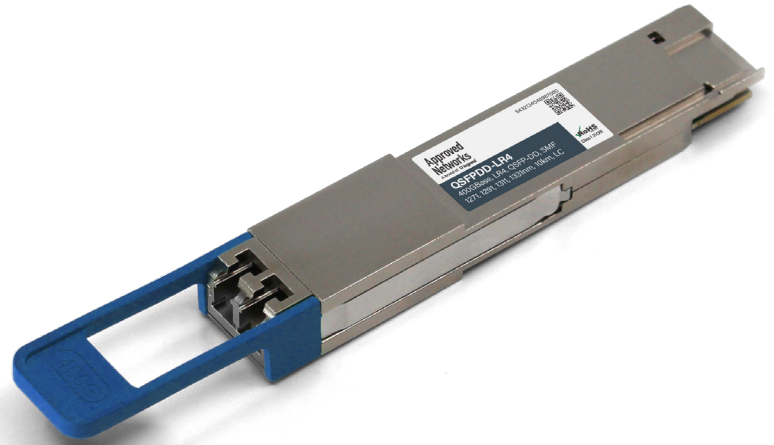


Features:

- Compliant with 100G Lambda MSA: 400GBASE-LR4-10 optical interface
- Compliant with IEEE 802.3bs standard: 400GAUI-8 electrical interface
- Compliant with QSFP-DD MSA HW Rev 5.1 type 2 housing with duplex LC connector
- Compliant with QSFP-DD CMIS Rev 4.0
- Operating distance at engineering link of up to 10km
- Maximum power consumption 10 W
- Case operating temperature: Commercial: 0°C to 70°C
- Two wire serial Interface with digital diagnostic monitoring
- Complies with EU Directive 2011/65/EU (RoHS compliant)
- Class 1 Laser



1. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Temperature	T _s	-40	85	°C	
Supply Voltage	V _{CC}	-0.5	3.6	V	
Relative Humidity (non-condensing)	RH	5	95	%	
Data Input Voltage Differential	V _{DIP} -V _{DIN}	-	1	V	
Control Input Voltage	V _I	-0.3	V _{CC} +0.5	V	
Control Output Current	I _O	-20	20	mA	

2. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T _{OPR}	0	-	70	°C	
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Instantaneous peak current at hot plug	I _{CC_IP}	-	-	4000	mA	
Sustained peak current at hot plug	I _{CC_SP}	-	-	3300	mA	
Maximum Power Dissipation	P _D	-	-	10	W	
Maximum Power Dissipation, Low Power Mode	P _{DLP}	-	-	1.5	W	

Signalling Rate per Lane	SRL	-	53.125	-	Gbd	PAM4
Two Wire Serial Interface Clock Rate	-	-	-	400	kHz	
Module power supply noise tolerance 10 Hz - 10 MHz (ptp)	-	-	-	66	mVpp	
Rx Differential Data Output Load	-	-	100	-	Ohm	
Operating Distance	-	2	-	10000	m	

3. Functional Characteristics (Optical)

The following tables list the performance specifications for the various functional blocks of the integrated optical transceiver module.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Wavelength L0	$\lambda C0$	1264.5	1271	1277.5	nm	
Wavelength L1	$\lambda C1$	1284.5	1291	1297.5	nm	
Wavelength L2	$\lambda C2$	1304.5	1311	1317.5	nm	
Wavelength L3	$\lambda C3$	1324.5	1331	1337.5	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Average Launch Power, each lane	AOPL	-2.7	-	5.1	dBm	1
Outer Optical Modulation Amplitude (OMA _{outer}), each lane	TOMA	-	-	4.4	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}) each lane: for TDECQ <1.4dB for 1.4 ≤ TDECQ ≤ 3.4dB	TOMA	0.3 -1.1+TDECQ				
Difference in launch power between any two lanes (OMA _{outer})	DP	-	-	4	dB	
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ), each lane	TDECQ	-	-	3.9	dB	
Transmitter eye closure for PAM4(TECQ)	TECQ	-	-	3.9	dB	
TDECQ - TECQ	-	-	-	2.5	dB	
Over/under-shoot	-	-	-	25	%	
Transmitter peak-to-peak power	-	-	-	5.2	dBm	
Average Launch Power of OFF Transmitter, each lane	TOFF	-	-	-16	dBm	
Extinction Ratio, each lane	ER	3.5	-	-	dB	
Transmitter transition time	-	-	-	17	ps	

RIN15.6OMA	RIN	-	-	-136	dB/Hz	
Optical Return Loss Tolerance	ORL	-	-	15.6	dB	
Transmitter Reflectance	TR	-	-	-26	dB	

Notes:

1. Average launch power, each lane (min) is informative and not the principal indicator of signal strength.

4. Receiver Optical Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Wavelength L0	$\lambda C0$	1264.5	1271	1277.5	nm	
Wavelength L1	$\lambda C1$	1284.5	1291	1297.5	nm	
Wavelength L2	$\lambda C2$	1304.5	1311	1317.5	nm	
Wavelength L3	$\lambda C3$	1324.5	1331	1337.5	nm	
Damage Threshold, each lane	AOP _D	6.1	-	-	dBm	
Average Receive Power, each lane	AOP _R	-9	-	5.1	dBm	1
Receive Power (OMA _{outer}), each lane	OMA _R	-	-	4.4	dBm	
Difference in receive power between any two lanes (OMA _{outer})	DR	-	-	4.3	dB	
Receiver Reflectance	RR	-	-	-26	dB	
Receiver Sensitivity (OMA _{outer}), each lane for TECQ <1.4dB for 1.4 ≤ TECQ ≤ 3.4dB	S _{OMA}	-	-	-6.8 -8.2+TECQ	dBm	
Stressed Receiver Sensitivity (OMA _{outer}), each lane	SRS	-	-	-4.3	dBm	
Conditions of stressed receiver sensitivity test						
Stressed eye closure for PAM4 (SECQ)	-	-	3.9	-	dB	
OMA _{outer} of each aggressor lane	-	-	-0.4	-	dBm	

Notes:

1. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.

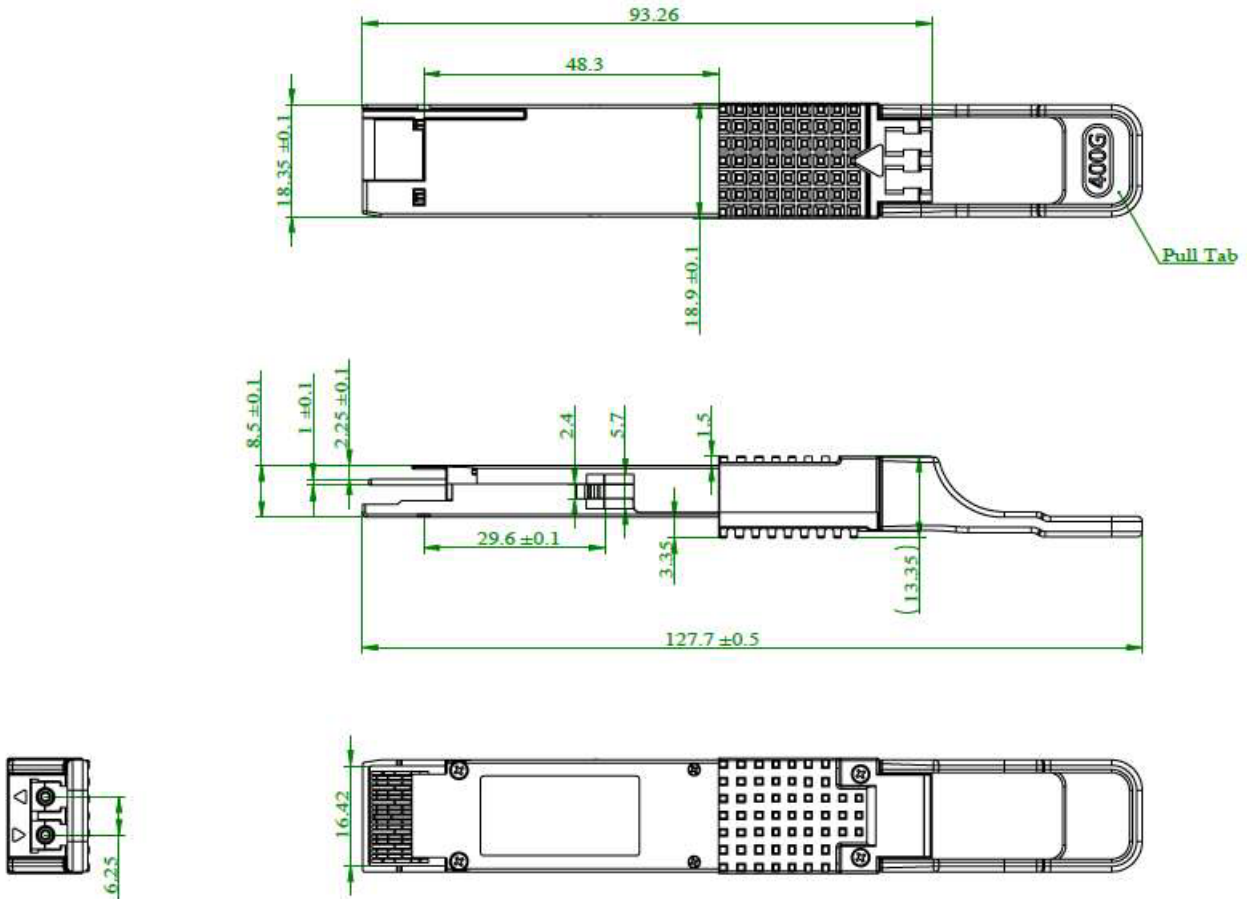
5. Functional Characteristics (Electrical)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Receiver (Module Output)						
AC common-mode output Voltage (RMS)		-	-	17.5	mV	
Differential output Voltage		-	-	900	mV	
Near-end Eye height, differential		70	-	-	mV	
Far-end Eye height, differential		30	-	-	mV	
Far end pre-cursor ISI ratio		-4.5	-	2.5	%	
Differential Termination Mismatch		-	-	10	%	
Transition Time (min, 20% to 80%)		9.5	-	-	ps	
DC common mode Voltage		-350	-	2850	mV	
Transmitter (Module Input)						
Differential pk-pk input Voltage tolerance		900	-	-	mV	
Differential termination mismatch		-	-	10	%	
Single-ended voltage tolerance range		-0.4	-	3.3	V	
DC common mode Voltage		-350	-	2850	mV	

6. Electrical Specification Low Speed Signal (compliant with QSFP-DD HW Rev 5.1)

Parameter	Symbol	Min.	Max.	Unit	Condition
Module output SCL and SDA	V _{OL}	0	0.4	V	
Module Input SCL and SDA	V _{IL}	-0.3	VCC*0.3	V	
	V _{IH}	VCC*0.7	VCC+0.5	V	
LPMode, ResetL, ModSelL and ePPS	V _{IL}	-0.3	0.8	V	
	V _{IH}	2	VCC+0.3	V	
IntL	V _{OL}	0	0.4	V	
	V _{OH}	VCC-0.5	VCC+0.3	V	

7. Mechanical Diagram



Note: External physical characteristics are subject to variation. This may include, but is not limited to, external case designs, pull tab colors and/or shapes, removal latch styles or colors, and label sizes and placement. These variations do not affect the function or characteristics of the transceivers.

8. Ordering Information

OEM	Part Number	OEM	Part Number
Arista	QDD-400G-LR4-A	Cisco	QDD-400G-LR4-S-A
Juniper	QDD-400G-LR4-10-A	Mellanox	MMS1V90-WR-A
MSA	AN-QSFPDD-LR4	MSA Champion ONE	400GQSFPDDE-LR4

9. Contact Information

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