

 News Brief

March 30th, 2020

First Optical Spectrum Analyzer to enable side mode analysis of MWIR lasers

By Rainer Becker,

Business Development Manager for Optical Measurement, Yokogawa Test & Measurement Germany

With the new AQ6377, Yokogawa optical spectrum analyzers portfolio now covers the entire wavelength range between 350 and 5500 nm.

The new AQ6377 optical spectrum analyzer from Yokogawa, which is the first OSA to allow side mode analysis of MWIR (medium wave infrared) lasers, is set to open new markets in environmental sensing and medical applications.

With regard to environmental sensing, lasers are increasingly being used to detect gases such as CO₂, NO₂ and NO. These lasers achieve detection by identifying the wavelength absorption lines of the different gases present. However, the side modes of the laser, which are normally difficult to detect with an OSA, compromise the ability to distinguish between the various gases.

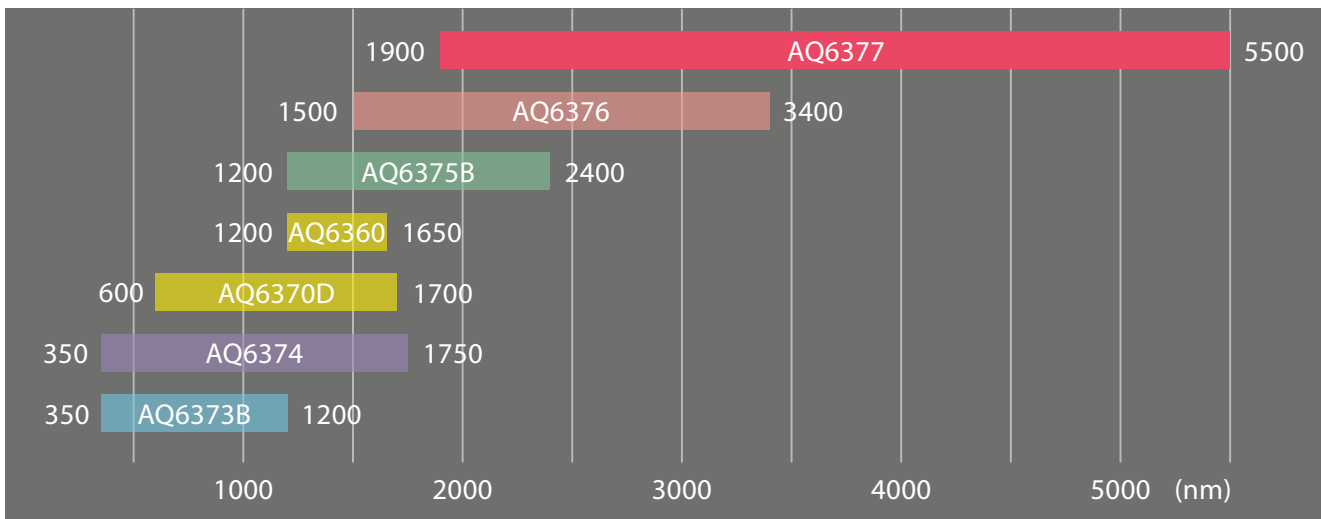
This issue prompted Yokogawa to develop the innovative AQ6377. In the range of 3.5 to 5 μm , the new optical spectrum analyzer is the only one capable of evaluating the wavelength spectrum of lasers, including their side modes, with high accuracy. As a result, manufacturers of gas sensor systems can now characterize lasers more precisely in order to select the best one for each application.

Characterization of sources in laser absorption technology

A good example is the characterization of sources used in laser absorption spectroscopy – a technique that can detect and measure airborne gas concentration in an open or closed environment. The lasers used in absorption spectroscopy require an excellent side mode suppression ratio (SMSR), as this has a direct influence on detection limits. In addition, the lasers deployed should allow wavelength tuning in the specific absorption range of interest.

The SMSR is an important parameter for evaluating the performance of the lasers selected, as it determines the amplitude difference between the main and secondary mode - as well as the noise level - as a measure of background noise. Both values can be measured accurately and quickly using the AQ6377.

Wavelengths covered by each model



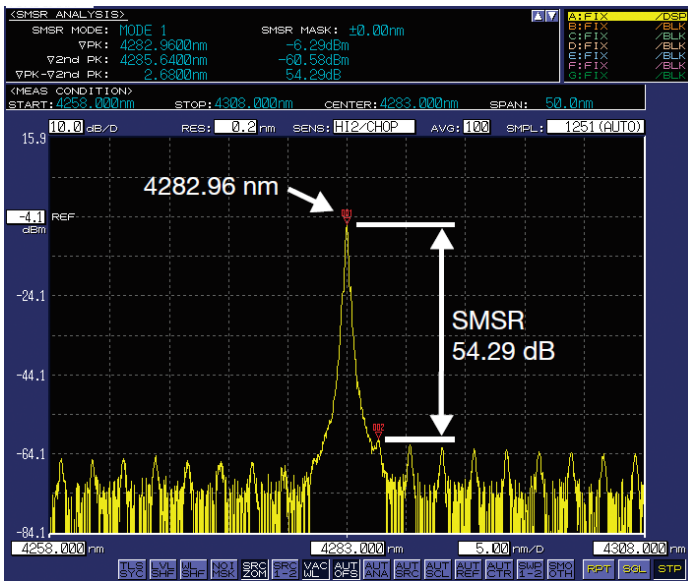
The AQ6370 range of Yokogawa Optical Spectrum Analyzers covers the entire wavelength range between 350 and 5500 nm

And there is good news for medical sector OEMs, too. Take quantum cascade lasers (QCLs), for example, which are being used increasingly for medical spectroscopy diagnostics. QCLs function in a pulsed manner over a very wide wavelength range. The AQ6377 offers the potential to provide stable measurements in this range, and evaluate pulsed QCL signals, even at low repetition rates, which has been difficult until now. The AQ6377 thus facilitates a significant step forward for researchers, allowing them to work at different pulse lengths and repetition rates.



The AQ6377 opens up new possibilities for the development of quantum cascade lasers used in medical spectroscopy diagnostics

Yokogawa's AQ6377 offers a specification that includes a wavelength resolution of 0.2 nm (five settings are available up to 5 nm), a wavelength accuracy of ± 0.5 nm, a high dynamic range of 50 dB and a measurable level range from -60 to +13 dBm. It is the combination of these capabilities that helps users visualize the side modes of MWIR lasers.



*Example of a 4.3 micron DFB laser
(Res: 0.2 nm, chip: 50 nm)*

The wide dynamic range and high sensitivity of the AQ6377 were achieved by reducing the influence of stray light in the monochromator. Furthermore, the built-in calibration light source leverages the natural absorption properties of acetylene gas to deliver a wavelength calibration signal accurate to ± 0.6 pm. This source is also used in conjunction with the automatic optical alignment capability to compensate for any deviations in the optical axis caused by vibration or shock during transit, as well as those resulting from temperature changes. With this capability, the AQ6377 maintains its high optical performance on site.

Regarding the optical free-beam input, this functionality enables the connection of single-mode MWIR fibers and multi-mode fibers (up to 400 μm) to the same instrument, delivering a low and stable insertion loss. As a result, the repeatability of measurement increases. The absence of physical contact also eliminates any possibility of damage when fibers are connected.

Another important feature of Yokogawa's latest optical spectrum analyzer is 'purging' via dedicated input/output ports. In the MWIR region, spectral measurements can be strongly influenced by the absorption of water vapor and carbon dioxide. The purging function significantly reduces the influence of these gases by continuously supplying a pure purge gas (such as nitrogen) to the monochromator via dedicated connectors on the back panel.

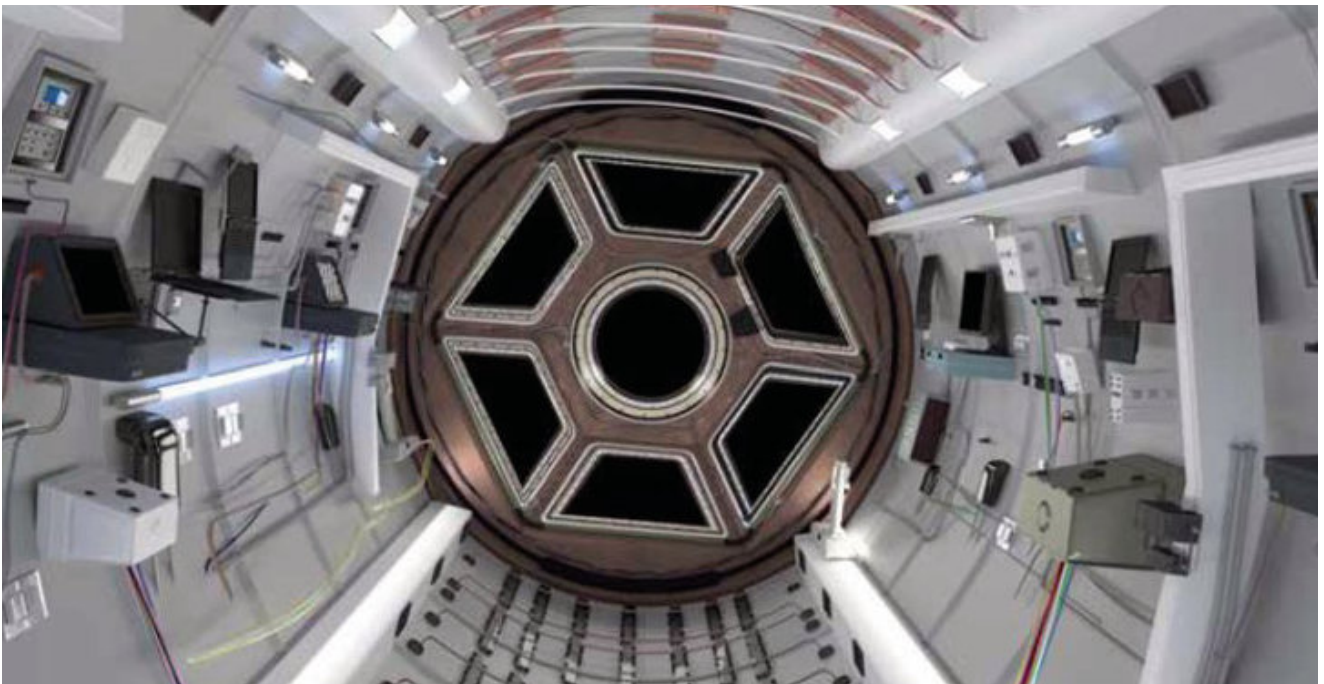
Characterization of supercontinuum light sources

Among further applications for the new AQ6377 is the characterization of supercontinuum light sources. Supercontinuum light is created using non-linear effects in special crystalline materials by means of intense light pulses from femtosecond lasers.

Today, these light sources have a wide range of uses, such as in optical coherence tomography, frequency metrology, optical communication, gas sensors and many more. Based on its performance data, the AQ6377 is the ideal optical spectrum analyzer for testing and characterizing supercontinuum light sources as part of quality control procedures during production.

Characterization of fiber Bragg gratings

The characterization of fiber Bragg gratings can also be performed using the AQ6377. A fiber Bragg grating (FBG) is a type of distributed Bragg reflector constructed in a short segment of optical fiber that reflects particular wavelengths of light and reflects all others. When used as inline optical interference filters in light waveguides, wavelengths within the filter bandwidth are transmitted. This effect can be achieved by generating a periodic change in the refractive index of the fiber core, thus acting like a dielectric mirror in relation to the relevant wavelength.



Sensitive components in space technology can also be tested with the new AQ6377 spectrum analyzer

The primary application of FBGs can be found in optical communication systems, where they are used as notch filters. However, FBGs also have uses in optical multiplexers and demultiplexers (together with an optical circulator or optical add-drop multiplexer), as well as for stabilizing the wavelength of fiber lasers. In addition, when tuned to a wavelength range of 2-3 μm , FBGs can be used as direct sensor elements for elongation and temperature in instrumentation applications such as seismology, or in pressure sensors designed for extremely harsh environments. Put simply, the high wavelength resolution and very high dynamic range of the AQ6377 are indispensable for the characterization of FBGs.

With the development of the high-performance AQ6377 optical spectrum analyzer, Yokogawa is meeting the needs of customers that develop solutions such as optical gas sensors and surgical devices, particularly those demanding optimum performance, ease of use and low maintenance.

Über Yokogawa Test & Messtechnik

Yokogawa entwickelt seit 100 Jahren Messlösungen und stellt den Forschungs- und Entwicklungsteams seit dieser Zeit stets geeignete Werkzeuge für ihre Test- und Mess-Herausforderungen zur Verfügung. Das Unternehmen gehört zu den Pionieren im Bereich der genauen Leistungsmessung und ist heute Marktführer bei digitalen Leistungsanalysatoren. In 2002 wurde Yokogawa durch den Erwerb der Ando Electric, zum führenden Anbieter von optischer Test- und Messtechnik. Heute, mit mehr als 30 Jahren Erfahrung in der optischen Messtechnik, bietet Yokogawa ein weites Portfolio an optischen Geräten und ist Marktführer im Bereich Optische Spektrumanalysatoren für den Einsatz in Forschung und Entwicklung.

Die Instrumente von Yokogawa sind bekannt für eine hohe Präzision und eine sehr lange produktive Nutzungsdauer, die weit über die vergleichbarer Geräte hinausgeht. Nach Ansicht von Yokogawa sind präzise und effektive Messungen eine wichtige Voraussetzung für erfolgreiche Innovationen. Das Unternehmen konzentriert daher seine Forschung und Entwicklung auf die Bereitstellung von Werkzeugen, mit denen die Forscher und Ingenieure große und kleine Herausforderungen meistern können.

Yokogawa ist stolz auf seinen Ruf für höchste Qualität, sowohl bei den Produkten als auch bei Kundenservice und Beratung. Oft werden neue Funktionen auf Grund spezieller Kundenanforderungen hinzugefügt, wodurch sich Messstrategien selbst für anspruchsvollste Aufgaben realisieren lassen.

Da das Unternehmen an seinem europäischen Hauptsitz in den Niederlanden ein eigenes nach ISO17025 akkreditiertes Kalibrierlabor mit entsprechenden Standards unterhält, kann Yokogawa eine garantierte Genauigkeit und Präzision für seine Instrumente auf höchstem Niveau gewährleisten. Dieses Labor kann weltweit als einzige industrielle Einrichtung (d.h. nicht-staatliche oder nationale), eine akkreditierte, rückführbare Leistungskalibrierung von Leistungsmessgeräten für Frequenzen bis zu 100 kHz anbieten. Die ISO17025 Akkreditierung zeigt die herausragende, internationale Kompetenz des Labors.

Meet the precision makers at <http://tmi.yokogawa.com/eu/>

Über Yokogawa

Yokogawa wurde 1915 gegründet und beschäftigt sich mit weitreichenden Aktivitäten in den Bereichen Messung, Automatisierung und Information. Das Geschäftsfeld Industrieautomatisierung bietet wichtige Produkte, Dienstleistungen und Lösungen für eine Vielzahl von Prozessindustrien, in den Bereichen Öl, Chemie, Erdgas, Energie, Eisen und Stahl sowie Zellstoff und Papier. Mit dem innovativen Geschäftsfeld Life Sciences will das Unternehmen die Produktivität in der gesamten Wertschöpfungs-kette der Pharma- und Lebensmittelindustrie primär verbessern. Die Geschäftsbereiche Test- und Messtechnik-, Aviation- und Andere liefern weiter wichtige Instrumente und Messgeräte mit branchenführender Präzision und Zuverlässigkeit. Yokogawa kooperiert mit seinen Kunden über ein globales Netzwerk von 113 Unternehmen in 60 Ländern und erwirtschaftete im Geschäftsjahr 2018 einen Umsatz von 3,6 Milliarden US-Dollar.

Für weitere Informationen, besuchen Sie bitte
www.yokogawa.com.

Für weitere Informationen kontaktieren Sie bitte:

Kelvin Hagebeuk
Marketing Manager
European Test & Measurement
Yokogawa Europe BV
Euroweg 2
3825 HD Amersfoort
The Netherlands

Tel.: +31 (0) 88 464 1803
Email: kelvin.hagebeuk@nl.yokogawa.com
<http://tmi.yokogawa.com/eu/>

nbn Austria GmbH

Riesstraße 146
8010 Graz
Österreich

Tel.: +43 316 40 28 05
e-mail: info@nbn.at
Web: www.nbn.at

Issued by:

Armitage Communications, The Old Forge, Audley End Business Centre, London Road, Wendens Ambo, Saffron Walden, Essex, CB11 4JL, UK.

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Tel: +44 (0) 1799 542858
Email: dave@napierb2b.com