Ordering number : EN7233A

LB1936V

Monolithic Digital IC

1-2 Phase Excitation Stepping Motor Driver

ON Semiconductor®

http://onsemi.com

Overview

The LB1936V is a 2-phase bipolar drive stepping 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 stepping 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_{CC} max		-0.3 to +10.5	V
	VS max		-0.3 to +10.5	V
Maximum output voltage	V_{OUT} max		VS+ VSF	V
Maximum input voltage	V_{IN} 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

* Specified circuit board : 114.3 × 76.1 × 1.6mm^3, 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.

Allowable Operating Range at Ta = 25°C

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

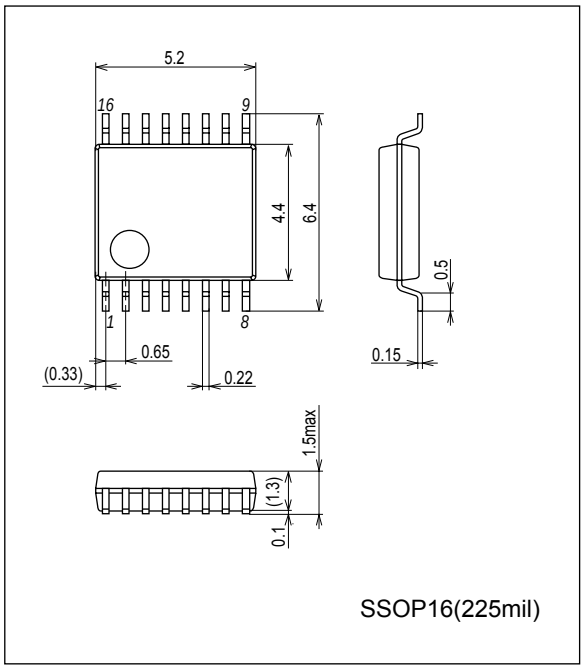
Electrical Characteristics at Ta = 25°C, V_{CC} = VS = 5V

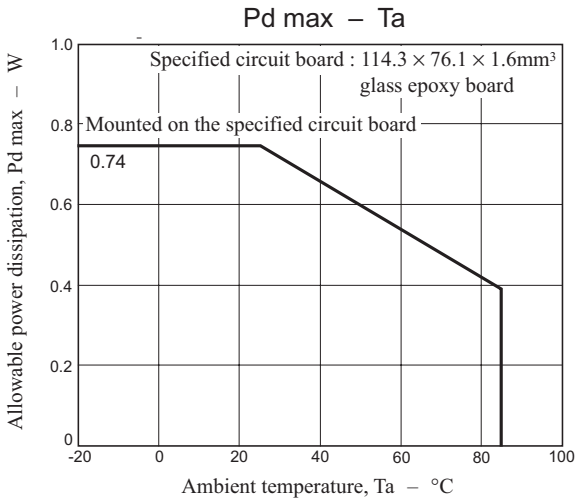
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
V_{CC} system power supply current	$I_{CC}0$	IN1 = IN2 = IN3 = IN4 = 0V		0.1	1	μA
	$I_{CC}1$	IN1 = IN3 = 3V, IN2 = IN4 = 0V		10	16	mA
VS system power supply current	IS0	IN1 = IN2 = IN3 = IN4 = 0V		0.1	1	μA
	IS1	IN1 = IN3 = 3V, IN2 = IN4 = 0V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

Package Dimensions

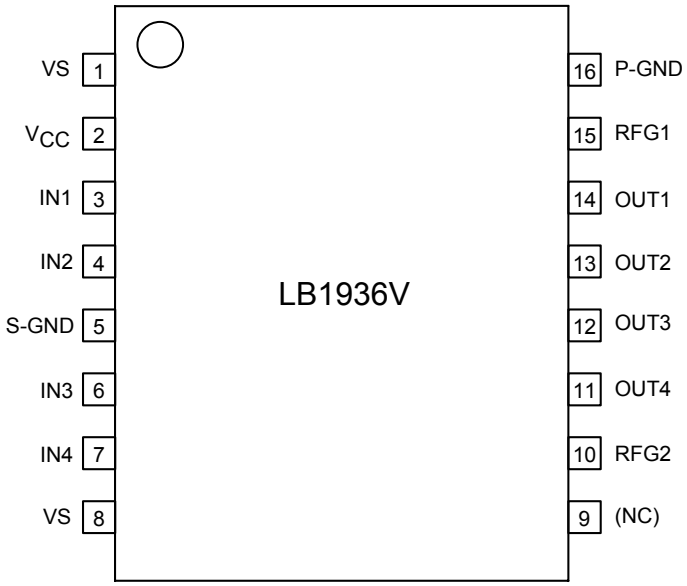
unit:mm (typ)

3178B



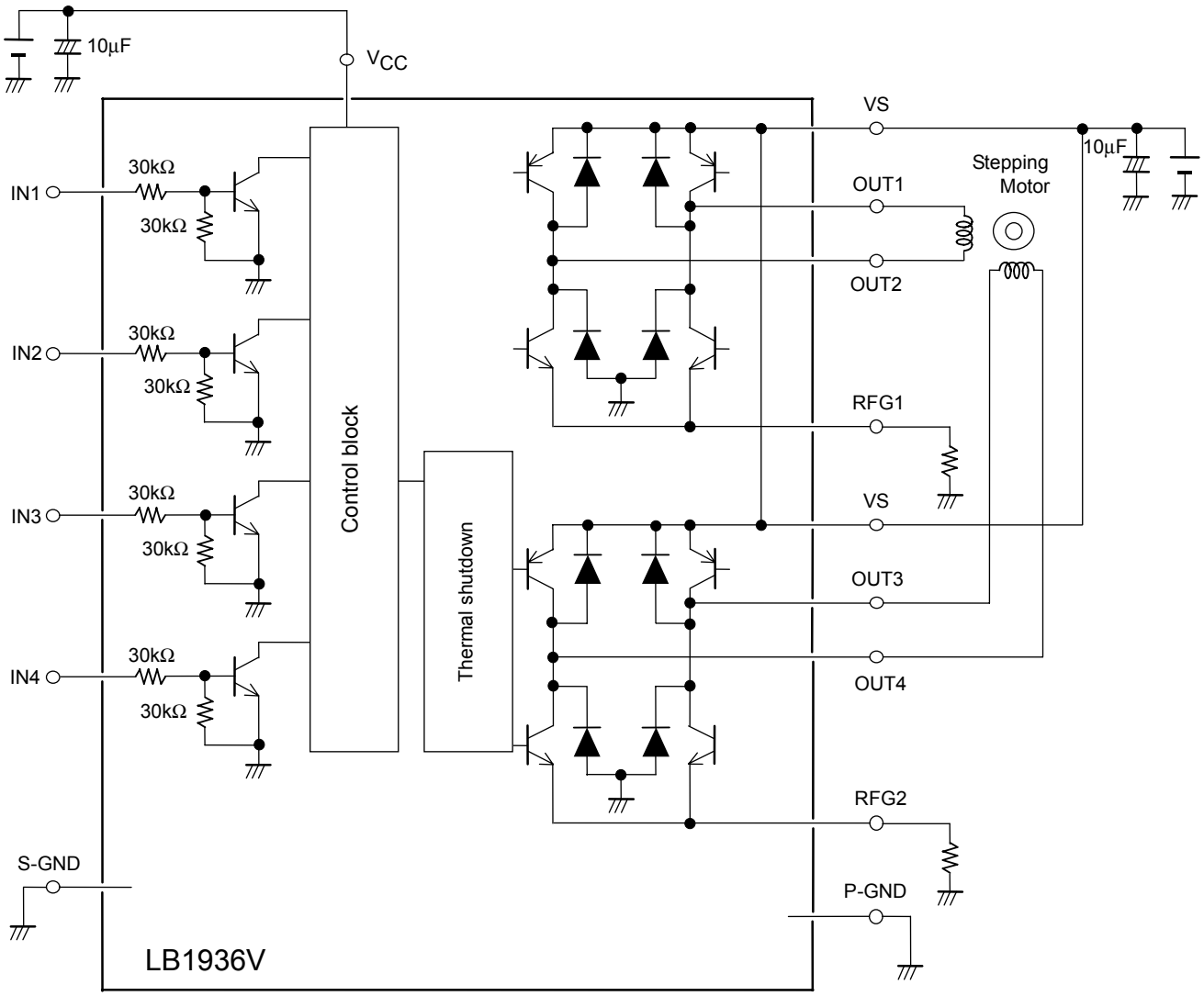


Pin Assignment



Top view

Block Diagram



Truth Table

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