



# LB1656

## 2-Phase Stepping Motor Driver

### Overview

The LB1656 is a dual bridge driver IC suited for use in 2-phase bipolar stepping motor driver for FDD (3 to 5.25 inches) head actuator. The maximum driver current×voltage is 0.33A×12V/bridge.

### Features

- Power save function.
- $\phi 1$ ,  $\phi 2$  direction inputs are used to make driver output selection.
- Low saturation voltage.
- Low current drain.
- Direct controllable from MPU due to low input current.
- Input level : TTL, LSTTL, 5V CMOS compatible.
- On-chip thermal shutdown (TSD) circuit.

### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Logic section supply voltage	$V_{CC}$		7	V
Seeking supply voltage	$V_{S1}$		15	V
Holding supply voltage	$V_{S2}$		7	V
Input voltage	$V_{IN}$		0 to $V_{CC}$	V
Peak seeking current	$I_{O\ peak}$	$t \leq 5\text{ms}$	500	mA
Continuous seeking current	$I_{OS}$		330	mA
Holding current	$I_{OH}$		200	mA
Allowable power dissipation	$P_d\ max$		1.9	W
Operating temperature	$T_{opr}$		-20 to 70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +125	$^\circ\text{C}$

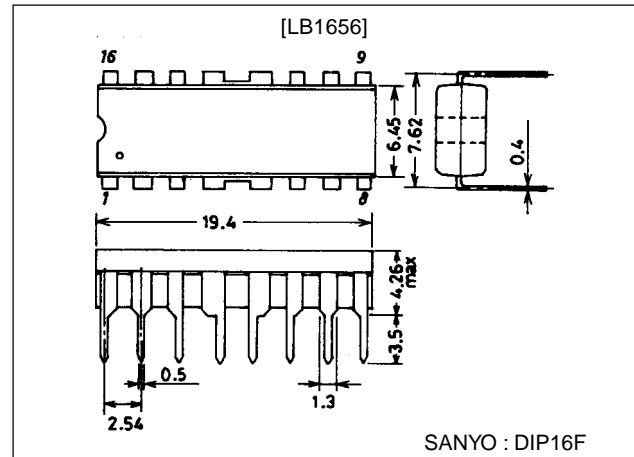
#### Allowable Operating Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Logic section supply voltage	$V_{CC}$		4.5	5.0	5.5	V
Seeking supply voltage	$V_{S1}$		10.2	12.0	13.8	V
Holding supply voltage	$V_{S2}$		4.5	5.0	5.5	V

### Package Dimensions

unit:mm

#### 3054A-DIP16F



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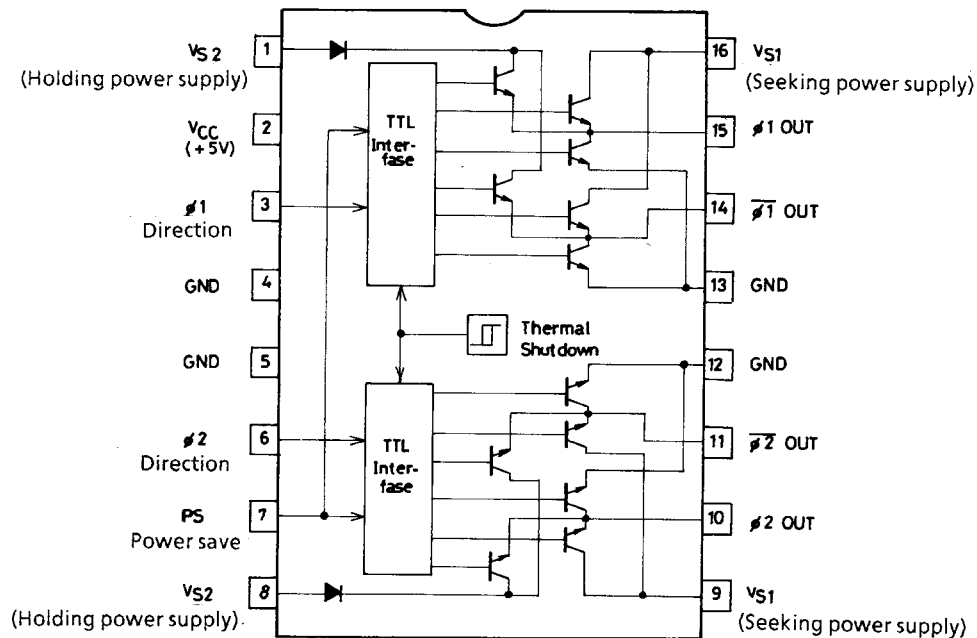
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## Electrical Conditions at $T_a = 25^{\circ}\text{C}$ , $V_{CC}=25^{\circ}\text{C}$ , $V_{CC}=5\text{V}$ , $V_{CC1}=12\text{V}$ , $V_{S2}=5\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit	
			min	typ	max		
Input low-level voltage	$V_{IL}$				0.8	V	
Input high-level voltage	$V_{IH}$		2.0			V	
Input low-level current	$I_{IL}$	$V_I=0.8\text{V}$	-10		+10	$\mu\text{A}$	
Input high-level current	$I_{IH}$	$V_I=2\text{V}$		2	10	$\mu\text{A}$	
		$V_I=5\text{V}$		0.3	1.0	$\text{mA}$	
Current drain	$I_{CC}$	$ps=0.8\text{V}, V_{CC}$		25	33	$\text{mA}$	
		$ps=0.8\text{V}, V_{S1}$ , Note1		6	10	$\text{mA}$	
		$ps=0.8\text{V}, V_{S2}$ , Note2			0.1		$\text{mA}$
		$ps=2\text{V}, V_{CC}$		25	33	$\text{mA}$	
		$ps=2\text{V}, V_{S1}$ , Note1		1	2	$\text{mA}$	
		$ps=2\text{V}, V_{S2}$ , Note2		2.5	4	$\text{mA}$	
Output transistor voltage	$V_{(BR)CER}$	$I_C=10\text{mA}$	18			V	
$V_{S1}$ saturation voltage	$V_{CE(sat)1}$	$ps=0.8\text{V}, I_O=330\text{mA}$ , Note3		1.5	2.0	V	
$V_{S2}$ saturation voltage	$V_{CE(sat)2}$	$ps=2.0\text{V}, I_O=130\text{mA}$ , Note3		1.5	2.0	V	
Clamp voltage	$V_F$	$I_F=330\text{mA}$ , upper		3		V	
		$I_F=330\text{mA}$ , lower		1.5		V	
Delay time	$t_{PLH}$			4		$\mu\text{s}$	
	$t_{PHL}$			2		$\mu\text{s}$	
TSD operating temperature	TSD			150		$^{\circ}\text{C}$	
TSD hysteresis	$\Delta T$			25		$^{\circ}\text{C}$	

- Note :
1. Measure sum of currents at pins 9 and 16.
  2. Measure sum of currents at pins 1 and 8.
  3. Measure sum of saturation voltages at upper and lower level.

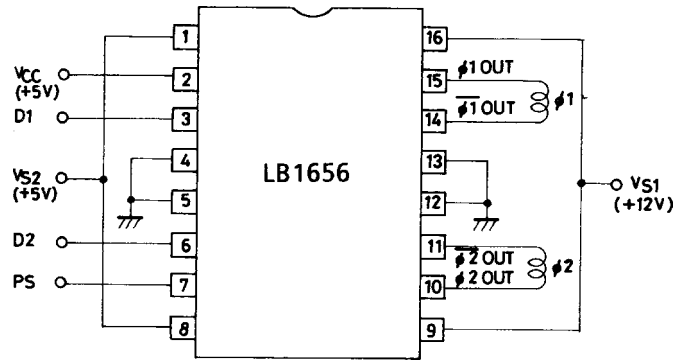
### Equivalent Circuit Block Diagram



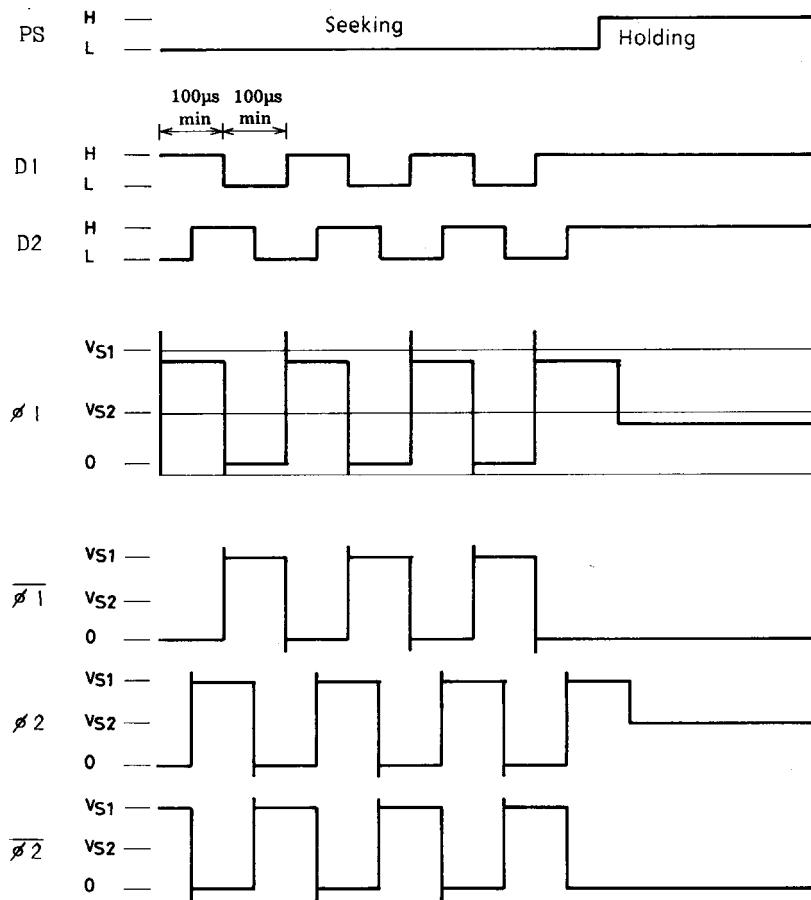
The  $\phi 1$ ,  $\phi 2$  direction inputs are used to make driver output selection and the power save input is used to select the driver source output from between 5V supply and 12V supply.

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Sample Application Circuit : 2-phase bipolar stepping motor driver.



## Timing Chart



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