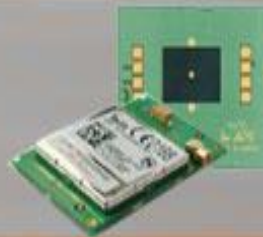


GS64 CA Terminal GT64 C Terminal Technical Description

Rev. 2.0



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Important information

This technical description contains important information for start up and use of the GS64 CA / GT64 C Terminal. Read it carefully before you start working with the Terminals. The warranty will be void should damage occur due to non-compliance with these instructions for use. We cannot accept any responsibility for consequential loss.

We cannot be held responsible for material loss or personal injury that is due to incompetent use or non-compliance with the safety instructions. The warranty will be void in such circumstances.

The GS64 CA / GT64 C Terminal contain highly integrated components which can be damaged by electrostatic discharge if the user would open the housing.



Therefore only touch the GS64 CA / GT64 C Terminal on the housing or connectors and avoid touching the components on the board.

Safety Instructions



When using products which are exposed to electric voltage the valid regulations have to be observed.

Before opening of a device always pull the mains adapter or make sure that the device is disconnected from the power supply.

You should only use tools on components, modules or devices if they are disconnected from the power supply and the electric charge, which may still be stored in some components, inside the device has been discharged.

All cables and wires which are energized and connected to the device, the module or components have to be checked regularly for any damage of the isolation shield or fractures of the cables. If the supply cables are visibly damaged the device has to be taken out of operation immediately until the faulty cable has been exchanged.

When using components or modules it is necessary to strictly observe the specification given in the corresponding description of these components. If a description for a private end-customer not clearly states which electric data is valid for a component or a module, how to wire the device, which external components or additional devices can be connected or which parameters these components are allowed to have, a specialist must be contacted.

Before putting a device into operation, it has to be clarified, whether this device or module is meant for the field of application. In case of doubt ask specialists or the manufacturer of the device.

Please note that we are not responsible for any errors in usage or connection. Therefore we cannot accept any responsibility for consequential loss.

Devices which operate with >35 Volt have to be connected by a specialist. Before putting the device into operation it should be checked that there is no current leakage on the housing.

In case those measurements with the opened housing are necessary, an isolating-transformer has to be integrated for safety reasons. Alternatively the voltage can be supplied by an appropriate power supply which complies with the safety regulations. All wiring work has to be done in a voltage free state only.

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1 Mechanical Description

1.1 Overview

The pictures below show the mechanical design of the GS64 CA and GT64 C Terminal along with the positions of the different connectors and mounting holes. The Terminal case is made of durable PC/ABS plastic.



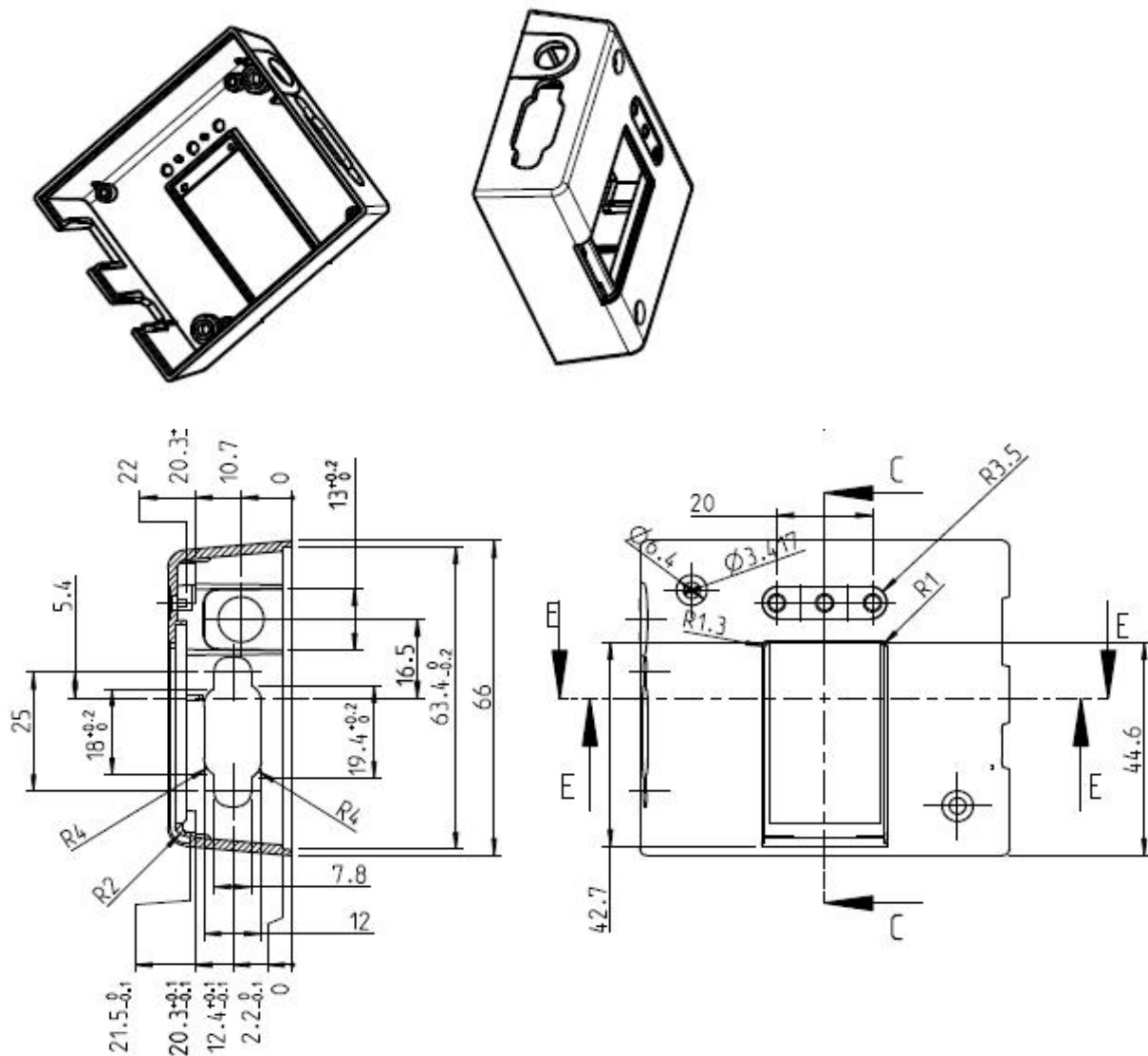
Please note the following:

- Mounting holes positioned at two of the corners make it possible to securely bolt the modem into your application.
- Keypad, display, microphone, speaker and battery are not part of the modem.
- The SIM card is mounted in the modem.
- The pins and electrical characteristics of the modem's various connectors are described in "2. Electrical Description"
- Information about the antenna connector is found in "2.3 Antenna Connector"

1.2 Physical Dimensions and Weight

Overall dimensions: 77 x 67 x 26 mm

Weight: approx. 90g



2 Electrical Description

The modem uses the following industry standard connectors:

- RJ11 6-way (power connector)
- Mini USB connector (audio or I/O connector)
- SIM card reader
- FME male coaxial jack (antenna connector)
- Sub-D socket, 9 pin (RS232 serial port)

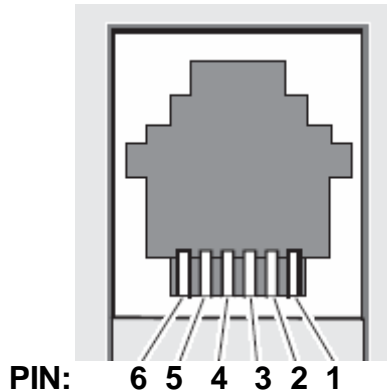
2.1 Power Connector

An RJ11 6-way connector, as shown and described below, serves as a means of supplying and controlling DC power to the modem.

The supply voltage, VCC, required by the modem is in the range 5V - 36VDC. Application of the supply voltage does not switch the modem on. To do so an additional active-high control signal, TO_IN, must be applied for > 0.5s. Please see chapter 3.1 for further important details about TO_IN and power supply requirements, especially if TO_IN is applied in parallel to VCC.

TO_IN are referenced to GND (pin 6 on the connector).

VCC and GND are reverse-polarity and over-voltage protected (up to reasonable limits).



Pin	Description
1	VCC
2	DIG_IN (GT64 C only)
3	Not used
4	TO_IN
5	DIG_OUT (GT64 C only)
6	GND

Signals of Power Connector

PIN	Signal	Direction	Limits	Description
1	VCC	Input	5 – 36V	Positive power input
2	DIG_IN or not connected	Input	5 – 36 V	- Digital Input in GT64 C - No connection in GS64 CA
3	No used	-	-	-
4	TO_IN	Input	5 – 36V	Positive edge triggered signal; used to switch on the modem $V_{IH} > 5V$, $V_{IL} < 2V$ Power on: $t > 0.2s$
5	DIG_OUT or not connected	Output	5- VCC max. 36 V	- Digital Output in GT64 C - No connection in GS64 CA
6	GND	Input	-	Negative power (ground) input and return path for TO_IN

2.1.1 Digital Input – GT64 C Terminal only

At the mini USB connector the Terminal supports 1 Digital Input with the following technical description:

- max. voltage V_{IN} is 30V
- low level: 0...1V; high level: 4...30V

Configure GPIO 4 as an input: `at+e2io=2,"IO4",0`

Read the GPIO status: `at+e2io=0,"IO4"`

For example GPIO 4: `*E2IO: 0,"IO4",0` Input is low
`*E2IO: 0,"IO4",1` Input is high

2.1.2 Digital Output – GT64 C Terminal only

At the mini USB connector the Terminal supports 1 Digital Output with the following technical description:

- switch voltage is VCC; high side switch
- max. Output 400mA
- short circuit protected
- ESC protected
- under full control of embedded application

Configure GPIO 5 as an output: `at+e2io=2,"IO5",1`

Set output to "high-level": `at+e2io=1,"IO5",1`

Set output to "low-level": at*e2io=1,"IO5",0

Note: Do not drive any significant digital input signals into a modem that is turn off. Although the modem will not be damaged (given the digital signal levels applied are within reason), this may prevent the modem from powering down or powering up correctly.

2.2 Mini USB Connector

There exist two different variants of the Terminals, both in the same housing, all equipped with the USB-type connector:

- **GS64 CA with Audio**

The GS64 CA Terminal provides "audio signals" on that connector, so you can connect a handset or microphone/speaker system here (available for the GS64 CA only)

By their nature all these 2 different signals are completely different regarding voltage levels, signal direction and applied energy. Especially the audio signals are quite sensitive to over-voltage, but they are protected against it to a limited extend only, since otherwise the audio signal would be significantly deteriorated.

- **GT64 C with GPIOs**

The programmable GT64 C provides digital inputs on that connector, so you can use external digital signals to control the behaviour of the terminal thereby (available for the GT64 C only)

So please make sure you are using the right variant for your application and do not mix up different variants - **especially do not drive any digital signals into the USB-type-connector of the Audio interface, since that might seriously damage the device.**

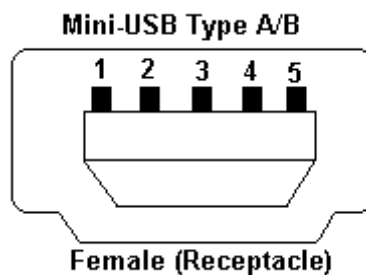
You will find the version of your Terminal (GS64 CA or GT64 C) at the label on the button of the device.

2.2.1 GS64 CA with Audio Interface

The USB connector supports the connectivity of a headset or any other audio equipment using the analogue microphone and loudspeaker interface of GS64 CA Terminal. The table below describes the signals on the USB connector.

GS64 CA Pin Layout for Mini USB connector – Audio:

Pin	Signal	Colour*
1	MIC -	Yellow
2	EAR -	Red
3	MIC +	White
4	EAR +	Turquoise
5	(GND – not necessary for audio)	Black



***Note:** The colours of the cable are only for the cable delivered by company CEP! If you use other cable, please check the pinning before!

Voice Features – please read the AT command manual for integration:

- Telephony, Emergency call
- Half rate, full rate, enhanced full rate and adaptive multi rate voice codec (HR, FR, EFR, AMR)
- Superior Echo cancellation & noise reduction
- DTMF

2.2.2 GT64 C with GPIOs Interface

At the mini USB connector are 4 inputs, with the following technical description:

- max. voltage V_{IN} is 30V
- low level: 0...1V
- high level: 4...30V
- ESD protected
- under full control of embedded application

GT64 C Pin Layout for Mini USB connector – GPIOs:

Mini USB PIN	GT64 C GPIO	Internal PIN	Mini USB
1	GPIO 6	48	IN1
2	GPIO 7	49	IN2
3	GPIO 3	43	IN3
4	GPIO 9	51	IN4
5	-	-	GND

All inputs are under control of an embedded application script or AT-commands!

The following commands have to be used for initialising and configuring the inputs:

Configure GPIO 6,7,3,9 as an input:

```
at*e2io=2,"IO6",0      at*e2io=2,"IO7",0
at*e2io=2,"IO3",0      at*e2io=2,"IO9",0
```

Read the GPIO status:

```
at*e2io=0,"IO6"       at*e2io=0,"IO7"
at*e2io=0,"IO3"       at*e2io=0,"IO9"
```

For example GPIO 6:

```
*E2IO: 0,"IO6",0      Input is low
*E2IO: 0,"IO6",1      Input is high
```

GPIO7, GPIO3, GPIO9 have the same behaviour!

2.3 Antenna Connector

The antenna connector allows transmission of radio frequency (RF) signals between the modem and an external customer-supplied antenna. The modem is fitted with a 50Ω, FME male coaxial jack.

Description of antenna connector parameters

Parameter	Limit	Description
Nominal impedance	50Ω (SWR better than 2.5:1)	
Output Power	2 Watt peak (Class 4)	Extended GSM850/900
	1 Watt peak (Class 1)	GSM1800/1900
Static Sensitivity	Better than -102dBm	Extended GSM850/900
	Better than -102dBm	GSM1800/1900

2.4 SIM card reader

The GS64 CA and GT64 C Terminals are fitted with a SIM card reader designed for 1.8V and 3V SIM cards. It is the flip-up type which is lockable in the horizontal position and is accessed through a removable panel.

2.5 RS232 Serial Port

The modem supports a standard RS232 serial interface (EIA/TIA 574) via its 9 pin Sub-D connector, shown below. In line with serial communication terminology the GS64 CA / GT64 C Terminal should be considered as the *data circuit-terminating equipment* (DCE) and the external application or computer as the *data terminating equipment* (DTE).

The electrical characteristics of the serial port signals are shown below:

PIN	Signal	Direction	Voltage levels	Description
1	DCD	Output	> +4V <- 4 V	Data carrier detect
2	RD	Output	> +4V <- 4 V	Received data
3	TD	Input	> +2.4V < 0.8 V	Transmitted data
4	DTR	Input	> +4V < 0.8 V	Data terminal ready
5	GND	-	0 V	Ground connection
6	DSR	Output	> +4V <- 4 V	Data set ready
7	RTS	Input	> +2.4V < 0.8 V	Request to send
8	CTS	Output	> +4V <- 4 V	Clear to send
9	RI	Output	> +4V <- 4 V	Ring indicator

2.5.1 Serial Data

The modem supports the standard data character format of

- 1 start bit, 7 or 8 data bits, 1 optional parity bit, 1 or 2 stop bits
- Programmable baud rate
- Auto-configuration mode with auto-baud and auto-format operation

2.5.2 Serial Data Signals

The default baud rate is 9.6kbps, however higher bit rates up to 460kbps are supported. At start-up the GS64 CA / GT64 C Terminal transmits and receives data at the default rate of 9.6kbps in either standard AT mode or binary mode (the first received data - AT or binary format - determines the operating mode). When reprogramming, the transmission rate is automatically negotiated by the programming application. Speeds up to 460kbps are supported.

Serial Data From Modem (RD)

RD is an output signal that the modem uses to send data to the application.

Serial Data To Modem (TD)

TD is an input signal, used by the application to send data to the modem.

2.5.3 Control Signals – RTS, CTS, DTR, DSR, DCD, RI

RTS and CTS are capable of transmitting at 1/10th of the data transmission speed for data rates up to 460kbps (byte-oriented flow control mechanism).

Request to Send (RTS)

Used to condition the DCE for data transmission. The default level is high by internal pull up.

The exact behaviour of RTS is defined by an AT command. Software or hardware control can be selected. Hardware flow is the default control. The application must pull RTS low to communicate with the modem. The modem will respond by asserting CTS low, indicating it is ready for communication.

Clear To Send (CTS)

CTS indicate that the DCE is ready to transmit data. The default level is high. You can define the exact behaviour of CTS through an AT command, and can select software or hardware flow control.

Data Terminal Ready (DTR)

DTR indicates that the DTE is ready to transmit and receive data. It also acts as hardware 'hang-up', terminating calls when switched high. The signal is active low. You can define the exact behaviour of DTR with an AT command. The DTR line can also be used to switch on the modem when activated for 0.2 seconds. The DTR line

must be deactivated prior to switching off the modem to ensure it switches off (powers down) correctly.

Data Set Ready (DSR)

An active DSR signal is sent from the modem to the application (DTE) to confirm that a communications path has been established. DSR has two modes of operation, settable using the AT command AT&S.

Data Carrier Detect (DCD)

DCD indicates that the DCE is receiving a valid carrier (data signal) when low. You can define the exact behaviour of DCD with an AT command.

Ring Indicator (RI)

RI indicates that a ringing signal is being received by the DCE when low. You can define the exact behaviour of RI with an AT command.

3 Operation

3.1 Switching on the modem

There are two ways to switch on the modem, once power is applied.

- assert TO_IN high for > 0.5s;
- activate the RS232 control line DTR, high for > 0.1s.

The modem is fully operational after 4 seconds. Logging onto a network may take longer than this and is outside the control of the modem. The modem can be configured to start up at the time power is applied by permanently tying power connector signals TO_IN (pin 4) and VCC (pin 1) together.

Note: The TO_IN signal requires a positive “edge” (a sharp” signal transition from low to high) to turn the modem on. This transition should be a rising signal from 0V (GND) to VCC, or at least a large fraction of that voltage range, and must be applied at the same time as VCC or after it. Very slow transitions (significantly slower than many milliseconds) or very small transitions (e.g. only few volts instead of 0V to VCC) will not turn on the module (since they are not considered to be a “positive edge”).

Although this will not be an issue in almost all typical applications of the modem, please consider following points:

- Large capacitors in your power supply which will lead to slow leading and falling edges (issue does not apply with modern stabilized switching regulator power-adaptors) AND TO_IN tied in parallel to VCC (instead of separate dedicated digital signal)
- Slow analogue signals used to assert TO_IN
- TO_IN signal not before VCC

All 3 cases above might prevent the modem from recognizing the power-up signal this is no failure of the modem itself, the same would apply to almost any electronic device that provides a separate “power-on” or “reset” signal.

If you are doubt, please

- Use the mains power adapter that is provided by your distributor and is know to work properly with your modem
- Make sure that your signal and system design is according to the above description
- Consult our support team that will be more than happy to assist you.

3.2 Switching off the modem

You can switch off (power down) the modem if you disconnect VCC.

Note: This instruction is for GS64 CA and GT64 C Terminals as of Hardware Revision C1d (see bottom of your Terminal) and higher. For all other Terminals please refer to "GX64 Technical Description Revision 1.5".

3.3 Operating states / LEDs

3.3.1 Power up LED (green LED in the middle)

The modem has a green power up LED, as depicted below, which is used to indicate various operating states. These states are described in following table.

Operating state of GS64 CA and GT64 C Terminals	GSM LED state
After switching the modem on	ON
Switching OFF (Power down) or power removed	OFF
Standby (registered into GSM network) and talk	Flashing (1x every 2 sec.)
No network, network search, no SIM card, no PIN entered	ON
Incoming SMS	Fast blinking

Note: Switch off (Power Down): DC power is applied but the modem is switched OFF.

Standby: The GS64 CA / GT64 C Terminal is switched ON and camped on to the network. No call in progress.

Talk: The GS64 CA / GT64 C Terminal is switched ON and a voice/data call is in progress.

3.3.2 Status LEDs (one yellow, one red)

The red and yellow Status LEDs are under control of GPIO1 and GPIO2 of the GS64 CA / GT64 C modem inside of the Terminal. They can be controlled via at-commands. The default status of these two LEDs is off. The following commands have to be used to initialise and to configure the GPIOs to control the two LEDs:

Configuration of GPIO1 as an output	<code>at*e2io=2,"IO1",1</code>
Configuration of GPIO2 as an output	<code>at*e2io=2,"IO2",1</code>
Switching on GPIO1	<code>at*e2io=1,"IO1",1</code>
Switching off GPIO1	<code>at*e2io=1,"IO1",0</code>
Switching on GPIO2	<code>at*e2io=1,"IO2",1</code>
Switching off GPIO2	<code>at*e2io=1,"IO2",0</code>

These LEDs can be controlled e.g. by an external micro controller via at-commands. They can be used for signalling any useful status of the external application such as:

- error indication
- status of communication (GPRS, SMS, CSD, etc.)
- quality of service

Please read the information in this section and the information in “Installation of the Modem”, before starting your integration work!

3.4 Safety instructions

PLEASE READ THESE SAFETY INSTRUCTIONS AND KEEP A COPY OF THEM.

- Always ensure that use of the modem is permitted. The modem may present a hazard if used in proximity to personal medical electronic devices. As a rule, the modem must not be used in hospitals, airports or planes.
- Never use the modem at a gas station, refuelling point, blasting area or in any other environment where explosives may be present.
- Operating the modem close to other electronic devices, such as antennas, television sets, and radios may cause electromagnetic interference.
- This product is intended to be used with the antenna or other radiating element at least 20cm away from any part of the human body. In applications where this rule cannot be applied, the application designer is responsible for providing the SAR measurement test report and declaration.
- You are responsible for observing your country's safety standards, and where applicable, the relevant wiring rules.

3.5 General precautions

The GS64 Terminal as a stand alone item is designed for indoor use only. To use outside it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in “Technical Data”.

- Avoid exposing the modem to lighted cigarettes, naked flames or to extreme hot or cold temperature.
- Never try to dismantle the modem yourself. There are no components inside the modem that can be serviced by the user. If you attempt to dismantle the modem, you may invalidate the warranty.
- The GS64 CA / GT64 C Terminal must not be installed or located where the surface temperature of the plastic case may exceed 85°C.
- All cables connected to the GS64 CA / GT64 C Terminal must be secured or clamped, immediately adjacent to the modem's connectors, to provide strain relief and to avoid transmitting excessive vibration to the modem in the installation.
- Ensure the DC cable, supplying power to the GS64 CA / GT64 C Terminal, does not exceed 3 metres.
- To protect power supply cables and meet the fire safety requirements when the unit is powered from a battery or a high current supply, fit in a 1.25A fuse in line with the positive supply.
- Do not connect any incompatible component or product to the Terminal.

Note: CEP AG may refuse warranty claims where evidence of product misuse is found.

3.6 Power Supply

There are 2 typical ways to provide electrical power to your terminal:

3.6.1 Power by mains AC adapter

In order to comply with the applicable CE (Safety) regulations, your mains power adapter (converting 115/230V AC to e.g. 12 VDC) must comply with EN 60950-1:2001 ("limited power supply" or "LPS").

The CEP Terminal AC adapter (Input 100-240 V AC, 50/60Hz, 450mA & Output 12VDC, 1.5A) does comply with these requirements.

3.6.2 Power from DC battery source

If you provide the supply voltage to the terminal from an existing battery, additional safety precautions by two independent fuses in the power supply line are required: You need 1.25A fuse (type "F") in the positive ("plus") power supply line, the housing of the fuse must comply to the requirements of fire protection, and you need to connect that cable to a section of your car's electric network that is protected with max. 2.5A fuse between the network you are connecting to and the battery (that means, don't connect the plus cable directly to you car's battery but instead connect it e.g. to your car's fuse compartment after one of the (max.) 2.5A fuses installed there as part of the car's series installation).

3.7 SIM card precautions

Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges.

- When the SIM card hatch is opened, the SIM card connectors lie exposed under the SIM card holder.

Caution! Do not touch these connectors! If you do, you may release an electrical discharge that could damage the modem or the SIM card.

- When designing your application, the SIM card's accessibility should be taken into account. We always recommend that you have the SIM card protected by a PIN code. This will ensure that the SIM card cannot be used by an unauthorized person.

3.8 Antenna precautions

If the antenna is to be mounted outside, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.

- Never connect more than one modem to a single antenna. The modem can be damaged by radio frequency energy from the transmitter of another modem.
- Like any mobile station, the antenna of the modem emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might

cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signals cable.

- The modem and antenna may be damaged if either come into contact with ground potentials other than the one in your application. Beware, ground potential are not always what they appear to be.

4 Installation of the modem

This chapter gives you advice and helpful hints on how to integrate the GS64 CA / GT64 C Terminal into your application from a hardware perspective. Please read the information given in “Safety and Product Care”, page 10 and then read the information in this section before starting your integration work.

4.1 Where to install the modem

There are several conditions which need to be taken into consideration when designing your application as they might affect the modem and its function. They are:

4.1.1 Environmental conditions

The modem must be installed so that the environmental conditions stated in the Technical Data chapter, such as temperature, humidity and vibration are satisfied. Additionally, the electrical specifications in the Technical Data section must not be exceeded.

4.1.2 Signal strength

The modem has to be placed in a way that ensures sufficient signal strength. To improve signal strength, the antenna can be moved to another position. Signal strength may depend on how close the modem is to a radio base station. You must ensure that the location, at which you intend to use the modem, is within the network coverage area. Degradation in signal strength can be the result of a disturbance from another source, for example an electronic device in the immediate vicinity. More information about possible communication disturbances can be found in section 5.3.5.

When an application is completed, you can verify signal strength by issuing the AT command AT+CSQ. See “AT+CSQ Signal Strength”.

Tip! Before installing the modem, use an ordinary mobile telephone to check a possible location for it. In determining the location for the modem and antenna, you should consider signal strength as well as cable length

4.1.3 Connections of components to GS64 CA / GT64 C Terminal

The integrator is responsible for the final integrated system. Incorrectly designed or installed, external components may cause radiation limits to be exceeded. For instance, improperly made connections or improperly installed antennas can disturb the network and lead to malfunctions in the modem or equipment.

4.1.4 Network and Subscription

Before your application is used, you must ensure that your chosen network provides the necessary telecommunication services. Contact your service provider to obtain the necessary information.

- If you intend to use SMS in the application, ensure this is included in your (voice) subscription.
- Consider the choice of the supplementary services

4.2 *How to install the modem*

4.2.1 Power supply

- Use a high-quality power supply cable with low resistance. This ensures that the voltages at the connector pins are within the allowed range, even during the maximum peak current.
- When the unit is powered from a battery or a high current supply, connect a fast 1.25A fuse in line with the positive supply. This protects the power cabling and modem.

4.2.2 Securing the modem

Before securing the modem take into account the amount of additional space required for the mating connectors and cables that will be used in the application.

- Where access is restricted, it may be easier to connect all the cables to the modem prior to securing it in the application.
- Securely attach the GS64 CA / GT64 C Terminal modem to the host application using two 3mm diameter pan-head screws

4.3 Antenna

4.3.1 General

The antenna is the component in your system that maintains the radio link between the network and the modem. Since the antenna transmits and receives electromagnetic energy, its efficient function will depend on:

- the type of antenna (for example, circular or directional);
- the placement of the antenna;
- communication disturbances in the vicinity in which the antenna operates.

In the sections below, issues concerning antenna type, antenna placement, antenna cable, and possible communication disturbances are addressed. In any event, you should contact your local antenna manufacturer for additional information concerning antenna type, cables, connectors, antenna placement, and the surrounding area. You should also determine whether the antenna needs to be grounded or not. Your local antenna manufacturer might be able to design a special antenna suitable for the application.

4.3.2 Antenna type

Make sure that you choose the right type of antenna for the modem. Consider the following requirements:

- Antenna must be designed for the one of the frequency bands in use; please ask your network provider for more information:
 - GSM 850/900 MHz
 - GSM 1800/1900 MHz
- Impedance of the antenna and antenna cable must be 50Ω;
- Antenna output-power handling must be a minimum of 2W;
- VSWR value should be less than 3:1 to avoid damage to the modem.

4.3.3 Antenna placement

The antenna should be placed away from electronic devices or other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50cm. If signal strength is weak, it is useful to face a directional antenna at the closest radio base station. This can increase the strength of the signal received by the modem. The modem's peak output power can reach 2W. RF field strength varies with antenna type and distance. At 10cm from the antenna the field strength may be up to 70V/m and at 1m it will have reduced to 7V/m. In general, CE-marked products for residential and commercial areas, and light industry can withstand a minimum of 3V/m.

4.3.4 Antenna cable

Use 50Ω impedance low-loss cable and high-quality 50Ω impedance connectors (frequency range up to 2GHz) to avoid RF losses. Ensure that the antenna cable is as short as possible. The Voltage Standing-Wave Ratio (VSWR) may depend on the effectiveness of the antenna, cable and connectors. In addition, if you use an adapter between the antenna cable and the antenna connector, it is crucial that the antenna cable is a high-quality, low-loss cable. Minimize the use of extension cables, connectors and adapters. Each additional cable, connector or adapter causes a loss of signal power.

4.3.5 Possible communications disturbances

Possible communication disturbances include the following:

- **Noise** can be caused by electronic devices and radio transmitters.
- **Path-loss** occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter.
- **Shadowing** is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced.
- **Multi-path fading** is a sudden decrease or increase in the signal strength. This is the result of interference caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals.
- **Hand-over** occurs as you move from one cell to another in the GSM network. Your mobile application call is transferred from one cell to the next. Hand-over can briefly interfere with communication and may cause a delay, or at worst, a disruption.

4.4 CEP Certified Accessories

Product	Description
Power supply 230V AC / 12 VDC	6pin RJ11 connector
Power cable	6pin RJ11 connector with open ends
Minimag Antenna	FME female, 900/1800 MHz
Stub Antenna	FME female, 900/1800 MHz
Rectangular Antenna	FME female, Quad-band
Roof-mount antenna	FME female waterproof, 900/1800 MHz
RS232 cable	1.5m for PC connection
Mini USB cable for Audio / GPIOs	Mini USB connector with open ends

Please contact your distributor or CEP AG for availability or check CEP's webpage www.cepag.de.

5 Technical Data

Product features:

- Quad Band GSM/GPRS
- GSM 850/900 Power class 4 (33dBm)
- GSM 1800/1900 Power class 1 (30dBm)
- Mobile class B
- Extended Measurement Reporting
- Complaint with 3GPP Release 99 Protocol Stack
- Power supply: 5 – 36 VDC
- Overall dimensions (excluding connectors): 77 x 67 x 26mm
- Weight: ca. 90g
- Temperature range
 - -30°C to +75°C (Operational)
 - -40°C to +85°C (Storage temperature)

Interfaces:

- RS232 –way SUB-D9
- Power: 5 – 36 VDC (RJ11)
- Antenna: 50 Ohm (FME male)
- SIM card reader: 1.8V / 3V interface with SIM detection
- Control by AT commands (GSM 27.005, 27.007 plus proprietary commands)

Data features:

- GPRS Class 10
- Multiple simultaneous PDP contexts
- GPRS Coding Schemes CS1 – CS4
- Transparent an non-transparent CSD up to 9.6 kbps
- Modem Type; V21, V22, V23, V22bis, V26ter, V32, V34, V24
- V42bis compression
- GSM supplementary services supported
- GSM 27.010 Multiplexing Protocoll
- USSD

Short Message Service (SMS) features:

- Text and PDU
- Point to point (MT/MO)
- Cell Broadcast

Internet Protocol:

- TCP/IP protocol stack
- Extensive AT command access to TCP/IP stack
- Multiple sockets with listening/server capability
- IPv4 protocol
- Dynamic & Static IP address allocation
- PPP protocol (PAP)
- UDP protocol
- FTP client – File Transfer Protocol (file transfers)

Audio (GS64CA only):

- Telephony, Emergency call
- Half rate, full rate, enhanced full rate and adaptive multi rate voice codec (HR, FR, EFR, AMR)
- Superior Echo cancellation & noise reduction
- DTMF

Other features:

- SIM Application Toolkit Class 2
- 3x LED for status indication
- Same mounting holes as Sony Ericsson GM29
- Same connector positions as Sony Ericsson GM29

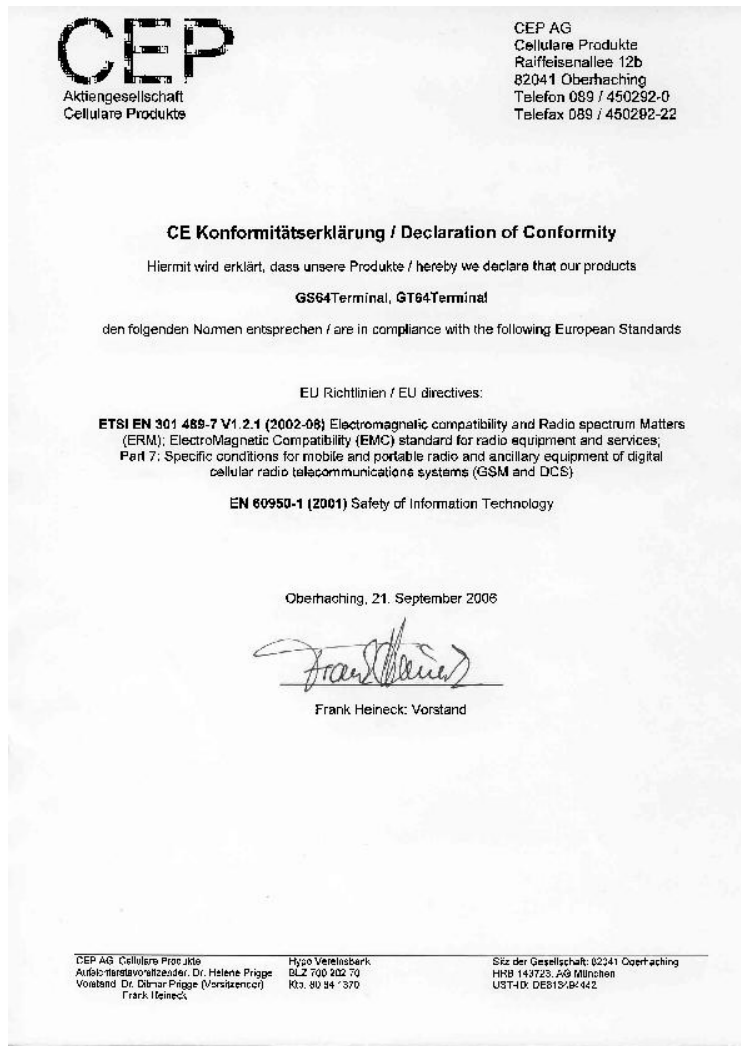
6 Abbreviations

Abbreviation	Explanations
CBM	Cell Broadcast Message
CBS	Cell Broadcast Service
CSD	Circuit Switched Data
DCE	Data Circuit Terminating Equipment
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
EFR	Enhanced Full Rate
EMC	Electro-Magnetic Compatibility
ETSI	European Telecommunication Standards Institute
FR	Full Rate
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communication
HR	Half Rate
HSCSD	High Speed Circuit Switched Data
ITU-T	International Telecommunication Union - Telecommunications Standardisation Sector
ME	Mobile Equipment
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
PDU	Protocol Data Unit
RLP	Radio Link Protocol
RF	Radio Frequency
RTC	Real Time Clock
SIM	Subscriber Identity Module
SMS	Short Message Service
TA	Terminal Adapter
TE	Terminal Equipment
TS	Telecom Services

7 Declaration of Conformity

The GS64 CA / GT64 C Terminal carry the CE, FCC and E-Mark certifications.

7.1 CE Certificate



7.2 FCC Certificate

ANIS C63.4-2003 and FCC 47 CFR Part 15 – Test Report Reference R60402FCC

7.3 E-Mark (issued by the German / European ministry of transportation)

Certification number: e1 72/245 2006/28 4935 00

7.4 Safety Test

Tested on the basis of EN60950-1:2001 and / or IEC 60950-1:2001, EN 60950-1/A11:2004 + Corrigendum:2004

8 Service and Support

To contact customer support please use the contact details below:

CEP AG

Customer Support
Raiffeisenallee 12b
D-82041 Oberhaching
Germany

E-mail: support@cepag.de or Phone +49-89-450 292 – 11

Information about CEP AG, products and accessories is available on the following web site: <http://www.cepag.de>

Note: CEP AG may, at any time and without notice, make changes or improvements to the products and services offered and / or cease producing or commercializing them.

9 Documentation Change Log

Revision	Date	Changes
Rev 1.5		Based on Hardware Version below C1d
Rev 2.0	08.08.2007	Based on Hardware Version C1d and higher 2.1 Power Connector 2.2 Mini USB Connector 3.1 Switching on the modem 3.2 Switching off the modem