

#### 407-BBSL-PRO

Dell® 407-BBSL Compatible TAA Compliant 100GBase-LR4 QSFP28 Transceiver (SMF, 1295nm to 1309nm, 10km, DOM, 0 to 70C, LC)

#### Features

- SFF-8665 Compliance
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



#### Applications:

- 100GBase Ethernet
- Access and Enterprise

#### Product Description

This Dell® 407-BBSL compatible QSFP28 transceiver provides 100GBase-LR4 throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1295nm to 1309nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Dell® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Proline's transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products.



## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Maximum Supply Voltage	Vcc	-0.5		3.6	V
Storage Temperature	TS	-40		85	°C
Operating Case Temperature	Tc	0	25	70	°C
Operating Humidity	RH	5		85	%
Receiver Damage Threshold, per Lane	Rxdmg	5.5			dBm

## Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Dissipation	PD			3.5	W	
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
<b>Transmitter</b>						
Differential data input swing per lane	Vin			900	Mvp-p	
Input Impedance (Differential)	Zin			10	%	
<b>Stressed Input Parameters</b>						
Eye width		0.46			UI	
Applied pk-pk sinusoidal jitter		IEEE 802.3bm Table 88-13				
Eye height		95			mv	
DC common mode voltage		-350		2850	mv	
<b>Receiver</b>						
Differential output amplitude		200		900	Mvp-p	
Output Impedance (Differential)	Zout			10	%	
Output Rise/Fall Time	tr/tf	12			ps	20%~80%
Eye width		0.57			UI	
Eye height differential		228			mv	
Vertical eye closure				5.5	db	

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes	
<b>Transmitter</b>							
Signaling Speed per Lane	Brave		25.78		Gbps		
Data Rate Variation		-100		+100			
Lane_0 Center Wavelength	$\lambda_{C0}$	1294.53	1295.56	1296.59	nm		
Lane_1 Center Wavelength	$\lambda_{C1}$	1299.02	1300.05	1301.09	nm		
Lane_2 Center Wavelength	$\lambda_{C2}$	1303.54	1304.58	1305.63	nm		
Lane_3 Center Wavelength	$\lambda_{C3}$	1308.09	1309.14	1310.19	nm		
Average Launch Power each Lane	$P_{each}$	-4.3		4.5	dBm	1	
Optical Modulation Amplitude (OMA) each Lane	$TxOMA$	-1.3		4.5	dBm		
Difference in launch power between any two lanes (OMA)				5	dB		
Launch power in OMA minus TDP, each lane		-2.3			dBm		
Transmitter and dispersion penalty (TDP), each lane				2.2	dB		
Extinction Ratio	ER	4			dB		
Side-mode Suppression ratio	SMSRmin	30			dB		
Average launch power of OFF transmitter per lane				-30	dBm		
Relative Intensity Noise	RIN			-130	dB/hz		
Transmitter Reflectance				-12	dB		
Optical Return Loss Tolerance				20	dB		
Transmitter eye mask definitions: X1, X2, X3, Y1, Y2, Y3		0.25, 0.4, 0.45, 0.25, 0.28, 0.4					2
<b>Receiver</b>							
Signaling Speed per Lane	BRAVE		25.78		Gbps		
Data Rate Variation		-100		+100	ppm		
Damage threshold per lane	Rxdmg	5.5			dBm		
Lane_0 Center Wavelength	$\lambda_{C0}$	1294.53	1295.56	1296.59	nm		
Lane_1 Center Wavelength	$\lambda_{C1}$	1299.02	1300.05	1301.09	nm		
Lane_2 Center Wavelength	$\lambda_{C2}$	1303.54	1304.58	1305.63	nm		
Lane_3 Center Wavelength	$\lambda_{C3}$	1308.09	1309.14	1310.19	nm		
Average Receive Power per Lane	Rxpow	-10.6		4.5	dBm	3	
Receive Power (OMA) per Lane	RxOMA			4.5	dBm		
Receive Sensitivity in OMA per Lane	Rxsens			-8.6	dBm		
Receiver 3 dB electrical upper cutoff frequency, per lane				31	GHz		
Stressed Receiver Sensitivity (OMA) per Lane	RXSRS			-6.8	dBm	4	

<b>Optical Return Loss</b>	ORL			-26	dB	
<b>LOS Assert</b>	LOSA	-25			dBm	
<b>LOS De-Assert</b>	LOSD			-12	dBm	
<b>LOS Hysteresis</b>		0.5			dB	
<b>Conditions of stressed receiver sensitivity test</b>						
<b>Vertical eye closure penalty</b>	VECP		1.8		dB	5
<b>Stressed eye J2 Jitter</b>	J2		0.3		UI	5
<b>Stressed eye J9 Jitter</b>	J9		0.47		UI	5

**Notes:**

1. 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.
2. Hit ratio  $5 \times 10^{-5}$ .
3. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
4. Measured with conformance test signal at TP3 for BER = 10<sup>-12</sup>.
5. Vertical eye closure penalty, stressed eye J2 Jitter, and stressed eye J9 Jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

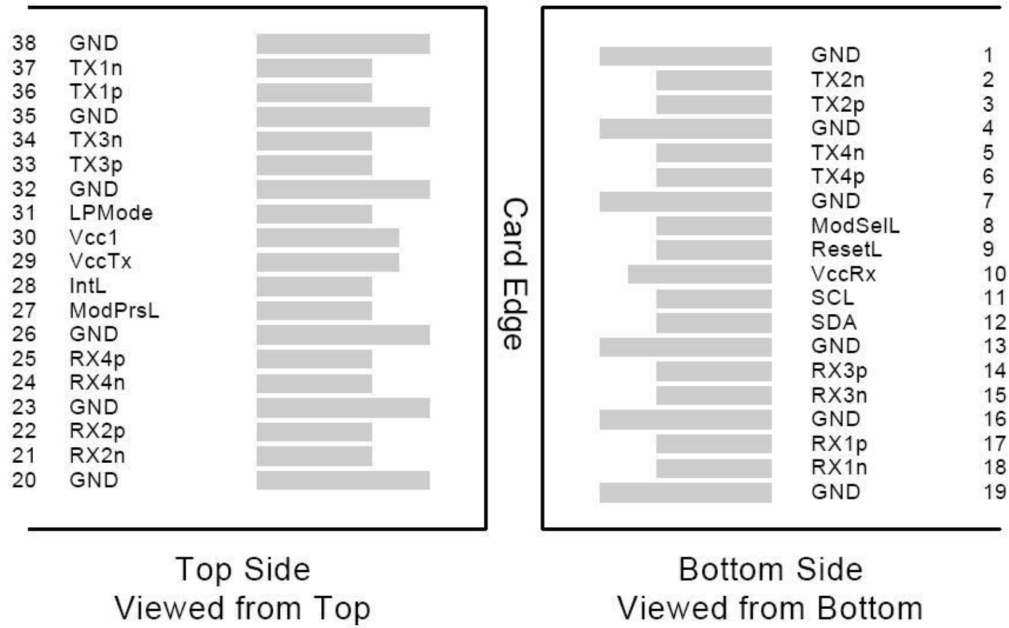
## Pin Descriptions

Pin	Logic	Symbol	Name/Descriptions	Ref.
1		GND	Module Ground	1
2	CML-I	Tx2-	Transmitter inverted data input	
3	CML-I	Tx2+	Transmitter non-inverted data input	
4		GND	Module Ground	1
5	CML-I	Tx4-	Transmitter inverted data input	
6	CML-I	Tx4+	Transmitter non-inverted data input	
7		GND	Module Ground	1
8	LVTTTL-I	MODSEIL	Module Select	2
9	LVTTTL-I	ResetL	Module Reset	2
10		VCCRx	+3.3v Receiver Power Supply	
11	LVCMOS-I	SCL	2-wire Serial interface clock	2
12	LVCMOS-I/O	SDA	2-wire Serial interface data	2
13		GND	Module Ground	1
14	CML-O	RX3+	Receiver non-inverted data output	
15	CML-O	RX3-	Receiver inverted data output	
16		GND	Module Ground	1
17	CML-O	RX1+	Receiver non-inverted data output	
18	CML-O	RX1-	Receiver inverted data output	
19		GND	Module Ground	1
20		GND	Module Ground	1
21	CML-O	RX2-	Receiver inverted data output	
22	CML-O	RX2+	Receiver non-inverted data output	
23		GND	Module Ground	1
24	CML-O	RX4-	Receiver inverted data output	
25	CML-O	RX4+	Receiver non-inverted data output	
26		GND	Module Ground	1
27	LVTTTL-O	ModPrsL	Module Present, internal pulled down to GND	
28	LVTTTL-O	IntL	Interrupt output, should be pulled up on host board	2
29		VCCTx	+3.3v Transmitter Power Supply	
30		VCC1	+3.3v Power Supply	
31	LVTTTL-I	LPMODE	Low Power Mode	2
32		GND	Module Ground	1
33	CML-I	Tx3+	Transmitter non-inverted data input	
34	CML-I	Tx3-	Transmitter inverted data input	
35		GND	Module Ground	1
36	CML-I	Tx1+	Transmitter non-inverted data input	
37	CML-I	Tx1-	Transmitter inverted data input	
38		GND	Module Ground	1

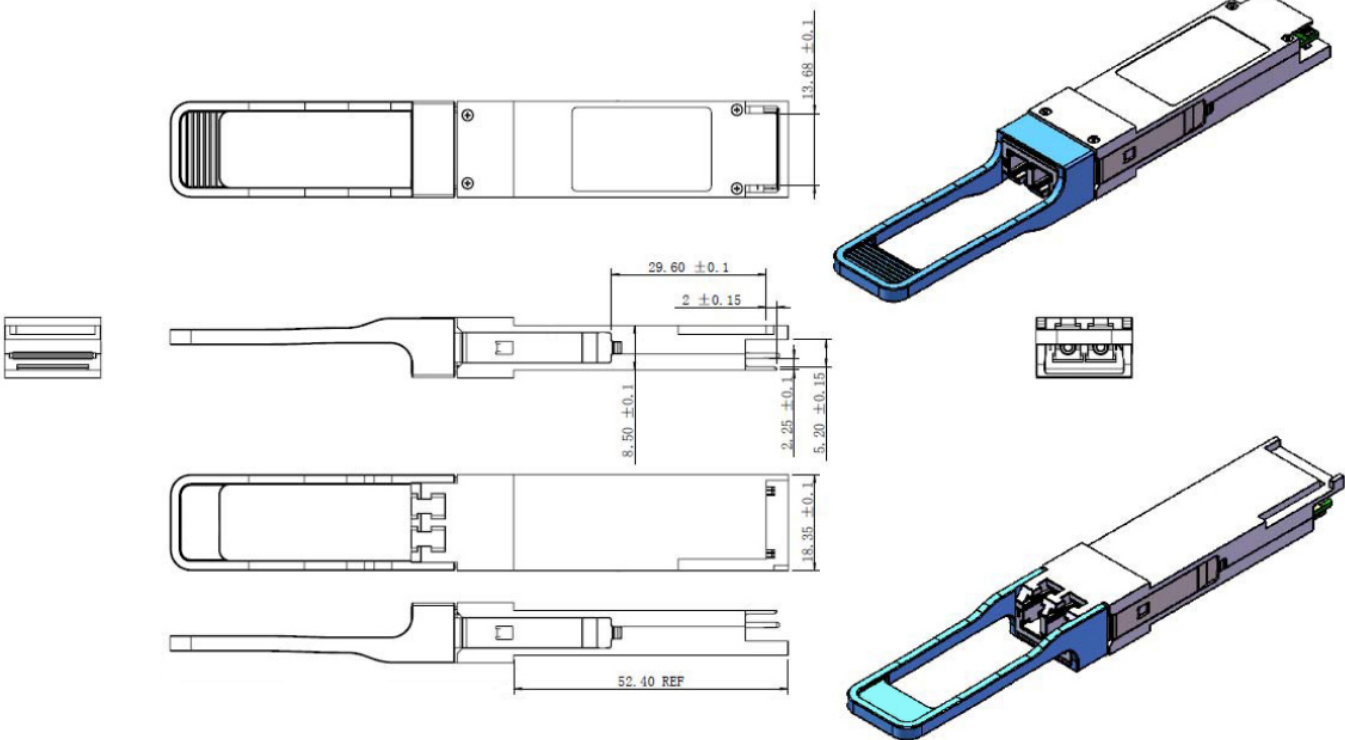
**Notes:**

1. Module circuit ground is isolated from module chassis ground with in the module.
2. Open collector; should be pulled up with 4.7k-10k ohms on host board to a voltage between 3.15V and 3.6V.

**Electrical Pin-out Details**



**Mechanical Specifications**



**About Us:**

Proline Options is one of North America's leading providers of transceivers and high speed cabling. With a reputation for quality, tested products that cover the connectivity spectrum, Proline Options has a solution for you regardless of the specification.

At Proline Options, every product is tested in its intended application - never batch or spec tested only. We run bandwidth, distance and IOS network tests. We have documented an impressive 0.03% failure rate over the last 10 years. To continue this rate of success we invest millions annually in our own on-site testing lab.



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