

Single Chip Systems Corporation

# MODEL MKR S512 SCANNER

## Functional Description

**Purpose:**

This device is intended for applications in the areas of identification, verification, and inventory control. The system consists of two main parts, a reader and ID tags. The reader is operated by the user to interrogate the tags which are attached to objects in the field. Tags are small in size and have read/write capability.

**Theory of Operation:**

The ID tags derive their power from the RF energy of the reader signal, and are not internally powered. Signaling from reader to tag is accomplished by momentarily switching off the RF transmitter in a predetermined pattern. Signaling from tag to reader is accomplished through antenna backscatter. The tag momentarily shorts its antenna terminals together, which causes the transmitted power that was being absorbed into the tag to reflect back off its antenna. This reflected signal is sensed by the receiver.

**Transmitter:**

The transmitter produces a phase locked CW signal, which is modulated by momentarily switching off the output power. In the transmitter, the phase locked loop output is amplified and then modulated by an RF switch which is also controlled by the microprocessor. It then passes through the final amplifier, SPDT switch, low pass filter and ultimately is transmitted from the antenna.

**Receiver:**

The received signal from the antenna, comes through the SPDT switch to a power divider. The two signals from the power divider are quadrature downconverted (to baseband) using an LO derived from the transmitter. The two baseband signals are amplified and filtered, the absolute values are taken, and the two resultant signals are summed. This composite baseband signal goes to a comparator circuit which provides an input signal to the microprocessor.

**Antenna:**

The model MKR S512 scanner can use up to two transmit and two receive antennas.

**Power:**

Antenna port power is less than 28.5 dBm. With an antenna gain of 8.5 dBi, the effective radiated output power is rated at less than 36 dBm (4 Watts).

**Modulated Signal Bandwidth:**

The 20 dB bandwidth of the modulated signal power is less than 1 MHz.

**Frequency Hopping Configuration:**

There are 75 hopping channels with center frequencies located at 1 MHz intervals starting at 2401 MHz and continuing to 2475 MHz. The hopping dwell time is 300msec. The frequencies - numbered 1 through 75 - are chosen pseudorandomly. The frequency number is modulo 75 of the contents of a 7 bit maximum length feedback shift register.

**Equal use of all channels §15.247 (a)(1):**

The linear feedback shift register (counter) operates continuously as soon as AC power is switched on. However, power is not applied to the final amplifier (to begin transmitting) until a command is received by the scanner from the operator via the host computer. The starting frequency (time) at which the transmit command occurs will generally be uniformly distributed across the 75 channels. The shift register (counter) continues to operate which should guarantee a uniform distribution of restart frequencies.