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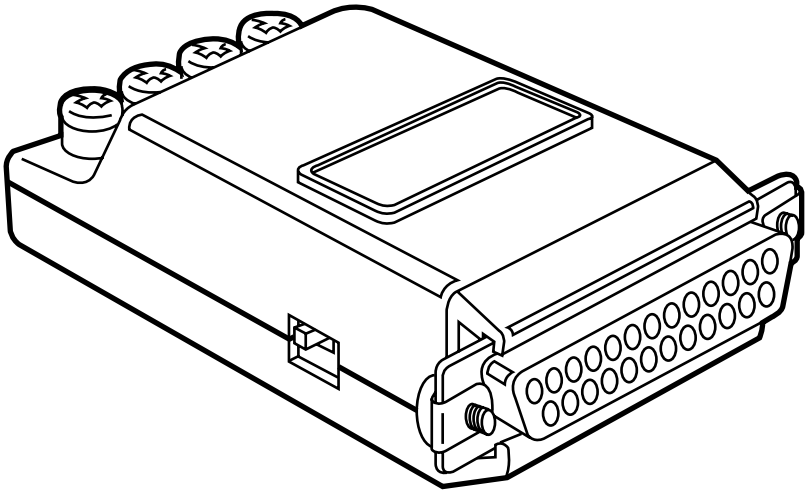
NETWORK SERVICES

MAY 1998
IC457A-F
IC457A-M

RS-232/RS-422 Optical Isolator



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FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENT

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for Radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

1. Specifications

Interface:	RS-232 (DTE or DCE) and RS-422
Protocol:	Asynchronous
Connectors:	
RS-232 port —	(1) DB25S female or DB25P male
RS-422 port —	(1) 4-screw terminal block
Operating Mode:	4-wire, full duplex, point-to-point only
Data Rate:	up to 19.2 Kbps
Voltage Isolation:	Withstands up to 2500 VAC
Pins Supported:	
RS-232 port —	TD, RD, SG
RS-422 port —	TXA, TXB, RXA, RXB
Power:	From RS-232/RS-422 interface
Power Consumption:	
RS-232 interface —	48 mW
RS-422 interface —	34 mW
RS-232 Voltage Requirements:	
Minimum —	±3 VDC
Maximum —	±15 VDC
RS-422 Voltage Requirements:	
Minimum —	2 VDC
Maximum —	6 VDC
Mean Time Between Failure:	300,000 hours
Operating Temperature:	32° to 158°F (0° to 70° C)
Humidity:	0 to 95% relative humidity, non-condensing
Enclosure:	High-impact plastic
Size:	0.7"H x 2.0"W x 2.7"D (1.8 x 5.1 x 6.9 cm)
Weight:	0.12 lb. (0.05 kg)

2. Introduction

The Optical Isolator

The RS-232/RS-422 Optical Isolator allows you to connect an RS-232 device to an RS-422 device.

NOTE: Two RS-232/RS-422 Optical Isolators cannot be used back-to-back in a short-haul modem application.

The RS-232/RS-422 Optical Isolator also electrically isolates each end of a data link. This prevents electrical surges from interfering with data integrity or damaging the attached RS-232 or RS-422 equipment. The unit does this by creating two electrical circuits and separating these circuits with an "air gap." Electrical energy cannot cross this gap. The unit translates the RS-232 or RS-422 signals into pulses of light. These pulses of light transmit data across the "air gap."

The RS-232/RS-422 Optical Isolator receives power from the attached interfaces. The RS-232 port receives power from the RS-232 interface. The RS-422 port receives power from the RS-422 interface. There is no need for an external power supply.

The RS-232 interface has a DTE/DCE switch. This allows the unit to be connected directly to any RS-232 device with a DB25 connector—no other cables are necessary.

NOTE: This unit does not support loopback testing.

The Need for Optical Isolation

Differences in ground potential (sometimes called "ground loops") can occur from one end of a floor to another, from one floor to another, or from one building to another. The possibility is greatest between widely spaced sites that have (1) different grounding systems and (2) dissimilar electrical demand environments.

Surge protectors limit unsteady-state disturbances to acceptable levels, but they do not control ground-potential differences. The Optical Isolator provides a defense against this kind of electrical exchange. The Optical Isolator's blocking of steady-state differences is effective up to 2500 volts.

Use the Optical Isolator whenever you connect an RS-232 device to a distant RS-422 device or when you connect devices that are powered by different AC sources. Use the Optical Isolator with surge protectors for optimum signal protection.

3. The RS-422 Interface

Installation

Figure 1 shows the proper connections between the RS-232/RS-422 Optical Isolator and an RS-422 device.

1. Strip each of the four wires about 1/2 inch.
2. Wrap the wires clockwise around the terminal screws.
3. Tighten the screw terminals.

Power

The RS-232/RS-422 Optical Isolator gets power from both the RS-422 and RS-232 interfaces. On the RS-422 port, a minimum voltage level of 2 VDC is required. The maximum voltage level is 6 VDC.

Maximum Distance

Do not position the RS-232/RS-422 Optical Isolator more than 4000 feet (1219 m) from the RS-422 device running at 19.2 Kbps. Otherwise the signal strength will be too weak for the RS-232/RS-422 Optical Isolator to function.

The maximum distance will vary depending upon the operational environment, the wire gauge used, and the baud rate of the attached devices.

Operation

Operation is four wire, full duplex, point-to-point only. The RS-232/RS-422 Optical Isolator does not support loopback testing.

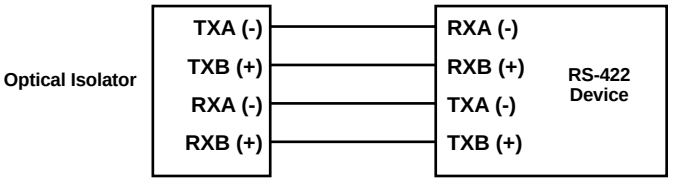
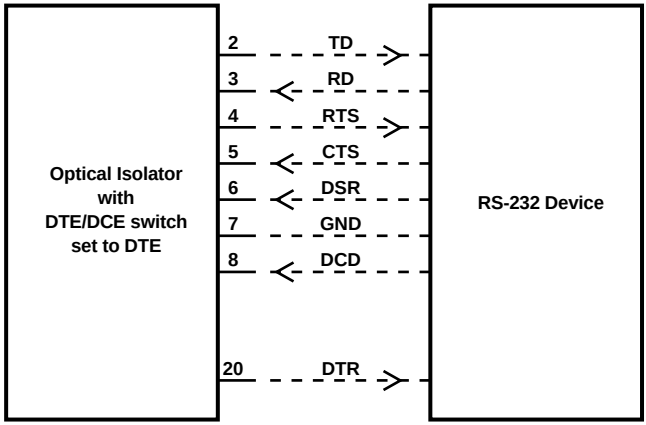


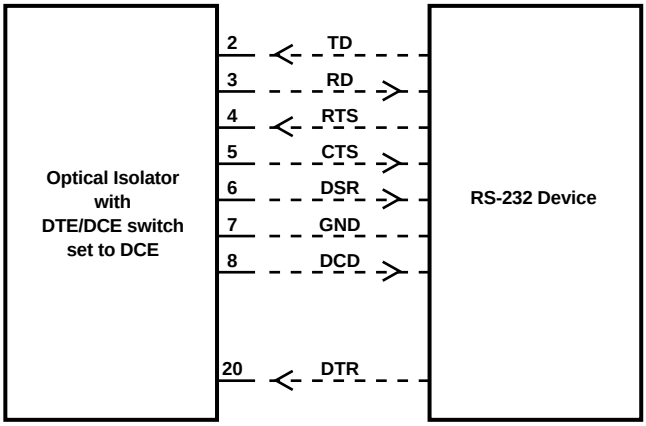
Figure 1. Wiring connection between the RS-232/RS-422 Optical Isolator and an RS-422 Device.

4. The RS-232 Interface

Connect the RS-232/RS-422 Optical Isolator directly to your RS-232 device, or use a standard RS-232 cable (maximum length: 6 feet or 1.8 m) with DB25 connectors (ECN25C). (If the RS-232 device is a PC with a DB9 serial port, see **5.0, Connection to a PC**.)

RS-232 pin assignments appear below.





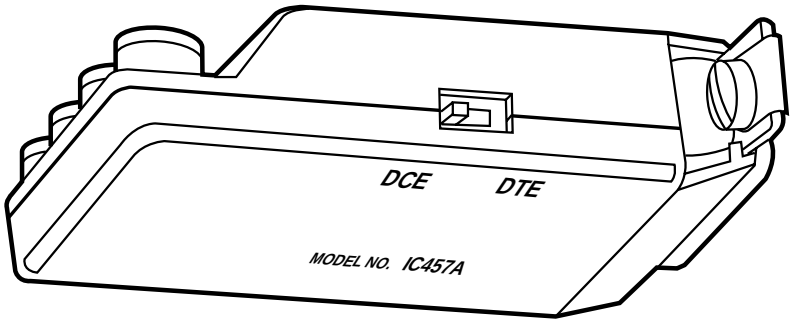


Figure 2. The DCE/DTE switch is on the side of the RS-232/RS-422 Optical Isolator. The labels "DCE" and "DTE"are on the bottom of the unit.

The DTE/DCE Switch

The DTE/DCE switch, on the side of the RS-232/RS-422 Optical Isolator, is used to configure the RS-232 interface port as either DTE or DCE. The label for the switch setting is on the bottom of the unit (see Figure 2).
If your RS-232/RS-422 Optical Isolator is connected to a DTE device (PC, terminal, printer), set the switch to DCE.

If your RS-232/RS-422 Optical Isolator is connected to a DCE device (modem), set the switch to DTE.

Power

The RS-232/RS-422 Optical Isolator gets power from both the RS-422 and RS-232 interfaces. Minimum loaded voltage is ±3 VDC. Maximum voltage is ±15 VDC.

The position of the DCE/DTE switch determines which pins supply power to the unit.

- If the switch is set to DCE, the unit draws power from any of the following pins: TD (pin 2), RTS (pin 4), and/or DTR (pin 20).
- If the switch is set to DTE, the unit draws power from any of the following pins: RD (pin 3), CTS (pin 5), and/or DSR (pin 6).

The RS-232/RS-422 Optical Isolator can also get power from a positive voltage present on pin 9 or a negative voltage present on pin 10.

5. Connection to a PC

Many PCs have a DB9 serial port. To connect the RS-232/RS-422 Optical Isolator to a PC, use a DB9-to-DB25 cable (EVNBMC) with the IC457A-F. The maximum cable length should be 6 feet (1.8 m). You can also use a DB9-to-DB25 adpater (FA520).

Some PCs have male DB25 serial ports. In this case, attach your Optical Isolator directly to the PC.

In both cases, set the DTE/DCE switch to the DCE position.

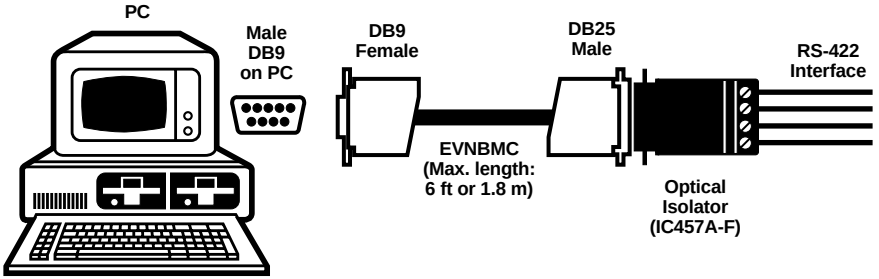


Figure 3. Use DB9-to-DB25 cable to attach the RS-232/RS-422 Optical Isolator to a PC with a DB9 serial port.

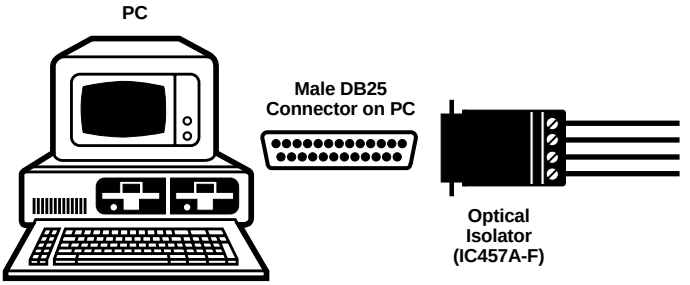


Figure 4. Attach the RS-232/RS-422 Optical Isolator directly to a PC that has a DB25 serial port.

6. Sample Applications

If two RS-232 devices are within 4000 feet (1219 m) of each other, use the RS-232/RS-422 Optical Isolator and the RS-232↔RS-422 Interface Converter (IC107A). Use 4-wire cable (EYN712A) to connect the RS-232/RS-422 Optical Isolator to the Interface Converter. See Figure 5.

If you have an RS-422 device that you wish to attach to an RS-232 modem, use RS-232/RS-422 Optical Isolator as an interface converter and to optically isolate the RS-422 device from the modem and phone line. See Figure 6.

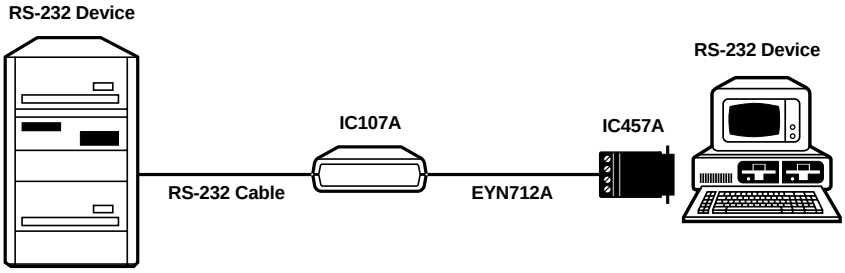


Figure 5. Use the RS-232↔RS-422 Interface Converter (IC107A), the RS-232/RS-422 Optical Isolator (IC457A), and 4-wire cable (EYN712A) to connect RS-232 devices up to 4000 feet (1219 m) apart.

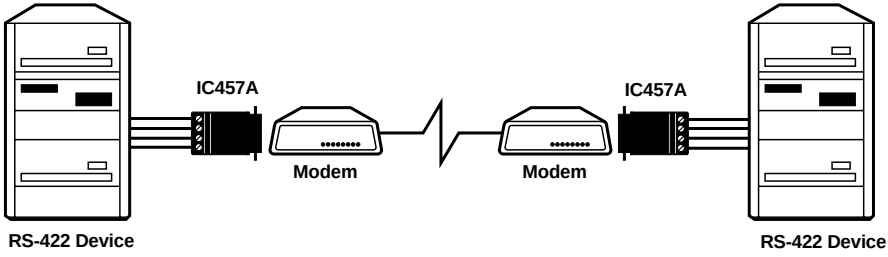


Figure 6. Use the RS-232/RS-422 Optical Isolator (IC457A) to connect an RS-422 device to an RS-232 modem.

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