



SANYO Semiconductors

DATA SHEET

LA5587

Monolithic Linear IC
General-Purpose Compact
DC Motor Speed Controller

Overview

LA5587 is a general-purpose compact DC motor speed controller. Especially suited for controlling speed of a DC motor for tape-recorders, radio-cassettes, record-players and etc.

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.

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max		12	V
Maximum motor current	I _m max	Switch-on or lock mode	1.4	A
Allowable power dissipation	P _d max		1.2	W
Operating temperature	T _{opr}		-20 to +80	°C
Storage temperature	T _{stg}		-40 to +150	°C

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended Supply voltage range	V _{CC} op		3.8 to 16	V
Recommended operating temperature	T _{opg}		-10 to +80	°C

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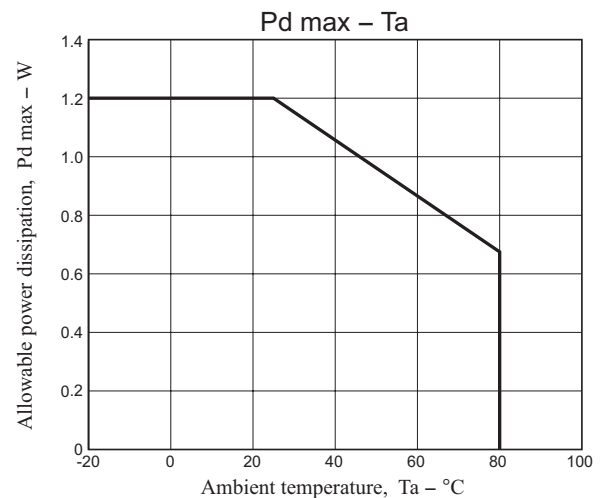
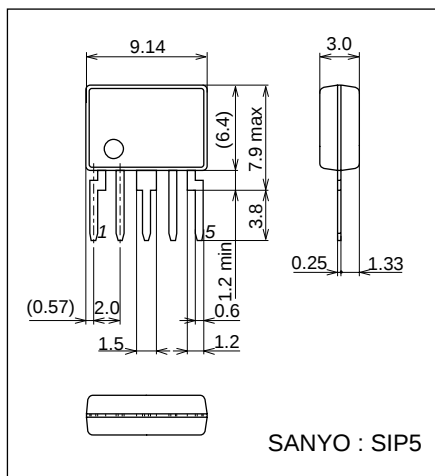
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{V}$, See Test Circuit.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage	V_{ref}	$I_m = 10\text{mA}$	1.08	1.21	1.27	V
Quiescent flow-in current	I_d	$I_m = 0\text{mA}$		1.0	1.6	mA
Shunt ratio	K	$I_m = 50\text{--}150\text{mA}$	18	20	22	
Residual voltage	V_{sat}	$V_{CC} = 4.2\text{V}$, $R_T = 4.4\Omega$		0.94		V
Voltage of characteristic of reference voltage	$\frac{\Delta V_{\text{ref}}}{V_{\text{ref}}} / \Delta V_{CC}$	$V_{CC} = 6.3\text{ to }16\text{V}$, $I_m = 100\text{mA}$,		0.06		%/V
Voltage of characteristic of shunt ratio	$\frac{\Delta K}{K} / \Delta V_{CC}$	$V_{CC} = 6.3\text{ to }16\text{V}$, $I_m = 50\text{--}150\text{mA}$,		0.1		%/V
Current characteristic of reference voltage	$\frac{\Delta V_{\text{ref}}}{V_{\text{ref}}} / \Delta I_m$	$I_m = 30\text{--}200\text{mA}$		-0.01		%/mA
Current characteristic of shunt ratio	$\frac{\Delta K}{K} / \Delta I_m$	$I_m = 50\text{--}100\text{mA}$ to $150\text{--}200\text{mA}$		0.02		%/mA
voltage characteristic of reference voltage	$\frac{\Delta I_S}{I_S} / \Delta V_{CC}$	$V_{CC} = 6\text{ to }16\text{V}$, $I_m = 0\text{mA}$		0.1		%/V
Temperature characteristic of reference voltage	$\frac{\Delta V_{\text{ref}}}{V_{\text{ref}}} / \Delta T_a$	$I_m = 10\text{mA}$, $T_a = -20\text{ to }+80^\circ\text{C}$		-0.01		%/°C
Temperature characteristic of shunt ratio	$\frac{\Delta K}{K} / \Delta T_a$	$I_m = 50\text{--}150\text{mA}$, $T_a = -20\text{ to }+80^\circ\text{C}$		-0.01		%/°C

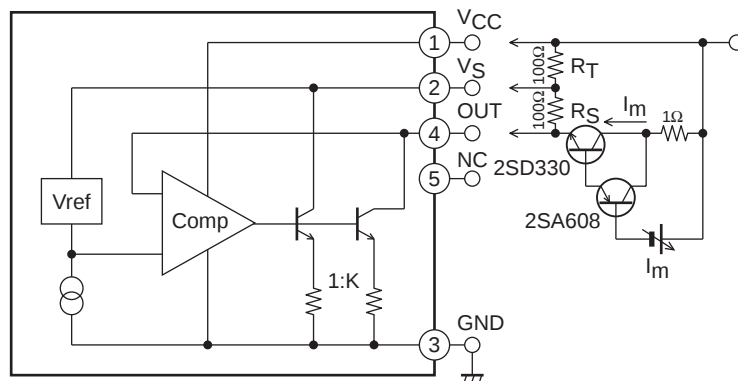
Package Dimensions

unit : mm (typ)

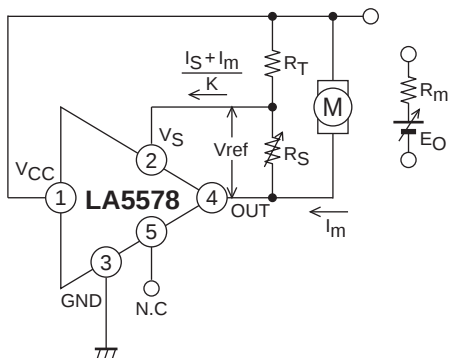
3042D



Block Diagram and Test Circuit



Application circuit Example



$$\text{From } I_m \times R_m + E_O = R_T \left(I_S + \frac{I_S + I_m}{K} \right) + V_{\text{ref}},$$

$$E_O = V_{\text{ref}} + R_T \left(1 + \frac{1}{K} \right) I_S + \left(\frac{R_T}{K} - R_m \right) I_m$$

Assuming $K \times R_m = R_T$,

The number of revolutions is determined by

$$E_O = V_{\text{ref}} + R_T \left(1 + \frac{1}{K} \right) I_S$$

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

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