



SANYO Semiconductors

DATA SHEET

LA5588

Monolithic Linear IC
 General-Purpose Compact
 DC Motor Speed Controller

Overview

LA5588 is a general-purpose compact DC motor speed controller. Especially suited for controlling speed of a DC motor for Radio-cassette tape recorders, car-stereos.

Features

- Wide operating voltage range (4.5 to 18V).
- Possible to make the equipment compact because of minimum number of external parts required and small-sized package.
- Facilitates speed control.
- Easy to control rotational speed from low speed to high speed.
- On-chip kickback absorber.
- High stability in oscillation.
- Facilitates heat radiation because of the use of a fin.

Specifications

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|-----------|------------------------|-------------|------------------|
| Maximum supply voltage | V_S max | | 20 | V |
| Starting current | I_m max | Switch-on or lock mode | 1.4 | A |
| Allowable power dissipation | P_d max | | 1.0 | W |
| Operating temperature | T_{opr} | | -20 to +80 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | -40 to +150 | $^\circ\text{C}$ |

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|----------------------------------|-----------|------------|---------|----------|
| Recommended Supply voltage range | V_S op | | 3 to 18 | V |
| Control resistance | R_A+R_B | | 100 | Ω |

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LA5528

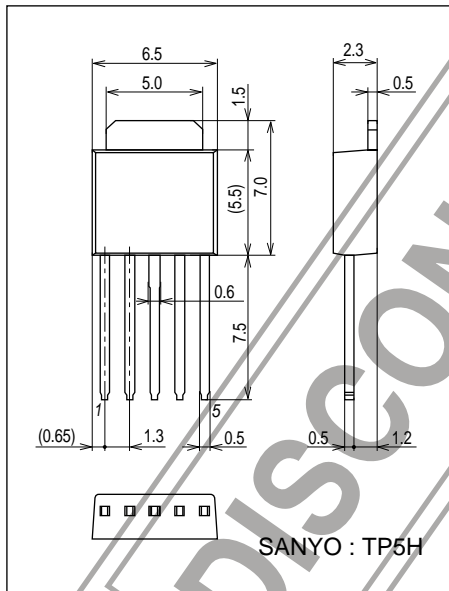
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_S = 8\text{V}$, See Test Circuit.

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|--|---|--|---------|--------|--------|------|
| | | | min | typ | max | |
| Reference voltage | V_{ref} | $I_m = 100\text{mA}$ | 1.1 | 1.2 | 1.3 | V |
| 2nd reference voltage | V_{ref}' | $I_m = 100\text{mA}$ | 2.0 | 2.15 | 2.3 | V |
| Quiescent flow-in current | I_d | $I_m = 0\text{mA}$ | 0.5 | 1.73 | 2.5 | mA |
| Shunt ratio | K | $I_m = 0\text{--}100\text{mA}$ | 18 | 20 | 22 | |
| Residual voltage | V_{sat} | $V_{CC} = 3\text{V}$, $I_m = 200\text{mA}$ | | 1.1 | 1.4 | V |
| Voltage of characteristic of 2nd reference voltage | $\frac{\Delta V_{ref}'}{V_{ref}'} / \Delta V_S$ | $V_{CC} = 3\text{ to }18\text{V}$, $I_m = 100\text{mA}$ | -0.02 | 0 | +0.02 | %/V |
| Voltage of characteristic of reference voltage | $\frac{\Delta V_{ref}}{V_{ref}} / \Delta V_S$ | $V_{CC} = 3\text{ to }18\text{V}$, $I_m = 100\text{mA}$ | -0.05 | +0.025 | +0.1 | %/V |
| Voltage of characteristic of quiescent flow-in current | $\frac{\Delta I_d}{I_d} / \Delta V_S$ | $V_{CC} = 3\text{ to }18\text{V}$, $I_m = 0\text{mA}$ | | 0.3 | 0.8 | %/V |
| Voltage of characteristic of shunt ratio | $\frac{\Delta K}{K} / \Delta V_S$ | $V_{CC} = 3\text{ to }18\text{V}$, $I_m = 0\text{--}100\text{mA}$ | -0.8 | -0.3 | +0.3 | %/V |
| Current characteristic of reference voltage | $\frac{\Delta V_{ref}}{V_{ref}} / \Delta I_m$ | $I_m = 50\text{--}150\text{mA}$ | -0.002 | 0 | +0.002 | %/mA |
| Current characteristic of 2nd reference voltage | $\frac{\Delta V_{ref}'}{V_{ref}'} / \Delta I_m$ | $I_m = 50\text{--}150\text{mA}$ | -0.1 | -0.013 | +0.05 | %/mA |
| Current characteristic of shunt ratio | $\frac{\Delta K}{K} / \Delta I_m$ | $I_m = 50\text{--}100\text{mA to }150\text{--}200\text{mA}$ | | 0.008 | 0.025 | %/mA |
| Temperature characteristic of reference voltage | $\frac{\Delta V_{ref}}{V_{ref}} / \Delta T_a$ | $I_m = 100\text{mA}$, $T_a = -20\text{ to }+80^\circ\text{C}$ | | 0 | | %/°C |
| Temperature characteristic of 2nd reference voltage | $\frac{\Delta V_{ref}'}{V_{ref}'} / \Delta T_a$ | $I_m = 100\text{mA}$, $T_a = -20\text{ to }+80^\circ\text{C}$ | | 0 | | %/°C |
| Temperature characteristic of shunt ratio | $\frac{\Delta K}{K} / \Delta T_a$ | $I_m = 100\text{mA}$, $T_a = -20\text{ to }+80^\circ\text{C}$ | | 0.12 | | %/°C |

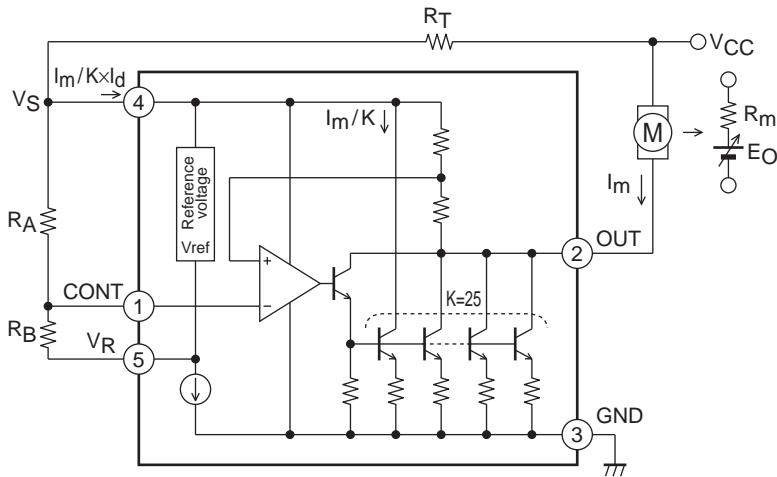
Package Dimensions

unit : mm (typ)

3103A

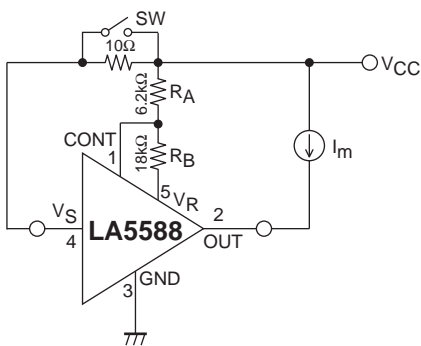


Block Diagram



R_m : Armature winding resistance
 E_O : Motor counter electromotive force
 I_m : Motor current

Test Circuit



- 1) Reference voltage (V_{ref})
 Measure the voltage across pins V_S and V_R with the Switch-on.
- 2) 2nd reference voltage (V_{ref}')
 Measure the voltage across pins V_S and OUT with the switch-on.
- 3) Quiescent flow-in current (I_d)
 Measure using the voltage across the resistor of 10Ω with the switch-on.
- 4) Shunt ratio (K)
 With the switch-off, measure I_{d1} , I_{d2} and I_{m1} , I_{m2} at $I_m = I_{m2}$ and calculate using the following formula.

$$K = \frac{(I_{m2} - I_{m1})}{(I_{d2} - I_{d1})}$$
- 5) Residual voltage (V_{sat})
 With the switch-off, measure the voltage across pins OUT and GND at $V_S = 3V$, $I_m = 200mA$.

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