

**LA5587**

## General-Purpose Compact DC Motor Speed Controller

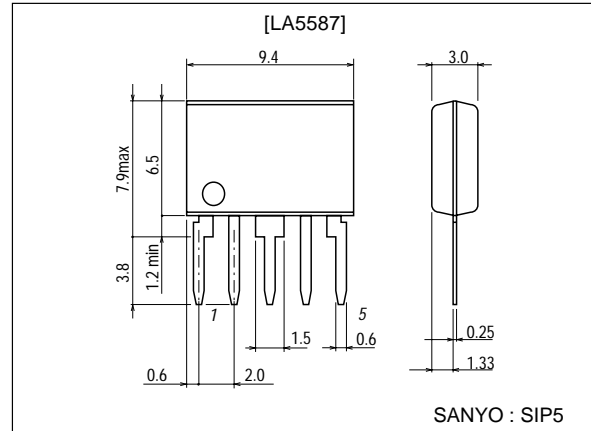
### Features

- On-chip stable voltage reference meeting the requirements for various motors.
- Wide operating voltage range (3.8 to 16V).
- Minimum number of external parts required and small-sized package.
- Facilitates speed control.
- On-chip kickback absorber.
- On-chip protector against inverted connection to power supply.

### Package Dimensions

unit:mm

3042C-SIP5



### Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V <sub>CC</sub> max		18	V
Motor current	I <sub>m</sub> max	Switch ON or lock mode	1.4	A
Allowable power dissipation	P <sub>d</sub> max		1.2	W
Operating temperature	T <sub>opr</sub>		-20 to +80	°C
Storage temperature	T <sub>stg</sub>		-40 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended operating voltage	V <sub>CC</sub> op		3.8 to 16	V
Recommended operating temperature	T <sub>opr</sub>		-20 to +80	°C

Operating Characteristics at Ta = 25°C, See Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage	V <sub>ref</sub>	V <sub>CC</sub> =12V, I <sub>m</sub> =10mA	1.08	1.21	1.27	V
Quiescent current drain	I <sub>d</sub>	V <sub>CC</sub> =12V, I <sub>m</sub> =0mA		1.0	1.6	mA
Shunt ratio	K	V <sub>CC</sub> =12V, I <sub>m</sub> =50-150mA	18	20	22	
Residual voltage	V(sat)	V <sub>CC</sub> =4.2V, R <sub>T</sub> =4.4Ω		0.94		V

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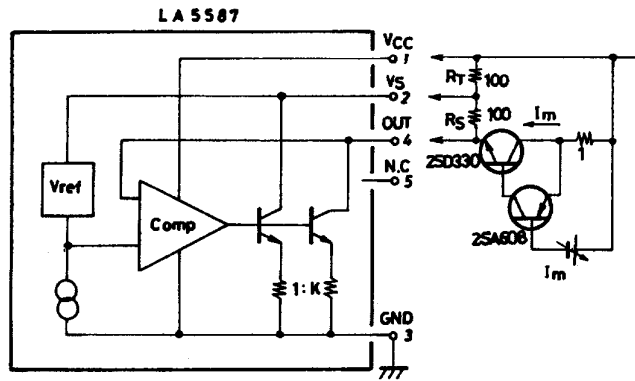
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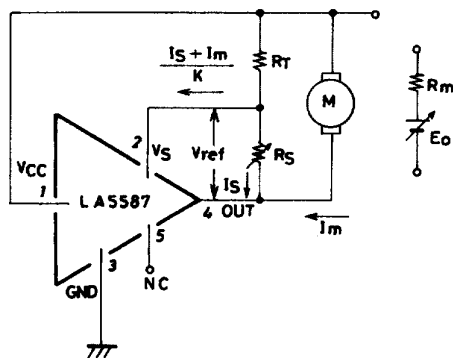
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Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Voltage characteristic of reference voltage	$\frac{\Delta V_{ref}}{V_{ref}} / \Delta V_{CC}$	$V_{CC}=6.3$ to $16V$ , $I_m=100mA$		0.06		%/V
Voltage characteristic of shunt ratio	$\frac{\Delta K}{K} / \Delta V_{CC}$	$V_{CC}=6.3$ to $16V$ , $I_m=50-150mA$		0.1		%/V
Current characteristic of reference voltage	$\frac{\Delta I_{ref}}{I_{ref}} / \Delta I_m$	$V_{CC}=12V$ , $I_m=30$ to $200mA$		-0.01		%/mA
Current characteristic of shunt ratio	$\frac{\Delta K}{K} / \Delta I_m$	$V_{CC}=12V$ , $I_m=50-100$ to $150-200mA$		0.02		%/mA
Voltage characteristic of reference voltage	$\frac{\Delta I_s}{I_s} / \Delta V_{CC}$	$V_{CC}=6$ to $16V$ , $I_m=0mA$		0.1		%/V
Temperature characteristic of reference voltage	$\frac{\Delta V_{ref}}{V_{ref}} / \Delta T_a$	$V_{CC}=12V$ , $I_m=10mA$ , $T_a=-20$ to $+80^\circ C$		-0.01		%/°C
Temperature characteristic of reference voltage	$\frac{\Delta K}{K} / \Delta T_a$	$V_{CC}=12V$ , $I_m=50-150mA$ , $T_a=-20$ to $+80^\circ C$		-0.01		%/°C

## Equivalent Circuit Block Diagram and Test Circuit



## Sample Application Circuit



$$\text{From } I_m \cdot R_m + E_o = R_T \left( I_s + \frac{I_s + I_m}{K} \right) + V_{ref},$$

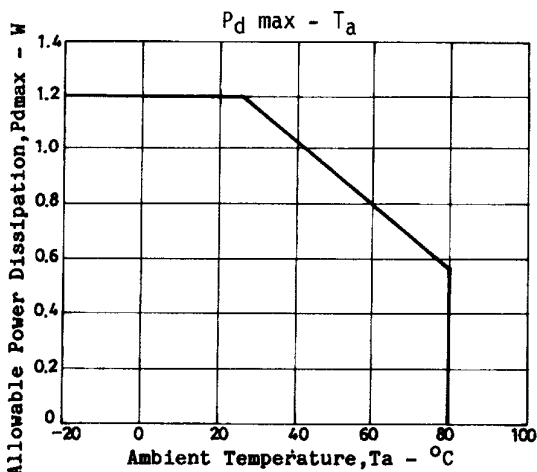
$$E_o = V_{ref} + R_T \left( 1 + \frac{1}{K} \right) I_s + \left( \frac{R_T}{K} - R_m \right) I_m$$

Assuming  $K \cdot R_m = R_T$ ,

The number of revolutions is determined by

$$E_o = V_{ref} + R_T \left( 1 + \frac{1}{K} \right) I_s$$

Unless  $R_T (\text{max}) < K \cdot R_m (\text{min})$  in the Sample Application Circuit, the operation becomes unstable.



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