



## DESCRIPTION

The AD8836 provides an integrated motor driver solution for consumer products, toys, and other low-voltage or battery-powered motion control applications. This device can drive a DC brushed motor. It consists of an internal charge pump to generate the required gate drive voltage circuit and 4 power NMOS to perform an H-bridge drive. It integrates the four motor functions forward /reverse /stop /brake.

AD8836 supports a maximum operating voltage of 15.0V, with a continuous current of 1.2A and a peak current of 2.0A.

The AD8836 has integrated protection functions such as over-temperature protection and under-voltage lockout.

AD8836 supports PWM (INA/INB) input and is compatible with industry-standard devices.

The AD8836 is available in SOP8 packages.

## ORDERING INFORMATION

Package Type	Part Number	
SOP8 SPQ: 4,000pcs/Reel	M8	AD8836M8R
		AD8836M8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

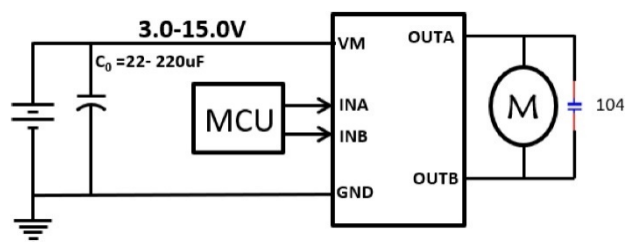
## FEATURES

- Operating voltage range: 3.0 -15.0V
- Continuous Current: 1.2A, Peak: 2.0A
- Low on-resistance: 450mΩ (HS+LS).
- Low standby current
- Low quiescent operating current
- Integrated Over-Current Protection
- Integrated Over-Temperature Protection
- Integrated under-voltage protection
- SOP8 Package

## APPLICATION

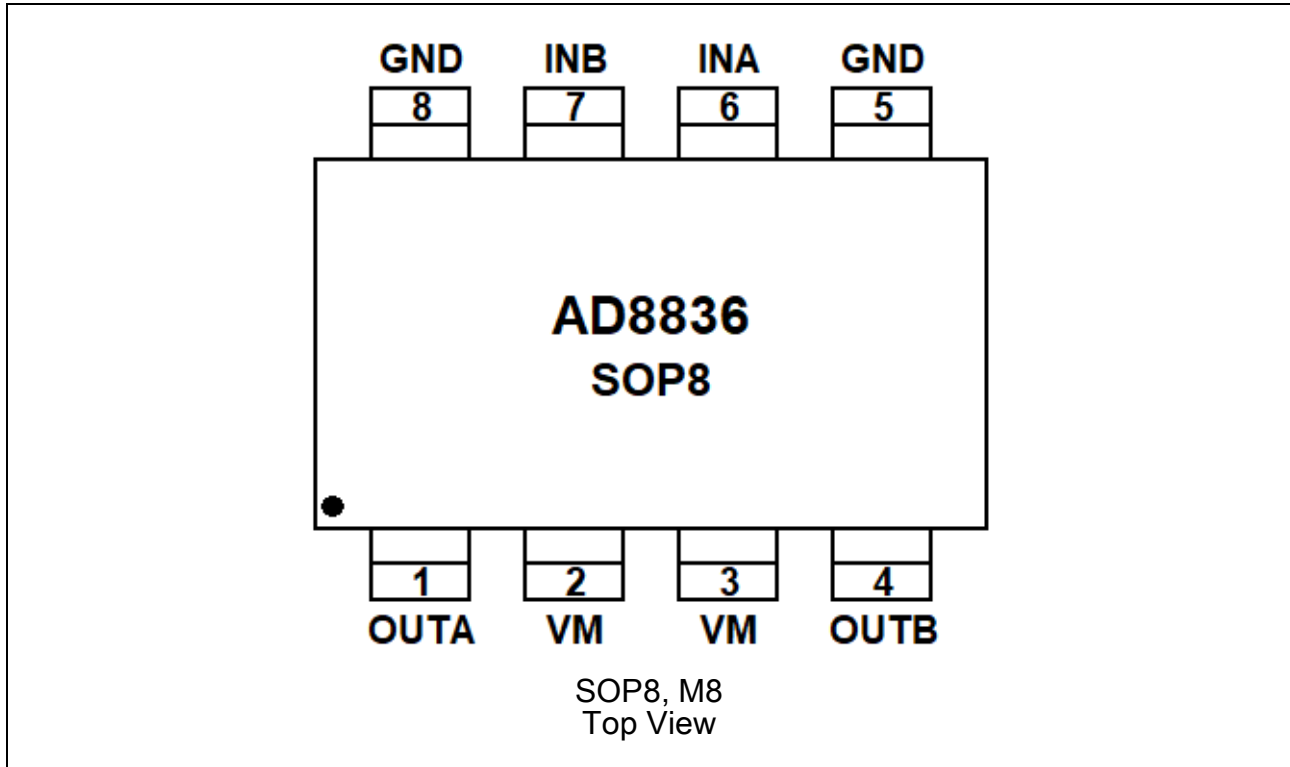
- DC motor drive
- Pulse solenoid valve driver
- Stepper motor drive
- switching power tube

## TYPICAL APPLICATION





**PIN DESCRIPTION**



SOT-25	Symbol	Function
1	OUTA	Output OUTA
2	VM	Power input pin, connect a 10uF or greater capacitor between the VM and ground
3	VM	Power input pin, connect a 10uF or greater capacitor between the VM and ground
4	OUTB	Output OUTB
5	GND	Ground
6	INA	Logic input INA
7	INB	Logic input INB
8	GND	Ground



## ABSOLUTE MAXIMUM RATINGS

VM, Supply voltage	-0.3~+18V
INA, INB, Input voltage	-0.3~+7V
VM, INA,INB,OUTA,OUTB, ESD Protection (Mannequin)	3kV
T <sub>stg</sub> , Storage Temperature	-40~+150°C
T <sub>j</sub> , Operating temperature	-65~+150°C
θ <sub>JA</sub> , Thermal resistance	100°C/W

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## RECOMMENDED WORKING RANGE

VM, Supply voltage	3~15V
INA, INB, Input voltage	7V
I <sub>OUTA</sub> , I <sub>OUTB</sub> , Output current	1.2A

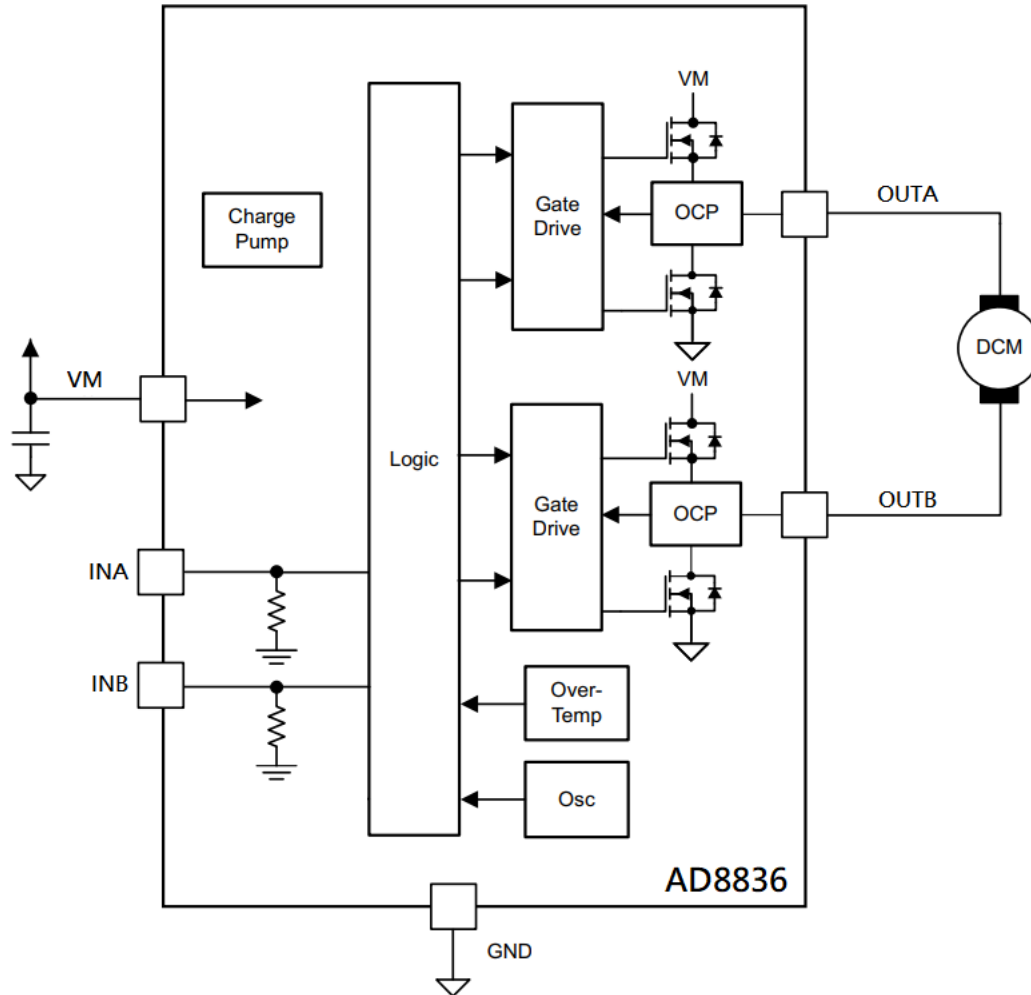
## ELECTRICAL CHARACTERISTICS

VM=8.4V, T<sub>A</sub>=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
<b>MOTOR DRIVER OUTPUT</b>						
R <sub>DSON</sub>	ΔV <sub>LINE</sub>	I <sub>OUT</sub> =0.8A	-	0.45	0.65	Ω
<b>CONTROL INPUTS (INA/INB)</b>						
High input voltage	V <sub>INH</sub>		2	-	7	V
Low level input voltage	V <sub>INL</sub>		0	-	0.8	
High input current	I <sub>INH</sub>	INH=3.3V	-	3	70	μA
Low input current	I <sub>INL</sub>		-	0	1	
Pull-down resistors	R <sub>PD</sub>		-	100	200	kΩ
<b>OPERATING CURRENT</b>						
Circuit shutdown current	I <sub>VM_OFF</sub>	INA=INB=0	-	0.5	2	μA
Circuit operating current	I <sub>VM_ON</sub>		-	0.5	1	mA



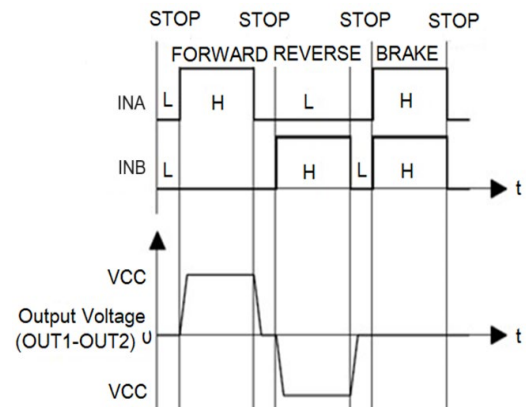
**BLOCK DIAGRAM**



**INPUT-OUTPUT LOGICAL TABLE**

INA	INB	OUTA	OUTB	Working Status	Operating Current
L	L	Hi-Z	Hi-Z	Stop	I <sub>CC_OFF</sub>
H	L	H	L	Forward	I <sub>CC_ON</sub>
L	H	L	H	Back Off	I <sub>CC_ON</sub>
H	H	L	L	Brake	I <sub>CC_ON</sub>

**INPUT-OUTPUT WAVEFORM**





## DETAILS INFORMATION

### Operating Mode

H-Bridge basic operating mode :

A) Stop mode

Definition : When  $INA=INB= L$ , then  $OUTA=OUTB=Hi-Z$

B) Forward mode

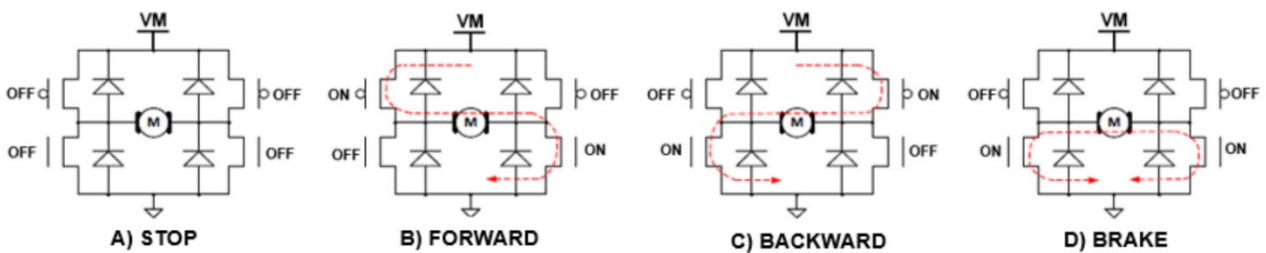
Definition : When  $INA=H$ ,  $INB=L$ , then  $OUTA=H$ ,  $OUTB=L$

C) Reverse mode

Definition : When  $INA=L$ ,  $INB=H$ , then  $OUTB=H$ ,  $OUTA=L$

D) Brake mode

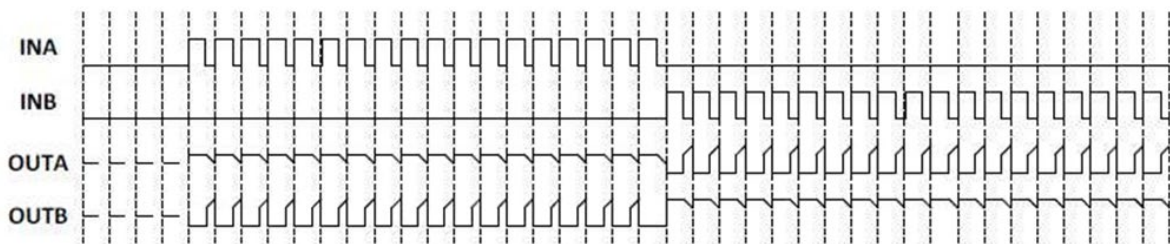
Definition : When  $INA=INB= H$  , then  $OUTA=OUTB=L$



e) PWM mode A

When the input signal  $INA$  is a PWM signal,  $INB=0$  or  $INA=0$ , and  $INB$  is a PWM signal, the rotational speed of the motor will be affected by PWM signal duty cycle control. In this mode, the motor drive circuit switches between On-and-Stop mode, where all power transistors are turned off and the energy stored inside the motor can only be slowly released through the power MOSFET's body diode.

Note: Due to the presence of a high impedance state in the operating state, the rotational speed of the motor cannot be precisely controlled by the duty cycle of the PWM signal. If the frequency of the PWM signal is too high, the motor will not start.



PWM mode A signal waveform

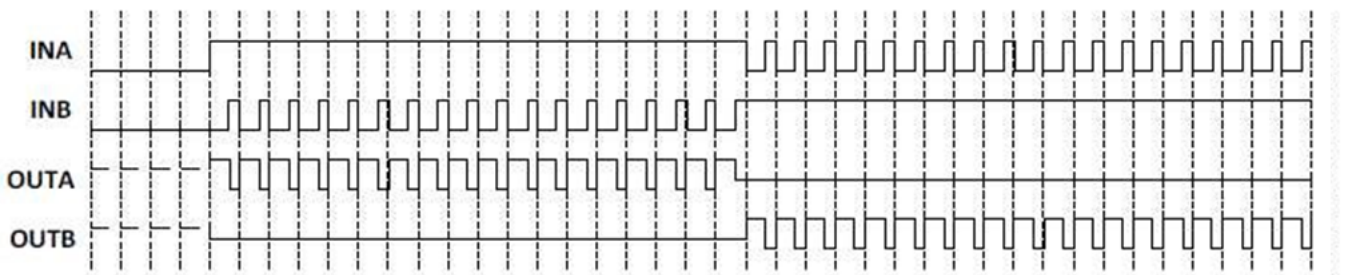


f) PWM mode B

When the input INA is a PWM signal, INB=1 or INA=1, and INB is a PWM signal, the motor's rotational speed is affected by PWM signal duty cycle control. In this mode, the motor drive circuit outputs between the Conduction and Brake modes, where the energy the motor stores is quickly released through the NMOS on the lower side.

Note: Due to the braking state in the working state, the motor energy can be released quickly, and the speed of the motor can be accurately controlled by the duty cycle of the PWM signal, but it must be noted that if the PWM signal frequency is too low, the motor will not be able to rotate smoothly continuously due to entering the Brake mode.

To reduce motor noise, it is recommended the PWM signal frequency is greater than 10KHz and less than 50KHz.



**PWM mode B signal waveform**

**Protection Mechanisms**

1) Over-current protection (OCP)

While the IC conducts a large current, 2.0A (Typ.), the internal over-current protection function will be triggered. The device enters protection mode of auto-recover to avoid damaging IC and system.

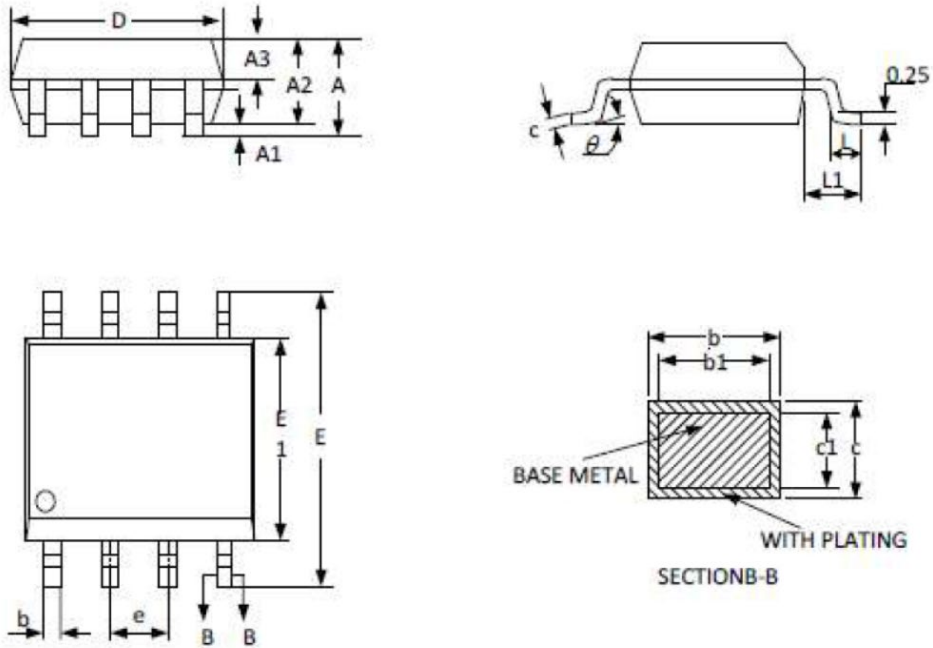
2) Over-temperature protection

If the IC junction temperature exceeds 180 °C (Typ.), the internal over-temperature protection function will be triggered, partial FETs in the H-bridge are disabled, that will ensure the safety of customers' products. If the IC junction temperature falls to 120 °C(Typ.), the IC resumes automatically.



**PACKAGE INFORMATION**

Dimension in SOP8 (Unit: mm)



Symbol	Min	Max
A	-	1.77
A1	0.08	0.28
A2	1.20	1.60
A3	0.55	0.75
b	0.39	0.48
b1	0.38	0.43
c	0.21	0.26
c1	0.19	0.21
D	4.70	5.10
E	5.80	6.20
E1	3.70	4.10
e	1.27BSC	
L	0.50	0.80
L1	1.05BSC	
theta	0°	8°



## IMPORTANT NOTICE

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