The C12332-01 is a simple evaluation starter kit for non-cooled MPPC. MPPC evaluation is possible by mounting an MPPC in the socket of the sensor circuit board. Various types of MPPCs can be evaluated. MPPC with flexible cable (for evaluating surface mount type MPPC) can also be connected by using the FFC connector of the power supply circuit board.

The power supply circuit board is equipped with the C11204-01, a high-accuracy, high-voltage power supply that provides the operating voltage for MPPC. It operates just by connecting to an external power supply (±5 V). It is also equipped with a USB interface that can be used to set the operating voltage and temperature compensation coefficient from a PC running the supplied sample software.

### Features
- Enables the evaluation of non-cooled MPPC
- Sensor circuit board with a socket for mounting an MPPC with leads
- Connection possible to MPPC with flexible cable
- Equipped with a high-accuracy, high-voltage C11204-01 power supply
- Adjustable operating voltage and temperature compensation coefficient
- Selectable amplifier usage (the default condition is use)
- Selectable load resistance 50 Ω or 1 kΩ
- Analog output

Note: MPPC is sold separately.

### Applications
- Simple initial evaluation of MPPCs

### Compatible MPPCs

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Number of channels (ch)</th>
<th>Effective photosensitive area (mm)</th>
<th>Pixel pitch (μm)</th>
<th>Number of pixels</th>
</tr>
</thead>
<tbody>
<tr>
<td>S12571-010C</td>
<td>1</td>
<td>1 x 1</td>
<td>10</td>
<td>10000</td>
</tr>
<tr>
<td>S12571-015C</td>
<td>1</td>
<td>1 x 1</td>
<td>15</td>
<td>4499</td>
</tr>
<tr>
<td>S12572-010C</td>
<td>1</td>
<td>3 x 3</td>
<td>10</td>
<td>90000</td>
</tr>
<tr>
<td>S12572-015C</td>
<td>1</td>
<td>3 x 3</td>
<td>15</td>
<td>40000</td>
</tr>
<tr>
<td>S13360-1325CS</td>
<td>1</td>
<td>1.3 x 1.3</td>
<td>25</td>
<td>2668</td>
</tr>
<tr>
<td>S13360-1350CS</td>
<td>1</td>
<td>1.3 x 1.3</td>
<td>50</td>
<td>667</td>
</tr>
<tr>
<td>S13360-1375CS</td>
<td>1</td>
<td>1.3 x 1.3</td>
<td>75</td>
<td>285</td>
</tr>
<tr>
<td>S13360-3025CS</td>
<td>1</td>
<td>3 x 3</td>
<td>25</td>
<td>14400</td>
</tr>
<tr>
<td>S13360-3050CS</td>
<td>1</td>
<td>3 x 3</td>
<td>50</td>
<td>3600</td>
</tr>
<tr>
<td>S13360-3075CS</td>
<td>1</td>
<td>3 x 3</td>
<td>75</td>
<td>1600</td>
</tr>
<tr>
<td>S13360-6025CS</td>
<td>1</td>
<td>6 x 6</td>
<td>25</td>
<td>57600</td>
</tr>
<tr>
<td>S13360-6050CS</td>
<td>1</td>
<td>6 x 6</td>
<td>50</td>
<td>14400</td>
</tr>
<tr>
<td>S13360-6075CS</td>
<td>1</td>
<td>6 x 6</td>
<td>75</td>
<td>6400</td>
</tr>
</tbody>
</table>
Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Specification</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Vs</td>
<td></td>
<td>±5.8</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>No dew condensation*1</td>
<td>-20 to +60</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>No dew condensation*1</td>
<td>-20 to +80</td>
<td>°C</td>
</tr>
</tbody>
</table>

*1: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

Recommended operating conditions (Ta=25 °C, unless otherwise noted)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage*2</td>
<td>Vs</td>
<td></td>
<td>±4.75</td>
<td>±5</td>
<td>±5.25</td>
<td>V</td>
</tr>
<tr>
<td>Load resistance*3</td>
<td>RL</td>
<td>When amplifier is not used</td>
<td>-</td>
<td>50 or 1 k</td>
<td>-</td>
<td>Ω</td>
</tr>
</tbody>
</table>

*2: Use a power supply with 300 mA or higher output.
*3: The initial condition is 50 Ω. When using an amplifier, set the load resistance to 50 Ω.

Electrical characteristics (Ta=25 °C, Vs=±5 V, unless otherwise noted)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption</td>
<td>Is</td>
<td>V₀=72 V, no load, when</td>
<td>±36</td>
<td>±48</td>
<td>±60</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>communication with a PC</td>
<td>-10</td>
<td>-15</td>
<td>-20</td>
<td></td>
</tr>
<tr>
<td>MPPC supply voltage range*4</td>
<td>V₀</td>
<td>No load</td>
<td>-4</td>
<td>±10</td>
<td>±40</td>
<td>V</td>
</tr>
<tr>
<td>Setting voltage resolution*4</td>
<td>V₀</td>
<td></td>
<td>-4</td>
<td>±10</td>
<td>±40</td>
<td>V</td>
</tr>
<tr>
<td>Setting voltage error</td>
<td>-</td>
<td>V₀=72 V, no load</td>
<td>-</td>
<td>±10</td>
<td>±40</td>
<td>mV</td>
</tr>
<tr>
<td>Voltage monitor error</td>
<td>-</td>
<td>V₀=72 V, no load</td>
<td>-</td>
<td>±10</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td>Current monitor error</td>
<td>-</td>
<td>V₀=72 V, Iₒ=1.0 mA</td>
<td>-</td>
<td>±0.05</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>High</td>
<td>fc When amplifier (gain: 20) is used (RL=50 Ω), -3 dB</td>
<td>-</td>
<td>40</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>fc When amplifier (gain: 20) is used (RL=50 Ω), -3 dB</td>
<td>-</td>
<td>DC</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Mounted temperature sensor</td>
<td>-</td>
<td>LM94021BIMG (by Texas Instruments)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Interface*6</td>
<td>-</td>
<td>USB 2.0 (Full Speed)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

*4: The MPPC operating voltage varies depending on the product. Refer to the value provided with the product.
*5: When the sample software is used
*6: After you set the operating voltage, remove the USB cable from the driver circuit for MPPC to eliminate any noise effects from the PC.

Block diagram

[Block diagram image]

- Temperature sensor
- Socket for MPPC
- Jumper selector
- Amplifier (gain: 20)
- Sensor circuit board
- Power supply circuit board
- USB I/F
- PC
- ±5 V
- Analog output
**Connection example**

![Connection diagram](image)

* MPPC is sold separately.

**Procedure**

1. **Connect**
   - Power cable
   - USB cable
   - Signal cable
   - Flexible flat cable

2. **Supply power**
   - Supply power from an external source.

3. **Install the driver software and sample software**

4. **Set parameters**

5. **Apply operating voltage**

6. **Measure**
   - From the sample software, disconnect the communication with the PC, remove the USB cable, and make measurements using an oscilloscope or other device.
Measurement examples [using amplifier, gain: approx. 20x (default), $R_L=50\ \Omega$]

**Dark state**

- S13360-1350CS
- S13360-3050CS

**Impulse light (wavelength: 466 nm)**

- S13360-1350CS
- S13360-3050CS

**Pulse light (wavelength: 470 nm, pulse width: 2 µs)**

- S13360-1350CS
- S13360-3050CS
Sample software (included)

The sample software*7 is designed to simplify the MPPC evaluation. You can use the sample software to set the operating voltage and temperature compensation coefficient. The sample software has been confirmed to work with Microsoft .NET Framework 2.0 and later. The sample software was created on Microsoft® Visual Basic® 2008 Express Edition SP1.

*7: Compatible OS
Microsoft® Windows® 7 Professional SP1 (32-bit, 64-bit)

Note: Microsoft, Windows, Visual Studio, and Visual Basic are registered trademarks of Microsoft Corporation in the United States and/or other countries.
Driver circuit for MPPC

Dimensional outlines (unit: mm)

**Sensor circuit board**

- MPPC (S12572-010C/-015C, S13360-3025CS/-3050CS) mount position
- MPPC (S12571-010C/-015C, S13360-1325CS/-1350CS) mount position
- MPPC (S13360-6025CS/-6050CS) mount position
- MPPC (5-pin) mount position
- MPPC (TO-18) mount position
- Analog temperature sensor
- Flexible cable connector (for connecting power supply circuit board)

**Power supply circuit board**

- Power connector 53047-0310 (Molex)
- Analog output connector (SMB connector)
- FFC connector (for connecting MPPC with flexible cable)
- FFC connector (for connecting sensor circuit board)
- USB connector

Tolerance unless otherwise noted: ±0.2
Driver circuit for MPPC

C12332-01

Accessories

- Power cable
- Operating voltage check cable
- USB cable
- Flexible flat cable (50 mm)
- CD-ROM (instruction manual, driver software, sample software, etc.)
- Quick start guide

Precautions

- For cleaning the product, wipe using a clean, soft, dry cloth. Do not use organic solvents such as thinner and acetone.
- If the product and the PC are connected with a USB cable, do not remove the USB cable while the sample software is communicating.
- This product is a simple MPPC evaluation circuit. Do not integrate this product in your device.

Options (sold separately)

Coaxial conversion adapter A10613 series

Coaxial conversion adapters for converting the SMB coaxial connector for extracting MPPC module signals into a BNC coaxial connector or an SMA coaxial connector. These adapters make connection to a BNC cable or SMA cable possible.

A10613-01 (SMB-BNC)  A10613-02 (SMB-SMA)

Related information


Precautions

- Disclaimer

Information described in this material is current as of March 2020.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.

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