

Technical documentation
Last changed on: 2021-03-01

BPS series

Small High Voltage Module for PCB mounting up to 4 Watt

- Versions from 300 V – 6 kV, 1W / 3W / 4W available
- patented resonance converter technology
- controlled by analog set voltage
- analog monitor voltage
- wide supply range
- low ripple and noise, low EMI



Document history

| Version | Date | Major changes |
|---------|------------|---|
| 2.6 | 2021-03-01 | Fixed Figure 4, Figure 5, Item code revision and customization |
| 2.5 | 2020-12-02 | Corrections of documentation (item code BP060674x12) |
| 2.4 | 2020-11-05 | Improved documentation Intended Use, Depiction of the safety instructions, Modules BPx 25 404 5, BPx 25 125 12 discontinued, new item Code (Table 3: Technical data: Options and order information) for modified dimensions for 1W / 3W modules (Figure 1: dimensional drawing BPS 1/3W), |
| 2.3 | 2020-07-08 | Improved documentation |
| 2.2 | 2019-06-03 | Corrections of documentation |
| 2.1 | 2018-09-04 | Extended operation temperature |
| | 2018-09-25 | Fixed typo |
| 2.0 | 2017-02-28 | Relayouted documentation |
| | 2018-06-13 | Corrections of documentation |
| | 2018-11-01 | Fixed typo BPx60 674 12 |

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The information in this manual is subject to change without notice. We take no responsibility for any mistake in the document. We reserve the right to make changes in the product design without reservation and without notification to the users. We decline all responsibility for damages and injuries caused by an improper use of the device.

Safety

This section contains important security information for the installation and operation of the device. Failure to follow safety instructions and warnings can result in serious injury or death and property damage.

Safety and operating instructions must be read carefully before starting any operation.

We decline all responsibility for damages and injuries caused which may arise from improper use of our equipment.

Depiction of the safety instructions

DANGER!



DANGER!

"Danger!" indicates a severe injury hazard. The non-observance of safety instructions marked as "Danger!" will lead to possible injury or death.

WARNING!



WARNING!

"Warning!" indicates an injury hazard. The non-observance of safety instructions marked as "Warning!" could lead to possible injury or death.

CAUTION!



CAUTION!

Advices marked as "Caution!" describe actions to avoid possible damages to property.

INFORMATION



INFORMATION

Advices marked as "Information" give important information.



Read the manual.



HIGH VOLTAGE

Attention high voltage!



Important information.

Intended Use

The device may only be operated within the limits specified in the data sheet. The permissible ambient conditions (temperature, humidity) must be observed. The device is designed exclusively for the generation of high voltage as specified in the data sheet. Any other use not specified by the manufacturer is not intended. The manufacturer is not liable for any damage resulting from improper use.

Qualification of personnel

A qualified person is someone who is able to assess the work assigned to him, recognize possible dangers and take suitable safety measures on the basis of his technical training, his knowledge and experience as well as his knowledge of the relevant regulations.

General safety instructions

- Observe the valid regulations for accident prevention and environmental protection.
- Observe the safety regulations of the country in which the product is used.
- Observe the technical data and environmental conditions specified in the product documentation.
- You may only put the product into operation after it has been established that the high-voltage device complies with the country-specific regulations, safety regulations and standards of the application.
- The high-voltage power supply unit may only be installed by qualified personnel.

Important safety instructions

WARNING!



WARNING!

Do not operate the unit in wet or damp conditions.

WARNING!



WARNING!

Do not operate the unit in an explosive atmosphere.

WARNING!



WARNING!

Do not operate the unit if you suspect the unit or the connected equipment to be damaged.

INFORMATION



INFORMATION

It is strongly recommended to read the manual before operation!

1 General description

The BPS High Voltage Power Supply module is a small DC/DC converter which can be mounted and soldered on printed circuit boards (PCB). The output voltage is controllable with an analog control voltage. Therefore a potentiometer or fixed resistor can be used. The patented resonance converter technology and moulded metal box shielding guarantee lowest electromagnetic interference and low ripple and noise of the output voltage.

Customized versions can be produced on request.

2 Technical Data

| SPECIFICATIONS | BPS 1 W | BPS 3W | BPS 4W |
|---|---|---|---|
| Polarity | Factory fixed, positive or negative | | |
| Ripple and noise (f > 10 Hz) ⁽¹⁾ | typ. < 10 mV max. 25 mV _{p-p} | typ.< 20 mV _{p-p} max. 60 mV _{p-p} | typ. < 5 mV _{p-p} max. 10 mV _{p-p} |
| Stability [ΔV _{out} vs. ΔV _{in}] ⁽¹⁾ | < 5 • 10 ⁻⁴ • V _{nom} | | < 2 • 10 ⁻⁴ • V _{nom} |
| Stability - [ΔV _{out} vs. Δr _{load}] ⁽¹⁾ | < 2 • 10 ⁻³ • V _{nom} | | < 5 • 10 ⁻⁴ • V _{nom} |
| Temperature coefficient | 50 ppm/K ⁽²⁾ | | |
| Supply voltage V _{in} | 4.5 – 5.5 V | 11.5 – 15.5 V | 11.4 – 12.6 V |
| Supply current I _{in} at V _{out} = 0 at V _{out} = V _{nom} / no load at V _{out} = V _{nom} / with load | < 10 mA < 50 mA < 400 mA | < 10 mA < 50 mA < 500 mA | < 10 mA < 40 mA < 500 mA |
| Set / Monitor voltage | 0 – 2.5 V | 0 – 5 V | |
| Adjustment accuracy | ± 1 % ⁽²⁾ | | |
| Signal - ON | TTL-Pegel LOW → HV = 0, HIGH or open → HV according to V _{set} | | |
| Signal - /ON | | | TTL-Pegel HIGH → HV = 0, LOW or open → HV according to V _{set} |
| Reference voltage V _{REF} (internal) | 2.5 V / 0.5 mA | 5 V / 0.5 mA | |
| Control V _{set} - version 1 | Remote control with an ext. potentiometer (10 – 100kΩ) between REF and GND, sliding contact on V _{set} | | |
| Control V _{set} - version 2 | with V _{set} 0 ≤ V _{set} ≤ V _{ref} → 0 ≤ V _{out} ≤ V _{nom} ± 1 % ⁽²⁾ | | |
| | Attention! Output voltage is internally not limited! Do not use V _{set} > 2.5V (1W) or 5V (3W)! Output current is internally limited to approx. 1.5• I _{nom} | | Attention! Output voltage and output current are internally limited to 1.1•V _{nom} resp. I _{nom} |
| Protection | Overload and short circuit protected | | |
| HV connector | Pin | | |
| Case | Metal box, moulded | | |
| Dimensions – L/W/H | 40 / 40 / 18mm ³ | | 50 (55) / 40 / 17mm ³ |
| Operating temperature | -20 – 60 °C | | |
| Storage temperature | -20 – 60 °C | | |

¹⁾ Specifications for stability, ripple and noise are guaranteed in the range 2% • V_{nom} < V_{out} ≤ V_{nom}

²⁾ Temperature coefficient and accuracy are guaranteed in the temperature range 0 – 40 °C;
for -20 – 60°C max. 150 ppm/K and ± 1.5 % resp.

Table 1: Technical data: Specifications

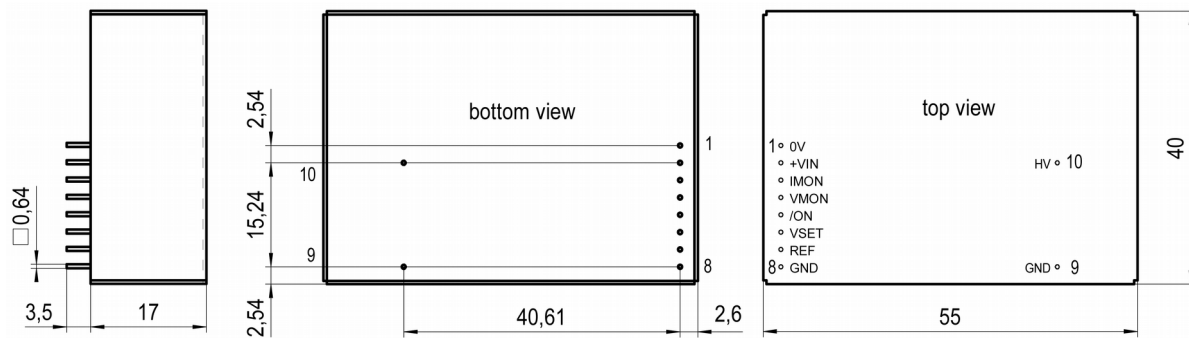
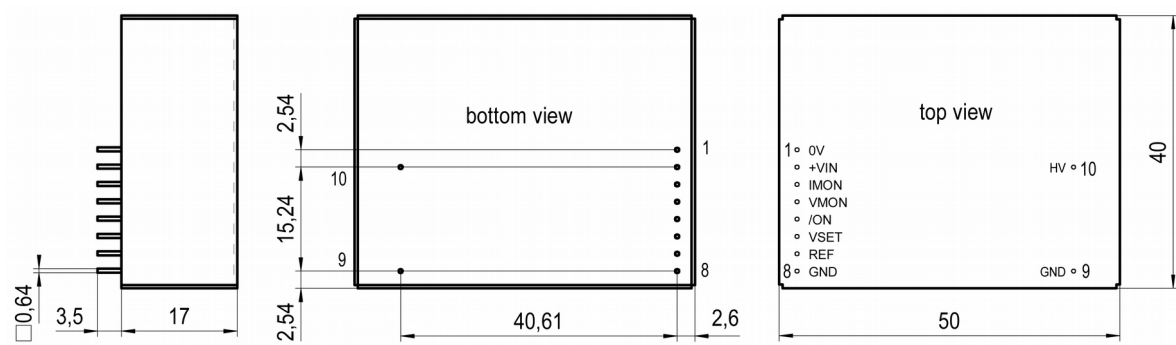
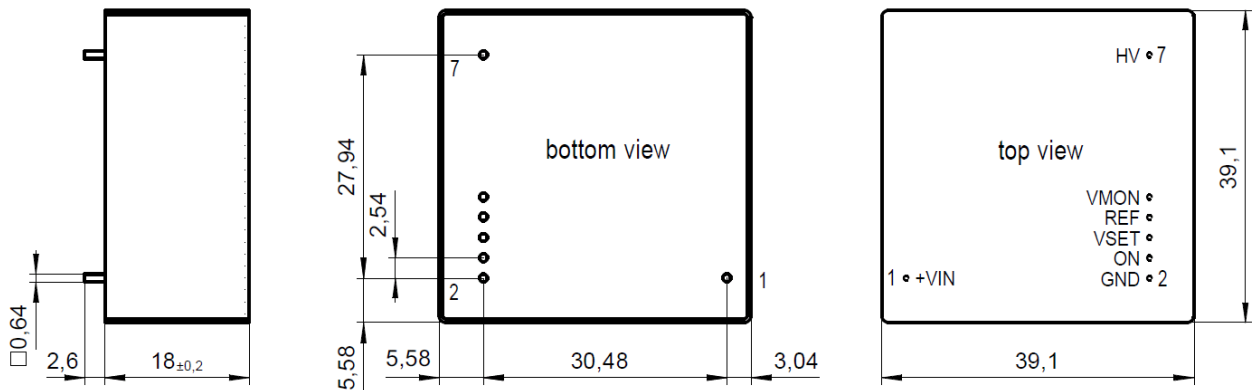
| CONFIGURATIONS | | | | | | |
|--|------------------|------------------|--|--|-------------|---------------|
| Type | V _{nom} | I _{nom} | Ripple / Noise typ. (mV _{p-p}) | Ripple / Noise max. (mV _{p-p}) | Length (mm) | Item code |
| BPS 1 W | | | | | | |
| BPx 05 205 5 | 500 V | 2 mA | < 10 | < 20 | 40 | BP005205x05A0 |
| BPx 10 105 5 | 1 kV | 1 mA | < 10 | < 20 | 40 | BP010105x05A0 |
| BPx 15 604 5 | 1.5 kV | 0.6 mA | < 10 | < 20 | 40 | BP015604x05A0 |
| BPx 20 504 5 | 2 kV | 0.5 mA | < 10 | < 20 | 40 | BP020504x05A0 |
| BPx 30 304 5 | 3 kV | 0.3 mA | < 15 | < 25 | 40 | BP030304x05A0 |
| BPS 3 W | | | | | | |
| BPx 03 106 12 | 300 V | 10 mA | < 15 | < 30 | 40 | BP003106x12A0 |
| BPx 05 605 12 | 500 V | 6 mA | < 15 | < 30 | 40 | BP005605x12A0 |
| BPx 10 305 12 | 1 kV | 3 mA | < 20 | < 40 | 40 | BP010305x12A0 |
| BPx 15 205 12 | 1.5 kV | 2 mA | < 25 | < 50 | 40 | BP015205x12A0 |
| BPx 20 155 12 | 2 kV | 1.5 mA | < 30 | < 55 | 40 | BP020155x12A0 |
| BPx 30 105 12 | 3 kV | 1 mA | < 35 | < 60 | 40 | BP030105x12A0 |
| BPS 4 W | | | | | | |
| BPx 05 805 12 | 500 V | 8 mA | < 5 | < 10 | 50 | BP005805x12 |
| BPx 10 405 12 | 1 kV | 4 mA | < 5 | < 10 | 50 | BP010405x12 |
| BPx 20 205 12 | 2 kV | 2 mA | < 5 | < 10 | 50 | BP020205x12 |
| BPx 30 135 12 | 3 kV | 1.3 mA | < 5 | < 10 | 50 | BP030135x12 |
| BPx 40 105 12 | 4 kV | 1 mA | < 5 | < 10 | 50 | BP040105x12 |
| BPx 60 674 12 | 6 kV | 0.67 mA | < 5 | < 10 | 55 | BP060674x12 |
| Notes: x – polarity (negative/positive) | | | | | | |

Table 2: Technical data: Configurations

| CONFIGURATION ORDER GUIDE (item code parts) | | | | | | |
|---|---|---|------------------------------|---|---|-----------------------------------|
| BP | 005 | 805 | P | 12 | 0 | 0 |
| Type | V _{nom} | I _{nom} (nA) | Polarity | Input Voltage | Revision | Customized Version |
| | three significant digits • 100V For Example: 005 = 500V | two significant digits + number of zeros For Example: 805 = 8mA | P = positive N = negative | two significant digits 05 = 5 Volt 12 = 12 Volt | one digit 0 = no revision A = first revision B = second revision | one digit 0 = no customization |

Table 3: Technical data: Options and order information

3 Dimensional drawing



4 PIN assignment

4.1 BPS 1W / 3W

| PIN | NAME | DESCRIPTION | VALUE |
|-----------------------------------|------|--|--|
| 1 | VIN | V _{in} supply voltage | +5 V / +12 V DC |
| 2 | GND | Ground | |
| 3 | ON | Signal ON | TTL-level: LOW → HV OFF HIGH or n.c. → HV ON |
| 4 | VSET | V _{set} Set value of output voltage | 0 ... 2.5 V 0 ... 5 V |
| 5 | REF | V _{ref} Internal reference voltage | 2.5 V 5V |
| 6 | VMON | V _{mon} Monitor voltage | 0 ... 2.5 V 0 ... 5 V |
| 7 | HV | V _{out} High voltage output | |
| Note: Case is connected to GND | | | |

Table 4: PIN Assignment BPS 1/3W

4.2 BPS 4W

| PIN | NAME | DESCRIPTION | VALUE |
|--|--------------------|--|--|
| 1 | 0V ⁽¹⁾ | Supply ground | |
| 2 | +VIN | V _{in} Supply voltage | +12 V DC |
| 3 | IMON | I _{mon} Monitor voltage of output current | 0 ... 5 V |
| 4 | VMON | V _{mon} Monitor voltage | 0 ... 5 V |
| 5 | /ON | Signal ON | TTL-level: LOW or n.c. → HV ON HIGH → HV OFF |
| 6 | VSET | V _{set} Set value of output voltage | 0 ... 5 V |
| 7 | REF | V _{ref} Internal reference voltage | 5 V |
| 8 | GND ⁽¹⁾ | Signal ground | |
| 9 | GND ⁽¹⁾ | HV ground | |
| 10 | HV | V _{out} High voltage output | |
| Note: ⁽¹⁾ Case is connected to GND, internally connected | | | |

Table 5: PIN Assignment BPS 4W

5 Control principle

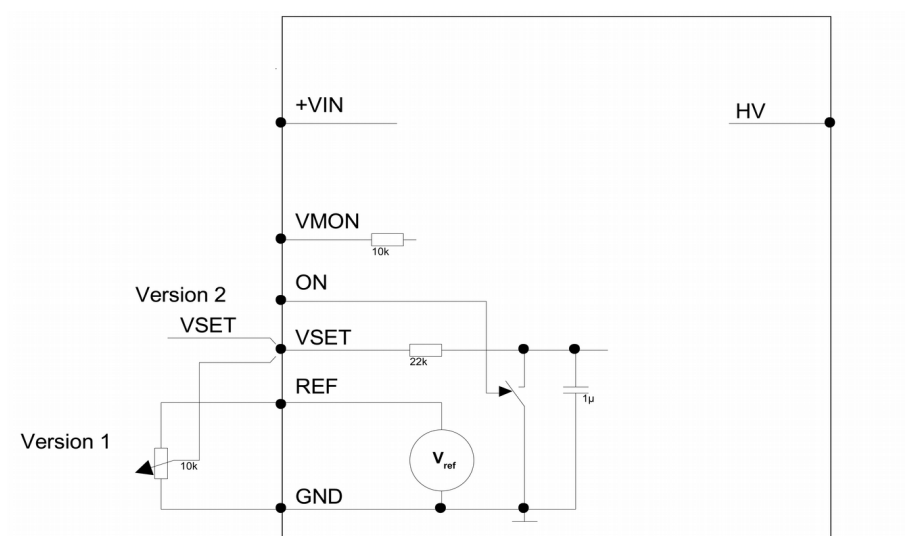


Figure 4: Control principle BPS 1/3W

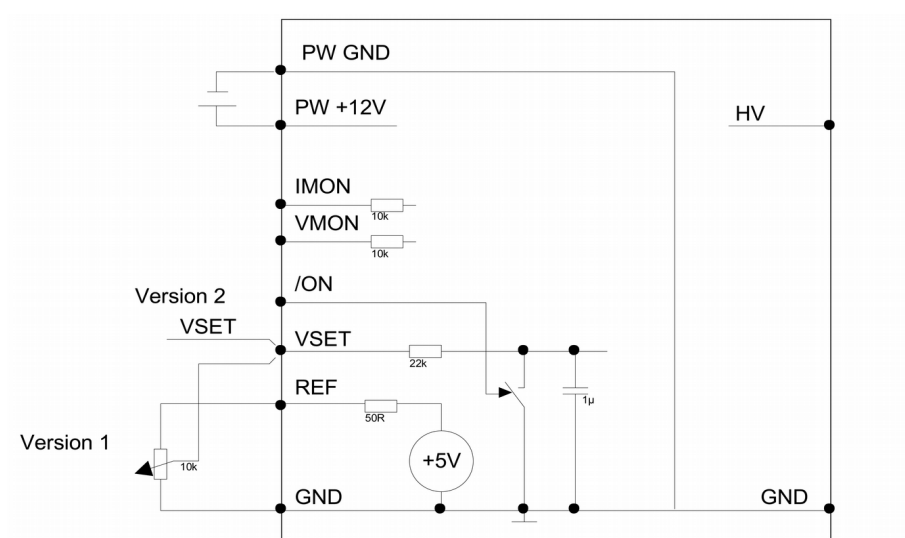


Figure 5: Control principle BPS 4W


6 Appendix

For more information please use the following download links:


| |
|---|
| This document |
| http://download.iseg-hv.com/DC_DC/BPS/iseg_datasheet_BPS_en.pdf |

7 Warranty & Service

This device is made with high care and quality assurance methods. The standard factory warranty is 12 months. Please contact the iseg sales department if you wish to extend the warranty.

| CAUTION! | |
|--|--|
|  CAUTION! | <p>Repair and maintenance may only be performed by trained and authorized personnel.</p> <p>For repair please follow the RMA instructions on our website: www.iseg-hv.com/en/support/rma</p> |

8 Disposal

| INFORMATION | |
|---|--|
|  INFORMATION | <p>All high-voltage equipment and integrated components are largely made of recyclable materials. Do not dispose the device with regular residual waste. Please use the recycling and disposal facilities for electrical and electronic equipment available in your country.</p> |

9 Manufacturer contact

iseg Spezialelektronik GmbH

Bautzner Landstr. 23

01454 Radeberg / OT Rossendorf

GERMANY

FON: +49 351 26996-0 | FAX: +49 351 26996-21

www.iseg-hv.com | info@iseg-hv.de | sales@iseg-hv.de