

Wireless Keypad Operation

The wireless keypad is a coin cell battery powered switch array with a single integrated circuit (IC) containing both a microcontroller and radio frequency transmitter. The IC monitors the switch array and transmits status messages using Frequency Shift Keyed (FSK) modulation centered at 433.92MHz.

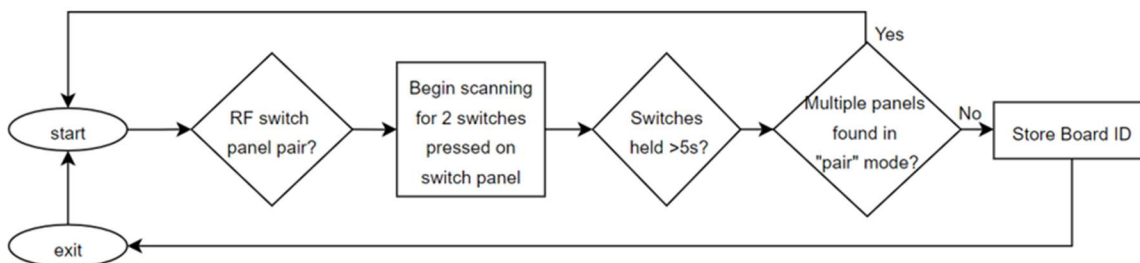
The device operates at 2 power levels. The periodic TX is lower power and complies with periodic rules 15.231(e) while the manual button mode complies with activated rules (15.231(a))

The radio frequency signal is derived from an inductor-capacitor (LC) voltage-controlled oscillator and a frequency divider implemented on the IC using a complementary metal oxide semiconductor (CMOS) process. The LC oscillator is frequency trimmed by the IC manufacture. All digital systems clocks are derived from a low power 24 MHz system clock generator.

After battery insertion, operation begins with the first key press. The majority of time is spent in stop mode, where the microcontroller ceases operation of high frequency oscillators to reduce operating current. A very low power oscillator allows sub micro-current operation and a periodic wake-up every 15 minutes to transmit a radio frequency message that confirms interim connectivity and indicates battery voltage.

When a switch is pressed, the microcontroller enters operational mode, scans the keypad, and continually transmits the SW_ASSERTED radio frequency encoded status message indicating the specific switch(es) pressed until release of all switches. Light Emitting Diodes (LEDs) provide backlighting of the keypad while a switch is pressed.

Two switches are simultaneously pressed to pair the keypad to the receiving module. The receiving module flow for pairing is summarized in the following diagram.



After release of all switches the microcontroller transmits a SW_RELEASED status message, pauses for 1.5 seconds, disables the LED drive circuit, and reverts to the stop mode.