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AP1011

9V　Dual H-Bridge Motor Driver IC

General Description

　The AP1011 includes 2 channel H-bride drivers in one package. It also includes Under voltage Detection and Thermal Shut Down circuits. It is suitable for driving stepper motor and voice coil motors.

Features

☐ 2 channel H-bridge drivers in one package
☐ Power Supply Voltage Range
　　　Control（VDD）　　：2.7V～5.5V
　　　Motor（VB）　　　：2.0V～7.0V（VDDmax=5.5V）
　　　　　　　　　　　　2.0V～9.0V（VDDmax=3.6V）
☐ Output Current：0.7A（DC）, 1.4A（Peak）
☐ Low ON Resistance：RDSON (TOP+BOT)=0.54Ω（TYP）@25℃ or 0.72Ω（TYP）@85℃
☐ Possible High Frequency PWM Pulse Input：max 200kHz
☐ Built in Flow-through Current Protection Circuit
☐ Built in Charge Pump Circuit
☐ Built in UVLO & TSD Circuits
☐ Package：16pin 3mm×3mm QFN
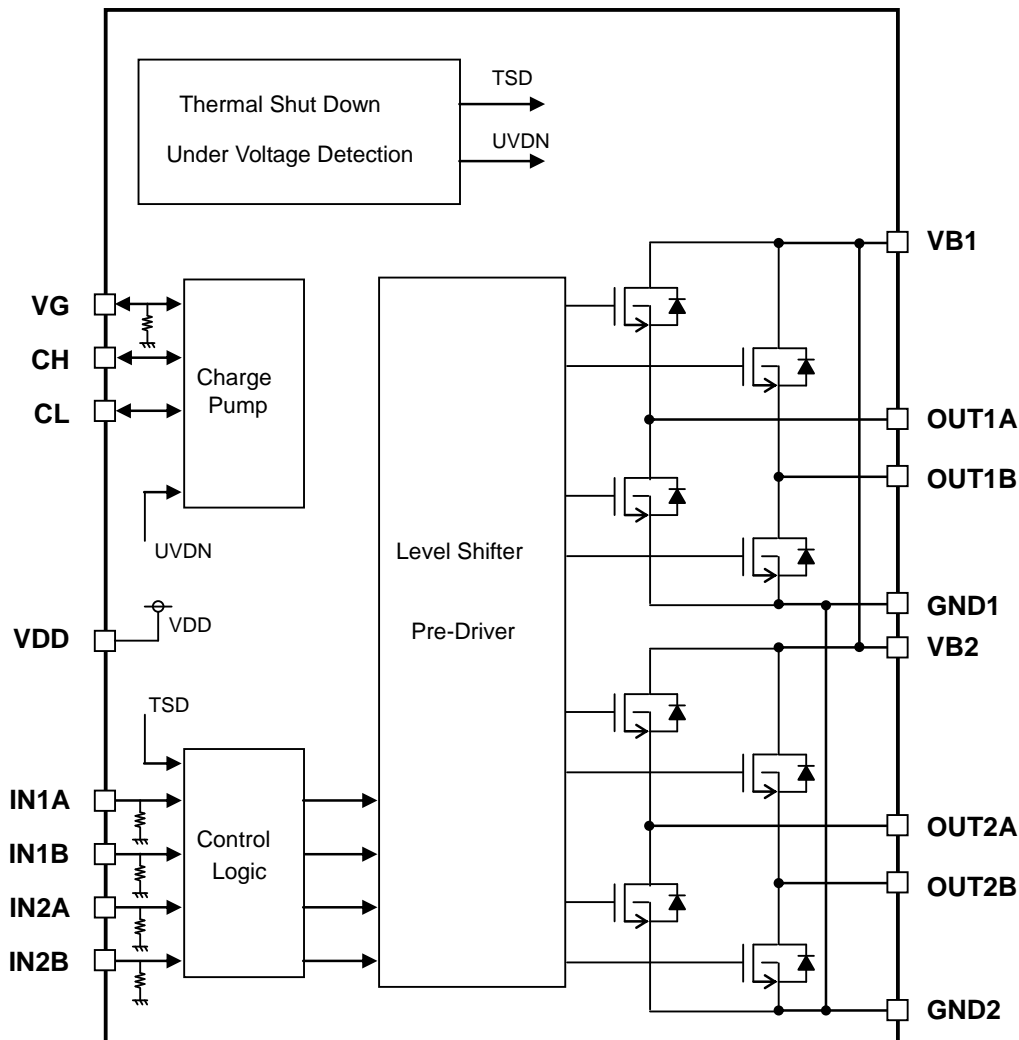
Block Diagram

Fig1. Block diagram

☐ H-bridge driver block

  NMOS type FETs are applied both high side and low side FETs of a H−bridge.

☐ Charge pump block

  It generates the drive voltage（VG）of gate for a high side FET.

☐ Control logic block

  Each H−bridge driver is controlled by two input signal IN1/2A or IN1/2B.

☐ Level shifter & pre-driver block

  Control signals for the high side FET is shifted VG voltage and then drive the gate of the high side FET.

☐　Under Voltage Detection

  It is monitoring the control voltage（VDD）, if the VDD is less than the specified voltage, the output
  of the H−bridge goes to high impedance.

☐ Thermal Shut Down

  If the temperature of the chip is more than the specified temperature, the output of the H−bridge goes
  to high impedance.

Absolute Maximum Ratings

Ta = 25°C unless otherwise specified.

Parameter	Symbol	Min	Max	Unit	Comments
Control supply voltage	VDD	-0.5	6.0	V	
Motor supply voltage1	VB1	-0.5	7.5	V	VDDmax=5.5V
Motor supply voltage 2	VB2	-0.5	9.4	V	VDDmax=3.6V
Input voltage 1 (IN1A, IN1B, IN2A, IN2B)	Vterm1	-0.5	VDD	V	
Input voltage 2 (OUT1A, OUT1B, OUT2A, OUT2B, CL)	Vterm2	-0.5	VB	V	
Input voltage 3 （CH, VG）	Vterm3	-0.5	13.5	V	
Maximum output current	Iload_dcr		1.0	A	Ta=25°C
Maximum output current	Iload_dch		0.7	A	Ta=85°C
Maximum output peak current	Iload_peak		1.4	A	(note3)
Power dissipation	PD_r		2.0	W	(note4), Ta=25°C
Power dissipation	PD_h		1.0	W	(note4), Ta=85°C
Storage temperature	Tstg	-40	150	°C	

(note1) All above voltage is defined to GND1/2=0V.

(note2) Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter. That is, the absolute maximum ratings are rated values at which the products on the verge of suffering physical damages, and therefore products must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

(note3) The ON time must be less than 10ms and the ON time duty cycle must be less than 5%.

(note4) Assembly condition: When the 2-layer(pattern rate:150%) board is used. This is calculated $R_{\theta J}$=60°C/W.

Recommended Operating Conditions

Ta = 25°C unless otherwise specified.

Parameter	Symbol	Min	Typ	Max	Unit	Comments
Motor supply voltage1	VB1	2.0	5.0	7.0	V	VDDmax=5.5V
Motor supply voltage 2	VB2	2.0	5.0	9.0	V	VDDmax=3.6V
Control supply voltage	VDD	2.7	3.0	5.5	V	
Input puls frequency	FIN			200	kHz	Duty=50%(input puls)
Ambient temperature	Ta	-40		85	°C	
Maximun junction temperaure	Tj			150	°C	

(note1) All above voltage is defined to GND1/2=0V.

Control logic truth table

Protection detection		Input		Output	
UVDN	TSD	IN1A IN2A	IN1B IN2B	OUT1A OUT2A	OUT1B OUT2B
H	L	L	L	L	L
H	L	H	L	H	L
H	L	L	H	L	H
H	L	H	H	Hi-Z	Hi-Z
H	H	X	X		
L	X	X	X		

Package

1. Mecanical demensions：16pin QFN package

3.00±0.07

B

1.50

A

3.00±0.07

1.50

1.80

1.80

0.30±0.07

0.22±0.05

⊕ 0.05 Ⓜ S A B

C0.30

S

0.75MAX

0.70

0.05MAX

A部

0.50

⌐ 0.05 S

0.00～0.05

0.12～0.18

0.17～0.27

【detail A】

Unit:mm
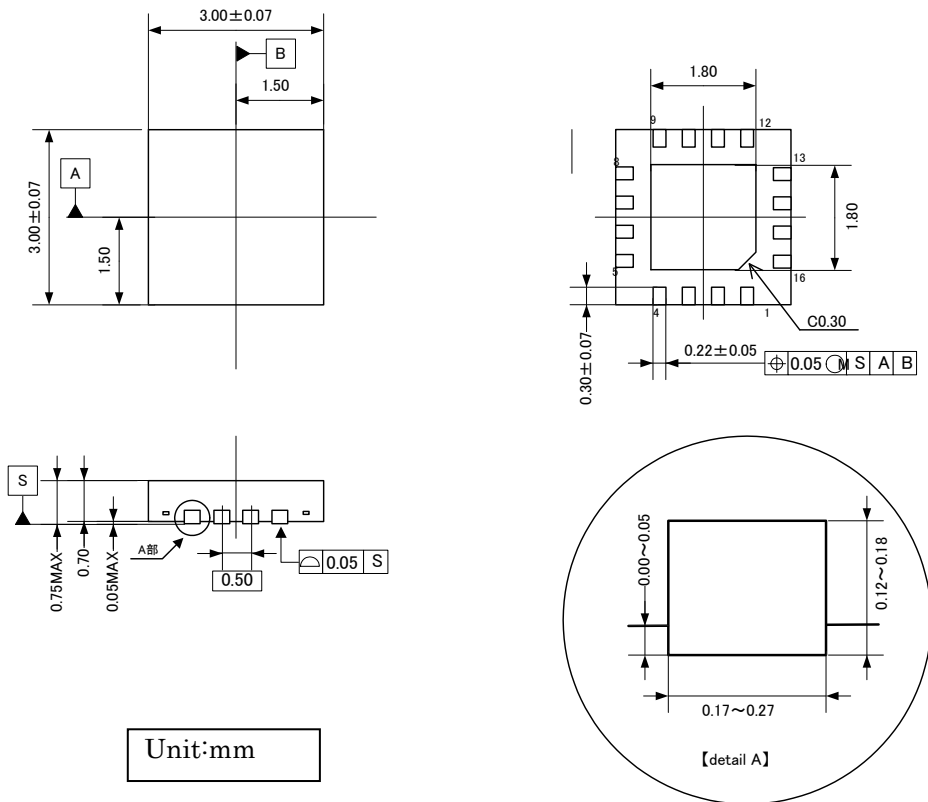
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