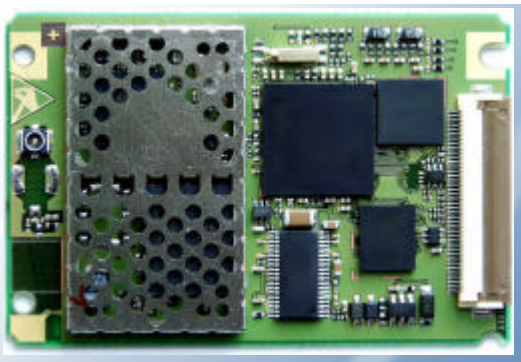
SIEMENS

TC35i

Siemens Cellular Engine



Migration from TC35 to TC35i

Version: V **01.01**
DocID: TC35_TC35i_MIG_01_V01.01

Status: Preliminary

Wireless Modules

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1 Revision history

Date	Author	Version	Change	Comment
021022	LR	00.01	Initial version based on M20T to TC35T migration paper and "Daphne" HW specification 00/011.	Done
021023	LR	00.02	Chapter # 5: AT commands - analysis and breakdown per module	Done
021023	NK	00.02	Initial version revision, AT Commands analysis	Done
021023	NK	00.03	Chapters # 3.1 – 4: HW	Done
021023	LR	00.03	Chapters # 3.1 – 4: HW – revision, Chapter # 2.1: How to use this document - revision	Done
021024	LR	00.03	Chapter # 5: AT-Commands migration – revision, Chapters # 2.1, 5.1, 5.2.1	Done
021024	NK	00.03	Chapters # 4: HW	Done
021025	LR	00.03	Chapter # 5.6: AT-Commands reference documents – new, Chapters # 5.2.2, 5.2.3	Done
021025	NK	00.03	Chapters # 4: HW	Done
021028	LR	00.03	Chapter # 5.2.4: AT commands originating from GSM 07.05 for SMS	Done
021028	NK	00.03	Chapters # 4: HW	Done
021029	LR	00.03	Chapter # 5.2.5: Siemens defined AT commands for enhanced functions	Done
021029	NK	00.03	Chapters # 3.1 – 4: HW	Done
021030	LR	00.03	Chapters # 5.3, 5.4, 5.5, 5.6	Done
021030	NK	00.03	Chapter # 3: Feature migration	Done
021104	NK	00.04	Chapter # 4: Hardware migration [all sub chapters] - revision	Done
021104	LR	00.04	Chapters [all]: Integration of HW & SW part, additional formatting and corrections	Done
021108	LR	00.05	Chapters [all]: Additional formatting and corrections	Done
021108	NK	00.05	Chapter #4: HW - revision, additional content	Done
021111	LR	00.05	Chapters [all]: Final formatting and corrections	Done
021111	AM	00.05	Chapters [all]: revision	Done
021112	AM/NK/LR	00.05	Chapters [all]: revision via telephone conference	Done
021112	NK/LR	00.06	Chapters [all]: corrections	Done
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021114	LR	00.07	Additional formatting and corrections	Done
021121	LR	00.08	Corrections, new "general notes" chapter	Done
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021219	AM/LR	00.10	Revision, phone conference	Done
090103		01.00	Released	Done

2 General info

2.1 How to use this document

The target audiences for this document are all categories of software and hardware developers, system integrators and expert end-users of SIEMENS GSM wireless modules. The content applies in particular to current users and developers whose applications are utilizing SIEMENS TC35/TC37/TC35T for their communications purposes.

The aim of this document is to provide information and offer support in order to facilitate the transition towards the new generation of SIEMENS wireless modules, namely, TC35i.

Information provided here is based on official technical manuals and released specifications for TC35 and TC35i. The naming conventions used in this document follow those of source documentation.
The authors presume the readers are already familiar with the contents of those manuals. The document presents migration issues in detail using comparison tables between the modules and covers topics ranging from hardware specifications to AT-command interface.

Technical specifications and interfaces to GSM telecom services are described and compared in detail as well as all the relevant features. AT-command interface was given particular attention since it represents the main tool available to developers through which applications can be controlled. Available commands for both TC35i and TC35T are listed and classified according to their implementation within each of the modules. Differences in test, query and execution syntax as well as in available parameters are noted for each command. Commands are classified in three main groups: jointly supported commands, commands new with respect to TC35 and TC35 commands not supported by TC35i.

3 Feature migration

Feature comparison for both modules is introduced in the table below. Only main specifications are listed.

3.1 General description

Table 3-1: General description a)

Features	Parameter	TC35	TC35i
Product Data	Frequency bands:	Dual-band EGSM 900, GSM1800 compliant to GSM Phase 2/2+	
	Output performance:	Class 4 (2W) for EGSM900 Class 1 (1W) for GSM1800	
	GSM Class:	small MS	
	Control:	via AT commands	
	Supported SIM card:	3V	
		External SIM card holder has to be connected via SIM interface connector	
	Phonebook management:	SM, FD, LD, MC, RC, ON, ME	
	Automatic dial on DTR line activation:	**not supported**	**supported, via AT%D**
	Input voltage range:	**3.3V – 5.5V**	**3.3 – 4.8 V**
		Automatic shutdown supported	
	Component mounting:	**both sides**	**single-side mounted**
	Dimensions:	**54.5 x 36 x 6.85 mm**	**54,5 x 36 x 3,6**
	Weight:	**18g**	**10g**
	Temperature conditions:	Normal operation: (-20°C; +55°C)	
		Restricted operation: (-29°C; -25°C) & (+55°C; +70°C)	
		Storage: (-40°C; +85°C)	
		Automatic shutdown supported: (>+75°C and <-29°C)	
	Real time clock:	Implemented	
		Pin 30, VDDLP Needs an external serial resistor between VDDLP and capacitor / battery to limit input current. If application is battery powered, additional diode(s) are suggested between VDDLP and VBATT+ (see Chapter "RTC backup" in your "TC3x Hardware Interface Description").	**Pin 30, VDDLP Includes 1kW resistor on VDDLP line between ZIF connector and PSU. No external resistor required. If used in earlier TC35 application, removing additional diode(s) between VDDLP and VBATT+ line is required.**
	Timer function:	Programmable via AT command	
	Antenna design:	50Ω antenna interface.	
	Antenna connectors:	GSC coaxial connector	
	Evaluation kit:	DSB 35 Support Box	
Audio	Speech codec:	Half Rate (ETS 06.20)	
		Full Rate (ETS 06.10)	
		Enhanced Full Rate (ETS 06.50 / 06.60 / 06.80)	
	Audio interface:	2 x analogue audio interfaces (hands-free, supports echo cancellation)	
SMS	General	Point-to-point MT and MO SMS	
		SMS Cell Broadcast	
		Text and PDU mode SMS MO	
	bulk SMS MO enhancement:	**-**	**+CMMS**
	SMS storages:	**SM**	**SM+ME (25 places)**
SAT	**SIM Application Toolkit:**	**-**	**SAT class 3, GSM 11.14 Release 98**

Table 3-2: General description b)

Features	Parameter	TC35	TC35i
Data	Supported services:	2400 bps (V.22bis) 4800 bps (V.32) 9600 bps (V.32) 14400 bps (V.34) 2400 bps (V.110) 4800 bps (V.110) 9600 bps (V.110) 14400 bps (V.110)	
	USSD support:	supported	
	Connection element:	non-transparent mode	
Fax	Supported classes:	Group 3: Class 1, Class 2	
External interfaces	**RF interface:**	**GSC antenna connector only**	
	Application interface:	40-pin ZIF connector	
Serial interface	**Baud rate:**	**Fixed range (300bps...115kbps) Autobauding (1.2kbps...115kbps)**	**Fixed range (300bps...230kbps) Autobauding (1.2kbps...230kbps)**
	Local character framing:	**8N1 - fixed**	**7E1, 7O1, 8E1, 8N1, 8O1, 7E2, 7O2, 8E2, 8N2, 8O2; via AT command**
	Multiplex mode:	supported, MUX GSM 07.10	
	Flow control:	RTS/CTS hardware handshake and software XON/XOFF flow control.	
Software update	via RS232 or SIM interface		

3.2 Certification and standards

Both TC35 and TC35i comply to the same directives and standards. For further information, please consult the HW manual.

4 Hardware migration

This chapter contains information regarding the hardware set-up, installation instructions and physical properties for both modules. Hardware features are listed in comparison tables related to power supply, RF, audio, SIM and RS232 serial interfaces with functionality descriptions. All features, except RF, are available through common host application interface.

4.1 Introduction

TC35i was intended as a "feature-superset" successor to TC35. It is super-slim, single-side mounted, compact, dual-band GSM OEM module for integration into industrial or mobile devices.
TC35i incorporates all the TC35 HW features with following additional features:

- **Automatic dial on DTR line activation**
- **Autobauding up to 230kbps. Character framing and flow control fully supported**
- **Single side mounted**
- **SM+ME (25 places)**
- **SAT class 3, GSM 11.14**

4.2 Operating Modes

Various operating modes for TC35 and TC35i modules are listed in the table below. TC35i module supports four additional sleep modes compared to TC35. For further details please consult the TC35i manual

The table below shows operating modes overview for both devices

Table 4-1: Operating modes

Mode	Function	TC35	TC35i
Normal operation	GSM SLEEP	Power saving mode set with AT+CFUN command. Software is active to minimum extent. If the GSM engine was registered to the GSM network in IDLE mode, it is registered and paging in SLEEP mode, too. AT interface is not responding.	Software is active to a minimum extent. If the module was registered to a GSM network in IDLE mode, it remains, in SLEEP mode, registered and pageable from the BTS. 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** alternatingly activate and deactivate the AT interface to allow permanent access to all AT commands.
	GSM IDLE	Software is active. Once registered to the GSM network, paging with BTS is carried out. The module 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.	
POWER DOWN		Operating voltage is applied. Only a voltage regulator in the Power Supply ASIC is active for powering the RTC. Software is not active. The RS-232 interface is not accessible.	
Alarm mode		Restricted operation launched by RTC alert function while the module is in Power Down mode. Module will not be registered to GSM network. Limited number of AT commands is accessible. If application is battery powered: No charging functionality in Alarm mode.	
Charge-only mode		Limited operation for battery powered applications. Enables charging while engine is detached from GSM network. Limited number of AT commands is accessible. There are several ways to launch Charge-only mode: ↘ From Power Down mode: Connect charger to POWER lines when engine was powered down by AT^SMSO. ↘ From Normal mode: Connect charger to POWER lines, then enter AT^SMSO.	
Charge mode during normal operation		Normal operation (SLEEP, IDLE, TALK, DATA) and charging running in parallel. Charge mode changes to Charge-only mode when the module is powered down before charging has been completed.	

4.3 Interface/connectors comparison TC35i/TC35

TC35 and TC35i are equipped with a 40-pin 0.5mm pitch ZIF connector that connects to the cellular application platform. The mentioned ZIF connector is completely the same for both devices. The host interface incorporates several sub-interfaces described in the following chapters

TC35 and TC35i are totally PIN compatible. Some off the TC35 signal names were changed with TC35i but the functionality is completely identical.

Table 4-2: Host interface PIN assignment - ZIF connector

Pin No.	Function	IO	Signal Name	
			TC35	TC35i
1-5	Power supply	I	VBATT+	BATT+
6-10	Ground	Ground	GND	GND
11-12	Charger	I	POWER	POWER
13	External supply voltage	O	VDD	VDD
14	Battery Temperature	I	AKKU_TEMP	BATT_TEMP
15	Ignition	I	/IGT	IGT
16	RS232	O	DSR0	DSR0
17	RS232	O	/RING	RING0
18	RS232	O	RxD0	RxD0
19	RS232	I	TxD0	TxD0
20	RS232	O	CTS0	CTS0
21	RS232	I	RTS0	RTS0
22	RS232	I	DTR0	DTR0
23	RS232	0	DCD0	DCD0
24	SIM	I	CCIN	CCIN
25	SIM	O	CCRST	CCRST
26	SIM	IO	CCIO	CCIO
27	SIM	O	CCCLK	CCCLK
28	SIM	O	CCVCC	CCVCC
29	SIM	Ground	CCGND	CCGND
30	RTC Backup	O	VDDLP	VDDLP
31	Power Down	I	/PD	EMERGOFF
32	Synchronization	O	SYNC	SYNC
33	Audio	O	EPP2	EPP2
34	Audio	O	EPN2	EPN2
35	Audio	O	EPP1	EPP1
36	Audio	O	EPN1	EPN1
37	Audio	I	MICP1	MICP1
38	Audio	I	MICN1	MICN1
39	Audio	I	MICP2	MICP2
40	Audio	I	MICN2	MICN2

4.4 Power Supply

4.4.1 General

TC35 and TC35i need to connect the power supply to the ZIF connector (5 pins each V_{BATT+} and GND). Power supply has to be a single voltage source at BATT+.
Power Supply ASIC handles all the key functions for supplying power.

The following tables show an overview of main power supply points with TC35 and TC35i

Table 4-3: Power supply signals

General		
Feature	**TC35**	**TC35i**
Input voltage range:	Five pins of BATT+ and GND must be switched in parallel for supply purposes because peaks of up to 2A may occur. V_I = 3.3V to 5.5V $V_{I,typ}$ = 4.2V I_{nom} ~ 2A, in burst	Five pins of BATT+ and GND must be switched in parallel for supply purposes because peaks of up to 3A may occur. **V_I = 3.3V to 4.8V** $V_{I,typ}$ = 4.2V I_{nom} ~ 2A, in burst
Ignition:	V_{out} = 2.3V R_{out} ≈ 220k. $V_{low,max}$ = 0.45V @ Iout = 10µA t_{low} ≈ 100ms Signal: falling edge and hold for t_{low} Open drain/collector driver is required to pull down this pin to power on the GSM Engine.	R_I ~ 100kΩ, C_I ~ 1nF $V_{IL\,max}$ = 0.5V @ I_{max} = 20µA $V_{Openmax}$ = 2.3V t_{low} ≈ 100ms Signal: falling edge and hold for t_{low}
	ON ~~~|____|~~~ Active Low ≥ 100ms	
Emergency shutdown: (Watchdog)	Via /PD (pin no. 31) This line must be driven by an Open Drain or Open Collector driver. Emergency shutdown deactivates the modules power supply. Signal ~~~| |~~~ Active Low ≥ 3.5s	via EMERGOFF (pin no. 31) This line must be driven by an Open Drain or Open Collector driver. Emergency shutdown deactivates the modules power supply. Signal ~~~|_____|~~~ Active Low ≥ 3.2s
Synchronization: Indication of increased current consumption during uplink transmission burst	$V_{out,low,max}$ = 0.2V @ I= 0.1mA $V_{out,high,min}$ = 2.25V @ I=-0.1mA $V_{out,high,max}$ = 2.76V	$V_{OL\,max}$ = 0.3V @ I = 0.1mA V_{OHmin} = 2.25V @ I = -0.1mA V_{OHmax} = 2.73V
Power saving:	Supported trough AT+CFUN Functionality levels <fun>=0	Supported trough AT+CFUN **Functionality levels <fun>=0, 5 , 6, 7 and 8**

Table 4-4: Power consumption comparison

Power consumption					
Device	**Stand-by**	**Sleep**	**Idle**	**Talk mode at EGSM900/1800**	**Talk mode (peak) at EGSM900/1800**
TC35	50µA typ	3mA typ	10mA typ	300mA/270mA	1.8A typ
TC35i	50µA typ	3mA typ	**25mA**	**300-400mA**	**2A typ**

4.4.2 Power up / down scenarios

TC35 and TC35i are fully identical regarding the power up/down scenario with the following exception:

To actually turn off the TC35i, the emergency shutdown line has to be driven to ground for ≥ 3.2s. The TC35 emergency shutdown line needs to be driven to ground for ≥ 3.5s
For further information please consult the HW manual for TC35 and TC35i.

4.4.3 Automatic shutdown

To ensure proper operation of all assemblies under varying conditions, such as temperature, input voltage, transmission power etc., TC35 and TC35i features protection elements for automatic shutdown.

Automatic shutdown takes effect if:
- the TC35/TC35i board is exceeding the critical limits of overtemperature or undertemperature
- the battery is exceeding the critical limits of overtemperature or undertemperature in a battery application, undervoltage is detected
- overvoltage is detected.

4.4.3.1 Temperature dependent shutdown

The board temperature is constantly monitored by an internal NTC resistor located on the PCB. The NTC that detects the battery temperature must be part of the battery pack circuit as described in the manual. The values detected by NTC resistor are measured directly on the board and the battery and are therefore, not fully identical with the ambient temperature.

Table 4-5: Maximum ratings and the associated URCs

Sending temperature alert		
	TC35	**TC35i**
^SCTM_A: 1	Caution: T_{amb} of battery between +56°C and +60°C.	
^SCTM_B: 1	Caution: T_{amb} of board between +55°C and +75°C.	Caution: T_{amb} of board between **+65°C and +75°C**.
^SCTM_A: -1	Caution: T_{amb} of battery between -14°C and -18°C.	
^SCTM_B: -1	Caution: T_{amb} of board between –20°C and –25°C.	Caution: T_{amb} of board between **–25°C and –29°C.**
^SCTM_A: 0	Battery back to uncritical temperature range	
^SCTM_B: 0	Board back to uncritical temperature range.	
Automatic shutdown (URC appears no matter whether or not presentation was enabled)		
^SCTM_A: 2	Alert: T_{amb} of battery ≥60°C. TC35 switches off immediately.	
^SCTM_B: 2	Alert: T_{amb} of board ≥70°C. TC35 switches off immediately.	Alert: T_{amb} of board **≥75°C**. TC35i switches off immediately.
^SCTM_A: -2	Alert: T_{amb} of battery < -18°C. TC35 switches off immediately	

^SCTM_B: -2	Alert: T_{amb} of board ≤-25°C. TC35i switches off immediately.	Alert: T_{amb} of board ≤-29°C. TC35i switches off immediately.

The table below shows which conditions will wake up TC35 and TC35i from sleep mode

As it can be seen from the following table TC35i supports four sleep modes (5,6,7,8) more then TC35.

Table 4-6: Wake up from SLEEP mode scenarios

Event	AT+CFUN=0 þ AT+CFUN=1		AT+CFUN=5 or 6 þ AT+CFUN=1	AT+CFUN=7 or 8 þ AT+CFUN=1
			TC35i only - (TC35 does not support sleep modes: 5-8)*	
	TC35	TC35i	TC35i	
Ignition line	No		No	No
/RTS0 or /RTS1 (falling edge)	Yes		No	No
Unsolicited Result Code (URC)	Yes		Yes	No
Incoming voice or data call	Yes		Yes	No
Any AT command (incl. outgoing voice or data call, outgoing SMS)	Not Possible (UART disabled)		No	No
Incoming SMS depending on mode selected by AT+CNMI: AT+CNMI=0,0 (= default, no indication of received SMS) AT+CNMI=1,1 (= displays URC upon receipt of SMS)	No Yes		No Yes	No No
RTC alarm	Yes		Yes	No
AT+CFUN=1	Not Possible (UART disabled)		Yes	Yes

* TC35i supports SLEEP modes 0, 5, 6, 7 and 8. Different events or commands cause a wake-up from a SLEEP mode. The detailed descriptions of these modes can be found in respective HID documents.

4.4.4 Battery pack

For some applications the use of a battery pack may be required. TC35 and TC35i can be powered from a Li-Ion battery:

Table 4-7: Battery specifications - general

General		
	TC35	TC35i
Supported Charging Technique	Trickle charging and processor controlled fast charging	
Operating modes	SLEEP, IDLE or TALK/DATA mode	
Output voltage (for charger)	5.5V…8V (under load)	
Charging current	Limited to 500mA	
Maximum voltage spikes	25V and must not exceed 1ms	15V and must not exceed 1ms

Table 4-8: Battery specifications - charging

Module	Battery specification	Maximum charging voltage	Capacity
TC35	3.6 V	4.2 V	600-800 mAh
TC35i	3.6 V	4.2 V	max 850 mAh

4.5 RTC backup

The internal Real Time Clock of is supplied from a dedicated voltage regulator in the power supply ASIC which is also active when TC35 and TC35i are in POWER DOWN status. Alarm function is included that allows waking up TC35 and TC35i without logging to the GSM network.

On the TC35i board a serial resistor is placed next to the VDDLP line in order to limit the input current of an empty capacitor. This eliminates the need of adding a resistor as required in applications based on the earlier TC35 module.

On the TC35 board there is no resistor placed on the board and it should be added when designing the GSM application

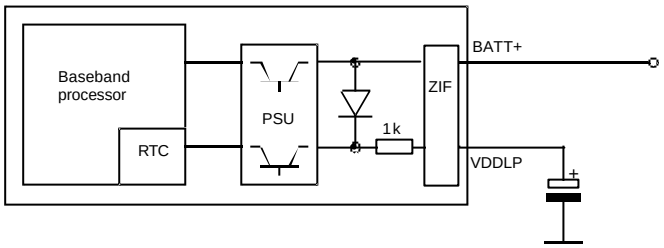


Figure 1: RTC supply from capacitor for TC35i

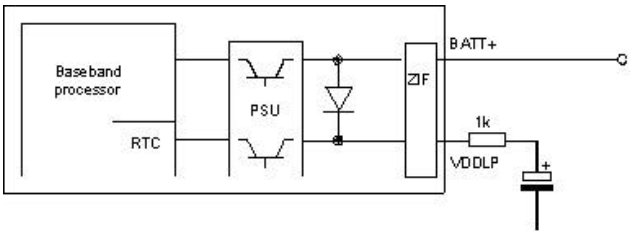


Figure 2: RTC supply from capacitor for TC35

4.6 Control signals

Input and Output control signals are identical with both TC35 and TC35i device.
For further information please consult the HW manual for TC35 and TC35i.

4.7 Interfaces

TC35 and TC35i interfaces are compatible. The following chapters shows a detailed comparison values for each interface. For further information please consult the TC35i HW manual

4.7.1 Serial Interface

Each device uses the same serial interface type with identical pin positions.

Compared to TC35 module that supports a fixed local character framing format between TA and TE, the new TC35i device offers various character framing formats specified in the next table. For further information please consult the AT command migration part of the document or the TC35i at command specification.

The table below shows a comparison of values for the serial interface with both devices.

Table 4-9: RS232 – Serial interface

RS232 - Serial interface		
Feature	**TC35**	**TC35i**
Type:	Serial asynchronous transmitter and receiver conforming to ITU-T RS232 Interchange Circuits DCE.	
Signal levels:	$V_{out\,low\,max}$ = 0.2V @ I = 0.1mA $V_{out\,high\,min}$ = 2.25V @ I = -0.1mA $V_{out\,high\,max}$ = 2.76V $V_{in\,high\,min}$ = 1.95V, $V_{i\,h\,max}$=3.3V	$V_{OL\,max}$ = 0.3V @ I = 0.1mA V_{OHmin} = 2.25V @ I = -0.1mA V_{OHmax} = 2.73V V_{IHmin} = 1.95V, V_{IHmax} = 3.45V
Local character framing:	fixed to 8 data bits, no parity and 1 stop bit	**7E1, 7O1, 8E1, 8N1, 8O1, 7E2, 7O2, 8E2, 8N2, 8O2**
Selectable baud rate	Fixed range (300bps...115kbps) Autobauding (1.2kbps...115kbps)	**Fixed range (300bps...230kbps)** **Autobauding (1.2kbps...230kbps**)
Flow Control	RTS0 / CTS0 and/or software flow control via XON / XOFF.	

4.7.2 SIM card interface

There are no changes on the integrated SIM interface with TC35 and TC35i.
For further information please consult the HW manual for TC35 and TC35i.

4.7.3 Antenna Interface

4.7.3.1 General

Both devices TC35 and TC35i use a GSC connector to establish the RF connection to the host application. The table below shows a RF interface overview for each device.

Table 4-10: RF interface

RF interface - general			
Feature		**TC35**	**TC35i**
Antenna connector:		GSC coaxial connector	
Interface type:		GSM 900/1800	
Max RF power:		2W [EGSM900] / 1W [GSM1800]	
RF Input sensitivity @ ARP BER Class II < 2.4%	Min	-104 [EGSM900] -102 [GSM1800]	-102dBm [EGSM900, GSM1800]

4.7.4 Audio Interface

Both TC35 and TC35i comprise two analogue audio interfaces, each with an analogue microphone input and an analogue loudspeaker output (see block diagram below).
To suit several types of equipment, there are several audio modes available which can be selected with the AT^SNFS command. The electrical characteristics of the voiceband part vary with the audio mode. For example, sending and receiving amplification, sidetone paths, noise suppression etc. depend on the selected mode and can be set with AT commands (except for mode 1).
All analogue microphone inputs and loudspeaker outputs are balanced. A power supply for electret microphones is implemented in both interfaces, too. If not needed, they have to be decoupled with capacitors.
Detailed instructions on using AT commands are presented in the AT Command Manual.

TC35i only: Independently of the audio mode, analogue interfaces 1 or 2 can be selected and configured by AT commands.

Characteristics of audio modes

The electrical characteristics of the voiceband part depend on the current audio mode, set with AT^SNFS command. Voice band characteristics are the same for TC35 and TC35i. For further details please consult the HW manual.

4.8 Electrostatic discharge

TC35 and TC35i are identical protected against Electrical Discharge. For additional information about ESD please consult the actual specification

4.9 Mechanical Dimensions

TC35 and TC35i provide the same type of connectors and mounting holes on the board. The position of mounting holes is identical as with TC35, as well as the order of external connectors. The outline mechanical dimensions are identical with both devices except the high. TC35i is a single side mounted device that makes it much thinner compared to TC35.

Figure 3: TC35 footprint

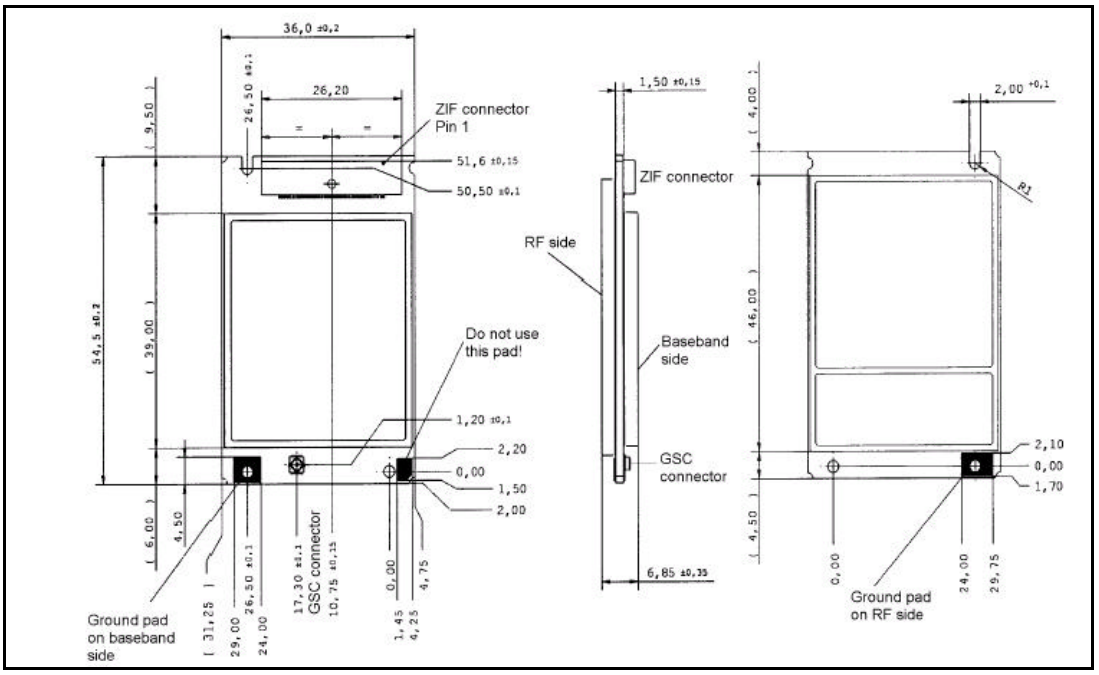
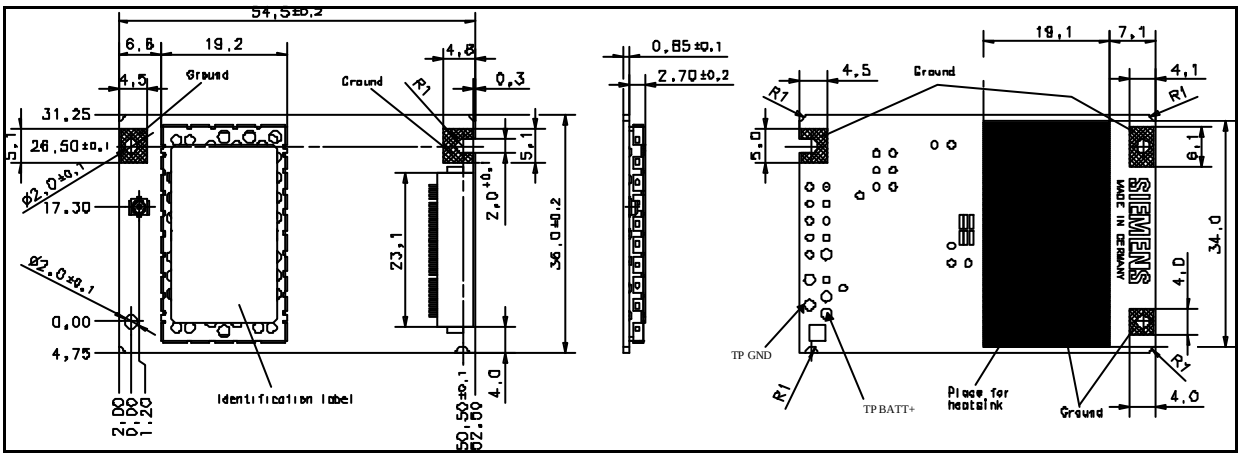


Figure 4: TC35i footprint



4.10 Mounting and installation

Appropriate installation and mounting to the host housing / enclosure is essential for reliable operation of the GSM engine.

TC35i & TC35

The TC35 board provides three mounting holes. To properly mount it to the host device you can use M1.6 or M1.8 screws plus suitable washers. The maximum diameter of the screw head, including the washer, must not exceed 4 mm.

To prevent mechanical damage, be careful not to force, bend or twist the GSM engine. Make sure it is positioned flat against the host device.

Avoid placing the TC35 board tightly to the host device. Instead, it is recommended to set the spacers between the module and the host device. If your design approach does not allow for spacers make sure the host device provides an opening for the RF part.

Avoid exerting any pressure on the shielding covers. Contact springs or other components must not be fastened to the covers. In extreme conditions, you run the risk of short-circuit if the cover was damaged or distorted due to pressure. Furthermore, the covers must not be used to apply any solder joints.

For snap-in concept please be aware that the TC35i PCB is thinner then the TC35 PCB

4.11 Terms and Abbreviations

Table 4-11: Glossary of terms

A/D	Analogue-to-Digital Converter
AF	Audio Frequency
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
AMR	Adaptive Multi Rate
ARP	Antenna Reference Point
ASIC	Application Specific Integrated Circuit
BB	Baseband
CPU	Central Processing Unit
CR	Change Request
CTR	Common Technical Regulation
DAI	Digital Audio Interface
DFC	Digital Frequency Centering
DSB	Development Support Board
DSP	Digital Signal Processor
DSR	Data Set Ready
DTR	Data Terminal Ready
DTX	Discontinuous transmission
EFR	Enhanced Full Rate
EMC	Electro Magnetic Compatibility
E-GAIM	Enhanced GSM Analog Interfacing Module
EGSM	Enhanced GSM
ESD	Electrostatic Discharge
ESR	Equivalent Serial Resistance
ETS	European Telecommunication Standard
FE	Front End
FFC	Flat Flexible Cable
FR	Full Rate
GAIM	GSM Analogue Interface Module
GMSK	Gaussian Minimum Shift Keying
GSC	(Type of antenna connector)
GSM	Global Standard for Mobile Communications
HR	Half Rate
HW	Hardware
IC	Integrated Circuit
IF	Intermediate Frequency
IMEI	International Mobile Equipment Identity
I/O	Input/Output
ISO	International Standards Organization
ITU	International Telecommunications Union
LDO	Low Drop Out
LFBGA	Low-Profile Fine-Pitch Ball Grid Array
Li-Ion	Lithium-Ion
LNA	Low-Noise Amplifier
LO	Local Oscillator
Mbps	Mbits per second
MMI	Man Machine Interface
MTBF	Mean Time Between Failures
NTC	Negative Temperature Coefficient
OC	Offset Compensation
OTP	One Time Programmable
PA(C)	Power Amplifier (Control)
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PGC	Programmable Gain-Controlled Amplifier
PLL	Phase Locked Loop
PSU	Power Supply Unit
RAM	Random Access Memory
RF	Radio Frequency
RI	Ring Indication
ROM	Read-Only Memory
RTC	Real-Time Clock
Rx	Receive direction
SAW	Surface Acoustical Wave Filter

SELV	Safety Extra Low Voltage
SIM	Subscriber Identification Module
SMS	Short Message Service
SW	Software
TBR	Technical Based Regulation
TBD	To Be Defined
TBI	To Be Inserted
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
Tx	Transmit direction
UART	Universal Asynchronous Receiver Transmitter
VCO	Voltage Controlled Oscillator
VCXO	Voltage Controlled Quartz Oscillator
VSWR	Voltage Standing Wave Ratio
ZIF	Zero insertion force (connector)

5 AT-Commands migration

TC35i was intended as a "feature-superset" successor to TC35.

AT Cellular command structure for TC35i corresponds to that of TC35 with the added improvements and new features.

Available commands for both TC35i and TC35 are listed and classified according to their implementation within each of the modules. The entire command set of TC35 is supported by TC35i. Differences in test, query and execution syntax as well as in available parameters are noted for each command. Commands are classified in three main groups:

- jointly supported commands
- commands new with respect to TC35 and
- TC35 commands not supported by TC35i

5.1 General comments

TC35i feature highlights

The commands below are either newly introduced or improvements based on the implementations present with other modules, e.g. M20, AC43/45, MC35.

- **AT+ICF, AT+IFC** - TC35i re-introduces these commands that were present in M20 but not in TC35 - character framing and flow control commands:
- **AT%D** - Command also previously available in M20 - automatic dialling by DTR toggle was not supported by TC35
- **ATS0** now applies to incoming voice calls as well
- **AT+CMER, AT+CIND**: mobile event reporting commands
- **AT^SRTC** – incoming SMS ring indication
- **AT+CPBS** - Extended ME phonebook up to 250 entries
- **AT&W** – user profile extended - new commands added: AT+ICF, AT+IFC, AT\Qn, AT%D
- **AT+CMMS** – keeps the data channel open for much faster throughput of SMS-SUBMIT messages
- **AT+CNMA** is no longer required for SMS-DELIVER messages delivered directly to TE
- **AT^SSR** - issues URCs related to availability of the SIM card
- **AT+CCUG** – closed user group now available

5.2 List of jointly supported AT-commands

AT-commands listed in the tables below are supported by both TC35i and TC35. Command defaults, however, may differ.

NOTE: Many commands are available only after the PIN has been entered. For a full list, please refer to respective AT reference manuals.

5.2.1 Standard V.25ter AT Commands

Table 5-1: Standard V.25ter AT commands

#	AT	Command
1	A/	Repeat previous command line
2	+++	Switch from data mode to command mode
3	**AT\Qn**	**Flow control**
	Differing implementation	
	TC35i AT\Qn included within user profile. See comments under AT&W.	**TC35** -
4	ATA	Answer a call
5	**ATD**	**Mobile originated call to dial a number**
	Differing implementation	
	TC35i International calls to be dialled exclusively starting with "+", i.e. "00" at the beginning of a dialling string will not be translated into a "+".	**TC35** -
6	ATD><mem><n>	Originate call to phone number <n> in memory <mem>
7	ATD><n>	Originate call to phone number selected from active memory
8	ATD><str>	Originate call to phone number in memory with corresponding field
9	ATDI	Mobile originated call to dialable ISDN number <n>
10	ATDL	Redial last telephone number used
11	**ATE**	**Enable command echo**
	Differing parameters	
	TC35i MUX: Echo is disabled at the start of MUX mode and is not available on logical channels, ATE1 responds with ERROR	**TC35** MUX: Echo is available on logical channels and is initially enabled only on main (data) MUX channel.
12	ATH	Disconnect existing connection
13	ATI	Display product identification information
14	ATI[value]	Display additional identification information
15	ATL	Set monitor speaker loudness
16	ATM	Set monitor speaker mode
17	ATO	Switch from command mode to data mod
18	ATQ	Set result code presentation mode
19	ATP	Select pulse dialling
20	**ATS0**	**Set number of rings before automatically answering the call**
	Differing implementation	
	TC35i ATS0 applies to incoming voice calls as well.	**TC35** ATS0 applies only to incoming data or fax calls.
22	ATS2	Escape code sequence
23	ATS3	Write command line termination character
24	ATS4	Set response formatting character
25	ATS5	Write command line editing character
26	ATS6	Set pause before blind dialling
27	**ATS7**	**Set number of seconds to wait for connection completion**
	Differing implementation	
	TC35i ATS7 applies to voice calls as well.	**TC35** ATS7 applies only to data calls.
28	ATS8	Set number of seconds to wait for comma dial modifier
29	ATS10	Set disconnect delay after indicating the absence of data carrier
30	ATS18	Extended error report
31	ATT	Select tone dialling

#	AT	Command
32	ATV	Set result code format mode
33	ATX	Set CONNECT result code format and call monitoring
34	ATZ	Set all current parameters to user defined profile
35	AT&C	Set circuit Data Carrier Detect (DCD) function mode
36	AT&D	Set circuit Data Terminal Ready (DTR) function mode
37	AT&F	Set all current parameters to manufacturer defaults
38	AT&S	Set circuit Data Set Ready (DSR) function mode
39	AT&V	Display current configuration
40	**AT&W**	**Store current configuration to user defined profile**
	Differing parameters	
	TC35i User profile extended to include the following commands: AT\V, AT+ICF, AT+IFC, AT\Q, AT%D, AT^STPB.	**TC35** Commands: AT\V, AT+ICF, AT+IFC, AT\Q, AT%D are either not available or not included within user profile.
41	AT+GCAP	Request complete TA capabilities list
42	AT+GMI	Request manufacturer identification
43	AT+GMM	Request TA model identification
44	AT+GMR	Request TA revision identification of software status
45	AT+GSN	Request TA serial number identification (IMEI)
46	AT+ILRR	Set TE-TA local rate reporting
47	**AT+IPR**	**Set fixed local rate**
	Differing parameters (factory defaults); minor wording differences	
	TC35i <rate> Factory settings, fixed: AT+IPR=57600 (230,4kbps possible in case of available memory)	**TC35** <rate> Factory settings, autobauding: AT+IPR=0

5.2.2 AT Commands for FAX

Table 5-2: AT commands for FAX

#	AT	Command
48	AT+FBADLIN	Bad Line Threshold
49	AT+FBADMUL	Error Threshold Multiplier
50	AT+FBOR	Query data bit order
51	AT+FCIG	Query or set the Local polling id
52	AT+FCLASS	Fax: Select, read or test service class
53	AT+FCQ	Copy Quality Checking
54	AT+FCR	Capability to receive
55	AT+FDCC	Query or set capabilities

#	AT	Command
56	AT+FDFFC	Data Compression Format Conversion
57	AT+FDIS	Query or set session parameter
58	AT+FDR	Begin or continue phase C data reception
59	AT+FDT	Data Transmission
60	AT+FET	End a page or document
61	AT+FK	Kill operation, orderly FAX abort
62	AT+FLID	Query or set the Local Id setting capabilities
63	AT+FMDL	Identify Product Mode
64	AT+FMFR	Request Manufacturer Identification
65	AT+FOPT	Set bit order independently
66	AT+FPHCTO	DTE Phase C Response Timeout
67	AT+FREV	Identify Product Revision
68	AT+FRH	Receive Data Using HDLC Framing
69	AT+FRM	Receive Data
70	AT+FRS	Receive Silence
71	AT+FTH	Transmit Data Using HDLC Framing
72	AT+FTM	Transmit Data
73	AT+FTS	Stop Transmission and Wait
74	AT+FVRFC	Vertical resolution format conversion

5.2.3 AT Commands originating from GSM 07.07

Table 5-3: AT commands from GSM 07.07

#	AT	Command	
75	AT+CACM	Accumulated call meter (ACM) reset or query	
76	**AT+CALA**	**Set alarm time**	
	Differing references to URC implementation in autobauding		
	TC35i		**TC35**
	Indicates ME wake-up into Alarm mode: ^SYSSTART ALARM MODE +CALA: <text> If autobauding is active (AT+IPR=0) the URCs ^SYSSTART ALARM MODE does not appear but your individual <text> message will be displayed.		Indicates ME wake-up into Alarm mode: ^SYSSTART ALARM MODE +CALA: <text> If autobauding is active (AT+IPR=0) the URCs ^SYSSTART ALARM MODE and +CALA: <text> do not appear. Therefore, avoid using Alarm mode in conjunction with autobauding.
77	AT+CAMM	Accumulated call meter maximum (ACMmax) set or query	
78	AT+CAOC	Advice of Charge information	
79	AT+CBST	Select bearer service type	
80	AT+CCFC	Call forwarding number and conditions control	
81	AT+CCLK	Real Time Clock	
82	AT+CEER	Extended error report	
83	**AT+CFUN**	**Set phone functionality**	
	Differing parameters and notes		

#	AT	Command
	TC35i <fun> parameter now accepts CYCLIC SLEEP MODE values 5, 6, 7 and 8, in addition to SLEEP MODE / FULL FUNCT., supported so far by TC35: 5 Reduced functionality (CYCLIC SLEEP MODE) The serial interface is enabled with every "wake up". If characters are recognized the serial interface will stay active for 2 seconds (after last character). 6 Reduced functionality (CYCLIC SLEEP MODE) The serial interface is enabled with every "wake up". If characters are recognized the serial interface will stay active for 10 minutes (after last character).Note: In any case, any circuit switched calls will be terminated. 7 Reduced functionality (CYCLIC SLEEP MODE) The serial interface is enabled with every "wake up". If characters are recognized the serial interface will stay active for 2 seconds (after last character). The sole exception for wake up is at+cfun=1. 8 Reduced functionality (CYCLIC SLEEP MODE) The serial interface is enabled with every "wake up". If characters are recognized the serial interface will stay active for 10 minutes (after last character). The sole exception for wake up is at+cfun=1. Additional notes **TC35i** • To check the current operation mode see „AT^SSYNC Configure SYNC Pin", pg. 181. • To check if ME has entered SLEEP mode it is necessary to measure the supply current. SLEEP mode actually starts after remaining network activities were terminated. • For SLEEP mode functionalities (<fun>=0, 5, 6) will not work without PIN1. • After reset it is necessary to enter PIN1 again. • In SLEEP mode the device wakes up by incoming call, short message, Real Time Clock alarm, falling edge of RTS (RS-232 levels) and upon receipt of an unsolicited result code (URC, see chapter 10.1.4). • In CYCLIC SLEEP mode device wakes up by incoming call, short message (only if notification output is configured using AT+CNMI=1,1), Real Time Clock alarm and upon receipt of an unsolicited result code (URC, see chapter 10.1.4). RTS signal is only for handshake and does not wake up the ME. • In CYCLIC SLEEP mode 7 and 8 device wakes up by incoming call, short message, Real Time Clock alarm and upon receipt of an unsolicited result code but continues the CYCLIC SLEEP after the event is finished. Only with at+cfun=1 the system wakes up permanently. RTS signal is only for handshake and does not wake up the ME.	**TC35** <fun> parameter accepts only values 0 and 1. Additional notes **TC35** • To check that ME has entered the SLEEP mode, it is recommended to measure the supply current. Depending on the configuration of the SYNC pin, the SLEEP mode may also be indicated by a status LED (see "AT^SSYNC Configure SYNC Pin", pg. 177). • When in SLEEP mode, the following events may cause the ME to wake up: incoming call, Real Time Clock alarm, falling edge of RTS (RS-232, 2.65V CMOS level) and receipt of an unsolicited result code (URC, see chapter 7.1.3).
84	AT+CGMI	Request manufacturer identification
85	AT+CGMM	Request model identification
86	AT+CGMR	Request revision identification of software status
87	AT+CGSN	Request product serial number identification (IMEI) identical to GSN
88	AT+CHLD	Call hold and multiparty
89	AT+CHUP	Hang up call
90	AT+CIMI	Request international mobile subscriber identity
91	AT+CLCC	List current calls of ME
92	AT+CLCK	Facility lock
93	AT+CLIP	Calling line identification presentation
94	**AT+CLIR**	**Calling line identification restriction**
	Differing implementation	
	TC35i TC35i supports +CLIR as a proper AT command with its own syntax.	**TC35** TC35 implementation was limited to ATD command with SS codes.

#	AT	Command
95	AT+CLVL	Loudspeaker volume level
96	AT+CMEE	Report mobile equipment error
97	AT+CMUT	Mute control
98	AT+CMUX	Enter multiplex mode
99	AT+COPN	Read operator names
100	AT+COPS	Operator selection
101	AT+CPAS	Mobile equipment activity status
102	AT+CPBR	Read current phonebook entries
103	AT+CPBS	Select phonebook memory storage
104	AT+CPBW	Write phonebook entry
105	AT+CPIN	Enter PIN
106	AT+CPIN2	Enter PIN2
107	AT+CPUC	Price per unit and currency table
108	AT+CPWD	Change password
109	AT+CR	Service reporting control
110	AT+CRC	Set Cellular Result Codes for incoming call indication
111	AT+CREG	Network registration
112	AT+CRLP	Select radio link protocol param. for orig. non-transparent data call
113	AT+CRSM	Restricted SIM access
114	AT+CSCS	Set TE character set
115	AT+CSNS	Single Numbering Scheme
116	AT+CSQ	Signal quality
117	AT+CSSN	Supplementary service notifications
118	AT+CUSD	Unstructured supplementary service data
119	AT+VTD=<n>	Tone duration
120	**AT+VTS**	**DTMF and tone generation (<Tone> in {0-9, *, #, A, B, C, D})**
	Differing implementation	
	TC35i Available without entering the PIN.	**TC35** PIN required.
121	AT+WS46	Select wireless network

5.2.4 AT commands originating from GSM 07.05 for SMS

Table 5-4: AT commands for SMS

#	AT	Command
122	AT+CMGC	Send an SMS command
123	AT+CMGD	Delete SMS message
124	AT+CMGF	Select SMS message format
125	AT+CMGL	List SMS messages from preferred store
126	**AT+CMGR**	**Read SMS message**

#	AT	Command
	Differing parameters	
	TC35i Filler "FF" will be displayed at PDU status report if <FF> is set to 1 at AT^SSCONF	
127	AT+CMGS	Send SMS message
128	AT+CMGW	Write SMS message to memory
129	AT+CMSS	Send SMS message from storage
130	AT+CNMA	New SMS message acknowledge to ME/TE, only phase 2+
131	**AT+CNMI**	**New SMS message indications**
	Differing implementation related to GSM phase 2+ compatibility issues and +CNMA requirements; differing notes	
	TC35i AT+CNMI settings requiring phase 2+ should be independent from AT+CSMS! WRITE syntax: Note 2: - (not enforced) Note 3: - (not enforced) Note: - (not required)	**TC35** WRITE syntax: Note2: The rules <mt>=2 and <mt>=3 for storing received SM are possible only if phase 2+ compatibility is activated with +CSMS=1 Note3: The parameter <ds>=1 is only available in phase 2+ Note: Parameters <mt>=2,3 and <ds>=1 are only available with GSM phase 2+ (see +CSMS=1). Incoming SMs or Status Reports have to be acknowledged with AT+CNMA=0 when using these phase 2+ parameters.
132	**AT+CPMS**	**Preferred SMS message storage**
	Differing parameters and implementation	

#	AT	Command
	TC35i	**TC35**
	Additional storage in ME memory for 25 SMS: <mem1> Messages to be read and deleted from this memory storage: "SM" SIM message storage "ME" Mobile Equipment message storage "MT" Any of the storages associated with ME <mem2> Messages will be written and sent to this memory storage: "SM" SIM message storage "ME" Mobile Equipment message storage "MT" Any of the storages associated with ME <mem3> Received messages will be placed in this memory storage if routing to TE is not set. See command AT+CNMI with parameter <mt>=2. "SM" SIM message storage "MT" Any of the storages associated with ME <usedx> Number of messages currently in <memx> <totalx> Number of messages storable in <memx> Note: The Mobile Equipment storage "ME" has space for 25 short messages. The storage "MT" is the sum of the storages "ME" and "SM". The indices (<index>) from 1 to 25 are associated to the "ME" storage. Indices equal to 26 and higher belong to the "SM" storage. Incoming short messages with message class 1 or 2 (refer <dcs> GSM 03.38) will be stored in the "ME" or "SM" storage only. Therefore the ^SMGO: 2 indication (see AT^SMGO) could occur, without the indication ^SMGO: 1 before. When switching parameter <mem3> from "MT" to "SM" the "ME" storage will be filled with dummy short messages. Therefore the execution can last up to 35 seconds if all the 25 records have to be written. When switching back from "SM" to "MT" the dummy short messages will be deleted. The execution could last 35 seconds, too. In case of short messages present in the "ME" storage they will be remembered when switching back from "SM" to "MT". The <mem1>, <mem2> and <mem3> parameter will be stored in non-volatile memory. Multiplexer: The parameter <mem3> will be the same for all instances. The parameter <mem2> and <mem3> can differ from one instance to the other.	Only "SM" storage available: <mem1> Memory to be used when listing, reading and deleting messages: "SM" SIM message storage <mem2> Memory to be used when writing and sending messages: "SM" SIM message storage <mem3> Received messages will be placed to this storage if routing to TE is not set. See AT+CNMI command with parameter <mt>=2 (Chapter 5.10). "SM" SIM message storage <usedx> Number of messages currently in <memx> <totalx> Number of messages storable in <memx> Note: -
133	AT+CSCA	SMS service centre address
134	AT+CSCB	Select cell broadcast message
135	AT+CSDH	Show SMS text mode parameters
136	AT+CSMP	Set SMS text mode parameter
137	**AT+CSMS**	**Select Message Service**
	Differing implementation related to GSM phase 2+ compatibility issues and +CNMA requirements; differing notes	

#	AT	Command
	TC35i Note: If CSMS is switched to <service> = 1, all messages with phase 2+ (see AT^SCNMI with <mt>= 2, <mt>= 3, <ds>= 1) has to be acknowledged with AT+CNMA (see AT+CNMA)	**TC35** Note: If CSMS Mode is switched from Phase 2+ to Phase 2 and one or more CNMI Parameter are Phase 2+ specific a '+CMS ERROR: unknown error' will appear. It is recommended to switch the CNMI Parameters to Phase 2 specific values before entering Phase 2.

5.2.5 Siemens defined AT commands for enhanced functions

Table 5-5: Siemens defined AT commands

#	AT	Command
138	**AT+CXXCID**	**Display card ID (identical to AT^SCID)**
	Differing implementation	
	TC35i Available without entering the PIN.	**TC35** PIN required.
139	**AT^MONI**	**Monitor idle mode and dedicated mode**
	Differing parameters; minor differences in wording of command syntax description; differing notes	
140	AT^MONP	Monitor neighbour cell
141	AT^SACM	Advice of charge and query of ACM and ACMmax
142	AT^SBC	Battery charging / discharging and charge control
143	**AT^SCID**	**Display SIM card identification number**
	Differing implementation	
	TC35i Available without entering the PIN.	**TC35** PIN required.
144	AT^SCKS	Set SIM connection presentation mode and query SIM connection status
145	AT^SCNI	List Call Number Information
146	**AT^SCTM**	**Set critical operating temperature presentation mode or query temperature**
	Differing parameters, notes and examples	
	TC35i TC35i has two additional parameters: <p> output/suppress <temp> in read syntax <temp> board temperature, Celsius <p> 0 Suppress output of <temp> in test and read command. 1 Output <temp> in test and read command. <temp> Board temperature in Celsius. Is comprised between the lowest temperature limit and the uppermost temperature limit. Syntax: AT^SCTM=<n>[,<p>]	**TC35** N/A
147	AT^SDLD	Delete the .last number redial. memory
148	AT^SHOM	Display Homezone
149	AT^SLCD	Display Last Call Duration
150	AT^SLCK	Facility lock
151	AT^SMGL	List SMS messages from preferred storage
152	AT^SMGO	Set or query SMS overflow presentation mode or query SMS overflow
153	AT^SMGR	Read SMS message without set to REC READ
154	AT^SMONC	Cell Monitoring
155	AT^SMSO	Switch off mobile station
156	**AT^SM20**	**Set M20 Compatibility**
	Differing parameters	
	TC35i Additional parameter: <n> Call compatibility parameter 0 Compatible to x35 Mobile Phones 1 Compatible to M20 <m> Short message write compatibility parameter. 0 Compatible to x35 Mobile Phones 1 Compatible to M20	**TC35** <n> 0 Compatible to x35/37mobiles. If this mode is active, TA returns OK right after attempting a call. 1 Compatible to M20. If the M20 mode is active, TA returns OK once the call is successfully set up. Issuing any command before TA returns OK will cancel the call setup.
157	AT^SNFD	Set audio parameters to manufacturer default value
158	AT^SNFI	Set microphone path parameters
159	AT^SNFM	Mute microphone
160	AT^SNFO	Set audio output (= loudspeaker path) parameter
161	AT^SNFPT	Call progress tones
162	**AT^SNFS**	**Select audio hardware set**
	Differences in command syntax description; differing notes	

#	AT	Command
	TC35i <audioMode> 1 Audio mode 1: Standard mode optimised for the default handset, that can be connected to the analogue interface 1 (see your "Hardware Interface Description" for information on this handset.) To adjust the volume use the knob of the default handset. This handset can be used in audio mode 4 with user defined parameters. Note: The default parameters are determined for type approval and are not adjustable with AT commands.	**TC35** <audMode> 1 Audio mode 1: Standard mode optimised for the default handset, that can be connected to the analogue interface 1 (see your "Hardware Interface Description" for information on this handset.) To adjust the volume use the knob of the default handset. In audio mode 4 and 5, this handset can be used with user defined parameters. Note: The default parameters are determined for type approval and are not adjustable with AT commands.
163	AT^SNFV	Set loudspeaker volume
164	**AT^SNFW**	**Write audio setting in non-volatile store**
	Differing implementation and notes	
	TC35i ME stores the following audio parameter values in non-volatile memory:<audioMode>, <inBbcGain>, <inCalibrate>, <outBbcGain>, <outCalibrate[0]> ... <outCalibrate[4]>, <side Tone>	**TC35** Saved parameters: <inBbcGain>, <inCalibrate>, <outBbcGain>, <outCalibrate[0]> ... <outCalibrate[4]>, <side Tone>
165	AT^SPBC	Search the first entry in the sorted telephone book
166	AT^SPBG	Read entry from active telephone book via sorted index
167	AT^SPBS	Steps the selected phonebook alphabetically
168	AT^SPIC	Display PIN counter
169	AT^SPLM	Read the PLMN list
170	AT^SPLR	Read entry from the preferred operators list
171	AT^SPLW	Write an entry to the preferred operators list
172	AT^SPWD	Change password for a lock
173	AT^SSCONF	SMS Configuration
174	AT^SSDA	Set Display Availability
175	**AT^SSYNC**	**Configure SYNC Pin**
	Differing notes on implementation (references to TC35T) and operating modes	
176	AT^STCD	Display Total Call Duration

5.3 List of new AT-Commands

This chapter lists only new commands, supported exclusively by TC35i.

5.3.1 AT Commands for SIM Application Toolkit (GSM 11.14)

Table 5-6: AT commands for SAT

#	AT	Command
1	AT^SSTA	Remote-SAT Interface Activation
2	AT^SSTN	Remote-SAT Notification
3	AT^SSTGI	Remote-SAT Get Information
4	AT^SSTR	Remote-SAT Response

5.3.2 AT Commands originating from GSM 07.07

Table 5-7: AT commands from GSM 07.07- new

#	AT	Command
5	AT+CCWA	Call waiting
6	AT+CCUG	Closed User Group
7	AT+CMER	Mobile Equipment Event Reporting

#	AT	Command
8	AT+CIND	Indicator Control

5.3.3 Commands from change requests TC/AC/MC35

Table 5-8: AT commands from change requests

#	AT	Command
9	AT^SRTC	Select, query and test ringing tones

5.3.4 New features for TC35i only – misc.

Table 5-9: New TC35i features

#	AT	Command
10	AT\V	Configure CONNECT Response
11	AT^SAIC	Audio Interface Configuration
12	AT^SMOND	Monitoring
13	AT^SSR	SIM READY
14	AT%D	Automatic dial on DTR line activation
15	AT+ICF	Set TE-TA control character framing
16	AT+IFC	Set TE-TA local data flow control
17	AT+CMMS	More Messages to Send

5.3.5 Siemens defined AT commands for enhanced functions

Table 5-10: New Siemens defined AT commands

#	AT	Command
18	AT^SNFA	Set or query of microphone attenuation
19	AT^SLMS	List Memory Storage
20	AT^SBV	Battery Voltage
21	AT^SPBD	Delete the given Phonebook

5.4 List of unsupported AT-Commands

TC35i supports the entire TC35 AT command set.

5.5 List of AT-Commands for V.25ter compatibility

These commands return "OK" but have no functionality in both TC35i and TC35.

Table 5-11: V.254ter compatibility commands

#	AT	Command
1	ATL	Set monitor speaker loudness
2	ATM	Set monitor speaker mode
3	ATP	Select pulse dialling
4	ATS2*	Escape code sequence
5	ATS6	Set pause before blind dialling
6	ATS8	Set number of seconds to wait for comma dial modifier
7	ATT	Select tone dialling

*not "formally" listed as supported by TC35i.