HRC05 series

XP Power

5W

DC-HVDC converter

The HRC05 series of regulated 5W high voltage DC-DC converters provide fully adjustable output voltages up to 6kV, with built in short circuit and overload protection, in a compact PCB-mount package. HRC05's precise load and line regulation ensures reliable, stable and accurate power delivery, and its low ripple is ideal for critical, noise-sensitive applications.

HRC05 features voltage and current monitoring and 0 to 100% voltage control for increased safety, flexibility and enhanced efficiency. Its advanced functionality, technical specifications, wide operating temperature, safety approvals and compact package allow easy integration into a wide range of high voltage applications in analytical instruments, medical devices and semiconductor fabrication equipment.

Features

▶ +24VDC input (22 to 30V)

▶ Voltage outputs from 600V to 6kV

▶ 0 to 100% programmable output voltage

▶ Voltage and current monitor output

▶ On-board +5V reference

▶ Load and line regulation <0.01%

▶ Low ripple <0.01%

▶ Short circuit, arc and overload protections

▶ UL62368 and UL61010 approvals

▶ Operating temperature: -40°C to +70°C

▶ 3 year warranty

Applications

▶ Mass Spectrometry

▶ Electrophoresis

▶ Electrostatic Chuck

▶ High Voltage Bias

▶ Detectors

▶ Scanning Electron Microscopy

Dimensions

64.8 x 33.0 x 15.2 mm (2.55" x 1.30" x 0.60")

More resources

Click the link or scan the code

⟶ **xppower.com**

Models & ratings

Model number[1]	Output voltage[1]	Model number[1]	Output voltage[1]	Output Current
HRC0524S600P	0 to +600V	HRC0524S600N	0 to -600V	8.33mA
HRC0524S1K0P	0 to +1000V	HRC0524S1K0N	0 to -1000V	5.00mA
HRC0524S1K5P	0 to +1500V	HRC0524S1K5N	0 to -1500V	3.33mA
HRC0524S4K0P	0 to +4000V	HRC0524S4K0N	0 to -4000V	1.25mA
HRC0524S6K0P	0 to +6000V	HRC0524S6K0N	0 to -6000V	0.83mA

Notes:

1. Other variants are available upon request.

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Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input Voltage Range	22	24	30	VDC	24V nominal
Input Current, Full Load			350	mA	@ 22VDC input
Input Current, No Load			85	mA	@ 22VDC input
Input Undervoltage Lockout	OFF/Shutdown @ <20.5V, ON/Restart @ >21.5V				
Input Overvoltage Protection	OFF/Shutdown @ >33V, ON/Restart @ <30V				
Voltage Programming Input	0		5	VDC	Controls output voltage 0 to 100%, see Signals.
Overprogramming Protection		5.5		VDC	110% maximum Voltage Programming

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage			6000	VDC	See Models & ratings table
Output current[6]			14.3	mA	See Models & ratings table
Output programming	0		100	%	Output Voltage is programmable via Analog DC Voltage Programming Input (Vpgm)
Gain adjust[4]		±5		%	Potentiometer, see Mechanical details
Setpoint accuracy[3]		±1		%	At maximum Vpgm, no Load
Linearity[5]: output vs program			1.5	%	
Minimum load	No minimum load required				
Start up response	See application notes				
Line regulation			0.01	%	At full load, maximum output voltage (22V to 30V input)
Load regulation			0.01	%	24Vin, maximum output voltage (0 to 100% load)
Transient response	Overshoot <5%, (For 50% - 100% - 50% load change). Load transient duration <25msec (Vout returns to within 1%)				
Ripple and noise			0.01	%	1MHz bandwidth
Temperature coefficient		100		ppm/°C	
Stability			100	ppm/8hrs	At 25°C
Short circuit, overload			100	%	110% overcurrent protection
Overtemperature protection		85		°C	Shutdown @ 85°C typical, ±5%, case temperature

Notes:
1. Specifications after 30 minutes warm-up, full load, 25°C, unless otherwise noted.
2. Proper thermal management techniques are required to maintain safe case temperature.
3. Refers to the ability of the unit to accurately deliver the programmed voltage.
4. Refers to the ability to alter the gain of the circuit to allow for setpoint accuracy error.
5. Refers to how much the transfer function can deviate from a straight line in the absence of any setpoint error.
6. No current derating over temperature range.

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General

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Isolation: input to output	N/A – Input ground is internally connected to output ground				
Construction	5-sided metal case, internally grounded, RTV vacuum encapsulation, UL94V-0 rated				
Switching frequency		100		kHz	At maximum output voltage, full load
Mean time between failure		1.2		Mhrs	MIL-HDBK-217F, +25°C GB
Weight		0.1625 (74)		lb (g)	

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Operating temperature (case)[1]	-40		+70	°C	
Storage temperature	-55		+105	°C	
Cooling	Natural convection				
Humidity			95	%RH	Non-condensing

Safety approvals

Certification	Standard	Notes & conditions
UL	UL/CSA/IEC/EN62368-1, UL/CSA/IEC/EN61010-1	
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

Signals

Characteristic	Pin	Function	Description
+Vin	1	Input: 24VDC	Power input
Imon	2	Output: Current Monitor	0V to +5V output measure 0 to 100% Iout, 3% accuracy, Zout = 10kΩ
Vmon	3	Output: Voltage Monitor	0V to +5V output measure 0 to 100% Vout, 1.5% accuracy, Zout = 10kΩ
Vpgm	4	Input: Voltage Programming	0V to +5V input programs Vout from 0 to 100%, Z=100kΩ
Sgnd	5	Signal Ground	Signal ground
Vref	6	Output: Voltage Reference	+5V ±2%, Current <10mA
Disable	7	Input: Remote Disable	Open or No Connect turns unit ON. Ground connection turns unit OFF
-Vin	8	Input Ground	Power input ground
HVrtn	9	HV Return	High voltage return
HVout	10	HV Output	High voltage output

Notes:

1. No current derating over temperature range.

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Mechanical details

Ø2.5 (0.10)
min pot access
for calibration

15.2 (0.60)

7.6 (0.30)

64.8 (2.55)

3.8 (0.15)

52.07 (2.050)

4.6 (0.18)

6.35 (0.250)

5 EQ SP@
2.54 (0.100)
= 12.7 (0.500)

25.4
(1.000)

1

2
3
4
5
6
7

8

10

9

8.4 (0.33)

33.0
(1.30)

55.88 (2.200)

4X Ø 1.02
(0.40) pins

BOTTOM VIEW

HIGH VOLTAGE

WARNING

0.64 (0.25)
6 sq pins

RECOMMENDED
PCB LAYOUT

TOP VIEW

55.88
(2.200)

3.8
(0.15)

3.1
(0.12)

0

0

0

6.35 (0.250)
8.89 (0.350)
11.43 (0.450)
13.97 (0.550)
16.51 (0.650)
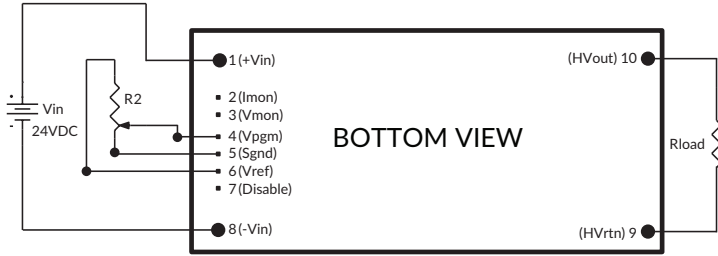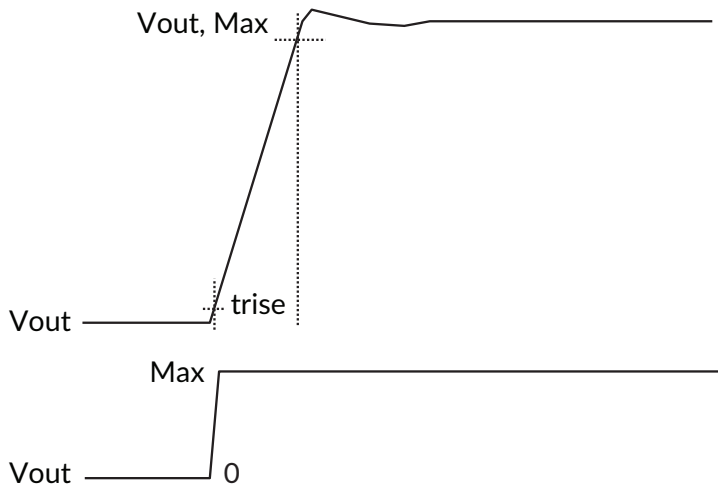19.05 (0.750)
25.4 (1.000)

21.59
(0.850)

0

52.07
(2.050)
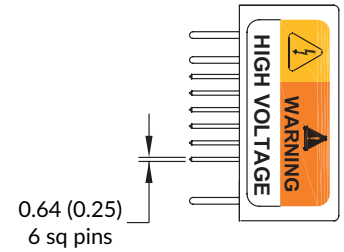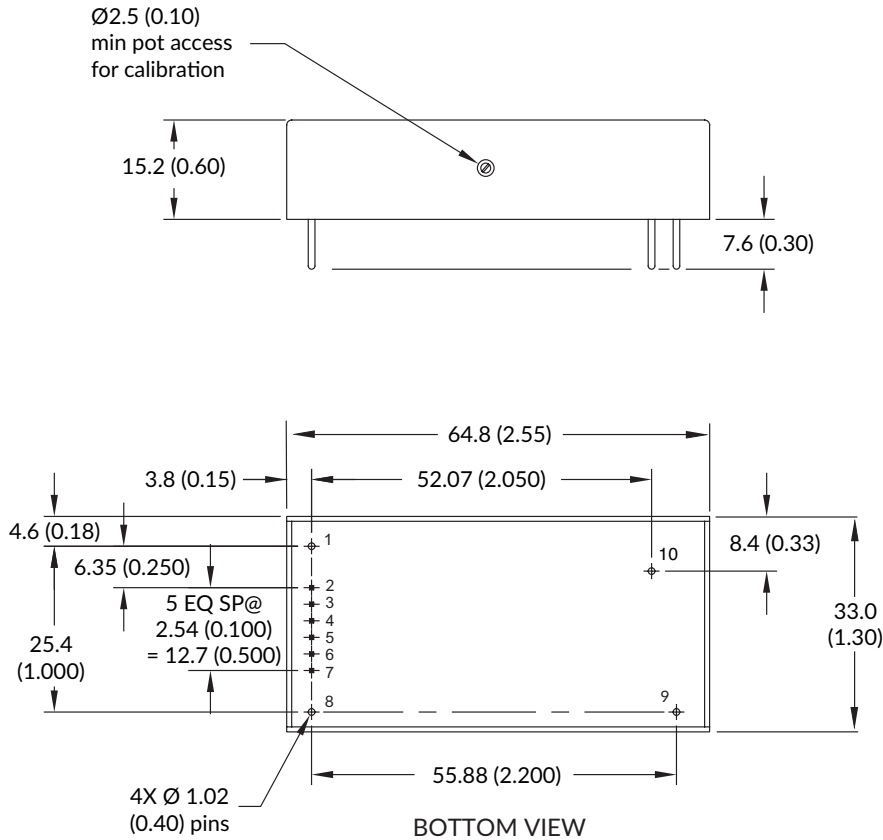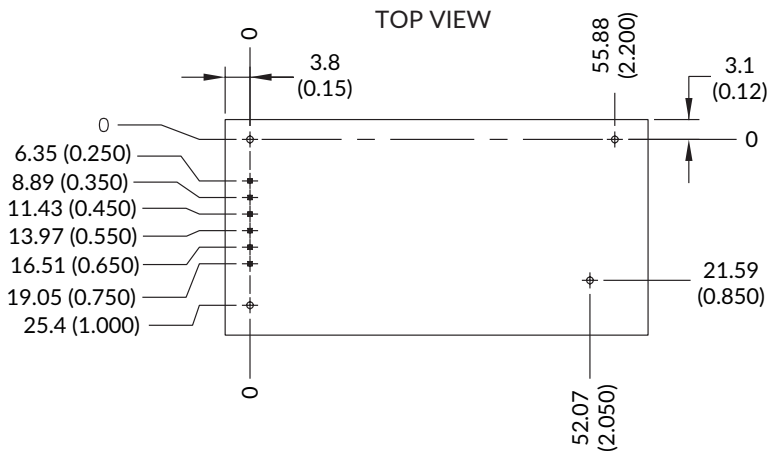
Notes:

1. Dimensions are in mm (inches).
2. Weight: 74g (0.1625lb) approx.
3. Tolerance: X.XX±0.02 (0.51).
4. Pin tolerance: ±0.005 (0.127).

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Application notes

Vref programming

Startup rise time Vout vs Vpgm

Example 600V model

Load	trise
0.3	54ms
0.375	200ms
0.75	400ms
1.5	1s

V/I rectangular characteristics
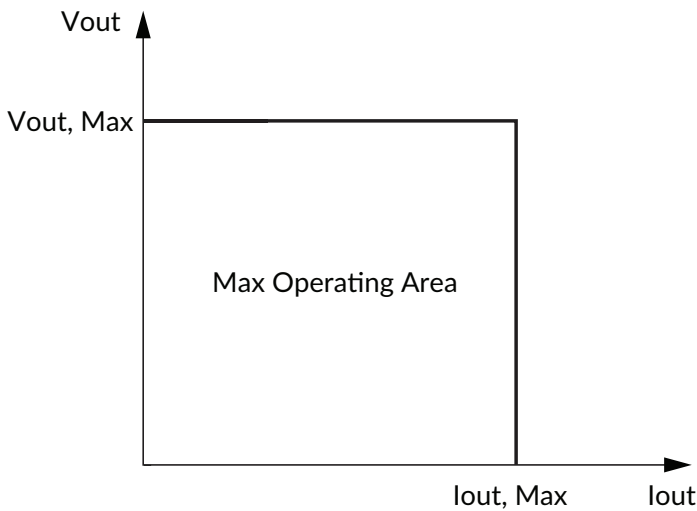
V programming linearity