Ordering number : ENA2034

LA6583MC

Monolithic Linear IC

Fan Motor Driver
BTL Driver Single-Phase Full-Wave

ON Semiconductor®

http://onsemi.com

Overview

The LA6583MC 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 12V electronic game products.

Features

- Single-phase full-wave linear drive with BTL output (gain resistance 1K-360K)
  : Most appropriate for consumer appliances power supply and car audio system, namely equipment that requires silence because this has no switching noise.
- Low-voltage operation possible, with wide operable voltage range (2.8 to 13.8V)
- Low saturation output (Upper + lower saturation voltage: V_O sat (total) = 1.1Vtyp, I_O = 200mA)
  : High coil efficiency with low current drain. IC itself does not generate much heat.
- Lock protection and auto return circuits built-in
- Lock protection signal output (L during rotation, H at stop; open collector output)
- FG output (rotation speed detection output: open collector output)
- Hall bias built-in (VHB = 1.3V)
- Heat protection circuit (Design guarantee)
  : 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.
- Compact and high heat 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		0.8	A
Output withstand voltage	V_{OUT} max		15	V
RD/FG output withstand	VRD/FG max		15	V
RD/FG output current	IRD/FG max		5	mA
HB output current	IB max		10	mA
Allowable dissipation	Pd max	Mounted on a specified board *1	800	mW
Operating temperature	Topr	*2	-30 to +100	°C
Storage temperature	Tstg		-55 to +150	°C

*1: Mounted on a specified board: 114.3mm × 76.1mm × 1.6mm glass epoxy

*2: Tj = 150°C Use this IC within a range where the chip temperature does not exceed Tj = 150 C during operation.

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}		2.8 to 14.0	V
Common-phase input voltage range of Hall input	VICM		0 to V_{CC}-1.5	V

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

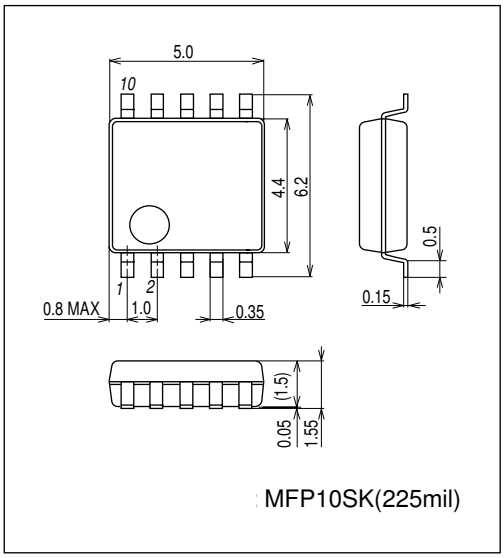
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit Current	$I_{CC}1$	During drive (CT=L)	4	6	9	mA
	$I_{CC}2$	At lock protection (CT=H)	2	4	6	mA
Lock detection capacitor charge current	ICT1		2.0	2.8	3.5	µA
Capacitor discharge current	ICT2		0.15	0.23	0.30	µA
Capacitor charge/discharge current ratio	RCT	RCT=ICT1/ICT2	9	12	15	-
CT charge voltage	VCT1		1.6	1.7	1.8	V
CT discharge voltage	VCT2		0.6	0.7	0.8	V
OUT output L saturation voltage	V_{OL}	I_O=200mA		0.2	0.3	V
OUT output H saturation voltage	V_{OH}	I_O=200mA		0.9	1.2	V
Hall input sensitivity	VHN	Zero peak value (Including offset and hysteresis)		7	15	mV
RD/FG output pin L voltage	VRD/FG	IRD/FG=5mA		0.1	0.2	V
RD/FG output pin leak current	IRD/FGL	VRD/FG=15V		1	30	µA
HB output voltage	VHB	IHB=5mA	1.3	1.5	1.7	V
Thermal protection circuit	TSD	Design target value *3	150	180	210	°C

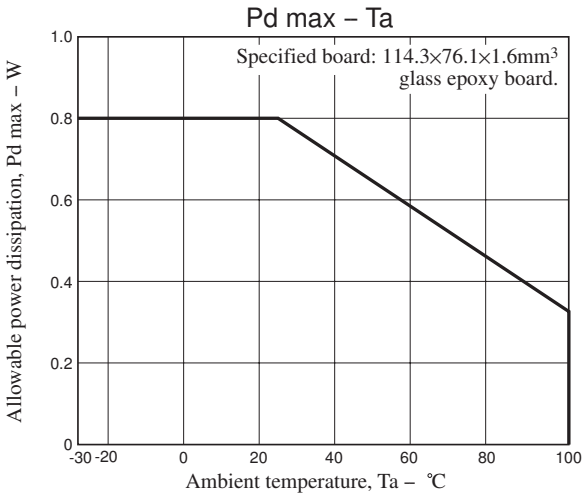
*3: This is a design guarantee value and no measurement with an independent unit is made.
Thermal protection circuit is built in this IC for the prevention of burnout of IC and thermal destruction.
But, since the operation is outside the guarantee temperature range, thermal design must be made so that the thermal protection circuit is not activated during normal fan operation.

Package Dimensions

unit : mm (typ)

3420

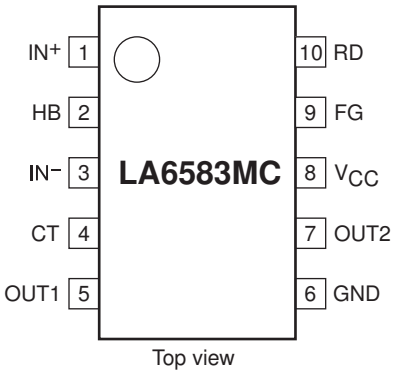




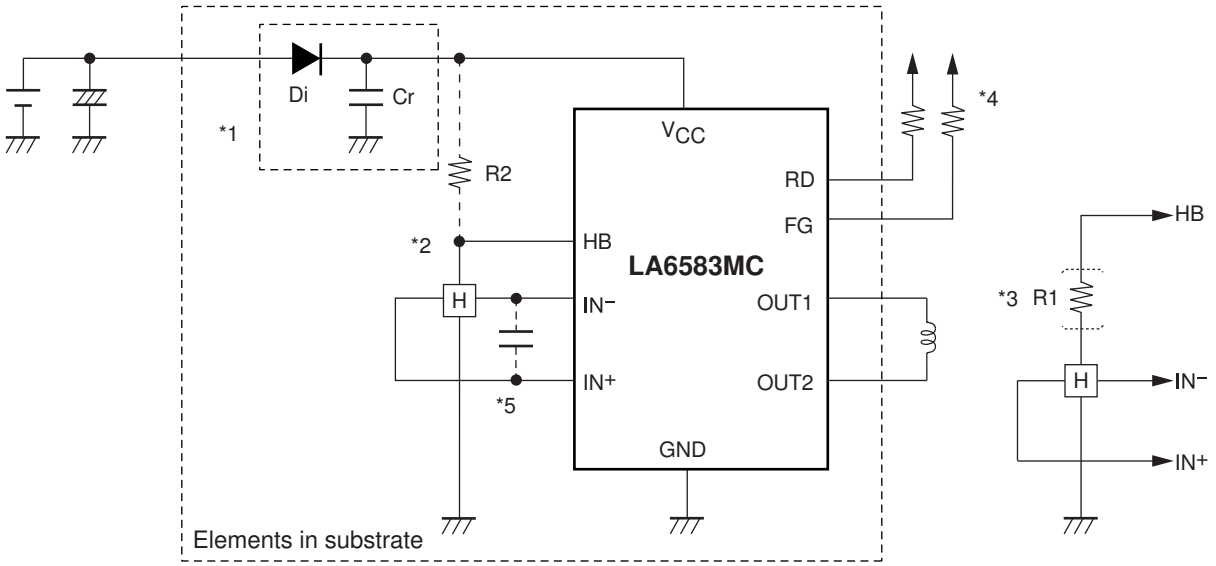
Truth Table

IN-	IN+	CT	OUT1	OUT2	FG	RD	Mode
H	L	L	H	L	L	L	During rotation
L	H		L	H	H		
-	-	H	OFF	OFF	-	H	Lock protection

Pin Assignment



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: When the Hall bias is taken from the HB pin, constant-voltage bias is made with about 1.3V.
Therefore, the Hall output becomes the stable amplitude voltage satisfactory in temperature characteristics.
By inserting R2 to obtain the Hall bias from both V_{CC} and HB, as shown in the figure, heat generation of IC can be suppressed.

*3: In this IC, the Hall output amplitude is amplified to produce the drive waveform.
Therefore, the switching time of the current application direction is determined by the Hall output, causing change in the characteristics of motor. If the Hall element output amplitude is large, the start-up performance and efficiency of the IC are improved. On the other hand, if the Hall element output amplitude is small, low-noise drive is ensured.
Adjust the Hall element output amplitude by R1.

*4: Keep this open when this is 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.

Internal Equivalent Circuit Diagram