HRC05 Series

XP Power

5W

DC-HVDC CONVERTER

The HRC05 Series, is a miniature 5W regulated high voltage DC-DC converter product line providing voltages up to 6kV. HRC05 provides a well regulated and fully adjustable output voltage with built in short circuit and overload protection. The adjustable output voltage can be controlled from 0 to 100% with a 0 to +5VDC input.

Voltage and current monitor outputs and a +5VDC reference output are included in the standard package for easier high voltage integration. The input control and output monitor signals are digital compatible making these modules an ideal solution for a wide range of high voltage applications.

Features

- +24VDC Input (22 to 30V)
- Output Voltages up to 6kV
- 0 to 100% Programmable Output Voltage
- Voltage & 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

Typical Applications

- Mass Spectrometry
- Electrophoresis
- Electrostatic Chuck
- High Voltage Bias
- Capacitor charging
- Detectors
- Scanning Electron Microscopy

Dimensions

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

Models & Ratings

Model Number	Output Voltage	Model Number	Output Voltage	Output Current	Input Current	
					No Load	Full Load
HRC0524S350P	0 to +350V	HRC0524S350N	0 to -350V	14.30mA	85mA	350mA
HRC0524S600P	0 to +600V	HRC0524S600N	0 to -600V	8.33mA	85mA	350mA
HRC0524S1K0P	0 to +1000V	HRC0524S1K0N	0 to -1000V	5.00mA	85mA	350mA
HRC0524S1K5P	0 to +1500V	HRC0524S1K5N	0 to -1500V	3.33mA	85mA	350mA
HRC0524S2K0P	0 to +2000V	HRC0524S2K0N	0 to -2000V	2.50mA	85mA	350mA
HRC0524S3K0P	0 to +3000V	HRC0524S3K0N	0 to -3000V	1.66mA	85mA	350mA
HRC0524S4K0P	0 to +4000V	HRC0524S4K0N	0 to -4000V	1.25mA	85mA	350mA
HRC0524S5K0P	0 to +5000V	HRC0524S5K0N	0 to -5000V	1.00mA	85mA	350mA
HRC0524S6K0P	0 to +6000V	HRC0524S6K0N	0 to -6000V	0.83mA	85mA	350mA

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	150msec for 4kV units				
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		95		°C	Shutdown @ 95°C typical, ±5%, case temperature

Notes:

1. Specifications after 30 minute 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.

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	UL Pending
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

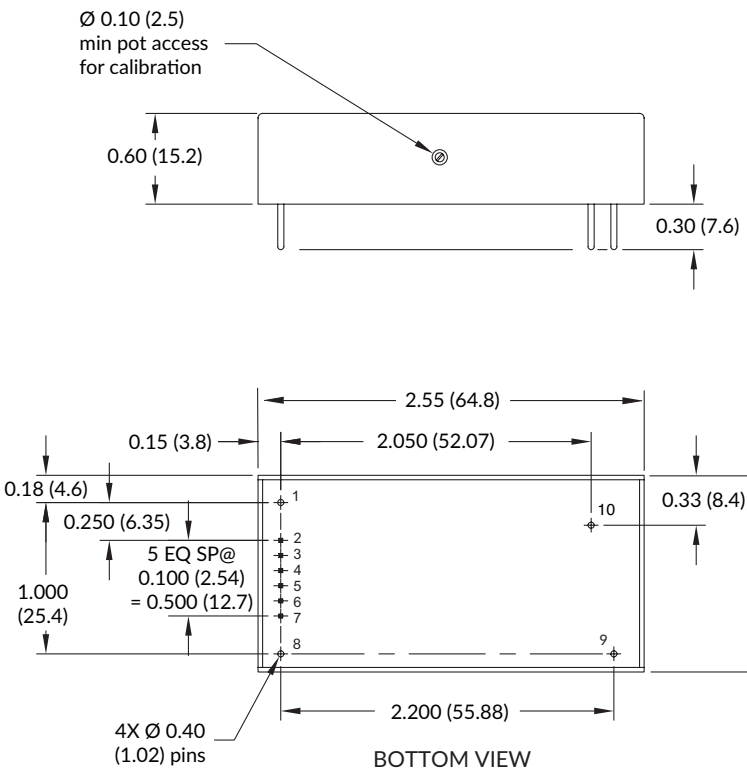
Signals

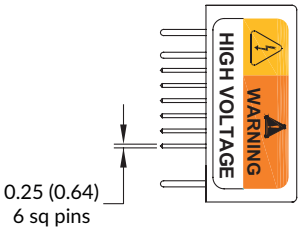
Characteristic	Pin	Function	Description
+Vin	1	Input: 24VDC	Power Input
Imon	2	Output: Current Monitor	0V to +5V output measure 0 to 100% Iout, 3% accuracy, Zout = 10kΩ
Vmon	3	Output: Voltage Monitor	0V to +5V output measure 0 to 100% Vout, 1.5% accuracy, Zout = 10kΩ
Vpgm	4	Input: Voltage Programming	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:

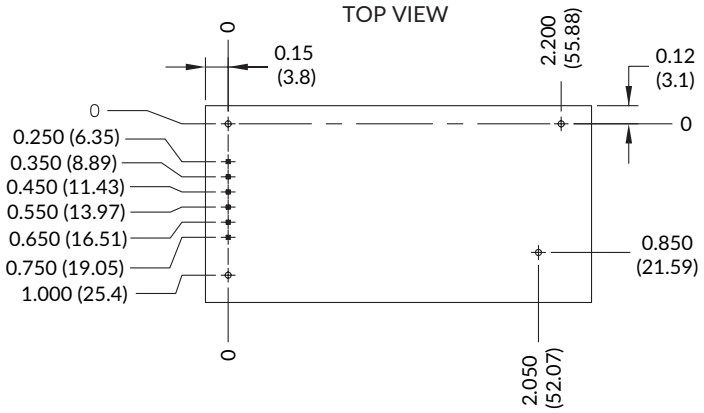
1. No current derating over temperature range.

Mechanical Details





RECOMMENDED
PCB LAYOUT

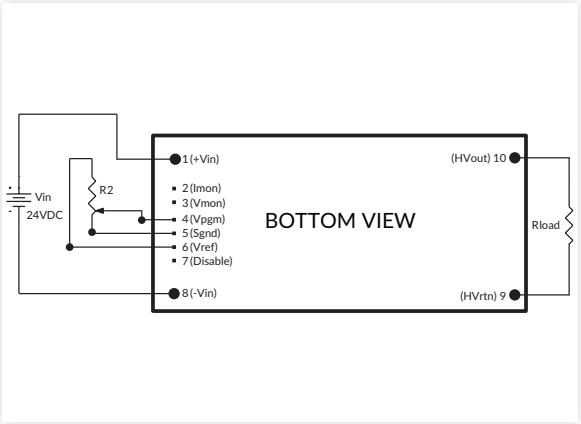


Notes:

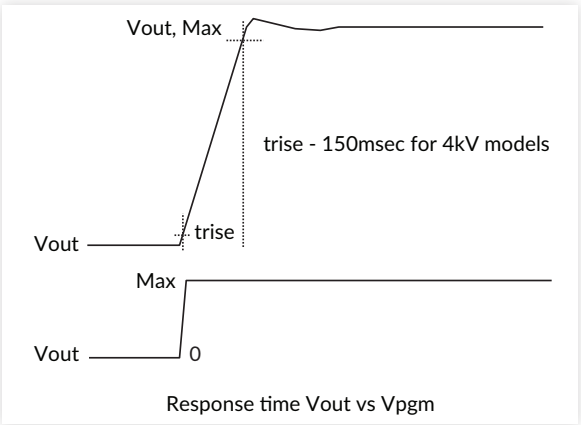
1. Dimensions are in inches (mm).
2. Weight: 0.1625lb (74g) approx.
3. Tolerance: X.XX±0.02 (0.51).
4. Pin Tolerance: ±0.005 (0.127).

Application Notes

Vref programming

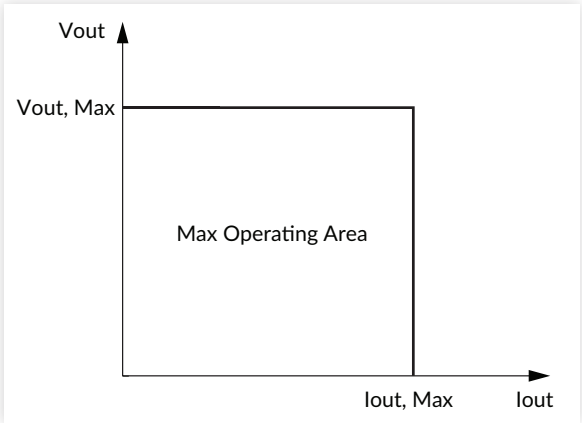


Startup rise time Vout vs Vpgm



Response time Vout vs Vpgm

V/I rectangular characteristics



V programming linearity