

**DL850 ScopeCorder**

**March 2011**

**Yokogawa oscilloscopes and ScopeCorder help  
European Space Agency to test high-power laser diodes  
for space missions**

The European Space Agency (ESA) is using Yokogawa digital oscilloscopes, including the recently launched DL850 ScopeCorder, at its European Space Research and Technology Centre (ESTEC) in Noordwijk, the Netherlands, to carry out key evaluation tests on different high-power laser systems for use on space satellites.

Typical laser system applications in space include precision range measurements, radar-like 'lidar' systems to gather a complete picture of surface terrain or three-dimensional samplings of planetary atmospheres, and laser-based space communications with high bandwidth and minimal electromagnetic interference.



ESTEC is the largest ESA research centre in Europe, and is responsible for developing and managing all types of space missions for scientific exploration, satellite-based navigation and communication, and earth observation purposes. It operates an environmental test centre for spacecraft, with supporting engineering laboratories specialised in systems engineering, components and materials, including an opto-electronics laboratory focusing on the performance verification of active optical instruments, including high-power laser systems and components of solid-state lasers



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The laboratory includes a Class 10,000 (ISO 7) clean room, two fully equipped optoelectronics laboratories designed for the operation of Class 4 laser systems (defined as powerful enough to burn skin, cause permanent eye damage or ignite flammable material), workshop and storage rooms. It has the equipment necessary to measure the optical spectrum, beam profile, power and energy, stability and modulation response, in free space as well as optical fibres.

The Yokogawa test equipment – initially a DL6154 oscilloscope which is currently being supplemented by a DL850 ScopeCorder – is used specifically to complement test set-ups developed for investigating laser-induced contamination or endurance testing on laser diodes used as pump sources for solid-state lasers.

These tests involve the recording of large amounts of data over considerable periods of time: several weeks or even months in some cases.

The key electrical parameters involved in the tests are voltage and current in well-controlled environmental conditions. Moreover, for endurance testing, the instruments need to be able to automatically detect and store very short and intermittent transient events such as current spikes.

In addition, the DL6154 is used to monitor the pulse shape of an injection seeded high power solid state laser used in the context of laser induced contamination and damage experiments. This equipment has proven to be able to successfully detect the intra-pulse modulation at laser output occurring when the seeding mechanism is not effective, and therefore gives reliable and crucial information on the laser behaviour.

The evaluation of the measured parameters and environmental conditions must be correlated with the optical performance of the test specimen: specifically the output power profile.

The ESTEC team selected the Yokogawa equipment as a result of previous experience with other Yokogawa products, and because of the applications knowledge and proactive support provided by Yokogawa engineers.

Another important point was the instruments' ability to observe high-speed physical phenomena and to review historical data over a long period of time, along with their compatibility with NI Labview software for subsequent analysis of the data.

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The ESTEC team are currently in the process of expanding their Yokogawa test set-up with the addition of new voltage, current and temperature modules for the DL850 ScopeCorder.

For further information about Yokogawa oscilloscopes and ScopeCorders, visit [www.tmi.yokogawa.com/ea](http://www.tmi.yokogawa.com/ea)

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