



DESCRIPTION

The AD8813 is a low-voltage DC motor driver IC specifically designed for low-voltage operating systems. It integrates 4 low-resistance MOS and forward, reverse, brake, and stop functions.

AD8813 protection function, when the output short circuit occurs, the output current increases instantaneously, the circuit power consumption rises sharply, and the chip temperature rises sharply, when the chip temperature exceeds the maximum temperature point set by the internal temperature protection circuit, the internal circuit turns off the built-in power switch to cut off the load current.

The AD8813 is available in SOT-26 package.

FEATURES

- Low-Voltage DC Motor
- Operating Voltage Range: 2.1V~6.8V.
- Low Operating Current: 6.5uA (TYP.)
- Low Standby Current: 0.1uA (TYP.)
- Continuous Working Current: 1.0A
- Peak Current:1.5A
- SOT-26 Package

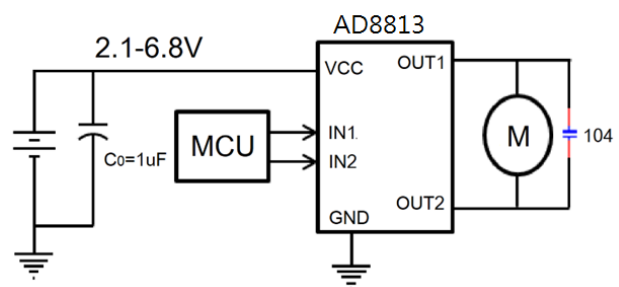
APPLICATION

- Smart Meter
- Handheld Devices
- Tooth Blush
- Blood Pressure
- Camera

ORDERING INFORMATION

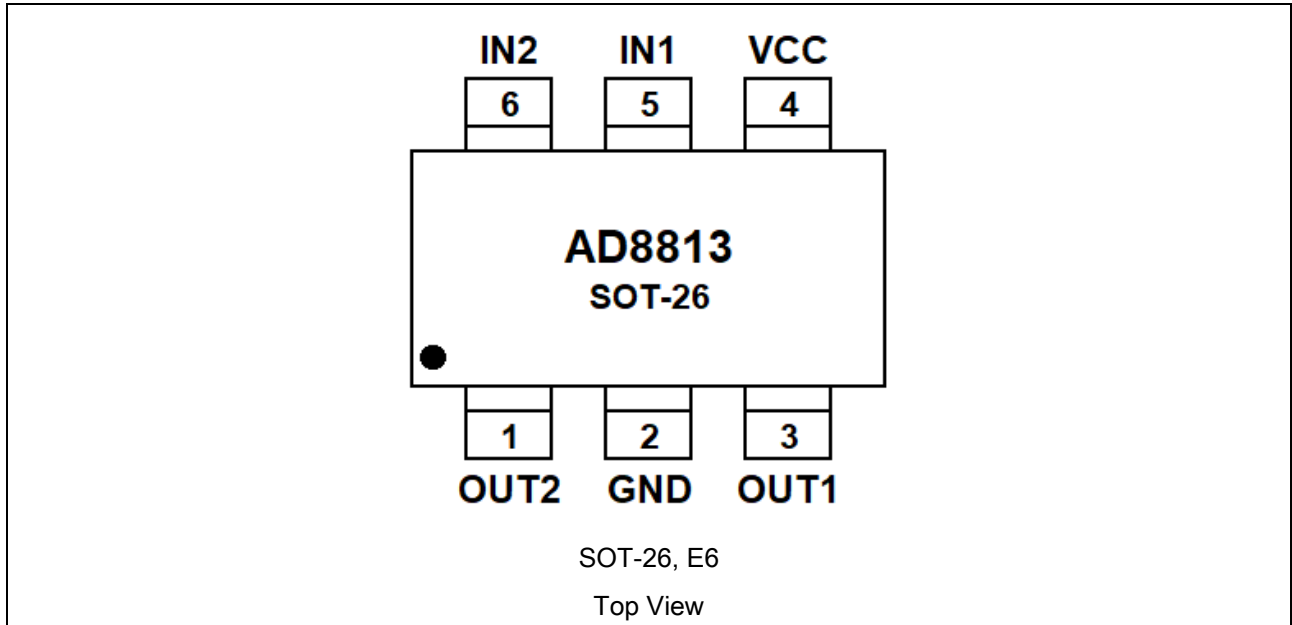
Package Type	Part Number	
SOT-26 SPQ:3,000pcs/Reel	E6	AD8813E6R
		AD8813E6VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

TYPICAL APPLICATION





PIN DESCRIPTION



PIN#	Symbol	Function
1	OUT2	OUTPUT OUT2
2	GND	Ground
3	OUT1	OUTPUT OUT1
4	VCC	Power Input Pin, Connect a Capacitor of 1uf or Greater between VCC and Ground
5	IN1	Logical Input IN1
6	IN2	Logical Input IN2

**ABSOLUTE MAXIMUM RATINGS**

VDD, Supply Voltage	-0.3 ~ +7.0V
IN1, IN2, Input Voltage	-0.3 ~ +7.0V
VDD, IN1, IN2, OUT1, OUT2, ESD Protection (Mannequin)	2KV
T _J , Operating Temperature	-40°C ~ +150°C
T _{stg} , Storage Temperature	-65°C ~ +150°C
θ _{JA} , Thermal Resistance	260°C/W

Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

RECOMMENDED WORKING RANGE

Parameter	Symbol	Min	Typ.	Max	Unit
Supply Voltage	VDC	2.1	-	6.8	V
Input Voltage	IN1, IN2	2.1	-	6.8	
Output Current	IOUT1, IOUT2	0	-	1	A

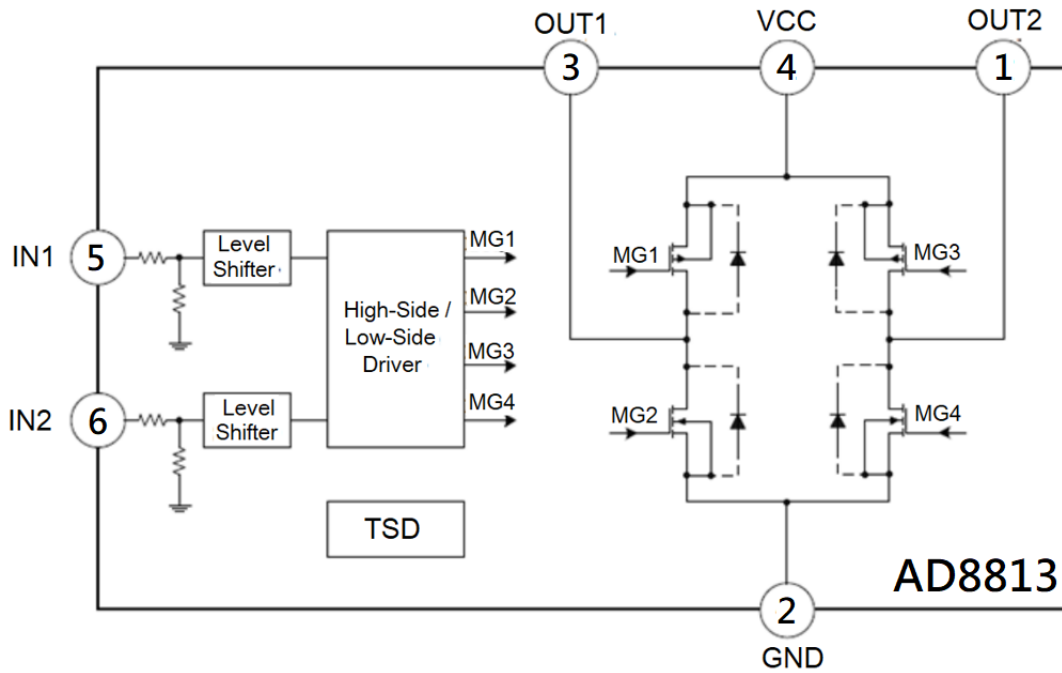
ELECTRICAL CHARACTERISTICS

V_{CC}=5.0V, T_a=25°C, R_{LOAD}=20, Unless otherwise specified

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
MOTOR DRIVER OUTPUT						
On-Resistance	R _{DS(on)}	I _{OUT} =400mA	-	0.7	1.0	Ω
CONTROL INPUTS (IN1/IN2)						
High Input Voltage	V _{INH}		20	-	VDD	V
Low Level Input Voltage	V _{INL}		0	-	0.7	V
High Input Current	I _{INH}		-	2.5	5.0	μA
Low Input Current	I _{INL}		-	0	1	μA
Pull-Down Resistors	R _{PD}		-	1.3	2.0	KΩ
OPERATING CURRENT						
Circuit Shutdown Current	I _{DD(OFF)}	IN1=IN2=0	-	0	1	μA
Circuit Operating Current	I _{DD(ON)}		-	65	100	
THERMAL PROTECTION						
Thermal Shutdown Protection	T _{OTSD}		-	150	-	°C
Thermal Shutdown hysteresis	T _{HYS}		-	30	-	°C



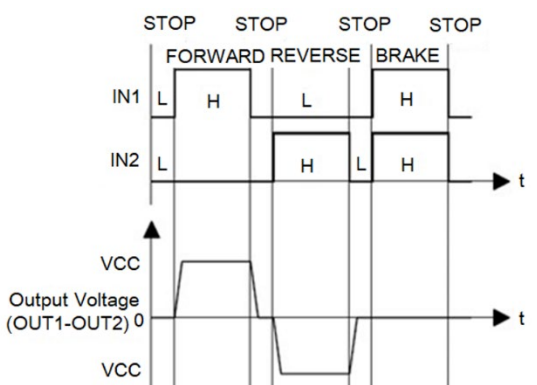
BLOCK DIAGRAM



INPUT-OUTPUT LOGICAL TABLE

IN1	IN2	OUT1	OUT2	Working Status	Operating Current
L	L	Hi-Z	Hi-Z	Stop	I _{CC_OFF}
H	L	H	L	Forward	I _{CC_ON}
L	H	L	H	Reverse	I _{CC_ON}
H	H	L	L	Brake	I _{CC_ON}

INPUT-OUTPUT WAVEFORM

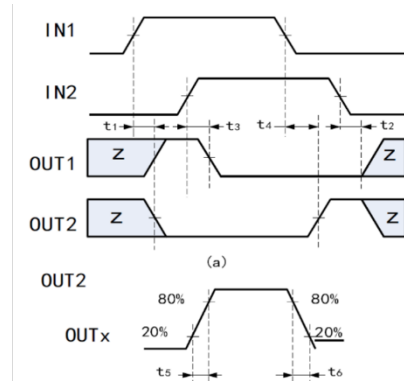




TIMING CHARACTERISTICS

Unit: us

Parameter	Symbol	Max
Output Enable Time	t1	0.9
Output Disable Time	t2	0.3
Delay Time, IN x High to OUT x High	t3	0.6
Delay Time, IN x Low to OUT x Low	t4	1.2
Output Rise Time	t5	0.2
Output Fall Time	t6	0.2



Operating Mode

H-Bridge basic operating mode :

A) Stop mode

Definition : When $IN1=IN2=L$, then $OUT1=OUT2=Hi-Z$

B) Forward mode

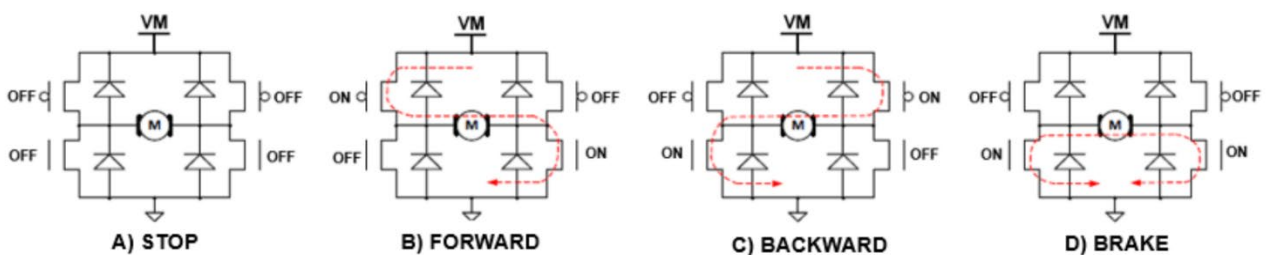
Definition : When $IN1=H$, $IN2=L$, then $OUT1=H$, $OUT2=L$

C) Reverse mode

Definition : When $IN1=L$, $IN2=H$, then $OUT2=H$, $OUT1=L$

D) Brake mode

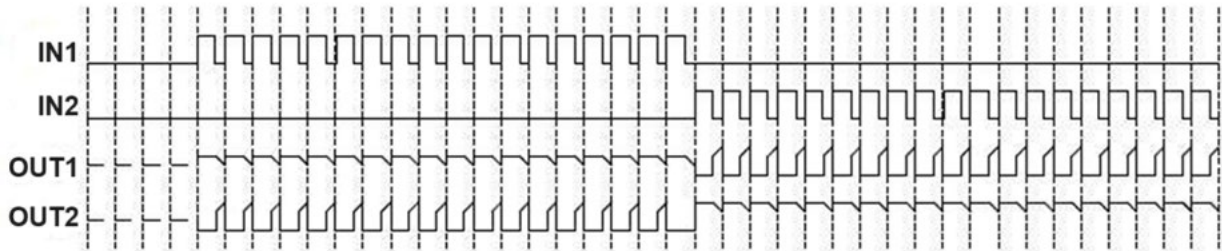
Definition : When $IN1=IN2=H$, then $OUT1=OUT2=L$



e) PWM mode A

When the input signal IN1 is a PWM signal, $IN2=0$ or $IN1=0$, and IN2 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.



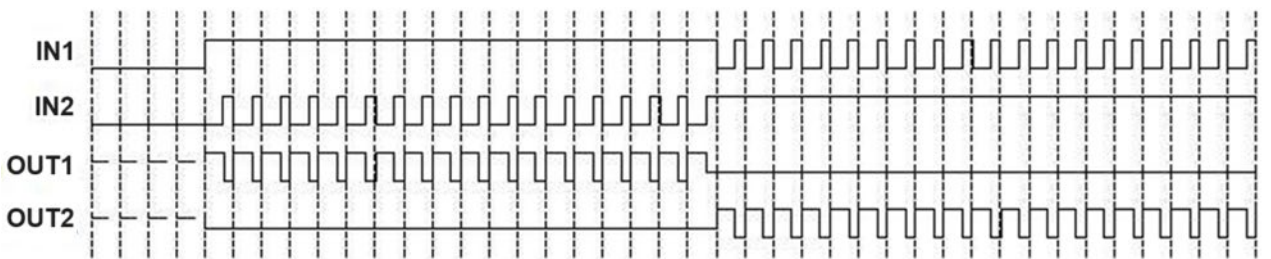
PWM mode A signal waveform

f) PWM mode B

When the input IN1 is a PWM signal, IN2=1 or IN1=1, and IN2 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, 4.5A (Typ.), the internal over-current protection function will be triggered. The device enters protection mode of auto-recover to avoid damaging IC and system.

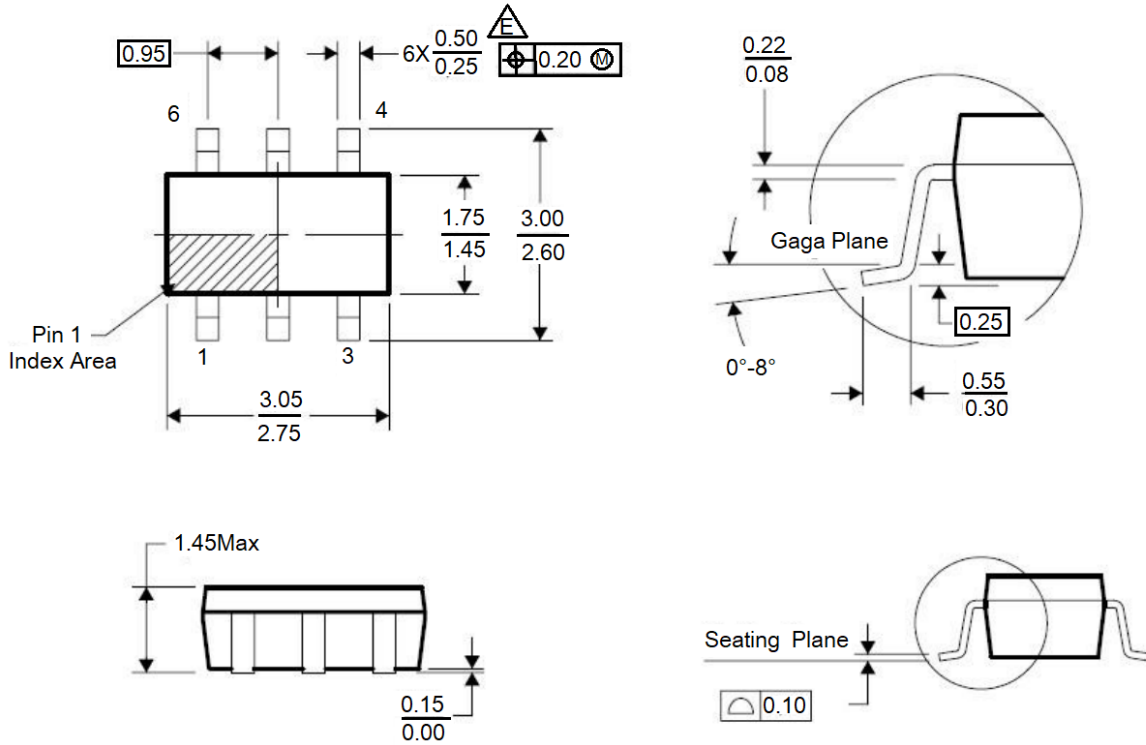
2) Over-temperature protection

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 SOT-26 (Unit: mm)





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