santec

PRODUCT GUIDE 2025

The Photonics Pioneer

Welcome to OPTOPIA

Santec is a leading manufacturer of products for today's fiber optic communications industry. Our mission is to contribute to the creation of an utopian society supported by optical technologies - a true Optopia. We take pride in our innovation and dedication to quality, which we developed from decades of experience in the industry.

Founded in **1979**

1984 Fiber Test System

1987 Benchtop Semiconductor Laser

1989 Benchtop Tunable Laser

1993 Tunable Filter Variable Attenuator

1997 Wavelength Locker

2000 Integrated Photodetector

2002 MEMS Attenuator

2003 System Solutions

2005 High Speed Scanning Laser

2006
High Performance Tunable Laser

2007
OCT System

2015
LC Based Spatial Light Modulator

2016
Advanced Optical Biometer

2017
All New 7th Gen Tunable Laser

2018
UV Hardened Spatial Light Modulator

2019
Tunable VCSEL

2020
3D Optical Profiler

2021
High Performance Tunable Laser
3D Optical Profiler

2022
Wafer Thickness Mapping System

2023
Swept Photonics Analyzer

2024
Laser Lock Pro

Above: Photonics Valley Ohkusa Campus, Japan

The Photonics Pioneer

We have been guided by a commitment to the optical technology that is revolutionizing the way we perceive the world and share information. Founded in 1979, Santec produces innovative products with proven quality and reliability. These products support today's high-speed fiber optic networks and are found in telecommunication systems throughout the world. Innovation has had its rewards and Santec has been first to market with many of its products. These include the world's first optical fiber geometry test system in 1984, an external cavity tunable laser in 1987, linear sliding tunable filters in 1993, multi-channel integrated photo detectors in 2000, an ultra-wideband light source in 2003, a wavelength & bandwidth tunable filter in 2007, and an LCOS based waveprocessor in 2011. We believe society will be advanced by photonics and look to the future by developing original products based on our advanced technologies.

PRODUCT LINE-UP

Optical Components
Santec is renowned for its quality components for CWDM, DWDM and PON applications.

Optical Subsystems
Our complete knowledge of optical component design and technology makes Santec your best partner for custom development of optical subsystems.

Bench Top Tunable Lasers
Santec was the first company to commercialize tunable lasers for telecommunications. Our current range offers leading edge performance for a plethora of applications.

Test Instruments
Santec has over 46 years of experience designing and manufacturing fiber optic test systems. Developed by fiber optic engineers for fiber optic engineers.

Optical Sensing Applications
Santec has been developping OCT components and software for medical and industrial applications. We provide a wide variety of solution for OCT including high speed swept sources and the other components such as fiber probe and balanced detector.

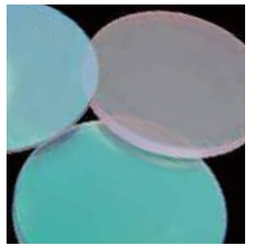
Medical Applications
The ARGOS® Optical Biometer has been designed to maximize the clinician's ease-of-use while delivering superior precision. It delivers the highest success rate and accuracy, even among the densest of cataracts for accurate selection of IOL(Intra Ocular Lens) using SS-OCT.

Software Solutions
A range of business productivity software solutions completes Santec's product range.

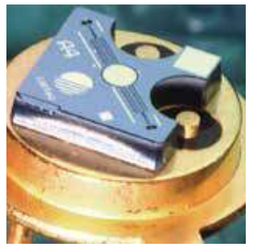
Core Technology

With 45 years of experience in the optics industry Santec has command of the key manufacturing processes to build lasers, instruments and components that meet the stringent demands for excellence by our customers. By committing to innovation as well as listening to our customer requests, Santec has succeeded in introducing solutions for a broad range of new optical applications. Our drive for Optopia has resulted in steps that minimize the timeline for a product to go from conception to commercial applications.

Thin-Film Coating

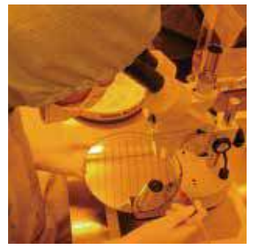


MEMS



Lasers & Instruments

LCOS



Medical Applications

MOVU
a santec company

MOVU is committed to helping clinicians improve Quality of Life with Advanced Optical Imaging. Movu has brought together a team of experts in medical device development, imaging, optical technology, engineering, and medicine. Combining these skill sets to deliver best-in-class optical imaging systems to market. We've combined the Swept-Source OCT(SS-OCT) technique with key technologies to produce ARGOS®, an advanced optical biometer that accurately reads biometric information even for the densest of cataracts. The SS-OCT technique delivers improvements in speed and accuracy over traditional OCT techniques such as SD-OCT or TD-OCT. Movu designed the SS-OCT ARGOS® Biometer to streamline biometry for the clinician. Enhanced ease-of-use and precision yield an accurate picture of the eye with minimal patient discomfort. A near infrared swept laser is scanned across the patient's eye and detects the returned light from boundary layers, accurately reconstructing the eyes' physiology in software.

Quality Products for Fiber Optic Applications

Santec manufactures a full range of passive optical components based on dielectric filter deposition, MEMS and other optical materials. These include interference filter products such as add/drop multiplexers and tunable filters, a range of variable attenuators, optical switches, and power monitoring devices, all specifically designed for WDM systems.
Santec's bench top tunable lasers are noted for their high optical output power, excellent wavelength and power stability, and competitive price. The tunable laser line includes laser products for the complete characterization, test, and manufacture of optical fibers, and optical components.
A full line of test and measurement equipment completes Santec's fiber optics product range. Built on Santec's expertise as an optical specialist, the test and measurement group provides the solutions that optical engineers demand, specializing in measurement equipment for the characterization, and manufacturing test of optical fibers and optical components.

ISO Certifications

ISO9001 ISO14001 ISO13485

Company Profile

Developing and manufacturing **tunable lasers**, **optical instruments**, **fiber-optic components** and laser source for **optical coherence tomography**.

IT Solution business in Japan.

Service for customers in **more than 30 countries**, which include most of the world's major telecommunications companies and telecommunications system manufactures.

Corporate Headquarters in Japan and five subsidiaries in the world.

310 employees in the world. (As of March 31, 2024)

Founded on Aug 25, 1979 by **Dr. Masao Sadamura**

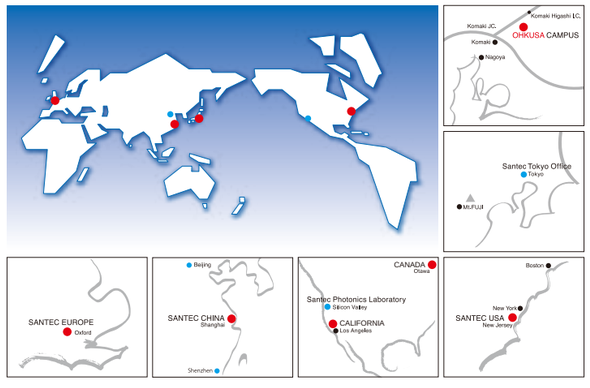
Listed on the Standard market in Tokyo Stock Exchange.

Stock Code:6777

Key Figures

(Consolidated)	FY 2022	FY 2021
Revenue (¥M)	15,246	8,890
Net income (¥M)	3,001	1,647
Capital (¥M)	4,978	4,978

Locations



FACT SHEET

Management

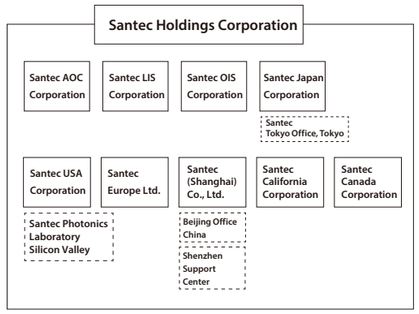
Mototaka Tei
President & CEO

Daikou Tei, Ph.D.
Executive Vice President and CSO

Naoyuki Mekada
Executive Vice President and COO

Changho Chong, Ph.D.
Executive Vice President and CTO

Group Structure



Contacts

Japan
Photonics Valley Ohkusa Campus
5823 Ohkusa-Nenjozaka, Komaki, Aichi
485-0802, Japan
Tel: +81-568-79-3536 Fax: +81-568-79-1718

USA
400 Kelby Street Suite 1501, Fort Lee, NJ 07024, USA
Toll Free: +1-800-726-8321 (santec-1)
Tel: +1-201-488-5505 Fax: +1-201-488-7702

Europe
99 Park Drive, Milton Park, Abingdon
Oxfordshire, OX14 4RY, UK
Tel: +44-20-3176-1550

China
307B, Yuexiu Building, 388 Fushan Road,
Pudong New Area, Shanghai, China 200122
Tel:+86-21-58361261

CANADA
160 Michael Cowpland Dr Kanata, ON K2M 1P6 Canada

CALIFORNIA
4750 Calle Quetzal Camarillo, CA 93012 USA

Tokyo Office (Japan)
Czech Office (Czech)
Beijing Office (China)
Shenzhen Support Center
Santec Photonics Laboratory (Silicon Valley)

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High Performance Tunable Laser

Laser

TSL-775 (Flagship model/ 7th generation)

RoHS Compliant NEW

Santec has brought all the experience and knowledge gained over the past 35 years, to the all-new 7th generation of their High Performance, High Speed TSL series tunable laser. A ground up redesign of the laser resonator and control electronics make the **TSL-775** our fastest tuning, widest scanning, lowest noise and narrowest linewidth laser ever. The TSL-775 is ideal for a wide range of applications: improving throughput, accuracy and precision in production, R&D and basic research. A proprietary resonator design enhances Q value and wavelength stability, opening doors for photonic investigations in the most cutting-edge of research applications.

Touchscreen

Features

- Wide tuning range from 1480-1640 nm
- Mode-hop-free with rapid sweeps up to 200 nm/s
- High output power +13 dBm
- High signal-to-noise ratio 90dB/0.1 nm
- High wavelength accuracy 0.3 pm(typ.)
- Narrow linewidth <60 kHz

Applications

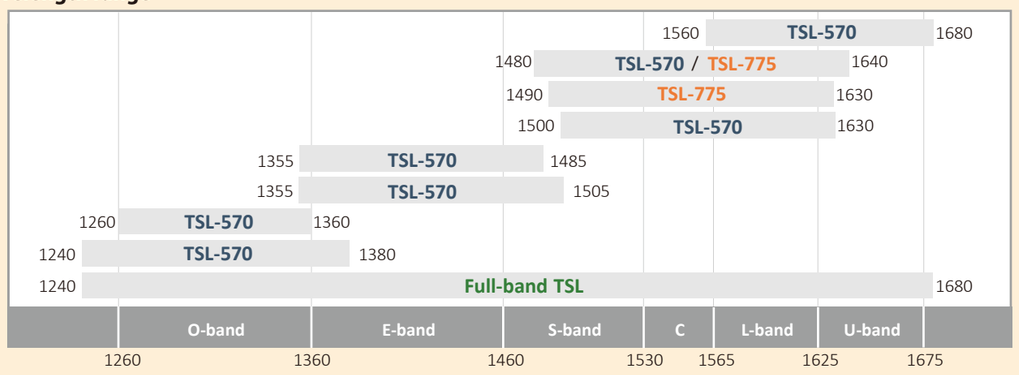
- Optical component & photonics material characterization
- Fiber optic transmission testing (Carrier LD, Local oscillator, etc.)
- Interferometry, Spectroscopy, Metrology (OFDR, Gas sensing, Teraheltz, etc.)

< TSL series performance comparison >

Typical Specifications

Product		Wavelength range (nm)	Sweep speed (nm/s)	Output Power (dBm)	Wavelength accuracy (pm)	Line width (kHz)
TSL-775		1480 - 1640 nm	200	> 13	+/- 1	60
TSL-570	Type A	1240 - 1680 nm	200	> 13	+/- 20	200
	Type C				+/- 5	
	Type P	1240 - 1640 nm			+/- 2	100
	Type H	1260 - 1360 nm 1500 - 1630 nm		> 20		

Wavelength range



TSL-775は、第7世代となる高性能・高速波長可変レーザです。レーザ共振器および制御回路を完全に新設計することで、従来比2倍の高速スキャンが可能となり、かつ狭スペクトル線幅と低ノイズ化を実現しました。本製品は最大160nmの広帯域波長可変が可能で、測定のスループット、精度を向上させることができます。これにより評価現場、R&D、基礎研究など様々なアプリケーションで理想的なツールとなっております。また、光学系の振動対策、制御系のノイズ低減により外部共振器型波長可変光源の特長である非常に高いQ値特性を活かした狭スペクトル線幅と、高周波数安定度の両立を実現したことにより、シリコンフォトニクス等、非常に高い周波数精度を求められる最先端の研究分野でもご利用いただけます。

TSL-570 (High performance model)

RoHS Compliant

Laser

Santec's all-new TSL-570 is a high performance tunable laser with a wide tuning range, high power output and high signal-to-noise ratio. It uses a new optical cavity design with precise speed control up to 200 nm/s and sub-picometer resolution and accuracy.
The TSL-570 is a high specification, full feature instrument suitable for all applications. It has a simple to use touch panel display as well as Ethernet, GPIB and USB interfaces for remote control. A Wake-on-LAN (WoL) feature provides convenience for remote installations. Models are available to cover from 1240 to 1680 nm with output powers up to 20 mW and feature 0.1 pm resolution, sub-pm accuracy and a market leading, 90 dB/0.1 nm, ultra-low level of spontaneous source emission. Santec's new sealed laser cavity is mode-hop-free and provides a stable output at every wavelength.

Touchscreen

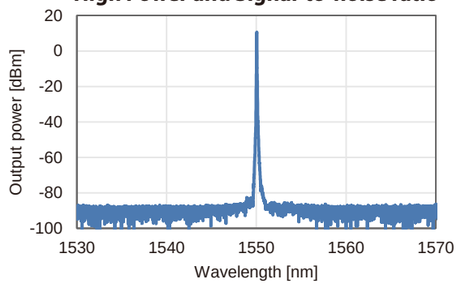
Features

- Fast, up to 200 nm/s, wavelength sweeps
- Wide tuning range lineup: 1240 to 1680 nm
- Wavelength resolution: 0.1 pm
- High Signal-to-Noise Ratio: 90 dB/0.1 nm
- High output power +13 dBm (+20 dBm available, Type H)

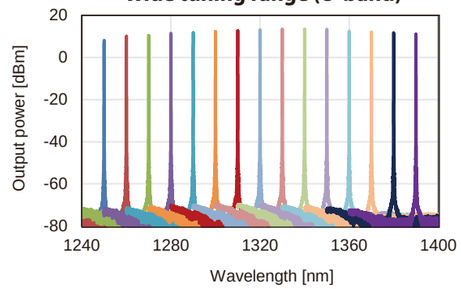
Applications

- Optical component characterization
- Photonic integrated circuit testing
- Quantum photonics
- Optical spectroscopy
- Interferometry

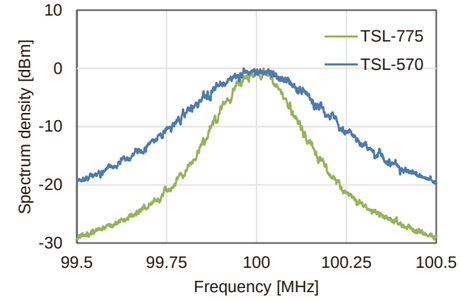
High Power and Signal-to-noise ratio



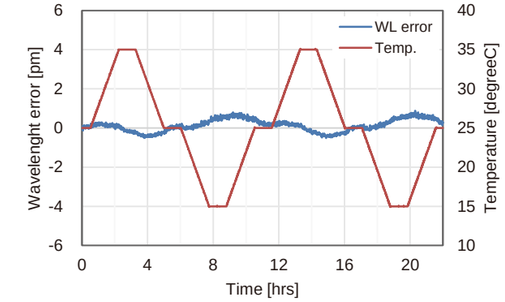
Wide tuning range (O-band)



Line width (Delayed Self-Heterodyne)



Wavelength stability



TSL-570は、高速スキャンと高い安定性の両方を備えた波長可変レーザーです。新しい光共振器設計により最大200nm/sの掃引速度制御とサブピコメートルの分解能と精度を備えています。 さらに、新しい密閉型レーザーキャビティによりモードホップフリーで、すべての波長で安定した出力を提供します。また、使いやすいタッチパネルディスプレイと、リモートコントロール用のイーサネット、GPIB、USBインターフェースを備えており、操作性も向上しています。ゆえに、光通信用光学部品の特性評価、フォトニック集積回路や量子フォトニクス等の研究開発など様々なアプリケーションで理想的なツールとなっております。

Full-band TSL

The Full-band TSL is a full-band, high performance tunable laser system that covers the ultra-wide tuning range of 1240 to 1680nm (O-band to U-band). The system combines up to four Santec's tunable lasers (TSL-570 and TSL-775) with an optical switch module (OSU-110) and control software. The Full-band TSL can be easily controlled via GPIB and USB on PC using the custom GUI.

Features

- Wide wavelength range 1240-1680 nm
- Mode-hop-free wavelength sweeps
- 200 nm/s sweep speed
- Easy and automatic operation by exclusive

Laser

OSU-110

The OSU-110 is an optical switch that covers a wide band of 1240-1680 nm. By combining the OSU-110 and multiple santec TSLs, it is possible to construct a tunable light source system with a ultra-wide band range. The OSU-110 is one of the key parts of test system automation and are ideal for reducing measurement time and improving measurement reproducibility.

Features

- Wide wavelength range 1240-1680 nm
- SMF or PMF
- Fast switching speed

Wavelength Selectable Laser

WSL-110

The WSL-110 is a compact and cost effective tunable laser source for use in WDM systems and optical measurement applications. This laser can be tuned to any wavelength with high, 1 MHz resolution in both C-band or L-band, covering a 38nm tuning range. An internal wavelength locker provides high wavelength accuracy and stability.

Features

- C-band or L-band tuning with high resolution
- Fine tuning available with 1 MHz resolution
- Narrow linewidth <100 kHz
- High output power >+15 dBm
- Integrated wavelength locker
- Single or two ports available

Full-band TSLは、1240-1680nm(O-bandからU-band)の広帯域をカバーする波長可変レーザー光源システムです。最大4台の波長可変レーザーTSL-570と光スイッチOSU-110で構成されており、コストパフォーマンスが高い光源システムとなります。
OSU-110は、1240-1680nmの広帯域をカバーする光スイッチです。波長可変レーザーTSLシリーズと組み合わせることによって広帯域をカバーする波長可変レーザー光源システムFull-band TSLとしてもご利用いただけます。
WSL-110は、1MHzの高分解能で任意の波長が設定可能な波長可変光源です。内部の波長ロッカーにより高波長精度と高波長安定度を実現しています。

Laser Lock Pro

LLP-100

NEW

The Laser Lock Pro (LLP-100) is a laser frequency control add-on designed for use with santec's TSL-570 laser system. It offers precise frequency locking capabilities by processing an electrical error signal derived from an extra frequency reference. Our dedicated PC software enables simulataneous control of the TSL-570 and LLP-100, ensuring optimized frequency lock conditions. In Auto-lock mode, various control sequences can be automated; including lock point search, engagement, monitoring, and relocking. There is also a Trigger Control mode which allows the feedback system to be activated with TTL signals.

Features

- Significant improvement in laser stability
- Advanced simultaneous control using the dedicated software
- Various locking sequences selectable for your application
- Equipped with essential adjustment functions
- Compatible with Santec's TSL-570 lasers

Applications

- Microcavity locking for Silicon photonics
- Absorption spectrum locking for Quantum photonics
- Continuous comb generation using a microcavity on a silicon photonics chip

Polarized Light Source

PLS-100

The PLS-100 is a light source with well defined polarization. It features stable, high output power while maintaining a high polarization extinction ratio (PER) of 45 dB (typ.). Combining the PLS-100 and PEM-340 (Polarization Extinction Ratio Meter) provides an optimized system for PER measurement of polarization maintaining (PM) fiber optic devices in both R&D and production environments.

Features

- Large polarization extinction ratio, up to 45 dB (typ.)
- High output power >0dBm
- Excellent power stability <0.1dB/h
- Wavelength range 1310 ± 20 nm or 1550 ± 20 nm

Stabilized Light Source

SLS-100

The SLS-1xx series of fixed light sources is a highly configurable system with many different options for light sources. There are three different versions of the SLS series. The SLS-100 is a fixed bank of light sources, the SLS-110 is a switched optical source, and the SLS-120 is a fixed bank of light sources dedicated to CWDM DFB laser sources. Each of these systems come in either a half rack or full rack 2U enclosure.

Features

- Up to 24 LEDs or Lasers in one rack
- Factory configurable wavelength mix including various SM and MM source types
- Adjust power levels

LLP-100 は、レーザの発振周波数を安定化するためのレーザサーボコントローラで、波長可変レーザ（TSLシリーズ）の発振周波数を、ユーザ所有の周波数基準器にロックさせることができます。
PLS-100は、 45dBの消光比を維持しながら高出力および高出力安定度を実現した偏光光源です。PEM-340と組合せることにより、PER測定が可能となります。
SLS-100は、最大24個の個別LEDレーザー（1mW）で構成された安定化光源システムです。この安定化光源は様々なオプション（SLSシリーズ）があり、SLS-110はスイッチ光源、SLS-120はDFBレーザーで構成された安定化光源となります。

Swept-Wavelength Component Test System

Swept Test System

The Santec's Swept Test System has been developed to streamline photonic testing, providing a complete solution where high-speed analysis, high resolution and accuracy are key. Combining one of Santec's tunable lasers (TSL-775 or TSL-570) with Santec's optical power meter (MPM-220), a polarization control unit (PCU-110) and custom software, the complete Swept Test System optimizes WDL and PDL measurement for use in both R&D and production environments. By combining multiple TSL units with an optical switch (OSU-110), it is possible to measure an ultra-wide tuning range from 1240 to 1680 nm.
Using real-time referencing, while simultaneously acquiring output power from the tunable laser and the transmitted optical power through the DUT, the system provides high accuracy in WDL and PDL analysis using the Mueller Matrix Method.
Over-sampling and rescaling algorithms are used to maximize testing throughput while maintaining measurement integrity.
The Santec MPM-220 power meter mainframe can be used in conjunction with the 4- channel current meter module, the MPM-213. The Swept Test System combined with the MPM-220 and MPM-213 is suitable for measuring the performance of fiber optics components using transceiver-like photodiodes (ROSA/Coherent receiver, etc.) or optical channel monitors.

Features

- Real-time power referencing
- Rescaling algorithm
- Multi-channel measurement available
- Supporting LabVIEW control software
- Achieving ultra-wide tuning range from 1240 to 1680 nm with a full-band TSL

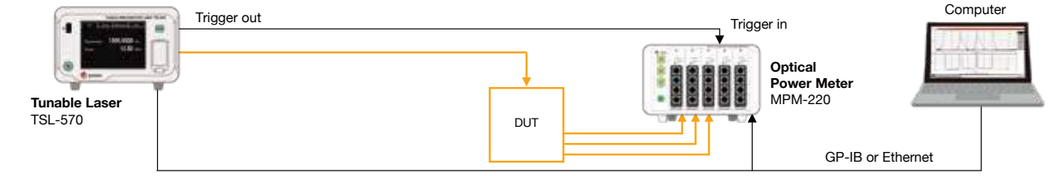
Applications

- Optical components characterization interleavers, Fiber Bragg Gratings(FBGs), WSS, DWDM components
- Photonic material characterization
- Optical spectroscopy

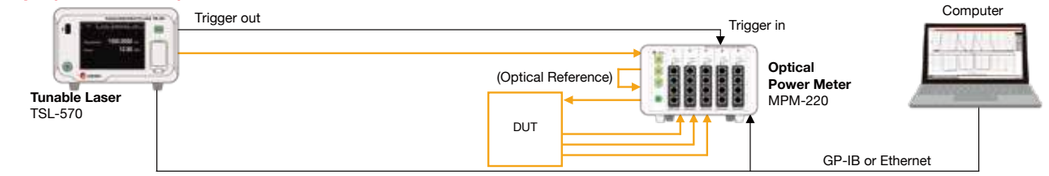
■Typical configuration

IL measurement setup with the power meter MPM-220

Standard setup

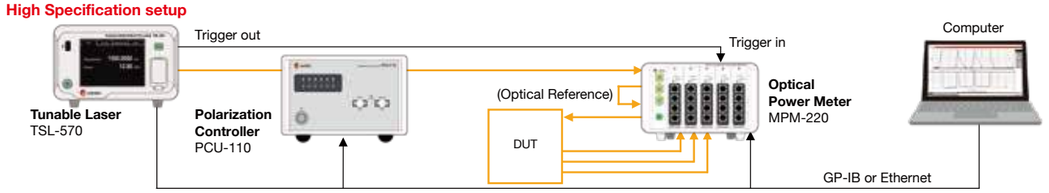


High Specification setup



IL/PDL measurement setup with the polarization controller PCU-110 and the power meter MPM-220

High Specification setup



SantecのSwept Test Systemは高速、高精度および高分解能で光コンポーネントやモジュールのWDL/PDL特性測定が可能で、生産ラインやR&Dなど幅広い分野でご利用いただけます。パワーモニタ出力を搭載したsantec TSLシリーズからの出力パワーモニタとDUTを透過した光パワーを同時に測定してリアルタイムにリファレンスを取得することで高精度にWDL/PDL特性を測定できます。Swept Test Systemはsantec波長可変光源 TSLシリーズ、パワーメータMPM-220、偏波コントローラPCU-110および専用ソフトウェアにて構築されます。PDLはMuller Matrix技術により測定しています。MPM-220とMPM-213を組み合わせたSwept Test SystemはROSA/コヒーレントレシーバーのようなフォトディテクタを内蔵したO/Eデバイス評価にも最適です。

Optical Power Meter

Analysis

NEW	**MPM-220**	(Main Frame)
	MPM-211	(4ch power meter)
	MPM-212	(2ch power meter with analog output)
	MPM-213	(4ch current meter)
	MPM-215	(High dynamic range 4ch power meter)
NEW	**MPM-217**	(4ch power meter with an interchangeable adapter)

MPM-220 (Main frame)

MPM-211/-212/-213/-215 (Modules)

MPM-217 (Modules) and interchangeable adapter

The MPM-220 is a new multi-port optical power meter that is perfect for measuring the optical characteristics of multi-port optical devices. The MPM-220 can simultaneously measure up to 20 ports (4 ports per MPM-211/-215/-217 modules) very fast with high resolution. It features high accuracy, high linearity, and extremely low polarization-dependent sensitivity with power levels from -80 to +10 dBm (-70 to +5 dBm @MPM-215) over a wavelength range of 1250-1680 nm. GPIB and Ethernet interfaces provide a convenient automated measurement solution. The MPM-220 is ideal for IL and PDL measurement of multi-port optical components including Dense Wavelength Division Multiplexing (DWDM), AWG, Wavelength Selective Switches (WSS) and more.
When combined with a santec TSL-Series laser equipped with a power monitor output, the MPM-220 allows the user to complete high precision IL measurements while referencing in real-time. Furthermore, the MPM-220 improves the IL repeatability by providing an optical reference port. The optical reference port provides excellent IL repeatability less than 0.005 dB option.
Seeing as the new MPM-220 multi-port optical power meter is command compatible with the previous MPM-210 model, switching to the new MPM-220 is as simple as swapping out your devices.

Features

- Wavelength Range 1250 - 1680 nm
- Up to 20 ports measurement

Specification Table for Modules

Modules	Category	Port number	Analog out	Power dynamic range	Dynamic range @Fixed gain	Connector
MPM-211	4ch power meter	4	None	-80 to +10 dBm	50dB (typ.)	FC
MPM-212	2ch power meter with analog output	2	2 ports	-80 to +10 dBm	50dB (typ.)	FC, BNC
MPM-213	4ch current meter	4	None	-70 to +10 dBm	40dB (typ.)	BNC
MPM-215	High dynamic range 4ch power meter	4	None	-70 to +5 dBm	70dB (typ.)	FC
MPM-217	4ch power meter	4	None	-80 to +10 dBm	50dB (typ.)	FC, LC, SC, Bare, fiber

Polarization Control Unit

PCU-110

The PCU-110 is PDL measurement with Mueller Matrix method. Command control (polarization control, etc.) that can be used for GPIB and Ether communication is possible.

Features

- Wavelength range 1260-1360 / 1480-1640 nm
- High SOP repeatability
- Power monitor function

MPM-220 は、マルチポート光デバイスの光特性評価のために最適な新しいマルチポート光パワーメータです。MPM-220は1台で最大20ポートまで同時に高速、高分解能にて測定可能です。 GPIB/Ethernetインタフェースを搭載しており、プログラムによる自動化、遠隔操作が可能です。
PCU-110は、6偏波を設定できる偏波コントローラです。Swept Test Systemに組み込むことでMuller MatrixによりPDL測定が可能になります。GPIBやEthernet通信で使用できるコマンド制御(偏波制御等)が可能になっています。

Swept Photonics Analyzer

Analysis

SPA-110

The SPA-110 is the next generation of Santec's swept photonics analyzers. It serves as a convenient optical frequency domain reflectometry (OFDR) add-on module for Santec's tunable lasers. When paired, this complete system can analyze even the most compact and complex optical components, providing detailed results for reflectance, transmission, propagation loss, and distance to events.
The complete system uses Optical Frequency Domain Reflectometry (OFDR) technology to analyze the back reflection and transmission characteristics of fiber optic devices and components in the spatial domain. It generates a trace similar to that of an Optical Time Domain Reflectometer (OTDR) but with significantly higher resolution and precision. With a sampling resolution of 5 µm, the system easily discerns structures within photonic integrated circuits (PICs) and silicon photonic (SiPh) devices.

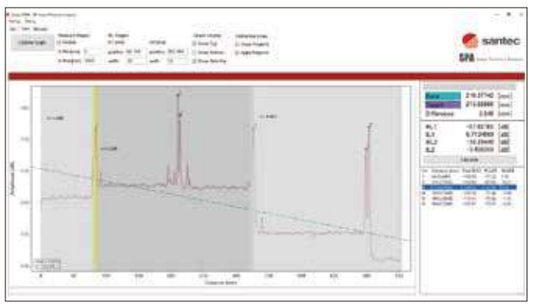
The SPA-110 builds on Santec's SPA-100 technology by extending the total measurement range from 5m to 30 meters. This increased range accommodates the addition of optical signal conditioning devices, such as polarization controllers and optical switches, within the fiber optic setup.
With the wide selection of tunable lasers, the OFDR system is highly configurable to function over the spectrum of importance to the device being measured. The system is offered in an O-band configuration (1260 to 1350nm range) as well as a CL band configuration (1480 to 1640nm range). No need to be limited to a small wavelength range.

Features
- Industry's highest resolution reflectometer (<5 µm)
- Available in O-band and CL-band configurations
- Up to 30 m measurement range
- Wide dynamic range (>80 dB) for WDL measurement
- Proximity Sensing for Fiber to SiPh Alignment
- Feedthrough port (Power monitor port) for active alignment
- Easy analysis software
- Configurable based on Santec TSL (TSL-570/-770/-550/-710/-775)

Applications
- Analysis of silicon photonic waveguides
- Automated SiPh wafer alignment
- Optical component reflectance and analysis
- Wavelength dependent component characterization
- Fiber optic connector and cable assembly mating analysis
- High resolution reflectance analysis and length measurement (5 µm)

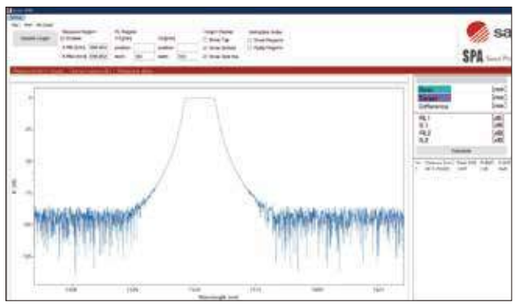
Specify Multiple Refractive Indexes for a Trace

User can specify multiple indexes of refraction within a single trace when analyzing signals that may pass through different mediums, i.e. from fiber to air to silicon



Wavelength Dependent Loss Measurement

Measure transmission wavelength dependent loss across the full TSL range with over 80 dB of dynamic range with no gain switching. Single sweep and saves time.



SPA-110は、santec波長可変レーザ（TSLシリーズ）の便利なアドオンモジュールであり、TSLと組み合わせたシステムは、OFDR（Optical Frequency domain Reflectometry）技術により、光デバイスの後方反射、および、透過特性を空間領域で分析できます。このシステムは5µmの高サンプリング分解ののため、フォトニック集積回路（PIC）、および、シリコンフォトニクス（SiPh）デバイス内の構造を簡単に識別できます。

Polarization Extinction Ratio Meter

Polarization

PEM-400

Preliminary

Current PER instruments are all single fiber solutions. For multifiber testing, a manual stage (often not included) is required. Therefore, testing a 12 fiber device can take up to 10 minutes (real customer feedback). The PEM-400 is an automated PER measurement solution which can measure all fibers of a connector (such as MPO) or fiber array without any manual intervention. A 12 fiber device can be measured in under 30 seconds, a 20x speed improvement on existing solutions! In addition, the PEM-400 can measure the angle of polarization as well as the insertion loss or output power for passive or active components, respectively. As CPOs and FAUs enter high volume production, only the PEM-400 can alleviate the PER and angle measurement bottleneck to meet growing market needs.

Features
- A wide 3mm acceptance diameter is available all fibers without manual intervention.

Applications
- 12F MPOs (250um spacing) or up to 24F FAs (127um spacing) available

Polarization Extinction Ratio Meter

PEM-340

The PEM-340 polarization extinction ratio (PER) meter enables rapid and accurate polarization axis alignment of optical components to a PMF (Polarization Maintaining Fiber). The PEM-340 incorporates a powerful GPIB interface enabling full system integration and production line automation. In addition, to facilitate automatic alignment of diode lasers to optical fibers, an analog power monitor with 1 kHz response time is available. With this addition, both translational and rotational fiber alignment can be controlled automatically.

Features
- Full band 1260 to 1630 nm
- Simultaneous display of extinction ratio, optical power, and polarization angle 50 dB dynamic range for PER measurement

Polarization Dependent Loss Meter

PLM-100

The PLM Polarization Dependent Loss Meter builds upon the BRM's stable and proven technology and takes it to the next level. Improved source isolation, electronics, optics, and continuous laser power referencing enhance the performance to allow for the most repeatable and stable measurements.
The base model is capable of PDL, IL, and average IL measurements with a resolution of 0.001 dB and an unmatched PDL accuracy of up to ± (0.005 + 2% of PDL).
The backreflection option allows BR measurements from 0 to -75 dB with an accuracy of ±0.4 dB.

Features
- Ultra stable and accurate PDL, BR & IL measurements
- Up to 4 internal lasers/external inputs
- 4 or 6 states Mueller Matrix methods
- Resolution down to 0.001 dB
- < 1 second PDL measurements

PEM-400 は、アライメントすることなくMPOなどの多芯コネクタを含む、あらゆるファイバを測定できる自動PER測定ソリューションです。
PEM-340は、 1260nm～1630nmのフルバンドをカバーした偏光消光比モニタです。ノーマルパワー仕様は+10～-40dBm、ハイパワー仕様は+20～-20dBmの光入力に対して測定が可能です。偏光消光比・偏光角度・入力光強度を同時に測定し、結果をディジタル信号とアナログ電圧信号で得ることができます。
PLM-100は、バックリフレクションメータ(BRM-100)で実証された技術を基盤に最適化され、再現性が高く安定した測定を実現した偏波依存損失測定器です。

Expandable Chassis System

XCS-100

Revolutionize your hardware configurations with the XCS Expandable Chassis System, a cutting-edge solution designed to adapt seamlessly to the evolving needs of your optical testing environment. Select and combine sources, attenuators, switches, power meters and more.
The innovative chassis modular system allows users to customize, expand, and future-proof their setups with unparalleled flexibility.

Features

- FP, DFB, LED and SLED sources
- Sources, switches and attenuators available in SM, PM and MM
- Ultra-low loss switches (< 0.5 dB) and attenuators (< 1.2 dB)
- 2mm InGaAs and integrating sphere free-space detectors

Chassis Modular

The XCS uses less benchtop space and reduces cost by eliminating expensive and mostly empty mainframes. It features a chassis modular architecture for easy user reconfiguration and customization of the test platform. Available in various form factors, from compact 1U half racks for expansion of existing systems, to full rack sizes (1U, 2U, 3U or 6U) capable of accommodating multiple modules configured during ordering.

With almost endless available configurations, talk to one of our experts to help design the system best suited to your needs.

Light sources or
Variable Attenuators

Optical Power Meters

Optical Switches

Source	Specification		
	FP Laser	DFB	LED
Fiber Type (µm)	9/125	9/125	50/125, 62.5/125 or 105/125
Nominal Wavelengths (nm)	1310 / 1490 / 1550 / 1625	1271 to 1611	850 / 1300
Center Wavelength Accuracy (nm)	< 15	< 3	< 30
Source Bandwidth (nm)	< 10	< 1	> 30
Output Power (typ.) (dBm)	0	0, 10 or 13	-18 @ 850 nm -21 @ 1300 nm

Attenuator	Specification			
	Single-mode			Multimode
Fiber Type (µm)	9/125	Panda PM	HI1060	50/125 or 62.5/125
Wavelength Range (nm)	1200-1700	1200-1700	960-1080	750-1700
Attenuation Range (dB)	60/100		60	60
Insertion Loss (dB)	1.2 / 1.5	1.7 / 2.0	2.5	2.5
Return Loss (dB)	60	55	50	35
PER (dB)	N/A	23	N/A	N/A
Repeatability(dB)	± 0.01			
Absolute Accuracy(dB)	± 0.1			
Maximum Optical Input Power (dBm)	23			
Beam Block (dB)	100			

Switch	Specification			
	Single-mode		Multimode	
Fiber Type	9/125	Panda PM	50/125	62/125
Wavelength Range (nm)	1250-1670		840-1350	
Insertion Loss (dB)	≤0.5	≤1.0	≤0.5	
Backreflection (dB)	≤-60		≤-40	
PER (dB)	N/A	≥23	N/A	
Repeatability(dB)	± 0.005			
Crosstalk (dB)	<-80			
Maximum Input Power (dBm)	23			
Switching Time (ms)	300			

Power Meter	Specification	
	2 mm InGaAs	Integrating sphere (InGaAs)
Wavelength Range (nm)	840 to 1700	
Power Range (dBm)	8 to -80	30 to -50
Uncertainty at Ref Conditions	± 3.7% (840 to 1200 nm) ± 2.7% (1200 to 1650 nm)	
Linearity (dB)	± 0.03 + 20 pW (840 to 1200 nm)	±0.04 + 2 nW (840 to 1200 nm)
	± 0.02 + 5 pW (1200 to 1650 nm)	± 0.04 + 500 pW (1200 to 1650 nm)
Polarization Dependent Responsivity (dB)	0.015	
Averaging Time	50 µs to 1 second	
Analog Output	0 to 2.2 V	
Data Logging	128,000 points per detector	

XCS-100 は、コンパクトな1Uハーフラックに統一されたハードウエア（光源、アッテネータ、スイッチ、およびパワーメータ）を測定用途に合わせて、任意に組み合わせられる革新的なシャーシシステムです。

Top-Flat Tunable Filter

Programmable type

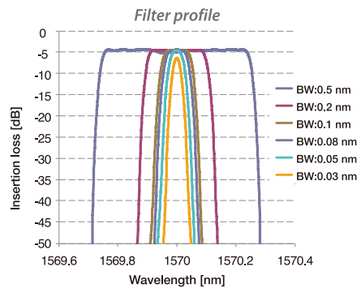
OTF-980

The OTF-980 is a versatile programmable optical tunable filter that provides simultaneous and independent tuning of center wavelength and bandwidth over C & L bands. The OTF-980 is built with novel free-space optics combined with an ultra-fine tuning mechanism to ensure precise filter control and a flat-top passband shape. The fully programmable OTF-980 has automatic adjustment of the filter center wavelength and bandwidth. An integrated power meter monitors power at the output and features an automatic peak search function

Touchscreen

Features

- Center wavelength & bandwidth can be tuned independently
- Flat-top filter shape with steep filter slope:
  Ultrafine-Plus: 0.05-3 nm, 1000 dB/nm
  Ultrafine: 0.08-4 nm, 500 dB/nm
  Standard: 0.1-15 nm, 200 dB/nm
- Wavelength tuning range: 85 nm in C&L-band
  O-band is available upon request.
- Peak search function
- Touchscreen and GPIB/Ethernet/USB interfaces



Manual type

OTF-350

The OTF-350 is a versatile manually optical tunable filter that allows simultaneous and independent tuning of center wavelength and bandwidth over C & L bands. Its unique precision free-space optics and accurate tuning mechanism bring forth excellent optical control and a flat top passband shape of filtered signal.

Features

- Wavelength tuning range: 80 nm
- Wavelength range: 1530-1610 nm (C&L Band)
  O-band is available upon request.
- Bandwidth: 0.2-10.0 nm (Normal type)
- Bandwidth: 0.1-15.0 nm (Wide type)

OTF-980は、波長と透過帯域幅をそれぞれ独立して変えることができるベンチトップ型の可変光フィルタです。回折格子をベースとしたユニークな高精度可変メカニズムにより、フラットトップな透過フィルタスペクトルと優れた光学特性を実現しております。波長と透過帯域幅の設定はタッチスクリーンもしくはGPIB/Ethernet/USBインタフェースより行うことができ、プログラムによる自動化、遠隔操作が可能です。
OTF-350は、波長と透過帯域幅をそれぞれ独立して変えることができる手動型可変光フィルタです。

IL/RL Meters

Optical Return Loss Meter

RLM-100

santec's Return Loss Meter (RLM-100) incorporates 20 years of customer feedback from being industry leaders in the cable assembly testing market. It is the next generation of optical IL/RL meters. Improvements on key hardware components make it twice as fast as other premium testing solutions with the same accuracy.
A new patented calibration method allows you to perform a user self-calibration and measure single-mode RL up to 85 dB with increased accuracy. The RLM 100 is ideal for production and lab environments because of its front panel touchscreen and easy-to-use software.
The redesigned integrating sphere detector can measure RL loss on dense 72-channel MTP/MPO and duplex LC connectors with a single connection. The patented SD Slide Detector Adapters allow for the ultimate in ease-of-use.

Features

- Most accurate RL test in its class
- Self-calibrating optical return loss meter
- Wireless integrating sphere detector
- Ready for production automation
- Barcode control available
- No computer required
- Chassis modular
- XNS ready

Applications

- IL/RL testing of fiber optic cable assemblies
- Single-fiber and multifiber testing
- SM 1310 nm, 1490 nm, 1550 nm, 1625 nm
- MM 850 nm, 1300 nm
- QA and R&D testing

Backreflection Meter

BRM-100

The BRM Backreflection Meter is an instrument developed with extremely stable optics for precise measurement of backreflection, insertion loss, and power. Available with 1, 4, 12, 16, 24, 32, 48, or 72 output channels, the BRM is a practical choice for both single fiber and multifiber testing.
The BRM features up to four built-in sources at wavelengths of 450, 650, 780, 850, 1060, 1300, 1310, 1490, 1550, 1625 or 1650 nm. Custom configurations available upon request. The BRM boasts the best backreflection accuracy in its class (± 0.4 dB) with a measurement sensitivity to -85 dB. Choose the integrating sphere detector option for multifiber assemblies such as MPO or duplex LC. You can use the BRM with our free GMS software for automated testing. The multimode BRM is internally conditioned to meet the IEC 61280-4-1 Encircled Flux standard.

Features

- Stable BR measurements at low values
- Up to 72 output channels
- Up to 4 internal sources
- Custom sources and core sizes possible

Applications

- Testing IL/BR of fiber optic components and assemblies
- Single-fiber and multifiber testing
- Incoming inspection
- QA and R&D testing

RLM-100は、新たに採用された特許補正方法により、ユーザーは自己補正が可能になり、最大85dBの反射減衰量を高精度で測定できるリターンロスメータです。タッチパネルや専用ソフトウェアなど操作性も充実しており、生産工場から研究用途まで幅広く使用いただけます。
BRM-100は、後方反射、挿入損失を正確に測定するために、非常に安定した光学系で構成された反射減衰量測定器です。最大72の出力チャネルで利用可能で、シングルファイバーとマルチファイバーの両方の評価に対応しています。

Insertion Loss Meter

ILM-100

The ILM-100 was designed to measure insertion loss on fiber optic components quickly and accurately. The system has a built-in stabilized laser source for single-mode applications or LED source for multi-mode applications. With a dual wavelength configuration, insertion loss can be measured for two wavelengths in less than 1 second. ILM-100 system comes equipped with both USB and ethernet control for ease of integration into test systems.

Features

- Compact benchtop instrument for all-in-one operation
- USB and Ethernet interface
- Test software OPL-CLX available for logging measurements
- Fully automated single and dual wavelength insertion loss measurements
- Multi-mode instruments available with define launch conditions (EF, AS100, 70/70, etc.)
- Various detector options

Applications

- Cable assembly testing
- Optical alignment
- Signal monitoring

Discontinuity Test System

DTS-100

The Discontinuity Test System, DTS-100, provides a method for testing a broad variety of passive or active fiber optic components for susceptibility to discontinuities (signal dropouts, transient outputs or transmittance fluctuations) during application of an external stimulus such as temperature, vibration or physical shock.
DTS-100 allows you to capture short optical power interruptions and dropouts every 0.8 µs to 1 second. The free and easy to operate software logs all of the events into a spreadsheet for analysis in accordance with EIA/TIA-FOTP-32A.

Features

- Single-mode and multimode
- Input power range of -40 dBm to -2 dBm
- Selectable dropout detection range of 0.8 µs to 1 s
- Selectable loss threshold of 0.5 dB to 3 dB
- Bundled application that records data directly into a spreadsheet
- USB interface for seamless remote control
- Support of most common connector options (FC, ST,SC, etc...)

Applications

- Optical component qualification and validation
- Stress and reliability testing
- Compliance testing such as EIA/TIA-FOTP-32A or similar

ILM-100 は、光コンポーネントの挿入損失を迅速かつ正確に測定する挿入損失測定器です。
DTS-100 は、光ファイバーや光部品に温度や振動などの外部刺激が加わった際の不連続性 (信号ドロップアウト、過渡出力、または、透過率の変動) を評価可能な不連続性評価システムです。0.8 µs～1 秒ごとの短い光パワーの中断やドロップアウトを確認できます。

Optical Switch

OSX-100

The OSX Optical Switch, OSX-100, is a customizable benchtop/rackmount instrument ideal for high-volume manufacturing production testing.Available in single-mode or multimode, channel counts range from 1x2 up to 1x400.
Extra common inputs are possible by adding a 1xN or in 2B or 2C configurations. A variety of other path routing configurations are available upon request.
The switch can be controlled through USB or Ethernet. The front panel bulkheads can be fitted with FC, SC, or LC connector types.

PM fiber available

Features
- Up to 400 outputs
- Ultra low IL < 0.5 dB
- ± 0.005 dB repeatability
- Crosstalk < -80 dB
- Customization available
- Available in SM, MM, PM and custom core sizes

Applications
- High-volume production testing
- Multiple device testing
- Test automation
- Pair with RLM for multifiber testing

OSX-150 NEW

Santec's MEMS Optical Switch, OSX-150, is an optical switch for single mode or multimode applications available in a slim-line and ultra-compact frame. This optical switch is USB powered and incorporates the latest MEMS technology in high-speed switching. With high repeatability and low loss, the OSX-150 is ideally suited for high channel count optical devices such as DWDM, waveguides, and splitters.

Features
- MEMS technology, high reliability, long life
- 2x2 configuration available for bi-directional testing
- High speed USB interface for communication
- USB powered, no external power supply needed

OEM Optical Switch

OSX-100E

The OSX-100E is an off-the-shelf fiber optic switch component that can be easily integrated into virtually any fiber optic routing or switching application. It is readily available in common fiber types (standard single-mode, 50 um or 62.5 um multimode); but can also be ordered with specialty fiber types (step index, large core multimode, small core single-mode).

PM fiber available

OSX-100は、信頼性が高くカスタマイズ可能なベンチトップ型の光スイッチで、研究用途から生産工場用途まで幅広くご利用いただけます。シングルモードまたはマルチモードで利用でき、チャネル数は 1x2 から 1x400までの幅広いラインアップを揃えています。
OSX-150 は、MEMSテクノロジーを採用した光スイッチです。USB電源で動作し、2x2の双方向も対応しています。
OSX-100E は、あらゆる光ファイバルーティング、または、スイッチングアプリケーションに簡単に統合できるOEM用光スイッチです。一般的なファイバタイプ (シングルモードファイバ/50 μm、または、マルチモードファイバ/62.5 μm) に加え、特殊ファイバタイプ (ステップインデックス、ラージコア/マルチモード、スモールコア/シングルモード) にも対応しています。

High Performance Optical Power Meter

OPM-200

The OPM-200 High Performance Optical Power Meter is the latest generation of Santec power meters. The standard 2 mm InGaAs detector can measure power down to -80 dBm over a wide wavelength range from 840 to 1700 nm. Superior accuracy and 50 µs averaging time make the OPM-200 a reliable power meter for almost any application. The detector is free-space and compatible with our patented SD Slide Detector Adapters. Together with the analog output it is ideal for automated optical alignment. Additionally, choose from 1 to 4 detectors and remote-head options for the ultimate, flexible power meter solution.

Features
- Free-space 2 mm InGaAs detector
- FC, SC, LC, MPO and more detector adapters are available
- 840 to 1700 nm wavelength range
- +30 to -80 dBm power range
- 50 µs averaging time
- Touch screen display
- USB or Ethernet
- 30 Day Money back guarantee

Applications
- Optical alignment
- Transceiver testing
- Laser and amplifier characterization
- Transient testing
- Lab and R&D

OPM-160 NEW

The OPM-160 is a multi-channel, high-speed optical power meter. Unlike other solutions, all channels are measured simultaneously. Up to 24 channels of data can be acquired at up to 125,000 readings per second or 8 µs sampling time.

Features
- Simultaneous 125 kHz readings from up to 24 detectors
- Software driven high-speed data capture

Multichannel Optical Power Meter

OPM-150

Santec's OPM-150 Multichannel Optical Power Meter is a cost-effective solution for manufacturers or labs requiring high channel counts. Available with up to 24 individual detectors, the OPM-150 includes simultaneous power measurements on all channels and built-in USB and Ethernet communication.
The OPM-150 is capable of faster than 30 ms sampling time over the USB interface allowing for fast feedback in active optical alignment applications for fiber coupling and silicon photonics. It's simultaneous optical power measurement capability enables users to instantly spot a port failure, making the OPM-150 an ideal instrument for demanding production and lab applications. Software is available for easy automated testing and data export.

Features
- Mix and match different detector types (Si or InGaAs) and sizes (1, 3, 5 or 10 mm)
- Simultaneous readings from up to 24 detectors
- < 30 ms sampling time
- Colour touch screen display
- USB or Ethernet
- Replaces OP760

OPM-200は、広い波長範囲と高いダイナミックレンジを有した光パワーメータです。特許取得済みの SD Slide Detector アダプターと互換性があるだけでなく、フリースペースにも対応しており、幅広い用途で利用していただけます。
OPM-160 は、最大24チャンネル全てを同時に測定できる高速マルチチャンネル光パワー メーターです。最大 24 チャネルのデータを、1 秒あたり最大 125,000 Hz、8 µs のサンプリング時間で取得できます。
OPM-150は、最大24チャンネルを同時に測定できるコストパフォーマンスの高いマルチチャンネル光パワー メータです。USB インターフェイスにより 30 ms の高速サンプリングが可能で、ファイバー結合やシリコンフォトニクスのアクティブな光アライメントなどのアプリケーションに最適です。

Optical Variable Attenuator

OVA-100

Santec's Optical Variable Attenuator, OVA-100, enables precise optical power control featuring high accuracy and superior repeatability. It can be used as a benchtop or rackmount instrument. The OVA-100 is ideal for lab and production applications including power level adjustments in automated test systems, Bit Error Rate Testing (BERT) of transceivers, and channel equalization in WDM systems. The OVA-100 attenuator offers ± 0.01dB repeatability and a dynamic range of up to 100 dB (depending on the model configuration). OVA-100 can be controlled via the front panel touch screen, or remotely via USB and Ethernet. OVA series attenuators operate from 1200-1700 nm for single-mode and 750-1700 nm for multi-mode. A power monitoring PD can be added to read the power output of the instrument. It can be used to auto adjust the attenuation for a constant customized power level.

Features

- Precise optical power
- ± 0.1 dB accuracy
- ± 0.01 dB repeatability
- 100 dB dynamic range
- Available in single-mode 9 µm, Panda PM, HI 1060, Multimode 50 µm and 62.5 µm
- Custom fiber types upon request

Applications

- Manufacturing production testing
- Bit Error Rate Testing (BERT)
- Channel equalization

Optical Backreflector

OVB-100

The OVB Optical Variable Backreflector enables precise backreflection control and superior repeatability. It can be used as a benchtop or rackmount instrument. The OVB is ideal for lab and production applications including transceiver testing, QA testing, laser production and automated test systems. The OVB variable backreflector offers ± 0.02dB repeatability and a range of 60dB in single-mode and 35 dB in multi-mode. The OVB can be controlled via the front panel touch screen, or remotely via USB and Ethernet. The OVB series variable backreflectors operate from 1200-1700 for single-mode and 750-1700 for multi-mode. A 50/50 coupler can be added to bypass the variable backreflector for input signal monitoring.

Features

- ±0.2 dB relative accuracy
- ±0.02 repeatability
- 60 dB range
- Available in single-mode or multi-mode

Applications

- Transceiver testing
- QA testing
- Laser production

OVA-100は、高い精度と再現性を備え正確なパワー制御が可能なベンチトップ型の光可変減衰器です。シングルモードでは 1200 ～ 1700nm、マルチモードでは 750 ～ 1700nm の波長範囲に対応しています。
OVB-100は優れた後方反射制御と再現性（±0.02dB ）を有する光可変後方反射測定器です。その測定範囲は、シングルモードで 60dB、マルチモードで 35dBに対応しており、研究用途から生産用途まで幅広い用途にご利用いただけます。

Polarity Test Meter

PTM-100

The PTM Polarity Test Meter is an easy-to-use instrument specifically designed to check the polarity of multifiber cable assemblies. The PTM is equipped with a touchscreen interface to allow for one touch testing of typical pre-programmed types A, B, C, and unlimited configurable custom profiles. The Visual Fault Locator (VFL) mode enables easy manual identification of any possible damaged or crossed fibers.

Features

- Fast Pass/Fail results
- Touchscreen display and operation
- Up to 288 channels in one box
- Test results stored with XNS IL/RL results or to Excel

Remote-Head Integrating Sphere and Polarity Detector

RD-SP-100

Create the fastest and simplest multifiber cable assembly test station by adding the RD-SP Remote-head Integrating Sphere and Polarity Detector to your RLM Return Loss Meter and OSX Optical Switch. In a single step, you can now test polarity, IL and RL of multifiber assemblies such as MPO and duplex LC.

Features

- Test polarity and IL/RL in a single step
- Fast Pass/Fail results
- Can measure most multifiber connectors
- Reduce reference complexity

Remote-Head Polarity Detector

RD-P-100

Create the ultimate multifiber cable assembly test station by adding the RD-P Remote-head Polarity Detector to your RLM Return Loss Meter and OSX Optical Switch. In a single connection, you can now test IL, RL and polarity of multifiber assemblies such as MPO or duplex LC.
Use with our free Cable Assembly software and have all your IL, RL and polarity results saved together in the XNS database.

Features

- Test polarity then IL/RL without disconnecting your DUT
- Fast Pass/Fail results
- Can measure most multifiber connectors
- Reduce reference complexity
- Test results stored with XNS IL/RL results

PTM-100は、マルチファイバーケーブルアセンブリの極性をチェックするために使いやすさを追求し特別に設計された極性テスタです。タッチスクリーンインターフェイスによりPC を必要としないスタンドアロンとしても動作が可能です。
RD-SP-100は、積分球ディテクタタイプの極性テスタです。RD-P-100と同様に使用いただけます。
RD-P-100 は、デバイスを切断することなく、12本のファイバーをわずか4秒で測定が可能なリモートヘッドタイプの極性テスタです。RD-P-100をRLM (リターンロスメータ) とOSX(光スイッチ)に接続することで、究極のマルチファイバーケーブルアセンブリ評価用ステーションとなります。

Non-contact, Non-destructive and Non-invasive real time imaging

Swept Source - Optical Coherence Tomography system for research, feasibility studies and product development

IVS-1000(1060 nm), -2000(1310 nm)

Santec has been an innovator in SS-OCT since the launch of our first swept source in 2004. We bring a wealth of expertise backed up with a wide selection of hardware and software to address most all applications of SS-OCT, in medical, industrial and scientific fields. A SS-OCT system from Santec can accelerate your product development by helping you image hard to see features, all with customized performance to meet your needs. Santec is the most flexible supplier of complete SS-OCT systems in the world, with a wider range of lasers, software modifications and probe hardware than any other manufacturer.

A recent addition to our SS-OCT system line-up is a long coherence length system for high speed remote surface profiling. We continue to widen our scope of SS-OCT solutions from the latest applications in medical diagnostics through to in-situ industrial non-destructive testing.

Features

- Custom order possible
- Wavelength band : 1060nm, 1310nm
- Axial resolution : 6 µm typ. (High resolution type)
- High speed measurement : max 100,000 line/sec
- Deep imaging depth : >12 mm (Long imaging depth type)
- SDK available for LabVIEW, C# and C++

Applications

- Industrial non-destructive inspection
  - Defect inspection (resin, molded plastic, etc.)
  - Figuration (semiconductor, etc.)
- Thickness monitor
- Height, Depth measurement
- Spectroscopic
- Biology & Medical microscope

OCT System Line up

	Model name and Option		Center wavelength(nm)	Axial resolution(µm)	Max. Imaging depth (mm)	Image acquisition speed (lines/sec)	Scanning Laser Type
For research, feasibility studies and product development	IVS-2000	Standard (ST)	1310	<18	>4	20,000	Polygon scanner
		High Resolution (HR)		<9	>4	20,000	
		Long Imaging depth (LC)		<18	>12	50,000	MEMS
		High Speed (HS)		<18	>10	100,000	
	IVS-1000	Standard (VCSEL)	1060	<16	20 to 150	10,000 to 400,000	Tunable VCSEL

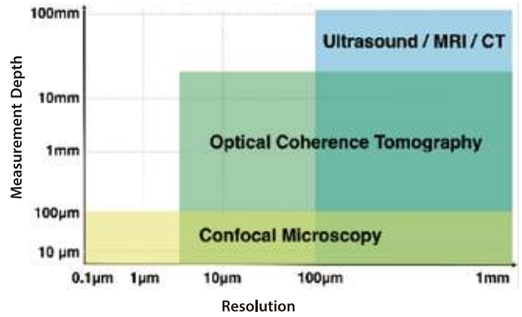
OCT(Optical Coherence Tomography : 光コヒーレンストモグラフィ)システムは、X線CT、MRI、超音波、共焦点顕微鏡に続く最先端断層測定器で、近赤外線の後方散乱光の干渉を利用して内部構造を可視化することができます。Inner Visionは、当社のHSLシリーズ高速スキャニングレーザーを使い、高解像度で鮮明な干渉分析画像をリアルタイムに得ることができます。電子顕微鏡や実体顕微鏡とは異なり、可視光では得られない内部の組織や構造を、生体や試料を採取、破壊することなく分析することができます。また、3次元撮影も可能です。

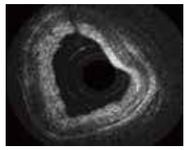
OCT Applications

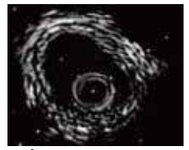
Features of OCT

OCT (Optical Coherence Tomography) is a non-invasive imaging technique that relies on analyzing the frequency components of backscattered light to reveal the internal structure of an object or tissue.
The advantages of OCT are:

- High resolution
- Real-time imaging
- Non-invasive
- Small size, cost

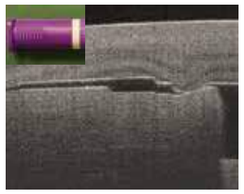


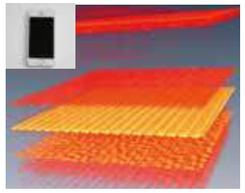

OCT image

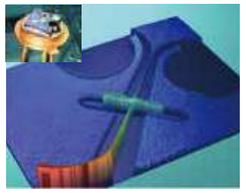

Ultrasonic image

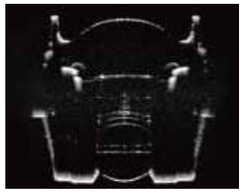
OCT image gallery

■Industrial Inspection


Plastic molded object (pen)

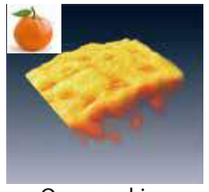

Liquid crystal display


Silicon structure

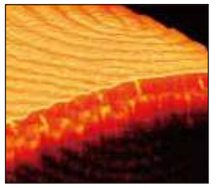

Optical lens

■Biology

Tadpole


Orange skin

■Medical Imaging


Skin

Eye

Wide field 3D-sensing with Tunable VCSEL

A tunable VCSEL, having intrinsically long coherence length, combined with advanced signal processing can benefit attractive applications.
Analogous to SS-OCT, but not just for cross-section imaging, it provides a high-sensitivity 3D profiling capability as well as velocity detection of moving objects in many different industries such as 3D depth sensing, robot machine vision and LIDAR.

IVS-2000は、研究用途、製品化の為の基礎検討などさまざまな分野・応用でご利用いただけるように、光源やプローブをご希望にあわせてお選びいただけるカスタマイズ対応が可能なSS-OCTシステムです。オプションでLabViewを用いたコード開示も出来ますので、お客様ご自信でのカスタマイズも可能です。LabView, C#, C++用のSDKもオプションで提供しております。

Tunable VCSEL OEM Solution

HSL-1

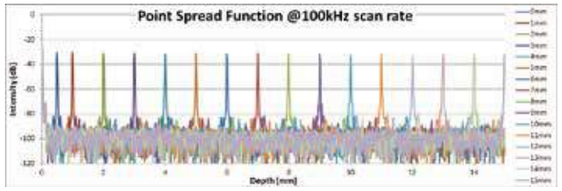
The HSL-1 is based on advanced electrically pumped VCSEL (Vertical Cavity Surface Emitting Laser) technology. An attractive laser for SS-OCT applications the HSL-1 takes advantage of a number of features intrinsic to VCSELs to deliver best-in-class performance, including long coherence length, variable scan speed and low noise. The HSL-1 has been designed with system integration in mind; a compact, efficient package the laser is also robust, reliable and suitable for mass production.

Features

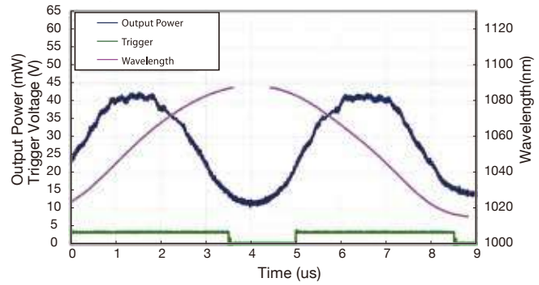
- 1060nm Wavelength Range
- Single Mode Lasing: Ultra Long Coherence Length >100mm
- Flexible Scanning Rate, Tuning Range, and Direction
  - Max. 200kHz scan rate, Wideband tuning range
- Coherence Revival and Mode Competition Noise Free
- Compact and Designed for Reliability
- Integrated k-Trigger

Applications

- OEM source for OCT systems
- Spectroscopy and Optic Sensing
- FMCW LiDAR



HSL-1 Optical Characteristics @200 kHz scan rate



MEMS based HSL OEM Solution

HSL-10 (1060nm wavelength band)

HSL-20 (1310nm wavelength band)

The HSL-20 is Santec's MEMS based swept laser that combines high speed operation with long coherence length in a compact package for the ultimate in integrated sources for SS-OCT imaging. Scan rates up to 100kHz are available from this robust laser that may be configured with start trigger and k-clock depending on system needs.

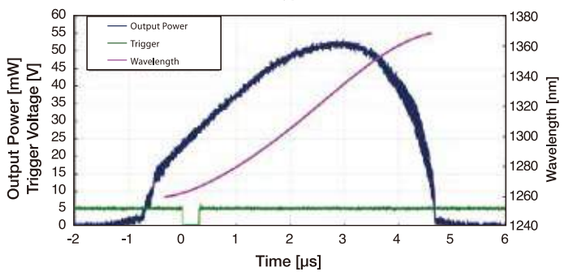
Features

- 1060nm, 1310nm wavelength band
- Unidirectional sweep
- Wide scan range >100nm
- Long coherence length >10mm
- High output power >40mW (at peak)
- k-Trigger integrated
- Compact size (150x226x67mm)

Applications

- OEM source for OCT systems
- Spectroscopy and Optic Sensing

HSL-20 Optical Characteristics
**100KHz standard type*



Santecの光源技術を駆使した高速波長掃引レーザーHSLシリーズ。狭線幅のレーザーが連続的に高速スキャンします。ターンキーひとつで起動し、トリガーも内蔵しているため、シンプルに測定系を構築する事が可能です。RIN（Relative Intensity Noise）が小さいため、OCTで利用した場合に高いS/Nを得ることが出来ます。OCTだけではなく、高速な分光分析用の光源としてもご利用いただけます。HSL-1は面発光レーザーの技術を応用し、シングルモード発振で高速に波長をスキャン。帯域やスキャンレートを可変できます。HSL-20はMEMSフィルタを用いた外部共振器型レーザーで、OEM光源として広く使われております。

Polygon scanner based HSL

HSL-2100 (1310nm wavelength band)

The HSL-2100 is Santec's best selling tried and trusted scanning laser designed for OCT applications. The output wavelength is scanned continuously at high speed using a polygon based filter.
Scan rates of up to 50kHz (high speed model) and tuning range of up to 170nm (wideband model) are available, with linear scan that allows for imaging using a rescaling technique without k-clock. Averaging of A-lines to increase image SNR is made possible by the high-stability of the laser scan.

HSL-200 (1310nm wavelength band) OEM Solution

HSL-200 is the OEM swept source package based on the same technology used in the bench-top lasers, HSL-2100. The HSL-200 packs the same high performance of the bench-top unit into a smaller footprint and adds features such as RS-232C communication for integration into customer systems. Santec will customize HSL-200 laser performance to match imaging requirements.

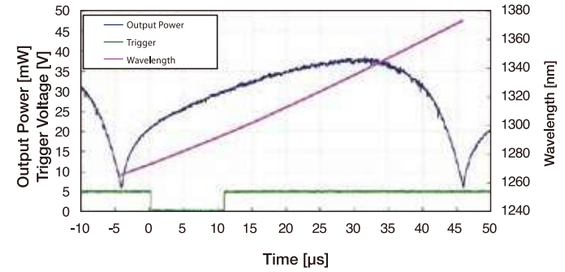
Features

- Max. 50kHz scan rate, >170nm tuning range
- Linear frequency scan. High-linearity option available

Applications

- Research in BioMedical Imaging
- Spectroscopy and Fiber-Optic Sensing
- OEM source for OCT systems(HSL-200)
  (Medical devices and in-line inspection systems)

HSL-200 / HSL-2100 Optical Characteristics
**20KHz standard type*



Type	1060 nm Ophthalmology OCT	1310 nm Conventional OCT	1550 nm Spectroscopic OCT
Tunable VCSEL Flexible scan rate, ultra long coherence length, no coherence revival	fs: 10-200 kHz ⊿λ: 70 nm Lc: >1 m	-	fs: 10-400 kHz ⊿λ: 80 nm Lc: >1 m coming soon
MEMS High speed, long coherence length	fs: 100 kHz ⊿λ: 100 nm Lc: 15 mm	fs: 50, 100 kHz ⊿λ: 100-130 nm Lc: 10-18 mm	-
Polygon scanner Simple rescaling, high accuracy	-	fs: 20-50 kHz ⊿λ: 100-170 nm Lc: 2-5 mm	-

*Lc：Coherence length

HSL-2100はポリゴンスキャナを用いた外部共振器型レーザーで、高繰り返し性、直線性を有しており、容易に波長校正が可能です。特に高精度の計測などで使われております。HSL-200はHSL-2100のOEM版で、コンパクトな設計、外部からのシリアル通信による制御が可能です。

OCT Components

Compact and High-performance SS-OCT Engine

OCT Engine

Santec's OCT Engine is based on our High Speed scanning laser (HSL), OCT-grade Balanced photo detector (BPD-200) and Real-time resampling OCT DAQ card (HAD-5200B-S) for cutting-edge performance in Swept Source Optical Coherence Tomography (SS-OCT) systems. Santec is a pioneer of scanning lasers and SS-OCT. Our SS-OCT is used for many applications in medical and industrial fields. Our OCT team provides great support for your integration and customization with our long experience. Santec's OCT engine and technical support will help your efficient product development and the superior performance of your systems.

Features

- 1060nm and 1310nm wavelength range
- High sensitivity, low noise and real-time imaging
- Easy integration, SDK for LabVIEW & C++/# available
- Optimizied images by real-time resampling & dispersion compensation
- 2 ch analog output (±4V, 16bit) to control

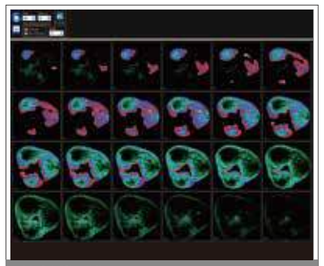
Specifications

Parameter	Unit	Specification			
		HSL-1	HSL-10	HSL-20-50	HSL-20-100
Center Wavelength	nm	1045 - 1075	1040 - 1070	1280 - 1340	1280 - 1340
Axial Resolution (in air)	μm	<15	<18	<18	<18
Imaging Depth Range (in air)	mm	>70 (@10kHZ)	>10	>20	>10
A-line Rate	kHz	10-200 +/- 0.1	100 +/- 0.1	50 +/- 0.1	100 +/- 0.1
Peak Output Power	mW	≥40			
Optical Fiber Type	-	SMF			
OS	-	Windows 11 (64 bit)			
System Bus	-	PCI Express 2.0 (Gen2) 5.0 GT/s x8			

*Please note, these specifications are subject to change. Please contact us for the details.

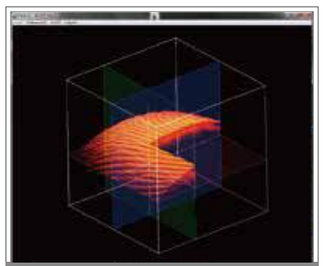
Features of IVS software

- Proprietary rescaling algorithm deployed on our FPGA DAQ board
- Real time imaging up to 30fps
- 1D, 2D and 3D imaging modes
- Storage mode for time elapsed measurement
- Scan angle control
- OCT graph capture, raw data import/export
- Custom settings viewing area
- Thickness, distance analysis software for industrial applications available
- SDK available for LabVIEW, C# and C++



Multi Slice Viewer

IVS Main software



3D OCT Viewer Software

OCTEngineは、高速波長掃引レーザーHSLシリーズ、バランスドフォトディテクタBPD-200、及びリアルタイムサンプリングDAQカードHAD-5200を使用したSS-OCTを実現するための核となるパーツです。

OCT-grade Balanced Detector OEM Solution

BPD-200 DC to 80MHz (Suitable for <30kHz A-Line rate)
BPD-200-HS DC to 200MHz (Suitable for >30kHz A-Line rate)
NEW **BPD-400** DC to 400MHz (Suitable for >100kHz A-Line rate)

BPD-200 isa balanced photo detector that outputs the difference of two detector signals. This can be used for reduction of common mode noise due to laser power fluctuation. In heterodyne detection as in most OCT applications, it provides a 3dB sensitivity advantage when detecting the signal inverted in phase in between two input signals. Furthermore, special design significantly reduced the problem of the undesired image artifacts which was a major problem in other balanced detectors. BPD-200 is the best detector ever made specifically for SS-OCT applications.

Features

- Wide dynamic range (DC to 80MHz, 200MHz or 400MHz)
- High reliability gain and linearity
- Flat balanced level
- Specially designed for artifact-reduction
- Wavelength range (950-1600nm or 1200-2300nm)

Applications

- Swept Source – OCT
- Heterodyne measurement
- OFDR (Optical Frequency Domain Reflectometry)

Integrated Interferometer Module OEM Solution

IFM-200

IFM-200 is an OEM module Mach-Zehnder type interferometer. A wide range of configurations can be realized based upon customer requirements including PS-OCT with added features such as targeting diode laser, and optical delay line. Thirty-five years of optical integration and packaging experience is applied to maintain high quality and high reliability as well as optimizing cost. Custom configuration including other interferometer types (ex. Michelson, Fizeau type) can be designed for OEM solutions.

Features

- Swept Source – OCT
- Heterodyne measurement
- OFDR (Optical Frequency Domain Reflectometry)

Applications

- Interferometer block for OCT systems
- K-clock module for SS-OCT systems
- Interferometer block for In-line inspection systems
- Interferometer block for heterodyne measurement

High Speed Imaging DAQ-Board for HSL OEM Solution

HAD-5200B

Santec offers a high speed imaging Data Acquisition (DAQ) Board compatible with santec's high performance swept laser. Santec's patented rescaling algorithm is encoded into the FPGA for real time OCT processing.

Features

- High speed ADC (12bit/1GSps sampling)
- Customized FPGA for SS-OCT with HSL-Series
- High reliability gain and linearity
- Includes analog output (2ch)

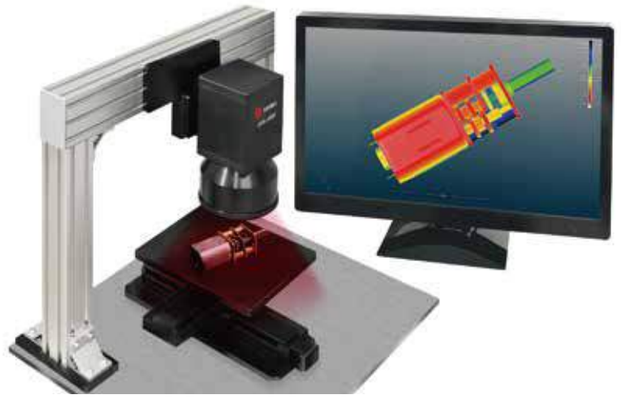
Applications

- Swept Source – OCT
- Heterodyne measurement
- OFDR (Optical Frequency Domain Reflectometry)

光源以外にもOCT用の様々なデバイスをご提供しております。BPD-200はSwept Source OCT (SS-OCT)で問題になるディテクタの波長依存性によるアーチファクトの問題を大幅に軽減しており、SS-OCTに最適なディテクタです。IFM-200はディレイラインや可視光などを内蔵した、マッハツェンダー型干渉計ユニットです。お客様のご要望に応じたカスタマイズも可能です。HSLシリーズに適したDAQボードもご提供しています。搭載されたFPGAにより、高速・リアルタイムイメージングを可能にします。

High Sensitivity and Speed, Game Changing 3D Optical Profiler for Production Development

The Santec Optical Profiling System uses the combination of a high-speed tunable laser and an interferometric detection technique to bring record sensitivity to a single beam, non-contact optical profiling. The Santec OPS-1000 is designed to deliver high speed, high accuracy and non-contact measurements regardless of shape, material, color or surface texture of the target object.



Top 3 Features of OPS-1000

1. High Sensitivity

Minimum light detection sensitivity of 100dB. Dynamic Range > 70dB

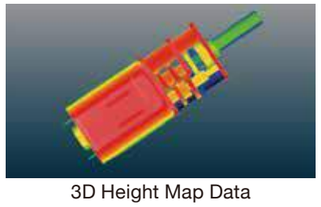
Drill Bit

3D Height Map Data

2. High Speed Measurement

Automate parts inspection with high speeds of up to 200,000 points / second

Gear Box

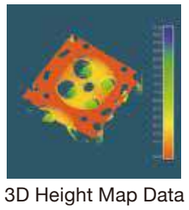


3D Height Map Data

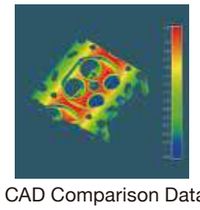
3. Single Beam Geometry

Minimized structural interference within complex parts

Engine Cylinder Head



3D Height Map Data

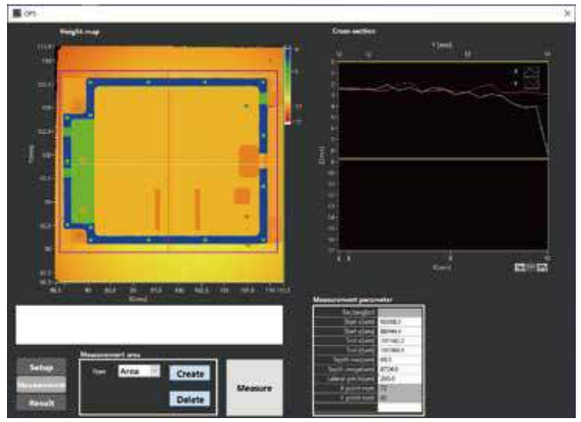


CAD Comparison Data

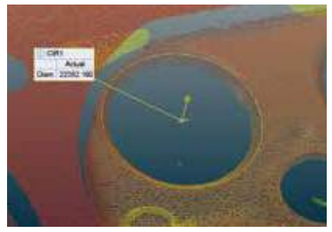
OPS-1000は高速波長可変レーザの技術を干渉計測に応用した、世界最高感度の光学式三次元計測器です。本製品はヘテロダイン検波方式により、約100dBという、三次元計測器では世界最高レベルの最小受光感度を実現しております。また、70dB以上の測定ダイナミックレンジを有するため、形状、材料、色、表面状態を問わず、非接触・ 高速・高精度測定が可能です。

OPS-1000 Software

Our user friendly data acquisition interface is included with the OPS-1000 for convenience. The software provides 3D Point Cloud Data and 3D Light Intensity Data for part analysis. The data is output as a PCD (Point Cloud Data) and the software is compatible with Windows OS.

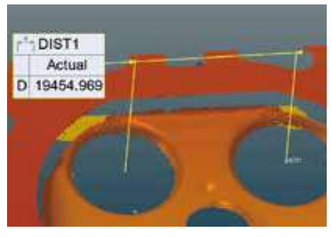


Measurement Examples



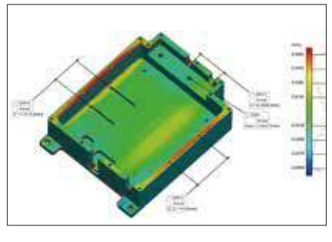
・Diameter of holes

Based on the measured point cloud data, you can find the edges of the hole in the part and measure the diameter and depth.



・Distance between holes

You can measure the distance between multiple holes.



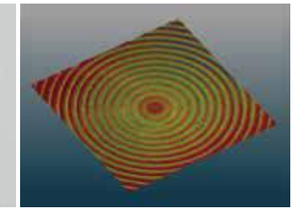
・Comparison with CAD Data

By reading the measured point cloud data and CAD data, the difference value can be displayed in a colored map.

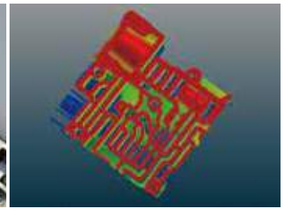
OPS-1000のシステムには、データ取得用の専用ソフトウェアが付属しています。Windows®ベースで、部品の測定に使いやすいソフトウェアです。このソフトウェアでは、3D点群データ、3D光強度データを取得することができます。ファイル形式はPCD (Point Cloud Data) 形式です。

Application Examples

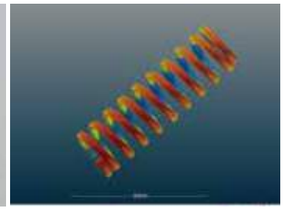
In- Situ Inspection



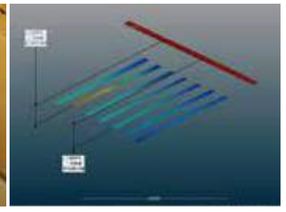
Fresnel Lens



Valve Body

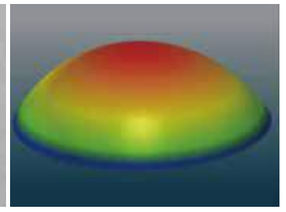


Metal Spring

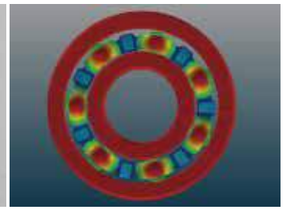


Butterfly Package

Tribology

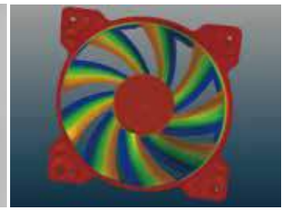


Metal Ball



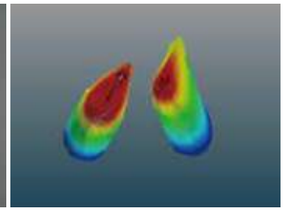
Metal Bearing

Angled Surface



Fan

Fractography



Metal Pipe

High Precision and Environmental Resistance Wafer Thickness and Shape Mapping System

The TMS-2000 measures wafer flatness with nm-level accuracy even in non-regulated conditions for wafers up to 12 inches in diameter. Traditional wafer thickness mapping techniques suffer from accuracy issues, especially when faced with unstable environments such as temperature changes and vibration. The innovative hardware design of the TMS-2000 effectively minimizes the effects of these environmental factors. Additionally, the effect of gravity can be eliminated, allowing a true wafer shape measurement, and mm-level warpage wafers can be measured thanks to the wide-range SS-OCT technology. Its high-speed measurement capabilities and compact size make it ideal for measuring the flatness of a variety of wafer materials, including silicon (~P++), SiC, sapphire, glass, $LiNb0_3$, and SOI.

Features

1. High Precision
High precision thickness measurement using interferometric detection technique (< 1nm repeatability with standard 300-mm Si wafer)

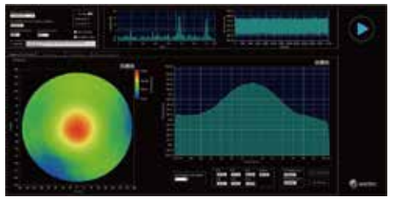
2. Various Measurement Parameters
Analysis of Global (GFLR, GFLD, GBIR), Site (SFQR, SFQD, SBIR), Edge (ESFQR) , and Warpage (Bow/Warp and Sori)

3. High Environmental Resistance
No temperature control or vibration countermeasures are required due to environmental durability

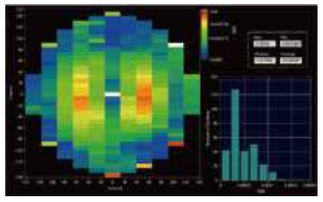
4. Compact Size and highly customizable
Small form factor suitable for multiple applications including embedding and integration

5. High Speed
Spiral Scanning (high speed, high density)

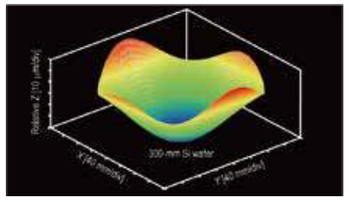
Measurement Data



Thickness Mapping

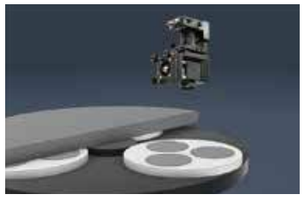


Edge & Site Measurements



Surface Shape Profile

Customization



OEM Solutions

We tailor embedded wafer mapping hardware and software for integrated systems and production tools.

EFEM Integration

We support design integation for robotic handling and controlled mini envirionments

TMS-2000はウエハの厚さ分布および形状を非接触で計測し、平坦度を1 nmの精度で計測可能です。本製品は環境変化にも高い耐性を有し、且つ小型、高速、低価格を実現しております。インライン検査を含め、高スループットを活かした幅広いアプリケーションへの導入が可能です。

Liquid Crystal On Silicon Based Spatial Light Modulators

Our LCOS-SLM (liquid crystal on silicon based spatial light modulator) is an advanced spatial light modulator.
WUXGA (1920 x 1200) resolution, 10-bit (1024 gray levels), and excellent phase stability (~0.003π rad.) make ultra-fine light modulation possible for various applications.

Laser processing (500W durable model)

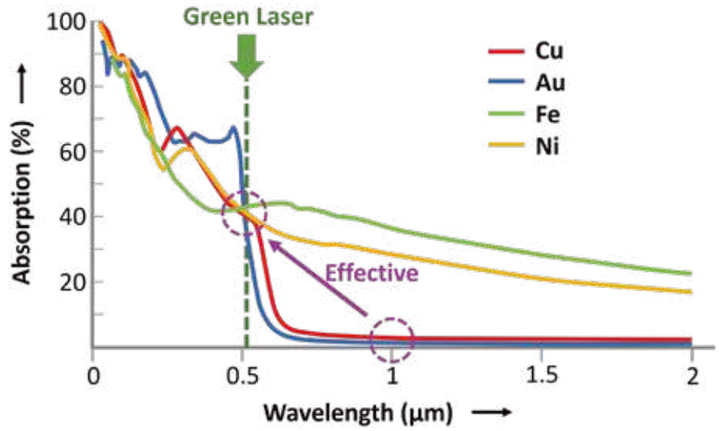
SLM-310-G RoHS Compliant Preliminary

Features

- **Wavelength Range 482-582 nm**
- **High-power model holds high-power durability up to CW 500 Watts.**
- **LCOS head with water-cooled heat sink**

Applications

- **Laser processing**
- **3D printing**
- **IC trimming**



SLM-310-G は当社第 3 世代となる液晶 LCOS 技術を用い、金属加工に有効なグリーンレーザーにおいて光出力パワー 500W の耐光性を実現しました。一般的な金属では、グリーン波長の吸収は近赤外波長の 1μm と比べて 10 倍以上大きく、レーザー加工で有効な波長帯と知られています。また、従来製品同様 10bit（1024 階調）の高分解能特性や高い位相安定度特性もそのまま継承しております。

Liquid Crystal On Silicon Based Spatial Light Modulators

High-Speed model

SLM-210 RoHS Compliant

Features

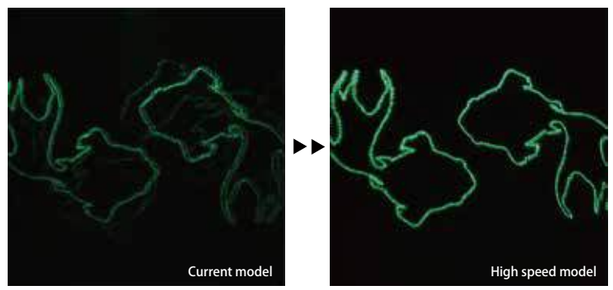
- **Wavelength ranges 400–700 nm (Type A), 750–1100 nm (Type B), 450–1600 nm (Type C).**
- **WUXGA (1920 x 1200)**
- **Memory function**
- **Triggers-input & output**

Applications

- **Holography**
- **Wavefront correction**
- **Beam steering**
- **Biosensing**
- **Quantum computing**
- **Pulse/Beam shaping**
- **Programmable phase pattern**

Current model / 249 ms

High speed model / 6 ms



SLM-210 は、当社第 2 世代の液晶 LCOS（Liquid Crystal on Silicon）技術を用いた高性能製品として、応答速度を大幅に 向上させた最新のハイスピードモデルです。従来品と比較して 20 倍以上の高速化となる、応答速度 10 ms 以下を実現。LCOS の応答速度向上に伴い当社特有の優れた 高階調度と相まって、光波面補正、レーザー加工用光ビーム 整形、バイオセンシング、量子コンピューティングなどの光応 用分野での性能向上に貢献します。

Liquid Crystal On Silicon Based Spatial Light Modulators

Standard model

SLM-200/20

- **Wavelength Range 400-1600 nm**
- **WUXGA (1920 x 1200) resolution**
- **10-bit (1024 gray levels)**
- **Excellent phase stability (~0.001π rad.)**

UV Hardened model

SLM-250

- **Wavelength range 365-550 nm**
- **WUXGA (1920 x 1200) resolution**
- **42 times higher UV tolerance to SLM-200**
- **10-bit (1024 gray levels)**

High-Power model

SLM-300/30

- **Wavelength Range 532, 800, 1064 nm**
- **20 times higher power durability to SLM-200**
- **LCOS head with water-cooled heat sink**
- **10-bit (1024 gray levels)**

Other models

Custom & Special Orders

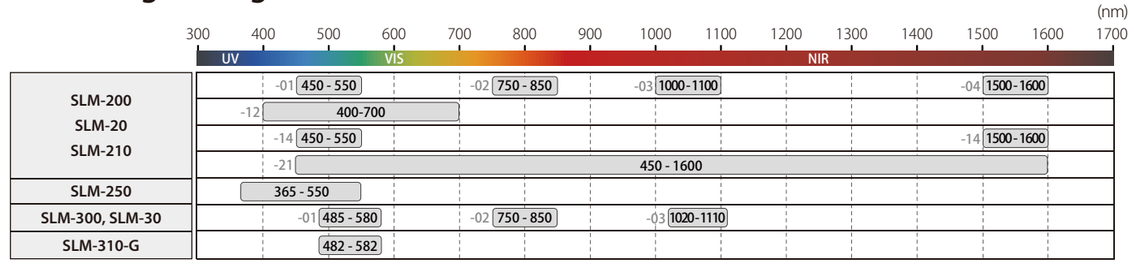
We can custom-build special SLM to suit your needs.
With heater, temperature sensor, etc.

SLM-200 は、ビーム整形、波面補正、光マニピュレーションなど、さまざまな科学・工業用途に適した空間光変調器です。SLM-250 は、液晶及び光学薄膜構造の最適化により、優れた紫外線耐性を有しています。SLM-300 は、水冷ヒートシンクを備えた LCOS ヘッドを採用し、200W(ワット) クラスの高出力レーザーにご利用いただけます。
SLM-20/SLM-30 は、産業分野における応用展開が出来るよう、小型・低価格化した機器組み込み用の空間光変調器です。SLM シリーズはいずれもパターンジェネレータソフトウェアが付属しており、コンピュータで生成したホログラムの計算が可能です。また、各種モデルはお客様のご要望に合わせた柔軟なカスタマイズに対応しています。

Comparison Tables for Spatial Light Modulator

Item	SLM-200 SLM-20	SLM-210			SLM-250	SLM-300 SLM-30	*Preliminary* SLM-310-G	Units
		Type A	Type B	Type C				
Wavelength range [1]	400-1600	400-700	750-1100	450-1600	365-550	532, 800, 1064	482-582	nm
Response time [2]	Typ. 200	Tr:6 / Tf:18	Tr:17 / Tf:53	Tr:48 / Tf:200	Typ. 50	Typ. 200	Typ. 200	ms
Panel reflectivity [3]	Typ. >70@532 nm	Typ. >70@532 nm			Typ. >80@532 nm	Typ. >80	Typ. >80	%
Phase stability	Typ. < 0.001π	Typ. < 0.002π			Typ. < 0.003π	Typ. < 0.003π	Typ. < 0.003π	rad.
Optical power handling [4]	Typ. 10	Typ. 10			Max. 10 mW/cm2	Max. 200	Max. 500	W/cm²
Water flow	-	-			-	1-2	8	L/min.
Water inlet and outlet	-	-			-	Pipe fittings	Pipe fittings	-
Dimensions LCOS unit	45 x 45 x 25.7	45 x 45 x 25.7			45 x 45 x 25.7	60 x 60 x 31.7	60×85.2×21.8	mm
Dimensions SLM body	117.6 x 117.6 x 33.7							mm
Panel size	(H)15.36 x (V)9.60							mm
Panel resolution [5]	(H)1920 x (V)1200							pixel
Pixel size / pitch	7.8 / 8.0							µm
Aperture ratio	95							%
Gray level	10 (1024 levels)							bit
Frame rate	60 or 120							Hz
LCOS drive frequency	1200							Hz
Phase depth	Min. 2π							rad.
Interface [6]	DVI / USB 3.0							-
Operating temperature	15-35							℃
Storage temperature	0-40							℃
Control software	GUI software and SDK for Windows: C#, Python, Matlab, Labview							-

Wavelength Range



< AR coating option for SLM-200, 20, 210>

Item	-00	-01	-02	-03	-04	-12	-14	-21	Units
AR coating range [7]	no coating	450-550	750-850	1000-1100	1500-1600	400-700	450-550 / 1500-1600	450-1600	nm
AR coating reflectance [8]	4	< 0.5				< 1.5	< 0.6	< 2.5	%

1) SLM-200, 20, 210 : No AR coating,
refer to table for available AR coating ranges.
2) Response time is a typical value and is not affected by frame rate.
Tr: Rise time between 10% and 90% levels in a phase change of 0 to 2π rad. at 25°C.
Tf: Fall time between 90% and 10% levels in a phase change of 0 to 2π rad. at 25°C.
3) Zero-order reflection.
Depending on specified wavelength range.
4) The value is not guaranteed.
SLM-200, 20, 210: 1550 nm CW, 2.0 mm beam diameter
SLM-250: Max. 10 mW/cm² : @365 nm, 24H/day continuous operation.
SLM-250: Typ. 40 mW/cm² : Peak power @355 nm, Pulse laser.
SLM-300, 30: CW @1064 nm
SLM-310-G: CW @ 532 nm
5) Specification on the defect pixels are no object.
6) DVI: 10-bit using RGB 8-bit, 3 colors
7) We support custom AR coating request. Please contact us for detail.
8) Angle of incidence = 0 degree

LCOS based Programmable Optical Filter

WSS-2000

The WSS-2000 is a LCOS based Programmable Optical Filter. Santec's proprietary LCOS (Liquid Crystal on Silicon) technology inside the WSS-2000 offers the ultimate in flexibility, enabling the user to program a limitless range of optical filtering, attenuation and switching schemes. The WSS-2000 is an enabling technology for investigating next generation optical networks by utilizing the filter as an optical equalizer of high-speed signals, as an adaptive channel filter for advanced optical transmission systems (DWDM, OFDM), as a WSS emulator or as a flexible test and measurement system.

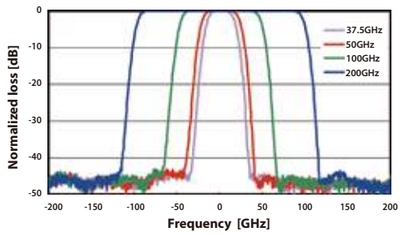
Features

- **Programmable arbitrary spectral generation and spectral shaping**
- **Fine frequency and bandwidth control using LCOS. Setting resolution 0.78GHz (typ.)**
- **Excellent optical filtering with steeper edge 400 dB/nm (typ.)**
- **Optical switching configuration (1x1, 1x2, 1x4)**
- **Optical phase control function (Option)**

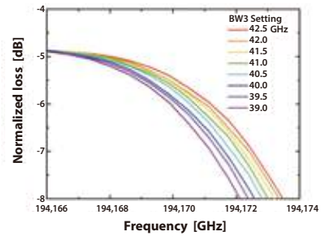
Applications

- **Optical amplifier testing and evaluation with optical equalizer for high-speed optical signal**
- **100 Gb/s, 400 Gb/s high speed transmission test**
- **Adjustable and adaptive DWDM,OFDM channel filtering**
- **Flexible test and measurement**
- **Next generation bundle wavelength OXC**
- **Pulse shaping**
- **Optical comb generation**
- **Wavelength Selective Switch (WSS) emulator**

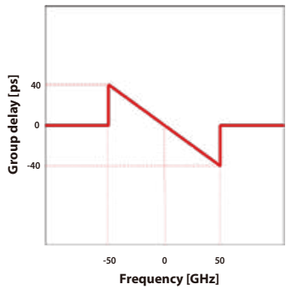
Measurement Data



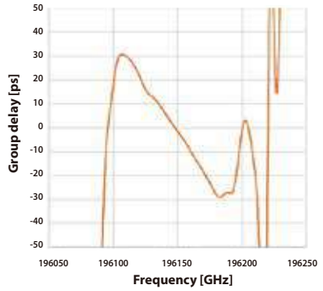
Relative frequency from ITU-grid center [GHz]



Bandwidth and frequency tuning



Setting



Result

The following items can be set as parameters, phase, group delay or chromatic dispersion.

WSS-2000 は任意の光スペクトルをプログラム生成可能な LCOS ベースの光フィルタです。santec 独自の LCOS 技術により 柔軟性に富んだ帯域可変、減衰制御、スイッチング動作を実現。さらに位相コントロール機能にも対応しております。WSS-2000 は次世代光ネットワークの評価及び検証に適しており、高速信号用の光イコライザ、DWDM（光波長 多重通信）や OFDM（直交周波数分割多重方式）チャネル選択フィルタ、WSS エミュレータとして、各種測定にご利用いただけます。

Multichannel Optical Power Monitor

MPA-100

The MPA-100 is a highly integrated rack model of pigtailed photo-detector array. Multi-channels optical power from MPO or MTP connectors are detected by photo-detector array. Photo-detector of Si type for 850 nm range and InGaAs type for 1260~1610 nm are available. The detected photo-current is converted to voltage output using a 16-bit DAQ interface. The dimension is (W)482.6x(D)430x(H)44 mm. The highly integrated MPA-100 is available up to 80 channels. The MPA-100 is useful for many applications, such as testing and monitoring of transceivers for data communications in data centers, broadband/CATV, and telecommunications. Tap-PD model (fibers input&output, a partial power detection) is also available upon customer's request.

Standard model

Features

- **Multi-channels photo-detector array up to 80 channels**
- **Power monitoring and testing at 850 nm SR4, SR10**
- **Wide-operating wavelength range: 1260 ~ 1610 nm**
- **Wide-optical input range: -50 ~ -10 dBm**
- **Excellent linearity: +/- 0.6 dB**
- **MPO adapter / High-density MPO, MTP connectors**
- **16-bit DAQ voltage output by a USB interface**
- **1U Size (44 mm) slim design**
- **Custom model is available upon request**

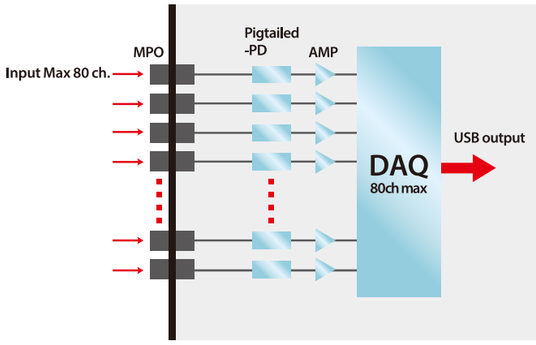
Custom model

Applications

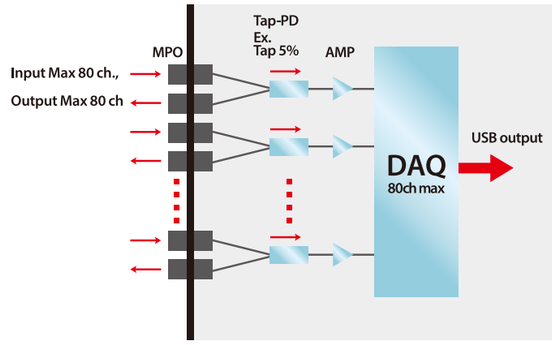
- **Optical power testing of transceivers for IEEE 802.3ba based SR4 ,SR10, LR4, ER4**
- **Optical power monitoring for data communications, broadband / CATV networks, and telecommunication networks**
- **Optical power monitoring in data center equipment**
- **Optical power monitoring of Interconnections of active optical cables**

Schematic diagram

■Pigtailed PD (standard)



■Tap-PD (custom)



MPA-100 はピグテイル型フォトディテクタ・アレイのラック・マウント型製品です。MPO・MTP 多芯コネクタより入力される複数の光パワー信号をモニタします。波長 850 nm 帯を検出するシリコンタイプと波長 1260 ～ 1610 nm 帯を検出する InGaAs タイプの光検出器よりお選び頂けます。光電流は内蔵する 16 ビットのマルチ信号 DAQ インターフェースを介して、USB 端子より電圧出力されます。

Ultimate Tap Photodetector

Isolator-integrated Nano Tap Photo Detector

INTP

Features

- Ultra-compact size 1.2 x 1.2 x 12 mm
- Compatible with φ0.16 bare fiber
- Minimum fiber bending radius of 5 mm

INTP

Nano Tap Photo Detector

NTP

Features

- Ultra-compact size 1.2 x 1.2 x 12 mm
- Telcordia GR-468 qualified
- Minimum fiber bending radius of 5 mm

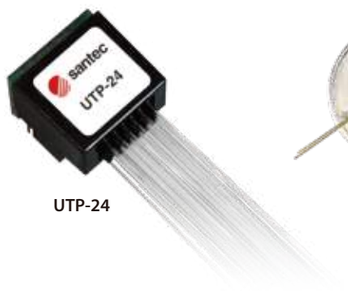
NTP

Ultimate Tap Photodetector

UTP-1/24

Features

- Ultra-compact size φ1.8 x 14 mm (UTP-1)
- Telcordia GR-468 qualified
- Minimum fiber bending radius of 5 mm
- 80/125 µm dual-core fiber support



UTP-24

UTP-1

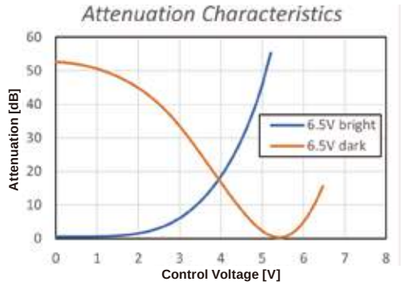
MEMS Attenuator

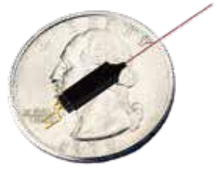
Compact Optical Variable Attenuator

COVA-1

Features

- Ultra-compact size 3 x 3 x 10 mm
- Bright / Dark types available
- Low power consumption
- Telcordia GR-1221 qualified
- Shock and vibration tolerance design
- Minimum fiber bending radius of 5 mm
- Shutter function





COVA-1

UTP シリーズは、世界最小サイズの高いダイレクティビティを持つユニディレクショナル光モニタ部品です。
体積比で従来モデルの MTP1 から 80% の低減を実現し、CFPx に代表される SFP (Small Form-factor Pluggable) 標準規格に適合する製品サイズを実現しております。極めてコンパクトなパッケージ設計が特長で、分岐カプラを設ける必要がありません。C バンドから L バンドまでの広い波長範囲で低損失、高感度な優れた特性を持ちます。
COVA シリーズは、PDL や波長依存性が小さく波長多重通信で必要とされる各種仕様について優れた特性を持つ超小型可変アッテネータです。MEMS(Micro Electro Mechanical Systems) 技術に基づく内部ミラー設計が採用されており、電圧変動の繰り返しや、大きな環境温度変化、機械的な衝撃に対して耐久性の高いデバイスです。

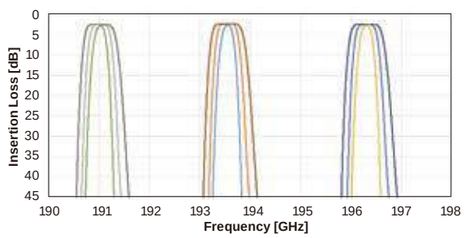
MEMS Tunable Filter

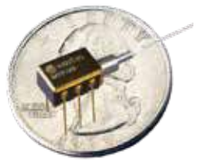
Variable Bandwidth - Optical Tunable Filter

MTF-VB

Features

- Ultra-compact size 9 x 5.5 x 3.5 mm
- Continuous λ& BW independent control
- Flat-top frequency response by excellent gaussian order





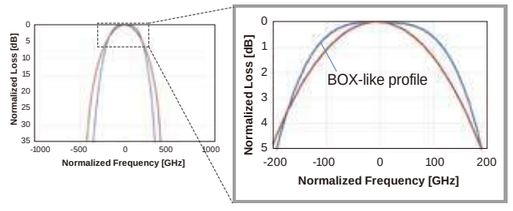
MTF-VB

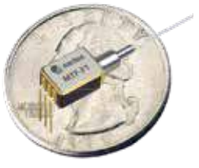
Compact Optical Tunable Filter

MTF-FT

Features

- Ultra-compact size 7.5 x 5.5 x 3.5 mm
- Flat-top frequency response by excellent gaussian order
- Low drive voltage 17 V





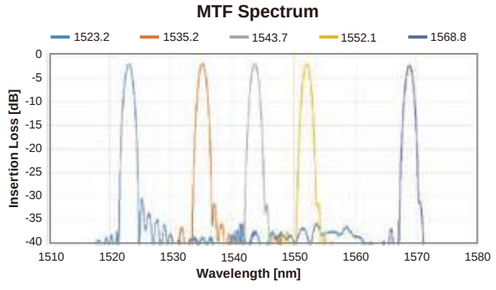
MTF-FT

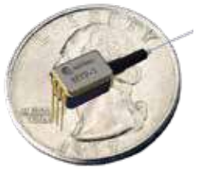
MEMS-based Tunable Filter

MTF-1

Features

- Ultra-compact size 7 x 5 x 3.5 mm
- Minimum fiber bending radius of 5 mm
- Robust mechanical design in shock and vibration
- Low drive voltage 12 V





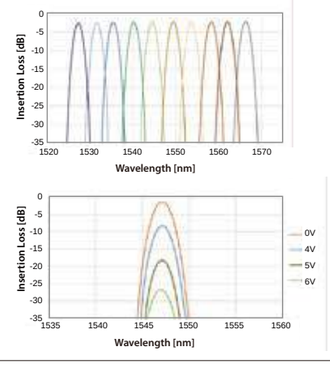
MTF-1

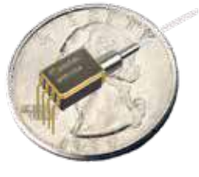
Variable Attenuator-integrated Optical Tunable Filter

MTF-VOA

Features

- Ultra-compact size 7.5 x 5.5 x 3.5 mm
- Minimum fiber bending radius of 5 mm
- Compatible with thin fiber of 80 µm cladding diameter
- Low drive voltage 12 V





MTF-VOA

MTF は、MEMS(Micro Electro Mechanical Systems) 技術に基づく世界最小サイズの波長可変フィルタです。高速大容量光伝送において光増幅後の雑音光除去に用いられる重要な光部品であり、光トランシーバの小型集積化に貢献します。従来のガウシアンフィルタに加え、800 Gb/s 越の超高速信号用に透過帯域が平坦、かつ急峻な雑音除去性能を特徴とするフラットトップフィルタ (MTF-FT)、400 Gb/s から 1.2 Tb/s の Flex rate に対応した帯域幅・波長可変フィルタ (MTF-VB) 及び 出力光の光強度を調整する機能（可変アッテネーション機能）を集積した集積型波長可変フィルタ (MTF-VOA) がございます。

Medical Applications

MOVU a santec company

MOVU CREATES THE BEST- IN-CLASS OPTICAL IMAGING DEVICES TO IMPROVE QUALITY OF LIFE.

We want to improve the eyesight of as many people as possible. That's why we've built our company on superior engineering. Based in Santa Clara, CA, we leveraged our extensive experience in cutting-edge optical science. By focusing on creating advanced optical imaging techniques, we help physicians improve the speed and accuracy in diagnosis.

Advanced Optical Biometer ARGOS®

The ARGOS® Optical Biometer has been designed to maximise the clinician's ease-of-use while delivering superior precision. This non-invasive, non-contact optical biometer outperformed its competitors in clinical trials.

ARGOS® streamlined the process of acquiring biometric parameters. It delivers:

Features

- **Benefit from next generation optical biometry**
- **Swept source OCT technology**
- **New standard in repeatability**
- **9 biometric parameters in less than a second**
- **Whole eye imaging, fewer surprises**

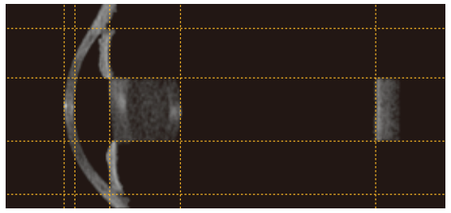
MADE IN JAPAN

FDA CE 0123

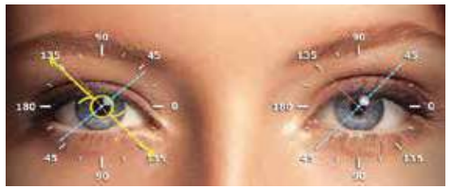
認証番号 ： 第 228AABZX00054000 号

ARGOS®は、波長走査型OCT光源を使用した光学式眼内寸法測定装置で、白内障手術の時に、眼内レンズ選定のために必要となる眼球パラメータの測定を従来技術よりも高精度、高速で行うことを実現した眼科向け医療機器です。また、波長走査型OCTとしては初めて、測定時に、角膜から網膜までの全眼部について2次元OCT画像を表示することを可能にしました。さらに、従来、測定の難しかった重度の白内障で混濁した眼においても、測定の成功率を格段に向上させています。

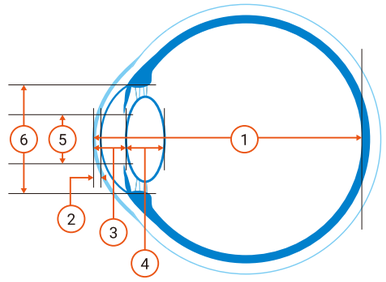
True real-time 2D imaging cornea to retina



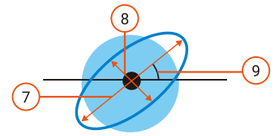
Seemless Toric Planning



BIOMETRIC PARAMETERS CAPTURED BY ARGOS®

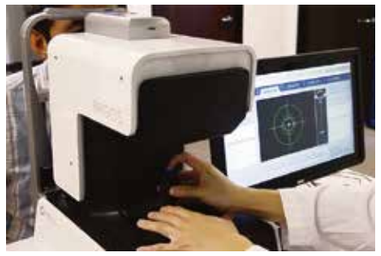


1 Axial length
2 Corneal thickness
3 Anterior chamber depth
4 Lens thickness
5 Pupil size
6 White-to-white(Corneal diameter)
7 Flat Meridian
8 Steep Meridian
9 Astigmatism



MEASUREMENT

SUMMARY



ANALYSIS MODE

IOL POWER CALCULATIONS

MOVU Web (English)
https://movu-inc.com

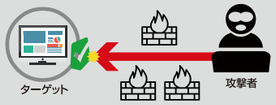
MOVU Web (Japanese)
https://www2.santec.com/movu/jp/

AppCheck

未知のランサムウェアに対応

ある日突然データが暗号化されたら
元に戻すために身代金を払いますか？

暗号化されるファイルの動きに着目



状況認識技術で未知のランサムウェアも検出・遮断

リアルタイムバックアップ復元

バックアップからファイルを復元。
ファイルの変更削除や毀損行為を記録。

他社ソフトとの共存も可能

低いPC負荷率。
動作が軽いため通常業務に影響を与えません。

AppCheckはランサムウェアそのものではなく、毀損されるファイル状況の変化に注目しています。

検知 Detection
① ランサムウェア暗号化検知

対応 Response
② リアルタイムバックアップ
③ ランサムウェア遮断／駆除

復旧 Recover
④ データを復旧

暗号化型ランサムウェア対策の決定版

未知のランサムウェアに対応
新型ランサムウェアでも状況を認識し、リアルタイムで検出遮断します。

重要ファイル/フォルダを保護
ランサムウェアによるファイル毀損をブロックし保護します。

リアルタイムバックアップ・復元機能
万一ランサムウェアに感染してしまった場合にも安心です。

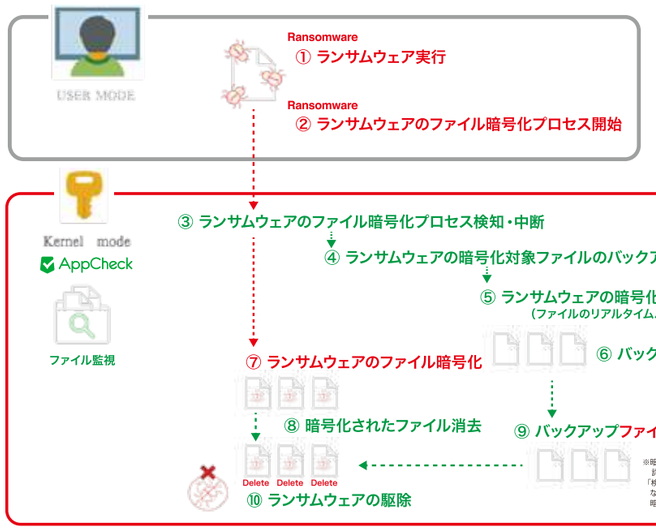
MBRの保護機能搭載
重要ファイルの暗号化だけではなく、PCを起動不能にするランサムウェアにも対応。

他社製品との共存
他社ウイルス対策ソフトと共存可能。これまでの資産を無駄にせず、アドオンすることで新しい脅威に対するセキュリティを強化。

パターンファイル不要
低いPC負荷率。動作が軽いので実務に影響を与えません。

AppCheckPro が暗号化型ランサムウェア対策に有効な理由

AppCheck



ランサムウェアによる暗号化の前に
暗号化対象ファイルをバックアップ（退避）
ランサムウェア駆除後に
元のフォルダに退避したファイルを戻します

AppCheckPro の主な機能

ランサムウェアの検知・遮断機能
未知のランサムウェアに対応。
新型ランサムウェアでも状況を認識し遮断。

毀損行為遮断
重要ファイル / フォルダを保護。
ランサムウェアの毀損行為を検知し遮断。

エクスプロイトガード機能
Web ブラウザやマイクロソフトオフィスのほか、各種プラグインなどのアプリケーションの脆弱性を突く、悪意のある攻撃から PC を保護します。

自動バックアップ・復元機能
ファイル自動バックアップ・復元機能搭載。
万一ランサムウェアに感染してしまった場合にも安心。

MBR 保護機能
MBR の保護機能搭載。重要ファイルの暗号化だけではなく PC を起動不能にするランサムウェアにも対応。

New! **共有フォルダのセキュリティ機能**

他社製品との共存
他社ウイルス対策ソフトと共存可能。これまでの資産を無駄にせず、アドオンすることで新しい脅威に対するセキュリティを強化。

パターンファイル不要
パターンファイル不要。低い PC 負荷率。
動作が軽いので実務に影響を与えません。

AppCheckPro 商品構成

		AppCheck Pro	AppCheck Pro for Windows Server	AppCheck CMS Cloud
価格（1ライセンスあたり 税別）		最低 1ライセンス～ オープン価格	最低 1ライセンス～ オープン価格	オープン価格
ランサムウェア対策	検疫・復旧	○	○	
	フォルダ保護	○	○	
	ログ提供	○	○	
中央管理機能（CMS）オプション	一括ポリシー設定			○
	エージェントロック機能			○
	モニタリング機能			○
	レポート機能			○
稼働OS／対応ブラウザ		Windows 8 (8.1) /10/ 11 (32/64bit)	Windows Server 2008 R2 (SP1) 以降※ Windows Storage Server 2012以降 ※SHA-2認証書のMicrosoft最新パッチがインストールされていること	Microsoft Edge Google Chrome Mozilla Fireox

AppCheckWeb
https://www2.santec.com/app/

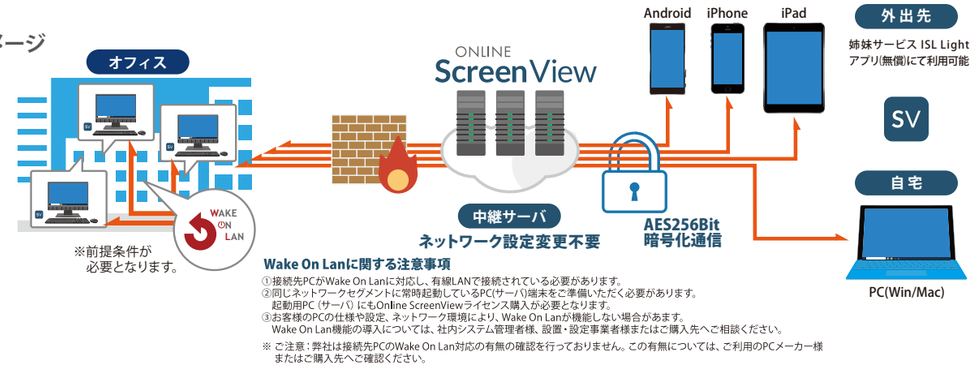
ONLINE ScreenView SV

リモートアクセスツール

PCはもちろんスマートフォン & タブレットからも簡単リモートアクセス

Online ScreenViewはいつでもどこでも遠隔でPCを操作できるサービスです。
社外から社内システムの閲覧、操作を実現するとともに高度なセキュリティ機能も合わせてご提供。
不正アクセスを防ぎ、安心してご利用いただけます。
テレワークでの業務遂行を可能にし、生産性向上に貢献します。

接続イメージ



Wake On Lanに関する注意事項

①接続先PCがWake On Lanに対応し、有線LANで接続されている必要があります。
②同じネットワークセグメントに常時起動しているPC(サーバ)端末をご準備いただく必要があります。
起動用PC（サーバ）にもOnline ScreenViewライセンス購入が必要となります。
③お客様のPCの仕様や設定、ネットワーク環境により、Wake On Lanが機能しない場合があます。
Wake On Lan機能の導入については、社内システム管理者様、設置・設定事業者様またはご購入先へ相談ください。

※ ご注意：弊社は接続先PCのWake On Lan対応の有無の確認を行っておりません。この有無については、ご利用のPCメーカー様またはご購入先へご確認ください。

安全、便利！ 各企業にあった運用管理・機能を実現できます！

機能一覧

デスクトップ共有	ショートカットキーの実行	キーボード&マウス操作	ドラッグ&ドロップによるファイル転送	Ctrl+Alt+Delの送信
スクリーンショットの取得	ホワイトボード	描画	マーカー	セッション再接続
レコーディング	画面拡大・縮小	画面カラー数	アクセスパスワードの設定	電源管理(WOL)
再起動モード	自動ポート設定	アクセス履歴	ワンタイムパスワード	アクセス通知

※「オンラインスクリーンビュー／ONLINE SCREEN VIEW」はサンテック株式会社の登録商標です。

ONLINE ScreenView Web
https://www2.santec.com/osv/

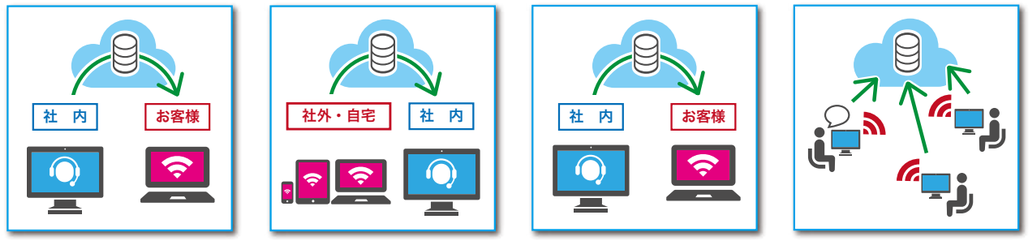
ONLINE ScreenAssist SA

リモート支援ツール

オールインワン型のリモートソリューション

Online ScreenAssistは「リモートサポート」「リモート保守・メンテナンス」「WEB商談」「WEB会議」を標準装備しています。
リモート操作支援・リモート保守支援・リモートアクセスでのテレワーク支援を実現します。

1ライセンスで使える豊富な機能



リモートサポート

コールセンターなどの業務で
お客様満足度の向上
- エスカレーション機能
- オペレータ ID 複数発行
- ファイル・フォルダ送受信

リモート保守・メンテナンス

データセンターなどの遠隔地
サーバの管理
- バッチファイルの転送可能
- 異常発生時の対処可能
- トラブル復旧時間の削減

WEB 商談

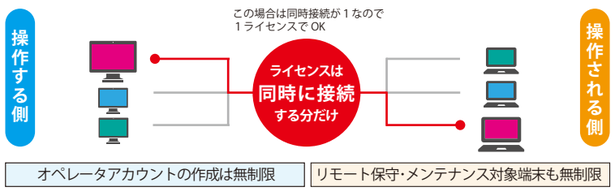
リモートセールスで新たな営業
手法と営業機会を創出
- プレゼン実施
- デモ実演
- 遠距離顧客を簡単フォロー

WEB 会議

資料や画面共有ができる WEB
会議機能も標準搭載
- 様々な部門で利用可
- 1 ライセンスで 10PC まで
- ダウンロード実行で簡単接続

同時接続ライセンスでコスト削減

今まで登録台数分ライセンスを購入していた場合は、同時接続ライセンスによる課金のため、コストを大幅に削減できます。また、オペレータや接続先コンピュータに台数の制限はなく無制限で登録できるため、簡単で気軽に運用ができます。



機能一覧

デスクトップ画面共有	キーボード&マウス操作	ドラッグ&ドロップによるファイル転送	Ctrl+Alt+Delの送信	ショートカットキーの実行
ホワイトボード	スクリーンショットの取得	ブラックスクリーン	画面拡大・縮小	画面カラー数
オペレーターID作成	レコーディング	セッション再接続	自動ポート設定	自動レコーディング
テキストチャット	権限管理	セッション履歴	アプリケーション共有	プレゼンテーション
音声・ビデオチャット	アクセスパスワードの設定	ワンタイムパスワード	アクセス制限	アクセス通知
アクセス履歴				

※「オンラインスクリーンアシスト／ONLINE SCREEN ASSIST」はサンテック株式会社の登録商標です。

ONLINE ScreenAssist Web
https ://www2.santec.com/osa/

LiveSupporter

スマートグラスソリューション

スマートグラスを使用した現場の作業支援ソリューション

スマートグラスとWeb会議システムやリアルタイム映像共有システムを組み合わせて
社内と現場との円滑なコミュニケーション、現場のハンズフリー作業を実現します。

スマートグラス

M400

- Vuzix 製 非透過型片眼スマートグラス
- ハイスペックと軽量化を両立
- 市場を牽引する老舗メーカーのフラッグシップモデル
- どのような現場にもフィットする汎用性
- 業種を問わず様々な現場で活躍中
- WEB 会議システムで現場の支援が可能
- 映像や音声の中継時もハンズフリーで作業可能
- Android OS を搭載し単独動作が可能
- Qualcomm Snapdragon XR1 プロセッサを搭載
- 1,280 万画素オートフォーカスカメラを搭載
- トリプルノイズキャンセリングマイク、スピーカーを搭載
- 鮮明で見やすい有機 EL ディスプレイを搭載
- ボタン操作、タッチパッド操作、音声操作に対応
- IP67 相当の防水防塵、ISO クラス 2 認証を取得

※「ライブサポーター／LIVE SUPPORTER」はサンテック株式会社の登録商標です。

LiveSupporter Web
https://www2.santec.com/ls/

www.santec.com

Santec Holdings Corporation
Santec AOC Corporation
Santec LIS Corporation
Santec OIS Corporation
Santec Japan Corporation
5823 Ohkusa-Nenjozaka, Komaki, Aichi 485-0802 Japan Tel: +81-568-79-3536 Fax: +81-568-79-1718

Santec USA Corporation
400 Kelby Street Suite 1501, Fort Lee, NJ 07024, USA Toll Free: +1-800-726-8321 (santec-1) Tel: +1-201-488-5505 Fax: +1-201-488-7702

Santec Europe Limited
99 Park Drive, Milton Park, Abingdon Oxfordshire OX14 4RY UK Tel: +44-20-3176-1550

Santec (Shanghai) Co., Ltd
307B, Yuexiu Building, 388 Fushan Road, Pudong New Area, Shanghai, China 200122 Tel:+86-21-58361261

Santec Canada Corporation
160 Michael Cowpland Dr Kanata, ON K2M 1P6 Canada Tel: +1-613-599-1000

Santec California Corporation
4750 Calle Quetzal Camarillo, CA 93012 USA Tel: +1-805-987-1700

（**BizSolution** 製品お問合せ）
東京オフィス 〒105-0013 東京都港区浜松町2-10-6 PMO浜松町III10階 Tel: 050-3110-3150

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