# **LB1936V**

**Monolithic Digital IC** 

# 1-2 Phase Excitation Stepper Motor Driver



http://onsemi.com

#### Overview

The LB1936V is a 2-phase bipolar drive stepper motor driver IC that supports low-voltage drive. The LB1936V's miniature package and minimal number of external components reduces the required mounting area. It also provides high-efficiency motor drive and can reduce circuit current consumption. Since it provides a current detection pin and supports PWM control input, it can be used to implement current chopper control at the system level. The LB1936V is optimal for the stepper motor drive in scanners, digital cameras, and printers.

#### **Features**

- Low saturation voltage forward/reverse motor driver ( $V_O$  sat = 0.25V at  $I_O$  = 200mA)
- Two H-bridge channels
- Wide usable voltage range (Allowable voltage range : 2.5V to 9.5V, absolute maximum rating : 10.5V)
- Supports PWM input (Low power consumption can be achieved in slow delay mode that uses IN1/IN2 = H/H logic.)
- Motor (coil) current detection pin
- Built-in thermal shutdown circuit
- Miniature package (SSOP16 : 225mil)

#### **Specifications**

#### **Absolute Maximum Ratings** at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max		-0.3 to +10.5	V
	VS max		-0.3 to +10.5	V
Maximum output voltage	V <sub>OUT</sub> max		VS+ VSF	V
Maximum input voltage	V <sub>IN</sub> max		-0.3 to +8.0	V
Ground pin source current	IGND max	Per channel	800	mA
Allowable power dissipation	Pd max	When mounted on a circuit board *	740	mW
Operating temperature	Topr		-20 to +85	°C
Storage temperature	Tstg		-40 to +150	°C

<sup>\*</sup> Specified circuit board : 114.3 × 76.1 × 1.6mm³, glass epoxy

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

#### **ORDERING INFORMATION**

See detailed ordering and shipping information on page 5 of this data sheet.

### **LB1936V**

#### Allowable Operating Range at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>CC</sub>		2.5 to 9.5	V
	VS		2.5 to 9.5	
High-level input voltage	V <sub>IH</sub>		2.0 to 7.5	V
Low-level input voltage	$V_{IL}$		-0.3 to 0.7	V

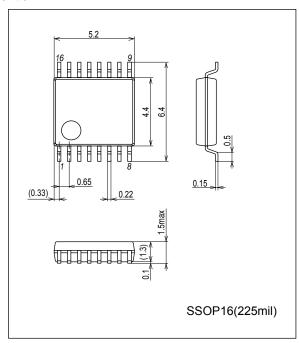
#### **Electrical Characteristics** at Ta = 25°C, $V_{CC} = VS = 5V$

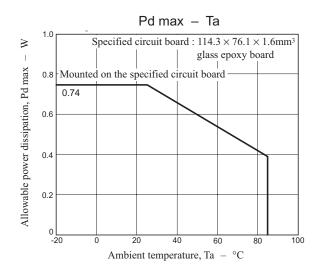
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Parameter	Symbol			max	Unit		
V <sub>CC</sub> system power supply	I <sub>CC</sub> 0	IN1 = IN2 = IN3 = IN4 = 0V		0.1	1	μΑ	
current	I <sub>CC</sub> 1	IN1 = IN3 = 3V, IN2 = IN4 = 0V		10	16	mA	
VS system power supply current	IS0	IN1 = IN2 = IN3 = IN4 = 0V		0.1	1	μΑ	
	IS1	IN1 = IN3 = 3V, IN2 = IN4 = 0V		12	19	mA	
Output saturation voltage	V <sub>OUT</sub> 1	$V_{CC}$ = VS = 3V to 7.5V, $V_{IN}$ = 3V or 0V, $I_{OUT}$ = 200mA (High and low side)	-	0.25	0.4	V	
	V <sub>OUT</sub> 2	V <sub>CC</sub> = VS = 4V to 7.5V, V <sub>IN</sub> = 3V or 0V, I <sub>OUT</sub> = 400mA (High and low side)	-	0.5	0.8	V	
Input current	I <sub>IN</sub>	V <sub>IN</sub> = 5V		150	200	μΑ	
Spark killer diode							
Reverse current	IS(leak)				30	μА	
Forward voltage	VSF	I <sub>OUT</sub> = 400mA			1.7	V	

# **Package Dimensions**

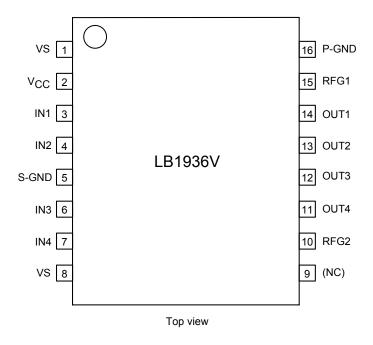
unit:mm (typ)

3178B

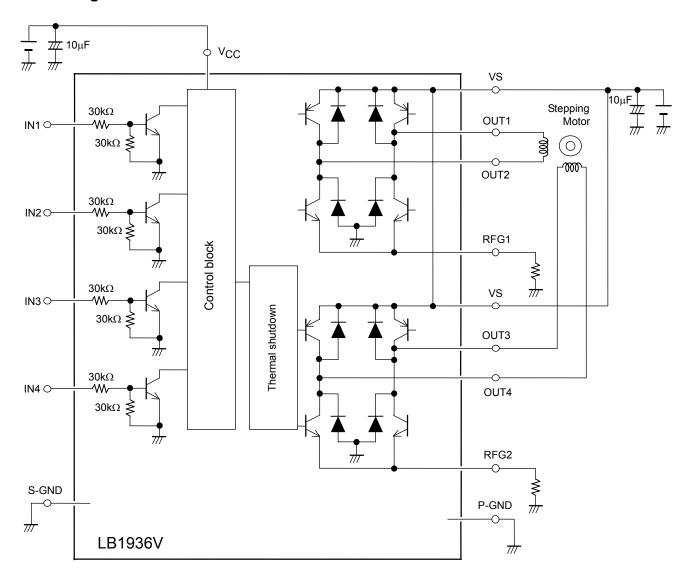




# **Pin Assignment**



# **Block Diagram**



#### **Truth Table**

IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	Output mode	
L	L			off	off			(1)	
L	Н			L	Н	-		(2)	
Н	L		-		L			(3)	
11/*)	11/*)			off	Н			(4)	
H(*)	H(*)			Н	off			(4)'	
		ا ـ	L			off	off	(5)	
		ا ـ	Н			L	Н	(6)	
	-		L	-		Н	L	(7)	
		11/*)	11/*)			off	Н	(8)	
		H(*)	H(*) H(*)			Н	off	(8)'	

L: low, H: high

\*: The output logic mode when IN1/IN2 = H/H is determined by the immediately preceding IN1/IN2 mode.

The post-switching output modes will be as follows.

When switching from (2): (4)

When switching from (3): (4)'

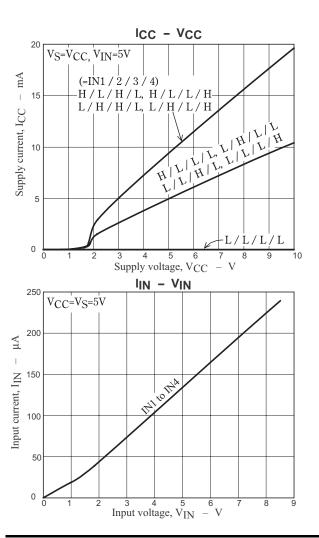
When switching from (1): Undefined (Either (4) or (4)')

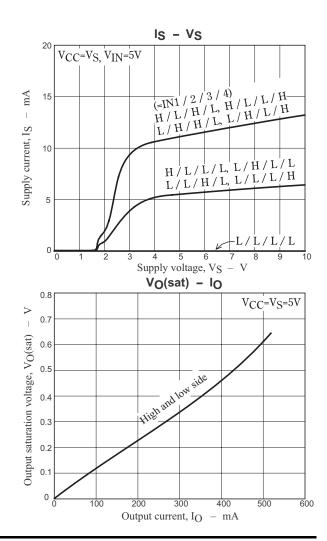
The modes when IN3/IN4 = H/H operate similarly as described below.

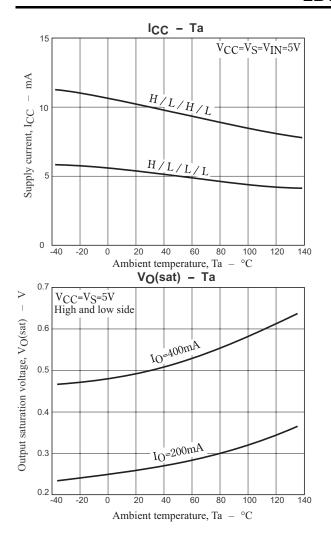
When switching from (6): (8)

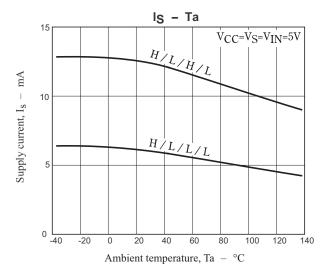
When switching from (7): (8)'

When switching from (5): Undefined (Either (8) or (8)')









#### ORDERING INFORMATION

Device	Package	Shipping (Qty / Packing)
LB1936V-MPB-E	SSOP16 (225mil) ( Pb-Free )	90 / Fan-Fold
LB1936V-TLM-E	SSOP16 (225mil) ( Pb-Free )	2000 / Tape & Reel

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