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LA6595T

Monolithic Linear IC

BTL Drive Single-Phase Full-Wave Fan Motor Driver

Overview

The LA6595T is a single-phase bipolar fan motor driver that achieves quiet operation, power savings, silent operation and high efficiency that suppresses reactive current through BTL output linear drive. It provides lock protection and rotation detection circuits on chip, and is optimal for applications that require high reliability and low noise, such as notebook personal computers, power supplies in consumer electronic equipment, car audio, and CPU cooling systems.

Features

- BTL output single-phase full-wave linear drive (gain resistor : 1 to 360k Ω , 51dB)
- Supports low-voltage drive and features a wide usable voltage range (2.2 to 14.0V)
- Low saturation output (high side + low side saturation voltage : V_{Osat} (total) = 1.2V (typical), I_O = 200mA)
- Built-in lock protection and automatic return circuits
- Built-in RD (Rotation Detection) output
- Thermal protection circuit
- Small-sized, high thermal capacity package

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		15	V
Output current	I_{OUT} max		0.5	A
Output voltage	V_{OUT} max		15	V
RD output pin output withstand voltage	V_{RD} max		15	V
RD output current	I_{RD} max		10	mA
Allowable power dissipation	P_d max	Mounted on a specified board*	400	mW
Operating temperature	T_{opr}		-30 to +90	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Specified board : 114.3mm $\times$ 76.1mm $\times$ 1.6mm, glass epoxy board.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V _{CC}		2.2 to 14.0	V
Common-phase input voltage range of hall input	V _{ICM}		0 to V _{CC} -1.5	V

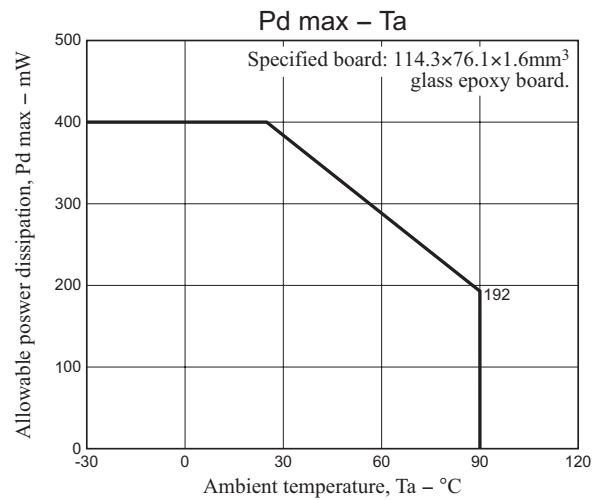
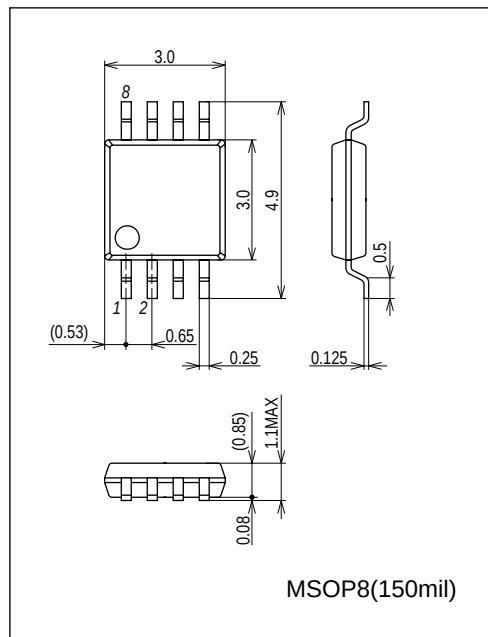
Electrical Characteristics at Ta = 25°C, V_{CC} = 12V, Unless otherwise specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	I _{CC1}	Drive mode (CT = low)	3	6	9	mA
	I _{CC2}	Lock protection mode (CT = high)	2.5	5	7.5	mA
Lock detection capacitor charge current	I _{CT1}		0.9	1.2	1.5	μA
Capacitor discharge current	I _{CT2}		0.10	0.18	0.25	μA
Capacitor charge/discharge current ratio	R _{CT}	R _{CD} = I _{CT1} /I _{CT2}	5	6.5	8	
CT charge voltage	V _{CT1}		1.3	1.5	1.7	V
CT discharge voltage	V _{CT2}		0.3	0.5	0.7	V
OUT output low saturation voltage	V _{OL}	I _O = 200mA		0.25	0.45	V
OUT output high saturation voltage	V _{OH}	I _O = 200mA		0.95	1.2	V
Hall input sensitivity	V _{HN}	Zero peak value (including offset and hysteresis)		7	15	mV
RD output pin low-level voltage	V _{RD}	I _{RD} = 5mA		0.15	0.3	V
RD output pin leakage current	I _{RDL}	V _{RD} = 15V		1	30	μA

Package Dimensions

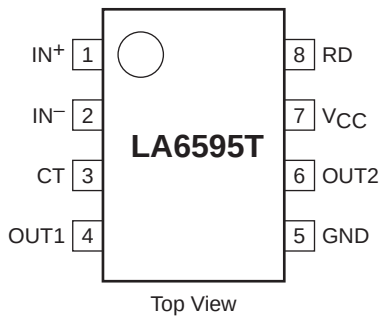
unit : mm (typ)

3245B

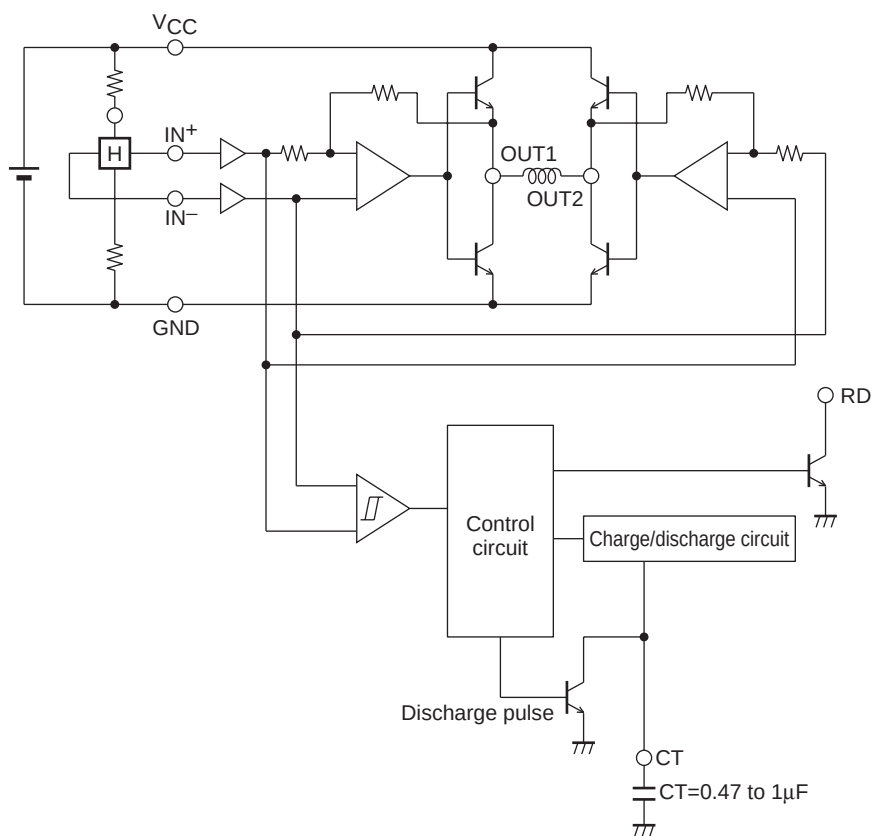


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Pin Assignment



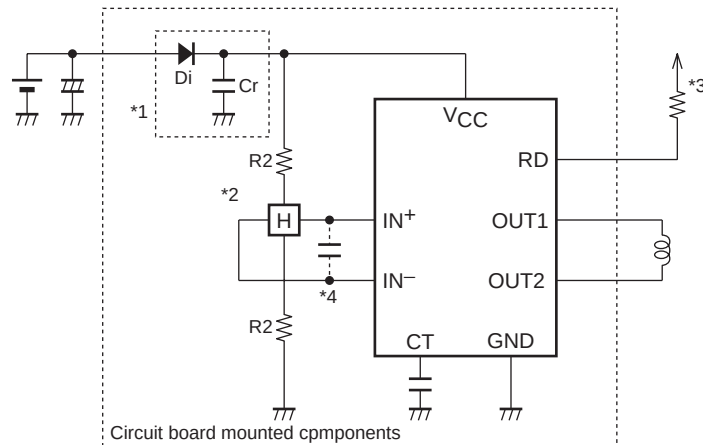
Block Diagram



Truth Table

IN ⁻	IN ⁺	CT	OUT1	OUT2	RD	Mode
High	Low	Low	High	Low	Low	During rotation
Low	High		Low	High	Low	
–	–	High	Off	Off	Off	Lock protection

Application Circuit Example



- *1. If the diode D_i (which protects the IC destruction by reverse connection) is used, it is necessary to insert the capacitor C_r and provide a regenerative current route. Similarly, if there is no nearby capacitor on the fan power supply line, C_r will also be necessary to improve reliability.
- *2. If the Hall sensor bias is taken from V_{CC} , a $1/2 V_{CC}$ bias, as shown in the figure, must be used. Linear drive is implemented by amplifying the Hall sensor output and applying voltage control to the coil. If the Hall effect sensor provides a strong output, the startup characteristics and efficiency will be good, then even quieter operation will be achieved by adjusting the Hall effect sensor.
- *3. This pin must be left open if unused.
- *4. If the line from the Hall sensor output to the Hall sensor input of IC are long, noise may enter the system from that line. If that becomes a problem, insert a capacitor as shown in the figure.

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