Theory of Operation
EV-DW4955

The WS4955S door sensor is a low power wireless entry detection device which is intended to operate on a single fixed frequency of 433.920 MHz. This device operates from a single 3 volt , type CR2450N battery.

This device contains a reed switch which is used to determine when the accompanying magnet is in close proximity (a 'restore " condition) or at a distance farther than several cm (a "fault" condition). There is also a tamper contact which will detect if the case of the device is opened. The device will send a status message via ASK data transmission at 433.920 MHz:

a) At 70 minute intervals, for supervisory purposes to assure security system integrity.
b) When status changes to a fault condition.
c) When status changes to a restore condition.
d) When the device detects a tamper condition.

Each message transmission will consist of four packets (data and control signal) of 32 mS each, over an interval of 800 mS. This means that the total transmission time for periodic supervisory transmissions is 128 mS every 70 minutes which is well below the current limit of 2 seconds per hour indicated in 47 CFR, 15.231 (a), (3).

Refer to the attached schematic diagram and block diagram with the following description.

The processor U2, runs on an internal oscillator which does not require an external crystal or ceramic resonator. U2 turns on and checks the status of the reed switchs SW2, andSW1 every second. If there is a change in the status of SW2 or SW1, U2 will stay on and transmit ASK data via U3 as follows:

1. The data line from pin 5 of U2, which is essentially connected to pin 6 of U3, will toggle high for 200uS and then
2.
3. for 200 uS. This will cause U3 to turn on and start its internal 13.560 MHz crystal reference oscillator which is connected to crystal X1. Within 200 to 300 uS of turning on, the 433.920 MHz PLL synthesizer inside U3 will be locked and stable.
4. After the data line is held low for 200 uS as described above, and the PLL is stable, U2 will then begin to send data to U3. When pin 6 of U3 goes high, the 433.920 MHz PA stage will be enabled and transmit RF from pin 4 of U3 until pin 6 of U3 goes low again.

5. When the data input pin 6 goes low, U3 will disable it's PA section and stop transmitting RF from pin4, but U3 will remain on and it's PLL will remain locked and ready to transmit when the data line goes high again.
6. This process described in 2 and 3 above is repeated thorough each data transmission.
7. After the data transmission is completed, U3 will shut down after running for 4.8 mS without any transitions on pin 6.
8. Steps 1 thru 5 will repeat as needed for additional packet transmissions.

After four status transmissions have been made, U2 will shut down and go back to turning on to check the status of SW2 once per second.

Components L1, L2, C11, C12, and C10 provide impedance matching and harmonic rejection between U3 and the PCB loop antenna.
If the battery voltage should drop below 2.2 VDC, pin 1 of U1 will switch pin 4 of U2 to a low state indicating a low battery condition. U2 will encode this status in each data transmission.

This device does not have any adjustments which can be changed by the user.