q00A-QSA28_E
29	Nominal encoding	0	0x0: NRZ 0x1: PAM4
30-31	Reserved	0	
32	Attenuation 2.5G	03	Typical attenuation in 1dB.
33	Attenuation 5G	03	
34	Attenuation 7G	06	
35	Attenuation 12G	07	
36	Attenuation 25G	0xFF	
37-63	Reserved		
64-66	Vendor OUI	0x0002C9	Mellanox IEEE company ID.
67	Reserved		
68-83	Vendor name	0x4D656C6C616E6F78202020 20202020 20	“Mellanox” in ASCII
84-99	Serial number	MTYYWWXXSSSSS	Written on backshell label. Refer to Table 10: Back-Shell Label Legend.

Page 00h Byte Address	Register Name	Value	Description
100-115	Part number	MAM1Q00A-QSA28	ASCII. Written on backshell label
116-117	Product revision		ASCII. Written on backshell label
118-125	Date code	YYMMDD__	Written on backshell label (6 digits padded w 0xFF)
126	Reserved		
127	Checksum		EEPROM checksum to detect invalid data (add mod 256). Written by production.

3.6 Electrostatic Discharge (ESD)

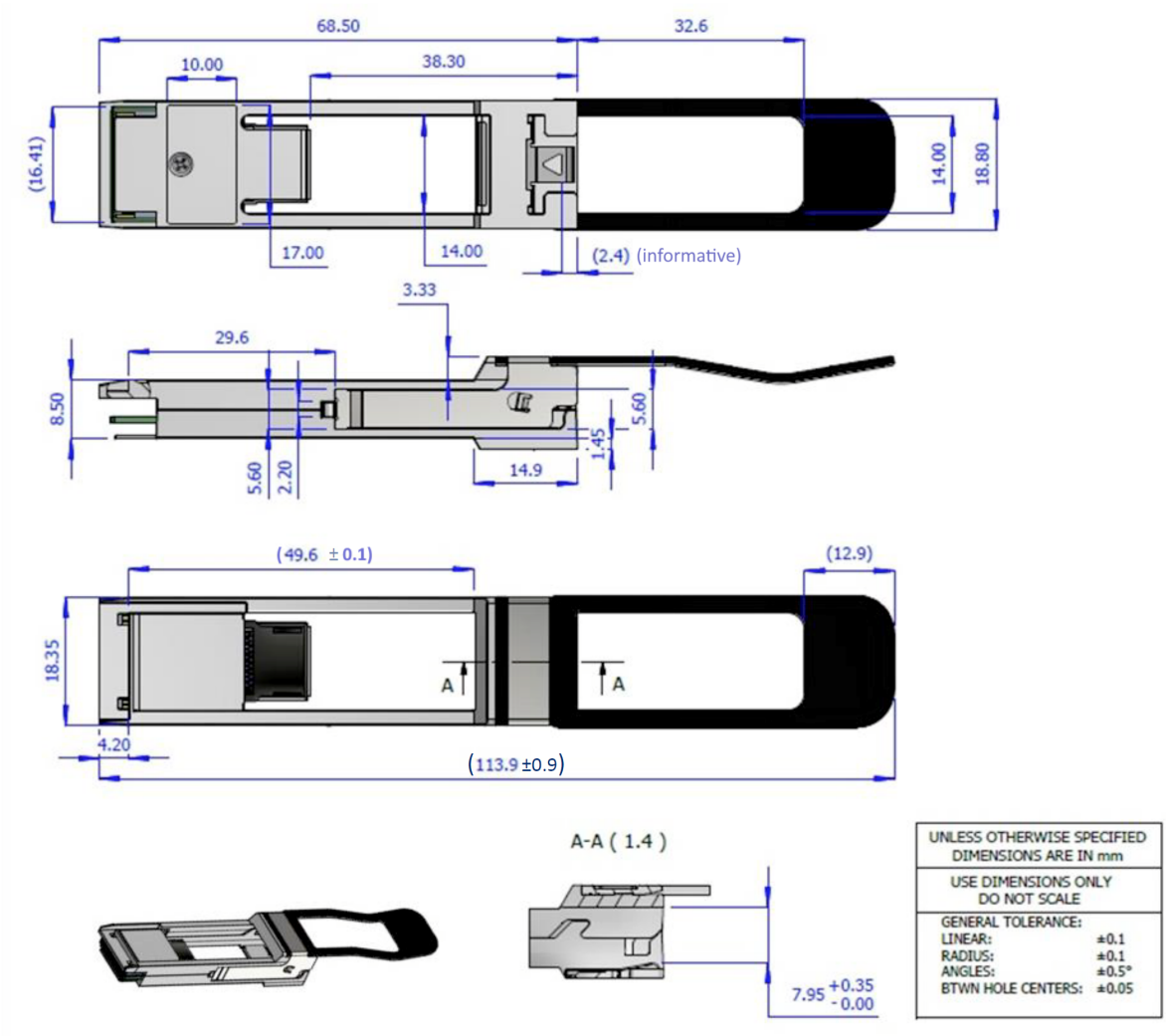
This product is compatible with ESD levels in typical data center operating environments and certified in accordance with the standards listed in the Regulatory Compliance Section. The product is shipped with protective caps on all connectors to protect it during shipping. In normal handling and operation of high-speed cables and optical transceivers, ESD is of concern during insertion into the OSFP cage of the server/switch. Hence, standard ESD handling precautions must be observed. These include use of grounded wrist/shoe straps and ESD floor wherever a cable/transceiver is extracted/inserted. Electrostatic discharges to the exterior of the host equipment chassis after installation are subject to system level ESD requirements.

3.7 Mechanical Specifications

The figure below shows the dimensions of the QSA28.

⚠ The SFP28/SFP+/SFP mating paddle card dimension A10 (length of component/solder mask keep-out area, refer to SFF-8071) shall be >6.0mm instead of >5.5mm. The reason for this requirement is to prevent damaging the adapter when trying to insert an SFP upside down

3.8 *Mechanical Dimensions*



⚠ Dimensions provided in parenthesis are informative only and not a controlled dimension

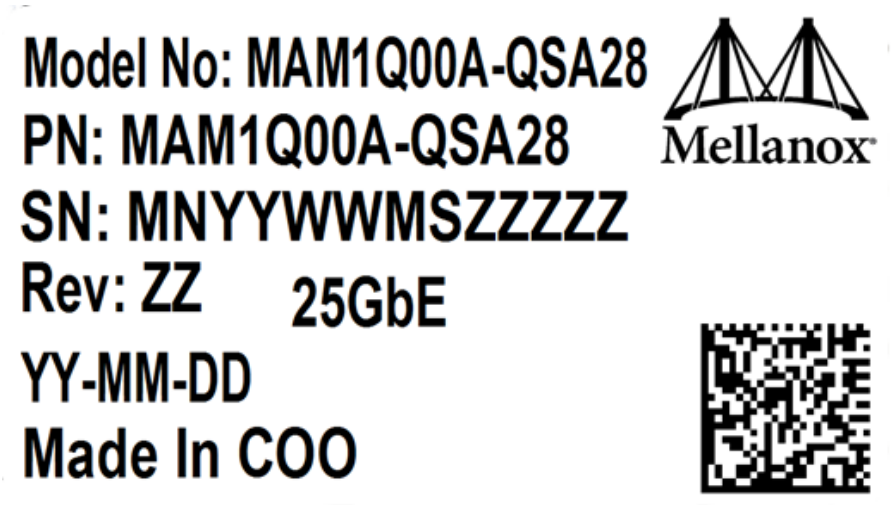
RF Connectivity

QSFP28 Side	SFP28 Side
Tx1p/n	TD+/-
Rx1p/n	RD+/-
Tx2p/n	Terminated
Rx2p/n	Terminated

QSFP28 Side	SFP28 Side
Tx3p/n	Terminated
Rx3p/n	Terminated
Tx4p/n	Terminated
Rx4p/n	Terminated

3.9 Labels

The following label is applied on the cable's backshell:



(sample illustration)

Legend: COO – Country of Origin

Backshell Label SN (Serial Number) Legend

Symbol	Meaning	Notes
SN – Serial Number		
MT	Manufacturer name	2 characters, e.g. MT
YY	Year of manufacturing	2 digits
WW	Week of manufacturing	2 digits
XX	Manufacturer site	2 characters
SSSSS	Serial number	5 digits for serial number, starting from 00001. Reset at start of week to 00001.
Miscellaneous		
ZZ	HW and SW revision	2 alpha-numeric characters
YYYY	Year of manufacturing	4 digits

Symbol	Meaning	Notes
MM	Month of manufacturing	2 digits
DD	Day of manufacturing	2 digits
COO	Country of origin	E.g. China or Malaysia
	Quick response code	Serial number (MTYYWWXXSSSSS)

3.10 MAM1Q00A-QSA28 Software Requirements

The required switch OS and adapter cards firmware versions are listed in the table below.

QSA28 OS/FW Software Requirements

OPN	Minimum OS/FW Version
MSN2700	OS 3.6.4006 or higher
MSN2410	OS 3.6.4006 or higher
MSN2100	OS 3.6.4006 or higher
ConnectX-4 LX	FW 14.18.1000 or higher
ConnectX-4	FW 12.19.0080 or higher
ConnectX-5	FW 16.18.1000 or higher

3.11 Regulatory Compliance and Classification

- Safety: CB, CE
- EMC: CE, FCC, ICES, RCM

Ask your NVIDIA FAE for a zip file of the certifications for this product.

3.12 FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

4 Ordering Information

See also cable length definition.

Ordering Part Number	Description
MAM1Q00A-QSA28	NVIDIA cable module, ETH 25GbE, 100Gb/s to 25Gb/s, QSFP28 to SFP28
MAM1Q00A-QSA28_E	NVIDIA cable module, ETH 25GbE, 100Gb/s to 25Gb/s, QSFP28 to SFP28, extended temperature

5 Document Revision History

Revision	Date	Description
2.6	Aug. 2022	Reformatted and rebranded; migrated to HTML. Updated the mechanical drawing.
2.5	Oct. 2021	Updated the Label. Corrected Memory Map entries. Corrected general Typos.
2.4	Apr. 2021	Updated document to the new NVIDIA template. Added QSFP to SFP Connectors Diagram. Added Electrostatic Discharge (ESD) section.
2.3	Nov. 2020	Updated COO definition in the Back-shell Label Option 1 Legend table.
2.2	Sep. 2020	Added SFP to QSFP Pin Description. Updated the Mechanical Drawing. The additional information is elaborated in the new note below the figure.
2.1 - 1.2	Jan. 23, 2017 up to Jul. 16, 2018	Refer to datasheet rev. 2.3 for the changes.
1.1	Jan. 23, 2017	Electrical Specifications – Removed Time Delay Skew.
1.0	Jan. 18, 2017	Initial release.

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