Overview

USB-C Universal Orientation Cable (UOC) is a custom USB-C male to USB-C male cable for use with Acroname's programmable USB-C-Switch. The UOC provides an orientation-agnostic USB-C connection, required for cable flip automation with the USB-C-Switch. By acting as a transparent USB-C port extension, the UOC enables validation and manufacturinting testing of USB-C devices including both USB-C cable orientations without needing to manually rotating cable connections.

Typical applications include:

– Manufacturing testing of USB Type-C ports
– USB device validation and development
– Cable orientation "flip" testing (requires USB-C-Switch)

Features

– USB-C male to USB-C male
– Supports USB 3.0 Gen 2 / 10Gbps link speeds
– Supports USB PD modes up to 20V / 5A
– USB-C Orientation Agnostic
– 1.5 feet in length
– No E-mark or SOP functionality on CC1 or CC2 pins

Absolute Maximum Ratings

Stresses beyond those listed under ABSOLUTE MAXIMUM RATINGS can cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under RECOMMENDED OPERATING CONDITIONS is not implied. Exposure to absolute-maximum rated conditions for extended periods affects device reliability and may permanently damage the device.

Parameter	Minimum	Maximum	Units
Voltage on V_{BUS} pins A4, A9, B4, B9	-	30.0	V
Current on V_{BUS} pins A4, A9, B4, B9	-	5.0	A
Current on CC1, CC2 pins A5, B5	-	1.25	A
Current on SSTXp1, SSTXn1, SSRXp1, SSRXn1, SSTXp2, SSTXn2, SSRXp2, SSRXn2, Dp1, Dn1, Dp2, Dn2, SBU1, SBU2	-	0.25	A

Table 1: Absolute Maximum Ratings

Handling Ratings

Parameter	Conditions/Notes	Minimum	Typical	Maximum	Units
Ambient operating temperature, T_A	Non-Condensing	0.0	25.0	50.0	°C
Storage temperature, T_{STG}		-10.0	-	85.0	°C

Table 2: Handling Ratings

Recommended Operating Ratings

Values presented apply to the full operating temperature range.

Parameter	Conditions/Notes	Minimum	Typical	Maximum	Units
Voltage on V_{BUS} pin		0.0	-	28.0	V

Table 3: Recommended Operating Ratings

Typical Performance Characteristics

Values presented apply to the full operating temperature range.

Parameter	Conditions/Notes	Minimum	Typical	Maximum	Units
DC Resistance of VBUS	A4, B4, A9, B9	14.4	15.3	16.5	mΩ
SSTXp1, SSTXn1, SSRXp1, SSRXn1, SSTXp2, SSTXn2, SSRXp2, SSRXn2, Dp1, Dn1, Dp2, Dn2		331	334	338	mΩ
SBU1, SBU2, CC1, CC2		294	298	304	mΩ

Table 4: Typical Performance Characteristics

Typical Applications

The UOC should only be used in conjunction with the USB-C-Switch. It will not function without a standard USB-C cable somewhere in the system. In most applications involving only one USB-C-Swtich, there will be only one UOC in any connection path. Generally, the UOC should be connected to the device under test (DUT), where the DUT is the device which needs to have

both connector orientationation tested or verified. The following block diagrams show two simple examples utilizing the UOC and the USB-C-Switch to test cable flip on the DUT port or ports.
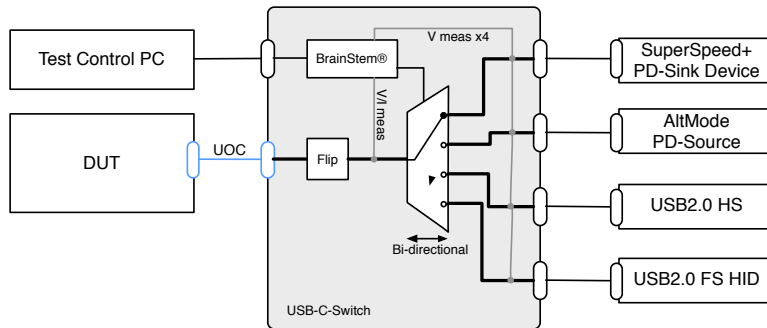

Figure 1: Application example using the UOC and USB-C-Switch to emulate cable flips on one DUT port and connecting multiple types of downstream devices.
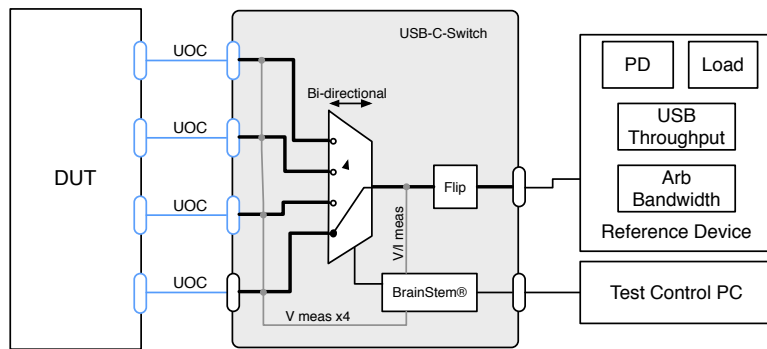

Figure 2: Application example using the UOC and USB-C-Switch to emulate cable flips on multiple DUT ports and connecting a reference downstream device.

Typical Full Featured USB Type-C Interface Assembly Wiring

	A12 GND	A11 RX2+	A10 RX2-	A9 V$_{BUS}$	A8 SBU1	A7 D-	A6 D+	A5 CC	A4 V$_{BUS}$	A3 TX1-	A2 TX1+	A1 GND
	GND B1	TX2+ B2	TX2- B3	V$_{BUS}$ B4	VCONN B5	D+ B6	D- B7	SBU2 B8	V$_{BUS}$ B9	RX1- B10	RX1+ B11	GND B12

Figure 1: Typical USB-C Male Receptacle Assignment

C38-USBC-UOC Assembly Wiring (Revision A)

Cables marked with the label "C38-USBC-UOC Rev A" have pins A6+B6 connected together as well as B7+B7 connected together.

USB Type-C Plug #1 Pin	USB Type-C Plug #1 Signal Name	USB Type-C Plug #2 Pin	USB Type-C Plug #2 Signal Name
A1, B1, A12, B12	GND	A1, B1, A12, B12	GND
A4, B4, A9, B9	VBUS	A4, B4, A9, B9	VBUS
A5[1]	CC1	A5[1]	CC1
B5[1]	CC2	B5[1]	CC2
A6 + B6	Dp1	A6 + B6	Dp1
A7 + B7	Dn1	A7 + B7	Dn1
A2	SSTXp1	B11	SSRXp1
A3	SSTXn1	B10	SSRXn1
B11	SSRXp1	A2	SSTXp1
B10	SSRXn1	A3	SSTXn1
B2	SSTXp2	A11	SSRXp2
B3	SSTXn2	A10	SSRXn2
A11	SSRXp2	B2	SSTXp2
A10	SSRXn2	B3	SSTXn2
A8	SBU1	B8	SBU2
B8	SBU2	A8	SBU1

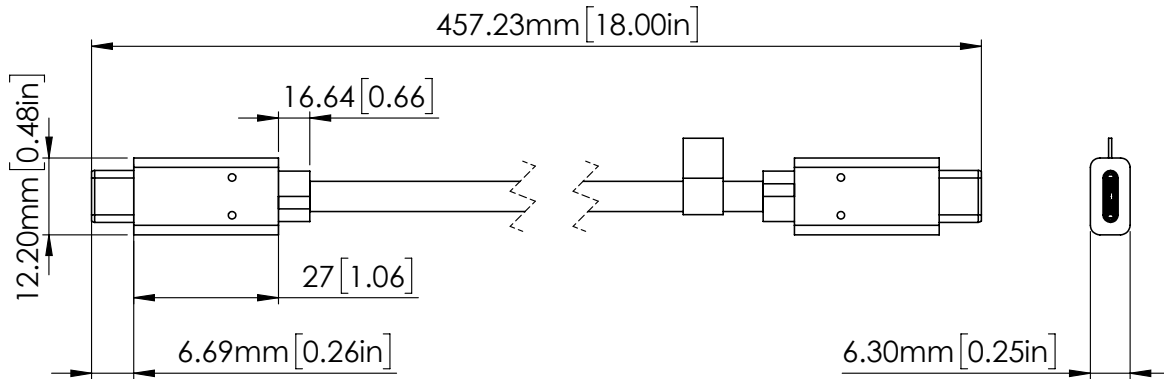[1] No E-mark or SOP functionality is present.

C38-USBC-UOC Assembly Wiring (Revision B)

Cables marked with the label "C38-USBC-UOC Rev B" have independent connectors for pins A6, A7, B6 and B7.

USB Type-C Plug #1 Pin	USB Type-C Plug #1 Signal Name	USB Type-C Plug #2 Pin	USB Type-C Plug #2 Signal Name
A1, B1, A12, B12	GND	A1, B1, A12, B12	GND
A4, B4, A9, B9	VBUS	A4, B4, A9, B9	VBUS
A5[1]	CC1	A5[1]	CC1
B5[1]	CC2	B5[1]	CC2
A6	Dp1	A6	Dp1
A7	Dn1	A7	Dn1
B6	Dp2	B6	Dp2
B7	Dn2	B7	Dn2
A2	SSTXp1	B11	SSRXp1
A3	SSTXn1	B10	SSRXn1
B11	SSRXp1	A2	SSTXp1
B10	SSRXn1	A3	SSTXn1
B2	SSTXp2	A11	SSRXp2
B3	SSTXn2	A10	SSRXn2
A11	SSRXp2	B2	SSTXp2
A10	SSRXn2	B3	SSTXn2
A8	SBU1	B8	SBU2
B8	SBU2	A8	SBU1

Mechanical

Dimensions are shown in inches [mm]. 3D CAD models available from https://acroname.com

457.23mm [18.00in]

16.64 [0.66]

12.20mm [0.48in]

27 [1.06]

6.69mm [0.26in]

6.30mm [0.25in]

Document Revision History

All major documentation changes will be marked with a dated revision code

Revision	Date	Engineer	Description
1.0	January 2018	MJK	Initial release
1.1	March 2018	JLG	Added application diagrams