12 Miniature Modems

Miniature short range modems offer a simple, low cost and highly reliable method to connect digital devices in a local, campus or metropolitan environment. They also offer very easy installation since in many cases they do not require AC power, but derive their power from the interface signals.

Miniature short range modems offer the same communications functions as AC-powered modems but with fewer features, such as limited diagnostics capability and no BER tests. Usually they operate over shorter distances at lower rates (normally up to 19.2 kbps). However, certain modems can operate at data rates up to 115.2 kbps in async transmission and up to 128 kbps in sync transmission. Like AC-powered modems, miniature modems are designed to overcome distance limitations of standard data communications interfaces such as V.24/RS-232. They also overcome noisy environments and provide ground isolation.

Miniature short range modems connect computers, terminals, bridges/routers and similar data communications devices inside buildings, campuses or within city boundaries. They support simple point-to-point communications as well as complex multipoint campus-wide systems. They also support flow control when connected to a printer or a multiplexer.

Typical communications problems, such as distance limitations and noise, are overcome by using special signal modulation and line equalization techniques that allow for error-free transmission over longer distances. RAD miniature modems have transformers to isolate the equipment from the line and ensure safety. The transformers are rated at over 1,500 VRMS and are approved by carriers worldwide for connection to their lines.

What is the difference between interface-powered and AC-powered modems?

Interface-powered and AC-powered modems perform the same basic communications functions. Interface-powered modems incorporate innovative VLSI and hybrid circuitry that enable them to consume very little power. These modems draw power from the interface signals without loading the adjacent equipment or interfering with normal operation. For computers that do not support control signals, there are special models that derive their power solely from the data signals.

How do you select the right modem for your application?

Several factors should be considered when selecting a modem:

- Computer/DTE interface: V.24/RS-232, V.35, etc.
- Communication method: sync, async or both
- Data rate
- Distance
- Media: twisted pair, coax, fiber
- Point-to-point or multipoint application
- Control signals (does the application require transmission of data only, or also transmission of one or more control signals?)
- Environment (is the environment noisy?)

A Quick Reference Guide on pages 158-159 will help you select the most suitable modem for your application.

CMN-16

Compact Modem Nest

- High density modem rack
- 2U high
- Accommodates copper and fiber optic modems
- Indicator LEDs on each card
- V.54 diagnostics available with several cards
- Redundant power supply

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The CMN-16 compact modem nest is a space-saving rack that houses up to 16 short range modem cards. Most of the cards carry two modems, doubling the capacity of the nest to up to 32 modems. The nest provides an inexpensive solution to central site racking of short range modems. In addition to short range modems, the nest supports interface converters, fiber optic modems and elastic buffers.

The CMN-16 is compatible with the SRM short range modem family and has the added capability of displaying activity on the interface signals.

The following cards are available:

CMN-C6A – dual async short range modem card, compatible with SRM-5A, SRM-6A, SRM-3A

CMN-C6AC – dual async multipoint short range modem card, compatible with SRM-5AC, SRM-6AC

CMN-C6S – sync short range modem card, compatible with SRM-5S, SRM-6S

CMN-C6SC – sync multipoint short range modem card, compatible with SRM-5SC, SRM-6SC

CMN-C6TX – dual async 2-wire short range modem card, compatible with SRM-5TX

CMN-C8 – sync/async short range modem card with V.54 loops, compatible with SRM-8, ASM-10/8

CMN-C8H – sync/async high speed short range modem card with V.54 loops, compatible with SRM-8H

CMN-CF6A – dual async fiber optic short range modem card, compatible with FOM-5A, FOM-6A

CMN-CF8 – sync/async fiber optic modem card with V.54 loops, compatible with FOM-8

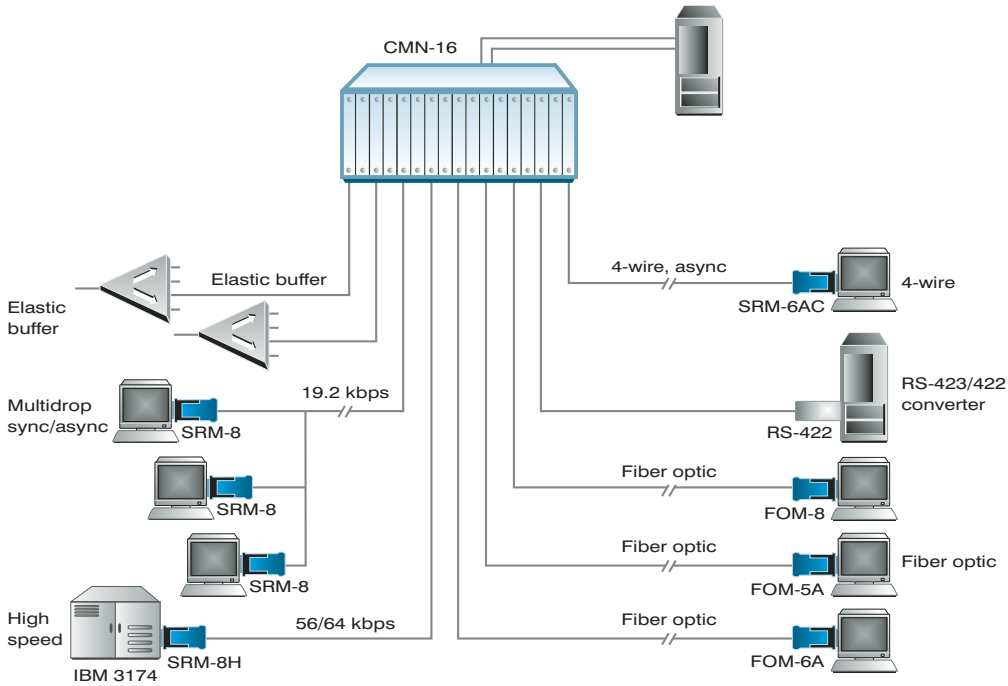
CMN-C11 – async short range modem card with V.54 loops, compatible with ASM-11, and with ASM-10/8 and SRM-8 in async mode

CMN-CEB – elastic buffer for connecting two independently clocked DCEs

CMN-C423/422 – interface converter from RS-423/V.10 to RS-422/V.11

Several plug-in power supplies are available for 115/230 VAC and –48 VDC operation. The card nest can be supplied with two totally independent plug-in power supply units, providing redundancy and automatic backup. A standalone 115/230 VAC high power version supports two card nests via cable and card connection.

The CMN-16 is available as a 19" rack mount enclosure and is 2U (3.5") high.



SRM-31S

Miniature Multirate 2-Wire Modem

- Full duplex transmission over 2 wires in synchronous transmission
- Data rates up to 128 kbps
- Transmission range up to 8 km (5 miles), independent of data rate
- Supports IDSL technology (ISDN, U interface)
- Works opposite the ASMi-31 modem, including remote control and monitoring, and LRS-24 modem rack (ASMi-31-2C)

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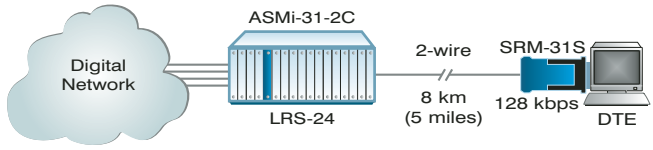
The SRM-31S miniature synchronous modem operates full duplex over a single pair of wires. It supports data rates from 1.2 kbps to 128 kbps. The transmission range is up to 8 km (5 miles) over 24 AWG cable, independent of the data rate.

IDSL technology (ISDN, U interface) provides extended range and efficient transmission over a single copper pair.

The SRM-31 can operate opposite the ASMi-31 modem, supporting remote control and monitoring. When the ASMi-31 is a card in the LRS-24 rack, the SNMP central management station can perform control and monitoring of the remote SRM-31.

Power is provided by a wall-mounted power supply that is supplied with the product.

End-to-end signaling is available with no interference to data transmission. The user can select between RTS/DCD and DSR/DTR end-to-end signaling options.



SRM-8H

High Speed Short Range Modem

- Selectable sync or async operation
- V.54 local and remote diagnostics
- Full or half duplex operation over 4 wires
- Selectable data rates: 56 or 64 kbps
- Range up to 4.5 km (2.8 miles) for 24 AWG
- Controlled or continuous carrier
- Four interfaces: RS-232/V.24, V.35, X.21, RS-530
- Four LED indicators
- Powered via wall-mount power supply
- Line connector options: terminal block, RJ-12 and RJ-45

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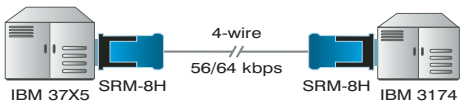

The SRM-8H is a high speed short range modem operating full duplex over twisted pair, unconditioned telephone lines. It has an extended range of 4.5 km (2.8 miles) for 24 AWG at data rates of 56 or 64 kbps.

The SRM-8H has diagnostic capabilities complying with ITU V.54 standard. Two loops are available: local analog loop and remote digital loop.

The modem's carrier can be strapped for either continuous or switched operation, controlled by the RTS signal, for passing control signals.

Transmit timing can be selected for internal, external or loopback clock. Four LED indicators monitor Transmit Data, Carrier Detect, Test and Power.

Four interface models are available: RS-232/V.24, V.35, X.21, and RS-530.

Power is provided by a standard wall-mounted power supply. Connection of modems to the line is usually via a 5-screw terminal block. Other connectors available are RJ-12 and RJ-45.

The modem is also available as a card version for mounting in a 19" rack (see the CMN-16 nest, card CMN-C8H).

Approximate Range (at 56/64 kbps)

Gauge	19 AWG (0.9 mm)	24 AWG (0.5 mm)	26 AWG (0.4 mm)
Range	10 km (6.0 miles)	4.5 km (2.8 miles)	3.2 km (2.0 miles)

SRM-5A, SRM-6A, SRM-6L

Asynchronous Short Range Modems

- SRM-5A/6A: 4-wire, full duplex
  SRM-6L: 4-wire, full or half duplex
- Internal filter for high noise immunity (SRM-5A)
- Insensitive to wire polarity (SRM-6L)
- Data rates up to 19.2 kbps
- DCE/DTE switch
- No external power required
- Transformer line isolation
- Available as a card for 19" rack (SRM-6A)

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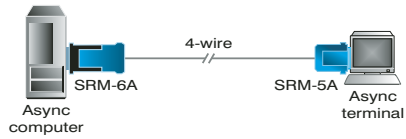
The miniature SRM-5A, SRM-6A and SRM-6L are asynchronous short range modems connecting full duplex asynchronous terminals to computers. The SRM-5A and SRM-6A operate at data rates of up to 19.2 kbps with a range of 4.5 km (2.8 miles) at 9.6 kbps. The SRM-6L operates at data rates of up to 19.2 kbps up to a range of 3.2 km (2 miles).

The SRM-5A is fully compatible with the SRM-6A and offers the same features in half the size.

The SRM-6L offers the unique feature of insensitivity to wire polarity: There is no need to observe + and – connections when using twisted pairs, making it easy to install and maintain.

The DCE/DTE switch allows operation as a DTE for connection to another DCE, without requiring a cross cable. All three units operate without external power by drawing low power from the data and control signals.

Connection to the line is through isolation transformers for protection against AC or DC overvoltages.



The SRM-5A modem is available with an internal filter (optional for the SRM-6A). The filter is designed to overcome radiated and conducted interference for high noise immunity.

The SRM-6A is also available as a card for mounting in a 19" rack (see the CMN-16 nest, card CMN-6A).

Approximate Range (for 24 AWG/0.5 mm)

Data Rate kbps	km	miles
19.2	2.0	1.2
9.6	4.5	2.8
4.8	5.0	3.0
1.2–2.4	5.5	3.4

SRM-5AC, SRM-6AC

Asynchronous Multipoint Short Range Modems

- 4-wire, full or half duplex
- Controlled carrier for multipoint
- Transfers one control signal
- Data rates up to 19.2 kbps
- Range up to 3.5 km (2.2 miles)
- DCE/DTE switch
- LED indicator for carrier detect (SRM-5AC only)
- No external power required
- Line connector options: terminal block, RJ-12 and RJ-45
- Available as a card for 19" rack

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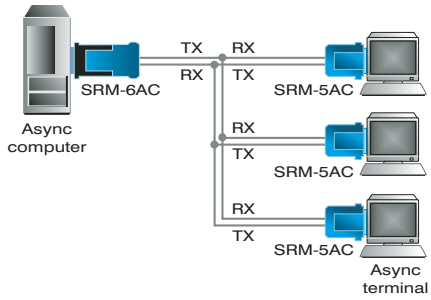
The miniature SRM-5AC and SRM-6AC are short range modems connecting full or half duplex asynchronous terminals to computers. Featuring carrier control, the modems can be used in multipoint applications and where end-to-end transfer of a control signal is required. They operate at data rates up to 19.2 kbps with a range of up to 3.5 km (2.2 miles) over 24 AWG. The SRM-5AC is a compatible sub-miniature model of the SRM-6AC, offering the same features in half the size.

The carrier can be strapped to be constantly ON, or controlled by the Request to Send signal. A switch-selectable DTE/DCE option allows the modems to operate as a DTE for connection to another DCE, without requiring a cross cable.

The modems are available with an internal filter (optional for the SRM-6AC). The filter is designed to overcome radiated and conducted interference for high noise immunity.



Connection to the line is usually via a 5-screw (4-wire and ground) terminal block. Optional connectors available for the SRM-6AC are RJ-12 and RJ-45. The SRM-5AC has both terminal block and RJ-12 or RJ-45 as its line connectors.

The modems are also available as a card for mounting in a 19" rack (see the CMN-16 nest, card CMN-C6AC).

SRM-5S

Synchronous Short Range Modem

- 4-wire, full duplex
- Selectable data rates up to 19.2 kbps
- Range up to 5 km (3.0 miles) at 9.6 kbps
- Full or half duplex, point-to-point
- LED indicator for carrier detect
- No external power required
- Line connector options: terminal block, RJ-12 and RJ-45

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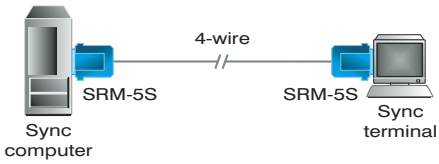

The miniature SRM-5S is a short range modem connecting full duplex synchronous terminals, controllers and computers. It operates at nine data rates up to 19.2 kbps. When operating at 9.6 kbps, the modem supports ranges up to 5 km (3.0 miles).

The modem operates without external power, by drawing low power from the data and control signals.

Connection to the line is through isolation transformers for protection against AC or DC overvoltages. Transmit timing is provided by an internal clock.

The unit has an RS-232/V.24 interface and is available with an integral male or female 25-pin connector for the DTE interface and a 5-screw (4-wire and ground) terminal block for the line.

The SRM-5S has both a terminal block and an RJ-45 or RJ-12 line connector.

The modem is also available as a card for mounting in a 19" rack.

Approximate Range (for 24 AWG/0.5 mm)

Data Rate kbps	km	miles
19.2	4.0	2.5
9.6	5.0	3.0
4.8	5.5	3.4
2.4	5.5	3.4
1.2	6.0	3.7

SRM-5SC, SRM-6SC

Sync Multipoint Short Range Modems

- 4-wire, full or half duplex
- Selectable data rates: 1.2 to 19.2 kbps
- Range up to 5 km (3 miles) at 9.6 kbps
- Transfers one control signal
- Internal, external or loopback clock
- No external power required
- LED indicator for carrier detect (SRM-5SC only)
- Line connector options: terminal block, RJ-12 and RJ-45

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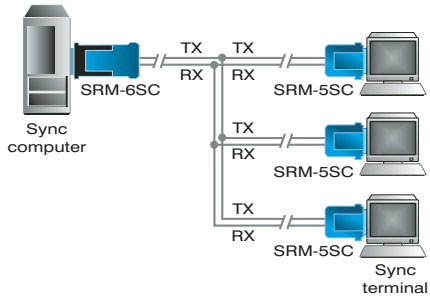
The miniature SRM-5SC and SRM-6SC are short range modems connecting full or half duplex synchronous terminals, controllers and computers in point-to-point or point-to-multipoint applications. The modems operate at data rates from 1.2 kbps to 19.2 kbps (selectable) with a range of 5 km (3.0 miles) at 9.6 kbps.

The SRM-5SC is a fully compatible sub-miniature model of the SRM-6SC, offering the same features in half the size.

Three alternative sources for transmit timing are available: internal oscillator, external clock from the terminal or loopback clock derived from the receive signal. The carrier can be strapped for continuous operation or switched operation controlled by the RTS signal.

The units have an RS-232-C/V.24 interface, and are available with a choice of a male or female integral 25-pin connector for the DTE interface and a 5-screw (4-wire and ground) terminal block for the line. Optional line connectors available for the SRM-6SC are RJ-12 and RJ-45. The SRM-5SC has both a terminal block and RJ-45 or RJ-12 as its line connectors. The modem is also available as a card version for mounting in a 19" rack (see the CMN-16 nest, card CMN-C6SC).



Approximate Range (for 24 AWG/0.5 mm)

Data Rate kbps	km	miles
19.2	4.5	2.8
9.6	5.0	3.0
4.8	6.0	3.7
1.2 – 2.4	6.5	4.0

SRM-3A

Ultra-Miniature Async Short Range Modem

- RS-232/V.24 on 9-pin connector
- 4-wire, full duplex
- Data rates up to 19.2 kbps
- Transformer-isolated
- No external power required
- Compatible with the SRM-5A and SRM-6A

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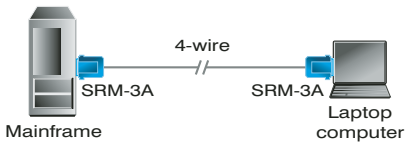

The SRM-3A is an ultra-miniature asynchronous short range modem connecting full duplex asynchronous terminals to computers. Using 24 AWG and operating at 9.6 kbps, it has an extended range of 4.5 km/2.8 miles. It typically operates at data rates up to 19.2 kbps.

The combination of the modem's miniature size and the use of a 9-pin D-type connector makes it particularly suitable for PCs, for connecting laptop computers to a mainframe and for UNIX systems such as Unisys U6000/50.

The SRM-3A is coupled to the line through isolation transformers for protection against AC or DC overvoltages. SRM-3A operates without external power by drawing low power from the DTE data and control signals. The modem will operate fully even if only Transmit Data is connected, i.e., without any control signals.

The modem connects to the DTE via a 9-pin connector, male or female. Connection to the line is via a 4-screw terminal block, RJ-11 jack or RJ-45 jack.

Approximate Range (for 24 AWG/0.5 mm)

Data Rate kbps	km	miles
19.2	1.0	0.6
9.6	4.5	2.8
4.8	6.0	3.7
2.4	7.0	4.3
1.2	7.0	4.3

FOM-485

Miniature RS-485 Fiber Optic Modem

- Converts from RS-485 to fiber
- Asynchronous transmission up to 115.2 kbps
- Transmission range up to 40 km (25 miles) over single mode fiber
- Full duplex over 4-wire or half duplex over 2-wire
- V.54 diagnostics
- LED indicators for status display

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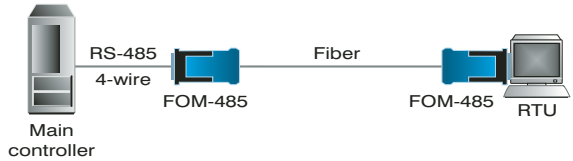
The FOM-485 is an asynchronous miniature fiber optic modem that transmits RS-485 signals over fiber optic cables. The FOM-485 is used in utility applications where there is a need to connect the main controller to a remote terminal unit (RTU).

The FOM-485 allows connection of up to 32 RTUs to a single host, at a wide range of data rates up to 115.2 kbps, at typical distances up to 40 km (25 miles) over single mode fiber.

The FOM-485 supports full duplex transmission over 4-wire or half duplex over 2-wire cables. It supports diagnostic capabilities complying with the ITU V.54 standard.

The modem has six LED indicators to display the status of the modem: TD, RD, DCD, RTS, TEST, and ERR.



FOM-9

Sync/Async High Speed Fiber Optic Modem

- Selectable sync or async operation
- Selectable data rates from 9.6 kbps to 128 kbps
- Range up to 15 km (9 miles) over single mode fiber
- Built-in BER tester and V.54 diagnostic loop support
- Carrier control mode for end-to-end signaling
- LED indicators for status display

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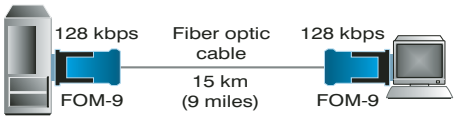

The FOM-9 is a miniature sync/async fiber optic modem operating full or half duplex over fiber optic cable. It has a range of 15 km (9 miles) over single mode fiber and operates at selectable data rates up to 128 kbps.

The FOM-9 includes a built-in BER tester that generates a 511-bit pattern and can be used for testing the link integrity. Diagnostic loopbacks according to ITU V.54 can be activated for fault isolation. Two types of diagnostic loops are supported: local analog loop and remote digital loop. The loopback options and the BER tester can be activated by toggling pin 18 or 21 on the V.24/RS-232 interface.

When set to asynchronous mode, the modem internally converts the transmission to synchronous format, in compliance with the ITU V.14 standard.

The FOM-9 includes innovative circuits that allow operation without external power, by drawing low power from the DTE data and control signals. In cases where the DTE cannot provide enough power, the FOM-9 includes a special jack that can be connected to an external AC power supply adapter.

The modem has six LED indicators to display the status of the modem: TD, RD, DCD, RTS, TEST, and ERR.

FOM-8H

High Speed Fiber Optic Modem

- Sync or async transmission at 56 kbps or 64 kbps
- V.54 diagnostics
- Range up to 4 km (2.5 miles) over multimode fiber
- Controlled or continuous carrier
- V.24/RS-232, V.35, RS-530, or X.21 interface

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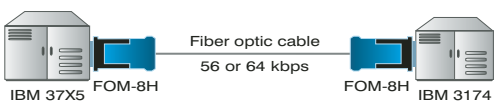

The FOM-8H is a high speed fiber optic modem operating full or half duplex over fiber optic cable. It has a range of 4 km (2.5 miles) at data rates up to 56 kbps or 64 kbps.

The FOM-8H has diagnostic capabilities complying with the ITU V.54 standard. Two loops are available: local analog loop and remote digital loop. These are activated by a manual switch or by toggling the corresponding pins of the DTE interface (not applicable with X.21 interface).

Transmit timing is provided by one of three alternative sources:

- internal oscillator
- loopback clock derived from the receive signal
- external clock from the terminal

The carrier can be strapped for either continuous or switched operation, controlled by the RTS signal.

Several interface options are available: RS-232/V.24, RS-530, X.21, or V.35. The modem has LED indicators for TD, DCD, TEST, and POWER. The FOM-8H is packaged in a lightweight plastic case.

FOM-8

Sync/Async Fiber Optic Modem

- Selectable sync or async operation
- V.54 diagnostics
- Selectable data rates up to 19.2 kbps
- Two versions: single mode and multimode
- Range up to 15 km (9 miles) over single mode fiber
- Carrier-controlled for transfer of control signal
- No external power required
- Metal case
- Card version

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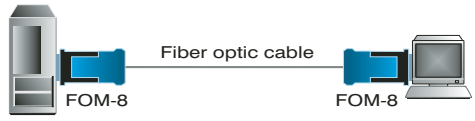
The FOM-8 is a sync/async fiber optic modem operating full or half duplex over fiber optic cable. It has a range of 15 km (9 miles) over single mode fiber and operates at selectable data rates up to 19.2 kbps.



The FOM-8 has diagnostic capabilities complying with the ITU V.54 standard.

Two loops are available: local analog loop and remote digital loop. These are activated by toggling pin 18 or 21 of the V.24/RS-232 interface.

In synchronous transmission, the transmit timing can be selected for internal, external or loopback clock. Asynchronous transmission is converted internally to sync format in compliance with the V.14 standard. Different async formats are switch-selectable.

Innovative circuitry design allows operation without external power, by drawing low power from the DTE data and control signals. The FOM-8 is packaged in a metal case for reduction of EMI/RFI emissions.

The modem is available as a card for mounting in a 19" rack (see CMN-16 nest, card CMN-CF8).

FOM-6MP

Async Fiber Optic Multipoint Modem

- Asynchronous transmission up to 38.4 kbps
- Multidrop operation over a fiber link
- Transmission range up to 46 km (28 miles) over single mode fiber
- RTS or data contention for multipoint operation
- Automatic disabling in the event of streaming
- Variety of optical options, including: multimode, single mode and laser diode for extended range

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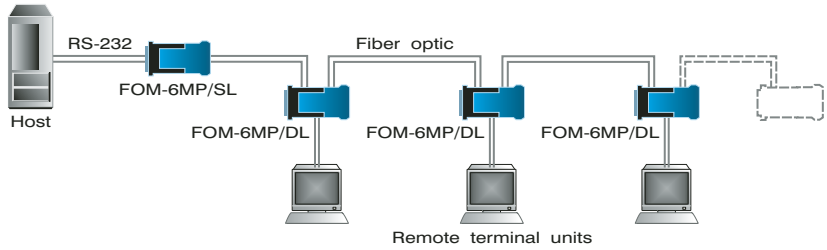
The FOM-6MP async fiber optic modem operates over fiber to connect remote terminals and computers, connected in multidrop, to a central host. Transmission range (regardless of the data rate):

- 3.5 km (2 miles) using 850 nm multimode fiber
- 30 km (18 miles) using 1310 nm single mode fiber
- 46 km (28 miles) using 1310 nm laser diode single mode fiber



The FOM-6MP contains two optical interfaces and one V.24/RS-232 port. One optical interface passes data to and from the host while the other passes data to and from the rest of the terminals in the chain. The V.24/RS-232 interface is connected to the local terminal.

Terminal contention for transmission to the host is selectable: transmitting data or raising RTS signal.

The FOM-6MP includes anti-streaming protection which prevents blockage of data transmission. The FOM-6MP disables a port that blocks the polling for a preset, user-selectable period of time.

LED indicators help the user to easily isolate faulty segments along the chain of terminals.

The FOM-6MP requires an external DC power supply of 10–30 VDC/500 mA.

FOM-6AV

High Speed Fiber Optic Modem

- Asynchronous transmission up to 57.6 kbps
- Supports any type of asynchronous characters with no need for configuration
- Transmission range up to 16 km (10 miles) over single mode fiber
- Full or half duplex
- Continuous or controlled carrier
- DTE/DCE switch
- No external power required

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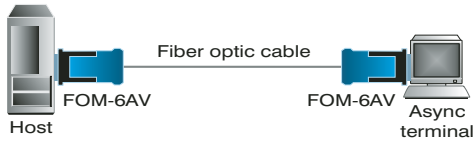
The miniature FOM-6AV high speed fiber optic modem is used for transmission of asynchronous data over fiber optic links. It operates at any data rate up to 57.6 kbps and supports any type of asynchronous characters with no need for configuration.



Transmission over fiber ensures data integrity, high immunity against EMI/RFI and data security. The modem supports ranges of up to 3 km (1.9 miles) over multimode fiber and up to 16 km (10 miles) over single mode fiber.

End-to-end signaling is available using the carrier between the modems in controlled carrier mode. When RTS is raised on one end, it causes the DCD to rise on the other end of the link.

Innovative circuitry allows the modems to operate without external power, by drawing low power from the DTE data and control signals.

The FOM-6AV has a V.24/RS-232 interface and is available with either a male or female integral D-type 25-pin connector.

The product includes an LED for indicating data transmission over the link.

The modem is available in a metal casing (ordering option) to increase data transmission security and EMI/RFI immunity.

FOM-5A, FOM-6A

Asynchronous Fiber Optic Modems

- Asynchronous transmission up to 19.2 kbps
- Transmission range up to 3 km (1.9 miles) over multimode fiber
- Full or half duplex
- Continuous or controlled carrier
- DCE/DTE switch
- LED indicator for data transmit
- No external power required
- Optional metal case (FOM-6A only)
- Available as a card for 19" rack

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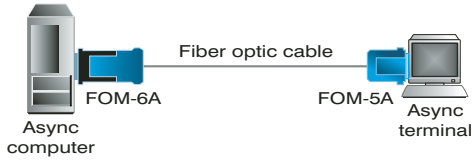

FOM-5A and FOM-6A are miniature fiber optic modems used for local data distribution, connecting full or half duplex async computers and terminals. A pair of modems ensures integrity of data transmission over multimode fiber optic cables for distances up to 3 km (1.9 miles) at data rates up to 19.2 kbps.

The FOM-5A is a sub-miniature version of the FOM-6A, offering all the features in half the size.

Innovative circuitry allows the modems to operate without external power, by drawing low power from the DTE data and control signals.

The FOM-5A and FOM-6A have a V.24/RS-232 interface and are available with either a male or female integral 25-pin connector.

The modem is available as a card for mounting in a 19" rack (see the CMN-16 nest, card CMN-CF6A).

MME, MME/V.35

Replaces Two Sync Modems

- **Data rates**
  MME: selectable up to 19.2 kbps
  MME/V.35: 56/64 kbps
- **Interfaces**
  MME: RS-232/V.24
  MME/V.35: V.35
- **Range of 100m (330 ft) on each side**
- **Selectable RTS-to-CTS delay**
- **Carrier-controlled or constantly ON**

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The MME and MME/V.35 miniature modem eliminators replace two synchronous modems, permitting direct DTE-to-DTE connection. They have a maximum range of 100 m (330 ft) on each side. MME operates at selectable data rates up to 19.2 kbps. MME/V.35 operates at 56/64 kbps, replacing high speed modems.

The MME and MME/V.35 generate the receive and transmit clocks internally for the two synchronous DTEs as well as the control signals necessary to emulate half or full duplex operation.

The delay between Request to Send and Clear to Send can be independently set (on the MME, on port 0 or 6.6, or 53 msec; and on the MME/V.35, on port 0 or 7, or 64 msec). Carrier Detect signal can be set to constantly ON, or used as a DTE-to-DTE handshaking signal where RTS on one port is converted to DCD on the other port.

Three models are available:

- **MME** requires no external power supply, drawing low power from the data and control signals. Physical connection between the MME and the DTEs is via 25-pin D-type connectors, either male or female.
- **MME/V.35** requires no external power supply, drawing low power from the V.35 control signals.
- **MME/V.35P** has a jack for connection to an external wall-mounted power supply of 9.12 VDC/200 mA. The MME/V.35P is used in applications where the DTEs do not provide the control signals necessary to power the MME/V.35.

Physical connection between the MME/V.35 and the DTEs is via two 34-pin V.35 connectors, each on a 30 cm (1 ft) cable.