

Figure 1.1. Top View of AHV24VN40KV1MAW



Figure 1.2. Side View



Figure 1.3. Bottom View



Figure 1.4. Side View



Figure 1.5. Side View

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025

FEATURES

- Input Power Voltage: 24V ± 1V
- Input Current Range: 550mA to 2.4A
- Output Voltage: 0 to −40kV@CTRL = 0 to 5V
- Monitor Voltage: 0 to 4V
- Max. Output Current: 1mA
- Reference Voltage: 5V ± 0.05V
- Input Control Voltage: 0 to 5V
- Full Span Modulation on Output Voltage
- Electronic Shutdown Control

APPLICATIONS

This power module, AHV24VN40KV1MAW, is designed for achieving DC-DC conversion from low voltage to high voltage as a power supply source which is widely used in scientific research and other fields including:

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

DESCRIPTION

Figure 2 shows the connecting wires of AHV24VN40KV1MAW, 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 −40kV proportionally at the output VOUT port as shown in Figure 3.

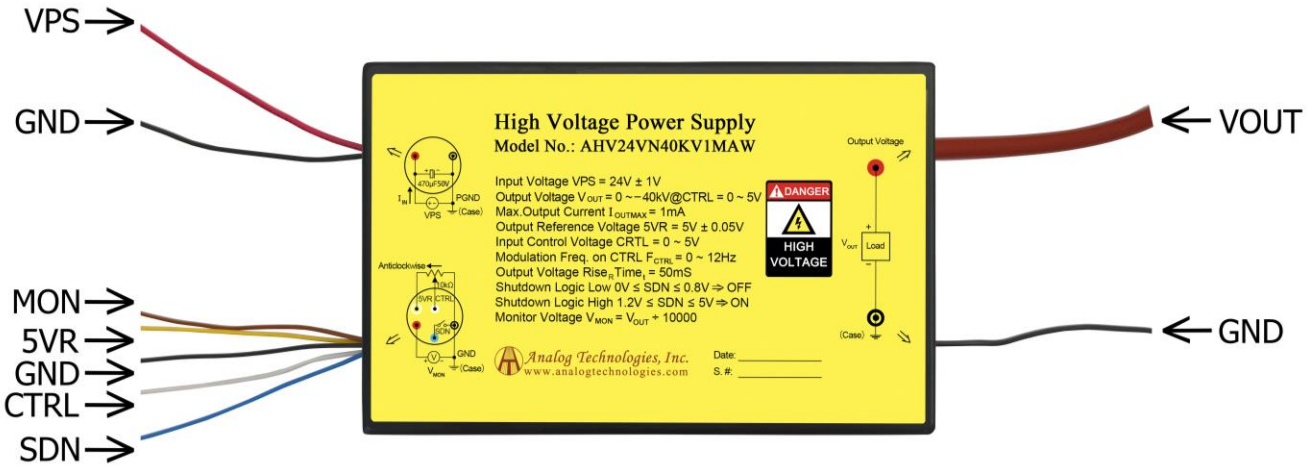


Figure 2. The Connecting Lead Wires of AHV24VN40KV1MAW

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

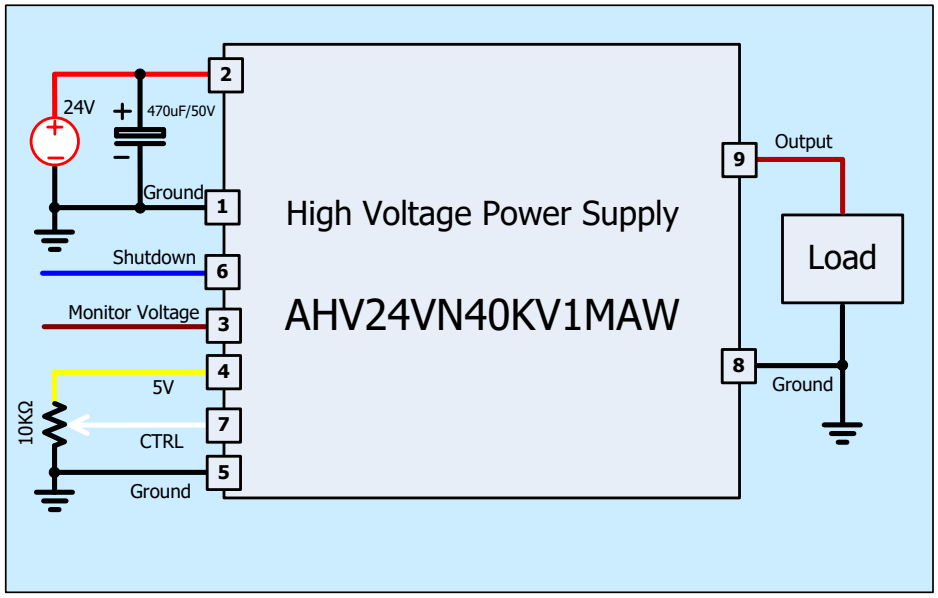


Figure 3. Setting Output to be a Constant Voltage

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		24V	
3	MON	Red	●	Analog output	Monitor Voltage	0V		4V
4	5VR	Yellow	●	Analog output	Reference voltage		5V	
5	GND	Black	●	Ground for analog, digital and power signals.	Control GND Monitor GND		0V	
6	SDN	Blue	●	Digital input	Shutdown logic low	0V		0.8V
					Shutdown logic high	1.2V		5V
7	CTRL	White	○	Analog input	Regulation	0V		5V
8	GND	Black	●	Power output	Output GND		0V	
9	VOUT	Brown	●	Power output	Output high voltage	0V		−40kV

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

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 MON port is shown in Figure 4.

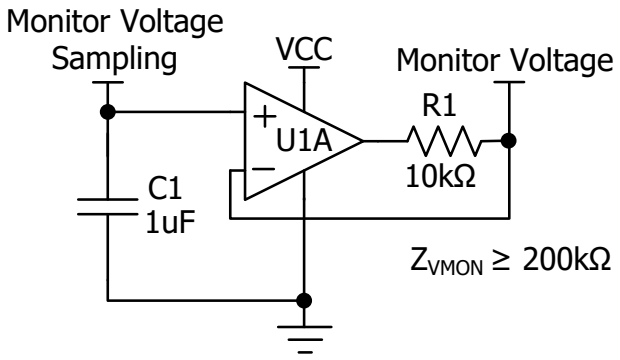


Figure 4. The Equivalent Circuit for MON Port

The equivalent input circuit for the CTRL is shown in Figure 5.

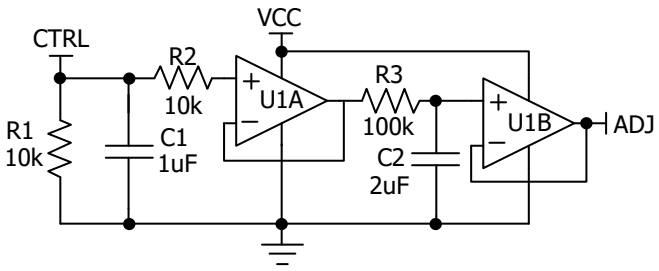


Figure 5. The Equivalent Circuit for CTRL Port

To shutdown AHV24VN40KV1MAW, 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.

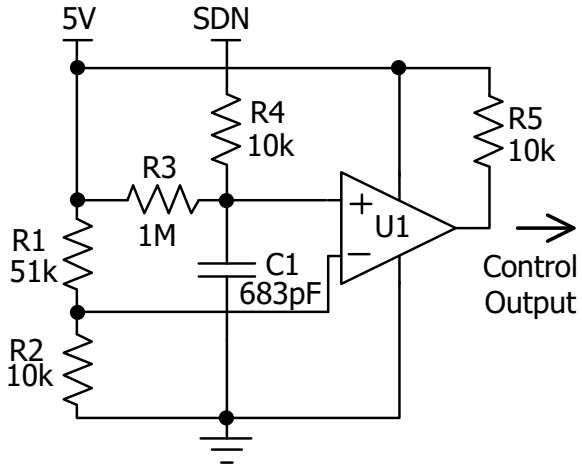


Figure 6. The Equivalent Circuit for SDN Port

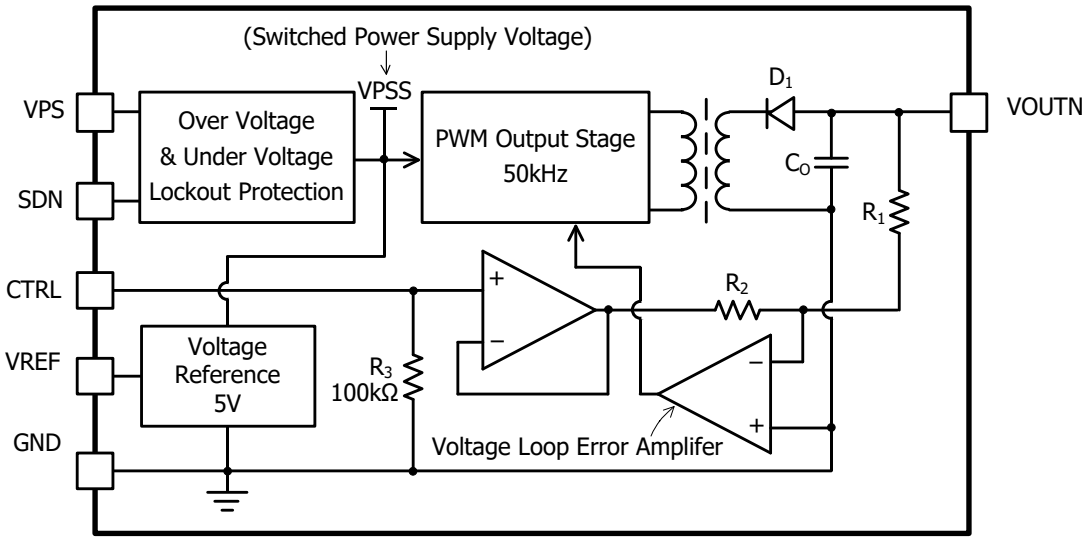
USING AHV24VN40KV1MAW

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 AHV24VN40KV1MAW 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.

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.



$VOUTN = -N \times V_{CTRL}$, 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	550	600	650	mA
Input Power Supply Current at Full Load	I_{VPS_FL}	I_{VOUT} = 1mA	2.3	2.4	2.5	A
Input Power Current at Shutdown	I_{VPS_SHDN}	T_A = −10°C ~ 55°C		15		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}	V_{SDNL} < 0.8V	−5		−4.2	μA
	I_{SDNH}	1.2V < V_{SDNL} < 5V	0		3.8	μA
Shutdown Voltage Logic Low	V_{SDNL}		0		0.8	V
Shutdown Voltage Logic High	V_{SDNH}		1.2		5	V
Output Voltage	V_{VOUT}	I_{VOUT} = 0 ~ 1mA	0		−40000	V
Output Current Range	$I_{VOUTMAX}$	V_{VPS} = 23V ~ 25V	0		1	mA
Reference Voltage Output Range	V_{5VR}	T_A = −10°C ~ 55°C $I_{5VR} \le$ 5mA	4.95	5	5.05	V
Reference Current Output Range	I_{5VR}	T_A = −10°C ~ 55°C V_{5VR} = 0 ~ 5V	0		1	mA

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit/Note
Monitor Voltage Out Impedance		Z_{VMON}			1		MΩ
Monitor Voltage		V_{MON}	V_{OUT} = 0 ~ −40kV	0		1.5	V
Output Load Resistance Range				$\frac{V_{VOUT}}{I_{VOUT}}$		∞	MΩ
Output Voltage Ripple		V_{VOUT_RP}	Bandwidth = 1MHz R_{LOAD} = 40MΩ	≤20			V_{P-P}
Output Voltage Temperature Coefficient		TCV_{VOUT}	V_{VPS} = 24V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = −40kV I_{VOUT} = 1mA T_A = −10°C ~ 55°C		≤0.1		%/°C
Output Voltage Range v.s. Temperature		$V_{VOUT}(T)$	V_{VPS} = 24V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = −40kV I_{VOUT} = 1mA T_A = −10°C ~ 55°C	0.99V_{VOUT}	V_{VOUT}	1.01V_{VOUT}	V
Output Voltage Drift	Short Term Drift	$\frlvert\Delta V_{VOUT}/V_{VOUT}\frrvert$ / Δt (min)	V_{VPS} = 24V V_{CTRL} = V_{5VR} = 5V V_{VOUT} = −40kV I_{VOUT} = 1mA T_A = −10°C ~ 55°C		≤0.3		%/min
	Long Term Drift	$\frlvert\Delta V_{VOUT}/V_{VOUT}\frrvert$ / Δt (h)			≤0.5		%/h
Output Voltage Rise Time		t_r	V_{VOUT} (t_1) = −4kV V_{VOUT} (t_2) = −36kV No-Load		30		ms
Output Voltage Fall Time		t_f	V_{VOUT} (t_2) = −36kV V_{VOUT} (t_3) = −4kV No-Load		100		ms
Mean Time Between Failure		MTBF			1M		h
Instantaneous Short Circuit Current at the Output		I_{VOUT_SC}			≤100		mA
Load Regulation		$\frlvert\Delta V_{VOUT}/V_{VOUT}\frrvert$ / ΔI_{VOUT}	V_{VOUT} = −40kV I_{VOUT} = 1mA		≤0.05		%/mA
Full Load Efficiency		η (3)	V_{VPS} = 24V V_{VOUT} = −40kV I_{VOUT} = 1mA		≥70		%
Operating Temperature Range		T_{opr}		−10		55	°C
Storage Temperature Range		T_{stg}		−20		85	°C
External Dimensions				170×100×55			mm
				5.51×6.69×2.17			inch
Weight					1200		g
					2.65		lbs
					42.33		Oz

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

TESTING DATA

Test conditions: V_{VPS} = 24V, T_A = 25°C, R_{LOAD} = 40MΩ

DC Testing

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

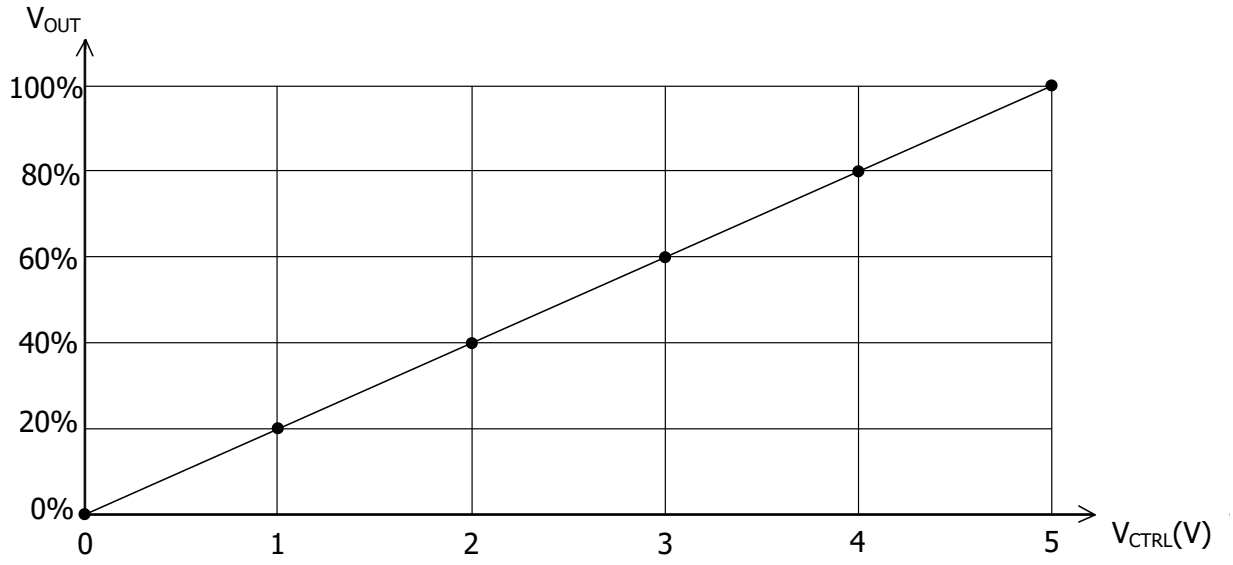


Figure 7. V_{CTRL} vs. V_{VOUT}

AC Testing

To test the analog modulation function, a triangle and sine-wave voltage signals of 0.25V ~ 5V, f = 0.10Hz, are applied to the CTRL port as the input source signal respectively. Figure 8 and 9 show both the input signal and the output signal waveforms when using the triangle and sine-wave signals at the CTRL port respectively.

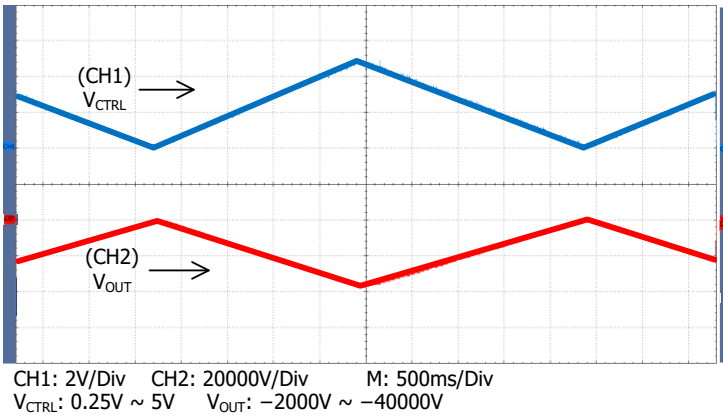


Figure 8. Triangle Wave Modulation

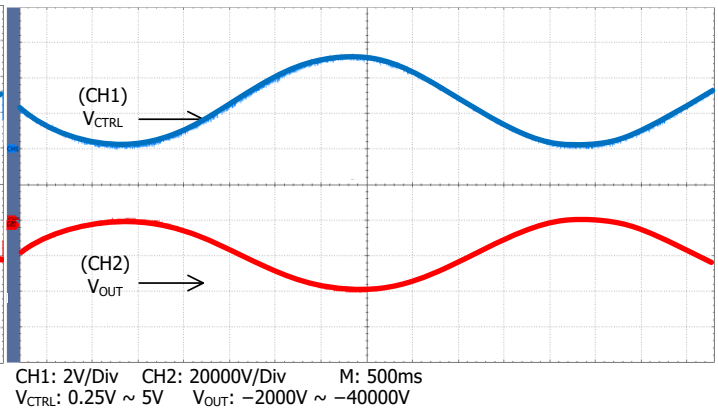


Figure 9. Sine Wave Modulation

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

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 10, Figure 11, and Figure 12. As shown in Figure 11 and Figure 12, 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.

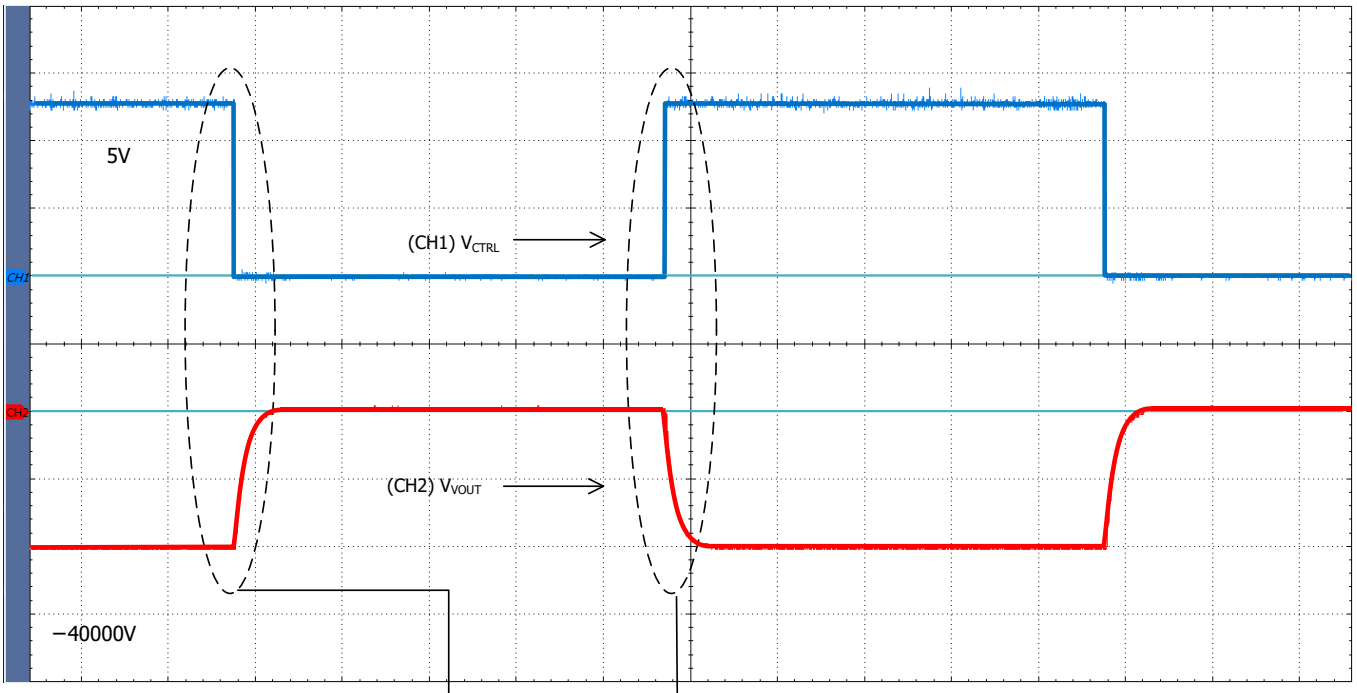


Figure 10. Input vs. Output Waveforms for Square Wave Control

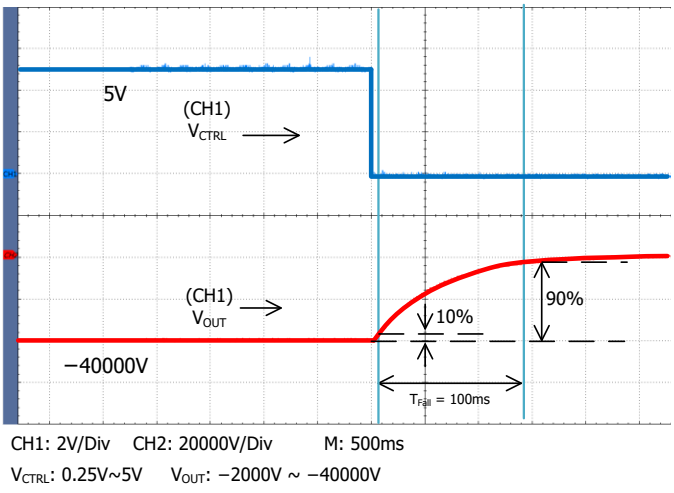


Figure 11. Falling Trail for Large Signal Response

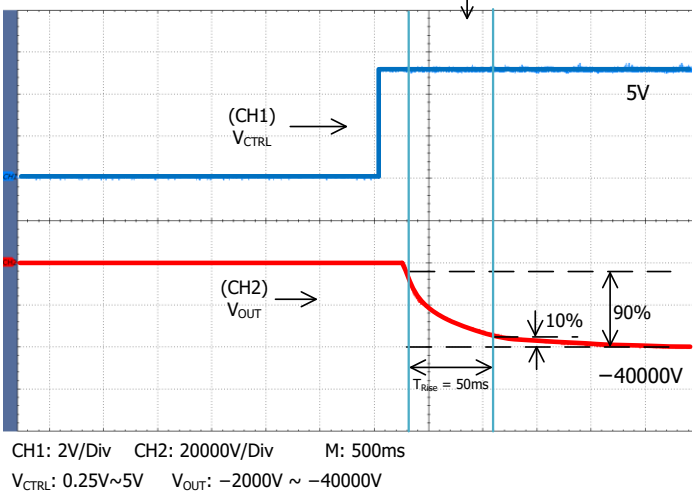
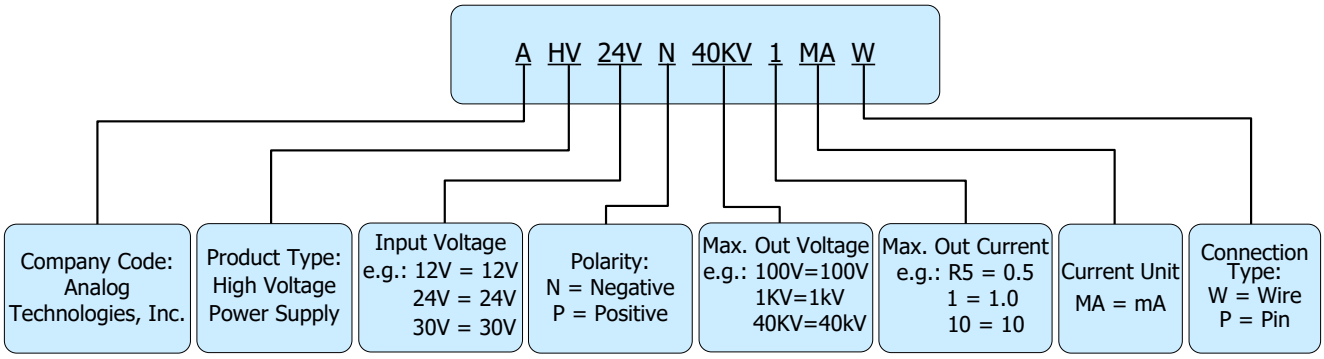


Figure 12. Rising Trail for Large Signal Response

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

NAMING PRINCIPLE



Naming Principle of AHV24VN40KV1MAW

DIMENSIONS

Connecting Lead Wire Sizes and Lengths



Figure 13. Connecting Lead Wires of AHV24VN40KV1MAW

Lead Wires	Diameter		Length	
	mm	inch	mm	inch
Thick brown lead wire	6.0	0.23	3000 ± 1	118.11 ± 0.039
Black lead wire	2.3	0.09	1000 ± 1	39.37 ± 0.039
Yellow, red, blue, black and white lead wires	1.5	0.06	500 ± 1	19.68 ± 0.039

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

Outline Dimensions

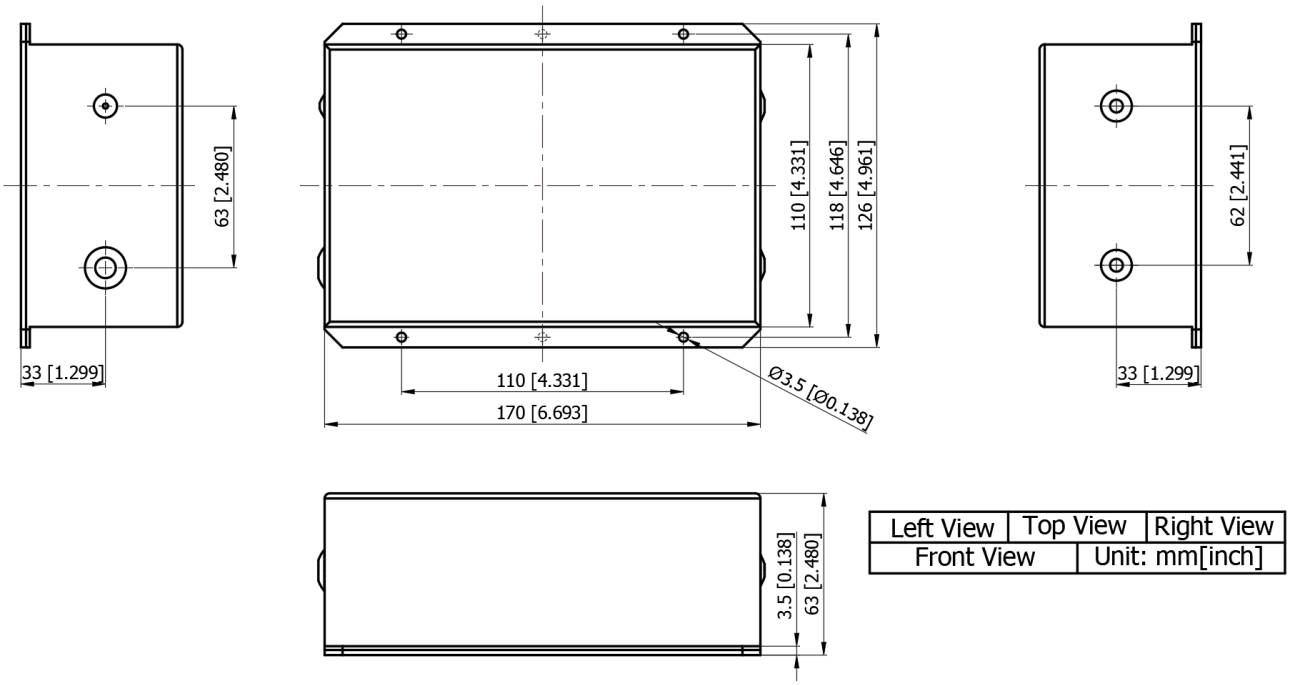


Figure 14. Outline Dimensions

ORDERING INFORMATION

Part Number	Buy Now
AHV24VN40KV1MAW	* *

*: both and are our online store icons. Our products can be ordered from either one of them with the same pricing and delivery time.

NOTICE

1. It is important to carefully read and follow the warnings, cautions, and product-specific notes provided with electronic components. These instructions are designed to ensure the safe and proper use of the component and to prevent damage to the component or surrounding equipment. Failure to follow these instructions could result in malfunction or failure of the component, damage to surrounding equipment, or even injury or harm to individuals. Always take the necessary precautions and seek professional assistance if unsure about proper use or handling of electronic components.
2. Please note that the products and specifications described in this publication are subject to change without prior notice as we continuously improve our products. Therefore, we recommend checking the product descriptions and specifications before placing an order to ensure that they are still applicable. We also reserve

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.

the right to discontinue the production and delivery of certain products, which means that not all products named in this publication may always be available.

3. This means that while ATI may provide information about the typical requirements and applications of their products, they cannot guarantee that their products will be suitable for all customer applications. It is the responsibility of the customer to evaluate whether an ATI product with the specified properties is appropriate for their particular application.
4. ATI warrants its products to perform according to specifications for one year from the date of sale, except when damaged due to excessive abuse. If a product fails to meet specifications within one year of the sale, it can be exchanged free of charge.
5. ATI reserves the right to make changes or discontinue products or services without notice. Customers are advised to obtain the latest information before placing orders.
6. All products are sold subject to terms and conditions of sale, including those pertaining to warranty, patent infringement, and limitation of liability. Customers are responsible for their applications using ATI products, and ATI assumes no liability for applications assistance or customer product design.
7. ATI does not grant any license, either express or implied, under any patent right, copyright, mask work right, or other intellectual property right of ATI.
8. ATI's publication of information regarding third-party products or services does not constitute approval, warranty, or endorsement.
9. ATI retains ownership of all rights for special technologies, techniques, and designs for its products and projects, as well as any modifications, improvements, and inventions made by ATI.
10. Despite operating the electronic modules as specified, malfunctions or failures may occur before the end of their usual service life due to the current state of technology. Therefore, it is crucial for customer applications that require a high level of operational safety, especially in accident prevention or life-saving systems where the malfunction or failure of electronic modules could pose a risk to human life or health, to ensure that suitable measures are taken. The customer should design their application or implement protective circuitry or redundancy to prevent injury or damage to third parties in the event of an electronic module malfunction or failure.

©Copyrights 2000-2025, Analog Technologies, Inc. All Rights Reserved. Updated on 11/12/2025 1161 Ringwood Ct, #110, San Jose, CA 95131, U. S. A.