

## ◆ UN-QSF40-0085MM01C

40Gbps QSFP+ SR4 850nm 100m MPO/MTP Transceiver

### Product Feature

- 4 independent full-duplex channels
- Up to 10.3125Gb/s data rate per channel
- QSFP+ MSA compliant
- Up to 100m OM4 MMF transmission
- Maximum power consumption 1.5W
- MTP/MPO optical connector
- Compliant to IEEE 802.3bm 40GBASE-SR4
- RoHS-6 compliant
- Single 3.3V power supply
- Operating case temperature  
Commercial: 0°C to +70°C



### Applications

- Rack to Rack
- Data Center
- Infiniband QDR, DDR and SDR
- 40G Ethernet

## Product Description

This product is a parallel 40Gb/s Quad Small Form-factor Pluggable (QSFP+) optical module. It provides increased port density and total system cost savings. The QSFP+ full-duplex optical module offers 4 independent transmit and receive channels, each capable of 10.3125Gb/s operation for an aggregate data rate of 40Gb/s on 100 meters of OM4 multi-mode fiber.

An optical fiber ribbon cable with an MTP/MPO connector can be plugged into the QSFP+ module receptacle. Proper alignment is ensured by the guide pins inside the receptacle. The cable usually cannot be twisted for proper channel to channel alignment. Electrical connection is achieved through an MSA-compliant 38-pin edge type connector.

The module operates by a single +3.3V power supply. LVCMOS/LVTTL global control signals, such as Module Present, Reset, Interrupt and Low Power Mode, are available with the modules. A 2-wire serial interface is available to send and receive more complex control signals, and to receive digital diagnostic information. Individual channels can be addressed and unused channels can be shut down for maximum design flexibility.

The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the QSFP+ Multi-Source Agreement (MSA). It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. The module offers very high functionality and feature integration, accessible via a two-wire serial interface.

## Product Selection

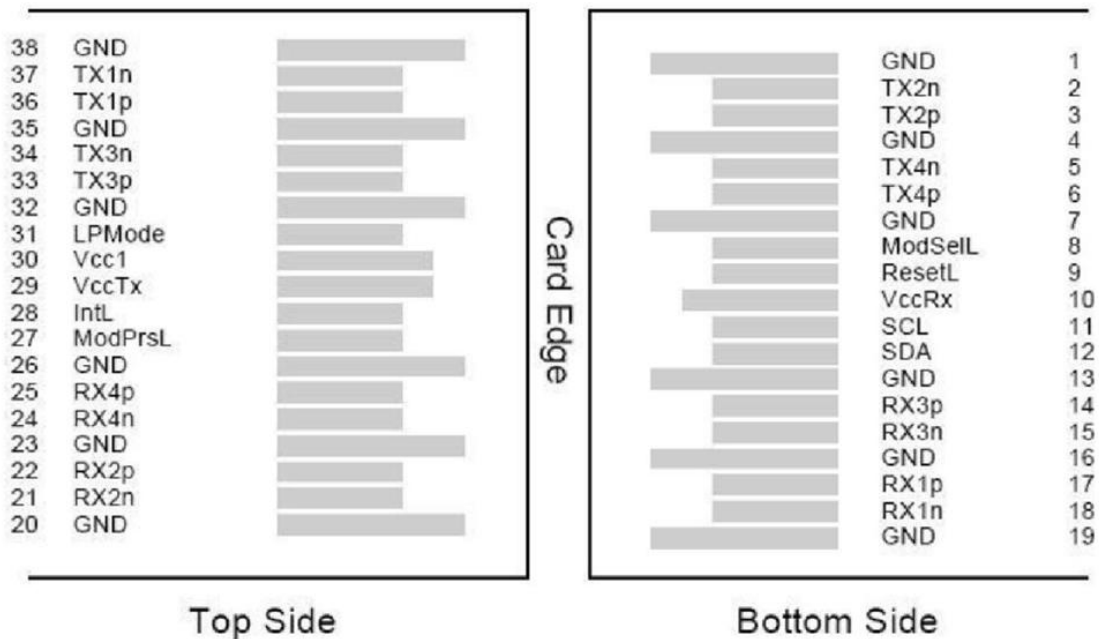
Part Number	Operating Case temperature	DDMI
UN-QSF40-0085MM01C	Commercial(0~70°C)	Yes

## Pin Descriptions

Pin	Symbol	Name/Description	NOTE
1	GND	Transmitter Ground (Common with Receiver Ground)	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Transmitter Ground (Common with Receiver Ground)	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver Ground)	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	3.3V Power Supply Receiver	2
11	SCL	2-Wire serial Interface Clock	
12	SDA	2-Wire serial Interface Data	
13	GND	Transmitter Ground (Common with Receiver Ground)	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	1
20	GND	Transmitter Ground (Common with Receiver Ground)	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Transmitter Ground (Common with Receiver Ground)	1
24	Rx4n	Receiver Inverted Data Output	1
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Transmitter Ground (Common with Receiver Ground)	1
27	ModPrsl	Module Present	
28	GND	Transmitter Ground (Common with Receiver Ground)	
29	Tx2n	Transmitter Inverted Data Input	2
30	Tx2p	Transmitter Non-Inverted Data output	2
31	GND	Transmitter Ground (Common with Receiver Ground)	
32	Tx4n	Transmitter Inverted Data Input	1
33	Tx4p	Transmitter Non-Inverted Data output	
34	GND	Transmitter Ground (Common with Receiver Ground)	
35	ModSelL	Module Select	1
36	ResetL	Module Reset	
37	VccRx	3.3V Power Supply Receiver	
38	SCL	2-Wire serial Interface Clock	1

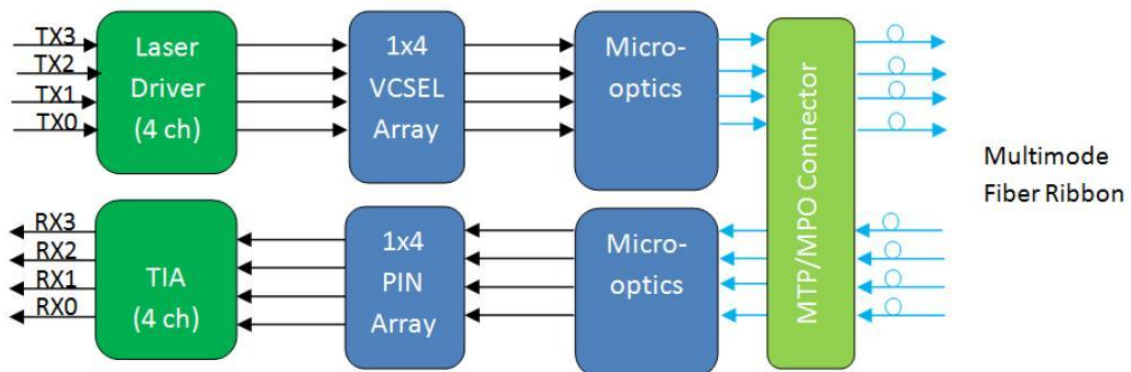
**Notes:**

1. GND is the symbol for signal and supply (power) common for QSFP28 modules. 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.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 4 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.



Pin-out of Connector Block on Host Board

## Transceiver Block Diagram



Transceiver Block Diagram

## Optical Interface Lanes and Assignment

The orientation of the multi-mode fiber facets of the optical connector. Table 1 provides the lane assignment.

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		+85	°C	
Relative Humidity	RH	0		95	%	
Power Supply Voltage	VCC	-0.5		+3.6	V	
Damage Threshold, each Lane	TH <sub>d</sub>	3.4			dBm	

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tc	0		70	°C	
Power Supply Voltage	V <sub>CC</sub>	3.13	3.3	3.47	V	
Control Input Voltage High	V <sub>CC</sub>	2		300	V	
Control Input Voltage Low	V <sub>CC</sub>	0		0.8	V	
Data Rate, each Lane	BR		10.3	11.3	Gbps	
Link Distance (OM3 MMF)	L <sub>max</sub>			70	M	
Link Distance (OM4 MMF)	L <sub>max</sub>			100	M	

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Tx Disable Input-High	VDISH	2		V <sub>CC</sub> +0.3	V	
Tx Disable Input-Low	VDISL	0		0.8	V	
Tx Fault Input-High	VTxFH	2		V <sub>CC</sub> +0.3	V	
Tx Fault Input-Low	VTxFL	0		0.8	V	
<b>Receiver</b>						
LOSS -High	V <sub>LOSH</sub>	2		V <sub>CC</sub> +0.3	V	
LOSS -Low	V <sub>LOSL</sub>	0		0.8	V	

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Center Wavelength	$\lambda_c$	840	850	860	nm	
RMS Spectral Width	$\Delta\lambda$			0.6	nm	
Average Launch Power, each Lane	$P_{AVG}$	-8.4		2.4	dBm	
Optical Modulation Amplitude (OMA), each Lane	$P_{OMA}$	-6.4		3.0	dBm	1
Difference in Launch Power between any Two Lanes (OMA)	$P_{tx,diff}$			4.0	dB	
Launch Power in OMA minus TDEC, each Lanes		-7.3			dBm	
Transmitter and Dispersion Eye Closure (TDEC), each Lane				4.3	dB	
Extinction Ratio	ER	3.5			dB	
Optical Return Loss Tolerance	TOL			12	dB	
Transmitter OFF Output Power	$P_{off}$			-30	dBm	
<b>Receiver</b>						
Center Wavelength	$\lambda_c$	840	850	860	nm	
Damage Threshold, each Lane	$TH_d$	3.4			dB	2
Average Receive Power, each Lane		-10.3		2.4	dBm	
Receiver Reflectance	$R_R$			-12	dB	
Receiver Sensitivity (OMA), each Lane	SEN			-9.2	dBm	
Stressed Receiver Sensitivity (OMA), each Lane				-5.2	dBm	3
LOS De-assert	LOSD			-12	dBm	
LOS Assert	LOSA	-30			dBm	2
LOS Hysteresis		0.5		6	dB	

### Notes:

1. Even if the TDP<0.9 dB, the OMA min must exceed the minimum value specified here.
2. 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.
3. Measured with conformance test signal at receiver input for BER=1x10<sup>-12</sup>.

## EEPROM Information

EEPROM memory map specific data field description is as below:

0~2	ID and Status	(3 Bytes)
3~21	Interrupt Flags	(19 Bytes)
22~33	Free Side Device Monitors	(12 Bytes)
34~81	Channel Monitors	(48 Bytes)
82~85	Reserved	(4 Bytes)
86~98	Control	(13 Bytes)
99	Reserved	(1 Bytes)
100~104	Hardware Interrupt Pin Masks	(5 Bytes)
105~106	Vendor Specific	(2 Bytes)
107	Reserved	(1 Bytes)
108~110	Free Side Device Properties	(3 Bytes)
111~112	Assigned for use by PCI Express	(2 Bytes)
113	Free Side Device Properties	(1 Bytes)
114~118	Reserved	(5 Bytes)
119~122	Password Change Entry Area	(4 Bytes)
123~126	Password Entry Area (Optional)	(4 Bytes)
127	Page Select Byte	(1 Bytes)

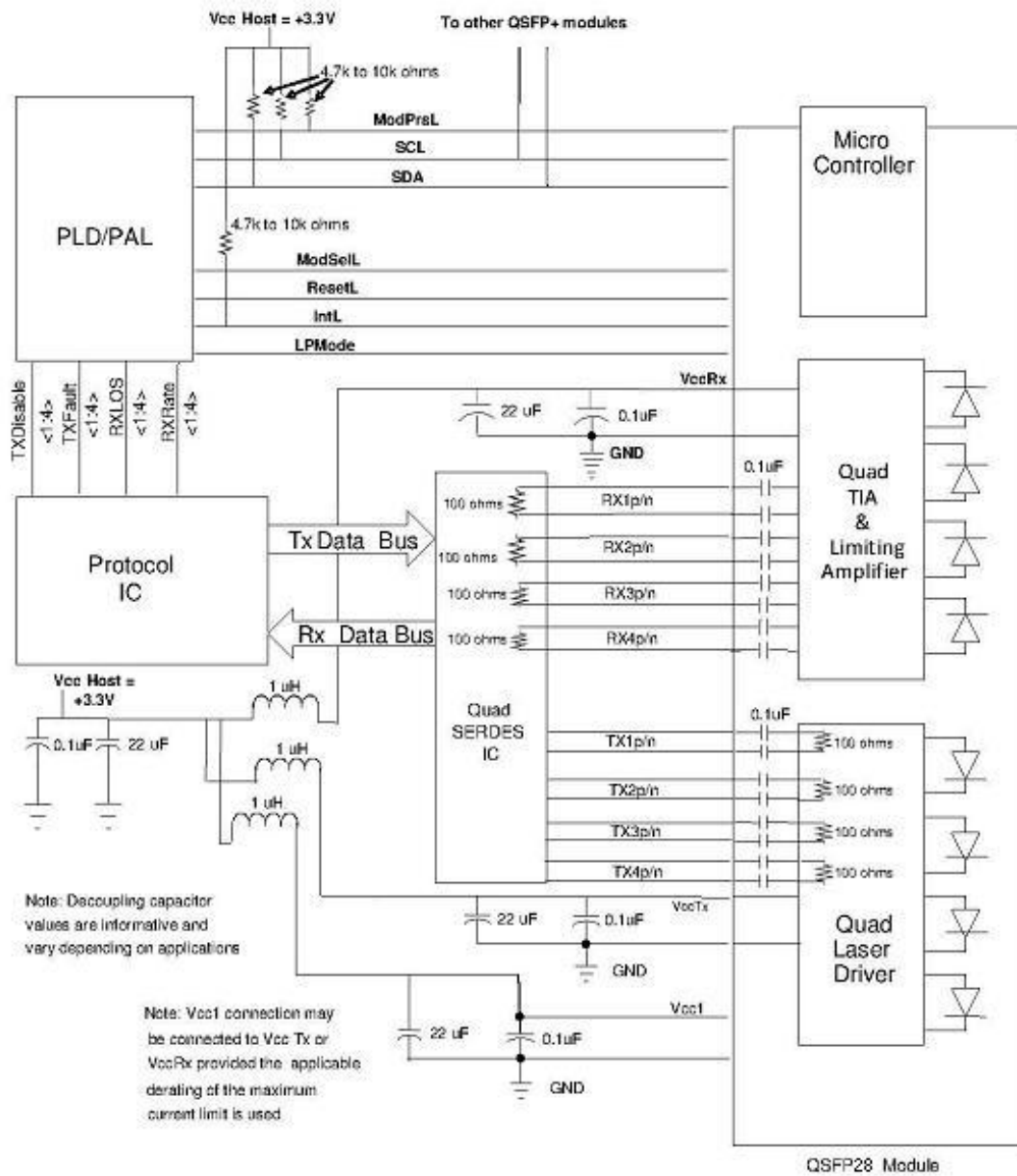
Upper Page 00h	Optional Page 01h	Optional Page 02h	Optional Page 03h
128 Identifier	128 CC_APPS	128-255 User EEPROM Data	128-175 Free Side Device Thresholds
129-191 Base ID Fields	129 AST Table Length (TL)		129-191 Base ID Fields
192-223 Extended ID	130-131 Application Code Entry 0		129 AST Table Length
224-255 Vendor Specific ID	132-133 Application Code Entry 1		176-223 Channel Thresholds
	134-253 other entries		224 Tx EQ & Rx Emphasis Magnitude ID
	254-255 Application Code Entry TL		225 RX output amplitude indicators
			226-241 Channel Controls
			242-251 Channel Monitor Masks
			252-255 Reserved

## Digital Diagnostic Monitoring Interface

Five transceiver parameter values are monitored. The following table defines the monitored parameter's accuracy.

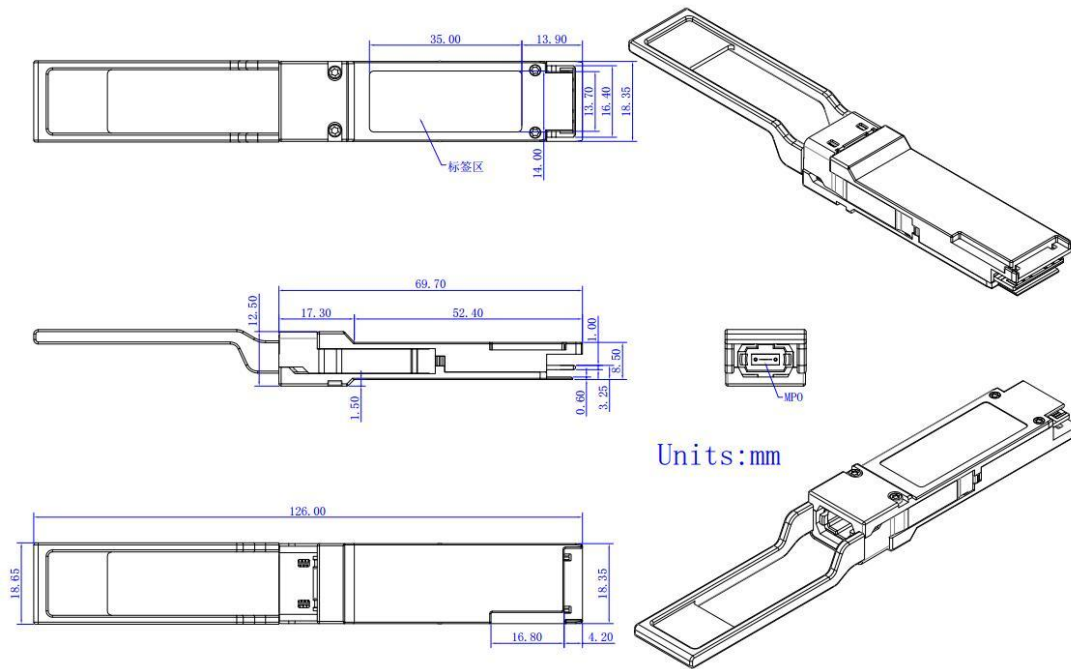
Parameter	Range	Accuracy	Calibration
Temperature	0 to +70°C (C)	±3°C	Internal
Voltage	3.13 to 3.47V	±3%	Internal
Bias Current	0 to 100mA	±10%	Internal
TX Power	-9 to +3dBm	±3dBm	Internal
RX Power	-11 to +3dBm	±3dBm	Internal

## Recommend Circuit Schematic





## Mechanical Specifications



## Revision History

Revision	Initiated	Reviewed	Approved	DCN	Release Date
Version1.0	Zhangchengxing	Pengyanhui	Liubin	New Released.	July 28, 2017
Version1.1	Liusong	Pengyanhui	Liubin	Updated document structure	Dec 10,2020