



# LA6581T

## BTL Driver Single-Phase Full-Wave Fan Motor Driver

### Overview

The LA6581T is a low-saturation BTL output linear driving motor driver for single-phase bipolar fan motors. It features quite, low power, high efficiency drive that suppresses reactive current. It is optimal for use in applications that require miniaturization and low noise, such as CPU cooling fan motors and 5 to 12 V electronic game products.

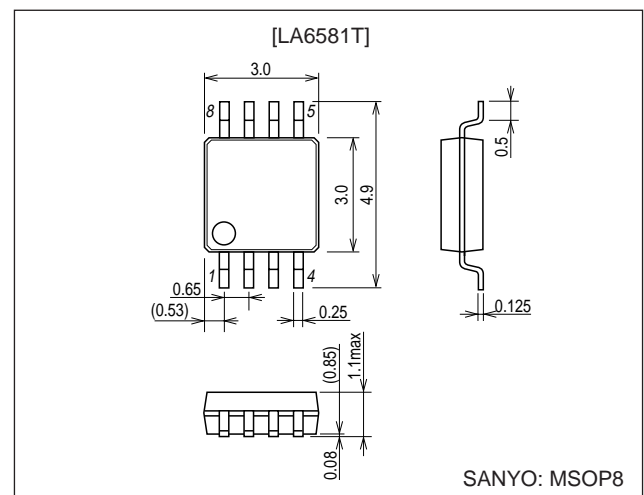
### Functions and Features

- Single-phase full-wave linear drive with BTL output (gain resistance 500-284k, 55dB): Suitable for the equipment requiring silent operation, such as game equipment, CPU cooler, etc. because of its freedom from switching noise
- Low-voltage operation possible, with wide operable voltage range (3 to 16 V)
- Low saturation output (Upper + lower saturation voltage:  $V_{Osat}(\text{total}) = 0.3 V_{\text{typ}}$ ,  $I_O = 100 \text{ mA}$ ): High coil efficiency with low current drain. IC itself does not generate much heat.
- High impedance of Hall input pin
- FG output (rotation speed detection output: open collector output)
- Heat protection circuit: When the large current flows because of output short-circuit, raising the IC chip temperature above 180°C, the heat protection circuit suppresses the drive current, preventing IC burn and breakdown.
- Ultraminiature package (MSOP-8: 3.0 × 4.0 × 0.93 mm typ): Small substrate while allowing larger blades.

### Package Dimensions

unit: mm

#### 3245A-MSOP8



■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

**SANYO Electric Co.,Ltd. Semiconductor Company**

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

## LA6581T

### Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Output voltage	$V_{CC}$ max	Mounted on a specified board*	18	V
Allowable dissipation	$P_d$ max	$V_{CC2}$ pin	400	mW
Output current	$I_{OUT}$	Pins UL, VL, WL, UH, VH, WH	0.30	A
Output withstand voltage	$V_{OUT}$ max		18	V
FG output withstand	$V_{FG}$ max		18	V
FG output current	$I_{FG}$ max		5	mA
Operating temperature	$T_{opr}$		-20 to +90	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$

Note\*: Mounted on a board ( $20.0 \times 10.1 \times 0.8$  mm: Paper Phenol, wiring density 20%)

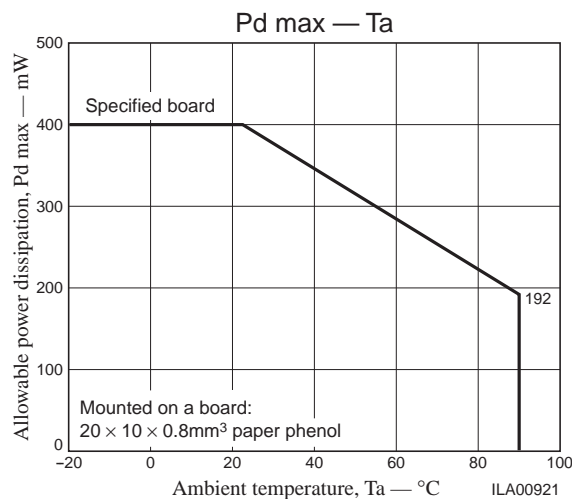
#### Recommended Operating Range at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	$V_{CC}$		2.5 to 16	V
Common-phase input voltage range of Hall input	$V_{ICM}$		0.3 to $V_{CC} - 1.5$	V

#### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 12.0$ V, unless especially specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit Current	$I_{CC}$	$I_{N-} = 5.8$ V, $I_{N+} = 6.0$ V, $R_L = \infty$		14	19	mA
OUT output low voltage	$V_{OL}$	$I_O = 100$ mA		0.1	0.2	V
OUT output high voltage	$V_{OH}$	$I_O = 100$ mA		0.1	0.2	V
Hall bias voltage	$V_{HB}$	$R_H = 360 \Omega + 91 \Omega$	1.85	1.95	2.05	V
Hall amplifier gain	$V_g$		52	55	58	dB
Hall amplifier input current	$V_{INR}$		-10	-2	10	$\mu\text{A}$
FG output low voltage	$V_{FG}$	$I_{FG} = 3$ mA		0.2	0.3	V
FG output leakage current	$I_{FGL}$	$V_{FG} = 7$ V			30	$\mu\text{A}$
Thermal protection circuit	$T_h$	*Design guarantee	150	180	200	$^\circ\text{C}$

Note\*: Design guarantee: Design target. Measurement with a single unit not made.

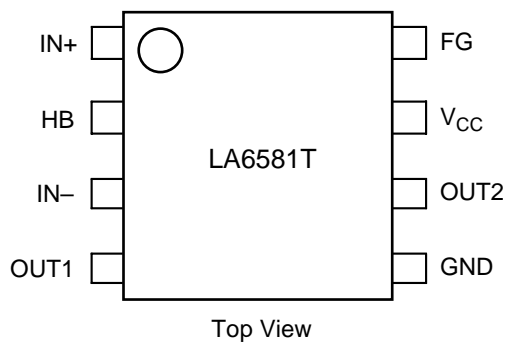


## LA6581T

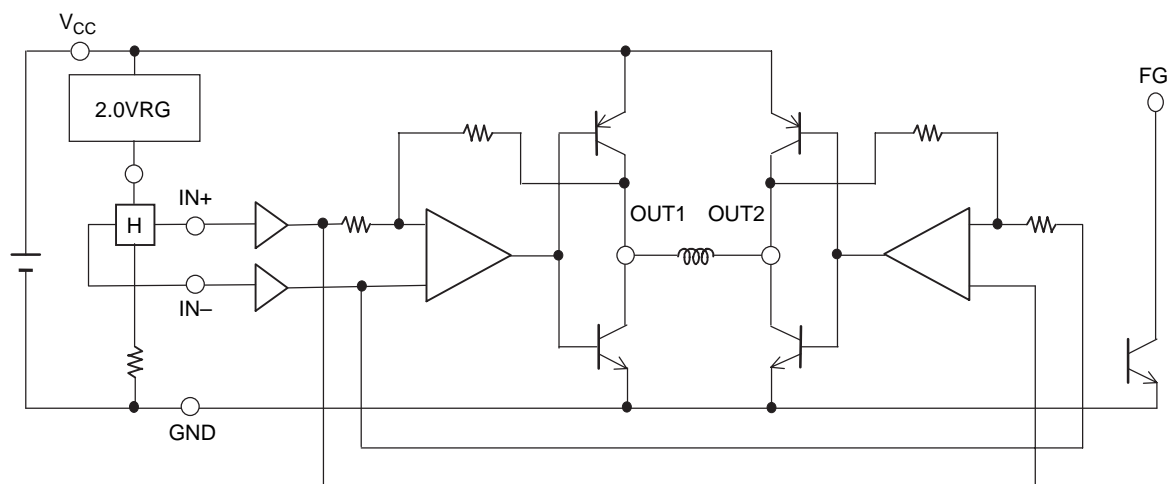
### Truth Table

IN-	IN+	OUT1	OUT2	FG	Mode
H	L	H	L	L	During rotation
L	H	L	H	Off	
—	—	Off	Off	—	During overheat protection

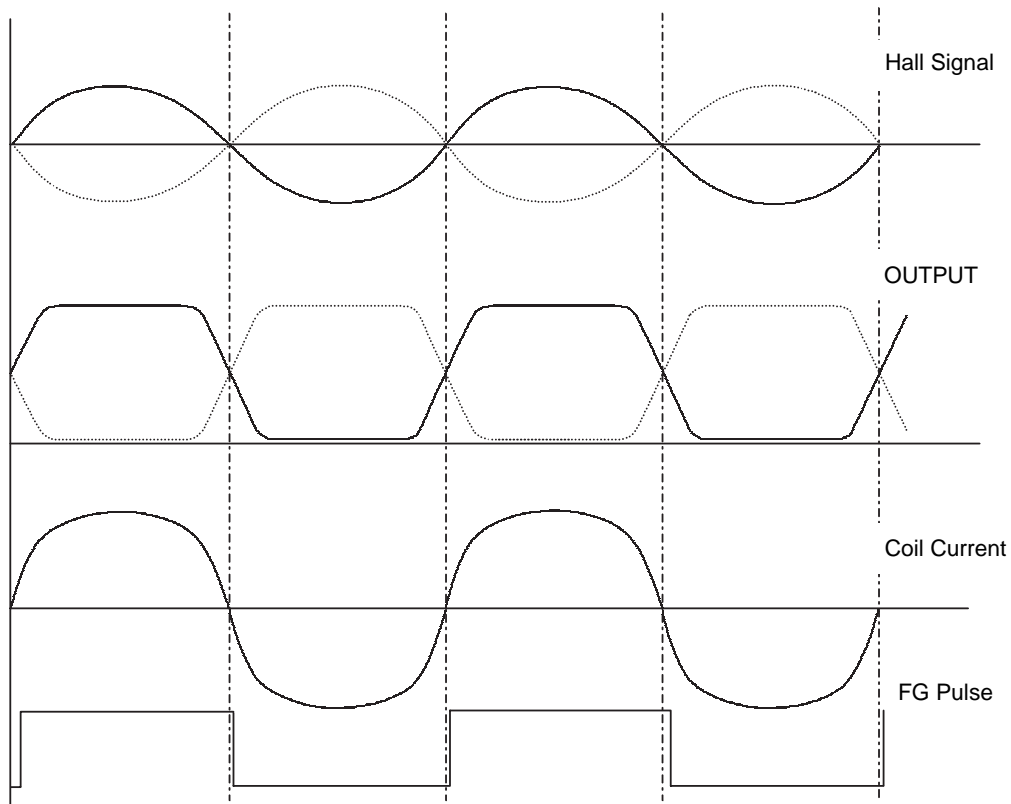
### Pin Assignment



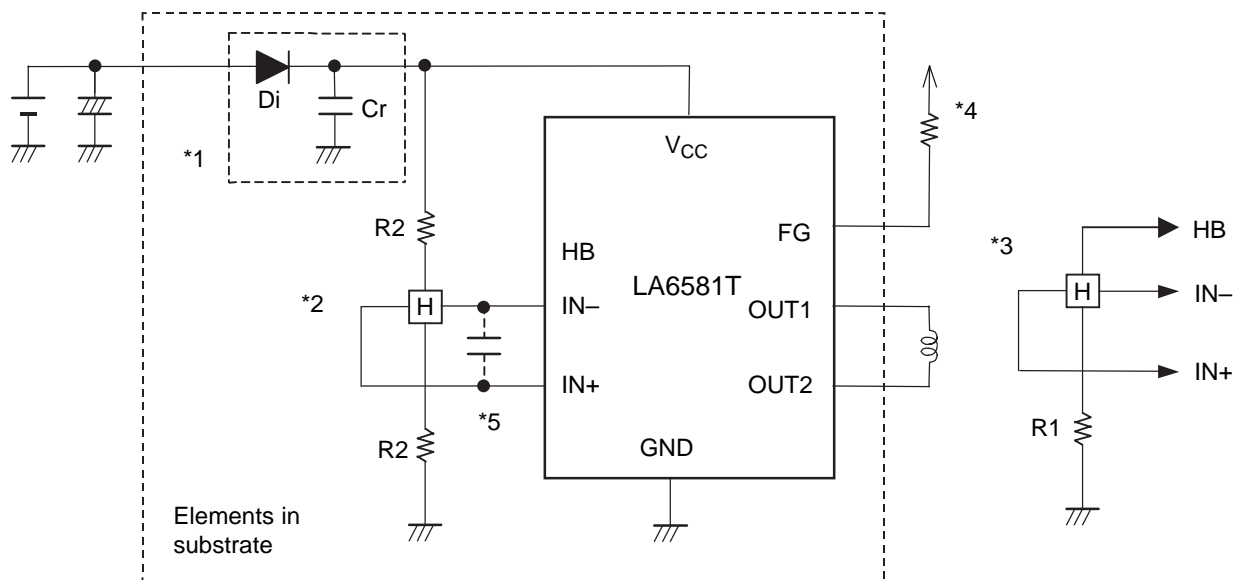
### Block Diagram



Timing Chart



Sample Application Circuit



- Notes 1. When Di to prevent breakdown in case of reverse connection is used, it is necessary to insert a capacitor Cr to secure the regenerative current route. Similarly, Cr is necessary to enhance the reliability when there is no capacitor near the fan power line.
2. To obtain Hall bias from  $V_{CC}$ , carry out  $1/2 \times V_{CC}$  bias as shown in the figure. Linear driving is made through voltage control of the coil by amplifying the Hall output. When the Hall element output is large, the startup performance and efficiency are improved. Adjustment of the Hall element can reduce the noise further.
3. When the Hall bias is taken from the HB pin, constant-voltage bias is made with about 2.0 V. Therefore, the Hall element can provide the output satisfactory in temperature characteristics. Adjustment of the Hall output amplitude is made with R1. (When  $V_{CC} = 12$  V, the step \*2 above proves advantageous for IC heat generation.)
4. Keep this open when not used.
5. When the wiring from the Hall output to IC Hall input is long, noise may be carried through the wiring. In this case, insert the capacitor as shown in the figure.

- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of November, 2002. Specifications and information herein are subject to change without notice.