



ON Semiconductor®

<http://onsemi.com>

LB1973JA

Monolithic Digital IC

Two-channel H-Bridge Driver

Overview

The LB1973JA 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
- 2ch simultaneous connection is possible
- Parallel input interface
- 2 phase excitation, 1-2 phase excitation drive are possible
- The range of the operation voltage is wide.(1.8V to 7.5V)
- 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		- V_{SF} to $V_{CC}+V_{SF}$	V
Input voltage	V_{IN} max		-0.3 to +8.0	V
Spark killer Di order direction electric	I_{SF} max		1000	mA
Ground pin source current	I_{GND}	Per channel	1000	mA
Allowable power dissipation	P_d max	*Mounted on a board	800	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

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

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 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}	$R_{IN} = 1\text{k}\Omega$	1.3 to 7.5	V
Low-level input voltage	V_{IL}	$R_{IN} = 1\text{k}\Omega$	-0.3 to +0.5	V

LB1973JA

Electrical Characteristics at Ta = 25°C, VCC = 1.9V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Source current	I _{CCO1}	V _{CC} = 1.9V, IN1 to IN4 = Low level		0.01	1	μA
	I _{CCO2}	V _{CC} = 3V, IN1 to IN4 = Low level		0.01	1	μA
	I _{CC1}	IN1 = High level, IN2 to IN4 = Low level		18	25	mA
	I _{CC2}	IN1 = High level, IN2 to IN4 = Low level, V _{CC} = 3V		19	27.5	mA
Output saturation voltage1 (single connection)	V _{OUT11}	I _{OUT} = 270mA, V _{CC} = 1.9V to 3.6V, Ta = -20 to 85°C V _{OUT} = Upper Tr and Under Tr IN1 = High level, IN2 to IN4 = Low level Supplementation: Standard similar as for IN2 to IN4 = High level		0.2	0.3	V
	V _{OUT12}	I _{OUT} = 350mA, V _{CC} = 1.9V to 3.6V, Ta = -20 to 85°C V _{OUT} = Upper Tr and Under Tr IN1 = High level, IN2 to IN4 = Low level Supplementation: Standard similar as for IN2 to IN4 = High level		0.25	0.4	V
Output saturation voltage2 (parallel connection)	V _{OUT21}	I _{OUT} = 270mA, V _{CC} = 1.9V to 3.6V, Ta = -20 to 85°C V _{OUT} = Upper Tr and Under Tr OUT1-3, OUT2-4 short. IN1 and IN3 = High level, IN2 and IN4 = Low level Supplementation: Standard similar as for IN2 and IN4 = High level		0.12	0.2	V
	V _{OUT22}	I _{OUT} = 500mA, V _{CC} = 1.9V to 3.6V, Ta = -20 to 85°C V _{OUT} = Upper Tr and Under Tr OUT1-3, OUT2-4 short. IN1 and IN3 = High level, IN2 and IN4 = Low level Supplementation: Standard similar as for IN2 and IN4 = High level		0.2	0.35	V
Output electric current with the parasitic element	I _{PA}	V _{IN} = 1.9 to 3.6V, Ta = -20 to 85°C *1			9	mA
Input current	I _{IN}	V _{IN} = 1.9V		32	70	μA
Thermal shutdown operation temperature	T _{tsd}	*2: Design guarantee		140		°C
Temperature hysteresis width	ΔT	*2: Design guarantee		20		°C
Spark killer Diode						
Reverse current	I _{S(leak)}	V _{CC-OUT} = 8V, V _{IN} = Low level			10	μA
Forward voltage	V _{SF}	I _{SF} = 400mA, V _{IN} = Low level			1.7	V

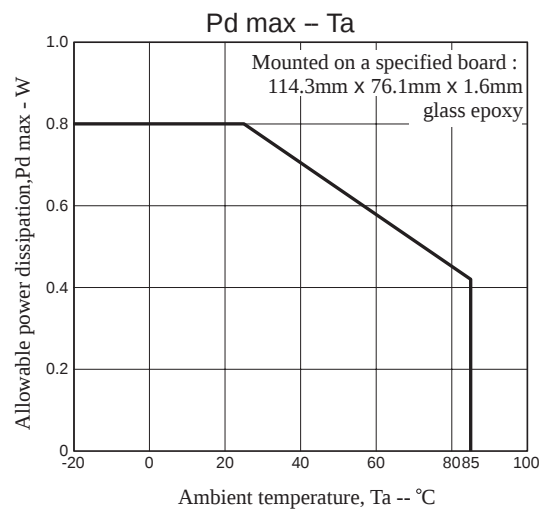
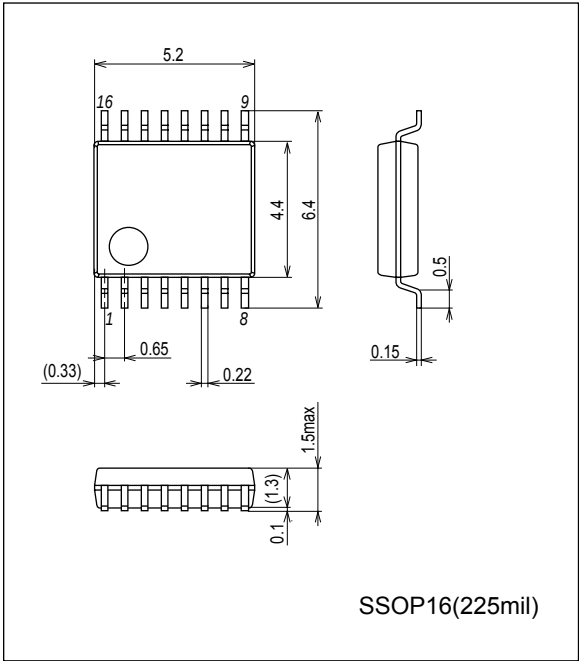
*1: Output electric current with the parasitic element I_{PA}: The current value that the off ch(-free) output is pulled at the time of one side ch drive by a parasitic element

*2: Design guarantee value and does not measure

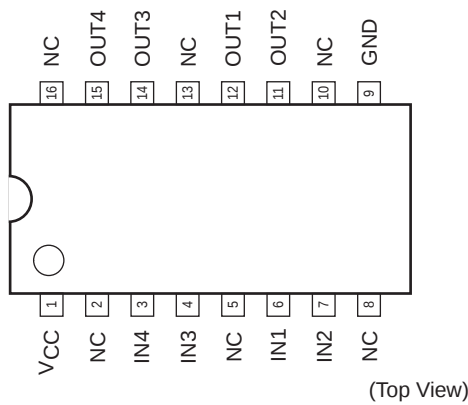
* V_{SF}: The current order direction voltage true in a time

Package Dimensions

unit : mm (typ)
3178B



Pin Assignment

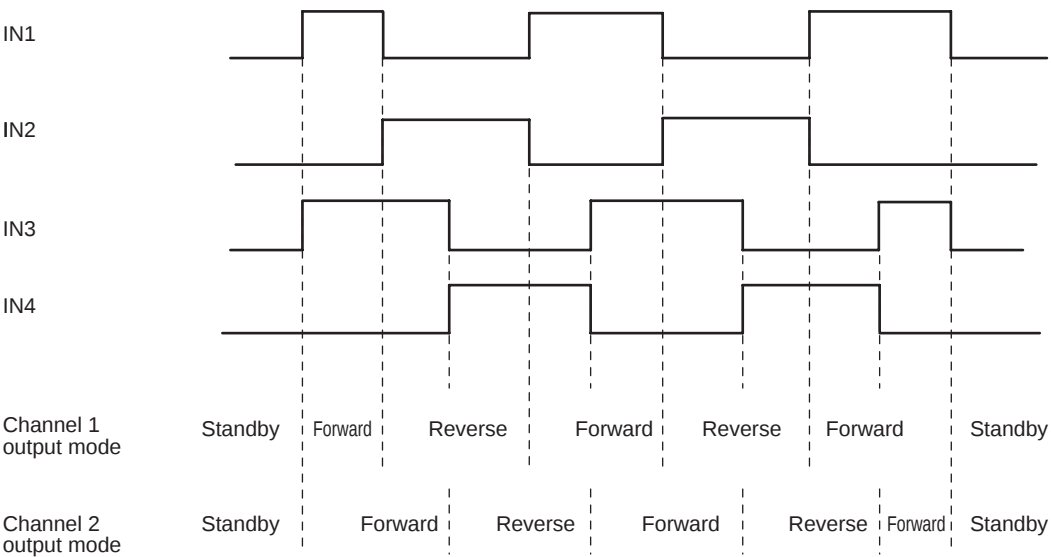


Truth Table

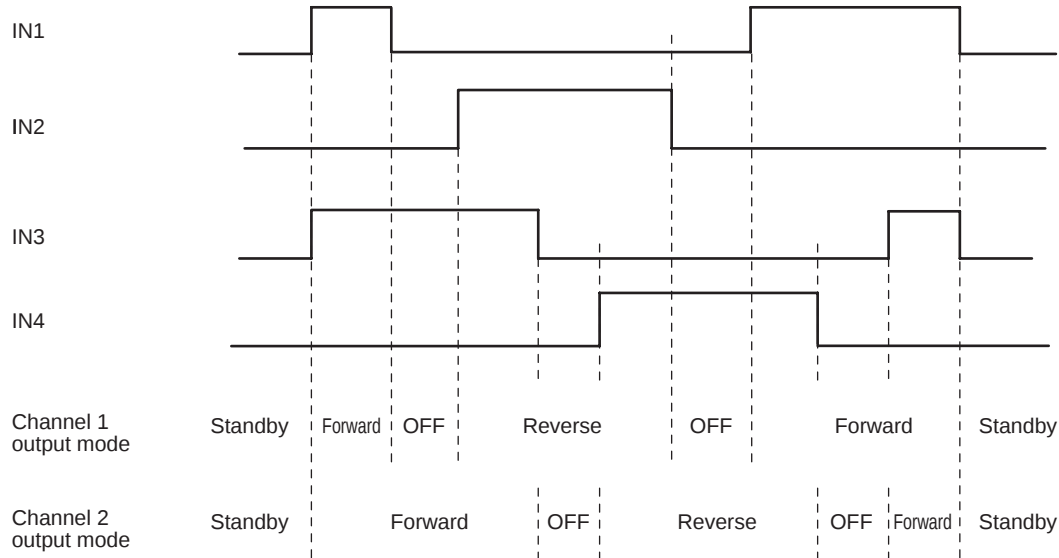
Input				Output				Mode
IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	
Low	Low	Low	Low	Off	Off	Off	Off	Standby mode
High	Low	-	-	High	Low	-	-	Channel 1, forward
Low	High			Low	High			Channel 1, reverse
-	-	High	Low	-	-	High	Low	Channel 2, forward
		Low	High			Low	High	Channel 2, reverse
High	High	-	-	The logic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

Stepping motor control example

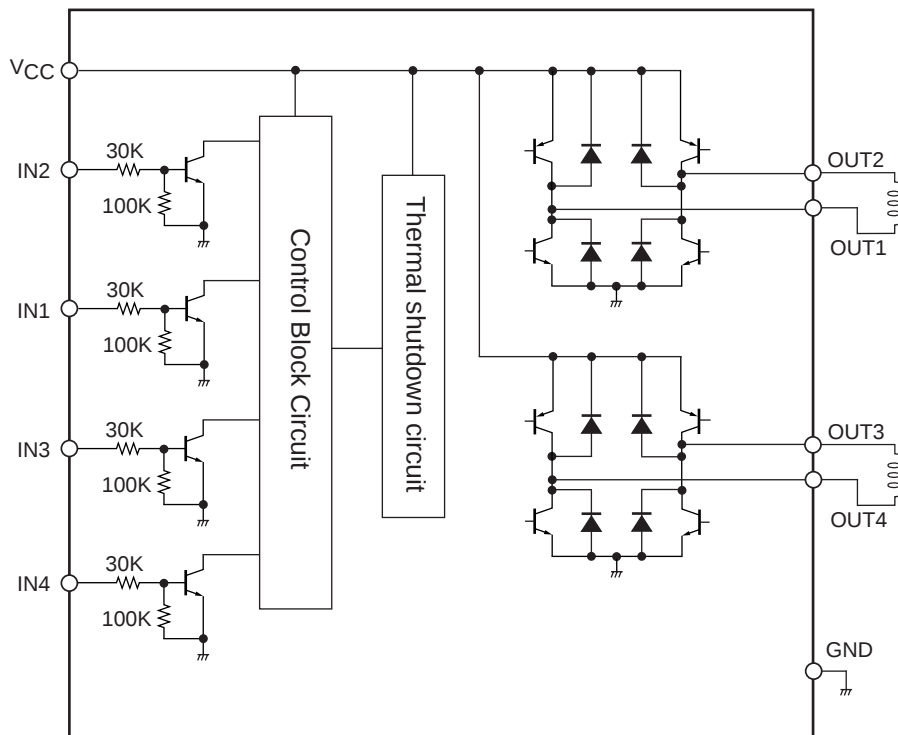
(1) Timing chart for 2-phase drive



(2) Timing chart for 1-2 phase drive



Block Diagram



ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.