



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

DATA SHEET

NY9M012A

Single Channel 1.2A Motor Driver

SKYTECH
ELECTRONIC

Version 1.2

May 15, 2015

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Revision History

<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2014/11/26	New release.	-
1.1	2014/12/04	Update DC Characteristics.	6
1.2	2015/05/15	Update DC Characteristics.	6

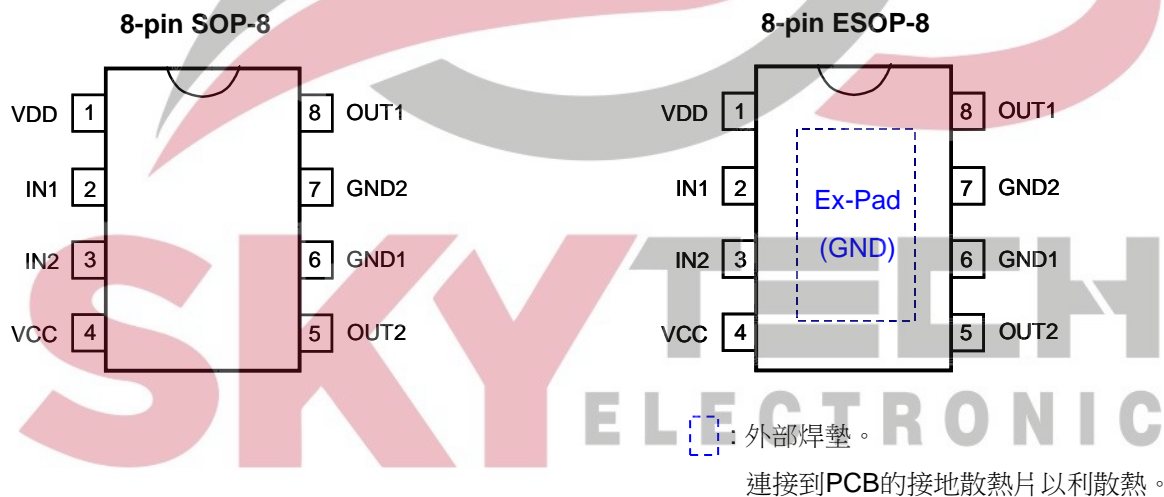


1. 概述

NY9M012A 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 ~ 9.6V。
- (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). 1.2A 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。

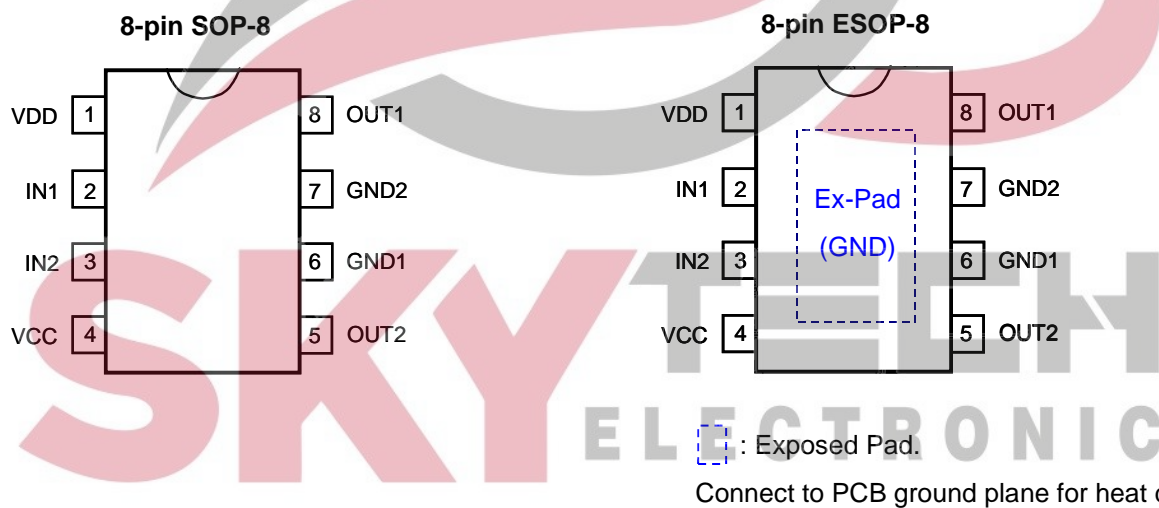


1. GENERAL DESCRIPTION

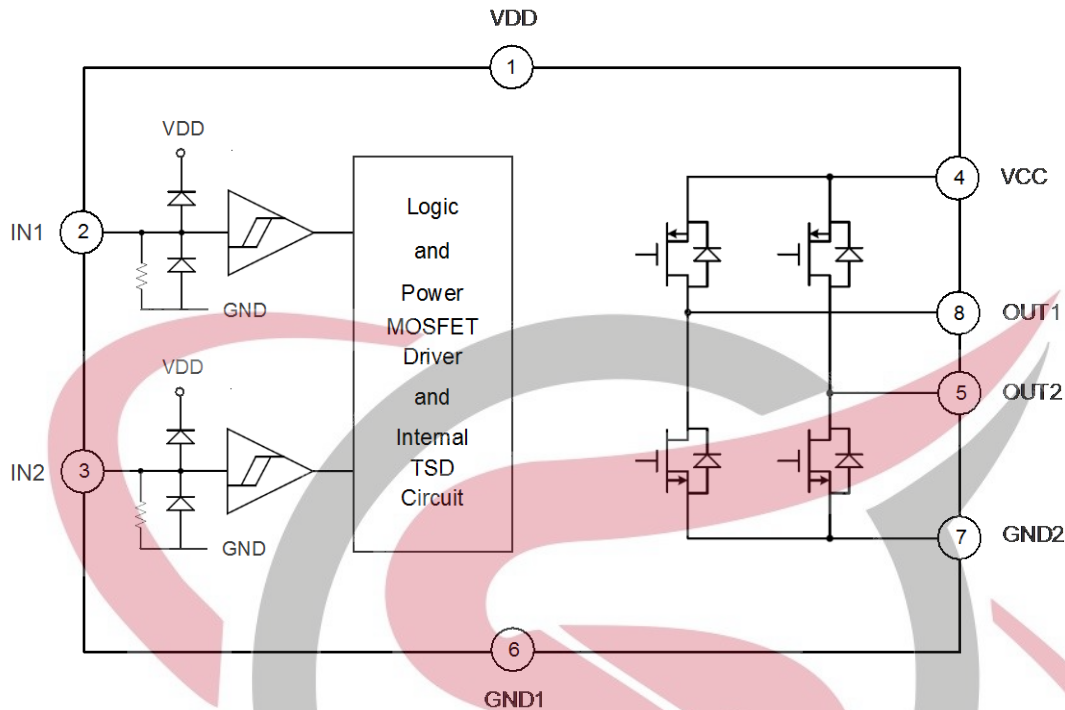
NY9M012A is a single-chip bi-directional motor driver CMOS IC for low-voltage applications. It is designed by LSI high technology with a low-power and low-cost process. It has H bridge driver of built-in MOSFET power switch to provide Forward / Reverse / Brake / Stop function for motor driver applications.

2. FEATURES

- (1). Wide operating voltage: 1.8V ~ 9.6V.
- (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 1.2A 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.



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

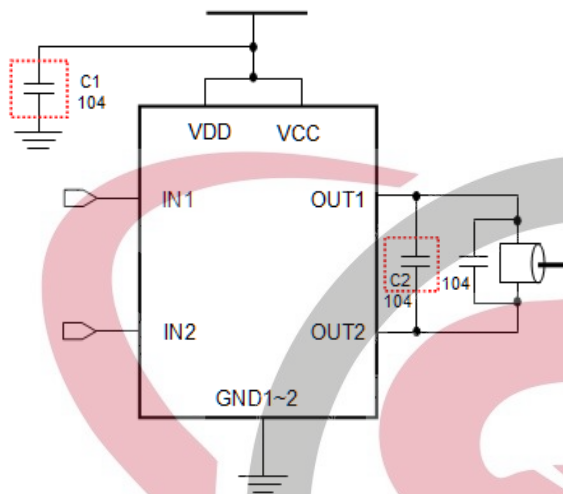
Symbol	Parameter	Rating	Unit	
$V_{DD} - V_{SS}$	Supply voltage of logic control circuit	-0.5 ~ +7.5	V	
V_{CC}	Supply voltage of output power MOSFET	10.0	V	
$I_{OUT-PEAK}$	Output peak current	2.5	A	
θ_{JA}	Thermal resistance (Junction to Ambient)	SOP-8	150	°C/W
		ESOP-8	60	
P_D	Power dissipation	SOP-8	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)

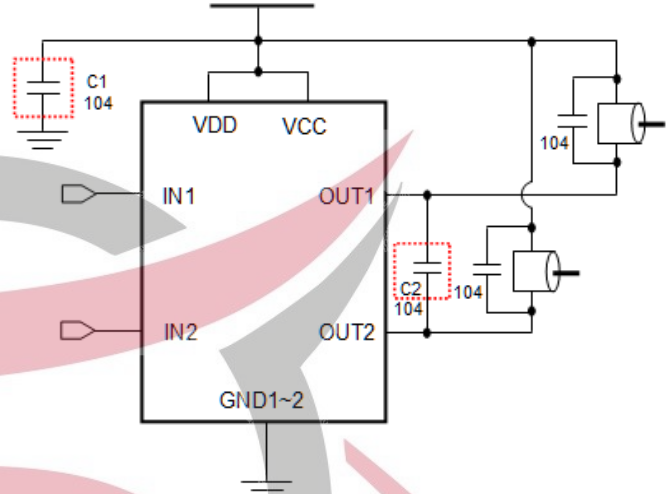
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
V_{DD}	Operating voltage (Logic)	1.8		6.8	V	
V_{CC}	Operating voltage (MOSFET)	1.8		9.6	V	
I_{SB}	Standby current		0.1	1	uA	IN1=IN2=0
I_{OP}	Operating current	$V_{DD} = V_{CC} = 3.0V$		180	uA	IN1=1, IN2=0 or IN1=0, IN2=1 or IN1=1, IN2=1
		$V_{DD} = V_{CC} = 6.0V$		260	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	2			V	
V_{IL}	Input low voltage			0.8	V	
R_{ON}	Output resistance (SOP-8 Package)		0.38		Ω	$I_{OUT} = 800mA$
			0.42		Ω	$I_{OUT} = 1200mA$
			0.48		Ω	$I_{OUT} = 1500mA$
	Output resistance (ESOP-8 Package)		0.35		Ω	$I_{OUT} = 800mA$
			0.38		Ω	$I_{OUT} = 1200mA$
			0.41		Ω	$I_{OUT} = 1500mA$
I_{OUT}	Output continuous current (* with PCB heat dissipation)		1200	1600*	mA	SOP-8
			1500	1900*	mA	ESOP-8
I_{PULSE}	Pulsed drain current			6.0	A	Pulse width < 20ms
T_{RISE}	Output rise time		310		ns	PWM=20kHz, Duty=50%
T_{FALL}	Output fall time		125		ns	
T_{RP}	Input-to-Output response time		420		ns	
T_{TSD}	Thermal shutdown (TSD)		160		°C	Junction temperature
T_{TSDH}	Thermal shutdown hysteresis		40		°C	

7. APPLICATION CIRCUIT

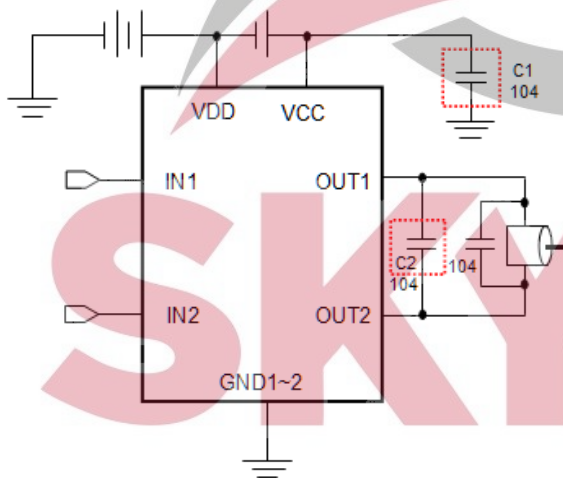
(1) One Motor Bi-Directional Control (Single Power)



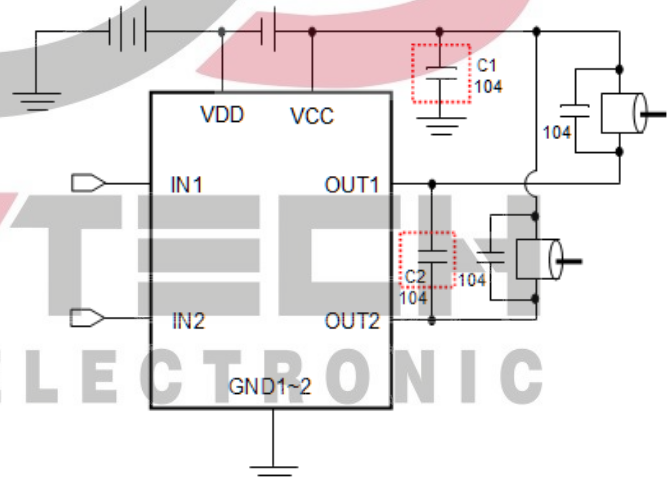
(2) Two Motors Directional Control (Single Power)



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



(4) Two Motors Directional Control (Dual Power)

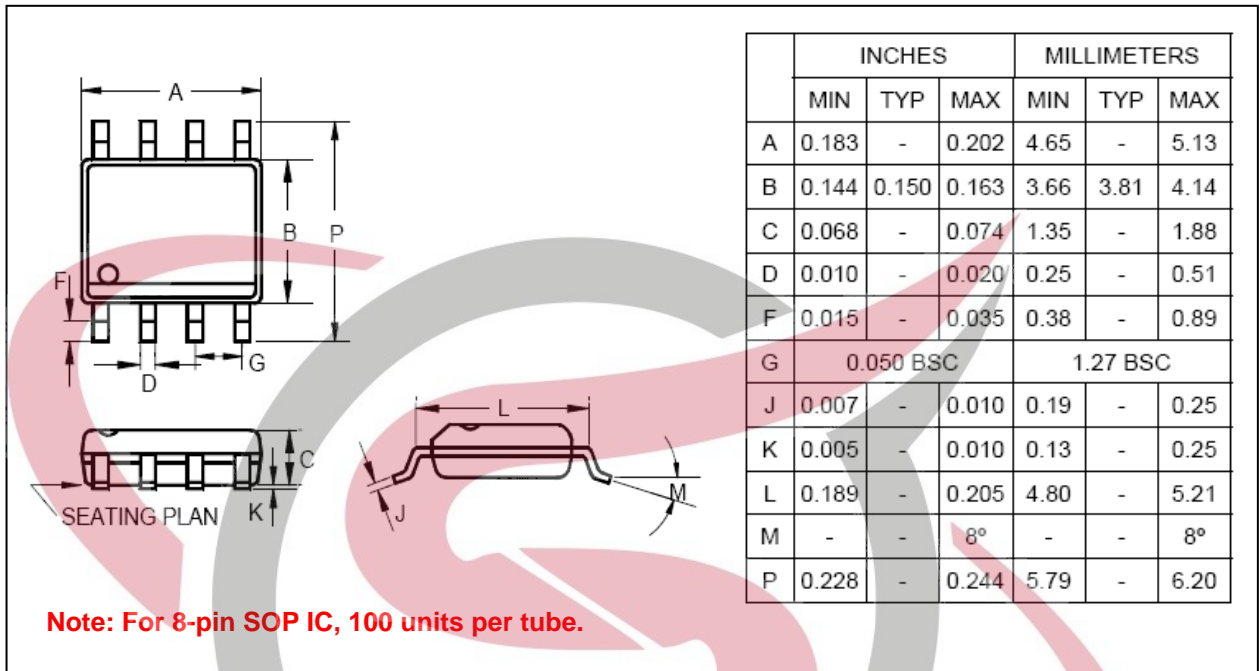


* In normal application, C1 (0.1uF) can be saved, but please reserve C1 space at PCB layout.

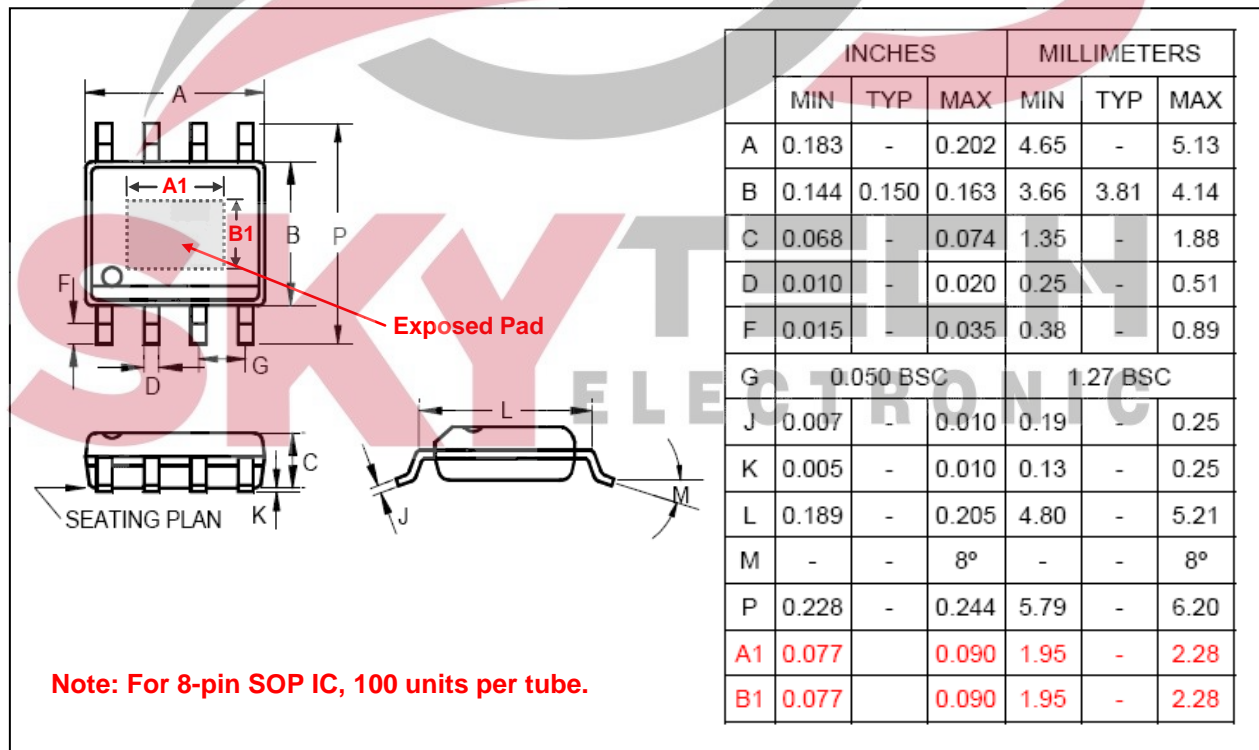
* If voltage is higher than 6.0V, C2 (0.1uF) is necessary to endure high voltage.

8. PACKAGE DIMENSION

8.1 8-Pin Plastic SOP (150 mil)



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



9. ORDERING INFORMATION

<i>P/N</i>	<i>Package Type</i>	<i>Package Width</i>	<i>Shipping</i>
NY9M012AS8	SOP-8	150 mil.	<u>Tape & Reel</u> : 2.5K pcs per Reel <u>Tube</u> : 100 pcs per Tube
NY9M012AE8	ESOP-8	150 mil.	

