Circuit Description

The Angelwatch reusable tag consists of two Printed Circuit Boards (PCB's) connected by four conductive board standoff pins marked P1, P2, P3 and P4 on both PCB's.

The bottom PCB is part # 015-00051. This board contains the Microcontroller IC, the metal spring fingers, and the battery. Referring to the schematic drawing, the battery is labeled B1. The microcontroller is U1. The spring finger contacts are J1 and J2. The spring finger contacts have prongs which grab the conductive strap used to attach the tag to arm or leg of the patient being tagged. When the strap bridges the gap from J1 to J2, the input pin GP1 on the microcontroller which is normally pulled low by resister R3, is pulled high. when the microcontroller senses that this input is pulled high for on uninterrupted minute, it signals the transmitter IC on the top PCB to transmit through the standoff pins P1a d P2. Resistors R! and R7 and diodes D1and D2 are to protect the circuit from Electrostatic Discharge (ESDP when the strap is touched. Capacitor C6 keeps the +3 volt DC battery output from dipping during transmission. The other two standoff pins P3 and P4 connect power and ground to the top PCB.

The top PCB is part # 015-00050. This board contains the RFM 418.00 MHz Hybrid transmitter TX5002. Referring to the schematic drawing, this part is labeled U1 on the top PCB. The resistor R1, the TXMOD resistor, is used to adjust the output power. The resistor R2 is used to protect U1 from ESD. The output is terminated at inductors L1 and L2 and connected through C4 to the spring finger J1 on the bottom PCB.

The transmission consists of two 31 millisecond pulse trains separated by a gap of approximately 200 milliseconds. See Figure 1. Each pulse train consists of 14 pulses, each pulse being 0.25 milliseconds wide, with a gap of approximately 2.1 milliseconds between pulses. The whole pulse train is approximately 31 milliseconds long. The transmission scheme used is On-Off Keyed. The transmitter outputs two of these 31 milliseconds pulse trains with a gap of approximately 200 milliseconds, then turns off for 10to 12 seconds. (2x 14 x 0.25 milliseconds = 7 milliseconds). The 14 pulses represent a digital ID code plus an alarm bit. The position of each pulse relative to the start bit determines its value.

When the Strap is cut, this represents a possibly life threatening emergency, such as a baby being stolen from the maternity unit. The transmitter then transmits once every 2 seconds for 30 seconds, then goes back to normal spacing (once every10 to 12 seconds) for 10 minutes, then shuts down. Normal operation resumes when a new strap is applied.

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