Technical Description of Operation

Ultramatic Hand Wand

The Ultramatic R2T4 RF Hand Wand is a microcontroller based, battery powered 310MHz On-Off-Keyed transmitter. The transmitter meets FCC part 15 subpart C. The hand wand is in sleep mode until a button on the Conductive Rubber Switch (CRS) is pressed. The button press wakes up the micro controller and processes the button press. After decoding, the microcontroller generates the data pattern to on-off key the transmitter circuit. The microcontroller stays awake for six seconds until another button is pressed or the same button is held pressed.

CRS/Button Matrix:
The CRS has conductive carbon impregnated pads situated above gold plated contacts on the PCB. When the button section of the CRS is pressed, the pad shorts two adjacent conductors. These conductors make up a four column by four row switch matrix. After wake-up, the microcontroller drives the columns and reads the rows to determine which button was pressed.

Battery:
The hand wand uses qty 1 "9V" type battery.

Transmit Light:
The LED flashes the data pattern that is on-off keying the transmit circuit.

Transmit circuit:
The transmitter is a SAW stabilized Colpitts oscillator. The transmit frequency is 310MHz +/- 500kHz. The oscillator circuit is on-off keyed per the following data pattern:
1msec on pulse
3msec off
.5msec pulse
There are 12 .5msec pulses. The time between the pulses is 3, 4, 5, or 6msec. The time between pulses symbolizes the digital data.
After the last symbol, the transmitter is off. Total time of an entire data packet before repeating is 131msec. The pattern uses the extra 20dB correction for duty cycles less than 10% over 100msec.