

# **ETMW**

# **RF Specification**

**Rev V2**

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## **1. Introduction**

The following document describes the technical specification of the second generation of Water Meter transceiver board (called ETMW) for the USA market.

The ETMW is actually a water odometer, offering Automatic Meter Reading – AMR. The ETMW is 2-Way RF communicator built-in water meter. The RF capabilities enable the transmission of the meter reading and some extra information to a Collecting unit. In addition specific parameters can be programmed via the RF link.

The ETMW consists of the following units: RF Transmitter & Receiver with integral Antenna that operate in 905.45 – 923.55 MHz range and a Microcontroller (plus simple Digital Logic), which control the operational modes of the unit.

### **1.1. Definitions, Abbreviation and Acronyms**

RFD : RF Dialog

## 2. ETMW Description

### 2.1. Block Diagram

A block diagram of the ETMW is described below.

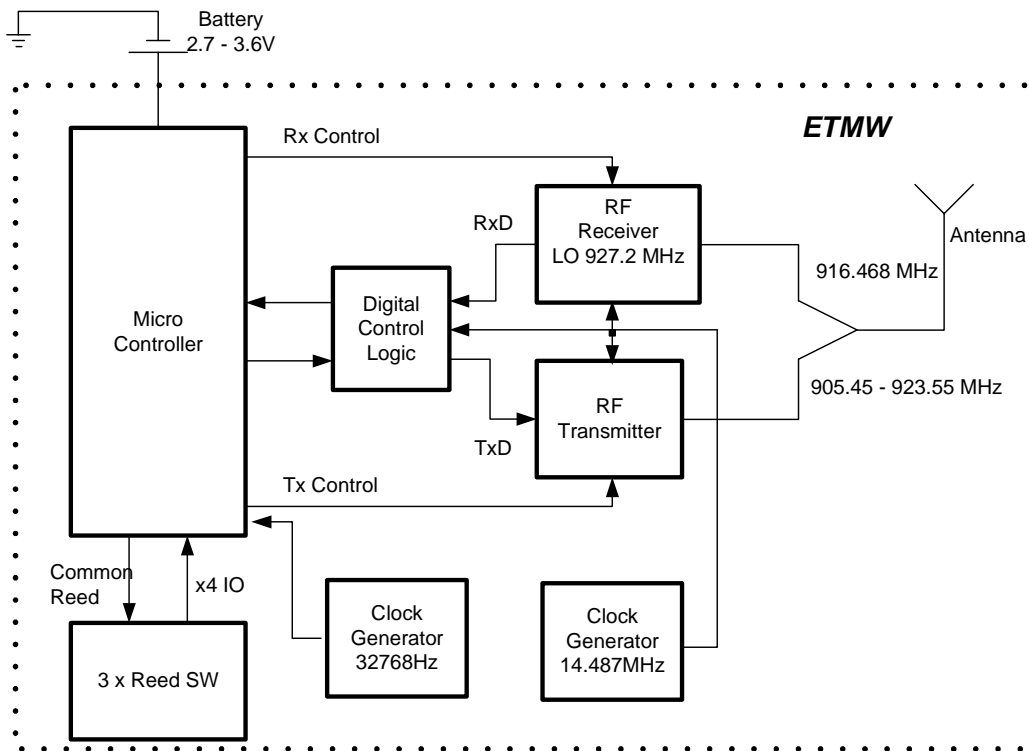


Figure 1: ETMW Block Diagram

## 2.2. Operational Modes

Table 1 – Operational Modes					
Mode	Microcontroller	Reed SW	Digital Logic	RF Receiver	RF Transmitter
Transmit	On (fast clock)	Disabled	On	Off	On
Receive	On (fast clock)	Disabled	On	On	Off
Reading Reeds SW	On (fast clock)	Enabled	Off	Off	Off
Idle/Sleep	On (32768Hz clock)	Disabled	Off	Off	Off

Notes:

1. When the Microcontroller reads the Reed SW it enables the *Common\_Reed* signal. In this case, if the Reed SW is closed then the current via the Reed shall be ~60uA, otherwise the current shall be zero.
2. When the Reeds are disabled (*Common\_Reed* = “0”), then the Reed current consumption is zero regardless of their state.

## 2.3. Board Dimension

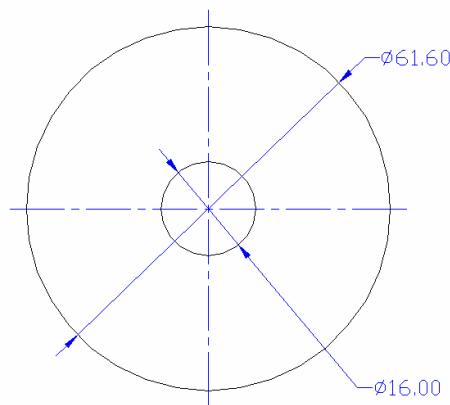


Figure 2: Board Dimension

### 3. Electrical Performance

#### 3.1. Transmit Unit

Each ETMW board has two transmit modes that controlled by the software:

- FSK mode (see table 2)
- PSKmode (see table 3)

##### 3.1.1. FSK Mode

<b>Table 2 – FSK Transmit Parameters</b>	
<b>Parameter</b>	<b>Value</b>
Transmit Frequency	Programmable in the range 905.45 MHz - 923.55 MHz
Modulation	Digital Modulation – Wide Band BFSK
Modulation Coding	Manchester
Bit rate (net data rate)	~60 kbps
Frequency deviation	190 kHz
Bandwidth (@6dB)	550 kHz – 650 kHz
Frequency stability (including initial stability, temperature and aging)	<20 ppm
Peak Output power (without Antenna)	13.5 dBm
Peak Output power spectral density (without Antenna)	<8 dBm in any 3 kHz
Harmonics	< - 54dBm
Tx Pulse duration	3.6 ms
Transmission rate	Programmable

**3.1.2. PSK Mode**

<b>Table 3 – PSK Transmit Parameters</b>	
<b>Parameter</b>	<b>Value</b>
Transmit Frequency	Programmable in the range 905.45 MHz - 923.55 MHz
Modulation	DSSS BPSK
Bit rate	~60 kbps
Chip rate	~900 kChip/sec
Bandwidth (@6dB)	800 kHz – 1100 kHz
Frequency stability (including initial stability, temperature and aging)	<20 ppm
Peak Output power (without Antenna)	19.0 dBm
Peak Output power spectral density (without Antenna)	<8 dBm in any 3 kHz
Harmonics	< - 54 dBm
Tx Pulse duration	3.6 ms
Transmission rate	Programmable

3.1.3. Tx Timing

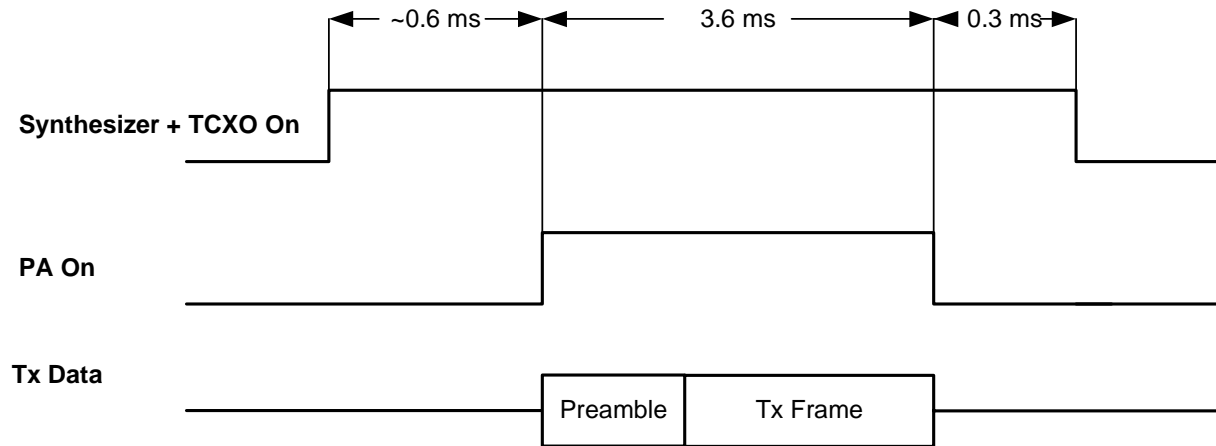


Figure 3: Transmit Timing



### 3.2. *Receive Unit*

#### 3.2.1. *Receive Parameters*

<b>Parameter</b>	<b>Value</b>
Receive frequency	916.468 MHz
Sensitivity (BER 1E-3)	-90 dBm
Modulation	FSK
Frequency deviation	190 kHz
Bit rate	41.156 kbps
Coding	Manchester

### 3.3. *Antenna*

The ETMW has an integral Antenna.

The Antenna type is PIFA – Planar Inverted “F” Antenna. The Antenna is Omni Directional in horizontal plane. The max gain is 3dBi. The Antenna is made of brass/tin.

### **3.4. *Power Source***

The ETMW is operated by a battery

- Battery rated voltage 3.6V.
- Operating voltage: 2.7-3.6V

### **3.5. *Environmental Conditions***

Operating Temperature: -40° C to + 85° C

Storage Temperature: : -40° C to +85° C

Humidity: Up to 95%