EMMR

Specification

Rev V1

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1. Introduction

The following document describes the technical specification of the Enhanced Meter & Monitoring Reader (called EMMR) for the USA market.

The EMMR is a compact RF Receiver/Transmitter unit operates at 900MHz ISM band (multi frequency).

The EMMR is used for wireless data collection (transmitted from water meters).

Following the data collection, the collected data is transmitted via the RF Transmitter to another EMMR
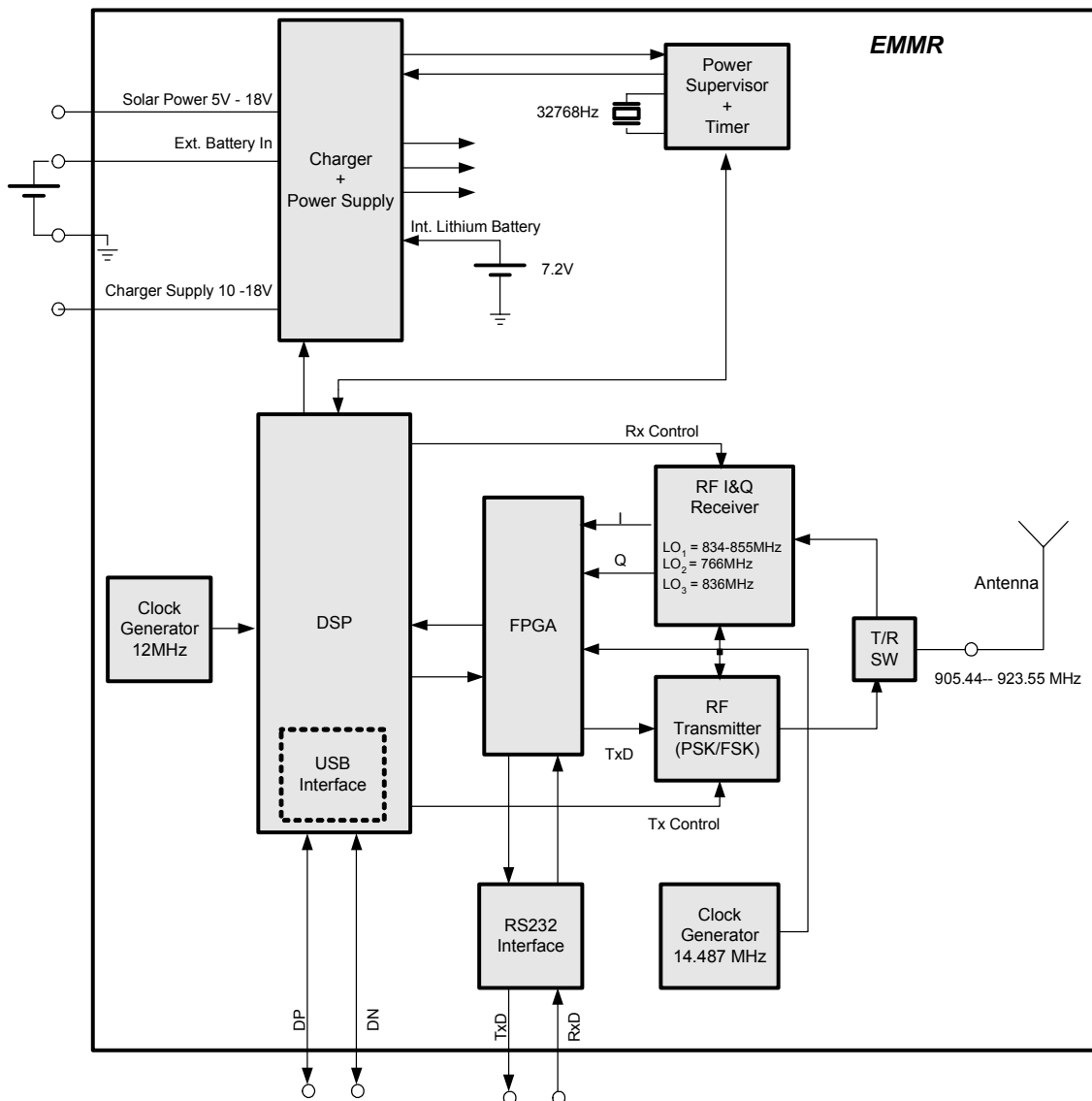
1.1. *Definitions, Abbreviation and Acronyms*

TBD

2. EMMR Description

2.1. *Block Diagram*

A block diagram of the EMMR is described below.

Figure 1 - EMMR Block Diagram

2.2. *Operational Modes*

The EMMR has 3 operational modes:

Power Down Mode

The unit is switched off except the Timer. The Timer shall wake the unit when its time
expired. The sleep time (power down) is programmable.

Receive Mode

The Receiver is enabled and collects data transmitted by water meters.. The received data
is decoded and saved in the internal memory or transmitted via the RS232/USB to external
PC/Lap Top/Pocket PC.

Transmit Mode

The Transmitter is enabled. The data collected during receive is transmitted towards the
Concentrator.

Mode	DSP	Digital Logic	Power Supervisor + Timer	RF Receiver	RF Transmitter
Transmit	On	On	On	Off	On
Receive	On	On	On	On	Off
Power Down (Timer mode)	Off	Off	On	Off	Off

2.2.1. *Software and FPGA Downloading*

By connecting the EMMR to a PC via their USB interface, software and FPGA files
can be downloaded into the EMMR.

2.3. Board Layout and Size
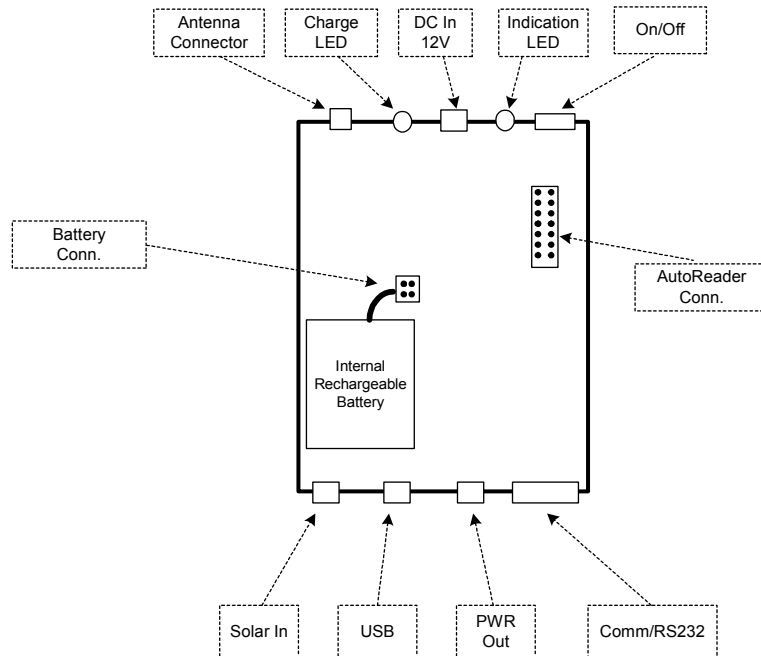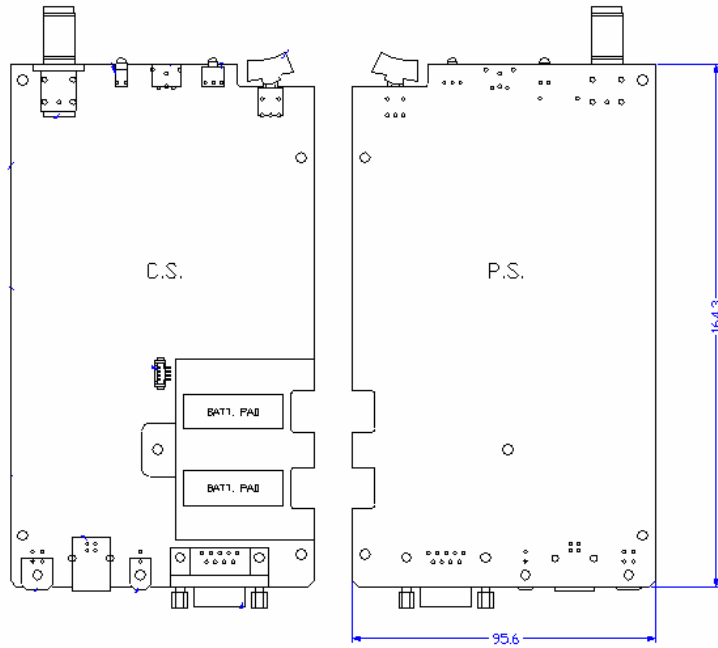
Figure 2 - Board Layout

3. Electrical Performance

3.1. *Receive Unit*

Table 1 – Receive Parameters

Parameter	Value
Receive frequency	Programmable in the range 905.44 MHz – 923.55 MHz
Sensitivity (BER 1E-3)	-114dBm
Modulation	DPSK DSSS
Bit rate	~60 kbps
Chip rate	~900 kChip/sec
Bandwidth (@6dB)	800 kHz – 1100kHz
Frequency stability (including initial stability, temperature and aging)	<15 ppm

3.2. *Transmit Unit*

The EMMR transmit unit has two operational mode (selected by the software):

- PSK Mode
- FSK Mode

3.2.1. *PSK Transmit Mode*

Table 2 – PSK Transmit Parameters	
Parameter	**Value**
Transmit Frequency	Programmable in the range 905.44 MHz – 923.55 MHz
Modulation	DSSS BPSK
Bit rate	~60 kbps
Chip rate	~900 kChip/sec
Bandwidth (@6dB)	800 kHz – 1100kHz
Frequency stability (including initial stability, temperature and aging)	<15 ppm
Peak Output power (without Antenna)	19.93 dBm
Peak Output power spectral density (without Antenna)	<8dBm in any 3kHz
Harmonics	< - 54dBm

3.2.2. *FSK Transmit Mode*

Table 3 – FSK Transmit Parameters	
Parameter	**Value**
Transmit Frequency	Programmable in the range 905.44 MHz – 923.55 MHz
Modulation	Digital Modulation – Wide Band BFSK
Modulation Coding	Manchester
Bit rate (net data rate)	~40 kbps
Frequency deviation	190 kHz
Bandwidth (@6dB)	550kHz – 650kHz
Frequency stability (including initial stability, temperature and aging)	<15 ppm
Peak Output power (without Antenna)	<20dBm
Peak Output power spectral density (without Antenna)	<8dBm in any 3kHz
Harmonics	< - 54dBm

3.2.3. *Antenna*

Antenna gain: maximum 3dBi (excluding cable lose).

There is no direct access to the antenna connector of the unit. In order to connect the antenna, special plastic cover of the connector should be removed by extracting two screws holding the cover. After connecting the antenna, the cover should be returned to its original position (using the same screws) with antenna connector covered completely by the cover.
The connection of the antenna shall be performed only by professional personnel responsible for the operating of the unit.

3.3. *Environmental Conditions*

Operating Temperature: -30° C to + 85° C
Storage Temperature: -40° C to +85° C
Humidity: Up to 95%