

|   |          |                |
|---|----------|----------------|
| <b>SANYO</b>                              | No. 4954 | <b>LB1674M</b> |
| <b>Brushless, Sensorless Motor Driver</b> |          |                |

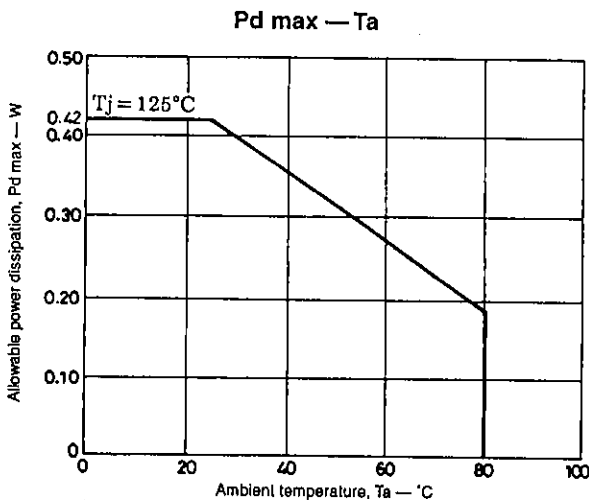
### Overview

The LB1674M is a motor driver IC which is ideal for minicassette player, headphone stereo, and microcassette player applications.

### Functions and Features

- Brushless, sensorless motor drive (3-phase unipole drive)
- Forward/Reverse direction
- Speed control function built-in (V-servo)
- Reference voltage built-in (0.5V)
- Soft switching drive

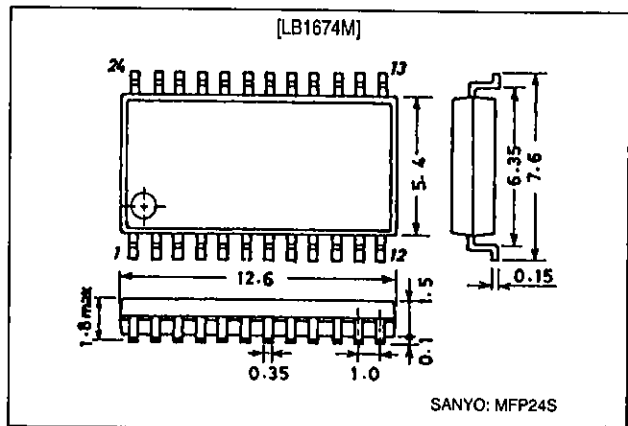
### Performance Characteristics



### Package Dimensions

Unit: mm

3112-MFP24S



## Specifications

### Absolute Maximum Ratings at Ta = 25°C

| Parameter                          | Symbol               | Conditions             | Ratings     | Unit |
|------------------------------------|----------------------|------------------------|-------------|------|
| Maximum supply voltage             | V <sub>CC</sub> max  |                        | 5           | V    |
| Output transistor blocking voltage | V <sub>O</sub> (sus) |                        | 10          | V    |
| Maximum output current             | I <sub>m</sub> max   |                        | 0.6         | A    |
| Allowable power dissipation        | P <sub>d</sub> max   | T <sub>j</sub> = 125°C | 0.42        | W    |
| Operating temperature              | T <sub>opr</sub>     |                        | 0 to 80     | °C   |
| Storage temperature                | T <sub>stg</sub>     |                        | -40 to +125 | °C   |

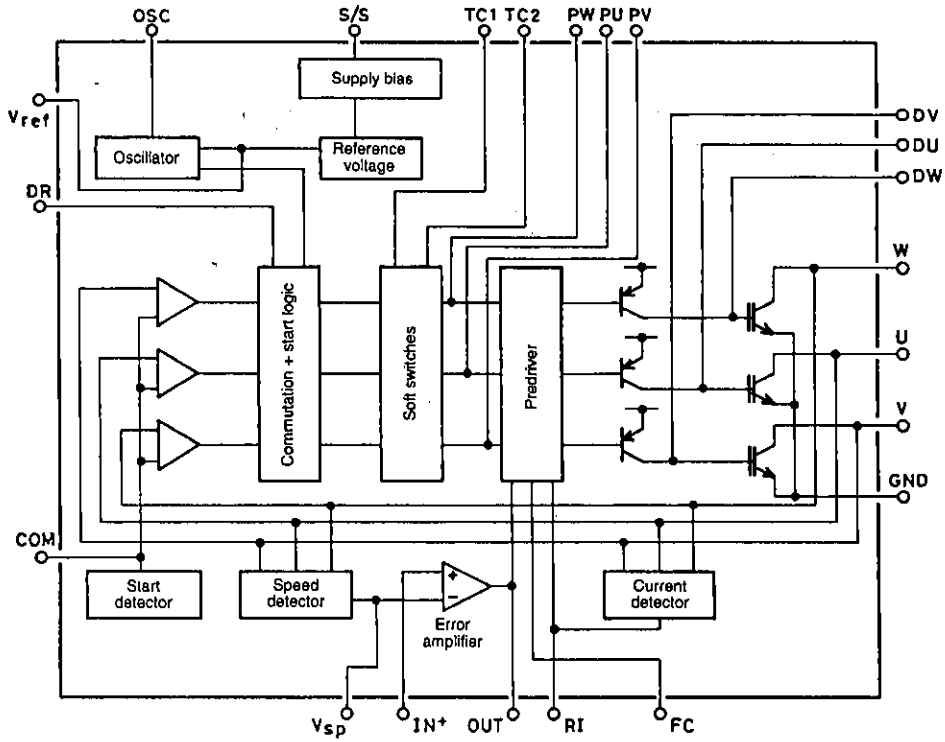
### Allowable Operating Ranges at Ta = 25°C

| Parameter      | Symbol          | Conditions | Ratings    | Unit |
|----------------|-----------------|------------|------------|------|
| Supply voltage | V <sub>CC</sub> |            | 1.0 to 3.5 | V    |

### Electrical Characteristics at Ta = 25°C, V<sub>CC</sub> = 1.5V, specified test circuit

| Parameter                                       | Symbol  | Conditions  | Ratings |       |      | Unit  |
|---|---|---|---------|-------|------|-------|
|   |   |   | min     | typ   | max  |       |
| Supply current                                  | I <sub>CC</sub>   | START = HIGH  | -       | 6.5   | 10   | mA    |
|   |   | START = LOW   | -       | 0     | 10   | μA    |
| Reference voltage                               | V <sub>ref</sub>  |   | 0.47    | 0.50  | 0.53 | V     |
| Voltage characteristic of reference voltage     | $\frac{\Delta V_{ref}}{V_{ref}} \times \frac{1}{\Delta V_{CC}}$ | V <sub>CC</sub> = 1.0 to 3.5V   | -       | 1     | 1.5  | %/V   |
| Load characteristic of reference voltage        | $\frac{\Delta V_{ref}}{\Delta I_{ref}}$                         | I <sub>ref</sub> = 0 to -50μA   | -0.2    | -0.06 | -    | mV/μA |
| Temperature characteristic of reference voltage | $\frac{\Delta V_{ref}}{V_{ref}} \times \frac{1}{\Delta T_a}$    | T <sub>a</sub> = 0 to 80°C  | -       | 0.01  | -    | %/°C  |
| Speed signal detector accuracy                  | V <sub>sp</sub>   | V <sub>IN</sub> = 750mV   | 140     | 155   | 170  | mV    |
| Speed signal interphase error                   |   |   | -5      | -     | +5   | %     |
| Voltage characteristic of speed signal          | $\frac{\Delta V_{sp}}{V_{sp}} \times \frac{1}{\Delta V_{CC}}$   | V <sub>CC</sub> = 1.0 to 3.5V   | -       | 2     | 3    | %/V   |
| Temperature characteristic of speed signal      | $\frac{\Delta V_{sp}}{V_{sp}} \times \frac{1}{\Delta T_a}$      | V <sub>IN</sub> = 0.75V, T <sub>a</sub> = 0 to 80°C                     | -       | 0.05  | -    | %/°C  |
| Current detector sensitivity                    | V <sub>RI</sub>   | V <sub>IN1</sub> = 0.3V, V <sub>IN2</sub> = 1.0V, R <sub>I</sub> = 330Ω | 70      | 85    | 100  | mV    |
| Current detection ratio                         | K <sub>I</sub>  | V <sub>IN1</sub> = 0.3V, V <sub>IN2</sub> = 1 to 1.3V                   | 0.17    | 0.22  | 0.27 |       |
| Start pulse cycle time                          | T <sub>s</sub>  | C <sub>s</sub> = 0.1μF  | -       | 32    | -    | ms    |
| COM <sub>⊖</sub> pull-in current                | I <sub>COM<sub>⊖</sub></sub>                                    |   | 25      | 35    | 45   | μA    |
| Output saturation voltage                       | V <sub>sat</sub>  | V <sub>CC</sub> = 1.0V, I <sub>m</sub> = 0.3A                           | -       | 0.15  | 0.25 | V     |
| HIGH-level logic input voltage                  | V <sub>H</sub>  |   | 0.9     | -     | -    | V     |
| LOW-level logic input voltage                   | V <sub>L</sub>  |   | -       | -     | 0.3  | V     |
| TC pin pull-in current                          | I <sub>TC</sub>   |   | 35      | 50    | 65   | μA    |

Block Diagram



Pin Functions

| Number        | Name           | Equivalent circuit <sup>1</sup> | Function                              |
|---------------|----------------|---------------------------------|---------------------------------------|
| 1<br>3<br>23  | V<br>W<br>U    |                                 | Motor coil connection pins            |
| 2<br>22<br>24 | DW<br>DU<br>DV |                                 | Power transistor base connections     |
| 4             | GND            |                                 | Common power ground and signal ground |
| 5             | OSC            |                                 | Start pulse cycle time set pin        |

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| Number | Name          | Equivalent circuit <sup>1</sup> | Function   |
|--------|---------------|---------------------------------|--|
| 6      | COM $\ominus$ |                                 | Start waveform detector circuit offset set pin                           |
| 7      | DR            |                                 | Rotation direction switching control pin (forward when LOW)              |
| 8      | Vref          |                                 | Reference voltage pin (0.5V)   |
| 9      | START         |                                 | Start/Stop pin. Active HIGH  |
| 10     | Vsp           |                                 | Speed signal (motor induced voltage) detector                            |
| 11     | IN*           |                                 | Speed signal error amplifier reference input pin                         |
| 12     | OUT           |                                 | Speed signal error amplifier output pin. Motor current feedback control. |

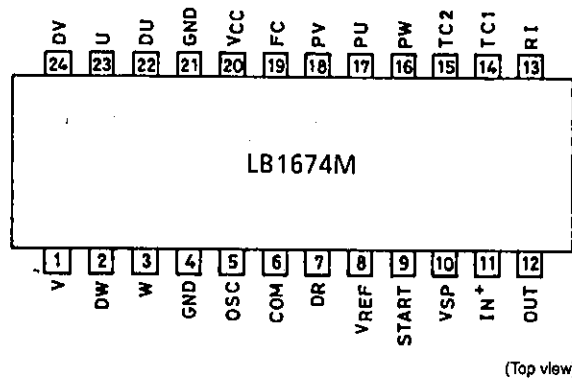
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| Number         | Name            | Equivalent circuit <sup>1</sup> | Function  |
|----------------|-----------------|---------------------------------|---|
| 13             | RI              |                                 | Motor current detector pin  |
| 14             | TC1             |                                 | Motor current rising/falling slope set pin (for soft switching operation)   |
| 15             | TC2             |                                 | Motor current rising/falling slope set pin (for soft switching operation)   |
| 16<br>17<br>18 | PW<br>PU<br>PV  |                                 | Current waveform generator. These pins are for measuring the internal operation. Always left open for normal use. |
| 19             | FC              |                                 | Noise and abnormal oscillation stop pin   |
| 20             | V <sub>CC</sub> |                                 | Supply pin  |
| 21             | GND             |                                 | Common power ground and signal ground   |

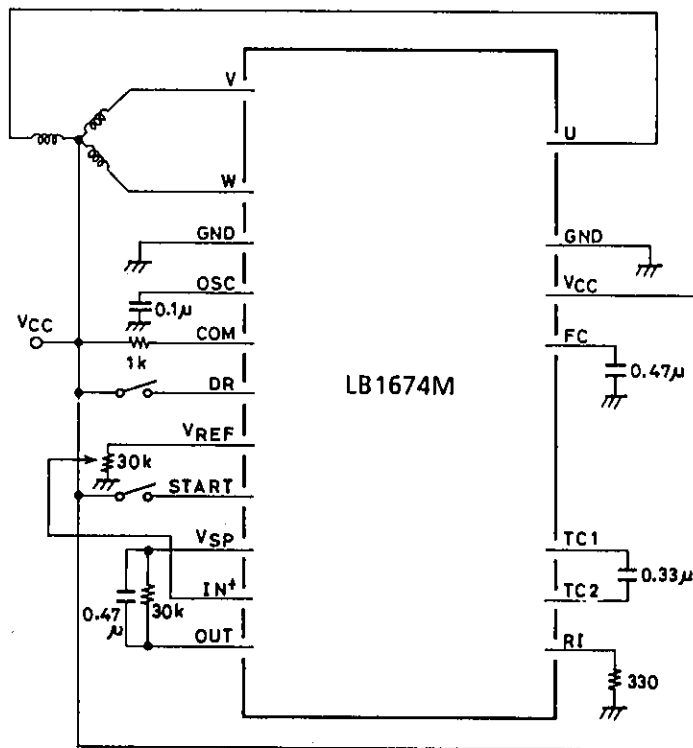
1. Unit (resistance: Ω)

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### Pin Assignment



### Sample Peripheral Circuit ( $V_{CC} = 1.5V$ )



Pins PU, PV and PW are for internal measurement.

Unit (resistance:  $\Omega$ , capacitance: F)

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