Operational Description Kiln Data Transmitter

Circuit functions:

The Kiln Data Transmitter determines the electrical resistance of 2 sensors:
- external wood or wafer
- internal thermistor

The results are converted into moisture readings and/or temperature readings and automatically transmitted to the Kiln Data Collector.

Description of circuitry:

The device is powered by a Lithium battery. A voltage detector chip monitors the voltage level of the battery.
Normally the microcontroller is in “Sleep”-mode (oscillator off) and doesn’t do anything. An internal watchdog of the microcontroller wakes up the device regularly.

If new readings need to be determined (approx. every 40sec), then the microcontroller controls the measuring circuitry accordingly and interprets the measuring signal.
Two permanently attached leads (length 20cm/7.5”) are used to connect the device to wood or wafer.

If a reading needs to be transmitted (approx. every 20sec), then the digital values (6 bytes total) are serially sent to the transmitter chip at 2400Bd.
Every byte consists of 14 bits: Start and Stop bit, 8 data bits and 4 balance bits. Individually for every byte, the balance bits are determined by the microcontroller to achieve a duty cycle of 50%.
In the worst case, when all data bits of all bytes are high, the duty cycle of the transmitter chip operated in on-off keyed modulation (OOK) will be less than 67%.

Operating frequency of the transmitter chip is 916.5MHz at a typical peak output power of 0.85mW.
A permanently attached ¼-wave length stub is used as antenna.