


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 drive 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 $T_a = 25^\circ\text{C}$

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	P_d max1	For Unit	350	mW
	P_d max2	Mounted on a circuit board.*	870	mW
Operating temperature	T_{opr}		-20 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +150	$^\circ\text{C}$

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

Allowable Operating Ratings at $T_a = 25^\circ\text{C}$

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

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LB1973M

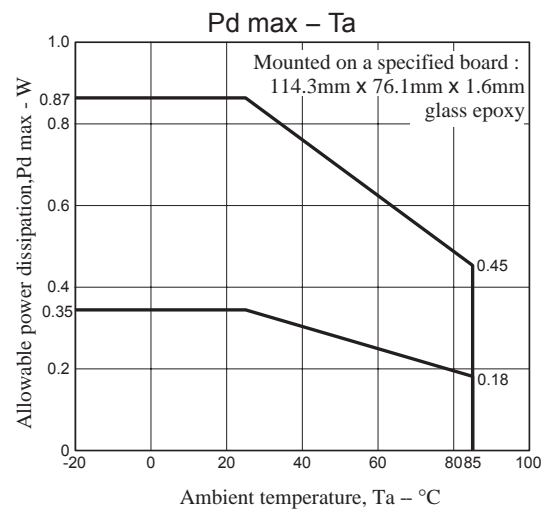
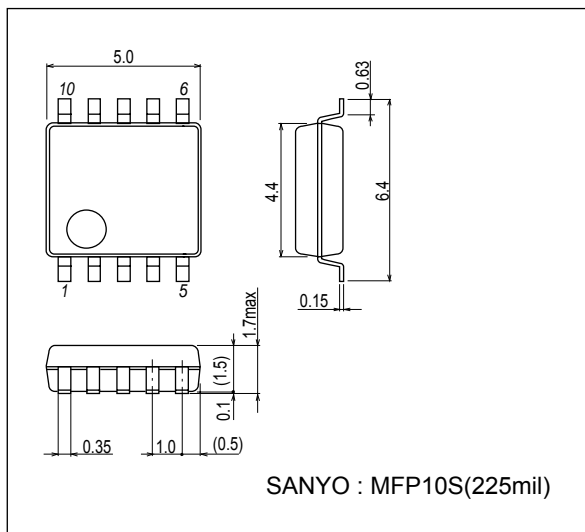
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 1.9\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Source current	I_{CCO1}	$V_{CC} = 1.9\text{V}, \text{IN1 to IN4} = 0\text{V}$		0.01	1	μA
	I_{CCO2}	$V_{CC} = 3\text{V}, \text{IN1 to IN4} = 0\text{V}$		0.01	1	μA
	I_{CC1}	$\text{IN1} = 1.9\text{V}, \text{IN2 to IN4} = 0\text{V}$		18	25	mA
	I_{CC2}	$\text{IN1} = 3\text{V}, \text{IN2 to IN4} = 0\text{V}, V_{CC} = 3\text{V}$		19	26	mA
Output saturation voltage1 (single connection)	V_{OUT11}	$I_{OUT} = 270\text{mA}, V_{CC} = 1.9\text{V to } 3.6\text{V}, V_{OUT} =$ Upper Tr and Under Tr $\text{IN1} = 1.3\text{V}, \text{IN2 to IN4} = 0\text{V}$ Supplementation: Standard similar as for IN2 to IN4 = 1.3V		0.2	0.3	V
	V_{OUT12}	$I_{OUT} = 350\text{mA}, V_{CC} = 1.9\text{V to } 3.6\text{V}, V_{OUT} =$ Upper Tr and Under Tr $\text{IN1} = 1.3\text{V}, \text{IN2 to IN4} = 0\text{V}$ Supplementation: Standard similar as for IN2 to IN4 = 1.3V		0.25	0.4	V
Output saturation voltage2 (parallel connection)	V_{OUT21}	$I_{OUT} = 270\text{mA}, V_{CC} = 1.9\text{V to } 3.6\text{V}, V_{OUT} =$ Upper Tr and Under Tr OUT1-3, OUT2-4 short. $\text{IN1 and IN3} =$ $1.3\text{V}, \text{IN2 and IN4} = 0\text{V}$ Supplementation: Standard similar as for IN2 and IN4 = 1.3V		0.12	0.2	V
	V_{OUT22}	$I_{OUT} = 500\text{mA}, V_{CC} = 1.9\text{V to } 3.6\text{V}, V_{OUT} =$ Upper Tr and Under Tr OUT1-3, OUT2-4 short. $\text{IN1 and IN3} =$ $1.3\text{V}, \text{IN2 and IN4} = 0\text{V}$ Supplementation: Standard similar as for IN2 and IN4 = 1.3V		0.2	0.35	V
Input current	I_{IN}	$V_{IN} = 1.9\text{V}$		32	70	μA
Thermal shutdown operation temperature	T_{tsd}			140		$^\circ\text{C}$
Temperature hysteresis width	ΔT			20		$^\circ\text{C}$
Spark killer Diode						
Reverse current	$I_S(\text{leak})$	$V_{CC-OUT} = 8\text{V}, V_{IN} = 0\text{V}$			10	μA
Forward voltage	V_{SF}	$I_{OUT} = 400\text{mA}, V_{IN} = 0\text{V}$			1.7	V

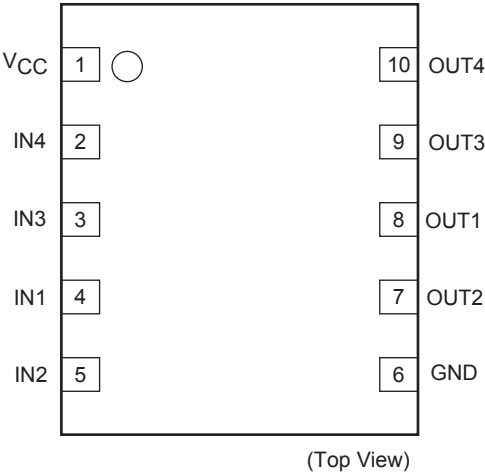
Package Dimensions

unit : mm (typ)

3086B



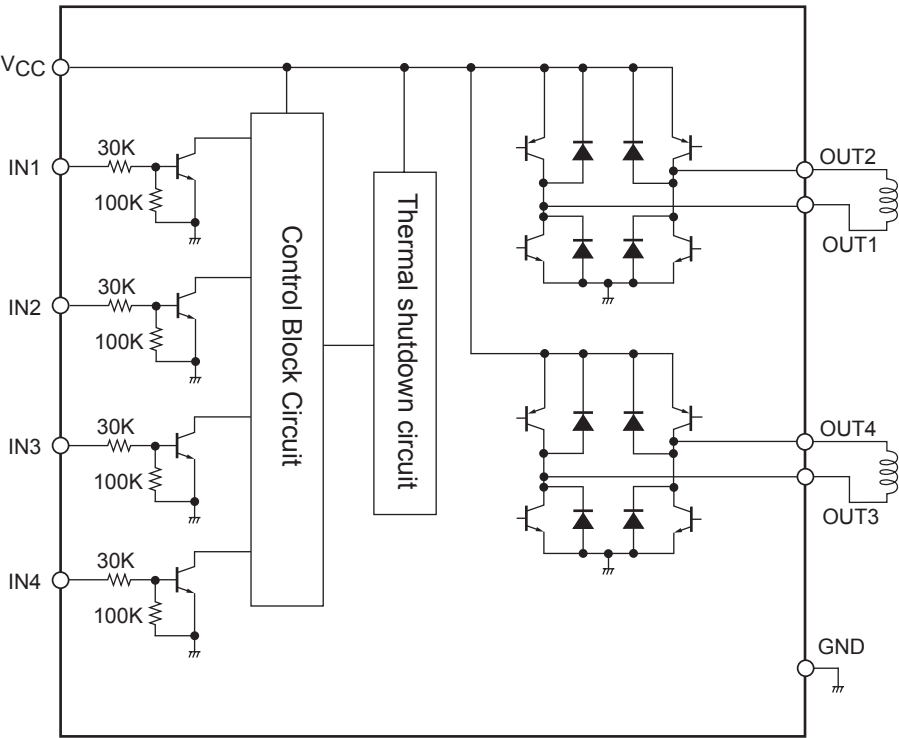
Pin Assignment



Truth Table

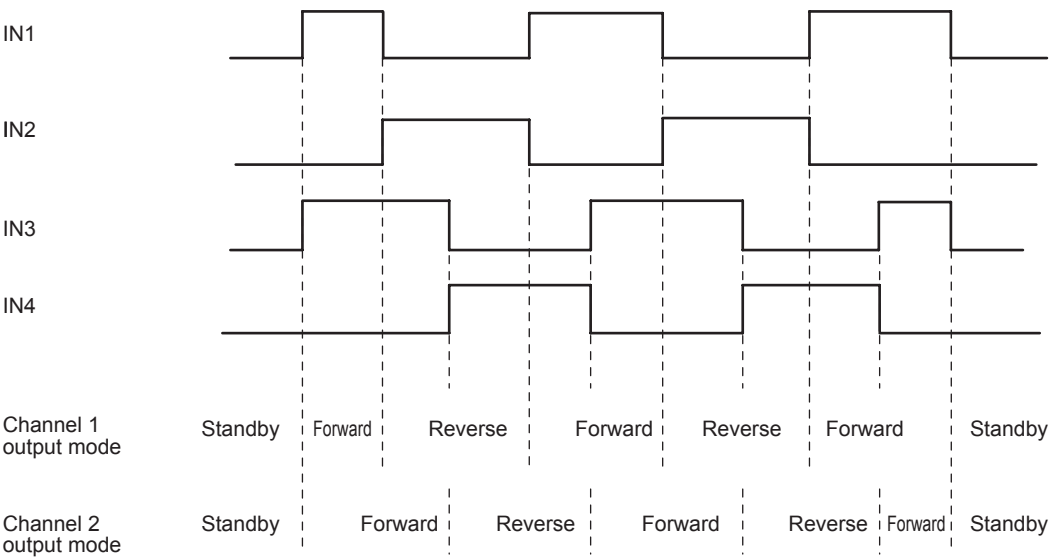
Input				Output				Mode
IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	
Low	Low	Low	Low	Off	Off	Off	Off	Standby mode
High	Low	-	-	High	Low	-	-	Channel 1, forward
Low	High			Low	High			Channel 1, reverse
-	-	High	Low	-	-	High	Low	Channel 2, forward
		Low	High			Low	High	Channel 2, reverse
High	High	-	-	The logic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

Block Diagram

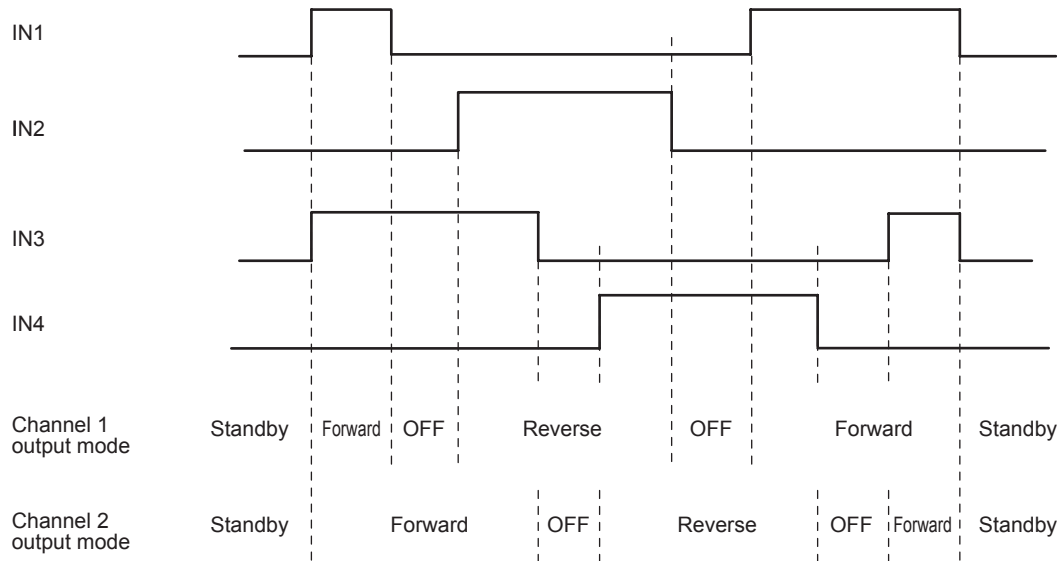


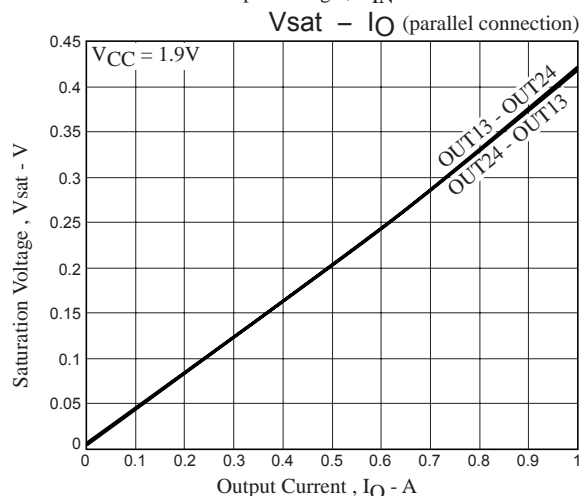
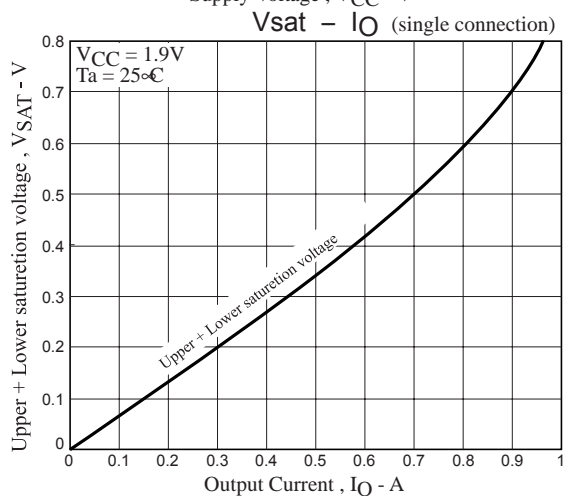
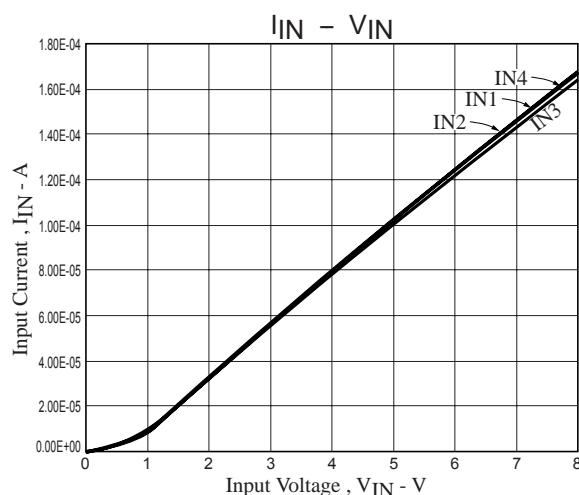
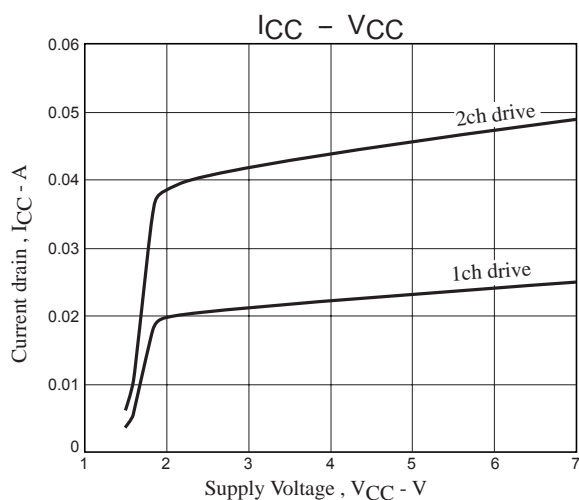
Timing Chart

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



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





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