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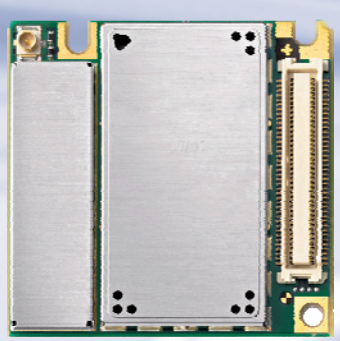

Migrating to MC75i, TC63i, TC65i

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DocID: MC75i_TC6xi_migration_v01

Migration Guide

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Contents

1 Introduction

This migration guide[1] compares the following Siemens wireless modules:

- MC75 04.001 and MC75i
- TC63 03.001 and TC63i
- TC65 03.00 and TC65i

The aim of the document is to help system engineers efficiently migrate their existing GSM application design to the next generation modules MC75i, TC63i, TC65i.

1.1 Related Documents

This section lists the documents referenced in this migration guide. For other related documents please refer to the Release Notes supplied with your Siemens wireless module.

[1] MC75 Hardware Interface Description, v04.001
[2] MC75i Hardware Interface Description
[3] MC75 AT Command Set, v04.001
[4] MC75i AT Command Set

[5] TC63 Hardware Interface Description, v03.001
[6] TC63i Hardware Interface Description
[7] TC63 AT Command Set, v03.001
[8] TC63i AT Command Set

[9] TC65 Hardware Interface Description, v03.000
[10] TC65i Hardware Interface Description
[11] TC65 AT Command Set, v03.000
[12] TC65i AT Command Set

[13] Application Note 02: Audio Interface Design for GSM Applications
[14] Application Note 07: Rechargeable Lithium Batteries in GSM Applications
[15] Application Notes 45: Jamming Detection – Radio Link Stability Monitor
[16] Application Note: Using TTY/CTM Equipment
[17] Remote SAT User's Guide

TC65 and TC65i only:
[18] Application Note 46: Incremental Java Update
[19] Java User's Guide
[20] Java doc \wtk\doc\html\index.html

1.2 Type Approval

MC75, TC63, TC65 and MC75i, TC63i, TC65i comply with the same standards and directives.

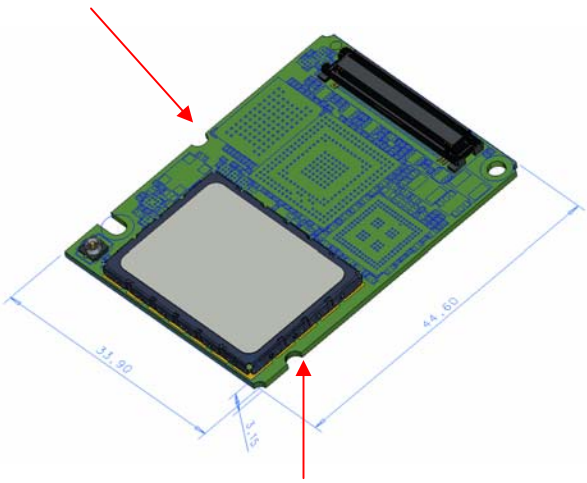
[1] The document is effective only if listed in the appropriate Release Notes as part of the technical documentation delivered with your Siemens wireless product.

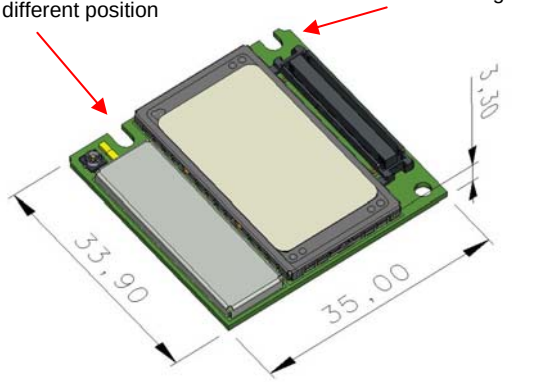
2 Hardware Related Differences

The focus of this chapter is on differences between MC75, TC63, TC65 and MC75i, TC63i, TC65i. It also refers to sections of the Hardware Interface Descriptions specifying features and properties that were modified for MC75i, TC63i, TC65i.

2.1 Mechanical

MC75, TC63, TC65 and MC75i, TC63i, TC65i are different in length and have different shieldings. This implies that the mounting holes have changed, except for the round hole.

<table>
<tr><th>MC75, TC63, TC65</th><th>MC75i, TC63i, TC65i</th></tr>
<tr><td>Length and width: 44.6 mm x 33.9 mm</td><td>Length and width: 35 mm x 33.9 mm</td></tr>
<tr><td colspan="2">Height: 3.3 mm excluding application connector</td></tr>
<tr><td colspan="2">Weight: 7.5 g</td></tr>
<tr><td>Shielding on RF components, no shielding on baseband components</td><td>Two shieldings protecting baseband and RF components.</td></tr>
<tr><td>1 round hole
1 oblong hole
2 half-round holes</td><td>1 round hole (same as MC75i, TC63i, TC65i)
2 oblong holes
no half-round holes</td></tr>
<tr><td>Half-round hole MC75, TC63, TC65 only
 

Half-round hole MC75, TC63, TC65 only</td><td>Oblong hole has different position
Additional oblong hole
 
</td></tr>
</table>

Reference:

- “Hardware Interface Description”: Section “Mechanics”

2.1.1 Power Supply

MC75	TC63, TC65, MC75i, TC63i, TC65i
3.2V – 4.3V	3.2V - 4.5V

Reference:
- "Hardware Interface Description": Section "Pin Assignment and Signal Description"

2.2 Operating Temperature

Due to smaller mechanical dimension the behaviour over temperature of MC75i, TC63i, TC65i will be different in comparison to MC75, TC63, TC65, in particular if the module is in TX multislot operation.

Therefore, means of heat dissipation should be checked when migrating from MC75, TC63, TC65 to MC75i, TC63i, TC65i.

2.2.1 Extended Low Temperature Range

Compared to MC75, TC63, TC65, the low temperature range has been extended for MC75i, TC63i, TC65i to support restricted operation down to -40°C.

Reference:
- "Hardware Interface Description": Section "Operating Temperatures"

2.3 Application Interfaces

2.3.1 SPI (Serial Peripheral Interface)

MC75, TC63	MC75i, TC63i, TC65, TC65i
SPI interface not available	SPI interface available

Unlike MC75 and TC63, MC75i and TC63i are equipped with an SPI interface. The SPI is a synchronous serial interface for data transfer between the GSM module and the connected application. The interface supports transmission rates up to 6.5 Mbit/s.

The SPI interface consists of four lines: the data lines SPIDI and SPIDO, the Clock line SPICLK and the Chip Select line SPICS. Two of these lines are shared among SPI and I^2C, meaning that both interfaces are mutually exclusive: If the SPI bus is active the lines I2CCLK_SPICLK (pin 11) and I2DAT_SPIDO (pin12) are locked for use as I^2C lines. The other two SPI lines (pin 7 and pin 75) are unused on the first generation modules MC75 and TC63.

To configure and activate the SPI interface (or the I^2C interface) use the AT^SSPI command. See also Section 3.3.

Reference:
- "Hardware Interface Description": Section "SPI", Section "Pin Assignment and Signal Description" (Table "Pin assignment", Table "Signal Description")
- "AT Command Set": Section "AT^SSPI"

2.3.2 Improved Handling of I^2C and USB on MC75i

MC75: I^2C and USB cannot be operated at the same time.
MC75i: The I^2C bus can be opened and used without any problems when the USB cable is plugged at the same time.

2.3.3 Audio Interfaces

Due to a different chip design, the internal gain of the power amplifier behind EPP1/EPN1 in MC75i, TC63i, TC65i is 6dB higher than in MC75, TC63, TC65. This additional gain is compensated internally in the audio modes 1, 4 and 5 intended to be used in conjunction with EPP1/EPN1. If AT^SAIC is used to switch between the audio outputs EPP1/EPN1 and EPP2/EPN2 in any audio mode, EPP1/EPN1 will always have a 6dB higher gain compared to EPP2/EPN2. In MC75, TC63, TC65 there is no such a difference.

Reference:
- "Hardware Interface Description": Section "Characteristics of Audio Modes"
- "AT Command Set": Section "AT^SNFO"
- Application Note 02: Audio Interface Design for GSM Applications

2.3.4 Voiceband Receive Path

The maximum differential output voltage (peak to peak) at EPP1 to EPN1 using 8 Ohm load shall not to lead to exceed the maximum power dissipation of 230 mW at board temperatures above 85°C.

That means the differential voltage at EPP1/EPN1 for a sine wave must not exceed 3.8 Vpp at 8 Ohm. At 16 Ohm it can be 6 Vpp as before.

Reference:
- "Hardware Interface Description": Sections "Voiceband Receive Path" and "Signal Description"

2.3.5 TTY/CTM Support

MC75, TC63, TC65	MC75i, TC63i, TC65i
CTM equipment can be connected to one of the three audio interfaces.	CTM equipment can be connected to one of the three audio interfaces. In addition, MC75, TC63, TC65 supports an internal TTY/CTM-Modem. TTY equipment can therefore be connected directly to one of the three audio interfaces.

Reference:
- "AT Command Set": Section AT^SNFTTY
- Application Note: Using TTY/CTM Equipment [16]
- See also Section 3.4

2.4 Charging

MC75, TC63, TC65	MC75i, TC63i, TC65i
Output voltage of DC battery chargers is limited to 5.2V ± 0.2V.	DC battery chargers with output voltages of up to 7V are now accepted, too.
Two charging timers are implemented: software controlled timer set to 4 hours and a hardware controlled timer set to 4.66 hours.	4-hour software controlled charging timer is the same as with MC75, TC63, TC65. The hardware controlled timer is not implemented.

Refererence:
- "Hardware Interface Description": Sections "Charger Requirements", "Implemented Charging Technique"
- Application Note 07: Rechargeable Lithium Batteries in GSM Applications

2.5 Measuring the Supply Voltage

Unlike MC75, TC63, TC65, the MC75i, TC63i, TC65i modules have no extra BATT+ and GND test points. To measure the supply voltage you can use one of the five BATT+ pins of the board-to-board connector and a nearby ground pad as reference.

Refererence:
- "Hardware Interface Description": Section "Measuring Supply Voltage""

2.6 Leakage Current in Power Down Mode

MC75, TC63, TC65	MC75i, TC63i, TC65i
50µA when the module is switched off with AT^SMSO or 90µA – 100µA when BATT+ was disconnected and applied again without ever starting the module.	Only 50µA when the module is switched off with AT^SMSO.

Refererence:
- "Hardware Interface Description": Section "Power Supply Ratings"

2.7 Antenna Interface

MC75i, TC63i, TC65i contain different radio frequency parts than MC75, TC63, TC65, meaning that the matching between module and antenna might be slightly different.

Application manufacturers should check their application for radiated harmonics emissions in TX operation when using MC75i, TC63i, TC65i in the same application as MC75, TC63, TC65 and with the same antenna.

Reference:
- "Hardware Interface Description": Section "Antenna Interface"

3 Software Related Differences

This chapter provides information on new or improved software features introduced with MC75i, TC63i, TC65i.

3.1 Bit Rate of the Local Asynchronous Serial Interface

MC75, TC63, TC65	MC75i, TC63i, TC65i
Maximum fixed bit rate selectable with AT+IPR: 460.800 bps	Maximum fixed bit rate bit rate selectable with AT+IPR: 921.600 bps

Reference:
- "AT Command Set": Section AT+IPR

3.2 Temperature Control

The AT^SCTM command has been enhanced as follows:
- The additional parameters <p> of the AT^SCTM write command and <temp> of the AT^SCTM? read command enable the MC75i, TC63i, TC65i module to display the exact board temperature in degrees Celsius.
- The guard period for deferred shutdown has been extended from 15 seconds to 2 minutes after power-up.

MC75, TC63, TC65	MC75i, TC63i, TC65i
Write command: AT^SCTM=<n> Read command: ^SCTM: <n>, <m> OK	Write command: AT^SCTM=<n>[, <p>] Read command response: AT^SCTM? ^SCTM: <n>, <m>[, <temp>] OK

Reference:
- "AT Command Set": Section AT^SCTM
- "Hardware Interface Description": Sections "Thermal Shutdown", "Operating Temperatures"

3.3 AT^SSPI

The AT^SSPI command controls both the I^2C and the SPI interface. Factory default is I^2C at 400 kbps data rate. Keep in mind that the two interfaces are mutually exlusive. See also Section 2.3.1.

MC75, TC63	MC75i, TC63i, TC65, TC65i

AT^SSPI applies only to I^2C.
 	
AT^SSPI write command parameters:
`AT^SSPI=[<basicConfiguration>`
`[, <delayOne>[, <delayTwo>]]]`
	AT^SSPI applies to I^2C and SPI.
	
	AT^SSPI write command parameters:
	`AT^SSPI=[<basicConfiguration>[,`
	`<delayOne>`
	`[, <delayTwo>[, <wordLength>`
	`[,<extendedSpiConfiguration>]]]]]`

Reference:
- "AT Command Set": Section AT^SSPI
- "Hardware Interface Description": Section "SPI"

3.4 AT^SNFTTY

MC75, TC63, TC65 incorporates an internal CTM modem. The AT^SNFTTY parameter <audioState> has been enhanced. The new value "2" enables the internal CTM modem.

MC75, TC63, TC65	MC75i, TC63i, TC65i

Supported values of <audiostate>:
 	
`AT^SNFTTY=?`
`^SNFTTY: (0-1)`
`OK`
	Supported values of <audiostate>:
	
	`AT^SNFTTY=?`
	`^SNFTTY: (0-2)`
	`OK`

Reference:
- "AT Command Set": Section AT^SNFTTY
- Application Note: Using TTY/CTM Equipment [16]
- See also Section 2.3.5

3.5 AT^SNFG

The AT^SNFG command generates local sine tones on the audio interface currently selected with AT^SAIC and AT^SNFS. Up to three different tones can be composed by changing the duration, frequency and amplitude.

MC75	MC75i, TC63, TC63i, TC65, TC65i

Not implemented	Write command:
	`AT^SNFG=<duration>, <frequency>, <amplitude>[, <frequency>, <amplitude> [, <frequency>, <amplitude>]]`
	
	Read command:
	`^SNFG:(list of supported <duration>s), (list of supported <frequency>s), (list of supported <amplitude>s)[, ...]`

Reference:
- “AT Command Set”: Section AT^SNFG

3.6 AT^SSTA Remote SAT Interface Activation

With MC75i, TC63i, TC65i, the Remote SAT interface activation via AT^SSTA is able to switch between a default automatic response mode (AR Mode) and an explicit response mode (ER Mode).

- In AR mode (<mode>=0) all commands and responses are exchanged automatically between the module and the SIM application (default). This eliminates the need to enter any Remote SAT AT commands incl. the AT^SSTA command.
  If AR mode is enabled the module enters the OFF state (<state>=1) after reboot.
- ER mode (<mode>=1) is intended for use with an MMI. If ER mode is enabled the MMI is required to handle, via the module's Remote-SAT interface, all commands and responses transmitted to or from the SIM.
  If ER mode is enabled the module enters the IDLE state (<state>= 2) after reboot.

Reference:
- Remote SAT User’s Guide [17]

3.7 RLS Monitor (Jamming Detection)

For MC75i, the AT^SIND command has been enhanced by the lsta" parameter designed to monitor the radio link stability of the module.

Switching on the "lsta" parameter enables the module to detect and report interferences caused by RF transmitters across all GSM frequency bands. "+CIEV: lsta" URCs display parameters for drawing conclusions whether the radio link is exposed only to industrial (non-jamming) interferences or whether a jamming attempt may have impaired the module's communication with the base station.

Reference:
- Application Notes 45: Jamming Detection – Radio Link Stability Monitor
- "AT Command Set": Section AT^SIND

4 Java Features of TC65 and TC65i

4.1 Incremental Update

TC65	TC65i
OTAP is intended to transfer the entire Java userware.	OTAP gives you the flexibility to transfer either the entire Java userware or only those *.jar and *jad files that have been changed. The benefit is that Java OTAP can be performed more efficiently by saving bandwith for the transfer and, thus reducing maintenance costs. Precondition is that the userware is programmed in a modular way using one Midllet jar file and single Liblet files.

Reference: [18], [19], [20]

4.2 New Interface APIs

TC65	TC65i
The module's interfaces I^2C, SPI, DAC and ADC can only be handled by the ATCommand Class.	TC65i provides dedicated Java APIs for direct access to module's interfaces I^2C, SPI, DAC and ADC.

Reference: [19], [20]