

40G QSFP+ Passive Copper Cable Assembly

CAB-Q10/Q10-PxM

Features

- Compliant QSFP MSA specifications and SFF-8436
- Fully compatible with IEEE802.3ba
- Infiniband QDR specifications 40 Gb/s total bandwidth
- 100 ohm differential impedance system
- AC coupling of PECL signals
- Low Near-End Crosstalk(NEXT)
- Operating case temperature: -20 to 85°C
- All-metal housing for superior EMI performance
- Precision process control for minimization of pair-to-pair skew
- EEPROM for cable signature & system communications
- 30 AWG to 24 AWG cable sizes available
- RoHS compliant

Applications

- External storage systems
- Data Center networking Communications
- Switches and Routers
- InfiniBand Trade Association (IBTA)
- 40Gigabit Ethernet (40G BASE – CR4)

Product Description

QSFP+ (Quad Small Form-factor Pluggable Plus) copper direct-attach cables are suitable for very short distances and offer a highly cost-effective way to establish a 40-Gigabit link between QSFP+ ports of QSFP+ switches within racks and across adjacent racks. These cables are used for 40GbE and Infiniband standards, to maximize performance. QSFP+ are designed to meet emerging data center and high performance computing application needs for a high density cabling interconnect system capable of delivering an aggregate data bandwidth of 40Gb/s. This interconnect system is fully compliant with existing industry standard specifications such as the QSFP MSA and IBTA (InfiniBand Trade Association). The QSFP+ cables support the bandwidth transmission requirements as defined by IEEE 802.3ba (40 Gb/s) and Infiniband QDR (4x10 Gb/s per channel) specifications.

Recommended Operation Condition

Parameter	Symbol	Min	Max	Unit
Operating Case Temperature	Topc	-40	85	degC
Storage Temperature	Tst	-20	125	degC
Relative Humidity (non-condensation)	RS	-	85	%
Supply Voltage	VCC3	3.135	3.465	V
Voltage on LVTTTL Input	Vi lvttl	-0.3	VCC3 +0.2	V
Power Supply Current	ICC3	0.001	-	mA
Total Power Consumption	Pd	-	0.003	W

Notes:

Stress or conditions exceed the above range may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not applied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Frequency Domain

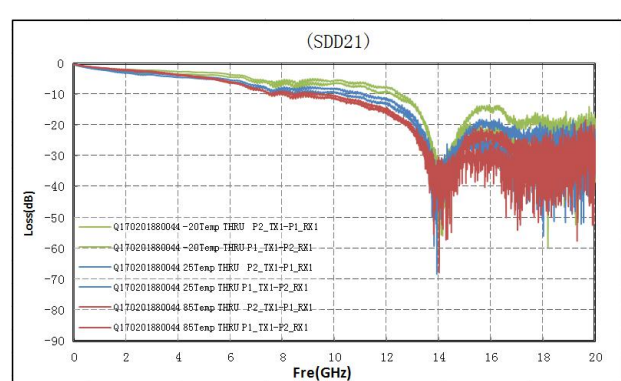
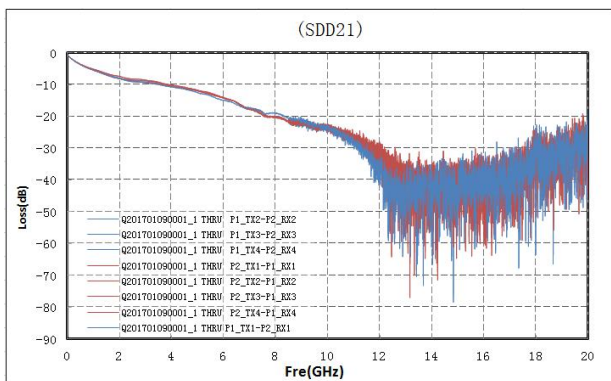
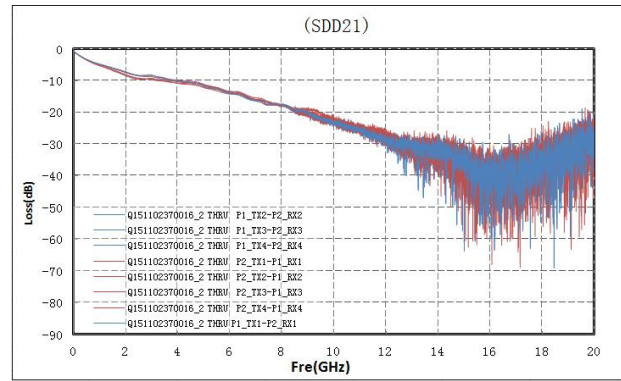
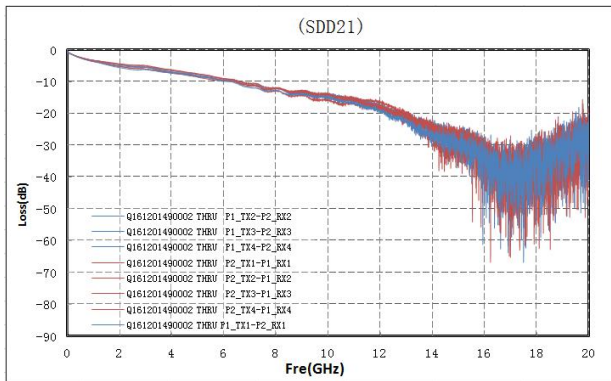
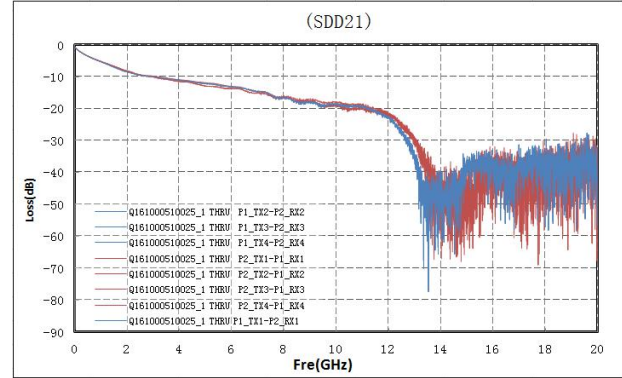
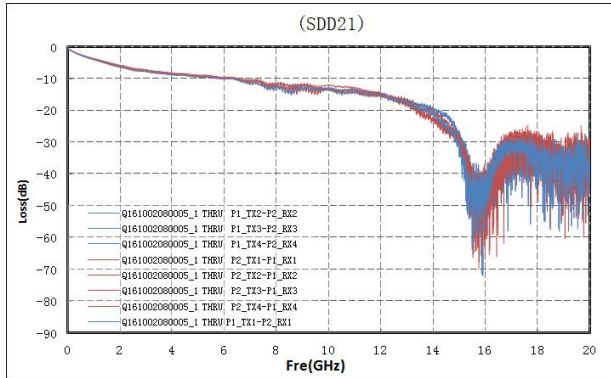
Item	Test Parameter	Specification (Proposal)
1	Receive Return Loss (SDD22)	-12+2*SQRT(f) @ 0.01 to 4.1GHz < -6.3 + 13 * log10(f/5.5), with f in GHz ; @4.1 to 11.1GHz
2	Transmit Return Loss (SDD11)	-12+2*SQRT(f) @ 0.01 to 4.1GHz < -6.3 + 13 * log10(f/5.5), with f in GHz ; @4.1 to 11.1GHz
3	Common Mode Reflection (SCC22)	< -7 + 1.6 × f, with f in GHz; @ 0.01 to 2.5GHz -3dB @ 2.5 to 11.1GHz
4	Common Mode Conversion (SCC11)	< -7 + 1.6 × f, with f in GHz; @ 0.01 to 2.5GHz -3dB @ 2.5 to 11.1GHz
5	Differential to Common-Mode Return Loss(SCD11)	> 10 dB @10Mhz to 11.1GHz

Time Domain

Item	Test Parameter	Specification (Proposal)
1	Intra-Skew*	20ps Max
	1M	25ps Max
	1.5M~2.5M	30ps Max
	2.5M~3.5M	40ps Max
	3.5M~5.5M	50ps Max
2	Impedance	100 +/- 10 Ohm
	Rise time: 50ps (20%~80%)	
3	Insertion Los (SDD21) for 1M	a. 0.6GHz : -2.5 dB Max
		b. 1.25GHz : -3.15 dB Max
		c. 2.50GHz : -4.22 dB Max
		d. 3.25GHz : -4.95dB Max
		e. 5.0GHz : -6.8dB Max
	Insertion Loss* (SDD21) for 2M	a. 0.6GHz : -3.1 dB Max
		b. 1.25GHz : -4.3 dB Max
		c. 2.50GHz : -6.14 dB Max
		d. 3.25GHz : -7.2 dB Max
		e. 5.0GHz : -10.1 dB Max
	Insertion Loss* (SDD21) for 3M	a. 0.6GHz : -3.85 dB Max
		b. 1.25GHz : -5.36 dB Max
		c. 2.50GHz : -7.58 dB Max
		d. 3.25GHz : -8.99 dB Max
		e. 5.0GHz : -11.78 dB Max
Insertion Loss* (SDD21) for 5M	a. 0.6GHz : -4.45 dB Max	
	b. 1.25GHz : -6.20 dB Max	
	c. 2.50GHz : -8.98 dB Max	
	d. 3.25GHz : -10.64 dB Max	
	e. 5.0GHz : -14.03 dB Max	
Insertion Loss* (SDD21) for 7M	a. 0.6GHz : -5.55 dB Max	
	b. 1.25GHz : -7.93 dB Max	
	c. 2.50GHz : -11.62 dB Max	
	d. 3.25GHz : -13.80 dB Max	
	e. 5.0GHz : -18.35 dB Max	

*For different length requirements, different specification

Typical Operation Characteristics



Host board Connector Pinout

Figure 1 : MSA compliant Connector

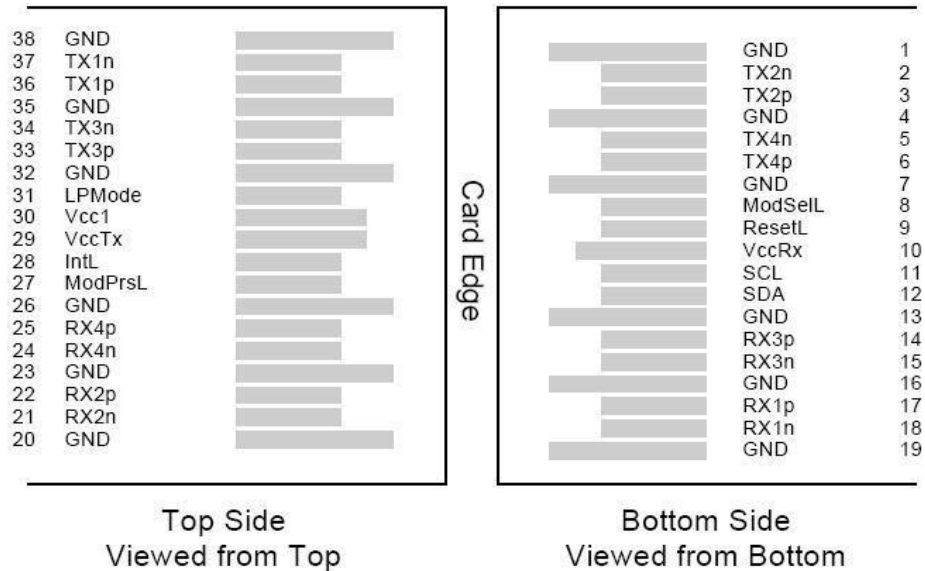


Figure 2: Pin Definitions.

Pin	Logic	Symbol	Name/Description	Note
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	
7		GND	Ground	1
8	LVTLL-I	ModSelL	Module Select	
9	LVTLL-I	ResetL	Module Reset	
10		VccRx	+ 3.3V Power Supply Receiver	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	
13		GND	Ground	
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	
15	CML-O	Rx3n	Receiver Inverted Data Output	
16		GND	Ground	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	
18	CML-O	Rx1n	Receiver Inverted Data Output	
19		GND	Ground	1
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	1

25	CML-O	Rx4p	Receiver Non-Inverted Data Output	
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	
28	LVTTL-O	IntL	Interrupt	
29		VccTx	+3.3 V Power Supply transmitter	2
30		Vcc1	+3.3 V Power Supply	2
31	LVTTL-I	LPMode	Low Power Mode	
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	
34	CML-I	Tx3n	Transmitter Inverted Data Output	
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	
37	CML-I	Tx1n	Transmitter Inverted Data Output	
38		GND	Ground	1

Notes:

- GND is the symbol for signal and supply (power) common for QSFP modules. All are common within the QSFP module and all module voltages are referenced to this potential otherwise noted. Connect these directly to the host board signal common ground plane
- Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP transceiver module in any combination.

Memory Map

The QSFP+ connector provides an MSA standard 2-wire serial communication interface to 256kB EEPROM memory maps; both standard and custom memory maps are available.

EEPROM Map			
Device 0xA0			
Address (Dec)	Value (Hex)	Name of Field (as per SFF-8636)	Description of data code
0	0D	ID and status	0Dh = QSFP+
1-2	01 02	Status	Compliance SFF-8636 Flat EEPROM, No IntL, Ready
3-21	0	Interrupt Flags	00h
22-33	0	Module Monitors	00h
34-81	0	Channel Monitors	00h
82-85	0	Reserved	00h
86-97	0	Control	00h
98-99	0	Reserved	00h
100-106	0	Module and Channel Mask	00h
107-118	0	Reserved	00h
119-122	0	Password Change Entry Area (Optional)	00h
123-126	0	Password Entry Area (Optional)	00h

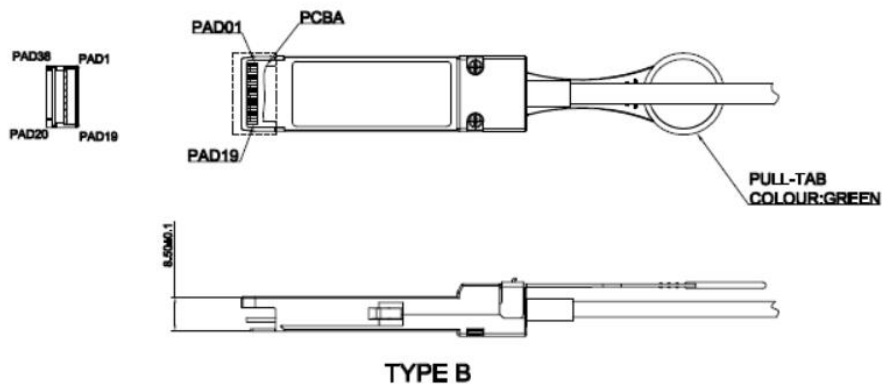
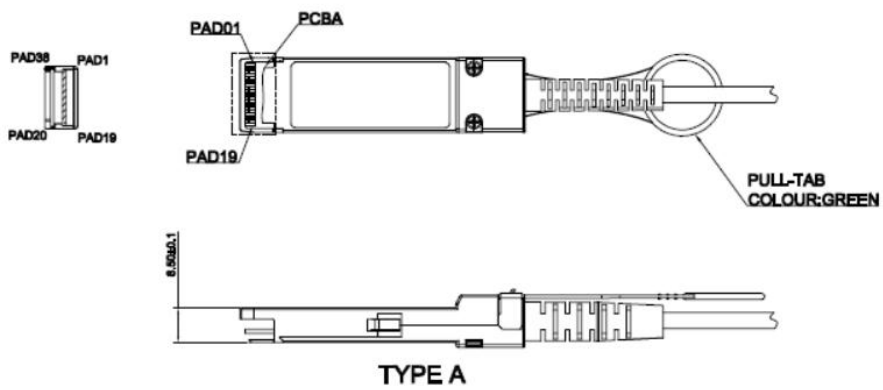
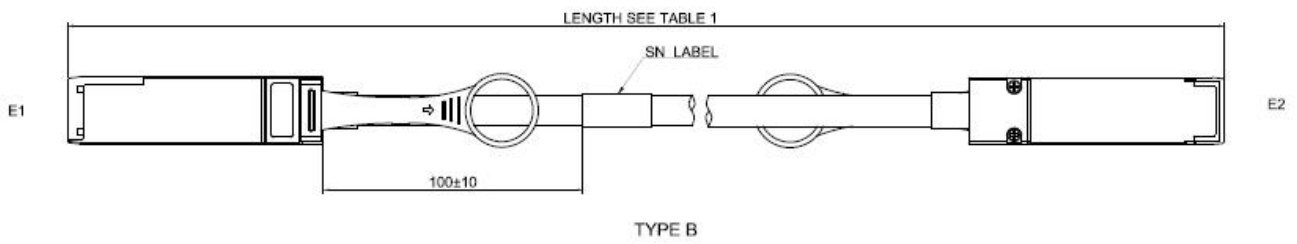
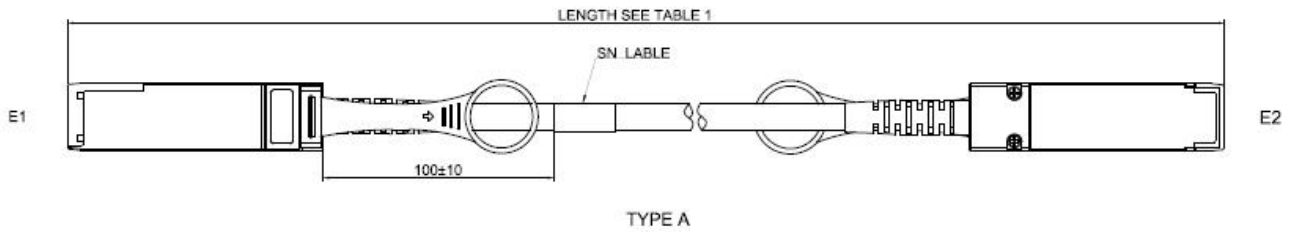
127	0	Page Select Byte	00h
128	0D	Identifier	0Dh = QSFP+
129	0	Ext. Identifier	00h = Power Class 1, No CLEI, No CDR
130	21	Connector	21h = Copper pigtail
131	0	Transceiver Reserved	00h = not specified
132	0		00h = not specified
133	0		00h = not specified
134	0		00h = not specified
135	41		00h = not specified
136	80		00h = not specified
137	80		00h = not specified
138	0		00h = not specified
139	0		Encoding
140	67	Nominal bit rate (unit: 100M bps)	67h= 10.3125G/bps
141	0	Reserved	00h = not specified
142	0	Length(SMF)	00h = not specified
143	0	Length (E-50µm)	00h = not specified
144	0	Length (50 µm)	00h = not specified
145	0	Length (62.5 µm)	00h = not specified
146	Length in meters	Cable Length(Copper)	Fill in length in units of 1 meter
147	A0	Device Tech	A0h = Copper Cable Un equalizer
148-163	31 30 47 74 65 6B 20 20 20 ...	Vendor name	Fill in "10Gtek" Extra Bytes are filled with space (20h)
164	03	Extended Transceiver Codes	03h =IB 4X Copper Passive
165	0	Vendor OUI[0]	10Gtek OUI Code
166	0	Vendor OUI[1]	
167	0	Vendor OUI[2]	
168	43	QSFP10 Vendor Part Number (ASCII)	Fill in 10Gtek P/N "CAB-Q10/Q10-P1M" Extra Bytes are filled with space (20h)
169	41		
170	42		
171	2D		
172	51		
173	31		
174	30		
175	2F		
176	51		
177	31		
178	30		
179	2D		
180	50		
181	31		
182	4D		
183	20		
184-185	10Gtek 's Rev	QSFP10 Vendor Revision Number (ASCII)	Fill in 10Gtek Rev. Extra Bytes are filled with space (20h)
186	Attenuation 2.5GHz	Copper Cable Attenuation	Fill in attenuation @ 2.5GHz in dB
187	Attenuation 5.0GHz		Fill in attenuation @ 5.0GHz in dB

188-189	0	Wavelength Tolerance	00h
190	46	Max Case Temperature	46 = 70C
191	Check Sum	Check Code for Base ID Fields	Fill in Check Sum
192	0	Options	00h = not specified
196-211	Manufacturer's S/N	Serial Number provided by Vendor (ASCII)	Fill in manufacturer's S/N Extra Bytes are filled with space (20h)
212-213	Year	Vendor's manufacturing data code	ASCII code, Two low order digits of year.(00 = 2000)
214-215	Month		ASCII code, digits of month.(01= Jan through 12 = Dec)
216-217	Day		ASCII code, day of month.(01~31)
218-219	Lot Number	Date Code[L]	ASCII code, Vendor Specific lot code
220	0	Diagnostic Monitoring Type	00h = not specified
221	0	Enhanced Options	00h = not specified
222	0	Reserved	Reserved
223	Check Sum	Check code for Extended ID fields	Fill in Check Sum
224-255	0	Vendor Specific ID Fields	0

Mechanical Specifications

Mechanical				
Parameter	Minimum	Typical	Maximum	Unit
Cable Diameter (24 AWG)		0.385		Inches
Bend Radius (24 AWG)	1.929			Inches
Cable Diameter (26 AWG)		0.346		Inches
Bend Radius (26 AWG)	1.732			Inches
Cable Diameter (28 AWG)		0.295		Inches
Bend Radius (28 AWG)	1.476			Inches
Cable Diameter (30 AWG)		0.259		Inches
Bend Radius (30 AWG)	1.299			Inches
Within Pair Skew			120	ps/10m
Cable Insertion Loss		10		dB/10m
Bulk Cable Crosstalk			1	%
Bulk Cable Time Delay			4.3	ns/m
Cable Capacitance (intra-pair)			43	pF/m
Bulk Cable Impedance	95	100	105	Ohms

Mechanical Dimensions (Type A for 30/28AWG, Type B for 26/24AWG)



40G QSFP10 Copper Cable Assemblies, Passive

Length	Data Rate	P/N	AWG	Length Tolerance
1m	40G	CAB-Q10/Q10-P1M	24 / 26 / 28 / 30	+0.1/-0.0m
2M	40G	CAB-Q10/Q10-P2M	24 / 26 / 28 / 30	+0.3/-0.3m
3M	40G	CAB-Q10/Q10-P3M	24 / 26 / 28	+0.3/-0.3m
5M	40G	CAB-Q10/Q10-P5M	24 / 26	+0.5/-0.5m
7M	40G	CAB-Q10/Q10-P7M	24 / 26	+0.9/-0.9m

Revision History

Revision	Initiated	Review	Approved	Revision History	Release Date
V1.4	Vinson	Steven	Nicky	Released.	Apr,26, 2017

Further Information

For further information, please contact 10GTEK.

Tel: +86 755 2998 8100

Fax: +86 755 6162 4140

Web: www.10gtek.com