Ordering number: EN 4954

Monolithic Digital IC

SANYO No. 4954

LB1674M

Brushless, Sensorless Motor Driver

Overview

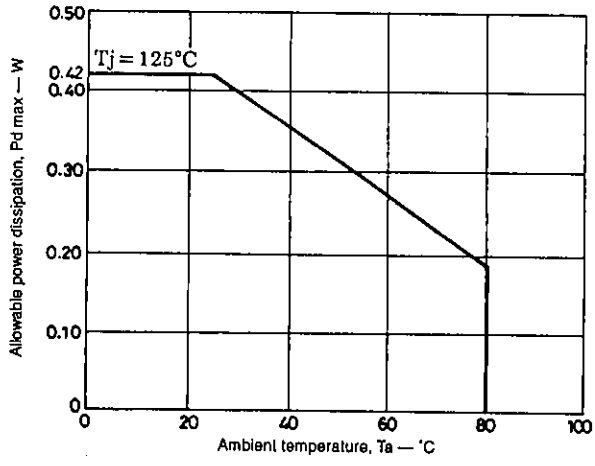
The LB1674M is a motor driver IC which is ideal for minicassette player, headphone stereo, and microcassette player applications.

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

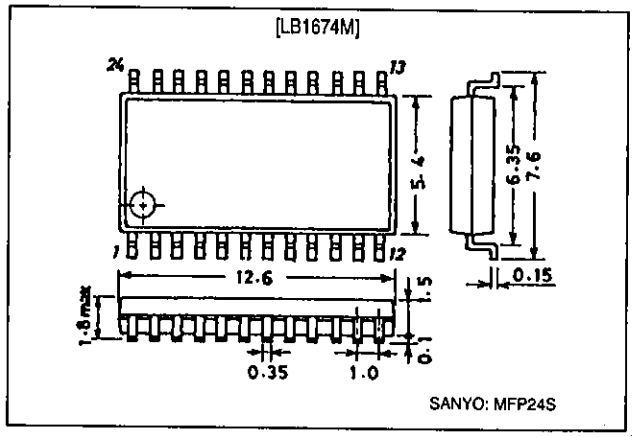
Pd max — Ta



Package Dimensions

Unit: mm

3112-MFP24S



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		5	V
Output transistor blocking voltage	V_O (sus)		10	V
Maximum output current	Im max		0.6	A
Allowable power dissipation	Pd max	Tj = 125°C	0.42	W
Operating temperature	Topr		0 to 80	°C
Storage temperature	Tstg		−40 to +125	°C

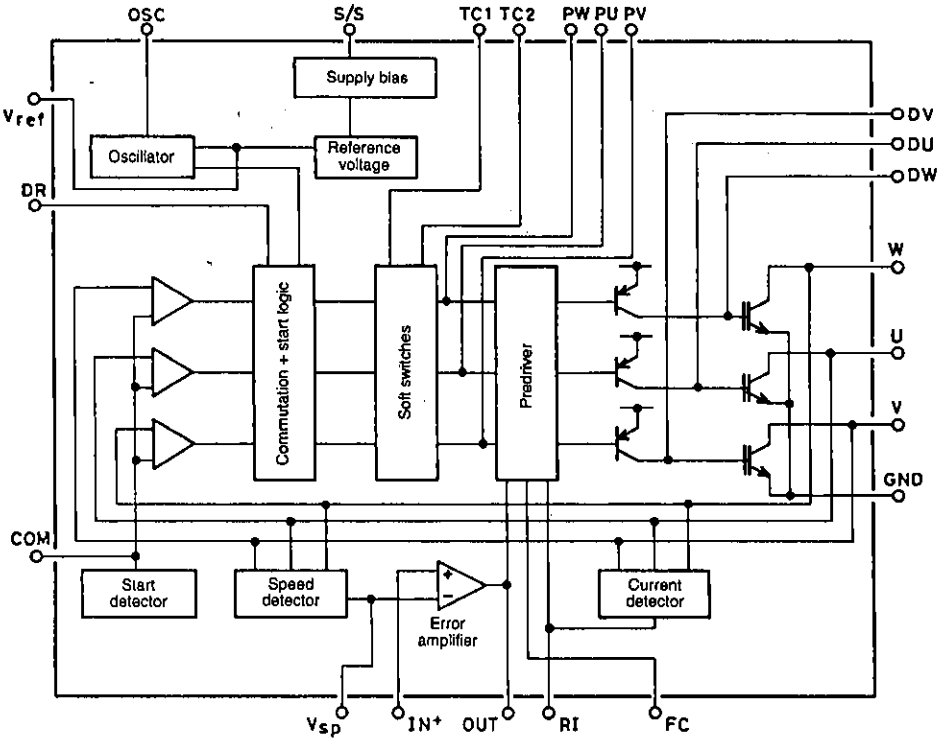
Allowable Operating Ranges at Ta = 25°C

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

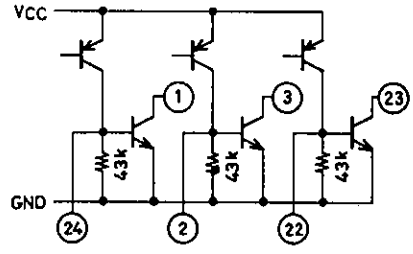
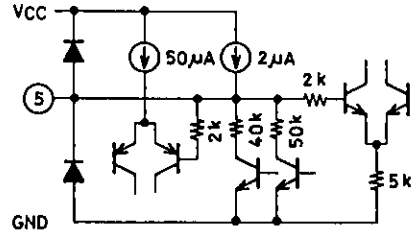
Electrical Characteristics at Ta = 25°C, V_{CC} = 1.5V, specified test circuit

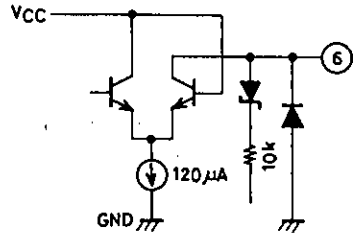
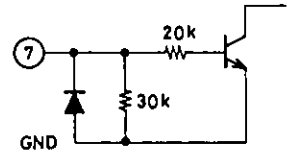
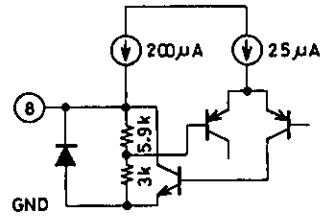
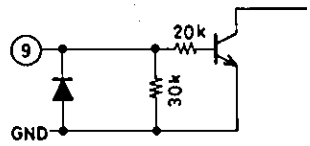
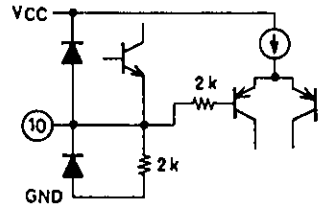
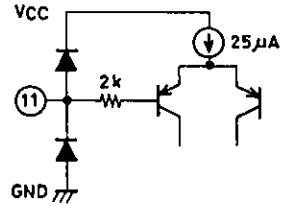
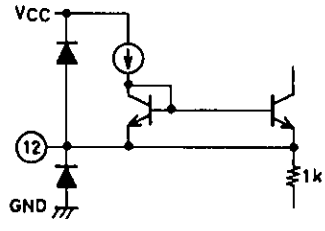
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	I_{CC}	START = HIGH	–	6.5	10	mA
		START = LOW	–	0	10	μA
Reference voltage	Vref		0.47	0.50	0.53	V
Voltage characteristic of reference voltage	$\frac{\Delta Vref}{Vref} \times \frac{1}{\Delta V_{CC}}$	V_{CC} = 1.0 to 3.5V	–	1	1.5	%/V
Load characteristic of reference voltage	$\frac{\Delta Vref}{\Delta Iref}$	Iref = 0 to −50μA	−0.2	−0.06	–	mV/μA
Temperature characteristic of reference voltage	$\frac{\Delta Vref}{Vref} \times \frac{1}{\Delta Ta}$	Ta = 0 to 80°C	–	0.01	–	%/°C
Speed signal detector accuracy	Vsp	V_{IN} = 750mV	140	155	170	mV
Speed signal interphase error			−5	–	+5	%
Voltage characteristic of speed signal	$\frac{\Delta Vsp}{Vsp} \times \frac{1}{\Delta V_{CC}}$	V_{CC} = 1.0 to 3.5V	–	2	3	%/V
Temperature characteristic of speed signal	$\frac{\Delta Vsp}{Vsp} \times \frac{1}{\Delta Ta}$	V_{IN} = 0.75V, Ta = 0 to 80°C	–	0.05	–	%/°C
Current detector sensitivity	V_{RI}	$V_{IN}1$ = 0.3V, $V_{IN}2$ = 1.0V, RI = 330Ω	70	85	100	mV
Current detection ratio	K_I	$V_{IN}1$ = 0.3V, $V_{IN}2$ = 1 to 1.3V	0.17	0.22	0.27	
Start pulse cycle time	T_S	C_S = 0.1μF	–	32	–	ms
COM⊖ pull-in current	I_{COM}⊖		25	35	45	μA
Output saturation voltage	Vsat	V_{CC} = 1.0V, Im = 0.3A	–	0.15	0.25	V
HIGH-level logic input voltage	V_H		0.9	–	–	V
LOW-level logic input voltage	V_L		–	–	0.3	V
TC pin pull-in current	I_{TC}		35	50	65	μA

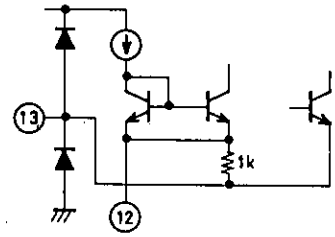
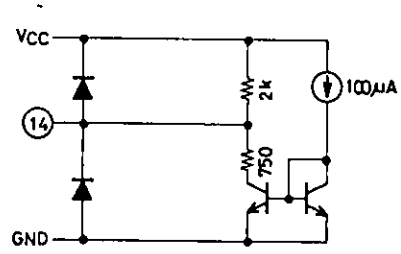
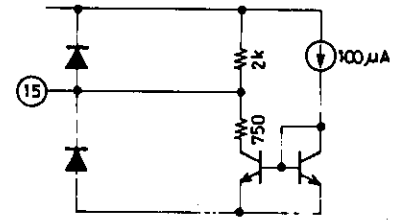
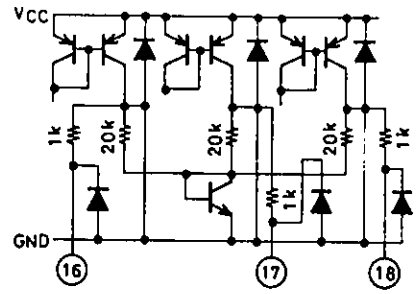
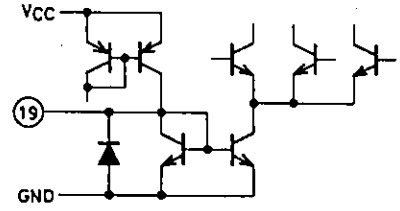
Block Diagram



Pin Functions

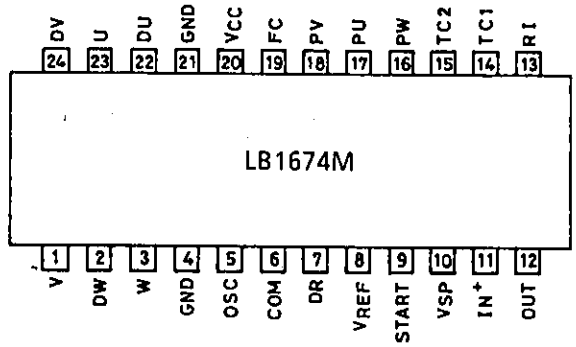
Number	Name	Equivalent circuit[1]	Function
1 3 23	V W U		Motor coil connection pins
2 22 24	DW DU DV		Power transistor base connections
4	GND		Common power ground and signal ground
5	OSC		Start pulse cycle time set pin

Number	Name	Equivalent circuit[1]	Function
6	COM⊖		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.

Number	Name	Equivalent circuit[1]	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_{CC}		Supply pin
21	GND		Common power ground and signal ground

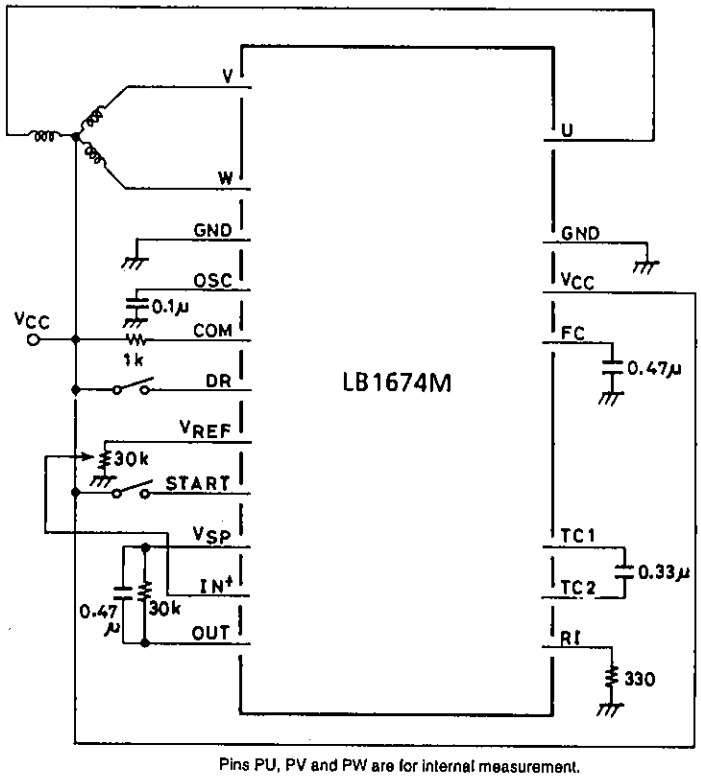
1. Unit (resistance: Ω)

Pin Assignment



(Top view)

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



Pins PU, PV and PW are for internal measurement.

Unit (resistance: Ω, capacitance: F)