USB 3.2 Gen 2 + 2-Lane DP 1.2

Hybrid USB Type-C Active Optical Cable

10Gbps	5-15 m	60 W
Speed	Length Range	PD

Model: SCFC-3120 Series

SPECIFICATION

ECN Change History Form

Edition	Release Date	Change Details	Prepare	Examine and verify	Ratify
1.1	2026.8.11	Updated from internal product specification	Lin Tongmeng		

I. Product Overview

The USB-C 3.2 Gen 2 Full-Featured Active Optical Cable is engineered for adaptive, long-distance connectivity. It automatically supports 2-lane DP 1.4 with USB 3.2 Gen 2 data at up to 10 Gbps and USB 2.0 up to 480 Mbps.

Combining high-speed USB data, DisplayPort video output, and Power Delivery charging in a single cable, it delivers the versatility of a full-featured USB-C copper cable over much longer distances. The cable is also backward compatible with USB 3.1/USB 2.0/USB 1.1

With intelligent DP Alt Mode negotiation, the cable automatically adapts to compatible host and display devices for a true plug-and-play experience, with no additional configuration or firmware installation required.

Engineered with premium, EMI/RFI-resistant materials, it ensures signal integrity in demanding environments—from conference rooms and classrooms to EMI-sensitive medical facilities. True plug-and-play with no drivers or configuration required, it delivers the full versatility of a copper USB-C cable over distances where traditional cables fail.



II. Important Notes

1. Directional connection

This AOC uses active electro-optical conversion and is directional. Connect the end marked SOURCE / HOST to the computer or USB-C source, and the end marked DISPLAY / DEVICE to the receiving USB-C monitor, dock or peripheral. Reversing the ends will prevent normal operation.

2. Host and display requirements

Video requires USB-C DisplayPort Alternate Mode support on the host and a compatible USB-C receiving device. USB-C connector shape alone does not guarantee video, 10 Gbps data or Power Delivery capability.

3. Power Delivery

The cable passes negotiated USB Power Delivery up to 60 W (20 V / 3 A). Actual charging power depends on the power source, host, sink and cable length. Use compliant USB-C PD equipment and do not assume every USB-C port supports charging.

4. Installation and handling

Do not kink, crush or pull the cable by the connector. Observe a minimum installed bend radius of 10 × cable outer diameter (approximately 65 mm for a 6.5 mm cable), unless a project-specific validation approves a tighter radius. Maintain strain relief at both ends.

5. Compatibility and system validation

Because the cable contains active electronics, compatibility may vary with host chipsets, BIOS/firmware, monitors, docks and USB peripherals. Validate the complete source-cable-sink system at the required resolution, data rate and charging load before deployment.

6. Resolution statement

2-Lane Mode: DP 1.4 + USB 3.2 Gen 2 (10 Gbps) for simultaneous high-speed data and video.

III. Product Features

USB 3.2 Gen 2 + 2-Lane DP 1.4Hybrid USB Type-C Active Optical Cable

General

- Type: USB-C Active Optical Cable (Hybrid Fiber + Copper+Kevlar protected fiber
- Construction: 6 × optical fiber + 8 × copper wire, Kevlar-protected fiber
- Plug: USB-C (both ends), plug-and-play, no external power required
- Length: 10 m (standard), Max 15 m
- Cable OD: 6.5 mm
- Backward compatible: USB 3.2 / 3.1 / 3.0 / 2.0 / 1.1

Data and video

- USB 3.2 Gen 2 / USB 3.1 Gen 2 data up to 10 Gbps
- Backward compatible with USB 2.0 high-speed and full-speed operation
- DisplayPort 1.2 Alternate Mode using two DP lanes
- USB data, DP video and PD power can operate simultaneously when supported by both devices
- Max resolution: 4K@60 Hz (no HDR / no DSC)
- Engineering validation required for the target timing and device set
- Ideal for users who need both video and external USB device connectivity (e.g., docking stations, touch monitors).

Power Delivery (PD)

Up to 60 W **No external power adapter needed**

EMC & Environment

- Highly resistant to RFI / EMI (fiber isolation + shielded hybrid design)
- Suitable for sensitive / industrial / education environments

Application

- Extends connection between PC and USB-C peripherals up to15 m
- Zero video / data / power degradation over rated length
- Ideal for: touch panels, smart boards, digiboards, docking, long-haul USB-C links

IV. Performance Parameters

Parameter	Specification
Product type	USB Type-C hybrid active optical cable
Model	SCFC-3120 Series
Connector	USB Type-C male x2
Cable structure	6 × optical fiber + 8 × copper wire, Kevlar-protected fiber (Remark:5 fibers for high-speed data + 1 fiber for process support)
Souce end	USB-C host or video source with the required USB data, Power Delivery and/or DisplayPort Alternate Mode capability.
Display end	USB-C display, touch panel, industrial display or compatible USB-C receiving device.
Maximum cable length	Up to 15 m
USB high-speed data	USB 3.2 Gen 2 / USB 3.1 Gen 2, up to 10 Gbps
USB 2.0 data	Up to 480 Mbps

Display protocol	DisplayPort 1.4 Alternate Mode
DP lane allocation	DP alt-mode 2-Lane video support, Power Delivery (SPR), USB Data
DP link capability	HBR3, 8.1 Gbps per lane raw; 12.96 Gbps Gbps aggregate raw
Typical maximum video	3840×2160@60Hz 8bit RGB 4:4:4 When connected to a DP 1.2 HBR2 host, the link falls back to 8.64 Gbps aggregate, limiting uncompressed output to 3840×2160@30Hz or 3840×2160@60Hz with YUV 4:2:0 chroma subsampling.
Power Delivery	12.0V up to 3.0A, 15.0V up to 3.0A, 20.0V up to 3.0A, 5.0V up to 3.0A, 9.0V up to 3.0A
Cable electronics supply	VCONN, 3.3 to 5.5 V
Power consumption	1.1 W typical at 5 V input
Outer diameter	6.5 mm nominal
Outer jacket	Black TPE; custom color optional
Reinforcement	Kevlar filler
Minimum bend radius	10 × OD (approximately 65 mm)
Tensile strength	200 N
Operating temperature	0 to 50 °C
Storage temperature	-20 to 60 °C
Relative humidity	10 to 80 %RH, non-condensing

Recommended Operating Conditions

Parameter	Symbol	Minimum	Maximum	Unit
VCONN supply voltage	VCONN	3.3	5.5	V
Operating temperature	Top	0	50	°C
Storage temperature	Ts	-20	60	°C
Relative humidity	Hs	10	80	%RH

VI. WORKING PRINCIPLE

4.1 Active Optical Signal Path

- The USB-C host and receiving device communicate through the CC channel to determine whether the link requires 2-lane operation.
- High-speed signals over fiber:The connectors house integrated VCSEL/PD arrays and driver ICs. At the transmitting end, high-speed SerDes electrical signals (USB 3.2 Gen 2 at 10 Gbps or DP1.4) are converted into optical signals for transmission via internal optical fibers; the receiving end converts them back into electrical signals.

- Low-speed signals and power over copper:Conductors carry low-speed signals (D+/D- for USB 2.0, CC, SBU) and power (VBUS, GND), facilitating PD power delivery and auxiliary communication.
- The embedded eMarker and active photoelectric control electronics obtain the CC information and select the appropriate lane configuration.
- The internal mux switches between the original 2-lane DP + USB 3.2 configuration the opposite connector is notified through the optical path to complete the same switch.
- After the link handshakes again, the connected display/device becomes available. The optical fibers carry the high-speed signal path and the copper conductors support auxiliary and power functions.

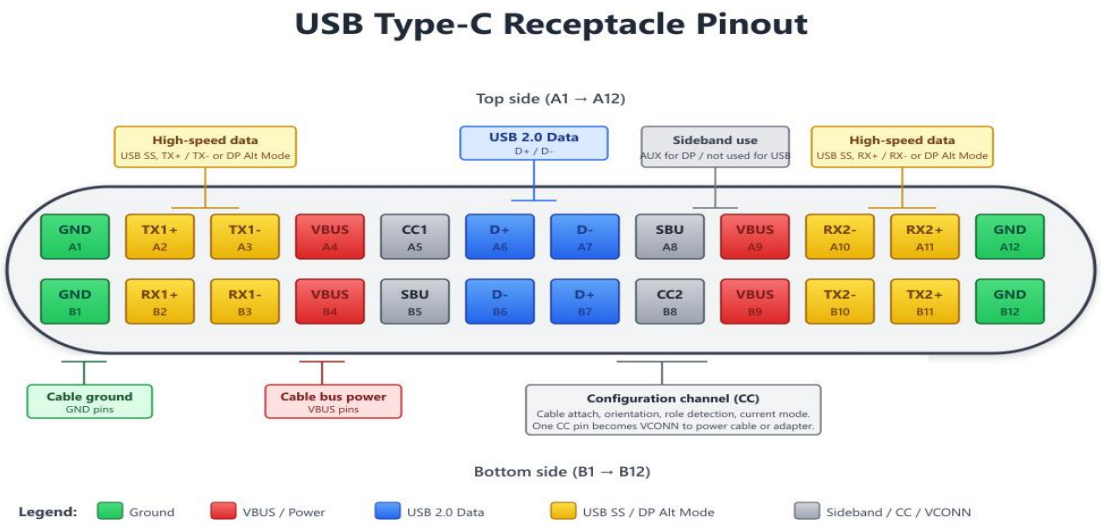


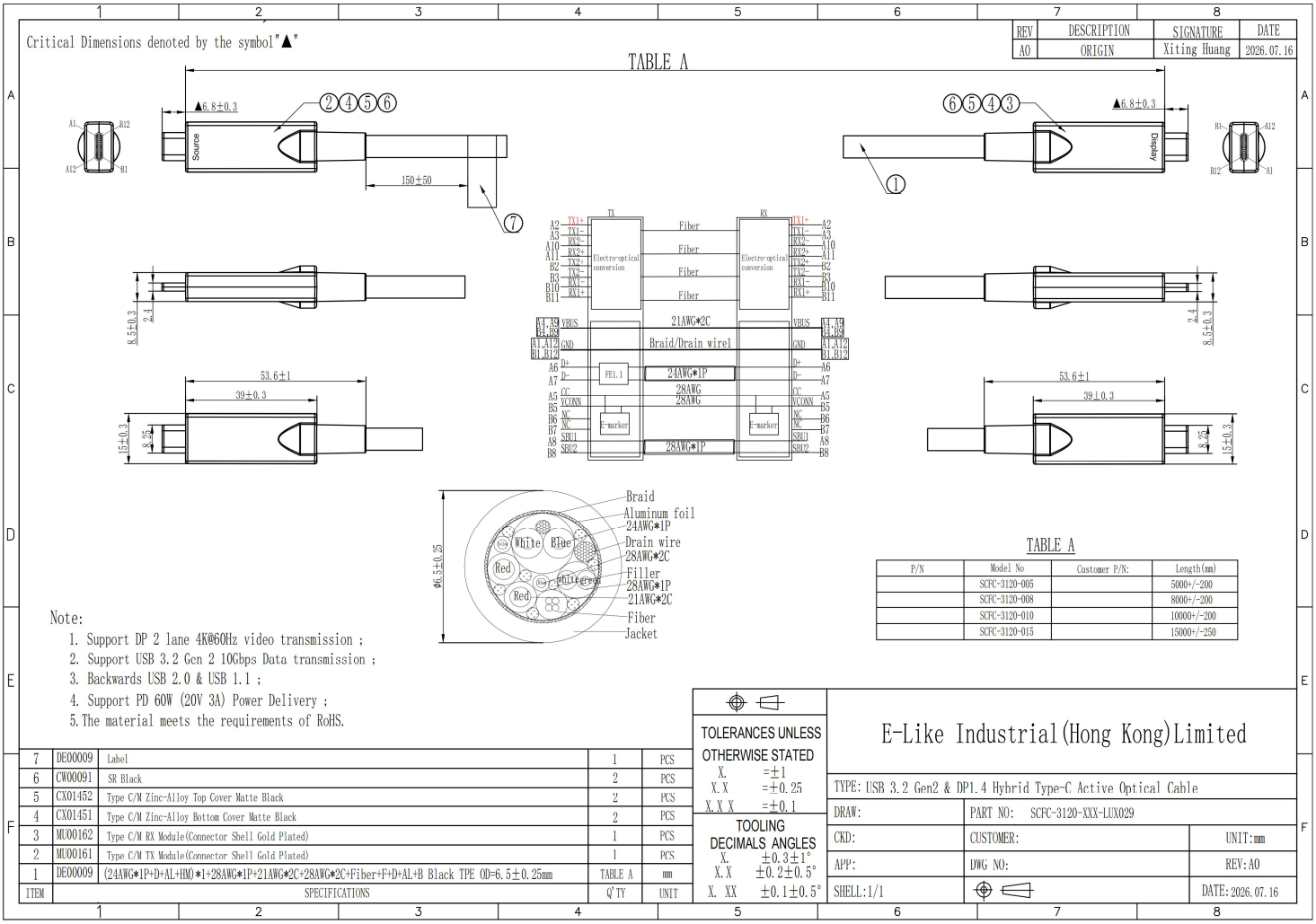
Figure 2. USB Type-C receptacle pin out

4.2 Lane-Mode Application Guide

Application Mode	Video / Data Allocation	Typical Use
2-lane mode	DP 1.4 video + USB 3.2 10G data	Video, high-speed USB data and power
Data-only mode	USB 3.2 Gen 2 data up to 10 Gbps	USB data and power without video

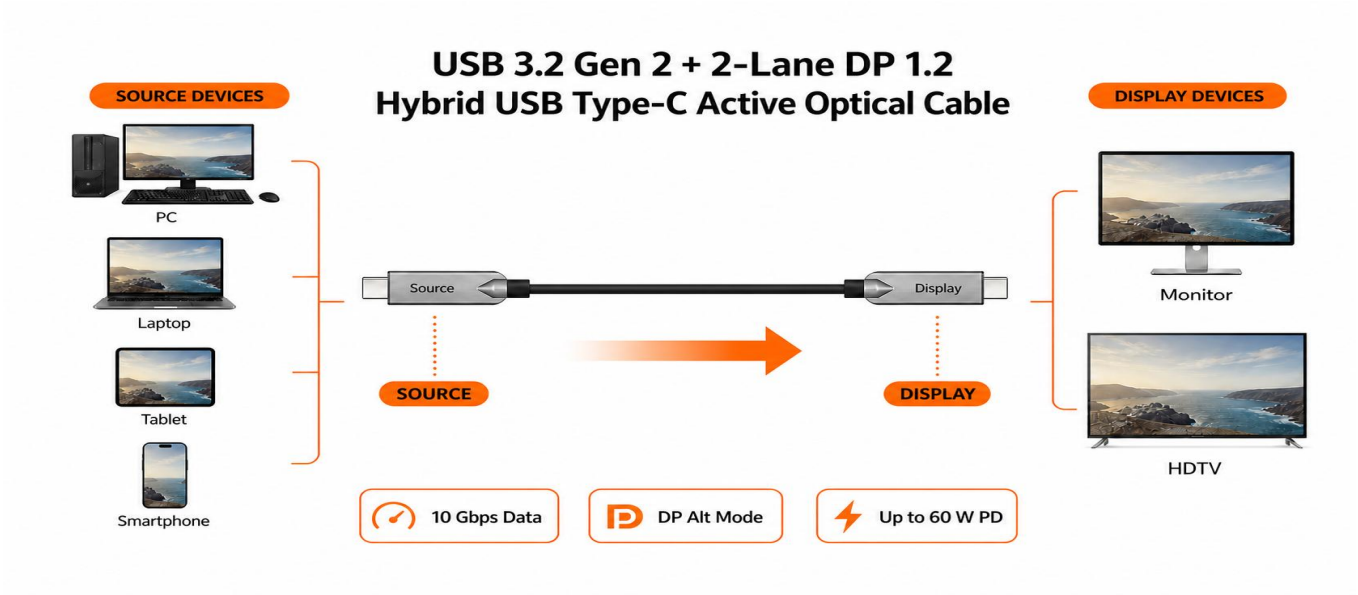


4.3 SavLink USB 3.2 Gen 2 + 2-Lane DP 1.2Hybrid USB Type-C Active Optical Cable



V. Applications

- Machine vision systems and industrial printing equipment
- Security monitoring systems, digital signage, and video walls
- Zero-client systems and remote storage systems
- Touch panels, smart boards, and interactive displays
- Professional USB-C device connections over extended distances
- Educational and conference environments
- EMI/RFI-sensitive applications in the medical industry



VI Q&A and Engineering Notes

Q1. Can SCFC-3120 carry video, USB data and power simultaneously?

Yes, when both connected devices support 2-lane DP 1.4 Alt Mode, USB 3.2 Gen 2 and USB PD. Actual performance is determined by the complete system.

Q2. Is the cable reversible end-to-end?

No. The USB-C plugs are physically reversible in their receptacles, but the AOC assembly itself is directional. Follow the SOURCE / DISPLAY directions.

Q3. Does the cable support Thunderbolt or USB4?

No claim is made for Thunderbolt or USB4 tunnelling. Use the cable for the stated USB 3.2 Gen 2, USB 2.0, DP 1.4 Alt Mode and PD functions only.

Q4: Can I get 4K@60Hz in full RGB?

A: Yes — 4K@60Hz 8bit RGB 4:4:4 is the maximum uncompressed resolution on a 2-lane DP 1.4 HBR3 link. This is the VESA-defined ceiling for 2-lane operation without DSC.

Q5: What happens if my source device only supports DP 1.2 (HBR2)?

A: The link will fall back to HBR2 (5.4 Gbps/lane), reducing effective bandwidth to 8.64 Gbps. In this case:

3840×2160@30Hz
3840×2160@60Hz with YUV 4:2:0 chroma subsampling

Q6. What should be checked if there is no image?

Check cable direction, display input, DP Alt Mode support, requested timing, connector seating and cable bend condition. Then test with a known-good host and display.

Q7. What should be checked if USB speed is reduced?

Confirm that both devices support 10 Gbps, remove hubs or adapters, check the negotiated USB mode and test with a known-good peripheral. USB 2.0 devices will operate at USB 2.0 speed.