**Technical documentation**
Last changed on: 2021-09-30

# CPS mini series

Built-in Compact High Voltage Module

- Versions from 1 kV – 6 kV
- patented resonance converter technology
- INHIBIT
- low ripple and noise, low EMI
- hardware limits for voltage and current

## Document history

| Version | Date | Major changes |
|---|---|---|
| 1.0 | 2021-09-30 | Documentation separation of the modules CPS mini series, fixed dimensions |

## 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!

"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.


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!

To avoid injury of users it is not allowed to open the unit. There are no parts which can be maintained by users inside of the unit. Opening the unit will void the warranty.

**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.

# Table of Contents

# 1. General description

CPS mini modules are highly stable analog controlled High Voltage Power supplies. Modules of the CPS series can be used as standalone DC/DC converters. The output voltage is controllable with an analog interface with either a potentiometer (internal reference voltage) or an input analog control voltage. The modules are equipped with INHIBIT, current and voltage limits.

**Customized versions can be produced on request.**

# 2. Overview

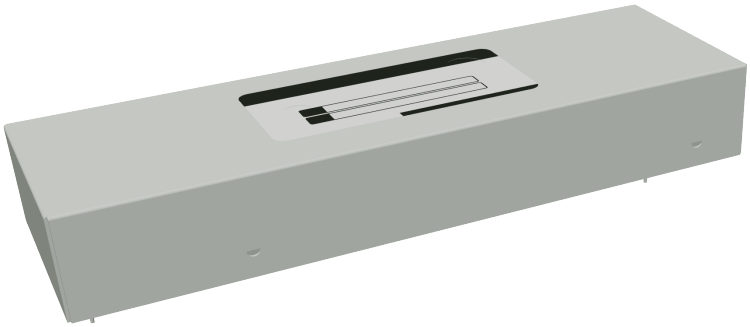


*Figure 1: TOP view*

[2] [1]

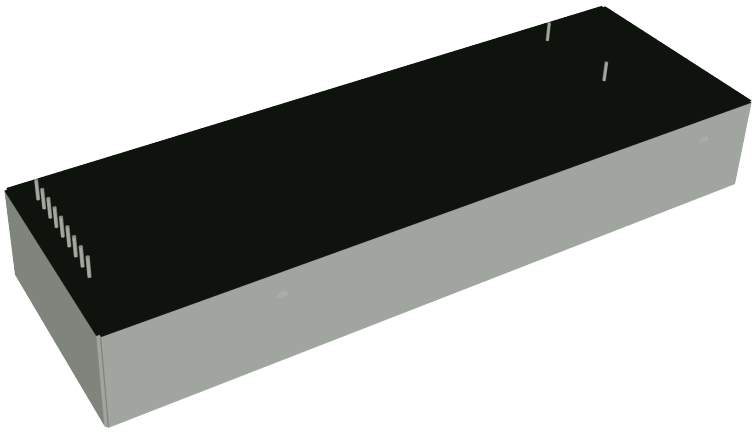


*Figure 2: Bottom view*

| Number | | Description | Detailed explanation in chapter |
|---|---|---|---|
| [1] | Connection pins | PIN 10 and 11 | Table 5: PIN Assignment,<br>5 Connectors and PIN assignments,<br>4 Dimensional drawings |
| [2] | Connection pins | PIN 1 to 9 | Table 5: PIN Assignment,<br>5 Connectors and PIN assignments,<br>4 Dimensional drawings |

*Table 1: Overview*

# 3. Technical Data

## 3.1. Specifications

| SPECIFICATIONS | CPS mini |
|---|---|
| Out voltage $V_{nom}$ | 1 – 6 kV |
| Polarity | Factory fixed, positive or negative |
| Ripple and noise (f > 10 Hz) [1] | < 2.5 • $10^{-6}$ • $V_{nom}$ |
| Stability - [$\Delta V_{out}$ vs. $\Delta V_{in}$] [1] | < 5 •$10^{-5}$ • $V_{nom}$ |
| Stability - [$\Delta V_{out}$ vs. $\Delta R_{load}$] [1] | < 2 •$10^{-4}$ • $V_{nom}$ |
| Temperatur coefficient | 50 ppm / K |
| Supply voltage $V_{in}$ | 22.8 – 25.2V |
| Supply current $I_{in}$<br>at $V_{out}$ = 0<br>at $V_{out}$ = $V_{nom}$ / with load | <br>< 25 mA<br>< 450 mA |
| Set / Monitor voltage | 0 – 5 V |
| Set / Monitor accuracy | ± 1 % • $V_{nom}$ |
| Voltage ramp up/down | 0.25 • $V_{nom}$ / s |
| Protection | Overload and short circuit protected<br>(**ATTENTION: there is only one short circuit or arc per second allowed!**)<br>$V_{limit}$/$I_{limit}$: Output voltage and current internally limited to approx 1.1 • $V_{nom}$ resp. $I_{nom}$ |
| System / Remote connector | Pin |
| HV connector | Pin |
| Case | metal box moulded |
| Dimensions – L/W/H | 120 / 40 / 25 $mm^3$ |
| Operating temperature | 0 – 40 °C |
| Storage temperature | -20 – 60 °C |
| Humidity | max. 70 % |

Notes:
[1)] Specifications for stability, ripple and noise are guaranteed in the range 2% • $V_{nom}$ < $V_{out}$ ≤ $V_{nom}$; $I_{set}$ ≥ 1% $I_{nom}$

*Table 2: Technical data: Specifications*

## 3.2. Configurations

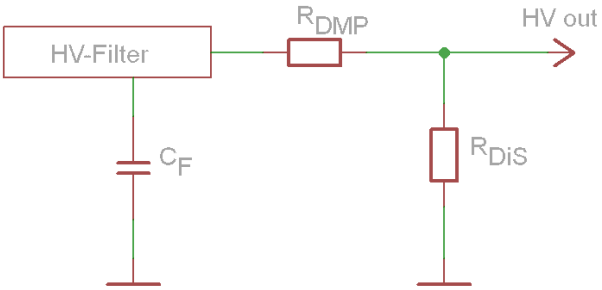



*Figure 3*

| CONFIGURATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **$V_{nom}$** | **$I_{nom}$** | **Standard Ripple** $mV_{p-p}$ | **Internal Capacitance nominal** $C_F$ / nF | **Damping Resistor** $R_{DMP}$ / kOhm | **Discharge Resistor** $R_{DiS}$ / MOhm | **HV connector** | **Item Code** |
| CPx 10 805 24 5 M | 1 kV | 8 mA | 3 | 110 | 0.22 | 55 | PIN | CM010805x2450ooo98rk |
| CPx 20 405 24 5 M | 2 kV | 4 mA | 5 | 45 | 1 | 55 | PIN | CM020405x2450ooo98rk |
| CPx 30 255 24 5 M | 3 kV | 2.5 mA | 8 | 33 | 1.5 | 55 | PIN | CM030255x2450ooo98rk |
| CPx 40 205 24 5 M | 4 kV | 2 mA | 10 | 24 | 1.5 | 200 | PIN | CM040205x2450ooo98rk |
| CPx 60 135 24 5 M | 6 kV | 1.3 mA | 15 | 18 | 5.1 | 200 | PIN | CM060135x2450ooo98rk |
| Notes:<br>replacement characters: o – options, r – revision, k – customization, x – polarity (negative/positive) | | | | | | | | |

*Table 3 Configurations*

## 3.3. Options

| ORDER INFO | INFO | | EXAMPLE |
|---|---|---|---|
| **POLARITY** | Positive: | x = p | CP**p** 10 805 24 5 M PBP |
| | Negative: | x = n | CP**n** 10 805 24 5 M PBP |

*Table 4: Technical data: Options and order information*

## 3.4. Functional description

CPS mini modules can be operated as constant voltage or constant current source, depending on the limiting set value ($V_{SET}$ or $I_{SET}$). The specification for ripple and noise and stability is valid for constant voltage mode only.

Via PIN “INH” the voltage generation is switched on with ramp, but switched off without ramp. A monitor voltage for the output current and output voltage is available via the $I_{MON}$ and $V_{MON}$ connections.

The pin REF (reference) can be used for the $V_{SET}$ voltage via an additional circuit (see Figure 4: VSET)

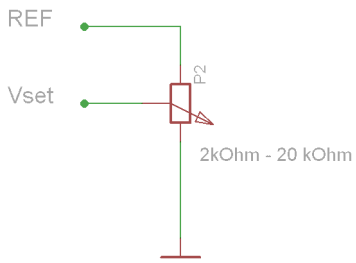



*Figure 4: VSET*

# 4. Dimensional drawings

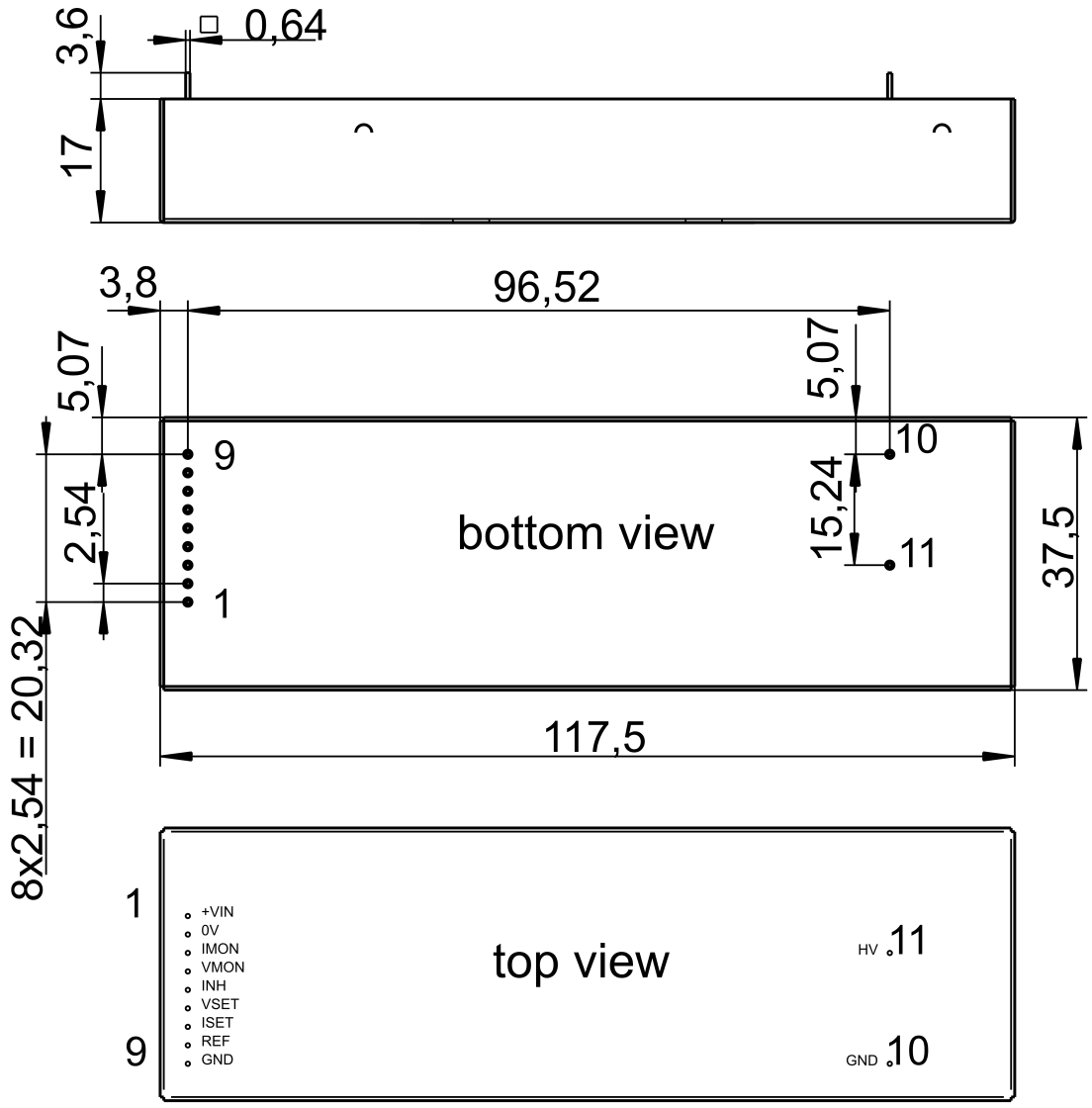
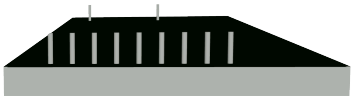
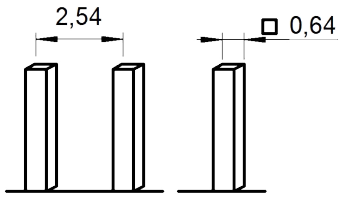



*Figure 5: Dimensional drawings*

# 5. Connectors and PIN assignments

| CONNECTORS | PART NUMBERS (manufacturer code / iseg accessory parts item code) | | |
|---|---|---|---|
| **98** | **CABLE SIDE** | | |
|  *Figure 6*   *Figure 7* | part number<br>manufacturer<br>iseg part number | none | Mounting on printed circuit board, Grid dimensions 2.54mm |

| PIN | NAME | DESCRIPTION | VALUE |
|---|---|---|---|
| **1** | **VIN** | $V_{in}$ Supply voltage | +24 V DC |
| **2** | **0V** [2] | Supply ground | |
| **3** | **IMON** | $I_{mon}$ Monitor voltage of output current | 0 ... 5 V |
| **4** | **VMON** | $V_{mon}$ Monitor voltage | 0 ... 5 V |
| **5** | **INH** | Inhibit, LOW = active, shut down the output voltage | TTL-level:<br>LOW ➞ Vout = 0V<br>HIGH or n.c. ➞ HV ON |
| **6** | **VSET** | $V_{set}$ Set value of output voltage | 0 ... 5 V |
| **7** | **ISET** | $I_{set}$ Set voltage of output current | 0 ... 5 V |
| **8** | **REF** | $V_{ref}$ Internal reference voltage | 5 V, $I_{max}$ = 2.5 mA |
| **9** | **GND** [1] | Signal ground | |
| **10** | **GND** [1] | HV ground | |
| **11** | **HV** | $V_{out}$ High voltage output | |

Notes:
Case is connected to GND
[1] internally connected
[2] electrically isolated from GND

*Table 5: PIN Assignment*

# 6. Order guides

| **CONFIGURATION ORDER GUIDE** (item code parts) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **CM** | **030** | **255** | **P** | **24** | **50** | **000** | **98** | **0** | **0** |
| Type | $V_{nom}$ | $I_{nom}$ (nA) | Polarity | Input Voltage | Monitor Voltage | Option | connector | Revision | Customized Version |
| CPS mini series | three significante digits • 100V<br><br>For Example: 030 = 3000V | two significante digits + number of zeros<br><br>For Example: 255 = 2,5 mA | P = positive<br>N = negative | two significante digits<br><br>24 = 24 Volt | two significante digits<br>1.th hex • 1V<br>2.th dez • 0,1V<br><br>50 = 5 Volt | | 98 = PIN | one digit<br><br>For Example:<br>A = first revision<br>B = second revision | one digit<br><br>For Example:<br>0 = no custo-mization |

*Table 6: Configuration item code*

# 7. Appendix

For more information please use the following download links:

| **This document** |
|---|
| https://iseg-hv.com/download/DC_DC/CPS/iseg_datasheet_CPSmini_en.pdf |
| **CPS Series** |
| https://iseg-hv.com/en/products/detail/CPS |
| **Archives** |
| https://iseg-hv.com/download/?dir=DC_DC/CPS/archive |

# 8. Glossary

| SHORTCUT | MEANING |
|---|---|
| $V_{nom}$ | 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 |
| $\Delta V_{out}$ [$\Delta V_{in}$] | deviation of $V_{out}$ depending on variation of supply voltage |
| $\Delta V_{out}$ [$\Delta R_{load}$] | deviation of $V_{out}$ depending on variation of output load |
| $V_{bounds}$ | Voltage bounds, a tolerance tube $V_{set} \pm V_{bounds}$ around $V_{set}$. |
| $I_{nom}$ | 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 |
| /ON | HV OFF/ON |
| CH | channel(s) |
| HV | high voltage |
| LV | low voltage |
| GND | signal ground |
| INH | Inhibit |
| POL | Polarity |
| KILL | KillEnable |

# 9. 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!

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

# 10. Disposal

**INFORMATION**

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.

# 11. Manufacturer contact

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