**Features**

- Wide operating voltage range (3.8 to 16V)
- Possible to make the equipment compact because of minimum number of external parts required and small-sized package
- Easy to change the speed
- Easy to increase the power dissipation because of the use of a fin
- Various lead formings available for making the equipment compact
- On-chip protector against inverted connection of power supply

Maximum Ratings at Ta=25°C

| | | | |
|---|--------------|----------------------------|-----|
| Maximum Supply Voltage | V_{CC} max | 18 | V |
| Allowable Power Dissipation | P_d max | 1.0* | W |
| Operating Temperature | T_{opr} | -20 to +80 | °C |
| Storage Temperature | T_{stg} | -40 to +150 | °C |
| Start Current | I_m max | 3sec at SW-ON or lock mode | 1.4 |
| *1.7W(heat of fin is radiated to 1cm ² Cu foil) at Ta=25°C | | | A |

Operating Conditions at Ta=25°C

| | | | |
|-----------------------------------|-------------|------------|----|
| Supply Voltage Range | V_{CC} op | 3.8 to 16 | V |
| Recommended Operating Temperature | T_{opr} | -20 to +80 | °C |

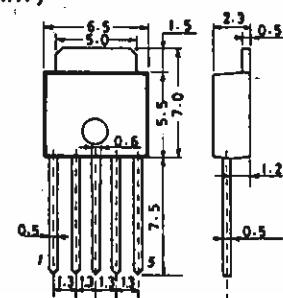
Operating Characteristics at Ta=25°C, See specified Test Circuit.

| | | | min | typ | max | unit |
|---|--|---|------|-------|------|------|
| Reference Voltage | V_{ref} | $V_{CC}=12V, I_m=10mA$ | 1.08 | 1.21 | 1.27 | V |
| Quiescent Current | I_d | $V_{CC}=12V, I_m=0$ | | 1.0 | 1.6 | mA |
| Dissipation | | | | | | |
| Shunt Ratio | K | $V_{CC}=12V, I_m=50$ to 150mA | 18 | 20 | 22 | |
| Saturation Voltage | $V_{(sat)}$ | $V_{CC}=4.2V, R_T=4.4ohms$ | | 0.94 | | V |
| 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, $I_m=50$ to 150mA | | 0.1 | | %/V |
| Current Characteristic of Reference Voltage | $\frac{\Delta V_{ref}}{V_{ref}}/\Delta I_m$ | $V_{CC}=12V,$ $I_m=30$ to 200mA | | -0.01 | | %/mA |

Continued on next page.

**Package Dimensions
(unit: mm)**

3103



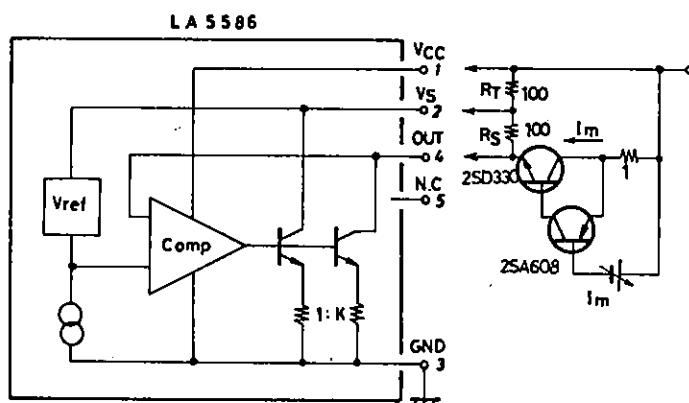
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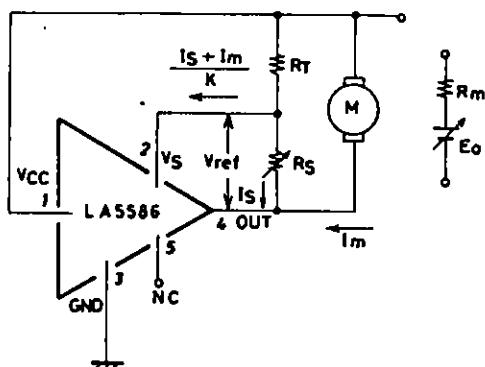
| | | min | typ | max | unit |
|--|----------------------------------|---|-------|-----|----------------|
| Current Characteristic of Shunt Ratio | $\frac{\Delta K}{K}$ | $\frac{V_{CC}}{12V}$, $I_m=50-100$ to $150-200mA$ | 0.02 | | %/mA |
| Current Characteristic of Reference Current | $\frac{\Delta I_s}{I_s}$ | $V_{CC}=6$ to $16V, I_m=0$ | 0.1 | | %/V |
| Temperature Characteristic of Reference Voltage of Reference Voltage | $\frac{\Delta V_{ref}}{V_{ref}}$ | $V_{CC}=12V, I_m=10mA$, $T_a=-20$ to $+80^{\circ}C$ | -0.01 | | %/ $^{\circ}C$ |
| Temperature Characteristic of Shunt Ratio | $\frac{\Delta K}{K}$ | $V_{CC}=12V, I_m=50-150mA$, $T_a=-20$ to $+80^{\circ}C$ | -0.01 | | %/ $^{\circ}C$ |

Equivalent Circuit and Test Circuit



Unit (resistance: Ω)

Sample Application Circuit



$$I_m \cdot R_m + E_0 = R_T (I_s + \frac{I_s + I_m}{K}) + V_{ref}$$

From this equation,

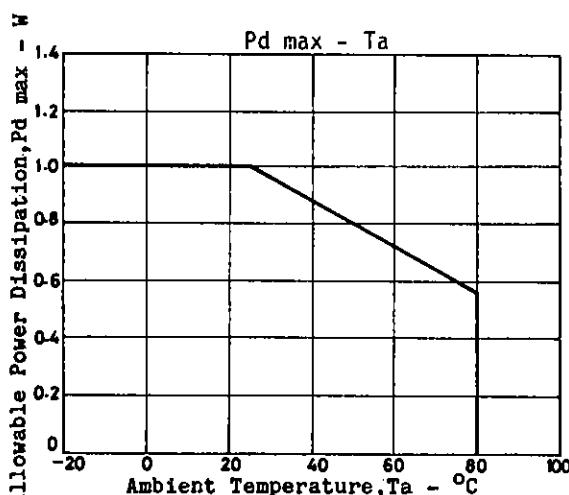
$$E_0 = V_{ref} + R_T (1 + \frac{1}{K}) I_s + (\frac{R_T}{K} - R_m) I_m$$

Assuming $K \cdot R_m = R_T$

The number of revolutions is determined by

$$E_0 = V_{ref} + R_T (1 + \frac{1}{K}) I_s$$

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



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