Theory of Operation

MicroWIS Sensor Unit

The MicroWIS Sensor Unit takes a temperature sample at a periodic rate based on an internal counter. At power up, this sample rate is 1 sample per minute (default rate). When the periodic timer has not timed out, the sensor unit is in its low power mode. In this mode, the radio and analog front end are not powered. While in this low power mode, the microprocessor is also in its lowest power consumption mode in which only the periodic timer is running. This timer is based on a 32.768 kHz crystal.

For sample rates less than 15 seconds, the microprocessor wakes up, acquires a temperature sample, powers on the radio, and transmits the data packet. For sample rates greater than 15 seconds, the processor wakes up briefly to update its sample rate counter in 15-second intervals and resumes its low power consumption mode. When the desired interval time has elapsed, the processor acquires a temperature sample, and transmits the data packet.

During each sample acquisition, the front-end power is enabled and a temperature measurement is acquired. During the time that the temperature measurement is being acquired, the radio remains in a non-powered condition. Once the temperature sample has been acquired, the front-end power is disabled, the radio power is enabled, and the sample is transmitted as part of a data packet.

The base-band data packet is sent from the microprocessor with a base-band bit time of 9 microseconds. The radio circuit modulates the message as an ASK modulated RF signal at 916.5 MHz. As soon as the entire data packet has been transmitted, the radio is put into receive mode (for 1.7 milliseconds). The processor then monitors the receiver for receipt of an acknowledgement message transmitted from the PC Interface Unit. Each acknowledgment message is transmitted in 1.1 milliseconds. If the MicroWIS Sensor Unit receives a valid acknowledge message from the PC Interface Unit, it will update its sample rate with the sample rate contained within the acknowledge message and will begin to acquire temperature samples at that new rate. If there is no successful acknowledge, the sensor unit will delay for 20 mS and re-transmit the data packet and will wait for the PC Interface Unit acknowledge again. If there is no successful acknowledge from the PC Interface Unit after 3 re-transmits, the MicroWIS Sensor Unit will enter its low power mode and will wait for the next sample time using the current sample rate.

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