Photonics Test Solution

Laser Diodes: VCSEL/CoS/TO-CAN/Packaged

www.chromaate.com

Get more information in Chroma ATE APP

Chroma
Test & Automation Turnkey Solution Provider
Founded in 1984, Chroma ATE is a world leading supplier in Automatic Testing Equipment (ATE). We provide proven test solutions for many key technology applications including Laser Diode, VCSEL, LED, photovoltaic, Li-battery, electric vehicle (EV/EVSE), semiconductor/IC, photonics, flat panel display, video and color, power electronics, passive component, electrical safety, and thermoelectric test, as well as automated optical inspection and manufacturing execution systems.

Chroma’s photonics test solutions address mainly on automated test equipment for laser diode, VSCEL, LED both in wafer and chip format as well as optical communication active components. With more than 30 years of power electronic and automated optical test experience, Chroma offers many integrated mechanism and temperature control technology capable of performing reliable characteristics and aging test for optical devices under various temperature test conditions.
Chroma 7940 wafer chip inspection system is an automated inspection system for post-diced wafer chip inspection. It is capable of inspecting both top and bottom view of the wafer chip simultaneously. Utilizing an advanced illumination technology and color camera acquisition, the system can be customized for various wafer processes and test configuration such as vertical chip or flip chip inspection.

With high-speed camera and inspection algorithms, Chroma 7940 can inspect up to 6” wafer in 3 minutes with a throughput of up to 15 msec./chip. It provides auto focus and compensation for wafer warpage and leveling of an uneven chuck. 2X and 5X magnifications with 1.3µm/pixel and 0.5µm/pixel resolutions respectively are used to detect various defects down to 1.5µm in size.

System Function
After tape expansion, individual chip orientation may become irregular and chip realignment is needed during the inspection process. Chroma 7940 includes a software alignment function that automatically adjusts wafer alignment angle for precision scanning. The system comes with an easy-to-read and user-friendly interface that significantly reduces user’s learning time while providing visual wafer mapping of defect regions and inspection result.

Defect Analysis
Besides pass/fail inspection and bin data, all raw data for the inspection result can be recorded for further analysis. This database makes it easy to analyze and obtain optimal parameters for balancing the over-kill and under-kill. It is also used to monitor defect trend caused by the production process, therefore capable of providing advanced feedback for production control.

Key Features
☑ Simultaneous double side color inspection
☑ 6” wafer / 8” inspection area
☑ Automatic wafer alignment
☑ Wafer shape / edge identification
☑ Unique defect detection algorithm
☑ Versatile defect criteria definitions
☑ Complete defect classification
☑ Defect detection rate > 99%
☑ Wafer mapping
  - Yield
  - Up/down stream operation

Detail defect raw data for analysis
**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model</th>
<th>7940</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suitable Chip and Package Type</td>
<td>Grip ring or wafer frame</td>
</tr>
<tr>
<td>Inspection Area</td>
<td>8 inches</td>
</tr>
<tr>
<td>Chip Size</td>
<td>125um x 125um ~ 2.2mm x 2.2mm at 5X magnification</td>
</tr>
<tr>
<td>Suitable Package</td>
<td>LED vertical chip, flip chip, VCSEL</td>
</tr>
</tbody>
</table>

**Camera**

25M Color Camera x 2

**Light Source**

LED co-axis light, ring light, back light

**Magnification**

2X, 5X objective lens selectable

**Resolution**

1.28um/pixel (2X), 0.5um/pixel (5X)

**Throughput**

6” wafer in 3 minutes at 2 lights, 2X magnification

**Algorithm**

- Pad defect, mesa defect, chipping defect, double chips and emitting area defect
- Provide algorithm interface to replace or add new inspection algorithm

**System**

**Cassette Load Port**

Auto load ports x 3

**Warpage Compensation**

Software auto focus to overcome wafer warpage

**PC**

x 1

**Software Function**

**Monitor**

Real-time wafer map display

**Image Storage**

All/defect image saving selectable

**Report**

Including chip position, defect type, inspection results

**Cassette Selection**

Programmable cassette selection and scheduling

**Facility Requirement**

**Dimension (WxDxH)**

1500 mm x 1500 mm x 1800 mm

**Weight**

2000 kg

**Power**

AC 220V±10%, 50/60 Hz, 1Φ, 3KW

**Compressed Air**

0.6 MPa

**Operation Temperature**

+5˚C ~40˚C

**Operation Humidity**

20%~60% R.H.
Optoelectronic Source Measurement System

Model 58602

Burn-in, Reliability & Life Test
Chroma 58602 is a high density, precision multi Source Measurement Unit (SMU) module with temperature control and exchangeable interface developed for Burn-In, Reliability and Life Test of optoelectronic components including Laser Diodes, LEDs, OLEDs, Photo-Diodes and other similar components. Each module has up to 768 discrete SMUs (6 modules contain up to 4608 SMUs per system), which may be used as Device Drives, Device Biasing and/or Measurement Operations. The system’s high density allows for optimized clean room space.

Source and Measurement
Discrete voltage measurements are available for high current devices placed in series. Multiple current sources may also be paralleled (exchanging the conversion interface board) to support higher power devices.

Ultimate Flexibility
Chroma brings the change kit flexibility used in the semiconductor industry to optoelectronics. Through the change kit the 58602 can be configured to other devices in minutes for:

- High Channel Density
- Higher Currents
- Optical Power Monitoring
- Monitor Photodiode Measurements
- Dark Current Measurements
- Component Biasing
- Multiple Device Types

Efficient Processing
- Higher temperatures reduce aging times and provide quicker results while lowering cost by requiring lower channels
- The High Density Design reduces floor space over other similar solutions
- Batch processing is performed through device carriers. Carriers may be used between Aging and Characterization Testing. Software tracks acquired data between all Chroma testing
- Same base system may be used for many device types. A Conversion Kit provides quick, cost effective adaptation to prototypes and new products or variation in production
- Hot Swappable power supplies eliminate this type of failure mode while reducing MTBF / MTTR

Key Features
- Burn-In, Reliability and Life Testing
- Up to 4608 Channels
- Up to 20A per device
- Up to 150 ºC
- Batch processing via device carriers
- Change Kit – adapts to multiple devices
### DEVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Devices</strong></td>
<td></td>
</tr>
<tr>
<td>Component Types</td>
<td>Laser Diodes, LEDs, OLEDs, SLEDs, Photodiode, MPDs</td>
</tr>
<tr>
<td>Package Types</td>
<td>CoS / CoC, TO-Can, C-Mount, Custom</td>
</tr>
</tbody>
</table>

### MODULE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Uncertainty Accuracy (%)</th>
<th>Random Uncertainty (Stability)</th>
<th>Max Devices Per Module / System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>380 nm – 1700 nm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Control (Life Test)</td>
<td>40°C - 150°C</td>
<td>0.1°C</td>
<td>± (2.0% + 1°C)</td>
<td>1°C</td>
</tr>
<tr>
<td>Temperature Control (I-V)</td>
<td>30°C - 50°C</td>
<td>0.1°C</td>
<td>± (2.0% + 1°C)</td>
<td>1°C</td>
</tr>
<tr>
<td>Source/Measure Voltage</td>
<td>0 - 3.00 V</td>
<td>175 µV</td>
<td>1% + 5 mV</td>
<td>5 mV</td>
</tr>
<tr>
<td>Source/Measure Current</td>
<td>0.250 mA*</td>
<td>48 µA</td>
<td>1% + 480 µA</td>
<td>480 µA</td>
</tr>
<tr>
<td>Power Measurement</td>
<td>0 – 250 mW</td>
<td>250 µW</td>
<td>(20% + 500 µW)</td>
<td>2500 µW</td>
</tr>
<tr>
<td>Source/Measure Voltage</td>
<td>1.50 - 4.00 V</td>
<td>76.3 µV</td>
<td>2% + 30 mV</td>
<td>30 mV</td>
</tr>
<tr>
<td>Source/Measure Current</td>
<td>0.1250 mA</td>
<td>38.3 µA</td>
<td>2% + 12.5 mA</td>
<td>12.5 mA</td>
</tr>
<tr>
<td>Current Pulses</td>
<td>200 µs - CW</td>
<td>100 µs Rise / 10 µs Fall (typical)</td>
<td>1% Overshoot</td>
<td>10 µs Settling Time</td>
</tr>
<tr>
<td>Power Measurement (CW Only)</td>
<td>0 – 1500 mW</td>
<td>5 mW</td>
<td>(20% + 500 µW)</td>
<td>2500 µW</td>
</tr>
<tr>
<td>Source/Measure Voltage</td>
<td>1.50 - 4.00 V</td>
<td>76.3 µV</td>
<td>2% + 30 mV</td>
<td>30 mV</td>
</tr>
<tr>
<td>Source/Measure Current</td>
<td>0.2500 mA**</td>
<td>76.6 µA</td>
<td>2% + 25 mA</td>
<td>25 mA</td>
</tr>
<tr>
<td>Current Pulses</td>
<td>200 µs - CW</td>
<td>100 µs Rise / 10 µs Fall (typical)</td>
<td>1% Overshoot</td>
<td>10 µs Settling Time</td>
</tr>
<tr>
<td>Power Measurement (CW Only)</td>
<td>0 – 2500 mW</td>
<td>5 mW</td>
<td>(20% + 500 µW)</td>
<td>2500 µW</td>
</tr>
<tr>
<td>Source/Measure Voltage</td>
<td>0.5000 V</td>
<td>175 µV</td>
<td>1% + 5 mV</td>
<td>5 mV</td>
</tr>
<tr>
<td>Source/Measure Current</td>
<td>0.5000 mA**</td>
<td>180 µA</td>
<td>0.1% + 2.5 mA</td>
<td>1.0 mA</td>
</tr>
<tr>
<td>Power Measurement</td>
<td>0 – 5000 mW</td>
<td>5 mW</td>
<td>(20% + 500 µW)</td>
<td>2500 µW</td>
</tr>
<tr>
<td>Source/Measure Voltage</td>
<td>20.50.0 V</td>
<td>175 µV</td>
<td>1% + 10 mV</td>
<td>30 mV</td>
</tr>
<tr>
<td>Source/Measure Current</td>
<td>500 - 5000 mA**</td>
<td>180 µA</td>
<td>2% + 2.5 mA</td>
<td>25 mA</td>
</tr>
<tr>
<td>Power Measurement</td>
<td>0 – 5000 mA &amp;</td>
<td>5 mW</td>
<td>(20% + 500 µW)</td>
<td>2500 µW</td>
</tr>
</tbody>
</table>

### Module & System Specifications:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module</td>
<td>Carriers Per Module*** 1 6</td>
</tr>
<tr>
<td>Data Sample Time</td>
<td>10 sec - 48 hrs</td>
</tr>
<tr>
<td>Communication</td>
<td>Ethernet - TCP/IP</td>
</tr>
<tr>
<td>Change Kit Device Adaptability</td>
<td>Maximizes Flexibility</td>
</tr>
<tr>
<td>User Site Calibration/Validation</td>
<td>With Validation Board &amp; DMM</td>
</tr>
<tr>
<td>Internal Water Leak Detectors</td>
<td>Yes</td>
</tr>
<tr>
<td>Device Temperature ****</td>
<td>40°C - 150°C</td>
</tr>
<tr>
<td>Modules Per System</td>
<td>1 6</td>
</tr>
<tr>
<td>System Per Server</td>
<td>1 2</td>
</tr>
<tr>
<td>System Thermal Deviation</td>
<td>5°C</td>
</tr>
<tr>
<td>System Internal Power</td>
<td>High Reliable, Redundant, Hot Swappable Power Supply</td>
</tr>
<tr>
<td>Water Leak Shut Down</td>
<td>System Level (Optional)</td>
</tr>
<tr>
<td>Power Requirement ****</td>
<td>208 3-Phase VAC or 187 to 250 VAC</td>
</tr>
<tr>
<td>Water Temperature</td>
<td>20°C ± 2                     18°C - 20°C</td>
</tr>
<tr>
<td>Water Flow (per Module)</td>
<td>3 to 6 Liters/Min</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>23°C ± 5°C</td>
</tr>
<tr>
<td>Ambient Relative Humidity</td>
<td>&lt; 60 %RH (Non Condensing)</td>
</tr>
<tr>
<td>Rack Size (HxWxD)</td>
<td>80.5” x 23” x 44”</td>
</tr>
</tbody>
</table>

* 58602-022: 8 channels may be paralleled to source up to 2-Amps per device.
** 58602-053 & .0535: 4 channels may be paralleled to source up to 20-Amps per device.
*** For discrete drive systems, Series sources vary per device power.
**** Typical thermal control range is 40°C.
***** Series drive source varies dependent on device power.

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Laser Diode Burn-in & Reliability Test System

Model 58604

Burn-in, Reliability & Life Test
Chroma 58604 is a high density, multifunctional, and temperature controlled test system designed for laser diode burn-in and lifetime test. Each module has up to 256 SMU channels providing source current and measure voltage in various control modes as described below.

Auto Current Control Mode (ACC)
In auto current control (ACC) mode, the control circuit provides a preset current to each laser diode with high stability. Regardless of change in device resistance and temperature, the current is always kept constant over the test period. The device voltage will be recorded as quality parameter for reference.

Auto Power Control Mode (APC)
In auto power control (APC) mode, the system utilizes feedback signal from the optional external Photo Diode PCB for each laser diode. The control circuit adjusts each laser diode current automatically to keep a constant feedback signal strength so that the laser diode optical output is maintained constant over the test period. The device voltage and current are recorded as quality parameters for reference.

Temperature Control
Chroma’s proprietary heat plate design allows the laser diode case temperature to be maintained with high accuracy, excellent stability, and good uniformity across the test fixture. Compared with oven or chamber type laser diode burn-in systems, Chroma’s solution is much more compact, easier to operate, better performance, and energy saving. Additional benefits include small footprint, versatile usage, and easy maintenance.

Individual Module Operation
Modular design enables individual modules to operate at different temperatures with different control modes as well as start and stop times. The design provides great flexibility during test operation.

Protection and Individual Channel Shutdown
The control circuit is specially designed to protect laser diodes during unexpected power shutdown. No surge current or voltage will occur to hurt the devices. High/Low limits of current and voltage can be set to perform shutdown protection. When abnormality happens to a particular channel, only that specific channel will be shut down while others continue to run normally. Besides protection functions implemented in the control circuit, isolation and ESD protection are also provided in the system.

Auto Data Recovery after Communication Interruption
Burn-in data are stored in the system PC as well as optional remote servers. If the communication between the module and PC is broken temporarily, the data will be buffered in the module up to 6 hours or longer. After the communication is restored, the buffered data will be transferred back to the PC/server without any data loss.

Key Features
☑ Laser Diode Burn-In, Reliability and Life Test
☑ ACC and APC control modes
☑ Individual channel control and measurement
☑ Drive current 500 mA per channel & up
☑ Precise temperature control up to 125°C
☑ Individual module operation
User Friendly Softpanel
The soft panel provides an intuitive user-friendly visual interface to allow convenient checking of certain device at certain module with simple mouse-clicks anytime during the test. The burn-in raw data are stored in a Microsoft Excel compatible format for further analyses. Optional barcode system can also be incorporated for test management.

Control Panel | Data Analysis | Test Item
--- | --- | ---

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model</th>
<th>S8604</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMU Module</td>
<td></td>
</tr>
<tr>
<td>Channel Number</td>
<td>up to 256</td>
</tr>
<tr>
<td>Laser Diode Type</td>
<td>TO-46, TO-56, CoC</td>
</tr>
<tr>
<td>Test Function</td>
<td>ACC (standard) APC, LIV (optional)</td>
</tr>
<tr>
<td>Burn-in Record Time</td>
<td>1 min to 5000 hours</td>
</tr>
<tr>
<td>Auto Current Control Mode</td>
<td></td>
</tr>
<tr>
<td>Current Range</td>
<td>± 500 mA</td>
</tr>
<tr>
<td>Current Accuracy</td>
<td>0.2% F.S.</td>
</tr>
<tr>
<td>Compliant Voltage</td>
<td>± 7 V</td>
</tr>
<tr>
<td>Voltage Measurement Range</td>
<td>± 7 V</td>
</tr>
<tr>
<td>Voltage Measurement Accuracy</td>
<td>0.2% F.S.</td>
</tr>
<tr>
<td>Auto Power Control Mode (Optional)</td>
<td></td>
</tr>
<tr>
<td>External PD type</td>
<td>Si or InGaAs *1</td>
</tr>
<tr>
<td>Wavelength Range</td>
<td>400 ~ 1600 nm *1</td>
</tr>
<tr>
<td>Optical Power Measurement Repeatability</td>
<td>± 1%</td>
</tr>
<tr>
<td>Temperature Control</td>
<td></td>
</tr>
<tr>
<td>Temperature Measuring Range</td>
<td>Ambient ~ 125 °C</td>
</tr>
<tr>
<td>Temperature Setting Range *2</td>
<td>45~125 °C</td>
</tr>
<tr>
<td>Temperature Setting/Reading Resolution</td>
<td>0.1 °C</td>
</tr>
<tr>
<td>Temperature Stability *3</td>
<td>1 °C</td>
</tr>
<tr>
<td>Temperature Uniformity</td>
<td>±(1 °C + 1.2% ΔT) *4</td>
</tr>
<tr>
<td>System</td>
<td></td>
</tr>
<tr>
<td>CommunicationPort</td>
<td>Ethernet to server</td>
</tr>
<tr>
<td>Dimensions (D x W x H)</td>
<td>1,300 mm x 900 mm x 1,900 mm</td>
</tr>
<tr>
<td>Weights</td>
<td>500 ± 50 kg</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>187 ~ 250 Vac (3 Phase 4 Wire, Δ Connection) or 323 ~ 437 Vac (3 Phase 5 Wire, Y Connection) / 45 ~ 65 Hz</td>
</tr>
<tr>
<td>Environment Temperature</td>
<td>20~30 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>&lt;80% RH, non-condensing</td>
</tr>
<tr>
<td>Compressed Air</td>
<td>5 kgf/cm³, 30 L/min.; 0.5 Mpa</td>
</tr>
</tbody>
</table>

Note *1: Wavelength dependent, customized PD types upon request
Note *2: Condition : under 10W thermal load of test fixture
Note *3: Thermal platform temperature without DUT loading, ΔT = |ambient temperature - setting temperature|
Note *4: 1 °C = (Max T - Min T) within 48 hrs burn-in time
Laser Diode Characterization System

Model 58620

58620 Characterization Station Overview
The Chroma 58620 Laser Diode Characterization Station is a state-of-the-art full turnkey system specifically designed for Laser Diode testing. Features range from macro inspection of the facet or aperture active area to a full suite of electro-optical parametric tests. When used in conjunction with Chroma’s high capacity carrier, multiple devices can be rapidly indexed to improve not only test times but also repeatability which produces a large impact on yield and quality control. The Chroma 58620 is equipped with an ultra stable and uniform thermal control platform to incorporate R&D-style tests in a production environment.

Ultra Precise Carrier Design
From vast experience in the Semiconductor industry, Chroma introduces a precision and high capacity carrier which may be designed to accommodate a large array of mechanical form factors such as Chip on Carrier (CoC), Chip on Submount (CoS), Transistor Outline (TO), or Laser Bars. The highly innovative bi-lateral design’s symmetry allows components to be placed on both sides allocating a larger batch of components. The carrier’s multi-layer configuration allows for components to be easily inserted manually or by a robotic pick and place system. Surfaces and materials are engineered to optimize thermal contact to the device under test (DUT) allowing for efficient heat transference and a high level of temperature control. Once the carrier is inserted, the robotics take over and perform a wide-range of pre-defined automated tests on all devices (both sides) in the carrier.

Multi-Purpose Platform
The Chroma 58620 is equipped with a fully-automated alignment station to simulate or correlate to real-world Optical Sub-Assembly (OSA) testing. These parameters include, but are not limited to, power, coupling efficiency and spectral performance. Equipment used can be as simple as a ber-coupled power meter and spectrometer, or as complex as a full-featured Optical Spectrum Analyzer to measure Side-Mode Suppression Ratio and more. Other stations may incorporate an integrating sphere for raw output measurements and current sweep curves, or even capacitance metrology equipment if necessary. Since the carrier is indexed to position and bar-coded for traceability, every device is tagged with an identification code. This enables the Chroma 58620 to provide the user with traceable data to either reduce the need for down-stream testing, or accurate device-specific correlation to final package test parameters.

Key Features
☑ Full Turn-Key Automated Test for edge and surface emitting laser diodes
☑ High precision and large capacity carrier, interchangeable with other automated equipment
☑ Fully automated alignment for fiber-coupled tests
☑ Automated optical inspection decreasing mechanical positioning Takt time
☑ Highly accurate TEC temperature controller with stability up to $\pm 0.01^\circ$C
☑ PXI-Based SMU and power meter for fast test times
☑ Full suite of software analysis tools for laser diode characterization (Including: Ith, Rs, Vf, slope efficiency, $\lambda$ p)
Cross-Platform Compatibility
The carrier, designed for a particular product type used on the Chroma 58620, can also be used in other processes. This enables the user to form a streamlined, fully automated, Laser Diode verification process. These processes are, but not limited to, Chip/Wafer Qualification, Life-Test, Burn-In, Chip Characterization, and Final Production Test. The carrier is designed to be inter-operable with the Chroma 58601-family of Opto-Electronic Burn-In and Life Test systems. Devices can be left in the carrier to burn-in for hours or months, collect valuable in-situ degradation data, and then inserted into the 58620 for full-scale characterization. With access to pre-test, burn-in, and post-test parametric information, the user can generate accurate component models that are empirically based. This adds tremendous value when working to increase yield or compare to theoretical expectations.

Friendly and Flexible User Interface
The Chroma 58620 features a complete user-friendly Graphical User Interface (GUI) that includes recipe generation, test sequence execution, and sophisticated data management with export to standard MES or proprietary database systems. There are rapid pre-verification features to ensure correct part positioning such as initial continuity testing and DUT photographs. This allows the user to be alerted and the opportunity to adjust for maximum test time efficiency and yield. Recipe generation enables the user to create complex test plans for an entire carrier or by DUT position. The display also provides complete battery of parametric data in tabular or graphical form. All or selective opto-electronic parameters such as output power sweep curves or spectral proles can be displayed and manipulated. The Chroma 58620 provides the user with an accurate picture of final test yield based on carrier or production lots. Once the tests are performed, the data management system allows for local viewing or remote storage to a wide array of MES architectures, proprietary databases and file systems.

SPECIFICATIONS
Model 58620
Device Under Test
Form Factor CoC, CoS
Channels in Carrier*1 80 Channels (Max.) / 40 DUTs (Max.)
Current Ranges (Chroma Model 52401)
Current Range (Source & Measurement) ± 200mA / 2μA / 20μA / 200μA / 2mA / 20mA / 200mA
Current Resolution ±1.6μA/±16μA/±160μA/±1.6nA/±16nA/±1.6μA
Current Accuracy (Source & Measurement) |range|±1mA : 0.1% + 0.1% FS ; |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 Peak wavelength, SMSR, etc.
Optical Spectrum Analyzer*(Optional)
Wavelength Range 700 nm to 1700 nm
Resolution Bandwidth < 0.1 nm
SMSR Measurement > 40 dB
Wavelength Accuracy ± 0.03 nm
Temperature Control
Temperature Range 25 °C – 85 °C ; -5 °C – 85 °C (optional)
Temperature Accuracy 0.3 °C
Temperature Uniformity ±(0.5 °C+1% Δ T)*3
Mechanical Specification
Motion Stage Travel Distance 400 mm
Minima Fine Stage Resolution 20 nm
System Size (W x D x H) 1000 mm x 1200 mm x 1350 mm
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; additional channels/DUTs to be reviewed and customized.
Note *2 : Chroma 58620 is compatible with multiple Optical Spectrum Analyzers.
Please inquire for further details.
Note *3 : Δ T = | Ambient temperature - setting temperature |
TO-CAN Package Inspection System

Model 7925

Chroma 7925 is an automated inspection system for TO-CAN package capable of detecting lens scratches (>30 μm) with clear display of particles through the advanced illumination technology. The system is equipped with auto-focus function to compensate for tray and package height variation during the inspection process.

The user can edit the defect criteria with versatile pass/fail settings and identify defect packages in another tray by defect code. The entire machine process is fully automated from loading, inspection, picking to unloading. It reduces the probability of operating error and abnormal procedure. A detailed inspection raw data and defect images are available for analysis of potential process problem and further enhancing the process yield.

Key Features
☑ Defect inspection of lens scratches, cracks, particles and metal cap of TO-CAN package
☑ Auto-focus function to compensate for tray or package height variation
☑ Defect criteria editor with versatile pass/fail settings
☑ High inspection reliability and repeatability as compared to visual inspection
☑ High inspection throughput (>3600 UPH)
☑ Auto-cassette function to reduce loading/unloading time
☑ Customized inspection report and defect images for analysis

TO-CAN Defect Items

- Abnormal Coating
- Lens Scratch
- Lens Contamination
- Lens Crack
- Cap Scratch
- Wrong Cap

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>7925</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>TO-CAN package</td>
</tr>
<tr>
<td>Tray Size</td>
<td>&lt; 6” (width) X 6” (Length)</td>
</tr>
</tbody>
</table>
| Station Layout | Optical side inspector X1  
                            Auto cassette X 2  
                            Picker X1 |
| Throughput  | UPH 3600 (depends on the numbers of light used) |
| Stages      | X, Y axis motorized stages |
| Algorithm   | Provide enable/ disable function and external algorithm interface |
| Image Save  | All/ defect/ none image selectable |
| Monitor     | Real-time tray map |
| Report      | *.txt, including chip position, defect type |
| Dimension   | 1500mm x 1200 mm x 1800mm |

All specifications are subject to change without notice.
High Precision Source Measure Unit
Model 52400 & 52400e Series

Light emitting devices such as LEDs or laser diodes require sourcing, loading and optical power measurement when conducting parametric test for LIV as well as reverse characteristics. The 52400 and 52400e series SMUs can either be programmed as a current source to drive the DUT testing forward device characteristics or may also be set as a voltage source performing device reverse characteristics.

Key Features
- 1-Slot PXI/PXIe express module
- 2/4 independent channels (4 ch for Model 52401e-7-1)
- 18-bit resolution
- Four quadrant operation
- 6-wire Force/Sense/Guard
- Low output noise
- DIO/Trigger bits
- Deterministic hardware sequencer
- Programmable resistance
- 16 control bandwidth selection
- Master/Slave operation
- LabView/LabWindows & C/C#
- Softpanel GUI

Applications
- Semiconductor
- LED / Laser Diode
- Solar Cell
- Battery / BMS
- Transistor
- Automotive
- Avionics
- Power Electronics
- Sensor / IoT

Four Quadrant Operation

Typical LIV test setup for LED/LD
Typical LIV Curve of LED/LD
**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model Name</th>
<th>S2401e-7-1</th>
<th>S2401-25-200m</th>
<th>S2405-5-3 *1</th>
<th>S2405-10-2 *1</th>
<th>S2405-25-1 *1</th>
<th>S2405e-25-3 *1</th>
<th>S2405-25-3 *1</th>
<th>S2405e-25-3 *1</th>
<th>S2405-25-6 *3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slots</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Output Channels</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>3.5W x 4</td>
<td>5W x 2</td>
<td>25W x 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td>1.8W x 4</td>
<td>5W x 2</td>
<td>10W x 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>Backplane Power</td>
<td>External 48VDC source required *2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Input Current</td>
<td>Peripherial 4A@+12V</td>
<td>0.7A Max</td>
<td>2.2A Max</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Isolation</td>
<td>Isolated but share common LO</td>
<td>Isolated by External Power Supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bit Resolution</td>
<td>20 bits for measurement 16 bits for programming</td>
<td>18 bits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programmable Loop Bandwidth</td>
<td>8 steps</td>
<td>16 steps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Settling Time</td>
<td>&lt;30µSec, typically</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 steps</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Force Voltage Ranges

- **±7V**
  - ±25V, ±10V, ±5V, ±2.5V, ±1V, ±500mV
  - ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV
  - ±10V, ±5V, ±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV
  - ±25V, ±12.5V, ±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV

### Force Current Ranges

- **±1A(Pulse mode)**
  - ±200mA, ±20mA, ±1mA, ±20µA, ±200µA, ±200mA
  - ±5V, ±2.5V, ±1V, ±500mV, ±250mV, ±100mV, ±50mV, ±25mV, ±10mV, ±4mV

### Measure Voltage Ranges

- **±7V**
  - ±25V, ±10V, ±5V, ±2.5V, ±1V, ±500mV, ±250mV, ±100mV, ±50mV, ±25mV, ±10mV, ±4mV

### Measure Current Ranges

- **±1A(Pulse mode)**
  - ±200mA, ±20mA, ±1mA, ±20µA, ±200µA, ±200mA
  - ±5V, ±2.5V, ±1V, ±500mV, ±250mV, ±100mV, ±50mV, ±25mV, ±10mV, ±4mV

### Force Voltage Accuracy

- 0.02% reading + 0.01% F.S.
- 0.05% reading + 0.0076% F.S. (<500mV Range)
- 0.02% reading + 25µV (<500mV Range)
- 0.05% reading + 0.008% F.S. (≥500mV Range)
- 0.05% reading + 25µV (<500mV Range)

### Force Current Accuracy

- 0.1% reading + 0.1% F.S. (≥500mA Range)
- 0.05% reading + 0.05% F.S. (<500mA Range)
- 0.05% reading + 25µV (<500mA Range)
- 0.1% reading + 0.1% F.S. (>1A Range)
- 0.05% reading + 0.05% F.S. (>1A Range)

### Measure Voltage Accuracy

- 0.02% reading + 0.01% F.S.
- 0.05% reading + 0.0076% F.S. (<500mV Range)
- 0.05% reading + 25µV (<500mV Range)
- 0.05% reading + 0.008% F.S. (≥500mV Range)
- 0.05% reading + 25µV (<500mV Range)

### Measure Current Accuracy

- 0.1% reading + 0.1% F.S. (≥500mA Range)
- 0.05% reading + 0.05% F.S. (<500mA Range)
- 0.05% reading + 25µV (<500mA Range)
- 0.1% reading + 0.12% F.S. (>1A Range)
- 0.05% reading + 0.05% F.S. (>1A Range)

### Wideband Source Noise

- < 20 mV pp 20MHz BW No Load

### Measurement Sampling Rate

- 600K Samples/s
- 100K Samples/s

### Output Connection

- 5 Wires (+Force, ±Sense, ±Guard)
- 6 Wires (+Force, ±Sense, ±Guard)

### Measurement Log

- 32K Samples/channel

### Output Profiling

- 65535 Steps

### Trigger Input

- Programmable 4 Ch
- Programmable 8 Ch

### Floating Output

- No
- Channel Isolated

### Master/Slave Mode

- Yes
- No

### Programmable Resistance

- Yes
- No

### Regulatory Compliance

- CE/FCC

*Note 1: If chassis has less than 38.2W/slot, then the below output limitations apply.
2.5Amp range = 50% on duty cycle, 500mSec maximum continuous on time ; 3.5Amp range = 40% on duty cycle, 500mSec maximum continuous on time (1250mSec off during maximum on time case) If the PXI-SMU card is over temperature, it will automatically disconnect output to protect the unit.
Note 2: Required voltage range 48V ± 5%; required voltage noise ±100mVpp.
Note 3: In the pulse mode of S2405-25-6, pulse width 100µS-5mS, maximum duty 5%, and voltage range ±5V only.

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