



**GNS-MC35iT, GNS-MC35iU Terminals
datasheet**

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Document history

Document version	What's changed

1 Abstracts

GNS-MC35iT (GNS-MC35iU) terminals is GSM terminals, based on Siemens MC39i module. If not called exactly, all of GNS-MC35iT and GNS-MC35iU are called “terminals” in this document.

Terminals are intended for:

- Data, SMS, Fax transmission using GSM network
- Internet access
- Installation inside equipment that need internet access or wireless data exchange

2 Key features

Table 1. Key features of terminals

Feature	Implementation
Transmission	Data, SMS, Fax
Power supply	Single supply voltage 8V to 28V
GSM class	Small MS
Frequency bands	- Dual Band E-GSM 900 and GSM 1800 - Compliant to GSM Phase 2/2+
Transmit power	- Class 4 (2W) for EGSM900 - Class 1 (1W) for GSM1800
GPRS connectivity	GPRS multi-slot class 10 GPRS mobile station class B
SIM card reader	Internal
External antenna	Connected via antenna FME connector antenna resistance 50Ω
SMS	MT, MO, CB, Text and PDU mode SMS storage: SIM card Preferred mode can be user-defined.
DATA GPRS:	- GPRS data downlink transfer: max. 85.6 kbps (see Table 3) - GPRS data uplink transfer: max. 42.8 kbps (see Table 3) - Coding scheme: CS-1, CS-2, CS-3 and CS-4 - GNS-MC35i Terminal supports the two protocols PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol) commonly used for PPP connections. - Support of Packet Switched Broadcast Control Channel (PBCCH) allows you to benefit from enhanced GPRS performance when offered by the network operators.
DATA CSD:	- CSD transmission rates: 2.4, 4.8, 9.6, 14.4 kbps, nontransparent, V.110 - Unstructured Supplementary Services Data (USSD) support
FAX	Group 3: Class 1, Class 2
Serial interface (both GNS-MC35iT, GNS-MC35iU models)	- RS-232 interface, bi-directional bus for AT commands and data - Multiplex ability according to GSM 07.10 Multiplexer protocol - Baud rates from 300bps to 230.400 bps - Autobauding supports baud rates: 1.200, 2.400, 4.800, 9.600, 19.200, 38.400, 57.600, 115.200 and 230.400 bps

	- Supports RTS/CTS hardware handshake and software XON/XOFF flow control.
Serial interface (only GNS-MC35iU terminal)	USB 2.0 interface, bi-directional bus for AT commands and data - Baud rates from 300bps to 230.400 bps - Autobauding supports baud rates: 1.200, 2.400, 4.800, 9.600, 19.200, 38.400, 57.600, 115.200 and 230.400 bps - Supports RTS/CTS hardware handshake and software XON/XOFF flow control.
Supported SIM card	3V
Phonebook management	Supported phonebook types: SM, FD, LD, MC, RC, ON, ME
Reset of terminal	Reset via AT command or Power Down Signal
Firmware upgrade	Upgradable via serial interface or SIM interface.
Real time clock	Implemented (clock frequency 32.768kHz)
Environmental	Temperature: - Normal operation: -20°C to +55°C - Humidity: max. 80 % relative humidity
Size	65x74x33 mm (approx.)
Weight	130g

Table 2. Coding schemes and maximum data rates

Coding scheme	1 Timeslot	2 Timeslots	4 Timeslots
CS-1:	9.05 kbps	18.1 kbps	36.2 kbps
CS-2:	13.4 kbps	26.8 kbps	53.6 kbps
CS-3:	15.6 kbps	31.2 kbps	62.4 kbps
CS-4:	21.4 kbps	42.8 kbps	85.6 kbps

3 Electrical and environmental characteristics

Table 3. Absolute maximum ratings

Parameter	Port/Description	Min	Max	Units
Supply voltage	PLUS	-40	28	V
Input voltage for on/off Control lines	/IGT_IN, PD_IN	-28	28	V
RS232 input voltage range	/TXD, /DTR, /RTS	-28	+28	V
	/RXD, /CTS, /DSR, /DCD, /RING	-0.3	+5.3	V
Immunity against discharge of static electricity	all connectors (lines)	-8	+8	kV
Protection Class	IP40 (avoid exposing GNS-MC35i Terminal to liquid or moisture, for example do not use it in a shower or bath)		IP40	

Table 4. Operating conditions

Parameter	Min	Type	Max	Units
Ambient temperature	-20	25	55	°C
Supply voltage PLUS measured at (6-pole) western jack plug (1 to 6)	7.6 lowest voltage (minimum peak) incl. all ripple and drops	12	28	V

Table 5. Power supply characteristics

Parameter description	Conditions	Min	Type	Max	Units
Average supply current (average time 3 min.)					
Power Down mode	@8V		480	550	mA
	@12		700	800	
	@28		1750	1850	
SLEEP mode (GSM/GPRS)	@8		45		mA
	@12		30		
	@28		17		
NET Searching mode (NO NET)	@8		70		mA
	@12		50		
	@28		30		
IDLE mode (GSM/GPRS)	@8		60		mA
	@12		45		
	@28		25		
GSM TALK mode	@8		270	560	mA
	@12		170	33	
	@28		72	125	
GPRS DATA mode(1 Tx, 4 RX)	@8		290	570	mA
	@12		180	330	
	@28		77	125	
Peak supply current (during 577µs transmission slot every 4.6ms)					
Power control level for Pout max	@8		1.7	3.2	A
	@12		1.2	1.4	
	@28		0.7	1.2	
Allowed powerfail time without terminal reset or power down	After this time the Terminal will be reset or switched off			1	ms
Allowed rise time of supply voltage	0% to 100%			20	ms

¹⁾ Typical values measured with antenna impedance = 50 Ohm (return loss >20dB)

Maximum values measured with mismatched antenna

Table 6. On/Off control lines characteristics

Parameter description	Conditions	Min	Type	Max	Units
Input voltage /IGT_IN, PD_IN, /DTR	active high	5		28	V
	Active low	-28		2	V
Input resistance of /IGT_IN, PD_IN		94			kOhm
Input resistance of /DTR		4	6	8	kOhm
Duration of active high /IGT_IN, /DTR		200			ms
Duration of active high PD_IN		3.5			s
Duration passive (low) of /IGT_IN, /DTR before restart	after power down	1			s

Table 7. RS232 Interface characteristics

Parameter description	Conditions	Min	Type	Max	Units
Transmitter Output Voltage for /RXD, /CTS, /DSR, /DCD, /RING	@ 5kOhm load	±5	±6	±7	V
Transmitter Output Resistance /RXD, /CTS, /DSR, /DCD, /RING				770	Ohm
Receiver Input Resistance /TXD, /RTS, /DTR		4	6	8	kOhm
Input Hysteresis		0.2	0.5	1	V
Input Threshold Low		1	1.8		V
Input Threshold High			2.4	3	V
Baud rate	Autobauding	4.8		230.4	kbps
	Fixed rate	0.3		230.4	Kbps

4 Operating modes

Table 9. Operating modes of the GNS-MC35iT, GNS-MC35iU

Mode	Function	
Normal operation	SLEEP	Various power saving modes set by AT+CFUN command. Firmware is active to minimum extent. If the Terminal was registered to the GSM network in IDLE mode, it remains registered in SLEEP mode. Power saving can be chosen at different levels. The NON-CYCLIC SLEEP mode (AT+CFUN=0) disables the AT interface. The CYCLIC SLEEP mode AT+CFUN=5, 6, 7 and 8 alternatively activate and deactivate the AT interface to allow permanent access to all AT commands.
	GSM IDLE	Firmware is active. Once registered to the GSM network, paging with BTS is carried out. The Terminal is ready to send and receive.
	GSM TALK	Connection between two subscribers is in progress. Power consumption depends on network coverage individual settings, such as DTX off/on, FR/EFR/HR,

		hopping sequences, antenna.
	GPRS IDLE	Module is ready for GPRS data transfer, but no data is currently sent or received. Power consumption depends on network settings and GPRS configuration (e.g. DRX settings)
	GPRS DATA	GPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates and GPRS configuration (e.g. used multislot settings).
Power Down		Operating voltage applied. Firmware is not active. The RS-232 interface is not accessible.

5 Power supply

The power supply of the GNS-MC35i Terminal has to be a single voltage source of 8V...28V providing a peak current (pulsed 577ms at T=4.615ms) of about 1.2A at 12V during the active transmission. The uplink burst causes strong ripple (drop) on the power lines. The drop voltage should not exceed 1V, but the absolute minimum voltage during drops must be >8V. The terminal is protected from supply voltage reverse.

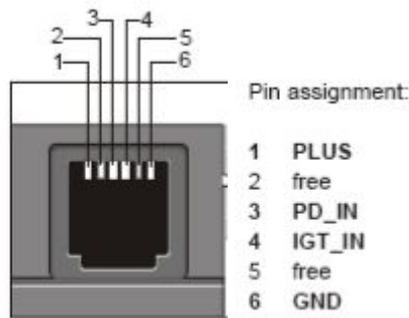


Figure 1: Female 6-pole Western plug for power supply, ignition, power down

Table 10: Female 6-pole Western plug for power supply, ignition, power down

Pin	Signal name	Use	Parameters
1	PLUS	Power supply	8V . 28V DC,
2	free		
3	PD_IN	Signal for power down mode	5V must be applied to this input for more than 3.5s to switch the terminal off. 2V must be applied for normal operation
4	IGT_IN	Ignition *)	5V applied to ignition input for more than 200ms switches the terminal on
5	free		
6	GND	Ground	0V

*) The ignition is activated only by a rising edge. The rise time is <20ms. The IGT_IN signal switches the terminal on (it changes from power down state to the net searching state).

Terminal GNS-MC35iU can be powered from the USB interface. If no additional power supply is used, in case of powering from the USB interface, then power line of the USB interface can be overloaded at some conditions. If this occurs then terminal will switch off due to insufficient power. After power will be restored terminal will switch on immediately. This can lead to unstable terminal functioning.

6 Power on/off control

In the event of software hang-ups etc. the GNS-MC35i Terminal can be switched off by applying a voltage >5V to pin 3 (PD_IN) for more than 3.5s. The PD_IN signal switches the terminal off. All internal supply voltages are off, except for the power down voltage, which still feeds the real-time clock (RTC).

To switch terminal on you have two options: Activate the ignition pin (IGT_IN pin 4) or switch on the RS-232 /DTR line, during PD_IN not active (pin 3 voltage <2V).

- For all other operating modes the PD_IN signal must be low (<2V).
- When the GNS-MC35i Terminal is switched off or enters the Power Down mode, e.g. after you have issued the AT^SMSO command or activated the PD_IN signal, all RS-232 interface lines are undefined during internal power shutdown process. This may cause undefined characters that can be ignored.

- In order to properly shut down the GNS-MC35i Terminal be sure to wait 10s after sending AT^SMSO before switching off the power supply at pin PLUS. This time is needed for the module to safely log off from the network and finish saving to the internal memory.

Caution: Use the PD_IN pin only when terminal is not responding for more than 5 seconds. Pulling the PD_IN pin causes the loss of all information stored in the volatile memory since power is cut off immediately. Therefore, this procedure is intended only for use in case of emergency, e.g. if GNS-MC35i Terminal fails to shut down properly.

In the case of using USB bus connection for the GNS-MC35iU terminal it will be switched on by USB emulated signal /DTR. This signal acts like /DTR signal of RS232 interface. In additional GNS-MC35iU terminal will switch power on automatically (it changes from power down state to the net searching state) when USB plug connected to the terminal

7 RS232 interface

Via RS-232 interface, the host controller controls the GNS-MC35i Terminal and transports data.

Table 11: 9-pole D-Sub (female) RS-232

Pin	Signal name	I/O	Function
1	/DCD	O	Data Carrier Detected
2	/RXD	O	Receive data
3	/TXD	I	Transmit data
4	/DTR	I	Data Terminal Ready Attention: The ignition of GNS-MC35i Terminal is activated via a rising edge of high potential (+5 ... +15 V)
5	GND		
6	/DSR	O	Data set ready
7	/RTS	I	Request to send
8	/CTS	O	Clear to send

9	/RI	O	Ring indication
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GNS-MC35iT and GNS-MC35iU terminals are designed for use as a DCE. Based on the conventions for DCE-DTE connections it communicates with the customer application (DTE) using the following signals:

- Port TxD @ application sends data to TXD of GNS-MC35i Terminal
- Port RxD @ application receives data from RXD of GNS-MC35i Terminal

The RS-232 interface is configured for 8 data bits, no parity and 1 stop bit, and can be operated at bit rates from 300bps to 115kbps. Autobauding supports bit rates from 4.8kbps to 115kbps. Hardware handshake using the /RTS and /CTS signals and XON/XOFF software flow control are supported.

In addition, the modem control signals /DTR (polled once per second by internal firmware), /DSR, /DCD and /RING are available. The modem control signal RING (Ring Indication) can be used to indicate, to the cellular device application, that a call or Unsolicited Result Code (URC) is received. There are different modes of operation, which can be set with AT commands.

8 USB interface

USB interface is realized in GNS-MC35iU terminal only and fully comply to USB 2.0 specification. GNS-MC35iU uses “B” receptacles plug for connection to PC.

During interaction via USB interface, control signals of RS232 interface (like /DTR, /CTS, /DSR etc.) are also used. USB interface control logic fully corresponds to RS232 control logic, include ON/OFF control described in part 6 of this document.

The USB host is responsible for supplying, across the USB power line for supplying power to the terminal’s USB interface. But in some cases GNS-MC35iU terminal can consume more than 500mA from USB power line and there are no protection for “overconsuming”. To protect USB host from overconsuming one need to use power supply connected to the western 6 pole plug jack. At most cases overconsumption occurs when GSM signal is bad.

Table 12: USB connector pins assignment

Contact	Signal name
1	VBUS
2	D-
3	D+
4	GND
Shell	Shield

9 Coding of the status LED

A green LED displays the operating status of the terminal:

Operating status	LED State
Power down	Off
Not registered to net (missing SIM, PIN, net)	Fast blinking
Standby (registered to the net)	Slow flash (75ms ON/ 3s OFF)
Sleep mode (Power save mode, registered to the net)	off
Talk mode, GPRS data	on