



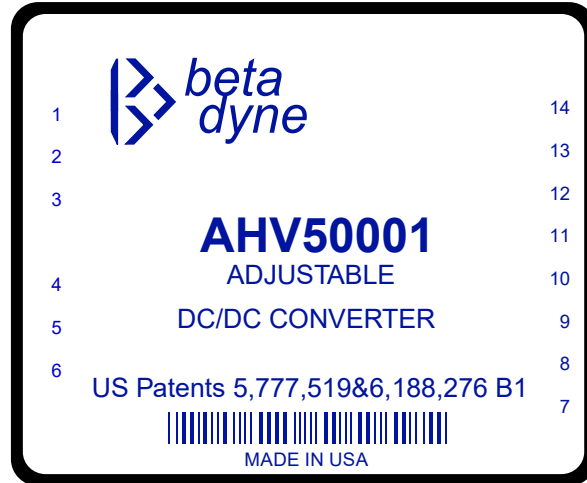
AHV50001

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



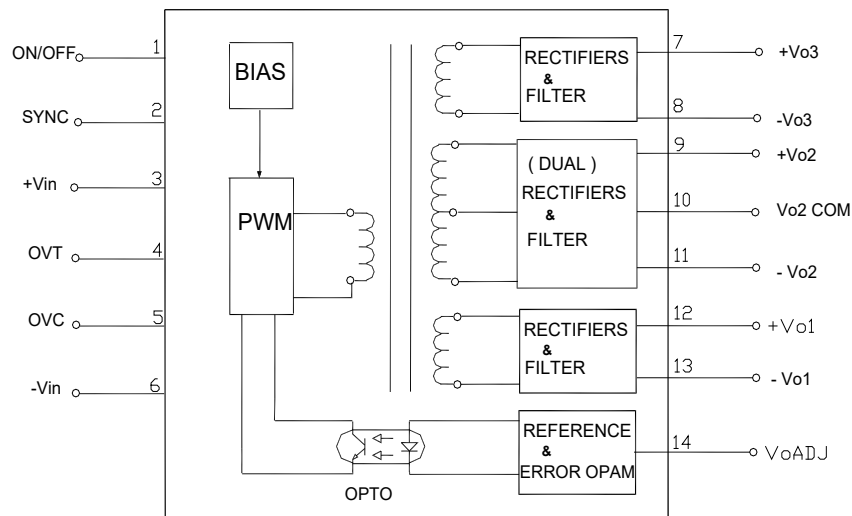
Beta Dyne is protected under various patents, including but not limited to U.S. Patent numbers: 5,777,519; 6,188,276; 6,262,901; 6,452,818; 6,473,3171.

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 V _c		0		2.5	V
V _c 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)				

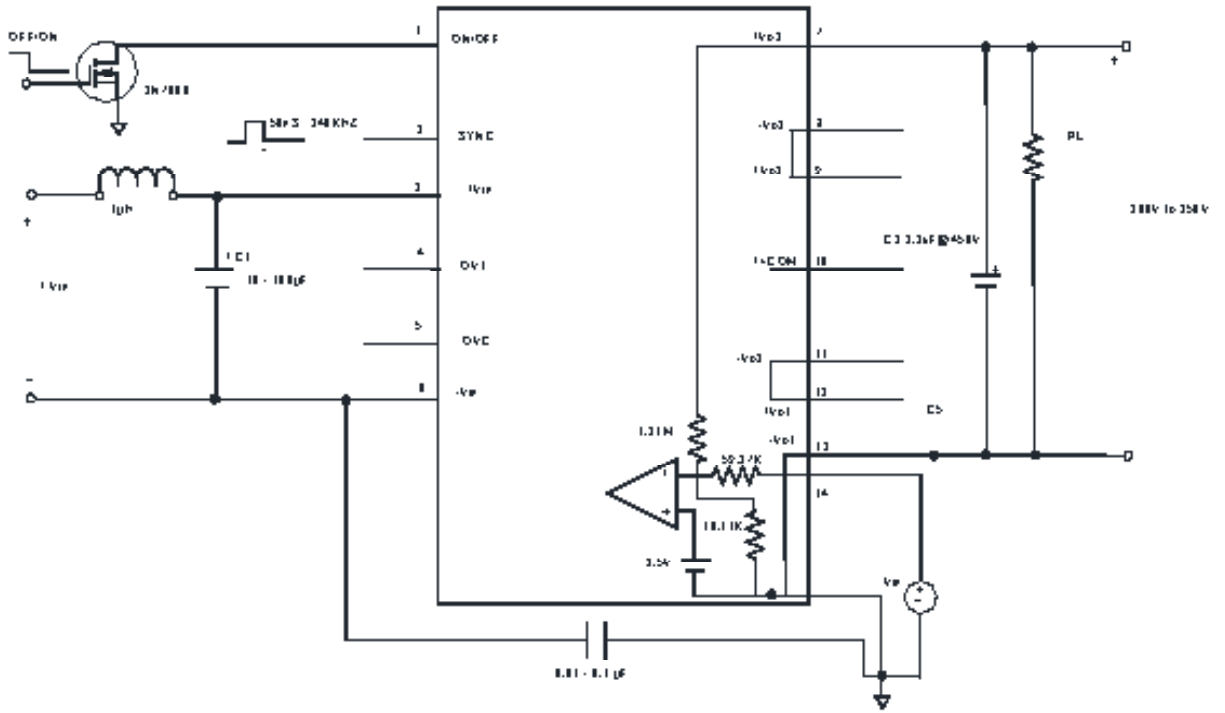


FIGURE 1. Typical Output Diagram Connection of AVH50001

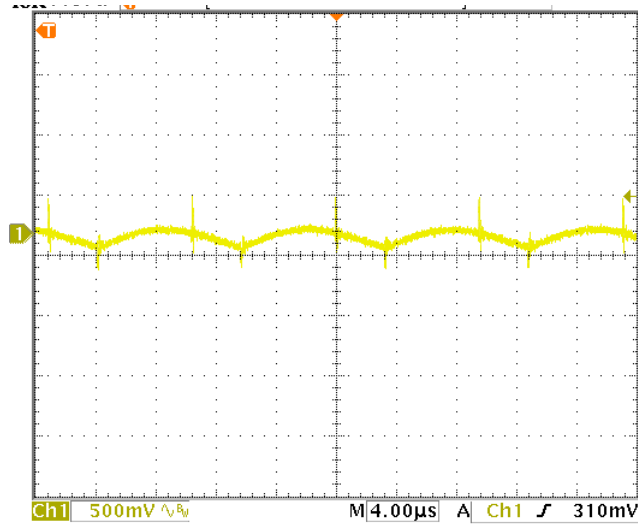


FIGURE 2. Output ripple of V_{out}=300V@168mA, V_{in}=120V as shown in figure 1.

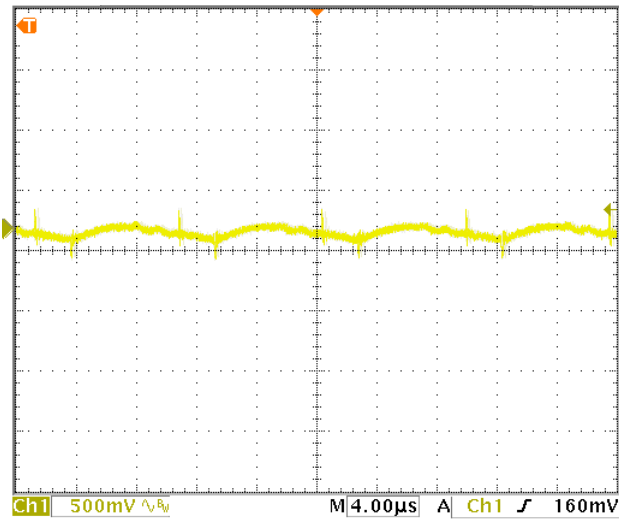


FIGURE 3. Output ripple of $V_{out}=350V@146mA$, $V_{in}=120V$ as shown in figure 1.

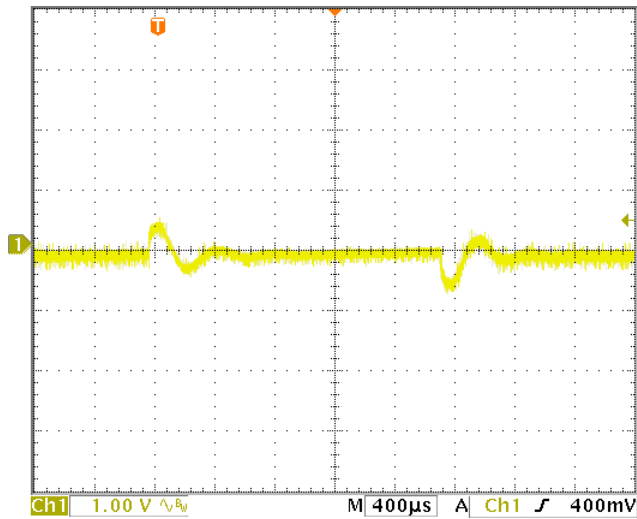
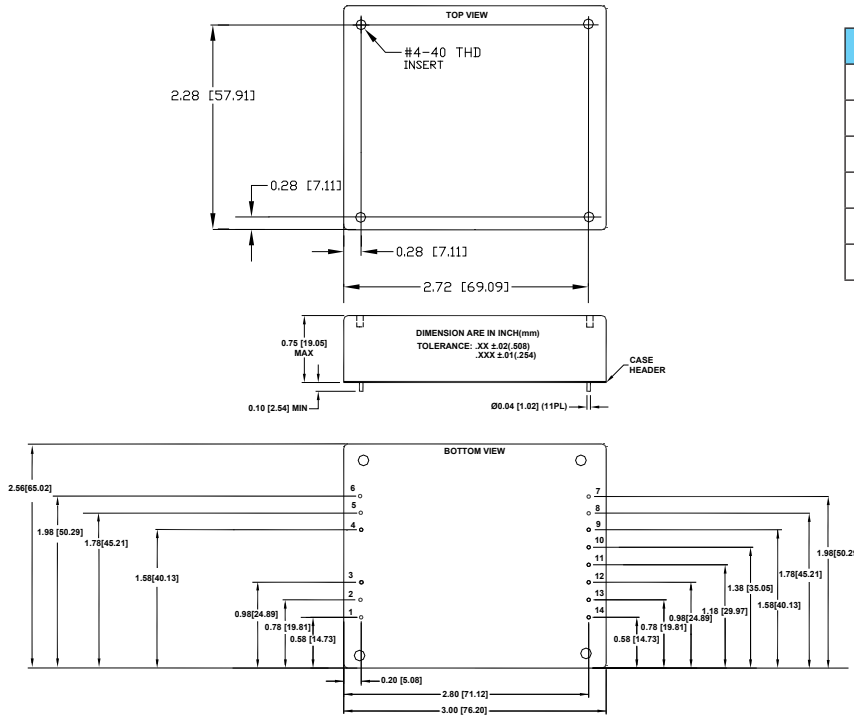


FIGURE 4. Transient reponse of $V_{in}=120V$, $V_{out}=350V$, I_{out} changing from full load (146mA) to 1/2 of full load.

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

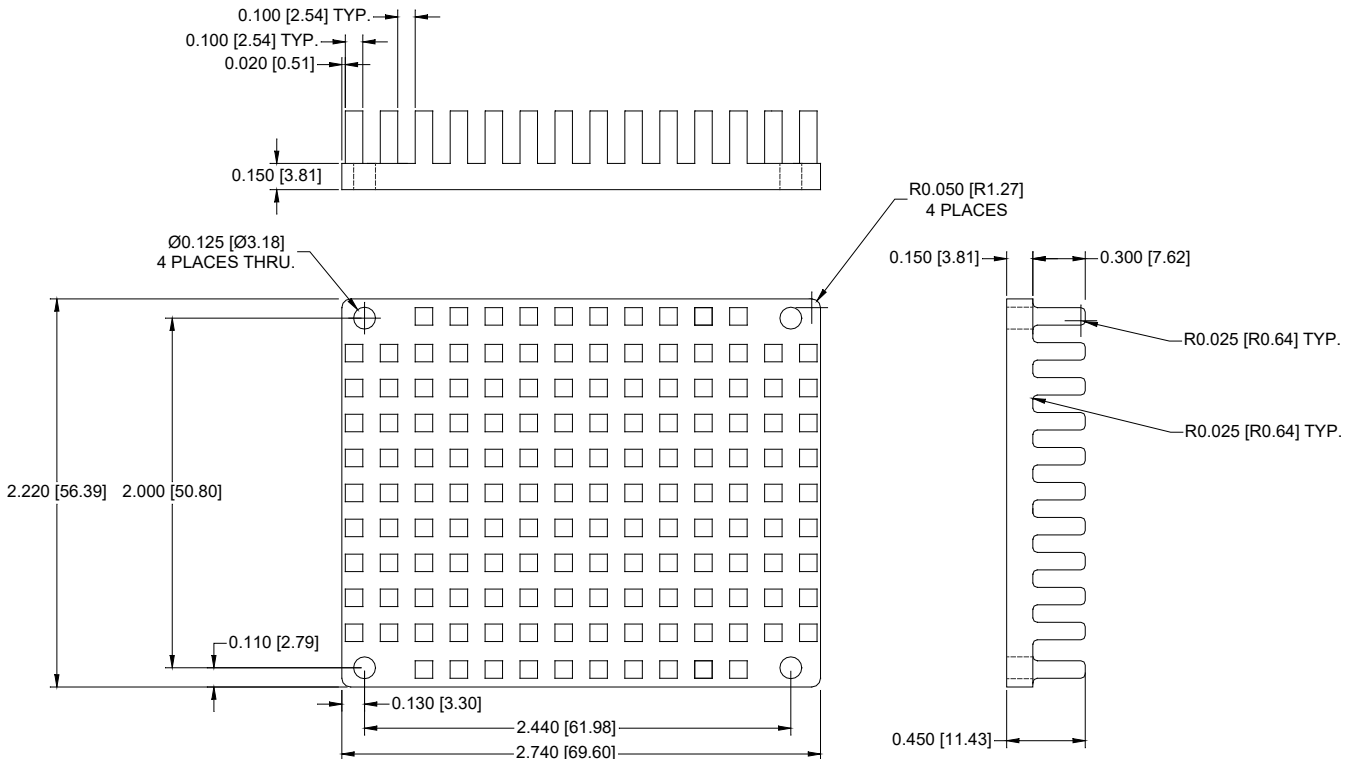


FIGURE 5. Optional Heat Sink for the AHV50 DC-DC Converter

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).

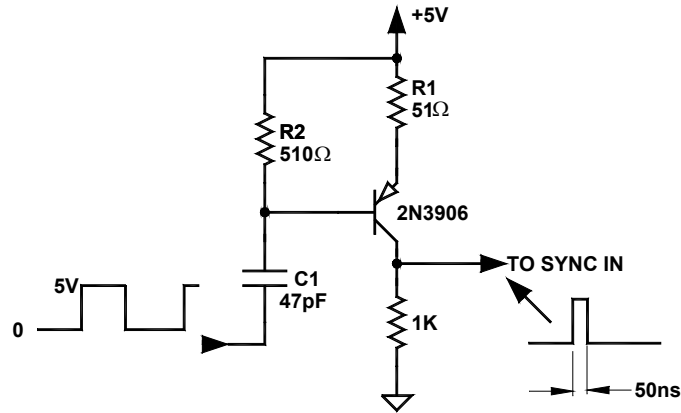


FIGURE 6. 50nS pulse generator from a square wave TTL/5V CMOS clock

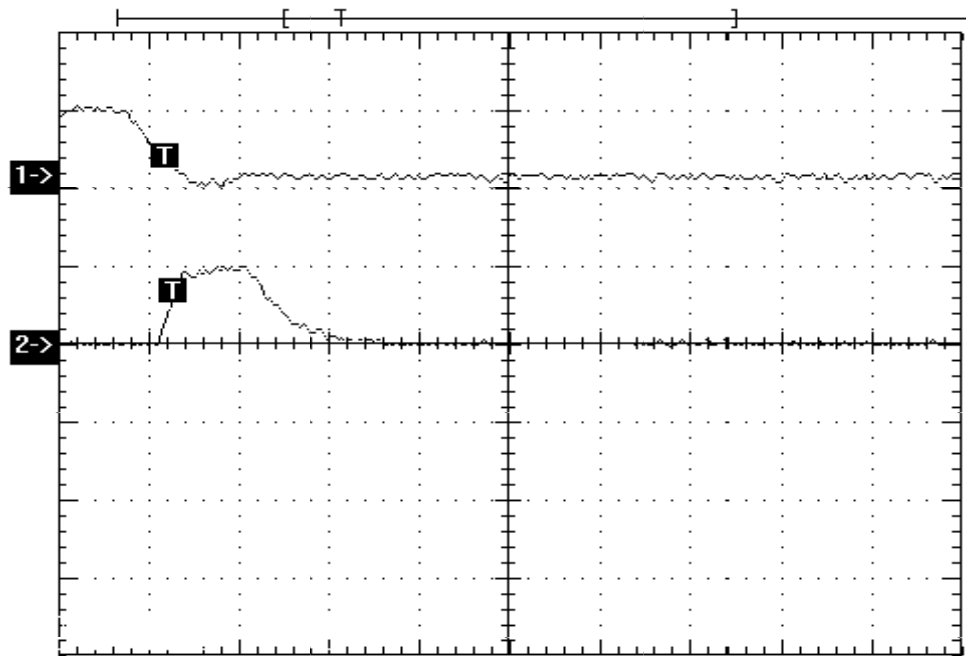


FIGURE 7. Waveforms generated from circuit in Figure 5

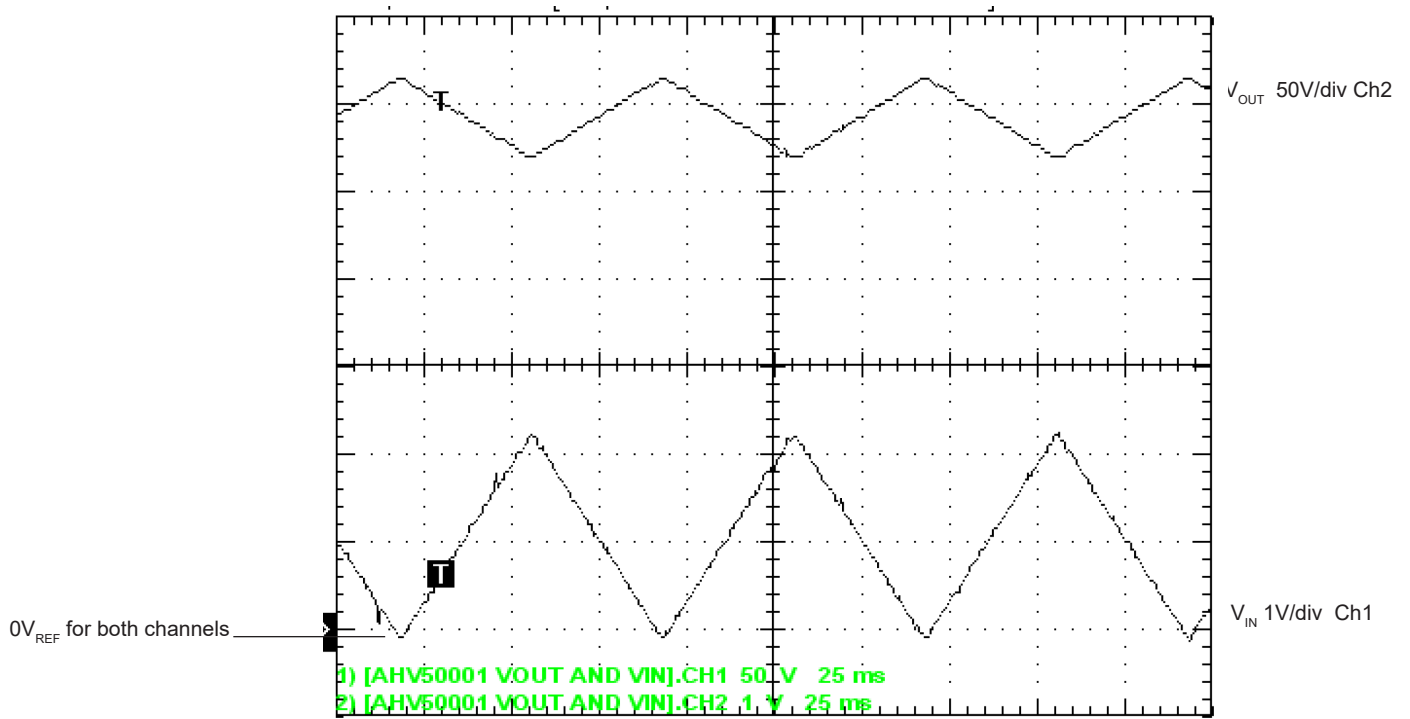


FIGURE 8. V_{OUT} versus V_{IN}