



九齊科技股份有限公司
Nyquest Technology Co., Ltd.

DATA SHEET

NY9M005A

Single Channel 0.65A Motor Driver

Version 1.2

Aug. 13, 2015

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Revision History

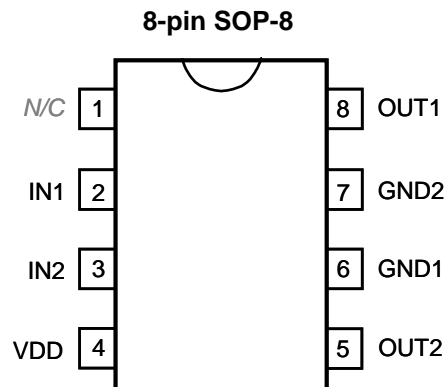
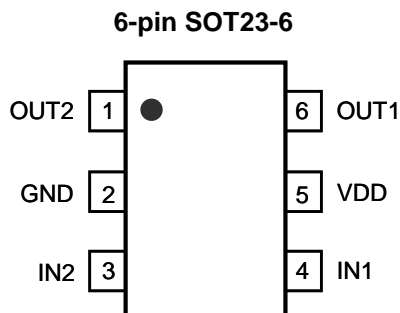
<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2014/02/27	New release.	-
1.1	2014/04/16	<ol style="list-style-type: none">1. Modify the output current capability from 500mA to 600mA.2. Modify thermal resistance and power dissipation of SOP-8.3. Modify the value of R_{ON} and I_{OUT}.	3, 4 6 6
1.2	2015/08/13	<ol style="list-style-type: none">1. Modify motor current to 650mA.2. Update DC characteristics.3. Remove Die pad diagram and Die form shipping.	3, 4 6 7, 8

1. 概述

NY9M005A 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 ~ 5.5V。
- (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). 650mA 以上電流輸出能力。
- (6). 內建過溫保護功能。(TSD, Thermal Shutdown)
- (7). CMOS 輸入，輸入腳無需外加限流電阻，且輸入腳內建下拉電阻。
- (8). 高達 5KV 的人體靜電模式 (HBM) 的 ESD 保護。
- (9). 提供 SOT23-6 和 SOP-8 封裝。

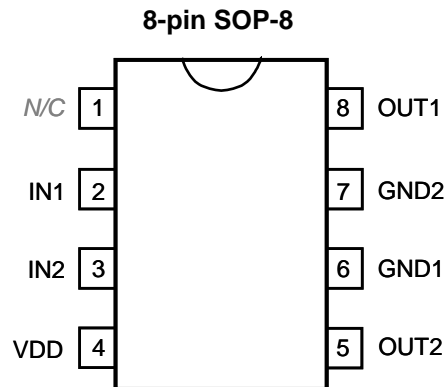
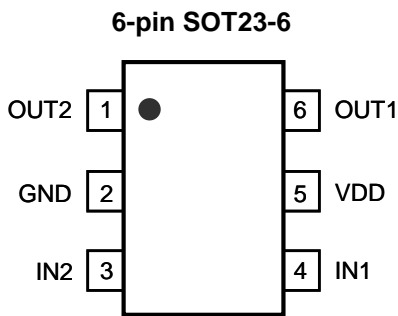


1. GENERAL DESCRIPTION

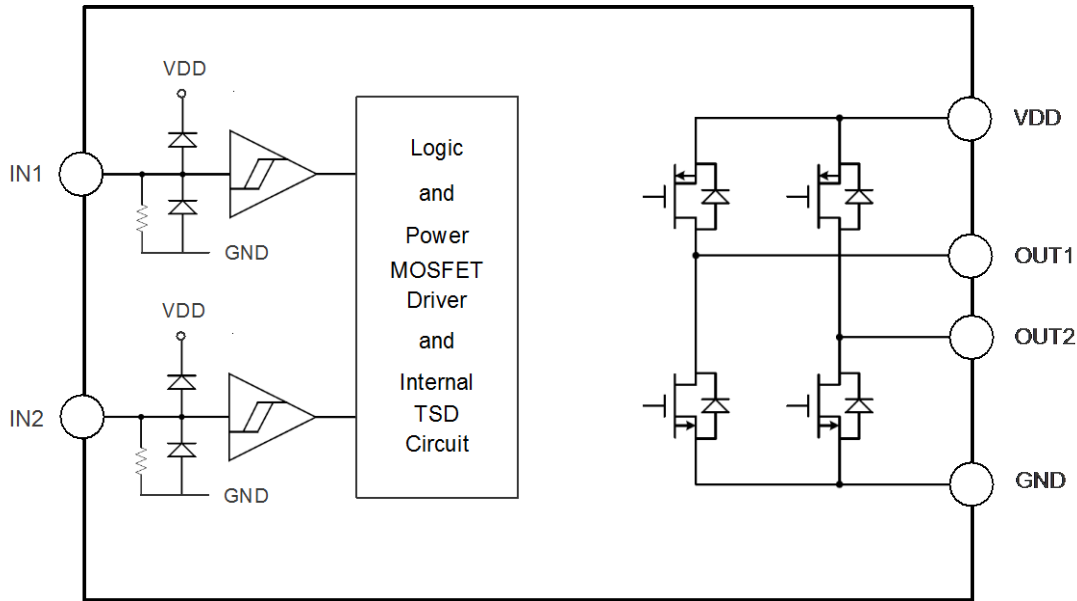
NY9M005A is a single-chip bi-directional motor driver CMOS IC for low-voltage applications. It is designed with LSI high technology with a low-power and low-cost process. It has H bridge driver of built-in MOSFET power switch to provide Forward / Reverse / Brake / Stop function for motor driver applications.

2. FEATURES

- (1). Wide operating voltage: 1.8V ~ 5.5V.
- (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 650mA output current capability.
- (6). Built-in Thermal Shutdown (TSD) circuit.
- (7). CMOS input. No current-limit resistance required and built-in input pull-low resistance.
- (8). High 5KV Human Body Mode (HBM) ESD protection.
- (9). SOT23-6 and SOP-8 package type are available.



3. BLOCK DIAGRAM



4. PIN DESCRIPTION

Pin Name	Pin No. (SOT23-6 / SOP8)	ATTR.	Description
IN1	4 / 2	I	Forward rotation logic input.
IN2	3 / 3	I	Backward rotation logic input.
OUT1	6 / 8	O	Forward rotation output.
OUT2	1 / 5	O	Backward rotation output.
VDD	5 / 4	Power	Positive power.
GND	2 / 6, 7	Power	Negative power.
N/C*	- / 1	-	No connection.

* N/C pin is suggested connecting to VDD for pin-to-pin compatible with NY9M008AS8 at PCB layout.

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

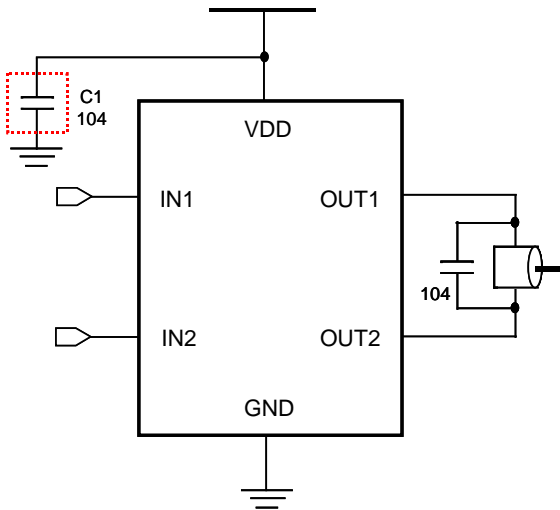
Symbol	Parameter	Rating	Unit	
$V_{DD} - V_{SS}$	Supply voltage	-0.5 ~ +6.0	V	
$I_{OUT-PEAK}$	Output peak current	1.0	A	
θ_{JA}	Thermal resistance (Junction to Ambient)	SOT23-6	180	°C/W
		SOP-8	150	
P_D	Power dissipation	SOT23-6	0.7	W
		SOP-8	0.8	
T_A	Operating ambient temperature	-40 ~ +85	°C	
T_J	Operating junction temperature	+150	°C	
T_{ST}	Storage temperature	-55 ~ +150	°C	

6.2 DC Characteristics *($V_{DD}=4.5V$, $T_A=25^\circ C$, unless otherwise specified)*

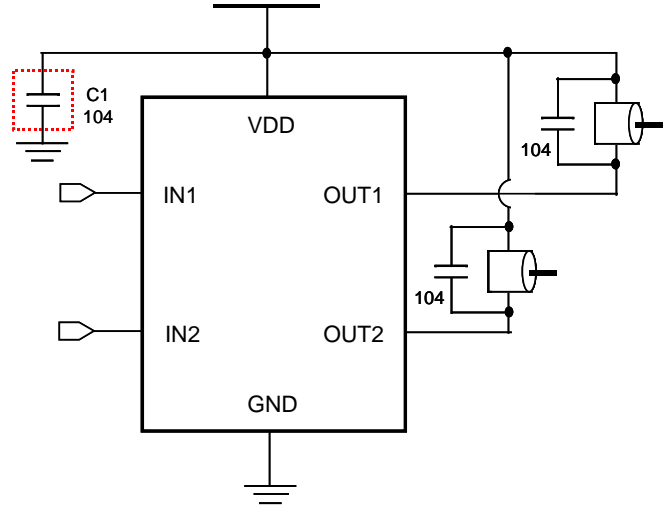
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
V_{DD}	Operating voltage	1.8		5.5	V	
I_{SB}	Standby current		0.1	1	μA	IN1=IN2=0
I_{OP}	Operating current	$V_{DD} = 3.0V$	35		μA	IN1=1, IN2=0 or IN1=0, IN2=1 or IN1=1, IN2=1
		$V_{DD} = 4.5V$	50		μA	
I_{IH}	Input high current (12k Ω pull-low resistance)		250		μA	$V_{IH} = 3.0V$
			370		μA	$V_{IH} = 4.5V$
V_{IH}	Input high voltage	$0.7V_{DD}$			V	
V_{IL}	Input low voltage			$0.3V_{DD}$	V	
R_{ON}	Output resistance (SOT23-6 Package)		1.20		Ω	$I_{OUT} = 200mA$
			1.38		Ω	$I_{OUT} = 500mA$
			1.73		Ω	$I_{OUT} = 800mA$
	Output resistance (SOP-8 Package)		1.25		Ω	$I_{OUT} = 200mA$
			1.43		Ω	$I_{OUT} = 500mA$
			1.80		Ω	$I_{OUT} = 800mA$
I_{OUT}	Output continuous current (* with PCB heat dissipation)		650	800*	mA	SOT23-6
			700	900*	mA	SOP-8
I_{PULSE}	Pulsed drain current			2.0	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		150		ns	
T_{TSD}	Thermal shutdown (TSD)		150		°C	Junction temperature
T_{TSDH}	Thermal shutdown hysteresis		35		°C	

7. APPLICATION CIRCUIT

(1) One Motor Bi-Directional Control



(2) Two Motors Directional Control



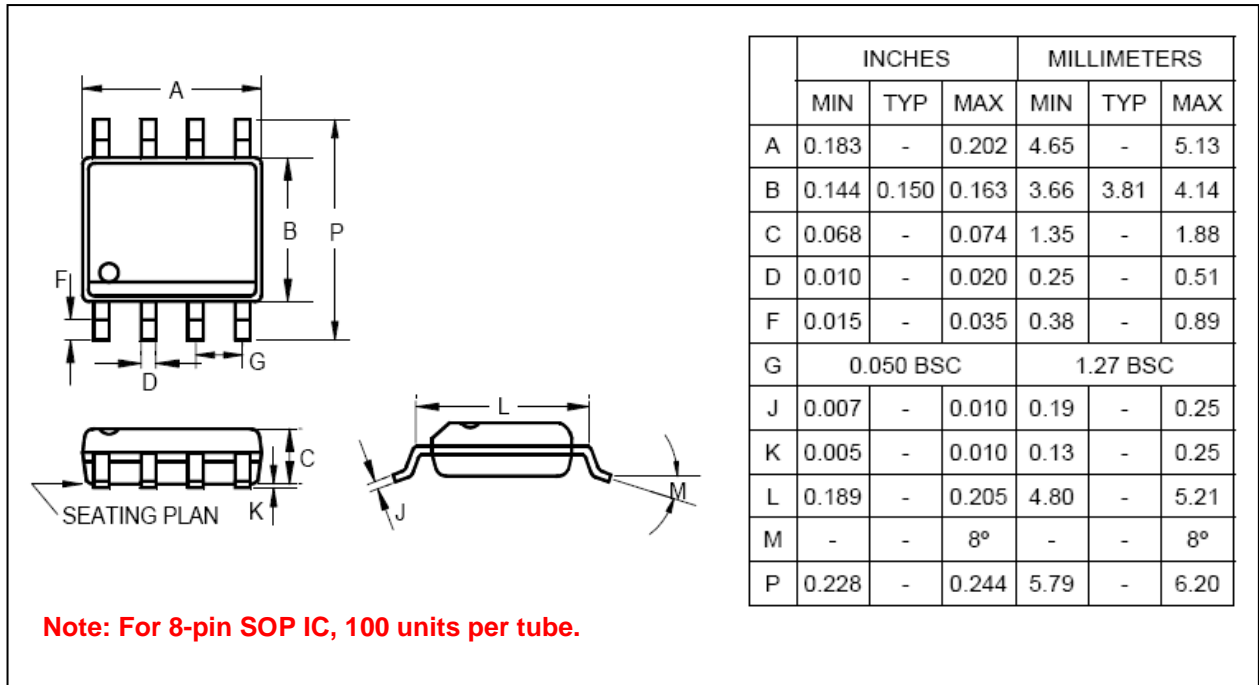
** In normal application, C1 (0.1uF) can be saved, but please reserve C1 space at PCB layout.*

8. PACKAGE DIMENSION

8.1 6-Pin Plastic SOT23-6 (63 mil)

	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	-	-	0.057	-	-	1.45
A1	-	-	0.006	-	-	0.15
A2	0.035	0.045	0.051	0.90	1.15	1.30
b	0.012	-	0.020	0.30	-	0.50
c	0.003	-	0.009	0.08	-	0.22
D	0.114 BSC			2.90 BSC		
E	0.110 BSC			2.80 BSC		
E1	0.063 BSC			1.60 BSC		
e	0.037 BSC			0.95 BSC		
e1	0.075 BSC			1.90 BSC		
L	0.012	0.018	0.024	0.30	0.45	0.60
L1	0.024 REF			0.60 REF		
L2	0.010 BSC			0.25 BSC		
°M	5°	10°	15°	5°	10°	15°

Note: For SOT23-6 IC, 3000 units per reel.

8.2 8-Pin Plastic SOP (150 mil)

9. ORDERING INFORMATION

P/N	Shipping Type	Package Width	Shipping
NY9M005AS6	SOT23-6	63 mil.	<u>Tape & Reel</u> : 3.0K pcs per Reel
NY9M005AS8	SOP-8	150 mil.	<u>Tape & Reel</u> : 2.5K pcs per Reel <u>Tube</u> : 100 pcs per Tube