



LB1855NM

3-Phase Brushless Motor Driver

Overview

The LB1855NM is a 3-phase brushless motor driver IC that is optimal for VCR drum motor drive.

- Current limiter circuit built in
- AGC circuit built in
- Thermal shutdown circuit built in

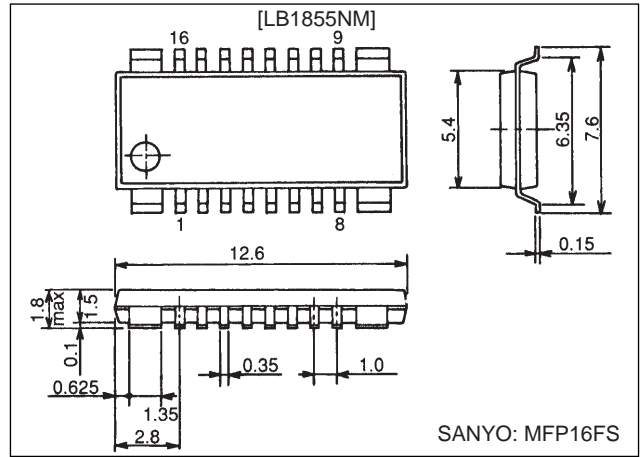
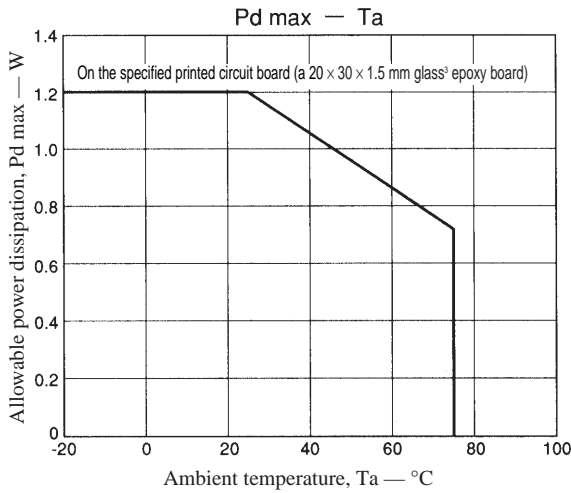
Features

- Current linear drive
- No output electrolytic capacitors required.

Package Dimensions

unit: mm

3097-MFP16FS



Specifications

Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|--|-------------|------|
| Maximum supply voltage | V _{CC} max | | 20 | V |
| Maximum output current | I _O max | | 1.2 | A |
| Allowable power dissipation | Pd max | On the specified printed circuit board (a 20 × 30 × 1.5 mm ³ glass epoxy board) | 1.2 | W |
| Operating temperature | T _{opr} | | -20 to +75 | °C |
| Storage temperature | T _{stg} | | -55 to +150 | °C |

Allowable Operating Ranges at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|----------------------|-------------------|-------------------------|-----------|-------|
| Supply current | V _{CC} | | 7 to 18 | V |
| Hall input amplitude | V _{HALL} | Between the Hall inputs | 70 to 300 | mVp-p |

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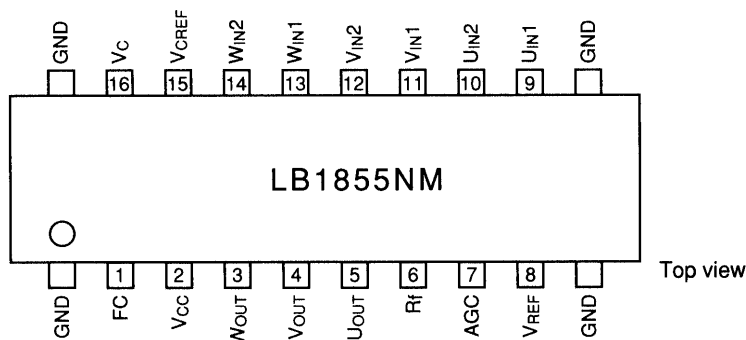
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Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{ V}$

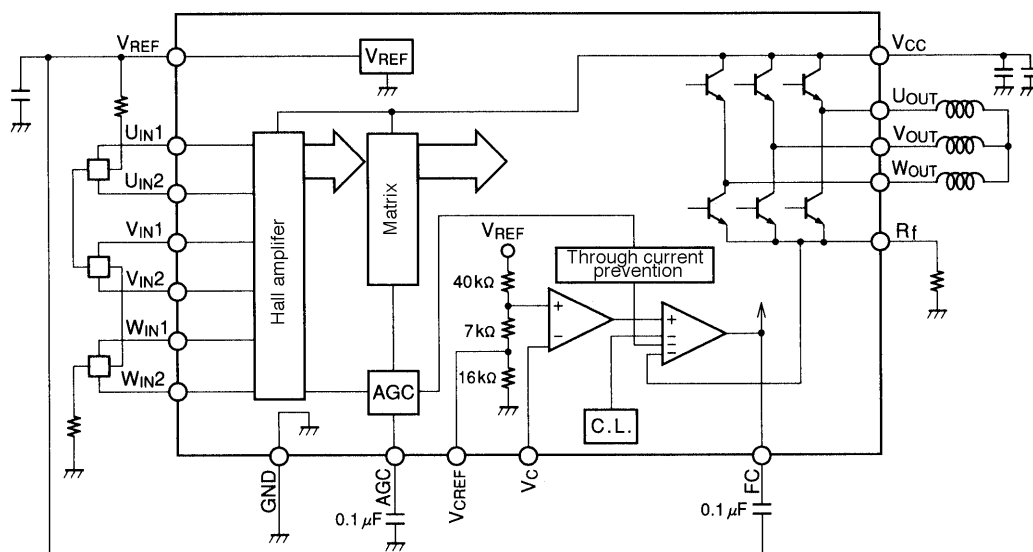
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---------------------------------|------------------|---|---------|-----|----------------|------------------|
| | | | min | typ | max | |
| Supply current | I_{CC} | $V_C = \text{GND}$ | | | 8 | mA |
| Reference voltage | V_{REF} | $I_R = 8\text{ mA}$ | 6.0 | 6.3 | 6.6 | V |
| [Saturation voltage] | | | | | | |
| Upper side | V_{sat1} | $I_O = 1\text{ A}$ | | 1.5 | 1.9 | V |
| Lower side | V_{sat2} | $I_O = 1\text{ A}$ | | 0.8 | 1.2 | V |
| [Leakage current] | | | | | | |
| Upper side | I_{OL1} | $V_{CC} = 18\text{ V}$ | | | 50 | μA |
| Lower side | I_{OL2} | $V_{CC} = 18\text{ V}$ | | | 50 | μA |
| [Hall Amplifier] | | | | | | |
| Input offset voltage | V_{HO} | * | -10 | | +10 | mV |
| Common-mode input voltage range | V_{HCM} | | 2.2 | | $V_{CC} - 0.7$ | V |
| [Control Amplifier] | | | | | | |
| Control reference voltage | V_{REF1} | (the V_{CREF} pin voltage) $\times 23/16$ | 2.1 | 2.3 | 2.5 | V |
| Control Gm | VG | $R_f = 1\Omega$ | | 1 | | A/V |
| Input current | I_{IN} | | | | 10 | μA |
| [Thermal Shutdown Circuit] | | | | | | |
| Operating temperature | T_{TSD} | * | | 180 | | $^\circ\text{C}$ |
| Hysteresis | ΔT_{TSD} | * | | 15 | | $^\circ\text{C}$ |

Note: Items marked with an asterisk (*) are design target values and are not tested.

Pin Assignment



Block Diagram

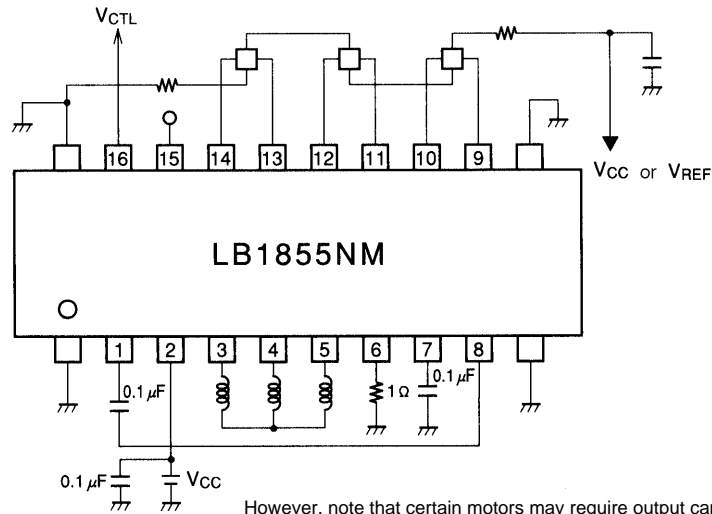


However, note that certain motors may require output capacitors to prevent oscillation.

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Sample Application Circuit

Hall input voltage range: 2.2 to ($V_{CC} - 0.7$) V DC
 70 mV p-p to 300 mV p-p AC



However, note that certain motors may require output capacitors to prevent oscillation.

Truth Table

| Item | Source → sink | Input | | |
|------|-------------------|-------|---|---|
| | | U | V | W |
| 1 | V phase → W phase | H | H | L |
| 2 | U phase → W phase | H | L | L |
| 3 | W phase → V phase | L | L | H |
| 4 | V phase → U phase | L | H | L |
| 5 | U phase → V phase | H | L | H |
| 6 | W phase → U phase | L | H | H |

Input: "H" indicates that the input phase 1 is at least 0.2 V higher than phase 2.
 "L" indicates that the input phase 1 is at least 0.2 V lower than phase 2.

Pin Functions

| Pin No. | Pin | Pin voltage (V) | Pin description | Equivalent circuit |
|---------|------------------|-----------------|--|--------------------|
| 1 | FC | | <ul style="list-style-type: none"> Frequency characteristics correction Oscillation in the current control closed loop can be prevented by inserting a capacitor between this pin and VREF. | |
| 2 | V _{CC} | 7 to 18 | <ul style="list-style-type: none"> Power supply pin | |
| 3 | W _{OUT} | | <ul style="list-style-type: none"> Outputs pin | |
| 4 | V _{OUT} | | | |
| 5 | U _{OUT} | | | |
| 6 | R _f | | <ul style="list-style-type: none"> Ground for the output transistor The output current can be detected as a voltage by inserting the resistor R_f between this pin and ground to provide fixed current drive. The current limiter also operates by detecting this voltage. | |

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| Pin No. | Pin | Pin voltage (V) | Pin description | Equivalent circuit |
|---------------------------------|--|---------------------------------|--|--------------------|
| 7 | AGC | | <ul style="list-style-type: none"> AGC pin The Hall amplifier gain can be controlled according to the amplitude of the Hall input by inserting a capacitor between this pin and ground. | |
| 8 | V _{REF} | | <ul style="list-style-type: none"> Internal reference voltage. About 6.3 V. | |
| 9 10 11 12 13 14 | U _{IN1} U _{IN2} V _{IN1} V _{IN2} W _{IN1} W _{IN2} | 2.2 to V _{CC} - 0.7 | <ul style="list-style-type: none"> Hall element inputs pin | |
| 15 16 | V _{CREF} V _C | 0 to 5 | <ul style="list-style-type: none"> Speed control pin This IC adopts a current control type in which the output current is controlled by the pin 16 voltage. The control start voltage changes about 1.3 to 1.4 V if pin 15 is connected to ground. | |

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