

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

1. DESCRIPTION

QSFP28 transceiver modules are designed for use in 100 Gigabit Ethernet links over single mode fiber. They are compliant with SFF-8665, INF-8438i, IEEE 802.3bm, 100G 4WDM-40 MSA. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP28 MSA.

2. PRODUCT FEATURES

- Up to 30km reach for G.652 SMF without FEC
- Up to 40km reach for G.652 SMF with FEC
- Cooled 4x25Gb/s LAN WDM EML TOSA with optical MUX
- 4x25G Electrical Interface
- Single +3.3V power supply
- DDM function implemented
- 2 Wire Serial Interface for module management
- Maximum power dissipation < 5W
- Operating temperature range: 0°C ~ 70 °C
- Compliant with RoHS6

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

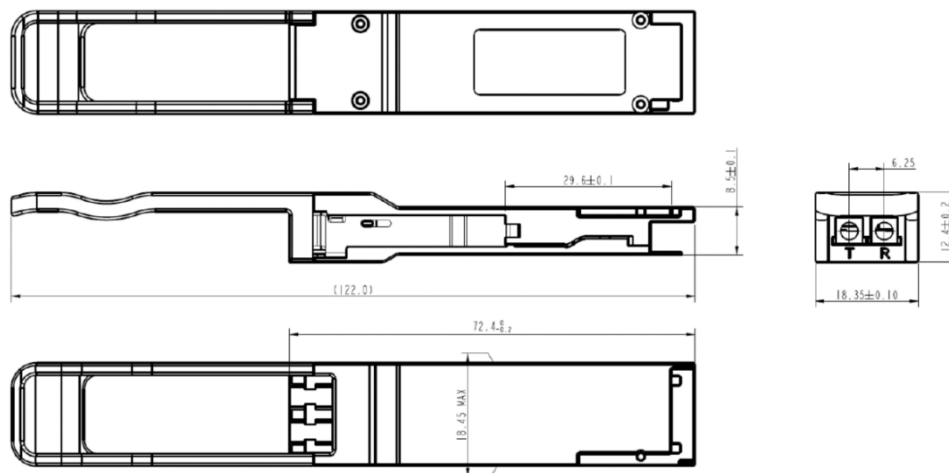
3. PRODUCT DESCRIPTION

3.1 PRODUCT NAME AND SERIES NUMBER(S)

112G QSFP28 ER4 Transceiver

Part Number	Data Rate	Wavelength (nm)	Optical Power	Sensitivity	Connector	Temp.
P58000EGCU40-1	112G	EML	-2.5 ~ 6.5dBm	-18.5dBm	LC	C

3.2 DIMENSIONS, MATERIALS, PLATINGS AND MARKING



Unit is millimeter. All dimensions are ±0.1mm unless otherwise specified.

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

4. APPLICABLE DOCUMENTS AND SPECIFICATIONS

- Compliant with QSFP28 Standard: SFF-8665, SFF-8636
- Compliant with 100G 4WDM-40 MSA technical specification rev 1.0
- High speed I/O electrical interface (CAUI-4) compliant with IEEE 802.3bm

5. Absolute Maximum Ratings & Recommended Operating Conditions

Absolute Maximum Ratings				
Parameter	Symbol	Min.	Max.	Unit
Storage Temperature Range	Ts	°C	-40	85
Relative Humidity	RH	%	5	85
Maximum Supply Voltage	Vcc3	V	0	3.6

Recommended Operating Conditions					
Parameter	Symbol	Min.	Type	Max.	Unit
Operating Case Temperature Range	Tc	0	-	70	°C
Power Supply Voltage	Vcc	3.14	3.	3.46	V
Bit Rate	BR	-	103.1	111.8	Gb/s
Operating Distance	L	-	-	30	km
	L	-	-	40	Km

Note:

1. Up to 30km reach for G.652 SMF without FEC
2. Up to 40km reach for G.652 SMF with FEC

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

Transmitter Optical Specification

Parameter	Symbol	Min.	Typical	Max.	Unit
Signal Rate (Each Lane)	-	25.78125±100ppm			Gbps
Lane Wavelength	L0	1294.53	1295.56	1296.59	nm
	L1	1299.02	1300.05	1301.09	nm
	L2	1303.54	1304.58	1305.63	nm
	L3	1308.09	1309.14	1310.19	nm
Total Average Launch Power	Pout	-	-	12.5	dBm
Transmit OMA per Lane	TxOMA	0.5	-	6.5	dBm
Average Launch Power per Lane	TXPx	-2.5	-	6.5	dBm
Optical Extinction Ratio	ER	4.5	-	-	dB
Side-Mode Suppression Ratio (SMSR)	SMSR	30	-	-	dB
Average launch power of OFF transmitter, per lane	-	-	-	-30	dBm
Relative Intensity Noise	RIN	-	-	-130	dB/Hz
Optical Return Loss Tolerance	-	20	-	-	dB
Transmitter Reflectance	-	-	-	-26	dB
Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3}	-	{0.25,0.4,0.45,0.25,0.28,0.4}			-

Receiver Optical Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit
Lane Wavelength	L0	1294.53	1295.56	1296.59	nm
	L1	1299.02	1300.05	1301.09	nm
	L2	1303.54	1304.58	1305.63	nm
	L3	1308.09	1309.14	1310.19	nm
Signaling Rate per Lane	-	25.78125 ±100 ppm			Gbps
Receiver sensitivity (OMA), each lane at 5E-5 BER	Rxsens	-	-	-18.5	dBm
Receiver sensitivity (OMA), each lane at 1E-12 BER	Rxsens	-	-	-16	dBm
Average Received Power per Lane	RXPx	-20.5	-	-3.5	dBm

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

Return Loss	RL	-	-	-26	-
LOS De-Assert	LOSD	-	-	-22	dBm
LOS Assert	LOSA	-30	-	-	dBm
LOS Hysteresis	-	0.5	-	5	dB

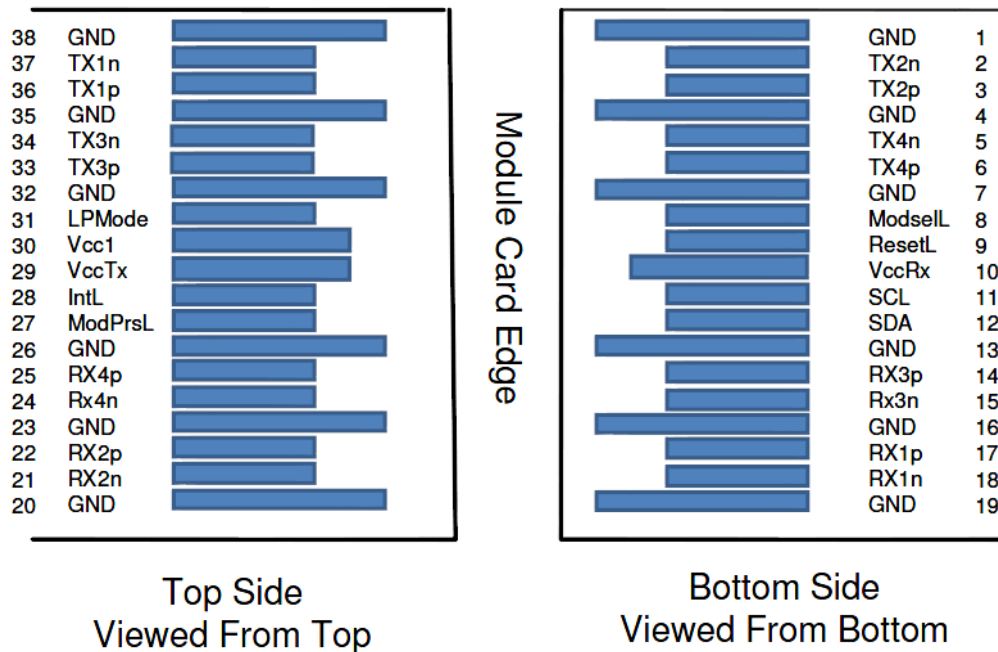
Note:

1. Measured with a PRBS 2³¹-1 test pattern , @25.78Gb/s , BER=5E-5
2. Measured with a PRBS 2³¹-1 test pattern , @25.78Gb/s , BER=1E-12

Electrical Specifications					
Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	Vcc	3.14	3.3	3.46	V
Module Power	-	-	-	5000	mW
Transmitter					
Input Differential Impedance	RIN	80	100	120	Ω
Differential Data Input	VIN	150	-	900	mVp-p
LP Mode, Reset and ModSelL	VIL	-0.3	-	0.8	V
	VIH	0.2	-	Vcc+0.3	V
Receiver					
Differential Data Output	VOD			900	mVp-p
Differential Termination Mismatch				10	%
Output Rise/Fall Time, 20% ~ 80%	Tr	9.5			ps
ModPrsL and IntL	VOL	0	-	0.4	V
	VOH	Vcc-0,5	-	Vcc+0.3	V

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

6. Applications Note:



Pin Definitions

Pin Assignment

Pin	Symbol	Logic	Name/Description
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	3
3	Tx2p	Transmitter Non-Inverted Data Input	3
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	3
6	Tx4p	Transmitter Non-Inverted Data Input	3
7	GND	Ground	1
8	ModSelL	Module Select	3
9	ResetL	Module Reset	3
10	Vcc Rx	+3.3 V Power supply receiver	2
11	SCL	2-wire serial interface clock	3
12	SDA	2-wire serial interface data	3
13	GND	Ground	1

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

14	Rx3p	Receiver Non-Inverted Data Output	3
15	Rx3n	Receiver Inverted Data Output	3
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	3
18	Rx1n	Receiver Inverted Data Output	3
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	3
22	Rx2p	Receiver Non-Inverted Data Output	3
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	3
25	Rx4p	Receiver Non-Inverted Data Output	3
26	GND	Ground	1
27	ModPrsL	Module Present	3
28	IntL	Interrupt	3
29	Vcc Tx	+3.3 V Power supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMode	Low Power Mode	3
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	3
34	Tx3n	Transmitter Inverted Data Input	3
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	3
37	Tx1n	Transmitter Inverted Data Input	3
38	GND	Ground	1

Note

1. GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ 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. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently.

TITLE 100G QSFP28 40km ER4 Transceivers	DOC No. RFD-20220920003-001	
	REVISION : 01	AUTHORIZED BY : Albert Lin
	DATE : 2022.08.23	CLASSIFICATION : Optical Transceiver

7. Modification History

Rev.	Comments	Date	Originator	Approval
01	Initial	2022/08/23	Albert Lin	Mike Sun