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SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

Monolithic Digital IC

LB1973M — Two-channel H-Bridge Driver

Overview

The LB1973M is a two-channel H-bridge driver that supports for low saturation draive operation. It is optimal for H-bridge drive of stepping motors (AF and zoom) in portable equipment such as camera cell phones.

Features

- Two-channel H-bridge driver
- The range of the operation voltage is wide.(1.8V to 7.5V)
- Small package : MFP10S(225mil)
- Built-in thermal protection

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		-0.3 to +8.0	V
Output voltage	V_{OUT} max		-0.3 to V_{CC}+V_{SF}	V
Input voltage	V_{IN} max	CONT, IN	-0.3 to +8.0	V
Ground pin source current	I_{GND}	Per channel	1000	mA
Allowable power dissipation	Pd max1	For Unit	350	mW
	Pd max2	Mounted on a circuit board.*	870	mW
Operating temperature	Topr		-20 to +85	°C
Storage temperature	Tstg		-40 to +150	°C

* Mounted on a Specified board : 114.3mm×76.1mm×1.6mm, glass epoxy

Allowable Operating Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		1.8 to 7.5	V
High-level input voltage	V_{IH}		1.3 to 7.5	V
Low-level input voltage	V_{IL}		-0.3 to +0.5	V

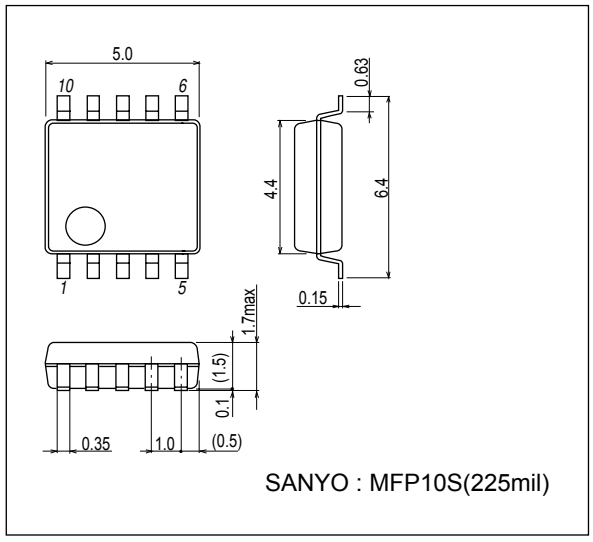
Electrical Characteristics at Ta = 25°C, V_{CC} = 1.9V

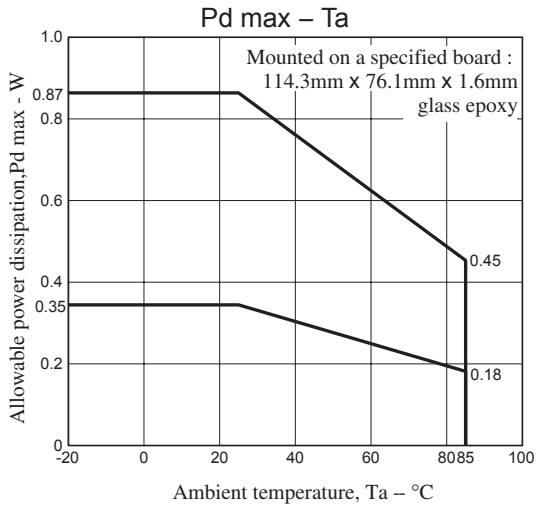
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Source current	$I_{CCO}1$	V_{CC} = 1.9V,IN1 to IN4 = 0V		0.01	1	μA
	$I_{CCO}2$	V_{CC} = 3V,IN1 to IN4 = 0V		0.01	1	μA
	$I_{CC}1$	IN1 = 1.9V,IN2 to IN4 = 0V		18	25	mA
	$I_{CC}2$	IN1 = 3V,IN2 to IN4 = 0V,V_{CC} = 3V		19	26	mA
Output saturation voltage1 (single connection)	$V_{OUT}11$	I_{OUT} = 270mA,V_{CC} = 1.9V to 3.6V,V_{OUT} = Upper Tr and Under Tr IN1 = 1.3V,IN2 to IN4 = 0V Supplementation: Standard similar as for IN2 to IN4 = 1.3V		0.2	0.3	V
	$V_{OUT}12$	I_{OUT} = 350mA,V_{CC} = 1.9V to 3.6V,V_{OUT} = Upper Tr and Under Tr IN1 = 1.3V,IN2 to IN4 = 0V Supplementation: Standard similar as for IN2 to IN4 = 1.3V		0.25	0.4	V
Output saturation voltage2 (parallel connection)	$V_{OUT}21$	I_{OUT} = 270mA,V_{CC} = 1.9V to 3.6V,V_{OUT} = Upper Tr and Under Tr OUT1-3,OUT2-4 short. IN1 and IN3 = 1.3V,IN2 and IN4 = 0V Supplementation: Standard similar as for IN2 and IN4 = 1.3V		0.12	0.2	V
	$V_{OUT}22$	I_{OUT} = 500mA,V_{CC} = 1.9V to 3.6V,V_{OUT} = Upper Tr and Under Tr OUT1-3,OUT2-4 short. IN1 and IN3 = 1.3V,IN2 and IN4 = 0V Supplementation: Standard similar as for IN2 and IN4 = 1.3V		0.2	0.35	V
Input current	I_{IN}	V_{IN} = 1.9V		32	70	μA
Themal shutdown operation temperature	Ttsd			140		°C
Temperature hysteresis width	ΔT			20		°C
Spark killer Diode						
Reverse current	I_S(leak)	V_{CC}-OUT = 8V,V_{IN} = 0V			10	μA
Forword voltage	V_{SF}	I_{OUT} = 400mA,V_{IN} = 0V			1.7	V

Package Dimensions

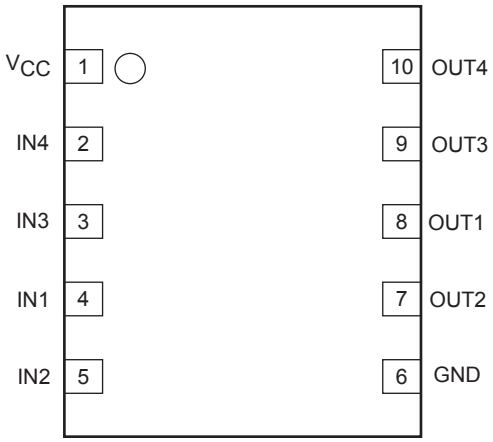
unit : mm (typ)

3086B





Pin Assignment

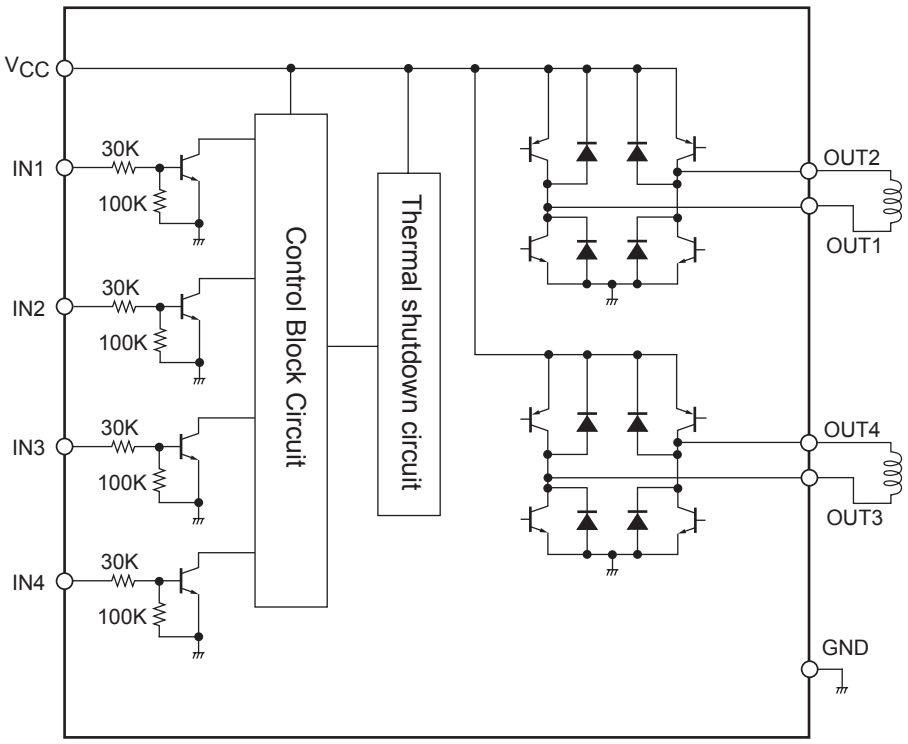


(Top View)

Truth Table

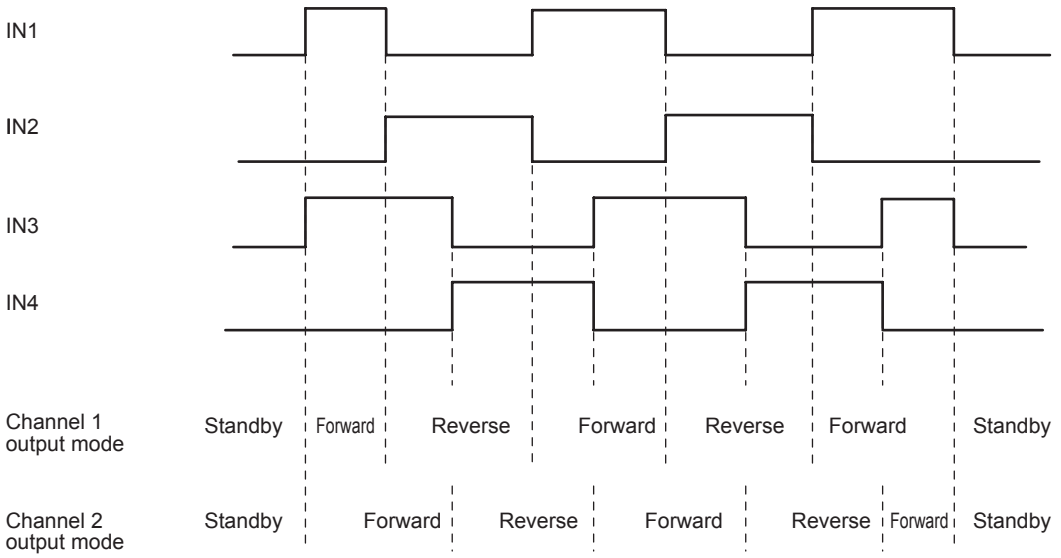
Input				Output				Mode
IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	
Low	Low	Low	Low	Off	Off	Off	Off	Standby mode
High	Low	-	-	High	Low	-	-	Channel 1, forward
Low	High			Low	High			Channel 1, reverse
-	-	High	Low	-	-	High	Low	Channel 2, forward
		Low	High			Low	High	Channel 2, reverse
High	High	-	-	The logic output for the first high-level input is produced.				
-	-	High	High					

Block Diagram



Timing Chart

(1) Stepper motor timing chart
Timing chart for 2-phase drive



(2) Timing chart for 1-2 phase drive (Fastdecay mode)