COMMANDO LightningFIBER 100GBASE-LR4

QSFP-LR4-100G Data Sheet



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Product Overview

COMMANDO LightningFIBER CMD-LR-100G is QSFP28 (Quad Small Form-Factor Pluggable 28) operates at 1310nm Wavelength on single mode fiber transceiver based on IEEE 802.3bm Ethernet standard, providing a faster and reliable interface speed of 100Gbps Ethernet applications. The product implements Digital Diagnostics Monitoring (DDM) via a 2-wire serial bus, compliant with the SFF-8665 and SFF-8636 standard.

The module is designed to offer multi-vendor compatibility offering users flexibility, scalability without incurring additional overhead and increasing interoperability.

COMMANDO QSFP28 transceiver module is for transmission at 1310nm over single mode fiber. The QSFP28 transceiver is featured with low-power, high-density, high-speed and offers an efficient way to help your IT infrastructure to be quickly scaled up and ready for up to 100Gbps transmission. It supports distances up to 10Km link lengths via LC Duplex connectors. It offers customers a wide variety of 100Gbps connectivity to multi-vendor equipment like routers, switches, server, NICs of data center, enterprise wiring closet, and service provider transport applications. It is ideal for Internet Service Provider (ISP) 100G communication links, Enterprise LAN & SAN Networks, Data Center LAN & SAN networks, and other optical links. It can be used as uplink for 100Gbps Quad Small Form-Factor Pluggable 28 (QSFP28) Fiber Network Module for delivering robust performance and Cloud networking needs of growing businesses, data centers and high-end campus networks.

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Product Highlights

- Multi-vendor platform compatible
- Supports 103.125Gb/s bit rates
- Hot-pluggable QSFP28 footprint
- 1310nm VCSEL laser transmitter
- LC duplex Connector
- Compliant with IEEE 802.3bm, 100GBASE-LR4
- Compliant with SFF-8665 and SFF-8636
- Built-in Digital Diagnostic Monitoring (DDM) functions
- Up to 10Km on SMF
- Low power consumption (Module work consumption <1W)
- Single power supply 3.3V
- RoHS Compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range (Case Temperature): 0◦C to 70◦C
- Applications: 100GBASE-SR Ethernet, 100G Fiber Channel, 100G CPRI
- Standard and compact size, fully metallic enclosure for Low EMI

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Features and Benefits

Easy to Use

COMMANDO QSFP28 Transceivers are easy to use with simple and hassle-free setup. Its compact and standard size makes it ideal for all top brand devices along with COMMANDO products. Easy Installation, Plug-and-play installation with no configuration required.

100 Gigabit speed with Reliable performance

It provides and offers 100Gbps speed. These QSFP28 are well built and rigorously tested and can sustain in very rough environment to provide reliable performance.

Dust proof Enclosure

It has a resilient dust proof enclosure protects against harsh outdoor condition with no ingress of dust.

Support uninterrupted critical network infrastructure

It is protected from any hardware failures with Extra Long operational life. With this feature protect on cost and the impact to your business by losing these network devices and thus the users/servers connected to them.

Cost Efficient

State of art quality product that can serve with world's top brand products along with COMMANDO devices on real time high-speed Performance, highly reliable, conformance to international open standards, durable, serviceable, aesthetics, perceived quality, enhanced performance leads to value to money.

Green Technology

It automatically adjusts power consumption according to the link status to limit the carbon footprint of your network. It also complies with RoHS, prohibiting the use of certain hazardous materials. Moreover, most of the packaging material can be recycled and reused.

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Hardware

High Performance

- Low power consumption <1W typically, saving power
- 100us typical latency, MTBF over 1 million hours
- QSFP28 Multi source Agreement (MSA) Compliant
- Input Voltage: 3.1V DC to 3.5V DC Maximum / 3.3V DC Typical.
- Input Current 300mA Maximum / 200mA Typical.

Extra Long operational life

- Stainless steel material
- Anti-corrosion and salt spray resistance
- Storage Relative Humidity: 5% to 95%
- Exceptional Performance in Harsh Outdoor Climates with dust proof enclosure ensuring it can withstand harsh outdoor and indoor environments.

Operating temperature range

- Commercial temperature range: 0 to 70°C (32 to 158°F)
- COMMANDO Extended temperature range: -5°C to 85°C (23 to 185°F)
- Storage temperature range: -40 to 85°C (-40 to 185°F)

Table 1 COMMANDO QSFP28 Hardware Specifications Comparison

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Product Code	Form Factor	Maximum Speed	IEEE Standard Compliance	Connector Type	TX Power (dBm)	Receiver Sensitivity (dBm)
SFP-SM-1G	SFP	1000Mbps	1000BASE-LX/LH	LC duplex	-9.5 ~ -3dBm	< -23dBm
SFP-MM-1G	SFP	1000Mbps	1000BASE-SX	LC duplex	-9.5 ~ -3dBm	< -17dBm
SFP-UTP-1G	GBIC-T, SFP	1000Mbps	1000BASE-T	RJ-45	Standard	<1W
SFP-SR-10G	SFP+	10.3125Gbps	10GBASE-SR	LC Duplex	-7.3~-1dBm	< -11.1dBm
SFP-LR-10G	SFP+	10.3125Gbps	10GBASE-LR	LC Duplex	-8.2~0.5 dBm	<-14.4dBm
SFP-ER-10G	SFP+	10.3125Gbps	10GBASE-ER	LC Duplex	-7.3~-1dBm	< -11.1dBm
SFP-ZR-10G	SFP+	11.3Gbps	10GBASE-ZR	LC Duplex	0~5dBm	<-23dBm
SFP-UTP-10G	10GBASE-T, SFP+	10Gbps	10GBASE-T	Copper CAT 6a/7	Standard	<1W
SFP-SR-25G	SFP28	25.78Gbps	25GBASE-SR	LC Duplex	-9.40 --3.40	–10.3dBm
SFP-LR-25G	SFP28	26.5Gbps	25GBASE-LR	LC Duplex	-7.97--2.8	14.4/-13.3dBm
QSFP-SR4-40G	QSFP+	41.2Gbps	40GBASE-SR4	MTP/MPO-12 Male	-7.6~1dBm	<-11.1dBm
QSFP -LR4-40G	QSFP+	44.6Gbps	40GBASE-LR4	LC duplex	-7~2.3dBm	<-11.5dBm
QSFP-SR4-100G	QSFP28	103.1 Gbps	100GBASE-SR4	MTP/MPO-12	-8.4~2.4 dBm	<-10.3dBm
QSFP-LR4-100G	QSFP28	103.125Gbps	100GBASE-LR4	LC duplex	-4.3~4.5 dBm	<-10.6dBm

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Specifications

COMMANDO CMD-SR-100G, QSFP28 is used for speed 100Gbps speed and It is a compact, hot-swappable device that plugs into a physical port of a network device. QSFP28 optics are used in communication networks and have a transmitting side (Tx) and a receiving side (Rx) work with 1310nm wavelengths with single mode fiber & supports up to 10Km link lengths over via LC duplex connector.

Table 2. COMMANDO QSFP28 Model Comparison

Product Code	Center Wavelength (nm)	Media Type	Max Transmission Distance	Digital Diagnostics Monitoring Supported
SFP-SM-1G	GBIC-LX/LH, 1310nm	MMF/SMF	550m/20km	DDM
SFP-MM-1G	GBIC-SX, 850nm	MMF	550m	DDM
SFP-UTP-1G	GBIC-T, RJ-45	Copper	100m	Standard
SFP-SR-10G	10GBASE-SR, 850nm	MMF	300m	DDM
SFP-LR-10G	10GBASE-LR, 1310nm	SMF	20km	DDM
SFP-ER-10G	10GBASE-ER, 1550nm	SMF	40km	DDM
SFP-ZR-10G	10GBASE-ZR/ZW, 1550nm	SMF	80km	DDM
SFP-UTP-10G	10GBASE-T RJ-45	Copper CAT 6a/7	80m	Standard
SFP-SR-25G	25GBASE-SR, 850nm	MMF	70/100m	DDM
SFP-LR-25G	10GBASE-LR/25GBASE-LR, 1310nm	SMF	10km	DDM

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QSFP-SR4-40G	40GBASE-SR4, 850nm	MMF	100m	DDM
QSFP-LR4-40G	40GBASE-LR4, 1310nm	SMF	10km	DDM
QSFP-SR4-100G	100GBASE-SR4, 850nm	MTP/MPO-12, MMF	100m	DDM
QSFP-LR4-100G	100GBASE-LR4, 1310nm	LC Duplex, SMF	10km	DDM

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR	109.83	100.3125	101.35	Gb/s	1
Bit Error Rate	BER	-	-	10−12	-	-
		0	-	70	◦C	3
		-5	-	85	◦C	3
		-40	-	85	◦C	3
Storage Temperature	T_{STO}	-40	-	85	◦C	3
Supply Current	Icc	-	180	290	mA	4
Input Voltage	Vcc	3.14	3.3	3.46	V	-
Maximum Voltage	V_{MAX}	-0.5	-	4	V	4

Notes:

1. IEEE 802.3bm
2. Case temperature

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3. Ambient temperature
4. For electrical power interface

Optical – Characteristics – Transmitter

Vcc=3.14V to 3.46V, Tc

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	PTX	-7	-	-1	dBm	1
Optical Center Wavelength	λC	1301	-	1335	nm	-
Optical Modulation Amplitude	OMA	-	-1.5	-	dBm	2
Extinction Ratio	ER	3	5.5	-	dB	-
Spectral Width (RMS)	Δλ	-	-	0.45	nm	-
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	-
Transmitter Dispersion Penalty	TDP	-	-	3.9	dB	-
Transmitter Jitter	-	-	-	-	-	3
Launch Power of OFF Transmitter	P_{OUT_OFF}	-	-	-30	dBm	1

Notes:

1. Average
2. IEEE 802.3bm
3. According to IEEE 802.3bm requirement

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Optical – Characteristics – Receiver

Vcc=3.14V to 3.46V, Tc

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λC	1301	1311	1335	nm	-
Receiver Sensitivity@100.3Gb/s	R_{X_SEN}	-	-	-10	dBm	1
Receiver Overload	P_{OL}	0.5	-	-	dBm	-
Receiver Reflectance	TR_{RX}	-	-	-12	dB	-
LOS Assert	LOS_A	-30	-	-	dBm	-
LOS De-Assert	LOS_D	-	-	-14	dBm	-
LOS Hysteresis	LOS_H	0.5	-	-	dB	-

Notes:

1. Measured with worst ER; BER<10^{-12}; 2^{31}-1 PRBS

Electrical – Characteristics – Transmitter

Vcc=3.14V to 3.46V, Tc

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R_{IN}	-	100	-	Ω	-
Differential data input swing	$V_{IN\ PP}$	180	-	700	mV	-
Transmit disable voltage	V_D	2	-	V_{CC}	V	-
Transmit enable voltage	V_{EN}	V_{EE}	-	V_{EE}+0.8	V	-

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Electrical – Characteristics – Receiver

Vcc=3.14V to 3.46V, Tc

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential data output swing	$V_{OUT\ PP}$	300	-	850	mV	-
Data output rise/fall time (20%-80%)	t_r/t_f	28	-	-	ps	-
LOS Assert	$V_{LOS\ A}$	2	-	$V_{CC\ HOST}$	V	-
LOS De-Assert	$V_{LOS\ D}$	V_{EE}	-	V_{EE}+0.5	V	-

Digital Diagnostic Monitor (DDM) Functions

COMMANDO CMD-SR-100G transceiver module supports 2-wire serial communication protocol as defined in SFF-8472. Digital diagnostic information is accessible over the 2-wire interface at address 0xA2. Digital diagnostics for CMD-SR-100G are internally calibrated by default. The internal micro control unit accesses the device’s operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage in real time. The module implements the alarm function of the SFF-8472, alerts the user when a particular operating parameter exceeds the factory-set normal range.

DDM Threshold Information

Parameter		Alarm Threshold		Warning Threshold	
		High Value	Low Value	High Value	Low Value
	C	90 (5A 00)	-10 (F6 00)	85 (55 00)	-5 (FB 00)
	E	90 (5A 00)	-10 (F6 00)	85 (55 00)	-5 (FB 00)
	I	90 (5A 00)	-45 (D3 00)	85 (55 00)	-40 (D8 00)

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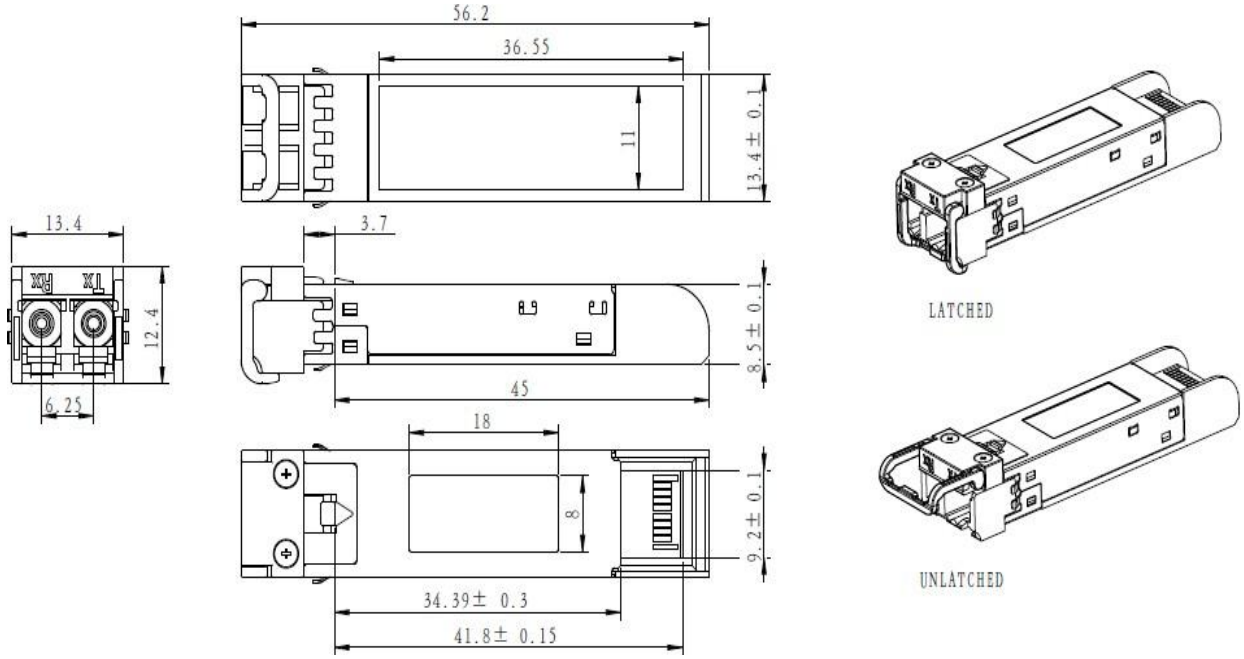
Vcc (V)	3.63(8D CC)	2.97 (74 04)	3.46 (87 28)	3.13 (7A 44)
Bias (mA)	15 (1D 4C)	1 (01 F4)	12 (17 70)	2 (03 E8)
TxPower (dBm)	0.79 (2E E0)	-7.97 (06 3C)	0.0 (27 10)	-7.0 (07 CB)
RxPower (dBm)	3.01 (4E 20)	-16.02 (00 FA)	0.0 (27 10)	-13.0 (01 F5)

Product Weight

Net weight of module: 15.7g /pc

Net weight of dust cap: 0.95g /pc

Dimensions



All dimensions are ±0.2mm unless specified otherwise

Unit: mm

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Included in the bundle/box

All COMMANDO QSFP28, QSFP-LR4-100G Transceivers are made available for use globally along with accessory used to facilitate or enhance operations. COMMANDO QSFP-LR4-100G, QSFP28 Transceivers comes with following Accessories.

- 1x (COMMANDO 100G QSFP28 Transceiver Module) QSFP-LR4-100G

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Support and Warranty

- Same-day assistance.
- Comprehensive 24-hour support using common communication/chat platforms, Email and Telephone.
- Provide FAQs and troubleshooting help online (self-service) through cloud-based solutions.
- Highly technical and trained representatives to resolve issues.
- One-year default warranty with option of warranty extension up to 3 years

COMMANDO WarrantyX Program available on: www.commandonetworks.com/warranty

Table 3. Support and Warranty

Warranty and Support	
Products covered	COMMANDO LightningFIBER 100GBASE-LR, QSFP28, 1310nm, 10Km, SMF, DDM (QSFP-LR4-100G)
Warranty duration	One Year RTB (Return To Base) replacement warranty – optionally extendable up to 3 years.
Hardware replacement	COMMANDO, its resellers, or its service center will use commercially reasonable efforts to replace the product subject to stock availability. Otherwise, a replacement will be arranged within 15 working days after receipt of the Return Materials Authorization (RMA) request.
End-of-life policy	In case of discontinuation of the product, support is limited to 3 years from announcement date.
Effective date	Hardware warranty commences from the date of shipment to customer (and in case of resale by a COMMANDO reseller, not more than 90 days after original shipment by COMMANDO).
Support duration	Lifetime support.
COMMANDO Care	COMMANDO will provide 24x7 support for basic configuration, diagnosis, and troubleshooting of device-level problems for up to one year from the date of shipment of the originally purchased product. This support does not include solution or network-level support beyond the specific device under consideration.
Online Portal Access	Warranty allows guest access to commandonetworks.com for all available technical queries.

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Ordering Information

Ordering information for the COMMANDO QSFP28, QSFP-LR4-100G Transceivers, To place an order, please contact your local reseller/distributor or COMMANDO Sales Representative at www.commandonetworks.com/catalog

Table 4. Ordering Information

Product Code	Description
SFP-SM-1G	COMMANDO LightningFIBER 1000BASE-LX/LH, SFP, 1310nm, 20km, SMF, DDM
SFP-MM-1G	COMMANDO LightningFIBER 1000BASE-SX, SFP, 850nm, 550m, MMF, DDM
SFP-UTP-1G	COMMANDO LightningCOPPER 1000BASE-T SFP, Copper, RJ-45, 100m, Standard
SFP-SR-10G	COMMANDO LightningFIBER 10GBASE-SR, SFP+, 850nm, 300m, MMF, DDM
SFP-LR-10G	COMMANDO LightningFIBER 10GBASE-LR, SFP+, 1310nm, 20km, SMF, DDM
SFP-ER-10G	COMMANDO LightningFIBER 10GBASE-ER, SFP+, 1550nm, 40km, SMF, DDM
SFP-ZR-10G	COMMANDO LightningFIBER 10GBASE-ZR/ZW, SFP+, 1550nm, 80km, SMF, DDM
SFP-UTP-10G	COMMANDO LightningCOPPER 10GBASE-T Copper RJ-45, SFP+, Up to 80m, CAT 6a/7
SFP-SR-25G	COMMANDO LightningFIBER 25GBASE-SR, SFP28, 850nm, 70/100m, OM3/4 MMF, DDM, Multi-vendor Compatible
SFP-LR-25G	COMMANDO LightningFIBER 10/25GBASE-LR, SFP28, 1310nm, 10km, SMF, DDM, Multi-vendor Compatible
QSFP-SR4-40G	COMMANDO LightningFIBER 40GBASE-SR4, QSFP+, 850nm, 100m, MMF, DDM
QSFP-LR4-40G	COMMANDO LightningFIBER 40GBASE-LR4, QSFP+, 1310nm, 10km, SMF, DDM
QSFP-SR4-100G	COMMANDO LightningFIBER 100GBASE-SR4, QSFP28+, 850nm, 100m, MTP/MPO-12, MMF, DDM
QSFP-LR4-100G	COMMANDO LightningFIBER 100GBASE-LR4, QSFP28+, 1310nm, 10km, SMF, DDM

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Document History

Release	What's new	Date
Release 1	First Release	March 24, 2021
Release 2	Multi-brand compatible model launch	November 9, 2022
Release 3	Model adjustment	September 18, 2023
Release 4	25G Model added	October 13, 2023

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