

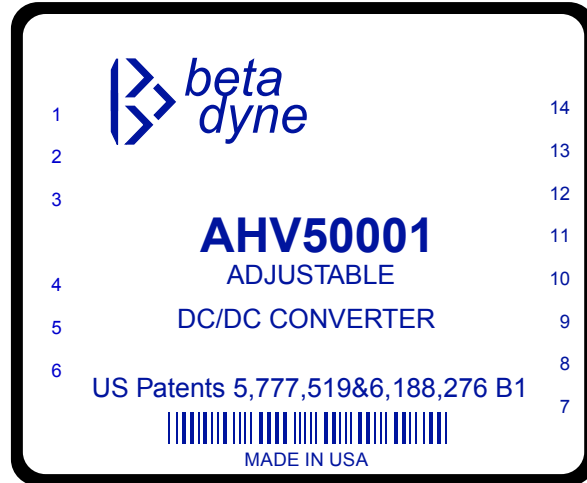


AHV50001

50W HIGH-VOLTAGE ADJUSTABLE
DC/DC CONVERTER
300 to 350Vdc Single Output, 72 to 145V_{IN}

Key Features

- Efficiency up to 90%
- Wide input voltage range (2:1)
- Six-sided shielding
- Soft start
- Single Output
- Short circuit and thermal protection
- Adjustable output



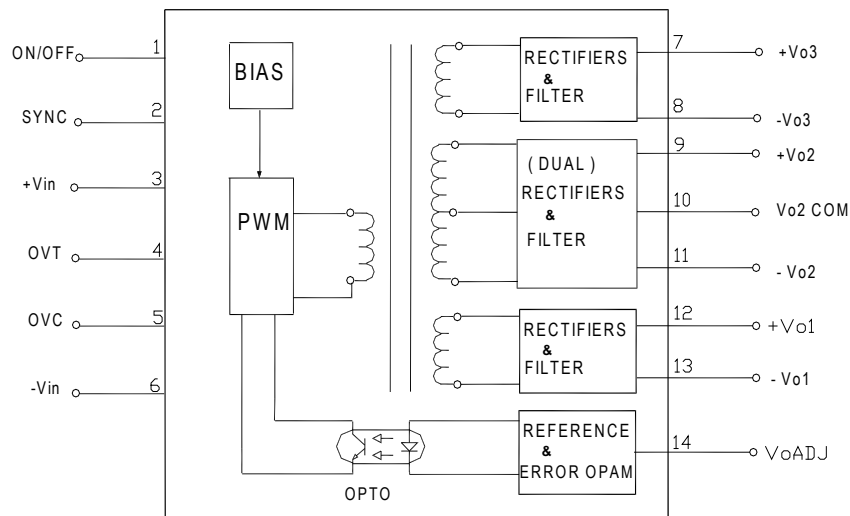
Beta Dyne is protected under various patents, including but not limited to U.S. Patent numbers: 5,777,519; 6,188,276; 6,262,901; 6,452,818; 6,473,3171.

Applications

- High Voltage Programmable
- Voltage Source
- Instrumentation
- Test & Measurement
- Telecom

Functional Description

The AHV50001 series is a 50W adjustable converter high output voltage isolated DC/DC Converter. It accepts 72 to 145 V_{IN} and provides 300 to 350V_{OUT}. The converter V_{OUT} adjustable pin#14 open provides 300V_{OUT}. With V_{OUT} adjustable pin#14 shorted to -V_{o1}(pin#13) provides an output of 350V_{OUT}. The output can also be adjusted with a voltage source ranging from 0 to 2.5V. With a 2.5V connected to pin#14, V_{OUT} is 300V_{OUT}. With 0V connected to pin#14, V_{OUT} is 350V_{OUT}. Other features include external synchronization, input over voltage, and under voltage protection. The converter is packaged in a 3x2.5x.75 case, with 6 sided EMI/RFI shielding .



Typical Block Diagram

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

Electrical Specifications

INPUT SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|--|---|------|-----|-----|-------------------|
| Input Voltage Range | | 72 | 120 | 145 | Vdc |
| Startup Voltage for Bias Converter ¹ | | 4.7 | 5 | | Vdc |
| Input Startup Voltage, 120V _{IN} | | 72 | 75 | | Vdc |
| Input Overvoltage Protection, 120V _{IN} | | 145 | | | Vdc |
| Input Filter | LC | | | | |
| Reverse Polarity | Internal parasitic shunt diodes | | | | |
| Reflected Ripple | I _O = FL | | 100 | | mA |
| No Load Input Current | V _{IN} = 120V | | 10 | | mA |
| Input Surge Current (20µS Spike) | | | | 10 | A |
| Short Circuit Current Limit | See Short Circuit Protection | | 150 | | % I _{IN} |
| Off State Current | | | 750 | | µA |
| Remote ON/OFF Control | | | | | |
| Supply ON | Pin 1 Open (Open circuit voltage: 13V max.) | | | | |
| Supply OFF | | -0.6 | 0 | 0.8 | Vdc |
| Logic Input Reference | To -V _{IN} for ON/OFF and SYNC | | | | |
| Logic Compatibility for Reference | TTL Open Collector or CMOS Open Drain | | | | |
| Sync, High | See External Synchronization, Figures 6 & 7 | 2 | | 6 | Vdc |
| Sync, Low | See External Synchronization, Figures 6 & 7 | 0 | | 0.8 | Vdc |

¹ Internal bias DC/DC converter is used to bias input and output circuitry of the converter.

² Pins 8 & 9 and 11 & 12 are connected internally.

³ Contact factory for -55° to +85°C operating temperature range.

⁴ The maximum input current at any given input range measured at minimum input voltage is given as 1.6*I_{NOMINAL}. Nominal input current is the typical value measured at the input of the converter under full-load room temperature and nominal input voltage (120V_{IN}).

⁵ Adequate insulation is to be provided to the converters at the end usage as per applicable requirements.

⁶ Temperature rise on the case of the converters is to be considered during the end usage as per applicable requirements.

⁷ Measured with 100µF external capacitor at the input pins.

⁸ See Figure 8.

OUTPUT SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|------------------------------|--|-----|-------|------|-----------------------|
| Output Voltage | | | 300 | 350 | |
| Output Voltage Accuracy | | | 1 | 2 | % |
| Ripple & Noise | | | .05 | .1 | % of V _{OUT} |
| Control Voltage Range Vc | | 0 | | 2.5 | V |
| Vc Current | Sink / Source | | | 1 | mA |
| Output Current | P _{OUT} = 50W max. | | 167 | 143 | mA |
| Line Regulation | | | ±0.05 | ±0.1 | % of V _{OUT} |
| Load Regulation | | | ±0.05 | ±0.1 | % of V _{OUT} |
| Temperature Coefficient @ FL | | | 0.02 | | %/°C |
| Transient Response Time | 50% FL to FL to 50% FL | | 200 | 250 | µS |
| Short Circuit Protection | By input current limiting | | | | |
| Output Adjust Range | V _{OUT} Adjust pin open, see figure 8 | | 300 | | V |
| Output Adjust Range | V _{OUT} Adjust pin=2.5V, see figure 8 | | 350 | | V |

GENERAL SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|---|------------------|-----|-----------------|-----|------|
| Efficiency | | | 90 | | % |
| Isolation Voltage (1 min.), Input to Output | | | 1500 | | Vdc |
| Isolation Resistance | | | 10 ⁹ | | Ω |
| Isolation Capacitance | | | 2700 | | pF |
| Switching Frequency, Power Stage | | | 100 | | kHz |
| Switching Frequency, BIAS Stage | | | 200 | | kHz |
| Turn On Delay | | | 12 | 30 | mS |
| Soft Start Time | | | 12 | 30 | mS |

ENVIRONMENTAL SPECIFICATIONS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|--|--|-----|---------|------|----------------------|
| Operating Temperature, Industrial (Ambient)* | See note 3 | -25 | | +71 | °C |
| Storage Temperature Range | | -40 | | +125 | °C |
| Thermal Resistance | | | 1.6 | | °C/W _{DISS} |
| Heatsink Thermal Res | | | 2.5 | | °C/W _{DISS} |
| Maximum Operating Case Temperature | | | | 95 | °C |
| Thermal Turn Off, Case Temperature | | 75 | 85 | 95 | °C |
| Thermal Hysterisis | | | 20 | | °C |
| Derating | | | | | |
| Humidity | Up to 95% non-condensing | | | | |
| Cooling | Free-air convection | | | | |
| EMI/RFI | Six-sided continuous shielded metal case | | | | |
| MTBF | per MIL-HNBK-217F (Ground benign, +25°C) | | 485,000 | | hours |

PHYSICAL CHARACTERISTICS

| PARAMETER | CONDITION / NOTE | MIN | TYP | MAX | UNIT |
|--|---|-----|-----|-----|------|
| Dimensions (L×W×H) | 3.00×2.50×0.75 in. (76.20×63.50×19.5mm) | | | | |
| Weight | 7.9 oz. (225g) | | | | |
| Case Material | Coated metal | | | | |
| Shielding Connection, 120V _{IN} | -Input (Pin 6) | | | | |

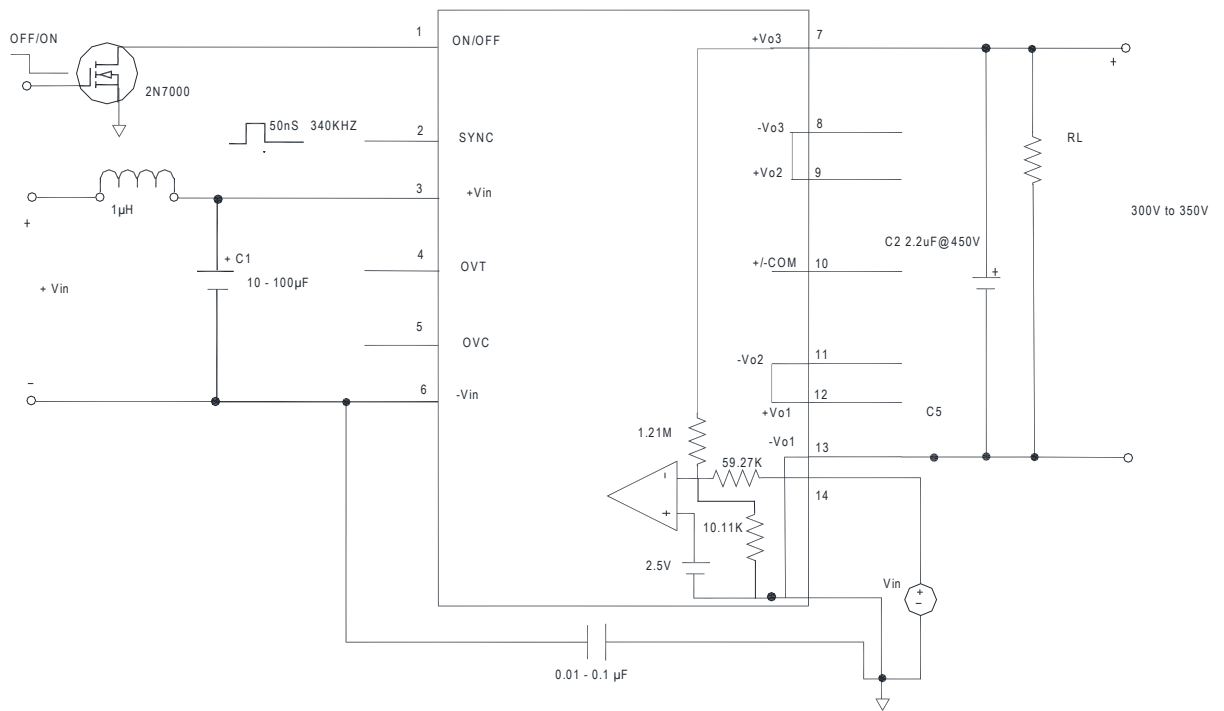


FIGURE 1. Typical Output Diagram Connection of AVH50001

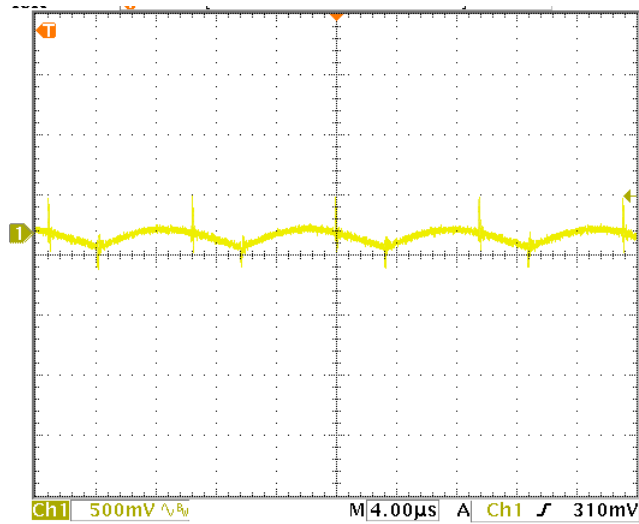


FIGURE 2. Output ripple of $V_{out}=300V@168mA$, $V_{in}=120V$ as shown in figure 1.

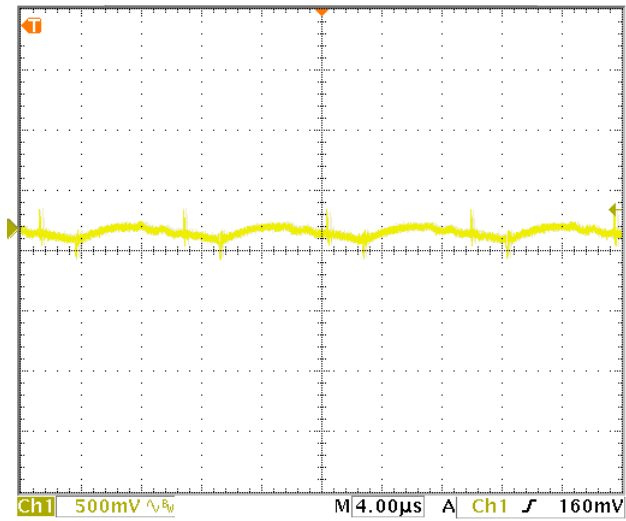


FIGURE 3. Output ripple of $V_{out}=350V@146mA$, $V_{in}=120V$ as shown in figure 1.

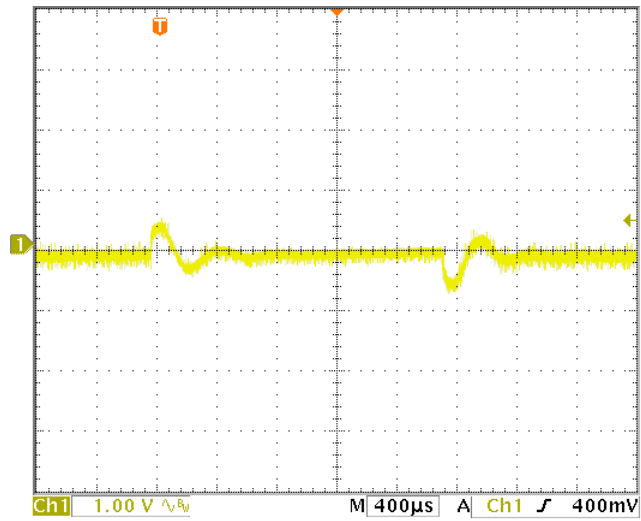
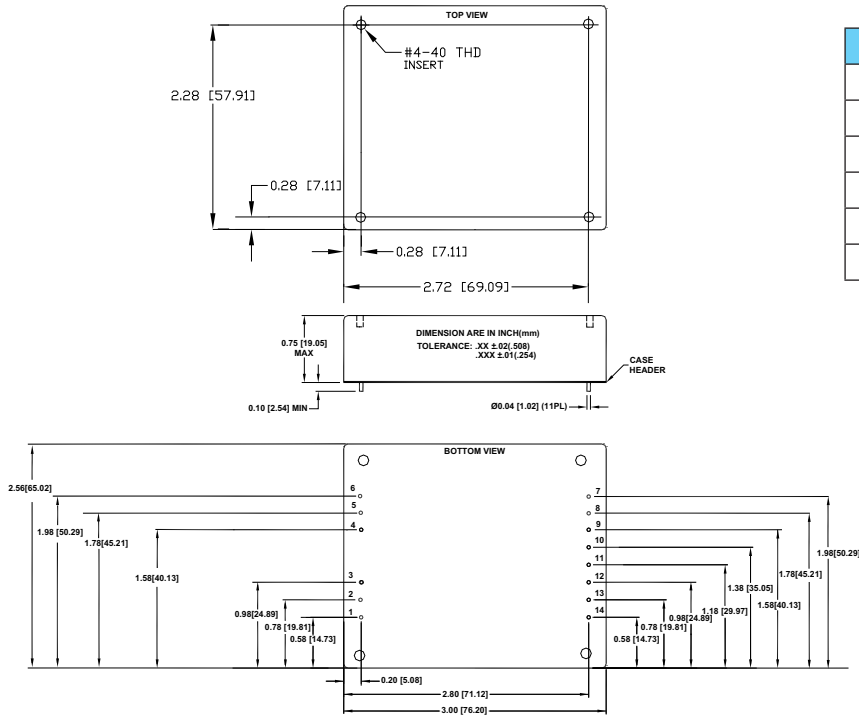


FIGURE 4. Transient reponse of $V_{in}=120V$, $V_{out}=350V$, I_{out} changing from full load (146mA) to 1/2 of full load.

MECHANICAL SPECIFICATIONS



| Pin | Function | Pin | Function |
|-----|------------------|-----|--------------------|
| 1 | ON/OFF | 7 | +V _{O3} |
| 2 | SYNC | 8 | -V _{O3} |
| 3 | +V _{IN} | 9 | +V _{O2} |
| 4 | NO Pin | 10 | ±V _{O2} |
| 5 | NO Pin | 11 | -V _{O2} |
| 6 | -V _{IN} | 12 | +V _{O1} |
| | | 13 | -V _{O1} |
| | | 14 | V _O ADJ |

MECHANICAL SPECIFICATIONS for HEAT SINK

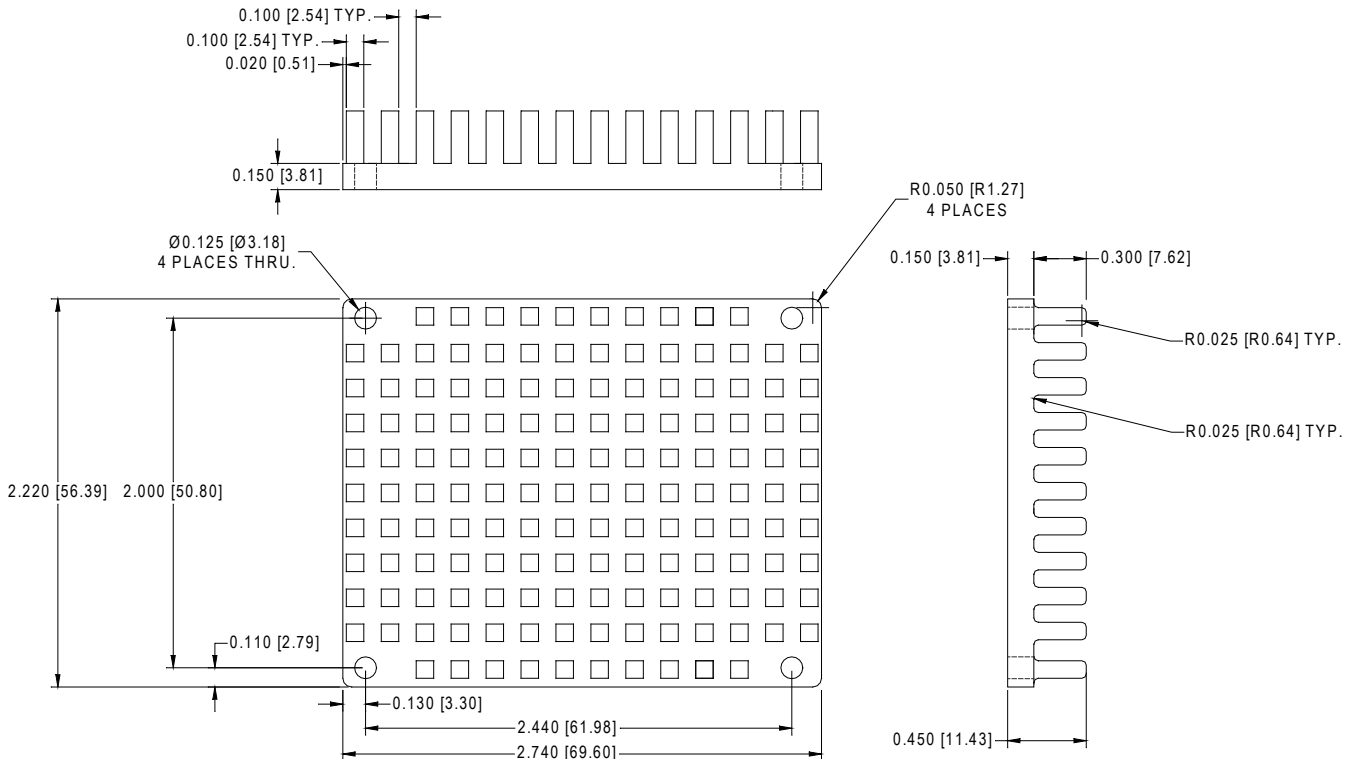


FIGURE 5. Optional Heat Sink for the AHV50 DC-DC Converter

EXTERNAL SYNCHRONIZATION

The converter can be synchronized to an external clock. The external clock MUST have a higher frequency than that of the converter's switching frequency. The amplitude of the external clock pulse must be 3.7 volts or greater and its duration between 15nS to 150nS for sync pulse detection.

The circuit in Figure 6 can be used to produce a 50nS to 150nS pulse from a square wave. The circuit will be turned on by the negative edge of the square wave and will stay on for approximately 50nS (depending on the $R2 \cdot C1$ time constant) (See Figure 7).

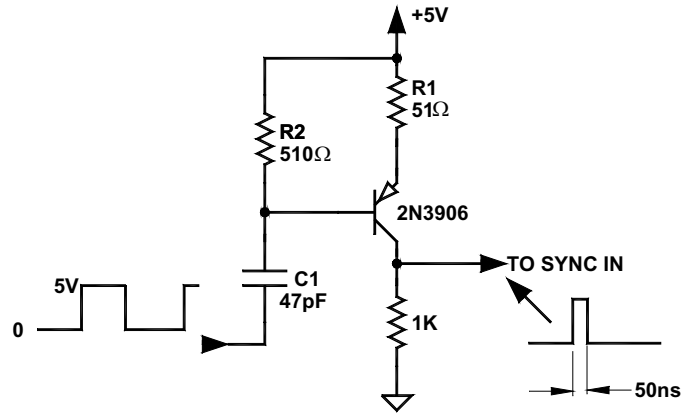


FIGURE 6. 50nS pulse generator from a square wave TTL/5V CMOS clock

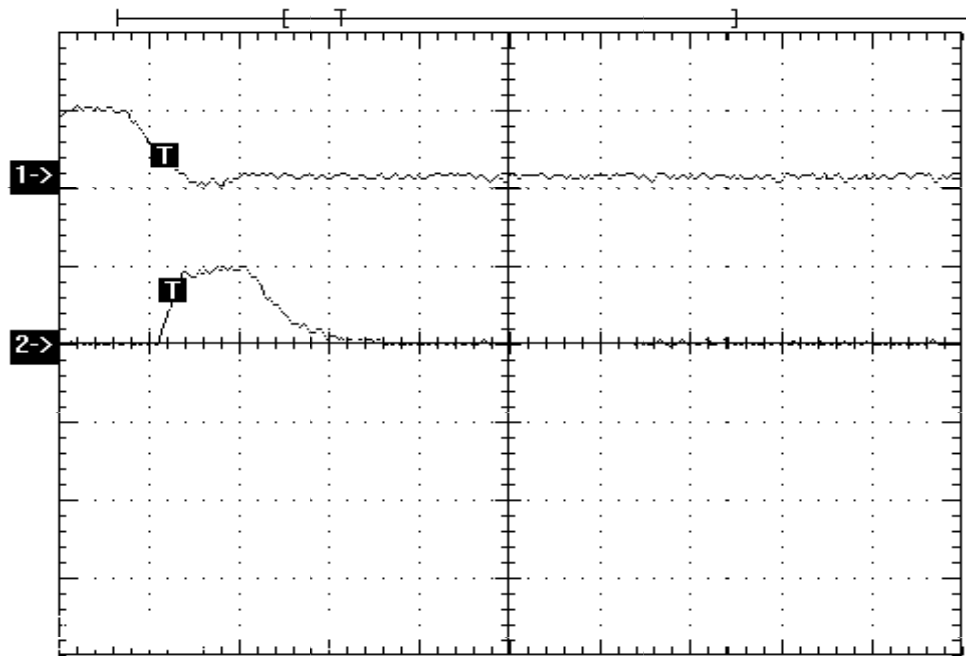


FIGURE 7. Waveforms generated from circuit in Figure 5

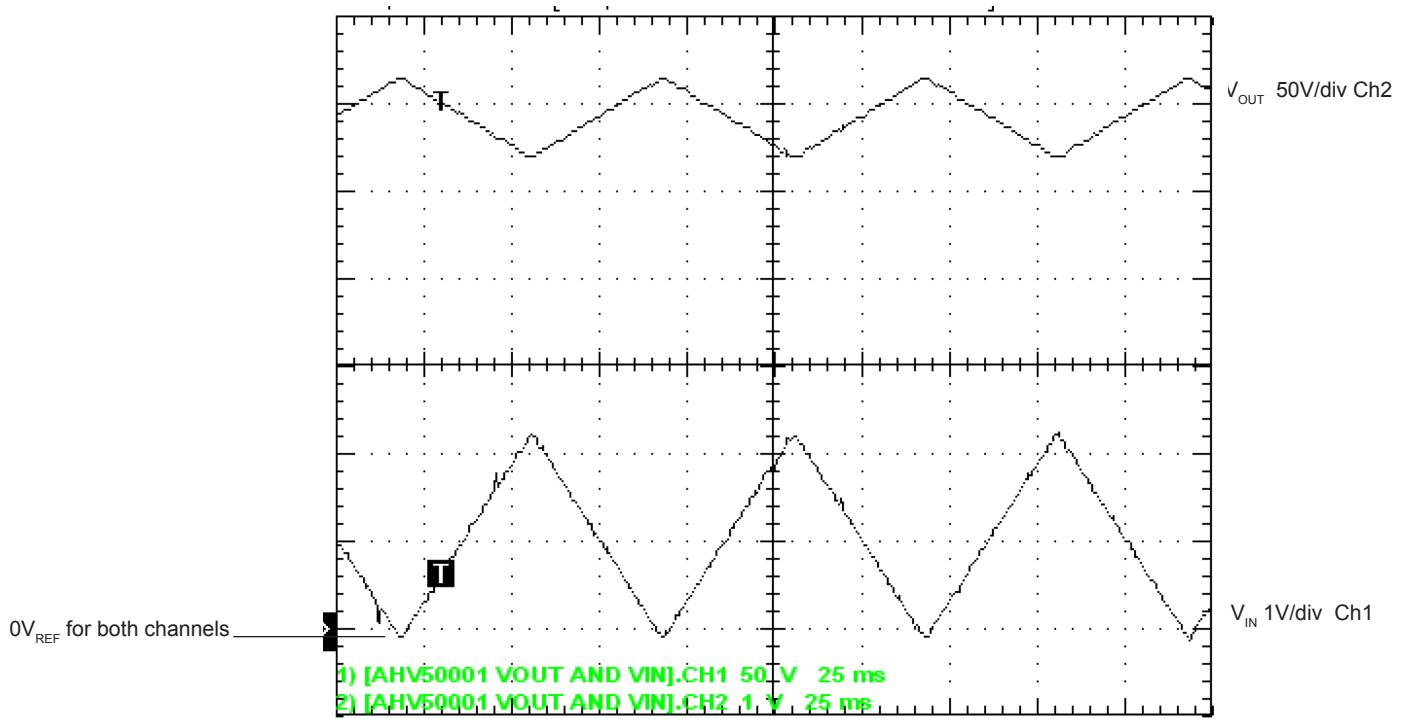


FIGURE 8. V_{OUT} versus V_{IN}