



SANYO Semiconductors

DATA SHEET

LB11963T

Monolithic Digital IC
For Fan Motor
Single-phase Full-wave

Overview

The LB11963T is a single-phase bipolar drive fan motor driver. Incorporating 1/2 FG output for 8-pole fan motors in a miniature MSOP8 package, it is optimum for driving compact fan motors used in the notebook PC.

This IC is pin-compatible to the LB11964T with normal FG output, and a common circuit board can be used for both 4- and 8-pole motors.

Functions

- Single-phase full-wave drive
- The built-in regeneration circuit makes it possible to use a reverse connection prevention diode.
- 1/2FG output
- Built-in thermal protection circuit

Specifications

Absolute 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
FG output withstand voltage	$V_R\ max$		15	V
FG output current	$I_R\ max$		5	mA
Allowable power dissipation	$P_d\ max$	Specified substrate *	400	mW
Operating temperature range	T_{opr}		-30 to 85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to 150	$^\circ\text{C}$

* Specified substrate: 20mm×10mm×0.8mm, paper phenol, wiring density 20%.

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LB11963T

Recommended Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V _{CC}		3.5 to 13.8	V
Hall input common-mode input voltage range	V _{ICM}		0.2 to V _{CC} -1.5	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 5V, unless otherwise specified.

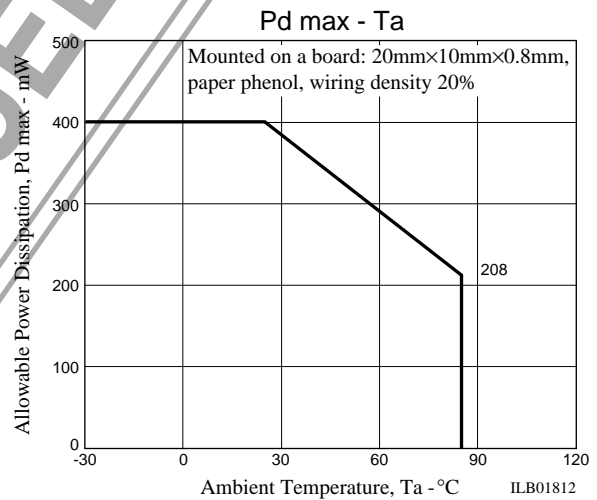
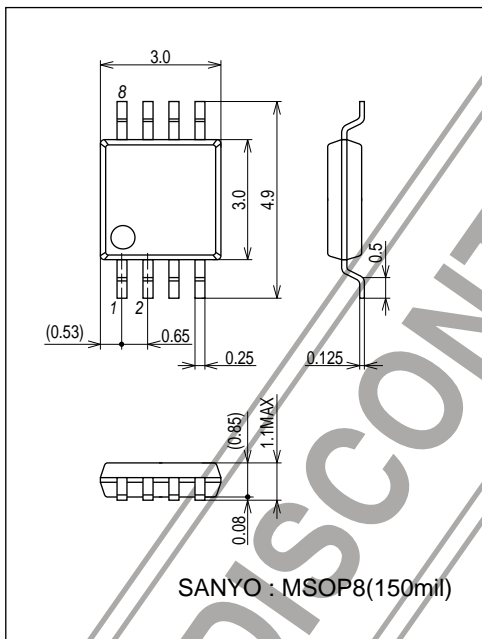
Parameter	Symbol	Conditions	Ratings			unit
			min	typ	max	
Circuit current	I _{CC}	During rive (CT=L)		9.0	14	mA
		During lock protection (CT=H)		3.0	5.0	mA
Charge current of lock detection capacitor	I _{CT1}	V _{CT} =0.2V	1.1	1.8	2.6	μA
Capacitor discharge current	I _{CT2}	V _{CT} =3.2V	0.15	0.25	0.40	μA
Capacitor charge/discharge ratio	R _{CT}	RCD=ICT1/ICT2	5.0	7.0	9.0	
CT charge voltage	V _{CT1}		2.6	2.9	3.2	V
CT discharge voltage	V _{CT2}		1.5	1.8	2.1	V
Output L voltage	V _{OL}	I _O =200mA		0.2	0.3	V
Output H voltage	V _{OH}	I _O =200mA	3.9	4.1		V
Hall input sensitivity	V _{HN}	Zero peak value (including offset and hysteresis)		7	15	mV
FG output L voltage	VRD	IRD=5mA		0.1	0.3	V
FG output leak current	IRDL	VRD=7V			30	μA
Thermal protection circuit	TSD	* Design target value	150	180	210	°C

*: Design target value and no measurement was made.

Package Dimensions

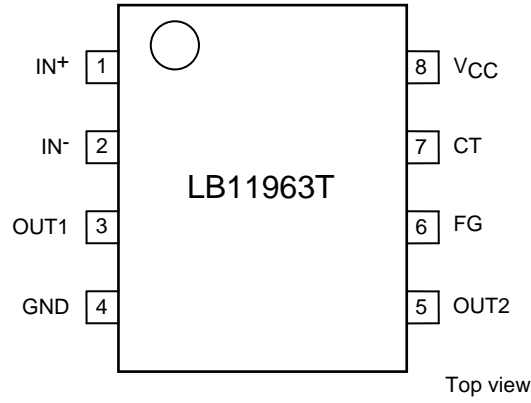
unit : mm (typ)

3245B

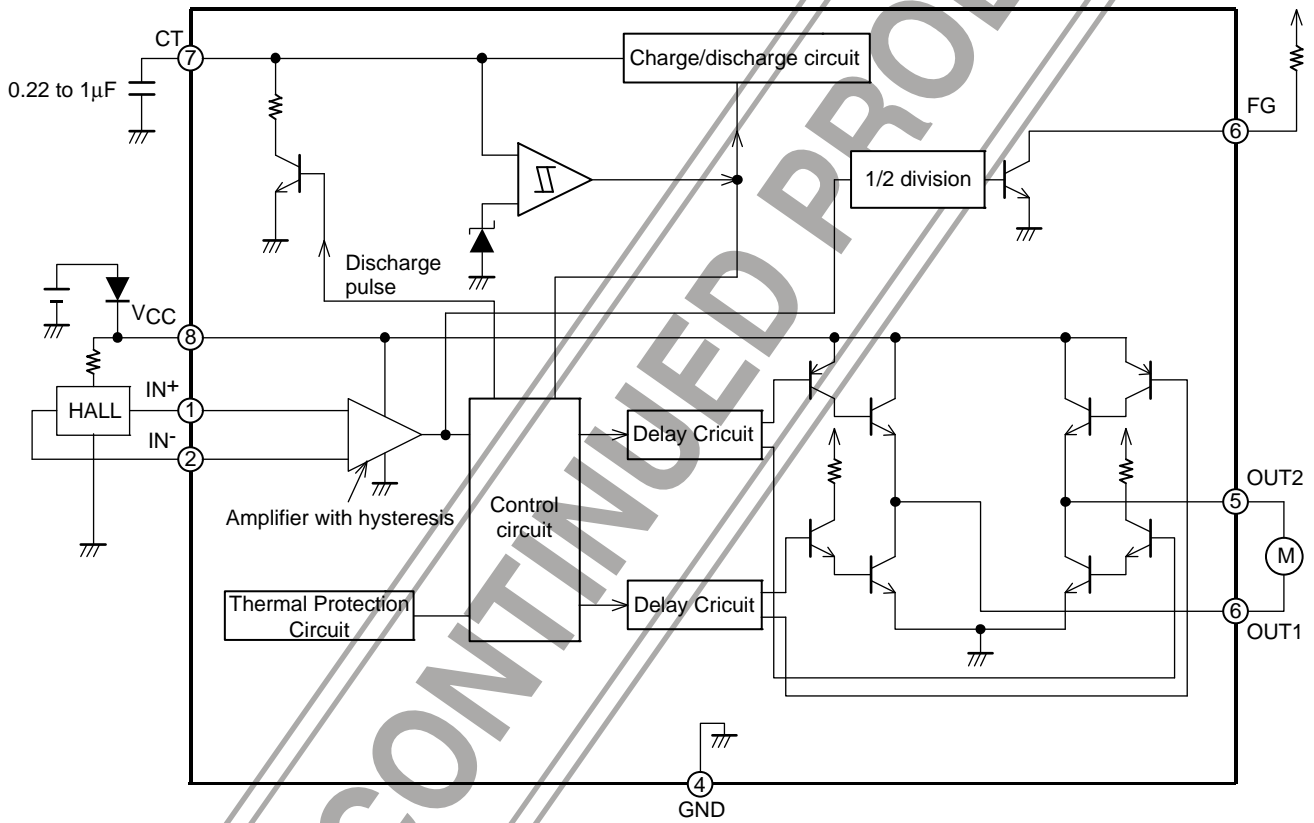


LB11963T

Pin Assignment



Block Diagram



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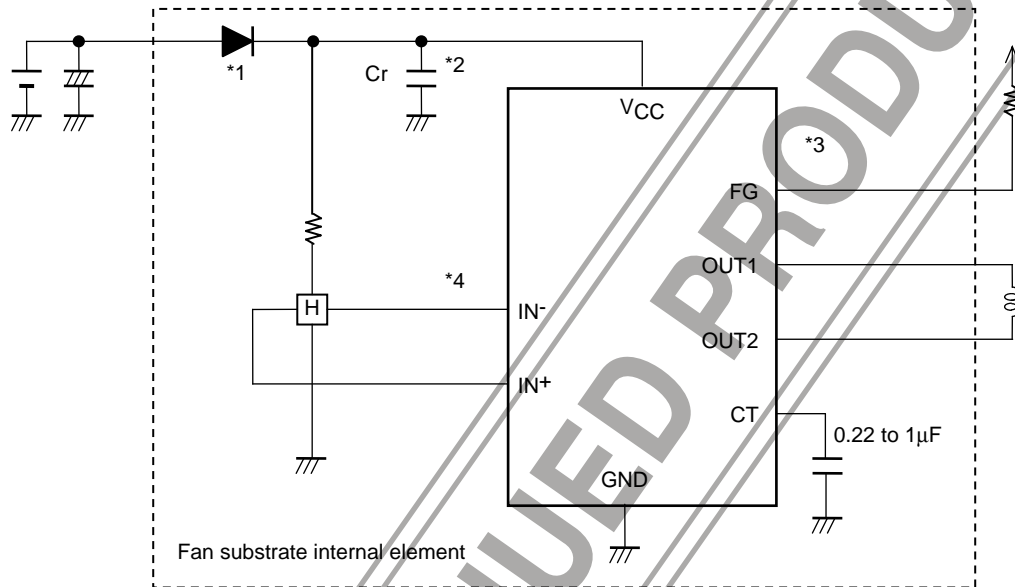
Truth Table

IN ⁺	IN ⁻	CT	OUT1	OUT2	FG	Mode
H	L	L	L	H	*1	Rotation
L	H	L	H	L		
-	-	H	OFF	OFF	H (*2)	During lock protection
-	-	-	OFF	OFF	-	Overheat protection

*1 FG equivalent to 1/2 of the frequency corresponding to the phase changeover is output. Accordingly, the same FG output frequency is available for both eight-pole and four-pole motors. This is compatible with pins of LB11964T that is the FG output compatible with four poles.

*2 In the restart mode (output ON) during rotor restriction, the FG output causes an operation similar to the one during rotation and varies depending on the rotor position.

Application Circuit Example



*1 This is Di to prevent breakage due to reverse connection. The built-in regeneration circuit regenerates the coil current between lower NPN outputs, suppressing kickback.

This may be eliminated if there is no problem because a power connector, etc. is used.

*2 This is necessary for commutation when the rotation speed is to be controlled with power PWM.

*3 Must be left open when not used.

*4 Chattering preventive measure is taken for the FG output by providing the Hall amplifier with hysteresis and by ensuring the pin arrangement with less interference. It is essential to carry out short wiring to make carrying of noise difficult.

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