



QSFP-SR4-100G Data Sheet

Application

- 100GBASE-SR4 100G Ethernet

Features

- Hot Pluggable QSFP28 Form Factor, RoHS-6 Compliant
- Supports 103.1Gb/s Aggregate Bit Rate
- 4x25G Electrical Interface, I2C Management Interface
- Maximum Link Length of 100m on OM4 Multimode Fiber (MMF)
- Single MPO-12 Receptacle
- Single 3.3V Power Supply
- Typical Power Dissipation <1.8W
- 4x 25Gb/s 850nm VCSEL-Based Transmitter
- Commercial Operating Case Temperature Range: 0°C to 70°C

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Type	Max	Notes
Storage Temperature Range	Ts	°C	-40		85	
Relative Humidity (non-condensing)	RH	%	5		95	
Supply Voltage	Vcc	V	-0.5		3.6	

II. Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Type	Max	Notes
Operating Case Temperature	TOPR	°C	0		70	
Relative Humidity (non-condensing)	RH	%	5		85	
Power Supply Voltage	Vcc	V	3.135	3.3	3.465	
Total Power Consumption	Pc	W			2.5	
Supply Current		mA			750	
Operating Distance		m			70	OM3
		m			100	OM4

III. Optical Specifications

- Transmitter

Parameter	Symbol	Unit	Min	Type	Max	Notes
Center Wavelength	C	nm	840	850	860	

Data Rate per lane	DR	Gbps		25.78125		
Optical Power for TXDISABLE		dBm			30	
Average Launch Power, each lane	Pavg	dBm	-8.4		2.4	
Optical Power OMA, each Lane	POMA	dBm	-6.4		3	
Extinction Ratio	ER	dB	2			
RMS Spectral Width	$\Delta\lambda$	nm			0.6	
Optical Return Loss Tolerance	ORLT	dB			12	

• Receiver

Parameter	Symbol	Unit	Min	Type	Max	Notes
Center Wavelength	C	nm	840	850	860	
Data Rate per lane	DR	Gbps		25.78125		
Overload Input Optical Power	RH	dBm	2.4			
Stressed Receiver Sensitivity (OMA), each lane(5E-5)	Vin	dBm			-5.2	
Rx LOS Assert	Ts	dBm	-30			
Rx LOS De-assert	Vcc	dBm			- 10	
Rx LOS Hysteresis	RH	dB	0.5			

IV. Electrical Characteristics

Parameter	Symbol	Unit	Min	Type	Max	Notes
Supply Voltage	Vcc	V	3.135		3.465	
Supply Current	Icc	A			1.5	
Module Total Power	P	W		1.8		

• Transmitter

Parameter	Symbol	Unit	Min	Type	Max	Notes
Signaling Rate per lane		Gb/s	25.78125 ± 100ppm			
Differential pk-pk Input Voltage Tolerance	Vin pp diff	mV			900	
Single-ended Voltage Tolerance	Vin pp	V	-0.35		3.3	
Module Stress Input Test			Per Section 83E.3.4. 1,IEEE 802.3 bm			

• Receiver

Parameter	Symbol	Unit	Min	Type	Max	Notes
Signaling Rate per lane		Gb/s	25.78125 ± 100ppm			
Differential Data Output Swing	Vout pp		100		400	

		mVpp	300		600	
			400		800	
			600		1200	
Eye Width		Ui	0.57			
Eye Height, differential		mV	288			
Vertical Eye Closure	VEC	dB	5.5			
Transition Time (20% to 80%)	tr tf	ps	12			

- ① **Notes:**
1. Maximum total power value is specified across the full operational temperature and voltage range when CDRs are locked or a lack of input signal results in squelch being activated. If incorrect frequencies cause the CDRs to continuously attempt to lock, maximum power dissipation may reach 4.5W.
 2. Output voltage is settable in 4 discrete ranges via I2C. Default range is Range2. Output voltage

V. High Speed Electrical Specifications

Parameter	Unit	Min	Type	Max
Input Differential Impedance	Ω	90	100	110
Differential Data Input Swing	V	300	25.78125	1100
Differential Data Output Swing	V	500		800
Input Logic Level High	V	2		Vcc
Input Logic Level Low	V	0		0.8
Output Logic Level High	V	Vcc-0.5		Vcc
Output Logic Level Low	V	0		0.4

VI. Wire Electrical Specifications

Parameter	Symbol	Unit	Min	Type	Max	Notes
Host 2-wire Vcc Voltage	Vcc_Host_2w	V	3.14		3.46	
SCL and SDA Voltage	VOL	V	0		0.4	
	VOH	V	Vcc_Host_2w-0.5		Vcc_Host_2w+0.3	
	VIL	V			VccT*0.3	
	VIH	V	VccT*0.7		VccT+0.5	
Input Current on the SCL and SDA	Ii	A	-10		10	

VII. Wire Timing Specifications

Parameter	Symbol	Unit	Min	Type	Max	Notes
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Clock Frequency	SCL	kHz	100		400	1
Clock Pulse Width Low	LOW	us	1.3			
Clock Pulse Width High	HIGH		0.6			
Time Bus Free before New Transmission can Start	BUF	us	20			2
START Hold Time	tHD,STA	us	0.6			
START Set-up Time	tSU,STA	us	0.6			
Data In Hold Time	tHD, DAT	us	0			
Data In Set-up Time	tSU, DAT	us	0.1			
Input Rise Time (100kHz)	tR, 100	ns			1000	3
Input Rise Time (400kHz)	tR, 400	ns			300	3
Input Fall Time (100kHz)	tF, 100	ns			300	4
Input Fall Time (400kHz)	tF, 400	ns			300	4
STOP Set-up Time	tSU, STO		0.6			

- ① **Notes:**
1. Module shall operate with fSCL up to 100 kHz without requiring clock stretching. The module may clock stretch with fSCL greater than 100 kHz and up to 400 kHz.
 2. Between STOP and START and between ACK and ReSTART.
 3. From (VIL,MAX-0.15) to (VIH,MIN+0.15).
 4. From (VIH,MIN+0.15) to (VIL,MAX-0.15).

VIII. Memory Specifications

Parameter	Symbol	Unit	Min	Type	Max	Notes
Serial Interface Clock Holdoff "Clock Stretching"	T_clock_hold	us			500	1
Complete Single or Sequential Write up to 4 Byte	WR	ms			40	
Complete Sequential Write of 5~8 Byte	WR	ms			80	
Endurance (Write Cycles)		cycles	10k			

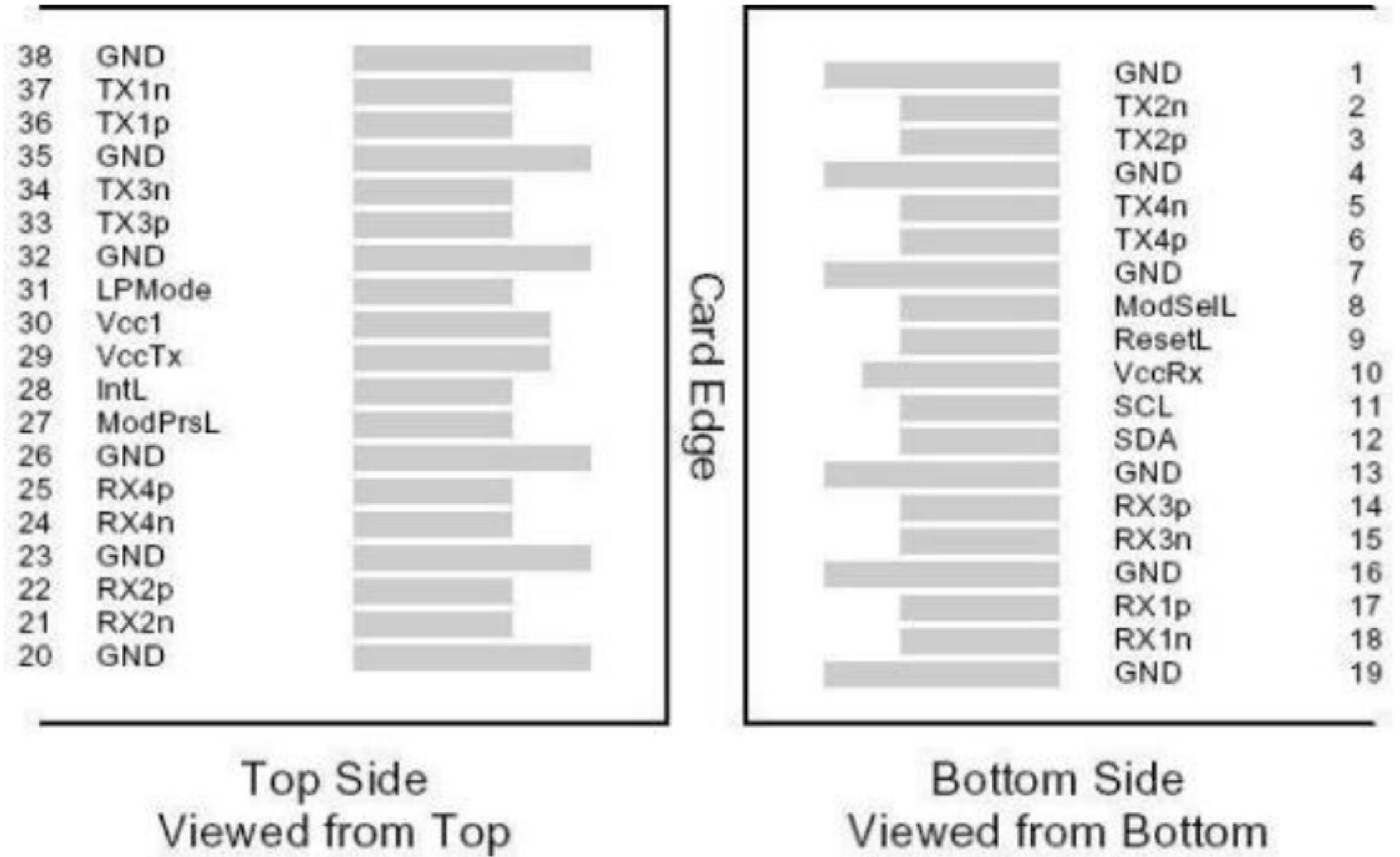
- ① **Notes:** 1. Maximum time the QSFP28 module may hold the SCL line low before continuing with a read or write operation.

IX. Digital Diagnostics Monitor Accuracy

Parameter	Accuracy	Unit	Calibration
Temperature	±3	°C	Internal
Voltage	±3	%	Internal
Tx Bias Current (Each Lane)	10	%	Internal

Tx Output Power (Each Lane)	±3	B	Internal
Rx Power (Each Lane)	±3	B	Internal

X. Pin Definitions



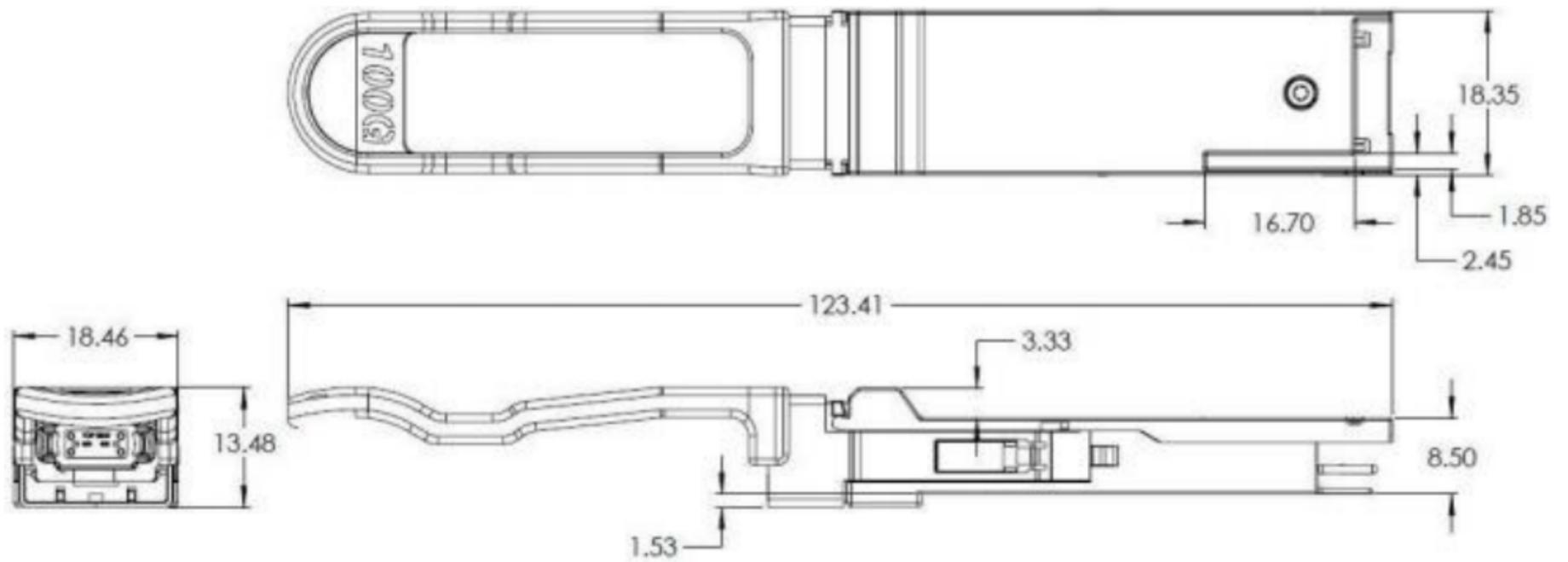
Pin	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModselL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		Vcc Rx	+3.3V Power Supply Receiver	2	2
11	LVC MOS-I/O	SCL	2-wire serial interface clock	3	
12	LVC MOS-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	Rx 1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx 1n	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	Interrupt	3	
29		Vcc Tx	+3.3V Power supply transmitter	2	2
30		Vcc1	+3.3V Power supply	2	2
31	LVTTL-I	LPMMode	Low Power Mode	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	Tx 1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx 1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1

- Notes:**
1. GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
 2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently.

XI. Mechanical Specifications

The mechanical specifications are compliant to the QSFP28 transceiver module specifications.



Regulatory and Standards Compliance

Standard

1. SFF-8665: QSFP28+ 28 Gb/s 4X Pluggable Transceiver Solution (QSFP28)
2. SFF-8636: Common Management Interface
3. 802.3™-2012 IEEE Standard for Ethernet
4. IEEE 802.3ba Amendment of IEEE Std 802.3
5. IEEE 802.3bm Amendment of IEEE Std 802.3
6. GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
7. GR-326-CORE: Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies
8. GR-468-CORE: Generic Requirements for Optoelectronic Devices Used in Telecommunications Equipment
9. GR-1435-CORE: Generic Requirements for Multifiber Optical Connectors
10. RoHS 6

Safety Instructions

Safety

1. Modules are compliant with Laser Class 1 as defined in IEC 60825-1, IEC 60825-2 and Comply with 21CFR 1040.10 and 1040.11
2. <http://www.qsfp-dd.com/specification/> (QDD Power Class)

Table 6- Power Classes

Power Class	Max Power (W)
1	1.5
2	3.5
3	7.0
4	8.0
5	10
6	12
7	14
8	>14

3. https://www.snia.org/technology-communities/sff/specifications?field_doc_status_value=All&combine=8679&items_per_page=20
 (QSFP Power Class)

TABLE 5-3 QSFP+ MODULE POWER CLASSES

Power Class	Maximum power consumption per module (W)
1	1.5
2	2.0
3	2.5
4	3.5
5	4.0
6	4.5
7	5.0
8	10.0 (Note)

4. https://www.snia.org/technology-communities/sff/specifications?field_doc_status_value=All&combine=8431&items_per_page=20
 (SFP Power Class)

Table 4- Power Classification

Power Class	Max Power (W)
1	1.0
2	1.5
3	2.0
4	3.5
5	5.0
6	reserved
7	reserved
8	See management register for maximum power consumption

Test Center

FS.COM transceivers are tested to ensure connectivity and compatibility in our test center before shipped out. FS.COM test center is supported by a variety of mainstream original brand switches and groups of professional staff, helping our customers make the most efficient use of our products in their systems, network designs and deployments.

The original switches could be found nowhere but at FS.COM test center, eg: Juniper MX960 & EX 4300 series, Cisco Nexus 9396PX & Cisco ASR 9000 Series, HP 5900 Series & HP 5406R ZL2 V3(J9996A), Arista 7050S-64, Brocade ICX7750-26Q & ICX6610-48, Avaya VSP7000MDA 2, etc.



Cisco ASR 9000 Series(A9K-MPA-1X40GE)



ARISTA 7050S-64(DCS-7050S-64)



Juniper MX960



Brocade ICX 7750-26Q



Extreme networks X670V VIM-40G4X



Mellanox M3601Q



Dell N4032F



HP 5406R ZL2 V30(9996A)



AVAYA 7024XL5(7002QQ-MDA)

Order Information

Part Number	Description
QSFP-SR4-100G	QSFP28 100GBASE-SR4 850nm 100m Transceiver,MPO-12, 100M over OM4 MMF
QSFP-SR4-100G-I	QSFP28 100GBASE-SR4 850nm 100m Transceiver (Industrial) , MPO-12, 100M over OM4 MMF
QSFP-PSM4-100G	QSFP28 100GBASE-PSM4 1310nm 500m Transceiver, LC, 500m over SMF
QSFP-CWDM4-100G	QSFP28 100GBASE-CWDM4 1310nm 2km Transceiver, LC, 2km over SMF
QSFP-4W10-100G	QSFP28 100GBASE-eCWDM4 1310nm 10km Transceiver, LC, 10m over SMF
QSFP-LR4-100G	QSFP28 100GBASE-LR4 1310nm 10km Transceiver, LC, 10km over SMF
QSFP-ZR4-100G	QSFP28 100GBASE-ZR4 1310nm 80km Transceiver, LC, 80km over SMF
QSFP-LR4-100G-I	QSFP28 100GBASE-LR4 1310nm 10km Transceiver (Industrial), LC, 10km over SMF
QSFP-LR4-100GM	QSFP28 100GBASE-LR4 and 112GBASE-OTU4 Dual Rate 1310nm 10km Transceiver , LC, 10km over SMF
QSFP-ELR4-100GM	QSFP28 100GBASE-LR4 and 112GBASE-OTU4 Dual Rate 1310nm 20km Transceiver, LC, 20km over SMF
OSFP-ER4-100GM	QSFP28 100GBASE-ER4 and 112GBASE-OTU4 Dual Rate 1310nm 40km Transceiver , LC, 40km over SMF

QSFP-ER4L-100G	QSFP28 100GBASE-ER4 1310nm 40km Transceiver, LC, 40km over SMF
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