WiMetry™ Core Module

Installation Guide

R1.1

FCC Statements

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to nearby electrical devices, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult CalAmp technical support for help

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with FCC regulations for the device, the following rules must be obeyed during and after installation

Keep the cellular antenna of the Cell Module at a safe distance from your head and body while the modem is in use. Maintain a distance of at least 20 cm (8 inches) between the transmitter's antenna and any person while in use. This device is designed for use in applications that observe the 20 cm separation distance. Consult the Cell Module installation guide for information on approved antennas.

Non-Collocation for External Antenna

External antenna must not be collocated or operating in conjunction with any other antenna or transmitter. Collocation is defined as any antenna or radiating element positioned within 20cm of another antenna or radiating element.

The supplied internal antenna for 802.15 will insure 20cm separation from a properly mounted, vertically positioned external cellular antenna.

Only FCC approved antennae can be used with the 802.15 transceiver. Consult with CalAmp, Corp. or FCC OET website, www.fcc.gov/oet/, for a list of approved antenna solutions for this device.

Safety Issues

The use of cellular telephones or devices in aircraft is illegal. Use in aircraft may endanger operation and disrupt the cellular network. Failure to observe this restriction may result in suspension or denial of cellular services to the offender, legal action or both.

- Do not operate in the vicinity of gasoline or diesel-fuel pumps unless use has been approved and authorized
- Do not operate in locations where medical equipment that the device could interfere with may be in use
- Do not operate in fuel depots, chemical plants, or blasting areas unless use has been approved and authorized
- Use care if operating in the vicinity of protected personal medical devices, i.e., hearing aids and pacemakers
- Operation in the presence of other electronic equipment may cause interference if equipment is incorrectly protected. Follow recommendations for installation from equipment manufacturers.

Contents

1. OVERVIEW

1.1. Advisory Symbols

Warning! Improper usage or handling may cause non-compliant device operation.

Warning! High voltage presents risk of injury due to electric shock.

Direct Current (DC).

1.2. Module Identification

The label contains the CalAmp part number, serial number, IC and FCC ID numbers. Additional labeling will be required on the end device.

1.3. General Description

The CalAmp WiMetry^{TM} Core Module is an Internet Protocol-based, bidirectional wireless data concentrator platform used for advanced metering and demand response monitoring and control applications. The platform also has other smart grid applications and facilitates real-time acquisition of critical usage and rate data from electric, gas or water meters via public wireless networks and the Internet.

The WiMetry^{TM} platform supports the latest in cellular 3G high-speed data communications and is backward compatible to existing EV-DO Rev. 0 and 1x networks. WiMetry^{TM} takes advantage of ongoing investments made by cellular network operators to build-out, improve and maintain ubiquitous, reliable wireless networks using the latest standards, thereby enabling utility companies to focus on their core business rather than having to establish their own proprietary wireless networks.

The Core Module is designed to be easily integrated into various end devices. This document describes the process and rules for integrating the core module into an end device.   It includes descriptions of all external interfaces and instruction on how to communicate and power the device. This document does not cover the software functionality of the device. Refer to end product documentation for more information on the application software.

1.4. External Connectors

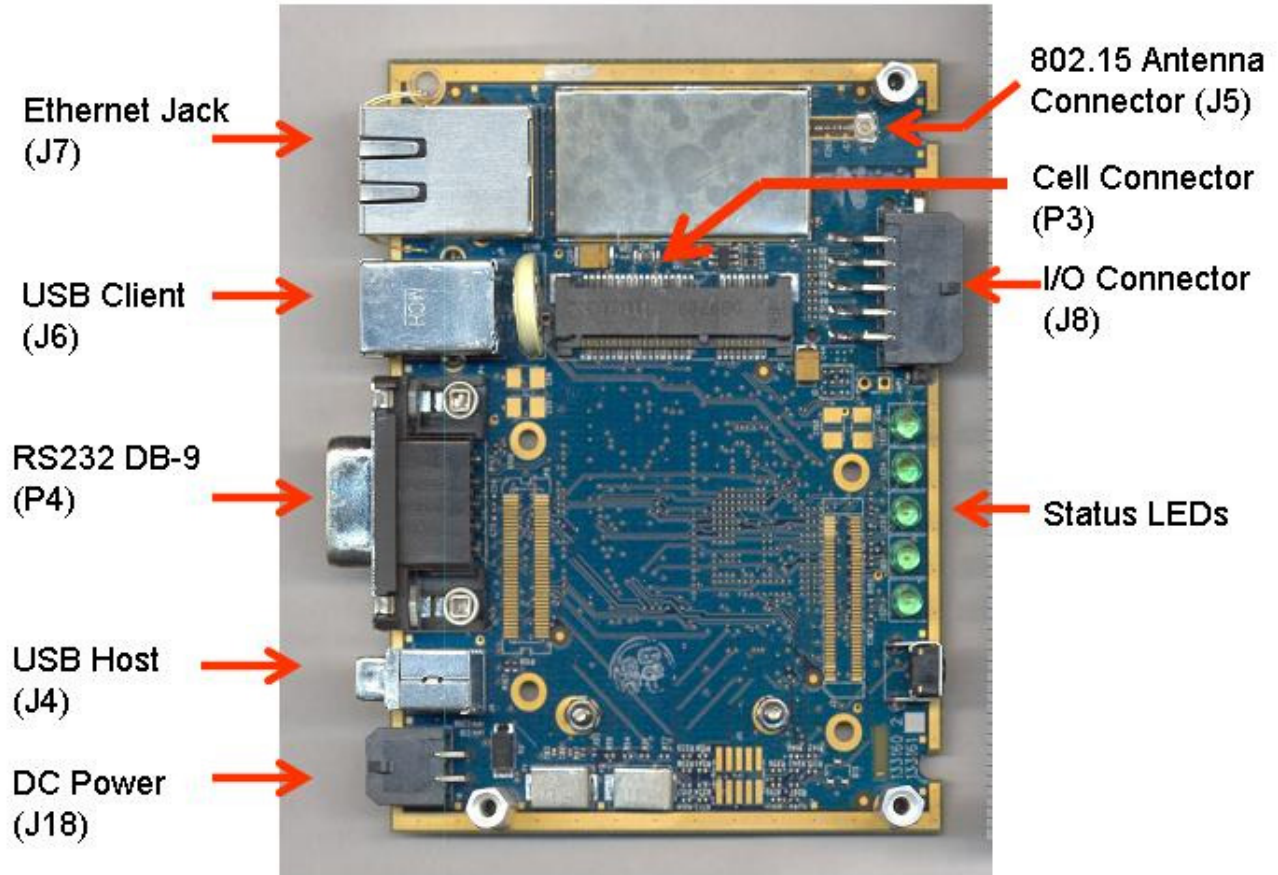See the images below for location of external connectors.
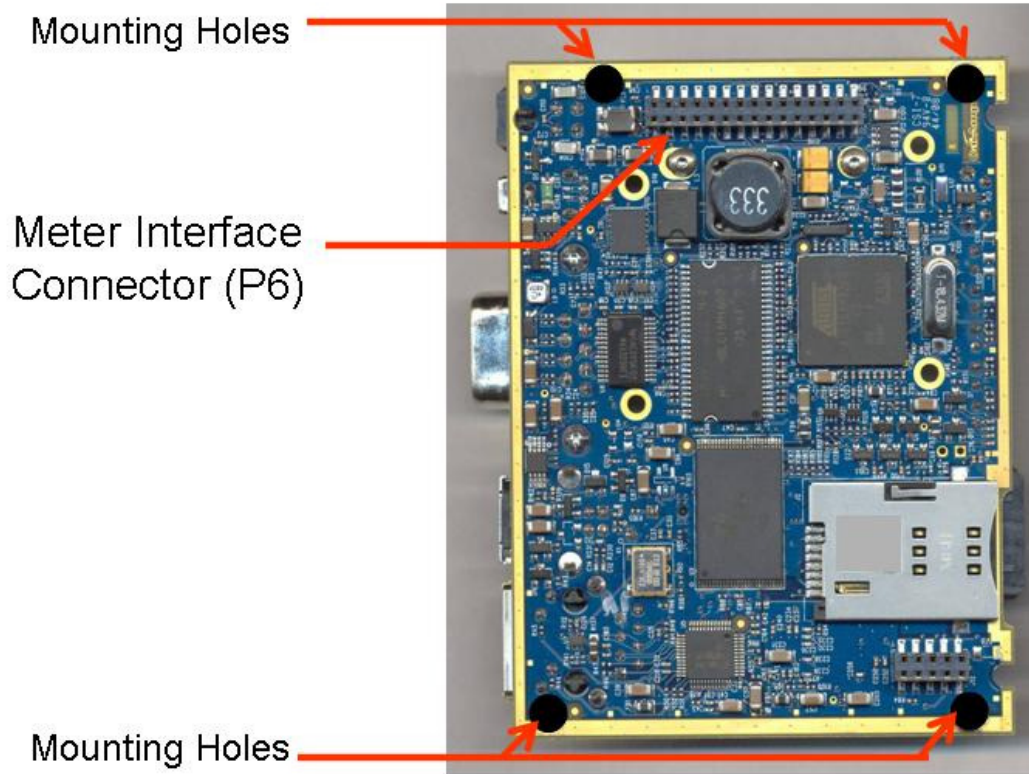

Figure 1: Top View of Core Module

Figure 2: Bottom View of Core Module

2. EXTERNAL INTERFACES

2.1. Power Connection

The connector on the core module is the **Molex 43045-0401**:

The mating connector (required for the power cable) is the **Molex 43025-0400**.

The contact required on the mating cable is the **Molex 43030-0002**

The core module is powered either from the J18 power connector or from the Meter Interface Connector. The pinout of the J18 power connector is below. The pinout of the Meter Interface Connector is in its own section.   For specifications on the digital input, see the External I/O section.

Table 1: DC Power Connector (J18)

Pin	Signal
1	V_IN (9-28VDC)
2	GND
3	DIGITAL_IN4
4	NO CONNECT

⚠ *Note: Do not connect independent power supplies to the power connector and the power inputs on the Interface Board Connector (P6). The power inputs are shorted on the core module and connecting both could cause a high current condition.*

Pinout

Power Connector (J8)
Front View
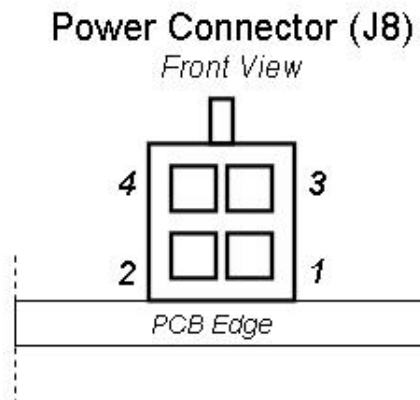
2.2. EIA-232 DB-9 connector

The concentrator contains a standard DB-9 female serial port connector that contains all the required signals for EIA-232 serial communication per the EIA-232 specification.

The table below provides the information to purchase or cables to connect to the DB-9 female connector on the core module.

Note: All signal names and directions are from the perspective of the core module

Table2 : DB9 EIA-232 Pin-out (P4)

Function	Pinout DB9 female (Port 1 only)	Direction
DCE Ready DSR	6	Output
Line Signal Detect	1	Input
Clear to Send (CTS)	7	Input
Receive*	3	Input
Request to Send (RTS)	8	Output
Transmit*	2	Output
Ground*	5	NA
DTE Ready (DTR)	4	Input

Required Signal

Pinout
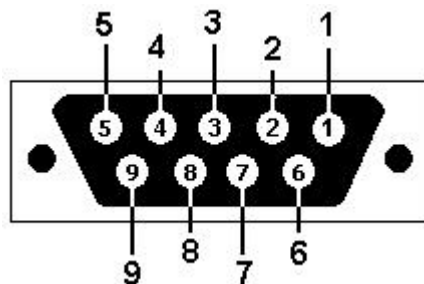
2.3. External I/O

The Core Module contains a variety of digital and analog external I/O. This I/O can be used to interface with external sensor or logic.

The connector on the core module is the ***Molex 43045-0101***:

The mating connector (required for the power cable) is the ***Molex 43025-1000***.

The contact required on the mating cable is the ***Molex 43030-0002***

Table 3: I/O Connections (J8)

Pin	Signal
1	DIGITAL OUT 2
2	DIGITAL GND
3	DIGITAL IN 3
4	ANALOG GND
5	ANALOG IN 3
6	DIGITAL OUT 1
7	DIGITAL IN 2
8	DIGITAL IN 1
9	ANALOG IN 1
10	ANALOG IN 2

Pinout

I/O Connector (J8)
Front View

10   6

5   1

PCB Edge
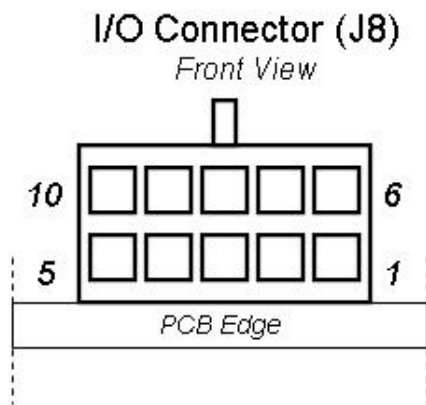
External I/O Specifications:

Analog Inputs:
Input Voltage Range: 0-28VDC, 10-bit resolution

Digital Inputs:
Input Voltage Range: 0-28VDC, 1.5V logic threshold

Digital Outputs:
Open Collector Outputs, 0-28VDC, 1Amp max current

2.4. Meter Interface Connector (P6)

The Meter Interface connector is **Samtec MMS-115-02-L-DV**

The Mating Connector to the Meter interface Connector is the **Samtec TW-15-07-L-D-570-090.** This connector is a surface mount connector and must be mounted to a mating PCB.

Table 4: MIB Pinout

Pin	Signal	Direction	Function
1	V_IN (9-28VDC)	NA	
2	GND	NA	
3	V_IN (9-28VDC)	NA	
4	GND	NA	
5	/MIB_AC_MON	Input	Indicates the presence of AC voltage input (active low)
6	/DB9_DISABLE	Input	Drive low to indicate the presence of a interface board
7	/MIB_BATT_MON	Input	Indicates the presence of Battery voltage input (active low)
8	/MIB_DIAB_PB	Input	Force the core module to run a diagnostic check (active low)
9	/MIB_OTA_PB	Input	Force the core module's cell module to perform an over the air activation
10	IO_DIN3	Input	General Purpose Digital Input
11	DOUT3	Output	General Purpose Digital Output (0-3.3VDC)
12	DOUT4	Output	General Purpose Digital Output (0-3.3VDC)
13	MIB_METER_TYPE	Output	Indicates the type of meter the board is communicating with (See MIB Meter Type)
14	MIB_232_485	Output	Controls the communication type; RS232 (logic high) or RS485 (logic low)
15	MIB_485_DIR	Output	Controls the direction of the RS485 transceiver, transmit (active high), receive (active low)
16	MIB_485_4W/2W	Output	Commands the RS485 to be a 4 wire (active high) or 2 wire (active low) interface
17	MIB_232_PORT_A2	Output	MUX driver that controls which serial port (1-8) is active.
18	MIB_232_PORT_A1	Output	MUX driver that controls which serial port (1-8) is active.
19	MIB_232_PORT_A0	Output	MUX driver that controls which serial port (1-8) is active.
20	MIB_DCE_TXD	Input	RS232 Receive Line
21	MIB_DCE_RXD	Output	RS232 Transmit Line
22	DCE_RTS	Input	RS232 Clear to Send Line

23	DCE_CTS	Output	RS232 Request to Send Line
24	DCE_DTR	Input	RS232 Data Set Ready
25	DCE_DSR	Output	RS232 Data Terminal Ready
26	DCE_RI	Output	RS232 Ring Indicator
27	DCE_DCD	Output	RS232 Data Carrier Detect
28	NO CONNECT		NA
29	AT91_BMS	Input	Boot Mode Select: Internal (Active High), External (Active Low)
30	NO CONNECT		NA

Pinout

Meter Interface Connector (P6)
Top View
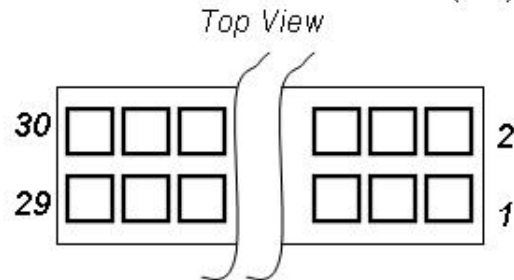
2.5. Status LEDs

Status LEDs are installed on the Core Module.

LEDs on the Core Module
LED1(802.15):   Indicates activity on the 802.15 link
LED2(Signal):   Indicates a sufficient RSSI on the cell signal
LED3(Activity):   Shows activity on the cellular link
LED4(Service):   The unit has connected to a cellular network
LED5(Power):   The Core Module is powered

2.6. COTS Interfaces

The following interfaces are industry standard and use off the shelf cables for communication. No customization is required.

Ethernet

Auto-Negotiating, Auto-MDIX, 10/100Mbps Ethernet LAN interface via an RJ-45 connector, with status indicators.

USB Device

USB v2.0, Low or Full speed, Device port via a Type-B style connector.

USB Host

USB v2.0, Low or Full speed, Host port via a Type-A style connector.

2.7.   Cellular Module

The Core Module contains a mini PCI express connector (P3) for connecting a 3G cell module. CalAmp will install the cell module prior to shipment. The Cell module will contain its own unique antenna connector and installation requirements.

⚠️ ***Refer to cell module manufacturer product documentation for installation rules and antenna options with regards to FCC certification.***

2.8.   802.15 Antenna

To insure FCC compliance, the Core Module 802.15 modular transmitter utilizes a U.FL antenna coupler and requires a unique coaxial feed assembly direct to the external antenna. Any antenna used with the module must meet certification requirements.

⚠️ ***To comply with FCC approval for the EVDO device, do not use a 2.4GHZ antenna with a gain greater than 2dBi.***

⚠️ ***To comply with FCC approval for the device, do not place the 802.15 antenna within 20cm of the cellular antenna or any other antennas in the system.***

3. GENERAL INSTALLATION GUIDELINES

Refer to module overview images, Figures 1 and 2, for locations of mounting holes.

The core module is mounted using the four mounting holes on the corners of the module using #4 screws.

Although not necessary for emissions compliance, it is recommended that each mounting hole or the associated edge copper rails are electrically connected to the chassis ground of the assembly enclosure.

Minimum single-shielded coax is required for emissions compliance of both cellular and 802.15 antenna feeds. Cables should route across top side of board, preferably outside of PWA perimeter. Enclosures and cable feed recommendations are shown below.
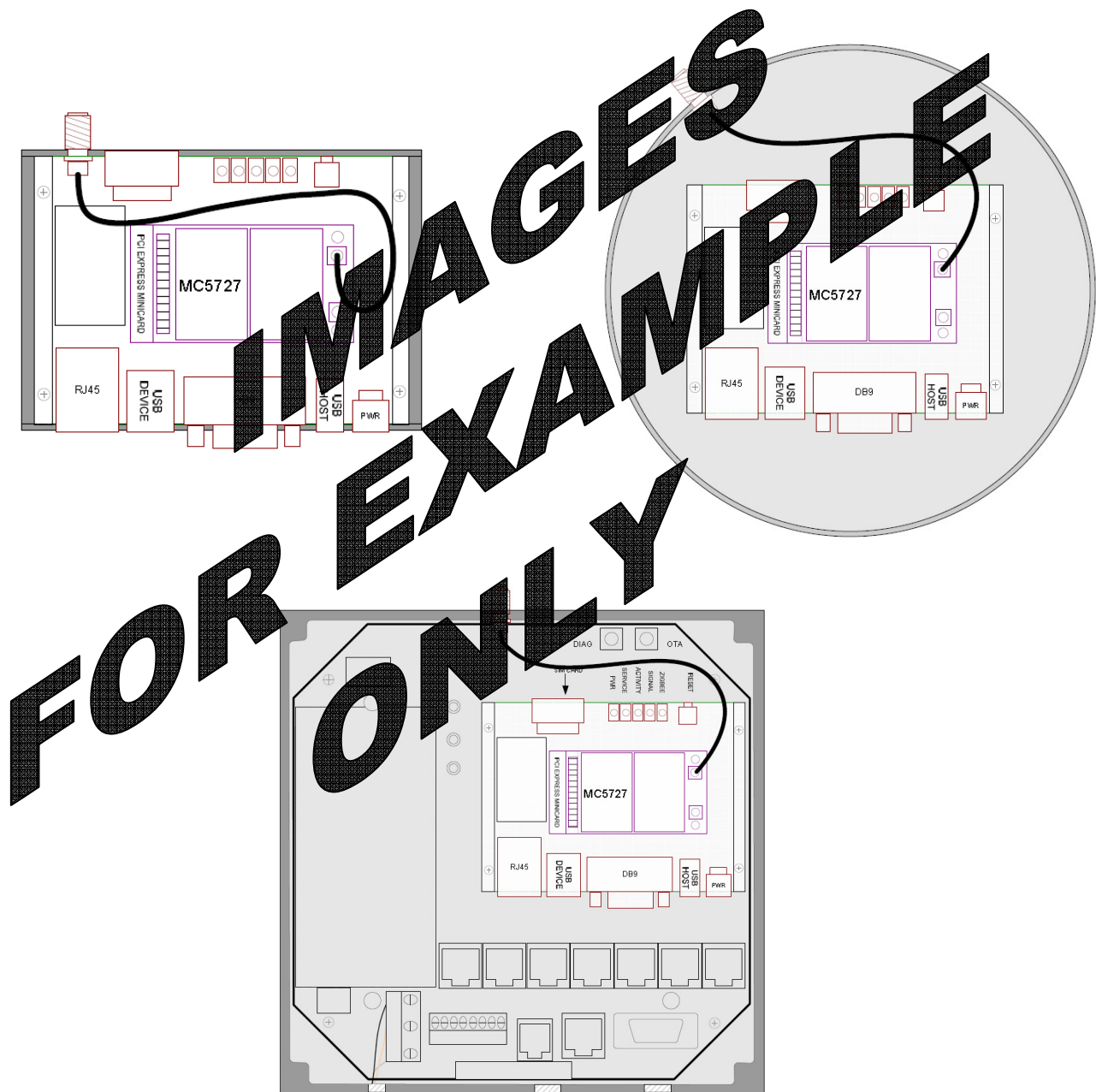
This page intentionally left blank.