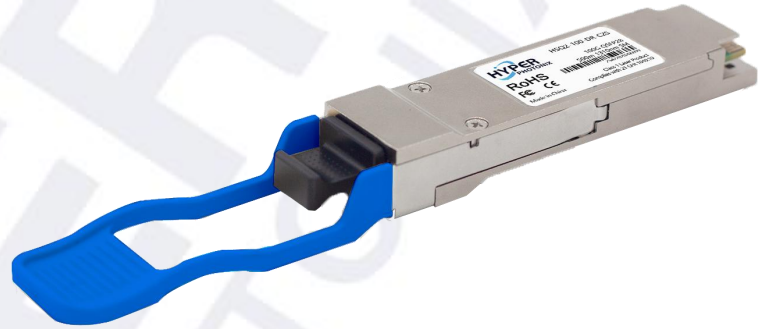


## 100G QSFP28 DR1 Pluggable Optical Transceiver

### Features

- QSFP28 MSA compliant
- IEEE 802.3cu compliant
- 106.25Gbps optical transmission
- 4x25.78125 CAUI-4 host interface
- Up to 500 m transmission over SMF
- Power consumption  $\leq 4.0W$
- Operating case temperature: 0°C to 70°C
- LC connector
- Non-hermetic package design
- Single 3.3 V power supply
- RoHS 2 compliant



### Applications

- 100GBASE-DR Ethernet
- Data center networks

### Product Description

The Hyper Photonix HSQ2-100-DR-C2S transceiver is designed for up to 500m optical communication applications and is compliant with IEEE 802.3cu 100GBASE-DR standard. The module converts 4-channel 25.78125 Gbps electrical data to a 1-channel 106.25 Gbps optical output signal. The receiver converts a 1-channel 106.25 Gbps optical input signal to 4-channel output electrical data.

### Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Maximum Supply Voltage	$V_{CC}$	-0.3	3.3	3.6	V	
Storage Temperature	$T_{sto}$	-40		85	°C	
Relative Humidity	RH	0		85	%	Non-condensing
Damage Threshold	$TH_d$	5			dBm	

*NOTE: Exceeding these ratings may damage the device permanently.*

## Specified Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	V <sub>cc</sub>	3.135	3.3	3.465	V
Case Operating Temperature	T <sub>op</sub>	0		70	°C
Relative Humidity (non-condensing)	RH	15		85	%

## Electrical Characteristics

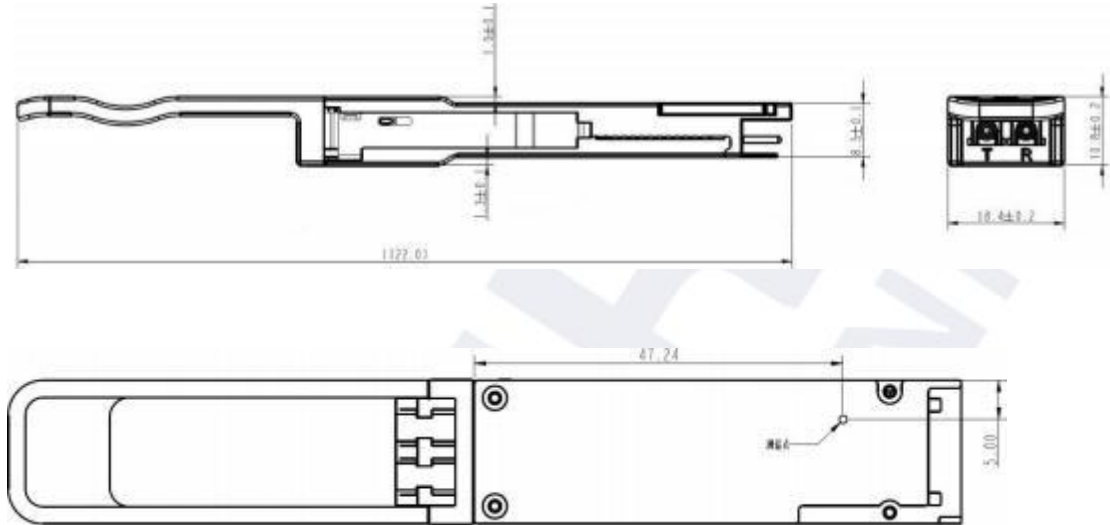
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Power dissipation	P			4.0	W	
Supply Current	I <sub>cc</sub>			1.212	A	
<b>Transmitter</b>						
Data Rate, each lane		25.78125			GBd	
Data Rate Tolerance		-100		100	ppm	
Differential input Voltage pk-pk	V <sub>pp</sub>			900	mV	
Common Mode Voltage	V <sub>cm</sub>	-350		2850	mV	
Common Mode Noise	RMS			17.5	mV	
Differential Termination Resistance Mismatch				10	%	At 1 MHz
Differential Return Loss	SDD22	See CEI-28-VSR Equation (13-2)			dB	
Common Mode to Differential Conversion	SDC22	See CEI-28-VSR Equation (13-4)			dB	
Common Mode Return Loss	SCC22			-2	dB	250MHz to 30GHz
Transition Time		9.5			ps	20% to 80%
Vertical Eye Closure	VEC			5.5	dB	
Eye Width at 1E-15 probability	EW15	0.57			UI	
<b>Receiver</b>						
Data Rate, each lane		25.78125			GBd	
Data Rate Tolerance		-100		100	ppm	
Overload Differential Voltage pk-pk	V <sub>pp</sub>	900			mV	
Common Mode Voltage	V <sub>cm</sub>	-350		2850	mV	
Differential Termination Resistance Mismatch				10	%	At 1 MHz
Differential Return Loss	SDD11	See CEI-28-VSR Equation (13-2)			dB	
Differential Common Mode Conversion	SCD11	See CEI-28-VSR Equation (13-4)			dB	
Stressed Input Test		See CEI-28-VSR Section 13.3 1.2.1				

## Optical Characteristics

Parameters	Min	Typ	Max	Unit	Notes
<b>Transmitter</b>					
Data Rate	53.125			GBd	
Data Rate Tolerance	-100		100	ppm	
Modulation Format	PAM4				
Line wavelengths	1304.5	1311	1317.5	nm	
Average Launch Power	-2.9		4.0	dBm	
Optical Modulation Amplitude (OMA)	-0.8		4.2	dBm	
Extinction Ratio (ER)	3.5			dB	
Side-Mode Suppression Ratio (SMSR)	30			dB	
Launch power in OMA-TDECQ	ER ≥ 5dB	-2.2		dBm	
	ER < 5dB	1.9			
TDECQ – 10log10(Ceq)			3.4	dB	
Transmitter and Dispersion Eye Closure for PAM4, each Lane (TDECQ)			3.4	dB	
Transmitter transition time			17	ps	
Optical Return Loss Tolerance			15.5	dB	
Transmitter Reflectance			-26	dB	
Average Launch Power of OFF Transmitter			-15	dBm	
<b>Receiver</b>					
Data Rate	53.125			GBd	
Data Rate Tolerance	-100		100	ppm	
Modulation Format	PAM4				
Damage Threshold	5.0			dBm	
Line wavelengths	1304.5	1311	1317.5	nm	
Average receiver power	-5.9		4.0	dBm	
Receiver power (OMA)			4.2	dBm	
Receiver Sensitivity (OMA <sub>outer</sub> )			max(3.9, SECQ-5.3)	dBm	1
Stressed receiver Sensitivity (OMA <sub>outer</sub> )			-1.9	dBm	2
LOS Assert	-15			dBm	
LOS Deassert			-7	dBm	
LOS Hysteresis	0.5			dB	
Receiver reflectance			-26	dB	
Conditions of Stressed Receiver Sensitivity					3
Stressed eye closure for PAM4 (SECQ), lane under test			3.4	dB	

1. Receiver sensitivity (OMA<sub>outer</sub>), each lane (max) is informative and is defined for a transmitter with a value of SECQ up to 3.4dB.
2. Measured with conformance test signal for BER = 2.4x10<sup>-4</sup>.
3. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

## Mechanical Specifications



## Laser Safety

This is a Class 1 Laser Product as defined by IEC 60825-1:2014. When operated within the limits of this specification it is considered non-hazardous. Operating this product in a manner inconsistent with specifications and intended usage may result in hazardous radiation exposure.



## Product Label



## Regulatory Certifications

Category	Standard
Radiated Emissions	EMC Directive 2014/30/EU EN 55032 CISPR 32 FCC rules 47 CFR Part 15 ICES-003 VCCI-CISPR 32 AS/NZS CISPR 32
Radiated Immunity	EMC Directive 2014/30/EU EN 55035 CISPR 35 IEC/EN 61000-4-3
RoHS	EU RoHS (2011/65/EU & (EU) 2015/863) & UK RoHS EN IEC 63000:2018 & BS EN IEC 63000:2018
Flammability (PCB)	UL Class 94 V-0

## Ordering Information

Part No.	Data Rate	Wavelength	Max Distance	Case Temperature Range
HSQ2-100-DR-C2S	100Gbps	1310nm	500m	0°C to 70°C

## Notice

Hyper Photonix reserves the right to change specifications of products identified in this datasheet without notice. Applications described herein are for illustrative purposes only, and Hyper Photonix makes no warranty that identified products will be suitable for the described applications without further testing and/or modification.

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