

# SIEMENS

## TC35 Terminal

### User Guide



[www.siemens.com/wm](http://www.siemens.com/wm)

be inspired

Wireless  
Modules



## Safety information

Radio devices have limitations in the vicinity of electronic devices:



- Switch the TC35 Terminal off when you are in a hospital or near medical devices like pacemakers or hearing aids. The Terminal may interfere with the operation of these devices.



- Switch the TC35 Terminal off when flying. Secure it so that it cannot be switched on inadvertently.



- Switch the TC35 Terminal off when you are near petrol stations, fuel depots, chemical plants or blasting operations. The Terminal can disturb the operation of technical equipment.



- Interference can occur if the device is used near televisions, radios or PCs.
- In order to avoid possible damage, we recommend that you only use the specified accessories. These have been tested and shown to work well with the Terminal. However, the warranty does not cover these accessories.

**The warranty does not apply in the event of improper use.**

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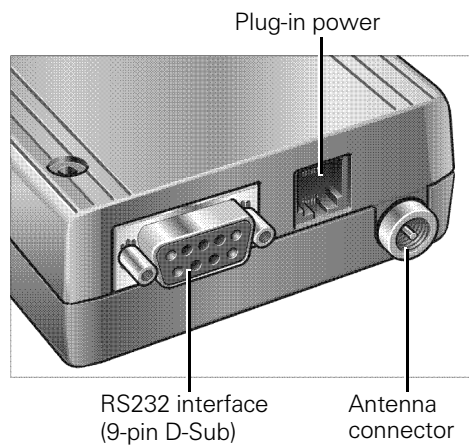
## Contents

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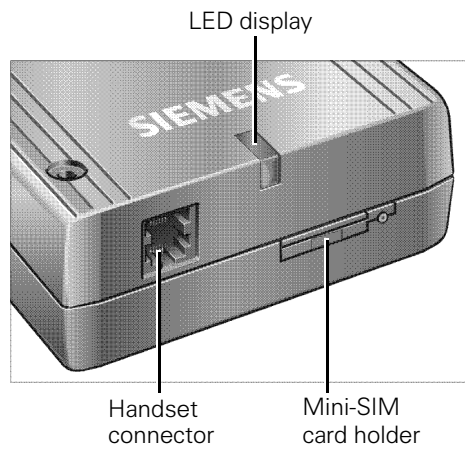
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## Overview

Front view



Rear view



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## Product description

The TC35 Terminal is a compact GSM modem for the transfer of data, voice, SMS and faxes in GSM networks. Industrial standard interfaces and an integrated SIMcard reader mean it can be used rapidly, easily and universally as a dual band GSM Terminal. Its performance band width and the robust housing make it easier to quickly implement new applications in areas such as telemetry and telematics.

The features, functions and interfaces of the GSM Terminal TC35 T are described below.

The functionality of the Terminal corresponds to the features of the TC35 module, to which a SIM card reader, an RS232 interface, an analog interface for the handset interface and a greater supply voltage range have been added.

All the external interfaces of the GSM Terminal TC35 T are integrated permanently in the housing. The plug-in connections are standardised and suitable for use under vibration.

## Product description

- Highlights**
- Dual-band EGSM900 / GSM1800
  - Data, voice, SMS and fax
  - R&TTE approval, GCF approval
  - Easy to integrate
  - Industrial interfaces
  - LED display
  - Wide input voltage range
  - Highly compact, light and powerful

- Applications**
- Fleet management
  - Teleservice
  - Security systems
  - Telematics
  - Telemetry
  - Remote monitoring
  - Remote meter reading
  - Vending machines



## Features

- Product data**
  - Dual-band EGSM900 and GSM1800
  - Certified in accordance with GSM phase2/2+
  - Output performance:
    - Class 4 (2 W) for EGSM900
    - Class 1 (1 W) for GSM1800
  - Control via AT commands
  - Input voltage range +8V ... +30V
  - Dimensions: 65 x 74 x 33mm
  - Weight: approx. 130g
- Certification**
  - R&TTE approval
  - GCF approval
- Audio**
  - Half rate (HR)
  - Full rate (FR)
  - Enhanced full rate (EFR)
- SMS**
  - Point-to-point MT and MO
  - SMS cell broadcast
  - Text and PDU mode
- Data**
  - CSD up to 14.4kbps
  - USSD
  - Non-transparent mode
  - V.110, V.32
- Fax**
  - Group 3, classes 1, 2

## Features

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- Supplementary services**
- Phone book
  - Multiparty
  - DTMF (Dual Tone Multi Frequency)

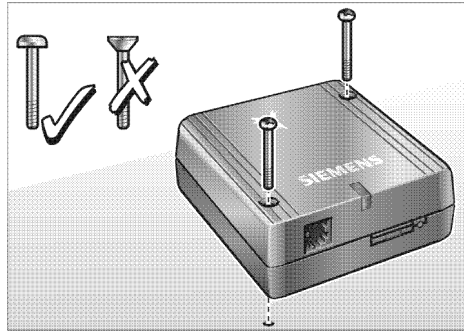
- External interfaces**
- Connector for plug-in power supply unit
  - Handset audio interface
  - Mini-SIM card holder
  - Antenna connector FME (male)
  - RS232 interface (V.24/V.28 on the Sub-D socket)

- Accessories**
- Antennae, SIM cards, power supply units, RS232 cables, handsets and a mounting kit for top-hat rails can be obtained from different manufacturers. Recommended suppliers are listed in the corresponding interface description.

## Installation

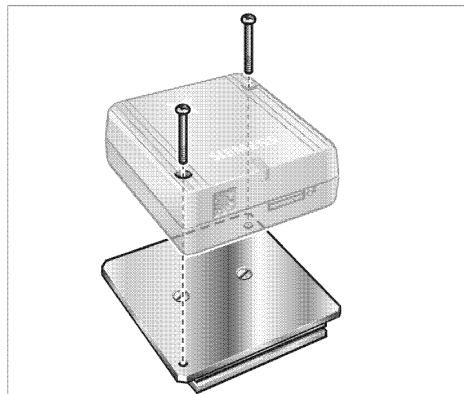
- Package contents / scope of delivery**
- Package unit:  
TC35 Terminal and user guide L36880-N8600-A100
  - TC35 Terminal S30880-S8600-A10
  - User guide A31008-H8600-A1-\*7619
- Safety and installation information**
- The Terminal should be installed and set up only by qualified personnel.
  - Connect a fast 1.25A fuse to the incoming line for the positive supply voltage to protect the Terminal.
  - If a power supply unit is used to supply the TC35 Terminal, it must meet the demands placed on SELV circuits in accordance with EN60950. When using batteries and accumulators, adhere to the relevant regulations.
  - The maximum permissible connection length between the TC35 Terminal and the supply source is 3m.
  - Your supplier will be pleased to provide you with a detailed technical description and technical support for the SIEMENS TC35 Terminal.
- Attaching the Terminal**
- The TC35 Terminal can be attached with two screws. Use screws approx. 50 mm long and Ø 3mm. The TC35 Terminal can be attached to a top-hat rail using an additional fixture (see the following page).

## Installation



### Mounting kit for top-hat rail installation

The TC35 Terminal can be attached to a 35mm top-hat rail using this mounting kit. There are two screws that are used to fix the top-hat rail adapter to the TC35 Terminal. The TC35 Terminal can be inserted onto the top-hat rail using this adapter.



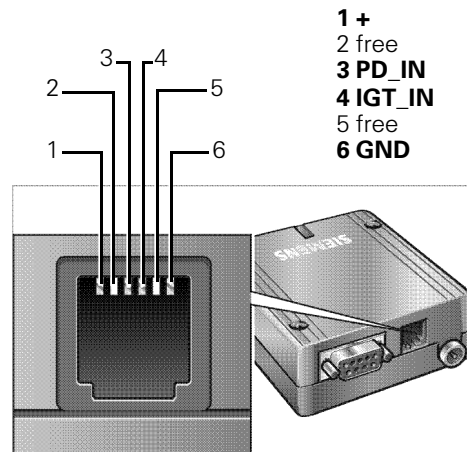
## Interface description

The following interfaces are available on the TC35Terminal:

- Connector for the plug-in power supply unit
- Handset connector
- Mini-SIM card holder
- Antenna connector FME (male)
- RS232 interface (V.24/V.28 on the D-Sub socket)

**Plug-in power supply unit** The TC35 Terminal receives its power supply in a wide voltage range (+8 V ... +30 V) via the power supply connectors. Two additional control lines are used for switching the Terminal on/off (resetting). The connection is implemented by a 6-pin Mini-Western connector.

### Connector for the plug-in power supply unit



## Interface description

### Purpose of the connectors/connections

| Signal name | PIN | I/O | Description  | Parameters                                       |
|-------------|-----|-----|--|--|
| +           | 1   | I   | Positive supply voltage connection   | +8V...+30V<br>max. 33V for 1 min                 |
|             | 2   |     | Free   |  |
| PD_IN       | 3   | I   | Reset input<br><i>high active</i>  | $U_{IH} > +5V$<br>( $>3.5s$ )<br>$U_{IL} < +2V$  |
| IGT_IN      | 4   | I   | Ignition input<br><i>high active</i>   | $U_{IH} > +5V$<br>( $>200ms$ )<br>$U_{IL} < +2V$ |
|             | 5   |     | Free   |  |
| GND         | 6   | I   | Negative supply voltage connection<br>Reference potential for PD_IN and IGT_IN | 0V   |

### Use and operation

The power supply is implemented by the **+** and the GND wire. To switch the TC35 Terminal on, proceed as follows:

- Either activate the DTR control line via the RS232 interface
- Or connect IGT\_IN to **+**. This connection has already been set up in the specified plug-in power supply unit below, see "Connectible plug-in power supply unit" on page 14.

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## Interface description

### **Polarity reversal protection**

Polarity reversal protection is implemented by means of a power diode. The diode has a reverse voltage of 400V.

### **Overvoltage protection**

Overvoltages are suppressed by a Zener diode after the polarity reversal protection diode.

### **Fuses**

A permanently installed, non-replaceable fuse in the TC35 Terminal ensures electrical safety in the event of faults. Connect a fast 1.25A fuse to the supply line of the positive supply voltage for general protection of the Terminal, see "Safety and installation information" on page9.

## Interface description

### Interference immunity

- The cable length must not exceed 3m
- Current carrying capacity <1.5A (Western modular jack)
- Nominal signal range: 0...+30V
- Max. load current 1.5A
- Electrical fast transient burst requirements in accordance with ETS 300-342-1
- Surge immunity requirements in accordance with ETS 300-342-1
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80MHz in accordance with ETS 300-342-1
- Transients and surges in a vehicular environment
- Voltages dips and interruption

### Connectible plug-in power supply unit

| Item  | Order no. | Supplier   |
|---|-----------|--|
| Plug-in power supply unit for the TC35 Terminal | 39001     | Sphere Design<br>Saarpfalz-Park 10<br>D-66450 Bexbach Saar<br>Tel.: +49 6826 / 5200-0<br>Fax: +49 6826 / 5200-25<br>E-mail: info@spheredesign.de |



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## Interface description

**Handset connector** The handset is connected via a 4-pin Mini-Western socket. The audio interface has a symmetrical design. The audio interface can be configured by AT commands. Three audio modes are prepared in the GSM module for this purpose.

**Mode 1 (default):**

The "Handset for Cellular Engine Siemens Terminal M20T, MC35T, TC35T, DSB35" can be connected to the TC35 Terminal (approved configuration and recommended handset).

**Mode 4:**

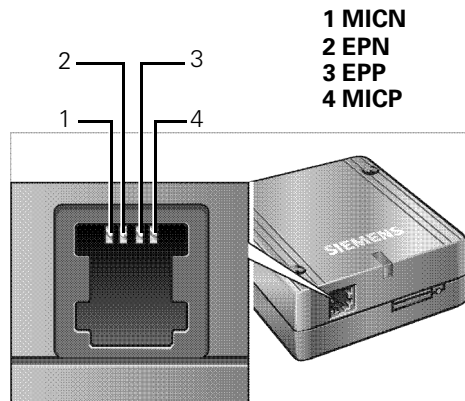
Any handset can be connected to the TC35 Terminal. The audio parameters can be adapted by means of AT commands. New approval must be obtained for this combination.

**Mode 5:**

The frequency responses have a linear setting in this mode for any audio equipment. Echo suppression and side tone are switched off.

## Interface description

### Handset connector



### Purpose of the connectors/connections

| Signal name | PIN | I/O          | Description            | Parameters  |
|-------------|-----|--------------|------------------------|---|
| MICN        | 1   | DC:O<br>AC:I | Microphone input minus | DC (no load):<br>$U_0 = 6.0V \pm 10\%$ (MICP)<br>$U_0 = 0V$ (MICN)<br>$R_i = 4.7k$ (MICP)<br>$R_i = 4.7k$ (MICN)<br>AC: $U_{imax} = 1.03V_{PP}$<br>$Z_i = 2k\Omega$<br>Gain range: 0...42dB |
| MICP        | 4   | DC:O<br>AC:I | Microphone input plus  |   |
| EPN         | 2   | O            | Earpiece connector     | $U_{0max} = 3.7V_{PP}$ no load<br>$R_i = 15\Omega$  |
| EPP         | 3   | O            | Earpiece connector     | Gain range: -18...0dB   |

## Interface description

### Use and operation

A connected handset can be used when the customer application initiates the TALK state with AT commands via the RS232 interface.

### Interference immunity

- The connecting cable must not exceed 3m in length.
- Electrical fast transient burst requirements (cable is >3m)
- Surge immunity requirements not specified
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80MHz in accordance with ETS300-342-1

### Connectible handset

| Item   | Order no.             | Supplier  |
|--|-----------------------|---|
| Votronic handset<br>Handset for<br>the TC35 Terminal | HH-SI-30.3/<br>V1.1/0 | Votronic GmbH<br>Saarbrücker Str. 8<br>D-86386 St. Ingbert<br>Tel.: +4968949255-44<br>Fax: +4968949255-88 |

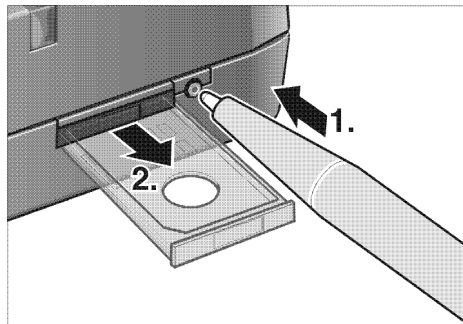
## Interface description

### **SIM card connector**

The connector is intended for 3V SIM cards in accordance with GSM11.12 phase2 to operate the Terminal.

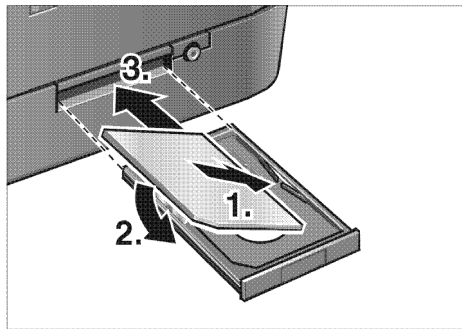
The SIM card (3V type) must be inserted in the card holder to put the TC35 Terminal into operation.

1. Make sure that there is no voltage applied to the TC35 Terminal.
2. Operate the eject mechanism (yellow pin next to the card holder) to open the card holder by pressing it down with a pen, for example.



## Interface description

3. Insert the SIM card in the SIM card holder and push it back into the housing.



## Interface description

### Purpose of the connectors/connections

| Signal name | PIN | I/O | Description of the GSM module connectors                   | Parameters  |
|-------------|-----|-----|--|---|
| CCIN        | 24  | I   | Input for detection of the SIM card;<br><i>high active</i> | $R_i = 100\text{ k}\Omega$ to GND<br>$U_{iLmax} = 0.4\text{ V}$<br>@ $I = 0.1\text{ mA}$<br>$U_{iHmin} = 1.95\text{ V}$<br>$U_{iHmax} = 3.3\text{ V}$ |
| CCRST       | 25  | O   | Restart  | $R_0 = 220\Omega$   |
| CCIO        | 26  | I/O | Date input/output  | Input: $R_i \geq 1\text{ M}\Omega$<br>Output: $R_0 = 220\Omega$   |
| CCCLK       | 27  | O   | Clock  | $R_0 = 220\Omega$   |
| CCVCC       | 28  | O   | Supply voltage   | $CCVCC_{min} = 2.84\text{ V}$<br>$CCVCC_{max} = 2.96\text{ V}$<br>$I_{max} = 50\text{ mA}$  |
| CCGND       | 29  | X   |  |   |

### Use and operation

A SIM card holder from Molex with a SIM\_IN contact is used. Only when the card holder is inserted is the switched closed.

The card can only be replaced when the GSM engine is in the POWER DOWN state.

## Interface description

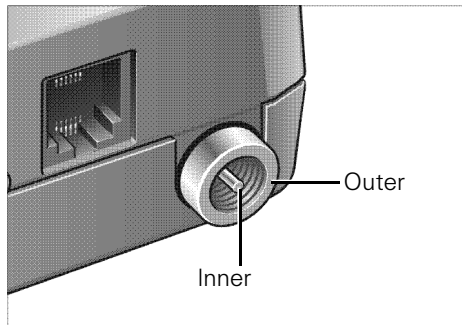
The Bootbox BB35 enables software to be updated via the SIM interface. The Bootbox is connected instead of a SIM card (see "Bootbox BB35" on page33).

### Interference immunity

Electrostatic discharge requirements in accordance with ETS 300-342-1

**Antenna connector FME (male)** A dual band antenna (GSM 900/1800) can be connected to the RF interface. The connection is implemented as a 50Ω FME (male) coaxial jack.

### Antenna connector



### Purpose of the connectors/connections

| Signal name | PIN   | I/O | Description      |
|-------------|-------|-----|------------------|
| RF          | Inner | I/O | RF input/output  |
| GND         | Outer | X   | Frame connection |

## Interface description

### Transmission type and method

- Digitally modulated RF burst signal
- GMSK in accordance with GSM05.04
- Half duplex
- Bidirectional

### Interference immunity

- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Electrical fast transient burst requirements (cable is >3m)
- Surge immunity requirements not specified
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80 MHz in accordance with ETS300-342-1

### Connectible antenna

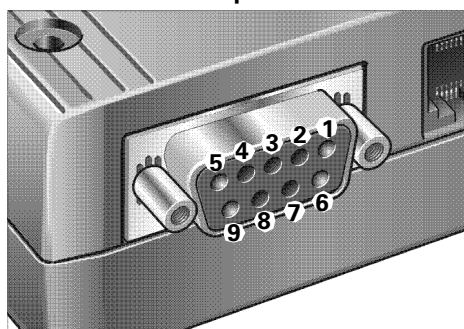
| Item  | Order no. | Supplier  |
|---|-----------|---|
| Dual-band antenna (900/1800MHz)<br>Magflex Dual | 300574    | Dynaflex Antennen<br>Vertriebs GmbH<br>Genker Str. 16<br>D-53842 Troisdorf<br>Tel.: +49 224195124-70<br>Fax: +49 224195124-77 |



## Interface description

**RS232 interface** The RS232 interface is the interface for the application software and the connection to the PC. The customer application communicates with the TC35 Terminal or the TC35 GSM engine by means of ATcellular commands. The RS232 interface is implemented as a 9-pin D-Sub socket with a screw fitting.

### RS232 interface – 9-pin D-Sub



## Interface description

### Purpose of the connectors/connections

| Signal name | PIN | I/O | Description  | Parameters                                |
|-------------|-----|-----|--|---|
| DCD         | 1   | O   | The functions correspond to those of a serial interface on the basis of a V.24 protocol. | active high >5V<br>low <-5V               |
| RXD         | 2   | O   |  | logical 1=low <-5V<br>logical 0=high >+5V |
| TXD         | 3   | I   |  | active high >2.4V<br>low <1.8V            |
| DTR         | 4   | I   |  | active high >2.4V<br>low <1.8V            |
| GND         | 5   |     |  | 0V  |
| DSR         | 6   | O   |  | active high >5V<br>low <-5V               |
| RTS         | 7   | I   |  | active high >2.4V<br>low <1.8V            |
| CTS         | 8   | O   |  | active high >5V<br>low <-5V               |
| RI          | 9   | O   |  | active high >5V<br>low <-5V               |

### Use and operation

In order to control the Terminal and transfer data, the customer application (e.g. host computer) is connected via the RS232 cable.

## Interface description

### Interference immunity

- The connecting cable must not exceed 1.8m in length.
- Nominal signal range:  $\pm 15V$
- Max. load current 1A
- Electrical fast transient burst requirements not specified
- Surge immunity requirements not specified
- Electrostatic discharge requirements in accordance with ETS 300-342-1
- Immunity RF common mode 0.15–80MHz in accordance with ETS300-342-1

### Connectible RS232 connecting cable

| Item   | Order no. | Supplier   |
|--|-----------|--|
| RS232 connecting cable<br>9-pin D-Sub<br>extension 1:1 | 300574    | Tecline<br>Behrener Str. 8<br>D-66117 Saarbrücken<br>Tel.: +49(0)68192678-29<br>Fax: +49(0)68192678-50 |

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## Startup

Before startup, the components required for your application must be connected. The SIM card must be inserted in a deenergized state.

The TC35 Terminal is ready for operation when supply voltage is applied and the ignition line is activated. If the recommended plug-in power supply unit is used, the ignition line is already connected to the supply voltage line, and the TC35 Terminal is thus immediately switched to the active state. It starts the network search and registers with network operator. Please read the following conditions for switching the Terminal on and off:

### Switching on Terminal

Simply applying supply voltage (+ to pin 1 and GND to pin 6) alone is not enough to switch on the TC35 Terminal.

It can be switched on in two different ways:

#### **Activation of the IGT\_IN ignition signal on the power supply connection**

The switching regulator is switched on with the IGT\_IN=high signal. When the switching regulator is switched on, VBAT is generated as the operating voltage for the GSM module. This still does not activate the GSM module. Triggered by VBAT, a transistor switch generates the IGT ignition signal with a delay of approx. 100ms for the GSM module. Only then is it switched on. (It exits the POWER DOWN operating state.)

## Startup

In its energized state, the GSM module provides the supply voltage (VDD). VDD ensures that the switching regulator remains on, even when its closing condition is lost (i.e. IGT\_IN=low).

Explanation:

VBAT=operating voltage for the GSM module

VDD=supply voltage from the module

### **Activation of the RS232 control line DTR**

The TC35 Terminal can be switched on in the same way as via IGT\_IN by activating the RS232 control line DTR (high signal).

### **Note**

The TC35 Terminal is switched on immediately using the recommended plug-in power supply unit (see the above explanation on startup).

### **Switching off / resetting the Terminal**

The Terminal can be switched off in two different ways:

#### **Using a software command by means of an AT command**

A software shutdown via an AT command is always advisable for a controlled shutdown of the TC35 Terminal. In this case, the GSM module signs off before the watchdog condition results in the specific switching off of the supply voltages.

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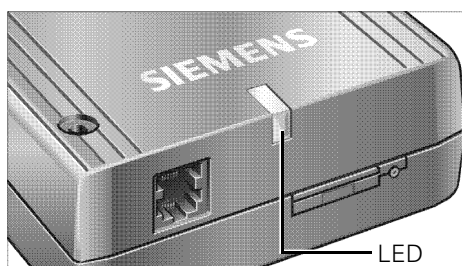
## Startup

### **Activation of the PD\_IN reset signal on the power supply connection**

The POWERDOWN line on the GSM module is connected to the watchdog input pin of the power supply ASIC, which can only be switched off by changing the watchdog condition. To do this, the PD\_IN Terminal reset line is active (high) for at least 3.5s. This results in immediate, "hard" disconnection, with the TC35 Terminal unable to sign off correctly from the base station in the STANDBY and TALK operating states .

In the case of this hardware shutdown, the software is no longer able to respond before the voltage is switched off. This corresponds to a direct, unannounced disconnection of the operating voltage. In the application you can switch off or reset the module without interrupting the input voltage supply.

## Operating states / LED



The LEDs display the following operating states of the Terminal:

| Operating state  | LED             |
|--|-----------------|
| After connecting the plug-in power supply unit   | On for 2 s      |
| POWER DOWN   | Off             |
| – Network search or<br>– no SIM card is inserted<br>or<br>– no PIN is entered<br>(via PC) or<br>– no GSM network is<br>available | Flashes rapidly |
| STANDBY<br>(registered in the network)   | Flashes slowly  |
| Connection (TALK)  | On              |

---

## Operating states / LED

**Note:**

Usually, the network search takes only a few seconds till the Terminal is registered. If the flashing continues, this means that no SIM card is inserted, no PIN number is entered or no GSM network is available.

**POWER DOWN** Once the operating voltage is applied (+ and GND), the TC35 Terminal is in the POWER DOWN state.

The operating voltage for the GSM module is disconnected (the switching regulator is off). In other words, the software of the GSM module is not active.

A transition to the POWER DOWN state always occurs in the following circumstances:

- When the Terminal (module) is shut down by means of AT commands (e.g. sleep mode).
- When the external reset line is active.



## Operating states / LED

|  |   |
|--|---|
| <b>Network search<br/>(no SIM card,<br/>no PIN number,<br/>no GSM network)</b> | <p>In the network search state, the TC35 Terminal searches for a GSM network. All the components in the GSM Terminal (module) that are not required are shut down in several stages by the energy-saving software.</p> <p>This state is reached:</p> <ul style="list-style-type: none"><li>• From the POWER DOWN state: by an active ignition (on) signal at the power supply connection or</li><li>• From the TALK or STANDBY state: when the network is lost (out of range)</li></ul> |
| <b>Standby</b>   | <p>In the STANDBY state, the TC35 Terminal is ready to send and receive and registered in the network. Paging is performed with the GSM network in order to obtain synchronisation with the GSM network (repetition rate dependent on the BSPA_Mutiframe=2...9 parameter). All the components that are not required are shut down in several stages by the energy-saving software. Power consumption in this state depends on the current network availability.</p>                     |
| <b>Talk</b>  | <p>In TALK mode a connection has been established between two subscribers via the GSM network. Power consumption is at the maximum and depends on the GSM network availability and several connection settings (e.g. DTX off/on, FR/EFR/HR, hopping sequences and antenna coupling).</p>  |

## AT command control

The TC35 Terminal is controlled and programmed by means of AT commands. The AT command structure corresponds to the TC35 module used. The AT commands can be obtained from the ICM WM home page: [www.siemens.com/wm](http://www.siemens.com/wm).

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## SW update

A SW update for the TC35 Terminal takes place via the RS232 interface or the SIM interface. These interfaces must be designed in such a way that the upgrading of the TC35 Terminal is integrated in the application. The software can be obtained from the ICM WM home page. The SW package is self-unpacking and menu-driven. The Bootbox BB35 is required for updating via the SIM interface.

### Ordering data for the Bootbox:

| Item         | Product code      | Source  |
|--------------|-------------------|---|
| Bootbox BB35 | L36880-N8102-A100 | Via the indirect sales channel, orders can be placed with your distributor or system integrator.<br><br>Via the direct sales channel (local companies), orders can be placed with ICM WM by using the familiar sales structure. |

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## Compatibility

### Compatibility with the predecessor, the M20 Terminal

The direct predecessor of the TC35 Terminal is the M20 Terminal.

The antenna connector is not compatible.

The modified version (passive version) of the Votronic handset must be operated at the audio interface in accordance with HH-SI-30.3/V1.1/0.

The following table shows the compatibility:

#### Hardware:

| Interfaces        | M20 Terminal        | TC35 Terminal       | Compatible |
|-------------------|---------------------|---------------------|------------|
| Power supply unit | Mini-Western socket | Mini-Western socket | Yes        |
| Audio interface   | Mini-Western socket | Mini-Western socket | Yes *1)    |
| Antenna connector | FME (female)        | FME (male)          | No         |
| PC interface      | RS232 interface     | RS232 interface     | Yes *2)    |

\*1) The studio interface is no longer available with the TC35 Terminal.

\*2) All the control lines are brought out of the TC35T.

#### Software:

The command set of the M20 Terminal has been modified and extended for the TC35 Terminal and is thus not 1:1 compatible. A migration paper with the modifications is available at the ICM WM home page on the Internet.

## Certification / maintenance

**Certification** The TC35 with its IMEI number is approved for operation in GSM networks and complies with the following EU directives:

- Directive 89/336/EEC on electromagnetic compatibility
- Directive 98/13/EC, CTR 19 and CTR 20, on telecommunications Terminal equipment
- Directive 98/13/EC, CTR 31 and CTR 32, on telecommunications Terminal equipment
- Directive 73/23/EEC on low voltage, supplemented by Directive 93/68/EEC



- Maintenance tips**
- Treat the SIM card with the same care as your credit card. Do not bend or scratch the SIM card or expose it to static electricity.
  - Wipe the Terminal housing with a moist or antistatic cloth. Do not use a chemical cleaning agent.

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