



Forward/Reverse Motor Driver with Brake

Overview

The LB1643 is a forward/reverse motor driver IC. The direction and brake functions are controlled from a single input, and the output voltages can be set by resistors. Further, the output voltage has 3 modes, full, high-level and low-level voltage modes. The output voltage can be controlled from a single input and a microcontroller interface.

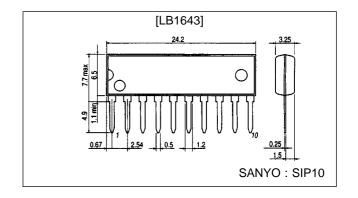
Features

- Single-input forward, reverse and brake functions
- Output voltage can be set using resistors
- Single-input full-drive, high-level drive and low-level drive select function
- Microcontroller interface
- · Built-in surge-current absorption components
- Built-in reference voltage circuit
- Built-in thermal protection circuit

Package Dimensions

unit: mm

3043A-SIP10



Specifications

Absolute Maximum Ratings at Ta = 25 °C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max		18	V
Input voltage	V _{IN}	V _{CC} > V _{IN}	-0.3 to +6	V
Output current	lout		±1.6	A
Allowable power dissipation	Pd max		1.2	W
Operating temperature	Topr		-25 to +75	°C
Storage temperature	Tstg		-55 to +125	°C

Allowable Operating Ranges at Ta = 25 °C

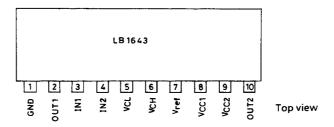
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage ranges	V _{CC} 1		8.0 to 18	V
Supply voltage ranges	V _{CC} 2	$V_{CC1} \ge V_{CC2}$	5 to 18	V
Forward-reverse direction prohibit time	t off		≧20	μs

Electrical Characteristics at Ta = 25 $^{\circ}$ C, V_{CC} = 12 V

Parameter	Symbol	Conditions	min	typ	max	Unit
Input low-level voltage	V_{INL}		0		1.0	V
Input high-level voltage	V _{INH}		4.2		6.0	V
Input mid-level voltage	V _{INM}		2.0		3.0	V
Input impedance	Z _{IN}			75		kΩ
Current drain	Icc			5.5	10	mA
Output voltages	V _{OUT1}	$R_L = 60 \Omega$, $V_{CH} = 2.5 V$, $V_{IN}1 = 2.5 V$, $V_{IN}2 = 0 V$	4.4	4.95	5.4	V
Output voltages	V _{OUT2}	$R_L = 60 \Omega$, $V_{CH} = 2.5 V$, $V_{IN}1 = 2.5 V$, $V_{IN}2 = 5.0 V$	4.4	4.95	5.4	V
Output leakage current	l _{OL}	R _L = ∞		0.01	1.0	mA
0-1	Vsat11	V _{CC} = 12 V, I _{OUT} = 300 mA		1.9	2.2	V
Saturation voltages (upper)	Vsat12	V _{CC} = 12 V, I _{OUT} = 500 mA		1.9	2.3	V
0-1	Vsat21	V _{CC} = 12 V, I _{OUT} = 300 mA		0.25	0.5	V
Saturation voltages (lower)	Vsat22	V _{CC} = 12 V, I _{OUT} = 500 mA		0.4	0.65	V
Reference voltage	Vref		6.0	6.35	6.8	V
Reference voltage load	∆Vref			0.05	0.4) // A
characteristics	∆lref	Iref = −2.0 to 0 mA		0.05	0.1	V/mA
Control to output gain		V_{OUT}/V_{CH} , V_{OUT}/V_{CL} $V_{CH} = 2.5 \text{ V}$, $V_{CL} = 2.5 \text{ V}$, $R_L = 60 \Omega$	1.5	1.9	2.4	Times
Thermal shutdown temperature	T _{TSD}	See note.	150	180		°C

Note: Design target value only (not measured).

Pin Assignment



Truth Table

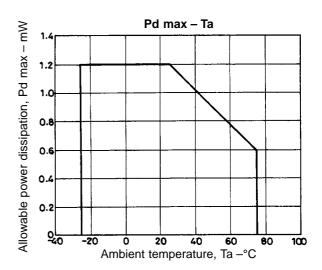
Int	Input		voltage	Operation	
IN1	IN2	OUT1	OUT2	Operation	
Н	Н	L	FULL		
М	Н	L	2V _{CH}	Forward (reverse)	
L	Н	L	2V _{CL}		
Н	М	OFF	OFF		
М	М	OFF	OFF	Brake	
L	М	OFF	OFF		
Н	L	FULL	LOW		
М	L	2V _{CH}	LOW	Reverse (forward)	
L	L	2V _{CL}	LOW		

Input levels are

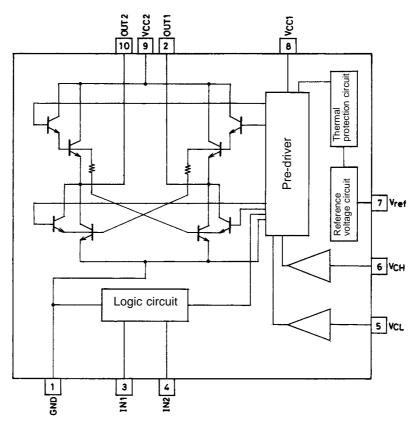


 $[\]begin{array}{l} \bullet \ \ V_H \geqq 4.2 \ V \\ \bullet \ \ V_M = 2.0 \ to \ 3.0 \ V \\ \bullet \ \ V_L \leqq 1.0 \ V \\ \end{array}$

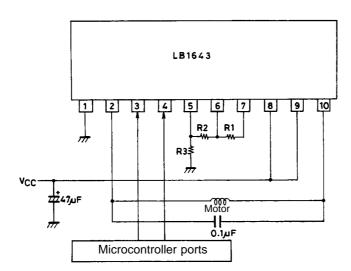
When IN1 and IN2 are open, they take on a voltage of 2.5 V. Operation equivalent to LB1641.



Internal Equivalent Circuit



Sample Application Circuit



Usage Notes

- 1. Use a microcontroller with CMOS output ports for hight-level, low-level and open-circuit conditions.
- 2. It is recommended that R1, R2 and R3 total approximately $60 \text{ k}\Omega$.
- 3. The input voltage for IN1 and IN2 should be 0 to 6 V to ensure the output voltage does not cause incorrect operation when a negative voltage is applied. Furthermore, IN1 and IN2 voltages should not be applied if the V_{CC} supply is not applied.
- 4. To avoid occurrences where both the upper and lower transistors are ON simultaneously, make sure IN1 or IN2 is open for a period of tens of ms before switching control to the opposite device.
- 5. Connect a 20 μF or larger capacitor between $V_{\mbox{\footnotesize CC}}$ and GND.
- 6. A large current of several hundred mA flows in the motor circuits when the motor is being driven. Accordingly, the output current line and the input circuit should be wired so that they do not have a common impedance.

Pin Description

Pin No.	Pin name	Equivalent circuit	Description		
1	GND		Power and signal ground		
3	IN1	VCC1 25µA € 19kΩ 75kΩ 25µA € 19kΩ GND	• Output voltage control input terminal • $V_M \cong 2.5 \ V$ when input is open.		
4	IN2	VCC1	 Forward, reverse and brake control input terminal V_M ≅ 2.5 V when input is open. 		
5	V _{CL}	VCC1 GND	Output voltage set terminal		
6	V _{CH}	VCC1 GND	Output voltage set terminal		
7	Vref	VCC1 OF GND	• Reference voltage output. Vref = 6.35 V		
8	V _{CC} 1		Signal voltage supply		
9	V _{CC} 2		Power voltage supply		

Pin No.	Pin name	Equivalent circuit	Description
2	OUT1	VCC2 \$260a 260a≨	a Mater call connection terminals
10	OUT2	Out 2 out 1	Motor coil connection terminals

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