

Laser Diode Characterization System

Model 58620



Laser Diodes are becoming more ubiquitous. Current applications range from medical and defense, to being the critical backbone of the world's fiber optic communication networks. There are several highly precise processes involved in the production of Laser Diodes. These processes are all quite cost intensive ranging from wafer growth all the way to fibre alignment and package high speed testing.

The Chroma 58620 Laser Diode Characterization Station is a state-of-the-art full turnkey system designed specifically for Laser Diodes. Its features range from macro inspection of the facet or aperture active area to a full suite of electro-optical parametric tests. When Chroma's high capacity carrier is used, multiple devices can be rapidly repeatedly indexed improving not only test times but the reliability of the tests themselves. The Chroma 58620 is equipped with a highly stable, large scale, temperature control platform to provide the ability to incorporate R&D style tests in a production environment. This enables the ability to study correlation between laser diode forward current and temperature.

Features:

- Full Turn-Key Automated Test for edge-emitting laser diodes
- High precision and large capacity carrier, interchangeable with other automated equipment
- Fully automated alignment for fiber-coupled tests
- Automated optical inspection to decrease mechanical positioning delays
- Highly accurate TEC temperature controller with stability up to $\pm 0.01^{\circ}\text{C}$
- PXI-Based SMU and power meter for fast test times
- Full suite of software analysis tools for laser diode characterization
(Ith, Rs, Vf, slope efficiency, λ_p , etc...)

Chroma

ULTRA-PRECISE CARRIER DESIGN

Chroma's high precision carriers can be adapted to suit multiple form factors such as Chip on Carrier, Submounts, or Laser-Bar's. The innovative bi-lateral design is symmetrical with components placed on both sides to allow for a larger volume of components. The carrier is multi-layered to allow for components to be easily placed in their respective pockets yet secured once the other layers are mounted. The thermal interface structure allows for efficient component thermal contact along with a high degree of temperature control during heating and cooling cycles. At the touch of a button, an operator can perform full-scale automated testing once a carrier has been inserted.



SHARING CARRIER

One of the primary uses of high performance laser diodes are in the fields of optical data and telecommunications where the requirements for fiber coupling are quite stringent. If most DC parametric and optical characteristics are understood before a laser diode is inserted into the final product there is a greater cost savings and higher degree of in-field reliability. The Chroma 58620 is equipped with a fully automated alignment station to simulate a real-world fiber package coupling test to predict coupling efficiencies and spectral performance. Multiple optical heads and fibers may be used and coupled to an optical receiver such as an Optical Spectrum Analyzer (OSA) to analyze full spectral characteristics such as Side Mode Suppression Ratio and Center Wavelength (λ_p , λ_c). Since every device is traceable with data, the Chroma 58620 affords the ability to correlate unpackaged optical performance with final package performance and helps in justifying a reduced final package test requirement.



Characterization System
Model 58620



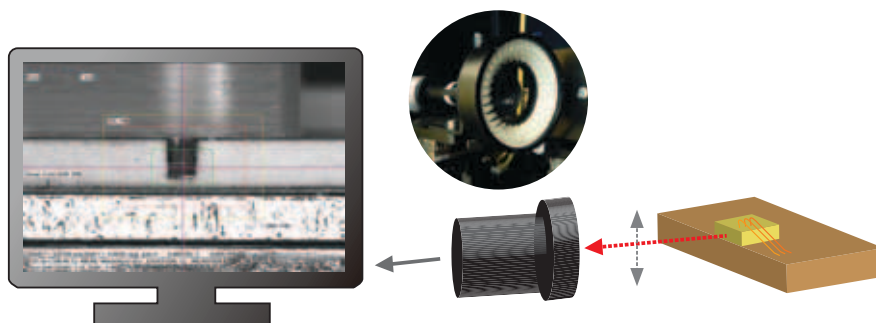
Carrier



Burn-In system
Model 58601

AUTO-ALIGNMENT FIBER WITH AOI ASSISTANCE

From developed technology in Semiconductor IC test technology, Chroma 58620 introduces batch processing through the sharing carrier and changing kit to the Laser Diode industry. The carrier protects the laser diode from being handled and damaged as it is processed as test lots through the burn-in and test process while providing the hooks for data tracking thus increasing both productivity and yields. This same carrier is designed to operate with the Chroma 58601 OptoElectronic SMU Module for seamless burn-in & test processing. Through a 58620 change kit, as the laser diode under test changes (by evolving design or new product), the systems can adapt to various form factors and features. This flexibility allows for one solution to potentially test TO-Can, Chip on Carrier, Laser-bar, etc.

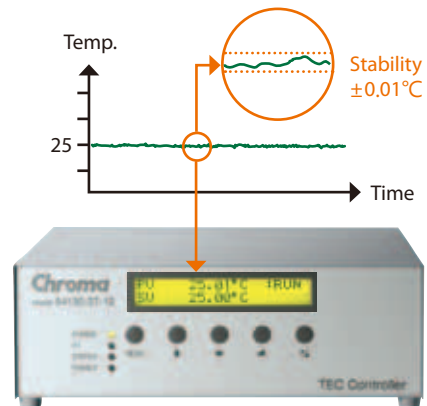


HIGH PRECISION TEC CONTROL PLATFORM

External and Internally induced thermal stresses on Laser Diodes strongly influence spectral and other electro-optical characteristics. Due to these issues, the Chroma 58620 includes a temperature control platform using a high precision Chroma 54130 - 300W TEC Controller and a Chroma 51101 Data Logger. These are highly regarded as world class instruments to ensure the uniformity of the carrier temperature and hence the devices under test. There are several thermal sensors placed along the carrier platform to ensure both a high degree of temperature uniformity and stability.



Data Logger
Model 51101/51101C Series



TEC Controller
Model 54100 Series

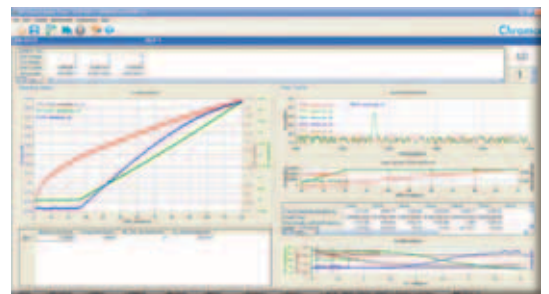
PXI TEST PLATFORM

Chroma's PXI Turnkey Test Solutions product offering are open and flexible platforms that can be rapidly integrated into production. High performance test instruments such as the Chroma 52400-Series 4-Quadrant current/voltage Source Measurement Unit (SMU) along with the Chroma 52961 Optical Power Meter (with various wavelength detectors) can perform an ultra-fast current source and detection sweep with a high dynamic range (80dB) for testing various Laser Diode demonstrating a wide range of output power and irradiance characteristics.



FRIENDLY AND FLEXIBLE USER INTERFACE

The Chroma 58620 is equipped with a complete Graphical User Interface (GUI) which includes recipe generation, test execution, and data management. There are checks and balances to ensure correct part placement in the carrier such as enabling the user to photograph every device and provide an ability to adjust before testing begins, saving time. Recipe generation enables the user to create test plans for an entire carrier down to the device level. Test execution provides the user with an in-depth window into the performance of every DUT from tabular opto-electronic parameters to graphical curves of spectral magnitude or any combination thereof. Depending on how test limits are managed, the Chroma 58620 can be a dumb data gathering tool with no pass/fail criteria or provide the user with an accurate picture of final test yield. Once tests are performed, Data Management is extremely flexible ranging from viewing on the tester itself to remote database and file storage systems for cross-enterprise data sharing.



ORDER INFORMATION

58620 : Laser Diode Characterization System

51101/51101C series : Data Logger

54100 series : TEC Controller

52400 series : Four-Quadrant Source

52961 : Optical Power Meter

SPECIFICATIONS

Model	58620
Device Under Test	
Form Factor	CoC, CoS, Edge-emission laser (singlet or bar)
Channels in Carrier	80 Channels per cycle ^{**}
Current Ranges (Chroma Model 52401)	
Current Ranges (Source & Measurement)	±200nA / 2µA / 20µA / 200µA / 2mA / 20mA / 200mA
Current Resolution	±1.6pA/±16pA/±160pA/±1.6nA/±16nA/±160nA/±1.6µA
Current Accuracy (Source & Measurement)	I range ≥ 1mA : 0.1% + 0.1% FS ; I range < 1mA : 0.05%+0.2% FS
Voltage Ranges	
Compliance Voltage Range	± 0.5V/1V/2.5V/5V/10V/25V
Compliance Voltage Accuracy	≥ 1V: 0.05% + 0.01%FS ; <1V: 0.05% + 0.1%FS
Voltage Measurement	± 3.8nV~ ± 25V
Voltage Measurement Accuracy	0.05% + 38nV @ 0.5V to 0.05% + 1.9mV @25V
Test Parameters	
Electrical	L-I-V Curves, Ith, Vf, Rs, Linearity (Kink)
Spectral	λp, λc, λrms, λFHW, Mode spacing, and others
Optical Spectrum Analyzer*(Optional)	
Wavelength Range	700 nm to 1700 nm
Resolution bandwidth	< 0.1 nm
SMSR Measurement	< 1 dbm
Wavelength Accuracy	±0.03 nm
Integrating Sphere	
Integrating Sphere Diameter	2 inch
Detector Port area	3mm
Wavelength Range	400~2000nm
CCD Camera	
Working Distance	6.5 mm
Resolution	6.7 µm
Magnification	8x~16x
Optical Power Meter (Chroma Model 52962)	
Channel	Dual channels
Wavelength Range (InGaAs Based)	900 to 1700nm
Minimum Power / Current	-70 dBm
Maximum Power / Current	+10 dBm
Resolution	0.01dB
Dynamic Range	80dB
Accuracy	±5%
Linearity	0.1dB
Measurements per Second	>5000
Fibre Types Supported	50/125µm · 62.6/125µm multimode and single
Connector Interface	FC
Form Factor	3U PXI
Thermal-Electrical Controller (Chroma Model 54130)	
Output Power	300W
Temperature Range	0 °C ~80°C
Temperature Accuracy	0.3 °C
Temperature Uniformity*	±0.5°C
Cooling System	External chiller
Mechanical Specifications	
Motion Stage Travel Distance	400 mm
Minima Fine Stage Resolution	20 nm
System Size	1000mm(W) x1200mm(D) x 1350mm(H)
System Weight	400 ± 20 Kg
Power Input	220V single phase · 50/60 Hz
Water flow Rate	<3~5 lpm
Operating Environment	Temperature : 20°C ~25 °C ; Humidity : <70%
Software	
Operating System Supported	Microsoft Windows® 2000 · XP or 7

Note *1: Capacity of carrier depends on the DUT size and form factor.

Note *2: Chroma 58620 is compatible with multiple Optical Spectrum Analyzers. Please inquire for further details.

Note *3: Temperature uniformity is dependent on operating temperature ±(1 °C + 1%ΔT).

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