



## LB1635M

### Low-Saturation Bidirectional Motor Drive for Low-Voltage Applications

## Overview

The LB1635M is a low-saturation bidirectional motor driver IC for use in low-voltage applications. At an  $I_O$  of 200 mA, they have a low saturation output of  $V_O(\text{sat}) = 0.5$  V typ. They are especially suited for use in compact motor of portable equipment.

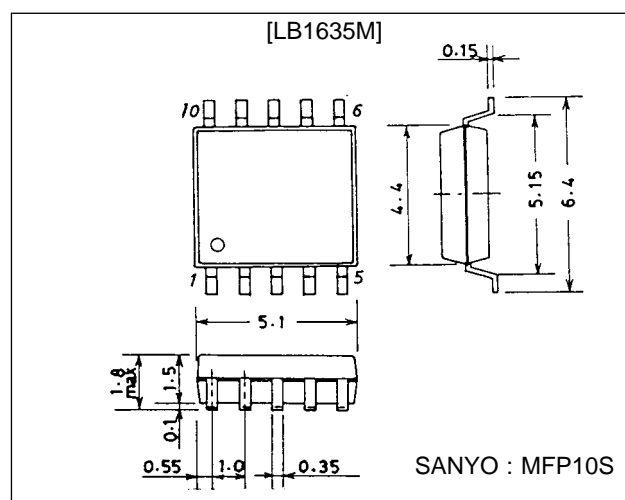
## Features

- Low voltage operation (2.5 V min.)
- Low saturation voltage  
(upper transistor + lower transistor residual voltage;  
at  $I_O = 200$  mA,  $V_O(\text{sat}) = 0.5$  V typ.)
- Low current drain at standby mode ( $I_{\text{CCO}} = 0.1$   $\mu\text{A}$  typ. or less)
- Separate logic power supply and motor power supply
- Brake function built in
- Spark killer diodes built in
- Compact package (MFP-10S) suited for surface mounting.

## Package Dimensions

unit : mm

### 3086A-MFP10S



## Specifications

### Absolute Maximum Ratings at $T_a = 25$ °C

| Parameter                   | Symbol              | Conditions     | Ratings                               | Unit |
|-----------------------------|---------------------|----------------|---------------------------------------|------|
| Maximum supply voltage      | $V_{\text{CC max}}$ |                | -0.3 to +8.0                          | V    |
|                             | $V_{\text{S max}}$  |                | -0.3 to +8.0                          | V    |
| Output applied voltage      | $V_{\text{OUT}}$    |                | -0.3 to $V_{\text{S}} + V_{\text{F}}$ | V    |
| Input applied voltage       | $V_{\text{IN}}$     |                | -0.3 to +8.0                          | V    |
| Ground pin flow-out current | $I_{\text{GND}}$    |                | 500                                   | mA   |
| Allowable power dissipation | $P_{\text{d max1}}$ | Independent IC | 300                                   | mW   |
|                             | $P_{\text{d max2}}$ | * With board   | 440                                   | mW   |
| Operating temperature       | $T_{\text{opr}}$    |                | -20 to +75                            | °C   |
| Storage temperature         | $T_{\text{stg}}$    |                | -40 to +125                           | °C   |

\* Specified board ( $30 \times 30 \times 1.5$  mm<sup>3</sup> glass epoxy)

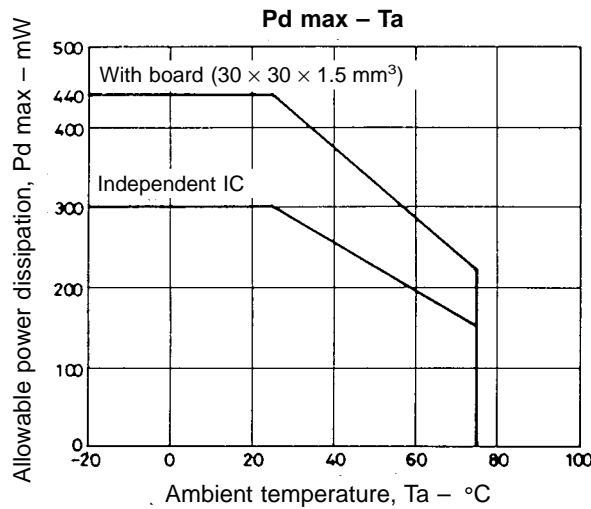
### Allowable Operating Ranges at $T_a = 25$ °C

| Parameter                | Symbol          | Conditions | Ratings      | Unit |
|--------------------------|-----------------|------------|--------------|------|
| Supply voltage           | $V_{\text{CC}}$ |            | 2.5 to 7.0   | V    |
|                          | $V_{\text{S}}$  |            | 2.2 to 7.0   | V    |
| Input high-level voltage | $V_{\text{IH}}$ |            | 2.0 to 7.0   | V    |
| Input low-level voltage  | $V_{\text{IL}}$ |            | -0.3 to +0.7 | V    |

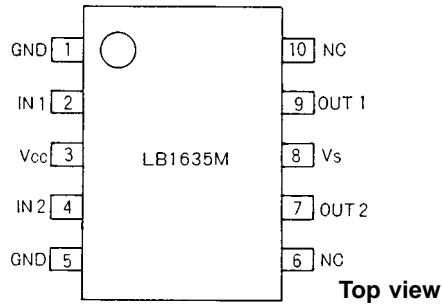
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## Electrical Characteristics at $T_a = 25\text{ }^\circ\text{C}$ , $V_{CC} = V_S = 3\text{ V}$

| Parameter                                 | Symbol       | Conditions                                       | min | typ  | max | Unit          |
|---|--------------|--|-----|------|-----|---------------|
| Supply current                            | $I_{CC0}$    | $V_{IN\ 1, 2} = 0\text{ V}$                      |     |      | 10  | $\mu\text{A}$ |
|   | $I_{CC1}$    | $V_{IN\ 1} = 3\text{ V}, V_{IN\ 2} = 0\text{ V}$ |     |      | 15  | $\text{mA}$   |
|   | $I_{CC2}$    | $V_{IN\ 1, 2} = 3\text{ V}$                      |     |      | 30  | $\text{mA}$   |
| Output saturation voltage (upper + lower) | $V_{OUT1}$   | $I_{OUT} = 100\text{ mA}$                        |     | 0.25 | 0.5 | V             |
|   | $V_{OUT2}$   | $I_{OUT} = 200\text{ mA}$                        |     | 0.50 | 1.0 | V             |
| Output pin voltage difference             |              | $I_O = 100\text{ mA}$                            | -20 | 0    | +20 | %             |
| Output sustain voltage                    | $V_O$ (sus)  | $I_{OUT} = 200\text{ mA}$                        | 9   |      |     | V             |
| Input current                             | $I_{IN}$     | $V_{IN} = 7\text{ V}, V_{CC} = 7\text{ V}$       |     |      | 0.5 | $\text{mA}$   |
| [Spark killer diode]                      |              |  |     |      |     |               |
| Reverse current                           | $I_S$ (leak) | $V_{CC}, V_S = 7\text{ V}$                       |     |      | 10  | $\mu\text{A}$ |
| Forward voltage                           | $V_{SF}$     | $I_{OUT} = 200\text{ mA}$                        |     |      | 1.7 | V             |



## Pin Assignment

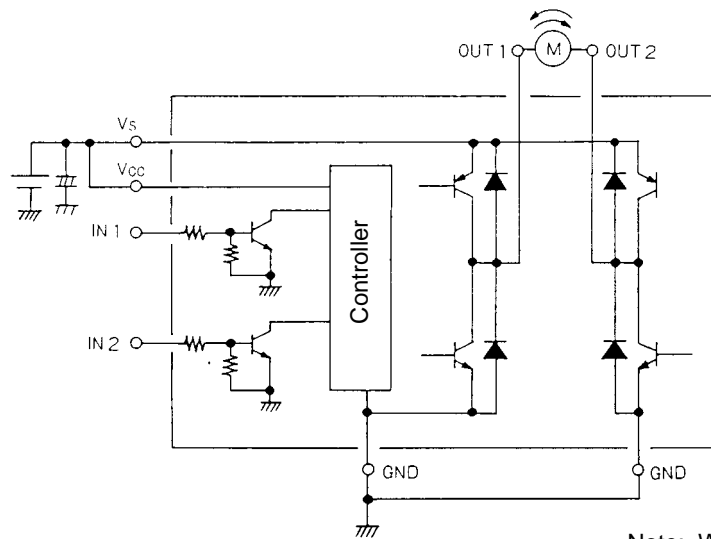


Note: both ground pins must be grounded.

## Truth Table

| IN 1 | IN 2 | OUT 1 | OUT 2 | Mode    |
|------|------|-------|-------|---------|
| H    | L    | H     | L     | Forward |
| L    | H    | L     | H     | Reverse |
| H    | H    | L     | L     | Brake   |
| L    | L    | OFF   | OFF   | Standby |

## Sample Application Circuit



Note: When using the same power supply for  $V_S$  and  $V_{CC}$ , short the  $V_{CC}$  and  $V_S$  pins to each other or insert a capacitor in the  $V_{CC}$  line.

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