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To Whom It May Concern:

This letter is to summarize the Class II permissive change being made to the 900 MHz frequency hopping spread spectrum radio module known by its FCC Identifier TGUDX80, and already carrying a Limited Modular Approval (LMA) certification.

- The certification is expanded to allow usage of an additional antenna of Sensonix custom design.
  - The antenna is a compact physical design meant to be used inside existing housings which will permit installation opportunities not attainable with commercially available external antennas.
  - The antenna is designed to have relatively low gain, that is to have a nearly omnidirectional pattern.
  - The antenna will be manufactured in a high volume facility with strict quality control measures and therefore its performance will not deviate markedly from the sample provided.
- As stated, this class II permissive change builds upon the original TGUDX80 certification obtained in 2005. This certification applied to the radio module measuring approximately 2.0 x 2.8 cm and containing all necessary RF components on a single printed circuit board, including RF Transceiver IC, crystal oscillator, RF switches, power amplifier, and SAW filter, and antenna port.
  - As the photos in this submission will show, this radio module has NOT changed since 2005.
  - Furthermore, all essential (from an RF emissions perspective) items not located on the radio module have NOT changed, either. These items include:
    - The voltage regulator circuitry (including bias levels) for the Radio module that resides on the larger carrier PCB. (This is the approximately 7cm diameter circular PCB that has two flattened sides.) All power supplies for the radio have always been dedicated to the radio functionality and remain dedicated. All other functions (microcontroller Vdd, analog Vdd, etc.) are isolated from the power planes of the radio by being on their own regulated supplies.
    - The frequency hopping methodology contained in the microcontroller firmware. (The microcontroller resides on the carrier PCB as well, but its interface to the radio hasn't changed.)
    - Pin by pin buffering of every pin on the radio module.
    - Power plane and ground plane size and decoupling strategy on the carrier PCB.
    - The RF protocol and timing protocols captured in the original certification.
- The photos submitted for this certification will show some differences from those taken in 2005. These differences are contained entirely in the carrier PCB and are limited to non-essential features. These changed items may include:
  - The rotary switches (white blocks with numerals 0-9) now have 16 positions. The interface to read them remains unchanged.
  - The array of via holes for wiring connections along one side of the board has been replaced by a connector header with 2x10 pins on 0.100" spacing
  - Some revisions of the carrier PCB have an LCD display installed.
  - Various interface circuits have changed. These interface circuits are the connection between the microcontroller and the outside world. These interface circuits include such things as discrete level inputs and outputs, analog inputs, and analog outputs such as 4-20 mA current loops common in the process control industry. None of these changes overlap with any of the RF functionality of the system.

Sincerely,

Brent Holm
Senior Design Engineer
Sensonix, Inc.