

Figure 1.1. The Physical Photo of AHVAN2KV20MA



Figure 1.2. The 3D View of AHVAN2KV20MA

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MAIN FEATURES

- Built-in High Voltage Converter
- Compact Size: 191.5(L)×147.0(W)×41.2(H) mm
- High Current Capability: Up to 20mA
- High Slew Rate: 150V/μs
- Wide Output Voltage Range: V_{OUT}=−10V～−2kV @V_{IN}=24V
- Offset Voltage Range: 10V
- Bandwidth: Up to 10kHz

APPLICATIONS

High voltage amplifications for driving piezos and other high voltage loads.

DESCRIPTION

The AHVAN2KV20MA is an electronic module for amplifying an analog input voltage into a high voltage output. Figure 1 shows its physical photo. It comes with a high voltage DC-DC converter, which converts the 24V input voltage into a −10V to −2kV output voltage. The analog output voltage can swing almost from −10V to −2kV when it is powered by a 24V power supply. There is three LEDs indicating if the amplifier works properly.

CAUTION

First, set up the AC power supply and fix it stably and firmly. Then make sure that the two switches of the high voltage amplifier are OFF. Connect the 24V DC power supply to the VPS and PGND of the high voltage amplifier. After the connection is complete, turn on the low voltage switch and set the input AC voltage or DC voltage. Then use the output monitor to check whether the input set voltage is correct. Finally turn on the high voltage switch.

Table 1. Descriptions of Terminal Block Pin Functions

Pin #	Name	Type	Description
1	VPS	Power Input	Power supply 24V.
2	PGND	Power Ground	Power ground pin.
3	SBDN	Digital Input	This is a duplex pin. It sets the amplifier into Off, Standby or On mode.
4	AGND	Signal Ground	Signal ground pin. Connect ADC and DAC grounds to here.
5	10VR	Analog Output	10V voltage reference.
6	IHVMON	Analog Input	-
7	HVMON	Analog Output	Output voltage indication. When going from 0.05V to 10V, it indicates the output voltage is from −10V to −2kV.
8	OFFSO	Analog Output	Output voltage setting. When going from 0.05V to 10V, it indicates the output voltage is from −10V to −2kV. The pin is controlled by a potentiometer.
9	GND	Signal Ground	Signal ground pin. Connect ADC and DAC grounds to here.
BNC 1	Input	Analog Input	Output voltage setting. When going from 0.05V to 10V, it indicates the output voltage is from −10V to −2kV.
BNC 2	Input+Offset Monitor	Analog Output	Input+Offset input control signal indication.
BNC 3	HVOUT	Analog Output	Output voltage for driving the load.
	OGND	Output Ground	Connect this pin to the load return terminal.

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SPECIFICATIONS

Table 2. Characteristics (Test ambient temperature T_A = 25°C)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Power Supply Input VPS (Pin 1)						
Input Range	V_{VPS}		23	24	25	V
Input Current	I_{IN}		0		4	A
High Voltage Output VOUT (BNC3)						
Output Voltage Range	V_{OUT}		−10		−2000	V
Output Current Range	I_{OUT}		−20		0	mA
Maximum Slew Rate				150		V/µs
Small Signal Bandwidth				20		kHz
Control Input SBDN (Pin 3)						
Off State	$V_{SBDN-OFF}$		0		0.4	V
	$V_{SBDN-OFF-HI}$ Going up from Off to Standby threshold				2.1	V
	$V_{SBDN-OFF-LOW}$ Going down from Standby to Off threshold		0.4			V
SBDN State	$V_{SBDN-STANDBY}$		2.1		2.51	V
	$V_{SBDN-SB-HI}$ Going up from Standby to On threshold				2.64	V
	$V_{SBDN-SB-LOW}$ Going down from On to Standby threshold		2.51			V
On State	$V_{SBDN-ON}$		2.64		V_{VPS}	V
SBDN Current	I_{SBDN}	See input equivalent circuit in Figure 4. An internal 10MΩ resistor pulls up to VPS pin.	−24	−10	0	µA
Voltage Reference10VR (Pin 5)						
Output Voltage	V_{10VR}		9.995	10	10.005	V
Output Current Range	I_{10VR}		−20		0	mA

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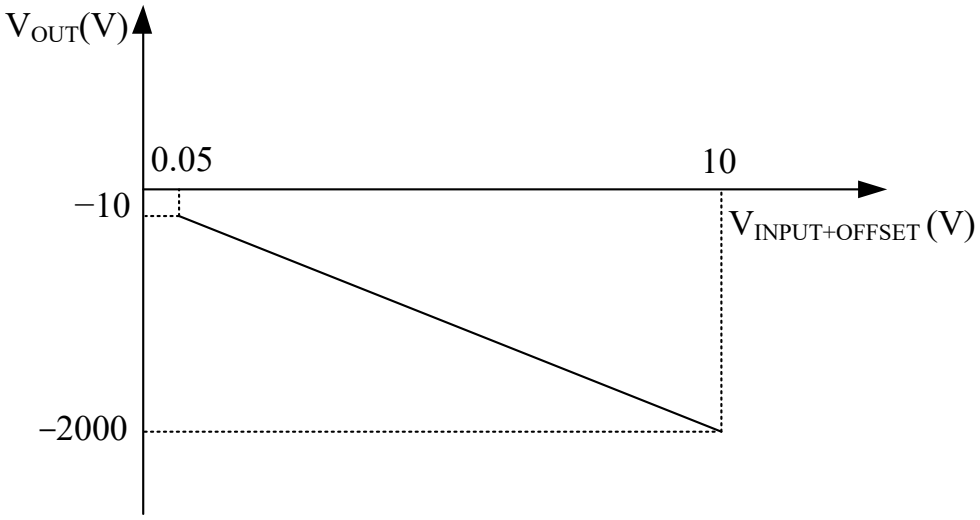


Figure 2. $V_{INPUT+OFFSET}$ vs. V_{OUT}

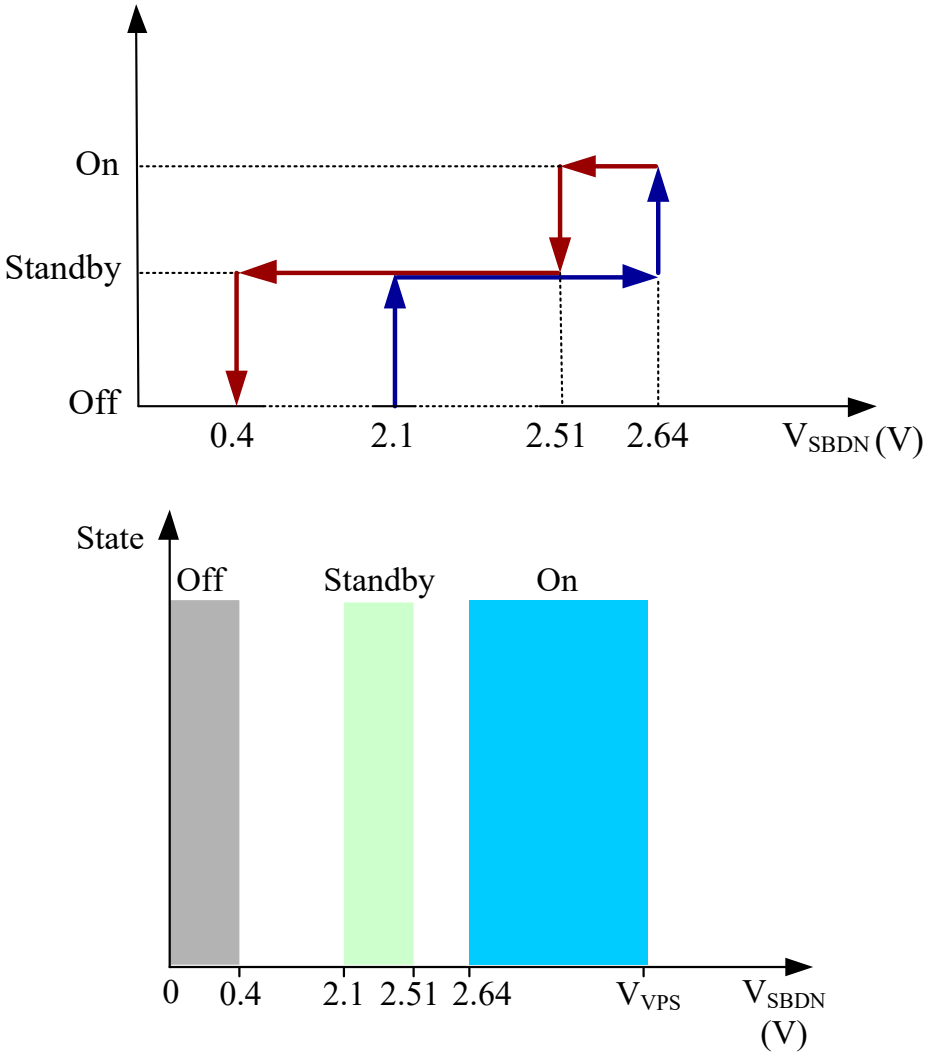


Figure 3. V_{SBDN} vs. Amplifier States

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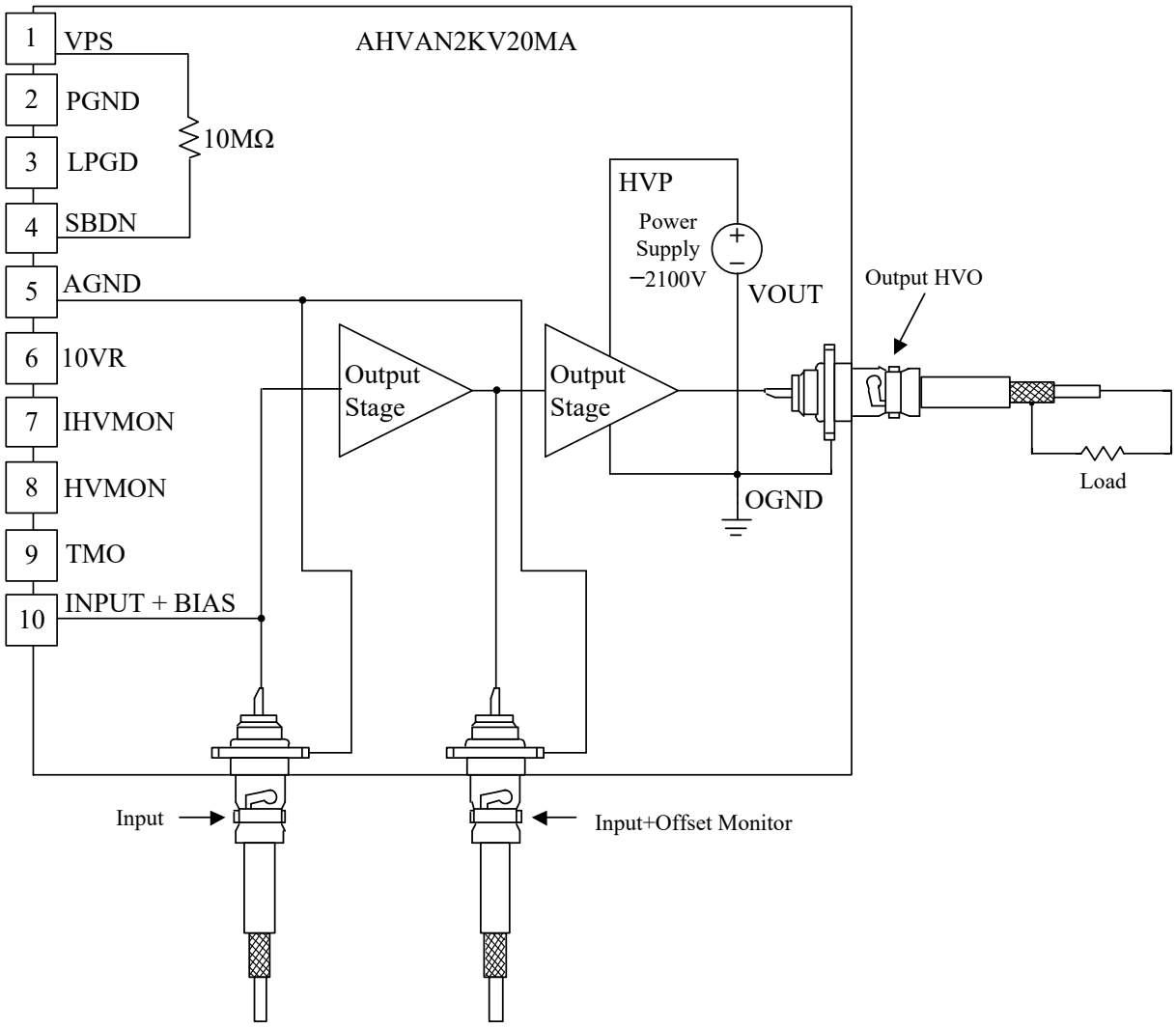


Figure 4. Schematic for Driving the Load

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As shown in Figure 5 and Figure 6, when a square wave of 0.05V ~ 10V, f=100Hz, is applied to AC input pin, measure the waveform of HVO. The rise time should be about 10μs, and the fall time should be about 11μs.

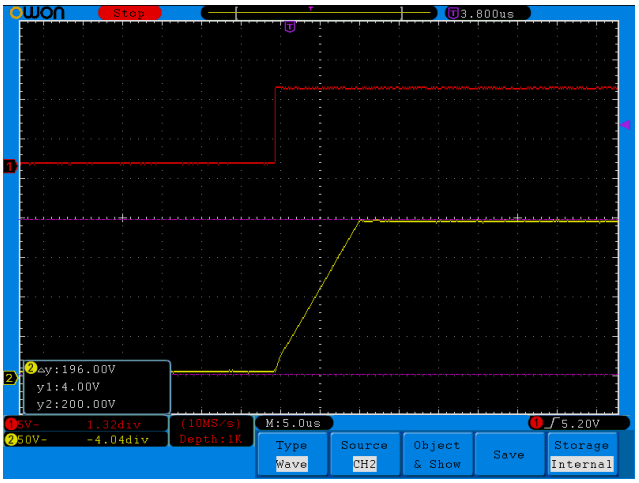


Figure 5. Rise Time

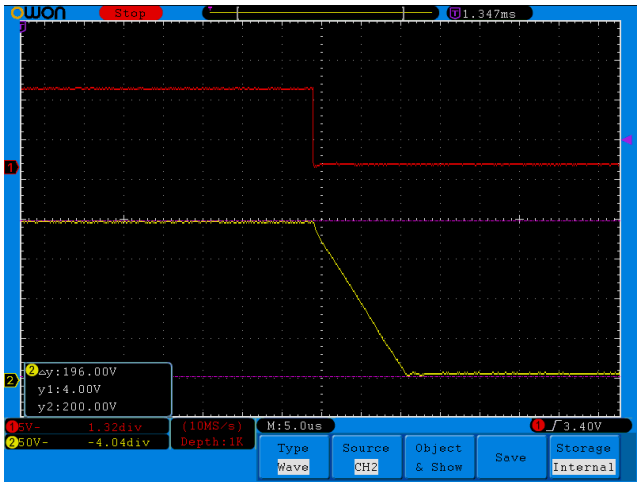


Figure 6. Fall Time

As shown in Figure 7 ~ Figure 10, when a sine wave of 0.05V ~ 10V, f = 100Hz/10kHz/20kHz/35kHz, is applied to AC input pin, measure the waveform of HVO. Gain = 200.

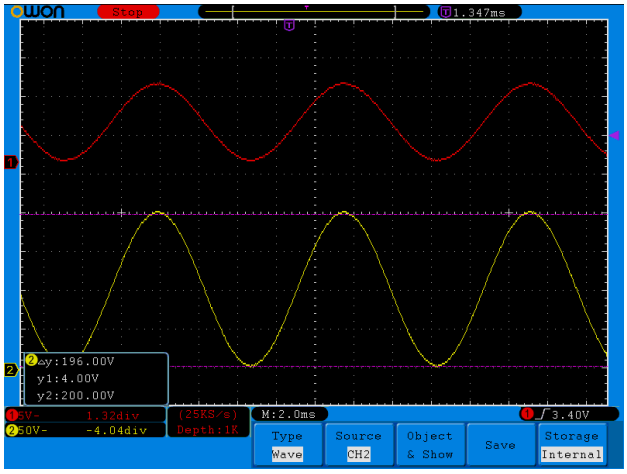


Figure 7. f=100Hz

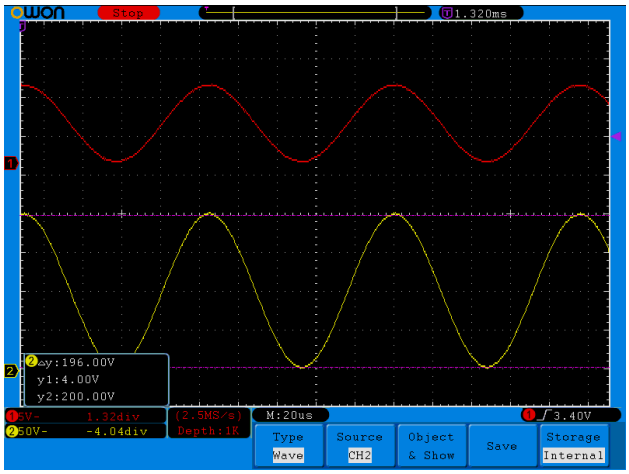


Figure 8. f=10kHz

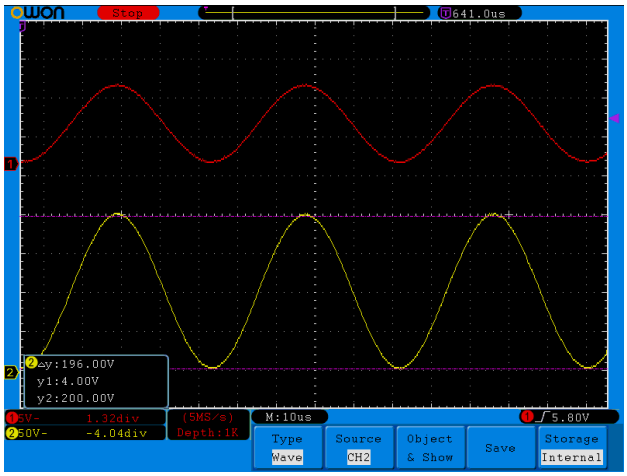


Figure 9. f=20kHz

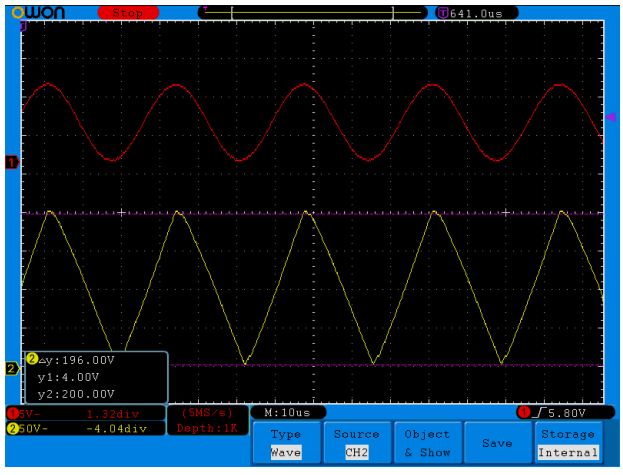


Figure 10. f=35kHz

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As shown in Figure 11, when a sine wave of 0.05V ~ 10V, f=50kHz, is applied to AC input pin, measure the waveform of HVO. Gain=140.

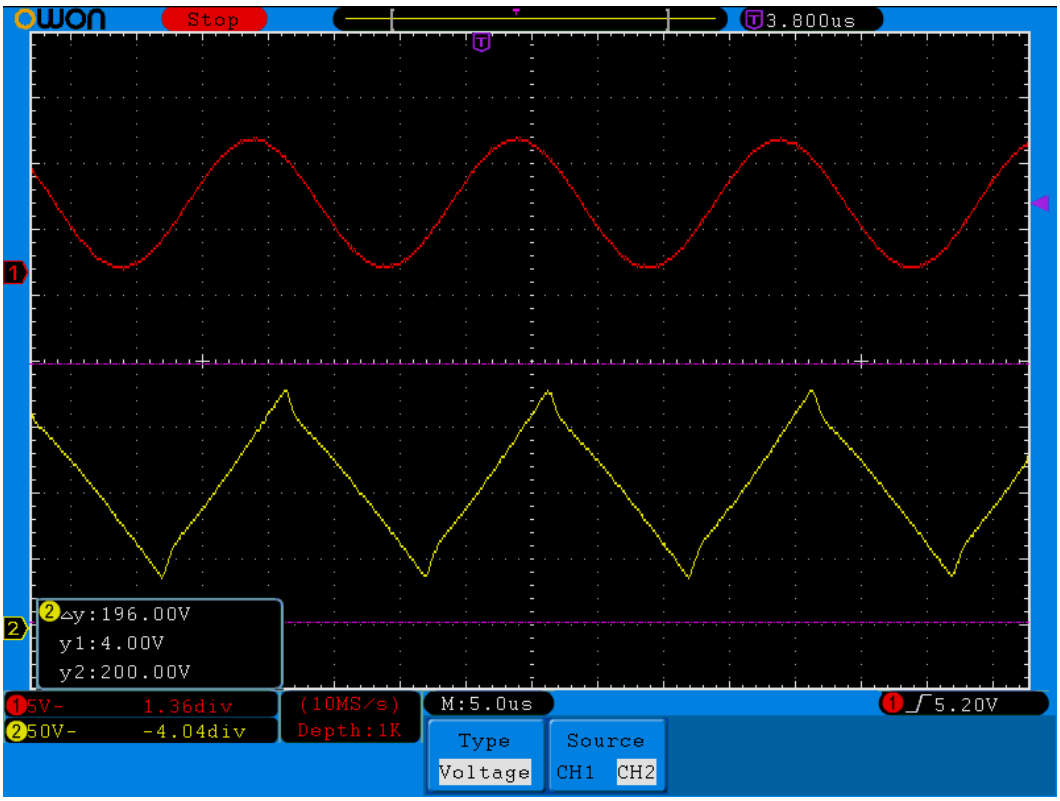


Figure 11. f=50kHz

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DIMENSIONS

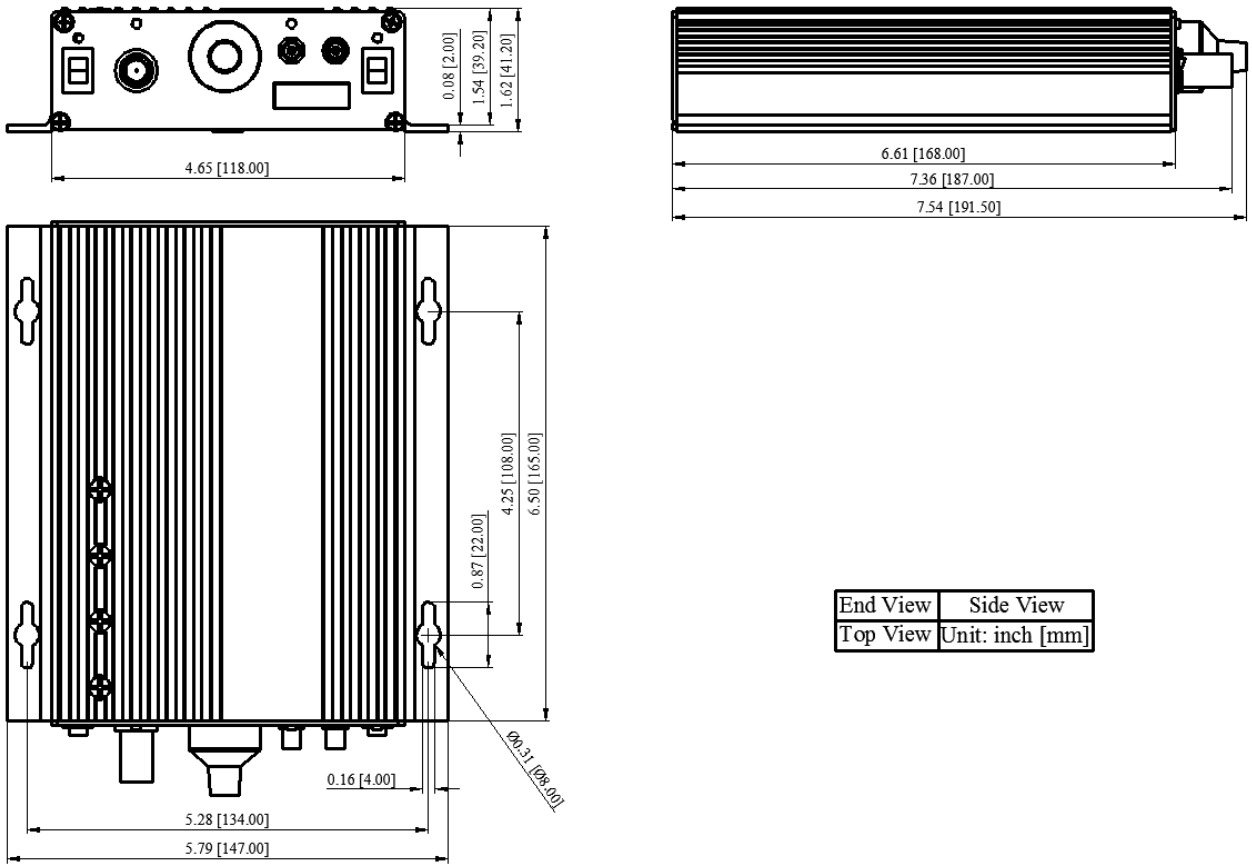


Figure 12. Dimensions of AHVAN2KV20MA

ORDERING INFORMATION

Table 3. Part Number

Part Number	Description
AHVAN2KV20MA	−2kV high voltage amplifier, with 20mA output current and 20kHz bandwidth

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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.
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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.

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