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SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## LB1830M

### Monolithic Digital IC Low-Voltage, Low-Saturation Bidirectional Motor Driver

#### Overview

The LB1830M is a low-saturation bidirectional motor driver IC with brake function for use in low-voltage applications. As both of forward and reverse outputs are regulated, it is especially suited for use in portable equipment.

#### Features

- Wide operating voltage range: 3.0 to 9.0 V
- Low saturation voltage: 0.2V at  $I_O = 40\text{mA}$  (typ)
- Low current drain at standby mode (0.1 $\mu\text{A}$  or less)
- Brake function
- Regulated voltage value (forward/reverse) setting available by one variable resistor
- Regulated output/saturation output switching available
- Built-in spark killer diodes
- Small package: MFP10S

#### Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
maximum supply voltage	$V_{CC \text{ max}}, V_S \text{ max}$		10.5	V
Output current	$I_M \text{ max}$		500	mA
Input supply voltage	$V_{IN}$		-0.3 to +10	V
Allowable power dissipation	$P_d \text{ max}$	Independent IC	0.4	W
		Mounted on a specified board *	0.55	W
Operating temperature	$T_{opr}$		-20 to +80	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

\* Specified board: 30mm  $\times$  30mm  $\times$  1.5mm, glass epoxy board.

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.

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# LB1830M

## Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>CC</sub> , V <sub>S</sub>		3.0 to 9.0	V
Input high level voltage	V <sub>IH</sub>		2.0 to 9.0	V
Input low level voltage	V <sub>IL</sub>		-0.3 to +0.3	V
Control voltage	V <sub>C</sub>		1.0 to 6.0	V

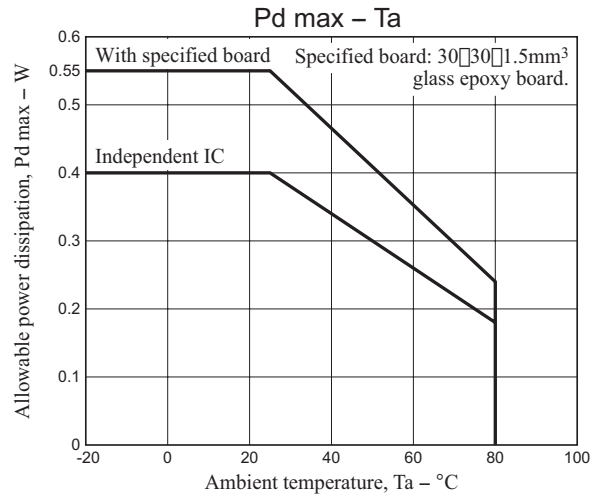
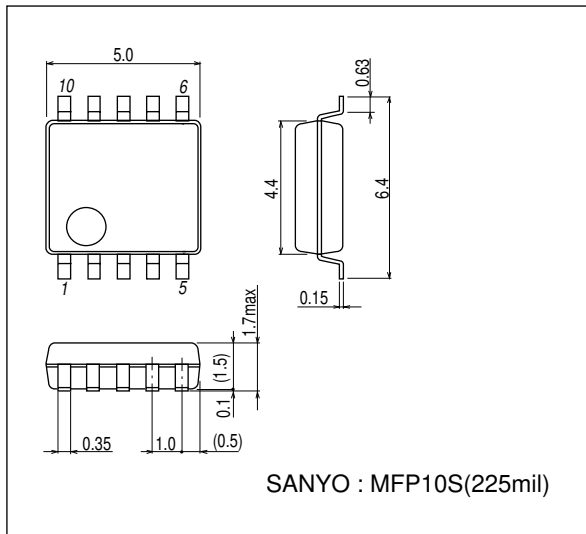
## Electrical Characteristics at Ta = 25°C, V<sub>CC</sub> = 6V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	I <sub>CC0</sub>	IN1 = IN2 = V <sub>m</sub> = 0V, V <sub>C</sub> = V <sub>ref</sub> at standby mode		0.1	10	μA
	I <sub>CC1</sub>	Forward/reverse, control, load OPEN		2	3	mA
	I <sub>CC2</sub>	Forward/reverse, saturation, load OPEN		3	5	mA
	I <sub>CC3</sub>	Braking, load OPEN		5	8	mA
Output saturation voltage	V <sub>sat1</sub>	I <sub>O</sub> = 40mA (upper side + lower side)		0.2	0.3	V
	V <sub>sat2</sub>	I <sub>O</sub> = 80mA (upper side + lower side)		0.4	0.6	V
Reference voltage	V <sub>ref</sub>	I <sub>Vref</sub> = 1mA	1.85	2.0	2.15	V
Voltage characteristics of output voltage	$\frac{\Delta V_O}{\Delta V_{CC}}$	V <sub>O</sub> = 5V, V <sub>CC</sub> = 5.5 to 9V, I <sub>O</sub> = 40mA			80	mA
Current characteristics of output voltage	$\frac{\Delta V_O}{\Delta I_O}$	V <sub>O</sub> = 5V, V <sub>CC</sub> = 6V, I <sub>O</sub> = 10 to 80mA			50	mA
Input current	I <sub>IN</sub>	V <sub>IN</sub> = 5V		90	150	μA
Output voltage	V <sub>O</sub>	V <sub>C</sub> = 2V	2.3×V <sub>C</sub>		2.5×V <sub>C</sub>	V

## Package Dimensions

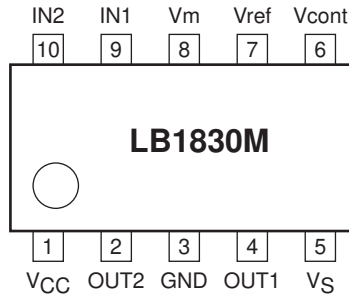
unit : mm (typ)

3086B

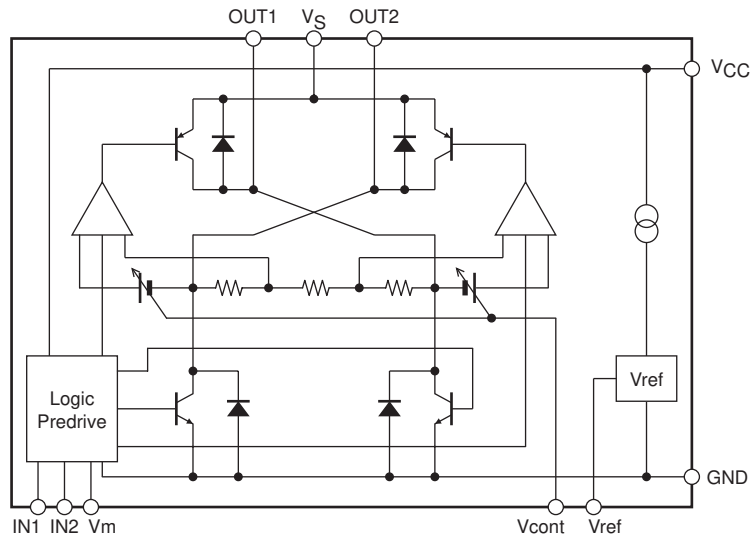


# LB1830M

## Pin Assignment



## Block Diagram



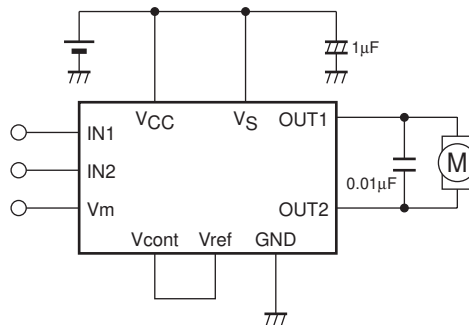
- The constant-voltage drive mode output voltage (the voltage between the output pins)  $V_O$  is determined by the following formula.  $V_O = (V_{cont} \text{ pin input voltage}) \times 2.4$  (typical)
- There are no restrictions on the relative magnitudes between the following voltages:  $V_{CC}$  (control system supply voltage),  $V_S$  (motor supply voltage), and  $IN1/IN2/V_m$  (the input signal voltages).

## Truth Table

Input			Output		Mode
IN1	IN2	$V_m$	OUT1	OUT2	
L	L	L	OFF	OFF	Standby
H	L	L	H	L	Forward (Regulated)
H	L	H	H	L	Forward (Saturation)
L	H	L	L	H	Reverse (Regulated)
L	H	H	L	H	Reverse (Saturation)
H	H	*	L	L	Brake

\* when in saturation mode,  $V_C = V_S$  available.

## Application Circuit Example



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