

# One Channel H-Bridge Power Driver AM2857

## ● Features and Benefits

- Wide supply voltage range up to 30V
- Maximum continuous current output up to 4.0A
- Low  $R_{DS(ON)}$  for high efficient H-bridge output.
- SOP-8 package for small size PCB layout
- Motor stall current protection
- Over temperature protection
- Low standby current
- Low quiescent current

## ● Application

- Toys (R/C car)
- Small Appliances
- Any relevant DC motor applications.

## ● Description

The AM2857 is one channel H-Bridge driver IC, It provides integrated motor-driver solution for toys, robotics, consumer products and battery-powered motion control applications. The output driver block consists of N-channel and P-channel power MOSFETs configured as an H-bridge to drive DC motor.

The AM2857 maximum operational voltage is 30V. It can supply up to 4.0A of output continuous current and 6.5A of output peak current. There are internal shutdown function for over-temperature protection and over-current protection ( $I_{OCP} = 6.5\text{ A}$ ).

Package material is Pb-Free Product & RoHS compliant for the purpose of environmental protection and for sustainable development of the Earth.

## ● Ordering Information

| Orderable Part Number | Package | Marking |
|-----------------------|---------|---------|
| AM2857                | SOP-8   | AM2857  |

● **Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ )**

| Parameter                 | Symbol             | Limits      | Unit |
|---------------------------|--------------------|-------------|------|
| Power Supply voltage      | VCC                | 34          | V    |
| Output continuous current | I <sub>ocont</sub> | 4.0 (NOTE*) | A    |
| Output peak current       | I <sub>omax</sub>  | 6.5         | A    |
| Operate temperature range | T <sub>opr</sub>   | -20~+85     | °C   |
| Storage temperature range | T <sub>stg</sub>   | -40~+150    | °C   |

Note \*: Based on 25 x 25 mm<sup>2</sup> FR4 PCB (1 oz.) at single side PCB

● **Recommended operating conditions ( $T_A=25^{\circ}\text{C}$ )**

(Set the power supply voltage taking allowable dissipation into considering)

| Parameter                          | Symbol            | Min  | Typ | Max         | Unit |
|------------------------------------|-------------------|------|-----|-------------|------|
| Power Supply voltage               | VCC               | 3.6  |     | 30          | V    |
| Signal input IN_A and IN_B voltage | V <sub>IN_x</sub> | -0.3 |     | 6*          | V    |
| H-bridge output continuous current | I <sub>OUT</sub>  | 0    |     | 4.0(Note**) | A    |
| Externally applied PWM frequency   | F <sub>IN_x</sub> |      |     | 30          | KHz  |

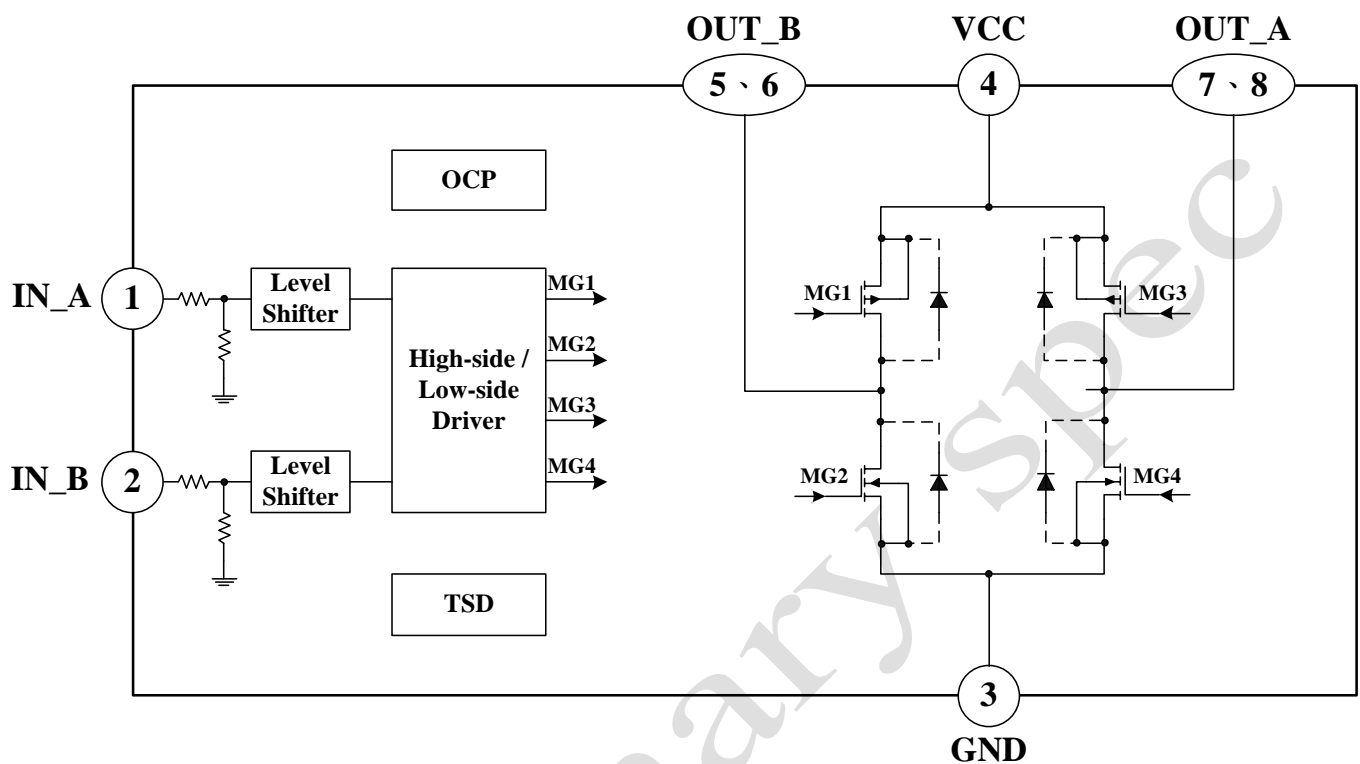
Note\* : Input signal voltage is not higher VCC voltage.

Note\*\* : Based on 25 x 25mm<sup>2</sup> FR4 PCB (1 oz.) at single side PCB

● **Electrical Characteristics ( Unless otherwise specified, TA = 25°C , VCC=6V)**

| Parameter                   | Symbol              | Limit |     |     | Unit | Conditions   |
|-----------------------------|---------------------|-------|-----|-----|------|--|
|                             |                     | Min   | Typ | Max |      |  |
| Power Supplies              |                     |       |     |     |      |  |
| Supply current              | I <sub>CC</sub>     |       | 4   |     | mA   | Input signal IN_A/B= L/H or H/L or H/H No load on OUT_A/B, |
| Standby current             | I <sub>STB</sub>    |       |     | 2   | uA   | Input signal IN_A/B= L/L                                   |
| IN_x Inputs                 |                     |       |     |     |      |  |
| Input H level voltage       | V <sub>IN_XH</sub>  | 2.0   |     | 6   | V    |  |
| Input L level voltage       | V <sub>IN_XL</sub>  | 0     |     | 0.7 | V    |  |
| Input H level current       | I <sub>IN_X</sub>   |       | 100 |     | μA   | V <sub>CC</sub> = 6V , V <sub>IN</sub> = 3 V               |
| Input frequency             | F <sub>IN_X</sub>   |       |     | 30  | KHz  |  |
| Input pull down resistance  | R <sub>IN_X</sub>   |       | 30  |     | KΩ   |  |
| H-bridge FETs               |                     |       |     |     |      |  |
| On-resistance               | R <sub>ds(on)</sub> |       | 90  |     | mΩ   | I <sub>O</sub> = 1A<br>Upper and Lower total               |
| On-resistance               | R <sub>ds(on)</sub> |       | 100 |     | mΩ   | I <sub>O</sub> = 3A<br>Upper and Lower total               |
| TSD Protections             |                     |       |     |     |      |  |
| Thermal shutdown protection | TSD <sub>p</sub>    |       | 160 |     | °C   |  |
| Thermal shutdown release    | TSD <sub>r</sub>    |       | 105 |     | °C   |  |

## ● Block Diagram



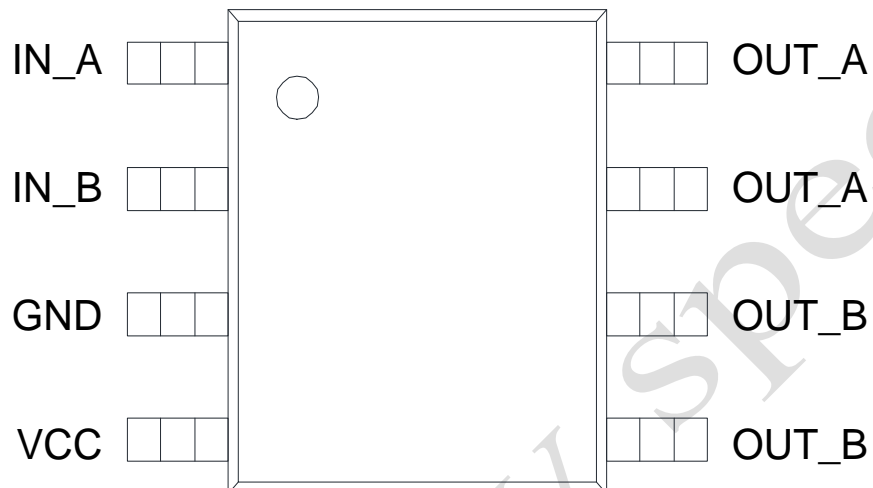
## ● Input Logic Descriptions

Function truth table

| IN_A | IN_B | OUT_A | OUT_B | Mode    |
|------|------|-------|-------|---------|
| L    | L    | Hi-Z  | Hi-Z  | Stop    |
| L    | H    | L     | H     | Reverse |
| H    | L    | H     | L     | Forward |
| H    | H    | L     | L     | Brake   |

● Pin configuration SOP-8

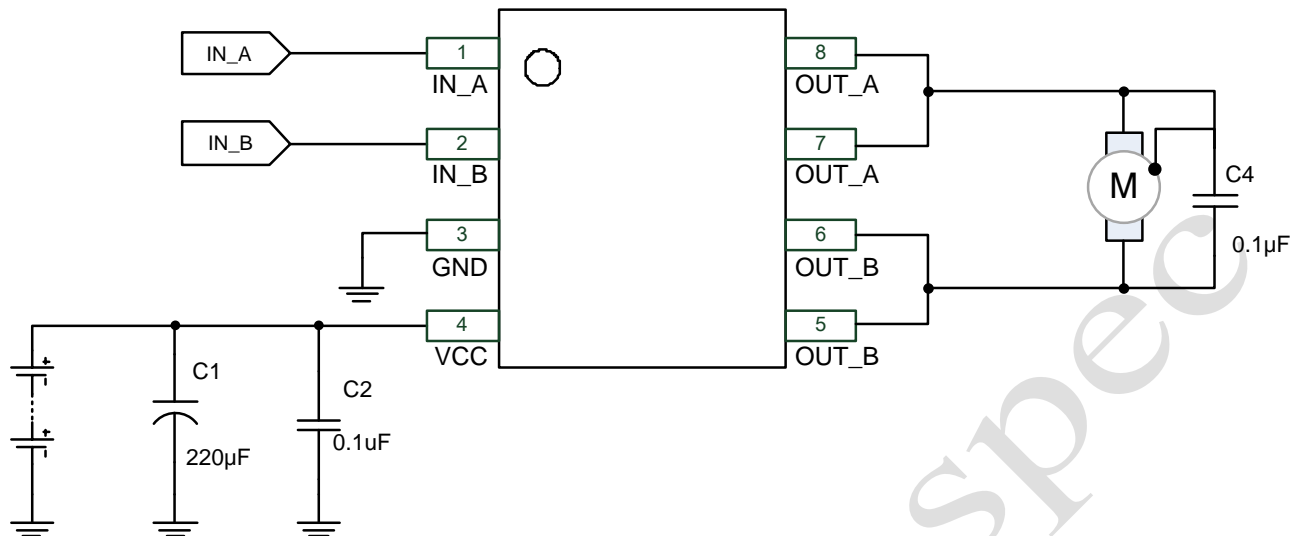
Top View



● Pin Descriptions

| PIN No. | Pin Name | I/O | Description          |
|---------|----------|-----|----------------------|
| 1       | IN_A     | I   | Input Half Bridge A  |
| 2       | IN_B     | I   | Input Half Bridge B  |
| 3       | GND      | I   | Ground Pin           |
| 4       | VCC      | I   | Power Supply         |
| 5       | OUT_B    | O   | Output Half Bridge B |
| 6       | OUT_B    | O   | Output Half Bridge B |
| 7       | OUT_A    | O   | Output Half Bridge A |
| 8       | OUT_A    | O   | Output Half Bridge A |

### ● Application



### ● Circuit Descriptions

The function descriptions of capacitors on the application circuit:

1. C1 、C2: Power supply VCC pin capacitor:
  - 1) The capacitor can reduce the power spike when the motor is in motion. To avoid the IC directly damaged by the VCC peak voltage. It also can stabilize the power supply voltage and reduce its ripples.
  - 2) The C1 capacitor can compensate power when motor starts running.
  - 3) The capacitor value ( $\mu\text{F}$ ) determines the stability of the VCC during motor in motion. If the large voltage power or a heavy loading motor is used, then a larger capacitor would be needed.
  - 4) On the PCB configuration, the C1 、C2 must be mounted as close as possible to VCC pin .
2. C4 : The across-motor capacitor
  - 1) The C4 capacitors can reduce the power spike of motor in start running. A  $0.1\mu\text{F}$  capacitor is recommended.
  - 2) The C4 capacitor must be added to the general application.
3. It's not allowed INA, INB input remain floating status, because there is a minor leakage current between P-N junction when temperature rising, the leakage current will go through internal pull- low resistor which causes INA or INB floating level abnormal pull high and output abnormal working.

### ● Operating Mode Descriptions

H-Bridge basic operating mode :

a) Forward mode

Definition : When  $IN\_A=H$  ,  $IN\_B=L$  , then  $OUT\_A=H$  ,  $OUT\_B=L$

b) Reverse mode

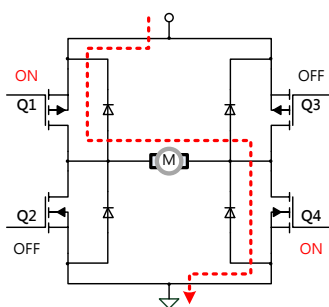
Definition : When  $IN\_A=L$  ,  $IN\_B=H$  , then  $OUT\_A=L$  ,  $OUT\_B=H$

c) Brake mode

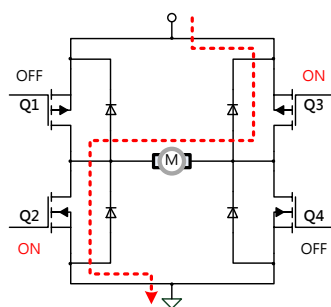
Definition : When  $IN\_A=IN\_B=H$  , then  $OUT\_A=OUT\_B=L$

d) Stop mode

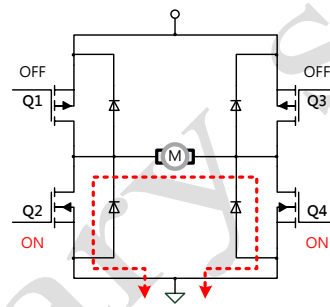
Definition : When  $IN\_A=IN\_B=L$  , then  $OUT\_A=OUT\_B=Hi-Z$



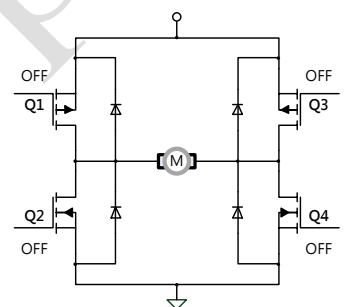
a) Forward mode



b) Reverse mode



c) Brake mode



d) Stop mode

### ● Protection Mechanisms Descriptions

1) Over-current protection (OCP)

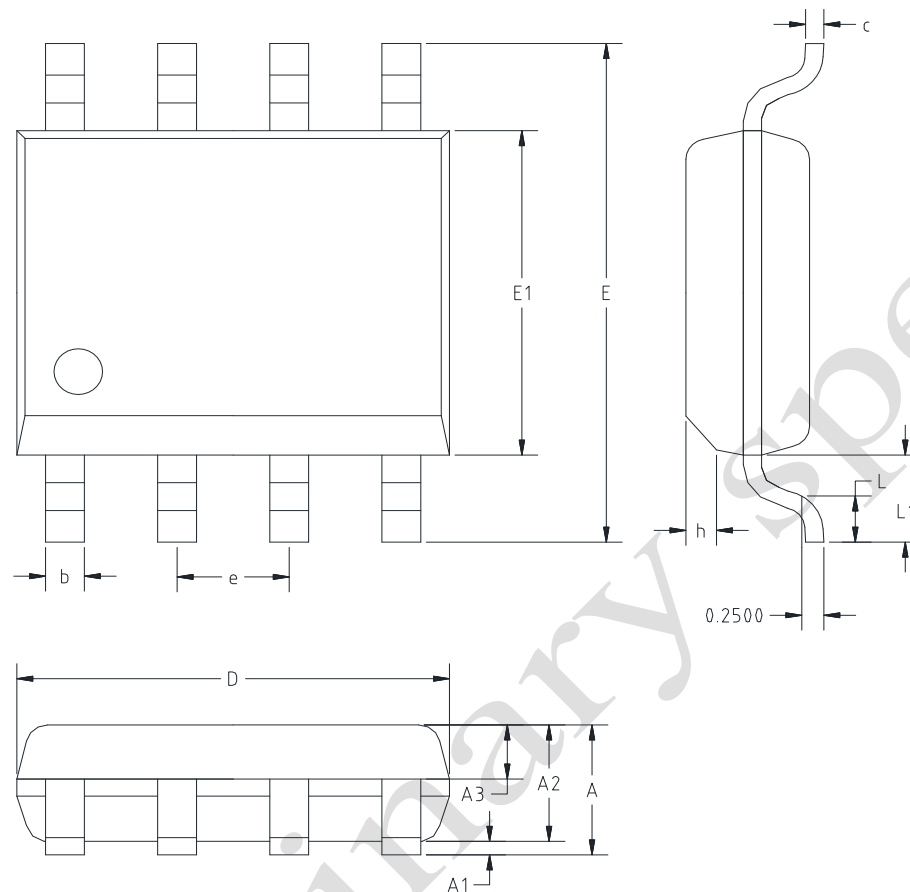
While the IC conducts a large current, 6.5A (Typ), the internal over-current protection function will be triggered. The device enter protection mode of auto-recover to avoid damaging IC and system.

2) Over-temperature protection

If the IC junction temperature exceeds 160° 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 105° C(Typ.), the IC resumes automatically.

● Packaging outline --- SOP-8

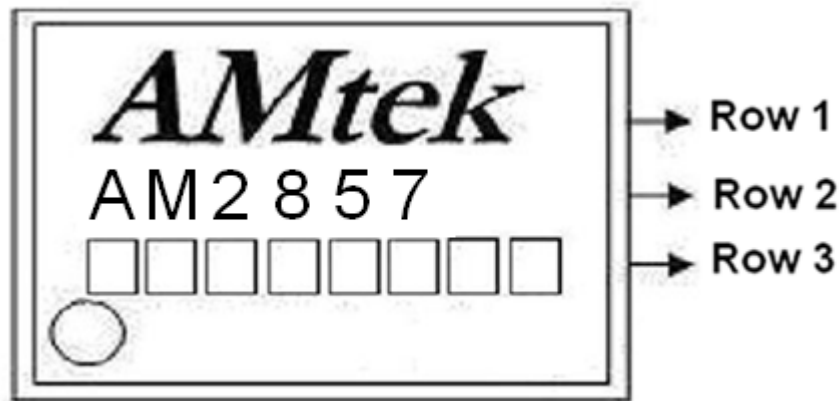
Unit : mm



| SYMBOL | MILLIMETERS |       | INCHES     |       |
|--------|-------------|-------|------------|-------|
|        | Min.        | Max.  | Min.       | Max.  |
| A      | --          | 1.75  | --         | 0.069 |
| A1     | 0.10        | 0.225 | 0.004      | 0.009 |
| A2     | 1.30        | 1.50  | 0.051      | 0.059 |
| A3     | 0.60        | 0.70  | 0.024      | 0.028 |
| b      | 0.39        | 0.48  | 0.015      | 0.019 |
| c      | 0.21        | 0.26  | 0.008      | 0.010 |
| D      | 4.70        | 5.10  | 0.185      | 0.201 |
| E      | 5.80        | 6.20  | 0.228      | 0.244 |
| E1     | 3.70        | 4.10  | 0.146      | 0.161 |
| e      | 1.27 TYP.   |       | 0.05 TYP.  |       |
| h      | 0.25        | 0.50  | 0.010      | 0.020 |
| L      | 0.50        | 0.80  | 0.020      | 0.031 |
| L1     | 1.05 TYP    |       | 0.041 TYP. |       |

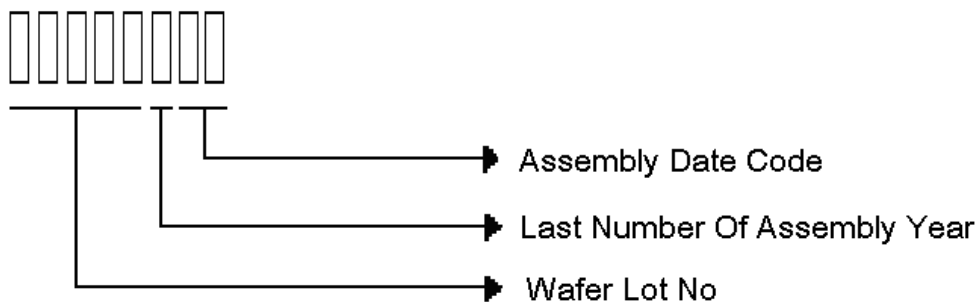


## ● Marking Identification



### NOTE:

- Row1 : Logo
- Row2 : Device Name
- Row3 : Wafer Lot No use five codes + Assembly Year use one code + Assembly Week use two codes



Example: Wafer Lot No is EB168 + Year 2017 is H + Week 08 is 08 , then mark "EB168H08"

The last code of assembly year, explanation as below: :

(Year : A=0,B=1,C=2,D=3,E=4,F=5,G=6,H=7,I=8,J=9. For example: year 2017=H )