Two Channel H-Bridge Power Driver AM1127

Features and Benefits

- Wide supply voltage range up to 6.8V
- Output_1A/1B maximum continuous current up to 1.5A
- Output _2A/2B maximum continuous current up to 1.1A
- Low standby current
- Low operating supply current
- Low $R_{DS(ON)}$ for high efficient H-bridge output
- Built-in LDO Regulator (3.3V/2.75V)
- LDO output driver current 60mA
- QFN 3X3 package for small size PCB layout
- Output_1A/1B over current protection
- Over temperature protection

Application

- Toys (R/C car)
- Robotics (Sweeping robot)
- Small Appliances (Reduce PCB area and perimeter part)
- Any relevant DC motor applications

Description

The AM1127 is two channels H-Bridge driver with a build in Low Dropout Regulator (LDO). It provides integrated motor-driver solution for high current power motion control applications. The output driver block consists of N-channel and P-channel power MOSFETs configured as H-Bridge to driver DC motor.

The AM1127 maximum operational voltage is 6.8V. Output_1A/1B can supply up to 1.5A of output continuous current and 3A of output peak current. There are internal shutdown function for over-temperature protection and over-current protection (I_{OCP} = 3 A).

Package material is Halogen-Free Green Product & RoHS compliant for the purpose of environmental protection and for sustainable development of the Earth.

Ordering Information

Orderable Part Number	Package	Marking
AM1127	QFN 3X3	A1127

● Absolute Maximum Ratings (T_A=25℃)

Parameter	Symbol	Limits	Unit
Power Supply voltage	PVCC	7	V
Digital Supply voltage	DVCC	7	V
Output_1A/1B continuous current	Iocont	1.5 (Note*)	A
Output_1A/1B peak current	Iomax	3.0	A
Output_2A/2B continuous current	Iocont	1.1 (Note*)	A
Operate temperature range	T_{opr}	-20～+85	℃
Storage temperature range	T_{stg}	-40～+150	℃

Note *: Based on 30x25mm^2 FR4 PCB (1 oz.) at double side PCB

● Recommended operating conditions (T_A =25℃)

(Set the power supply voltage taking allowable dissipation into considering)

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply voltage	PVCC	2.0		6.8	V
Digital Supply voltage	DVCC	2.0(Note**)		6.8	V
Signal input IN_xA/xB voltage	V_{IN_x}	-0.3		Vcc+0.3	V
Output_1A/1B continuous current	$I_{OUT\_1A/1B}$	0		1.5(Note*)	A
Output_2A/2B continuous current	$I_{OUT\_2A/2B}$	0		1.1(Note*)	A
Externally applied PWM frequency	F_{IN_x}	0.02		65	KHz

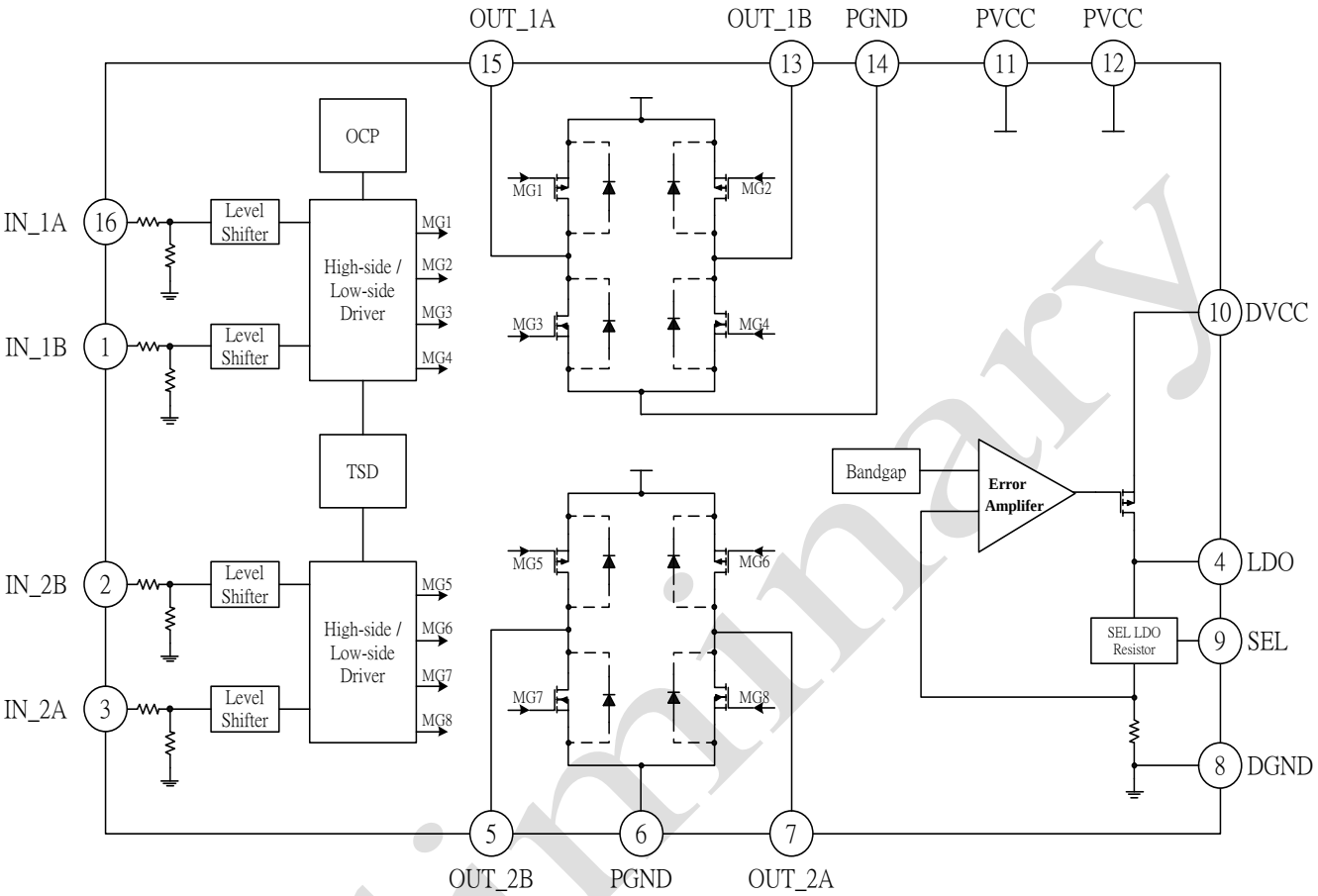
Note *: Based on 30x25mm^2 FR4 PCB (1 oz.) at double side PCB

Note **: The DVCC should be considered when using LDO function.

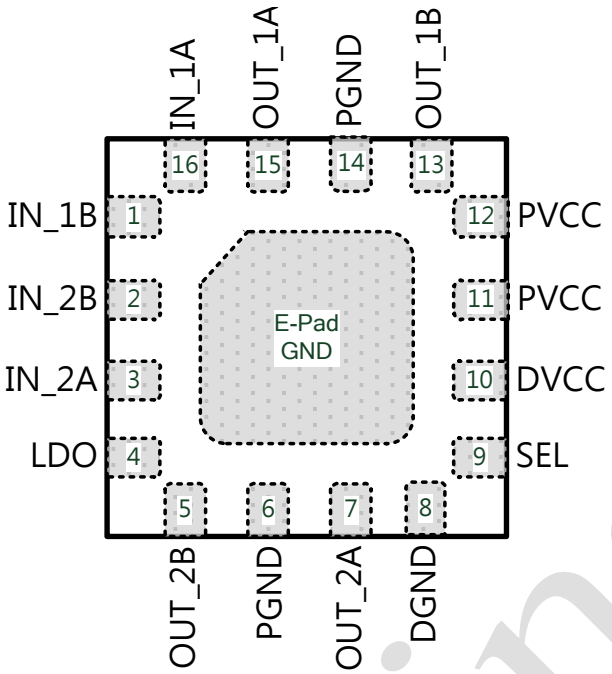
Electrical Characteristics (Unless otherwise specified, TA = 25℃, PVCC=DVCC=5V)

Parameter	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Power Supplies						
Operating supply current	I_{CC}		25		uA	Input signal IN_xA/xB= L/H or H/L or H/H, OUT_ xA/xB and LDO no load
Standby current	I_{STB}		8		uA	Input signal IN_ xA/xB=L, OUT_ xA/xB and LDO no load
IN_x Inputs						
Input H level voltage	V_{IN_xH}	2.0		DVCC	V	
Input L level voltage	V_{IN_xL}	0		0.7	V	
Input pull down resistance	R_{IN_X}		100		KΩ	
Input frequency	F_{IN_x}	0.02		65	KHz	
H-bridge FETs						
Output_1A/1B On-resistance	$R_{ds(on)}$		0.33		Ω	I_O = 1.0A Upper and Lower total
Output_2A/2B On-resistance	$R_{ds(on)}$		0.50		Ω	I_O = 0.6A Upper and Lower total
TSD Protections						
Thermal shutdown protection	TSD_p		175		℃	
Thermal shutdown release	TSD_r		120		℃	
LDO parameter (SEL=L)						
LDO output voltage	V_{LDO}	2.5	2.75	3	V	I_{Load} = 60mA
Load regulation	$\triangle V_{RL}$			50	mV	I_{Load}= 0~60mA
Dropout voltage	$\triangle V_{DO}$			300	mV	I_{Load}= 60mA
LDO parameter (SEL=H)						
LDO output voltage	V_{LDO}	3.0	3.3	3.6	V	I_{Load} = 60mA
Load regulation	$\triangle V_{RL}$			50	mV	I_{Load}= 0~60mA
Dropout voltage	$\triangle V_{DO}$			300	mV	I_{Load}= 60mA

Block Diagram



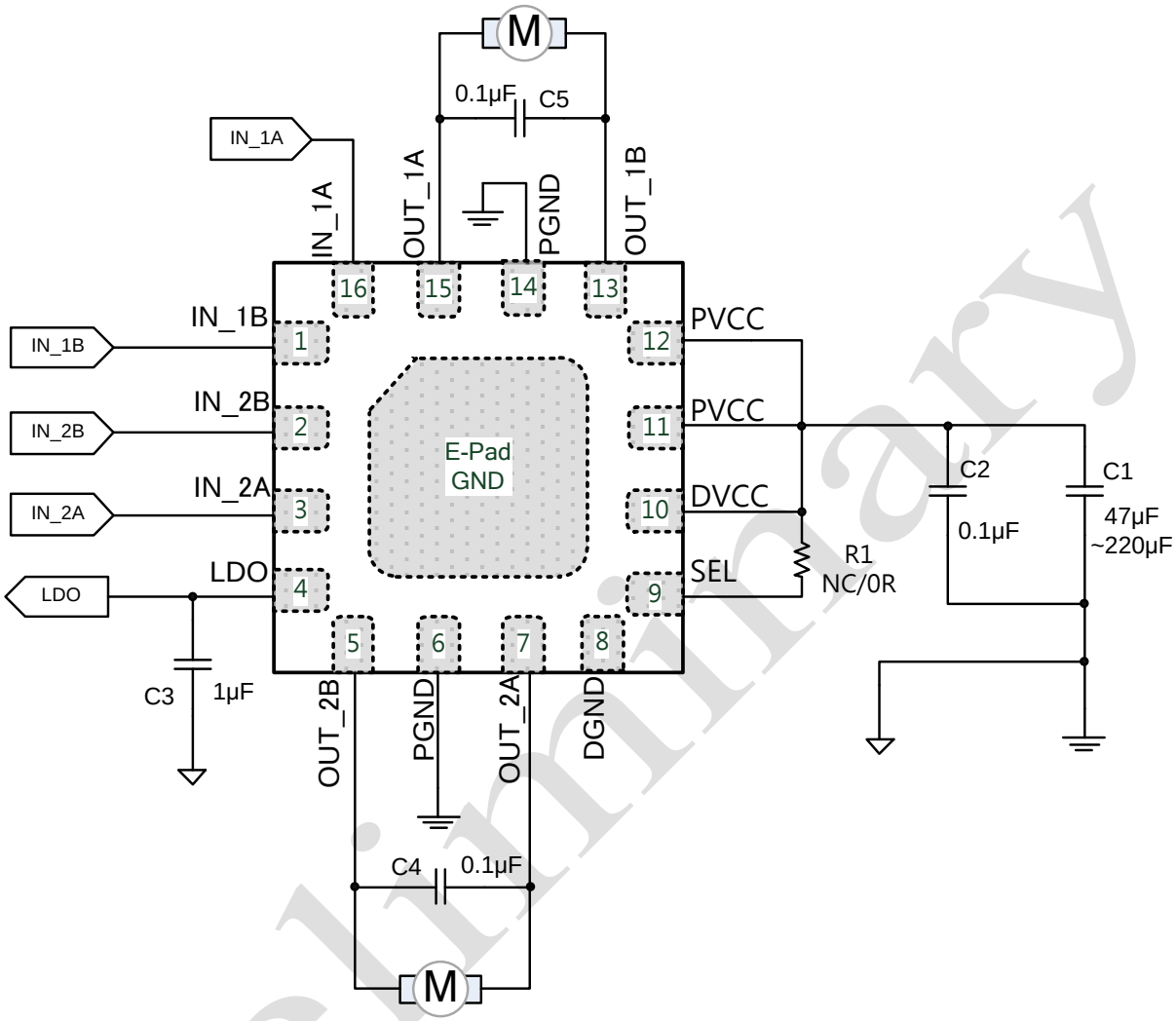
- **Pin configuration QFN 3X3**



- **Pin Descriptions**

PIN No	Pin Name	I/O	Description
1	IN_1B	I	Input Signal 1B
2	IN_2B	I	Input Signal 2B
3	IN_2A	I	Input Signal 2A
4	LDO	O	Low Dropout Regulator
5	OUT_2B	O	Output 2B
6	PGND	-	Power Ground
7	OUT_2A	O	Output 2A
8	DGND	-	Digital Ground
9	SEL	I	Selection LDO output Voltage pin
10	DVCC	-	Digital Power Supply
11	PVCC	-	Power Supply
12	PVCC	-	Power Supply
13	OUT_1	O	Output 1B
14	PGND	-	Power Ground
15	OUT_1A	O	Output 1A
16	IN_1A	I	Input Signal 1A

Application



LDO	SEL Function	R1
2.75V	L	NC
3.30V	H	0R

Circuit Descriptions

The function descriptions of capacitors on the application circuit:

1. C1、C2: Power supply PVCC/DVCC pin capacitor:
   a) The capacitor can reduce the power spike when the motor is in motion. To avoid the IC directly damaged by the PVCC/DVCC peak voltage. It also can stabilize the power supply voltage and reduce its ripples.
   b) The C1 capacitor can compensate power when motor starts running.
   c) The capacitor value (μF) determines the stability of the PVCC/DVCC during motor in motion. In general, 47μF capacitor is enough in low voltage power. If the large voltage power or a heavy loading motor is used, then a larger capacitor would be needed.
   d) On the PCB configuration, the C1、C2 must be mounted as close as possible to PVCC/DVCC pin .
2. C3: The LDO output capacitor
   a) The capacitor can reduce the power spike while motor is in motion; it also can stabilize the LDO output voltage and reduce its ripples.
3. C4、C5: The across-output capacitor
   a) The capacitors can reduce the power spike of motor when operating. Therefore, a 0.1μF capacitor is recommended.
   b) On the PCB configuration, the C4、C5 must be mounted as close as possible to motor side.
   c) The C4、C5 capacitor must be added to the general application.

Input Logic Descriptions

Function truth table Output_2A/2B

IN_2A	IN_2B	OUT_2A	OUT_2B	Mode
L	L	Z	Z	Stop
L	H	L	H	Reverse
H	L	H	L	Forward
H	H	L	L	Brake

Function truth table Output_1A/1B

IN_1A	IN_1B	OUT_1A	OUT_1B	Mode
L	L	Z	Z	Stop
L	H	L	H	Reverse
H	L	H	L	Forward
H	H	L	L	Brake

Operating Mode Descriptions

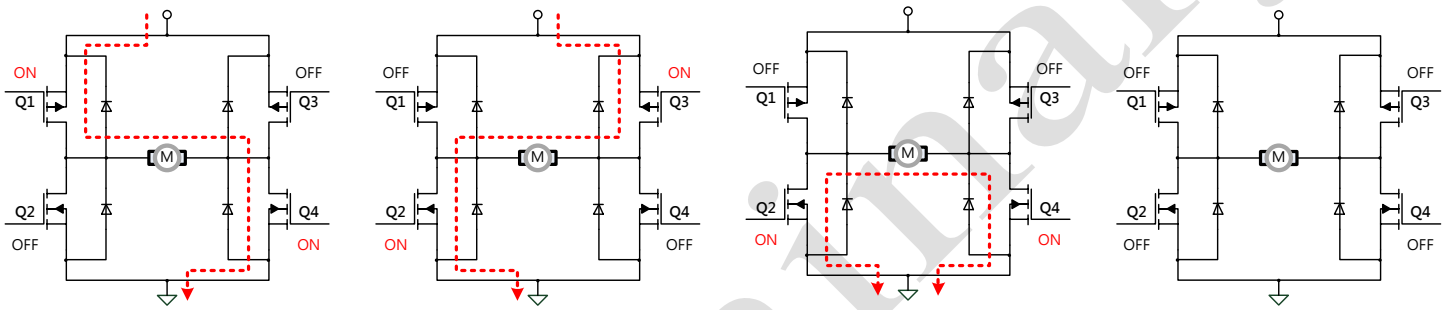
H-Bridge basic operating mode：

a) Forward mode
Definition：When IN_xA=H，IN_xB=L，then OUT_ xA=H，OUT_xB=L

b) Reverse mode
Definition：When IN_xA=L，IN_xB=H，then OUT_xA=L，OUT_ xB=H

c) Brake mode
Definition：When IN_xA =IN_xB= H，then OUT_xAF=OUT_ xB=L

d) Stop mode
Definition：When IN_xA=IN_xB= L，then OUT_ xA=OUT_ xB=Hi-Z



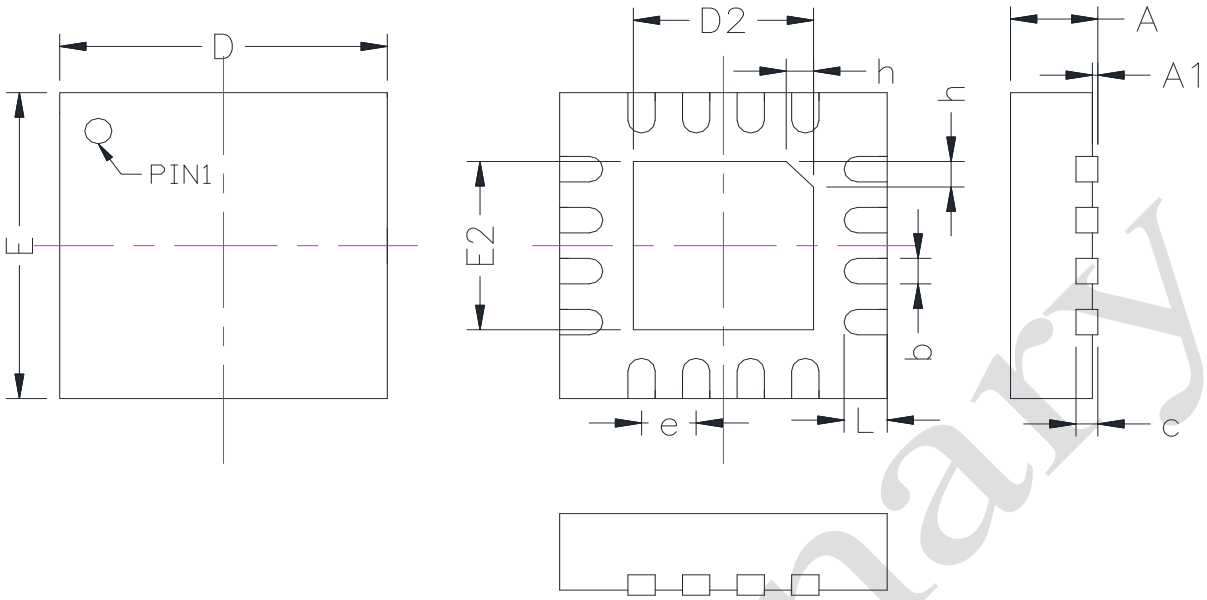
a) Forward mode　　b) Reverse mode　　c) Brake mode　　d) Stop mode

Protection Mechanisms Descriptions

1) Over-temperature protection
If the IC junction temperature exceeds 175° C (Typ.), the internal over-temperature protection function will be triggered, all FETs in the H-bridge are disabled, that will ensure the safety of customers' products. If the IC junction temperature falls to 120° C (Typ.), the IC resumes automatically.

2) Output_1A/1B over-current protection (OCP)
While the IC conducts a large current, 3A (Typ), the internal over-current protection function will be triggered. The device enter protection mode of auto-recover to avoid damaging IC and system.

- **Packaging outline --- QFN 3X3 16L** **Unit : mm**



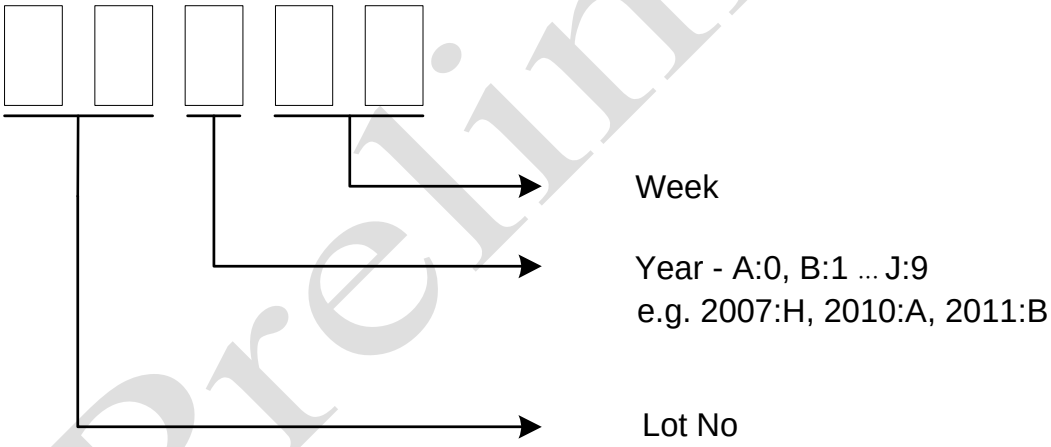
SYMBOL	MILLIMETERS		INCHES	
	Min.	Max.	Min.	Max.
A	0.70	0.80	0.028	0.032
A1	0.00	0.05	0.000	0.002
c	0.20 REF		0.008 REF	
b	0.18	0.30	0.007	0.012
D	3.00 BSC		0.118 BSC	
D2	1.55	1.75	0.061	0.069
E	3.00 BSC		0.118 BSC	
E2	1.55	1.75	0.061	0.069
L	0.35	0.45	0.014	0.018
h	0.20	0.30	0.008	0.012
e	0.50 BSC		0.020 BSC	

● Marking Identification

NOTE:

Row1 ： A1127

Row2 ： Wafer Lot No use two codes + Assembly Year use one code + Assembly Week use two codes



Example: Wafer Lot No is PK + Year 2015 is F + Week 08 is 08，then mark〝PKF08〞

The last code of assembly year, explanation as below:：

(Year： A=0,B=1,C=2,D=3,E=4,F=5,G=6,H=7,I=8,J=9. For example: year 2015=F)