1.3 Description of Changes in Certified Equipment

Changes to the Advantage MPU board P/N 12011-XXX

Introduction

We have experienced some yield problem with Advantage MPU board. Most of the RFM chips bit rise time varied from 1 micro second to 40 microseconds. Receiver had difficult time to compensate for the bit rise time delay. After reviewing the TX6004 RFM transmit chip we discovered that the same chip could be used in ASK mode with only 1 micro second bit rise time delay. We have consulted with RFM and they recommended to go with ASK modulation instead of OOK to keep the bit rise time variation tightly controlled. While improving the RF interface circuit we discovered that the antenna length was not optimized for 914 MHz. In the improved design we have made sure that the antenna is optimized and other peripheral circuits are implemented per the RFM specification. Overall it looks like a more rugged, consistent and quiet design. Based on our preliminary lab test results the RF spurious noise has been reduced significantly.

These are the following changes made to the new design over the existing design:

1. Changed RF modulation from OOK to ASK
2. Optimized antenna length for the intended center frequency 914 MHz. But no change to the transmit frequency.
3. Used a voltage switch circuit to keep the unit 100% on when transmitting and turn it 100% off when not transmitting. This helps to eliminate the leakage current in the circuit and increases battery life.
4. We used proper pull ups to make sure that the signal levels are correct for the RFM chip.
5. Updated the RF output matching circuits to have more consistent RF power and reduced RF spurious noise
6. Kept the RF power under 1 mWatt as specified in the RFM TX6004 transmit chip.
7. Minor layout changes to incorporate items listed above.
8. Updated firmware to change the RF modulation from OOK to ASK.
9. Kept everything else same as the current production units.
10. RF transmit circuitry same as before

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