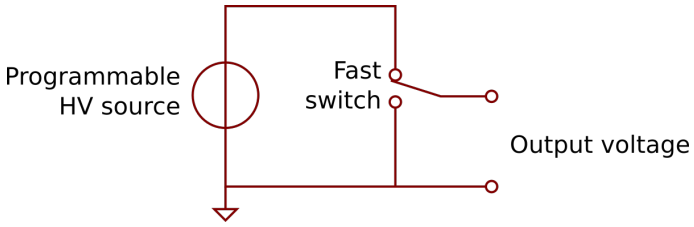
EPFL-LMTS
Maladière 71b | CH-2002 Neuchâtel

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Single Channel High Voltage Power Supply (SHVPS) datasheet

Main Features

The SHVPS consists of a programmable high voltage source coupled to a fast switch. The SHVPS can generate a precise output voltage, either continuously (DC mode), or with a square waveform (switching mode).

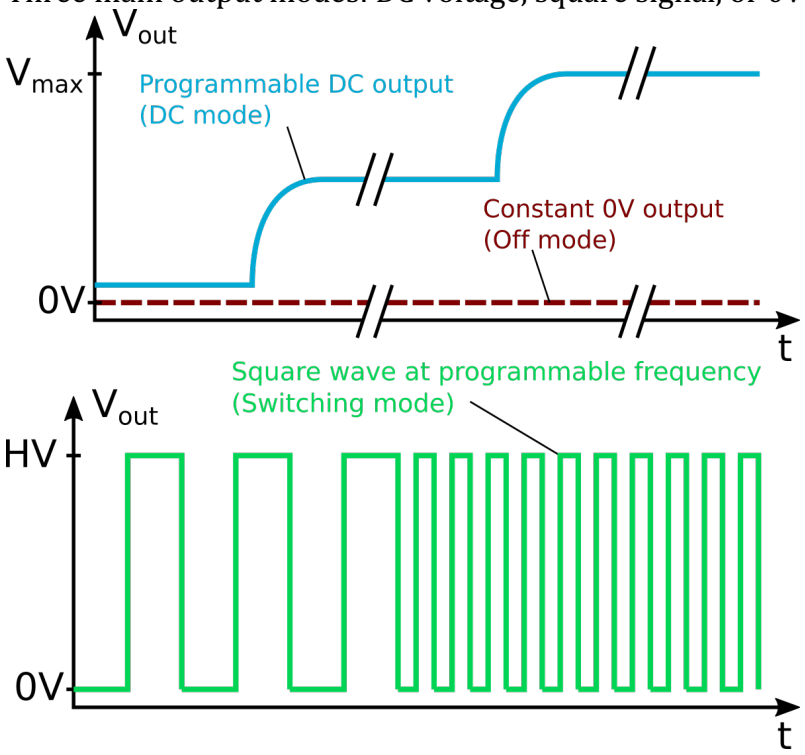


Programmable voltage source

- Voltage rating: up to a maximal voltage of 5kV, 3kV, 2kV or 1.2kV (other custom values possible).
- Voltage set point resolution: 0.1% of full scale.
- Voltage control modes: Internal (open loop or regulated) or external analog voltage.

Fast switch

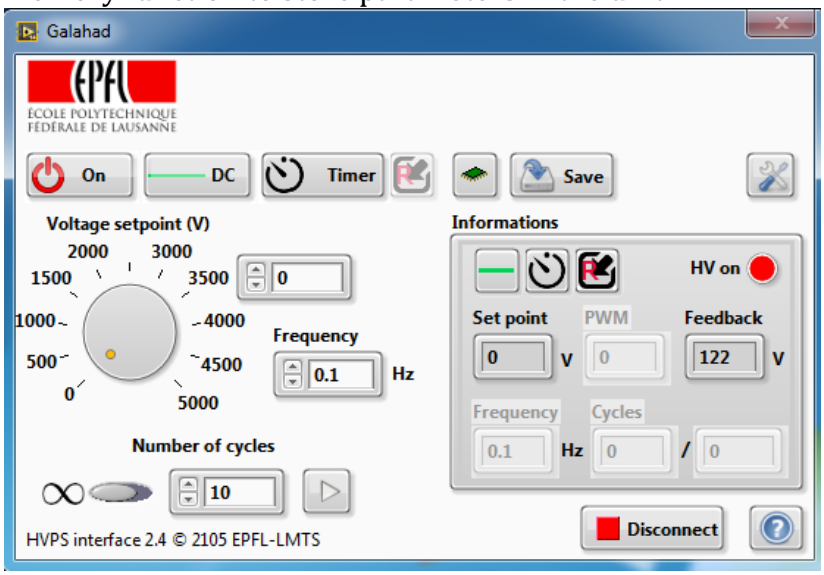
- Three main output modes: DC voltage, square signal, or 0V (off).



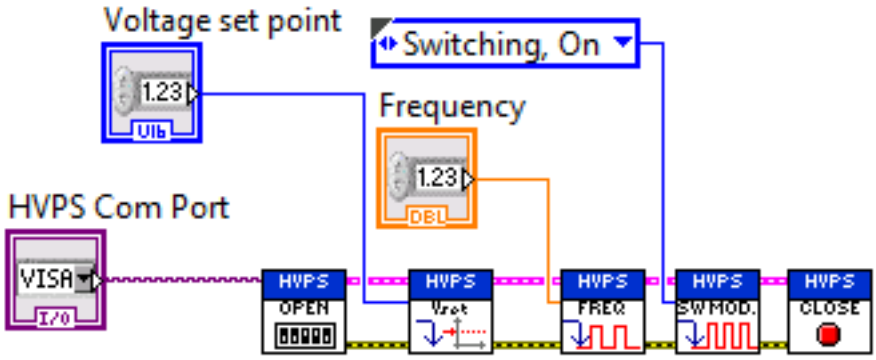
- Square signal:
  - High voltage level: programmable voltage. Low voltage level: 0V
  - Frequency range: 0.001 Hz to >1kHz.
  - Source of switching signal: Internal timer, manual push-button, or external 5V TTL signal.

Interface

- GUI interface providing access to all functions.
  - Ability to control several SHVPS in parallel.
  - Safety feature to limit the output voltage below a user-defined level.
  - Memory function to store parameters in the unit.



- LabVIEW library with all the necessary functions required to program the SHVPS and to synchronize it with other instruments.



- Set of commands for direct serial communication with the SHVPS for use with any programming language.

Miscellaneous

- Possibility to group up to 4 SHVPS into a multichannel unit.
  - Synchronized switching between the channels.
  - Precise phase shift between the channels.
  - Single USB cable to address up to 4 SHVPS.

Contents of SHVPS kit

- Single Channel High Voltage Power Supply
- 6V DC power adapter
- USB cable
- Pair of HV cable with alligator clips
- Getting started guide
- Detailed user manual
- Graphic user interface (Windows 7[1], OSX)
- LabVIEW library (Labview 2015 and later)

[1)] Compatibility with newer versions not yet tested

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Detailed performance

Preliminary data
Measurements are performed with a 100MΩ//1pF output load.

5000V SHVPS

Output Voltage accuracy

	Min.	Typical	Max
Average absolute error between 5%-95% of Vmax[1] (V)		3.9	4.5
Average absolute error between 5%-95%of Vmax (% of full scale)		0.078	0.09
Maximal absolute error between 5%-95% of Vmax (V)		19	22
Maximal absolute error between 5%-95%of Vmax (% of full scale)		0.38	0.44

Voltage set point and regulation

Change of voltage set point in open loop

	Min.	Typical	Max
Rise time for a step from 0 to 20% Vmax (ms)	100	125	150
Fall time for a step from 20% Vmax to 0 (ms)	280	288	295
Rise time for a step from 0 to 100% Vmax (ms)	25	33	40
Fall time for a step from 100% Vmax to 0 (ms)	205	210	215

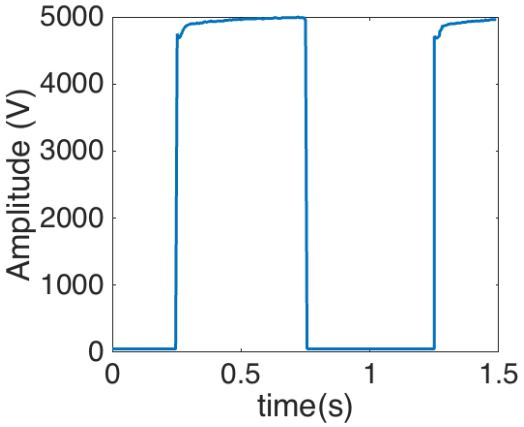
Change of voltage set point in voltage regulation mode[2,3]

	Min.	Typical	Max
Rise time for a step from 0 to 20% Vmax (ms)	75	90	115
Fall time for a step from 20% Vmax to 0 (ms)	340	355	370
Overshoot for step from 0 to 20% Vmax (%)		0	5
Rise time for a step from 0 to 100% Vmax (ms)	35	65	105
Fall time for a step from 100% Vmax to 0 (ms)	240	250	255
Overshoot for step from 0 to 100% Vmax (%)		0	<1

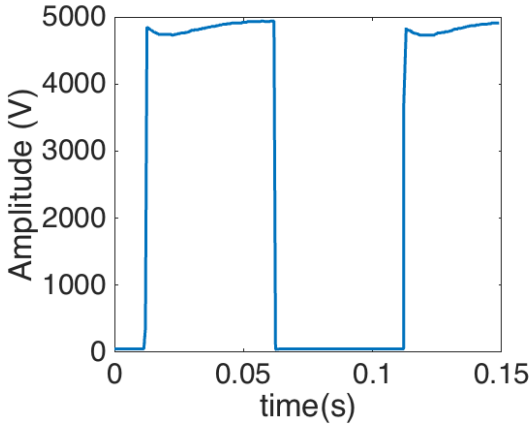
High speed switching

	Min.	Typical	Max
Frequency accuracy (1-1000Hz): Error in % of set point		0.01	0.04
Voltage overshoot switching to Vmax (1Hz-1kHz) (%)		0	<0.5
Final Voltage level, switching to Vmax (1-100Hz) (% of Vmax)	97	99.3	
Final Voltage level, switching to Vmax (1kHz) (% of Vmax)	85	92	
Rise time for a switch to Vmax (µs)		300	400
Voltage slope for a switch to Vmax (V/µs)	12.5	16.7	
Fall time for a switch from Vmax (µs)		250	320
Voltage slope for a switch from Vmax (V/µs)	15.6	20	

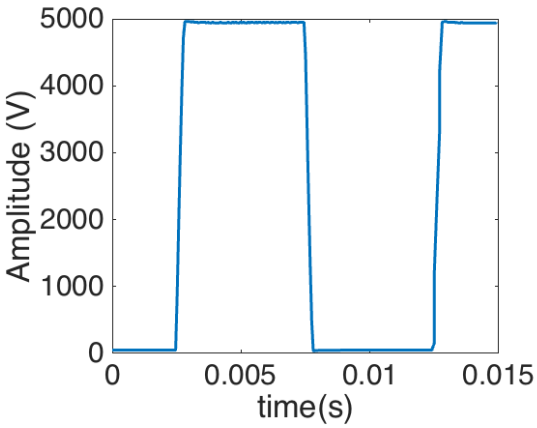
Typical switching profiles



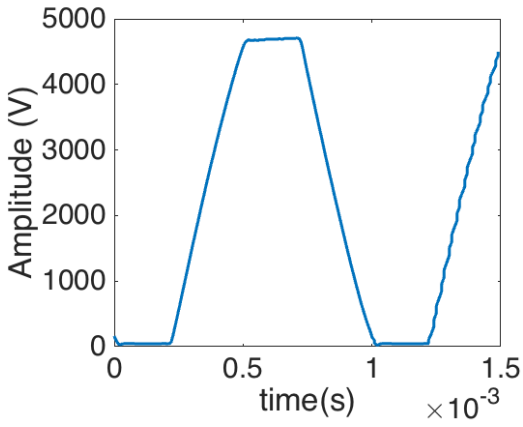
1Hz



10Hz



100Hz



1000Hz

[1] Vmax=5000V. [2] default voltage control mode of the HVPS. [3] depends on PID coefficient values.