Ordering number : ENA0706

SANYO Semiconductors
DATA SHEET

LA6581CL — Monolithic Linear IC Fan Motor Driver BTL Driver Single-Phase Full-Wave

Overview

The LA6581CL is single-phase bipolar fan motor is driven, through BTL output linear drive, at high efficiency, low power, and low sound by suppressing the reactive power. Lock protection, rotary signal (FG, RD) circuits are incorporated, which is optimum for the notebook PC, consumer equipment power supply, car audio system, CPU cooler, etc. that require high reliability and low noise.

Functions

- 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 16V)
- Low saturation output (Upper + lower saturation voltage : $V_O$sat (total) = 0.3V typ, I_O = 100mA) : 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 (ECSP2828-10 : 2.8×2.8×0.8mm^3 typ) : Small substrate while allowing larger blades.

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

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Output voltage	V_{CC} max		18	V
Allowable dissipation	Pd max	Mounted on a specified board*1	450	mW
Output current	I_{OUT} max	*2	0.36	A
	I_{OUT} max	T < 200ms	0.50	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	Topr		-30 to +100	°C
Storage temperature	Tstg		-55 to +150	°C

*1 ; Mounted on a board (20.0×10.1×0.8mm^3 : Paper Phenol)

*2 ; This specifies the starting current. Tj = 150°C max must not be exceeded.

Recommended Operating Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		2.2 to 16	V
Common-phase input voltage range of Hall input	VICM		0.3 to V_{CC}-1.5	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 12.0V, unless especially specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	I_{CC}	IN^- = 5.8V, IN^+ = 6.0V, RL = ∞		14	19	mA
OUT output low voltage	V_{OL}	I_O = 100mA		0.1	0.2	V
OUT output high voltage	V_{OH}	I_O = 100mA		0.1	0.2	V
Hall bias voltage	VHB	IHB = 5mA	1.85	1.95	2.05	V
Hall amplifier gain	Vg		52	55	58	dB
Hall amplifier input current	VINR		-10	-2	10	μA
Input offset voltage	VOFST			3	6	mV
FG output low voltage	V_{FG}	I_{FG} = 3mA		0.2	0.3	V
FG output leakage current	I_{FGL}	V_{FG} = 7V			30	μA
Thermal protection circuit	Th	* Design guarantee	150	180	200	°C

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

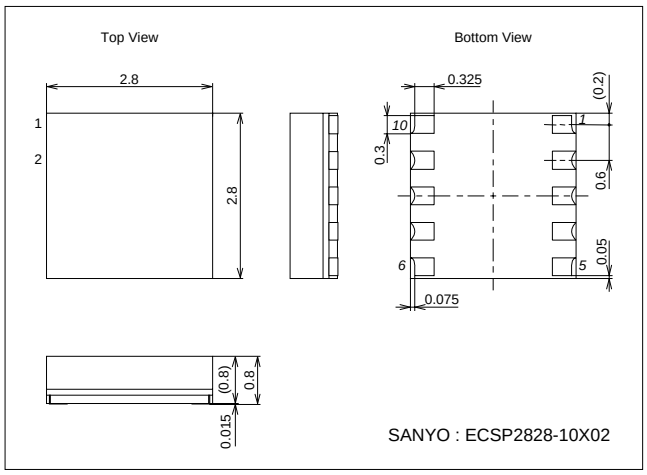
Truth Table

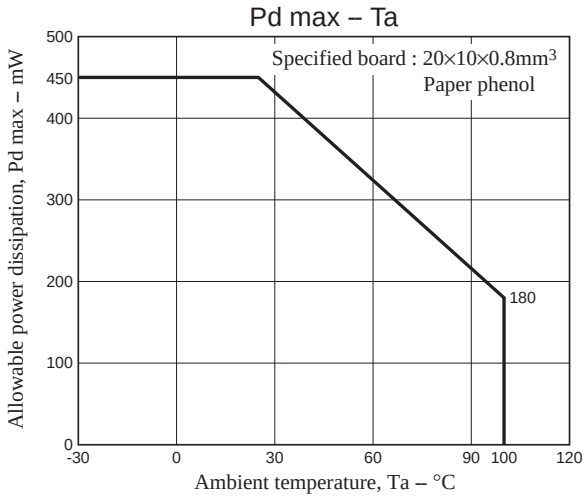
IN-	IN+	OUT1	OUT2	FG	Mode
H	L	H	L	L	During rotation
L	H	L	H	off	
-	-	off	off	-	During overheat protection

Package Dimensions

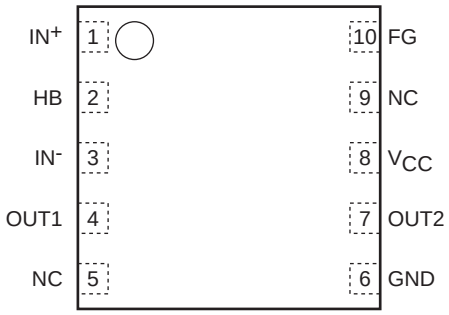
unit : mm (typ)

3301



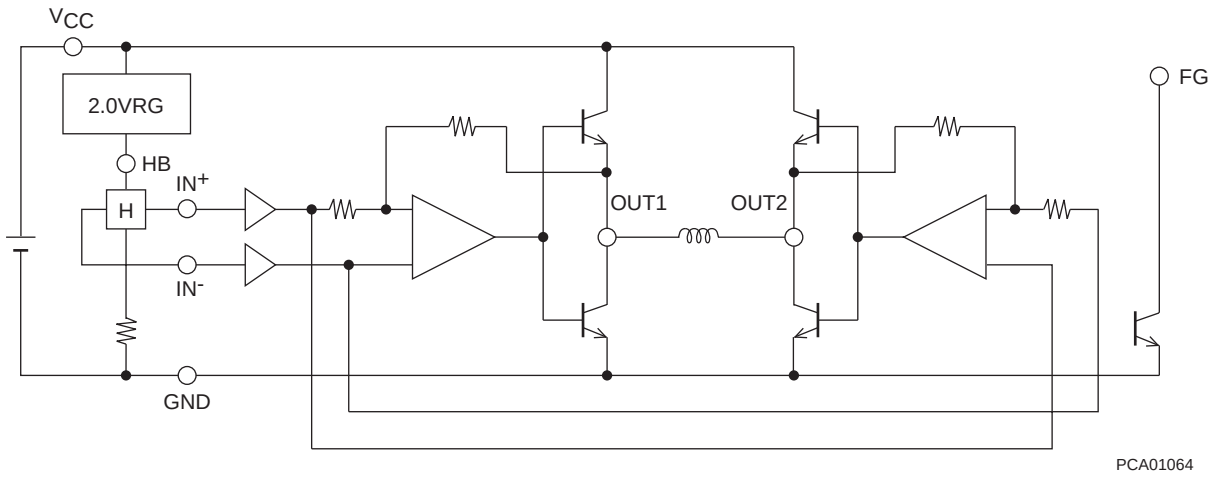


Pin Assignment

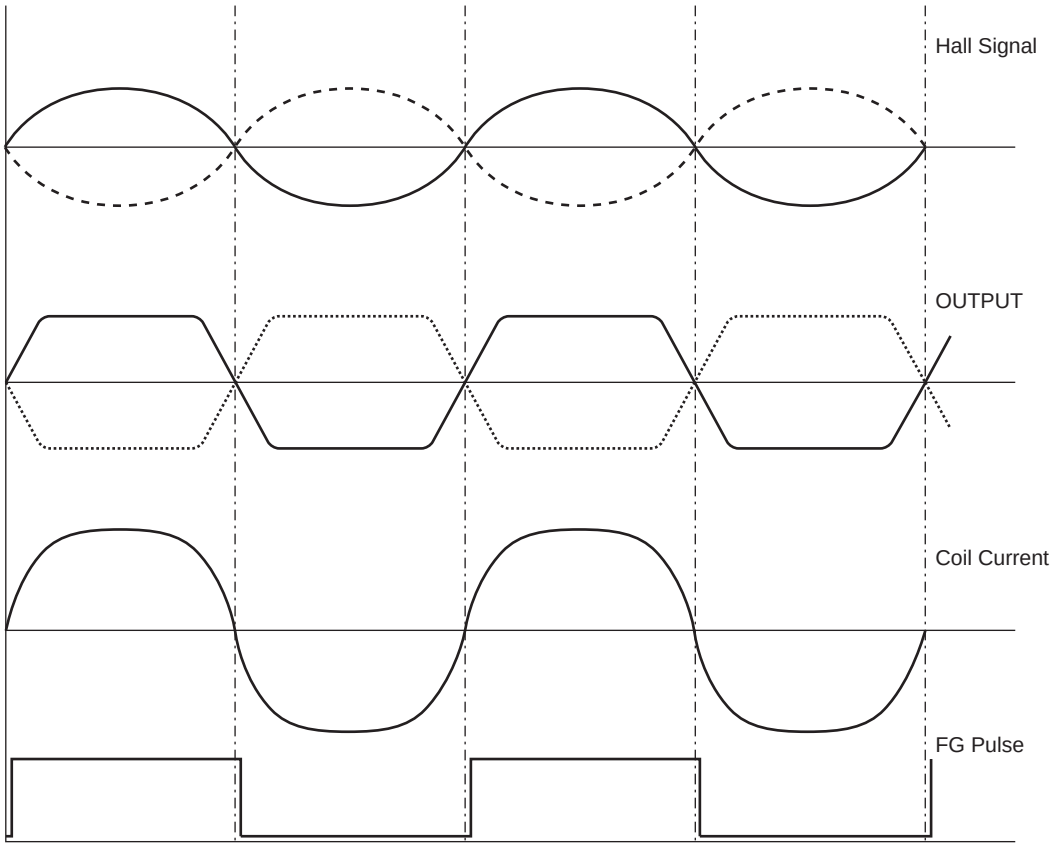


Top view

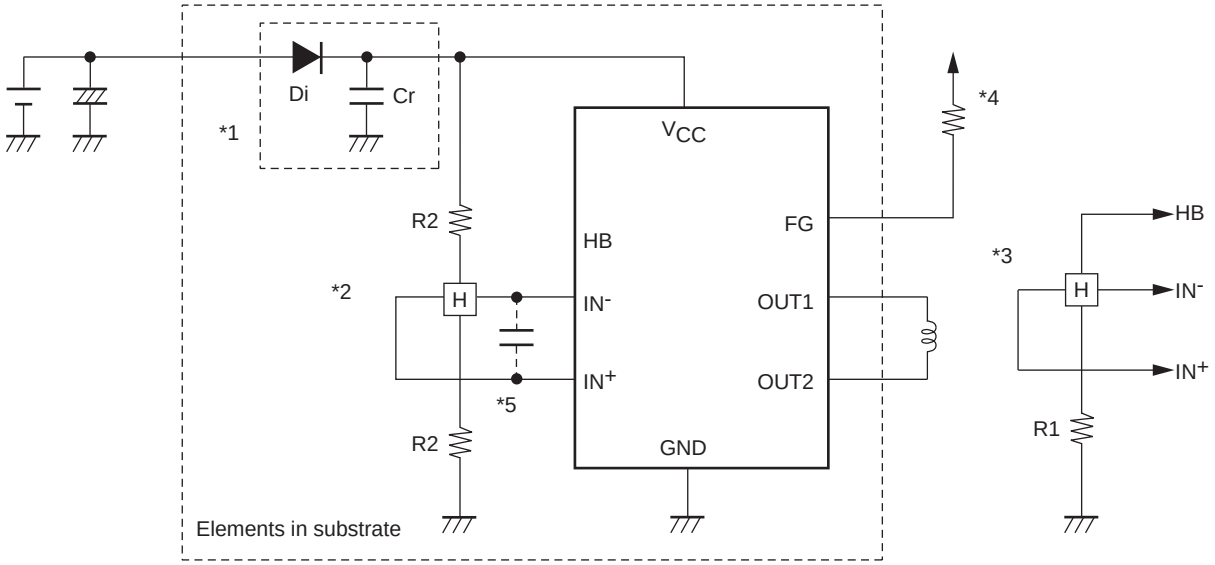
Block Diagram



Timing Chart



Sample Application Circuit



*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 2.0V. 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} = 12V, 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.