TMW – DM

Specification

Rev V1

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1. Introduction

The following document describes the technical specification of the Water Meter transceiver board with digital modulation (called TMW-TransMeter Water) for the USA market.

The TMW is actually a water odometer, offering Automatic Meter Reading – AMR. The TMW 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 TMW consists of the following units: RF Transmitter & Receiver with integral Antenna that operate at 916.3 MHz 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. TMW Description

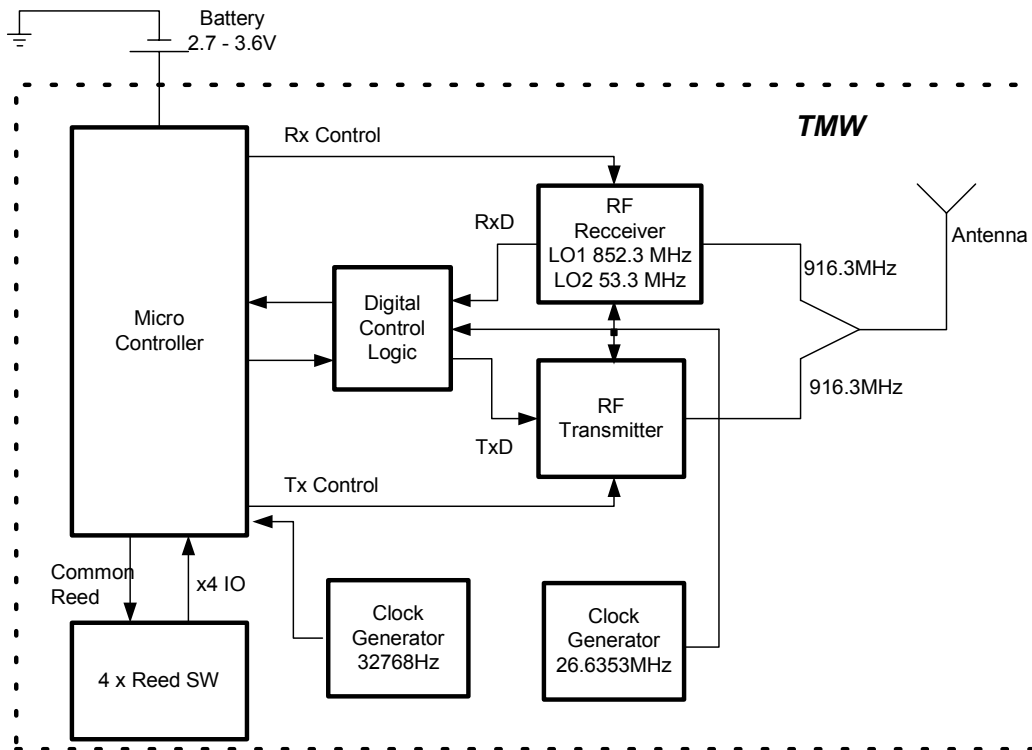## 2.1. Block Diagram

A block diagram of the TMW is described below.

Figure 1: TMW Block Diagram

2.2. 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 ~6uA, 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.
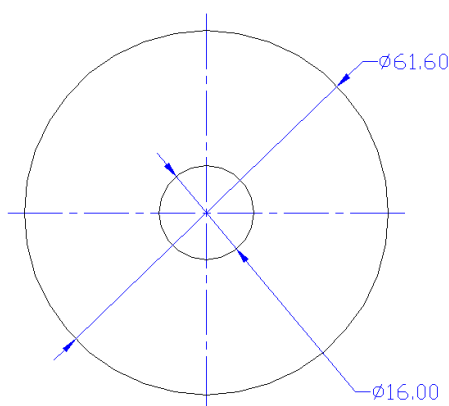
2.3. Board Dimension

Figure 2: Board Dimension

3.   Electrical Performance

3.1.   *Transmit Unit*

3.1.1.   *Transmit Parameters*

Table 1 – Transmit Parameters

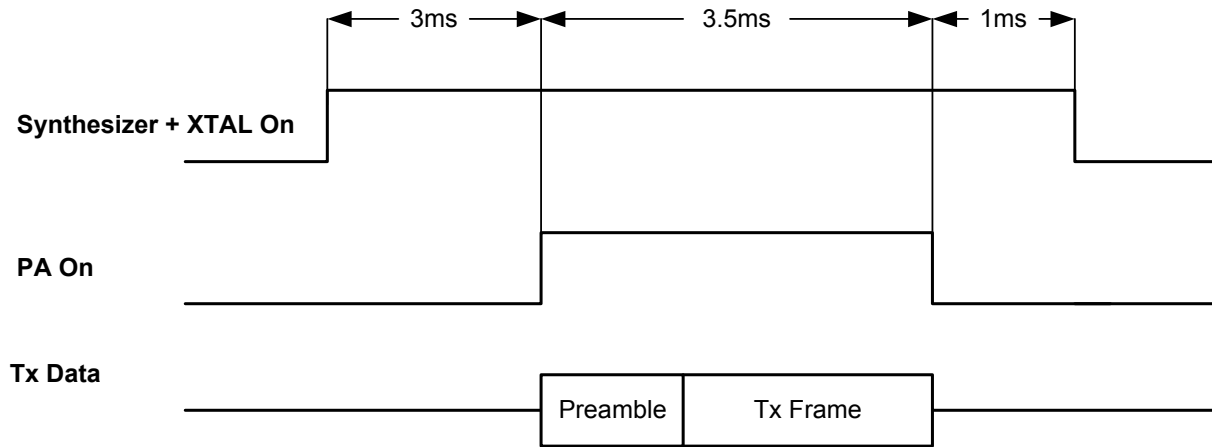| Parameter	Value
Transmit Frequency	916.3 MHz
Modulation	Digital Modulation – Wide Band FSK
Modulation Coding	Manchester
Bit rate (net data rate)	60 kbps
Frequency deviation	190 kHz
Frequency stability (including initial stability, temperature and aging)	±50 ppm
Peak Output power (without Antenna)	14dBm
Harmonics	< - 54dBm
Tx Pulse duration	~3.5ms
Transmission rate	Programmable.

3.1.2. *Transmit Protocol*
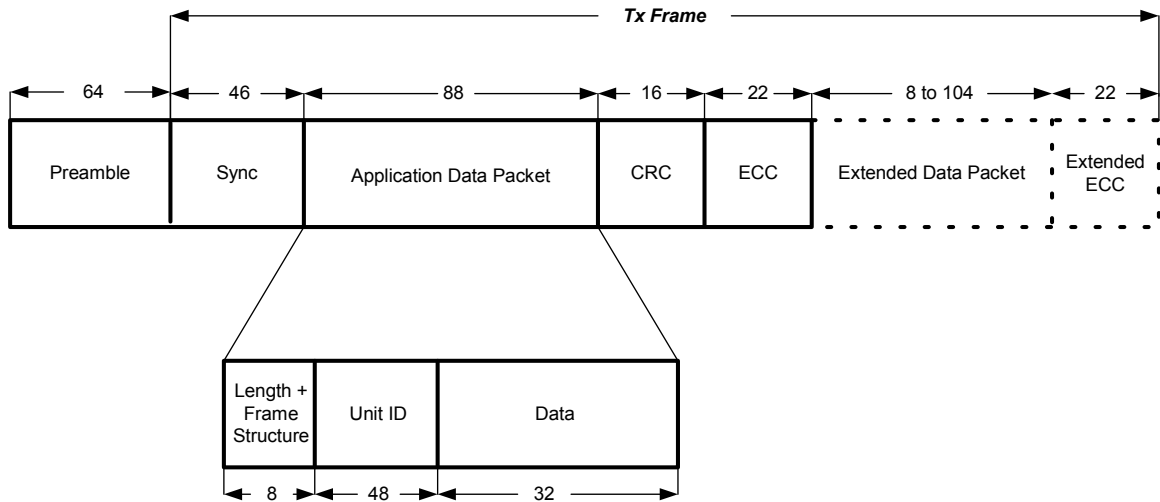
Notes:

1. All numbers indicate number of bits

2. The preamble is alternating ones and zeros. The Preamble length is ~64 bits (at 120kbps).

3. When "Length + Frame Structure" field is all zero then the "Data Packet" field is used by the communication layer (Telematics) and not by the application layer.

4. If the "Application Data Packet" is less then 11 bytes then the communication layer shall fill this field to 11 bytes (88 bits).

5. CRC is used as an error detection code. It is calculated on the entire data packet.

6. ECC is used as an error correction code. The ECC is calculated on the Packet data + CRC.

Figure 3: Transmit Frame
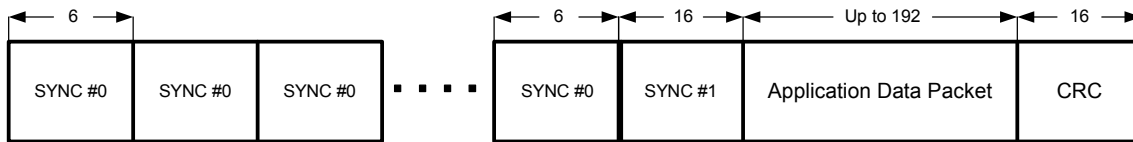
3.1.3.   Tx Timing

Figure 4: Transmit Timing

3.2. Receive Unit

3.2.1. Receive Parameters

Table 2 – Receive Parameters

Parameter	Value
Receive frequency	916.3 MHz
Sensitivity (BER 1E-3)	-87 dBm
Modulation	FSK
Frequency deviation	190 kHz
Bit rate	20 Kbps
Coding	Manchester

3.2.2. Receive Protocol

Figure 5: Wake Up Sequence and Receive Frame

Notes:

1. All numbers indicate number of bits

2. CRC is used as an error detection code. It is calculated on the entire data packet.

3.3. Antenna

The TMW 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 2dBi. The Antenna is made of brass/tin.

3.4. Power Source

3.4.1. Operating Voltage

Battery rated voltage 3.6V.

Operating voltage: 2.7-3.6V

3.4.2. Battery Life

The battery life shall be at least 6 years

3.5. Environmental Conditions

Operating Temperature: -10° C to + 70° C

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

Humidity: Up to 95%