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LA6595T

Monolithic Linear IC

BTL Drive Single-Phase Full-Wave Fan Motor Driver

ON Semiconductor®

http://onsemi.com

Overview

The LA6595T is a single-phase bipolar fan motor driver that achieves quite 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 360kΩ, 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 : $V_O$sat (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 Ta = 25°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	Pd max	Mounted on a specified board*	400	mW
Operating temperature	Topr		-30 to +90	°C
Storage temperature	Tstg		-55 to +150	°C

* Specified board : 114.3mm × 76.1mm × 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.

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

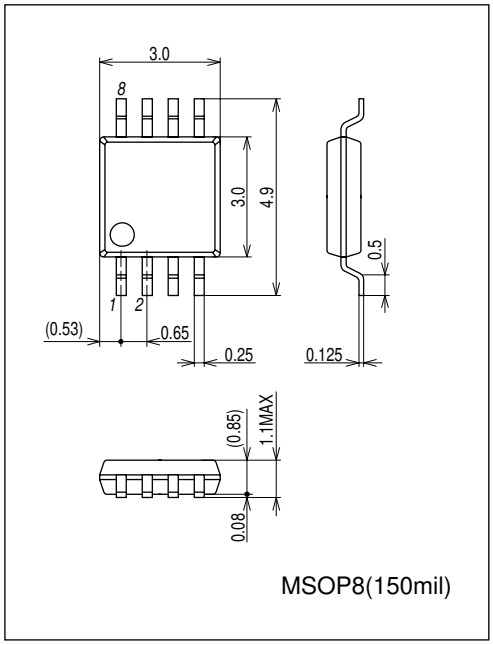
Electrical Characteristics at Ta = 25°C, V_{CC} = 12V, Unless otherwise specified.

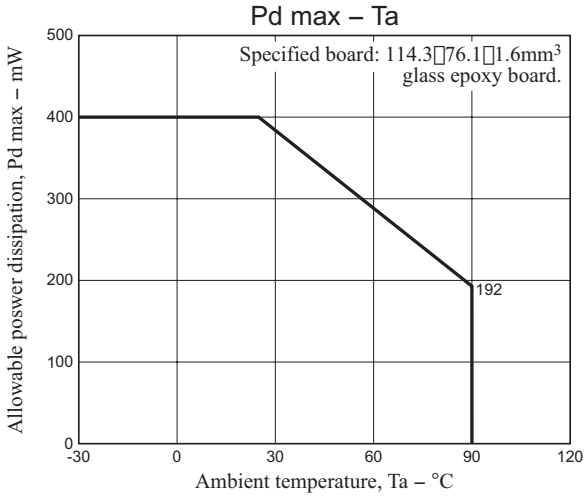
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	$I_{CC}1$	Drive mode (CT = low)	3	6	9	mA
	$I_{CC}2$	Lock protection mode (CT = high)	2.5	5	7.5	mA
Lock detection capacitor charge current	$I_{CT}1$		0.9	1.2	1.5	μA
Capacitor discharge current	$I_{CT}2$		0.10	0.18	0.25	μA
Capacitor charge/discharge current ratio	R_{CT}	$R_{CD} = I_{CT}1/I_{CT}2$	5	6.5	8	
CT charge voltage	$V_{CT}1$		1.3	1.5	1.7	V
CT discharge voltage	$V_{CT}2$		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	VHN	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

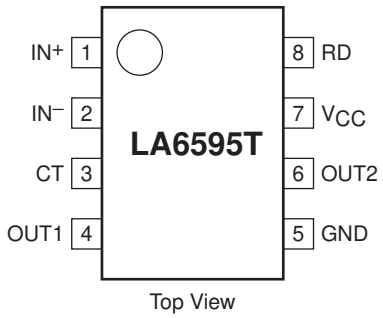
unit : mm (typ)

3245B



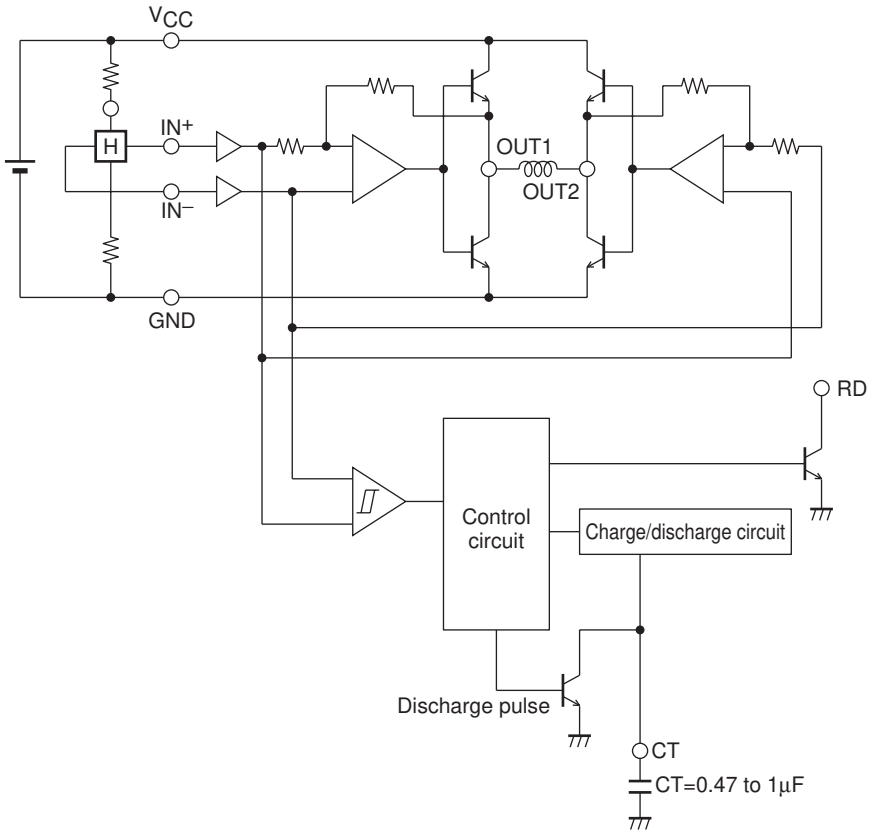


Pin Assignment



Top View

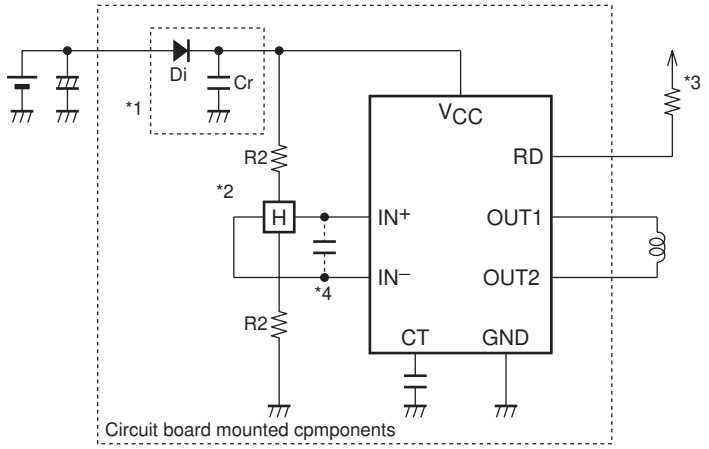
Block Diagram



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 Di (which protects the IC destruction by reverse connection) is used, it is necessary to insert the capacitor Cr and provide a regenerative current route. Similarly, if there is no nearby capacitor on the fan power supply line, Cr 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.