

## AT-SFP28 100GBASE-LR4 10Km

### AT-SFP100GLR4



### Product Features

- Hot-pluggable QSFP28 form factor
- Supports 103.1Gb/s aggregate bit rate
- Power dissipation < 3.5W
- RoHS-6 compliant
- Commercial case temperature range of 0°C to 70°C
- Single 3.3V power supply
- Maximum link length of 10km on Single Mode Fiber (SMF)
- 4x26Gb/s EML-based LAN-WDM transmitter

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1

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- □4x26G retimed electrical interface
- □Duplex LC receptacles
- □I2C management interface

## APPLICATIONS

√ 100GBASE-LR4 100G Ethernet

## 1. Product Description

ANDA TELECOM, AT-SFP100GLR4 QSFP28 transceiver modules are

designed for use in 100 Gigabit Ethernet links on up to 10km of single mode

fiber. They are compliant with the QSFP28 MSA1, IEEE 802.3ba

100GBASE-LR42 and IEEE 802.3bm CAUI-46. Digital

diagnostic functions are available via the I2C interface, as specified by the QSFP28

MSA. The transceiver is RoHS-6 compliant per Directive 2011/65/EC3 .

## 2. Absolute Maximum Ratings

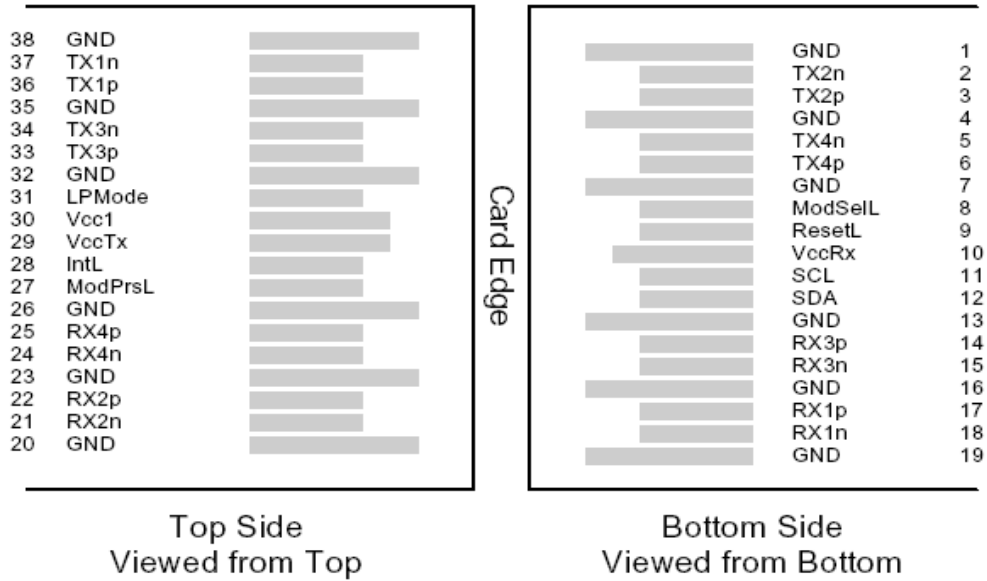
It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Note
Storage Temperature Tst	Tst	40	+85	degC	
Relative Humidity (non-condensation)	RH	5	90	%	
Operating Case Temperature	Topc	-5	+75	degC	
Supply Voltage	VCC	-0.5	3.6	V	

### 3. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	Vcc	3.1	3.3	3.5	V
Case Operating Temperature	Tca	5	25	75	°C
Data Rate Per Lane	fd		25.78125		Gbps
Humidity	Rh	5		85	%

### 4.Pin Descriptions



Pin	Symbol	Name/Description	Notes
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	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	

10	Vcc Rx	+3.3 V Power supply receiver	
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	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	

26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3 V Power supply transmitter	
30	Vcc1	+3.3 V Power Supply	
31	LPMODE	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

## 5. Electrical Characteristics (EOL, TOP = 0 to +70 °C, VCC

= 3.135 to 3.465 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			1.12	A	
Module total power	P			3.5	W	1
Transmitter						
Signaling rate per lane		25.78125 ± 100 ppm			GBd	
Differential data input swing per lane	V <sub>in,pp</sub>			900	mV	
Differential input return loss (min)	RL <sub>d</sub> (f)	$9.5 - 0.37f, 0.01 \leq f < 8$ $4.75 - 7.4 \log_{10}(f/14), 8 \leq f < 19$			dB	
Differential to common mode input return loss (min)	RL <sub>dc</sub> (f)	$22 - 20(f/25.78), 0.01 \leq f < 12.89$ $15 - 6(f/25.78), 12.89 \leq f < 19$			dB	
Differential termination mismatch				10	%	

Stressed input parameters						
Eye width			0.46		UI	
Applied pk-pk sinusoidal jitter		Per IEEE 802.3bm Table 88-13				
Eye height			95		mV	
DC common mode voltage		-350		2850	mV	
Receiver						
Signaling rate per lane		25.78125 ± 100 ppm			GBd	
Differential data output swing	Vout,pp	100		400	mVpp	2
		300		600		
		400		800		
		600		1200		
Eye width		0.57			UI	
Vertical eye closure				5.5	dB	
Differential output return loss (min)	RLd(f)	$9.5 - 0.37f, \quad 0.01 \leq f < 8$ $4.75 - 7.4 \log_{10}(f/14), \quad 8 \leq f < 19$			dB	



Common to differential mode conversion return loss (min)	RLdc(f) )	22-20(f/25.78), 0.01≤f<12.89 15-6(f/25.78), 12.89≤f<19			dB	
Differential termination mismatch				10	%	
Transition time, 20% to 80%	tr tf	12			ps	

Notes:

1. Maximum total power value is specified across the full temperature and voltage range.

2. Output voltage is settable in 4 discrete ranges via I2C. Default range is 400 – 800 mV.

## 6. Optical Characteristics (EOL, TOP = 0 to +70 °C, VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Signaling Speed per Lane		25.78125 ± 100 ppm			Gb/s	1

Lane center wavelengths (range)		1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19	nm		
Total Average Launch Power	POUT		10.5	dBm	
Transmit OMA per Lane	TxOMA	-1.3	4.5	dBm	
Average Launch Power per Lane	TXPx	-4.3	4.5	dBm	2,7
Optical Extinction Ratio	ER	4		dB	
Sidemode Suppression ratio	SSRmin	30		dB	
Average launch power of OFF transmitter, per lane			-30	dBm	
Relative Intensity Noise	RIN		-130	dB/Hz	
Optical Return Loss Tolerance			20	dB	
Transmitter Reflectance			-12	dB	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}		3	

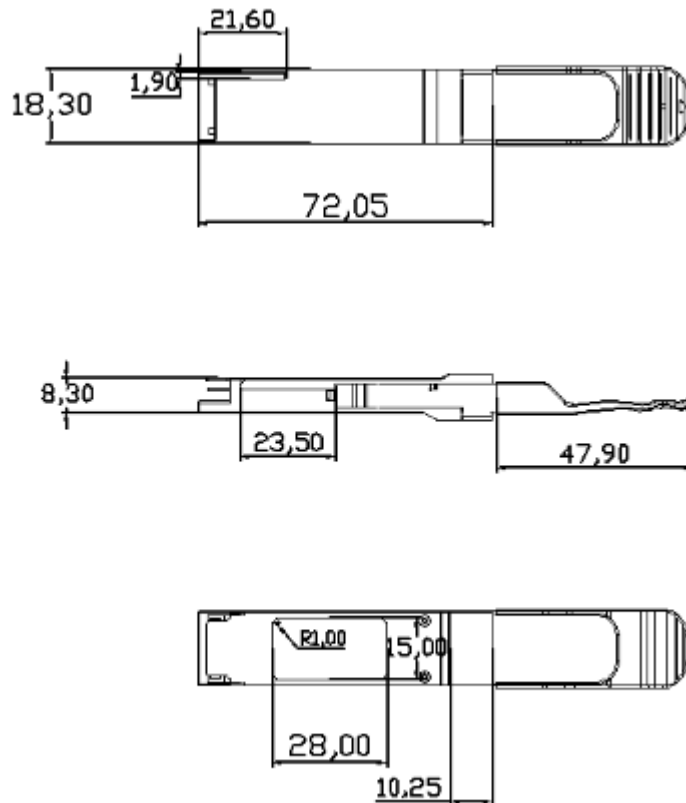
Receiver						
Signaling Speed per Lane		25.78125 ± 100 ppm		GBd		4
Lane center wavelengths (range)		1294.53 – 1296.59 1299.02 – 1301.09 1303.54 – 1305.63 1308.09 – 1310.19		nm		
Receive Power (OMA) per Lane	RxOMA			4.5	dBm	
Average Receive Power per Lane	RXPx	-10.6		4.5	dBm	5,7
Receiver Sensitivity (OMA) per Lane	Rxsens			-8.6	dBm	
Return Loss	RL	-26			dB	
Stressed Receiver Sensitivity (OMA) per Lane	SRS			-6.8	dBm	6
Receive electrical 3 dB upper cutoff frequency, per lane				31	GHz	
LOS De-Assert	LOSD			-11.6	dBm	
LOS Assert	LOSA	-24		-13.6	dBm	

LOS Hysteresis			1.5		dBm	
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Notes:

1. Transmitter consists of 4 lasers operating at 25.78Gb/s each.
2. Minimum value is informative.
3. Hit ratio  $5 \times 10^{-5}$ .
4. Receiver consists of 4 photodetectors operating at 25.78Gb/s each.
5. Minimum value is informative, equals min TxOMA with infinite ER and max channel insertion loss.
6. SRS is measured with vertical eye closure penalty of 1.8 dB max, J2 of 0.30 UI, and J9 of 0.47 UI.
7. Power value and power accuracy are with all channels on.

## 7. Mechanical Specifications



## 8. ESD

This transceiver is specified as ESD threshold 1kV for all electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

## 9. Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:1993+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 24, 2007)

## Ordering Information

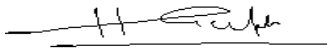
Par	Product Description
	100G... QSER...

## VERSION UPDATE:

VERSION NO.	DATE	UPDATED INFORMATION
V20151101	20151101	1. NEW PUBLISHED

## NOTICE:

reserves the right to make changes to this product in this specification without notice, in order to improve product performance.




(Harish Gupta)

Authorised Signatory