Technical documentation
Last changed on: 2024-08-20

APS series

Small High Voltage Print Module for PCB mounting

- 200 V – 1 kV versions available
- patented resonance converter technology
- controlled by analog set voltage
- analog monitor voltage
- low ripple and noise, low EMI
- RoHS compliant

Document history

Version	Date	Major changes
2.5	2024-08-20	Editing the safety instructions added soldering and case temperature, Voltage and current monitor accuracy in technical data, Vin separated in table 2, Humidity added
2.4	2022-12-01	Improved description revision (revision and customization), rename document
2.3	2021-04-26	Improved documentation, Item code revision and customization
2.2	2020-07-08	Improved documentation
2.1	2019-06-03	Improved documentation, error correction
2.0	2017-02-28 2018-06-13	Relayouted documentation Improved documentation

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!

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!

1 General description

The APS High Voltage Power Supply module series is a very small DC/DC power 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	APS 0.5 W	APS 1 W
Out voltage V_{nom}		
Polarity	Factory fixed, positive or negative	
Ripple and noise (1	typ. < 10 mV_{p-p} | max. < 30 mV_{p-p} [f > 10 Hz] | < 5 mV_{p-p} [f > 2 kHz]	
Stability [ΔV_{out} vs. ΔV_{in}] (1	< 1 • 10^{-3} • V_{nom}	
Stability [ΔV_{out} vs. ΔR_{load}] (1	< 2 • 10^{-3} • V_{nom}	
Temperatur coefficient	< 50 ppm/K (3	
Supply voltage (2 V_{in}	4.5 – 5.5 V	11.5 – 15.5 V
Supply current I_{in} at V_{out} = 0 at V_{out} = V_{nom} / no load at V_{out} = V_{nom} / with load	 < 5 mA < 25mA < 180 mA	 < 5 mA < 18mA < 150 mA
Set / Monitor voltage	0 - 2.5 V	0 – 5 V
Adjustment accuracy	± 1 % (3	
Voltage monitor accuracy	1 % • V_{nom}	
Current monitor accuracy	1 % • I_{nom}	
Signal /ON	/ON: = 0 (LOW or open) ➜ V_{OUT} according setting 5.5V ≥ $V_{/ON}$ >2.5V(HIGH) ➜ V_{OUT} =0 !	
Reference voltage V_{ref} (internal)	2.5 V ±1%	5 V ±1%
Control V_{set} - version 1	with R_{set} connected between V_{set} and GND: R_{set} = V_{out} • 10kΩ / (V_{nom} – V_{out})	
Control V_{set} - version 2	with V_{set} (Ri<<10 kΩ):	
	0 ≤ V_{set} ≤ 2.5V ➜ 0 ≤ V_{out} ≤ V_{nom} ±1.0% (3	0 ≤ V_{set} ≤ 5V ➜ 0 ≤ V_{out} ≤ V_{nom} ±1.0% (3
	Attention! Output voltage is internally **not limited!**	
	At V_{set} > 2.5 V ➜ V_{out} > V_{nom} is possible! Do not use V_{set} > 2.5 V !	At V_{set} > 5 V ➜ V_{out} > V_{nom} is possible! Do not use V_{set} > 5 V !
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 steel, moulded	
Dimensions – L/W/H	40 / 16 / 11mm^3	
Operating temperature	0 – 40 °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) Blocking circuit is recommended for ripple rejection to input line with 22 µF near pin +VIN

3) Temperature coefficient and accuracy are guaranteed in the temperature range 0 – 40 °C

Table 1: Technical data: Specifications

CONFIGURATIONS							
Type	**V_{nom}**	**I_{nom}** [1]	**Ripple / Noise typ. (mV_{p-p})**	**Ripple / Noise max. (mV_{p-p})**	**Supply voltage V_{in}**	**P_{nom}**	**Item code**
APx 02 255	200 V	2.5 mA	< 10	< 30	5 V	0.5 W	AP002255x05rk
APx 04 125	400 V	1.2 mA	< 10	< 30	5 V	0.5 W	AP004125x05rk
APx 06 804	600 V	0.8 mA	< 10	< 30	5 V	0.5 W	AP006804x05rk
APx 08 604	800 V	0.6 mA	< 10	< 30	5 V	0.5 W	AP008604x05rk
APx 10 504	1 kV	0.5 mA	< 10	< 30	5 V	0.5 W	AP010504x05rk
APx 02 505	200 V	5 mA	< 10	< 30	12 V	1 W	AP002505x12rk
APx 04 255	400 V	2.5 mA	< 10	< 30	12 V	1 W	AP004255x12rk
APx 06 165	600 V	1.6 mA	< 10	< 30	12 V	1 W	AP006165x12rk
APx 08 125	800 V	1.2 mA	< 10	< 30	12 V	1 W	AP008125x12rk
APx 10 105	1 kV	1 mA	< 10	< 30	12 V	1 W	AP010105x12rk
Notes: [1] I_{out} is limited to approx. 1.5 • I_{nom} replacement characters: r – revision, k – customization (Without revision or customization, these digits are omitted)							

Table 2: Technical data: Configurations

CONFIGURATION ORDER GUIDE (item code parts)						
AP	**002**	**255**	**P**	**05**	**0** [1]	**0** [1]
Type APS	V_{nom}	I_{nom} (nA)	Polarity	Input Voltage	Revision	Customized Version
	three significante digits • 100V For Example: 002 = 200V	two significante digits + number of zeros For Example: 255 = 2.5mA	P = positive N = negative	two significante digits For Example: 05 = 5 Volt 12 = 12 Volt	one digit 0 = no revision For Example: A = first revision B = second revision	one digit
Notes: 1) - Without revision or customization, these digits are omitted						

Table 3: Technical data: Options and order information

3 Dimensional drawing

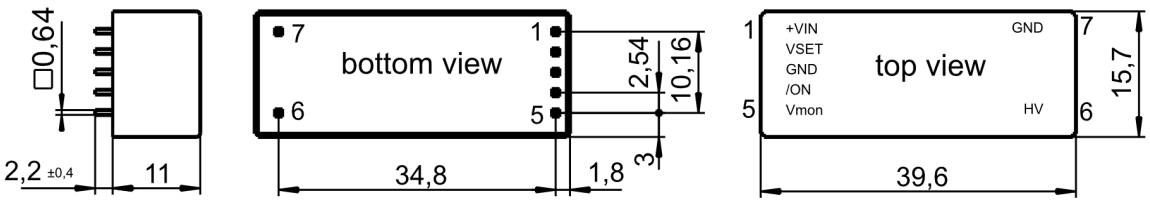

Figure 1: dimensional drawing APS

4 PIN assignment

PIN	NAME	DESCRIPTION	VALUE	
			V_{in} = 5V	V_{in} = 12V
1	**+VIN**	V_{in} Supply voltage	+5 V	+12 V
2	**VSET**	V_{set} Set voltage	0 ... 2.5 V	0 ... 5 V
3/7	**GND**	Ground		
4	**/ON**	Signal ON	TTL-level: LOW or n.c. ➜ HV ON HIGH ➜ HV OFF	
5	**VMON**	V_{mon} Monitor voltage	0 ... 2.5 V	0 ... 5 V
6	**HV**	V_{out} High voltage output		
Notes: Case is connected to GND				

Table 4: Technical data: options and order information

5 Control principle

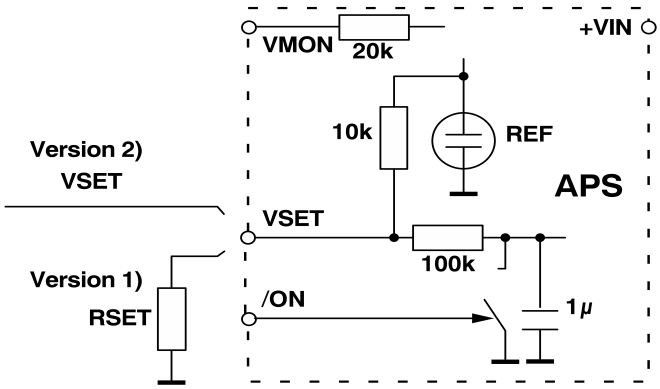

Figure 2: Control principle of APS HV supply series

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

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.

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