Ordering number : ENA2264

LA6581DM

Monolithic Linear IC

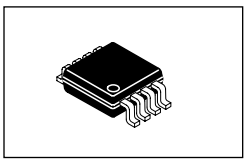
Fan Motor Driver
BLT Driver Single-Phase Full-Wave

ON Semiconductor®

http://onsemi.com

Overview

The LA6581DM 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.



Micro8

Functions

- Single-phase full-wave linear drive with BTL output (gain resistance 500Ω to 284kΩ, 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 (2.2 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.
- Extra-small package (Micro8)
  Small substrate while allowing larger blades

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Output voltage	V_{CC} max		18	V
Allowable power dissipation	Pd max	Mounted on a specified board *1	400	mW
Output current	I_{OUT}1 max	*2	0.36	A
	I_{OUT}2 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 (20.0mm 10.0mm 0.8mm: Paper Phenol, wiring density 20%)

*2: This specifies the starting current. Tj=15°C max must not be exceeded..

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.

ORDERING INFORMATION

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

Recommended Operating Conditions 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	V_{ICM}		0.3 to V_{CC}-1.5	V

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

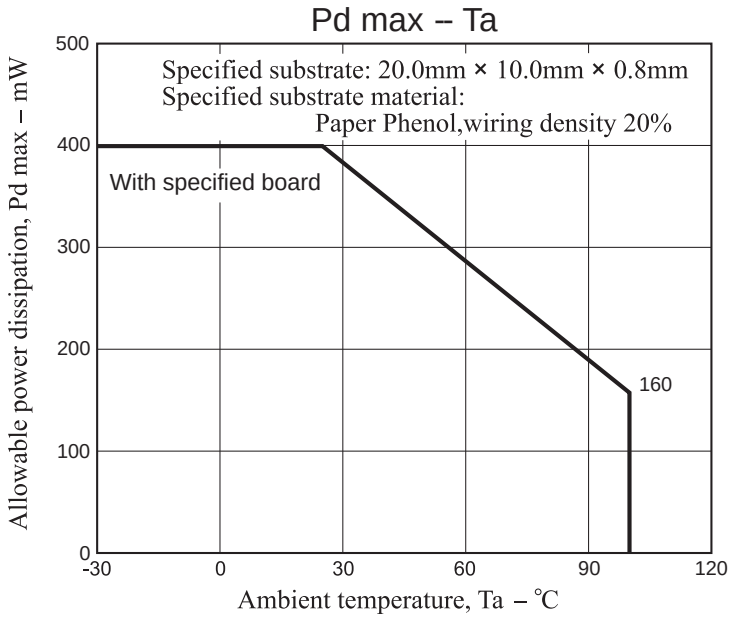
Parameter	Symbol	Conditions	Ratings			Unit
			min	Typ	Max	
Circuit Current	I_{CC}	IN^- = 5.8V, IN^+ = 6.0V, R_L = ∞		14	19	mA
OUT output low voltage	V_{OL}	I_O = 100mA		0.1	0.2	V
OUT output high voltage	V_{OH}	I_O = 100mA		0.1	0.2	V
Hall bias voltage	V_{HB}	RH = 360Ω +91Ω	1.85	1.95	2.05	V
Hall amplifier gain	Vg		52	55	58	dB
Hall amplifier input current	V_{INR}		-10	-2	+10	μA
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

*: These values are design guarantee values, and are not tested.

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

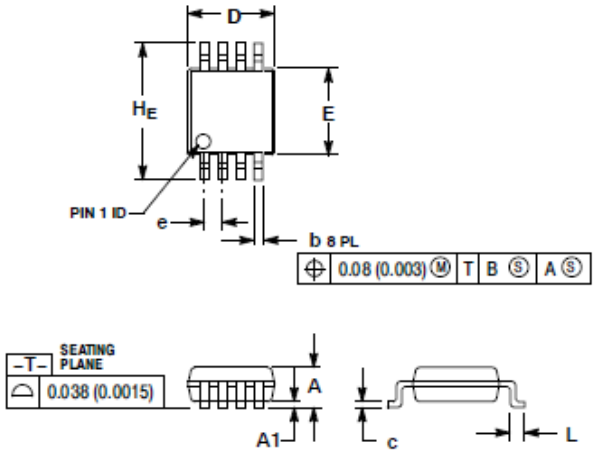
Pd-Ta



Package Dimensions

unit : mm (typ)

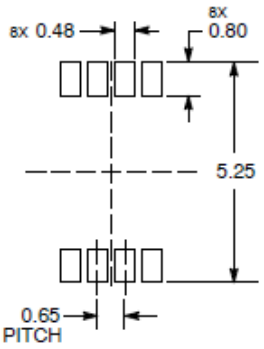
Micro8
CASE 846A-02
ISSUE J



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. 846A-01 OBSOLETE, NEW STANDARD 846A-02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	--	--	1.10	--	--	0.043
A1	0.05	0.08	0.15	0.002	0.003	0.006
b	0.25	0.33	0.40	0.010	0.013	0.016
c	0.13	0.18	0.23	0.005	0.007	0.009
D	2.90	3.00	3.10	0.114	0.118	0.122
E	2.90	3.00	3.10	0.114	0.118	0.122
e		0.65 BSC			0.026 BSC	
L	0.40	0.55	0.70	0.016	0.021	0.028
H_E	4.75	4.90	5.05	0.187	0.193	0.199

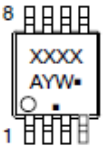
RECOMMENDED SOLDERING FOOTPRINT*



DIMENSION: MILLIMETERS

*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*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb–Free Package
(Note: Microdot may be in either location)

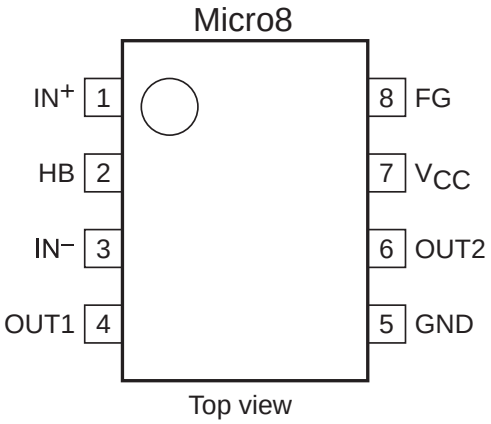
*This information is generic. Please refer to device data sheet for actual part marking. Pb–Free indicator, "G" or microdot " ▪", may or may not be present.

STYLE 1:
PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

STYLE 2:
PIN 1. SOURCE 1
2. GATE 1
3. SOURCE 2
4. GATE 2
5. DRAIN 2
6. DRAIN 2
7. DRAIN 1
8. DRAIN 1

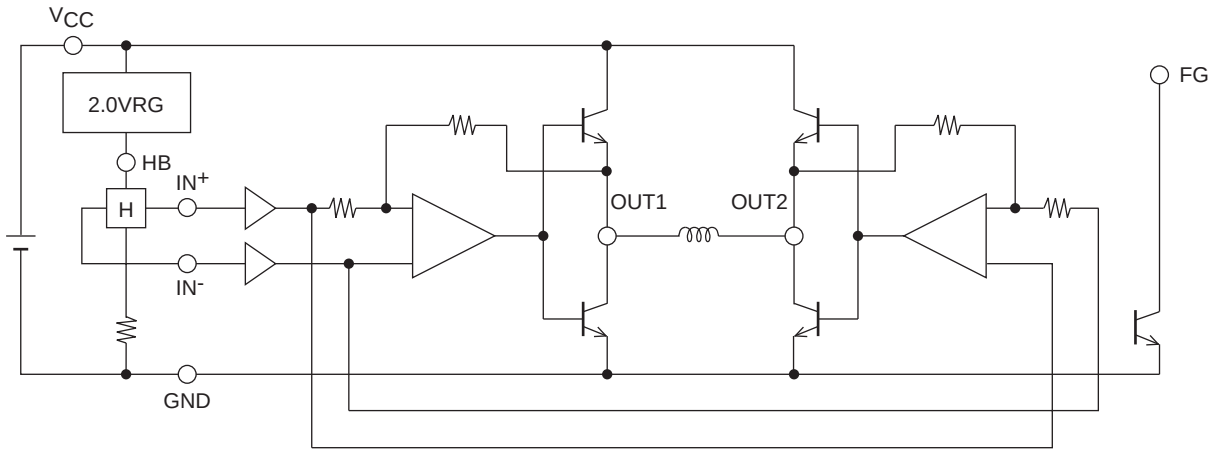
STYLE 3:
PIN 1. N-SOURCE
2. N-GATE
3. P-SOURCE
4. P-GATE
5. P-DRAIN
6. P-DRAIN
7. N-DRAIN
8. N-DRAIN

Pin Assignment

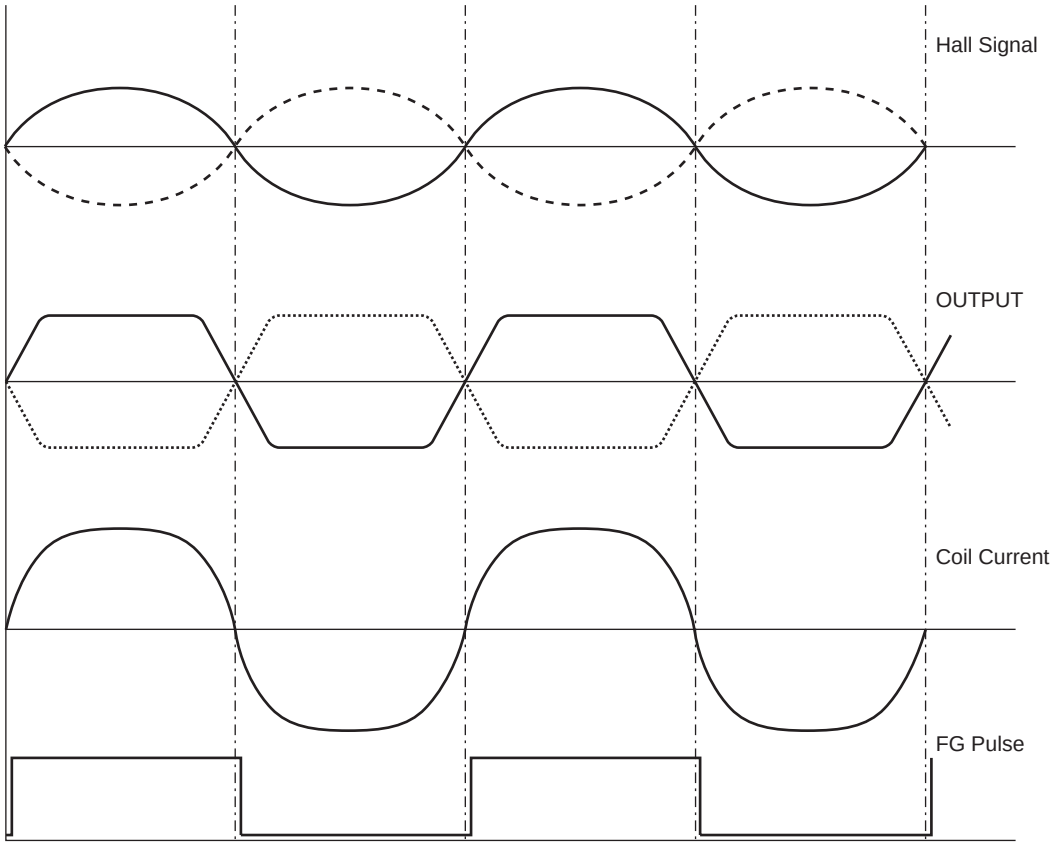


Top view

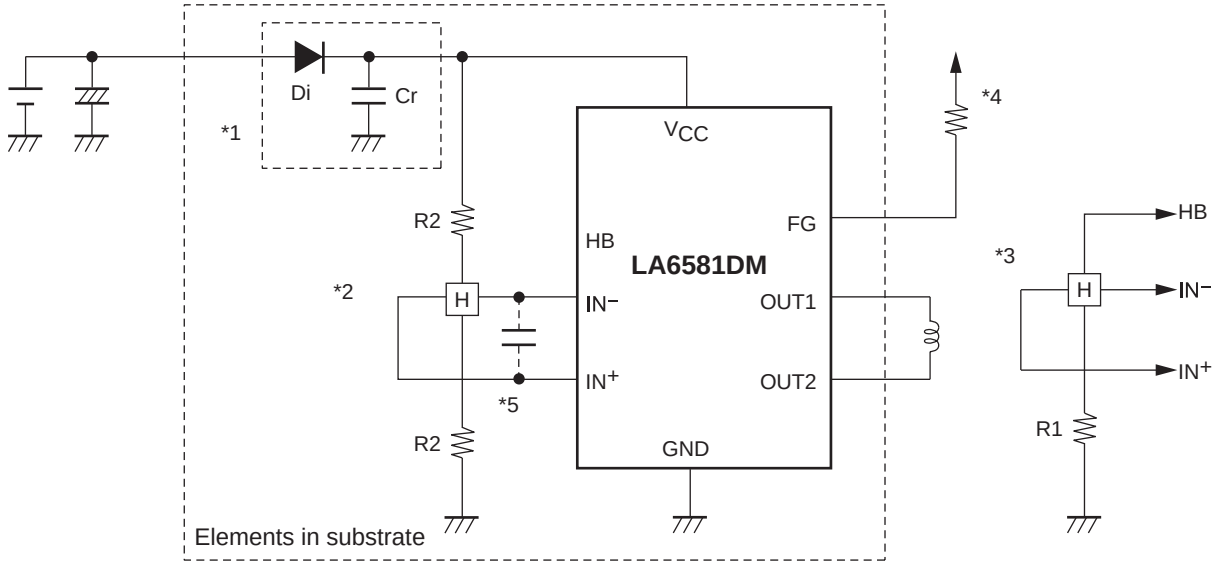
Block Diagram



Timing Chart



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 : 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. In this case, insert the capacitor as shown in the figure.

ORDERING INFORMATION

Device	Package	Shipping (Qty / Packing)
LA6581DMR2G	Micro8 (Pb-Free / Halogen Free)	4000 / Tape & Reel