

# USB 3.Industrial Active Optical Cable

## P/N: AOC-ABS2JMEXXM20



### Features and Benefits

Supports USB 3.1 Gen 1 (5 Gb/s) data transfer up to 50 m over fiber optic cable

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Host connector: USB Type-A plug  
Device connector: USB Micro-B plug with USB 3 Vision locking screws

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Attached device can be powered through the cable

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850 nm VCSEL transmitter, PIN photodiode receiver

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Computer plug and play for USB devices, no driver or software to install

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Operating temperature (case surface): 5 °C to 70 °C

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All-metal housing for superior EMI performance

The Corning USB 3.Industrial Active Optical Cable (AOC) is used to transmit 5 Gb/s USB protocol extended distances up to 50 meters from the host computer over a composite copper-optical fiber cable. The AOC assembly connects to the host through USB 3.1 standard-A plug and to the device through a USB 3.1 Micro-B plug with locking screws compatible with the USB 3 Vision standard. The assembly supports 5 Gb/s USB 3.1 Gen 1 transmission only, and is not backward-compatible with USB 1.X or USB 2 hosts or devices. The cable draws power to operate from the host port and a connected device may also be powered directly through the cable from the host USB port via copper wires in the cable.

### Applications

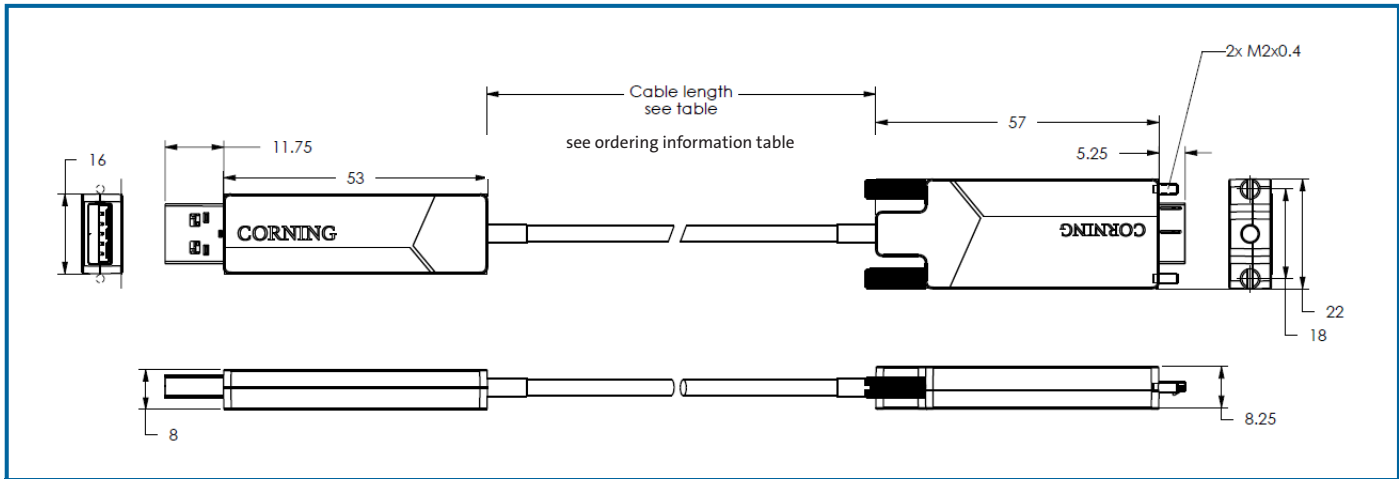
Machine Vision Cameras

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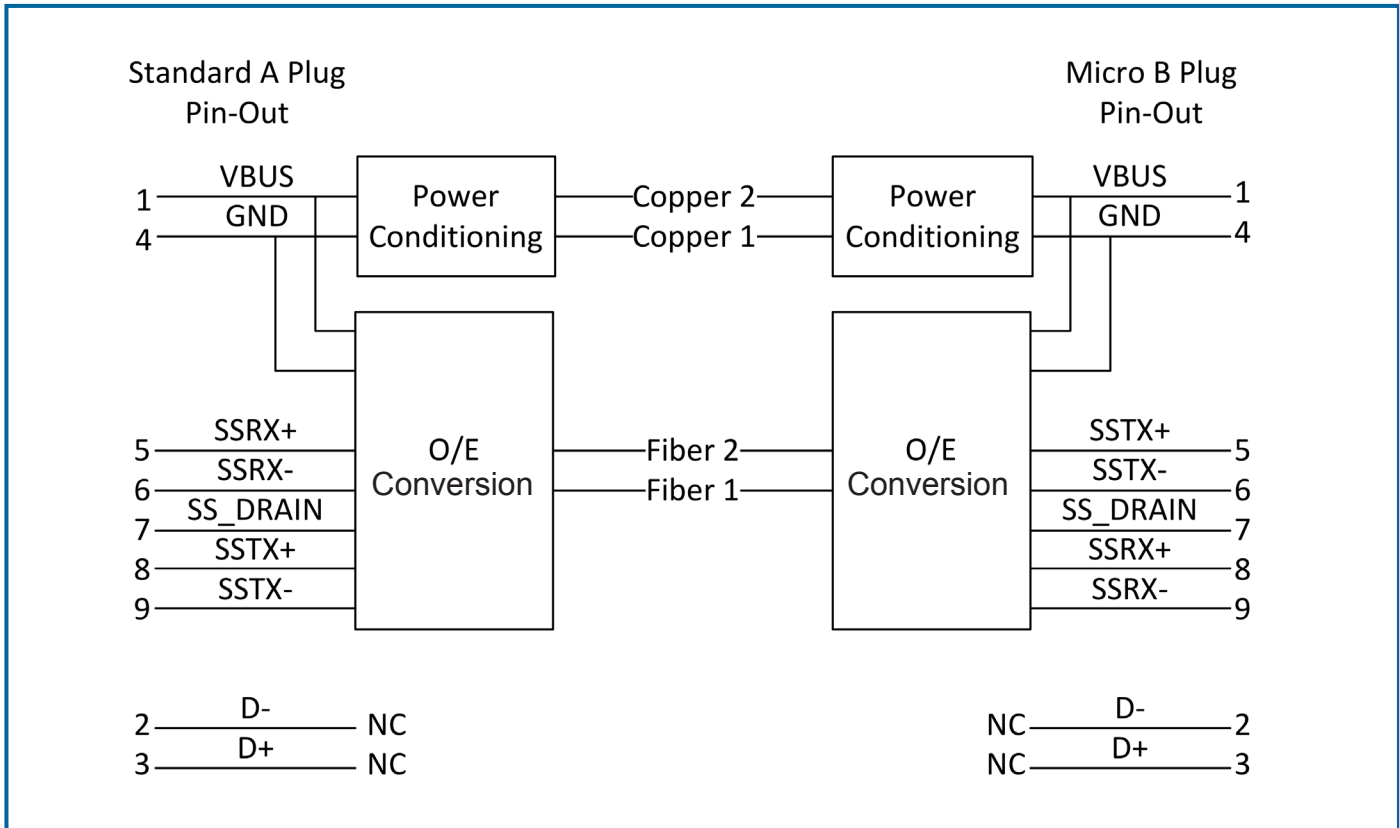
Any USB link requiring extended distance or repetitive cable bending

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**Figure 1 – Cable Assembly Dimensions**



**Figure 2 – Cable Assembly Wiring**

Note: Pin numbers, as per Universal Serial Bus 3.1 Specification. Pin designation of A-plug connector is from the host perspective, and pin designation of Micro-B connector is from the device perspective.

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### Absolute Maximum Ratings (permanent damage may occur if cable is subjected to conditions beyond these limits)

| Parameter | Parameter  | Min   | Max | Units |
|-----------|--|-------|-----|-------|
| Vbus_max  | Supply voltage                                       | -0.50 | 5.5 | V     |
| Vss_max   | Voltage on signal pins                               | -0.50 | 1.6 | V     |
| T_stg     | Storage temperature                                  | -40   | 90  | °C    |
| V_ESD     | Electrostatic discharge, power and signal pins (HBM) |       | 2   | kV    |

### Environmental Specifications

| Parameter | Parameter                                      | Min | Max | Units |
|-----------|--|-----|-----|-------|
| Tambient  | Ambient temperature (informative) <sup>1</sup> | 5   | 50  | °C    |
| Tcase     | Temperature of connector housing <sup>2</sup>  | 5   | 70  | °C    |
| RH        | Relative humidity (non-condensing)             | 5   | 95  | %     |

<sup>1</sup>Case temperature is 20°C higher than ambient temperature for a single cable running at maximum electrical load connected to a typical host. The case temperature takes precedence over ambient temperature.

<sup>2</sup>At case temperatures above 60°C, proper safety precautions should be taken when handling the metal connector shells by hand, due to burn risks (reference IEC 60950-1).

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### USB 3.1 AOC Electrical Specifications (DC)

| Parameter  | Parameter   | Min  | Typ  | Max  | Units |
|--|---|------|------|------|-------|
| Vbus_A   | Required supply voltage (from host)                           | 4.75 | 5.00 | 5.25 | V     |
| Vbus_A_noise   | Supply voltage ripple and noise (0-10 GHz)                    |      |      | 100  | mVpp  |
| Vbus_B   | Output supply voltage (from cable to device)                  | 4.75 | 5.05 | 5.15 | V     |
| Condition 1: No load, self-powered device                          |   |      |      |      |       |
| lbus_act_noload  | Active mode current consumption (powered from Host)           | 75   | 85   | 100  | mA    |
| lbus_idle  | Current consumption (idle mode, each end)                     |      | 1    | 2    | mA    |
| Condition 2: USB 3.0-compliant port (900 mA current limit)         |   |      |      |      |       |
| lbus_B_std   | Maximum current supplied to device                            | 600  |      | 700  | mA    |
| lbus_A_std   | Current drawn from host port at maximum device supply current |      |      | 900  | mA    |
| Condition 3: USB 3.0 charging port ( $\geq 1500$ mA current limit) |   |      |      |      |       |
| lbus_B_ch  | Maximum current supplied to device <sup>1</sup>               | 900  | 950  | 1050 | mA    |
| lbus_A_ch_max  | Current drawn from host port at maximum device supply current |      | 1500 |      | mA    |
| lbus_A_ch_nom  | Current drawn from host port at 900 mA device supply current  |      | 1300 | 1400 | mA    |

<sup>1</sup> Controlled by current-limiting switch within the active optical cable

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### USB 3.1 AOC Electrical Specifications (AC)

| Parameter | Parameter  | Min | Typ | Max | Units             |
|-----------|--|-----|-----|-----|-------------------|
| DR        | Bit rate (BER < 10 <sup>-12</sup> , USB 3.1 Gen 1 SS only) |     | 5   |     | Gb/s              |
| tr        | Rise time (20-80%), data output                            |     | 25  | 35  | ps                |
| tf        | Fall time (80-20%), data output                            |     | 25  | 35  | ps                |
| Vout_diff | Differential output swing                                  | 0.8 | 1.0 | 1.2 | V                 |
| DJ        | Deterministic jitter (K28.5 pattern)                       |     | 10  | 22  | ps                |
| RJ        | Random jitter  |     | 0.8 | 1.4 | ps <sub>rms</sub> |

### USB 3.1 AOC Cable Mechanical Specifications (AC)

| Parameter             | Parameter  | Min  | Typ | Max | Units  |
|-----------------------|--|------|-----|-----|--------|
| OD                    | Cable outer diameter                             | 2.95 | 3.1 | 3.3 | mm     |
| BR <sub>static</sub>  | Static bend radius                               | 20   |     |     | mm     |
| BR <sub>dynamic</sub> | Dynamic bend radius                              | 10   |     |     | mm     |
| BC                    | Bending cycles unsupported                       | 10 M |     |     | cycles |
|                       | Bending cycles 45 mm radius C-track <sup>1</sup> | 9 M  |     |     | cycles |
|                       | Bending cycles 38 mm radius C-track <sup>1</sup> | 9 M  |     |     | cycles |
| TC                    | Torsion cycles (+/- 180°)                        | 1 M  |     |     | cycles |
| TF                    | Tensile force (bulk cable)                       |      |     | 120 | N      |
|                       | Tensile force (connector assembly)               |      |     | 80  | N      |
| Crush                 | TIA/EIA-455-41A                                  |      |     | 100 | N/cm   |
| Flame Rating          | UL-1581-VW-1                                     |      |     |     |        |

<sup>1</sup>Cable failure is due to jacket abrasion and not internal component failure (copper wires or optical fiber). Actual cable performance in customer application is therefore dependent on mechanical conditions within the drag chain/energy chain or other mechanical cable routing and management systems.

# USB 3.Industrial Active Optical Cable

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### EMC and Standards Specifications

| Standard        | Description  | Specification | Performance Criterion |
|-----------------|--|---------------|-----------------------|
| IEC 61000-6-2   |  |               |                       |
| IEC 61000-4-4   | Fast transients (capacitive clamp test)                          | +/- 1000 Vpk  | A                     |
| IEC 61000-4-6   | RF common mode conducted immunity                                | 10 V          | A                     |
| IEC 61000-4-2   | ESD – Contact discharge  | +/- 4 kV      | A <sup>1</sup>        |
|                 | ESD – Air discharge  | +/- 8 kV      | A                     |
| EN 55032:2015   | EM compatibility of multimedia equipment – emission requirements | Class B       |                       |
| FCC Part 15     |  | Class B       |                       |
| ICES-003        |  |               |                       |
| IEC 60950-1     |  |               |                       |
| IEC 60825-1:Ed2 |  | Class 1       |                       |

<sup>1</sup> Contact discharge performance criterion A is achieved when host and device also achieve performance criterion A (i.e. host and device have sufficiently low impedance chassis to earth paths and appropriate protection between internal chassis ground and power/signal ground references). If this is not the case, the active cable fulfills performance criterion C (no permanent damage due to ESD event, data or state may be lost during the ESD event).

### Ordering Information

| Part Number(s)    | Product Description  |
|-------------------|--|
| AOC-ABS2JME005M20 | USB 3.1 active optical cable, A plug to Micro-B plug, 5 m  |
| AOC-ABS2JME010M20 | USB 3.1 active optical cable, A plug to Micro-B plug, 10 m |
| AOC-ABS2JME015M20 | USB 3.1 active optical cable, A plug to Micro-B plug, 15 m |
| AOC-ABS2JME020M20 | USB 3.1 active optical cable, A plug to Micro-B plug, 20 m |
| AOC-ABS2JME030M20 | USB 3.1 active optical cable, A plug to Micro-B plug, 30 m |
| AOC-ABS2JME050M20 | USB 3.1 active optical cable, A plug to Micro-B plug, 50 m |

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Date  
March 5th, 2019

## Cross Reference

The below table is a cross reference between the manufacturer Corning Incorporated Type Code and Festo part number, who acts as dealer, in regard to prevailing conformities and certificates.

| Manufacturer | Manufacturer Type Code | Festo Part Number | Festo Type Code           |
|--------------|------------------------|-------------------|---------------------------|
| Corning      | AOC-ABS2JME015M20      | 8093271           | NEBC-U7G10-EH-15-N-S-U5G9 |
| Corning      | AOC-ABS2JME030M20      | 8093272           | NEBC-U7G10-EH-30-N-S-U5G9 |

Legal form:  
Limited partnership  
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HRA 211583  
Value added tax id. number:  
DE 145 339 206  
General partner:  
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Aktiengesellschaft  
Registered office: Vienna/Austria  
Commercial registry court:  
Commercial court Vienna  
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Dipl.-Ing. Dr. h.c. Oliver D. Jung  
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