CEL California Eastern Laboratories

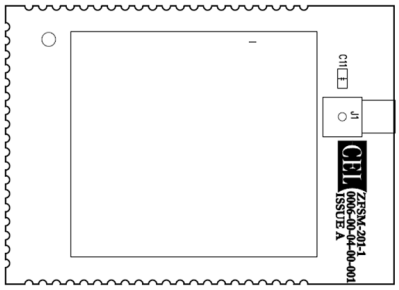
4590 Patrick Henry Drive
Santa Clara, CA 95054-1817
Telephone: (408) 919-2500
Facsimile: (408) 988-0279

# Permissive Change Description

Date: June 4, 2012

CEL is seeking a Class II Permissive change to their ZFSM-201-1 module (FCC ID: W7Z-FSTARPRO, IC ID: 8254A-FSTARPRO) to allow the use of a Nearson Half-Wave dipole Whip antenna (Model S181AH-2405S) with a five inch MMCX to RPSMA connector to be used with the existing module.

The current module is certified with the PCB trace antenna. Upon a successful Permissive Change request, CEL would be allowed to sell the module under the current FCC/IC ID's with the MMCX connector for use with the Nearson whip antenna. The only circuitry change between the existing design and the permissive change request would be the placement of Capacitor C11 & MMCX Connector J1.




FCC/IC Compliance testing of the existing design configured for use with the Nearson Whip antenna has been completed by LS Research and been found to be specification compliant when implemented with power shaping restrictions. The increased antenna gain was compensated for by restricting the power settings to Power setting 4 and taking advantage of the packet transmission rate of the 802.15.4 module. The power setting restrictions will be implemented in the firmware for the specific model using the MMCX connector. The power setting is governed by commands sent through the serial port by the end user. The internal firmware will compare the Power setting received through the UART to the level "4" and if greater will overwrite the level with a value of "4". For any values less than 4, the firmware will allow that setting to be used. Through this method, it is not possible for the end user set power settings greater than the allowed power settings.

The maximum transmission rate occurs when the packets contains the maximum data payload corresponding to the longest time the transmitter is on. The maximum payload is controlled by the internal firmware by setting a limit on an internal buffer at 106 bytes. If an end user attempts to send more than 106 bytes through the UART, the buffer will ignore those bytes greater than the first 106. The maximum transmission rate was demonstrated during testing and is contained in the test report. It shows that the payload of 106 bytes plus header information corresponds to a packet transmission "ON" time of 4.5ms. Also

demonstrated was that the maximum number of packets within 100ms was four packets. Thus the total on time was 18ms in any 100ms time frame. Since the module does not transmit faster than four packets in any 100mS, and the firmware limits the user to 106 bytes of data through the UART, the end user can not increase the transmission rate beyond what was demonstrated.

CEL believes the change qualifies for certification because there were no changes made to any of the RF circuitry or PCB. The only change is the use of an external Whip antenna. Since the Whip antenna has RF characteristics different than the PCB trace antenna, testing was done to determine the power shaping required to maintain spec. compliance as stated above.