



LB1674V

Brushless, Sensorless Motor Driver

Overview

The LB1674V is a small motor driver ideal for mini-cassettes, headphone stereos and micro-cassettes.

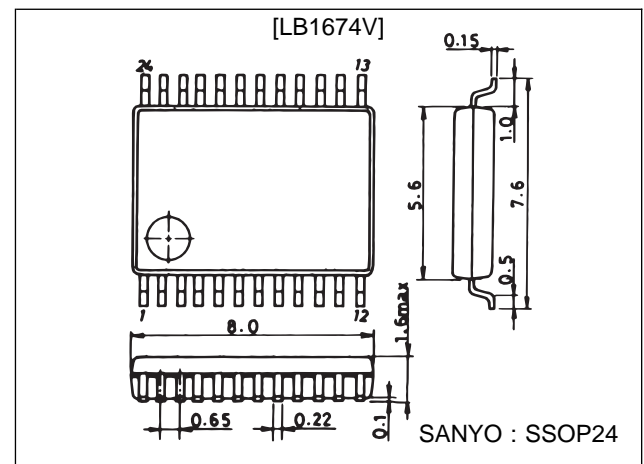
Functions and Features

- 3-phase unipolar, brushless, sensorless motor driver
- Reverse function
- Built-in speed control function (V servo)
- Built-in reference voltage (0.5 V)
- Soft switching driver

Package Dimensions

unit : mm

3175A-SSOP24



Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|-------------------------------------|----------------------|---------------------------|--------------|------------------|
| Maximum supply voltage | $V_{CC \text{ max}}$ | | 5 | V |
| Output transistor withstand voltage | V_{sus} | | 10 | V |
| Maximum output current | $I_m \text{ max}$ | | 0.6 | A |
| Allowable power dissipation | $P_d \text{ max}$ | $T_j = 125^\circ\text{C}$ | 0.4 | W |
| Operating temperature | T_{opr} | | 0 to + 80 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -40 to + 125 | $^\circ\text{C}$ |

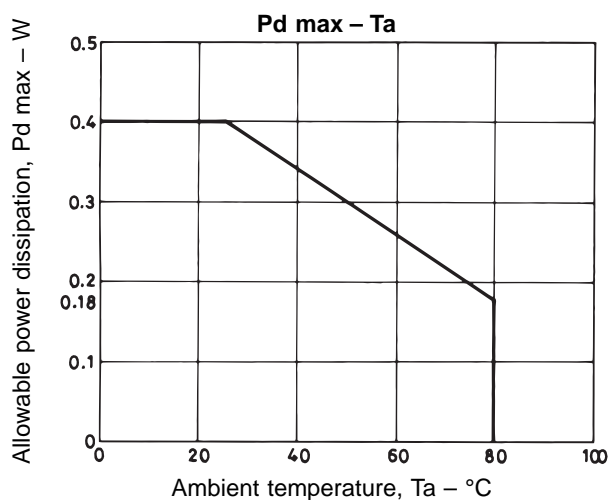
Allowable Operating Range at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|----------------|----------|------------|------------|------|
| Supply voltage | V_{CC} | | 1.0 to 3.5 | V |

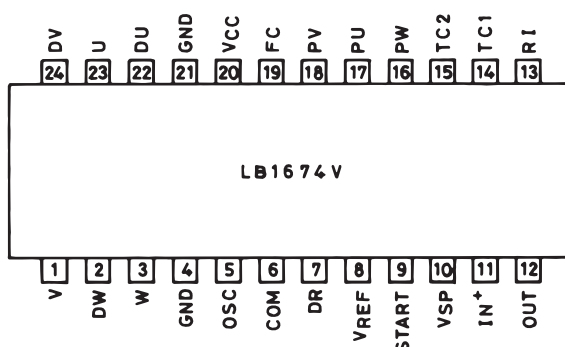
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Electrical Characteristics at Ta = 25°C, VCC = 1.5 V, unless otherwise noted

| Parameter | Symbol | Conditions | min | typ | max | Unit |
|-----------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------|------|-------|------|-------|
| Supply current | I _{CC} | START pin: high | | 6.5 | 10 | mA |
| | | START pin: low | | 0 | 10 | μA |
| Reference voltage | V _{ref} | | 0.47 | 0.50 | 0.53 | V |
| Reference-voltage characteristic | $\frac{\Delta V_{ref}}{V_{ref}} / \Delta V_{CC}$ | V _{CC} = 1.0 to 3.5 V | | 1 | 1.5 | %/V |
| Reference-voltage load characteristics | $\frac{\Delta V_{ref}}{\Delta I_{ref}}$ | I _{ref} = 0 to -50 μA | -0.2 | -0.06 | | mV/μA |
| Reference-voltage temperature characteristics | $\frac{\Delta V_{ref}}{V_{ref}} / \Delta T_a$ | T _a = 0 to 80°C | | 0.01 | | %/°C |
| Speed signal detection accuracy | V _{sp} | V _{IN} = 750 mV | 140 | 155 | 170 | mV |
| Speed signal interphase error | | | -5 | | +5 | % |
| Speed-signal voltage characteristics | $\frac{\Delta V_{sp}}{V_{sp}} / \Delta V_{CC}$ | V _{CC} = 1.0 to 3.5 V | | 2 | 3 | %/V |
| Speed-signal temperature characteristics | $\frac{\Delta V_{sp}}{V_{sp}} / \Delta T_a$ | V _{IN} = 0.75 V, T _a = 0 to 80°C | | 0.05 | | %/°C |
| Current detection accuracy | V _{RI} | V _{IN1} = 0.3 V, V _{IN2} = 1.0 V, R _I = 330 Ω | 70 | 85 | 100 | mV |
| Current detection ratio | K _I | V _{IN1} = 0.3 V, V _{IN2} = 1 to 1.3 V | 0.17 | 0.22 | 0.27 | |
| Starting pulse period | T _S | C _S = 0.1 μF | | 32 | | ms |
| COM _⊖ lead-in current | I _{COM_⊖} | | 25 | 35 | 45 | μA |
| Output saturation voltage | V _{sat} | V _{CC} = 1.0 V, I _m = 0.3 A | | 0.15 | 0.25 | V |
| Logic input high-level voltage | V _H | | 0.9 | | | V |
| Logic input low-level voltage | V _L | | | | 0.3 | V |
| TC pin lead-in current | I _{TC} | | 35 | 50 | 65 | μA |



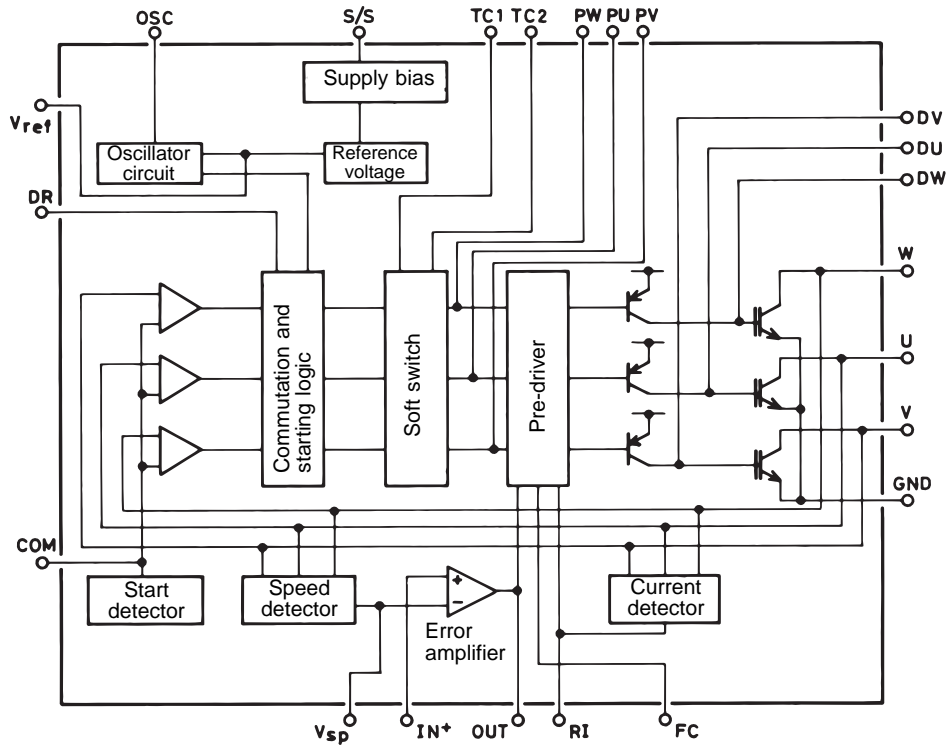
Pin Assignment



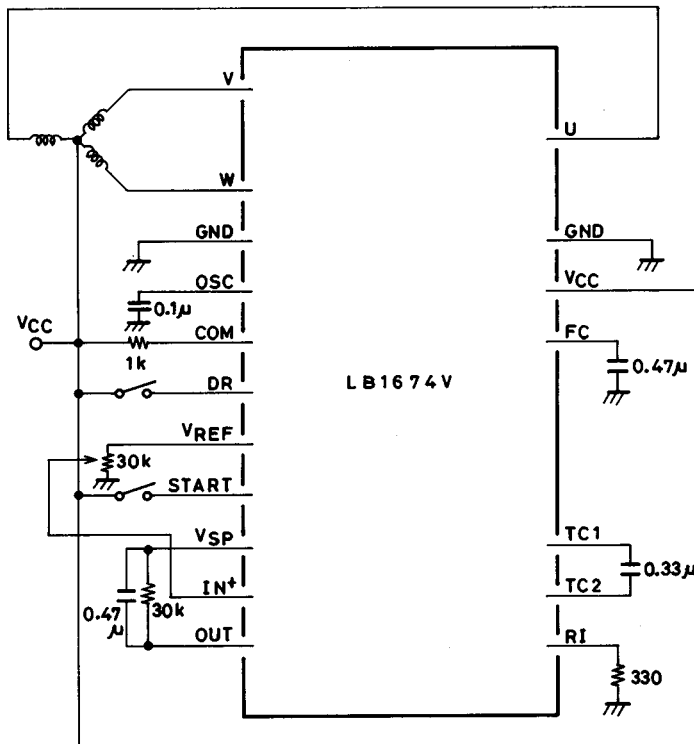
Top view

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Equivalent Circuit Block Diagram



Sample Application Circuits at $V_{CC} = 1.5\text{ V}$



Note:
PU, PV and PW are internal
operation measurement pins.

Unit (resistance: Ω , capacitance: F)

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Pin Description

Unit (resistance: Ω)

| Pin Number | Pin Name | Equivalent Circuit | Description |
|---------------|----------------|--------------------|------------------------------------------------------|
| 1 3 23 | V W U | | • Motor coil connection pins |
| 2 22 24 | DW DU DV | | • Power transistor base pins |
| 4 | GND | | • Power and signal ground |
| 5 | OSC | | • Starting pulse period set pin |
| 6 | COM \ominus | | • Start-up waveform detection circuit offset set pin |
| 7 | DR | | • Drive direction switch pin (normally low) |
| 8 | Vref | | • Reference voltage pin (0.5 V) |
| 9 | START | | • Start/stop control pin. Active-high |
| 10 | Vsp | | • Speed signal (motor induction voltage) detector |

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Unit (resistance: Ω)

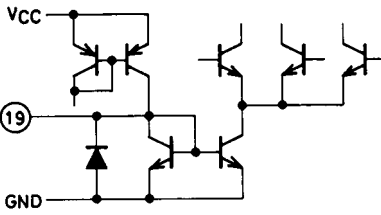
| Pin Number | Pin Name | Equivalent circuit | Description |
|----------------|-----------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 11 | IN ⁺ | | <ul style="list-style-type: none"> Speed signal error amplifier reference input pin |
| 12 | OUT | | <ul style="list-style-type: none"> Speed signal error amplifier output for motor current feedback |
| 13 | RI | | <ul style="list-style-type: none"> Motor current detection pin |
| 14 | TC1 | | <ul style="list-style-type: none"> Motor current rising/falling time constant set pins |
| 15 | TC2 | | <ul style="list-style-type: none"> Motor current rising/falling time constant set pins |
| 16 17 18 | PW PU PV | | <ul style="list-style-type: none"> Current waveform generator. Internal operation measurement pins. Must be left open. |

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Unit (resistance: Ω)

| Pin Number | Pin Name | Equivalent circuit | Description |
|------------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 19 | FC |  | <ul style="list-style-type: none"> • Abnormal oscillation stop pin |
| 20 | V_{CC} | | <ul style="list-style-type: none"> • Power supply |
| 21 | GND | | <ul style="list-style-type: none"> • Power and signal ground |

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