Ordering number: EN 4528B

Monolithic Digital IC

LB1643

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

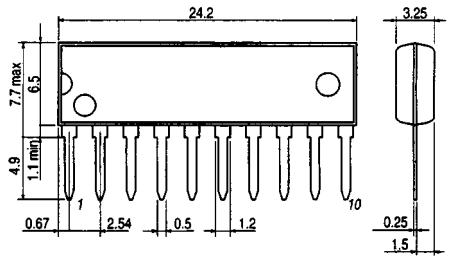
- Single-input forward, reverse and brake functions
- Output voltage can be set using resistors
- Single-input full-drive, high-level drive and low-level drive select function
- Microcontroller interface
- Built-in surge-current absorption components
- Built-in reference voltage circuit
- Built-in thermal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

Package Dimensions

unit : mm

3043A-SIP10

[LB1643]



SANYO : 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	I_{OUT}		±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

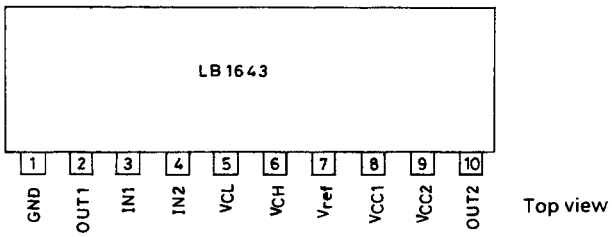
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage ranges	$V_{CC}1$		8.0 to 18	V
	$V_{CC}2$	$V_{CC1} \geqq V_{CC2}$	5 to 18	V
Forward-reverse direction prohibit time	t off		≧20	µs

Electrical Characteristics at Ta = 25 °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	I_{CC}			5.5	10	mA
Output voltages	V_{OUT1}	R_L = 60 Ω, V_{CH} = 2.5 V, $V_{IN}1$ = 2.5 V, $V_{IN}2$ = 0 V	4.4	4.95	5.4	V
	V_{OUT2}	R_L = 60 Ω, 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	I_{OL}	R_L = ∞		0.01	1.0	mA
Saturation voltages (upper)	Vsat11	V_{CC} = 12 V, I_{OUT} = 300 mA		1.9	2.2	V
	Vsat12	V_{CC} = 12 V, I_{OUT} = 500 mA		1.9	2.3	V
Saturation voltages (lower)	Vsat21	V_{CC} = 12 V, I_{OUT} = 300 mA		0.25	0.5	V
	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 characteristics	$\frac{\Delta Vref}{\Delta Iref}$	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 V, V_{CL} = 2.5 V, R_L = 60 Ω	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



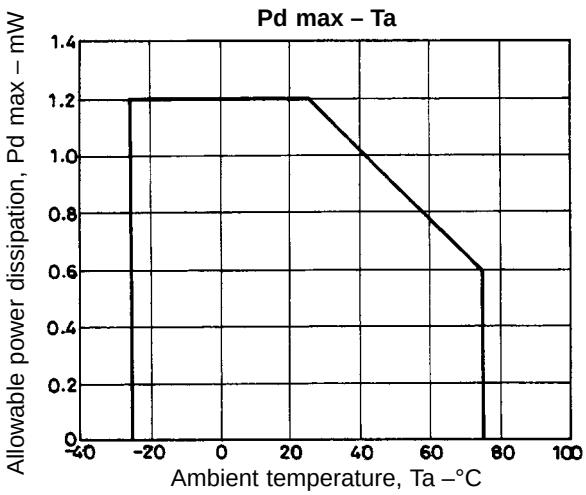
Truth Table

Input		Output voltage		Operation
IN1	IN2	OUT1	OUT2	
H	H	L	FULL	Forward (reverse)
M	H	L	$2V_{CH}$	
L	H	L	$2V_{CL}$	
H	M	OFF	OFF	Brake
M	M	OFF	OFF	
L	M	OFF	OFF	
H	L	FULL	LOW	Reverse (forward)
M	L	$2V_{CH}$	LOW	
L	L	$2V_{CL}$	LOW	

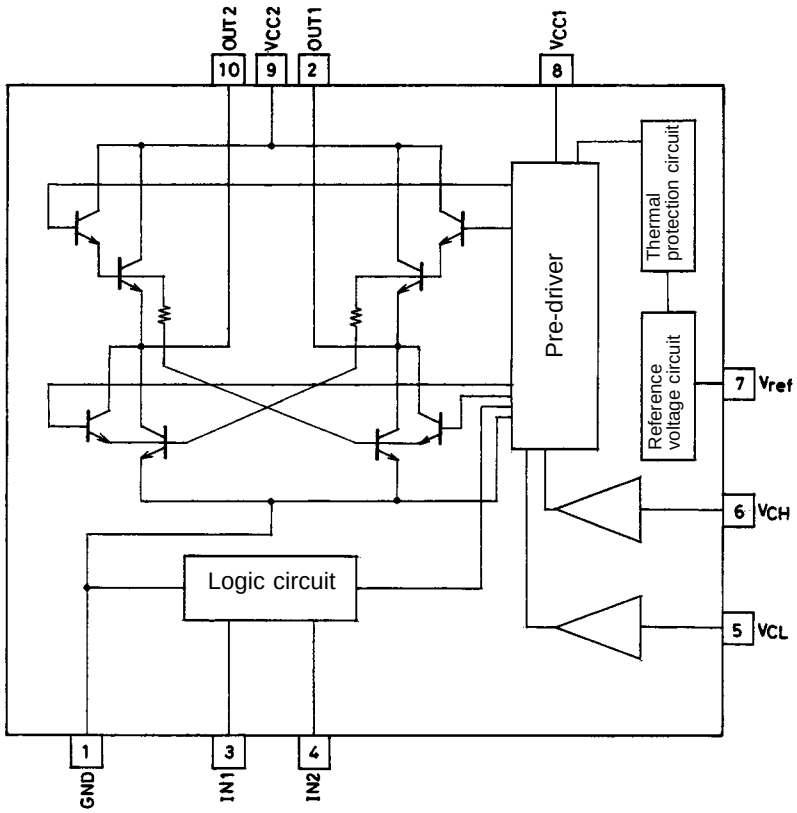
Input levels are

- $V_H \geqq 4.2$ V
- V_M = 2.0 to 3.0 V
- $V_L \leqq 1.0$ V

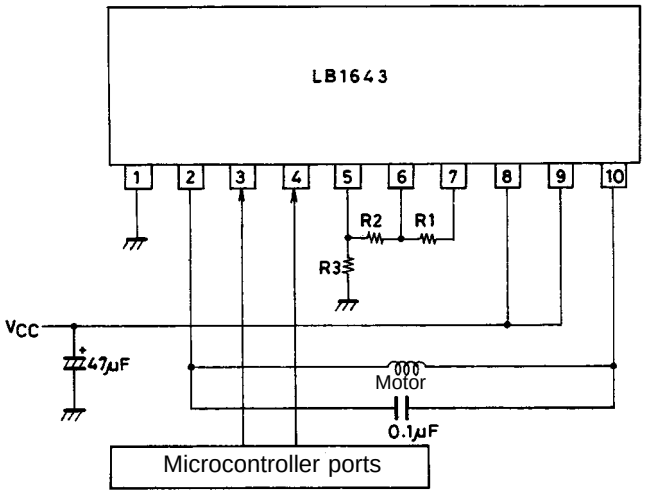
When IN1 and IN2 are open, they take on a voltage of 2.5 V.
Operation equivalent to LB1641.



Internal Equivalent Circuit



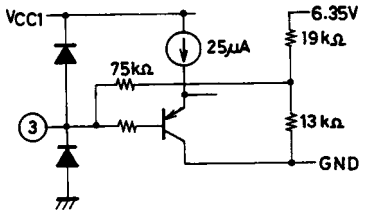
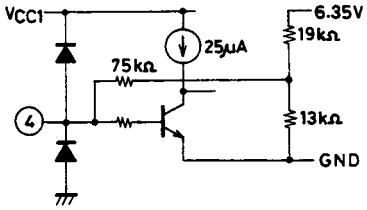
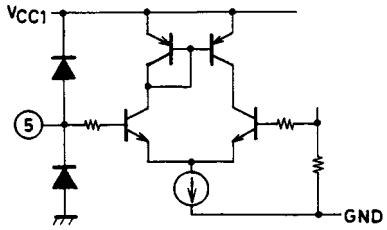
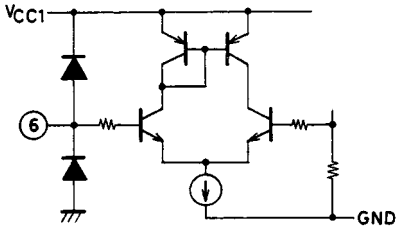
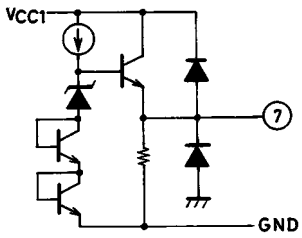
Sample Application Circuit

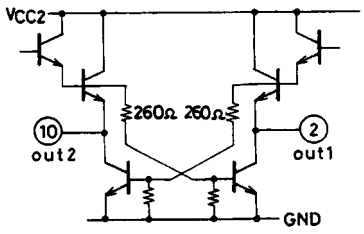


Usage Notes

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 kΩ.
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_{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		• Output voltage control input terminal • $V_M \cong 2.5$ V when input is open.
4	IN2		• Forward, reverse and brake control input terminal • $V_M \cong 2.5$ V when input is open.
5	V_{CL}		• Output voltage set terminal
6	V_{CH}		• Output voltage set terminal
7	Vref		• 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		• Motor coil connection terminals
10	OUT2		