160-9401-900-DW20-AO

Ciena® 160-9401-900-DW20 Compatible TAA 100GBase-DWDM PAM4 Single Lambda QSFP28 Transceiver (SMF, 1561.42nm, 80km w/EDFA/DCM, LC, DOM)

Features

- SFF-8636 MSA Compliance
- 100GHz DWDM ITU Grid
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- PAM4 optical signal with integrated FEC
- Single-mode Fiber
- Metal with Lower EMI
- Hot Pluggable
- RoHS Compliant and Lead Free
- Excellent ESD Protection

Applications

- 100GBase Ethernet
- Access, Metro and Enterprise

Product Description

This Ciena® 160-9401-900-DW20 compatible QSFP28 transceiver provides 100GBase-DWDM throughput up to 80km over single-mode fiber (SMF) using a wavelength of 1561.42nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Ciena® 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.

AddOn'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."

TAA COMPLIANT

Rev. 062722

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

Wavelength Guide (100GHz ITU-T Channel)

Channel #	Frequency (GHz)	Center Wavelength (nm)	Channel #	Frequency (GHz)	Center Wavelength (nm)
21	192.1	1560.61	**41**	194.1	1544.53
22	192.2	1559.79	**42**	194.2	1543.73
23	192.3	1558.98	**43**	194.3	1542.94
24	192.4	1558.17	**44**	194.4	1542.14
25	192.5	1557.36	**45**	194.5	1541.35
26	192.6	1556.55	**46**	194.6	1540.56
27	192.7	1555.75	**47**	194.7	1539.77
28	192.8	1554.94	**48**	194.8	1538.98
29	192.9	1554.13	**49**	194.9	1538.19
30	193.0	1553.33	**50**	195.0	1537.40
31	193.1	1552.52	**51**	195.1	1536.61
32	193.2	1551.72	**52**	195.2	1535.82
33	193.3	1550.92	**53**	195.3	1535.04
34	193.4	1550.12	**54**	195.4	1534.25
35	193.5	1549.32	**55**	195.5	1533.47
36	193.6	1548.51	**56**	195.6	1532.68
37	193.7	1547.72	**57**	195.7	1531.90
38	193.8	1546.92	**58**	195.8	1531.12
39	193.9	1546.12	**59**	195.9	1530.33
40	194.0	1545.32	**60**	196.0	1529.55

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature (case)	T_S	-40		85	˚C
Operating Case Temperature	T_{op}	0	25	70	V
Supply Voltage	V_{CC}	0		3.6	V
Relative Humidity (non-condensing)	RH	5		85	%
Optical Receiver Damage Threshold	Rxdmg	5			dBm
ESD Sensitivity		500			V

Electrical Characteristics

The host 4x25.78 Gbps electrical interface complies with the CAUI-4 standard.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Rate per Lane (host side)	BR_{avg}		25.78125		Gbps	
Data Rate Variation		-100		100	ppm	
Power Supply Voltage	V_{CC}	3.135	3.3	3.47	V	
Power Consumption	PD		4.7	5.5	W	
Transmitter						
Input Swing (Differential)	V_{in}			900	mVpp	AC coupled
Input Impedance (Differential)	Z_{in}	90	100	110	Ohm	
Receiver						
Output Swing (Differential)	V_{out}			900	mVpp	AC coupled
Output Impedance (Differential)	Z_{out}	90	100	110	Ohm	
Low Speed Signals						
LPMode, Reset, ModSel	VIL	-0.3		0.8	V	
	VIH	2		V_{CC}+0.3	V	
ModPrs, Int	VOL	0		0.4	V	IOL = 2.0mA
	VOH	V_{CC}-0.5		V_{CC}+0.3	V	
SCL, SDA	VIL	-0.3		0.3*V_{CC}	V	
	VIH	0.7*V_{CC}		V_{CC}+0.5	V	
SCL, SDA	VOL	0		0.4	V	IOL_{max} = 3.0mA
	VOH	V_{CC}-0.5		V_{CC}+0.3	V	

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Rate	BR	103.125			Gbps	1
Data Rate Variation		-100		100	ppm	
Transmitter						
Central Wavelength	λ_C	1527	λ	1567	nm	
Central Wavelength Stability		λ_C-0.1		λ_C+0.1	nm	
Average Output Optical Power	P_0	-2	-0.5	2	dBm	5
Optical Extinction Ratio (outer)	ER	6			dB	
Optical Output Power, TX: OFF	P_{off}			-30	dBm	
TX Reflectance				-26	dB	
Receiver						
Operating Wavelength		1527		1567	nm	
RX Sensitivity, Avg Power	RX_{sens}		-9	-8	dBm	2, 5
RX Overload, Avg Power	RX_{sat}	4			dBm	2
RX Damage Threshold	RX_{dmg}	4			dBm	
RX Sensitivity, Avg Power at OSNR 32dB/0.1nm				-7	dBm	3, 5
Dispersion Tolerance		-30		+30	ps/nm	4, 5
RX Reflectance				-26	dB	
LOS Assert	LOSA	-15			dBm	
LOS De-Assert	LOSD			-10.5	dBm	
LOS Hysteresis			1		dB	

Notes:

1. The raw data rate is minimum 103.125 Gbps, when FEC code is added, the actual optical signal data rate is higher.
2. Rx average power sensitivity and overload are for post-FEC BER < 1E-15 with integrated FEC without dispersion and noise load at BOL.
3. Rx average power sensitivity at OSNR 32dB is for post-FEC BER < 1E-15 with integrated FEC without dispersion at OSNR 32dB/0.1nm at BOL. A 100GHz spacing DWDM filter with enough bandwidth should be used to remove the extra noises of the optical signal with noises for the RX test.
4. Dispersion tolerance is for dispersion values that cause Rx OSNR penalty less than 2 dB when compared with no dispersion at RX power -6 dBm and PRBS15 signal at BER 2e-3 at the operating data rate at BOL. A 100GHz spacing DWDM filter with enough bandwidth should be used to remove the extra noises of the optical signal with noises for the RX BER test.
5. The Average output optical power, RX sensitivity, RX sensitivity at OSNR 32dB/0.1nm, and Dispersion tolerance parameters are specified for beginning of life (BOL) over the operating temperature with clean fiber connectors.

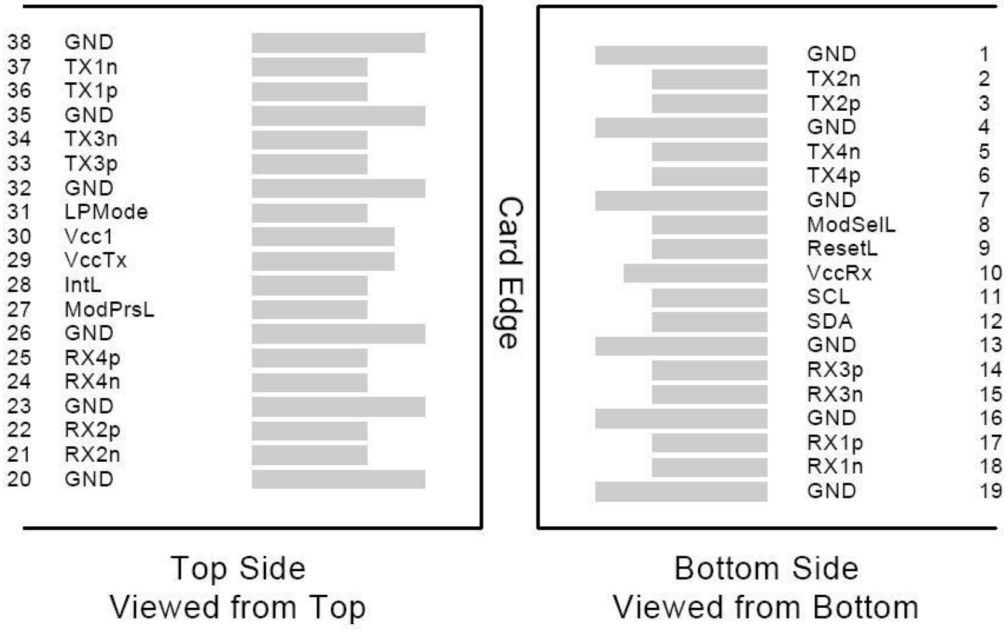
Pin Descriptions

Pin	Logic	Symbol	Name/Descriptions	Plug Sequence	Ref.
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModSelL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		VccRx	+3.3V Power Supply Receiver	2	2
11	LVCMOS- I/O	SCL	2-wire serial interface clock	3	
12	LVCMOS- I/O	SDA	2-wire serial interface data	3	
13		GND	Ground	1	1
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL/RX_LOS	Interrupt	3	3
29		VccTx	+3.3V Power supply transmitter	2	2
30		Vcc1	+3.3V Power supply	2	2
31	LVTTL-I	LPMode/TX_DIS	Low Power Mode	3	3
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1

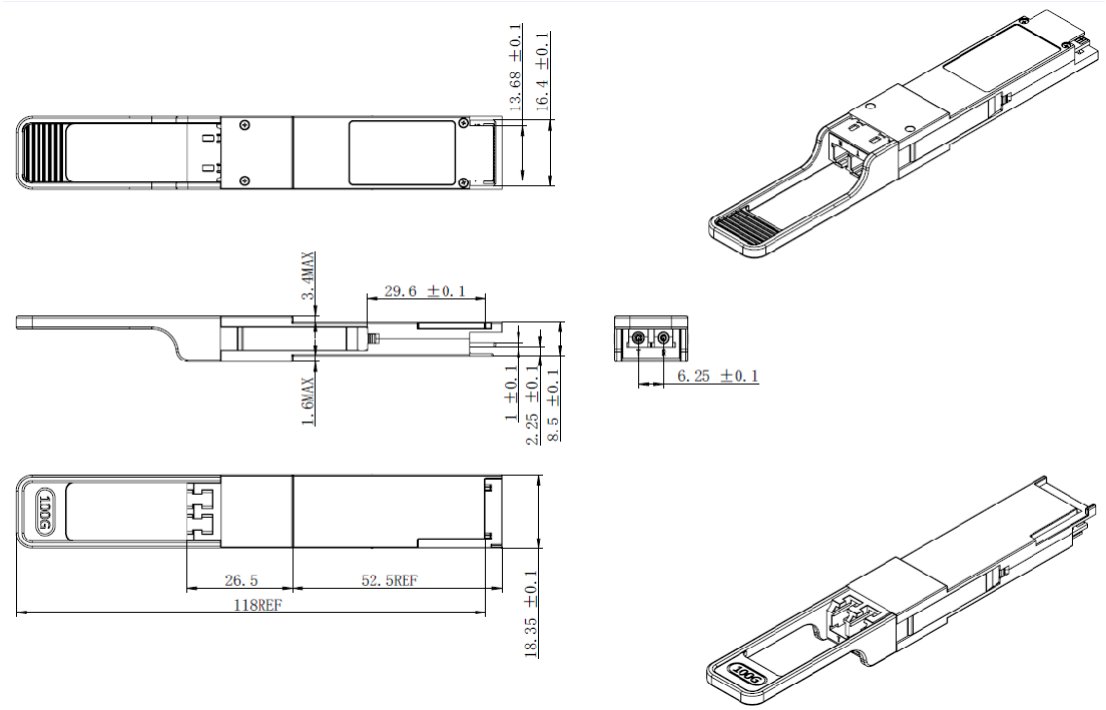
Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently

Electrical Pin-out Details



Mechanical Specifications



About AddOn Networks

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is in engrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications from ranging from NEBS Level 3 to ISO 9001:2005 with every new development while maintaining the signature reliability of its products.

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