



50Gb/s QSFP28 Transceiver

APQP2315xDL40A



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Product Features

- ✓ Single 3.3V Supply Voltage
- ✓ Power dissipation <4.5W
- ✓ Commercial and industrial operating temperature optional
- ✓ EML laser and APD Receiver
- ✓ QSFP28 MSA package with duplex LC Connector
- ✓ Two Wire Serial Interface with Digital Diagnostic Monitoring
- ✓ Compliant with QSFP28 Standard: SFF-8665 Revision 1.9, SFF-8636 Revision 2.9
- ✓ Compliant with IEEE 802.3cn_D2p0 50GBASE-ER
- ✓ Compliant with IEEE802.3 50GAUI-2 C2M and LAUI-2 C2M electrical interfaces

Applications

- ✓ 50GBASE-ER



Product Selection

Part Number	Operating Case temperature	DDMI
APQP2315CDL40A	Commercial(0~70°C)	Yes
APQP2315IDL40A	Industrial(-40~+85°C)	Yes

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with EN 61000-4-2
- Immunity compatible with EN 61000-4-3
- EMI compatible with FCC Part 15 Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 IEC 60950, IEC60825-1,2
- RoHS compliant with RoHS 2.0(2015/863/EU)-amending.

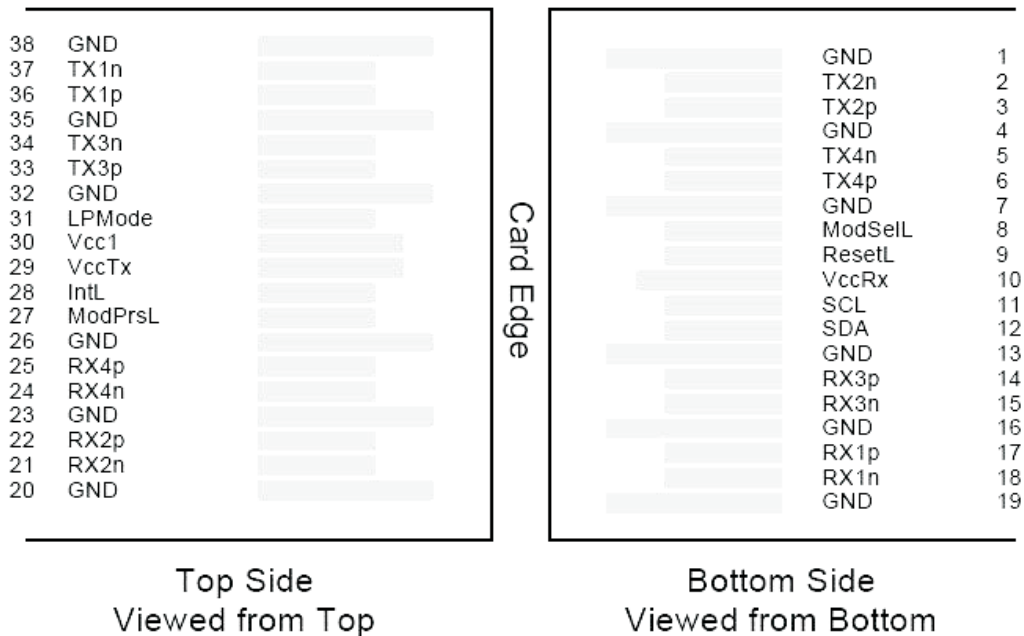
Pin Descriptions

Pin	Symbol	Name	Ref.
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
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	
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	Ground	1
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	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
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	

Pin	Symbol	Name	Ref.
28	IntL	Interrupt/Rx LOS	4
29	VccTx	+3.3 V Power Supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMODE	Low Power Mode/Tx disable	4
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	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Notes:

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.
3. Not used.
4. Dual function pin as specified into SFF-8679.



Pin-out of Connector Block on Host Board

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	V _{cc}	-0.5		+3.6	V	
Storage Temperature	TS	-40		+85	°C	
Operating Humidity (non-condensing)	RH	5		85	%	

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Power Supply Voltage	V _{cc}	3.14	3.30	3.47	V	
Steady state current	I _{supply}			1298.7	mA	
Case Operating Temperature	T _c	0		+70	°C	Commercial
	T _I	-40		+85	°C	Industrial
Maximum Power Dissipation	PD			4.5	W	
Power Noise and Ripple noise tolerance 10 Hz to 10 MHz (peak-to-peak)				66	mVpp	
Two Wire Serial Interface Clock Rate				400	kHz	
Rx Differential Data Output Load			100		ohms	
Operating Distance		2		40000	m	

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Differential Data Input Amplitude	V _{IN,P-P}			900	mVpp	1
Differential Termination Mismatch				10	%	
LPMode, Reset and ModSelL	V _{IL}	-0.3		0.8	V	
	V _{IH}	2		V _{cc} +0.3	V	
Receiver						
Differential Data Output Amplitude	V _{OUT,P-P}			900	mVpp	1
Differential Termination Mismatch				10	%	
Output Rise/Fall Time, 20%~80%	T _R	12			ps	
ModPrsL and IntL	V _{OL}	0		0.4	V	I _{OL} =4mA
	V _{OH}	V _{cc} -0.5		V _{cc} +0.3	V	I _{OL} =4mA

Notes:

High-Speed Signal: Compliant to 50GAUI-2 C2M (IEEE 802.3cd)

Low-Speed Signal: Compliant to SFF-8679

1..Amplitude customization beyond these specs is dependent on validation in customer system.

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Wavelength	λ		1310		nm	
Side-mode suppression ratio	SMSR	30			dBm	
Spectral Width (-20dB)				0.5	nm	
Average launch power	P_{OUT}	+0.4		+6.63	dBm	
Average launch power of OFF transmitter	P_{OUT_OFF}			-15	dBm	
Outer Optical Modulation Amplitude (OMAAouter)	P_{OUTL}	+3.4		+7.4	nm	
Extinction ratio	ER	6			dB	
Launch power in OMAouter minus TDECQ	OMA - TDECQ	+2			dBm	
Transmitter and dispersion eye closure for PAM4 (TDECQ)	TDECQ			3.2	dB	1
Receiver						
Wavelength	λ		1310		dBm	
Receiver sensitivity (OMAAouter)				$\max(-15.1, \text{SECQ} - 16.5)$	dBm	2
Damage Threshold	P_{damage}	-2.37			dBm	
Overload		-3.37				
Average Receive Power		-17.6		-3.37	dBm	
Receive power (OMAAouter)	OMA			-2.6	dBm	
Receiver Reflectance	RXR			-26	dBm	
Stressed Sensitivity OMA	SRS			-13.3	dBm	
LOS assert	LOSA	-30			dBm	
LOS de-assert	LOSD			-19.6	dBm	
LOS hysteresis	LOSH	+0.5			dB	

Notes:

1. Measured with a PRBS²¹⁵-1 test pattern @53.125Gbps, 40km fiber.
2. Measured with a PRBS²³¹-1 test pattern @53.125Gbps, BER $\leq 2.4E-4$. IEEE 802.3cd clause 139 equation 139-2.

Control and status timing requirement

Item	Symbol	Min	Max	Unit	Ref
Initialization time	t_init		10	s	1
Reset Init Assert Time	t_reset_init	10		us	
Serial Bus Hardware Ready Time	t_serial		2	s	
Monitor Data Ready Time	t_data		2	us	
Reset Assert Time	t_reset		10	s	1
LPMODE Assert Time	ton_LPMODE		100	ms	
LPMODE De-assert Time	toff_LPMODE		10	s	1
IntL Assert Time	ton_IntL		200	ms	
IntL Deassert Time	toff_IntL		500	us	
Rx LOS Assert Time	ton_los		100	ms	
Flag Assert Time	ton_flag		200	ms	
Mask Assert Time	ton_mask		100	ms	
Mask Deassert Time	toff_mask		100	ms	
Power_over-ride or Power-set Assert Time	ton_Pdown		100	ms	
Power_over-ride or Power-set Deassert Time	toff_Pdown		10	s	1

Notes:

1. Timing not compliant with SFF-8679 V1.8.

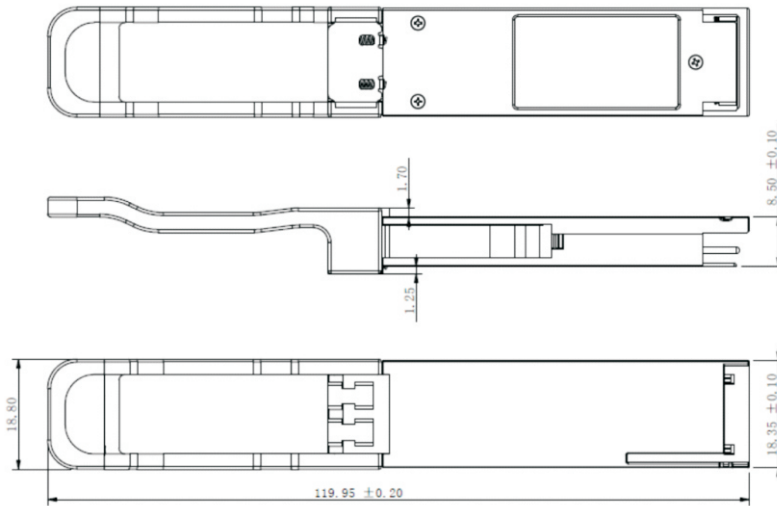
Squelch and disable timing

Item	Symbol	Min	Max	Unit	Ref
Rx Squelch Assert Time	ton_Rxsq		15	ms	
Rx Squelch Deassert Time	toff_Rxsq		350	ms	1
Tx Squelch Assert Time	ton_Txsq		400	ms	
Tx Squelch Deassert Time	toff_Txsq		400	ms	
Tx Disable Assert Time	ton_txdis		100	ms	
Tx_Disable Deassert Time	toff_txdis		20	ms	2
Rx Output Disable Assert Time	ton_rxdis		100	ms	
Rx Output Disable Deassert Time	toff_rxdis		350	ms	1
Squelch Disable Assert Time	ton_sqdis		100	ms	
Squelch Disable Deassert Time	toff_sqdis		100	ms	

Notes:

1. Timing not compliant with SFF-8679 V1.8.
2. Note 2: Can meet timing spec using following options:
 - by SW management interface as defined in SFF-8636
 - by HW option on dual mode QSFP pin LPMODE/TxDis

Mechanical Specifications



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Digital Diagnostic Monitoring Interface

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

Parameter	Range	Accuracy	Calibration
Temperature	0 to +70°C (C)	±3°C	Internal
	-40 to +85°C (I)		
Voltage	0 to Vcc	±3%	Internal
Tx Bias Current	0 to 100mA	±10%	Internal
Tx Output Power	+0.4 to +6.63 dB	±3dB	Internal
RX Power	-17.6 to -3.37 dB	±3dB	Internal

Revision History

Revision	Initiated	Reviewed	Approved	DCN	Release Date
Version 1.0	Colin Huang	Billy Tang	Dingzheng	New Released.	Apr 21, 2019
Version 1.1	Billy Tang	Colin Huang	Dingzheng	Update the new template	Dec 19, 2019



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