



ME910C1 PSM Application Note

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APPLICABILITY TABLE

PRODUCTS

- ■ ME910C1-NA
- ■ ME910C1-NV
- ■ ME910C1-J1
- ■ ME910C1-AU
- ■ ME910C1-K1
- ■ ME910C1-E1
- ■ ME910C1-WW
- ■ ME910C1-E2
- ■ NE910C1-E1

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1. INTRODUCTION

1.1. Scope

The ME910C1 includes unique advanced features in order to support the PSM according to 3GPP Rel-12.

The aim of this document is the description of the suggested Application design to use this functionality.

1.2. Audience

This document is intended for Telit customers, who are integrators, about to implement their applications using our ME910C1 modules.

1.3. Contact Information, Support

For general contact, technical support services, technical questions and report documentation errors contact Telit Technical Support at:

- TS-EMEA@telit.com
- TS-AMERICAS@telit.com
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Alternatively, use:

<http://www.telit.com/support>

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

<http://www.telit.com>

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Text Conventions



Danger – This information **MUST** be followed or catastrophic equipment failure or bodily injury may occur.



Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.



Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.5. Related Documents

- ME910C1 HW User Guide, 1VV0301210
- ME910C1 AT Commands Reference Guide, 80471ST10691A
- Telit EVK2 User Guide, 1vv0300704

2. OVERVIEW

The aim of this document is the description of some hardware solutions useful for developing a product with the Telit ME910C1 module.

In this document all the basic functions of a mobile phone will be taken into account; for each one of them a proper hardware solution will be suggested and eventually the wrong solutions and common errors to be avoided will be evidenced. Obviously this document cannot embrace the whole hardware solutions and products that may be designed. The wrong solutions to be avoided shall be considered as mandatory, while the suggested hardware configurations shall not be considered mandatory, instead the information given shall be used as a guide and a starting point for properly developing your product with the Telit ME910C1 module. For further hardware details that may not be explained in this document refer to the Telit ME910C1 Product Description document where all the hardware information is reported.



NOTICE:

(EN) The integration of the LTE **ME910C1** cellular module within user application shall be done according to the design rules described in this manual.

(IT) L'integrazione del modulo cellulare LTE **ME910C1** all'interno dell'applicazione dell'utente dovrà rispettare le indicazioni progettuali descritte in questo manuale.

(DE) Die Integration des **ME910C1** LTE Mobilfunk-Moduls in ein Gerät muß gemäß der in diesem Dokument beschriebenen Konstruktionsregeln erfolgen.

(SL) Integracija LTE **ME910C1** modula v uporabniški aplikaciji bo morala upoštevati projektna navodila, opisana v tem priročniku.

(SP) La utilización del modulo LTE **ME910C1** debe ser conforme a los usos para los cuales ha sido diseñado descritos en este manual del usuario.

(FR) L'intégration du module cellulaire LTE **ME910C1** dans l'application de l'utilisateur sera faite selon les règles de conception décrites dans ce manuel.

(HE) האינטגרציה של המודול הסלולרי **ME910C1** עם המוצר. תהליך האינטגרציה של המודול הסלולרי.

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3. PSM DESCRIPTION

The Power Saving Mode (PSM) in 3GPP Rel12 allows the Module to skip idle mode tasks for a longer time period while still maintaining the NAS context. The functionality is available on M1/NB1 on the ME910C1.

This feature permits to reduce the overall power consumption when there is no required data activity with the network for a long time.

This saves the power also related to the Paging activity.

The PSM reduces the signaling load between the ME910C1 and the network on NAS level (24.301 Rel.12 chapter 5.3.11) compared to a standard attach/detach procedure.

Within the attach/RAU/TAU procedure the UE indicates that it supports PSM.

The network confirms PSM usage by sending a value for a timer (T3324) in the confirmation message.

The timer T3324 specifies an active period after the RAU/TAU procedure the UE has to follow the normal idle mode procedures (paging reception, measurements,...).

After timer T3324 elapses the Module enters PSM state, i.e. it disables all AS/NAS activities until the next periodic RAU/TAU update.

A second Timer (T3412) is defining the duration of the PSM.

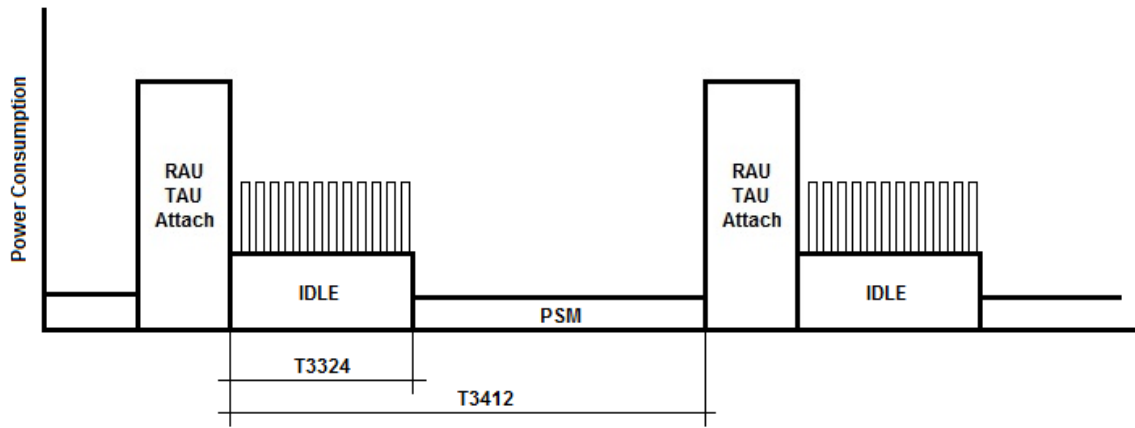
During this period the Module is NOT reachable by the network, i.e. it cannot be paged and stops access stratum activities.

Before the inactivity period the complete NAS context needs to be stored and reused when accessing the network again.

The Module can leave the PSM mode at any point in time when there is MO data or when periodic TAU timer expires.

The PSM is only intended for those Modules that can tolerate a high MT Call latency.

The 3GPP standard does not imply whether or to which extent the PSM does reduce the power of the Module. Only the signaling reduction (i.e. Not doing a reattach but just a RAU/TAU procedure) is defined.



HARDWARE CONTROLS

3.1. ME910C1 pins related to PSM Mode

Pin	Signal	I/O	Function	Type	Comment
R12	ON_OFF/WAKE*	I	Input command for power ON and to wake from deep sleep mode	Digital 1.8V	Active low, connected to open drain or open collector
R11	VAUX PWRMON	O	1.8V LDO output Power ON monitor	Supply 1.8V	
R13	HW_SHUTDOWN*	I	HW Unconditional Shutdown	Digital 1.8V	Active low, connected to open drain or open collector

3.2. CONTROL PINS DESCRIPTION

3.2.1. ON_OFF*/WAKE*

ON_OFF*/WAKE* is the pin that turns on the system after VBATT and VBATT_PA is applied to ME910C1. Moreover, this pin can make an asynchronous wakeup of the system from the PSM Mode, before the scheduled event of timer T3412 expired.

To make asynchronous exit from PSM mode ON_OFF*/WAKE* pin must be set LOW for at least 5 seconds.



NOTE:

Don't use any pull up resistor on the ON_OFF*/WAKE* line, it is internally pulled up. Using pull up resistor may bring to latch up problems on the ME910C1 power regulator and improper power on/off of the module. The line ON_OFF*/WAKE* must be connected only in open collector or open drain configuration.

3.2.2. VAUX/PWRMON

There is no pin dedicated to PSM status indicator, host can only detect deep sleep mode by monitoring of VAUX/PWRMON output pin.

3.2.3. HW_SHUTDOWN*

During PSM mode, HW_SHUTDOWN toggle has no effect. The use of HW_SHUTDOWN* pin is valid only when ME910C1 has VAUX/PWRMON output HI.

3.3. SIM interface

SIM interface is powered down when ME910C1 enters in PSM mode to ensure minimal power consumption

For this reason SIM PIN, if enabled, should be managed in every scheduled wake, or can simply be disabled.

3.4. PSM configuration

PSM has to be configured by the command AT+CPSMS.

The command controls whether the UE wants to apply PSM or not, as well as the requested extended periodic RAU value and the requested GPRS READY timer value in GERAN/UTRAN, the requested extended periodic TAU value in E-UTRAN and the requested Active Time value.

Examples:

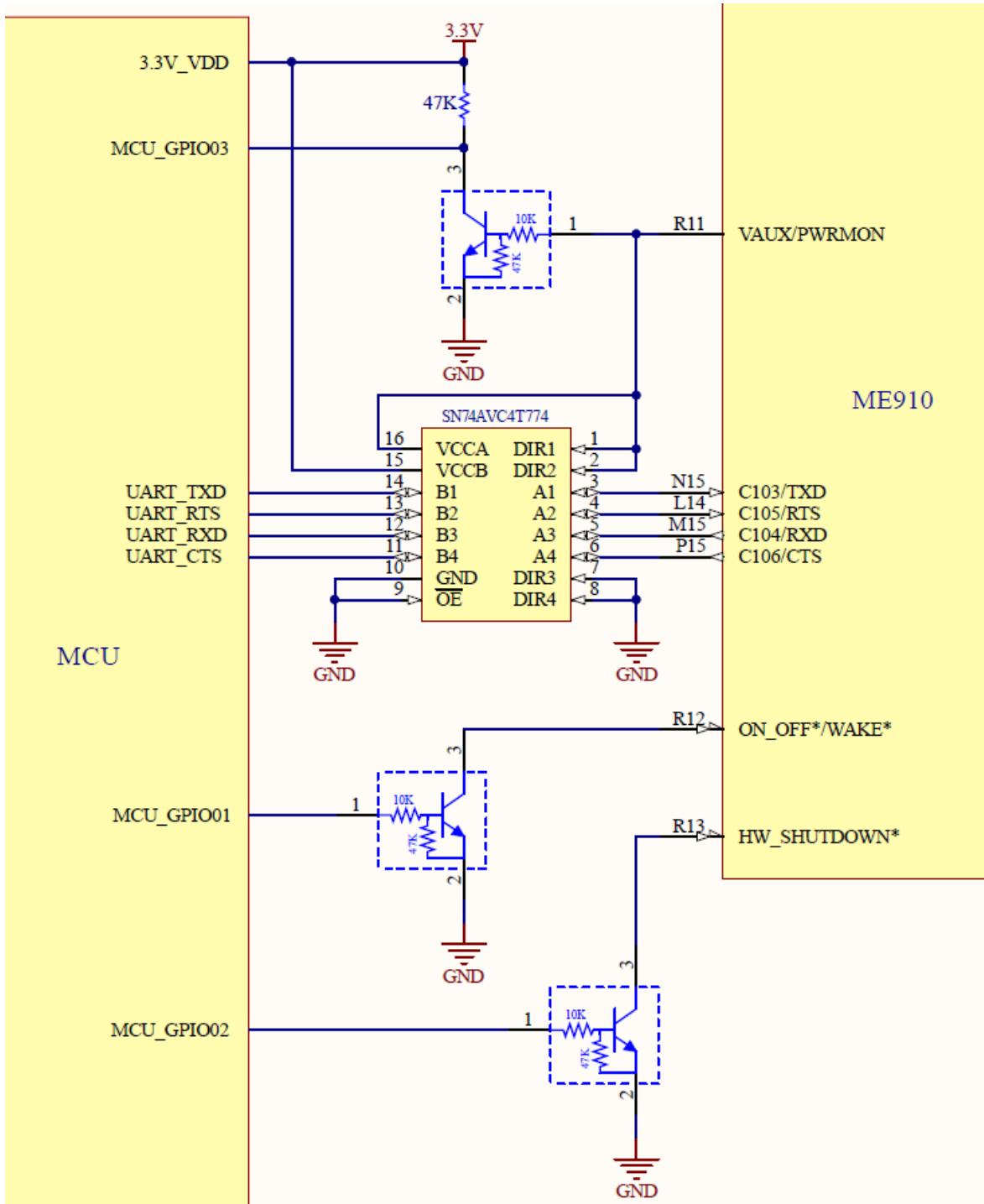
AT+CPSMS=0 → disable the use of PSM

AT+CPMS= 1,,,"01100001","01100010" → PSM Mode is set to enabled and module enters in PSM after a minute (T3324 = 33) and stay in this mode for two minute (T3412 = 162).

For additional details on AT+CPMS command please refer to the ME910C1 AT commands Reference Guide

When Periodic Update Timer expires (T3324), ME910C1 turns off until the next scheduled wake-up time.

3.5. Hardware application example



WARNING:



If MCU and its digital interface has 1.8V supply, UART can be directly connected but all MCU output lines must be set to 0V in OFF and in PSM state to avoid backpowering.

4. GLOSSARY AND ACRONYMS

	Description
TTSC	Telit Technical Support Centre
USB	Universal Serial Bus
HS	High Speed
DTE	Data Terminal Equipment
LTE	Long Term Evolution
PSM	Power Saving Mode according to 3GPP Rel.12
AS	Access Stratum
NAS	Non-Access Stratum
RAU	Routing Area Update
TAU	Tracking Area Update
HSIC	High Speed Inter Chip
SIM	Subscriber Identification Module
SPI	Serial Peripheral Interface
ADC	Analog – Digital Converter
DAC	Digital – Analog Converter
I/O	Input Output
GPIO	General Purpose Input Output
CMOS	Complementary Metal – Oxide Semiconductor
CLK	Clock
MRDY	Master Ready
SRDY	Slave Ready
CS	Chip Select
RTC	Real Time Clock
PCB	Printed Circuit Board
ESR	Equivalent Series Resistance
VSWR	Voltage Standing Wave Ratio
VNA	Vector Network Analyzer

5. DOCUMENT HISTORY

Revision	Date	Changes
0	2018-02-08	First Issue



SUPPORT INQUIRIES

Link to www.telit.com and contact our technical support team for any questions related to technical issues.

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