



## KEY FEATURE

- ❖ Provides 10 Gb/s or 1250 MB/s transporting bandwidth for image, GPIO, RS232 and RS422
- ❖ Fully support Camera Link standard for Base, Medium, Full, 8tapx10bits and 10tapx8bits modes
- ❖ Operating pixel clock range from 20 to 85 MHz defined in 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 additional 4 GPIO channels (2 inputs and 2 outputs), a full duplex RS232 and a full duplex RS422 for external trigger and 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

**PHRONTIER™**  
TECHNOLOGIES

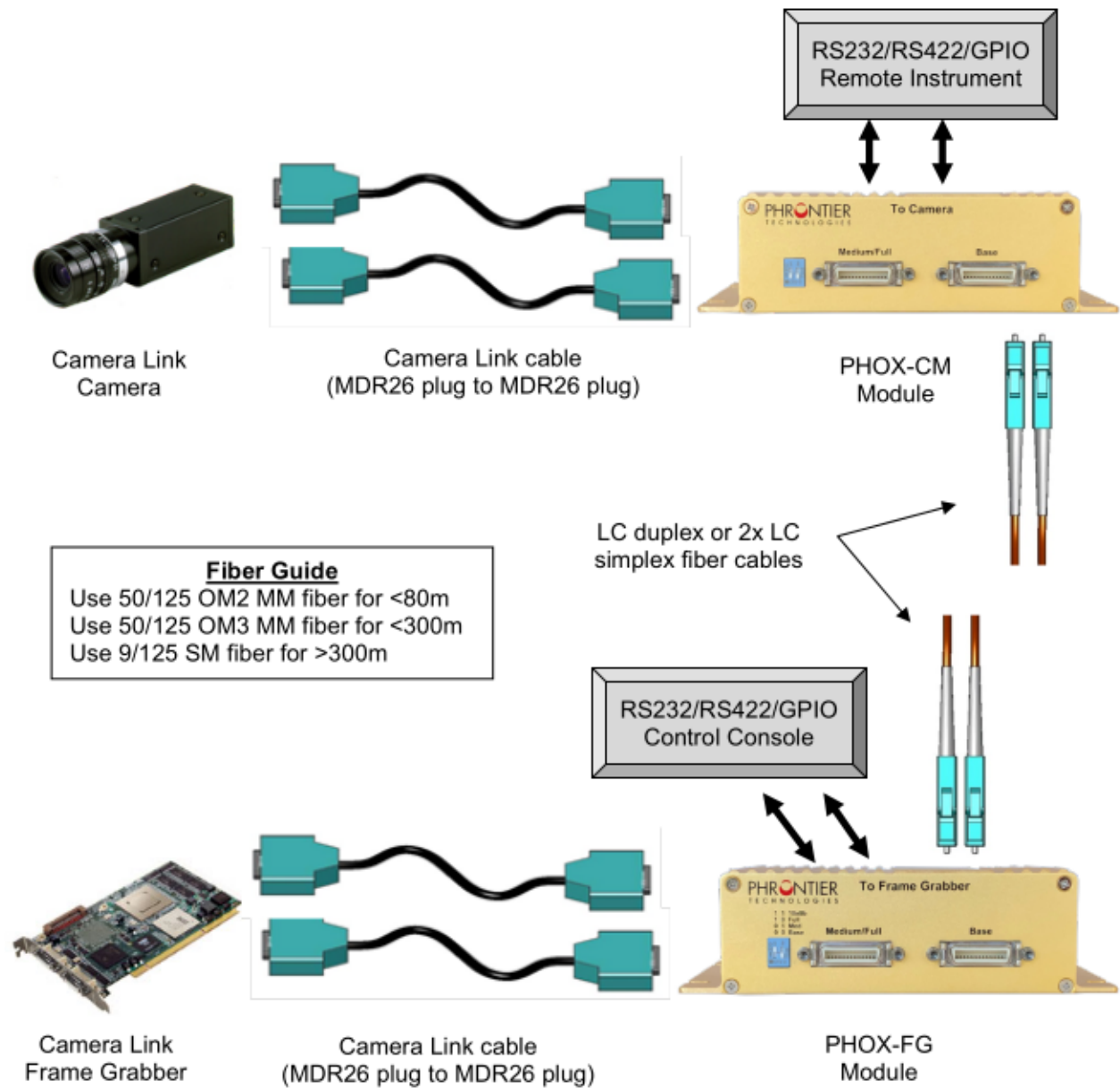
## PHOX™ Camera Link Fiber Extender

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

**PHOX-FD-M300  
PHOX-FD-Sxx  
PHOX-FD-Bxx  
PHOX-FD-Cxx-xx**



## TYPICAL SET UP DIAGRAM



## TECHNICAL SPECIFICATIONS

### General Specification

|                               |          |             |
|-------------------------------|----------|-------------|
| Operating ambient Temperature | Standard | 0 ~ 55 °C   |
|                               | Extended | -40 ~ 70 °C |
| Operating Case Temperature    | Standard | 0 ~ 60 °C   |
|                               | Extended | -40 ~ 75 °C |

|                                        |                           |          |           |          |
|----------------------------------------|---------------------------|----------|-----------|----------|
| Operating Humidity                     | 20 ~ 80% (non-condensing) |          |           |          |
| Input Voltage                          | DC 10 ~ 24 V              |          |           |          |
| Supply Current <sup>1</sup> @12V       | CM module                 | 0.25 Amp | FG module | 0.26 Amp |
| Typical Power Consumption <sup>1</sup> | CM module                 | 3 Watt   | FG module | 3.1 Watt |
| Connector Type                         | Switchcraft TRAPC3MX      |          |           |          |
| Approx. Weight (each module)           | 288 g                     |          |           |          |

Note 1: Measured with PHOX-FD-M300

## Camera Link Interface

|                        |                                             |                                                          |  |
|------------------------|---------------------------------------------|----------------------------------------------------------|--|
| Pixel Clock Range      | 20 ~ 85 MHz                                 |                                                          |  |
| Supported Camera Modes | Base/Medium/Full//8tapsx10bits/10tapsx8bits |                                                          |  |
| Connector Type         | MDR26 x2                                    |                                                          |  |
| Signal latency         | Image                                       | 2.91 us @85MHz pixel clock<br>3.35 us @68MHz pixel clock |  |
|                        | SerTFG                                      | 1.08 us                                                  |  |
|                        | CC1~4                                       | 0.19 us                                                  |  |
|                        | SerTC                                       | 0.19. us                                                 |  |

## Optical Interface

|                             | PHOX-FD-M300        | PHOX-FD-S10        | PHOX-FD-S20 | PHOX-FD-Cxx <sup>2</sup>      | PHOX-FD-B10                | PHOX-FD-B20                |
|-----------------------------|---------------------|--------------------|-------------|-------------------------------|----------------------------|----------------------------|
| Operating Wavelength        | 850nm               | 1310nm             | 1310nm      | 1270 ~ 1610 with 20nm spacing | CM: 1270 nm<br>FG: 1330 nm | CM: 1270 nm<br>FG: 1330 nm |
| Min Optical Tx Output Power | -5 ~ -1 dBm         | -8 ~ +0.5 dBm      | -3 ~ +1 dBm | -5 ~ 0 dBm                    | -5 ~ 0 dBm                 | -2 ~ +3 dBm                |
| Min Optical Rx Input Power  | -11.1 dBm           | -14 dBm            | -14 dBm     | -15 dBm                       | -14 dBm                    | -14 dBm                    |
| Link Distance               | 300m                | 10km               | 20km        | Note 3                        | 10km                       | 20km                       |
| Connector Type              | LC duplex           | LC duplex          |             |                               | LC simplex                 |                            |
| Fiber Type                  | 50/125μm OM3 fibers | 9/125 μm SM fibers |             |                               |                            |                            |

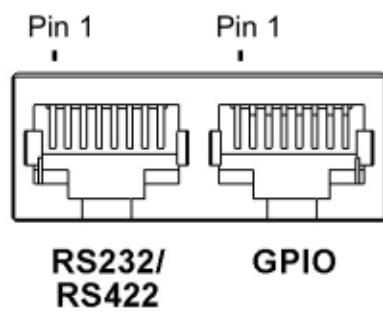
<sup>2</sup>Other optical power options are available. See the ordering info.

<sup>3</sup>Link distance depends on the optical network topology

## Auxiliary Channel Input/Output Interface

| Opto-isolated GPIO Interface                             |                      |              |             |
|----------------------------------------------------------|----------------------|--------------|-------------|
| Chipset Manufacturer Part Number                         | Toshiba TLP2168      |              |             |
| Number of I/O Channels                                   | 2 input and 2 output |              |             |
| Max. Data Rate                                           | 1 Mbps               |              |             |
| Input Forward Voltage                                    | Min. = 1.4V          | Typ. = 1.57V | Max. = 1.8V |
| Output Stage Vcc                                         | 3.3V                 |              |             |
| Connector Type                                           | RJ45                 |              |             |
| RS232 Interface                                          |                      |              |             |
| Number of Data Channels                                  | one TxD and one RxD  |              |             |
| Max Data Rate                                            | 250 Kbps             |              |             |
| Output Voltage pk-to-pk (R <sub>L</sub> = 3KΩ to GND)    | Typ. +/-5.4V         |              |             |
| Max. Input Voltage pk-to-pk                              | +/- 25V              |              |             |
| Connector Type                                           | RJ45                 |              |             |
| RS422 Interface                                          |                      |              |             |
| Number of Data Channels                                  | one TxD and one RxD  |              |             |
| Max Data Rate                                            | 20 Mbps              |              |             |
| Driver Differential Output (R <sub>L</sub> =100Ω)(RS422) | Min. = 2V            | Typ. = 2.3V  |             |
| Driver Common-mode Output (R <sub>L</sub> =54Ω)(RS422)   |                      | Typ. = 2V    | Max. = 3V   |
| Logic Input High Voltage                                 | Min. = 2V            |              |             |
| Logic Input Low Voltage                                  |                      |              | Max. = 0.8V |
| Connector Type                                           | RJ45                 |              |             |

## AUX CHANNEL PIN ASSIGNMENT (RS232/RS422/GPIO)



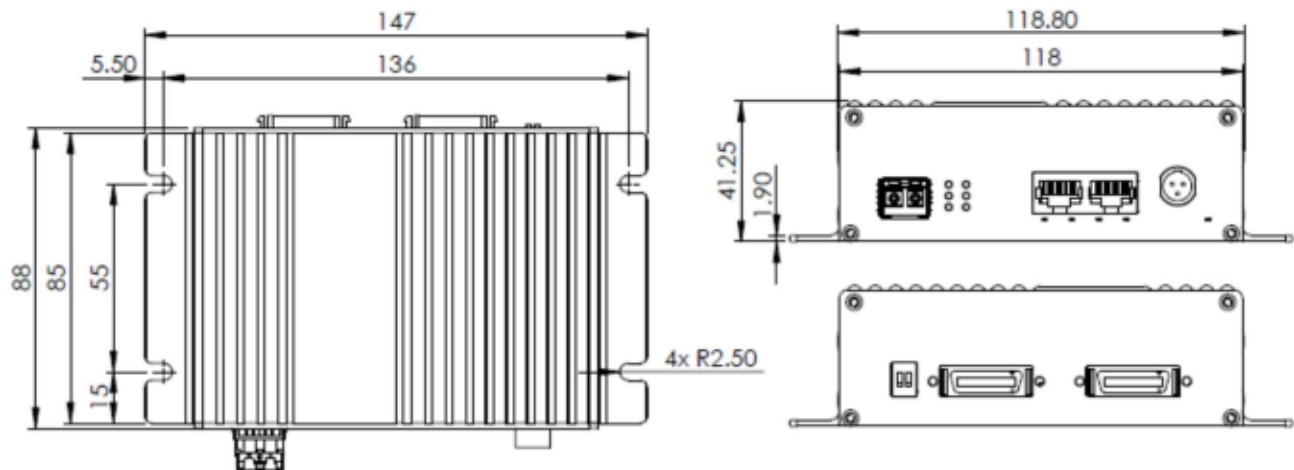
### RS232/RS422 RJ45 Pin Assignment

- 1: RS422\_RX+
- 2: RS422\_RX-
- 3: RS232\_TX
- 4: GND
- 5: GND
- 6: RS232\_RX
- 7: RS422\_TX+
- 8: RS422\_TX-

### GPIO RJ45 Pin Assignment

- 1: 3.3/5V\_EXTERNAL
- 2: GPIO\_OUT1
- 3: GPIO\_OUT2
- 4: GPIO\_IN\_ANODE1
- 5: GPIO\_IN\_CATHODE1
- 6: GND\_EXTERNAL
- 7: GPIO\_IN\_ANODE2
- 8: GPIO\_IN\_CATHODE2

## MECHANICAL INFORMATION (mm)



## ORDERING INFORMATION

| Model #        | Operating Temperature | Transport Distance*                                                   | Items included                                                                                                                                                         |
|----------------|-----------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PHOX-FD-M300   | Standard              | OM1 fiber up to 30 m<br>OM2 fiber up to 80 m<br>OM3 fiber up to 300 m | 1x PHOX camera (CM) side module<br>1x PHOX frame grabber (FG) side module<br>2x 12V international wall mount AC/DC power adapters (LC duplex fiber cable not included) |
| PHOX-FD-M300-T | Extended              |                                                                       |                                                                                                                                                                        |
| PHOX-FD-S10    | Standard              |                                                                       |                                                                                                                                                                        |
| PHOX-FD-S10-T  | Extended              | Up to 10 km                                                           |                                                                                                                                                                        |
| PHOX-FD-S20    | Standard              | Up to 20 km                                                           |                                                                                                                                                                        |

|             |          |                          |  |
|-------------|----------|--------------------------|--|
| PHOX-FD-S40 | Standard | Up to 40 km              |  |
| PHOX-FD-S80 | Standard | Up to 80 km              |  |
| PHOX-FD-B10 | Standard | Single fiber up to 10 km |  |
| PHOX-FD-B20 | Standard | Single fiber up to 20 km |  |
| PHOX-FD-B40 | Standard | Single fiber up to 40 km |  |
| PHOX-FD-B80 | Standard | Single fiber up to 80 km |  |

Note:

\* Distances are estimated. Extra optical losses in the system will reduce the maximum transmission distance.

## AUX ports routing option (-AF option)

This option routes auxiliary input signals on the CM module to the CC1~CC4 outputs of the Camera Link port instead of coming from the frame grabber. It adds the -AF at the end of standard part numbers, e.g. PHOX-FD-M300-AF; PHOX-FD-S10-AF

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

| Model #        | Optical Power Budget | Optical Wavelengths                                                                                                                                                  | Items Provided                                                                                                                                                                 |
|----------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PHOX-FD-Cxx-10 | 10dB                 | xx=27 for 1270 nm<br>xx=29 for 1290 nm<br>xx=31 for 1310 nm<br>xx=33 for 1330 nm<br>xx=35 for 1350 nm                                                                | 1x PHOX camera (CM) side module<br><br>1x PHOX frame grabber (FG) side module<br><br>2x 12V international wall mount AC/DC power adapters (LC duplex fiber cable not included) |
| PHOX-FD-Cxx-14 | 14dB                 | xx=37 for 1370 nm<br>xx=39 for 1390 nm<br>xx=41 for 1410 nm<br>xx=43 for 1430 nm<br>xx=45 for 1450 nm                                                                |                                                                                                                                                                                |
| PHOX-FD-Cxx-23 | 23dB                 | xx=47 for 1470 nm<br>xx=49 for 1490 nm<br>xx=51 for 1510 nm<br>xx=53 for 1530 nm<br>xx=55 for 1550 nm<br>xx=57 for 1570 nm<br>xx=59 for 1590 nm<br>xx=61 for 1610 nm |                                                                                                                                                                                |

## Accessories:

| Part #           | Description                                                          |
|------------------|----------------------------------------------------------------------|
| 618-TRG10R-TA3FX | 12V DC international wall mount AC/DC adapter with Switchcraft TA3FX |
| 614-14T26-xx-0LC | Camera Link cable – Plug to Plug. xx = desired length in meters.     |

|             |                                                                                   |
|-------------|-----------------------------------------------------------------------------------|
| LC-LC-SD-xx | LC to LC duplex 9/125 $\mu\text{m}$ SM fiber. xx = desired length in meters.      |
| LC-LC-MD-xx | LC to LC duplex 50/125 $\mu\text{m}$ OM2 MM fiber. xx = desired length in meters. |
| LC-LC-GD-xx | LC to LC duplex 50/125 $\mu\text{m}$ OM3 MM fiber. xx = desired length in meters. |

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