



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

DATA SHEET

NY9M116B

**Dual Channel 1.3A/0.9A Motor Driver
With built-in 60mA LDO output**

Version 1.0

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Revision History

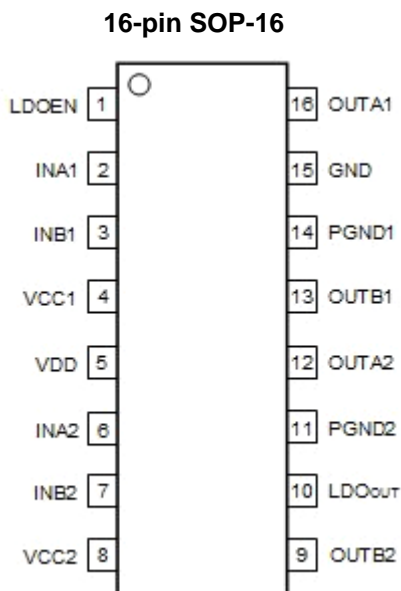
<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2017/11/25	Formal release.	-

1. 概述

NY9M116B 為單晶片 CMOS 的兩通道雙向馬達驅動 IC 並內建 3.3V LDO 輸出，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。通道 1 的持續輸出電流為 1.3A，最大峰值輸出電流可到 2.2A。通道 2 的持續輸出電流為 0.9A，最大峰值輸出電流可到 1.5A。NY9M116B 內建 60mA LDO 輸出電流，可提供給藍牙、微控制器等穩定電壓源。

2. 功能

- (1). 寬廣的工作電壓：CH1=1.8V ~ 6.8V，CH2=1.8V ~ 6.8V。
- (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). 通道 1 達到 1.3A，通道 2 達到 0.9A 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). 整合高性能穩壓器 (LDO)，內建輸出短路保護電路，可以提供穩定的 3.3V 輸出電壓。
- (9). 高達 5KV 的人體靜電模式 (HBM) 的 ESD 保護。
- (10). 邏輯電源 VDD 掉電過低時，輸出會進入停止 (Standby) 模式。
- (11). 僅提供 SOP-16 封裝。



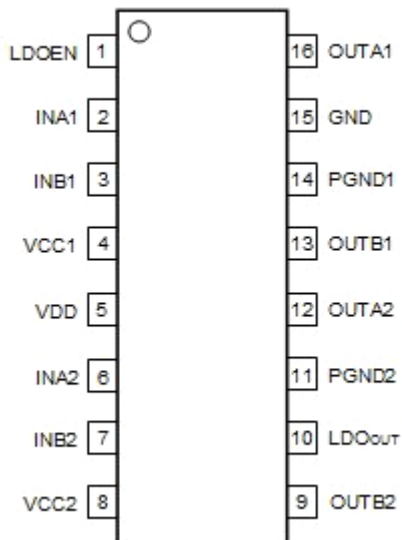
1. GENERAL DESCRIPTION

NY9M116B is a single-chip dual channel bi-directional motor driver CMOS IC with built-in 3.3V LDO output 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. Channel 1 has continuous current 1.3A with peak current 2.2A output capability. Channel 2 has continuous current 0.9A with peak current 1.5A output capability. With 60mA LDO output current, it can provide stable output voltage for Bluetooth, MCU and other applications.

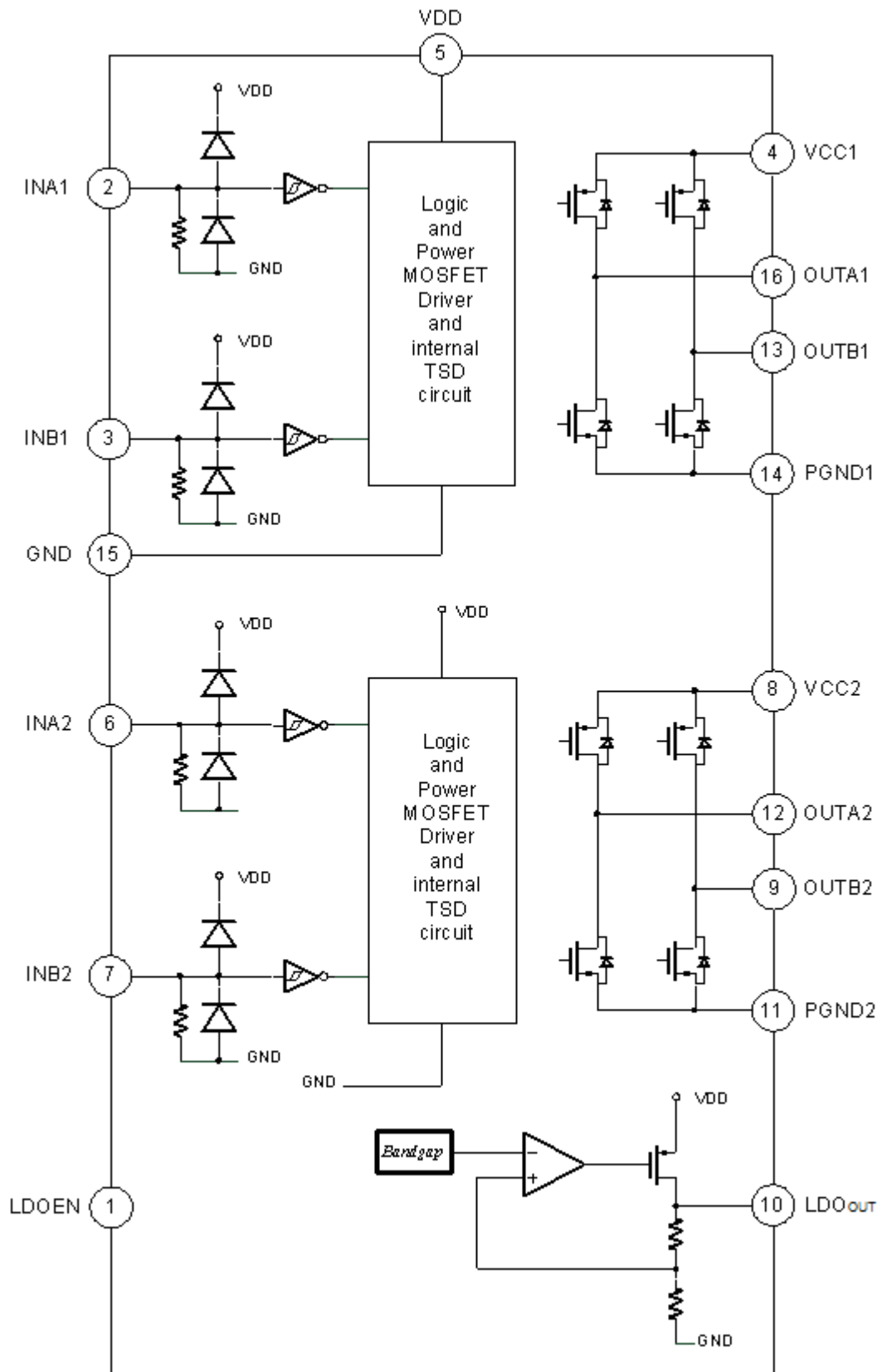
2. FEATURES

- (1). Wide operating voltage: CH1=1.8V ~ 6.8V, CH2=1.8V ~ 6.8V.
- (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). Channel 1 has over 1.3A output current capability. Channel 2 has over 0.9A 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). Built-in LDO Regulator with 3.3V fixed output voltage, and it has internal short circuit protection.
- (9). High 5KV Human Body Mode (HBM) ESD protection.
- (10). Stop (Standby) mode will take place after logic power VDD is too low or disappeared.
- (11). Only SOP-16 package type is available.

16-pin SOP-16



3. BLOCK DIAGRAM



4. PIN DESCRIPTION

Pin Name	Pin No.	ATTR.	Description
VDD	5	Power	Channel 1 & 2 logic control and LDO Positive power.
GND	15	Power	Channel 1 & 2 logic control and LDO Negative power.
INA1	2	I	Channel 1 Forward rotation logic input.
INB1	3	I	Channel 1 Backward rotation logic input.
OUTA1	16	O	Channel 1 Forward rotation output.
OUTB1	13	O	Channel 1 Backward rotation output.
VCC1	4	Power	Channel 1 Positive power of output power MOSFET.
PGND1	14	Power	Channel 1 Negative power of output power MOSFET.
INA2	6	I	Channel 2 Forward rotation logic input.
INB2	7	I	Channel 2 Backward rotation logic input.
OUTA2	12	O	Channel 2 Forward rotation output.
OUTB2	9	O	Channel 2 Backward rotation output.
VCC2	8	Power	Channel 2 Positive power of output power MOSFET.
PGND2	11	Power	Channel 2 Negative power of output power MOSFET.
LDOEN	1	I	LDO enable logic input, high active.
LDOout	10	Power	LDO 3.3V output.

5. FUNCTION DESCRIPTION

INAx	INBx	OUTAx	OUTBx	Function
0	0	Z (Off)	Z (Off)	Stop (Standby)
1	0	1	0	Forward
0	1	0	1	Backward
1	1	0	0	Brake

LDOEN	Function
VDD	LDO on
GND	LDO off (Standby)

6. ELECTRICAL CHARACTERISTICS

6.1 Absolute Maximum Rating

Symbol	Parameter	Rating	Unit
$V_{DD} - V_{SS}$	Ch-1 & Ch-2 Supply voltage of logic control circuit	-0.5 ~ +7.5	V
V_{CC1}	Ch-1 Supply voltage of output power MOSFET	7.5	V
V_{CC2}	Ch-2 Supply voltage of output power MOSFET	6.8	V
$I_{OUT-PEAK}$	Output peak current	Channel 1	2.2
		Channel 2	1.5
θ_{JA}	Thermal resistance (Junction to Ambient)	SOP-16	123
P_D	Power dissipation	SOP-16	1.1
T_A	Operating ambient temperature		-40 ~ +85
T_J	Operating junction temperature		+160
T_{ST}	Storage temperature		-55 ~ +160

6.2 DC Characteristics ($V_{DD}=4.5V$, $V_{CC1}=6.0V$, $V_{CC2}=6.0V$, $T_A=25^\circ C$, unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
V_{DD}	Ch-1 & Ch-2 Operating voltage (Logic)	1.8		6.8	V	
V_{CC1}	Ch-1 Operating voltage (MOSFET)	1.8		6.8	V	
V_{CC2}	Ch-2 Operating voltage (MOSFET)	1.8		6.8	V	
I_{SB}	Standby current		0.1	1	μA	$IN_A=IN_B=0$
I_{OPX}	Operating current	$V_{DD} = V_{CCX} = 4.5V$		400	μA	$IN_A=1, IN_B=0$ or $IN_A=0, IN_B=1$ or $IN_A=1, IN_B=1$
		$V_{DD} = V_{CCX} = 6.0V$		540	μA	
I_{IHx}	Input high current (12k Ω pull-low resistance)		390		μA	$V_{IHx} = 4.5V$
			510		μA	$V_{IHx} = 6.0V$
V_{IH1}	Ch-1 input high voltage	2.0			V	
V_{IL1}	Ch-1 input low voltage			0.8	V	
V_{IH2}	Ch-2 input high voltage	2.0			V	
V_{IL2}	Ch-2 input low voltage			0.8	V	
R_{ON1}	Ch-1 output resistance		0.58		Ω	$I_{OUT1} = 500mA$
			0.63		Ω	$I_{OUT1} = 800mA$
			0.74		Ω	$I_{OUT} = 1200mA$
R_{ON2}	Ch-2 output resistance		0.93		Ω	$I_{OUT2} = 200mA$
			0.99		Ω	$I_{OUT2} = 500mA$
			1.14		Ω	$I_{OUT2} = 800mA$
I_{OUT1}	Ch-1 output continuous current (* with PCB heat dissipation)		1300	1500*	mA	SOP-16
I_{OUT2}	Ch-2 output continuous current (* with PCB heat dissipation)		900	1100*	mA	

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
I _{PULSE1}	Ch-1 pulsed drain current			5.0	A	Pulse width < 20ms
I _{PULSE2}	Ch-2 pulsed drain current			2.5	A	Pulse width < 20ms
T _{RISE1}	Ch-1 output rise time		350		ns	PWM=20kHz, Duty=50%
T _{FALL1}	Ch-1 output fall time		170		ns	
T _{RP1}	Ch-1 Input-to-Output response time		570		ns	
T _{RISE2}	Ch-2 output rise time		360		ns	PWM=20kHz, Duty=50%
T _{FALL2}	Ch-2 output fall time		190		ns	
T _{RP2}	Ch-2 Input-to-Output response time		600		ns	
T _{TSD}	Thermal shutdown (TSD)		160		°C	Junction temperature
T _{TSDH}	Thermal shutdown hysteresis		40		°C	

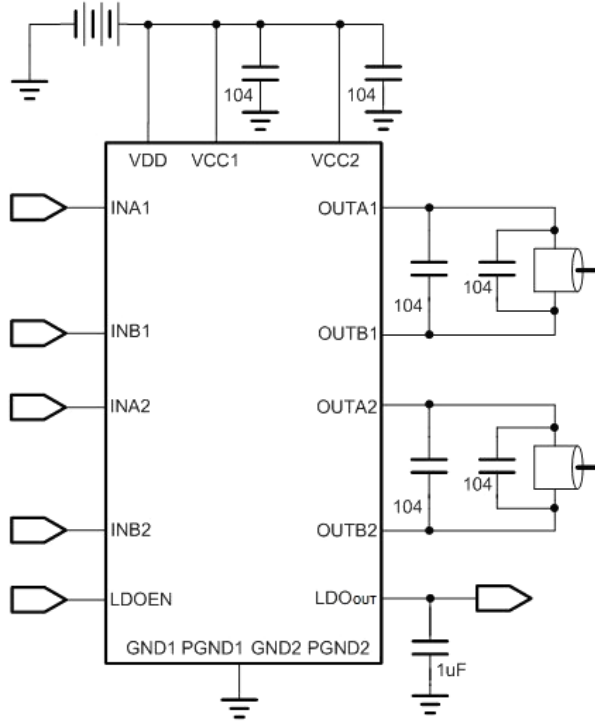
'x' presents value 1 or 2.

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

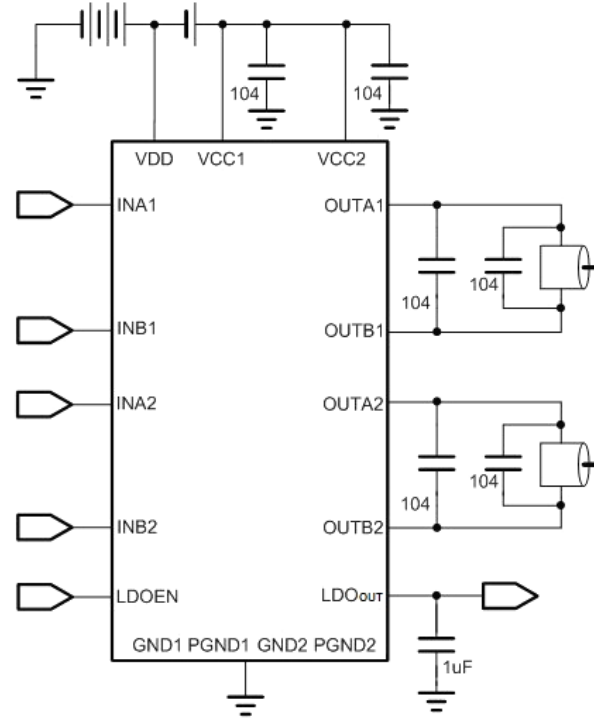
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
V _{DD}	LDO Operating voltage	2.5		6.8	V	
V _{LDO}	LDO output voltage	3.2	3.3	3.4	V	I _{LDO} = 1mA
I _{OUT}	LDO output current		60	80	mA	
V _{DROP}	Dropout Voltage		300		mV	I _{OUT} = 60mA
I _Q	Ground Current		12	20	uA	No Load
V _{LDR}	Load Regulation		60		mV	0mA ≤ I _{OUT} ≤ 60mA
V _{LNR}	Line Regulation		0.05		%/V	V _{IN} = 3.7V to 5.5V, I _{OUT} = 60mA
I _{SHORT}	Short Circuit Current		70		mA	V _{OUT} = GND

7. APPLICATION CIRCUIT

(1) Two Motors Bi-Directional Control (Single Power)



(2) Two Motors Bi-Directional Control (Dual Power)



8. PACKAGE DIMENSION

16-Pin Plastic SOP (150 mil)

	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.236 BSC			6.00 BSC		
B	0.154 BSC			3.90 BSC		
C	0.012	-	0.020	0.31	-	0.51
C'	0.390 BSC			9.90 BSC		
D	0.065	-	0.069	1.64	-	1.75
E	0.050 BSC			1.27 BSC		
F	0.004	-	0.010	0.10	-	0.25
G	0.016	-	0.050	0.40	-	1.27
H	0.004	-	0.010	0.10	-	0.25
α	-	-	8°	-	-	8°

Note: For 16-pin SOP IC, 50 units per tube.

9. ORDERING INFORMATION

<i>P/N</i>	<i>Package Type</i>	<i>Package Width</i>	<i>Shipping</i>
NY9M116BS16	SOP-16	150 mil.	<u>Tape & Reel</u> : 2.5K pcs per Reel <u>Tube</u> : 50 pcs per Tube