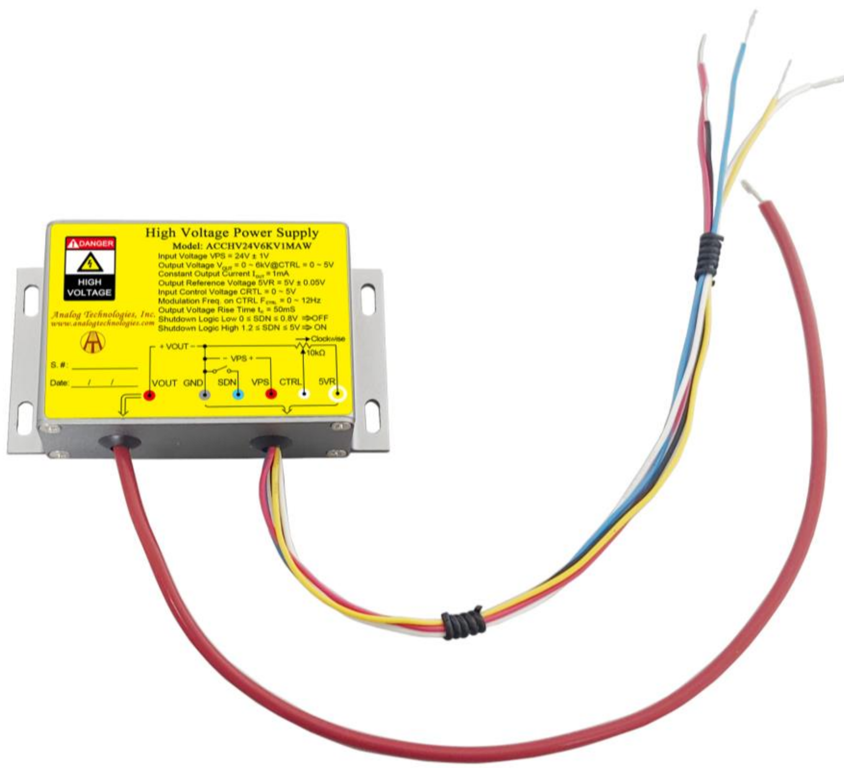


Figure 1.1. Top View of ACCHV24V6KV1MAW

Figure 1.2. Side View

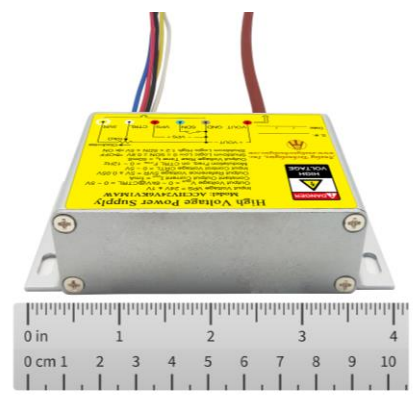


Figure 1.3. Side View

Figure 1.4. Side View

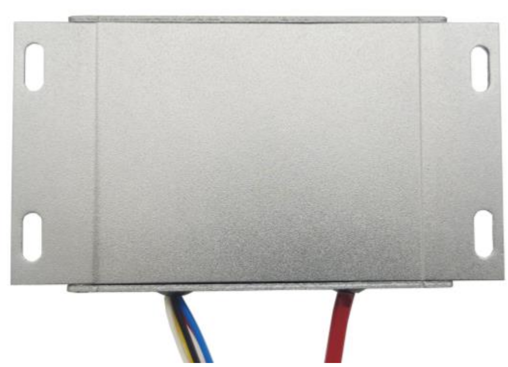


Figure 1.5. Bottom View

FEATURES

- Input Power Voltage: 24V ± 1V
- Input Current Range: 80mA to 380mA
- Output Voltage: 0 to 6kV@CTRL = 0 to 5V
- Constant Output Current: 1mA
- Reference Voltage: 5V ± 0.05V
- Input Control Voltage: 0 to 5V
- Electronic Shutdown Control Available
- Zero EMIs and Good Heat Sinking by Metal Enclosure

Figure 2. The Connecting Lead Wires of ACCHV24V6KV1MAW

APPLICATIONS

This power module, ACCHV24V6KV1MAW, 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

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

No.	Name	Description	Type	Color		Min.	Typ.	Max.
1	SDN	Shutdown logic low	Digital input	● (blue)	Blue	0V		0.8V
		Shutdown logic high				1.2V		5V
2	5VR	Reference voltage	Analog output	● (yellow)	Yellow		5V	
3	CTRL	Regulation	Analog input	○ (white)	White	0V		5V
4	VPS	Input voltage	Power supply input	● (red)	Red	23V	24V	25V
5	GND	Ground	Ground for power supply and analog & digital signals	● (black)	Black		0V	
6	VOUT	Output high voltage	Power output	● (brown)	Brown	0V		6kV

DESCRIPTION

Figure 1 shows the actual pictures of ACCHV24V6KV1MAW. Figure 2 shows its connecting wires. More detail information is given in Table 1. The high voltage output can be set to a constant value between 0V to 6kV by connecting the CTRL port to the central tap of a POT (Potentiometer) or modulated by an AC signal ranging from 0V to 5V, as see Figure 3 and Figure 4 respectively. The output voltage equals to 1000 times the input control voltage: $V_{VOUT}=1000\times V_{CTRL}$.

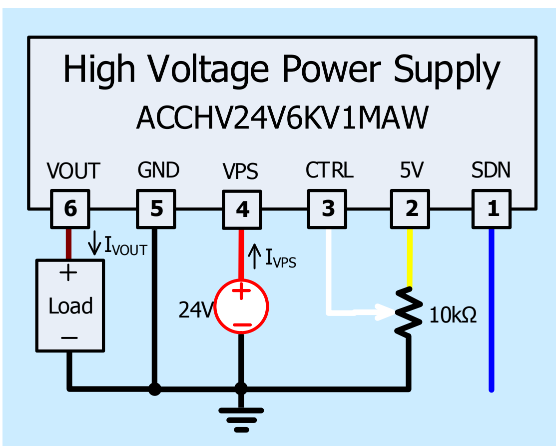


Figure 3. Setting Output to be a Constant Voltage

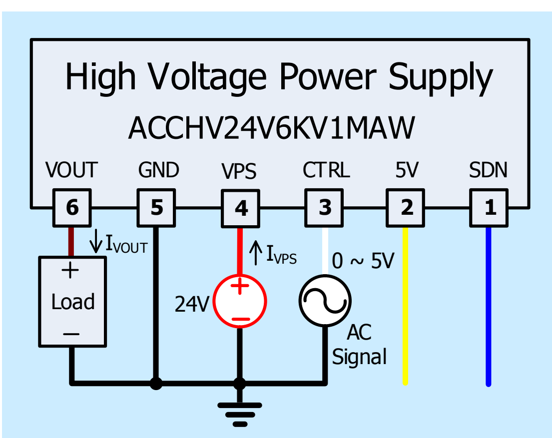


Figure 4. Modulating Output by an AC Signal Source

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

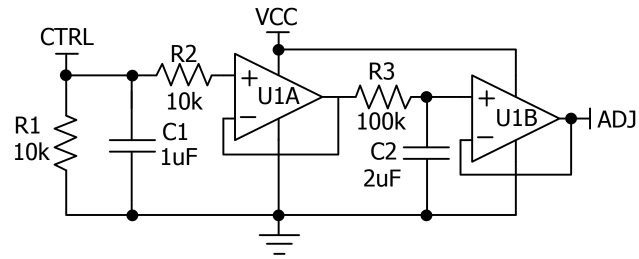


Figure 5. The Equivalent Circuit for CTRL Port

To shutdown ACCHV24V6KV1MAW, 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 6.

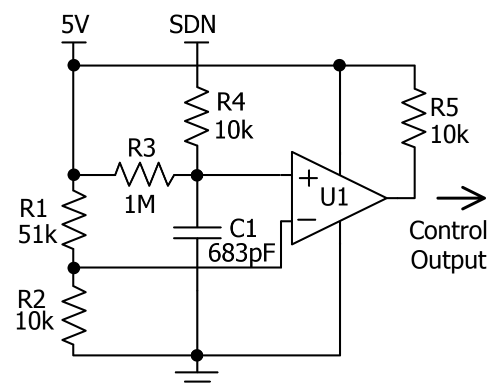


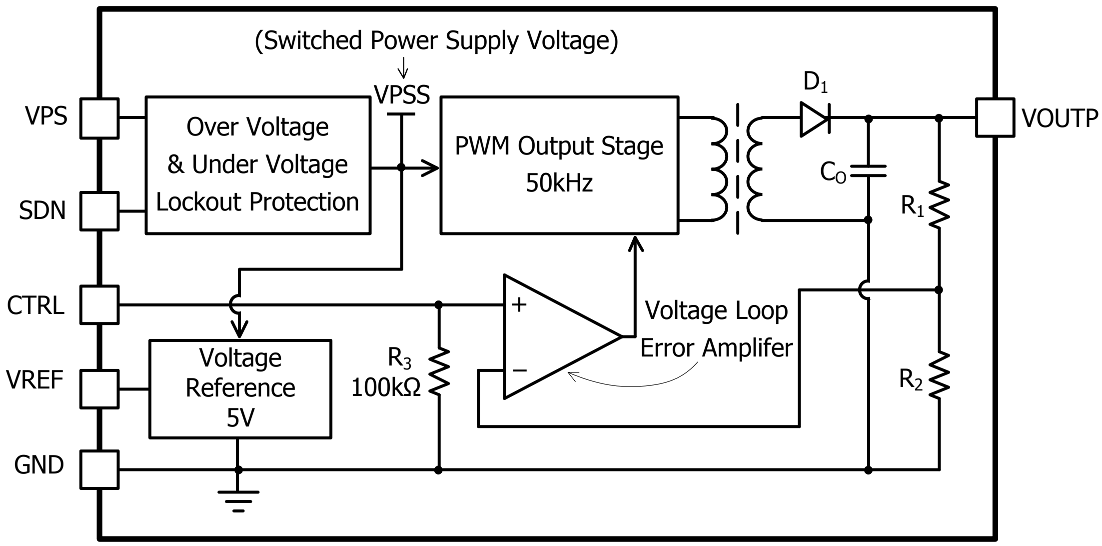
Figure 6. The Equivalent Circuit for SDN Port

USING ACCHV24V6KV1MAW

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 ACCHV246KV1MAW 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.



VOUTP = N×V_{CTRL}, where N is the amplification factor: N = R_1/R_2.

High Voltage Power Supply Function Block Diagram

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}		23	24	25	V
Input Power Supply Quiescent Current	I_{VPS_QC}	I_{VOUT} = 0mA V_{SDN} = V_{CTRL} = 5V	80	90	100	mA
Input Power Supply Current at Full Load	I_{VPS_FL}	I_{VOUT} = 1.0mA	370	380	390	mA
Input Power Supply Current at Shutdown	I_{VPS_SHDN}	T_A = −10°C ~ 55°C		18		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 ~ 1.0mA	0		6000	V
Constant Current Output	I_{VOUT}	V_{VPS} = 11V ~ 13V		1.0		mA
Reference Output Voltage Range	V_{5VR}	T_A = −10°C ~ 55°C I_{5VR} ≤ 5mA	4.98	5	5.02	V
Reference Output Current Range	I_{5VR}	T_A = −10°C ~ 55°C V_{5VR} = 0 ~ 5V	0		1.0	mA

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit/Note
Output Load Resistance Range			$\frac{V_{VOUT}}{I_{VOUT}}$		∞	MΩ
Output Voltage Ripple	V_{VOUT_RP}	Bandwidth = 1MHz R_{LOAD} = 6MΩ V_{VOUT} = 6kV		≤3		V_{P-P}
Output Voltage Temperature Coefficient	TCV_{VOUT}	V_{VPS} = 12V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = 6kV I_{VOUT} = 1mA 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} = 6kV I_{VOUT} = 1mA T_A = −10°C ~ 55°C	$0.99V_{VOUT}$	V_{VOUT}	$1.01V_{VOUT}$	V
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} = 6kV I_{VOUT} = 1mA T_A = −10°C ~ 55°C		≤0.5		%/min
Output Voltage Drift: Long Term Drift	$\frac{\lvert \Delta V_{VOUT}/V_{VOUT} \rvert}{\Delta t\ (h)}$			≤1		%/h
Output Voltage Rise Time	t_r	$V_{VOUT}(t_1)$ = 600V $V_{VOUT}(t_2)$ = 5400V R_{Load} = 6MΩ		50		ms
Output Voltage Fall Time	t_f	$V_{VOUT}(t_2)$ = 5400V $V_{VOUT}(t_3)$ = 600V R_{Load} = 6MΩ		100		ms
Mean Time Between Failure	MTBF			1M		h
Instantaneous Short Circuit Current at the Output	I_{VOUT_SC}			≤100		mA
Load Regulation	$\frac{\lvert \Delta V_{VOUT}/V_{VOUT} \rvert}{\Delta I_{VOUT}}$	V_{VOUT} = 6kV I_{VOUT} = 1mA		≤0.05		%/mA
Full Load Efficiency	η (3)	V_{VPS} = 12V V_{VOUT} = 6kV I_{VOUT} = 1mA		≥70		%
Operating Temperature Range	T_{opr}		−10		55	°C
Storage Temperature Range	T_{stg}		−20		85	°C
External Dimensions				82×55×28		mm
				3.23×2.17×1.10		inch
Weight				210		g
				0.46		lbs
				7.4		Oz

TESTING DATA

Test conditions: V_{VPS} = 24V, T_A = 25°C, R_{LOAD} = 6MΩ

DC Testing

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

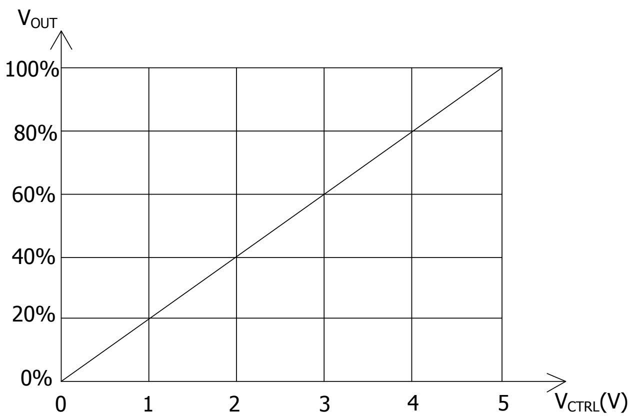


Figure 7. V_{CTRL} vs. V_{VOUT}

Charging Testing

It takes 6 seconds to charge a 1μF capacitor by using 6kV voltage and 1mA constant current. We can also customize high voltage power supply based on users' requirements.

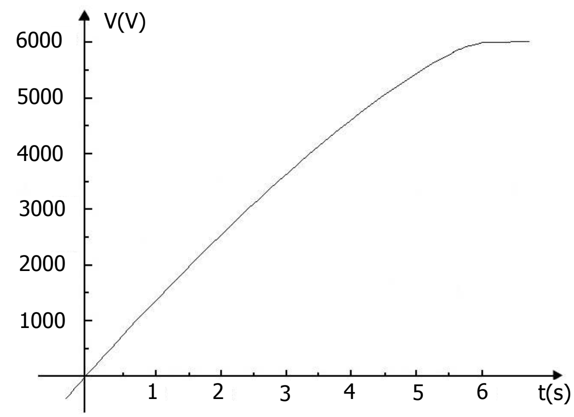


Figure 8. Charging Curve

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 9 and 10 show both the input signal and the output signal waveforms when using the triangle and sine-wave signals at the CTRL port respectively.

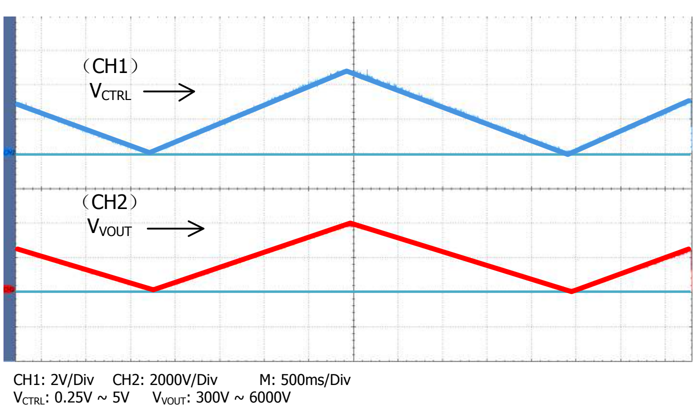


Figure 9. Triangle Wave Modulation

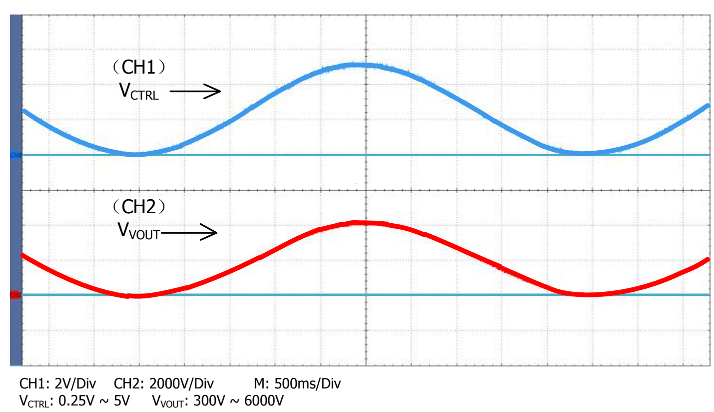


Figure 10. Input vs. Sine Wave Modulation

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 11, Figure 12, and Figure 13. As shown in Figure 12 and Figure 13, 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 30ms. 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.

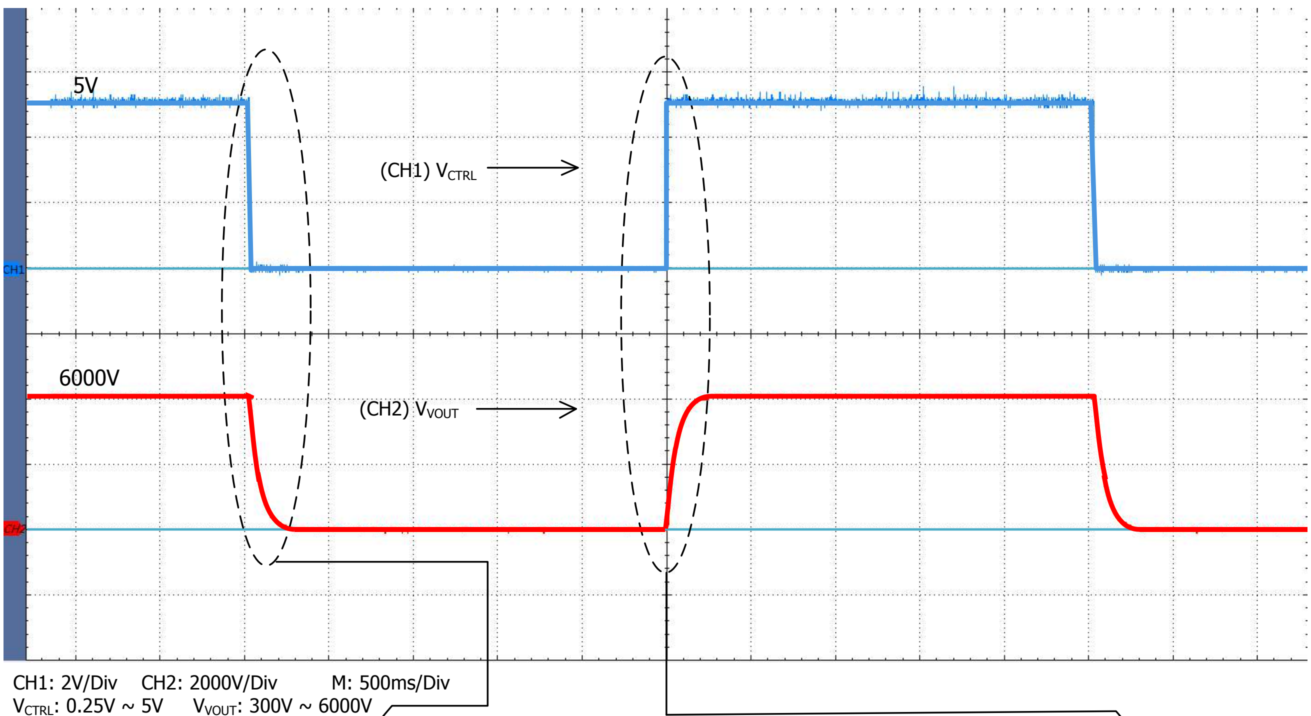


Figure 11. Input vs. Output Waveforms for Square Wave Control

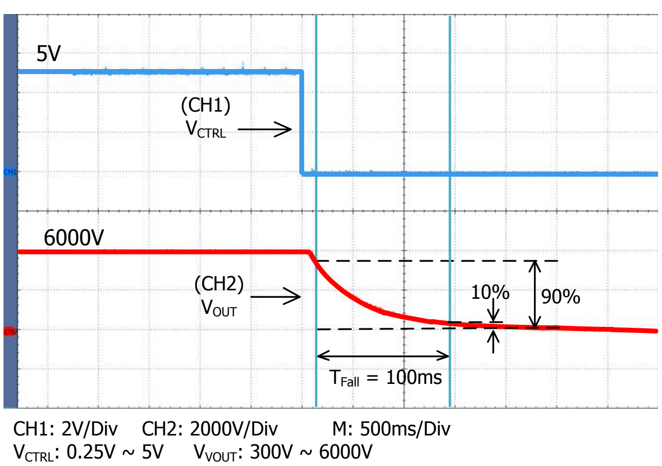


Figure 12. Falling Trail for Large Signal Response

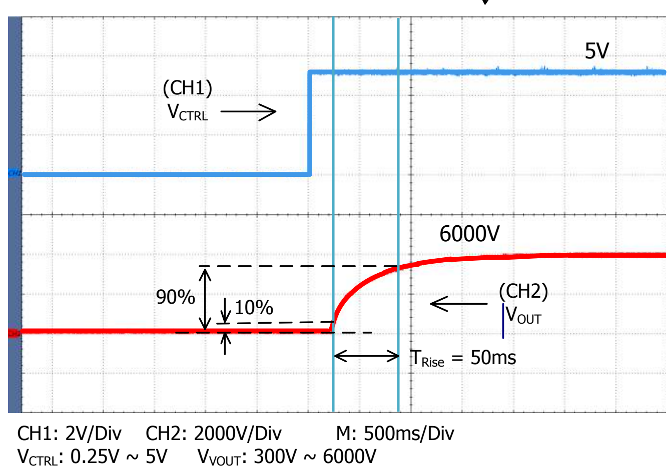
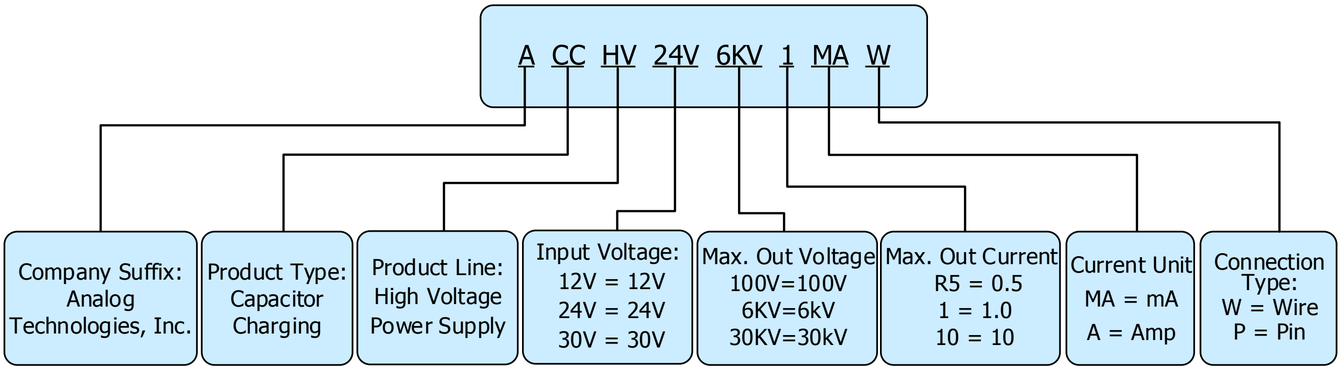


Figure 13. Rising Trail for Large Signal Response

NAMING PRINCIPLE



Naming Principle of ACCHV24V6KV1MAW

DIMENSIONS

Connecting Lead Wire Sizes and Lengths

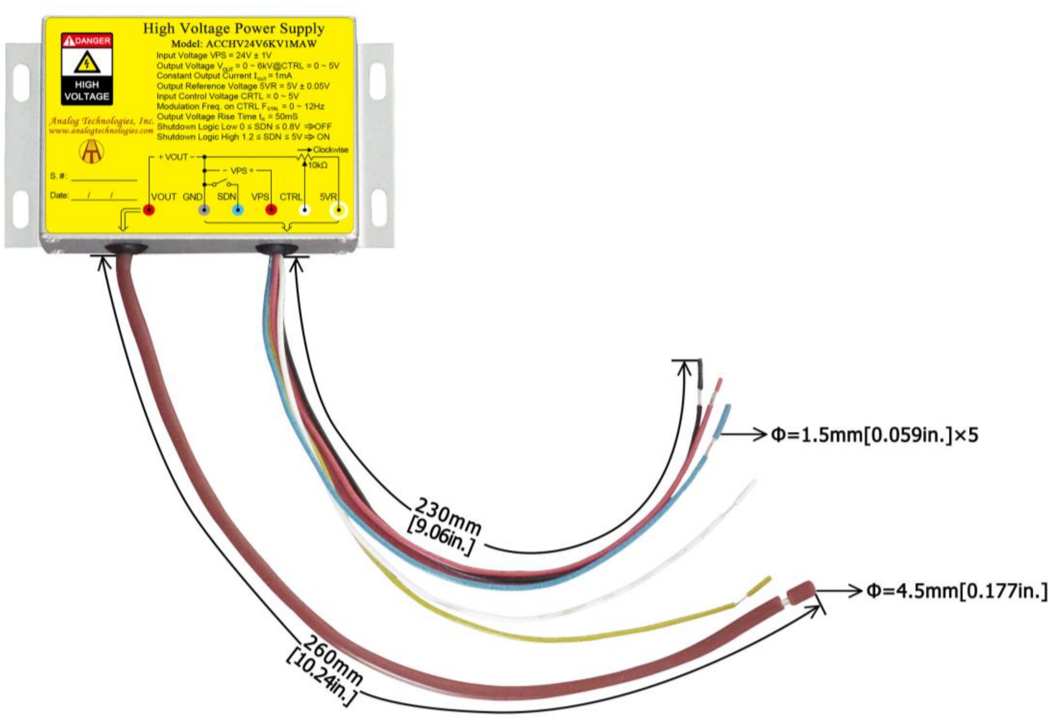


Figure 14. Connecting Lead Wires of ACCHV24V6KV1MAW

Lead Wires	Diameter		Length	
	mm	inch	mm	inch
Thick brown lead wire	4.5	0.177	26 ± 1	1.024 ± 0.039
Yellow, red, blue, black and white lead wires	1.5	0.059	23 ± 1	0.906 ± 0.039

Outline Dimensions

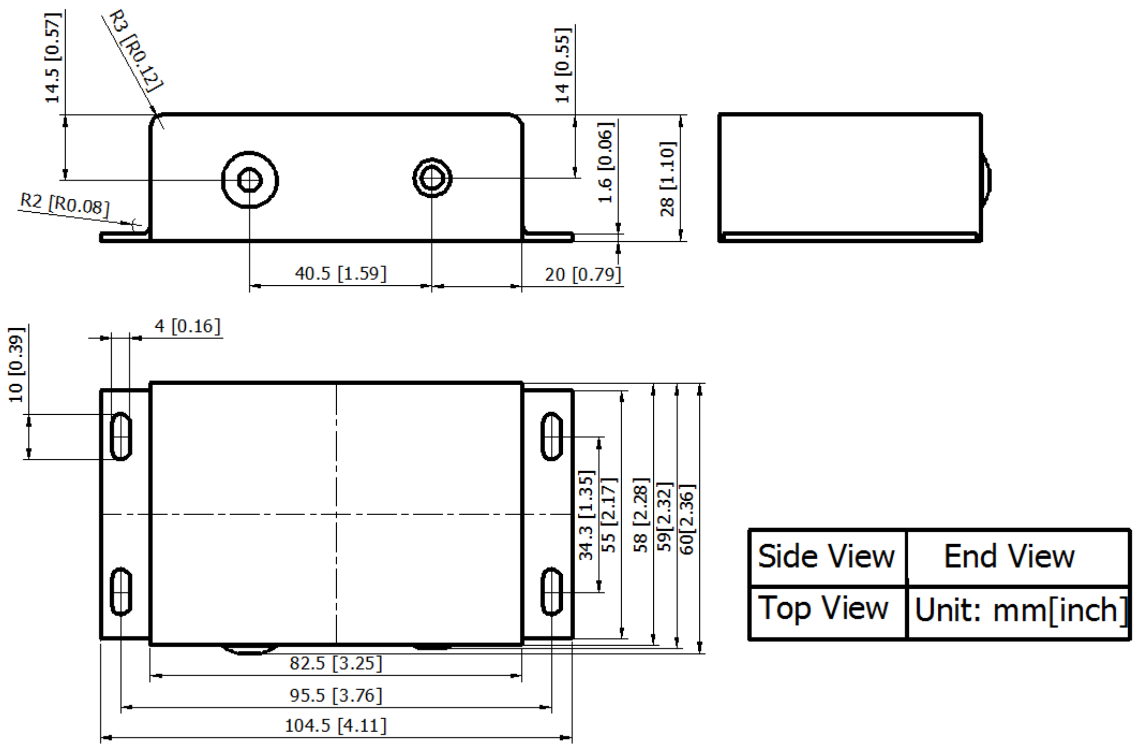


Figure 15. Outline Dimensions

ORDERING INFORMATION

Part Number	Buy Now
ACCHV24V6KV1MAW	* *

RELATED PRODUCTS

Input Voltage: 24V, Input Control Voltage: 0 to 5V, Efficiency: 70%.

Part #	Datasheet	Output Voltage (V)	Output Current (mA)	Description	Buy Now*
ACCHV24V500V1MAW	Contact Us	500	1	Positive 500V 1mA module with lead wires	Contact Us
ACCHV24V1KV1MAW	Contact Us	1000	1	Positive 1kV 1mA module with lead wires	Contact Us
ACCHV24V2KV1MAW	Contact Us	2000	1	Positive 2kV 1mA module with lead wires	Contact Us
ACCHV24V3KV1MAW	Contact Us	3000	1	Positive 3kV 1mA module with lead wires	Contact Us
ACCHV24V4KV1MAW	Contact Us	4000	1	Positive 4kV 1mA module with lead wires	Contact Us
ACCHV24V5KV1MAW	Contact Us	5000	1	Positive 5kV 1mA module with lead wires	Contact Us
ACCHV24V6KV1MAW	PDF	6000	1	Positive 6kV 1mA module with lead wires	* *
ACCHV24V7KV1MAW	Contact Us	7000	1	Positive 7kV 1mA module with lead wires	Contact Us
ACCHV248KV1MAW	Contact Us	8000	1	Positive 8kV 1mA module with lead wires	Contact Us
ACCHV249KV1MAW	Contact Us	9000	1	Positive 9kV 1mA module with lead wires	Contact Us
ACCHV2410KV1MAW	Contact Us	10,000	1	Positive 10kV 1mA module with lead wires	Contact Us
ACCHV24N500V1MAW	Contact Us	−500	1	Negative 500V 1mA module with lead wires	Contact Us
ACCHV24N1KV1MAW	Contact Us	−1000	1	Negative 1kV 1mA module with lead wires	Contact Us
ACCHV24N2KV1MAW	Contact Us	−2000	1	Negative 2kV 1mA module with lead wires	Contact Us
ACCHV24N3KV1MAW	Contact Us	−3000	1	Negative 3kV 1mA module with lead wires	Contact Us
ACCHV24N4KV1MAW	Contact Us	−4000	1	Negative 4kV 1mA module with lead wires	Contact Us
ACCHV24N5KV1MAW	Contact Us	−5000	1	Negative 5kV 1mA module with lead wires	Contact Us
ACCHV24N6KV1MAW	Contact Us	−6000	1	Negative 6kV 1mA module with lead wires	Contact Us
ACCHV24N7KV1MAW	Contact Us	−7000	1	Negative 7kV 1mA module with lead wires	Contact Us
ACCHV24N8KV1MAW	Contact Us	−8000	1	Negative 8kV 1mA module with lead wires	Contact Us
ACCHV24N9KV1MAW	Contact Us	−9000	1	Negative 9kV 1mA module with lead wires	Contact Us
ACCHV24N10KV1MAW	Contact Us	−10000	1	Negative 10kV 1mA module with lead wires	Contact Us

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