Technical documentation
Last changed on: 2024-10-24

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
2.9	2024-10-24	Fix manual Link, Identification of the view in the dimension drawings, Description of the shortcuts in the Table 2: Technical data: Configurations
2.8	2024-08-20	Editing the safety instructions, added soldering and case temperature, Voltage and current monitor accuracy in technical data, Vin separated in table 1, Description of the PIN assignment, Table 4 revised
2.7	2023-09-01	Renaming to manual, addition of “Voltage monitor accuracy” and “Current monitor accuracy” in the technical data, Configurations Guide Sample for revision, Glossary insert, insert table of content
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 2018-09-25	Extended operation temperature Fixed typo
2.0	2017-02-28 2018-06-13 2018-11-01	Relayouted documentation Corrections of documentation Fixed typo BPx60 674 12

Disclaimer / Copyright

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

WARNING

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

CAUTION

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

INFORMATION

Advices marked as "Information" give important information.

Read the manual.

Important information.

Attention high voltage!

The crossed bin symbol indicates that the device shall not be disposed with regular.

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

Do not operate the unit in wet or damp conditions.

WARNING

Do not operate the unit in an explosive atmosphere.

WARNING

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

INFORMATION

It is strongly recommended to read the manual before operation!

Table of content

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 (2	1 %		
Voltage monitor accuracy (2	1 % • V_{nom}		
Current monitor accuracy (2	1 % • I_{nom}		
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} $0 \le V_{set} \le V_{ref}$ ➞ $0 \le V_{out} \le \mid V_{nom} \mid \pm 1$ % (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 opprox. 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		
Maximum soldering temperature	1.5mm from case for 10 sec, 270 °C		
Maximum case temperature	120 °C		
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		
Humidity	max. 70 %, not condensing		

Notes:

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})**	**Supply voltage V_{in}**	**Length (mm)**	**Item code**
BPS 1 W							
BPx 05 205	500 V	2 mA	< 10	< 20	5 V	40	BP005205x05RK
BPx 10 105	1 kV	1 mA	< 10	< 20	5 V	40	BP010105x05RK
BPx 15 604	1.5 kV	0.6 mA	< 10	< 20	5 V	40	BP015604x05RK
BPx 20 504	2 kV	0.5 mA	< 10	< 20	5 V	40	BP020504x05RK
BPx 30 304	3 kV	0.3 mA	< 15	< 25	5 V	40	BP030304x05RK
BPS 3 W							
BPx 03 106	300 V	10 mA	< 15	< 30	12 V	40	BP003106x12RK
BPx 05 605	500 V	6 mA	< 15	< 30	12 V	40	BP005605x12RK
BPx 10 305	1 kV	3 mA	< 20	< 40	12 V	40	BP010305x12RK
BPx 15 205	1.5 kV	2 mA	< 25	< 50	12 V	40	BP015205x12RK
BPx 20 155	2 kV	1.5 mA	< 30	< 55	12 V	40	BP020155x12RK
BPx 30 105	3 kV	1 mA	< 35	< 60	12 V	40	BP030105x12RK
BPS 4 W							
BPx 05 805	500 V	8 mA	< 5	< 10	12 V	50	BP005805x12RK
BPx 10 405	1 kV	4 mA	< 5	< 10	12 V	50	BP010405x12RK
BPx 20 205	2 kV	2 mA	< 5	< 10	12 V	50	BP020205x12RK
BPx 30 135	3 kV	1.3 mA	< 5	< 10	12 V	50	BP030135x12RK
BPx 40 105	4 kV	1 mA	< 5	< 10	12 V	50	BP040105x12RK
BPx 60 674	6 kV	0.67 mA	< 5	< 10	12 V	55	BP060674x12RK
Notes:							
replacement characters: R – revision K – customization x – polarity (negative/positive)							
The position for the revision and customer customization is not necessarily present in the article number.							

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 significante digits • 100V For Example: 005 = 500V	two significante digits + number of zeros For Example: 805 = 8mA	P = positive N = negative	two significante digits 05 = 5 Volt 12 = 12 Volt	one digit	one digit

Table 3: Technical data: Options and order information

3 Dimensional drawing

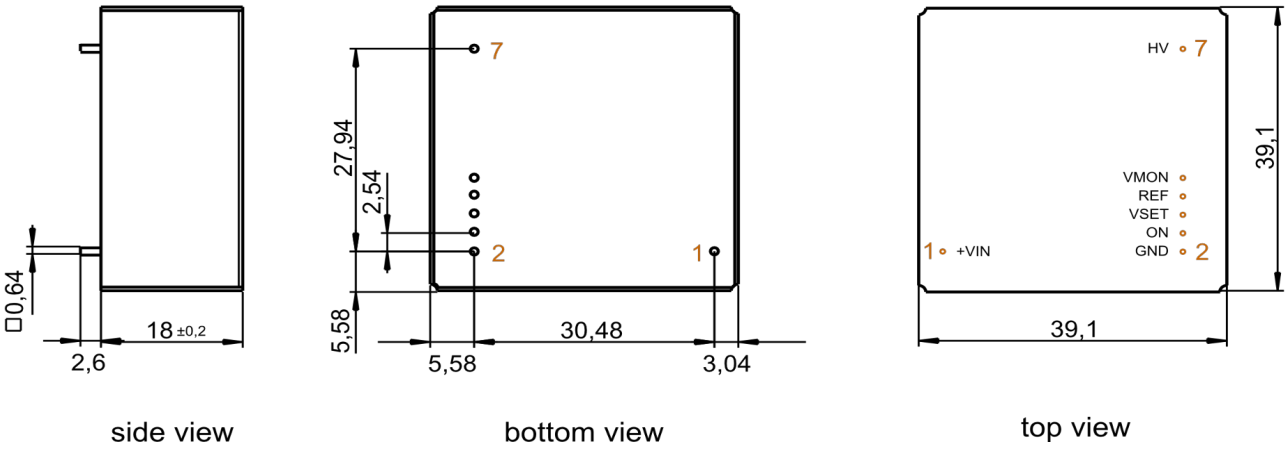

Figure 1: dimensional drawing BPS 1/3W

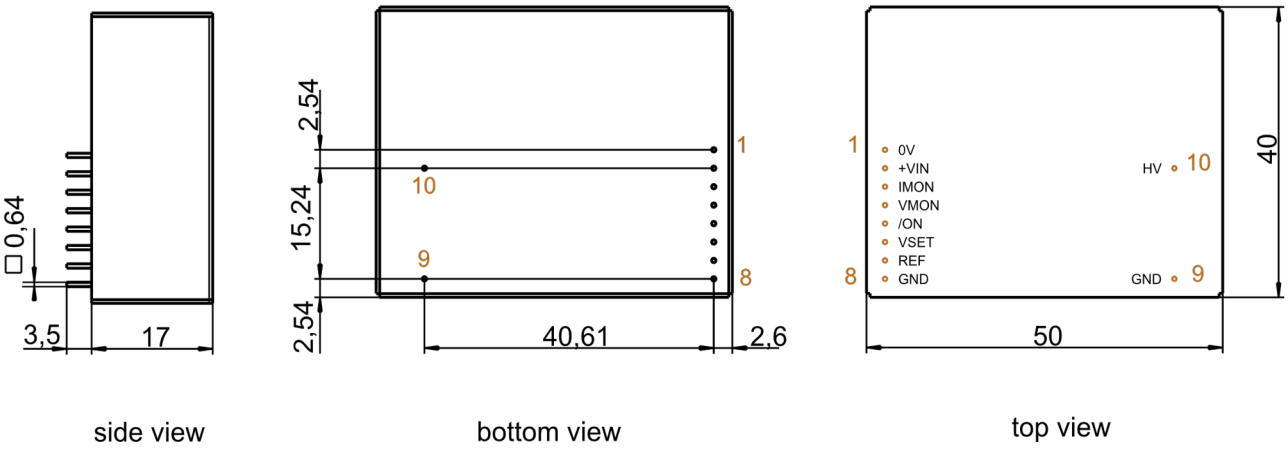

Figure 2: dimensional drawing BPS 4W

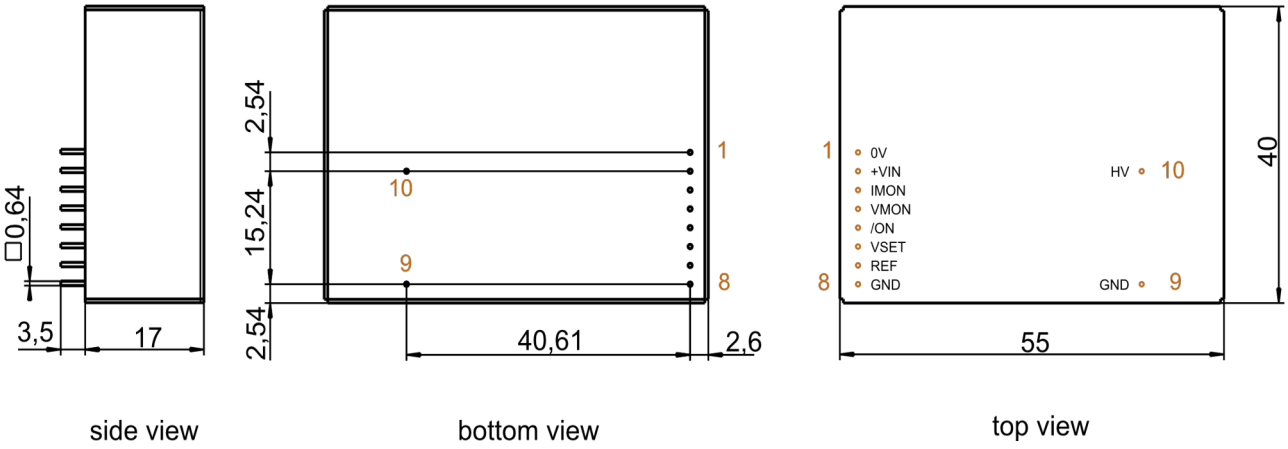

Figure 3: dimensional drawing BPS 4W/6kV

4 PIN assignment

4.1 BPS 1W / 3W

PIN	NAME	DESCRIPTION	VALUE	
			V_{in} = 5V	V_{in} = 12V
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

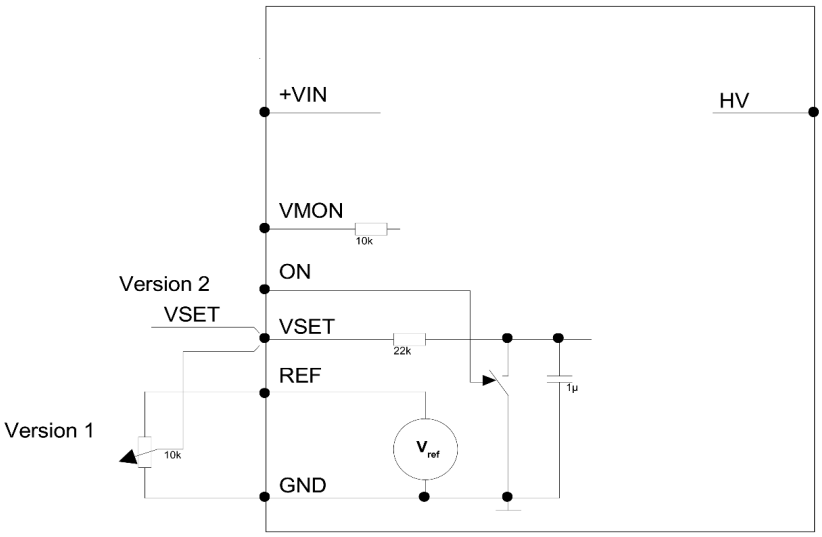

Figure 4: Control principle BPS 1/3W

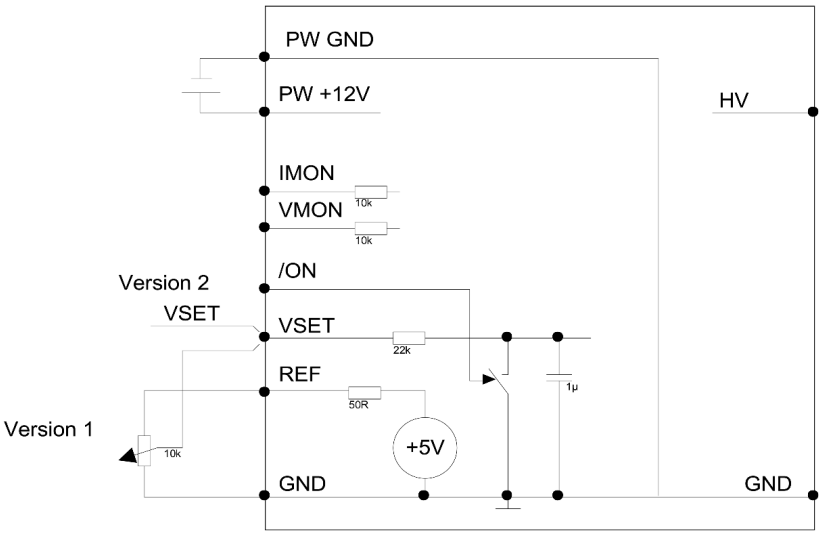

Figure 5: Control principle BPS 4W

6 Glossary

SHORTCUT	MEANING
0V	Supply ground
V_{nom}	nominal output voltage
V_{out}	output voltage
V_{set}	set value of output voltage
V_{mon}	monitor voltage of output voltage
V_{meas}	digital measured value of output voltage
V_{p-p}	peak to peak ripple voltage
V_{in}	input / supply voltage
V_{type}	type of output voltage (AC, DC)
V_{ref}	internal reference voltage
V_{max}	limit (max.) value of output voltage
V_{limit}	voltage limit
ΔV_{out} – $[\Delta V_{in}]$	deviation of V_{out} depending on variation of supply voltage
ΔV_{out} – $[\Delta R_{load}]$	deviation of V_{out} depending on variation of output load
I_{nom}	nominal output current
I_{out}	output current
I_{set}	set value of output current
I_{mon}	monitor voltage of output current
I_{meas}	digital measured value of current
I_{trip}	current limit to shut down the output voltage
I_{in}	input / supply current
I_{max}	limit (max.) value of output current
I_{limit}	current limit
I_{bounds}	current bounds, a tolerance tube $I_{set} \pm I_{bounds}$ around I_{set}
P_{nom}	nominal output power
P_{in}	input power
P_{in_nom}	nominal input power
T	temperature
T_{REF}	reference temperature
ON	HV ON
OFF	HV OFF
CH	channel(s)
HV	high voltage
LV	low voltage
GND	signal ground
INH	Inhibit
POL	Polarity
KILL	KillEnable

7 Appendix

For more information please use the following download links:

This document https://iseg-hv.com/download/DC_DC/BPS/iseg_manual_BPS_en.pdf
Archive https://iseg-hv.com/download/?dir=DC_DC/BPS/archive/
Product Change Notification (PCN) https://iseg-hv.com/download/?dir=DC_DC/BPS/PCN/

8 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

Repair and maintenance may only be performed by trained and authorized personnel.

For repair please follow the RMA instructions on our website: www.iseg-hv.com/en/support/rma

9 Disposal

INFORMATION

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.

10 Manufacturer contact

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