



LB11676V

Three-Phase Brushless Sensorless Motor Driver for Headphone Stereo Motor Drive

Overview

The LB11676V is a three-phase brushless motor driver that is optimal for portable electronic equipment such as headphone stereos and microcassette recorders. The LB11676V supports implementing power saving drive techniques using an external capacitor and can achieve lower power consumption levels than earlier devices.

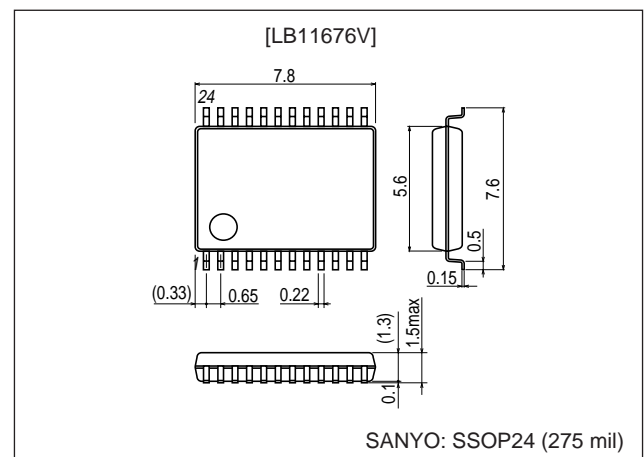
Functions

- Brushless sensorless motor drive (3-phase, half-wave drive)
- Supports forward and reverse rotation.
- Speed control function
- Built-in reference voltage circuit
- Soft switching drive

Package Dimensions

unit: mm

3175B-SSOP24



Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		5.0	V
Output transistor voltage	V_O sus		9.0	V
Output current	I_O max		0.6	A
Allowable power dissipation	P_d max	Independent IC, $T_J = 125^\circ\text{C}$	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 Ranges at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC1}		1.0 to 3.5	V

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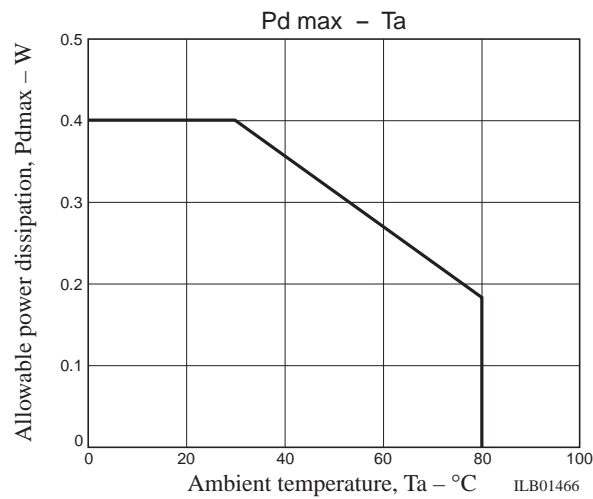
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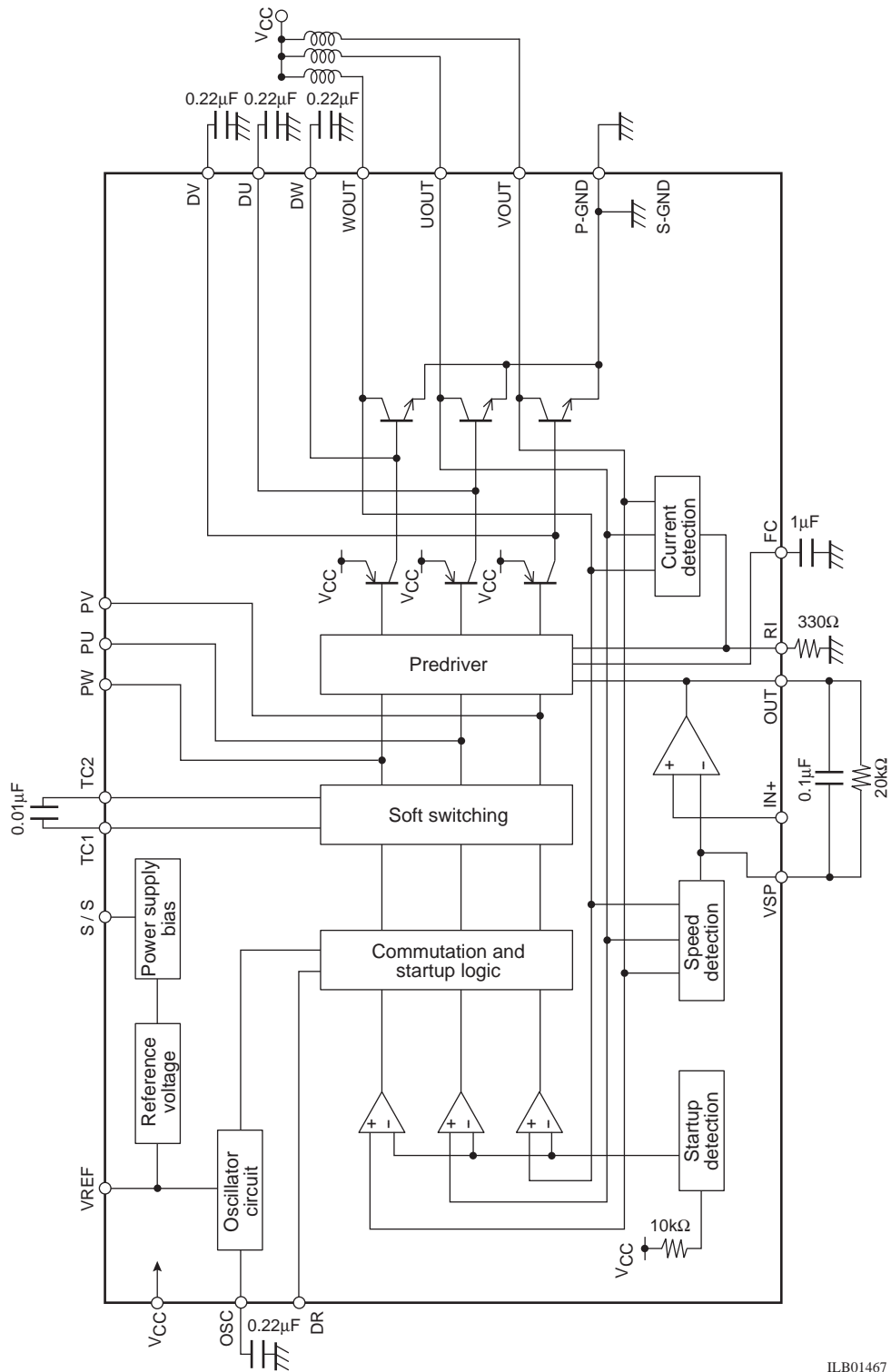
LB11676V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 1.5\text{ V}$ (In the specified test circuit)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current						
Supply current	I_{CC}			2.2	3.5	mA
Quiescent current	I_{CCQ}			0	10	μA
Reference voltage						
Reference voltage	V_{REF}		0.49	0.52	0.55	V
Voltage regulation	V_{REFV}	$V_{CC} = 1.0$ to 3.5 V		1	1.5	%/V
Load regulation	V_{REFO}	$I_{ref} = 0$ to $-50\ \mu\text{A}$	-0.2	-0.06		V
Temperature characteristics	V_{REFT}	$T_a = 0$ to 80°C		0.01		%/°C
Speed signal						
Detection speed	VSP	$V_{IN} = 1.0\text{ V}$	180	200	220	mV
Inter-phase error	VSP_C		-5		+5	%
Voltage regulation	VSP_V	$V_{CC} = 1.0$ to 3.5 V		2	3	%/V
Temperature characteristics	VSP_{TA}	$V_{IN} = 0.75\text{ V}$, $T_a = 0$ to 80°C		0.05		%/°C
Current detection						
Current detection accuracy	VRI	$V_{IN1} = 0.3\text{ V}$, $V_{IN2} = 1.0\text{ V}$, $R_I = 330\ \Omega$	75	85	100	mV
Current detection ratio	KI	$V_{IN1} = 0.3\text{ V}$, $V_{IN2} = 1$ to 1.3 V	0.17	0.22	0.27	
Other items						
Startup pulse period	TS	$CS = 0.1\ \mu\text{F}$		21.7		ms
Output saturation voltage	$V_{O\ sat}$	$V_{CC} = 1.0\text{ V}$, $I_m = 0.3\text{ A}$		0.15	0.25	V
TC pin pull-in current	I_{TC}		17	25	32	μA
Logic inputs						
High-level input voltage	V_{IH}		0.9			V
Low-level input voltage	V_{IL}				0.3	V



Block Diagram



ILB01467

External component values are provided for reference purposes; these are not necessarily optimal values.

LB11676V

Pin Functions

Pin No.	Symbol	Voltage	Function	Equivalent circuit
1 23 3 24 22 2	V W U DV DW DU		Motor coil connections Motor coil connections	
4	GND		Ground for both power and signal systems	
7	OSC		Sets the startup pulse period.	
18	DR		Direction switching pin (High: forward)	
8	VREF	0.52 V	Reference voltage (0.5 V)	
4	START		Start/stop control. This is an active-low input.	

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LB11676V

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Pin No.	Symbol	Voltage	Function	Equivalent circuit
9	VSP		Speed signal (motor induction voltage) detection	
10	IN+		Speed signal error amplifier reference input	
11	OUT		Speed signal error amplifier output. The motor current is fed back.	
12	RI		Detects the motor current.	
13	TC1		Sets the slope of the rise and fall of the motor current.	
14	TC2		Sets the slope of the rise and fall of the motor current.	

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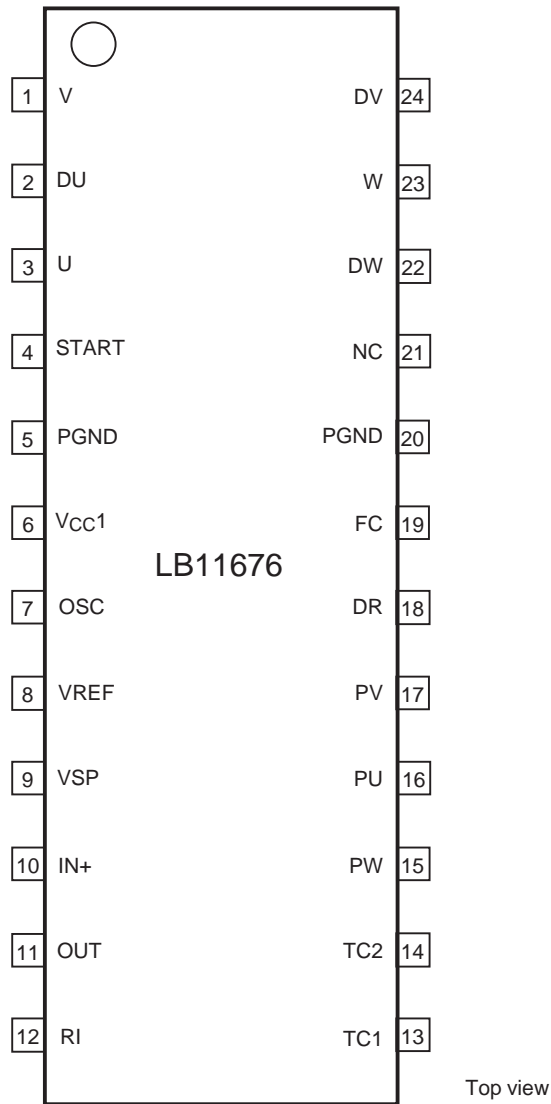
LB11676V

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Pin No.	Symbol	Voltage	Function	Equivalent circuit
15 16 17	PW PU PV	0.8 V to 0.9 V	Forms the current waveform. Internal operation measurement. These pins must be left open during normal operation.	
19	PC	0.7 V	Oscillation prevention.	
6	V _{CC}		Power supply	
5	GND		Ground for both power and signal systems	

LB11676V

Pin Assignment



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