Instruments and Motion Solutions for the Telecom/Datacom Market
Introduction

Telecommunications/ data communications, also known as telecom/datacom, is the exchange of information over significant distances by electronic means and refers to all types of voice, data and video transmission. This is a broad term that includes a wide range of information transmitting technologies such as telephones (wired and wireless), microwave communications, fiber optics, satellites, radio and television broadcasting, the internet and telegraphs.

A complete, single telecommunications circuit consists of two stations, each equipped with a transmitter and a receiver (the transmitter and receiver at any station may be combined into a single device called a transceiver). The medium of signal transmission can be via electrical wire or cable, optical fiber, electromagnetic fields or light. The free space transmission and reception of data by means of electromagnetic fields is called wireless communications.

The simplest form of telecommunications takes place between two stations, but it is common for multiple transmitting and receiving stations to exchange data among themselves. Such an arrangement is called a telecommunications network.

One of the trending technologies of modern Telecom/ Datacom industry is silicon photonics, where data is transferred among computer chips by optical means.

Optical fiber is used to overcome the limitations of copper and support faster interconnects between data centers. Combining laser and silicon technology results in higher propagation speed compared to electrical current (ability to carry more data in less time compared with electrical conductors). Thus, the effective implementation of silicon photonics technology would dramatically increase the processing speed and power of computers.

The other hot topic is 400Gb/s transmission speed.

Network carriers continue to face the bandwidth and capacity demand in metro, regional and long-haul networks as the traffic driven by more and more video streaming, cloud computing, social media, mobile data delivery and IoT grows. Optical transport of per-channel bit rate beyond 100 Gb/s is now under active R&D to sustain the traffic growth, improve spectral efficiency and lower cost per bit in fiber transmission. In that respect, 400-Gb/s data rate per channel emerged as a natural and promising step.

At Newport Corporation we provide a wide variety of Instruments and Motion products to assist with any step in the generation of devices in the Telecom / Datacom industry, covering from device design all the way to final testing.
Process

In this brochure we will touch base on 3 main stages in the development of devices for Telecom/ Datacom applications and the recommended products at each of these stages: R & D, Assembly/Production and Test.
Research and Development

During the R&D stage, engineers are tasked to evaluate and verify new technologies or new design concepts. One of the challenges is to complete this task in shortest amount of time to move quickly into production, while guaranteeing precise characterization and analysis of new devices. To assist with this task here is the list of products we offer, that provide comprehensive characterization of beam and are easy to setup and use.

Laser Diode Controllers, Mounts, and Optical Power/Wavelength Meters
- Proven Laser Diode Protection to ensure your device is not damaged or destroyed during critical characterization and analysis tests.
- Reliable, stable, and precise performance to ensure the data you are collecting is accurate
- Applications and technical support to assist you with challenges and questions encountered along the way

Laser Diode Mount
Provide a compact, easy-to-use solution for laser diode fixturing

Laser Diode Controller
Combination of a precision current source and thermoelectric temperature controller that is optimized for laser diode control in the telecom/datacom space

Optical Power/Wavelength Meter and Measurement Head
Allows laser diode designers to analyze the power and wavelength performance of a device in a single solution. Capable of measuring the typical telecom/datacom wavelengths of 1310nm and 1550nm.
Power Meters and Detectors
Enable beam power detection and measurements.
- Up to 10 kHz data acquisition rate
- USB, RS-232, and GPIB communication available
- High speed analog output available
- Trigger in/out available
- Superb sensitivity and accuracy

Beam Profilers
Accurately capture and analyze spacial distribution.
- Quantitative beam measurements
- NIST Traceable power/energy output data
- Quantify beams Special distribution
- Quick and easy pass/fail testing
- Real time visual and numerical feedback

Motion Control Systems
Featuring an easy to use, compact and inexpensive motion solution, consisting of ultra-precision 561/562 series manual stages and Conex-TRA motorized actuators to allow overcoming a difficult task of aligning or attaching a fiber optic to a laser diode or an optical waveguide. Basic alignment algorithms can be implemented using the supplied SW drivers. Another option is to get the APOGEE software.
Assembly/Production

In the Assembly/Production stage, the objective is to build many devices in the shortest possible amount of time. Achieving repeatable and reliable results is the main challenge in this stage. Newport Corporation provides modular systems to allow multiple controls and functions within a single instrument, large scale test systems, precise motion solutions and instruments to ensure reliable, stable and precise performance.

Modular Laser Diode Controllers
Allow users to drive current and control temperature of up to 16 devices and optimize laser diode design for longevity and performance.
- Modular systems to allow multiple controls and functions within a single instrument
- Interface options to allow remote instrument control
- Reliable, stable, and precise performance to ensure the data you are collecting is accurate
- Applications and technical support to assist you with challenges and questions encountered along the way

Power Meters and Detectors
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Wavemeters
Enable high accuracy and high resolution measurements of CW laser source wavelength for research, OEM and production applications.
• Wavelength monitoring of devices including DFB Lasers, Tunable Lasers and VCSELs
• Accurate wavelength calibration of tunable and swept laser sources
• Accurate calibration of OSAs and other test equipment
• Spectroscopy and other scientific wavelength characterization

Motion Control Systems
Motion control systems used in production phase exhibit high reliability, fast motion and stability. Solutions can range from the ultra-precision XMS stages to VP-25 compact XYZ systems to hexapods. These stages are known for their outstanding bi-directional repeatability and minimum incremental motion, which are critical specifications for assembly phase. With an XPS Universal Motion Controller, basic to complex alignment algorithms can be implemented using the supplied SW drivers. Another option is to get ready to use APOGEE software to facilitate starting up a production line.

• Compact multi axis systems
• Highly reliable, fast and stable
• Outstanding bi-directional repeatability and MIM
• Easy to use alignment software option
• Software drivers to develop customized programs for OEM

APOGEE features
• Multiple search algorithms, combination possible
• Single to multi-channel
• Single and Double-ended devices
• Vision and instrument compatible
• Simulation mode

Newport can also supply full motion systems including the isolation and the structure.
Test

In the Test stage, the goal is to get quality finished goods. The challenges are moving high volume finished devices thru test to ensure functionality and reliability. We offer proven laser diode protection to ensure devices are not damaged and destroyed during test, LIV capable instruments to allow performance validation, high speed photodetectors and photo receivers, as well as power meter, detectors and beam profilers.

- Proven Laser Diode Protection to ensure your device is not damaged or destroyed during test
- Large scale test systems to allow testing and burn-in of multiple devices
- LIV capable instruments to allow performance validation
- Reliable, stable, and precise performance to ensure the data you are collecting is accurate
- Applications and technical support to assist you with challenges and questions encountered along the way

Single Shelf Test System – Allows the user to test reliability and performance of multiple laser diodes in a production environment. Testing at various currents, temperatures, analyzing output power (i.e. LIV curves), and running long term burn-in provides useful information for optimizing performance and eliminating infant mortalities of laser diodes that are often embedded into a transceiver or other device.
High Speed Photodetectors and Photoreceivers
Serve as O/E converter for oscilloscopes, network analyzers and spectrum analyzers.
- Visible and NIR versions
- Switchable DC-coupled or AC-coupled output versions
- Single mode and Multimode fiber connector options
- High speed with high dynamic range
- Instrument quality linear photoreceiver in small package
- Low-noise amplifier
- Ultra high speed photodetectors
- High sensitivity throughout spectrum
- Easy-to-use, self-contained module

Beam Profilers
Accurately capture and analyze spatial distribution.
- Quantitative beam measurements
- NIST Traceable power/energy output data
- Quantify beams Special distribution
- Quick and easy pass/fail testing
- Real time visual and numerical feedback
- Increased testing throughput
- Report generation

Power Meters and Detectors
Enable beam power detection and measurements.
- Up to 10 kHz data acquisition rate
- USB, RS-232, and GPIB communication available
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# Quick Reference Selection Guide

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Note: Newport has wide variety of products for every stage described above. Our applications and technical support engineers are always there to assist you with challenges and questions encountered along the way, so please don’t hesitate to contact us as [tech@newport.com](mailto:tech@newport.com) to discuss your application needs.