



C11204-01

## Bias power supply with built-in high precision temperature compensation for MPPCs

The C11204-01 is a high voltage power supply that is optimized for MPPCs (multi-pixel photon counters). It can output up to 90 V. It contains a temperature compensation function that constantly optimizes the MPPC operation even in environments with varying temperatures. It also has built-in output voltage monitor and output current monitor. All functions can be controlled from a PC via its serial interface (UART).

### Features

- ➔ **Wide output voltage range: 40 V to 90 V**
- ➔ **Low ripple noise\*1: 0.1 mVp-p typ.**
- ➔ **Superb temperature stability: ±10 ppm/°C typ.**
- ➔ **Finely adjustable resolution (in 1.8 mV steps)**
- ➔ **Serial interface**

\*1: No load, using the recommended circuit

### Applications

- ➔ **Power supply for MPPCs**

### Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Supply voltage	Vs		6	V
Operating temperature	Topr	No dew condensation*2	0 to +50	°C
Storage temperature	Tstg	No dew condensation*2	-20 to +70	°C

\*2: 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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage	Vs		4.75	5	5.25	V

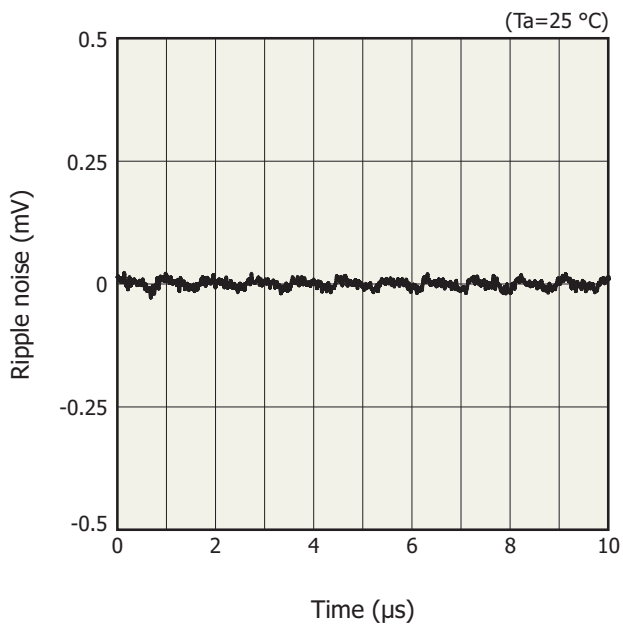
**Electrical characteristics (Typ. Ta=25 °C, Vs=+5 V, unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption	Icc	Vo=72 V, no load	-	20	-	mA
Output voltage	Vo	No load	-	40 to 90	-	V
Output current	Io		0	-	2	mA
Ripple noise*3	Vn	Vo=72 V, no load	-	0.1	0.2	mVp-p
Output voltage setting precision	-	Vo=72 V, no load	-	±10	-	mV
Output voltage setting resolution	-		-	1.8	-	mV
Temperature stability	-	25 ± 10 °C Vo=72 V, no load	-	±10	-	ppm/°C
Interface*4	-		Serial communication			-
Low level input voltage	Vil	RXD	0	-	0.4Vcc	V
High level input voltage	Vih	RXD	0.65Vs	-	Vs	V
Low level output voltage	Vol	TXD	-	-	2.0	V
High level output voltage	Voh	TXD	Vs - 2.0	-	Vs	V

\*3: Using the recommended circuit

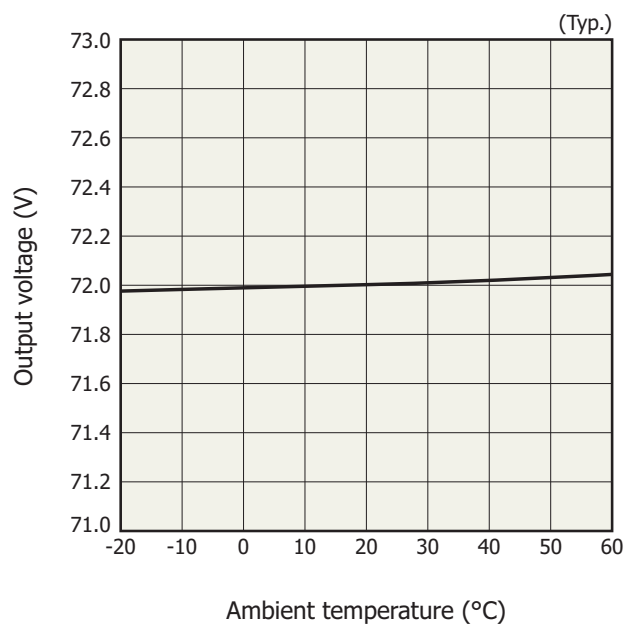
\*4: To control the C11204-01 from a PC, we recommend that you use the C12332 driver circuit (starter kit) for MPPC (sold separately, C11204-01 built in).

**Ripple noise vs. time (typical example)**



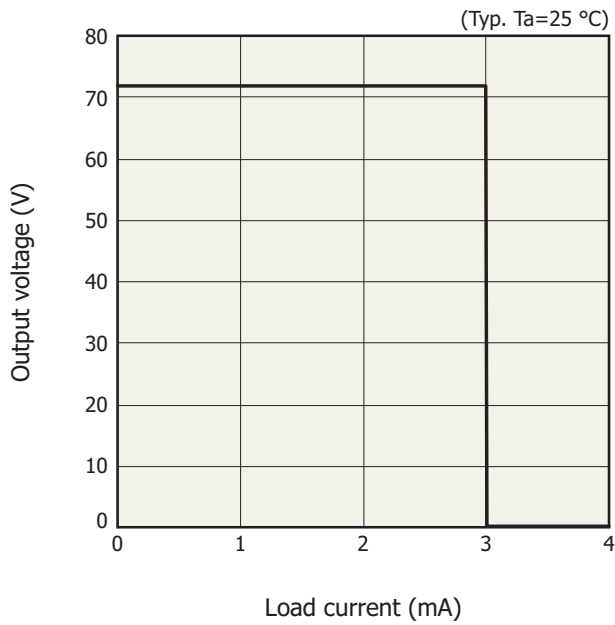
KACCB0287EA

**Output voltage vs. ambient temperature**



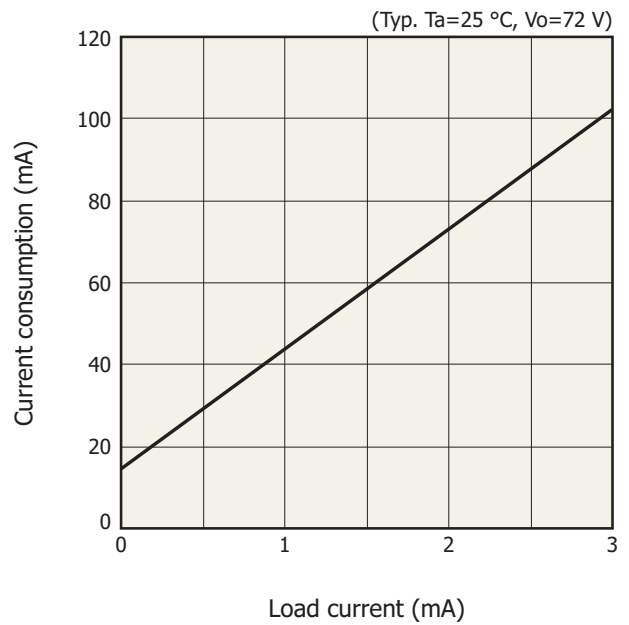
KACCB0288EA

Output voltage vs. load current



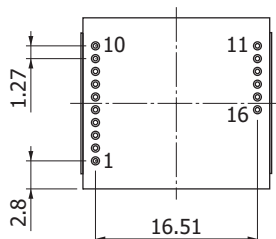
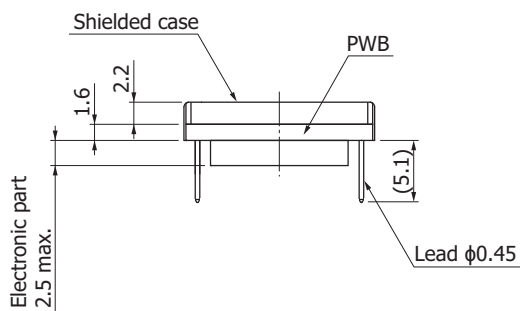
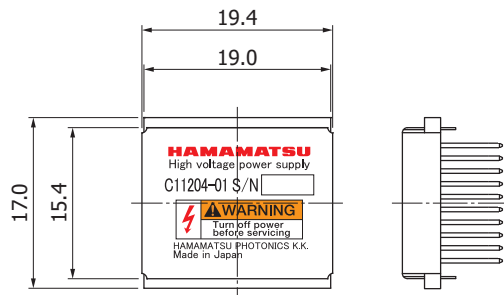
KACCB0289EA

Current consumption vs. load current



KACCB0290EA

Dimensional outline (unit: mm)



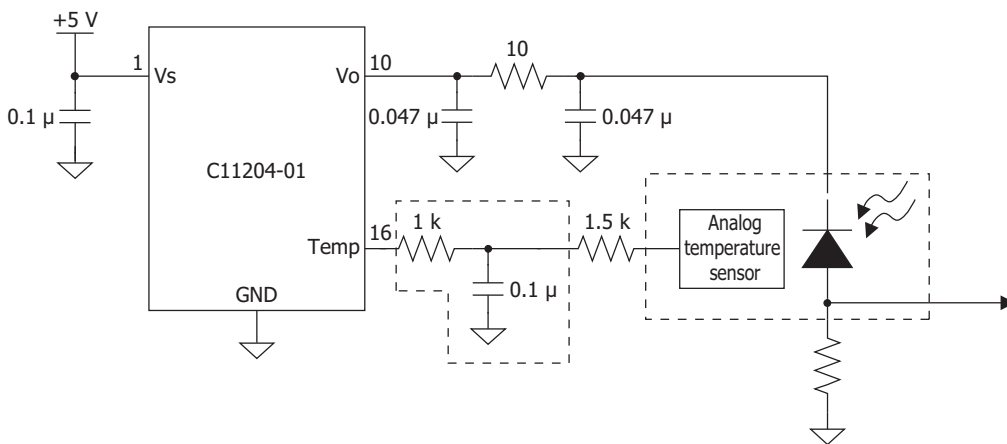
Tolerance unless otherwise noted: ±0.2

KACCA0308EB

**Pin connections**

Pin no.	Symbol	Function
1	Vs	Positive supply voltage Furnish a bypass capacitor to ground as close to this pin as possible.
2, 5, 8, 15	GND	Ground Connect directly to the ground plane using the shortest wire possible.
3	RXD	Serial data input
4	TXD	Serial data output
6, 7, 9, 11 to 14	NC	No connection These pins should not be connected to any terminals.
10	Vo	High voltage output
16	Temp	Connect to an analog temperature sensor

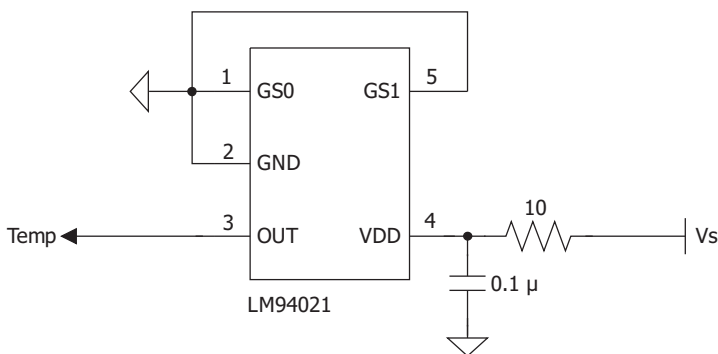
**Recommended circuit**



KACCC0661EB

Note: For the bypass capacitor to connect to Vo, use a high-withstand-voltage, low-ESR capacitor. Provide a noise filter near the Temp pin.

**Analog temperature sensor block**



KACCC0660EB

Note: For the analog temperature sensor, use the LM94021 by Texas Instruments. Connect pins 1 and 5 of the analog temperature sensor to ground.

### UART Communication specifications

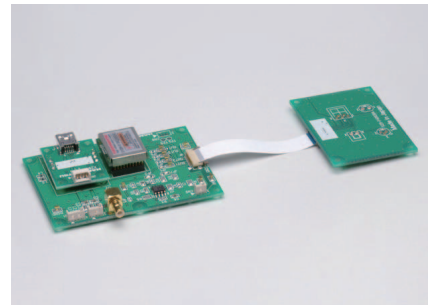
Parameter	Specifications
Baud rate	38400 bps
Data bits	8
Parity bits	Even
Stop bit	1
Flow control	None

### Accessories




- CD-ROM (Instruction manual, Command reference)

### Related product: C12332-01 Driver circuit (starter kit) for MPPC

The C12332-01 is a starter kit designed for simple non-cooled MPPC evaluations. It consists of a sensor board and a power supply board. The sensor board includes an MPPC socket and a temperature sensor. The power supply board includes a C11204-01 power supply module for MPPC, an amplifier, and a USB interface board. The USB interface allows you to change the bias voltage and set the temperature compensation coefficient from a PC. The C12332 operates just by connecting it to an external power supply ( $\pm 5$  V).



### Power supply lineup for MPPCs

Photo	Type no.	Package type	Temperature stability (ppm/°C)	Features
	C11204-01	With leads	$\pm 10$	High precision Low ripple noise
	C11204-02	Surface mount type	$\pm 10$	High precision Low ripple noise Compact: 11.5 × 11.5 mm
	C14156	Surface mount type	$\pm 200$	Low cost Compact: 7 × 7 mm

## Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

- Precautions
- Disclaimer

Information described in this material is current as of March 2019.

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. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.

# HAMAMATSU

[www.hamamatsu.com](http://www.hamamatsu.com)

HAMAMATSU PHOTONICS K.K., Solid State Division

1126-1 Ichino-cho, Higashi-ku, Hamamatsu City, 435-8558 Japan, Telephone: (81)53-434-3311, Fax: (81)53-434-5184

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, Bridgewater, N.J. 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218, E-mail: [usa@hamamatsu.com](mailto:usa@hamamatsu.com)

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8, E-mail: [info@hamamatsu.de](mailto:info@hamamatsu.de)

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10, E-mail: [infos@hamamatsu.fr](mailto:infos@hamamatsu.fr)

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, United Kingdom, Telephone: (44)1707-294888, Fax: (44)1707-325777, E-mail: [info@hamamatsu.co.uk](mailto:info@hamamatsu.co.uk)

North Europe: Hamamatsu Photonics Norden AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46)8-509 031 00, Fax: (46)8-509 031 01, E-mail: [info@hamamatsu.se](mailto:info@hamamatsu.se)

Italy: Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20020 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41, E-mail: [info@hamamatsu.it](mailto:info@hamamatsu.it)

China: Hamamatsu Photonics (China) Co., Ltd.: B1201, Jiaming Center, No.27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, P.R.China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866, E-mail: [hpc@hamamatsu.com.cn](mailto:hpc@hamamatsu.com.cn)

Taiwan: Hamamatsu Photonics Taiwan Co., Ltd.: 8F-3, No. 158, Section2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)3-659-0080, Fax: (886)3-659-0081, E-mail: [info@hamamatsu.com.tw](mailto:info@hamamatsu.com.tw)