

# FOI-4141 and FOI-4411

## FIBER OPTIC ISOLATOR



### Description

The FOI-4141 and FOI-4411 both provide complete electrical isolation for RS-232 communications. The units are transparent to all handshaking protocols and can accept data and clock signals up to a maximum rate of 1 Mbps. A regeneration switch on the FOI-4141 allows users to toggle between synchronous applications that require Send Timing (ST) and asynchronous or synchronous applications that require Terminal Timing (TT).

The units can be used in areas of high electrical noise or in and out of RF shielded enclosures. The fiber optic cable is not susceptible to interference caused by impulse noise, crosstalk, or EMI. Privacy of communications is also enhanced because the fiber optic cable does not radiate any emissions. FiberPlex recommends "T" units for high security applications because they have been TEMPEST tested and approved.

In addition, fiber optic cable offers much longer transmission distances than traditional RS-232 cabling. Multimode optics on the units can extend the distance to 2km, while singlemode optics can further extend the distance to 20km. A typical link consists of an FOI-4141 at the Data Communication Equipment (DCE) and an FOI-4411 at the Data Terminal Equipment (DTE) with a duplex fiber optic cable between them as shown under "TYPICAL APPLICATION".



### TIA/EIA-232 (RS-232)

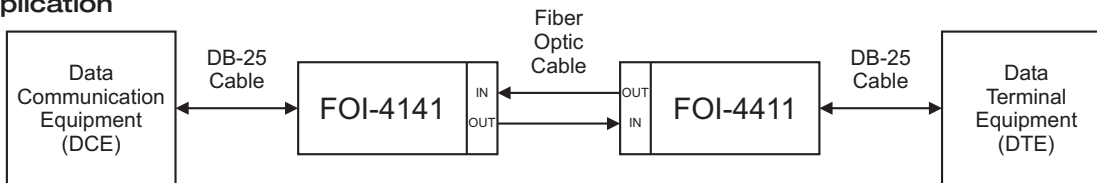
#### DC to 1 Mbps

- FOI-4141:** To DCE
- FOI-4411:** To DTE

#### Features:

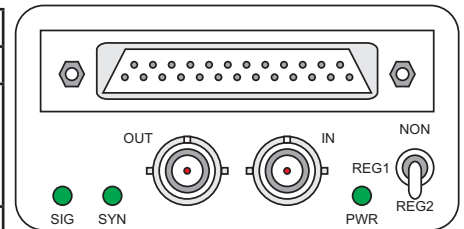
- Data Rate: DC to 1 Mbps
- Compatible with:
  - MIL-STD-188C
  - TIA/EIA-423 (RS-423)
  - FED-STD-1020A
  - TIA/EIA-694 (RS-694)
  - TIA/EIA-723 (RS-723)
- Supports tail circuit and null modem functions for DCE to DCE or DTE to DTE communications. Requires two of the same FOI units.
- An alternate interface (RS-422 or V.35) may be installed at the opposite end, allowing the user to create a link between two electrically incompatible interfaces without requiring a separate interface converter. For more information see the "OPTICAL COMPATIBILITY" table.

### Typical Application

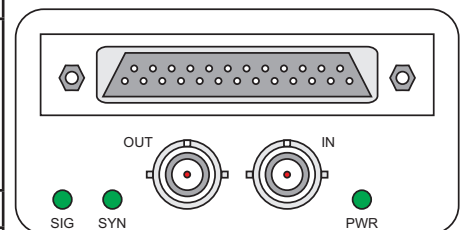


### LED Indicators

Label	Color	Description
PWR	Green	Power supply in FOI unit is operating properly.
	Off	No power from the PSQ power supply or open fuse inside the FOI unit. Check that the PSQ power supply is operating properly. If the PSQ power supply is good, separate the FOI unit from the PSQ power supply for 30 seconds and then reattach so that the fuse inside the FOI unit has time to reset. If the PWR led is still off or not constant, replace the FOI unit.
SIG	Green	<b>Standard units:</b> No function. The SIG led will turn on upon power up and remain on. <b>TEMPEST units:</b> Optical signal in detected.
	Off	<b>Standard units:</b> No function. The SIG led will turn on upon power up and remain on. <b>TEMPEST units:</b> No optical signal in or optical level too low. Check that the opposite unit has power and that the fiber optic cables are properly connected. The transmit OUT optic from one end of the network connects to the receive IN optic at the opposite end as shown under "TYPICAL APPLICATION".
SYN	Green	Unit is in sync.
	Off	No sync characters detected. Unit is unable to frame to the data stream.

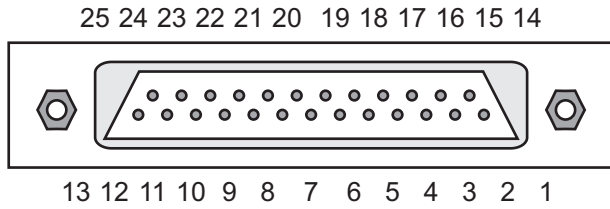


FOI-4141-ST Front View

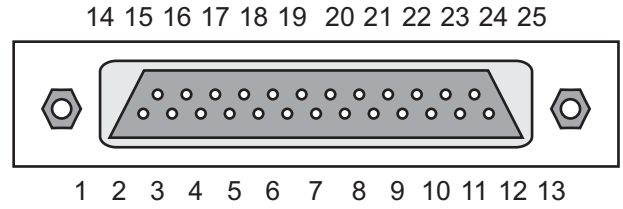


FOI-4411-ST Front View

RS-232 TO DCE



RS-232 TO DTE



FOI-4141 DB-25 Male pinout

Pin	Direction	Label	Description
1			Chassis Ground
2	Out	SD	Send Data
3	In	RD	Receive Data
4	Out	RTS	Request To Send
5	In	CTS	Clear To Send
6	In	DSR	Data Set Ready
7			Signal Ground
8	In	RR	Receiver Ready
9			
10			
11			
12			
13			
14	Out	S-SD	Secondary Send Data
15	In	ST	Send Timing
16			
17	In	RT	Receive Timing
18	Out	LL	Local Loopback
19	Out	S-RTS	Secondary Request To Send
20	Out	TR	Terminal Ready
21			
22	In	RI	Ring Indicator
23			
24	Out	TT	Terminal Timing
25	In	TM	Test Mode

FOI-4411 DB-25 Female pinout

Pin	Direction	Label	Description
1			Chassis Ground
2	In	SD	Send Data
3	Out	RD	Receive Data
4	In	RTS	Request To Send
5	Out	CTS	Clear To Send
6	Out	DSR	Data Set Ready
7			Signal Ground
8	Out	RR	Receiver Ready
9			
10			
11			
12			
13			
14	In	S-SD	Secondary Send Data
15	Out	ST	Send Timing
16			
17	Out	RT	Receive Timing
18	In	LL	Local Loopback
19	In	S-RTS	Secondary Request To Send
20	In	TR	Terminal Ready
21			
22	Out	RI	Ring Indicator
23			
24	In	TT	Terminal Timing
25	Out	TM	Test Mode

Data and clock signals are highlighted in yellow with a maximum data rate of 1 Mbps. All other signals not highlighted are control signals with a maximum data rate of 120 kbps.

**FOI-4141 Switch**

Label	Position	Description
<b>NON</b>	Up	Non-Regeneration Typically set for asynchronous or synchronous applications requiring Terminal Timing (TT). Transmit Data (TD) and Terminal Timing (TT) from the DTE are both passed transparently to the DCE with the addition of normal propagation delay and sampling jitter.
<b>REG1</b>	Middle	Regeneration 1 and 2 Typically set for synchronous applications requiring Send Timing (ST). This may be used to correct for timing delays over long runs of wiring between the DCE and the DTE.  Terminal Timing from the DTE is ignored and will not be passed to the DCE. Instead, Send Timing (ST) from the DCE is looped back to the Terminal Timing (TT) output on the FOI-4141.  Transmit Data (TD) from the DTE is sampled in on the rising edge of Send Timing (ST) from the DCE.
<b>REG2</b>	Down	Transmit Data (TD) from the DTE is sampled in on the falling edge of Send Timing (ST) from the DCE.

The REG1 and REG2 switch position is determined by the data rate of the RS-232 link and the distance between the DCE and the DTE. In some cases if the timing delays are just right, a link will function in 2 switch positions, NON and REG1 or NON and REG2. It is also possible to have a link operate in all 3 switch positions, NON, REG1, and REG2. However, in synchronous applications where the DCE requires Send Timing (ST), it would be more beneficial to use either REG1 or REG2 rather than NON because regeneration eliminates the sampling jitter from the Transmit Data (TD) to the DCE.

**FOI-4141 Optical Compatibility**

Model	Description	Typical Application
<b>FOI-4141</b>	RS-232 to DCE	RS-232 ↔ fiber ↔ RS-232 (tail circuit)
<b>FOI-4411</b>	RS-232 to DTE	RS-232 ↔ fiber ↔ RS-232
<b>FOI-4541</b>	RS-422 to DTE	RS-232 ↔ fiber ↔ RS-422
<b>FOI-4431</b>	V.35 to DTE	RS-232 ↔ fiber ↔ V.35

**FOI-4411 Optical Compatibility**

Model	Description	Typical Application
<b>FOI-4411</b>	RS-232 to DTE	RS-232 ↔ fiber ↔ RS-232 (null modem)
<b>FOI-4141</b>	RS-232 to DCE	RS-232 ↔ fiber ↔ RS-232
<b>FOI-4451</b>	RS-422 to DCE	RS-232 ↔ fiber ↔ RS-422
<b>FOI-4341</b>	V.35 to DCE	RS-232 ↔ fiber ↔ V.35

## Specifications

		minimum	typical	maximum	unit
<b>Power Requirement</b>	Voltage Range	7	9	12	V
	Supply Current	-	550	-	mA
<b>Data and Clock Signals</b>	Data Rate	DC	-	1	Mbps
	Sampling Jitter	0	-	4	%
	Input Resistance	3	5	7	kΩ
	Input Voltage Range	-25	-	25	V
	Output Voltage Swing	-	±5	-	V
<b>Control Signals</b>	Data Rate	DC	-	120	kbps
	Sampling Jitter	0	-	0.4	%
	Input Resistance	3	5	7	kΩ
	Input Voltage Range	-25	-	25	V
	Output Voltage Swing	-	±5	-	V
<b>Environmental</b>	Storage Temperature	-40	-	85	°C
	Operating Temperature	0	-	50	°C
<b>Interface Connector</b>	FOI-4141	DB-25 Male			
	FOI-4411	DB-25 Female			
<b>Case Dimensions</b>	Size 4	<b>length</b>	<b>width</b>	<b>height</b>	<b>weight</b>
		4.5 in (114 mm)	1.453 in (37 mm)	2.562 in (65 mm)	2 lb (0.9 kg)

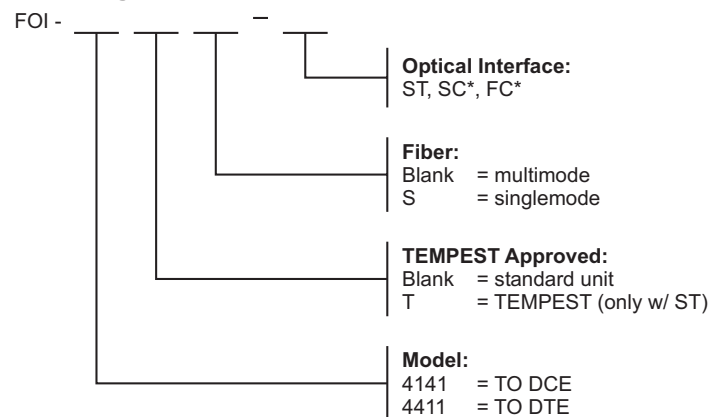
## Optical Characteristics

Fiber	Size	Max Distance	Wavelength	Output Power	Receiver Sensitivity	Loss Budget
<b>Multimode</b>	62.5 / 125 μm	2 km	1300 nm	-18 dBm	-30 dBm	12 dB
<b>Singlemode</b>	9 / 125 μm	20 km	1300 nm	-11 dBm	-32 dBm	21 dB

## Accessories

Model	Description
<b>CMA-2001</b>	Chassis Mounting Adapter for RMC-2101
<b>CMA-3002</b>	Chassis Mounting Adapter for RMC-3101, RMC-3102
<b>PSQ-4910</b>	Power Supply for FOI-4xxx series
<b>RMC-2101</b>	Rack Mount Chassis 3-1/2" H x 19" W, rear access
<b>RMC-3101</b>	Rack Mount Chassis 5-1/4" H x 19" W, front access
<b>RMC-3102</b>	Rack Mount Chassis 5-1/4" H x 19" W, front access with optical patch panel
<b>WMA-2001</b>	Wall Mount Adapter with optical patch
<b>WMA-3002</b>	Wall Mount Adapter

## Ordering Information



\* Indicates Custom Catalog Item

## Standard Options:

FOI-4141-ST	FOI-4411-ST
FOI-4141S-ST	FOI-4411S-ST
FOI-4141T-ST	FOI-4411T-ST
FOI-4141TS-ST	FOI-4411TS-ST

**For special applications that require custom units, please call FiberPlex for more information.**