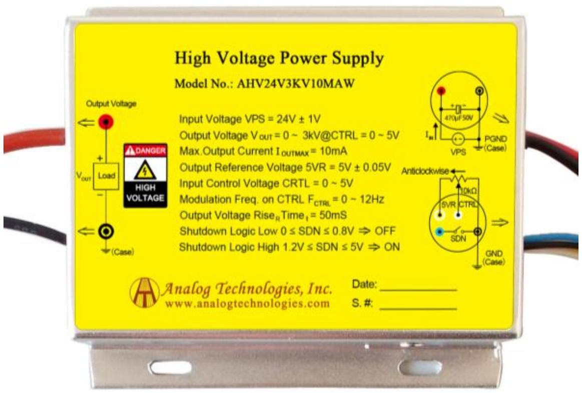


Figure 1. Physical Photo of AHV24V3KV10MAW

FEATURES

- Input Power Voltage: 24V ± 1V
- Input Current Range: 400mA to 1.8A
- Output Voltage: 0 to 3kV@CTRL = 0 to 5V
- Max. Output Current: 10mA
- Reference Voltage: 5V ± 0.05V
- Input Control Voltage: 0 to 5V
- Electronic Shutdown Control Available
- Zero EMIs and Good Heat Sinking by Metal Enclosure

APPLICATIONS

This power module, AHV24V3KV10MAW, is designed for achieving DC-DC conversion from low voltage to high voltage as a power supply source. It can be used for:

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

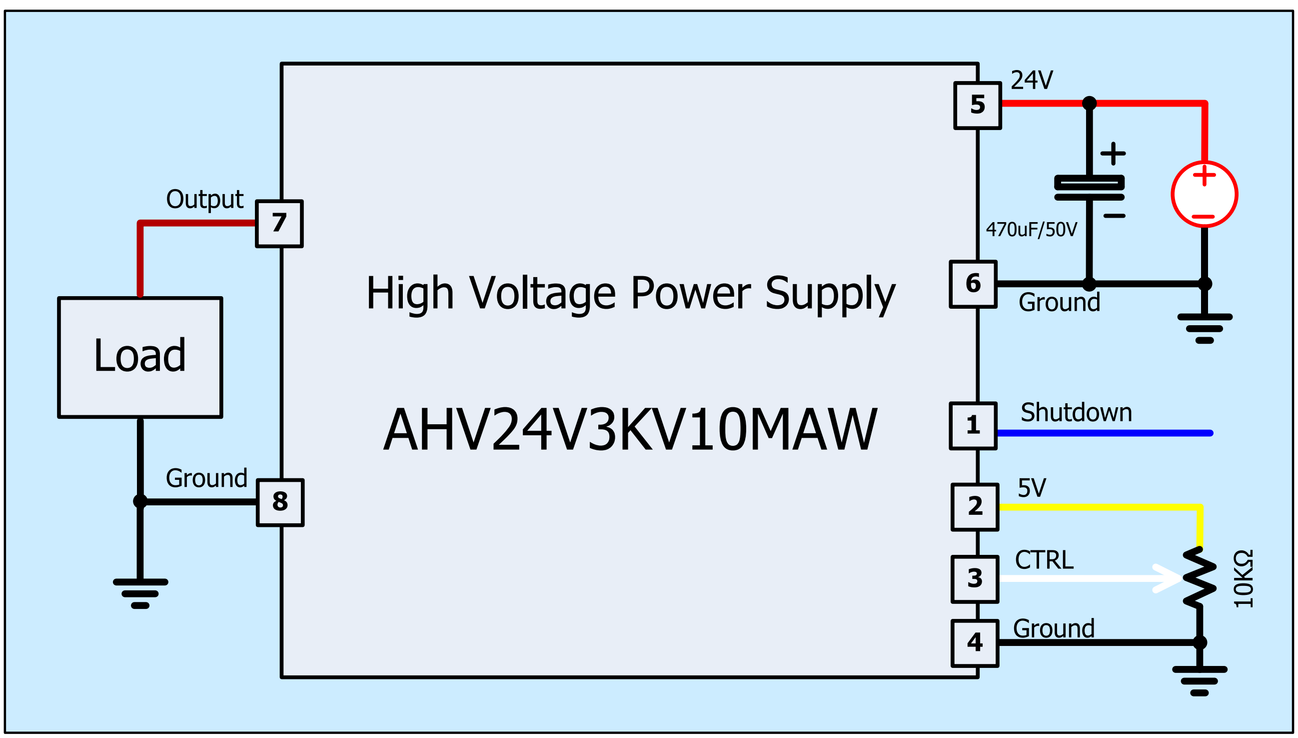


Figure 2. Setting Output to be a Constant Voltage

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

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

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 3.

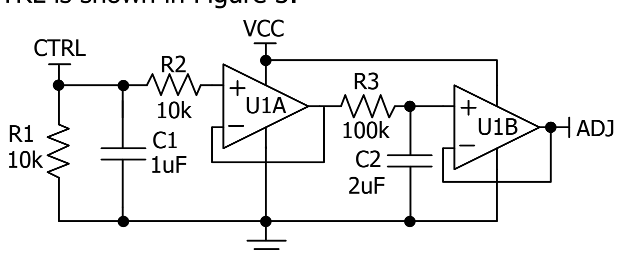


Figure 3. The Equivalent Circuit for CTRL Port

To shutdown AHV24V3KV10MAW, 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 4.

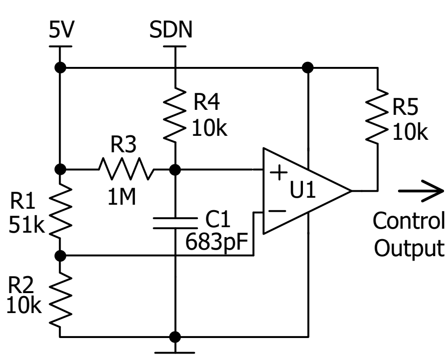


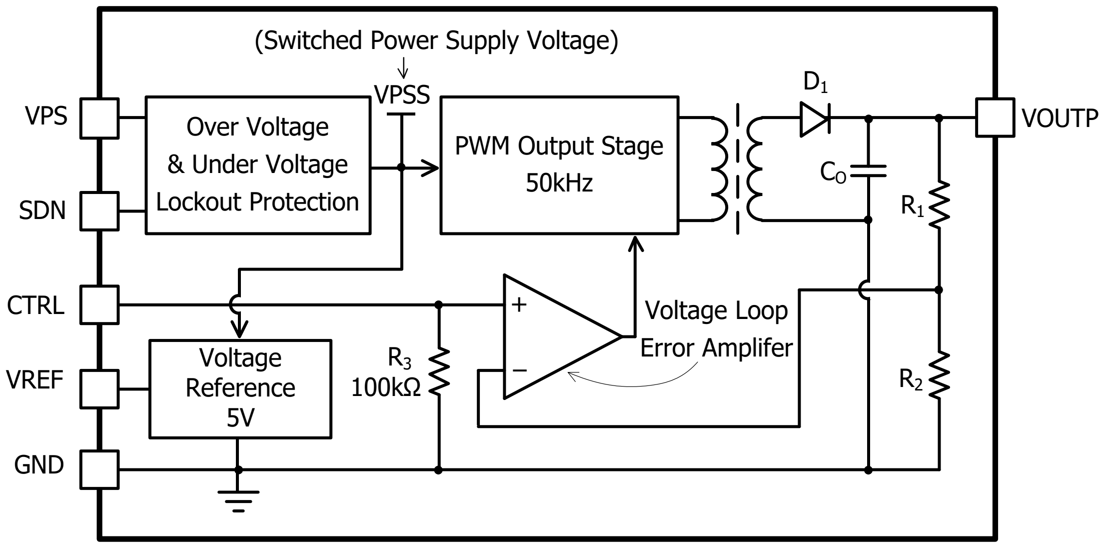
Figure 4. The Equivalent Circuit for SDN Port

USING AHV24V3KV10MAW

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 AHV24V3KV10MAW 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.

Figure 5. 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	400	450	500	mA
Input Power Supply Current at Full Load	I_{VPS_FL}	I_{VOUT} = 10.0mA	1.7	1.8	1.9	A
Input Power Supply Current at Shutdown	I_{VPS_SHDN}	T_A = −10°C ~ 55°C		16		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
Output Current Range	$I_{VOUTMAX}$	V_{VPS} = 23V ~ 25V	0		10.0	mA
Reference Output Voltage Range	V_{5VR}	T_A = −10°C ~ 55°C I_{5VR} ≤ 1mA	4.95	5	5.05	V
Reference Output Current Range	I_{5VR}	T_A = −10°C ~ 55°C V_{5VR} = 0 ~ 5V	0		1	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} = 300kΩ V_{VOUT} = 3kV		≤1.5		V_{P-P}
Output Voltage Temperature Coefficient	TCV_{VOUT}	V_{VPS} = 24V 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} = 24V 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
Output Voltage Drift: Short Term Drift	$\frac{\lvert\Delta V_{VOUT}/V_{VOUT}\rvert}{\Delta t\ (min)}$	V_{VPS} = 24V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = 3kV I_{VOUT} = 10mA 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	$V_{VOUT}(t_1)$ = 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 (3)	V_{VPS} = 24V 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				100×90×30		mm
				3.94×3.54×1.18		inch
Weight				210		g
				0.46		lbs
				7.4		Oz

TESTING DATA

Test conditions: V_{VPS} = 24V, 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 6.

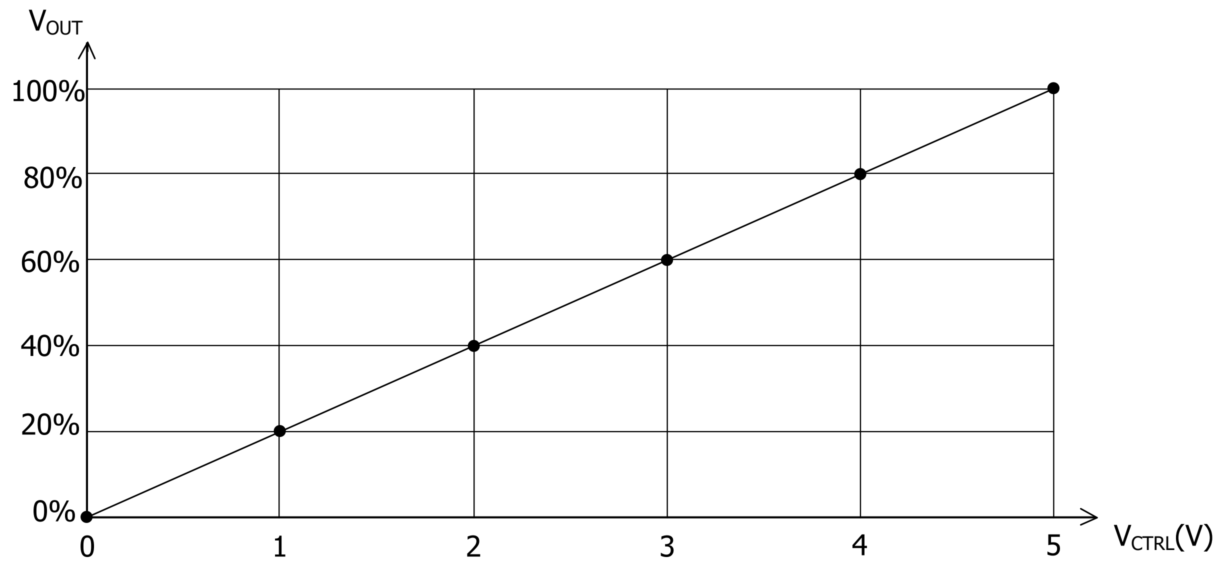


Figure 6. V_{CTRL} vs. V_{VOUT}

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.

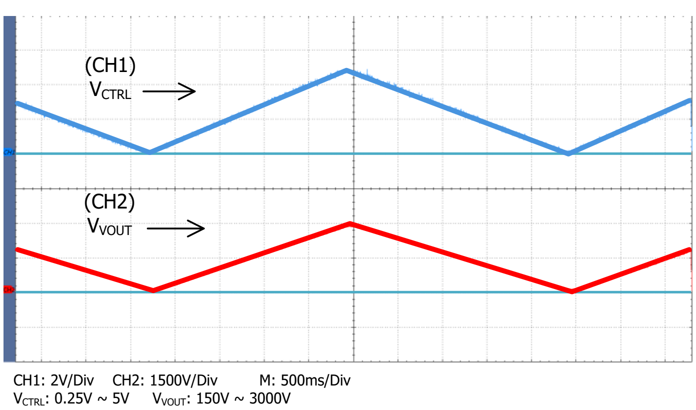


Figure 7. Triangle Wave Modulation

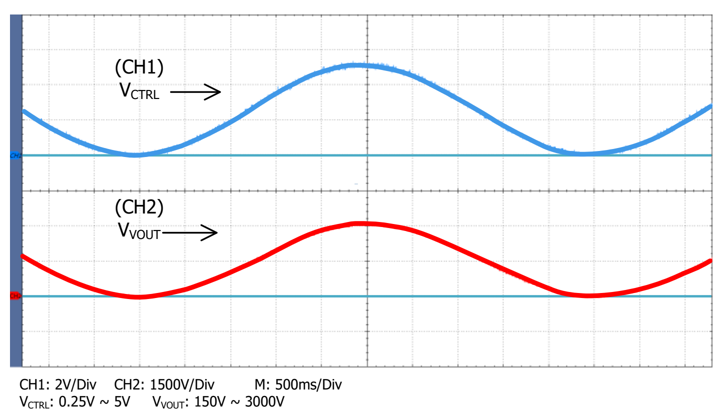


Figure 8. Sine Wave Modulation

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 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.

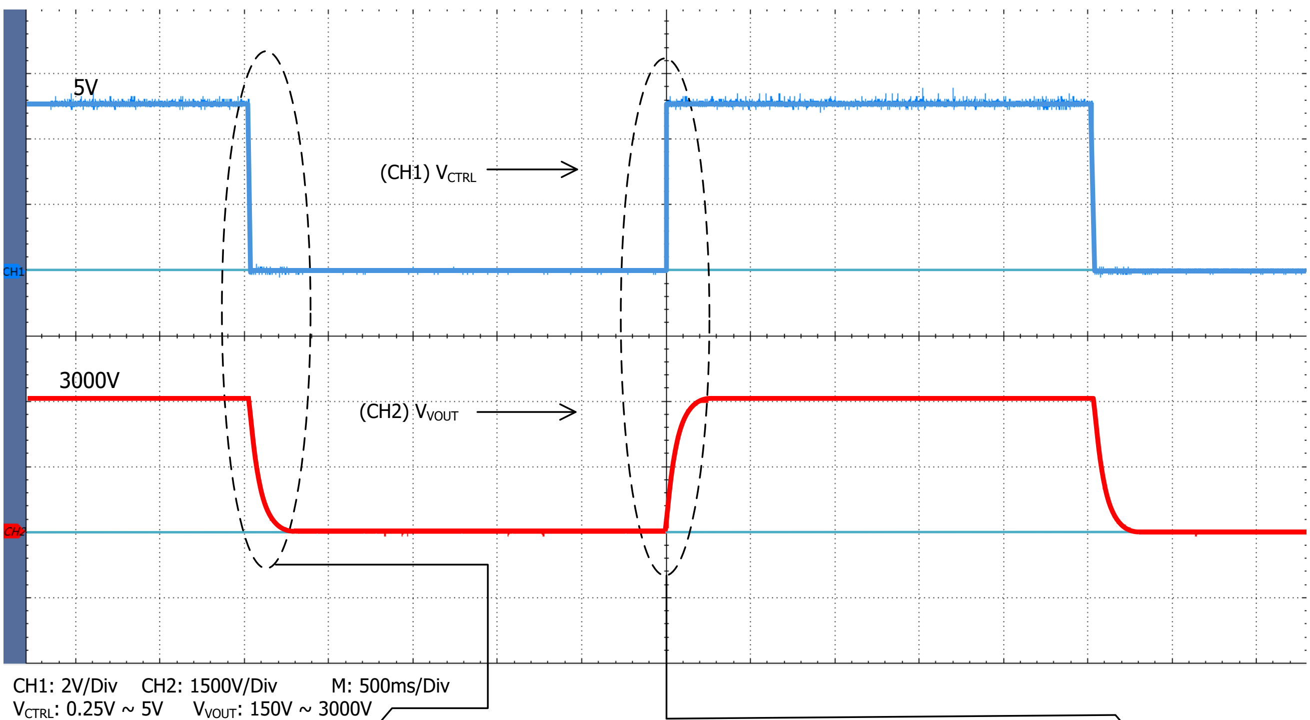


Figure 9. Input vs. Output Waveforms for Square Wave Control

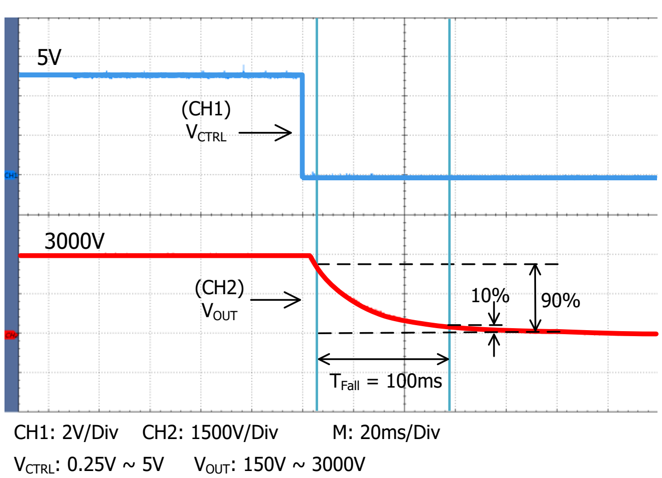


Figure 10. Falling Trail for Large Signal Response

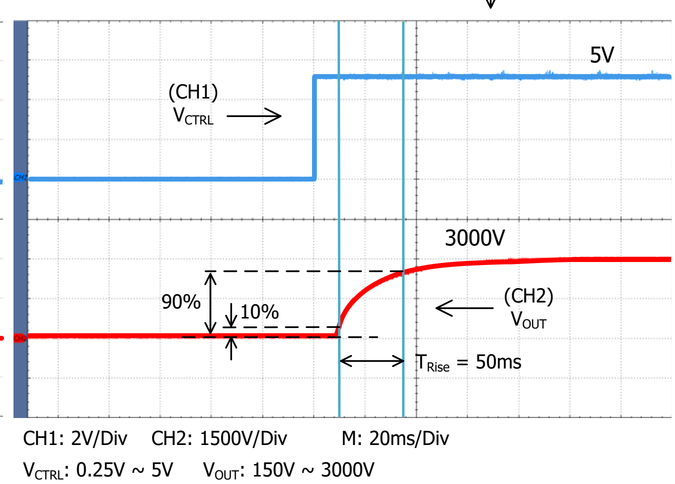
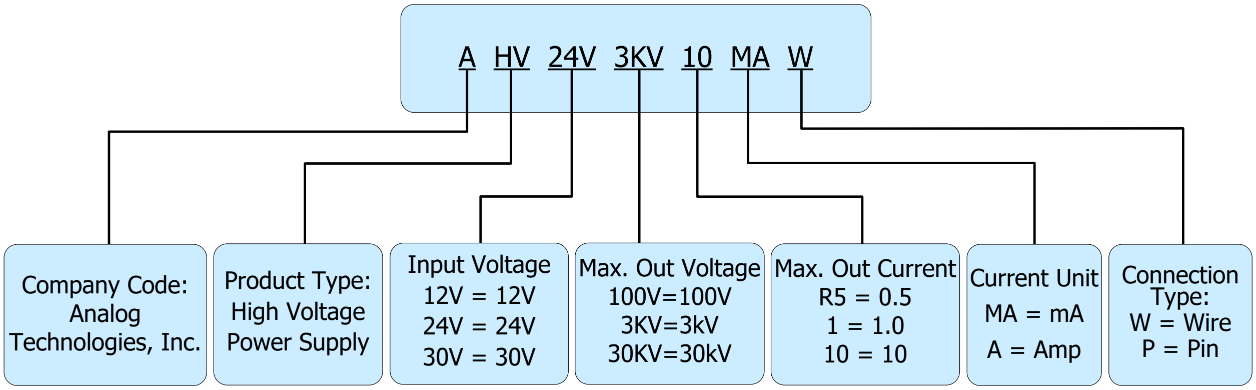


Figure 11. Rising Trail for Large Signal Response

NAMING PRINCIPLE



Naming Principle of AHV24V3KV10MAW

DIMENSIONS

Connecting Lead Wire Sizes and Lengths

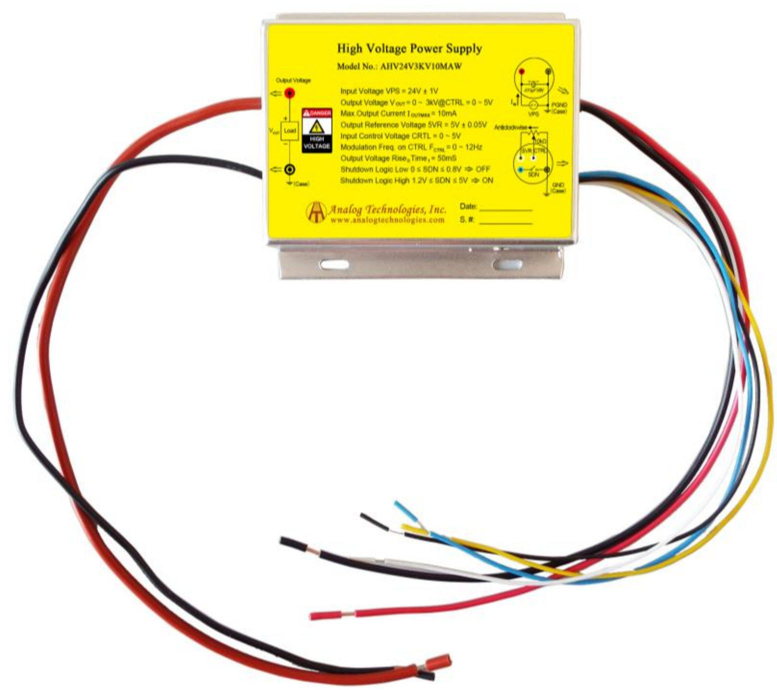


Figure 12. Connecting Lead Wires of AHV24V3KV10MAW

Lead Wires	Diameter		Length	
	mm	inch	mm	inch
Thick brown lead wire	4.5	0.177	260 ± 1	10.24 ± 0.039
Yellow, red, blue, black and white lead wires	1.5	0.059	230 ± 1	9.06 ± 0.039

Outline Dimensions

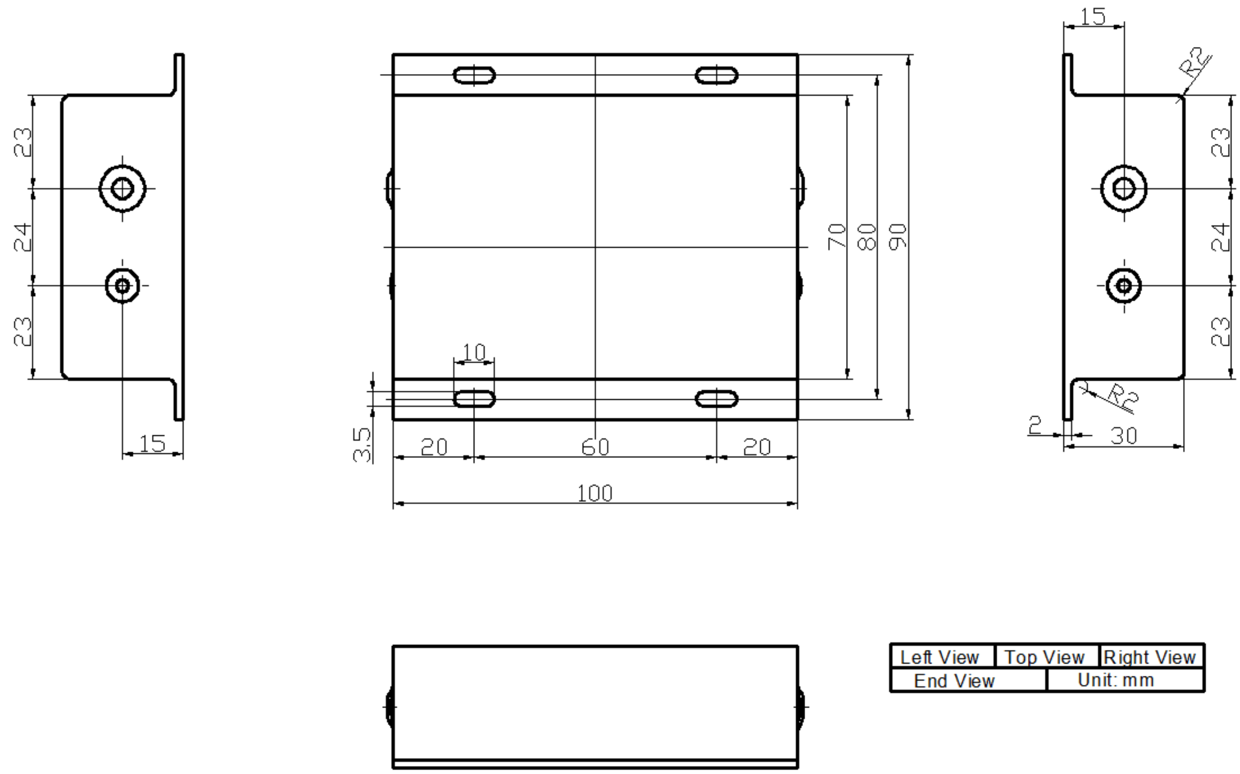


Figure 13. Outline Dimensions

ORDERING INFORMATION

Part Number	Buy Now
AHV24V3KV10MAW	* *

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