

Figure 1.1. Top View of ACCHV12V3KV10MAIW



Figure 1.2. Side View



Figure 1.4. Bottom View



Figure 1.3. Side View



Figure 1.5. Side View

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FEATURES

- Input Power Voltage: 12V ± 1V
- Input Current Range: 850mA to 3.6A
- Output Voltage: 0 to 3kV@CTRL = 0 to 5V
- Constant Output Current: 10mA
- Reference Voltage: 5V ± 0.05V
- Input Control Voltage: 0 to 5V
- Isolation Voltage: 5000VDC
- Input to Output Isolation
- Electronic Shutdown Control Available
- Zero EMIs and Good Heat Sinking by Metal Enclosure

APPLICATIONS

This power module, ACCHV12V3KV10MAIW, is designed for achieving DC-DC conversion from low voltage to high voltage as a power supply source. It can be used for:

- Charge capacitors
- X-ray Machine
- Spectral Analysis
- Nondestructive Inspection
- Semiconductor Manufacturing Equipment
- Particle Accelerator
- Capillary Electrophoresis
- Particles Injection
- Physical Vapor Phase Deposition
- Electrospinning Preparation of Nanofiber
- DC Reactive Magnetron Sputtering

DESCRIPTION

Figure 2 shows the connecting wires of ACCHV12V3KV10MAIW, of which their detail information given in Table 1. The output voltage can be set to a constant value by connecting the CTRL port to the central tap of a POT (Potentiometer) corresponding to 0V to 3kV proportionally at the output VOUT port as shown in Figure 3.

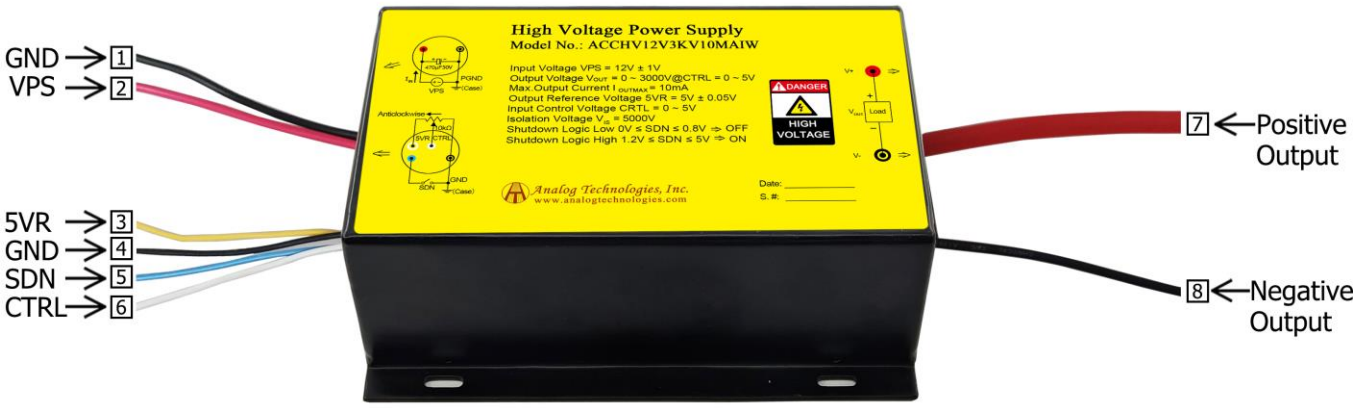


Figure 2. The Connecting Lead Wires of ACCHV12V3KV10MAIW

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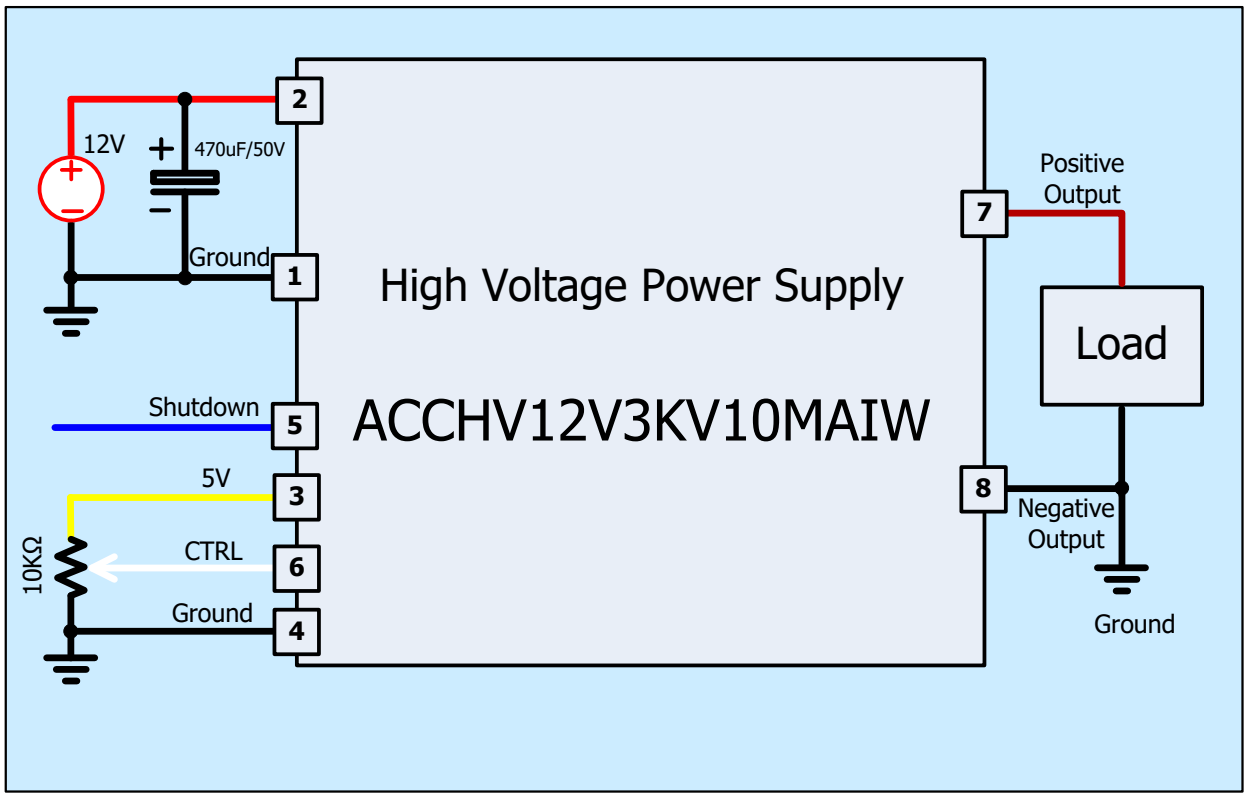


Figure 3. Setting Output to be a Constant Voltage

Table 1. Pin Names, Colors, Functions and Specifications.

No.	Name	Color		Type	Description	Min.	Typ.	Max.
1	GND	Black	●	Ground for analog, digital and power signals.	Input GND		0V	
2	VPS	Red	●	Power input	Input voltage	11V	12V	13V
3	5VR	Yellow	●	Analog output	Reference voltage		5V	
4	GND	Black	●	Ground for analog, digital and power signals.	Control GND Monitor GND		0V	
5	SDN	Blue	●	Digital input	Shutdown logic low	0V		0.8V
					Shutdown logic high	1.2V		5V
6	CTRL	White	○	Analog input	Regulation	0V		5V
7	Positive Output	Brown	●	Power output	Output high voltage	0V		3kV
8	Negative Output	Black	●	Power output	Output GND		0V	

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Please note that the modulation signal must have a low frequency ≤ 10Hz and the value range must be 0V ≤ V_{CTRL} ≤ 5V. The equivalent input circuit for the CTRL is shown in Figure 4.

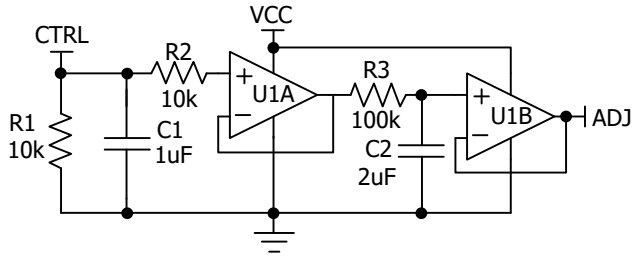


Figure 4. The Equivalent Circuit for CTRL Port

To shutdown ACCHV12V3KV10MAIW, pull down SDN pin to <0.8V; to turn it on, leave SDN pin unconnected or pull it >1.2V. The maximum voltage allowed on the SDN pin is 5V. The equivalent circuit for SDN port is shown in Figure 5.

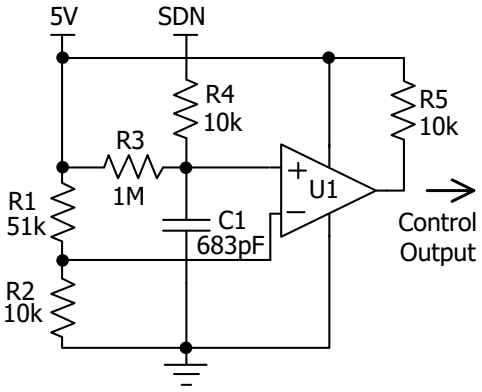


Figure 5. The Equivalent Circuit for SDN Port

USING ACCHV12V3KV10MAIW

This high voltage power supply must be mounted tightly onto a metal plate, ideally, thus expanding its heating sinking capacity of the metal enclosure. Sufficient ventilation must be provided to keep the power supply surface temperature under 55°C.

SAFETY PRECAUTIONS

Although ACCHV12V3KV10MAIW high voltage power supply comes with an over current protection circuit, a short circuit at the output should always be avoided. Make sure the high voltage wire for connecting VOUT node has sufficient insulation capability with its surrounding objects.

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SPECIFICATIONS

Table 2. Characteristics. T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit/Note
Input Power Supply Voltage	V_{VPS}		11	12	13	V
Input Power Supply Quiescent Current	I_{VPS_QC}	I_{VOUT} = 0mA V_{SDN} = V_{CTRL} = 5V	850	900	950	mA
Input Power Supply Current at Full Load	I_{VPS_FL}	I_{VOUT} = 10.0mA	3.5	3.6	3.7	A
Input Power Supply Current at Shutdown	I_{VPS_SHDN}	T_A = −10°C ~ 55°C		13		mA
Modulation Voltage Range on CTRL	V_{CTRL}		0		5	V
Modulation Frequency Range on CTRL	f_{CTRL}		0		12	Hz
Shutdown Port Current	I_{SDNL}	0 ≤ V_{SDNL} < 0.8V	4		4.8	μA
	I_{SDNH}	1.2V < V_{SDNL} < 5V	0		3.6	μA
Shutdown Voltage Logic Low	V_{SDNL}		0		0.8	V
Shutdown Voltage Logic High	V_{SDNH}		1.2		5	V
Output Voltage Range	V_{VOUT}	I_{VOUT} = 0 ~ 10.0mA	0		3000	V
Constant Current Output	I_{VOUT}	V_{VPS} = 11V ~ 13V		10.0		mA
Reference Output Voltage Range	V_{5VR}	T_A = −10°C ~ 55°C I_{5VR} ≤ 5mA	4.95	5	5.05	V
Reference Output Current Range	I_{5VR}	T_A = −10°C ~ 55°C V_{5VR} = 0 ~ 5V	0		1.0	mA
Output Load Resistance Range			$\frac{V_{VOUT}}{I_{VOUT}}$		∞	MΩ
Isolation Voltage	V_{IS}			5000		VDC
Output Voltage Ripple	V_{VOUT_RP}	Bandwidth = 1MHz R_{LOAD} = 300kΩ V_{VOUT} = 3kV	≤1.5			V_{P-P}
Output Voltage Temperature Coefficient	TCV_{VOUT}	V_{VPS} = 12V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = 3kV I_{VOUT} = 10mA T_A = −10°C ~ 55°C		≤0.01		%/°C
Output Voltage Range v.s. Temperature	$V_{VOUT}(T)$	V_{VPS} = 12V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = 3kV I_{VOUT} = 10mA T_A = −10°C ~ 55°C	0.99V_{VOUT}	V_{VOUT}	1.01V_{VOUT}	V

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Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit/Note
Output Voltage Drift	Short Term Drift	$\frac{\lvert\Delta V_{VOUT}/V_{VOUT}\rvert}{\Delta t\ (min)}$	V_{VPS} = 12V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = 3kV I_{VOUT} = 10mA T_A = −10°C ~ 55°C		≤0.5		%/min
	Long Term Drift	$\frac{\lvert\Delta V_{VOUT}/V_{VOUT}\rvert}{\Delta t\ (h)}$			≤1		%/h
Output Voltage Rise Time		t_r	V_{VOUT} (t_1) = 300V V_{VOUT} (t_2) = 2700V R_{Load} = 300kΩ		50		ms
Output Voltage Fall Time		t_f	V_{VOUT} (t_2) = 2700V V_{VOUT} (t_3) = 300V R_{Load} = 300kΩ		100		ms
Mean Time Between Failure		MTBF			1M		h
Instantaneous Short Circuit Current at the Output		I_{VOUT_SC}			≤1000		mA
Load Regulation		$\frac{\lvert\Delta V_{VOUT}/V_{VOUT}\rvert}{\Delta I_{VOUT}}$	V_{VOUT} = 3kV I_{VOUT} = 10mA		≤0.05		%/mA
Full Load Efficiency		η	V_{VPS} = 12V V_{VOUT} = 3kV I_{VOUT} = 10mA		≥70		%
Operating Temperature Range		T_{opr}		−10		55	°C
Storage Temperature Range		T_{stg}		−20		85	°C
External Dimensions				140×100×55			mm
				5.51×3.94×2.17			inch
Weight					1000		g
					2.21		lbs
					35.27		Oz

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TESTING DATA

Test conditions: V_{VPS} = 12V, T_A = 25°C, R_{LOAD} = 300kΩ

DC Testing

The measured output voltage, V_{VOUT}, corresponding to the control port input voltage, V_{CTRL}, is shown in Figure 7.

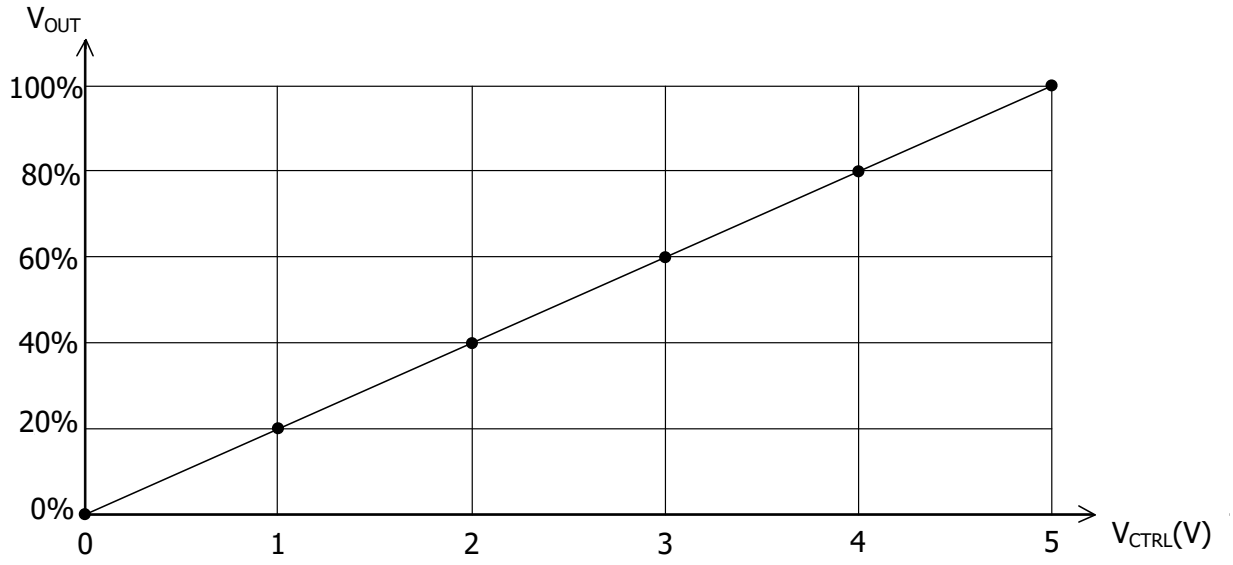


Figure 6. V_{CTRL} vs. V_{VOUT}

AC Testing

To test the analog modulation function, a triangle and sine-wave voltage signals are applied to the CTRL port as the input source signal respectively. Figure 7 and 8 show both the input signal and the output signal waveforms when using the triangle and sine-wave signals at the CTRL port respectively.

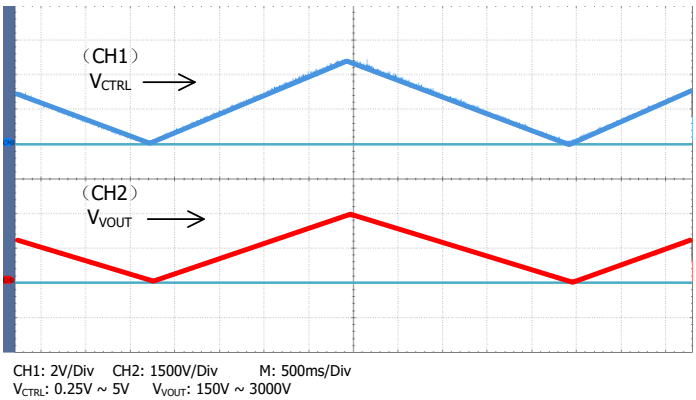


Figure 7. Triangle Wave Modulation

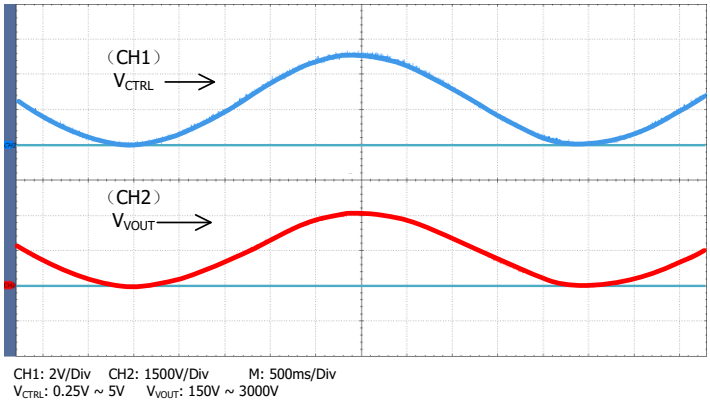


Figure 8. Input vs. Sine Wave Modulation

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To test the rise and fall times at the output, a step function signal is applied to the CTRL port. The testing results are shown in Figure 9, Figure 10, and Figure 11. As shown in Figure 10 and Figure 11, a square wave of 0.25V ~ 5V, f = 0.10Hz, is applied to CTRL port, the output waveform fall time is measured to be about 100ms and the rise time is about 50ms. These two values are not the same, that is because on the rising trail, the power supply injects a current to the load; while on the falling trail, the best the power supply can do is to stop its output current and let the load resistor drain the output filtering capacitor to a lower voltage, and the draining current is much smaller than the injection current.

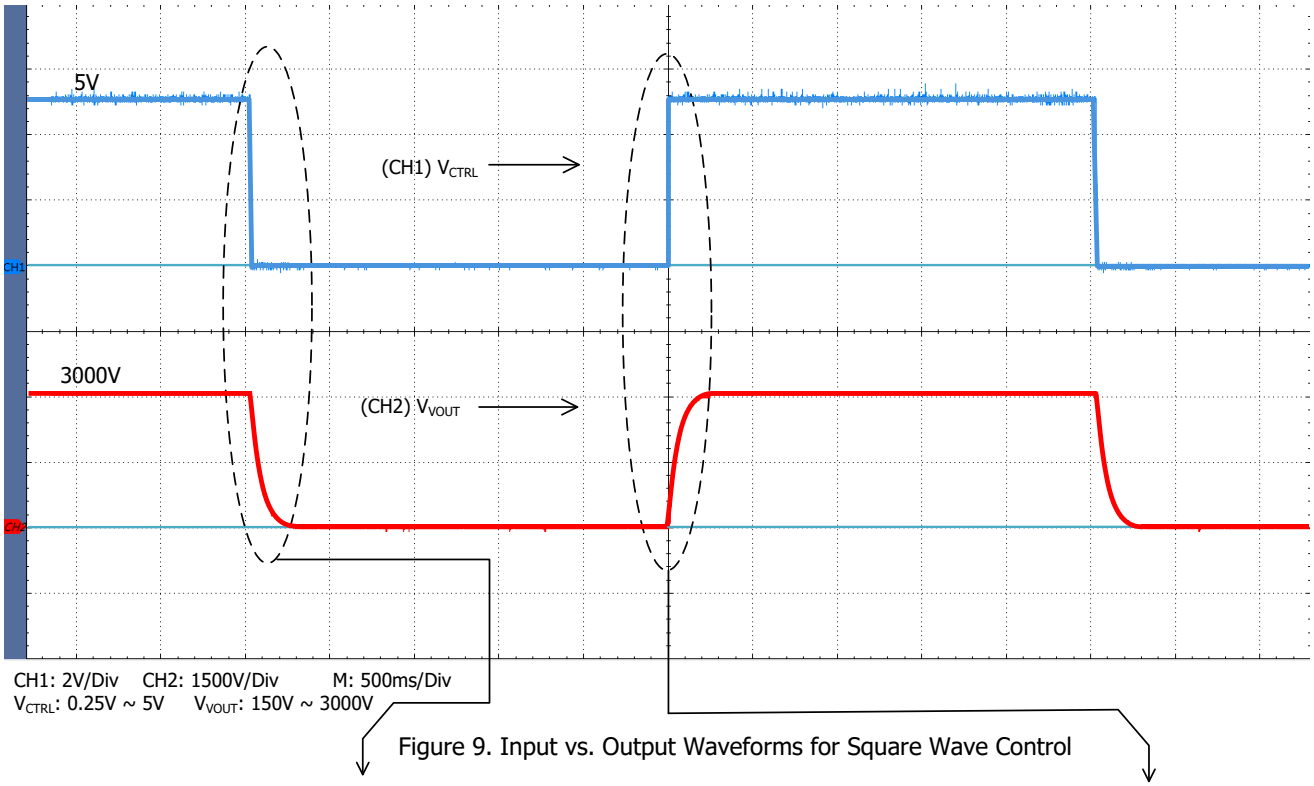


Figure 9. Input vs. Output Waveforms for Square Wave Control

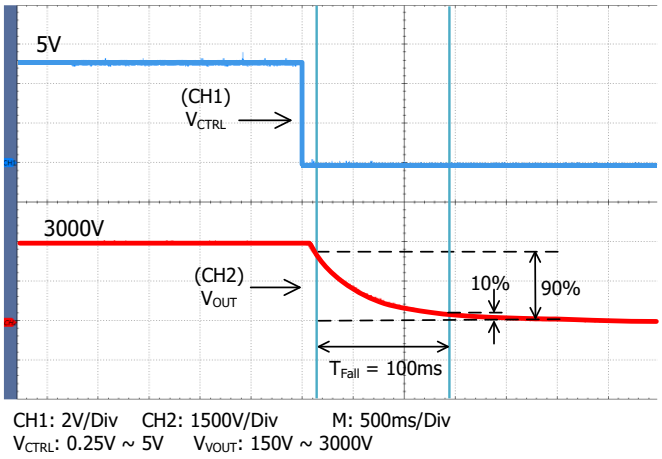


Figure 10. Falling Trail for Large Signal Response

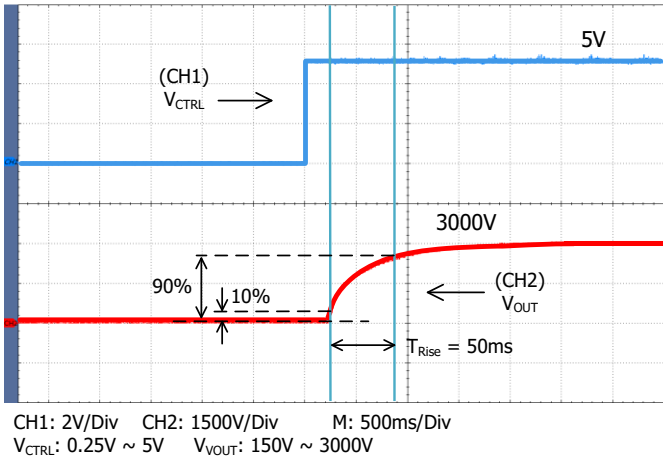
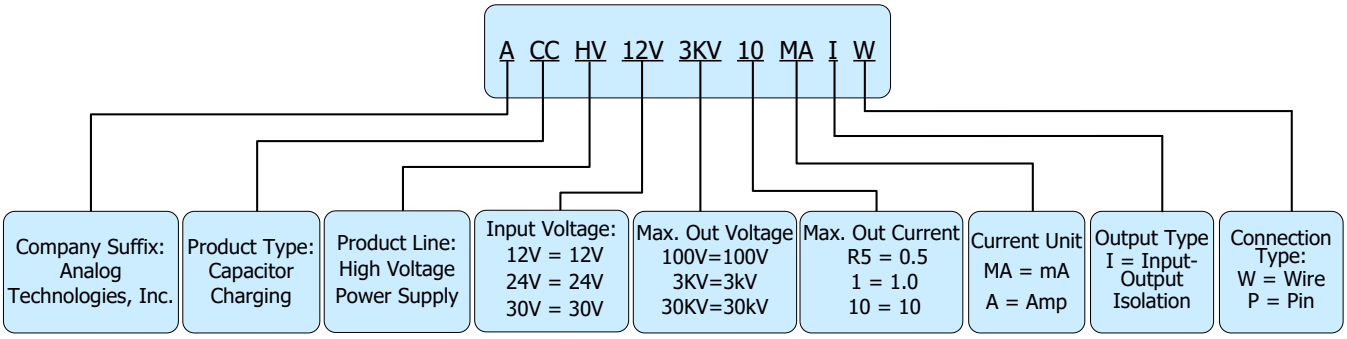


Figure 11. Rising Trail for Large Signal Response

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NAMING PRINCIPLE



Naming Principle of ACCHV12V3KV10MAIW

DIMENSIONS

Connecting Lead Wire Sizes and Lengths

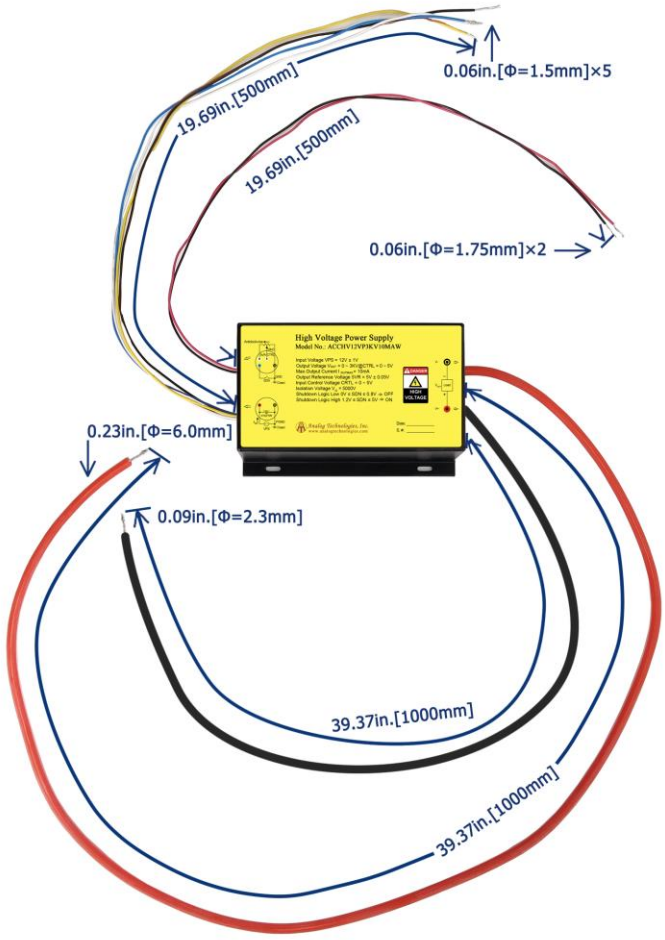


Figure 12. Connecting Lead Wires of ACCHV12V3KV10MAIW

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Outline Dimensions

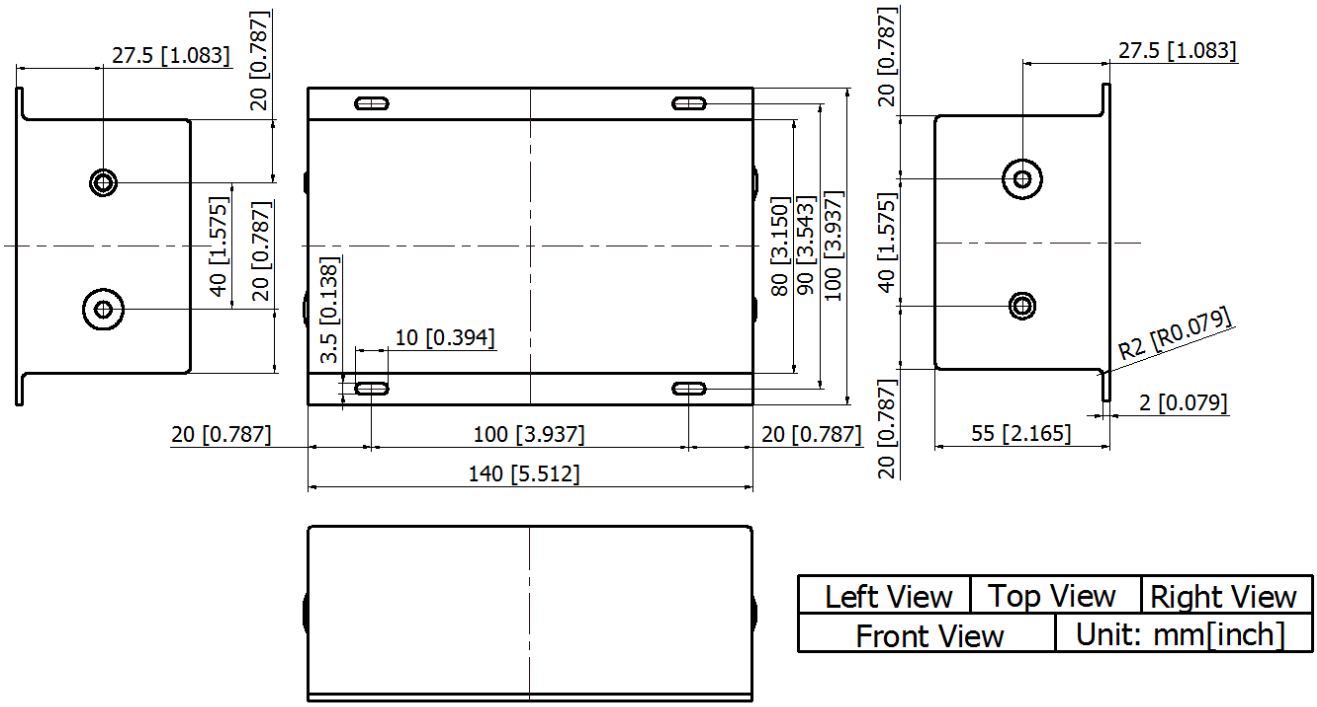


Figure 13. Outline Dimensions

ORDERING INFORMATION

Part Number	Buy Now
ACCHV12V3KV10MAIW	* *

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