**KEY FEATURE**

- Provides 10 Gb/s or 1250 MB/s transporting bandwidth for image, GPIO and RS232
- Fully support Camera Link standard for Base, Medium, Full and 10tapx8bits modes
- Operating pixel clock range from 20 to 100 MHz exceeding Camera Link standard
- Plug-and-play – no changes or programming required for camera and/or frame grabber
- Optional 2- fiber LC duplex or 1-fiber LC simplex optical interface
- Includes 4 GPIO channels (2 inputs and 2 outputs) for external trigger and control
- Includes a full duplex RS232 for remote instrument control
- Accept 10V~24V DC input power with locking mechanism for industrial applications
- Extended operating temperature range are available
- Transmission distances:
  - OM3 Multi-mode fiber – up to 300m
  - Single-mode fiber – up to 80km

**Applications**

- Solar panel or glass panel inspection
- Semiconductor wafer inspection
- High speed printing inspection
- High precision surface inspection (e.g. airplane surface or automobile painting)
- Automated product inspection (e.g. food, drinking or pharmaceutical products)
- High resolution and real-time analysis for science, sports, automobile tests, and 3-D animation.
- High precision security surveillance (e.g. border control, airport)
- Traffic surveillance/control and vehicle license plate reading/recording (e.g. toll booth)
- Cameras placed in harsh environment (e.g. nuclear plant, steel mill or undersea monitoring)
- Other Machine Vision Applications

**PHOX™ Camera Link Fiber Extender**

**Base/Medium/Full/Deca Configuration**

- PHOX-FM-300
- PHOX-FL-xx
- PHOX-FL-L10
- PHOX-FL-xx-Cxx

**Applications**

- Solar panel or glass panel inspection
- Semiconductor wafer inspection
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**Phrontier Technologies, LLC**

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- Toll Free: 1-866-389-2829
**Fiber Guide**

- Use 62.5/125 OM1 MM fiber for <30 m
- Use 50/125 OM2 MM fiber for <80 m
- Use 50/125 OM3 MM fiber for <300 m
- Use 9/125 SM fiber for <10 km
# TECHNICAL SPECIFICATIONS

## General Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Standard</th>
<th>Extended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Case Temperature</td>
<td>0 ~ 55 °C</td>
<td>-40 ~ 70 °C</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>20 ~ 80% (non-condensing)</td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>DC 10 ~ 24 V</td>
<td></td>
</tr>
<tr>
<td>Supply Current @12V</td>
<td>CM module 0.5 Amp</td>
<td>FG module 0.6 Amp</td>
</tr>
<tr>
<td>Typical Power Consumption</td>
<td>CM module 6 Watt</td>
<td>FG module 7.2 Watt</td>
</tr>
<tr>
<td>Connector Type</td>
<td>Switchcraft TRAPC3MX</td>
<td></td>
</tr>
<tr>
<td>Approx. Weight (each module)</td>
<td>325 g</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** Measured with PHOX-FM-300

## Camera Link Interface

<table>
<thead>
<tr>
<th>Specification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pixel Clock Range</td>
<td>20 ~ 100 MHz</td>
</tr>
<tr>
<td>Supported Camera Modes</td>
<td>Base/Medium/Full/10 tapsx8 bits</td>
</tr>
<tr>
<td>Image Data Throughput</td>
<td>8.4 Gbits/s or 1050 Mbytes/s</td>
</tr>
<tr>
<td>Connector Type</td>
<td>MDR26 x2</td>
</tr>
</tbody>
</table>

### Signal latency

- **Image** 7.3 us
- **SerTFG** 9.5 us
- **CC1~4** 4.3 us
- **SerTC** 4.3 us

**Note 2:** The latency should be deterministic and includes jitter for the worst case.

## Additional Input/Output Interface

### GPIO Interface (optional)

<table>
<thead>
<tr>
<th>Specification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of I/O Channels</td>
<td>2 input and 2 output</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>0~3.3V</td>
</tr>
<tr>
<td>Max. Data Rate</td>
<td>250 Kbps</td>
</tr>
<tr>
<td>Connector Type</td>
<td>RJ45</td>
</tr>
</tbody>
</table>

### RS232 Interface

<table>
<thead>
<tr>
<th>Specification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Data Channels</td>
<td>one TxD and one RxD</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>Input: +/- 25V, Output: +/- 6V</td>
</tr>
<tr>
<td>Max Data Rate</td>
<td>250 Kbps</td>
</tr>
<tr>
<td>Connector Type</td>
<td>RJ45</td>
</tr>
</tbody>
</table>
### Optical Interface

<table>
<thead>
<tr>
<th></th>
<th>PHOX-FM-300</th>
<th>PHOX-FL-10</th>
<th>PHOX-FL-40</th>
<th>PHOX-FL-80</th>
<th>PHOX-FL-14-Cxx</th>
<th>PHOX-FL-L10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Wavelength</strong></td>
<td>850 nm</td>
<td>1310 nm</td>
<td>1310 nm</td>
<td>1550 nm</td>
<td>1270 ~ 1610 with 20nm spacing</td>
<td>CM: 1270 nm FG: 1330 nm</td>
</tr>
<tr>
<td><strong>Min Optical Tx Output Power</strong></td>
<td>-5 ~ -1 dBm</td>
<td>-8 ~ +0.5 dBm</td>
<td>-3 ~ +4 dBm</td>
<td>0 ~ +4 dBm</td>
<td>-1 ~ +3 dBm</td>
<td>-5 ~ 0 dBm</td>
</tr>
<tr>
<td><strong>Min Optical Rx Input Power</strong></td>
<td>-11.1 dBm</td>
<td>-14 dBm</td>
<td>-19 dBm</td>
<td>--22 dBm</td>
<td>-15 dBm</td>
<td>-14 dBm</td>
</tr>
<tr>
<td><strong>Connector Type</strong></td>
<td>LC duplex</td>
<td>LC duplex</td>
<td></td>
<td></td>
<td></td>
<td>LC simplex</td>
</tr>
<tr>
<td><strong>Fiber Type</strong></td>
<td>50/125 μm MM fibers</td>
<td></td>
<td></td>
<td></td>
<td>9/125 μm SM fibers</td>
<td></td>
</tr>
</tbody>
</table>

### MECHANICAL INFORMATION (mm)

![Mechanical Diagram]

### RS232 and GPIO PIN ASSIGNMENT (RJ45)

Note: RS232 is connected by default. GPIO is optional and not connected in standard product. Please see ordering information to activate this option at the time of purchase.

- 1: GPIO TX1
- 2: GPIO TX2
- 3: RS232 TxD
- 4: GND
- 5: GND
- 6: RS232 RxD
- 7: GPIO RX1
- 8: GPIO RX2
ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Model #</th>
<th>Operating Temperature</th>
<th>Transport Distance*</th>
<th>Items included</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHOX-FM-300</td>
<td>Standard</td>
<td>OM1 fiber up to 30 m</td>
<td>1x PHOX camera (CM) side module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OM2 fiber up to 80 m</td>
<td>1x PHOX frame grabber (FG) side module</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OM3 fiber up to 300 m</td>
<td>2x 12V international wall mount AC/DC power adapters (LC duplex fiber cable not included)</td>
</tr>
<tr>
<td>PHOX-FM-300-T</td>
<td>Extended</td>
<td>Up to 10 km</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-10</td>
<td>Standard</td>
<td>Up to 10 km</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-10-T</td>
<td>Extended</td>
<td>Up to 40 km</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-40</td>
<td>Standard</td>
<td>Up to 80 km</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-80</td>
<td>Standard</td>
<td>Single fiber up to 10 km</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-10</td>
<td>Standard</td>
<td>Single fiber up to 10 km</td>
<td></td>
</tr>
</tbody>
</table>

Note:
* Distance depending on fiber type and system design. 300 m is estimated based on 50/125 OM3 MM fiber and 10 km is estimated based on 9/125 SM fiber. Extra optical losses in the system will reduce the maximum transmission distance.

CWDM models (users need to specify wavelengths for CM and FG modules)

<table>
<thead>
<tr>
<th>Model #</th>
<th>Optical Power Budget</th>
<th>Optical Wavelengths</th>
<th>Items Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHOX-FL-14-Cxx</td>
<td>14dB</td>
<td>xx=27 for 1270 nm</td>
<td>1x PHOX camera (CM) side module</td>
</tr>
<tr>
<td>PHOX-FL-14-Cxx</td>
<td>14dB</td>
<td>xx=29 for 1290 nm</td>
<td>1x PHOX frame grabber (FG) side module</td>
</tr>
<tr>
<td>PHOX-FL-14-Cxx</td>
<td>14dB</td>
<td>xx=31 for 1310 nm</td>
<td>2x 12V international wall mount AC/DC power adapters (LC duplex fiber cable not included)</td>
</tr>
<tr>
<td>PHOX-FL-16-Cxx</td>
<td>16dB</td>
<td>xx=39 for 1390 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-16-Cxx</td>
<td>16dB</td>
<td>xx=41 for 1410 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-16-Cxx</td>
<td>16dB</td>
<td>xx=43 for 1430 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-16-Cxx</td>
<td>16dB</td>
<td>xx=45 for 1450 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-16-Cxx</td>
<td>16dB</td>
<td>xx=47 for 1470 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-16-Cxx</td>
<td>16dB</td>
<td>xx=49 for 1490 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-24-Cxx</td>
<td>24dB</td>
<td>xx=51 for 1510 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-24-Cxx</td>
<td>24dB</td>
<td>xx=53 for 1530 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-24-Cxx</td>
<td>24dB</td>
<td>xx=55 for 1550 nm</td>
<td></td>
</tr>
<tr>
<td>PHOX-FL-24-Cxx</td>
<td>24dB</td>
<td>xx=57 for 1570 nm</td>
<td></td>
</tr>
</tbody>
</table>

GPIO option

Add –G at the end of the desired standard model numbers to activate the GPIO ports. For example: PHOX-FM-300-G and PHOX-FL-10-G.
Accessory:

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>618-TRG10R120-TA3FX</td>
<td>12V DC international wall mount AC/DC adapter with Switchcraft TA3FX</td>
</tr>
<tr>
<td>614-14T26-xx-0LC</td>
<td>Camera Link cable – Plug to Plug. xx = desired length in meters.</td>
</tr>
<tr>
<td>LC-LC-MD-xxM2</td>
<td>LC to LC duplex 50/125 μm OM2 MM fiber. xx = desired length in meters.</td>
</tr>
<tr>
<td>LC-LC-MD-xxM3</td>
<td>LC to LC duplex 50/125 μm OM3 MM fiber. xx = desired length in meters.</td>
</tr>
<tr>
<td>PXF-DB9RJ45-6</td>
<td>6 ft RJ45 plug to DB9 female cable</td>
</tr>
</tbody>
</table>

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