

Features

- Supports 425Gbps
- Single 3.3V Power Supply
- Power dissipation < 10W
- Up to 2km over SMF
- RoHS compliant
- QSFP DD MSA Compliant
- 8x53.125Gbps (PAM4) electrical interface
- SN connector
- Commercial case temperature range of 0°C to 70°C
- PIN and TIA array on the receiver side



- I²C interface with integrated Digital Diagnostic Monitoring
- Safety Certification: TUV/UL/FDA*1

Applications

- 4 x 100G-FR applications
- Data center
- Infiniband interconnects

1. Absolute Maximum Ratings

Exceeding the absolute maximum ratings table may cause permanent damage to the device. This is just an emphasized rating, and does not involve the functional operation of the device that exceeds the specifications of this technical specification under these or other conditions. Long term operation under absolute maximum ratings will affect the reliability of the device.

Parameter	Symbol	Min	Typ	Max	Units
Storage Temperature	Ts	-40		85	°C
3.3 V Power Supply Voltage	Vcc	-0.5	3.3	3.6	V
Data Input Voltage – Single Ended		-0.5		Vcc+0.5	V
Data Input Voltage – Differential*4				0.8	V
Relative Humidity	RH	5		85	%

*4: This is the maximum voltage that can be applied across the differential inputs without damaging the input circuitry. The damage threshold of the module input shall be at least 1600 mV peak to peak differential.

2. Recommended Operating Conditions*5

For operations beyond the recommended operating conditions, optical and electrical characteristics are not defined, reliability is not implied, and such operations for a long time may damage the module.

Parameter	Symbol	Min	Typ	Max	Unit
Operating case temperature*6	Tc	0		70	°C
Power supply voltage	Vcc	3.135	3.3	3.465	V
Power dissipation	PD			10	W
Electrical Signal Rate per Channel (PAM encoded)*7			26.5625		GBd
Optical Signal Rate per Channel (PAM encoded)*8			53.125		GBd
Power Supply Noise*9				50	mVpp
Receiver Differential Data Output Load		100			Ohm
Fiber Length (9um SMF)*10				2000	m

*5: Power Supply specifications, Instantaneous, sustained and steady state current compliant with QSFP DD MSA Power Classification.

*6: The position of case temperature measurement is shown in Figure 9.

*7: 400GAUI 8 operation with Host generated FEC. The transmitter must receive pre coded FEC signals from the host ASIC.

*8: 4x100G FR operation with Host generated FEC. The transmitter must receive pre coded FEC signals from the host ASIC.

*9: Power Supply Noise is defined as the peak to peak noise amplitude over the frequency range at the host supply side of the recommended power supply filter with the module and recommended filter in place. Voltage levels including peak to peak noise are limited to the recommended operating range of the associated power supply. See Figure 7 for recommended power supply filter.

*10: 9µm SMF. The maximum link distance is based on an allocation of 1dB of attenuation and 3dB total connection and splice loss. The loss of a single connection shall not exceed 0.5dB.

3. General Electrical Characteristics*11

Unless otherwise stated, the following characteristics are defined under recommended operating conditions.

Parameter	Symbol	Min	Typ	Max	Unit
Transceiver Power Consumption			8	10	W
Transceiver Power Supply Total Current			2600	3200	mA
AC Coupling Internal Capacitor			0.1		µF

*11: For control signal timing including LPWn/PRSn, INT/RSTn, SCL and SDA see Control Interface Section.

4. High Speed Electrical Input Characteristics

Unless otherwise stated, the following characteristics are defined under recommended operating conditions.

Parameter	Test Point	Min.	Typical	Max.	Unit	Conditions
Signaling Rate, Per Lane (PAM4 encoded)	TP1		26.5625		GBd	+/- 100 ppm
Differential peak-peak Input Voltage Tolerance	TP1a	900			mV	
Differential input Return Loss (min)	TP1	Equation(83E-5)			dB	802.3bs
Differential to common mode input return loss (min)	TP1	Equation(83E-6)			dB	802.3bs
Termination Mismatch	TP1			10	%	
Module stressed input test	TP1a					
Single-ended voltage tolerance range			3.3	V		
DC common-mode output voltage ^{*12}	TP1	-350		2850	mV	
Module stressed input test^{*13}						
Eye width			0.22		UI	
Applied peak-peak sinusoidal jitter		Table 120E-6				802.3bs
Eye height			32		mV	

*12: DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

*13: Module stressed input tolerance is measured using the procedure defined in 120E.1.1.

5. High Speed Electrical Output Characteristics

Unless otherwise stated, the following characteristics are defined under recommended operating conditions.

Parameter	Test Point	Min.	Typical	Max.	Unit
Signaling Rate, Per Lane (range)	TP4a	26.5625 ± 100 ppm			GBd
Differential peak-to-peak input voltage tolerance	TP4			900	mV
Differential output Return Loss (min)	TP4a	Equation(83E-2)			dB
Common to differential mode conversion return loss (min)	TP4a	Equation(83E-3)			dB
Differential termination mismatch	TP4a			10	%
Transition time (min, 20% to 80%)	TP4	9.5			ps
DC Common mode voltage	TP4a	-0.35		2.85	V

*12: DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

*13: Module stressed input tolerance is measured using the procedure defined in 120E.1.1.

6. High Speed Optical Characteristics

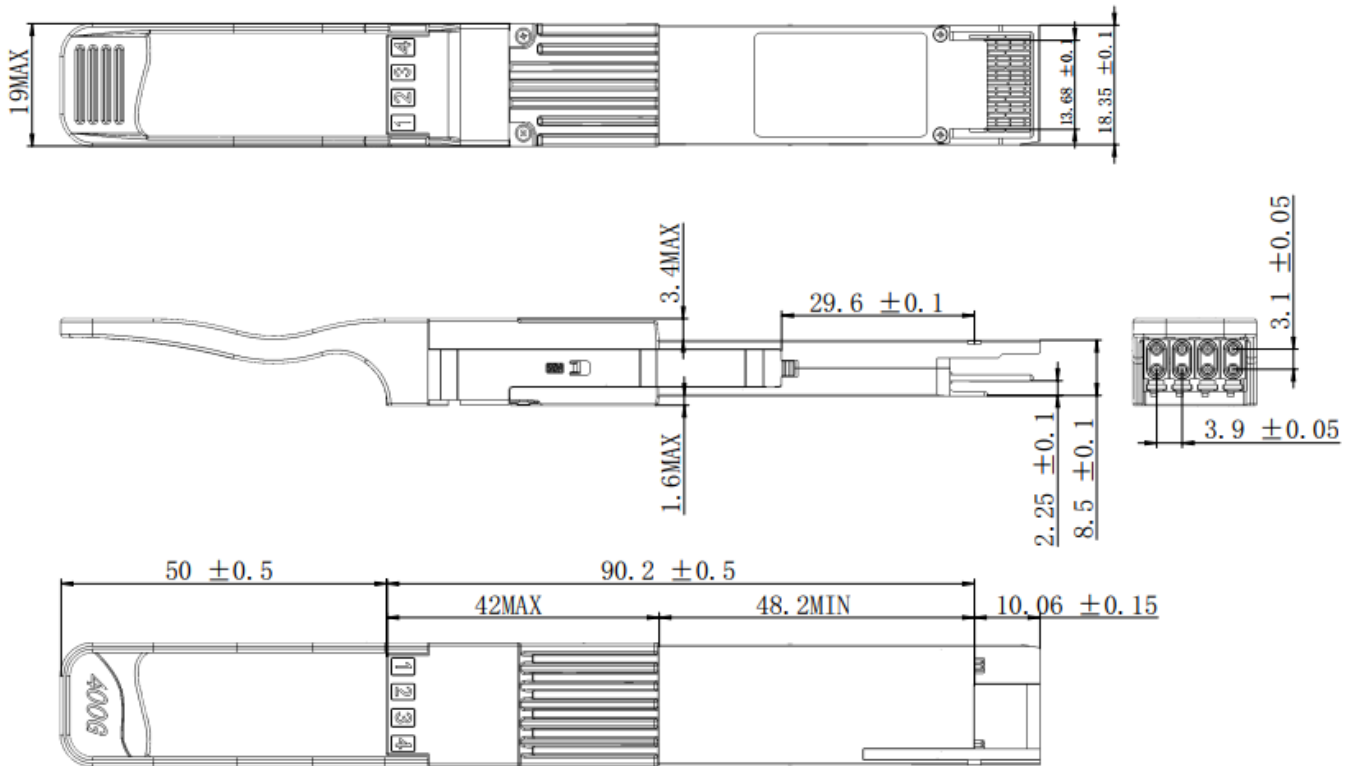
Unless otherwise stated, the following characteristics are defined under recommended operating conditions.

Parameter	Symbol	Min	Typ	Max	Unit
Transmitter					
Signaling speed per lane			106.25		Gbps
Modulation format			PAM4		
Center wavelength	λ	1304.5	1311	1317.5	nm
Side-mode Suppression Ratio	SMSR	30			dB
Extinction ratio	ER	3.5			dB
Average launch power ^{*14}		-2.4		4	dBm
OMA per lane		-0.2		4.2	dBm
Launch Power in OMA-TDECQ for extinction ratio ≥ 4.5 dB for extinction ratio < 4.5 dB		-1.6 -1.5			dBm
Transmitter and dispersion eye closure for PAM4 (TDECQ)				3.4	dB
TDECQ- $10 \cdot \log_{10}(C_{eq})$ ^{*15}				3.4	dB/Hz
TECQ (PAM4)				3.4	dBm
RIN ₁₇₁ OMA				-136	dB
Average launch power of OFF transmitter				-15	dB
Optical return loss tolerance				17.1	dB
Transmitter Reflectance				-26	dB
Receiver					
Signaling speed per lane			106.25		Gbps
Center wavelength	λ	1304.5	1311	1317.5	nm
Damage threshold		5.5			dBm
Average receiver power per lane		-6.4		4.5	dBm
Saturation receive power (OMA) per Lane				4.7	dBm
Unstressed receiver sensitivity (OMA) per Lane	Sen ^{*16}			-4.5 TECQ-5.9	dBm
LOS Assert (Avg.)	LOSA	-15			dBm
LOS De-Assert (Avg.)	LOSD			-10	dBm
LOS Hysteresis		0.5			dB

RSSI accuracy		-2		2	dB
Receiver reflectance				-26	dB

- *14: Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
- *15: Ceq is a coefficient defined in IEEE Std 802.3-2018 clause 121.8.5.3 which accounts for reference equalizer noise enhancement.
- *16: Measured with conformance test signal at TP3 for the BER specified in IEEE Std 802.3cd clause 140.1.1.

7. Mechanical Diagram



Unit: mm

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-XDR4-S-A	MSA	AN-QSFPDD-DR4P-SN

9. Contact Information

Tel: 800.590.9535

Web: <http://www.approvednetworks.com>