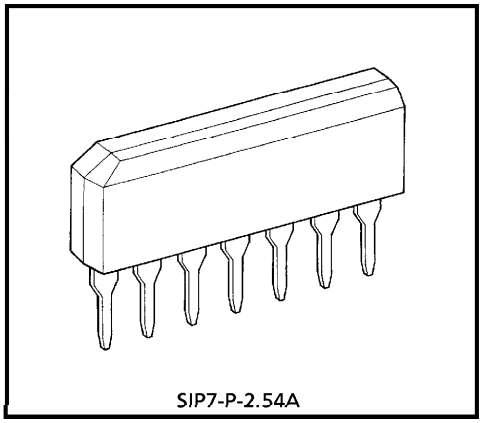
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA8001S

## 5V VOLTAGE REGULATOR WITH RESET TIMER

The TA8001S is an IC specially designed for automotive microcomputer systems. It produces an output voltage of 5 ± 0.5V without need for adjustment from its accurate reference voltage and amplifier circuit.
At power-on, it outputs a reset signal to reset the system. It will also output a reset signal when the 5V output voltage drops below 92% because of external disturbance or other problem. Since it is also designed to have a small bias current, power consumption on the system can be reduced.



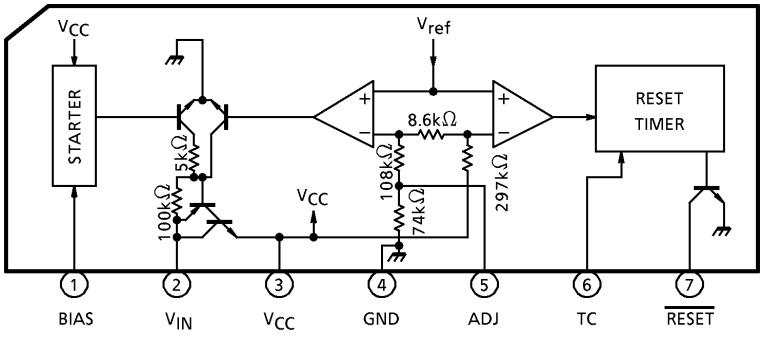
SIP7-P-2.54A

Weight : 0.7g (Typ.)

### FEATURES

- Accurate output : 5 ± 0.5V
- Standby output : 3.5V
- Low bias current : 150$\mu$A (Typ.)
- Power-on reset timer
- Operating temperature range : from −40 to 85°C
- Wide operating voltage range : 30V (max.)
- Small SIP-7 pin

### BLOCK DIAGRAM AND PIN LAYOUT

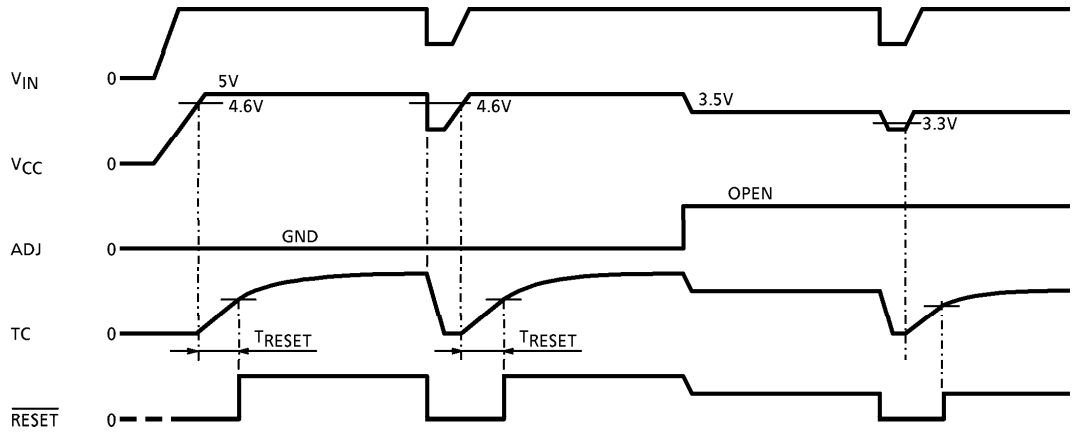



961001EBA2

**PIN DESCRIPTION**

| PIN No. | SYMBOL | DESCRIPTION |
|---|---|---|
| 1 | BIAS | Power supply starting pin. The starting current is supplied through a resistor to which the input voltage is applied. The output current from this starting current is as follows :<br>$I_{OUT}$ (pin 1) $\geqq 3000 \times (V_{IN} - 0.6) / (200 + R_1)$ (mA)<br>where $R_1$ is the external resistance attached to pin 1 (kΩ).<br>When the output voltage rises above 2.7V, its control is transferred from the starting circuit to the internal control circuit. |
| 2 | $V_{IN}$ | Power supply input pin. |
| 3 | $V_{CC}$ | Power supply pin for internal circuit. The output voltage can also be detected at this pin. |
| 4 | GND | Grounded |
| 5 | ADJ | The output voltage can be adjusted by inserting a resistor between ADJ and GND or between ADJ and $V_{CC}$.<br>Mode / ADJ Pin / Output Voltage $V_{REG}$<br>Standby / OPEN / 3.5V<br>Normal / GND / 5.0V |
| 6 | TC | Time setting pin for reset timer |
| 7 | $\overline{RESET}$ | NPN transistor open-collector output. This pin supplies a reset signal when the output drops below 92% of the specified level. After the output voltage increases above 92% of the specified level, the reset signal will be output for a period of time set at the TC pin. |

**TIMING CHART**



**MAXIMUM RATINGS** (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | 30 | V |
| Output Current | $I_{OUT1}$ | 20 | mA |
| | $I_{OUT2}$ | 1 | mA |
| Output Voltage | $V_{OUT2}$ | 16 | V |
| Power Dissipation | $P_D$ | 500 | mW |
| Operating Temperature | $T_{opr}$ | −40~85 | °C |
| Storage Temperature | $T_{stg}$ | −55~150 | °C |
| Lead Temperature-time | $T_{sol}$ | 260 (10s) | °C |

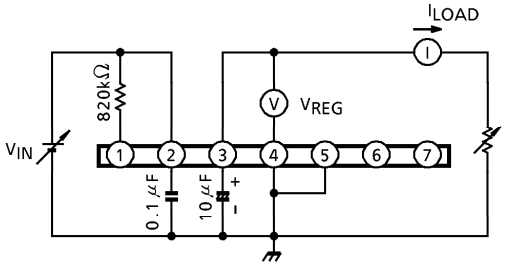
Note : $V_{IN}$ : BIAS input
$I_{OUT1}$, $V_{OUT1}$ : $\overline{OUT}$ output
$I_{OUT2}$, $V_{OUT2}$ : $\overline{RESET}$ output

**ELECTRICAL CHARACTERISTICS** ($V_{IN}$ = 7 to 17V, Ta = −40 to 85°C, $I_{LOAD}$ = 5mA)

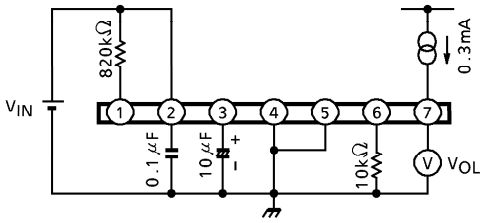
| CHARACTERISTIC | SYMBOL | PIN | TEST CIR-CUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{REG}$ | $V_{CC}$ | 1 | — | 4.5 | 5.0 | 5.5 | V |
| Line Regulation | — | $V_{CC}$ | — | $V_{IN}$ = 7~30V | — | 0.2 | 1.0 | % |
| Load Regulation | — | $V_{CC}$ | — | $I_{LOAD}$ = 2~10mA | — | 0.5 | 2.0 | % |
| Temperature Coefficient | — | $V_{CC}$ | — | — | — | 0.01 | — | % / °C |
| Output Voltage | $V_{OL}$ | $\overline{RESET}$ | 2 | $I_{OL}$ = 300μA | — | — | 0.4 | V |
| Output Leakage Current | $I_{LEAK}$ | $\overline{RESET}$ | 3 | $V_{OUT}$ = 10V | — | — | 5 | μA |
| Input Current | $I_{IN}$ | TC | 4 | $V_{IN}$ = 0~$V_{REG}$ | −2 | — | 2 | μA |
| Threshold Voltage | $V_{TH}$ | TC | 5 | TC : Low to High | — | 1.7 | — | V |
| Reset Detect Voltage | — | $V_{CC}$ | — | $V_{REG}$ = 5V | — | 4.6 | — | V |
| Standby Voltage | $V_S$ | $V_{CC}$ | 6 | — | 3.1 | 3.5 | 3.9 | V |
| Standby Current | $I_S$ | $V_{CC}$ | 7 | $V_{IN}$ = 14V | — | 150 | 300 | μA |
| Reset Timer | $T_{RESET}$ | $\overline{RESET}$ | 5 | — | — | 0.4 × $C_T R_T$ | — | — |

**TEST CIRCUIT**

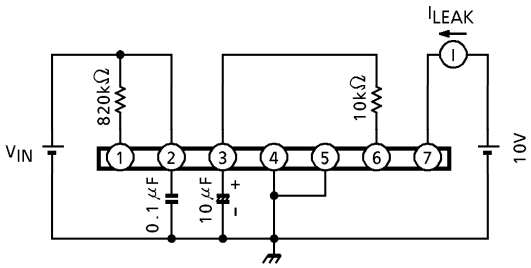
1. $V_{REG}$



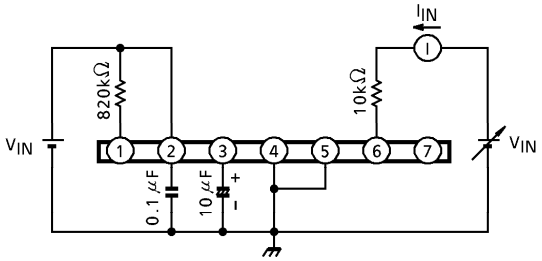

2. $V_{OL}$ ($\overline{RESET}$)



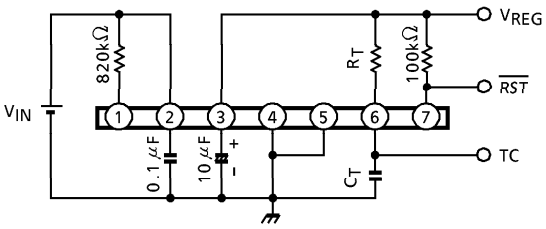

3. $I_{LEAK}$ ($\overline{RESET}$)

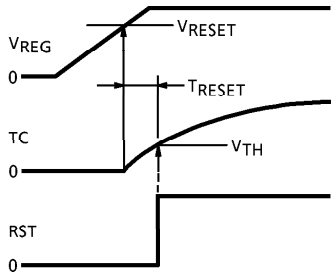



4. $I_{IN}$ (TC)

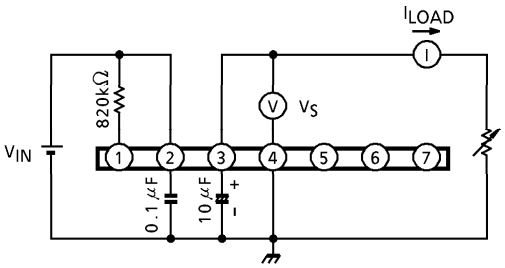



5. $V_{RESET}$, $V_{TH}$, $T_{RESET}$

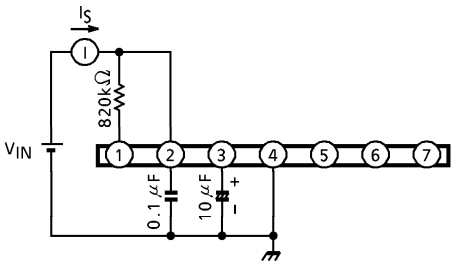



6. $V_S$

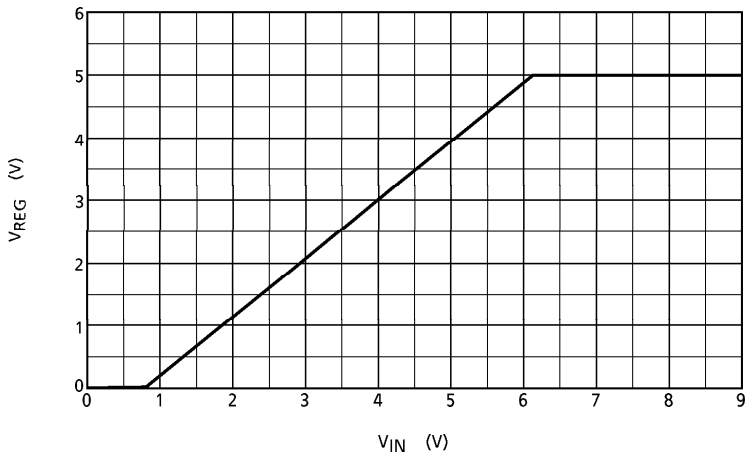



7. $I_S$

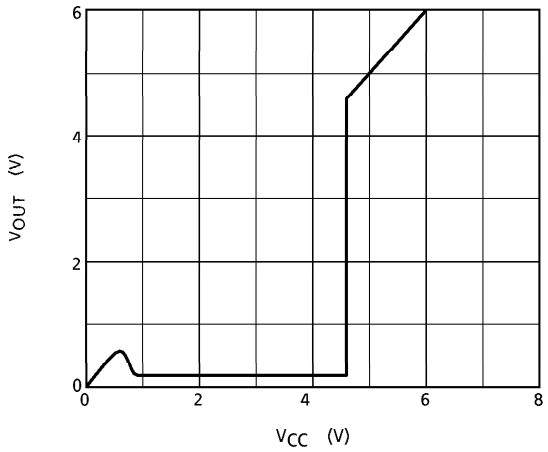


## TYPICAL CHARACTERISTICS

1. Input-Output Characteristic ($R_L = 500\Omega$)



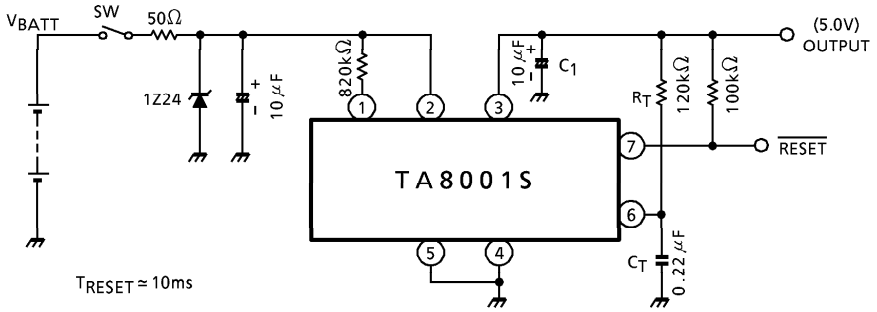

2. Reset Characteristic



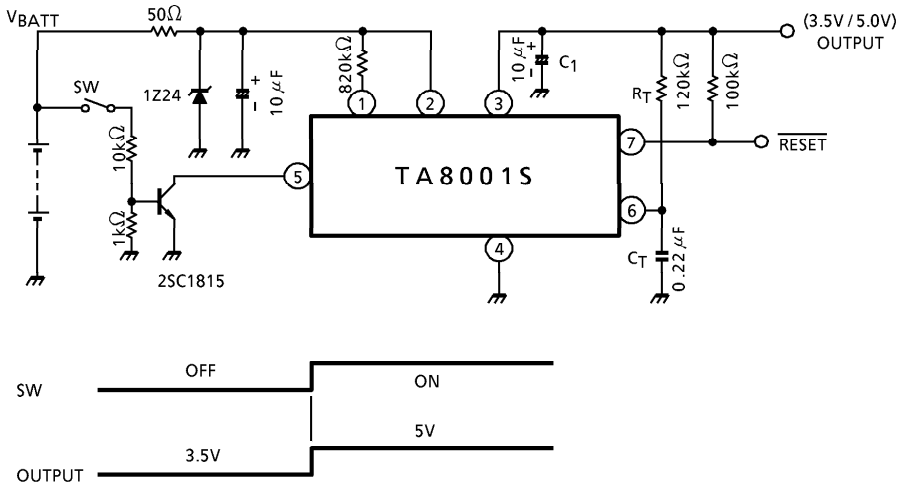
**EXAMPLE OF APPLICATION CIRCUIT**

$I_{LOAD}$ = 10mA Max. $V_{BATT}$ = 7~17V (LOAD DUMP 120Vpeak, 200ms)

1. 5V Standard Circuit




2. Backup Circuit

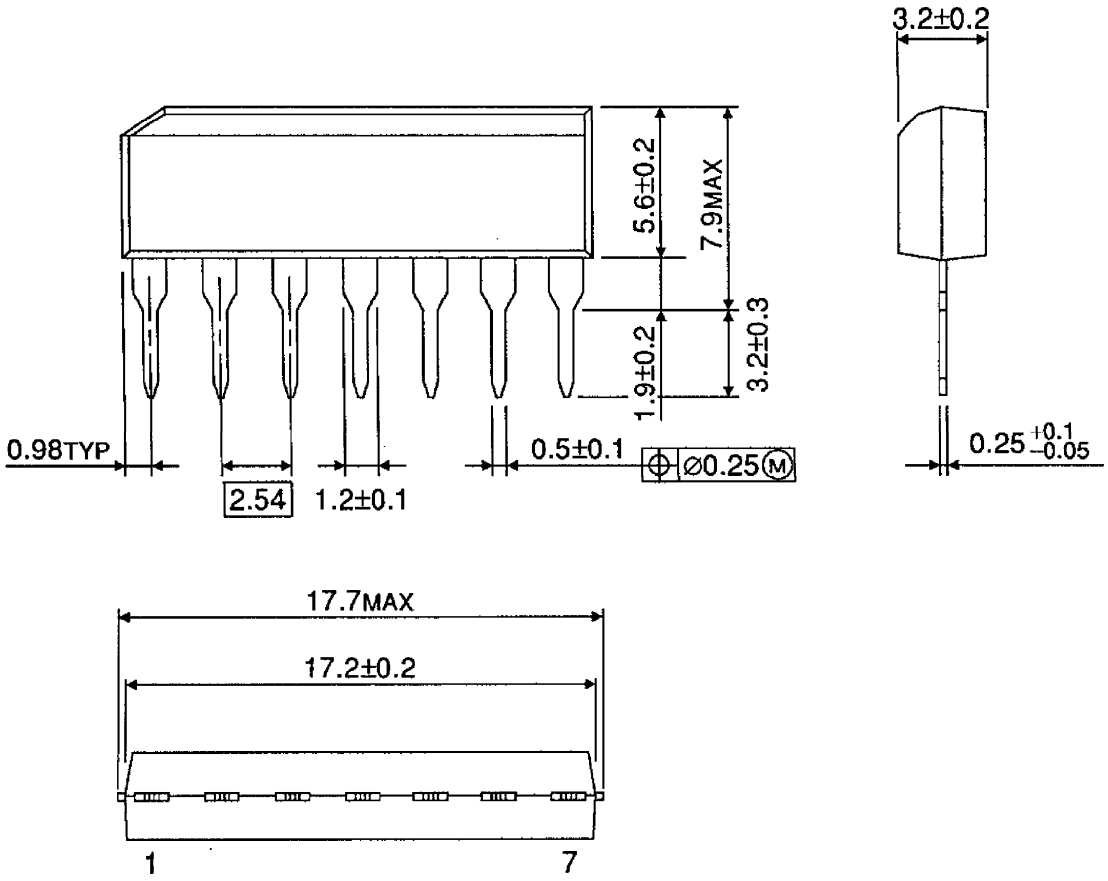



* Use an output capacitor $C_1$ which has a low temperature dependence (such as a tantalum capacitor). Connect it as close to the IC as possible.

**OUTLINE DRAWING**

SIP7-P-2.54A

Unit : mm




Weight : 0.7g (Typ.)