



## HV20000 15W SINGLE DC/DC CONVERTER

18-72V<sub>IN</sub>, 118V<sub>OUT</sub>@125mA  
Low Noise >=.1% of Vout

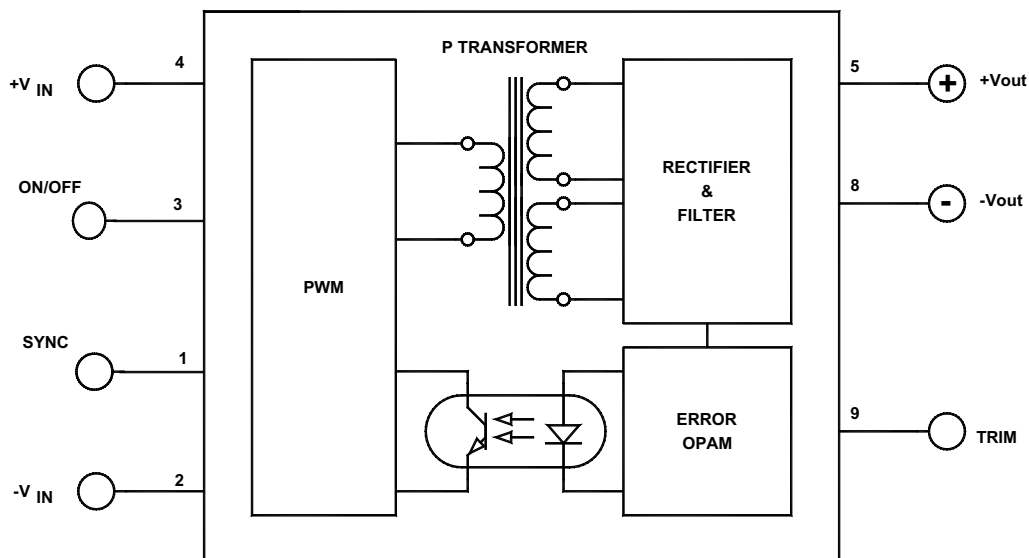
### Key Features

- Soft start
- Short circuit and thermal protection
- EMI six-sided shielding
- 1500Vdc input-to-output isolation
- Efficiency up to 90%
- Wide Input Range 4:1
- Adjustable Output
- External Synchronization



### Functional Description

The HV20000 is a 15W Single DC/DC Converter with a 4:1 input voltage range and a low noise regulated 118V output DC voltage, makes the DC/DC ideal for the ethernet, high voltage OPAMPS and pizeoelectric applications. Additional features include 1500V isolation, input under voltage turn off, short circuit protection, external synchronization, soft start, thermal protection adjustable output (10%) and efficiency up to 90%.The unit is packaged in a 2x1x0.45 inch case which helps reduce EMI, while its six-sided shielding eliminates RFI.



Typical Block Diagram

## Electrical Specifications

### INPUT SPECIFICATIONS

Unless otherwise specified, all parameters are given under typical +25°C with nominal input voltage and under full output load conditions.

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Input Voltage Range		18	36	72	Vdc
No Load Input Current	@36V <sub>in</sub>		12		mA
Full Load Input Current	@36V <sub>in</sub>		432		mA
Input Filter	C				
Reverse Voltage Protection	Parallel Diode		5		A
On/Off, Sync	Reference to -V <sub>IN</sub>				
Converter ON	Open		5.6		Vdc
Converter OFF	0V, Pin 3 (On/Off) shorted to Pin 2 (-V <sub>IN</sub> )	-2	0	0.2	Vdc
Turn On Delay	Including soft start, See Figure 5		25	35	mS
Startup Input Voltage		16	18		Vdc

### OUTPUT SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Output Voltage			118		Vdc
Output Voltage Accuracy			.5	1	%
Output Current			125		mA
Output Adjust Range			10		% of V <sub>OUT</sub>
Ripple & Noise (20MHz BW)			.1	.5	% of V <sub>OUTPP</sub>
Line Regulation	Output Fully Loaded		.1	1	%
Load Regulation			.1	1	%
Temperature Coefficient @ FL			±0.02		%/°C
Short Circuit Protection	Continuous, Current Limit				
Short Circuit Restart	Automatic				
Transient response (to within 1% of V <sub>out</sub> )	50% FL to 100% FL to 50% FL ,See Figure 3		2		ms

### GENERAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Efficiency		82	88	90	%
Isolation Voltage (1 min.)			1500		Vdc
Isolation Resistance			10 <sup>9</sup>		Ω
Isolation Capacitance			300		pF
Switching Frequency			190		kHz
External Synchronization Frequency	See Synchronization Notes and Figure 4		200		kHz

### ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Operating Temperature (Ambient)		-40		+72	°C
Storage Temperature Range		-60		+125	°C
Thermal Resistance			4		°C/W
Thermal Protection, Turn Off	Junction Temperature		145		°C
Thermal Hysteresis			30		°C
Humidity	Up to 95% non-condensing				°C
Cooling	Free-air convection				
MTBF	per MIL-HNBK-217F (Ground benign, +25 °C)		2.048x10 <sup>6</sup>		hours

**PHYSICAL CHARACTERISTICS**

PARAMETER	CONDITION / NOTE	MIN	TYP	MAX	UNIT
Dimensions (LxWxH)	2.00x1.00x0.450 IN. (50.80x25.40x11.43mm)				
Weight	1.30 oz. (36.85g)				
Case Material	Coated metal				
Shielding	Six-sided continuous				
Case Connection	-V <sub>IN</sub> (Pin 2)				

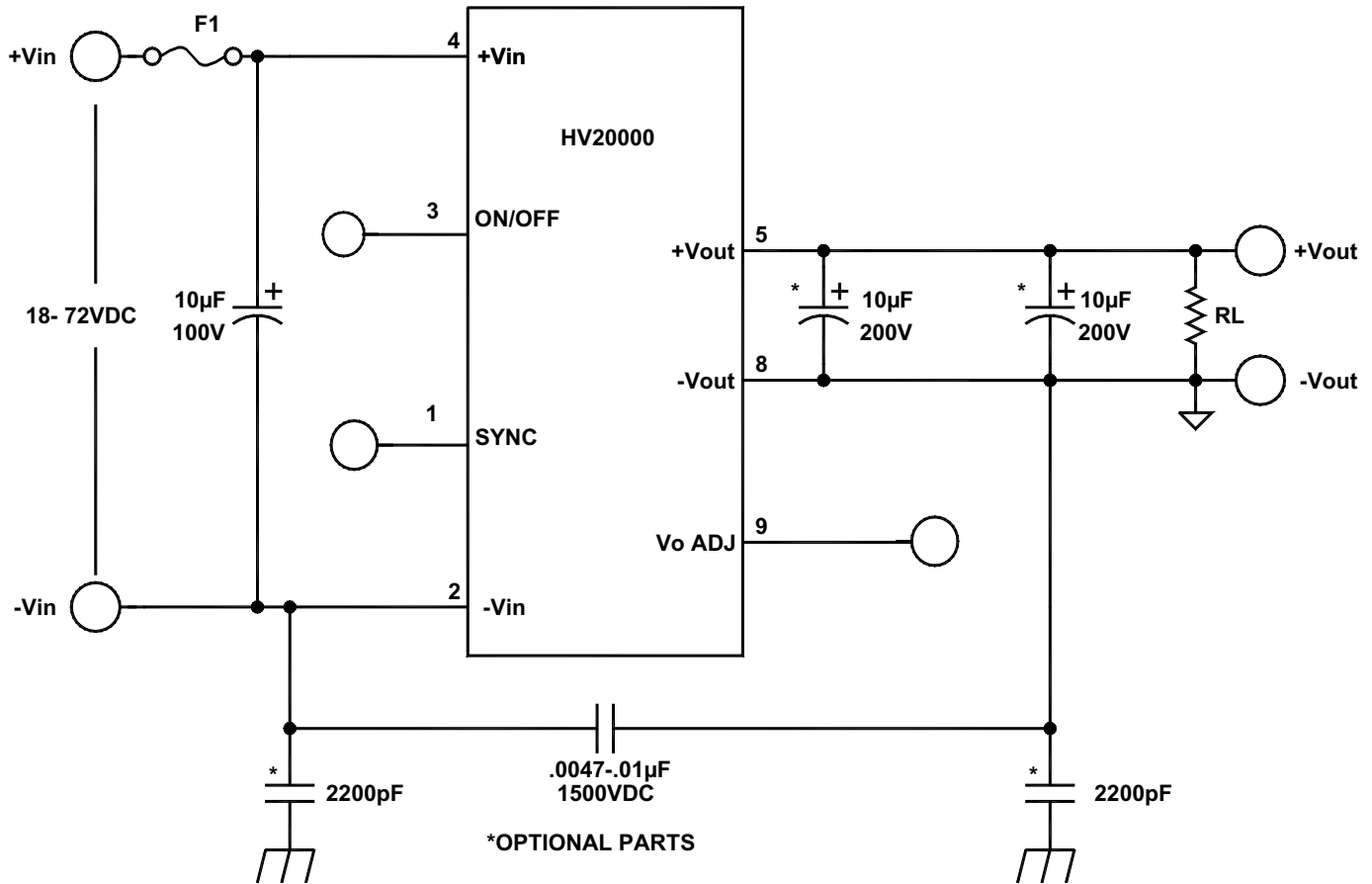


FIGURE 1. Connection diagram of HV20000

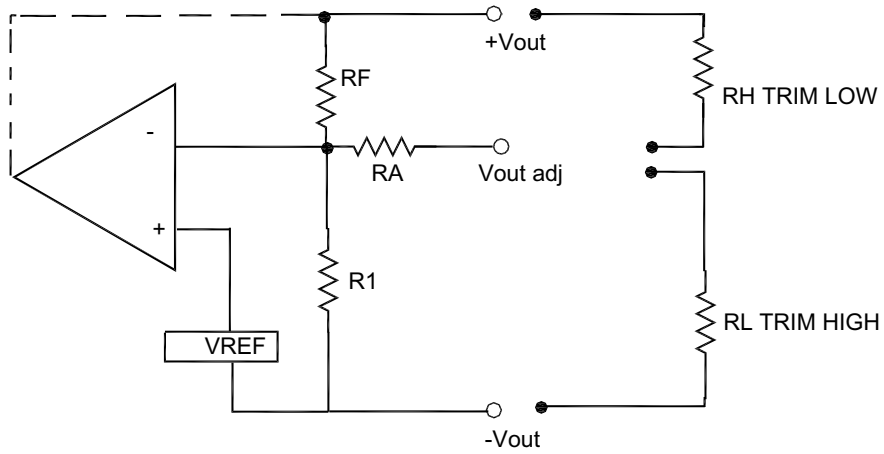


FIGURE 2. Equations for output adjustment

$$R1=2.55K, RF=118K, RA=30.1K, VREF= 2.5V$$

To calculate R adjust for higher Vout use

$$RT= [R1*RF*Vref]/[(R1*Vout)-Vref(R1+RF)]-RA$$

where Vout is the new higher value of Vout.

To calculate RT for lower Vout use

$$RT= [R1*RF(Vout-Vref)]/[ Vref(RF+R1)-R1Vout]-RA$$

where Vout is the new lower value of Vout.

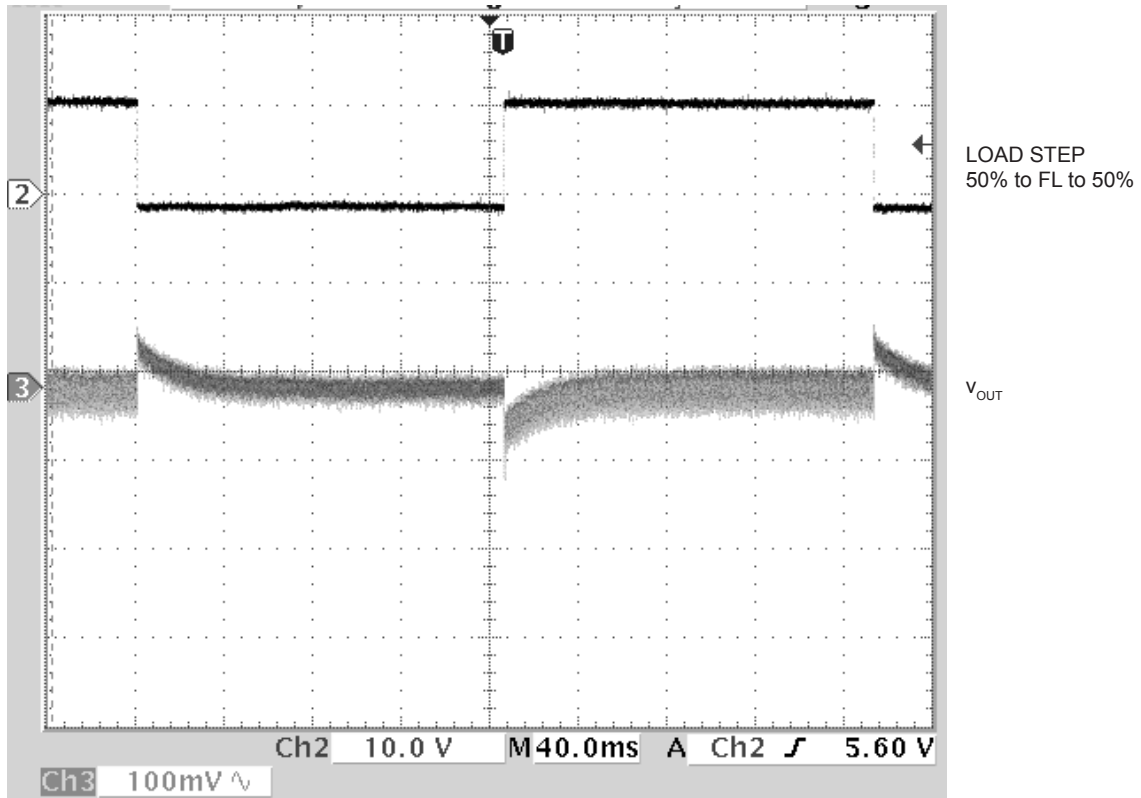


FIGURE 3. Transient response waveforms of HV20000

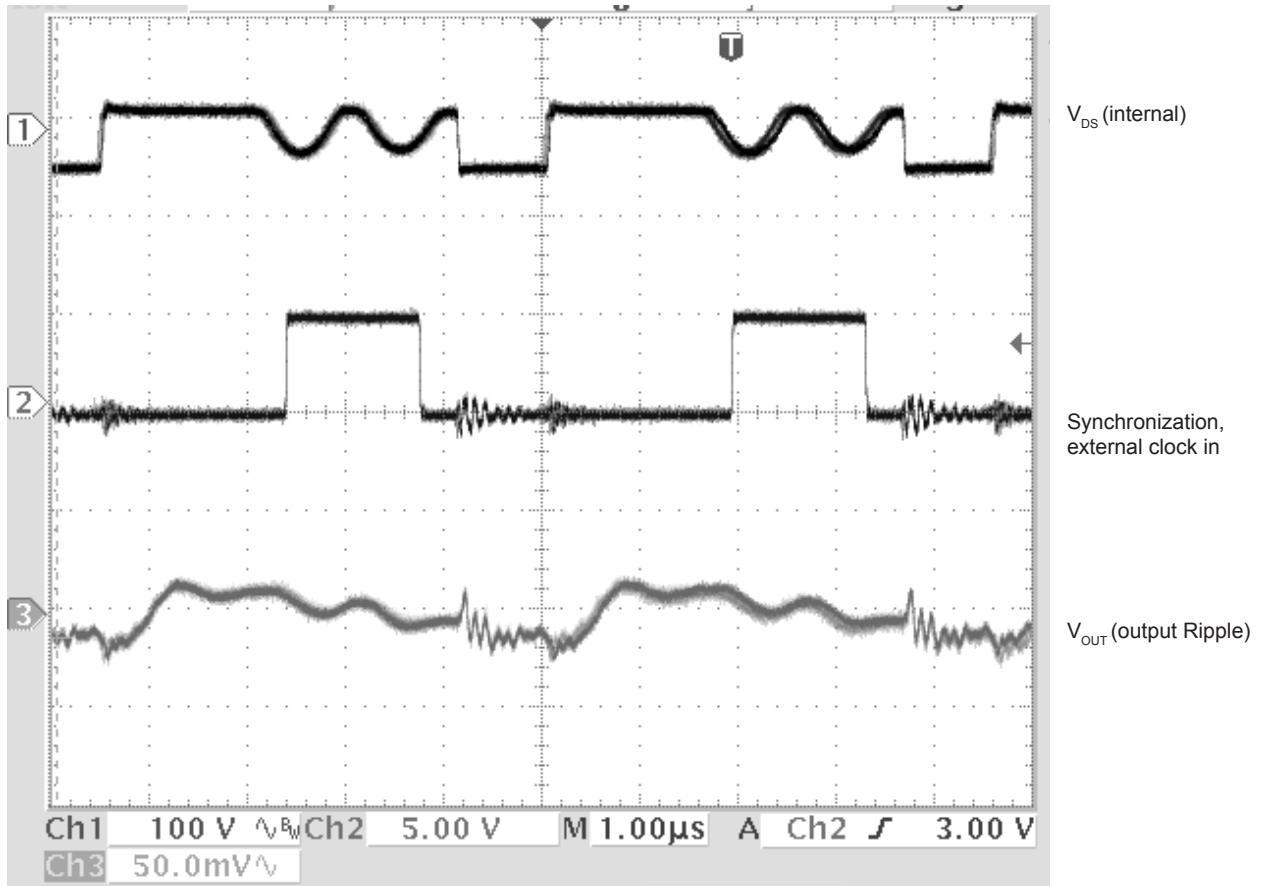


FIGURE 4. Synchronization waveforms of HV20000

#### SYNCHRONIZATION NOTES

The synchronization of the converter's switching frequency is to an external clock. The external clock must have a frequency of 200kHz, amplitude 0 to 3V or 0 to 5V, a duty cycle of 30% to 50% and a slew rate of .2V/ns or greater. Connect the above describe digital signal shown in Figure 4 to pin one of the converter and sync Channel 1 of an oscilloscope from the same point. Connect Channel 2 at the output(pin#5) of the converter and set the gain for 100mV/Div with AC coupling. Observe the signals on both channels to be in sync. Note that the converters must have a load of 50% or greater. See above Figure 4.

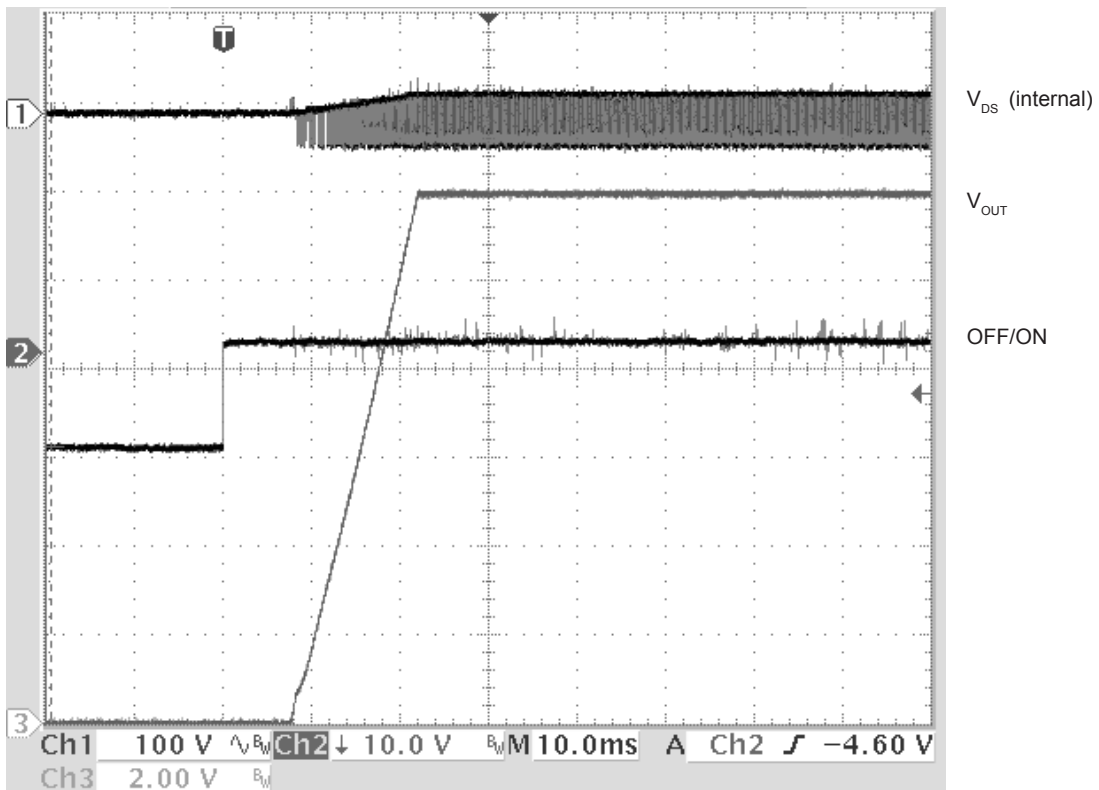


FIGURE 5. Soft start and turn on delay waveforms of HV20000

Pin	Function
1	SYNC
2	-V <sub>IN</sub>
3	ON/OFF
4	+V <sub>IN</sub>
5	+V <sub>OUT</sub>
8	-V <sub>OUT</sub>
9	TRIM

### MECHANICAL SPECIFICATIONS

DIMENSIONS ARE IN INCH(mm)  
 TOLERANCES: .XX ±.01(.254)  
 .XXX ±.005(.127)

