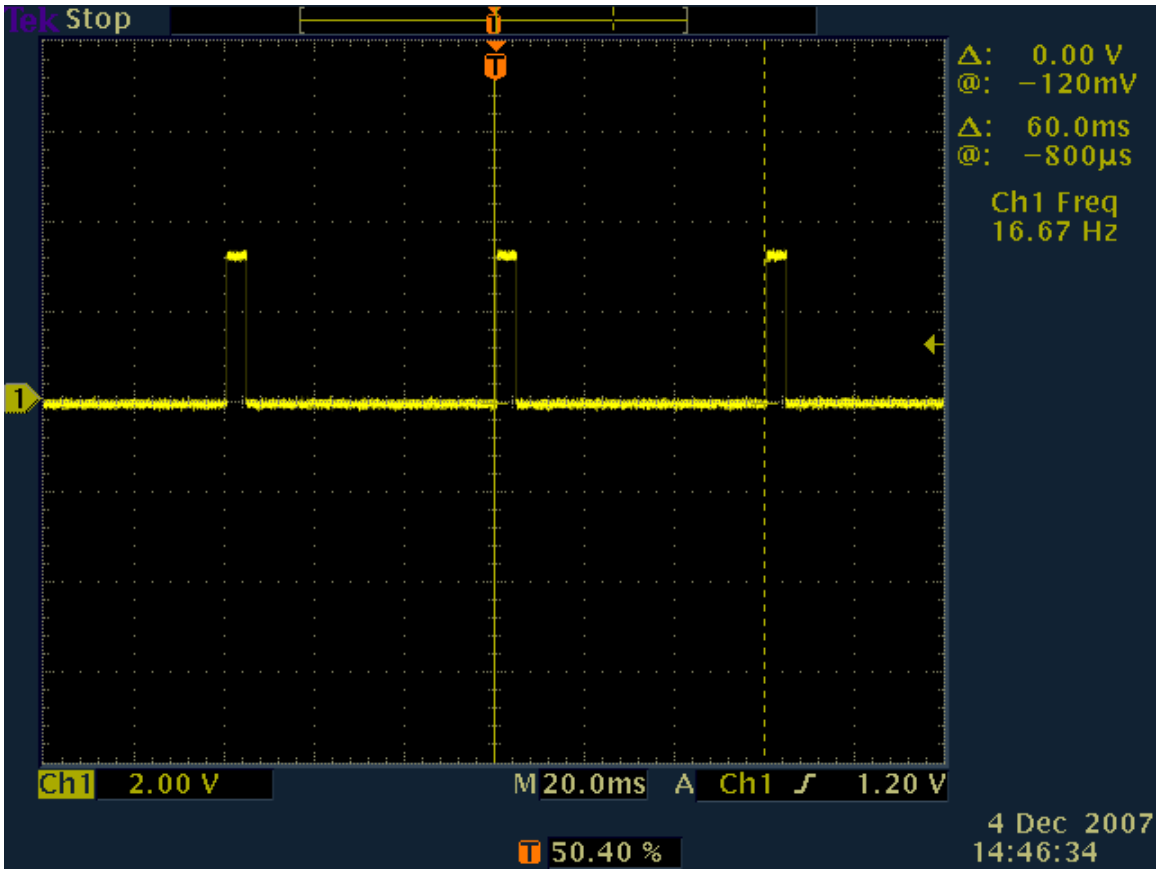
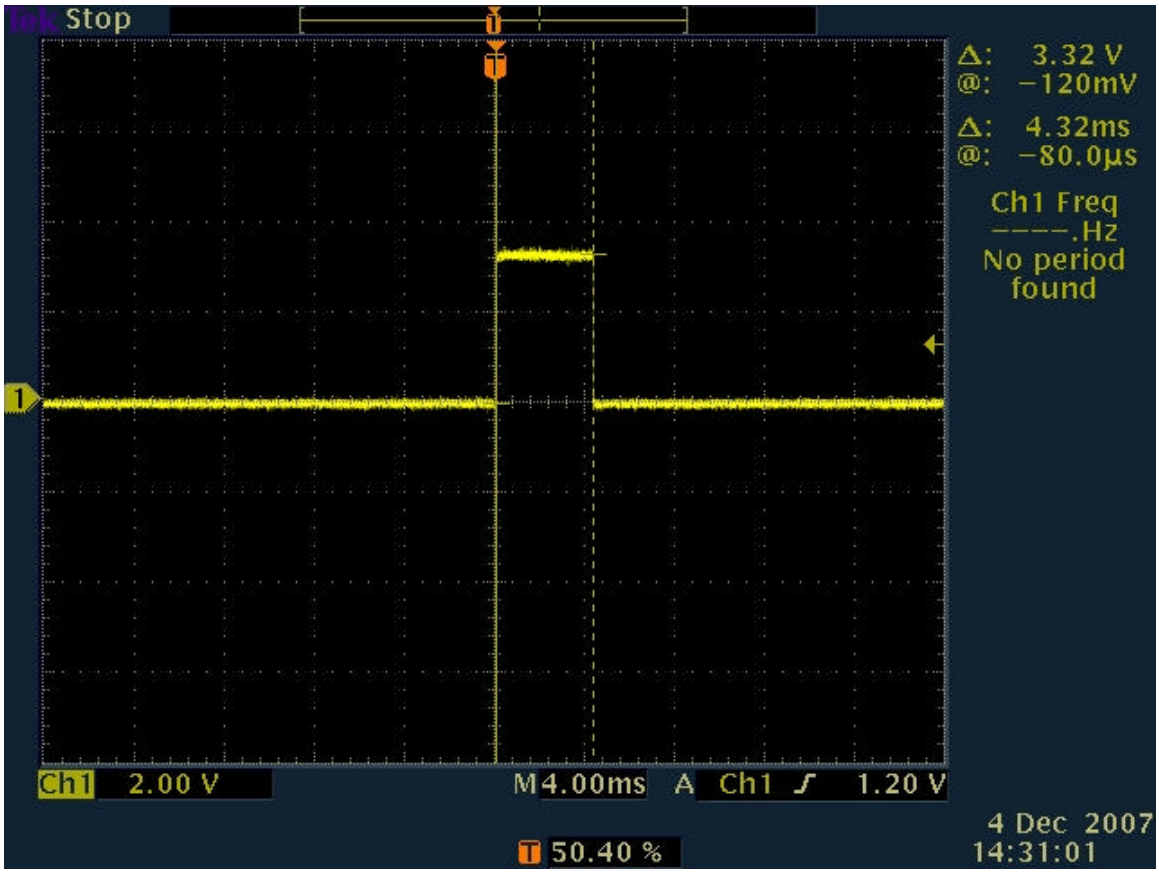
A.

The following screen shot shows the master device transmitting every 60 milliseconds. Software in the master device uses a timer to determine when a message can be transmitted to a slave device. The pulses shown below were taken from an output that is turned on at the beginning of transmission and turned off when the transmission ends. Each pulse corresponds to a different frequency based on a hopping table.



The following screen shot shows the duration the transmitter is active. This time is approximately 4.3 milliseconds. After the master device transmits a message, it waits for a response from a slave device. Each message contains an address to identify which slave device should respond. Each message also contains a 16-bit CRC to ensure corrupt data will not cause more than one slave to reply.



The following screen shot shows the master on channel 1 and the slave responding on channel 2. The transmit duration of both the master and slave combined is approximately 9 milliseconds. Thus, during a 60 millisecond period, transmission on a single frequency occupies about 9 milliseconds. Since there are 127 channels in the hopping table, the duration on a given frequency can be determined within a 20 second period.

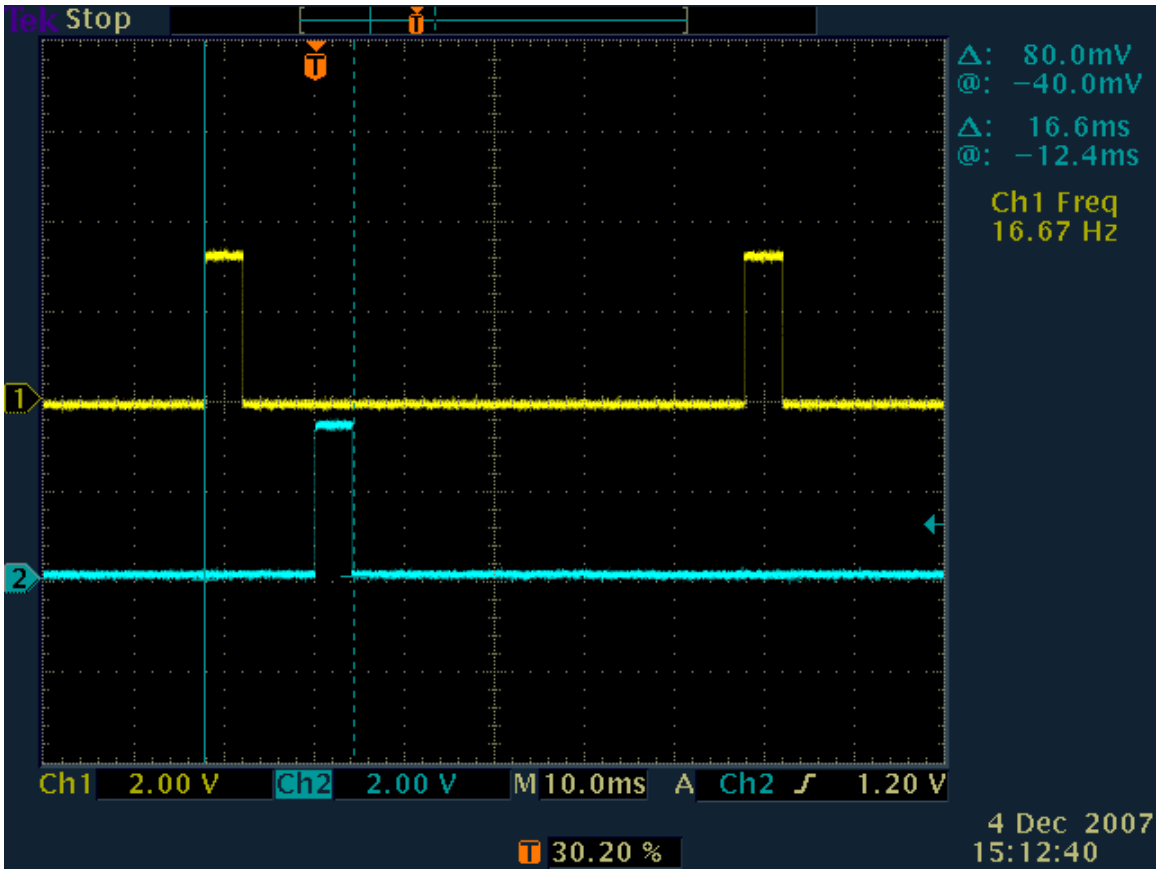
127 x 0.06 seconds = 7.62 seconds time to traverse all channels

In a 20 second period each channel is used 2.625 times on average

20 secs / 7.62 secs = 2.625

Total duration on any given channels during a 20 second period is:

9 milliseconds x 2.625 = 23.62 milliseconds in a 20 second period



B.

The hopping frequency table is generated using a pseudo-random number sequence with values ranging from 1 through 127. These 127 values define unique channels which are used for communicating between the master and slave devices. The master device sequences through the table using a pointer which starts at the beginning and resets after the 127 entry has been exceeded. The frequencies corresponding to channels 1 through 127 are 902.199921 MHz through 927.393768 MHz.

Hopping time is controlled by the master device which uses an embedded controller with an internal clock. The clock is used to increment a timer. The resolution on the timer is 1 millisecond. When the timer reaches 60 milliseconds, the master device and slave devices increment their pointers into the hopping table and reconfigure their radios for the next channel.

The slave device synchronizes to the master device by listening on one of the frequencies within the hopping table. The slave continues to monitor the frequency until a valid message is received or a 3 second timeout has occurred. If no message is received after 3 seconds, the slave device switches to the next channel in the frequency hopping table and repeats the process. If a valid message is received, the slave device synchronizes its timer. It calculates the

time the message started based on the number of bytes received to determine the start of the 60 millisecond period. It then sets its timer accordingly. Approximately 5 milliseconds before, the 60 millisecond timer expires; it reconfigures the radio receiver for the next channel in the hopping table. The receiver remains synchronized by switching frequencies every 60 milliseconds and recalculating the point in time when the master device sent the first byte in the message. If a message is missed, the slave continues to hop to the next channel every 60 milliseconds. If no valid message is received after 10 seconds, the slave device restarts the synchronization process described above.

The master and slave devices are configured with an identification byte which is used by the software to determine which hopping table will be used. This scheme allows multiple networks of master and slave devices to be used in close proximity.

C.

Description of how 15.247g) and 15.247h) are met:

Before transmitting, the master device listens on the channel and reads the Receive Signal Strength Indicator register in the Chipcon CC1100, to determine if the channel is occupied. If a signal is detected, the transmission is not performed. The software then waits for 60ms until the timer expires. It then changes to the next channel in the hopping table. The master device listens on the new channel and reads the Receive Signal Strength Indicator to determine if the new channel is occupied. It only transmits when it finds a clear channel. If a continuous data stream existed on a given channel, that channel would thus not be used.