Ordering number : ENA2073

LA6597FMC

Monolithic Linear IC

Single-phase Full-wave Fan Motor IC

ON Semiconductor®

http://onsemi.com

Overview

The LA6597FMC drives the single-phase bipolar fan motor by means of the BTL output linear drive highly efficiently while suppressing the reactive current, in the power-saving and silent manner. With incorporated lock protection and lock signal circuits, this product is optimum for fans of car audio, projector, and VGA card where the high-temperature operation, high reliability, and low noise are required.

Functions

- Single-phase full-wave linear drive by BTL output (gain resistance 1k to 240k, 48dB)
  : No switching noise, which is optimum for equipment requiring silent operation of the projector and car audio.
- Operable at low voltage and over a wide operation voltage range (2.2 to 14.0V)
- Low saturation output (Upper + lower saturation voltages: $V_O$sat (total) = 1.1V typ, I_O = 200mA)
  : High coil efficiency and small current drain. Small heat generation from IC itself
- Diffusion of generated heat
  : Connection of external resistor between V_M and V_{CC} enables reduction of heat generation of IC itself.
  (Upper side + lower side saturation voltage: Vosat (total) = 0.85Vtyp, I_O = 300mA, R_M = 1Ω)
- Lock protection and automatic return circuits incorporated
- FG output (Rotation detection output: Open collector output)
- Hall bias incorporated (V_{HB} = 1.55V)
- Heat protection circuit
  :The heat protection circuit suppresses the drive current to prevent burn or damage of IC when the large current flows due to output short-circuit and the IC chip temperature exceeds 180°C.
- Small package with high heat capacity

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC} max		15	V
Output current	I_{OUT} max		1.0	A
Output withstand voltage	V_{OUT} max		15	V
Output withstand voltage of FG output pin	V_{FG} max		15	V
FG output current	I_{FG} max		5	mA
HB output current	I_{HB} max		10	mA
Allowable dissipation	Pd max	Mounted on a specified board. *	750	mW
Operating temperature	Topr		-30 to +110	°C
Storage temperature	Tstg		-55 to +150	°C

* Mounted on a specified board: 114.3×76.1×1.6 mm^3, glass epoxy board.

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

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	$I_{CC}1$	During drive (CT = L)	4.5	6.0	8.5	mA
	$I_{CC}2$	During lock protection (CT = H)	3.0	4.5	6.0	mA
Lock detection capacitor charge current	$I_{CT}1$		2.0	2.8	3.5	µA
Capacitor discharge current	$I_{CT}2$		0.14	0.22	0.30	µA
Capacitor charge and discharge current ratio	R_{CT}	RCD = $I_{CT}1/I_{CT}2$	9	12	15	
CT charge voltage	$V_{CT}1$		1.40	1.55	1.70	V
CT discharge voltage	$V_{CT}2$		0.4	0.5	0.6	V
OUT output L saturation voltage	V_OL	I_O = 300mA		0.2	0.3	V
OUT output H saturation voltage	V_OH	I_O = 300mA		0.65	0.85	V
Hall input sensitivity	V_{HN}	IN+, IN- difference voltage (including offset and hysteresis)		±10	±15	mV
FG output pin L voltage	V_{FG}	I_{FG} = 5mA		0.1	0.2	V
FG output pin leak current	I_{FG}	V_{FG} = 15V		1		µA
HB output voltage	V_{HB}L	I_{HB} = 5mA	1.40	1.55	1.70	V

Truth Table

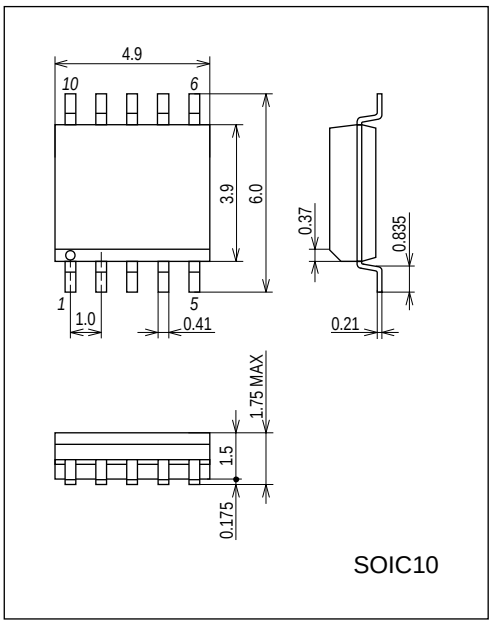
IN^-	IN^+	CT	OUT1	OUT2	FG	Mode
H	L	L	H	L	L	During rotation
L	H		L	H	H	
-	-	H	OFF	OFF	-	During overheat protection

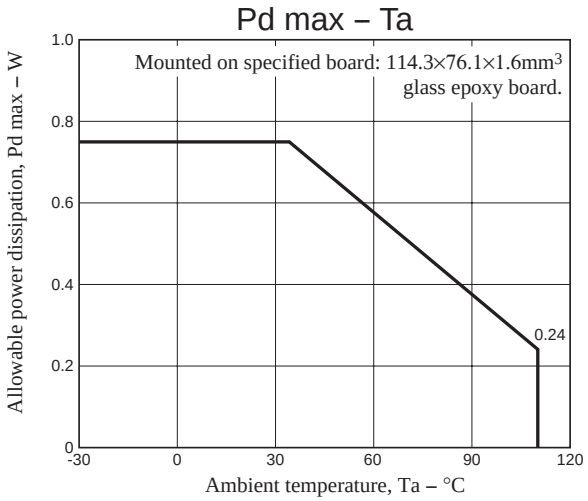
-:Don't care.

Package Dimensions

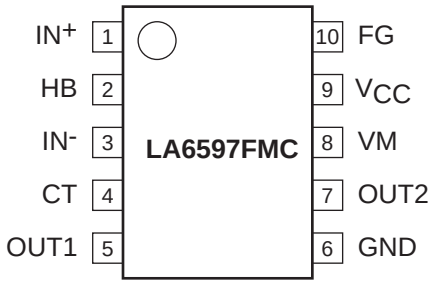
unit : mm (typ)

3426A



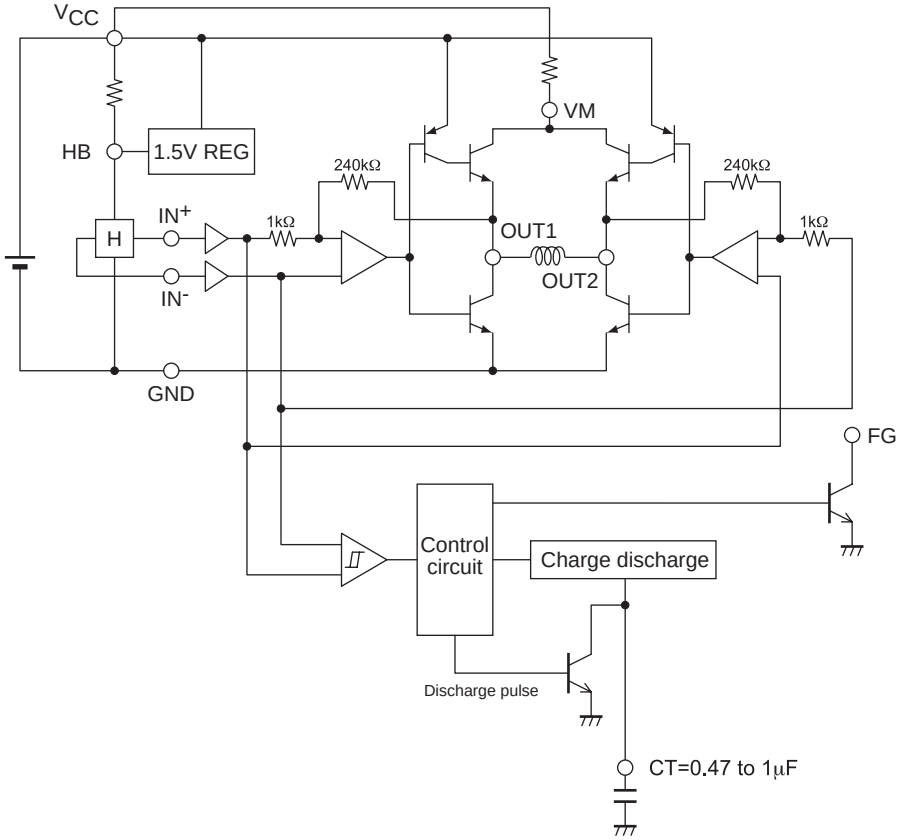


Pin Assignment

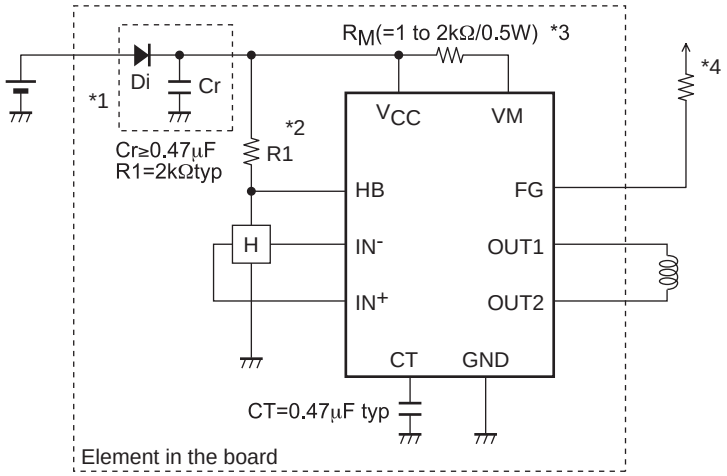


Top View

Block Diagram



Application Circuit Examples



*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 (≥0.47μF) is necessary to enhance the reliability when there is no capacitor near the fan power line.

*2: This IC performs linear drive by amplifying the Hall output and by voltage-controlling the coil.
The Hall element is biased by means of the bias from V_{CC} with R1 and by means of the constant voltage (V_{HB} = 1.5V) from the HB pin. As a result, stable Hall output is obtained even at high temperatures.

*3: Heat generated in IC is dissipated by inserting the resistor R_M between V_{CC} and V_M, which enables the use of the product in the environment with high ambient temperature. Recommended R_Ms is as follows:

R_M = 1Ω/0.5W (Ioave = 0.25A or more)

R_M = 2Ω/0.5W (Ioave = 0.25A or less)

*4: Keep this open when not using.

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