ORDERING

FOM-485/*/&
Asynchronous RS-485 Miniature Fiber Optic Modem

* Specify fiber optic connector:
ST85 for ST type, 850 nm multimode
ST13 for ST type, 1300 nm single mode
FC85 for FC type, 850 nm multimode
FC13 for FC type, 1300 nm single mode
SC85 for SC type, 850 nm multimode
SC13 for SC type, 1300 nm single mode

& Specify DTE connector:
RJ45 for RJ-45
TB for terminal block

P/S-AC/9/500
9 VDC / 90 to 264 VAC, 500 mA power supply

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319-100-08/00

FOM-485

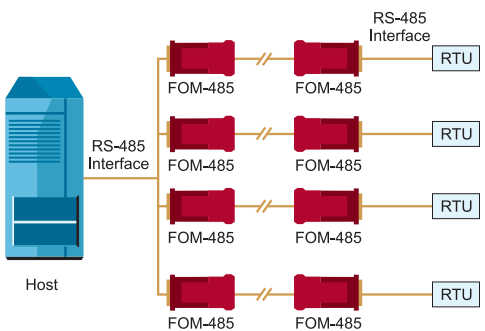
RAD

Asynchronous RS-485 Miniature Fiber Optic Modem

FEATURES

- Provides asynchronous transmission up to 115.2 kbps
- Operates full duplex over 4-wire or half duplex over 2-wire and 4-wire
- Meets ITU RS-485 and ITU V.11 requirements
- Meets ITU V.54 and ITU V.52 requirements (in V.11 only)
- Operates over multimode or single mode fiber optic
- Point-to-point or multipoint applications with up to 32 units in RS-485
- Six LED indicators
- Miniature, lightweight, easy to install
- Operates with an external power supply

APPLICATION



DESCRIPTION

- FOM-485, asynchronous RS-485 miniature fiber optic modem, provides the capability of transmitting an RS-485 or V.11 signal via a fiber optic link. FOM-485 is typically used for data transmission in utility applications. The asynchronous data rate can be up to 115.2 kbps in full or half duplex mode.
- FOM-485 performs diagnostic loopbacks in compliance with ITU V.54 standard. Two V.54 loopbacks are available: local analog (Loop 3) and remote digital (Loop 2), activated via external DIP switches. Local digital loopback is also available. The loopbacks are available in V.11 mode only.
- FOM-485 includes a built-in V.52 standard BER tester for testing link integrity. The internal BER tester is activated by an external DIP switch. The ERR LED blinks when an error is detected in the data transmission.
- FOM-485 incorporates all the advantages of a fiber optic system, providing:
  - Lower attenuation than with copper wire
  - EMI/RFI immunity, saving the cost of expensive and heavy shielding, and complex error checking routines
  - Almost absolute security and reduction in the cost of data encryption
  - Eavesdropping is virtually impossible as negligible power is radiated from the fiber
  - Safety and electrical isolation: no spark hazard and no ground-loop noise problems.
- FOM-485 operates with an external 9 VDC 300 mA power supply.

SPECIFICATIONS

DTE Interface

- **Type**
  User-selectable:
  - V.11 over 4-wire
  - RS-485 over 2-wire or 4-wire
- **Data Rate**
  Up to 115.2 kbps
- **Pulse Width Distortion**
  Less than 25%
- **Transmission Mode**
  Full or half duplex, user-selectable
- **Connectors**
  RJ-45 or 5-clip terminal block (see *Ordering*)

Fiber Optic Interface

- **Transmission Line**
  Optical duplex cable
- **Transmission Mode**
  Full or half duplex
- **Optical Output Level**
  -18 dBm over 62.5/125 fiber
  -18 dBm over 9/125 fiber
- **Optical Wavelength**
  850 nm, multimode
  1300 nm, single mode (see *Ordering*)
- **Fiber Optic Connectors**
  ST, FC or SC (see *Ordering*)
- **Operating Budget**
  Up to 22 dB in full duplex (for 850 nm)
  Up to 24 dB in full duplex (for 1300 nm)

General

- **Indicators**
  TD (yellow) – Transmit data
  RD (yellow) – Receive data
  ERR (yellow) – BERT error
  RTS (yellow) – Request to Send
  DCD (yellow) – Data Carrier Detect
  TST (red) – A test is active
- **Power**
  9 VDC, 300 mA
- **Physical**
  Length: 100 mm / 3.9 in
  Height: 23 mm / 0.9 in
  Width: 53 mm / 2.1 in
  Weight: 140g / 4.9 oz
- **Environment**
  Temperature: 0–50°C / 32–122°F
  Humidity: Up to 90%, non-condensing

Declaration of Conformity

Mfr. Name: RAD Data Communications Ltd.
Mfr. Address: 12 Hanechoshet St.
Tel Aviv 69710
Israel

declares that the product:

Product Name: FOM-485

Conforms to the following standard(s) or other normative document(s):

EMC: EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
EN 50082-1 (1992): Electromagnetic compatibility – Generic immunity standards for residential, commercial and light industry.

Supplementary Information:
The product herewith complies with the requirements of the EMC Directive 89/336/EEC. The product was tested in a typical configuration.

Tel Aviv, August 3rd 1999

Haim Karshen
VP Quality

European Contact: RAD Data Communications GmbH, Berner Strasse 77, 60437 Frankfurt am Main, Germany

INSTALLATION

Caution. *Be careful when setting jumpers or performing any actions within the product so that you do not bend or break any components.*

Installation of FOM-485 is simple and straightforward. Follow these instructions:

1. Open the unit by pressing the places marked on the sides.
2. Configure the modem according to the desired mode, referring to *Figure 1* and *Table 2*.

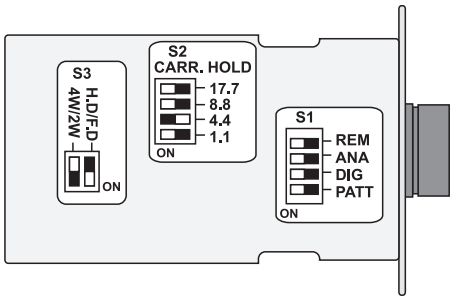


Figure 1. DIP Switch Locations

V.11 Operation (4-wire, Full Duplex)

3a. Set the H.D./F.D. switch to F.D.

4a. Set the 4W/2W switch to 4W.

5a. Set the CARR. HOLD switch to 4.4 msec.

RS-485 Operation (4-wire, Half Duplex)

3b. Set the H.D./F.D. switch to H.D.

4b. Set the 4W/2W switch to 4W.

5b. Set the CARR. HOLD switch to 4.4 msec.

RS-485 Operation (2-wire, Half Duplex)

3c. Set the H.D./F.D. switch to H.D.

4c. Set the 4W/2W switch to 2W.

5c. Set the CARR. HOLD switch according to your application requirements.

6. Close the unit by pressing the two halves of the unit together.

7. Connect the DTE:

   - For terminal block:

     Connect the 4- or 2-wire UTP or STP line, observing the following polarity:

     - **4-wire**: TDA and TDB clips are data output from the modem; RDA and RDB clips are data input to the modem (see *Figure 2*).
     - **2-wire**: RDA and RDB clips are data input/output in and from the modem (see *Figure 2*).

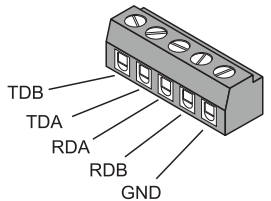


Figure 2. Terminal Block Connector Pinout

   - For RJ-45:

     Plug the cable into the RJ-45 jack (see *Figure 3*).

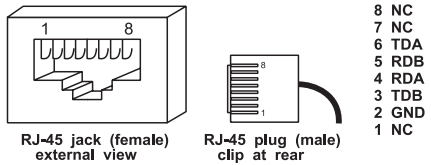


Figure 3. RJ-45 Connector Pinout

8. Connect the line:

   Remove the plastic dust caps from the fiber optic connectors, and connect the cable, observing the following polarity:

   - TX on the local modem should be connected to RX on the remote modem
   - RX on the local modem should be connected to TX on the remote modem.

9. Connect the external power supply to FOM-485, and then plug it into the mains.

Table 1. DIP Switch Settings

Switch	Switch Identity	Function	Possible Settings	Factory Setting
S3-1	H.D./F.D.	Selects the transmission mode on the DTE side	H.D. – Half duplex operation, RS-485 F.D. – Full duplex operation, V.11	H.D.
S3-2	4W/2W	Selects the operation type of the RS-485 interface	4W – 4-wire operation 2W – 2-wire operation	2W
S2-1, S2-2, S2-3, S2-4	CARR. HOLD	Selects the length of time that the modem maintains transmission when received data from RS-485 interface becomes mark or idle (carrier delay).	1.1 msec 4.4 msec 8.8 msec 17.7 msec	4.4 msec
***Note**: Set the carrier delay to 1.1 msec when working at the high data rate. For the low data rate applications, set the carrier delay to 17.7 msec.*				
S1-1	PATT	Controls the BER testing	See *Operation*	OFF
S1-2	DIG	Controls the local digital loopback	See *Operation*	OFF
S1-3	ANA	Controls the local analog loopback	See *Operation*	OFF
S1-4	REM	Controls the remote digital loopback	See *Operation*	OFF

OPERATION

- **Normal Operation**
  For normal operation, make sure that the test and diagnostic switches (S1-1, S1-2, S1-3 and S1-4) are set to OFF.

- **Tests and Diagnostics**

  BERT Test Mode V.52

  BERT enables testing of the local modem and the communication line. When the PATT DIP switch is set to ON, the modem generates and transmits standard V.52 pattern (511-bit pseudo-random) and checks its response. If errors are detected, the ERR indicator LED lights. The test can be carried out in local analog loopback, in remote digital loop, or in normal point-to-point operation, opposite a remote modem.

V.54 Diagnostics

FOM-485 features diagnostic loopbacks according to ITU V.54. The modem performs local analog loopback (ANA), local and remote digital loopback (DIG, REM). All tests are controlled by the S1-2, S1-3, S1-4 switches.

The TST LED turns on when a diagnostic loopback is active.

The ANA V.54 loopback (Loop 3) tests the local FOM-485 only. The XMT signal is returned to the receiver (see *Figure 4*).

Figure 4. Analog Loopback (ANA)

The REM V.54 loopback (Loop 2) tests the remote modem and the communication link (see *Figure 5*).

Figure 5. Remote Digital Loopback (REM)

To return to normal operation, set the test DIP switches to OFF.