

NY9M008A

Single Channel 0.9A Motor Driver

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Revision History

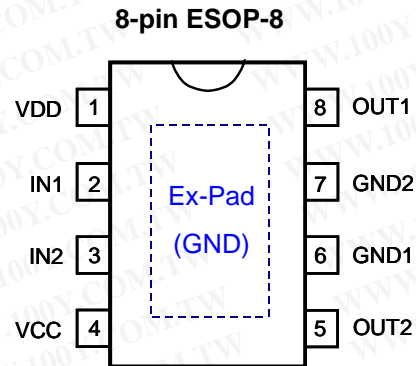
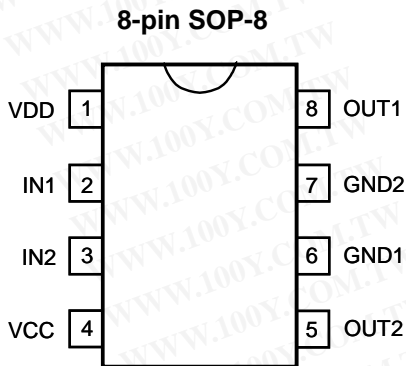
| Version | Date | Description | Modified Page |
|----------------|-------------|---|----------------------|
| 1.0 | 2014/04/16 | New release. | - |
| 1.1 | 2014/08/04 | 1. Update application circuit. 2. Delete die form shipping and add Tape & Reel shipping. | 7 9 |
| 1.2 | 2015/05/15 | 1. Modify motor current to 900mA. 2. Update DC characteristics. | 3, 4 6 |


1. 概述

NY9M008A 為單晶片 CMOS 的雙向馬達驅動 IC，利用大型積體電路 (LSI) 製造技術，具有低電源及低成本的特性，可應用於低電壓工作模式。電路採用 H 橋架構，內置功率 MOSFET 開關，可實現對直流電機做 正轉、反轉、煞車、停止 四個功能的控制。

2. 功能

- (1). 寬廣的工作電壓：1.8V ~ 9.0V。
- (2). 內置 PMOS/NMOS 功率開關的 H 橋驅動器。
- (3). 支援 4 種操作模式：正轉 / 反轉 / 剎車 / 停止。
- (4). 低待機電流 (Typ.=0.1uA)。
- (5). 900mA 以上電流輸出能力。
- (6). 內建過溫保護功能。(TSD, Thermal Shutdown)
- (7). CMOS 輸入，輸入腳內建下拉電阻，無需外加限流電阻。
- (8). 高達 5KV 的人體靜電模式 (HBM) 的 ESD 保護。
- (9). 提供 SOP-8 和 ESOP-8 封裝。



 : 外部焊墊。

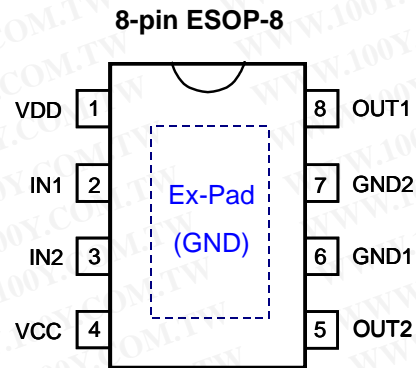
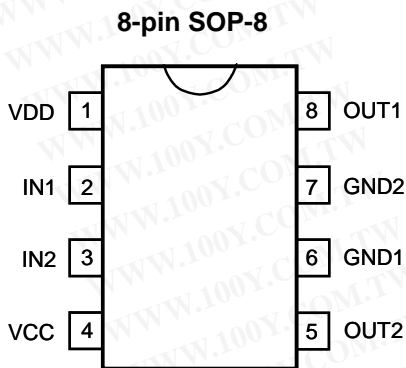
連接到 PCB 的接地散熱片以利散熱。

1. GENERAL DESCRIPTION

NY9M008A is a single-chip bi-directional motor driver CMOS IC for low-voltage applications. It is designed by LSI high technology with a low-power and low-cost process. It has H bridge driver of built-in MOSFET power switch to provide Forward / Reverse / Brake / Stop function for motor driver applications.

2. FEATURES

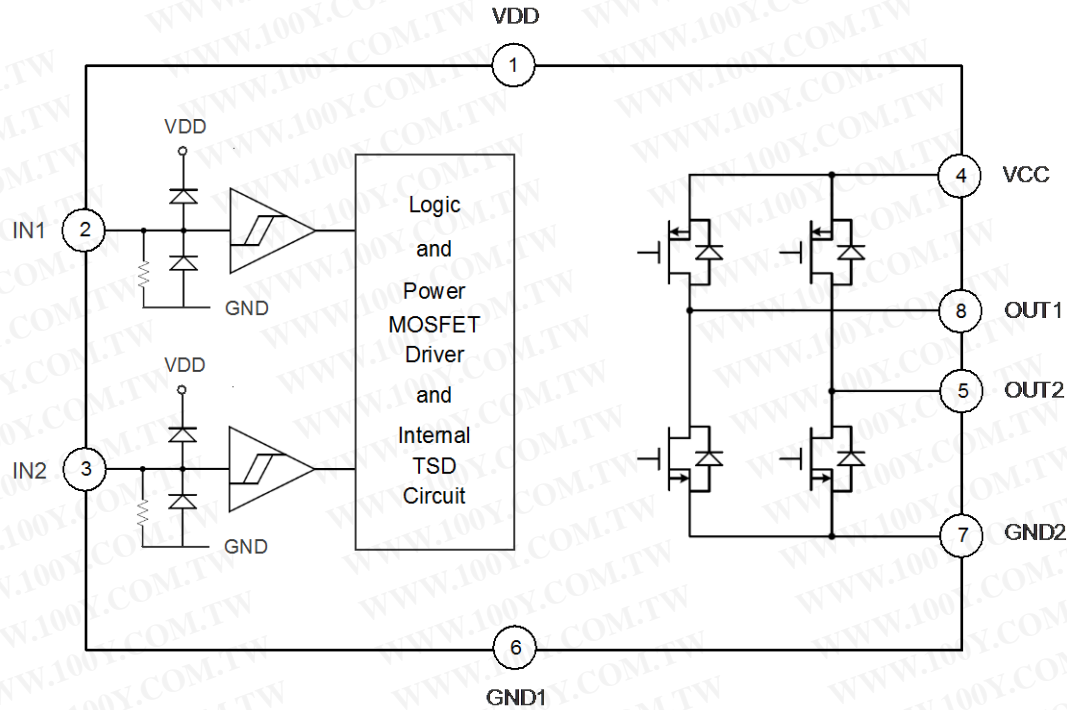
- (1). Wide operating voltage: 1.8V ~ 9.0V.
- (2). H bridge driver of internal PMOS/NMOS power switches.
- (3). Support 4 operating mode: Forward / Backward / Brake / Stop.
- (4). Low standby current. (Typ.=0.1uA)
- (5). Over 900mA output current capability.
- (6). Built-in Thermal Shutdown (TSD) circuit.
- (7). CMOS input. Built-in input pull-low resistance and no current-limit resistance required.
- (8). High 5KV Human Body Mode (HBM) ESD protection.
- (9). SOP-8 and ESOP-8 package type are available.



 : Exposed Pad.

Connect to PCB ground plane for heat dissipation.

3. BLOCK DIAGRAM



4. PIN DESCRIPTION

| Pin Name | Pin No. | ATTR. | Description |
|----------|---------|-------|--|
| IN1 | 2 | I | Forward rotation logic input. |
| IN2 | 3 | I | Backward rotation logic input. |
| OUT1 | 8 | O | Forward rotation output. |
| OUT2 | 5 | O | Backward rotation output. |
| VDD | 1 | Power | Positive power of logic control circuit. |
| VCC | 4 | Power | Positive power of output power MOSFET. |
| GND1 | 6 | Power | Negative power of logic control circuit. |
| GND2 | 7 | Power | Negative power of output power MOSFET. |
| Ex-Pad | 9 | Power | Exposed pad for thermal tab, must be connected to GND. |

5. FUNCTION DESCRIPTION

| IN1 | IN2 | OUT1 | OUT2 | Function |
|-----|-----|---------|---------|----------------|
| 0 | 0 | Z (Off) | Z (Off) | Stop (Standby) |
| 1 | 0 | 1 | 0 | Forward |
| 0 | 1 | 0 | 1 | Backward |
| 1 | 1 | 0 | 0 | Brake |

6. ELECTRICAL CHARACTERISTICS

6.1 Absolute Maximum Rating

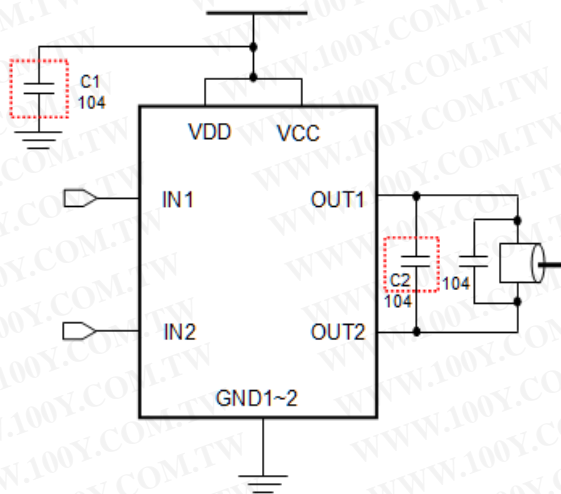
| Symbol | Parameter | Rating | Unit | |
|-------------------|--|-------------|------|------|
| $V_{DD} - V_{SS}$ | Supply voltage of logic control circuit | -0.5 ~ +7.5 | V | |
| V_{CC} | Supply voltage of output power MOSFET | 9.6 | V | |
| $I_{OUT-PEAK}$ | Output peak current | 2.0 | A | |
| θ_{JA} | Thermal resistance (Junction to Ambient) | SOP-8 | 150 | °C/W |
| | | ESOP-8 | 60 | |
| P_D | Power dissipation | SOP-8 | 0.9 | W |
| | | ESOP-8 | 2.3 | |
| T_A | Operating ambient temperature | -40 ~ +85 | °C | |
| T_J | Operating junction temperature | +160 | °C | |
| T_{ST} | Storage temperature | -55 ~ +160 | °C | |

6.2 DC Characteristics ($V_{DD}=3.0V$, $V_{CC}=6.0V$, $T_A=25^\circ C$, unless otherwise specified)

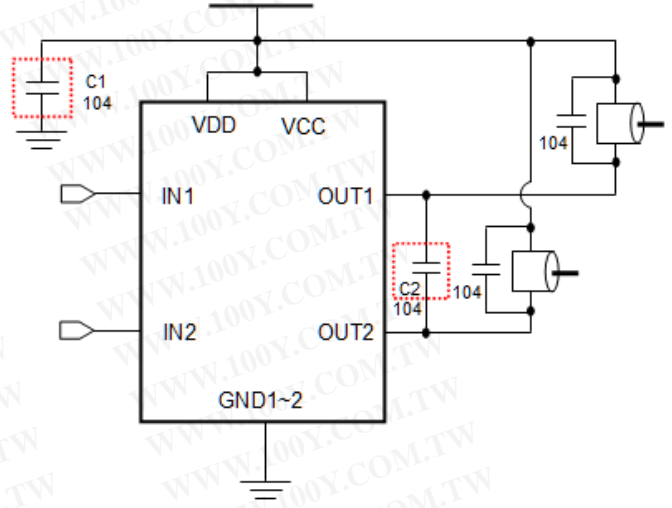
| Symbol | Parameter | Min. | Typ. | Max. | Unit | Condition |
|-------------|---|--------------------------|------|-------------|------|--|
| V_{DD} | Operating voltage (Logic) | 1.8 | | 6.8 | V | |
| V_{CC} | Operating voltage (MOSFET) | 1.8 | | 9.0 | V | |
| I_{SB} | Standby current | | 0.1 | 1 | uA | IN1=IN2=0 |
| I_{OP} | Operating current | $V_{DD} = V_{CC} = 3.0V$ | 200 | | uA | IN1=1, IN2=0 or IN1=0, IN2=1 or IN1=1, IN2=1 |
| | | $V_{DD} = V_{CC} = 6.0V$ | 270 | | uA | |
| I_{IH} | Input high current (12kΩ pull-low resistance) | | 260 | | uA | $V_{IH} = 3.0V$ |
| | | | 510 | | uA | $V_{IH} = 6.0V$ |
| V_{IH} | Input high voltage | $0.7V_{DD}$ | | | V | |
| V_{IL} | Input low voltage | | | $0.3V_{DD}$ | V | |
| R_{ON} | Output resistance (SOP-8 Package) | | 0.68 | | Ω | $I_{OUT} = 500mA$ |
| | | | 0.77 | | Ω | $I_{OUT} = 800mA$ |
| | | | 0.92 | | Ω | $I_{OUT} = 1200mA$ |
| | Output resistance (ESOP-8 Package) | | 0.60 | | Ω | $I_{OUT} = 500mA$ |
| | | | 0.65 | | Ω | $I_{OUT} = 800mA$ |
| | | | 0.79 | | Ω | $I_{OUT} = 1200mA$ |
| I_{OUT} | Output continuous current (* with PCB heat dissipation) | | 900 | 1200* | mA | SOP-8 |
| | | | 1100 | 1600* | mA | ESOP-8 |
| I_{PULSE} | Pulsed drain current | | | 5.0 | A | Pulse width < 20ms |
| T_{RISE} | Output rise time | | 300 | | ns | PWM=20kHz, Duty=50% |
| T_{FALL} | Output fall time | | 120 | | ns | |
| T_{RP} | Input-to-Output response time | | 250 | | ns | |
| T_{TSD} | Thermal shutdown (TSD) | | 160 | | °C | Junction temperature |
| T_{TSDH} | Thermal shutdown hysteresis | | 35 | | °C | |

7. APPLICATION CIRCUIT

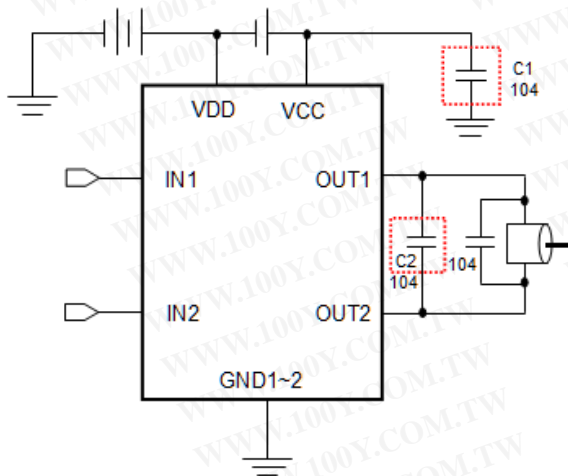
(1) One Motor Bi-Directional Control
(Single Power)



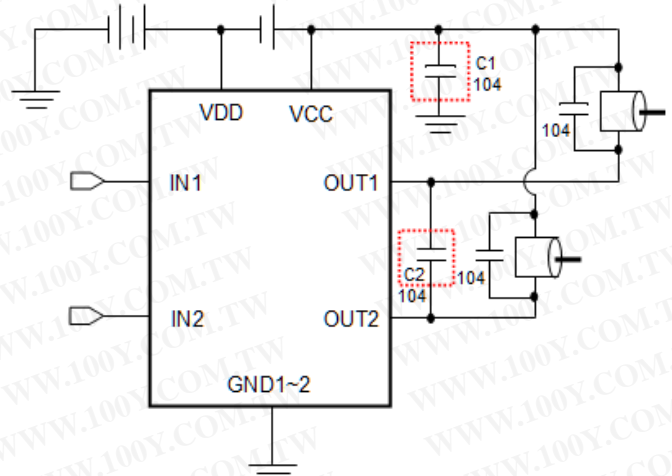
(2) Two Motors Directional Control
(Single Power)



(3) One Motor Bi-Directional Control
(Dual Power)

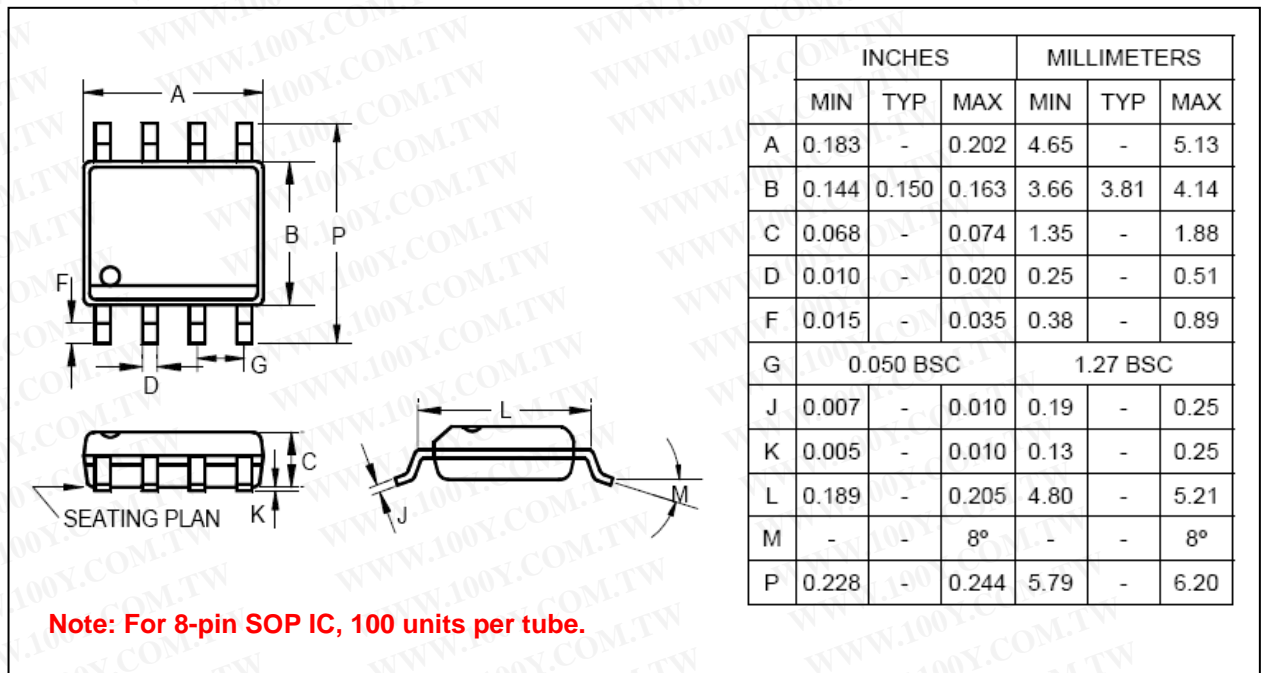


(4) Two Motors Directional Control
(Dual Power)



* In normal application, C1 (0.1uF) can be saved, but please reserve C1 space at PCB layout.

* If voltage is higher than 6.0V, C2 (0.1uF) is necessary to endure high voltage.

8. PACKAGE DIMENSION
8.1 8-Pin Plastic SOP (150 mil)

8.2 8-Pin Plastic ESOP with Exposed Pad (150 mil)
