

PHOX-FD

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**

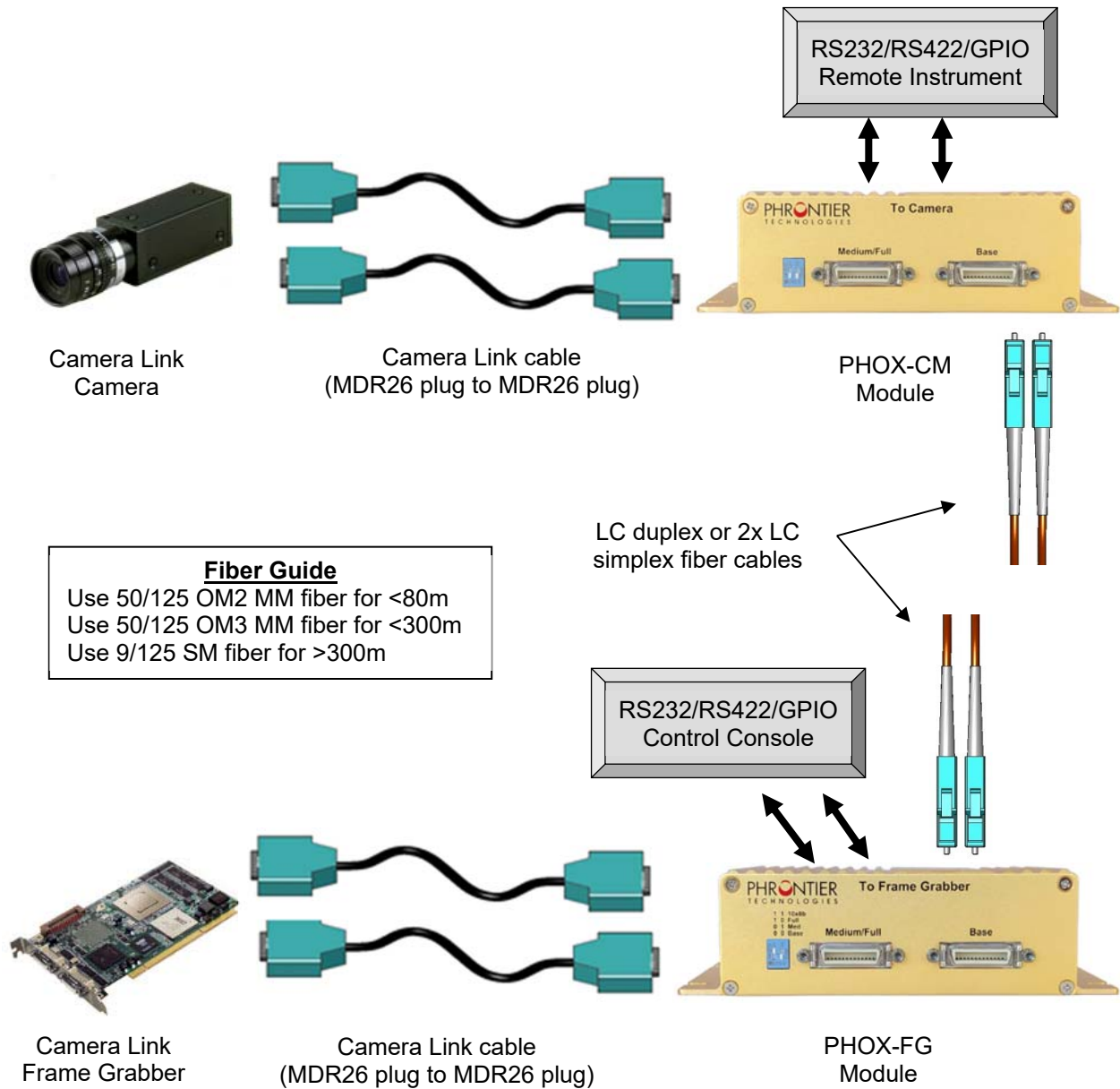
Base / Medium /
Full / Deca
Configuration

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



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TYPICAL SET UP DIAGRAM



TECHNICAL SPECIFICATIONS

General Specification

Standard Operating Temperature ¹	Ambient	0 ~ 55 °C	Case	0 ~ 60 °C
Extended Operating Temperature ¹	Ambient	-40 ~ 70 °C	Case	-40 ~ 75 °C
Operating Humidity	20 ~ 80% (non-condensing)			
Input Voltage	DC 10 ~ 24 V			
Supply Current ¹ @12V	CM module	0.25 Amp	FG module	0.26 Amp
Typical Power Consumption ²	CM module	3 Watt	FG module	3.1 Watt
Connector Type	Switchcraft TRAPC3MX			
Approx. Weight (each module)	288 g			

Note 1: For CWDM models, due to the component limitation the extended ambient is only available for -20~60C and the extended case temperature is only available for -20~65C.

Note 2: Measured with PHOX-FD-M300 at room temperature.

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 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 ²	PHOX-FD-B10	PHOX-FD-B20
Operating Wavelength	850nm	1310nm	1310nm	1270 ~ 1610 with 20nm spacing	CM: 1270 nm FG: 1330 nm	CM: 1270 nm 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	50/125 μ m OM3 fibers	9/125 μ m SM fibers	

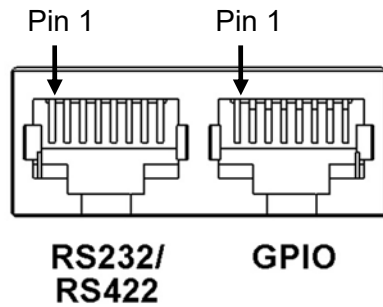
²Other optical power options are available. See the ordering info.

³Link 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 _L = 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 _L =100Ω)(RS422)	Min. = 2V	Typ. = 2.3V	
Driver Common-mode Output (R _L =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)



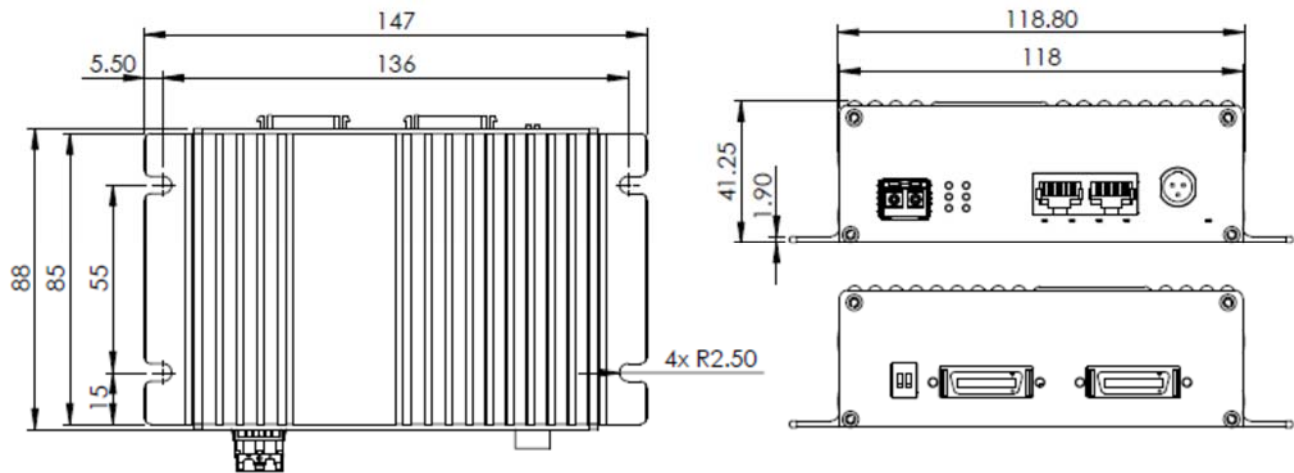
RS232/RS422 RJ45 Pin Assignment

- 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

Standard models

Model #	Operating Temperature	Transport Distance*	Items included
PHOX-FD-M300	Standard	OM1 fiber up to 30 m OM2 fiber up to 80 m OM3 fiber up to 300 m	1x PHOX camera (CM) side module 1x PHOX frame grabber (FG) side module
PHOX-FD-S10	Standard	Up to 10 km	

PHOX-FD-S20	Standard	Up to 20 km	2x 12V international wall mount AC/DC power adapters (LC duplex fiber cable not included)
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.

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 xx=29 for 1290 nm xx=31 for 1310 nm xx=33 for 1330 nm xx=35 for 1350 nm	1x PHOX camera (CM) side module 1x PHOX frame grabber (FG) side module 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 xx=39 for 1390 nm xx=41 for 1410 nm xx=43 for 1430 nm xx=45 for 1450 nm	
PHOX-FD-Cxx-23	23dB	xx=47 for 1470 nm xx=49 for 1490 nm xx=51 for 1510 nm xx=53 for 1530 nm xx=55 for 1550 nm xx=57 for 1570 nm xx=59 for 1590 nm xx=61 for 1610 nm	

Ordering options:

Extended temperature option (-T)

This option uses industrial grade (-40~85C) components on the board. Please see temperature specifications for details. For CWDM models, extended temperature range depends on wavelengths and optical power budgets. For this option, add -T at the end of standard part numbers, e.g. PHOX-FD-M300-T, PHOX-FD-S10-T

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. For this option, add -AF at the end of standard part numbers, e.g. PHOX-FD-M300-AF; PHOX-FD-S10-AF

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-M-D-xxxM	LC to LC duplex 50/125 μ m OM2 MM fiber. xxx = desired length in meters.
LC-LC-G-D-xxxM	LC to LC duplex 50/125 μ m OM3 MM fiber. xxx = desired length in meters.
LC-LC-S-D-xxxM	LC to LC duplex 9/125 SM fiber. xxx = desired length in meters.



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