



SANYO Semiconductors

DATA SHEET

Monolithic Linear IC

LA5688H — Multi power supply regulator+1.5ch forward/reverse motor driver

Overview

The LA5688H is Multi power supply regulator+1.5ch forward/reverse motor driver.

Functions

- One circuit of 2.6V regulator ($I_O = 100\text{mA}$)
- 3.1V regulator-2 circuit ($I_O = 50\text{mA}$)
- One circuit of 3.3V regulator ($I_O = 150\text{mA}$)
- Independent ON/OFF of each regulator
- 1.5ch forward/reverse motor driver incorporated

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		-0.3 to 9	V
Input voltage	$V_{IN\text{ max}}$		-0.3 to 9	V
Allowable power dissipation	$P_d\text{ max}$	$T_a \leq 25^\circ\text{C}$ Independent IC	0.79	W
		$T_a \leq 25^\circ\text{C}$ Mounted on a specified board. *	1.8	W
OUT pin output current	$I_{OUT\text{ max}}$		± 1	A
Operating temperature	T_{opr}		-20 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Mounted on a board : $76.1 \times 114.3 \times 1.6\text{mm}^3$, glass epoxy board.

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Operating Conditions at $T_a = 25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage 1	V_{CC1}		4.1 to 7.5	V
Supply voltage 1'	$V_{CC1'}$	*	3.5 to 7.5	V
Supply voltage 2	V_{CC2}		0 to 7.5	V
Supply voltage 3	V_{CC3}		3.5 to 7.5	V
VREF voltage	V_{REF}		0.3 to $V_{CC3}-1$	V
REG2.6 output current	REG2.6		0 to 100	mA
REG3.1A•B output current	REG3.1A•B		0 to 50	mA
REG3.3 output current	REG3.3		0 to 150	mA
Input "H" level voltage	V_{IH}		2.0 to 7.5	V
Input "L" level voltage	V_{IL}		-0.3 to 0.7	V

* When only the motor driver is used without using the regulator

Electrical Characteristics at $T_a = 25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
All regulator blocks Power dissipation $V_{CC1} = 6V$ IREG2.6 = 100mA, IREG3.3A•B = 50mA, IREG3.3 = 150mA						
V_{CC1} power dissipation	I_{CC1}			30	47	mA
REG2.6 Regulator block $V_{CC1} = 6V$, IREG2.6 = 100mA						
Output voltage 1	$V_{O_REG2.6}$		2.55	2.6	2.65	V
Dropout voltage	$VDROP_REG2.6$			0.25	0.5	V
Line regulation	$\Delta VOLN_REG2.6$	$V_{CC1} = 4.1$ to 7.5V			200	mV
Load regulation	$\Delta VOLD_REG2.6$	IREG2.6 = 5 to 100mA			200	mV
Peak output current	$IOP_REG2.6$		100	140		mA
Output short-circuit current	$IOSC_REG2.6$			50	100	mA
Input “H” level voltage	$V_{IH_EN2.6}$		2.0			V
Input “L” level voltage	$V_{IL_EN2.6}$				0.7	V
“H” level input current	$I_{IH_EN2.6}$	$V_{EN2.6} = 2V$		50	70	μA
REG3.1A•B Regulator block $V_{CC1} = 6V$, IREG3.1A•B = 50mA						
Output voltage	$V_{O_REG3.1A\bullet B}$		3.04	3.1	3.16	V
Dropout voltage	$VDROP_REG3.1A\bullet B$			0.25	0.5	V
Line regulation	$\Delta VOLN_REG3.1A\bullet B$	$V_{CC1} = 4.1$ to 7.5V			200	mV
Load regulation	$\Delta VOLD_REG3.1A\bullet B$	IREG3.1A•B = 5 to 50mA			200	mV
Peak output current	$IOP_REG3.1A\bullet B$		50	70		mV
Output short-circuit current	$IOSC_REG3.1A\bullet B$			25	50	mA
Input “H” level voltage	$V_{IH_ENB3.1A\bullet B}$		2.0			V
Input “L” level voltage	$V_{IL_ENB3.1A\bullet B}$				0.7	V
“H” level input current	$I_{IH_ENB3.1A\bullet B}$	$V_{EN3.1A\bullet B} = 2V$		50	70	μA
REG3.3 Regulator block $V_{CC1} = 6V$, IREG3.3 = 150mA						
Output voltage	$V_{O_REG3.3}$		3.23	3.3	3.37	V
Dropout voltage	$VDROP_REG3.3$			0.25	0.5	V
Line regulation	$\Delta VOLN_REG3.3$	$V_{CC1} = 4.1$ to 7.5V			200	mV
Load regulation	$\Delta VOLD_REG3.3$	IREG3.3 = 5 to 150mA			200	mV
Peak output current	$IOP_REG3.3$		150	210		mA
Output short-circuit current	$IOSC_REG3.3$			75	150	mA
Input “H” level voltage	$V_{IH_EN3.3}$		2.0			V
Input “L” level voltage	$V_{IL_EN3.3}$				0.7	V
“H” level input current	$I_{IH_EN3.3}$	$V_{EN3.3} = 2V$		50	70	μA

Continued on next page.

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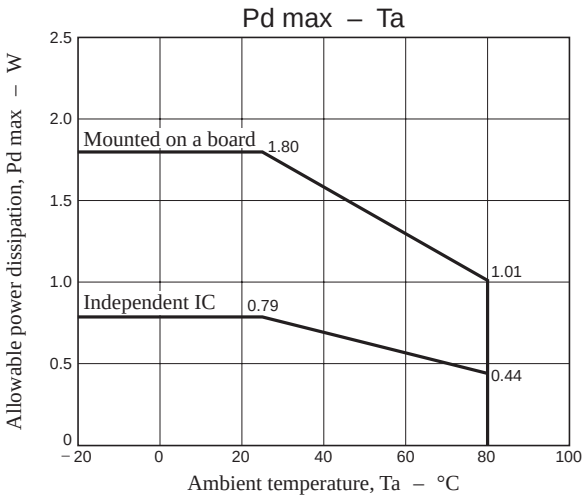
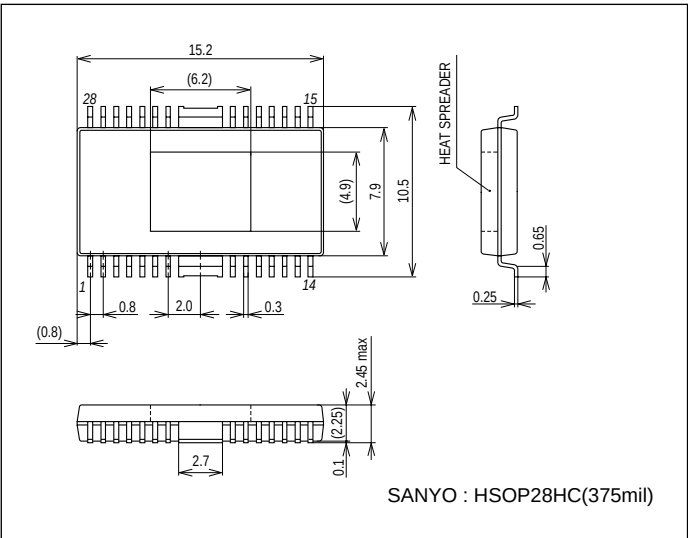
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Motor driver block $V_{CC1} = V_{CC2} = V_{CC3} = 6V$						
V_{CC3} power dissipation 1	I_{CC3_1}	Forward/Reversed, $V_{REF} = V_{CC3}$		38	58	mA
V_{CC3} power dissipation 2	I_{CC3_2}	Brake		48	68	mA
V_{CC3} power dissipation 3	I_{CC3_3}	Standby			15	μA
Output saturation voltage	V_{SAT_OUT}	$I_{OUT} = 200mA$, $V_{REF} = V_{CC3}$ (Upper side + Lower side)		1.0	1.5	V
V_{REF} pin outflow current	I_{REF}	$V_{REF} = 2.5V$ (Forward/Reversed)		1.3	3.5	μA
V_{OUT} - V_{REF} offset	VOF	$V_{REF} = 2.5V$, $I_O = 100mA$	-200		200	mV
Output TR current capacity 1	I_{OUT_max1}	$V_{CC3} = 3.5V$, $V_{REF} = V_{CC3}$ Lower side Tr $V_{CE} = 1V$	900			mA
Output TR current capacity 2	I_{OUT_max2}	$V_{CC3} = 4.0V$, $V_{REF} = V_{CC3}$ Lower side Tr $V_{CE} = 1V$	1000			mA
Input "H" level voltage	V_{IH_IN}		2.0			V
Input "L" level voltage	V_{IL_IN}				0.7	V
"H" level input current	I_{IH_IN}	$V_{IN} = 2V$		50	70	μA

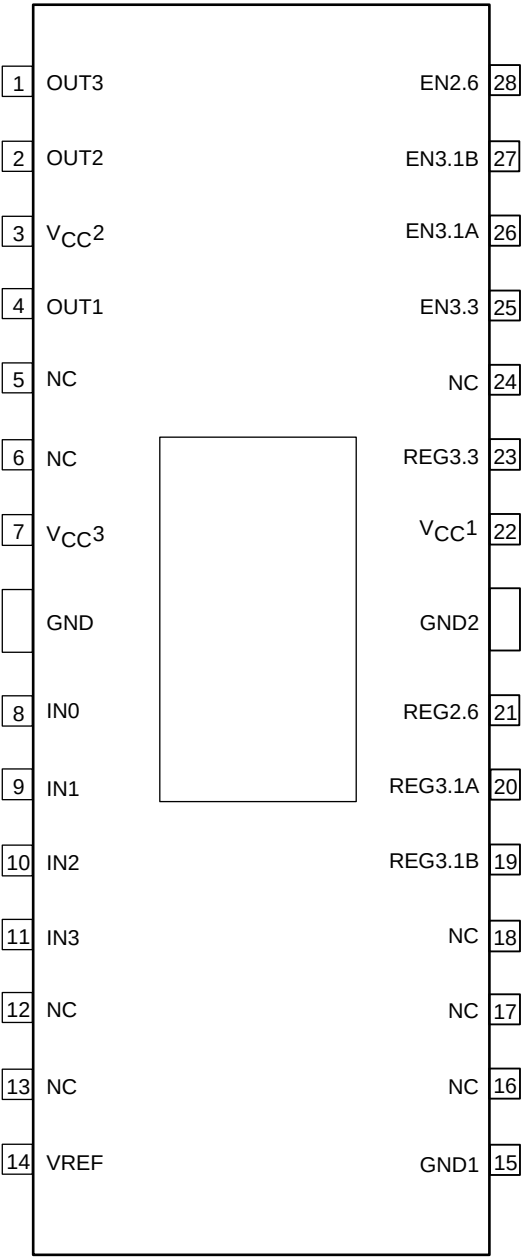
Package Dimensions

unit : mm (typ)

3234B



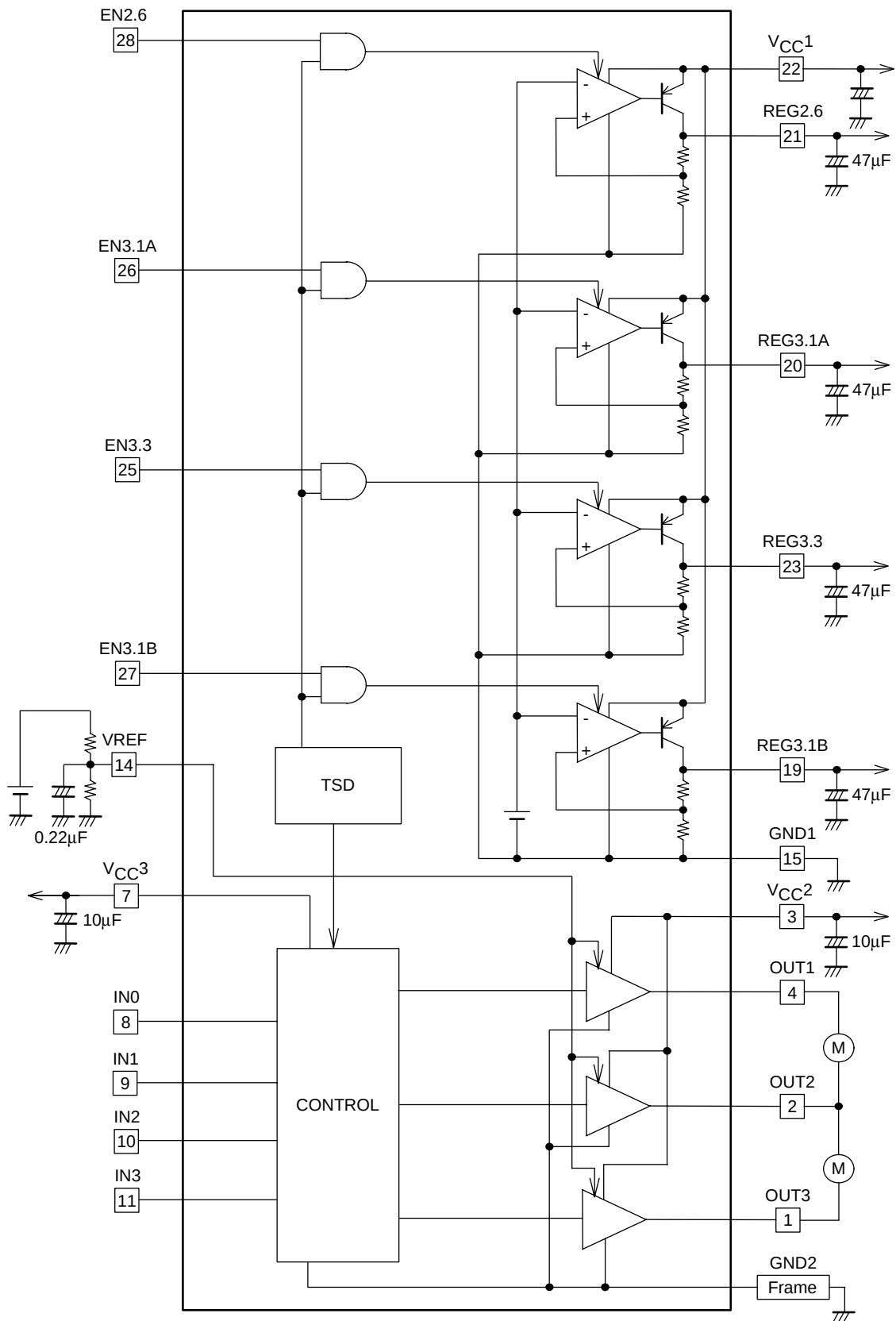
Pin Assignment



Top view

NC for no contact

Block Diagram



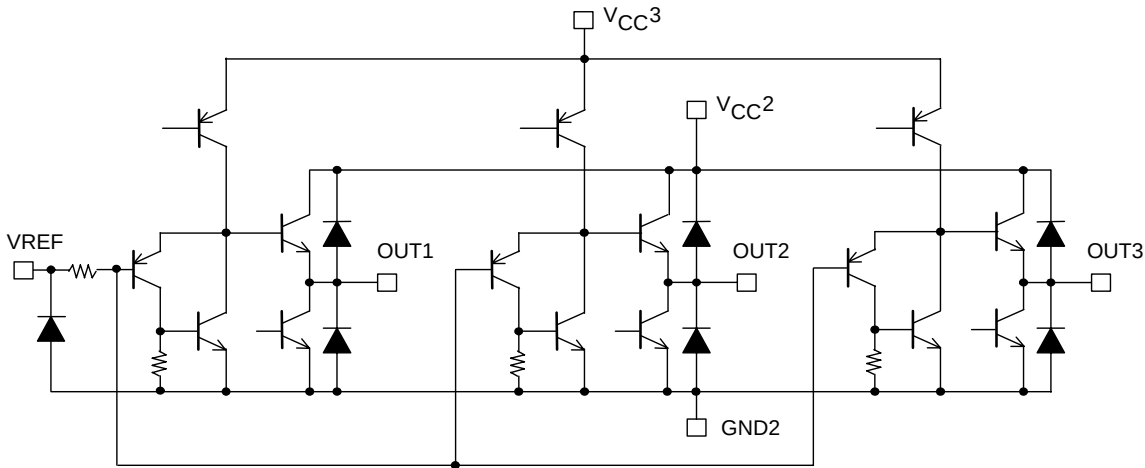
LA5688H

Truth table for 1.5ch forward/reverse motor driver

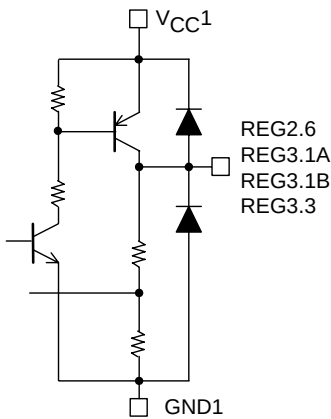
Input				Output			Mode	
INO	IN1	IN2	IN3	OUT1	OUT2	OUT3		
L	L	L	L				Standby	
L	L	H	L	H	L		ch1	Forward
L	L	L	H	L	H			Reversed
L	L	H	H	L	L			Brake
H	L	L	L		L	H	ch2	Forward
L	H	L	L		H	L		Reversed
H	H	L	L		L	L		Brake

Blank column is for OFF.

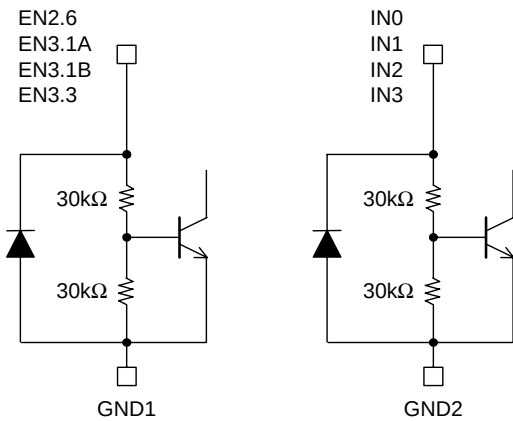
1.5ch forward/reverse motor driver output circuit



Each regulator output circuit



EN2.6, EN3.1A, EN3.1B, EN3.3, INO to IN3 input circuit



*Resistance values are TYP values.

Cautions for Use

(1) GND1 and GND2

When using, short-circuit GND1 and GND2 externally.

(2) Supply voltage when only the motor driver is used without using the regulator

As the reference power supply in IC is taken from V_{CC1} , apply the voltage also to V_{CC1} .

In this case, the operation condition of V_{CC1} ranges from 3.5 to 7.5V.

(Refer to page 2. Operation Conditions, Supply Voltage 1')

(3) Supply voltage when only the regulator is used without using the motor driver

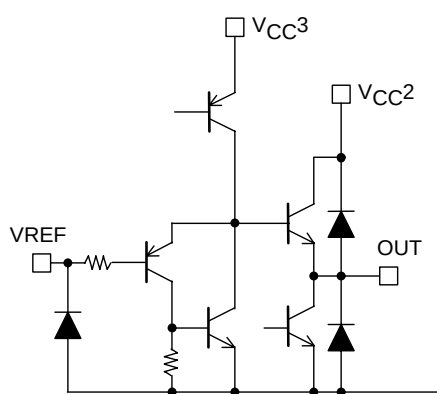
The regulator operates with V_{CC1} (without need of applying voltage to V_{CC2} , V_{CC3} , and VREF)

(4) VREF pin

Application of the voltage to VREF pin enables setting of each OUT Hi voltage.

In this case, the input to VREF ranges from 0.3 to ($V_{CC3}-1$) V.

(Refer to page 2. Operation conditions, VREF voltage)



VREF pin equivalent circuit

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