



SAF CFM Series Microwave Radio System Indoor Unit

V.35 Interface Module

Installation and Configuration Guide

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Overview

Proprietary notice

The specifications or information contained in this document are subject to change without notice due to continuing introduction of design improvements. If there is any conflict between this document and compliance statements, the latter will supersede this document.

The purpose of this description is to support the user of the CFM equipment with the detailed information on the generic and technical issues regarding the installation, commissioning and configuration of the V.35 interface module.

General Features

The V.35 interface module is a device intended for use in the CFM Modular Multiplexer Indoor Units and Modular Fast Ethernet Bridge Indoor Units in order to expand it with an additional V.35 traffic interface for data transmission at speeds from 64 kbps up to 8 Mbps.

V.35 interface module is provided with M.34 standard connector.

- The V.35 module in CFM-4-MUX, CFM-16-REBM and CFM-34-REBM IDU terminates 2 Mbps from multiplexer and provides user selectable data rates of 64 kbps - 128 kbps - 256 kbps - 512 kbps - 1024 kbps - 2048 kbps to single V.35 interface on M.34 connector.
- The V.35 module in CFM-8-MUX, CFM-16-MUX IDU terminates 2-4-6-8 Mbps from multiplexer and provides user selectable data rates of 64 kbps - 128 kbps - 256 kbps - 512 kbps - 1024 kbps - 2048 kbps - 4 Mbps - 6 Mbps - 8 Mbps to single V.35 interface on M.34 connector.

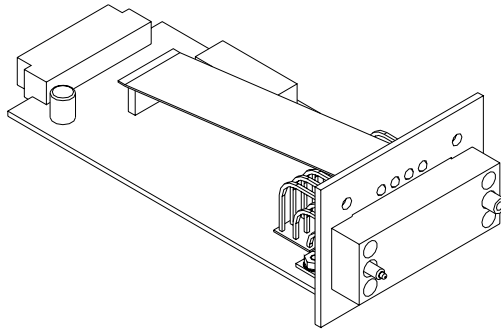


Figure 1. The V.35 Interface Module

The capacity of the module can be configured:

- Using the remote Telnet or ASCII console;
- Using the IDU LCD and keypad.

For detailed description of LEDs please refer to chapter *Hardware Features*.

The most common applications

Typical applications of CFM V.35 interface are illustrated in the Figure 2.

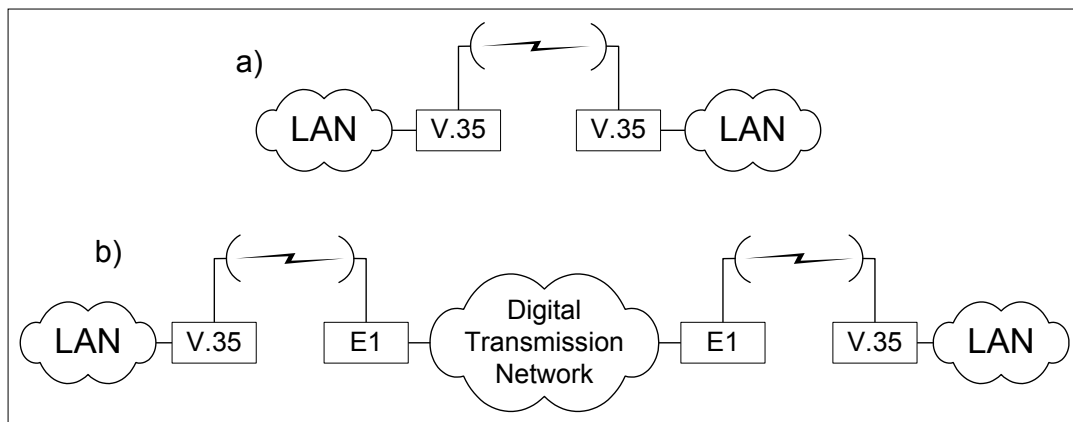


Figure 2. Applications of CFM series V.35 interface module:

- Interconnection of LANs;
- Interconnection of LANs or DTEs through any transmission (backbone) network providing E1 interfaces (Radio, fiber optics, SDH, etc).

One of the major advantages of using CFM series interface modules is potential savings on cost of equipment when it is required to interconnect two LANS or DTEs between two different network types. An example below depicts one of the possible connections between two LANs. The IDU connected to the E1 DCN substitutes the functions of E1/V.35 converter providing E1 interface.

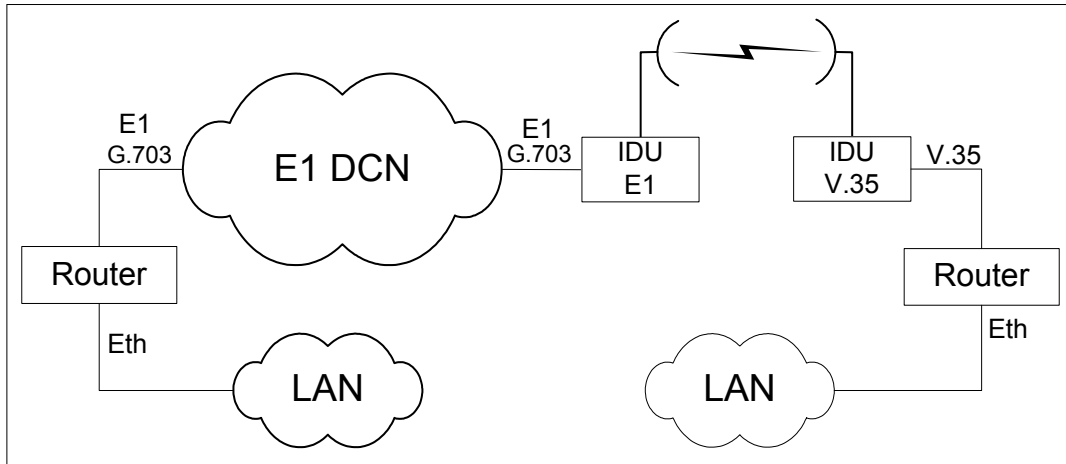


Figure 3.

Hardware Features

V.35 Interface Module LEDs

LED	Color	Name	Function	Direction
TX	Green	Data Transmitting Active	Data activity - data is being transferred from module's front port to multiplexer .	V.35 → MUX*
SL	Red	Signal Loss	V.35 port failure.	
LB	Red	Loopback Active	Loopback on V.35 module is switched on, informing that the connection between V.35 port and MUX is interrupted.	Dual, - there are actually two loopbacks active, please refer to chapter <i>Loop Test</i> for information about V.35 module loopback mode.
RX	Green	Data Receiving Active	Data activity - data is being received from multiplexer and transmitted to module front port.	MUX → V.35*

* - both TX and RX LEDs will flash simultaneously while the V.35 module loopback is switched on.

Signal Types and Pinouts

Description of V.35 interface signal types

Data transfer signals		
Signal	Direction (DCE ↔ DTE)	Description
TxC (SCT)	→	Transmit timing
SCTE	←	Timing of the transmitted data
TxD	←	Transmitted data
RxC	→	Timing of the received data
RxD	→	Received data
Note: All data transfer signals are balanced; DTE - Data Terminal Equipment DCE - Data Communications Equipment		
Control signals		
Signal	Direction (DCE ↔ DTE)	Description
DSR	→	Data Set Ready – DCE is ready.
DTR	←	Data Terminal Ready – DTE is ready.
RTS	←	Request to Send (DTE is ready to send)
CTS	→	Clear to Send (DCE is ready to receive)
DCD	→	Data Carrier Detect: DTE monitors if the DCE is intact.
Note: All control signals are unbalanced.		

V.35 Interface Connector Pinouts

There are 17 of 34 pins expedient on M34 connector.

Signal	M34 Pin	60 Pin Cisco*	Interconnectable pinouts at the Cisco equipment side:
P GND	A	46	48 & 49 50 & 51 & 52 53 & 54 & 55 & 56
S GND	B	45	
RTS	C	42	
CTS	D	35	
DSR	E	34	Notes: * This information is for the user's reference only P GND – Protection Ground S GND – Signal Ground
DCD (RLSD)	F	33	
DTR	H	43	
TxD+	P	18	
TxD-	S	17	
RxD+	R	28	
RxD-	T	27	
SCTE+	U	20	
SCTE-	W	19	
RxC+ (SCR+)	V	26	
RxC- (SCR-)	X	25	
TxC+ (SCT+)	Y	24	
TxC- (SCT-)	AA	23	

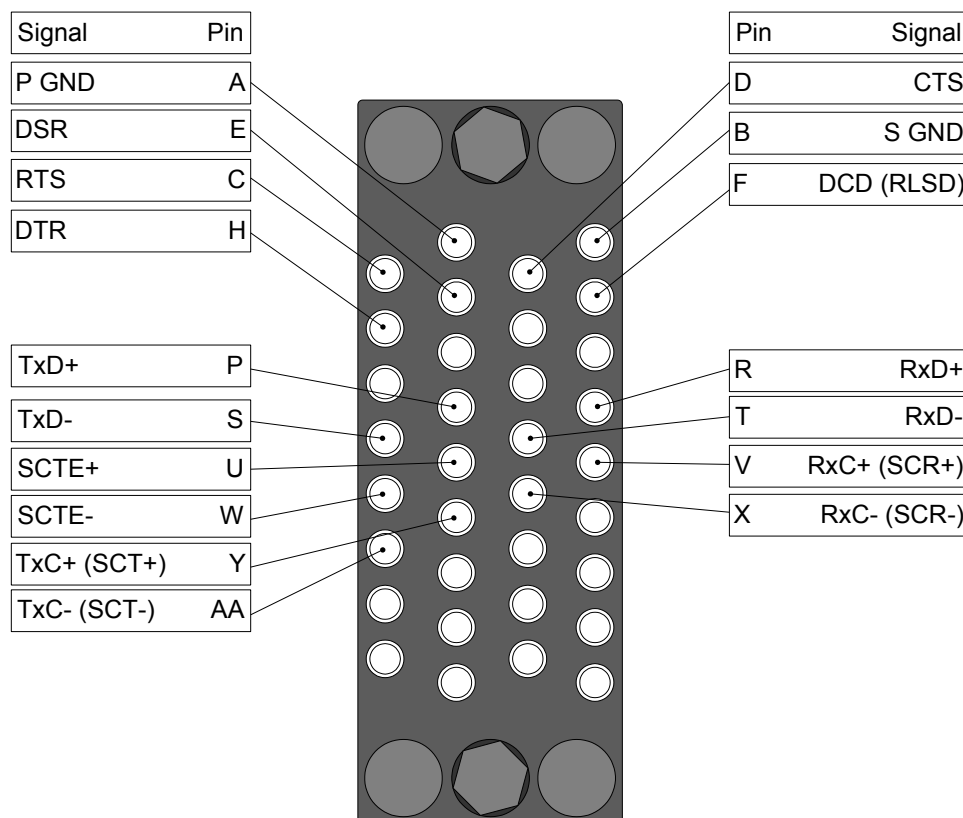
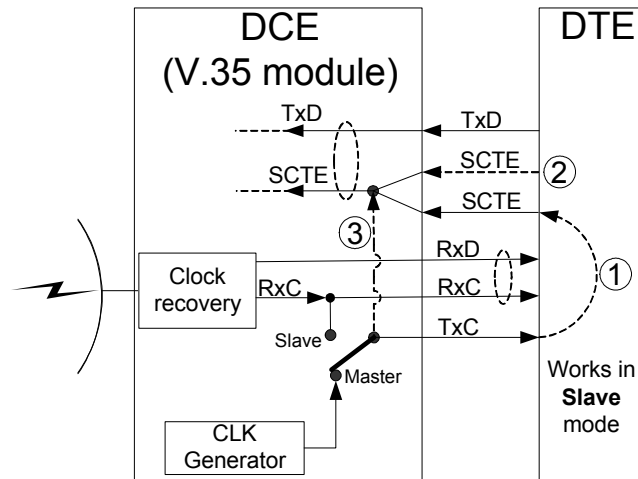


Figure 4. V.35 interface Male connector pin layout (not to scale)

Master/Slave Mode

The difference between master and slave modes is in a principled way illustrated in the Figure 5. If the DTE works as in slave mode then the DCE, when set as master, states the data transfer speed to the opposite direction by generating the clock signal from a built in generator. When set as slave, the DCE recovers clock (RxC) from the received data signal (from WAN) and sends it to DTE.



DTE - Data Terminal Equipment
DCE - Data Communications Equipment

Figure 5

Depending on the DTE there may be three scenarios:

- 1** the DTE receives TxC, recovers it and sends it to the DCE (as SCTE);
- 2** the DTE ignores TxC and generates its own unique clock;
- 3** the DTE does not transmit SCTE, the data reception from the DTE within the DCE is internally clocked.

When referring how to connect the module within the network, there are three common scenarios possible:

1. Interconnection of two DTEs that are not rooted to any far-flung or built-in independent clock, i.e., when both DTEs work in slave mode in term of synchronization. A typical example is the connection of two LANs where both DTEs work as in slave mode. The data transfer speeds from DCE1 to DCE2 and conversely are unequal if both DCEs are set as masters (both DCEs state their own transfer speed to the opposite DCE), and speeds are equal if one DCE is set as master and other as slave.

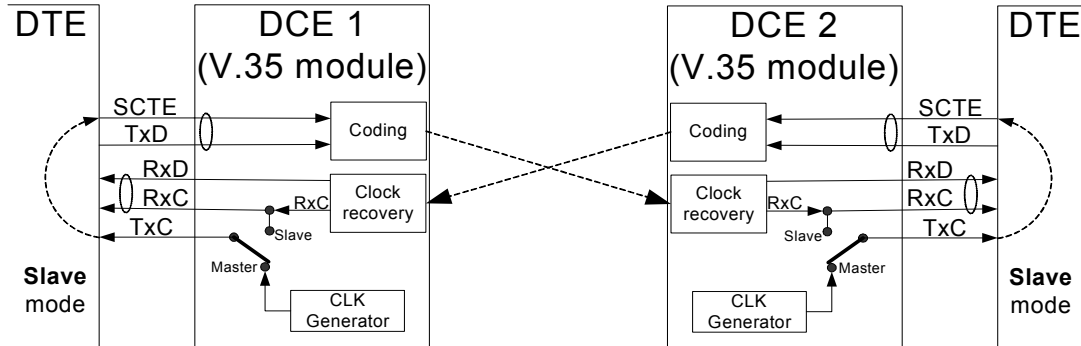


Figure 6

2. Interconnection of two DTEs that are clocked independently from a built-in or an external far-flung clocking source (Figure 7), i.e., when both DTEs work as masters in term of synchronization. Both DTEs ignore the TxC clocking signal from DCEs, hence it is unimportant whether DCEs are set as masters or slaves.

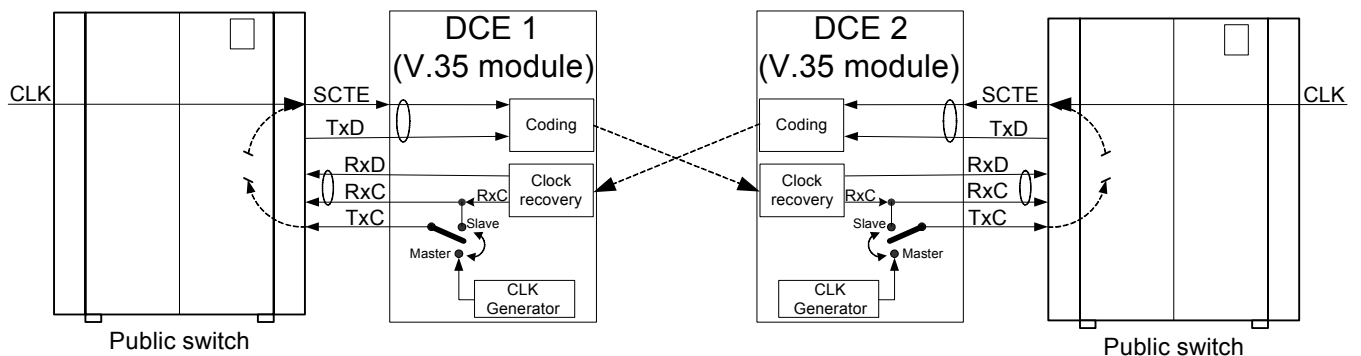


Figure 7

Interconnection of two DTEs where one DTE works in master mode and the other in slave mode. In this case to ensure synchronization between DTEs so as to have an equal transfer speed from DCE1 to DCE2 and conversely, the DCE2 should be set as slave but the setting of DCE1 does not affect the transmission.

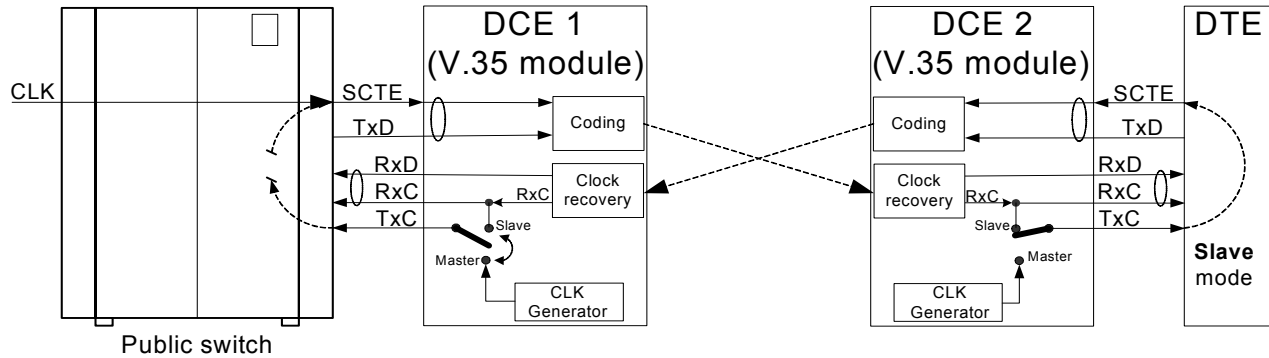


Figure 8

The master/slave mode can be set using Telnet/ASCII terminal or from IDU LCD:

- If using Telnet or ASCII console, the following command line should be used:
Mod {slot#} setV35 {Master | Slave}
 Slot# - MUX slot number, example: `Mod 2 setV35 slave`
- If setting from IDU using LCD and keypad, proceed as follows:
 Press "ENTER" to enter setup mode → select: "Modules" → select "Module # V35"
 → select "V.35 Clock" → "Change Mode", choose the mode and confirm as prompted.

Inverting Clock Signal (Phase)

Depending on the DTE receives, there may be necessity to invert phase of the timing signal for data reception (RxC) at the DTE allowing the sampling of data on either rising or falling edge. This is necessary in cases if sampling of the receiving data signal at the DTE synchronizes with the instants of the phase shift of the RxC signal (see Figure 9), - the RxC signal front matches with the RxD signal front.

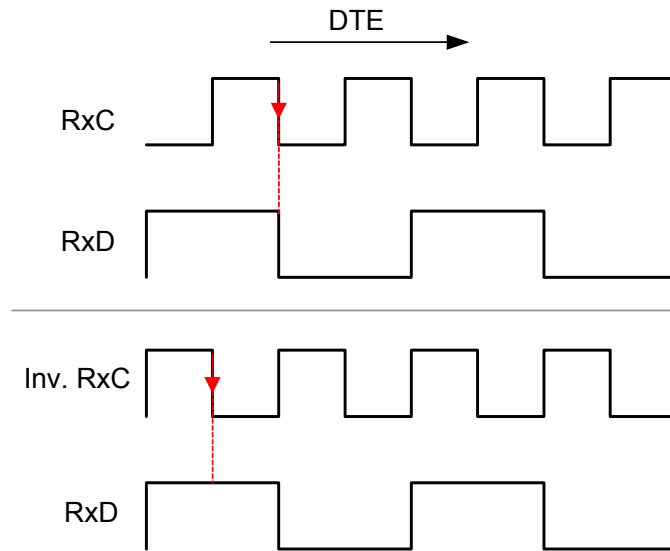


Figure 9.

The phase of the RxC signal can be changed from a Telnet/ASCII console using the following command line:

Mod {slot#} setV35 phase {Normal | Inverse}

Slot# - MUX slot number, example: Mod 4 setv35 phase normal

Inverting Incoming and Outgoing Data Signal (Polarity)

Some user equipment (DTEs) may operate with data signal which is invert to the logic used in V.35 module. To avoid the incompatibility, the outgoing and incoming data signals (data output from V.35 module and data input to V.35 module) should be inverted. This can be done from Telnet or ASCII console using the following command:

Mod {slot#} setV35 polarity {Normal | Inverse}

Loop Test

The loopback mode is activated/deactivated using Telnet or ASCII management console or from the IDU using LCD and keypad.

- Using "**Mod # setV35 loop {on|off}**" command line from the Telnet or ASCII terminal, # - MUX slot number,

Example: `mod 3 setv35 loop on 2`

- Using IDU LCD/keypad, - from status display mode do the following: Press "ENTER" to enter setup mode → select "Modules" → select "Module # V35" → select "V.35 Loopback" → "Change Loopback", switch over to ON and confirm.

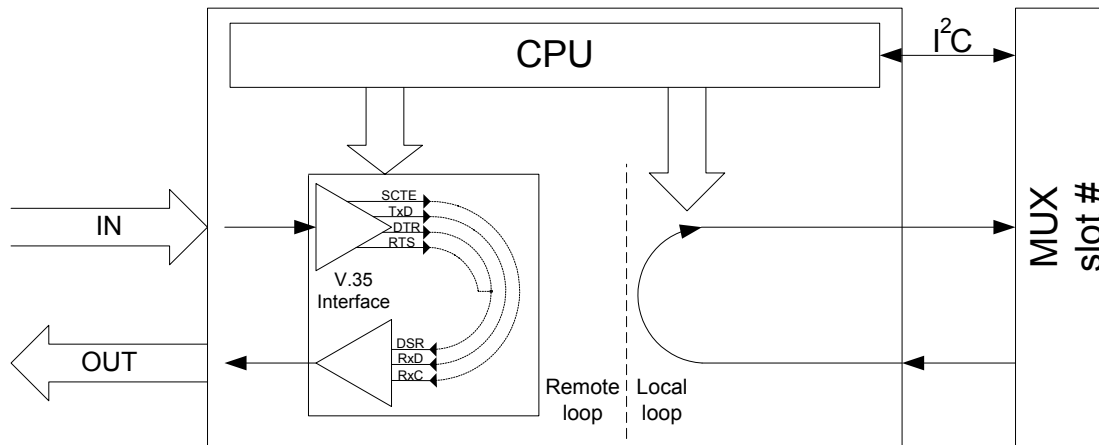


Figure 10. Dual loopback mode

The loopback mode of V.35 interface module is dual. The interface module is interconnected with the management module through the I²C data bus.

The loopback is dual if activated using one of above-mentioned methods however it can also be set manually by interconnecting the appropriate interface connector pins (see Figure 11), in this case the loopback is local (not dual).

Signal	Pin
P GND	A
S GND	B
RTS	C
CTS	D
DSR	E
DCD (RLSD)	F
DTR	H
TxD+	P
RxD+	R
TxD-	S
RxD-	T
SCTE+	U
RxC+ (SCR+)	V
SCTE-	W
RxC- (SCR-)	X
TxC+ (SCT+)	Y
TxC- (SCT-)	AA

Figure 11.

Installing the V.35 Interface Module

Required Tools

The installation requires solely the hex-head nut driver (torx 10) that is not provided as standard equipment with the module.

Inserting the Module

The following enumerates the operations for installing the V.35 module in the IDU on step-by-step approach:

- 1) Unscrew the cover of free slot or unscrew and draw out an unused module (2 hex-head screws)
- 2) Insert the module, - both side margins of the module board should be fitted in furrows on both sides of the slot,
- 3) Screw up the module with 2 hex-socket screws; this completes the physical installation of the module.

After the installation it is essentially to perform installation test by setting loopback in the V.35 interface module.

Configuring V.35 Module

There are three ways to configure the V.35 module:

- Using IDU Keypad/LCD, available parameters to configure are port speed, loopback (on\off), master\slave mode;
- Using Web Interface, available parameters to configure are port speed, loopback (on\off), master\slave mode;
- Telnet or ASCII terminal. The configuration of module is done using command interface, allowing to configure all user-changeable settings: port speed, loopback on\off, master\slave mode, phase (normal\inverse), polarity (normal\inverse).

Configuring parameters using LCD and keypad

From status display mode do the following:

Press "ENTER" to enter setup mode → select "Modules" → select "Module # V35" →

- ...to change port speed: select "V.35 Speed" → "Change Speed", choose the capacity as necessary and confirm as prompted;
- ...to switch the loopback on\off: select "V.35 Loopback" → "Change Loopback", choose *on* or *off* as necessary and confirm as prompted;
- ...to switch between master\slave modes: select "V.35 Clock" → "Change Mode", choose *master* or *slave* as necessary and confirm as prompted;

- number of the IDU slot, where the V.35 module is installed.

Configuring parameters using Telnet or ASCII terminal

The following table lists all available commands for V.35 module configuration, using Telnet terminal or ASCII console.

Command	Description
Mod {1 2 3 4} setV35 speed {64 128 256 512 1024 2048 4096 6144 8192}	Set the speed of V.35 interface (in kbps). The maximum V.35 interface speed in the CFM-4-MUX is 2048 kbps.
Mod {1 2 3 4} setV35 phase {normal inverse}	Invert the RxC clock signal (it is transmitted from V.35 module to user equipment)
Mod {1 2 3 4} setV35 polarity {normal inverse}	Invert the incoming and outgoing data signals (RxD - outgoing, TxD - incoming) between DCE (module) and DTE (user equipment).
Mod {1 2 3 4} setV35 loop {on off}	Set the loopback mode of V.35 interface module.
Mod {1 2 3 4} setV35 {Master Slave}	Set the sync status of V.35 interface module, ie. master or slave. Example: Mod 2 setV35 slave

Note: Before changing V.35 port speed, make sure the MUX slot speed configuration correctly conforms the speed setting of V.35 module.

Troubleshooting

In case of failure the following procedures should be performed as means of fault tracing or detection and diagnosing:

- Checking for conformity of pinouts,
- Analysis of interface status LEDs at the DCE and DTE sides,
- Performing loopback tests.

The user should himself draw consequences on the reasons of malfunction using the above-mentioned methods.

If interface loop test is negative, - DTE does not detect it (or produces dissatisfactory results) the user should take heed on interface status LEDs and pinout compatibility:

- Check if any of LEDs is in red (constant or flickering) including radio alarm LEDs and resolve accordingly. For information on LEDs refer to page 6.
- Check if the connector pinouts match the cable pinouts and replace the cable or modify connectors if necessary. This is the most common fault. For information on V.35 interface connector pinouts refer to page 8.
- Make sure the port of DTE is properly configured and port LEDs do not indicate any faults.
- Check if the master/slave setting of the module is correct.
- Change the phase of the clock signal.

The following lists most prospective causes of malfunction:

- Cable between DTE and DCE is faulty,
- Pinout incompatibility between DTE and DCE,
- MUX slot speed configuration does not match the module speed setting,
- Incorrect master/slave settings between DTE and DCE;
- Wrong sampling of the receiving data signal at DTE - the phase of the clocking signal should be inverted.

Mechanical Data

Weight [g]	Dimensions HxWxD [mm]
86	43x59x139

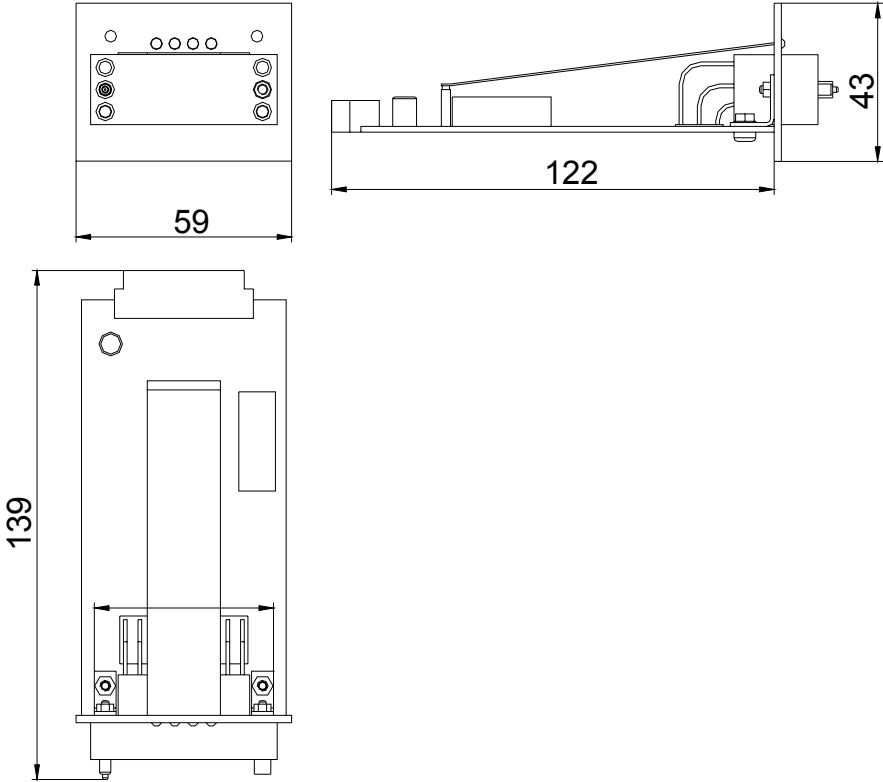


Figure 12. Dimensions of the V.35 interface module

SAF Tehnika Contacts

Most up to date contacts of SAF Tehnika A/S could be found at Web site www.saftehnika.com.

SAF Tehnika A/S technical support could be reached at:

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Abbreviations

DCE Data Communications Equipment
DCN Digital Communications Network
DTE Data Terminal Equipment
IDU Indoor Unit
ODU Outdoor Unit
LAN Local Area Network
MUX Multiplexer

Revision History

Revision	Date	Comments
1.0	October, 2003	
1.1	December, 2003	
1.2	January, 2004	
1.3	November, 2004	