100G QSFP28 DR1 Optical Transceiver Compact in networking equipment

- Compatibility with SMF connectors and cable infrastructures
- Application supports operation with Forward Correction (FEC)
- CAUI-4 compliant electric interface per IEEE 8
- Power dissipation <3.5W
- Operating temperature range: 0°to 70℃
- Full module diagnostics and control through I compliant with SFF-8636
- Single 3.3V power supply
- RoHS-6 compliance

APPLICATIONS

- 100GbE connectivity for large-scale cloud and enterprise data centers
- Ethernet switch, router, and client-side telecom interfaces

ABSOLUTE MAXIMUM RATINGS

Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

LOW-SPEED ELECTRICAL SPECIFICATIONS

	Pcon	-	-	3.5	W
	Vih	+2.8	-	+3.3	V
	Vil	-0.3	-	+0.8	V
	Voh	+2.8	-	+3.3	V
	Vol	0.0	-	+0.4	V
		-	-	30	mA
		-	-	30	mA
		-	-	3	mA

(*) IntL
(**) Requires a host board pull-up to Vcc of 5kΩ or less.

Optical Transmitter

The 100G DR1 optical transceiver electric interface is based on IEEE 802.3 CAUI-4 host to module retimed interface. Optical transmitter/receiver specifications are compliant with 100G DR specification.

TRANSMITTER ELECTRICAL INPUT CHARACTERISTICS

		-	25.8	-	Gbps	
	V_{in_CM}	-400	-	2850	mV	
		-	-	10	%	
	Vin_pp	300	-	900	mV	
	Vin_se	-0.4	-	3.3	V	
	CL	-	-	10	dB	Chip-to-chip @ 12.9 GHz
		-	-	1e-15		With stressed input signal per IEEE802.3bm Annex 83E.3.4.2
		Minimum per IEEE802.3bm Annex 83E.				
		Minimum per IEEE802.3bm Annex 83E.	-			

RECEIVER OPTICAL INPUT CHARACTERISTICS

		PAM4				
	BR	106.24	106.25	106.26	Gbps	
	BR	53.12	53.125	53.13	Gbd	
		1304.5 to 1317.5 1311 center wavelength			nm	

Electrical PIN Assignment

The 100 Gbps DR1 QSFP28 optical transceiver pinout is compliant with the QSFP specifications in SFF-8436. The table below lists and describes all of the electrical pins of the module.

ELECTRICAL CONNECTOR PAD LAYOUT

TOP SIDE
VIEWED FROM TOP

BOTTOM SIDE
VIEWED FROM BOTTOM

QSFP28 MODULE ELECTRICAL CONNECTOR PIN DEFINITIONS

1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModSelL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		VccRx	+3.3V Power Supply, Receiver	2	2
11	LVCMOS-I/O	SCL	2 Wire Serial Interface Clock	3	
12	LVCMOS-I/O	SDA	2 Wire Serial Interface Data	3	
13		GND	Ground	1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	

Control and Monitoring Interface

The 100 Gbps DR1 QSFP28 Optical Transceiver hardware pins support a full SFF-8436 and SFF-8636–compliant set of control,

Management Interface

GENERAL FUNCTIONALITY

An I^2C interface shall be used for management interface between the optical transceiver and the host system. The communication protocol shall follow the industry standard SFF-8636 specification for common management interface. Additional detail and clarified functionality are described in this sub-section.

MONITOR ACCURACY

The 100G DR1 module analog monitors have accuracy as defined below.

RX input power	+/- 3 dB
TX output power	+/- 3 dB
TX bias current	+/- 10%
Module temperature	+/- 3C
Module supply voltages	+/- 3%

REGISTER MAPPING

The module complies with the SFF-8636 memory map specification for a QSFP28 module.

0	2	ID and Status	3	Read-Only
3	21	Interrupt Flags (Clear on read)	19	Read-Only
22	33	Free Side Device Monitors	12	Read-Only
34	81	Channel Monitors	48	Read-Only
82	85	Reserved	4	Read-Only
86	99	Control	14	Read/Write
100	106	Free Side Interrupt Masks	7	Read/Write
107	110	Free Side Device Properties	4	Read-Only
111	112	Assigned to PCI Express	2	Read/Write

REGISTER MAPPING CONT.

Nid(F)0.5113(3)6e 2 58	Bcsp251635 (c)-6(s)1	Free Side Device Properties	4 1	

Mechanical Specifications

QSFP28 DIMENSIONS

Label Specification

The following printed label is attached to the product (note that the certification labels will be added/removed according to requests and certification process results):

:

Regulatory and Compliance

- EN 55024 (EU)
- IEC EN 61000-4-3 (International)
- EMC Directive 89/336/EEC
- IEC /CISPR/24

- CISPR 22, class B (Comité International Spécial des Perturbations Radioélectriques — CISPR; Special international committee on radio interference. International).
- AS/NZS CISPR22 (Australia/New Zealand)
- VCCI-03 (Japan)
- FCC 47 CFR Part 15, class B (US)
- ICES-003, Issue 4 (Canada)
- EN 55022 (EU)
- EMC Directive 2004/108/EEC (EU)

- Per MIL-STD 883C Method 3015.4 or ANSI/ESDA/JEDEC JS-001-2012 (component level).
- IEC EN 61000-4-2; +/- 8kV contact, +/- 15kV air.

- UL Recognized Component: UL 60950-1 (2nd Ed.) Information Technology Equipment; CAN/CSA-C22.2 No. 60950-1 (2007) Information Technology Equipment; UL94-V0 flammability.
- TUV Bauart Certificate: EN 60950-1 (2006+ A12:2012) Information Technology Equipment.
- CB Certificate: IEC 60950-1 (2005 +A1:2009) Information Technology Equipment.

- PCB material must be fully compliant to UL796; Temperature class B (IEC 60085); flammability class V-0- UL94).
- Cables and connectors must have a flammability ratings of V0- UL94; Service temp.≥ 90 C.
- Label materials must have a flammability ratings of V0- UL94; Service temp.≥ 90 C.
- Optical fbers must have a flammability ratings of V0- UL94; Service temp.≥ 85 C.

- FDA/CDRH certified with accession number, Class 1 laser product:
  - U.S. 21 CFR 1040;
  - UL mark
- UL Certificate:
  - IEC 60825-1:2014;
  - EN 60825-1:2014 + A11:2021
- Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
- Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- 2002/95/EC and the revised and recast Directive 2011/65/EC (RoHS) Restriction on Hazardous Substances.
- 2006/1907/EC (REACH) Registration, Evaluation, Authorization of Chemicals.
- JIG 101-A, JIG 101-B Joint Industry Guide Japanese Material Composition Declaration.
- CAITEC SJ/T 11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products (China RoHS)
- Complies with RoHS II Directive 2011/65/EU.

Ordering Information

Q81CS3LCCxx0L13	100 Gb/s DR1 QSFP28 Optical Transceiver with LC connector, 500m Reach	QSFP28	106.25G	500m	C-Temp

Document Version

1.0	11/24/2023	Initial specification version
1.1	7/8/2024	Updated Regulatory and Compliance

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