

**TOSHIBA****TA8002S/AS**

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

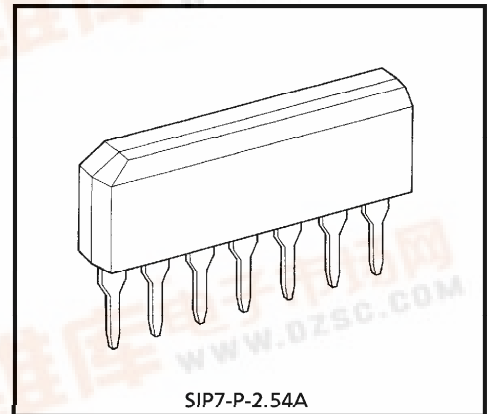
# TA8002S, TA8002AS

## 5V VOLTAGE REGULATOR WITH RESET TIMER

The TA8002S is an IC specially designed for automotive microcomputer systems. It produces an output voltage of  $5 \pm 0.5V$  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.

The TA8002AS produces an output voltage of  $5 \pm 0.25V$ .



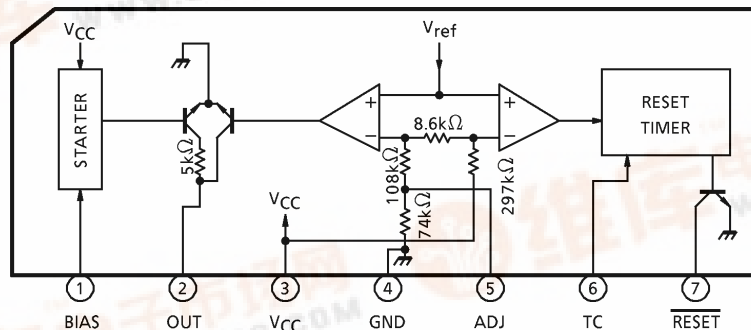
SIP7-P-2.54A

Weight : 0.7g (Typ.)

### FEATURES

- Accurate output :  $5 \pm 0.5V$  (TA8002AS :  $5 \pm 0.25V$ )
- Standby output : 3.5V
- Low bias current :  $150\mu A$  (Typ.)
- Power-on reset timer
- Operating temperature range : from  $-40$  to  $85^\circ C$
- Wide operating voltage range : 40V (max.)
- Small SIP-7 pin

### BLOCK DIAGRAM AND PIN LAYOUT



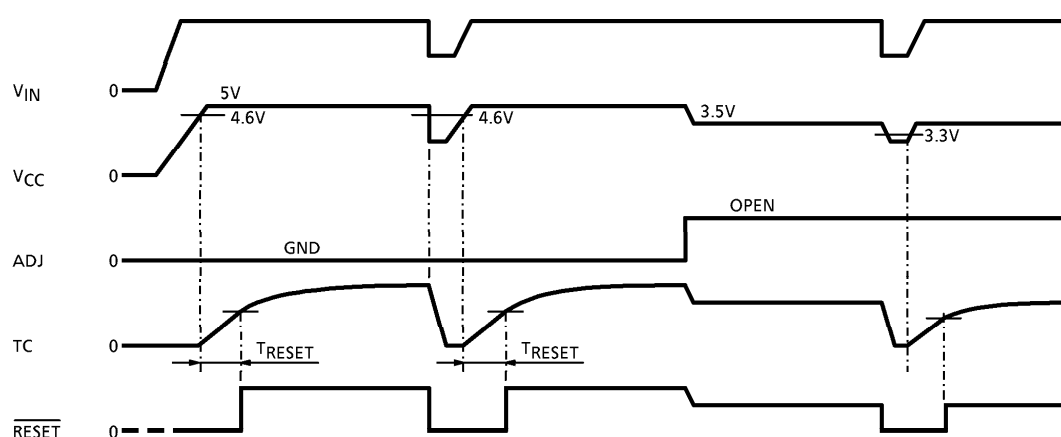
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## PIN DESCRIPTION

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 : $I_{OUT}(\text{pin } 1) \geq 30 \times (V_{IN} - 0.7) / (200 + R_1) \text{ (mA)}$ where $R_1$ is the external resistance attached to pin 1 (k $\Omega$ ). When $V_{CC}$ rises above 2.7V, the starting current is absorbed in the internal circuit ; instead, the output current OUT is supplied via $V_{CC}$ .									
2	OUT	Connected to the base of an external PNP transistor so that the output voltage is stabilized.									
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 $V_{CC}$ . <table border="1"> <thead> <tr> <th>Mode</th><th>ADJ Pin</th><th>Output Voltage <math>V_{REG}</math></th></tr> </thead> <tbody> <tr> <td>Standby</td><td>OPEN</td><td>3.5V</td></tr> <tr> <td>Normal</td><td>GND</td><td>5.0V</td></tr> </tbody> </table>	Mode	ADJ Pin	Output Voltage $V_{REG}$	Standby	OPEN	3.5V	Normal	GND	5.0V
Mode	ADJ Pin	Output Voltage $V_{REG}$									
Standby	OPEN	3.5V									
Normal	GND	5.0V									
6	TC	Time setting pin for reset timer									
7	$\overline{\text{RESET}}$	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 <sub>IN</sub>	40	V
Output Current	I <sub>OUT1</sub>	0.5	mA
	I <sub>OUT2</sub>	1	mA
Output Voltage	V <sub>OUT1</sub>	40	V
	V <sub>OUT2</sub>	16	V
Power Dissipation	P <sub>D</sub>	500	mW
Operating Temperature	T <sub>opr</sub>	-40~85	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C
Lead Temperature-time	T <sub>sol</sub>	260 (10s)	°C

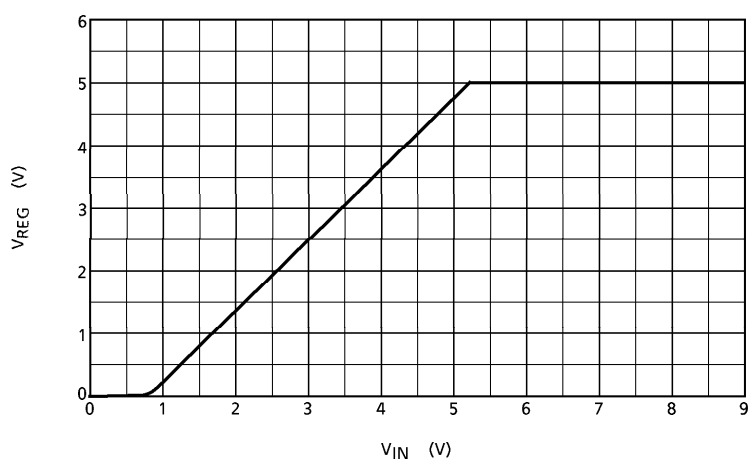
Note : V<sub>IN</sub> : BIAS input  
I<sub>OUT1</sub>, V<sub>OUT1</sub> : OUT output  
I<sub>OUT2</sub>, V<sub>OUT2</sub> : RESET output

ELECTRICAL CHARACTERISTICS (V<sub>IN</sub> = 7 to 17V, Ta = -40 to 85°C, I<sub>LOAD</sub> = 5mA)

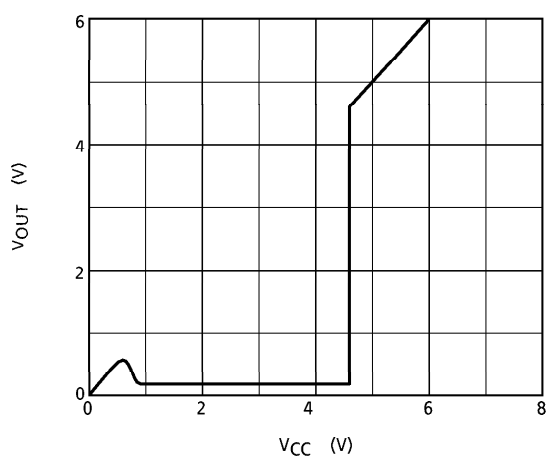
CHARACTERISTIC	SYMBOL	PIN	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V <sub>REG</sub>	V <sub>CC</sub>	1	—	TA8002S	4.5	5.0	5.5
			1		TA8002AS	4.75	5.0	5.25
Line Regulation	—	V <sub>CC</sub>	—	V <sub>IN</sub> = 7~40V	—	0.1	0.5	%
Load Regulation	—	V <sub>CC</sub>	—	I <sub>LOAD</sub> = 2~10mA	—	0.1	0.5	%
Temperature Coefficient	—	V <sub>CC</sub>	—	—	—	0.01	—	% / °C
Output Voltage	V <sub>OL</sub>	RESET	2	I <sub>OL</sub> = 300μA	—	—	0.4	V
Output Leakage Current	I <sub>LEAK</sub>	RESET	3	V <sub>OUT</sub> = 10V	—	—	5	μA
Input Current	I <sub>IN</sub>	TC	4	V <sub>IN</sub> = 0~V <sub>REG</sub>	-2	—	2	μA
Threshold Voltage	V <sub>TH</sub>	TC	5	TC : Low to High	—	1.7	—	V
Reset Detect Voltage	—	V <sub>CC</sub>	5	V <sub>REG</sub> = 5V	—	4.6	—	V
Standby Voltage	V <sub>S</sub>	V <sub>CC</sub>	6	—	3.1	3.5	3.9	V
Standby Current	I <sub>S</sub>	V <sub>CC</sub>	7	V <sub>IN</sub> = 14V	—	150	300	μA
Reset Timer	T <sub>RESET</sub>	RESET	5	—	—	0.4 × C <sub>TRT</sub>	—	—

## TYPICAL CHARACTERISTICS

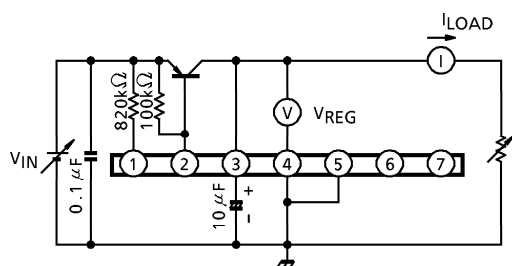
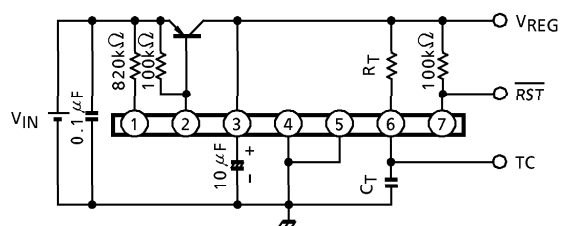
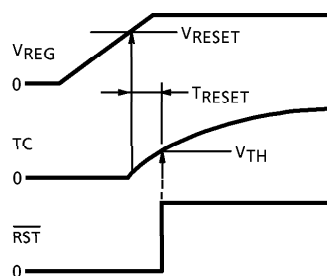
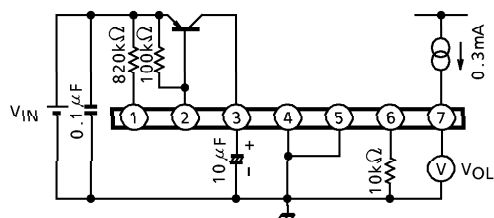
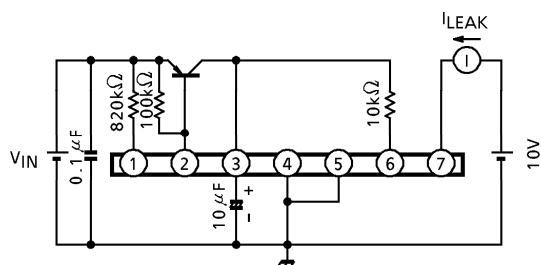
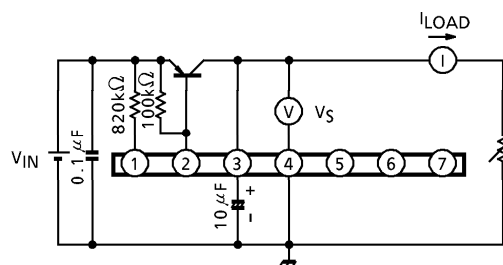
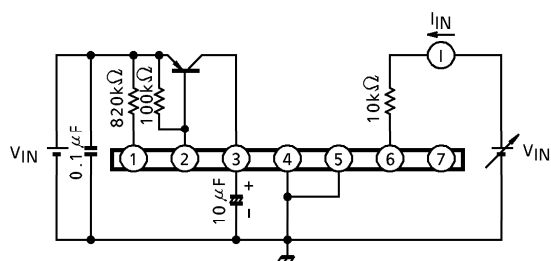
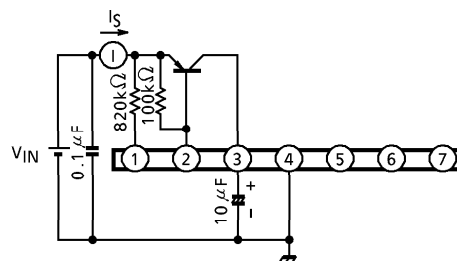
1. Input-Output Characteristic ( $R_L = 500\Omega$ , external transistor 2SA817A)



2. Reset Characteristic



## TEST CIRCUIT

1.  $V_{REG}$ 5.  $V_{RESET}$ ,  $V_{TH}$ ,  $T_{RESET}$ 2.  $V_{OL}(\overline{RESET})$ 3.  $I_{LEAK}(\overline{RESET})$ 6.  $V_S$ 4.  $I_{IN}(TC)$ 7.  $I_S$ 

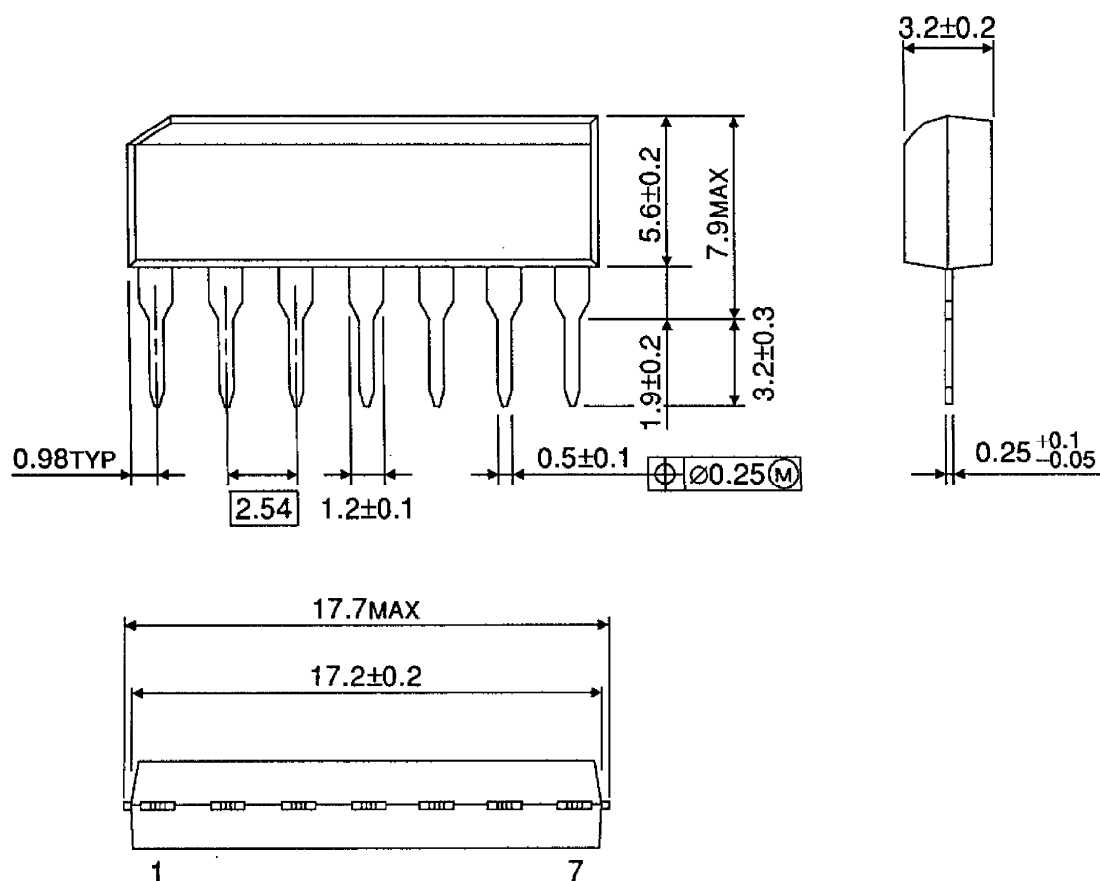
$I_{LOAD} = 10mA$  Max.  $V_{BATT} = 6 \sim 17V$  (LOAD DUMP 120Vpeak, 200ms)

The diagram shows a voltage regulator circuit using a TA8002S integrated circuit. The input voltage is  $V_{BATT}$ , which passes through a switch (SW) and a  $50\Omega$  resistor. A  $1230$  diode is connected in parallel with the input. The input voltage is also labeled  $V_{IN}$ . The TA8002S chip has pins 1, 2, 3, 4, 5, 6, and 7. Pin 1 is connected to  $V_{IN}$  through an  $820k\Omega$  resistor. Pin 2 is connected to the base of a Darlington transistor through a  $100k\Omega$  resistor. Pin 3 is connected to the emitter of the Darlington transistor through a  $10\mu F$  capacitor. The Darlington transistor's emitter is connected to ground. The output voltage is  $V_{REG}$ . A  $120k\Omega$  resistor ( $R_T$ ) is connected between the output and pin 6. A  $100k\Omega$  resistor is connected between the output and the RESET signal. The RESET signal is also connected to pin 7. A  $0.22\mu F$  capacitor ( $C_T$ ) is connected between pin 6 and ground. The TA8002S chip is labeled with  $T_{RESET} \approx 10ms$ .

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## OUTLINE DRAWING SIP7-P-2.54A

Unit : mm



Weight : 0.7g (Typ.)