Laser Processing Systems

Scan optical system and Focusing optical system

For the maskless processing, it can do direct drawing processing on the basis of the data like CAD. It is usually classified as scan optical system and focusing optical system. (There is also a hybrid scanning that combines both.)

<table>
<thead>
<tr>
<th>Scanning method</th>
<th>Scan optical system</th>
<th>Focusing optical system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanning speed</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>Scanning area</td>
<td>narrow</td>
<td>wide</td>
</tr>
<tr>
<td>Focusing method</td>
<td>Φθ Lens</td>
<td>Objective Lens</td>
</tr>
<tr>
<td>Focusing spot diameter</td>
<td>few 10μ – few 100μ</td>
<td>submicron – few 10μ</td>
</tr>
<tr>
<td>Death of focus</td>
<td>deep</td>
<td>shallow</td>
</tr>
</tbody>
</table>

[Scan Type]

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Part Number</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Power Laser Shutter Unit</td>
<td>SHPS-□□□□□□</td>
<td>Compatible with YAG (1064, 532, 355 and 266nm)</td>
</tr>
<tr>
<td>Beam Expander</td>
<td>LBE-□□□□□□</td>
<td>He-Ne (λ=632.8nm), for LD (λ=780, 830nm), YAG (λ=1064nm)</td>
</tr>
<tr>
<td>Laser Beam Expander</td>
<td>BE/LBED</td>
<td>Fitted with dioptr movement</td>
</tr>
<tr>
<td>Variable Attenuator</td>
<td>SVAB-□□□□□□</td>
<td>High output power type</td>
</tr>
<tr>
<td>fθ Lens</td>
<td>fθ</td>
<td>Available for each wavelength</td>
</tr>
</tbody>
</table>

[Focusing System (with Observation System)]

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Part Number</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Power Laser Shutter Unit</td>
<td>SHPS-□□□□□□</td>
<td>Compatible with YAG (1064, 532, 355 and 266nm)</td>
</tr>
<tr>
<td>Beam Expander</td>
<td>LBE-□□□□□□</td>
<td>He-Ne (λ=632.8nm), for LD (λ=780, 830nm), YAG (λ=1064nm)</td>
</tr>
<tr>
<td>Laser Beam Expander</td>
<td>BE/LBED</td>
<td>Fitted with dioptr movement</td>
</tr>
<tr>
<td>Variable Attenuator</td>
<td>SVAB-□□□□□□</td>
<td>High output power type</td>
</tr>
<tr>
<td>Auto Focus Unit</td>
<td>TAF-SS-KZ</td>
<td>TTL system</td>
</tr>
<tr>
<td>Objective Lens</td>
<td>PAL□□□□□□□□</td>
<td>Available for each wavelength</td>
</tr>
<tr>
<td>Observation Unit with Coaxial Illumination</td>
<td>OUCI-2</td>
<td>Compatibility with YAG (1064, 532 and 355nm)</td>
</tr>
<tr>
<td>Dichroic Case for Laser Introduction</td>
<td>DIMC□□□□□□</td>
<td>Fitted with laser introduction port</td>
</tr>
<tr>
<td>Observation Unit with Coaxial Illumination</td>
<td>OUCI-3□□□□□□</td>
<td>Compatibility with YAG (1064, 532 and 355nm)</td>
</tr>
</tbody>
</table>
**Processing software**

It is a software that can set processing pattern and area on the screen while observing the position of processing by camera. It integrates the set of wavelength switching and irradiation condition of multiple laser, switching of the objective lens, and control of the stage. It corresponds to drawing CAD data like DXF and to mass production line from prototype applications.

- **Program Operation**
  - Stage operation by specifying coordinates
  - On Off operation for the laser irradiation
  - Easy processing by reading a CSV file
- **Software Joystick**
  - Continuous movement
  - Step movement

**Applications**

- Removing metal thin film of 10µm or less
- Cutting silicon wafer of about 100µm thickness
- Cutting metal and ceramic of 100 – 500µm thickness, drilling (≥100µm – )
Shutter for high power laser

Safely interrupt the optical path by the high-power laser mirror and beam.

![Shutter for high power laser](image)

Laser beam expander unit

By lens configuration of the air gap, it is possible to correspond to high-power laser and be strict collimation adjustment in diopter correction mechanism.

![Laser beam expander unit](image)

Variable attenuator

Light quantity of the high-power laser can be continuously variable by PBS and wavelength plate.

![Variable attenuator](image)

Auto focus unit

By built-in laser sensor, it enables high-speed tracking even for transparent object such as films or glasses.

![Auto focus unit](image)
Surface accuracy guarantee mirror
Guaranteed surface accuracy in integrated holder, ideal for built-in locking mechanism

Objective lens
For from DUV to the near-infrared and for various processing laser

Motorized stage
Plentiful lineup from high precision type to high rigidity long stroke.

Galvano unit
Drawing high speed laser of high quality reducing the jitter and wobble

fθ lens
Lineup in each wavelength, scanning area and focal length

Barrel unit + laser introduction block
Observation barrel of optimal coaxial epi-illumination for the positioning of the micro-machining

Base
High rigidity base series to support the stable performance

* it is available to assembly for each company’s galvanometer. Please contact to our international sales division.
This is the power supply (supporting CW and pulse) for driving the laser diode (LD). The power supply for driving a Peltier element and cooling unit all-in-one type required for driving LD is also part of our lineup.

- **LD Terminal Short Function**
  Function to short between anode and cathode of LD when power is switched OFF is equipped. By doing it, LD can be protected from static electricity, etc.

- **Goggle compatible white display**
  Letters can be displayed in white. Superior in legibility even when using laser-protect goggle.

- **Instantaneous power failure detection**
  LD can be safely protected by shutdown operation after instantaneous power failure detection, while there is electric current running after power has been cut off.

- **Various Alarm Functions**
  Alarm with screen display equipped enables prompt identification of cause and repair.

- **LD operation integrator**
  LD operation integrator function equipped, which is essential for LD lifecycle management. Zero reset available for LD replacement.

- **Full Interface**
  Interface equipped for setting in a system. Freely externally operable.

---

**Power supply for LD driving | SLD**

Precise digital control environment-friendly highly efficient Laser Diode power supply

- Developed specifically for LD driving.
- Various functions to protect LD.
- Various alarms such as instantaneous power failure etc..
- Can be controlled using the front panel and by commands from a PC connected via RS232C.
- Includes I/O (Input-Output) for interfacing to external devices and for emergency stop.
- Automatic Current Control for stable operation.

---

**SLD Series**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max. output voltage [V]</th>
<th>Max. output current* [A]</th>
<th>Input voltage [AC V]</th>
<th>Apparent power [VA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLD0350</td>
<td>3</td>
<td>50</td>
<td>85 – 264</td>
<td>500</td>
</tr>
<tr>
<td>SLD0450</td>
<td>4</td>
<td>50</td>
<td>85 – 264</td>
<td>600</td>
</tr>
<tr>
<td>SLD0635</td>
<td>6.5</td>
<td>35</td>
<td>85 – 264</td>
<td>600</td>
</tr>
<tr>
<td>SLD03A0</td>
<td>3</td>
<td>100</td>
<td>85 – 264</td>
<td>800</td>
</tr>
<tr>
<td>SLD04A0</td>
<td>4</td>
<td>100</td>
<td>85 – 264</td>
<td>1000</td>
</tr>
<tr>
<td>SLD0670</td>
<td>6.5</td>
<td>70</td>
<td>85 – 264</td>
<td>1000</td>
</tr>
<tr>
<td>SL01050</td>
<td>10</td>
<td>45</td>
<td>85 – 264</td>
<td>1000</td>
</tr>
<tr>
<td>SLD1338</td>
<td>13</td>
<td>38</td>
<td>85 – 264</td>
<td>1000</td>
</tr>
<tr>
<td>SLD06A0</td>
<td>6.5</td>
<td>100</td>
<td>170 – 264</td>
<td>1800</td>
</tr>
<tr>
<td>SLD1078</td>
<td>10</td>
<td>78</td>
<td>170 – 264</td>
<td>1800</td>
</tr>
<tr>
<td>SLD1365</td>
<td>13</td>
<td>65</td>
<td>170 – 264</td>
<td>1800</td>
</tr>
<tr>
<td>SLD2240</td>
<td>22</td>
<td>40</td>
<td>170 – 264</td>
<td>1800</td>
</tr>
</tbody>
</table>

* Minimum current value is approximately 5% of maximum output current.

---

**Guide**

▶ We do handle orders for manufacturing products with special specifications, which are not shown in the catalog. Please contact our sales department.

---

**Option Cable for LD**

- **For 50A**
  
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Cable Length [m]</th>
<th>Applicable Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50-CA-05</td>
<td>0.5</td>
<td>SLD0350, SLD0450</td>
</tr>
<tr>
<td>LD50-CA-10</td>
<td>1.0</td>
<td>SLD0635, SLD1045</td>
</tr>
<tr>
<td>LD50-CA-20</td>
<td>2.0</td>
<td>SLD1338, SLD2240</td>
</tr>
</tbody>
</table>

- **For 100A**
  
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Cable Length [m]</th>
<th>Applicable Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD100-CA-05</td>
<td>0.5</td>
<td>SLD03A0, SLD04A0</td>
</tr>
<tr>
<td>LD100-CA-10</td>
<td>1.0</td>
<td>SLD0670, SLD06A0</td>
</tr>
<tr>
<td>LD100-CA-20</td>
<td>2.0</td>
<td>SLD1078, SLD1365</td>
</tr>
</tbody>
</table>
Precise digital control and high efficiency power supply for laser diodes

**Power supply for LD driving (CW or pulse output) | SMD**

- Designed specifically as a laser diode power supply.
- Pulse or CW diodes can be driven.
- Many LD protection features are included.
- Equipped with various alarm detection systems such as instantaneous power failure detection.
- Fine resolution closed loop current control.
- Arbitrary wave output is available. (30 steps)
- Output can be carried out with an output input signal only.
- Bias control function for setting idle current.

### Specifications

- **Control method**: High-frequency switching method for CW only
- **Output terminal block**: 146
- **Current ripple**: <0.1% RMS (for maximum output current) (within the range of maximum output current x 1% or over)
- **Current setting accuracy**: 0.1%
- **Output current error**: <1% (for maximum output current)
- **Linearity error**: <1% (for maximum output current)
- **Output current temperature characteristic**: <0.03%/°C (for maximum output current)
- **Rise time**
  - 1sec – 1 sec –
- **Fall time**
  - 1sec – 1 sec –
- **Operation ambient temperature**: 0°C – 40°C
- **Storage ambient temperature**: -20°C – 60°C
- **Ambient humidity**: 20 – 90%RH (No condensation)
- **External dimensions**: (W)200 × (H)125 × (D)420mm (Excluding projections)
- **Interface**: RS232C, emergency stop interlock, emission interlock, emission etc.
- **Accessory**: Jumper connector, AC100V cable (For apparent power 1000VA or less only)

### System Configuration

- **PC (Computer control using Serial interface)**: All control modes are available with RS232C (serial communications)
- **ANALOG (The output current is set by the voltage of the SIGNAL IN)**: All control modes are available only with RS232C
- **MOD (The output frequency is set by the frequency of the EXT MOD)**: The output frequency is set by the frequency of the EXT MOD
- **GATE (Control emission on or off with GATE input)**: Control emission on or off with GATE input

### Outline Drawing

- **SLD**: Note) Apparent power of 1800VA applies to outlines

---

**Outline Drawing** (Units: mm)

**SLD**

- **W2026**

---

**Specifications**

- **Part Number**: SMD
- **Voltage**: 4V
- **Output current**: 60A (Duty100%)
- **Output current (pulse)**: 120A (Duty50%, pulse width <10ms)
- **Current ripple**: <120mA (rms)
- **Startup time**: >20μs (It depends on load)
- **Resolution of setting current**: 0.1A
- **Frequency**: 1Hz – 50kHz
- **Digits of setting frequency**: 3 digits
- **Minimum setting pulse width**: 0.01ms
- **Minimum setting duty**: 0.01%
- **Wave shape**: Rectangular or arbitrary (30 steps)
- **Start emission trigger**: Internally set or external input
- **Hour meter**: Emission time
- **Output of current monitor**: 0 – 10V DC
- **Operation temperature**: 0°C – 40°C
- **Storage temperature**: -20°C – 60°C
- **Humidity**: 20 – 90%RH (No condensation)
- **External dimensions**: (W)250 × (H)140 × (D)330mm (Excluding projections)
- **Interface**: Jumper connector, AC100V cable
- **Accessories**: Jumper connector, AC100V cable (For apparent power 1000VA or less only)

---

**Outline Drawing** (Units: mm)

**SLD**

- **Note) Apparent power of 1800VA applies to outlines**
Power Supply Series

Power supply for Peltier | STD/STDS

Precise digital control highly efficient power supply for peltier optics drive for low electric power and high-power lined up.

- Measures temperatures with a thermistor or platinum resistance temperature detector, and drives the Peltier device so that the measured temperature becomes the set value.
- Equipped with various alarm detection systems and auto tuning function.
- Temperature measurement accuracy is 0.01°C. Please use A/D inverter for 24bits.
- For the STD type, both a Pt100 and thermistor can be selected using the parameters.

Guide

▶ We do handle orders for manufacturing products with special specifications, which are not shown in the catalog. Please contact our sales department.

Specifications for Each Model

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max. output voltage [V]</th>
<th>Max. output current [A]</th>
<th>Input voltage [AC V]</th>
<th>Apparent power [VA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>STDS*</td>
<td>4</td>
<td>1.6</td>
<td>85 – 264</td>
<td>100</td>
</tr>
<tr>
<td>STD3609</td>
<td>36</td>
<td>9</td>
<td>85 – 264</td>
<td>600</td>
</tr>
<tr>
<td>STD4813</td>
<td>48</td>
<td>13</td>
<td>85 – 264</td>
<td>1000</td>
</tr>
</tbody>
</table>

* STDS: Maximum output is 3W. Temperature sensor is by thermistor only.

System Configuration

Cooling unit equipped power supply | SXD

This is a user friendly cooling unit equipped power supply for Laser Diode.

- Laser Diode driver
- Temperature of laser diode is kept at a certain point. (Peltier, its drive circuit, heat sink, and fan equipped.)
- Customized heat sink process can be done for laser diode
- High capacity heat sink and fan adopted will cool down LD under high temperature.
- Customer-supplied fiber couple laser diode is to be installed in this power supply.

Guide

▶ We do handle orders for manufacturing products with special specifications, which are not shown in the catalog. Please contact our sales department.

Example of Performance Specifications

<table>
<thead>
<tr>
<th>Part Number</th>
<th>LD Max. output voltage [V]</th>
<th>LD Max. output current [A]</th>
<th>Peltier driving voltage [V]</th>
<th>Peltier driving current [A]</th>
<th>Input AC voltage [V]</th>
<th>Apparent power [VA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SXD</td>
<td>3</td>
<td>50</td>
<td>36</td>
<td>9</td>
<td>85 – 264</td>
<td>800</td>
</tr>
</tbody>
</table>

System Configuration
LD + Power supply for Photodiode driving | SPD

Low profile Laser Diode power supply with temperature controller.

- Constant current Laser Diode driver.
- Closed loop temperature controller with built in Peltier driver.
- Includes all essential functions to maintain SLD and STD's performance in a small, low cost package.
- Output currents of 50A and 100A.
- Temperature resolution is 0.01°C. Supports both Pt100 and thermistor as the temperature sensor.
- Peltier driver maximum power of 300W.

### Specifications of the LD driving part

<table>
<thead>
<tr>
<th>Control method</th>
<th>High-frequency switching method for CW only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ripple</td>
<td>Less than 0.1% RMS (FS) (However, it is in the range of more than maximum output current × 10%)</td>
</tr>
<tr>
<td>Current setting accuracy</td>
<td>0.1A</td>
</tr>
<tr>
<td>Output current error</td>
<td>&lt;1% (for maximum output current)</td>
</tr>
<tr>
<td>Linearity error</td>
<td>&lt;1% (for maximum output current)</td>
</tr>
<tr>
<td>Output current temperature character</td>
<td>&lt;0.03%/C (for maximum output current)</td>
</tr>
<tr>
<td>Rise time*</td>
<td>1sec</td>
</tr>
<tr>
<td>Fall time*</td>
<td>1sec</td>
</tr>
</tbody>
</table>

* If you want to shorten the rise / fall time, please contact our company separately.

Guide

- We can receive an order for manufacturing a product with special specifications, which is not shown in the catalog. Please contact the sales department.

### System Configuration

![System Configuration Diagram]

- Cable for LD
- Cable for Peltier
- Outside I/F
  * Optional cable for LD and cooling unit can also be used.
- PC
- LD
- Peltier
- Heatsink

### Specifications of the Peltier driving part

#### Measurement part

- Applicable sensor: Thermistor or Pt100 (3wire system)
- Accuracy: 0.01°C
- AD convertor: 24bit

#### Control part

- Control method: Digital PID system
- Control range: -50°C ~ 150°C (depends on the sensor)
- Max. current: 9A
- Max. voltage: 36V

### Specifications of SXD/SPD

#### Part Number

- Cooling unit equipped power supply: SPD0350S, SPD03A0S
- Power supply for Laser Diode + Peltier: SPD

#### External dimensions

- SXD: (W)413 × (H)177 × (D)390mm (Excluding projections)
- SPD: (W)414 × (H)79 × (D)430mm (Excluding projections)

#### Operation ambient temperature

- Depends on specifications
- -20°C ~ 60°C

#### Storage ambient temperature

- 20 ~ 90%RH (No condensation)

#### Interface

- RS232C, emergency stop interlock, emission interlock, emission etc.

#### Accessory

- Jumper connector, AC100V cable

### Outline Drawing

- (Units: mm)

---

WEB: http://www.sigma-koki.com/english/
E-mail: international@sigma-koki.com
TEL: +81-3-5638-8228
FAX: +81-3-5638-6550

A069