



CM1 Telematics Module
User Guide

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Regulatory Statements

CE

This product has been designed and assessed to meet the essential protection requirements of the European EMC Directive (2004/108/EC), the Low Voltage Directive (2006/95/EC), and the R&TTE Directive (1999/5/EC) when installed and used in conjunction with the guidelines provided within this document.

[Note that compliance with the R&TTE directive is only required for those versions of the product equipped with radio frequency interfaces].

FCC

NOTE:

FCC compliance of product versions equipped with radio frequency interfaces may require specific approval for the finished products.

WARNING:

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Safety Warning for North America

If the power lead (cord) is not supplied with the computer, select a power lead according to your local electrical regulations. In the USA use a 'UL listed' lead. In Canada use a CSA approved or 'cUL listed' lead.

Si le cordon secteur n'est pas livré avec l'ordinateur, utiliser un cordon secteur en accord avec votre code électrique nationale. En l'Etat Unis utiliser un cordon secteur 'UL listed'. En Canada utiliser un cordon secteur certifié CSA, ou 'cUL listed'.

Manual Organisation

This manual describes the CM1 Telematics Module.

We have tried to include as much information as possible but we have not duplicated information that is provided in standard Technical References, unless it proved to be necessary to aid in the understanding of the product.

The manual is sectioned as follows:

- Introduction, including product overview;
- Mechanical details showing outline dimensions;
- Connector Layout and assembly instructions;
- Software and Firmware Setup;

We strongly recommend that you study this manual carefully before attempting to interface the CM1 Telematics module with RE2 or other RISC Engines.

IT IS PARTICULARLY IMPORTANT THAT YOU READ THE SECTION 'PRECAUTIONS' BEFORE HANDLING ANY COMPONENT.

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Technical Services department with the relevant details.

Introduction

The Blue Chip Technology CM1 Telematics Module is an easy plug-in board which enhances the Blue Chip Technology RISC Engine product range.

The CM1 board connects via a 20 pin header connector and offers support for 20-channel GPS satellite positioning with wireless cellular communication over GSM/GPRS using the GE863-GPS GSM/GPRS module from Telit.

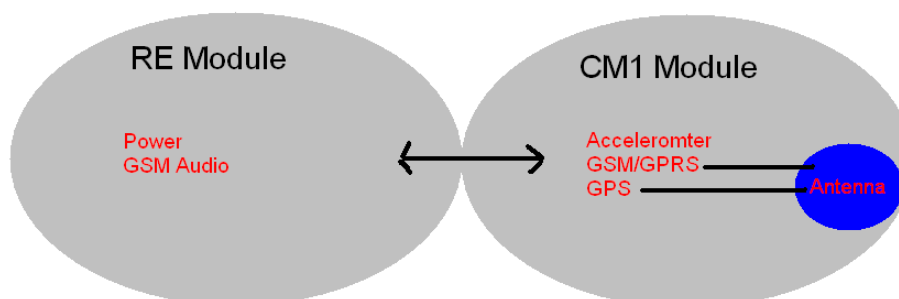
The CM1 Telematics module is capable of position resolution accuracy to 2.5m, including an onboard 3 Axis accelerometer and high sensitivity for indoor fixes. Additional features include jamming detection, integrated TCP/IP protocol stack and Telit's Easy Scan® automated scan over GSM frequencies (with or without SIM card attached)

Combined with a RISC Engine module, the CM1 Telematics module is ideal for real time vehicle tracking and Telematics applications requiring worldwide GPRS roaming and precise GPS positioning

IMPORTANT: On attachment to the RE2 SBC with CE6 Applications, ensure that the CM1 module is ENABLED on the RE2 via the RE2 GUI, in order for the CM1 Interface to be enabled. Refer to the [System Firmware](#) page for more details. The Telit device on the CM1 board can then be enabled / disabled in program as required.

Functional Overview

The following block diagram shows the key components of the Telematics Module and its interaction with the RISC Engine



Specification

- Telit GE863-GPS GSM/GPRS module
- Quad-band EGSM 850/900/1800/1900 MHz
- Control via AT commands according to GSM 07.05, 07.07 and Telit enhancements
- Serial port multiplexer GSM 7.10
- Sensitivity
 - -107 dBm [typ.] @ 850 / 900 MHz
 - -106 dBm [typ.] @ 1800 / 1900 MHz
- GPS
 - Supports 20 Channel GPS, L1 1575.42 MHz
 - Low power GPS receiver
 - High sensitivity for indoor reception, up to -159 dBm (with Active Antenna)
 - Position resolution accuracy of less than 2.5m
 - Satellite Based Augmentation System (WAAS and EGNOS) support
 - GPS NMEA 0183 output format
 - Dedicated GPS AT commands
 - Date WGS-84
- SMS
 - Point to point mobile originated and mobile terminated SMS
 - Concatenated SMS supported
 - SMS cell broadcast
 - Text and PDU mode
- GPRS data
 - GPRS class 10
 - Mobile station class B
 - Coding Scheme 1 to 4
 - PBCCH support
- GSM supplementary
 - Call forwarding
 - Call barring
 - Call waiting & call hold
 - CLIP (call line identification presentation)
 - CLIR (call line identification restriction)
 - USSD (unstructured supplementary services mobile originated data)
 - Closed user group
 - EASY SCAN automatic scan over GSM frequencies

- Additional features
 - Jamming detection & report
 - Embedded TCP/IP stack, including TCP, IP UDP, SMTP and FTP protocols
 - Telit Firmware Management Services Over-the Air update
- Wide Input Voltage – 7 to 36 volts (note: Pass through from RISC Engine)
- Low power consumption – typically 3 watts (5 watts including RISC Engine)

General Precautions

All Single Board Computers and electronic equipment is susceptible to damage by electrostatic discharges. In order to avoid damage, you should work at an anti-static bench and observe normal anti-static precautions. Wear an anti-static wrist strap connected to an earth point *before* opening any packaging.

Where a wrist strap is not available, discharge any static charge you may have built-up by touching an earth point. Avoid any further movement that could build up another static charge. Touch an earth point from time to time to avoid further build-up, and remove the items from their anti-static bags only when required

Electro-Static Discharges

If you are going to handle electronic equipment, including the Telematics board, it is important to realise that the devices on the Telematics board and the RE2 board can be damaged by static electricity. Bear in mind that the damage caused by static electricity may vary from total destruction to partial damage, which may not be immediately obvious. This could have an effect on the product's reliability and warranty. Before handling, ensure that you take necessary static precautions. Ideally you should work at an anti-static bench and wear an approved wrist strap or if that is not possible, touch a suitable ground to discharge any static build up before touching the electronics. This should be repeated if the handling continues for any length of time.

If it is necessary to remove a board or electronic assembly, place it into an anti-static bag. This will prevent any static electricity build up damaging the board. Metallised bags are preferred. Do not use black anti-static bags for any item containing a battery because these tend to be conductive and will discharge the battery.

On-Board Battery

The CM1 Telematics module does not contain a Lithium battery, however the RISC Engine board it is attached to may do so. Great care should be taken with this type of battery. If the battery is mistreated in any way there is a very real possibility of fire, explosion, and personal harm. Under NO circumstances should it be short-circuited, exposed to temperatures in excess of 100°C or burnt, immersed in water, recharged or disassembled.

Expired batteries remain hazardous and must be disposed of in a safe manner, according to local regulations.

Le panneau de processeur est équipé d'une batterie de lithium. Le grand soin devrait être pris avec ce type de batterie. Si la batterie est mistreated il y a de dans de toute façon un possibility très vrai du feu, d'explosion et de mal personnel. Dans au cunes circonstances il est sous peu circuité, exposé aux températures au dessus de 100 degrés de centigrade ou brûlé, immergé dans l'eau, rechargée ou dissassembled.

Les batteries expirées restent dazaedous et doivent être reejetées d'une façon sûre, selon des règlements locaux.

Electromagnetic Compatibility

This CM1 Telematics Module has been assessed operating in representative, standard configurations. As with any PC product, however, final installation & configuration can vary significantly, and so the following guidelines are offered to help ensure that compatibility is maintained.

- All components added to a system should either carry appropriate equivalent levels of compliance, or be tested for compliance as part of the final system, and should be installed in accordance with supplier recommendations.
- The external enclosure should be securely fastened (with standard lids and covers in place) to ensure good metal-to-metal contact around the internal electronics

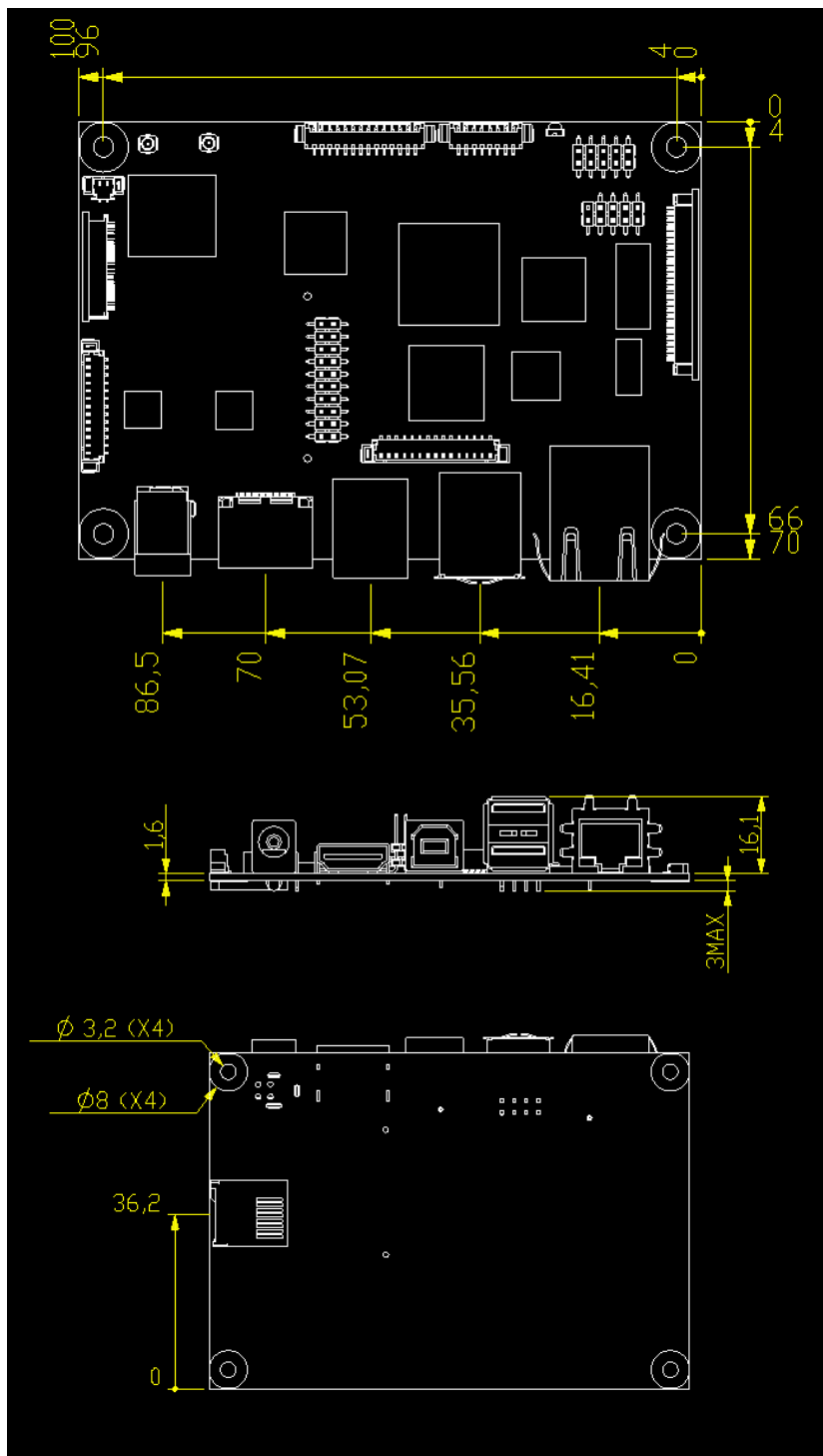
- Any metal back plate must be securely screwed to the chassis of the computer to ensure good metal-to-metal (i.e. earth) contact.
- Metal, screened, connector bodies should be securely connected to the enclosure.
- The external cabling to boards causes most EMC problems. It is recommended that any external cabling to the board be totally screened, and that the screen of the cable connects to the metal end bracket of the board or the enclosure and hence to earth. Round, screened cables with a braided wire screen are used in preference to those with a foil screen and drain wire. Wherever possible, use metal connector shells that connect around the full circumference of the cable screen: they are far superior to those that earth the screen by a simple “pig-tail”.
- The keyboard and mouse will play an important part in the compatibility of the processor card since they are ports into the board. Similarly, they will affect the compatibility of the complete system. Fully compatible peripherals must be used otherwise the complete system could be degraded. They may radiate or behave as if keys/buttons are pressed when subject to interference. Under these circumstances it may be beneficial to add a ferrite clamp on the leads as close as possible to the connector. A suitable type is the Chomerics type H8FE-1004-AS.
- USB cables should be high quality screened types.
- Ensure that the screens of any external cables are bonded to a good RF earth at the remote end of the cable.

Failure to observe these recommendations may invalidate the EMC compliance

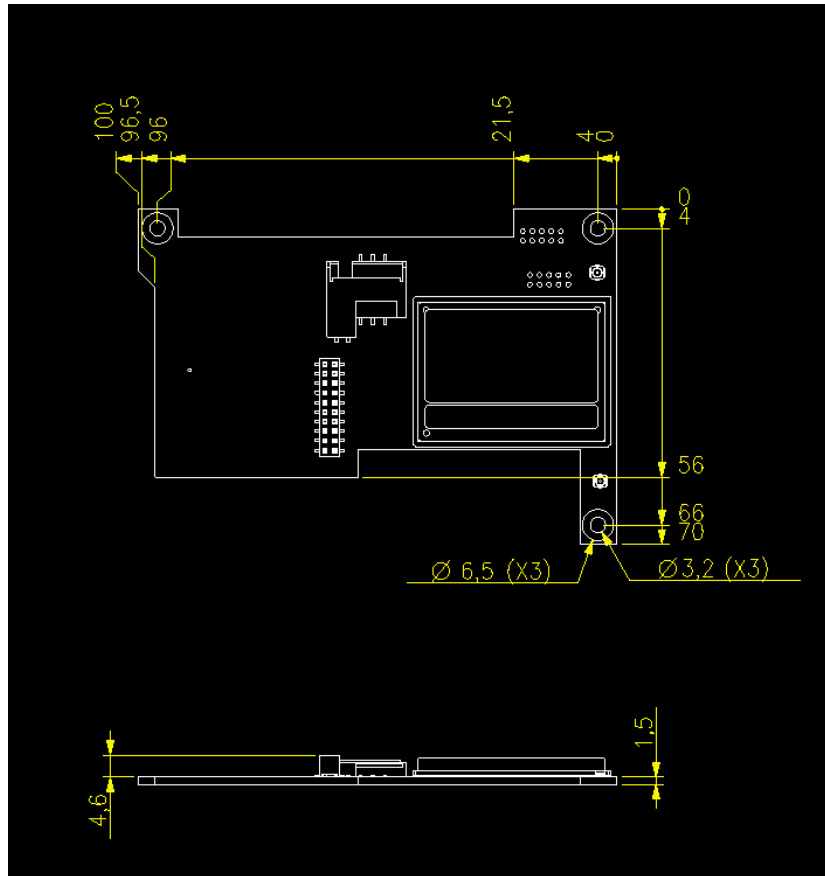
Mechanical Specifications

For operation, the CM1 Telematics Module requires to be attached to a RISC Engine platform. The following details use the RE2 as an example.

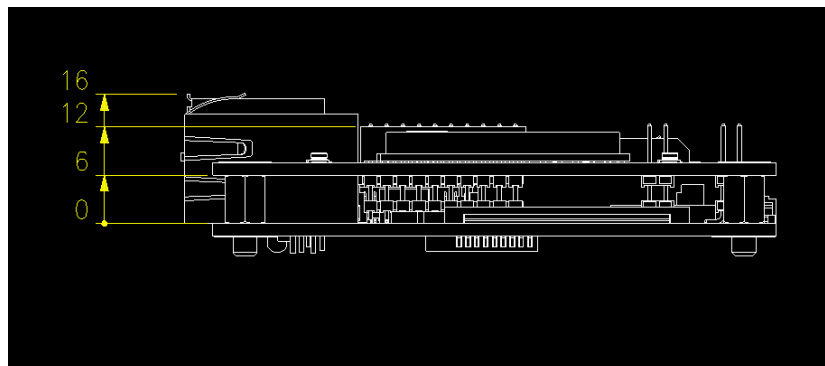
Outline Dimensions



RE2

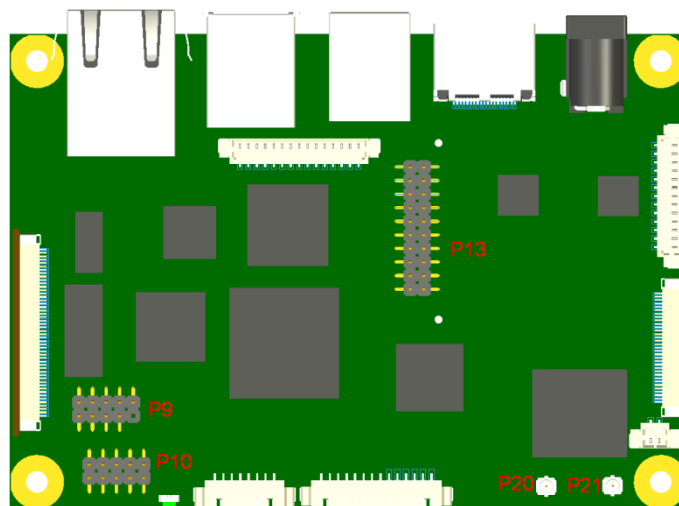


CM1 Telematics Module

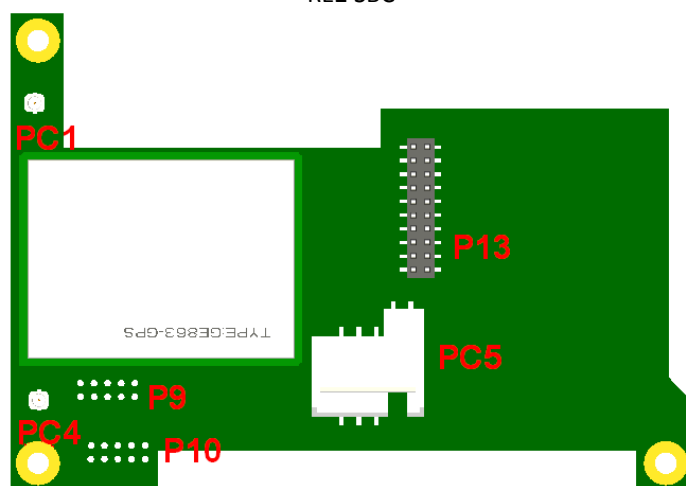


CM1 Combined with RE2

Connector Locations



RE2 SBC



CM1 Telematics Module

Connector	Description	Connector	Description
P9	USB x 2	P10	RS232 (COM3)
P13	Connection to CM module	P14	Battery
P20	Wifi Antenna Connection	P21	Bluetooth Antenna Connection
PC1	GPS Antenna Connection	PC4	GSM/GPRS Antenna Connection
PC5	SIM Holder		

For full details of all connectors on the RISC Engine, please refer to the appropriate RISC Engine User Guide

Connector Details

P9 – Dual USB Connector (Header)

Pin	Signal	Comments
1	VBUS	+5 volts – Filtered & current limited
2	VBUS	+5 volts – Filtered & current limited
3	D+	USB 3 Data Positive
4	D+	USB 4 Data Positive
5	D-	USB 3 Data Negative
6	D-	USB 4 Data Negative
7	Ground	Filtered Electrical ground
8	Ground	Filtered Electrical ground
9	Key	Removed
10	NC	Not connected

P10 – RS232 Full Connector

Pin	Signal	Comments
1	XDCD3#	COM 3 Data Carrier Detect
2	XR3	COM 3 RX
3	XTX3	COM 3 TX
4	XDTR3#	COM 3 Data Terminal Ready
5	0 volts	Electrical ground
6	XDSR3#	COM 3 Data Send Ready
7	XRTS3#	COM 3 Ready To Send
8	XCTS3#	COM 3 Clear to Send
9	XRI#	COM 3 Ring indicator
10	+5 volts	Fused voltage rail

P13 – RE2 to CM1 Interface Connector

Pin	Signal	Pin	Signal
1	GND	2	GND
3	I2C3_SDA_3V	4	Not Connected
5	I2C3_SCL_3V	6	MCSPi2_CS0
7	5VSS	8	MCSPi2_SOMI
9	GSM_A_IN	10	MCSPi2_SOMO
11	GSM_A_IN#	12	MCSPi2_CLK
13	GSM_A_OUT#	14	Not Connected
15	GSM_A_OUT	16	Not Connected
17	GND	18	UART_IRQ#
19	Vin	20	Vin

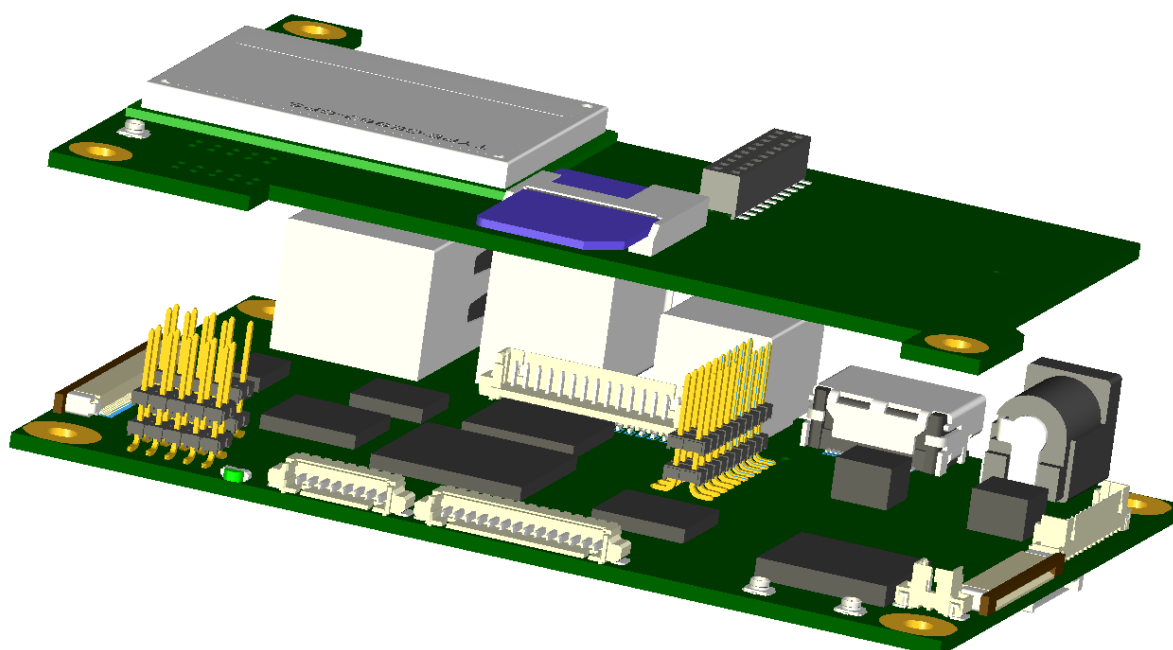
P13 Signal Description

Signal	Description
I2C3_SDA_3V	I ² C Data bus for Accelerometer and GPIO control
I2C3_SCL_3V	I ² C Clock bus for Accelerometer and GPIO control
GSM_A_IN	GSM Audio Input to CM1
GSM_A_IN#	GSM Audio Input to CM1 (GND return)
GSM_A_OUT#	GSM Audio Output from CM1
GSM_A_OUT	GSM Audio Output from CM1 (GND Return)
MCSPi2_CS0	SPI Interface to DUART on CM1
MCSPi2_SOMI	SPI Interface to DUART on CM1 (output from CM1)
MCSPi2_SOMO	SPI Interface to DUART on CM1 (input to CM1)
MCSPi2_CLK	SPI Interface to DUART on CM1
UART_IRQ#	GPRS & GPS interrupt (from DUART on CM1)
5VSS ¹	Power Enable Input (to CM1)
Vin	Power Input (to CM1)

¹ Note that on the RE2, the 5VSS is controlled via the RE2 GUI. Default setting is "Comm Module (CM1)" set to disable

Connecting CM1 Telematics Module to the RISC Engine

The following picture shows how to connect the CM1 module to the RISC Engine, in this instance, the RE2 is shown.



To ensure equal separation of boards, 7mm spacers should be fitted between boards.

The RE2 can be mounted onto a chassis, the spacers fitted then the CM1 module attached to the RE2. However, it is equally possible to mount the CM1 Telematics module to a chassis first, attach the spacers and then attach the RE2 to the CM1.

Align the USB and COM3 PIN headers so that they will pass through the matching holes in the CM1 module and press the CM1 module onto PIN header P13. Once correctly attached, lock the boards together – the above picture shows screws used to perform this task.

If using a Terminal program, the Functions of the Telit device are accessed via the following ports

COM 8: GSM / GPRS: Settings – Baud 115200; 8-bit; no parity; no flow control/software control

COM 9: GPS: Settings – Baud 4800; 8-bit; no parity; no flow control/software control

IMPORTANT: For CE6 Applications, ensure that the CM1 module is ENABLED on the RISC Engine via the RE GUI, in order for the CM1 Interface to be enabled. The Telit device on the CM1 board can then be enabled / disabled in program as required.

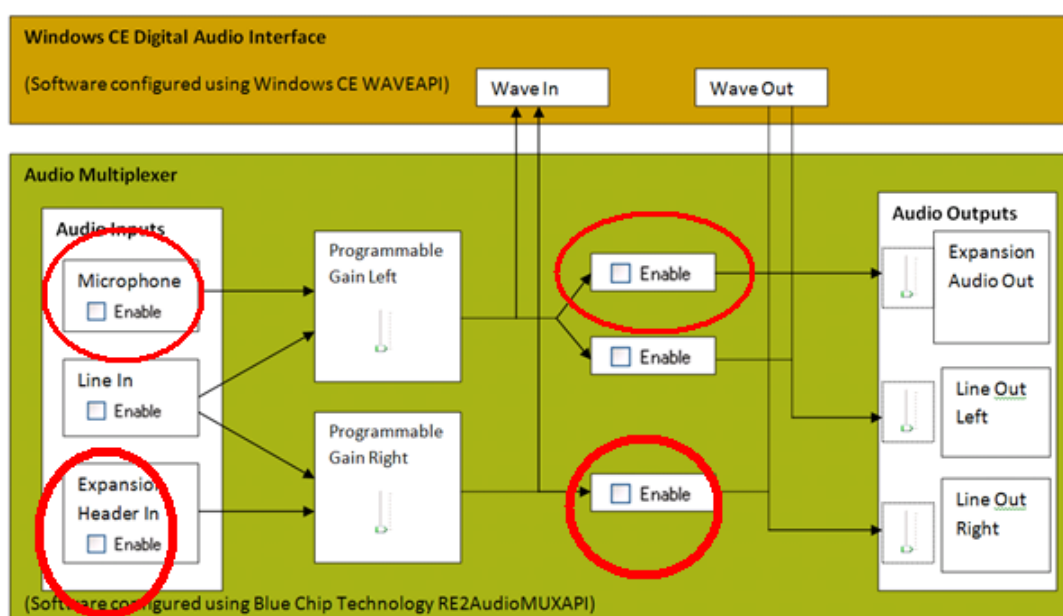
Software

Sample applications are available to aid customers in the design of their applications to use the CM1 Telematics module.

These are:

RE2AudioMuxSampleApp

- Shows how to turn on / off the GSM audio

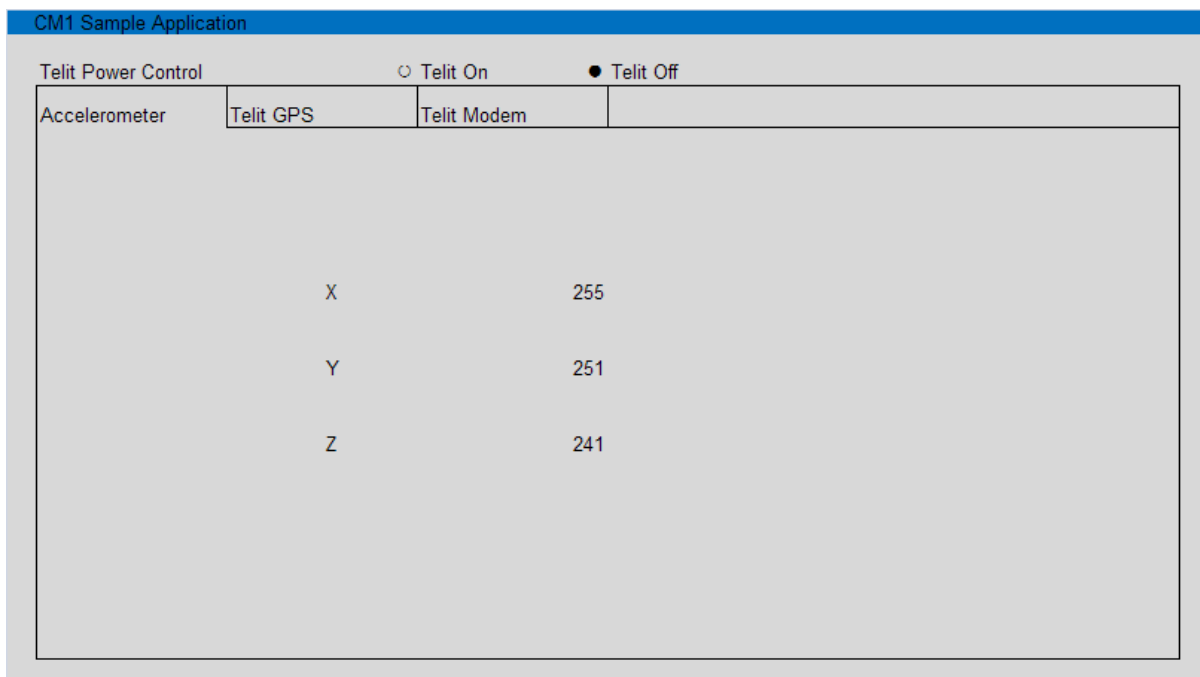


For instance to make a GSM call, the items above would be enabled

CM1SampleApplication

- Demonstrates turning the Telit module On and Off
- Shows an example of using the Accelerometer
- Shows an example of using the GPS
- Shows an example of using the GSM

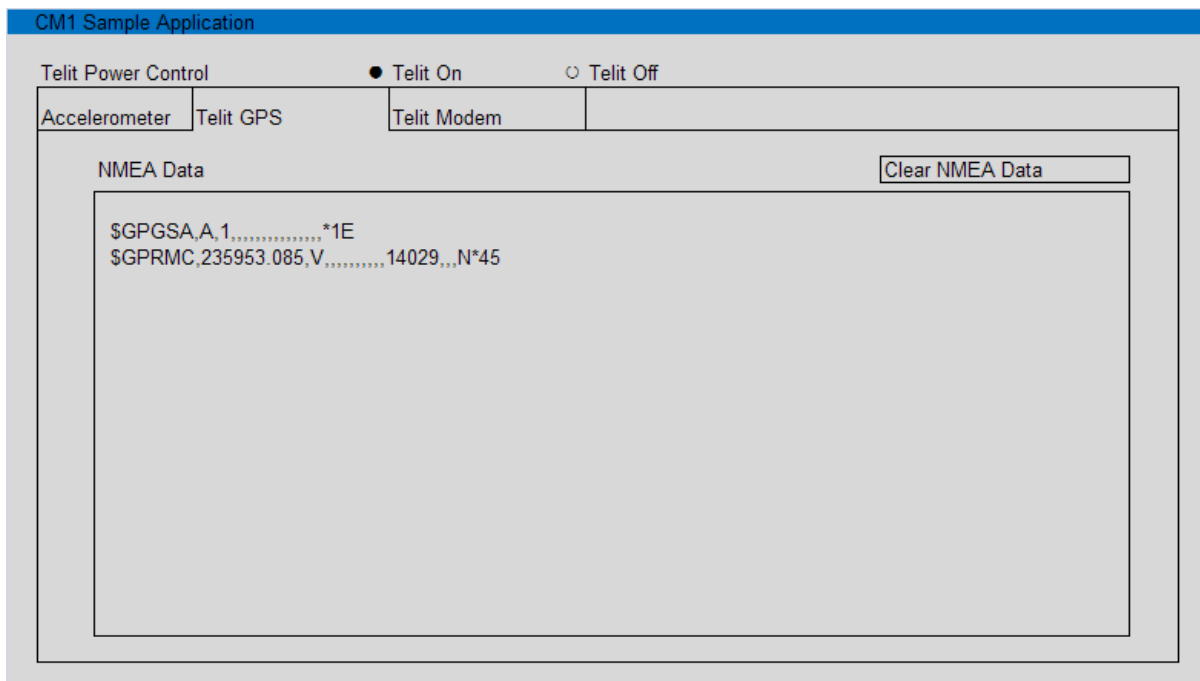
Note: When setting up the configuration using the Graphical Interface, this only turns on Power to the CM1 Telematics Module. The Telit device is disabled by default in the supplied Windows CE operating system so requires to be turned on to access the functions of the device.



When the Sample runs, it shows a picture as above.

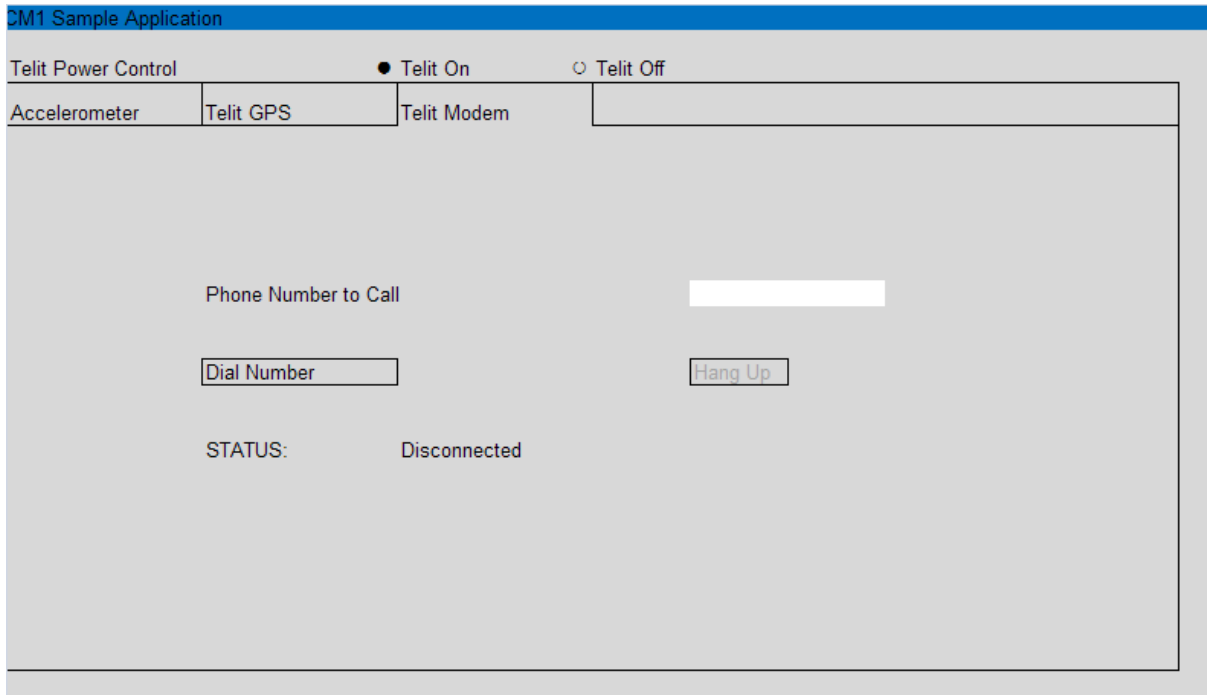
Moving the RISC Engine around, the X, Y and Z co-ordinates should change. By default the Telit Device is in the OFF mode. To turn the Telit Device on, just click on the "Telit On" button at the top of the application

Select the "Telit GPS" tab and the following window will be shown



Note, if the Telit Device is turned off, no data will appear in the box. When turned on, the text box should show a continuous stream of data.

Selecting the "Telit Modem" tab will show the following



With an appropriate SIM card fitted to the CM1 Telematics module, and the Audio setup as indicated previously, it is possible to make a voice call.

System Firmware

There are no system firmware settings on the CM1 Telematics module on its own; however, it will rely on the settings of the RISC Engine it is attached to. The following describes the necessary modifications required when attached to a RE2 SBC. This is managed via the USB-B communications port as follows.

- 1- Install the RE2 GUI on your Admin PC as per the previous section
- 2- Connect the Admin PC to the RE2 via a USB-A/B cable
- 3- Short/Link the SETUP pins on the Utility Header and power on the RE2
- 4- The Power LED on the RE2 will remain unlit for approx 5 seconds, after this the LED should briefly flash. At this stage remove the short/link on the SETUP pins
- 5- Open the RE2 GUI on your Admin PC

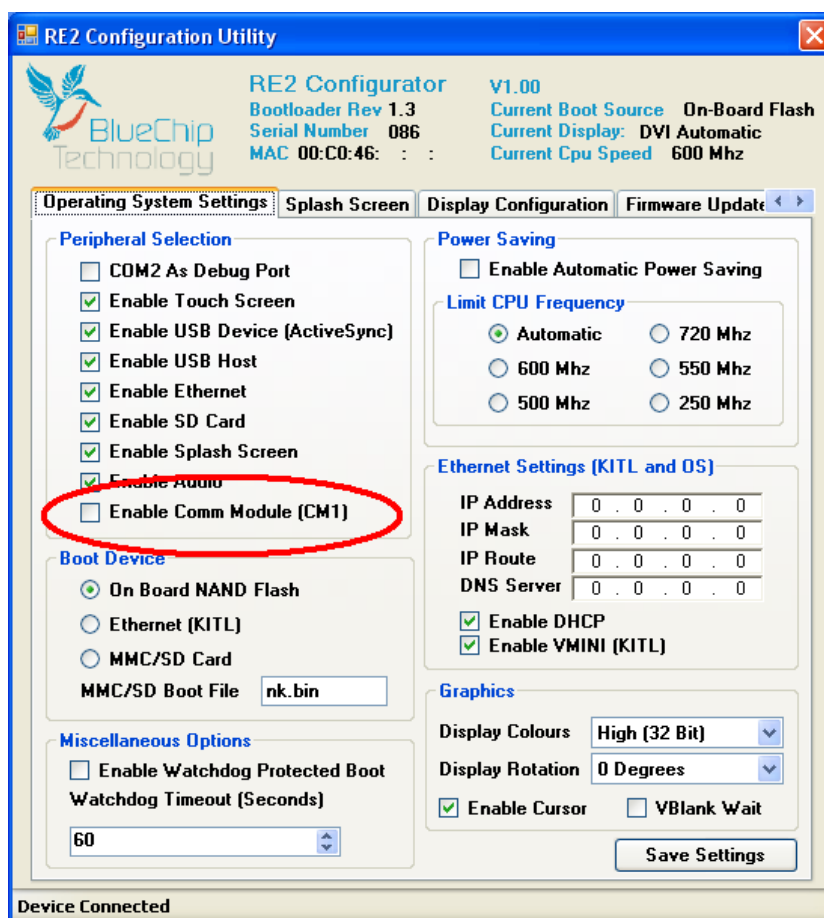
Note: the RE2 GUI can be opened on the Admin PC before powering on the RE2. The GUI will appear as follows



As soon as a connection is made, the connection should appear on the GUI within a few seconds as below.



The current settings of the board are populated automatically, including Serial Number, MAC Address, Firmware Revision, current Boot device and Display output



The first page provides most of the configuration settings for the RE2. **For the CM1 Telematics module to work, the setting for “Enable Comm Module [CM1]” needs to be checked.**

Important:

If this setting is enabled and a Telematics module is not fitted, then the RE2 will hang at the Splash Screen.

If this setting is disabled and a Telematics module is fitted, then the Telematics will not receive power and will not work.

Note that this setting turns on Power to the CM1 Telematics Module. To access the functions of the module, the Telit device will need to be turned ON when the operating system loads

Refer to the RE2 User Guide for more information on the options available with the GUI, and also for details on how to install the GUI.

Maintenance

The CM1 Telematics Module should not require any regular maintenance.

On a regular basis the inside of the unit which houses the RISC Engine and Telematics module should be cleaned out to prevent dust build up which could eventually cause elevated temperatures and static build up around key devices and prevent efficient and reliable operation.

Amendment History

Issue Level	Issue Date	Author	Amendment Details
1.0	28/07/11	TMCK	1 st release

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<i>Returns**</i>	rma@bluechiptechnology.co.uk

* To use the Support email address requires the sender to be first registered on the Support Web site at

<http://support.bluechiptechnology.co.uk/>

**To request a Returns Authorisation number, use the RMA portal at

[Http://rma.bluechiptechnology.co.uk](http://rma.bluechiptechnology.co.uk)

RE2 & CM1 Antennae Guide

For best operation Wi-Fi, Bluetooth, GPS and GSM all require the attachment of appropriate Antennae. The basic requirements for compatible antennae are as follows:

WiFi / Bluetooth

Frequency:	Impedance:
2.4GHz	50 ohm

GPS

Frequency:	Antenna:	Impedance:	Gain:
1575.42MHz (RX only)	DC feed available from nominal 3.8V DC/20mA	50 ohm	1.5dBi to 4.5dBi plus amplification up to 27dB (25dB typical recommended)

GSM/GPRS

Frequency:	Antenna:	Impedance:	Gain:	VSWR:
850/900MHz 1800/1900MHz	Must handle at least 2W peak power	50 ohm	<3dBi	<=10:1 (<=2:1 recommended)



To connect the Antennae to the RE2 or CM1 PCB's a High Frequency cable, such as shown on the left, is required.

The one tested by Blue Chip is from Samtec MH113 series of cables. The 01BJ1 end refers to a SMA Bulkhead Straight Jack connector; however this is available in other types to suit the Antenna chosen. The 0xxx part of the description refers to the cable length: typically these are 0050 (50mm), 0100 (100mm), 0150 (150mm) and 0300 (300mm).

See www.samtec.com for more details



A good all round choice for a compact antenna covering all of WiFi, Bluetooth and GSM/GPRS is shown on the left. This is a Siretta ANTA7000A0200BD1, and is approx 50mm in length. The Siretta ANTA7000S0200BD1 is similar length to this but is right angled.

For better performance in the quad band GSM frequencies, the Siretta ANTG2000A0000AR1 is a suitable option.

See www.siretta.co.uk for more details on their product offerings.



For GPS, a good choice from testing is the Linx Tech ANT-GPS-SH-SMA. This has Magnetic attachment and a 3m cable length

See www.linxtechnologies.com for more details on their product offerings