

Monolithic Digital IC

**SANYO**

No. 4954

**LB1674M**

**Brushless, Sensorless Motor Driver**

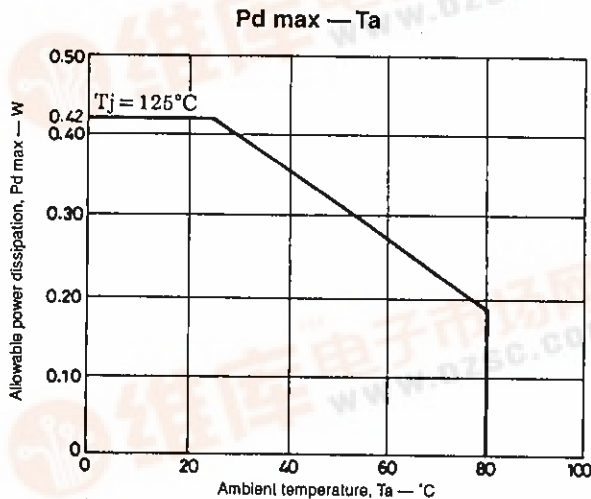
### Overview

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

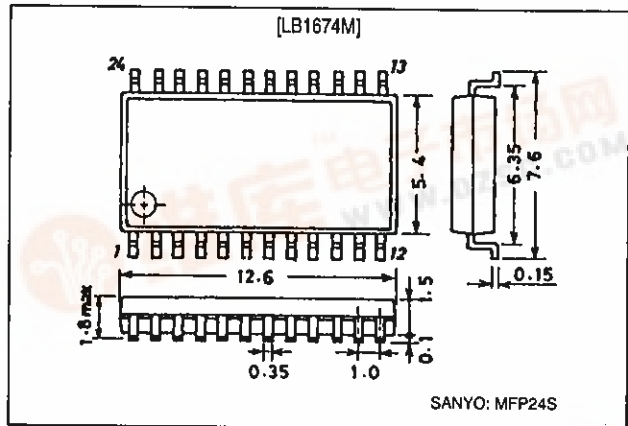
### Performance Characteristics



### Package Dimensions

Unit: mm

3112-MFP24S



## LB1674M

### 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

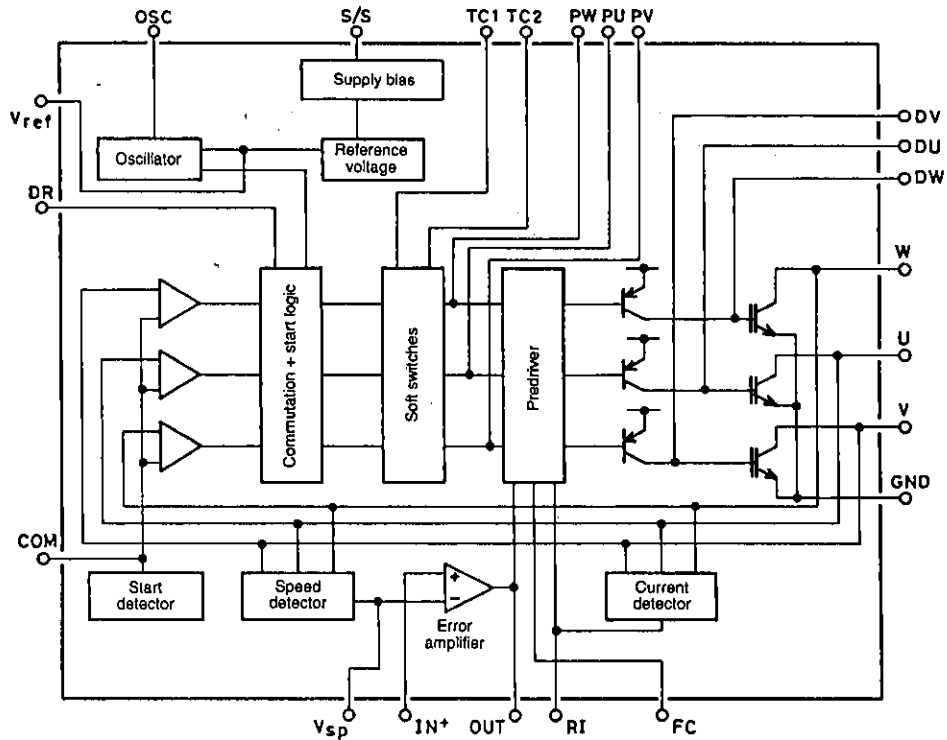
Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V <sub>CC</sub>		1.0 to 3.5	V

#### 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⊖ pull-in current	I <sub>COM⊖</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

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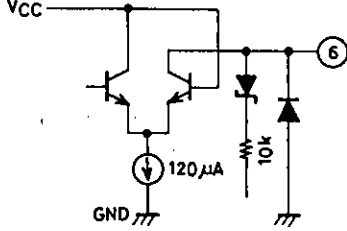
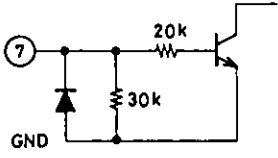
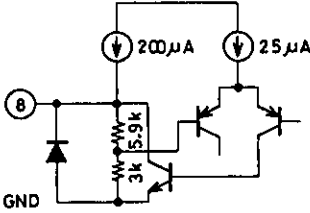
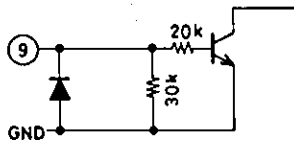
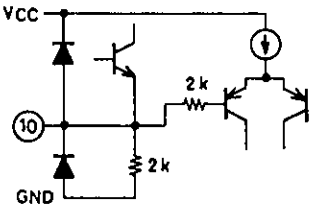
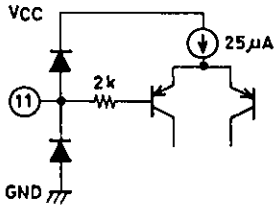
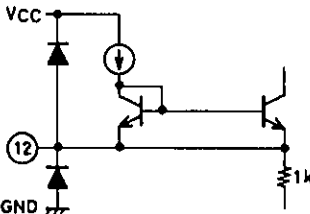
## Block Diagram



## Pin Functions

Number	Name	Equivalent circuit <sup>1</sup>	Function
1 3 23	V W U		Motor coil connection pins
2 22 24	DW DU 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 <sup>+</sup>		Speed signal error amplifier reference input pin
12	OUT		Speed signal error amplifier output pin. Motor current feedback control.

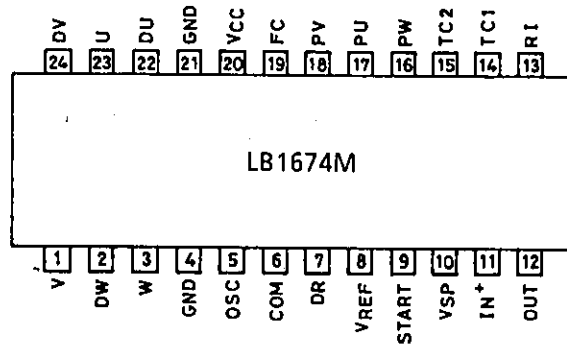
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Number	Name	Equivalent circuit <sup>1</sup>	Function
13	RI		Motor current detector pin
14	TC1		Motor current rising/falling slope set pin (for soft switching operation)
15	TC2		Motor current rising/falling slope set pin (for soft switching operation)
16 17 18	PW PU 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)

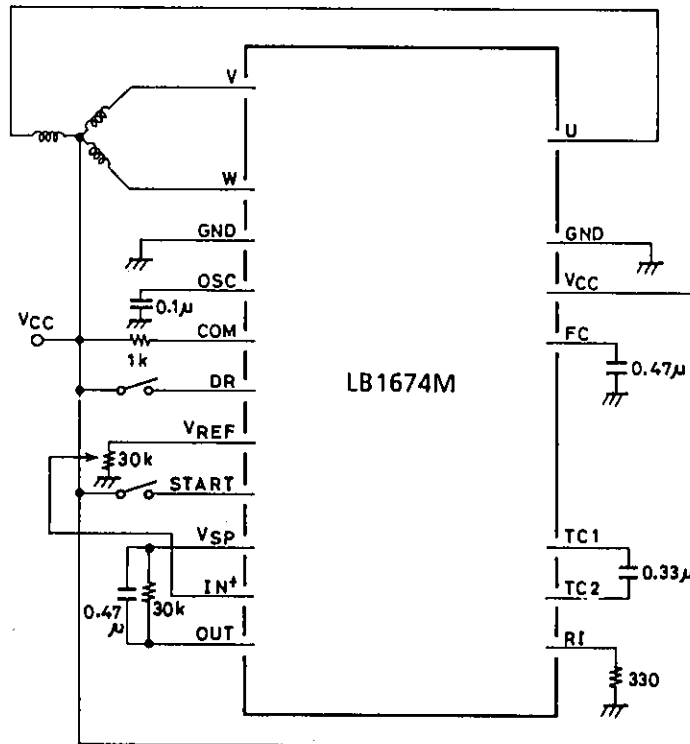
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### Pin Assignment



(Top view)

### 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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