TILT SENSOR TILT-345MHZ
(P/N 235725-01)

THEORY OF OPERATION

The tilt sensor TILT-345MHZ, P/N 235725-01 is a low power wireless entry detection device which operates on a single fixed frequency of 345.000MHz. This device operates from a single 3 volt , type CR2032 battery.

This device contains a rolling-ball switch which is used to determine when the sensor is moving from (bottom) vertical to (bottom) horizontal position (in this case alarm bit becomes 1) or vice versa (in this case alarm bit becomes 0). The device will send a status message via ASK data transmission at 345MHz:

a) When position of the sensor changes from horizontal to vertical or vice versa.
b) When tamper switch is pressed or released.
c) When more than 65 minutes have passed since last transmission.

Each transmission consists of two messages, each of them having six packets.

Refer to the 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. During initialization U2 and checks the status of the tamper switch SW1 and if SW1 is released, sends out to transmitter U3 a tamper message. After initialization U2 normally is in sleep mode and is waking up upon change in the status of Tamper switch SW1 or Roll Ball Switch SW2. In this case it sends out to the transmitter message with the respective change of the Status byte.
Transmissions via U3 are done as follows:

1. The data line from pin 5 of U2, which is connected to pin 6 of U3, will toggle high and then low. This will cause U3 to turn on its oscillator which is based on 10.78125 MHz crystal Y1. Within 200 to 300uS of turning on, the 345MHz PLL synthesizer inside U3 will be locked and stable.
2. 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 345MHz PA stage will be enabled and transmit RF from pin 4 of U3 until pin 6 of U3 goes low again.
3. When the data input pin 6 goes low, U3 will disable its PA section and stop transmitting RF from pin4, but U3 will remain on and its PLL will remain locked and ready to transmit when the data line goes high again.

4. This process described in 2 and 3 above is repeated thorough each data transmission.
5. After the data transmission is completed, U3 will shut down after running for 6 mS without any transitions on pin 6.
6. Steps 1 thru 5 will repeat as needed for additional packet transmissions.

After two messages six packets each have been sent, U2 will go back to sleep mode.

Components L1, L2, C11, C10, C13 and C19 provide impedance matching and harmonic rejection between U3 and the PCB loop antenna.
If the battery voltage should drop below 2.6 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.