LA6588MC

Single-phase Fan Motor IC, 24 V Power Supply, BTL Output Linear Drive

Monolithic Linear IC

Overview

The LA6588MC is a Single-phase bipolar fan motor IC for 24 V power supply. BTL output linear drive ensures highly-efficient, energy-saving, and silent drive while suppressing the ineffective current. Lock protection and lock signal circuit are incorporated, proving most suitable for consumer equipment power supply, OA equipment and car audio system, etc which require high reliability and low noise.

Features

- Single-phase Full-wave Linear Drive by BTL Output (Gain Resistance 500 to 360 kΩ, 57 dB): No Switching Noise, which is Most Favorable for use in Equipment Requiring Silent Operation, such as Consumer Equipment Power Supply, etc.
- Operable at Low Voltage and Over a Wide Operation Voltage Range (8 to 26.4 V)
- Low Saturation Output (Upper + Lower Saturation Voltages: $V_O$sat (total) = 1.1 V Typ, I_O = 200 mA): High Coil Efficiency and Small Current Drain. Small Heat Generation from IC itself
- Lock Protection and Automatic Return Circuits Incorporated
- Lock Protection Signal Output (L during Rotation, H at Stop, Open Collector Output)
- Output (Rotation Detection Output: Open Collector Output)
- Hall Bias Incorporated (V_{HB} = 1.5 V)
- 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 (MFP10SK) Pin-compatible Silent Series (5 V/12 V/24 V Products)

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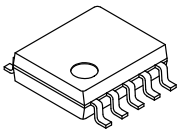
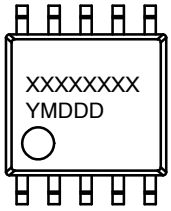


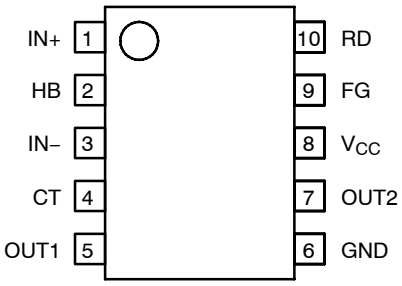
MFP10SK
CASE 751DA

MARKING DIAGRAM



XXXX = Specific Device Code
Y = Year
M = Month
DDD = Additional Traceability Data

PIN ASSIGNMENT



(Top View)

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC} max	Supply Voltage		28	V
I_{OUT} max	Output Current		0.8	A
V_{OUT} max	Output Withstand Voltage		28	V
$V_{RD/FG}$ max	Output Withstand Voltage of RD/FG Output Pin		28	V
$I_{RD/FG}$ max	RD/FG Output Current		5	mA
I_B max	HB Output Current		10	mA
P_d max	Allowable Dissipation	Mounted on a specified board (Note 1)	800	mW
T_{opr}	Operating Temperature		−30 to +90	°C
T_{stg}	Storage Temperature		−55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

CAUTION: Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

CAUTION: 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.

RECOMMENDED OPERATING CONDITIONS (T_A = −30 to +90°C)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage		8	–	26.4	V
V_ICM	Common-phase Input Voltage Range of Hall Input		0	–	V_{CC}−1.5	V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

ELECTRICAL CHARACTERISTICS (T_A = 25°C, V_{CC} = 24 V, unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CC}1$	Circuit Current	During drive (CT = L)	4.5	7	9.5	mA
$I_{CC}2$		During lock protection (CT = H)	2.5	4.5	6.5	mA
$I_{CT}1$	Lock Detection Capacitor Charge Current		2.0	2.7	3.5	μA
$I_{CT}2$	Capacitor Discharge Current		0.15	0.23	0.30	μA
R_{CT}	Capacitor Charge and Discharge Current Ratio	RCD = $I_{CT}1/I_{CT}2$	10	12	14	
$V_{CT}1$	CT Charge Voltage		1.55	1.7	1.8	V
$V_{CT}2$	CT Discharge Voltage		0.65	0.75	0.85	V
V_OL	OUT Output L Saturation Voltage	I_O = 200 mA	–	0.2	0.3	V
V_OH	OUT Output H Saturation Voltage	I_O = 200 mA	–	0.9	1.2	V
V_{HN}	Hall Input Sensitivity	Zero peak value (including offset and hysteresis)	–	7	–	mV
$V_{RD/FG}$	RD/FG Output Pin L Voltage	$I_{RD/FG}$ = 5 mA	–	0.2	0.3	V
$I_{RD/FG}$	RD/FG Output Pin Leak Current	$V_{RD/FG}$ = 15 V	–	1	3	μA
V_{HB}	HB Output Voltage	I_{HB} = 5 mA	1.3	1.5	1.7	V

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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	During lock protection

NOTE: –: Don't care.

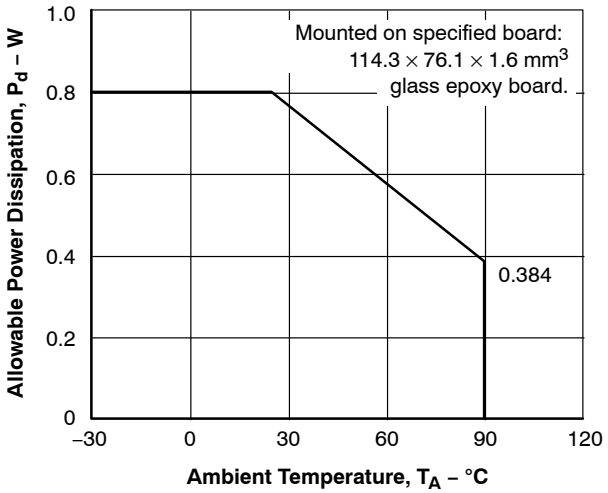


Figure 1. P_d max – T_A

BLOCK DIAGRAM

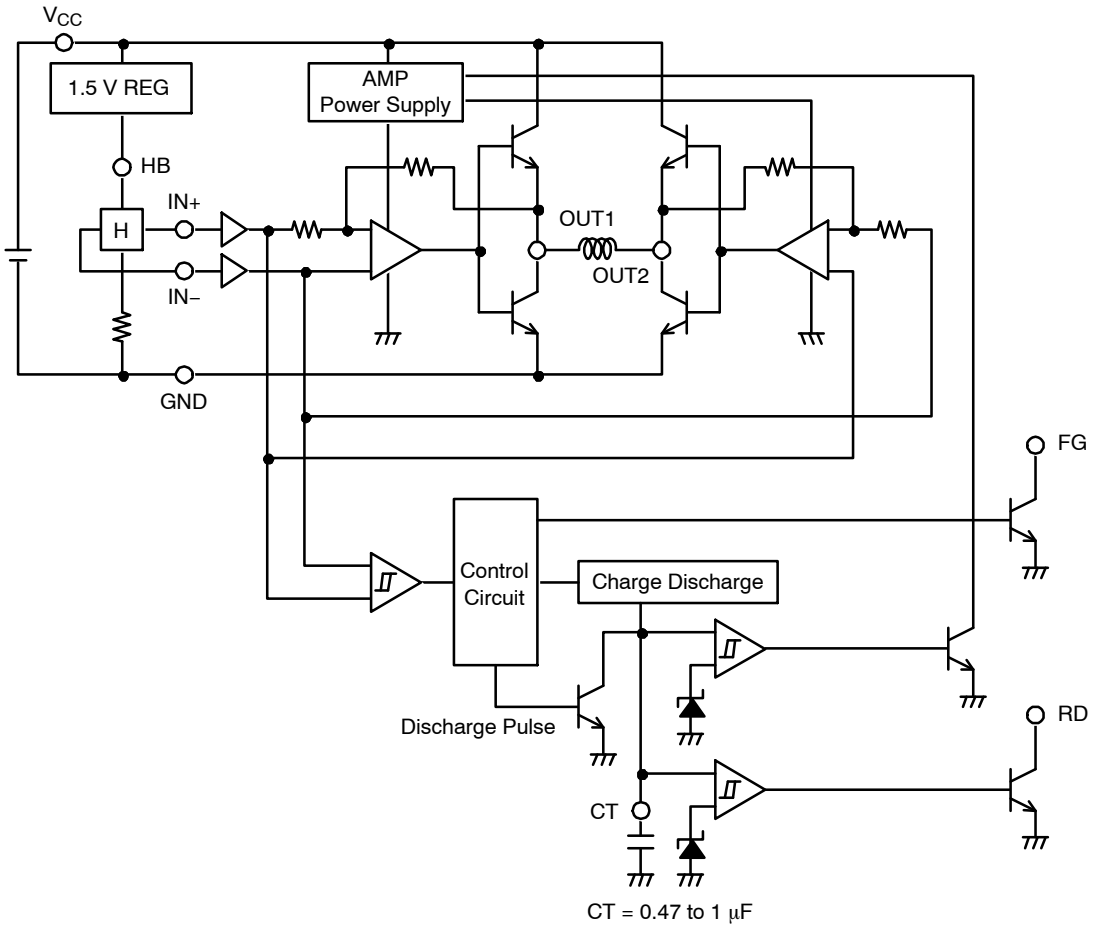


Figure 2. Block Diagram

APPLICATION CIRCUIT EXAMPLE

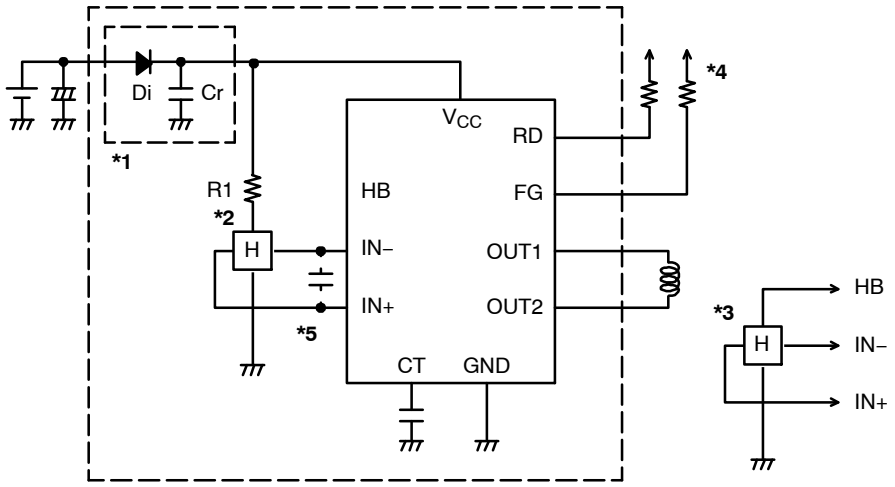


Figure 3. Application Circuit Example

*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 taking Hall bias from V_{CC}, carry out bias to V_{CC} with resistor R1 as shown in the figure. Linear drive is achieved through voltage control of the coil by amplifying the Hall output. With large Hall element output, the start performance and efficiency are improved. Noise can be reduced further by adjusting the Hall element.

*3: When the Hall bias is taken from the HB pin, constant-voltage bias is made with about 1.5 V. Therefore, the Hall element can provide the output satisfactory in temperature characteristics.

*4: Keep this open when not using.

*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.

ORDERING INFORMATION

Device	Package	Wire Bond	Shipping† (Qty / Packing)
LA6588MC−AH	MFP10SK (225mil)	Au−wire	1,000 / Tape & Reel
LA6588MC−W−AH	MFP10SK (225mil)	Cu−wire	1,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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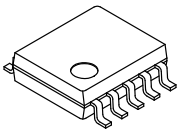
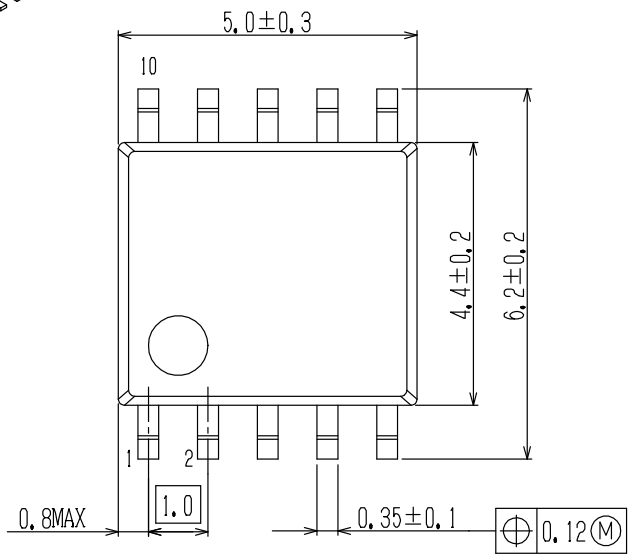
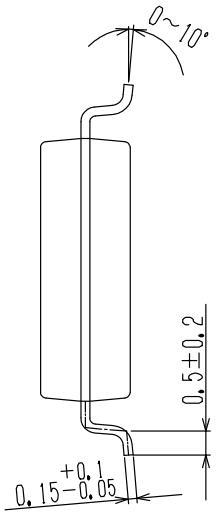
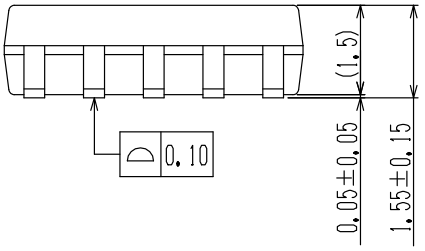


SOIC10W / MFP10SK (225 mil)
CASE 751DA
ISSUE A

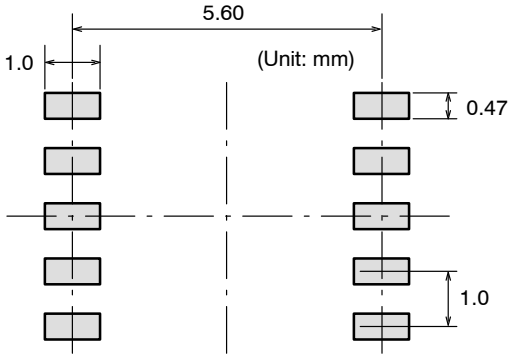
DATE 23 OCT 2013







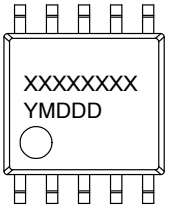
SOLDERING FOOTPRINT*



NOTE: The measurements are not to guarantee but for reference only.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



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*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present.

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DESCRIPTION:	**SOIC10W / MFP10SK (225 MIL)**	**PAGE 1 OF 1**

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