

MTT-3

Microwave photonics



Student Design Competition: An Optical-to-Microwave Converter

IEEE MTT-S Technical Committee MTT-3 (Microwave photonics) is sponsoring a “High power optical to microwave converter” Student Competition at the IEEE International Microwave Symposium IMS2010 to be held at Anaheim, California.

This contest is open to all IEEE MTT-S members who are enrolled as students at a university. The objective of the contest is to demonstrate new and effective photodiode power combining and power extraction techniques for stringent microwave photonics applications. **Proposals are due by March 15, 2010.** Following submission of a proposal describing the potential solution, up to five contestants will be selected and provided pre-defined photodiodes that are provided by Discovery semiconductor. Teams of up to four (4) student members are allowed, provided each team member has a direct contribution to the solution. Contestants are required to demonstrate their design and the optical-to-microwave converter at the IMS2010. The designs will be judged by members of MTT-3 using pre-defined criteria that include converter efficiency, maximum power output, and linearity.

Two winners (or teams) will be selected with a first prize of USD700 and a second prize of USD300. The prizes shall be equally divided between all members of a winning team. In addition, the winners are required to submit an article to the IEEE Microwave magazine. Further details and a call for this competition can be found on the IMS2010 Website.

Specifications and Requirements:

| | |
|-----------------------------|--------------------------|
| Center frequency | 1 to 3 GHz (select one) |
| Relative bandwidth | >10% of center frequency |
| Peak RF power output | >20dBm |
| Output IP3 | >35dBm |
| Power efficiency | >5% |

The converter must be securely mounted in a customer designed package. It should have an optical FC/APC connector for optical input, an SMA connector for RF output, and up to three banana plugs for DC power supply voltage input. The contestants should choose the most suitable DC power supply voltages. But the maximum/minimum DC voltage is limited to +/- 10 volts. The converter will be evaluated based on the performance between the optical FC/APC connector input and the SMA RF connector output. The MTT-3 committee will use an optical source with a modulation index up to 100% and an optical power up to 100mW for evaluating the design. Datasheets of the package will be provided upon an email to yli2@umassd.edu.

Evaluation Criteria

1. Has the converter met specifications? Yes=25%; No =0 %
2. Passband Peak RF output power (25%)

The Peak RF output power is defined as the maximum RF output power while varying the power of the optical input (with a 100% modulation index). The worst case peak RF power in passband will be recorded for comparison. For example, if the passband RF power varies between 21 to 25dBm, the worst case power (21dBm) will be used for comparison between submitted designs.

3. Passband output IP3 (25%)

The output IP3 is defined as the output IP3 point when varying the optical modulation index for a given optical input power. The contestant should specify the desired optical input power. The worst case OIP3 in passband will be recorded for comparison. If the OIP3 varies between 35 to 40dBm, the worst case power (35 dBm) will be used for comparison between submitted designs.

4. Power efficiency (25%)

The power efficiency is defined as the ratio between the peak RF power over the sum of the power drawn from the DC power supply and the optical power input.

In the event of a tie, the bandwidth of the converter will be the tie-breaker and the decision of the MTT-3 committee is final and cannot be challenged.

How to participate:

- Email a proposal describing the intended solution to Prof. Yifei Li at yli2@umassd.edu, along with documents verifying IEEE MTT student membership and enrollment at a university as a student or PhD student. Deadline is March 15, 2009. If all requirements are met you will receive a confirmation of participation and the package will be shipped to you.
- Bring your piece of hardware to the International Microwave Symposium in Boston for characterization (including a photo of the circuit inside the package and a schematics of the filter structure). Exact date and location of this evaluation event will be announced later.