Operational Description
PMF-001B Microfence BLE Beacon
FCC ID: 2A2BS-PMF-001-BGA

Chuck Ferguson

August 4, 2021

Revision 2

1 Operational Description

The PMF-001B Microfence BLE Beacon is a Bluetooth Low-Energy (BLE) beacon using Texas Instruments' ultra-low power, multi-protocol, wireless MCU, CC2640R2F. The beacon contains a single internal PCB containing all required passive components, including a 32.768 kHz crystal, a 24 MHz crystal and an on-board 2.4-GHz Inverted F patch antenna integral to the PCB.

The CC2640R2F radio includes a 4.8 GHz PLL running off the 24 MHz crystal oscillator. The PLL outputs the 2.4 GHz digitally modulated RF signal which is amplified in the IC-internal PA and then output on the ICs differential RF pins. The PA can be controlled from -21 dBm to 5 dBm output power.

On the beacon PCB the differential RF output is transformed to a single ended 50 ohm signal through a passive component (capacitor / inductor) balun. The output of the balun is passed through a T-filter to reduce harmonic emission and then connected to the PCB patch antenna.

The 2.4-GHz Inverted F patch antenna on the module is a clone of Texas Instruments reference design. The antenna is integral to the PCB and as such not replaceable by the end user.

The CC2640R2F within the beacon contains an integrated ARM processor that uses TI's Bluetooth® low energy stack running GFSK modulation at 1 Mbps data rate.

The actual frequency range of the beacon is 2.402 to 2.480 Ghz.

The beacon transmits at 0 dBm power by default. All beacon testing was conducted at 0 dBm power.

Users have no access to transmit power settings.

The manufacturing tolerance in transmit output power (in dB) is determined by the Texas Instruments CC2640R2F chip set. Please refer to the data sheet for the part.

The duty cycle of the radio transmitter is fixed at 0.0496%. The duty cycle is brief as is typical of all Bluetooth Low-Energy devices. An advertisement message is transmitted every 500 ms. The advertisement is 31 bytes (248 bits) long, resulting in a on-time of 248 μs for the transmitter every 500 ms.

2   Revision History

Rev.	Date	Originator	Description
0	July 26, 2021	Chuck Ferguson	Initial release
1	July 26, 2021	Chuck Ferguson	Added detail re: duty cycle of transmitter.
2	August 4, 2021	Chuck Ferguson	Corrected model number. Corrected transmit power to 0 dBm.