

Meter Booster Specification

Rev V1



Table Of Content

| | |
|--|----------|
| 1. INTRODUCTION | 0 |
| 2. WATER METER BOOSTER DESCRIPTION..... | 5 |
| 2.1. BLOCK DIAGRAM | 5 |
| 3. ELECTRICAL PERFORMANCE | 0 |
| 3.1. TRANSMIT PARAMETERS OF PATH #1 | 0 |
| 3.1.1. Frequency Hopping Parameters..... | 0 |
| 3.2. TRANSMIT PARAMETERS OF PATH #2..... | 0 |
| 3.3. TRANSMIT PARAMETERS OF PATH #3 | 0 |
| 3.4. RECEIVE PARAMETERS OF PATH #4..... | 12 |
| 3.5. RECEIVE PARAMETERS OF PATH #5..... | 13 |
| 3.6. ANTENNAS | 0 |
| 3.7. POWER SOURCE..... | 0 |
| 3.8. ENVIRONMENTAL CONDITIONS | 0 |

1. Introduction

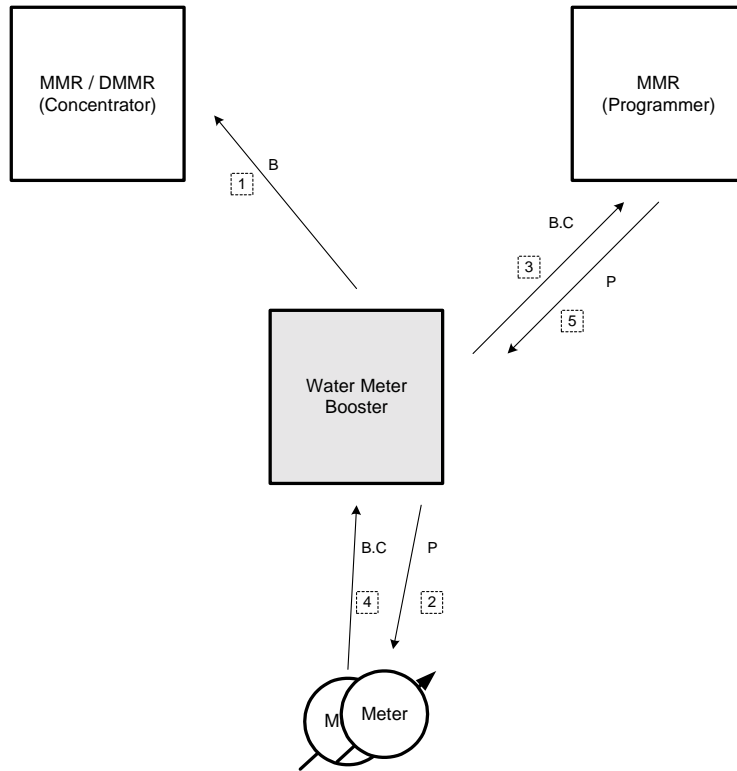
The following document describes the technical specification of the Water Meter Booster Unit (called WMB) for the USA market.

The WMB communicates by a RF channel with up to 2 meters and collects their data. The collected data is transmitted by the WMB (towards the a Fix Reader) by the RF channel using a 1 watt Spread Spectrum Frequency Hopping technique.

All RF channels to/from the WMB operate at the 900MHz ISM band.

The WMB communicates via the RF channel with the following units (see figure 1):

- Path #1 - Transmit (via an external antenna) the collected data towards the Fix Reader
- Path #2 - Transmit (via an internal antenna) the programming parameters and commands towards the Meters
- Path #3 - Transmit (via an external antenna) the response to the Programming Unit
- Path #4 - Receive (via an internal antenna) the response from the Meters
- Path #5 - Receive (via an external antenna) the programming parameters and commands from a Programming Unit



P = Programming Channel

B.C = Back Command Channel

B = Beacon Channel

Figure 1: WMB Communication Channels

2. Water Meter Booster Description

2.1. Block Diagram

A block diagram of the Meter Booster is described below.

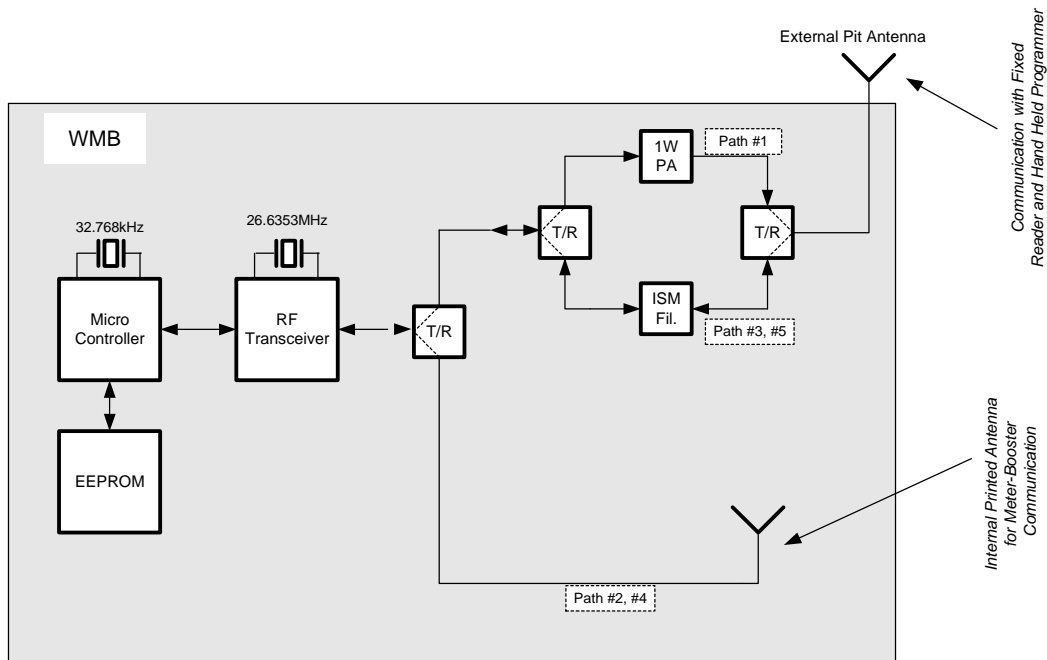
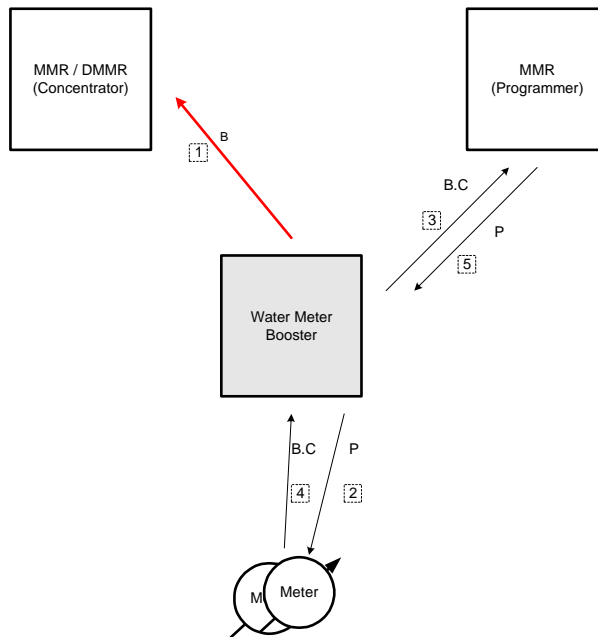


Figure 2: Water Meter Booster Block Diagram

3. Electrical Performance

3.1. Transmit Parameters of Path #1



| Table 2 – Transmit Parameters of Path #1 | |
|--|--|
| Parameter | Value |
| Transmit frequency band | 905.25 MHz - 924.75 MHz |
| Radio type | Spread Spectrum Frequency Hopping (54 hopping Frequencies) |
| Modulation | FSK |
| Frequency deviation | 30kHz - 45 kHz |
| Data rate | 30 kbps |
| Data coding | No data coding or Manchester |
| Bandwidth (@-20dB) | <250 kHz |
| Frequency stability (including initial stability, temperature and aging) | <40 ppm |
| Peak output power (without Antenna) | <30 dBm |
| Harmonics | TBD |
| Occupancy time on any frequency | ~8ms |
| Transmission rate | Programmable. Duty Cycle < 0.1% |
| Transmit current | < 850mA |

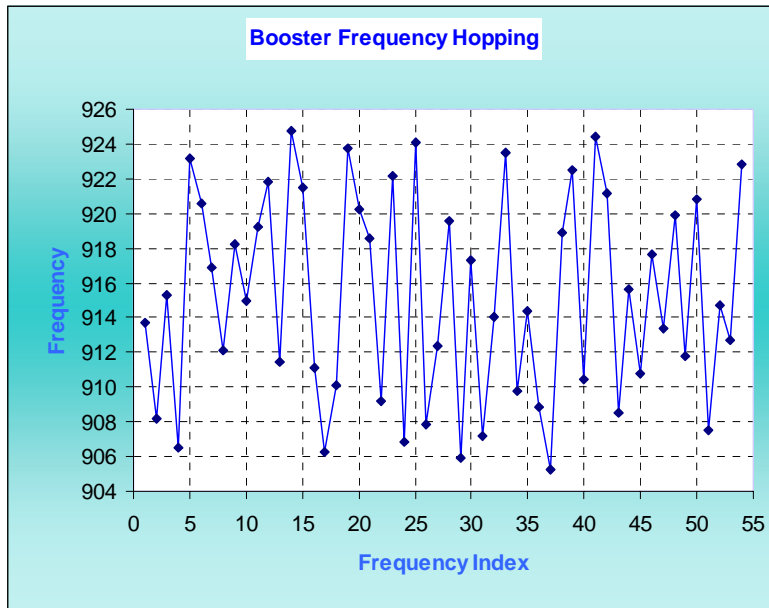
3.1.1. Frequency Hopping Parameters

- The Water Meter Booster uses 54 hopping frequencies.
- A Transmit cycle consists of 54 transmissions (frames)
- Each frame is transmitted in different frequency.
- A full transmit cycle is greater than 15 minutes.
- A Tx frame duration is less than 10ms. This is under the limit of 400ms in a 10 sec window.
- The FH carrier hops on a predetermined, pseudo random pattern (see table below).
- All channels are used equally
- System's receiver has input bandwidth that matches the hopping channel bandwidth of the Meter Booster and captures the transmitter on any of 54 channels and performs equally on all channels.

| Frequency Index | Frequency |
|-----------------|-----------|
| 1 | 913.700 |
| 2 | 908.175 |
| 3 | 915.325 |
| 4 | 906.550 |
| 5 | 923.125 |
| 6 | 920.525 |
| 7 | 916.900 |
| 8 | 912.075 |
| 9 | 918.250 |
| 10 | 915.000 |
| 11 | 919.225 |
| 12 | 921.825 |
| 13 | 911.425 |
| 14 | 924.750 |
| 15 | 921.500 |
| 16 | 911.100 |
| 17 | 906.225 |
| 18 | 910.125 |

| Frequency Index | Frequency |
|-----------------|-----------|
| 19 | 923.775 |
| 20 | 920.200 |
| 21 | 918.575 |
| 22 | 909.150 |
| 23 | 922.150 |
| 24 | 906.875 |
| 25 | 924.100 |
| 26 | 907.850 |
| 27 | 912.400 |
| 28 | 919.550 |
| 29 | 905.900 |
| 30 | 917.275 |
| 31 | 907.200 |
| 32 | 914.025 |
| 33 | 923.450 |
| 34 | 909.800 |
| 35 | 914.350 |
| 36 | 908.825 |

| Frequency Index | Frequency |
|-----------------|-----------|
| 37 | 905.250 |
| 38 | 918.900 |
| 39 | 922.475 |
| 40 | 910.450 |
| 41 | 924.425 |
| 42 | 921.175 |
| 43 | 908.500 |
| 44 | 915.650 |
| 45 | 910.775 |
| 46 | 917.600 |
| 47 | 913.375 |
| 48 | 919.875 |
| 49 | 911.750 |
| 50 | 920.850 |
| 51 | 907.525 |
| 52 | 914.675 |
| 53 | 912.725 |
| 54 | 922.800 |



3.2. Transmit Parameters of Path #2

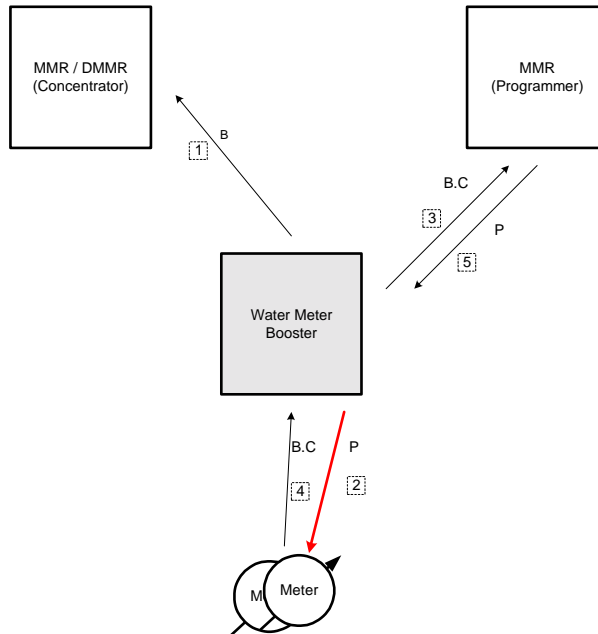
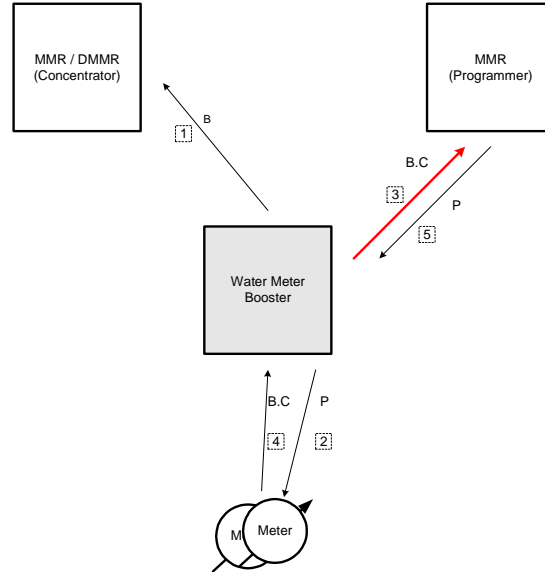


Table – Transmit Parameters of Path #2

| Parameter | Value |
|--|-------------------------------------|
| Transmit Frequency | 905.25 -924.75 MHz |
| Modulation | Digital Modulation – Wide Band BFSK |
| Frequency deviation | ~190 kHz |
| Data rate | 40 kbps |
| Data Coding | Manchester |
| Frequency stability (including initial stability, temperature and aging) | < 40 ppm |
| Bandwidth (@6dB) | 500 kHz – 650 kHz |
| Peak Output power (without Antenna) | < 10 dBm |
| Peak Output power spectral density (without Antenna) | < 8dBm in any 3kHz |
| Harmonics | < - 54dBm |
| Tx Pulse duration | < 5ms |
| Transmission rate | Programmable. Duty Cycle < 0.1% |
| Tx Current | < 30mA |

3.3. Transmit Parameters of Path #3



| Table – Transmit Parameters of Path #3 | |
|--|-------------------------------------|
| Parameter | Value |
| Transmit Frequency | 915 MHz |
| Modulation | Digital Modulation – Wide Band BFSK |
| Frequency deviation | ~170 kHz |
| Data rate | ~60 kbps |
| Data Coding | Manchester |
| Frequency stability (including initial stability, temperature and aging) | < 40 ppm |
| Bandwidth (@6dB) | 500 kHz – 650kHz |
| Peak Output power (without Antenna) | <10 dBm |
| Peak Output power spectral density (without Antenna) | < 8dBm in any 3kHz |
| Harmonics | < - 54dBm |
| Tx Pulse duration | < 5ms |
| Tx Current | < 30mA |

3.4. Receive Parameters of Path #4

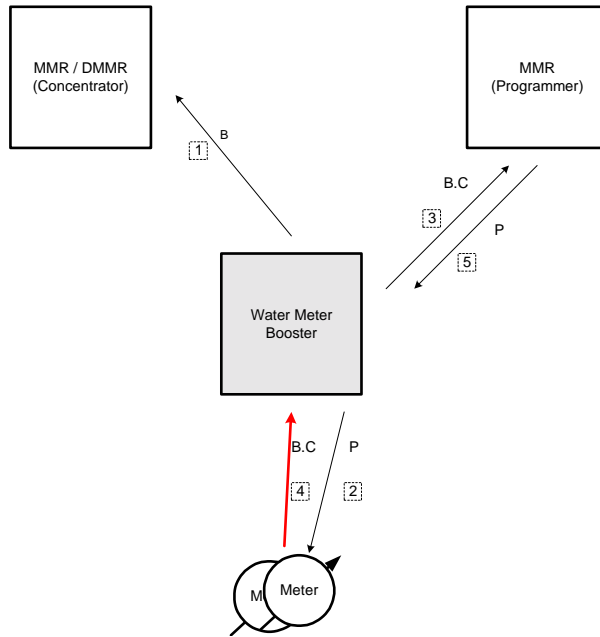
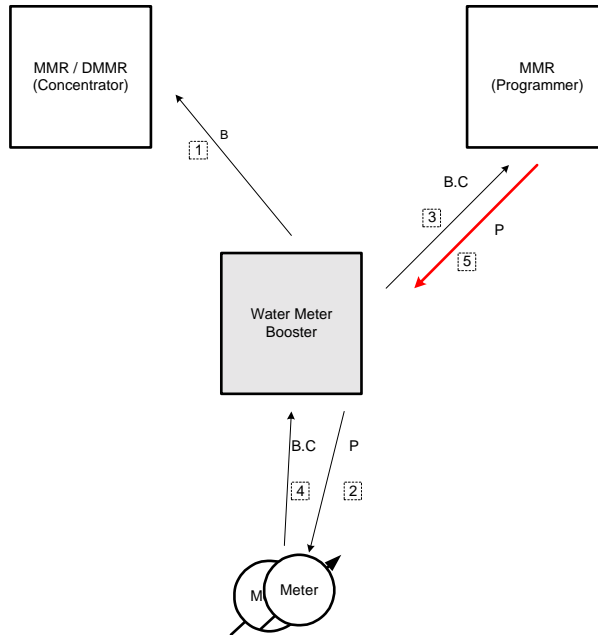


Table – Receive Parameters of Path #4

| Parameter | Value |
|--|-------------------------------------|
| Receive Frequency | 916.3 MHz |
| Sensitivity (BER 1E-3) | -90 dBm |
| Modulation | Digital Modulation – Wide Band BFSK |
| Frequency deviation | 90kHz - 170kHz |
| Data rate | ~60 kbps |
| Data Coding | Manchester |
| Frequency stability (including initial stability, temperature and aging) | <40 ppm |
| Rx Current | < 20mA |

3.5. Receive Parameters of Path #5



| Table – Receive Parameters of Path #5 | |
|--|------------|
| Parameter | Value |
| Receive frequency | 916.3 MHz |
| Sensitivity (BER 1E-3) | -90 dBm |
| Modulation | FSK |
| Frequency deviation | ~100 kHz |
| Data rate | ~20 kbps |
| Data Coding | Manchester |
| Frequency stability (including initial stability, temperature and aging) | < 40 ppm |
| Rx Current | < 20mA |

3.6. Antennas

The Water Meter Booster has 2 Antennas:

- Internal Antenna - printed Antenna on the PCB. The max antenna gain is 4dBi
- External Antenna - soldered to the Booster printed circuit. The max antenna gain is 4dBi.

3.7. Power Source

The Water Meter Booster is operated by 2 lithium batteries

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

3.8. Environmental Conditions

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

Storage Temperature: -40° C to +85° C

Humidity: Up to 95%