Control Electronics Optotune-DSD

Optotune-DSD is an FPGA-based digital controller which is used for the control of the EL-10-42-OF lens module. The board is composed of two layers for which the top one is Digital Servo Interface (DSI-1-O16) and the bottom one is Digital Servo Controller (DSC-1). The board is particularly designed and optimized for OEM-integration in 3D laser marking systems. The main features are:

- Pulse-width modulation (PWM) based lens control
- Automatic tuning for the lens
- Lens error detection
- Tracking delay of < 2 ms
- Heater control unit
- XY2-100 and bi-directional XY-SCAPS interface
- Marking speed of 6000 mm/s for a 45-degree hatching job

Main specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension total (with connectors)</td>
<td>80 x 67 x 40 mm</td>
</tr>
<tr>
<td>Dimension base plate (with mounting holes)</td>
<td>80 x 67 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>175 g</td>
</tr>
<tr>
<td>Main DSD power supply</td>
<td>15 - 24 V</td>
</tr>
<tr>
<td>Heater power supply</td>
<td>12 - 24 V</td>
</tr>
<tr>
<td>Max power output</td>
<td>15 W</td>
</tr>
<tr>
<td>Max current output</td>
<td>1 A</td>
</tr>
<tr>
<td>Max heater power consumption</td>
<td>12 W</td>
</tr>
<tr>
<td>Max total power consumption</td>
<td>27 W</td>
</tr>
<tr>
<td>Response time</td>
<td></td>
</tr>
<tr>
<td>80% jump length</td>
<td>8 ms</td>
</tr>
<tr>
<td>20% jump length</td>
<td>4.5 ms</td>
</tr>
<tr>
<td>Tracking delay time</td>
<td>&lt; 2 ms</td>
</tr>
</tbody>
</table>

Description and Features

**DSI-1-O16 the Digital Servo Interface 16-bit Analog**

- Connection board for Optotune lens EL-10-42-OF
- Compact format
- Analog 16 bit position input
- One lens can be connected
- Additional 5 inputs
- Additional 5 outputs
- Heater circuit for controlling the lens temperature

**DSC-1 the Digital Servo Controller**

- Compact format
- Low power consumption
- Extension connector for customized solutions
- CPU and digital position control output
- XY2-100 electrical interface to control board - protocols XY2-100 or XY-SCAPS
Response time measurement

The response of EL-10-42 lens controlled with Optotune-DSD board for different jump lengths (20% for top two plots and 80% for bottom two plots). The optical feedback signal is shown in black curves. The cyan trace shows the applied voltage at the input of Optotune-DSD control board. Both falling and rising edge show a very similar response time.

### 20% jump length

- **Tracking delay:** 1.5 ms
- **Response time:** 4.5 ms

### 80% jump length

- **Tracking delay:** 2 ms
- **Response time:** 8 ms
Bottom plate drawing for mounting

There are 2 M3 threads on each side and 4 M3 threads on top of the plate (45x45mm) to mount the plate to a laser system. The 2.5mm holes are for the mounting of the driver boards onto the bottom plate.

The height of the driver boards mounted on this plate is 40mm.