

## **Student Competition for Low Power Consumption FM Radio Receiver Design**

A Low Power Consumption RF Radio Receiver Design Competition is open to all students registered at an educational institution. Competitors are required to design, construct, measure, and demonstrate an FM radio receiver with low DC (battery) power consumption driving simple earphones/ear buds. This project will introduce students to low-power wireless technology. The winner will be judged on lowest DC power consumption with acceptable reception through earphones/ear buds of an FM station. A schematic of the radio is required. DC power consumption and novelty of the design will be the leading criteria in selecting the winning FM radio. Testing and judging of the radios will be performed at the 2008 International Microwave Symposium held in Atlanta, Georgia. A member of the design group must be present at the testing to assist with the evaluation.

The winner will receive a prize of \$1000 and will be invited to submit a paper describing his/her project to the IEEE Microwave Magazine. Participants will be recognized at the Student Awards Luncheon at the 2008 International Microwave Symposium. Professors are encouraged to introduce this as a project for their students in order to acquaint them to system and circuit level design.

This competition is sponsored by the Microwave and Millimeter-Wave Integrated Circuits (MTT-6), the Microwave Systems (MTT-16), and Wireless Communications (MTT-20) Technical Committees. Additional information about these committees is found at <http://mtt.org/index.html>.

Please find below the design competition rules. Please e-mail Roger Kaul of your intention to participate with details as found below in the competition rules. We will mail you a set of earphones for your project. We look forward to receiving your entries and evaluating your design at IMS2008. If you need additional information, please do not hesitate to contact us as follows:

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### **Low-Power FM Receiver (LPFMR) Design Competition Rules:**

1. The LPFMR may use any technology, but must be the result of student effort. Use of commercially available receiver subsystems and passive components is allowed.
2. The LPFMR shall allow for internal inspection of the circuitry.
3. The LPFMR shall be capable of receiving stereo FM broadcasts throughout the band 88.1 to 107.9 MHz.
4. The LPFMR shall incorporate an internal or an external antenna provided by the participant.
5. The prime power shall be totally derived from a battery. Supplementing the battery power with other sources such as solar cells, RF rectification, etc. is not allowed. The battery voltage shall not exceed 15 Volts DC. A positive and negative supply cord at least 2 feet in length shall be provided to connect to the calibrated power source to replace the battery at the time of the testing.
6. The stereo audio output signal shall be capable of driving the stereo headphones provided. These headphones use a 1/8-inch stereo phone plug. The nominal impedance of each headphone channel is 33 Ohms. The maximum volume level shall be at least 4 mW to provide adequate volume in each channel. The volume shall be adjustable.
7. The LPFMR's performance shall be measured while receiving an FM stereo signal from a local FM station with a peak audio output power of 4 mW per channel. The performance is based solely on the input power, which shall be computed as the DC supply voltage times the DC supply current.
8. Contestants must notify Roger Kaul by emailing [r.kaul@ieee.org](mailto:r.kaul@ieee.org) of their intention to participate in the contest before April 1, 2008. Participants will be provided a pair of headphones. This notification should include information on the university or educational affiliation of the entry, a statement that the LPFMR is the product of a student(s), and the approximate input power and voltage. All contestants are expected to bring their LPFMR to IMS2008 to be measured at a time TBD. The DC voltage and current measurements will be the official values used for the competition while the

LPFMR delivers 4mW peak per channel to the headphones provided. The decision of the judges shall be final.

9. Award certificates will be presented to all participants at the Student Award Luncheon at IMS2008.