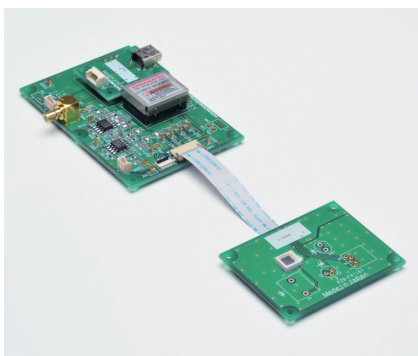# Driver circuit for MPPC®

C12332-02

Simple evaluation driver circuit for non-cooled MPPC

The C12332-02 is a driver circuit for simple evaluation of non-cooled MPPC and power supply C11204-01 for 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 PZC (pole-zero cancellation) circuit is built-in to reduce the falling edge decay time of MPPC. The power supply circuit board is equipped with the power supply C11204-01 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 MPPC supply 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 high-accuracy power supply C11204-01
- MPPC supply voltage and temperature compensation coefficient can be set from PC.
- Selectable amplifier usage (default setting: used)
- Selectable load resistance 50 Ω or 1 kΩ
- Built-in PZC circuit (default setting: PZC constant is set to S13360-3050CS)
- Analog output

Note: MPPC is sold separately.

Applications

- Simple initial evaluation of MPPC

Compatible MPPCs

Type no.	Number of channels (ch)	Effective photosensitive area (mm)	Pixel pitch (µm)	Number of pixels
S13360-1325CS			25	2668
S13360-1350CS		1.3 × 1.3	50	667
S13360-1375CS			75	285
S13360-3025CS			25	14400
S13360-3050CS	1	3 × 3	50	3600
S13360-3075CS			75	1600
S13360-6025CS			25	57600
S13360-6050CS		6 × 6	50	14400
S13360-6075CS			75	6400

Absolute maximum ratings

Parameter	Symbol	Condition	Specification	Unit
Supply voltage	Vs		±5.8	V
Operating temperature	Topr	No dew condensation*1	-20 to +60	°C
Storage temperature	Tstg	No dew condensation*1	-20 to +80	°C

*1: When there is a temperature difference between a product and the surrounding area in high humidity environments, 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)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage*2	Vs		±4.75	±5	±5.25	V
Load resistance*3	R_L	When amplifier is not used	-	50 or 1 k	-	Ω

*2: Use a power supply with 300 mA or higher output.
*3: The default setting 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)

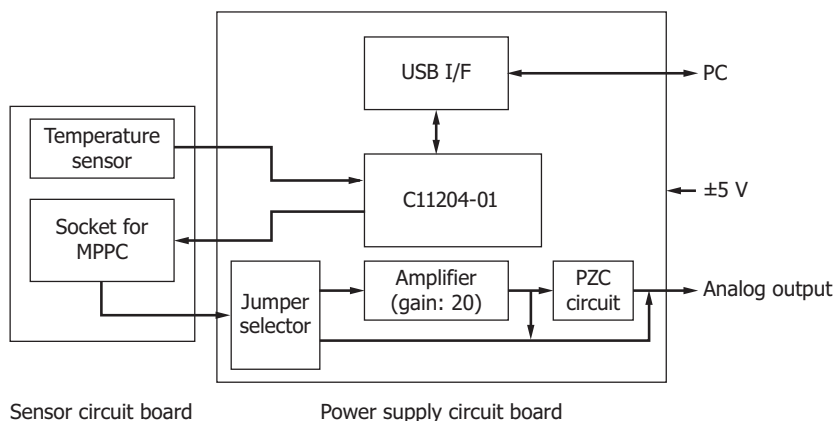| Parameter		Symbol	Condition		Min.	Typ.	Max.	Unit
Current consumption		Is	Vo=72 V, no load, when communicating with a PC	+5 V	+36	+48	+60	mA
				-5 V	-10	-15	-20	
MPPC supply voltage range*4		Vo	No load		-	20 to 80	-	V
Setting voltage resolution*5		-			-	10	-	mV
Setting voltage error		-	Vo=72 V, no load		-	±10	±40	mV
Voltage monitor error		-	Vo=72 V, no load		-	±10	-	mV
Current monitor error		-	Vo=72 V, Io=1.0 mA		-	±0.05	-	mA
Cutoff frequency	High	fc	When amplifier (gain: 20) is used, R_L=50 Ω, -3 dB		-	40	-	MHz
	Low				-	DC	-	
PZC constant*6		-			Set for S13360-3050CS			-
Mounted temperature sensor		-			LM94021BIMG (Texas Instruments)			-
Interface*7		-			USB 2.0 (Full Speed)			-

*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
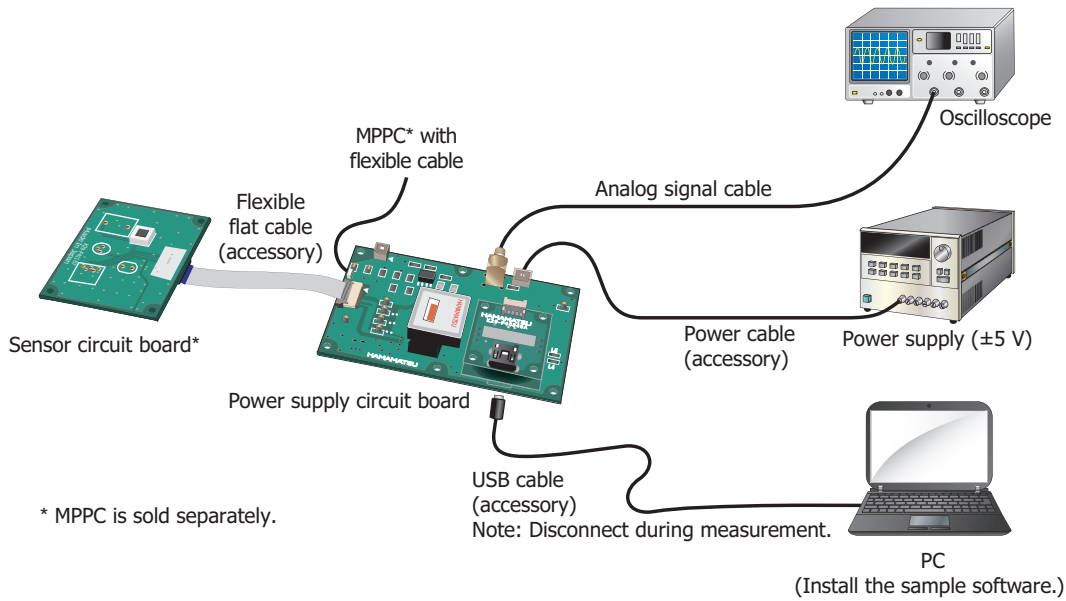*6: The default setting is "Amplifier → PZC circuit" jumper.
*7: After you set the operating voltage, remove the USB cable from the driver circuit for MPPC to eliminate any noise effects from the PC.
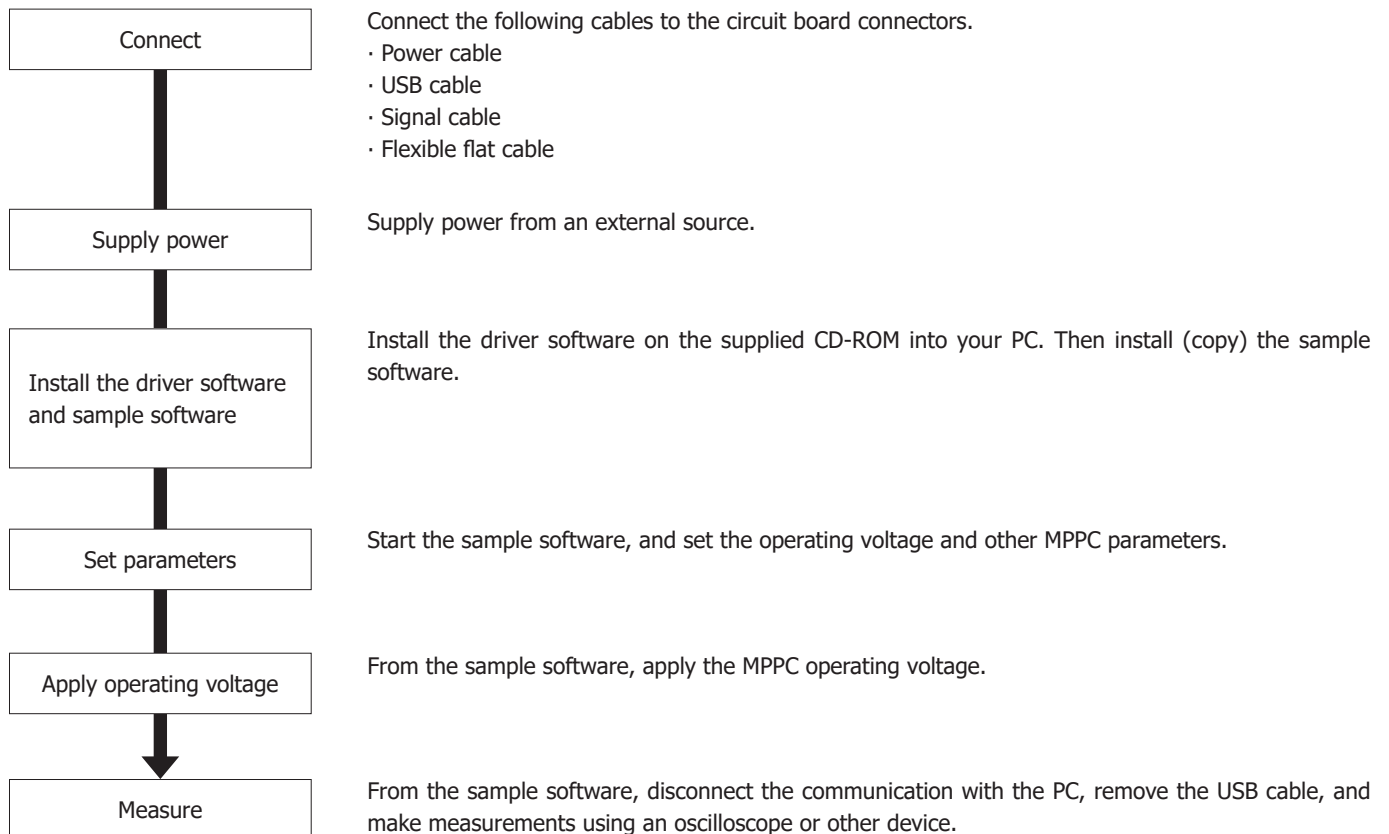
## Block diagram

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Connection example

MPPC* with flexible cable

Flexible flat cable (accessory)

Analog signal cable

Oscilloscope

Sensor circuit board*

Power supply (±5 V)

Power cable (accessory)

Power supply circuit board

USB cable (accessory)
Note: Disconnect during measurement.

PC (Install the sample software.)

* MPPC is sold separately.

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Procedure

Connect	Connect the following cables to the circuit board connectors. · Power cable · USB cable · Signal cable · Flexible flat cable
Supply power	Supply power from an external source.
Install the driver software and sample software	Install the driver software on the supplied CD-ROM into your PC. Then install (copy) the sample software.
Set parameters	Start the sample software, and set the operating voltage and other MPPC parameters.
Apply operating voltage	From the sample software, apply the MPPC operating voltage.
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 setting), R_L=50 Ω]

Dark state
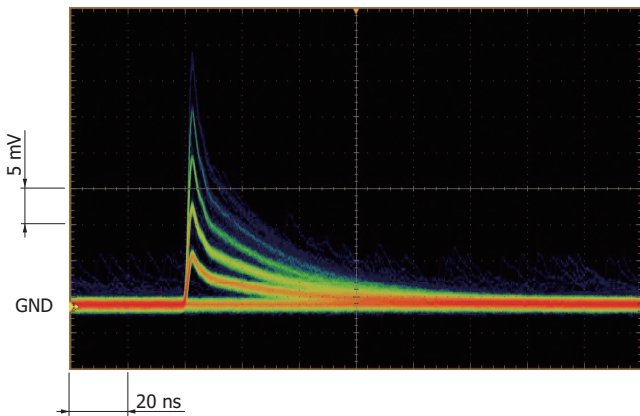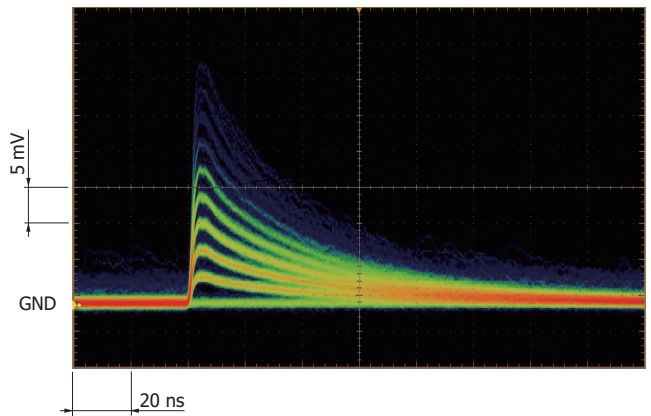
■ S13360-1350CS

200 ns
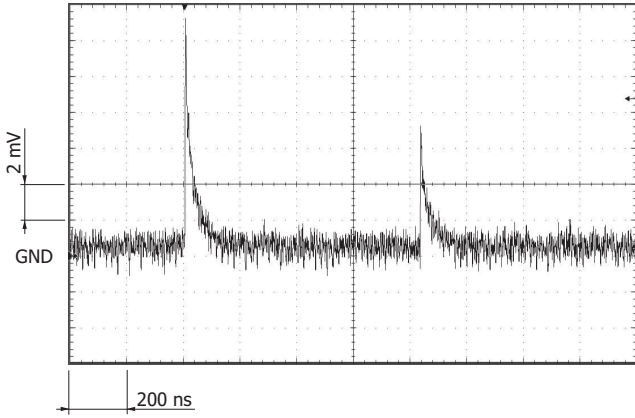
■ S13360-3050CS

200 ns
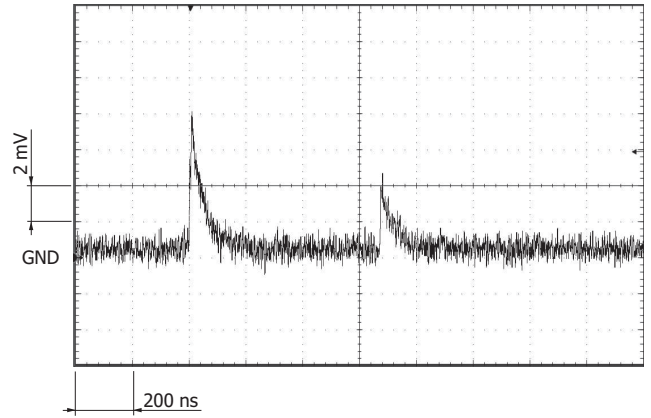
Impulse light (wavelength: 466 nm)
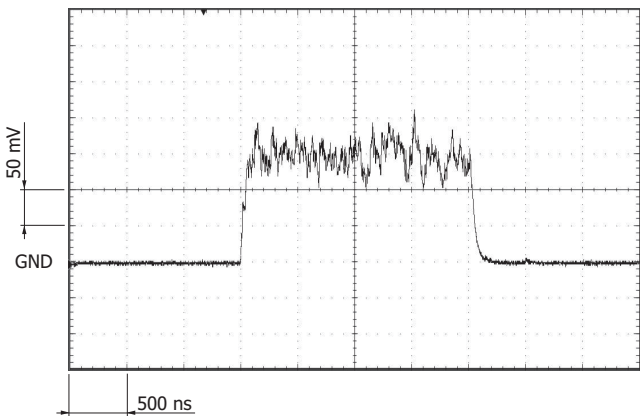
■ S13360-1350CS

20 ns

■ S13360-3050CS

20 ns

Pulse light (wavelength: 470 nm, pulse width: 2 µs)
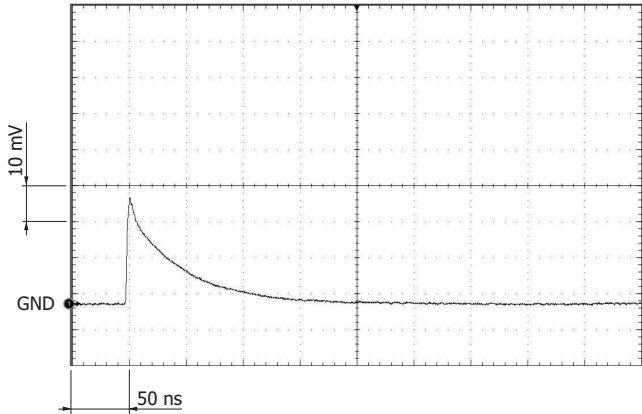
■ S13360-1350CS

500 ns

■ S13360-3050CS

500 ns

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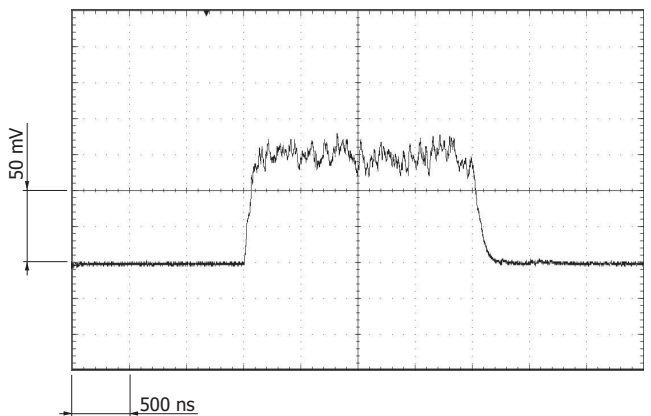
Reduction of falling time by PZC circuit

■ S13360-3050CS (amplifier only)

10 mV

GND

50 ns

■ S13360-3050CS (amplifier → PZC circuit)

10 mV

GND

50 ns
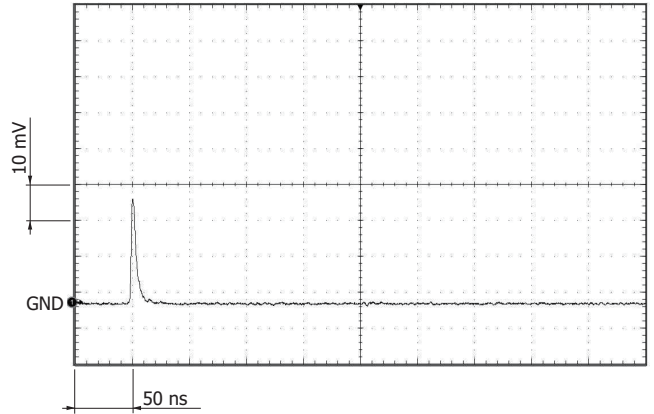
Sample software (included)

The sample software[8] 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 3.5 and later. The sample software was created on Microsoft® Visual Basic® 2008 Express Edition SP1.
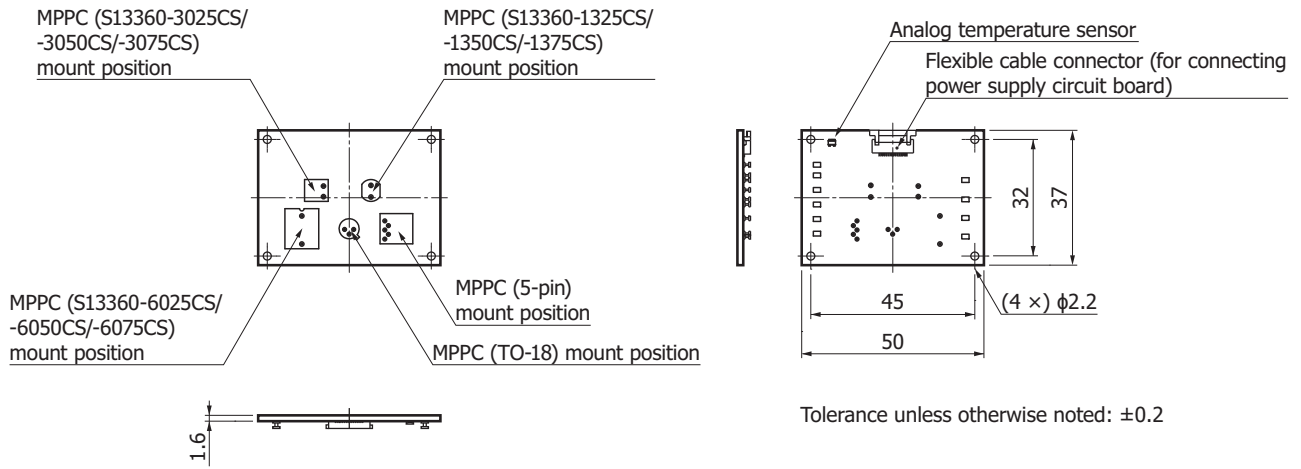
[8]: Compatible OS
Microsoft® Windows® 10 (32-bit, 64-bit)

Note: Microsoft, Windows, Visual Studio, and Visual Basic are registered trademarks of Microsoft Corporation in the United States and/or other countries.
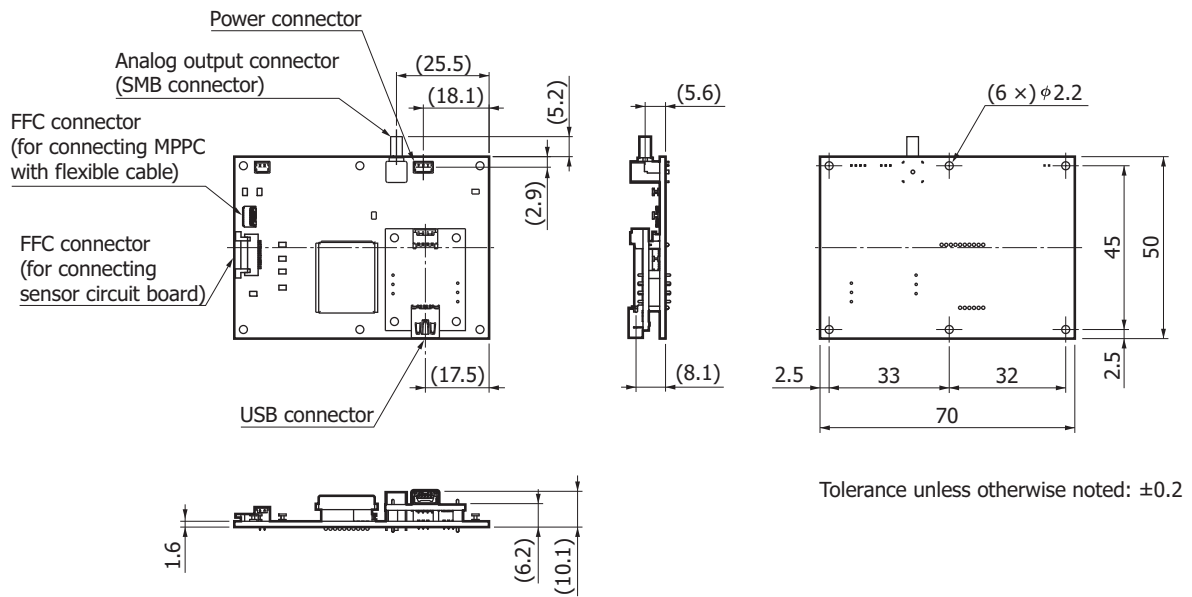
C11204-01 Sample application

Serial port
COM4   Open   Close

High voltage output
ON   OFF

EEPROM parameter setting
Reference voltage: Vb (range: 20-80)
40.00   [V]   Write

Reference temperature: Tb (range: 0-50)
25.0   [deg C]   Read

Temperature coefficient (High temp.): ΔT1 (range: 0-1000)
0.0   [mV/deg C]

Temperature coefficient (Low temp.): ΔT2 (range: 0-1000)
0.0   [mV/deg C]

Monitor
Output voltage: +HV
____   [V]

Output current: Id
____   [mA]

Temperature: T
____   [deg C]

Output voltage [V]   Vb   ΔT1   ΔT2   Tb   Temperature [°C]

+HV   Id   T   Temp sensor

Dimensional outlines (unit: mm)

Sensor circuit board

MPPC (S13360-3025CS/
-3050CS/-3075CS)
mount position

MPPC (S13360-1325CS/
-1350CS/-1375CS)
mount position

Analog temperature sensor

Flexible cable connector (for connecting
power supply circuit board)

MPPC (S13360-6025CS/
-6050CS/-6075CS)
mount position

MPPC (5-pin)
mount position

MPPC (TO-18) mount position

32
37
45
50
(4 ×) φ2.2
1.6

Tolerance unless otherwise noted: ±0.2

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Power supply circuit board

Power connector

Analog output connector
(SMB connector)

FFC connector
(for connecting MPPC
with flexible cable)

FFC connector
(for connecting
sensor circuit board)

USB connector

(25.5)
(18.1)
(5.2)
(2.9)
(5.6)
(6 ×) φ2.2
(17.5)
(8.1)
2.5
33
32
2.5
45
50
70
1.6
(6.2)
(10.1)

Tolerance unless otherwise noted: ±0.2

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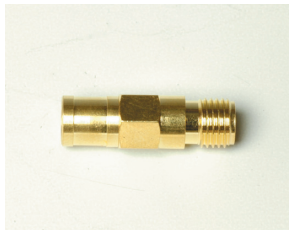
A10613-01 (SMB-BNC)   A10613-02 (SMB-SMA)

Related information

http://www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
· Disclaimer

Information described in this material is current as of November 2021.

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.

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