# HRL30 series

**30W** Baseplate cooled

DC-HVDC converter

The HRL30 series of miniature 30W baseplate-cooled high-voltage DC-DC converters deliver output voltages from 200V to 6kV. Designed for precision and flexibility, HRL30 provides programmable voltage and current control, along with integrated monitoring, enabling accurate and repeatable power delivery in demanding applications.

Excellent regulation, low ripple, and robust protection features support reliable operation in noise-sensitive and safety-critical systems. With international safety approvals and a compact PCB-mount footprint, the HRL30 series simplifies integration into a wide range of applications including pulsed electric field, analytical instruments, capacitor charging and semiconductor manufacturing equipment.

## Features

- +24VDC input (22 to 30V)
- Output voltage and current regulated
- 10 to 100% programmable output voltage and current
- Voltage and current monitor outputs
- Operating temperature: -40°C to +70°C
- Short circuit, arc, and overload protections
- On-board +5V reference
- Efficiency >80%
- Output ripple as low as 0.01%
- Premier thermal performance
- UL 60950 and 62368 approved
- 3 year warranty

## Applications

- Mass Spectrometry
- Electrophoresis
- Pulsed Electric Field
- E-beam/Ion Beam
- Electrostatic Chuck
- Capacitor Charging
- High Voltage Bias
- Photo Multiplier Tube
- Scanning Electron Microscopy

## Dimensions

76.2 x 38.1 x 18.6 mm (3.00” x 1.50” x 0.75”)

## Documentation

For further information click the link or scan the code

→ xppower.com

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DC-HVDC converter

## Models & ratings

| Model number[5] | Output voltage | Model number[5] | Output voltage | Output current | Input current | | Ripple & noise |
|---|---|---|---|---|---|---|---|
| | | | | | No load[1] | Full load | |
| HRL3024S200P | 0 to +200V | HRL3024S200N | 0 to -200V | 150mA | 100mA | 1.5A | ≤0.05% |
| HRL3024S350P | 0 to +350V | HRL3024S350N | 0 to -350V | 85.7mA | 100mA | 1.5A | ≤0.05% |
| HRL3024S600P | 0 to +600V | HRL3024S600N | 0 to -600V | 50.0mA | 100mA | 1.5A | ≤0.01% |
| HRL3024S1K0P | 0 to +1000V | HRL3024S1K0N | 0 to -1000V | 30.0mA | 100mA | 1.5A | ≤0.04% |
| HRL3024S1K5P | 0 to +1500V | HRL3024S1K5N | 0 to -1500V | 20.0mA | 100mA | 1.5A | ≤0.05% |
| HRL3024S2K0P | 0 to +2000V | HRL3024S2K0N | 0 to -2000V | 15.0mA | 100mA | 1.5A | ≤0.05% |
| HRL3024S3K0P | 0 to +3000V | HRL3024S3K0N | 0 to -3000V | 10.0mA | 100mA | 1.5A | ≤0.05% |
| HRL3024S4K0P | 0 to +4000V | HRL3024S4K0N | 0 to -4000V | 7.5mA | 100mA | 1.5A | ≤0.05% |
| HRL3024S5K0P | 0 to +5000V | HRL3024S5K0N | 0 to -5000V | 6.0mA | 100mA | 1.5A | ≤0.04% |
| HRL3024S6K0P | 0 to +6000V | HRL3024S6K0N | 0 to -6000V | 5.0mA | 100mA | 1.5A | ≤0.04% |

**Notes:**

1. Typical at 24V input
2. Specifications after 30-minute warm up, at full load, maximum output voltage and 25°C, unless otherwise indicated.
3. No current derating over temperature range.
4. Proper thermal management techniques are required to maintain safe case temperature at maximum power output.
5. Other versions available on request.

## Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|---|---|---|---|---|---|
| Input voltage range | 22 | 24 | 30 | VDC | 24V nominal |
| Input current | | | 1.5 | A | See Models and ratings table |
| Input filter | Internal Pi filter | | | | |
| Input undervoltage lockout | OFF/Shutdown @ <20.5V, ON/Restart @ >21.5V | | | | |
| Input overvoltage protection | OFF/Shutdown @ >31.5V, ON/Restart @ <30.5V | | | | |
| Voltage programming input | 0 | | 5 | VDC | Analog DC voltage controls output 0 to 100%, see Signals. |
| Overprogramming protection | | 5.5 | | VDC | 110% maximum voltage and current |

## Output

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|---|---|---|---|---|---|
| Output voltage | | | 6000 | VDC | See Models & ratings table |
| Output current | | | 150 | mA | See Models & ratings table |
| Output programming | 10 | | 100 | % | Output voltage/current is programmable via Analog DC Voltage programming input (Vpgm) |
| Output calibration range | | ±5 | | % | Potentiometer, see Mechanical details |
| Initial setpoint accuracy | | ±1 | | % | At maximum Vpgm, No load |
| Linearity: output vs program | | | 1.5 | % | 10 to 100% output |
| Minimum load | No minimum load required | | | | |
| Start up response | See Application notes | | | | |
| Line regulation | | | 0.01 | % | 100% Vpgm, Full load, (min to max input) |
| Load regulation | | | 0.01 | % | 100% Vpgm, 24Vin, [NL to FL] |
| Transient response | Overshoot <5%, (For 50% - 100% - 50% load change). Load transient duration <25msec (Vout returns to within 1%) | | | | |
| Ripple and noise | 0.01 | | 0.05 | % | 1MHz bandwidth, see Models and ratings table |
| Temperature coefficient | | 100 | | ppm/°C | |
| Stability | | | 100 | ppm/8hrs | After 30 minute warm up |
| Short circuit, overload | | | | | Rectangular V/I characteristics |
| Overtemperature protection | | 85 | | °C | Shutdown @ 85°C typical, ±5% at the hot spot |

# HRL30 series

## General

| Characteristic | Minimum | Typical | Maximum | Units | Notes & conditions |
|---|---|---|---|---|---|
| Efficiency | 80 | 85 | | % | Max Vpgm, Full Load |
| Isolation: input to output | N/A – Input ground is internally connected to output ground | | | | |
| Isolated baseplate | | | 1500 | VDC | |
| Construction | DAP case. Solid vacuum encapsulation, UL 94 V-0 rated | | | | |
| Switching frequency | | 100 | | kHz | |
| Mean time between failure | 1 | | | Mhrs | MIL-HDBK-217F, +25°C GB |
| Weight | | 120 (0.26) | | g (lb) | |

## Environmental

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

## Safety approvals

| Certification | Standard | Notes & conditions |
|---|---|---|
| UL | IEC/UL/CSA/EN 62368, 60950 | |
| CE | Meets all applicable directives | |
| UKCA | Meets all applicable legislation | |

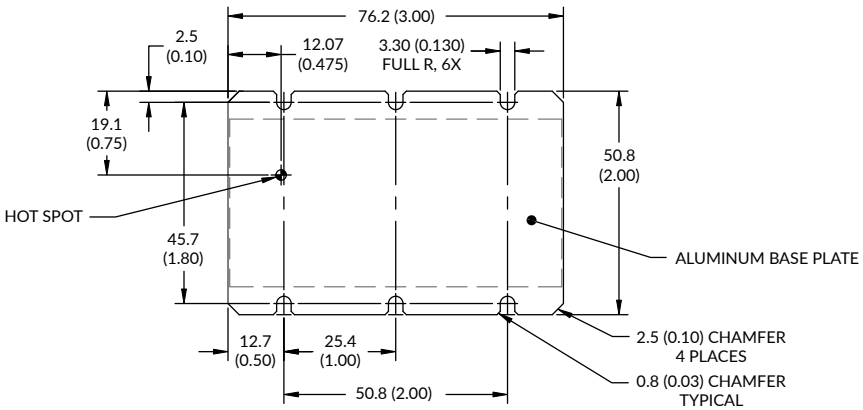
## Signals

| Characteristic | Pin | Function | Description |
|---|---|---|---|
| -VIN | 1 | Input ground | Input power ground |
| DISABLE | 2 | Input: remote disable | Open or No Connect turns unit ON. Ground connection turns unit OFF |
| VREF | 3 | Output: voltage reference | +5V ±2% - current <10mA |
| SGND | 4 | Signal ground | Signal ground |
| VPGM | 5 | Input: voltage programming | 0V to +5V signal programs Vout from 0 to 100%, Z=100kΩ |
| VMON | 6 | Output: voltage monitor | 0V to +5V output measures 0 to 100% Vout, 1.5% accuracy |
| IPGM | 7 | Input: current programming | 0V to +5V signal programs Iout from 0 to 100%, Z=100kΩ |
| IMON | 8 | Output: current monitor | 0V to +5V output measures 0 to 100% Iout, 1.5% accuracy. |
| N/C | 9 | N/A | |
| N/C | 10 | N/A | |
| N/C | 11 | N/A | |
| +VIN | 12 | Input: 24Vin | Power input |
| HVOUT | 13 | HV output | High voltage output |
| HVRTN | 14 | HV return | High voltage return |

## Mechanical details

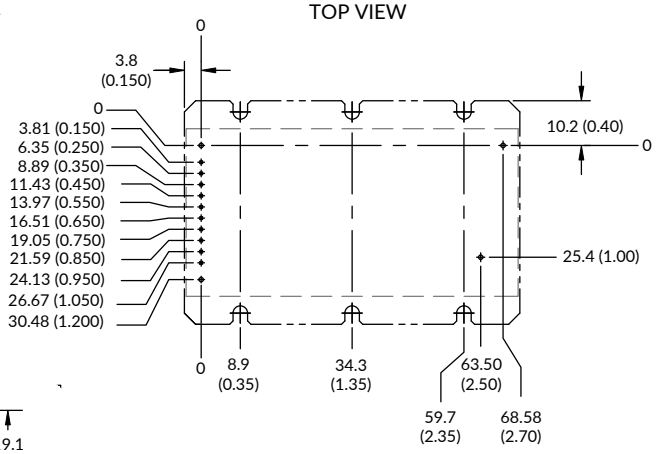
### Standard

TOP VIEW

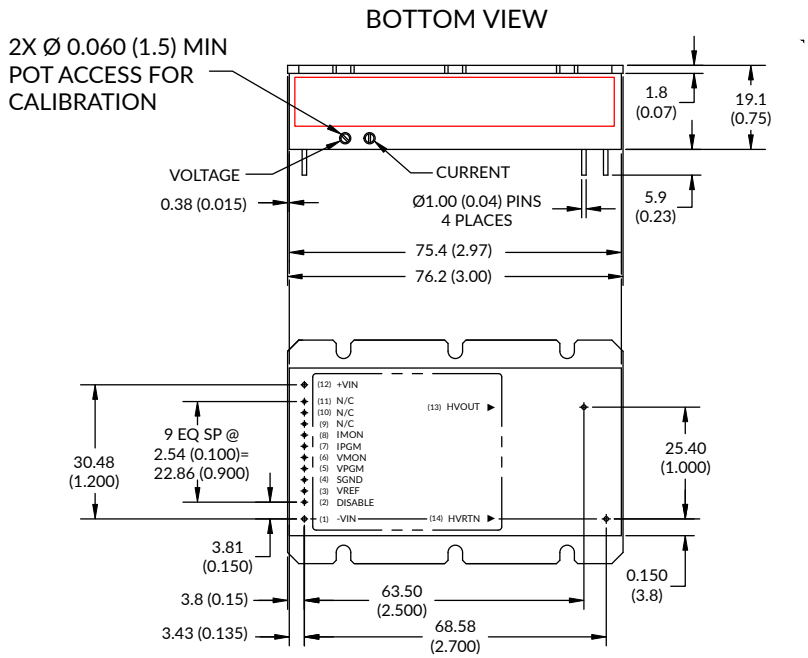



RECOMMENDED PCB LAYOUT

TOP VIEW




BOTTOM VIEW

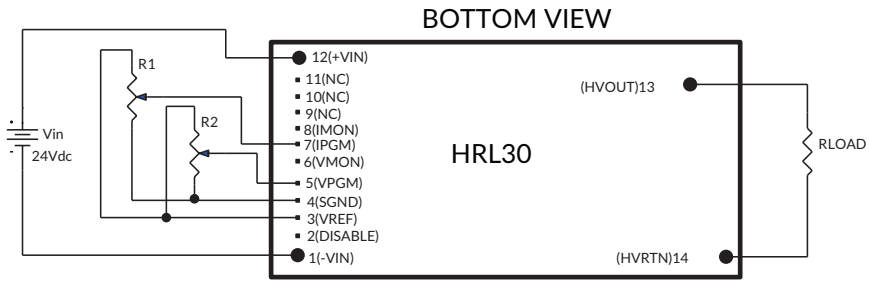



**Notes:**

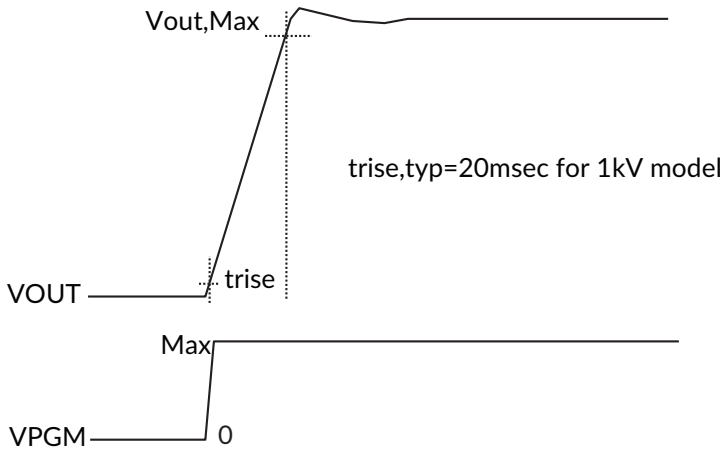
1. Dimensions are in mm (inches).
2. Weight: 120g (0.26lb) approx.
3. Tolerance: X.XX±0.51 (0.02).
4. Pin tolerance: ±0.127 (0.005).

## Application notes

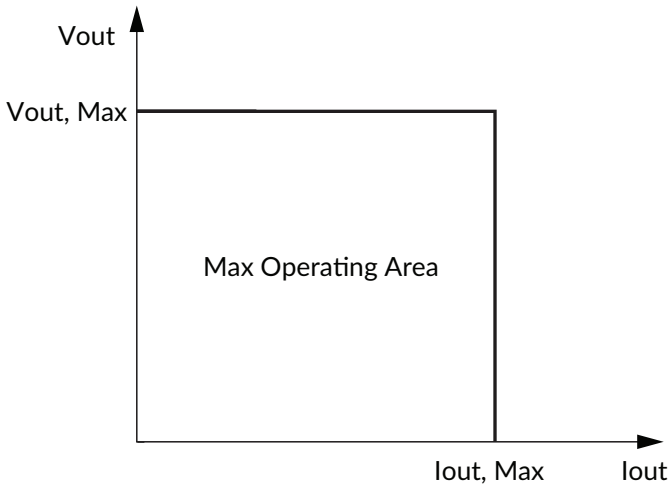
### Vref programming

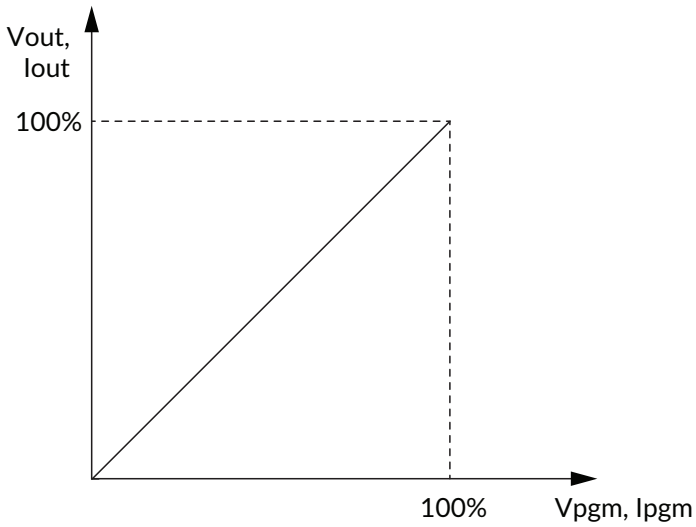



### Startup rise time Vout vs Vpgm




### V/I rectangular characteristics




### V/I programming linearity