160-9604-900-AO

Ciena® 160-9604-900 Compatible TAA 400GBase-DR4+ QSFP-DD Transceiver (SMF, 1310nm, MPO, 2km, DOM)

Features

- INF-8628 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

- 400GBase Ethernet
- Access, Metro and Enterprise

Product Description

This Ciena® 160-9604-900 compatible QSFP-DD transceiver provides 400GBase-DR4+ throughput up to 2km over single-mode fiber (SMF) using a wavelength of 1310nm via an MPO 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

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Storage Temperature	Tstg	-40		85	℃	
Operating Case Temperature	Tc	0		70	℃	
Power Supply Voltage	Vcc	-0.5		3.6	V	
Relative Humidity	RH	5		95	%	
Operating Distance	D	2		2000	m	
Signaling Rate Per Lane	SRL		53.125		GBd	1
Maximum Power Dissipation	PD			9	W	
Maximum Power Dissipation (Low-Power Mode)	PDLP			1.5	W	

Notes:

1. PAM4.

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Supply Voltage	Vcc	3.135	3.3	3.465	V	
Control Input Voltage	VI	-0.3		Vcc+0.5	V	
Instantaneous Peak Current at Hot Plug	Icc_IP			3600	mA	
Sustained Peak Current at Hot Plug	Icc_SP			2970	mA	
Power Supply Noise Tolerance (10Hz-10MHz)				66	mV	
Rx Differential Data Output Load			100		Ω	
2-Wire Serial Interface Clock Rate				400	kHz	
Transmitter (Module Input)						
Differential Pk-Pk Input Voltage Tolerance		900			mV	
Differential Termination Mismatch				10	%	
Single-Ended Voltage Tolerance Range		-0.4		3.3	V	
DC Common-Mode Voltage		-350		2850	mV	
Receiver (Module Output)						
AC Common-Mode Output Voltage (RMS)				17.5	mV	
Differential Output Voltage				900	mV	
Near-End Eye Height (Differential)		70			mV	
Far-End Eye Height (Differential)		30			mV	
Far-End Pre-Cursor Ratio		-4.5		2.5	%	
Differential Termination Mismatch				10	%	
Transition Time (Minimum, 20-80%)		9.5			ps	
DC Common-Mode Voltage		-350		2850	mV	
Low-Speed Signal						
Module Output SCL and SDA	VOL	0		0.4	V	

Module Input SCL and SDA	VIL	-0.3		Vcc*0.3	V	
	VIH	Vcc*0.7		Vcc+0.5	V	
InitMode, ResetL, and ModSelL	VIL	-0.3		0.8	V	
	VIH	2		Vcc+0.3	V	
IntL	VOL	0		0.4	V	
	VOH	Vcc-0.5		Vcc+0.3	V	

Optical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter							
Wavelength		λ_C	1304.5	1311	1317.5	nm	
Side-Mode Suppression Ratio		SMSR	30			dB	
Average Launch Power Per Lane		AOPL	-3.1		4	dBm	1
Outer Optical Modulation Amplitude (OMA_{outer}) Per Lane		TOMA			4.2	dBm	
Outer Optical Modulation Amplitude (OMAouter) Per Lane	**TDECQ < 1.4dB**	TOMA	-0.1			dBm	
	1.4dB ≤ TDECQ ≤ 3.4dB		-1.5+TDECQ				
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ) Per Lane		TDECQ			3.4	dB	
Transmitter Eye Closure for PAM4 (TECQ)		TECQ			3.4	dB	
TDECQ - TECQ					2.5	dB	
Over/Under-Shoot					22	%	
Transmitter Power Excursion					2	dBm	
Average Launch Power of Off Transmitter Per Lane		Poff			-15	dBm	
Extinction Ratio Per Lane		ER	3.5			dB	
$RIN_{17.1}OMA$		RIN			-136	dB/Hz	
Optical Return Loss Tolerance		ORL			17.1	dB	
Transmitter Reflectance		TR			-26	dB	
Transmitter Transition Time					17	ps	
Receiver							
Wavelength		λ_C	1304.5	1311	1317.5	nm	
Damage Threshold Per Lane		AOPD	5			dBm	
Average Receive Power Per Lane		AOPR	-7.1		4	dBm	2
Receive Power (OMA_{outer}) Per Lane		OMAR			4.2	dBm	
Receiver Reflectance		RR			-26	dB	
Receiver Sensitivity (OMA_{outer}) Per Lane	**TECQ < 1.4dB**	SOMA			-4.5	dBm	
	1.4dB ≤ TECQ ≤ 3.4dB				-5.9+TECQ		
Stressed Receiver Sensitivity (OMA_{outer}) Per Lane		SRS			-2.5	dBm	3
Conditions of Stressed Receiver Sensitivity Test							
Stressed Eye Closure for PAM4 (SECQ)				3.4		dB	

Notes:

1. Average launch power, per lane (minimum), is informative and not the principal indicator of signal strength.
2. Average receive power, per lane (minimum), is informative and not the principal indicator of signal strength.
3. Measured with conformance test signal at TP3 for the BER = $2.4x10^{-4}$.

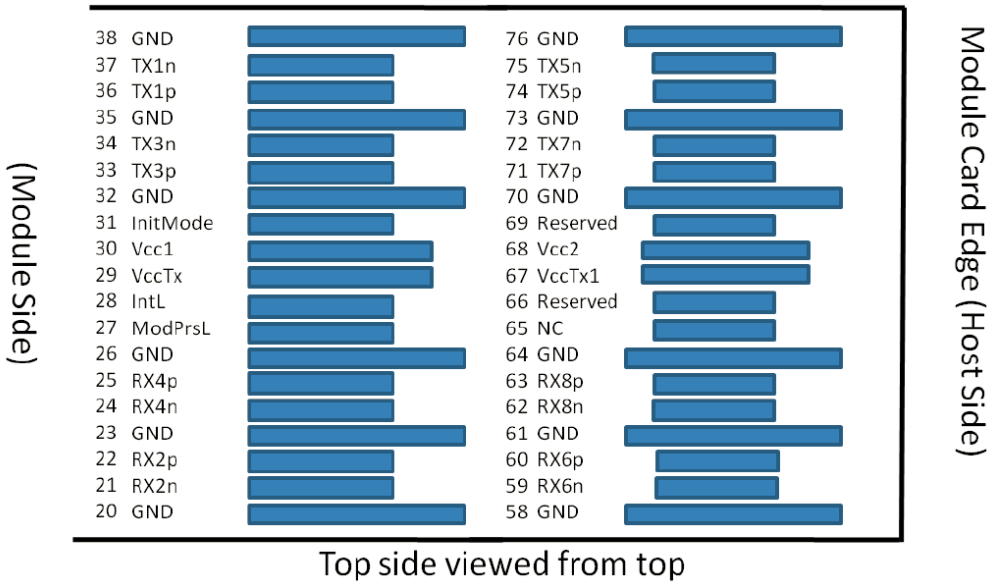
Pin Description

Pin	Logic	Symbol	Name/Description	Notes
1		GND	Module Ground.	
2	CML-I	Tx2n	Transmitter Inverted Data Input.	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input.	
4		GND	Module Ground.	
5	CML-I	Tx4n	Transmitter Inverted Data Input.	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input.	
7		GND	Module Ground.	
8	LVTTL-I	ModSelL	Module Select.	
9	LVTTL-I	ResetL	Module Reset.	
10		VccRx	+3.3V Receiver Power Supply.	
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock.	
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data.	
13		GND	Module Ground.	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output.	
15	CML-O	Rx3n	Receiver Inverted Data Output.	
16		GND	Module Ground.	
17	CML-O	Rx1p	Receiver Non-Inverted Data Output.	
18	CML-O	Rx1n	Receiver Inverted Data Output.	
19		GND	Module Ground.	
20		GND	Module Ground.	
21	CML-O	Rx2n	Receiver Inverted Data Output.	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output.	
23		GND	Module Ground.	
24	CML-O	Rx4n	Receiver Inverted Data Output.	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output.	
26		GND	Module Ground.	
27	LVTTL-O	ModPrsL	Module Present.	
28	LVTTL-O	IntL	Interrupt.	
29		VccTx	+3.3V Transmitter Power Supply.	
30		Vcc1	+3.3V Power Supply.	
31	LVTTL-I	InitMode	Initialization Mode.	
32		GND	Module Ground.	

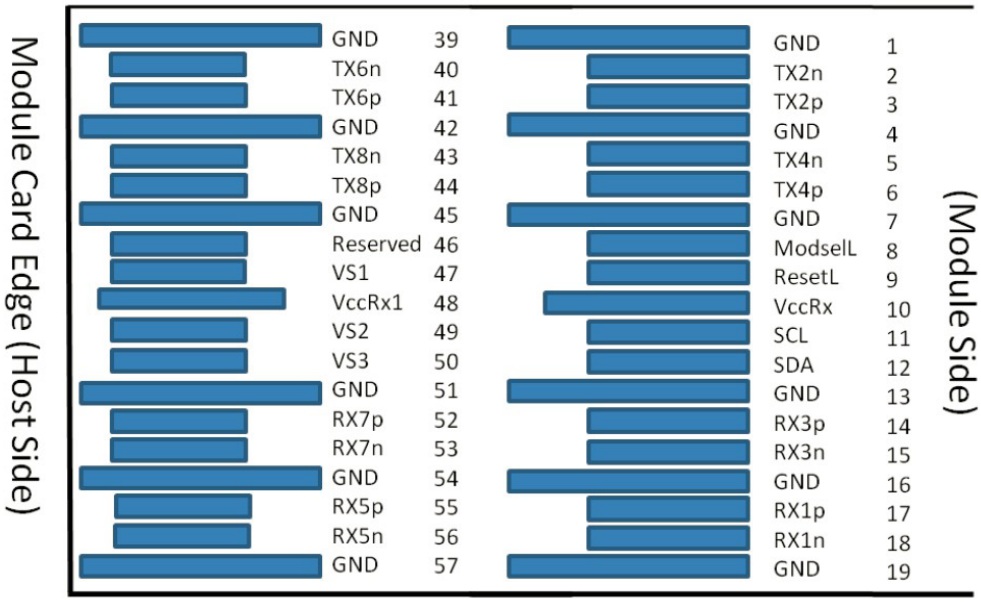
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input.	
34	CML-I	Tx3n	Transmitter Inverted Data Input.	
35		GND	Module Ground.	
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input.	
37	CML-I	Tx1n	Transmitter Inverted Data Input.	
38		GND	Module Ground.	
39		GND	Module Ground.	
40	CML-I	Tx6n	Transmitter Inverted Data Input.	
41	CML-I	Tx6p	Transmitter Non-Inverted Data Input.	
42		GND	Module Ground.	
43	CML-I	Tx8n	Transmitter Inverted Data Input.	
44	CML-I	Tx8p	Transmitter Non-Inverted Data Input.	
45		GND	Module Ground.	
46		Reserved		
47		VS1	Module Vendor-Specific 1.	
48		VccRx1	+3.3V Receiver Power Supply.	
49		VS2	Module Vendor-Specific 2.	
50		VS3	Module Vendor-Specific 3.	
51		GND	Module Ground.	
52	CML-O	Rx7p	Receiver Non-Inverted Data Output.	
53	CML-O	Rx7n	Receiver Inverted Data Output.	
54		GND	Module Ground.	
55	CML-O	Rx5p	Receiver Non-Inverted Data Output.	
56	CML-O	Rx5n	Receiver Inverted Data Output.	
57		GND	Module Ground.	
58		GND	Module Ground.	
59	CML-O	Rx6n	Receiver Inverted Data Output.	
60	CML-O	Rx6p	Receiver Non-Inverted Data Output.	
61		GND	Module Ground.	
62	CML-O	Rx8n	Receiver Inverted Data Output.	
63	CML-O	Rx8p	Receiver Non-Inverted Data Output.	
64		GND	Module Ground.	
65		NC	Not Connected.	
66		Reserved		
67		VccTx1	+3.3V Transmitter Power Supply.	
68		Vcc2	+3.3V Power Supply.	
69		Reserved		
70		GND	Module Ground.	
71	CML-I	Tx7p	Transmitter Non-Inverted Data Input.	
72	CML-I	Tx7n	Transmitter Inverted Data Input.	
73		GND	Module Ground.	

74	CML-I	Tx5p	Transmitter Non-Inverted Data Input.	
75	CML-I	Tx5n	Transmitter Inverted Data Input.	
76		GND	Module Ground.	

Electrical Pin-Out Details

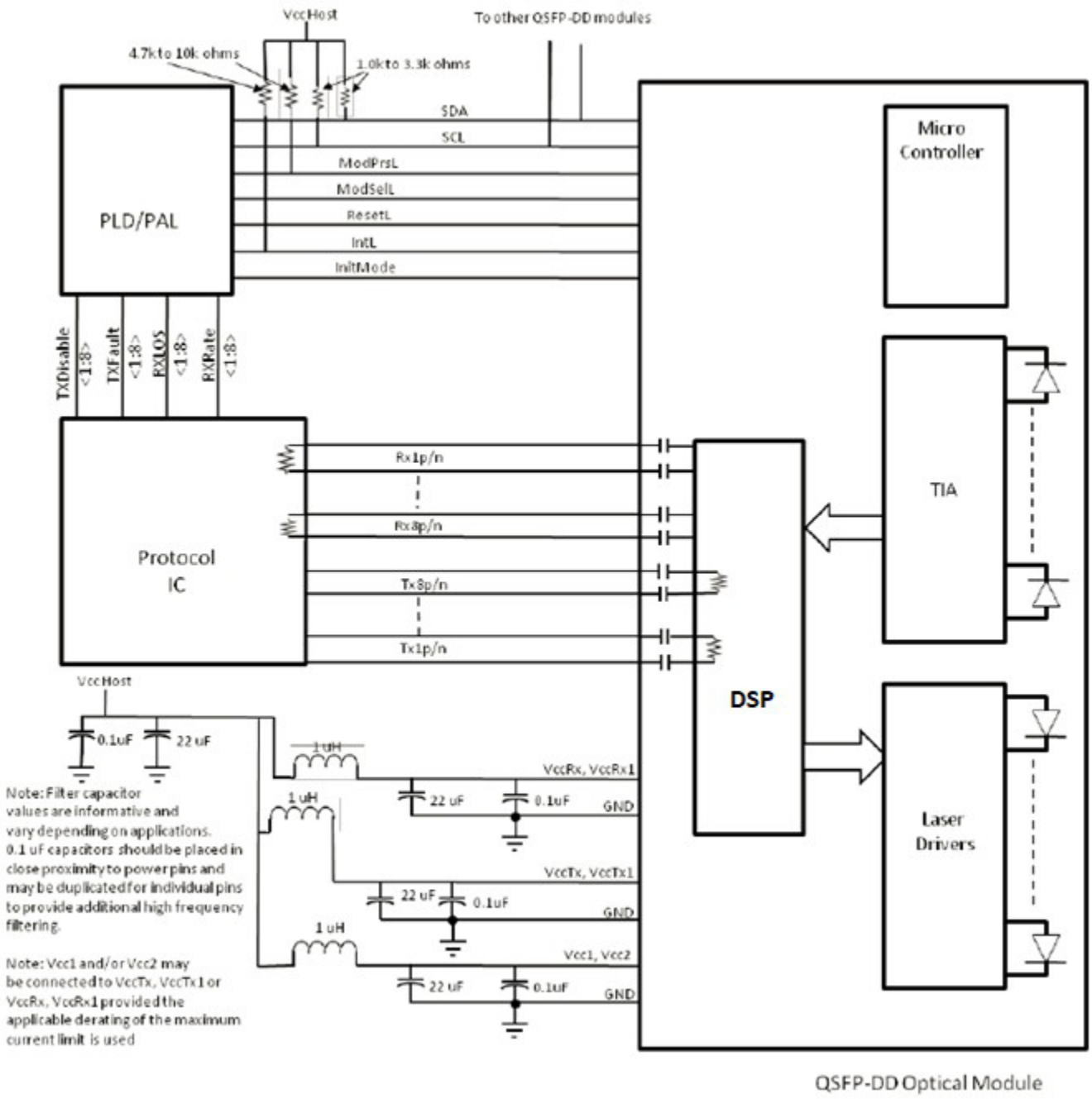


Top side viewed from top

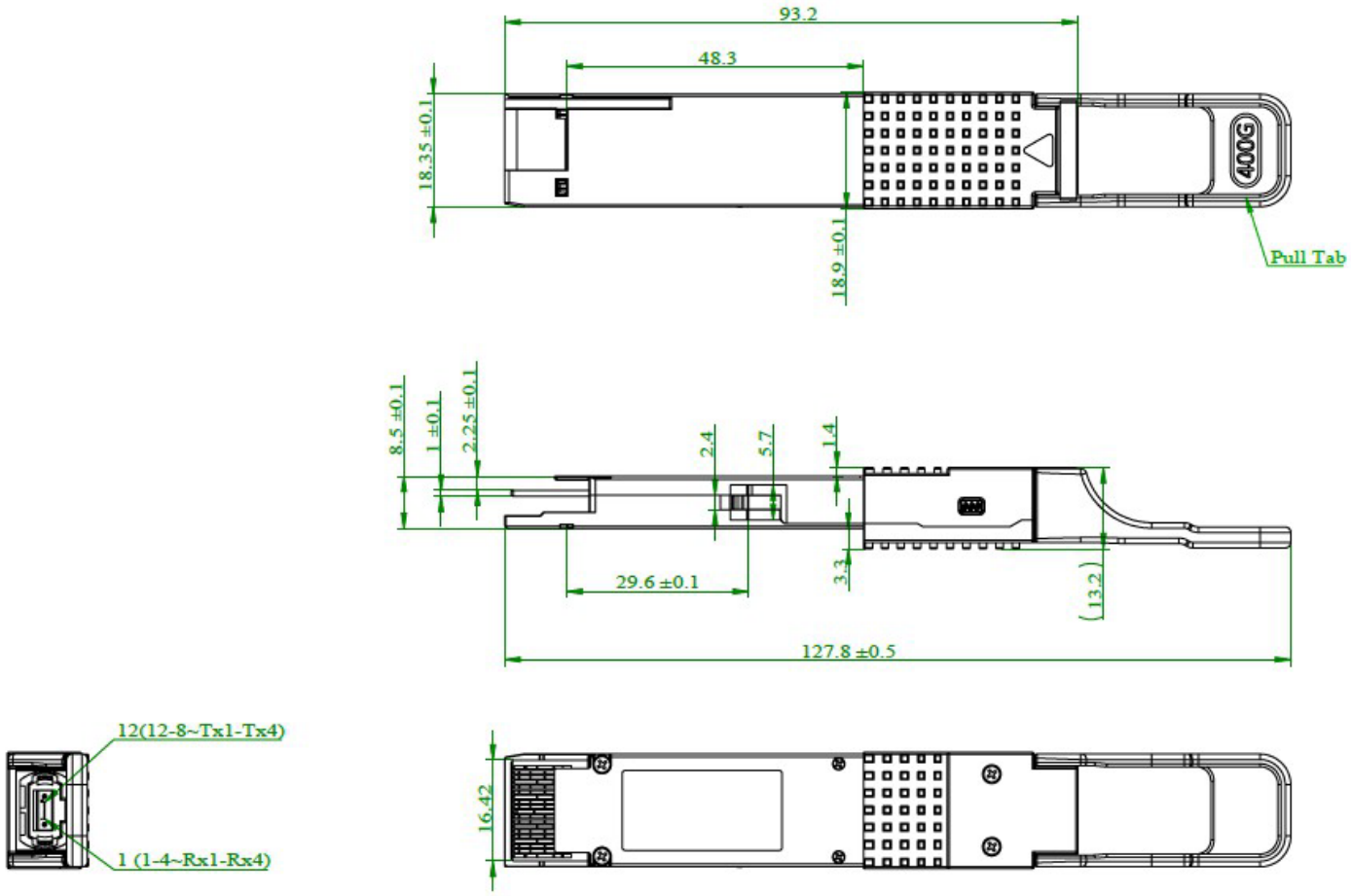


Bottom side viewed from bottom

Recommended QSFP-DD Host Board Schematic



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 ingrained 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 ranging from NEBS Level 3 to ISO 9001:2015 with every new development while maintaining the signature reliability of its products.

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