

SANYO Semiconductors DATA SHEET

An ON Semiconductor Company

LB1937T — 1-2 Phase Excitation Stepping Motor Driver

Overview

The LB1937T is a 2-phase bipolar drive stepping motor driver IC that supports low-voltage drive and can drive two stepping motors at the same time. The LB1937T'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 LB1937T is optimal for the stepping motors used for lens drive in digital cameras, printers, and movie cameras.

Functions and Features

- Low saturation voltage forward/reverse motor driver (V_O sat = 0.3V at I_O = 200mA)
- Four 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
- Thin form factor miniature package (TSSOP24)

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Specifications

Absolute Maximum Ratings at $Ta = 25^{\circ}C$

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
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 *	1100	mW
Operating temperature	Topr		-30 to +85	°C
Storage temperature	Tstg		-40 to +150	°C

^{*} Specified circuit board : 114.3 \times 76.1 \times 1.6mm³, glass epoxy

Allowable Operating Range at Ta = 25°C

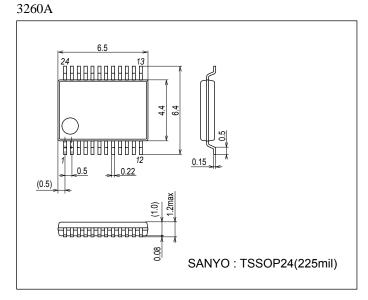
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V _{CC}		2.5 to 9.5	V
	VS		2.5 to 9.5	
High-level input voltage	VIH		2.0 to 7.5	V
Low-level input voltage	V _{IL}		-0.3 to 0.7	V

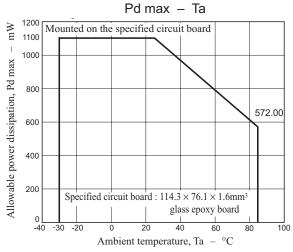
Electrical Characteristics at $Ta=25^{\circ}C,\,V_{\mbox{\footnotesize{CC}}}=VS=5V$

Davastas	Comments and	Conditions		1.1-4			
Parameter	Symbol	Conditions	min	typ	max	Unit	
V _{CC} system power supply	I _{CC} 0	IN1 to IN8 = 0V		0.1	5	μΑ	
current	I _{CC} 1	IN1 = IN3 = 3V		10	16	mA	
VS system power supply current	IS0	IN1 to IN8 = 0V		0.1	5	μΑ	
	IS1	IN1 = IN3 = 3V		13	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)		0.3	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)		0.6	0.8	V	
Input current	I _{IN}	V _{IN} = 5V		150	200	μΑ	
Spark killer diode							
Reverse current	IS(leak)				30	μΑ	
Forward voltage	VSF	I _{OUT} = 400mA			1.7	V	

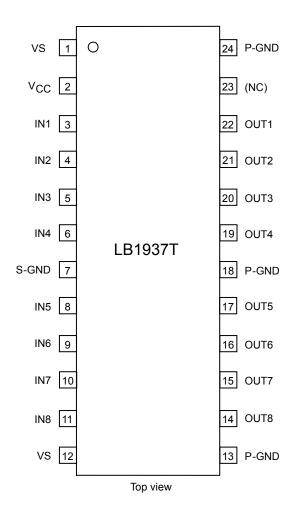
Package Dimensions

unit:mm (typ)

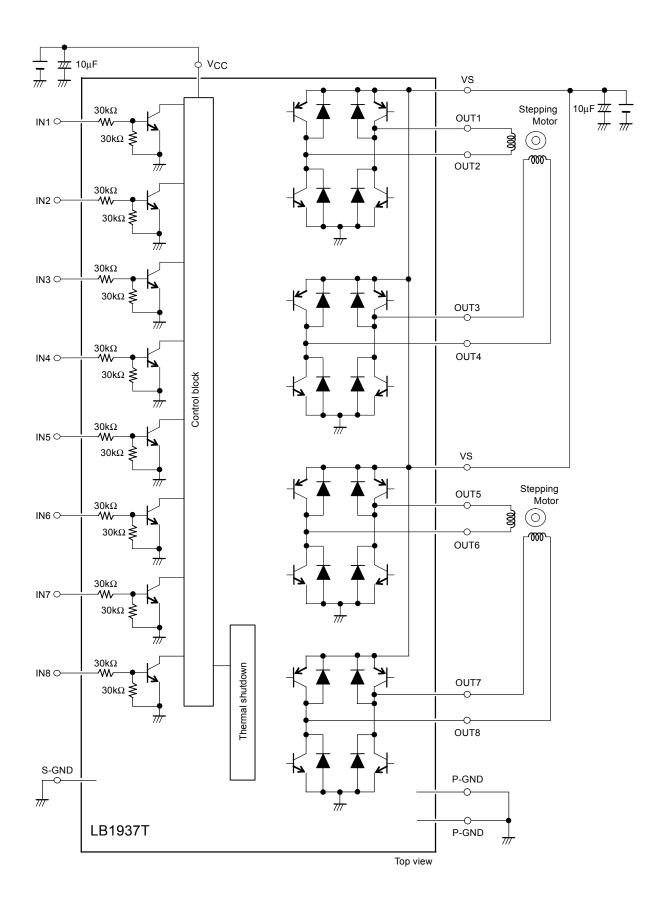




Pin Assignment



Block Diagram



LB1937T

Truth Table

Input						Output						Output				
IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	mode
L	L							off	off							(1)
L	Н							L	Н							(2)
Н	L							Н	L							(3)
Н	Н							off	Н							(4)
(*)	(*)							Н	off							(4)'
		L	L							off	off					(5)
		L	Н							L	Н					(6)
		Н	L							Н	L					(7)
		Н	Н							off	Н					(8)
		(*)	(*)							Н	off					(8)'
				L	L							off	off			(11)
				L	Н							L	Н			(12)
				Н	L							Н	L			(13)
				Н	Н							off	Н			(14)
				(*)	(*)							Н	off			(14)′
						L	L							off	off	(15)
						L	Н							L	Н	(16)
						Н	L							Н	L	(17)
						Н	Н							off	Н	(18)
						(*)	(*)							Н	off	(18)′

L : low, H : high

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)')

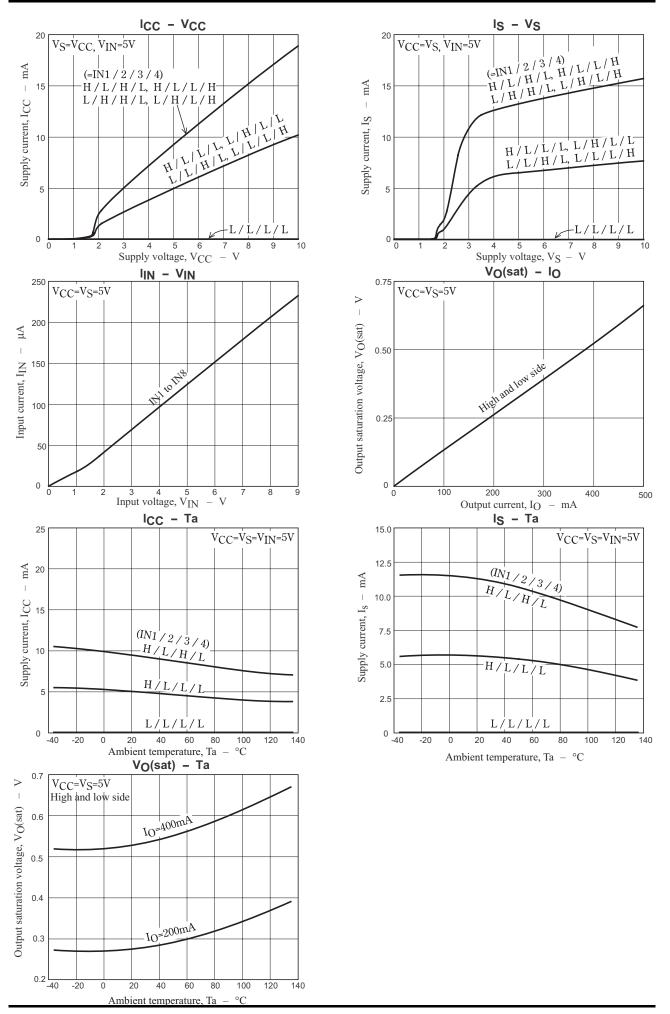
The modes when IN3/IN4 = H/H operate similarly as described below.

When switching from (6): (8)

When switching from (7): (8)'

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

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



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