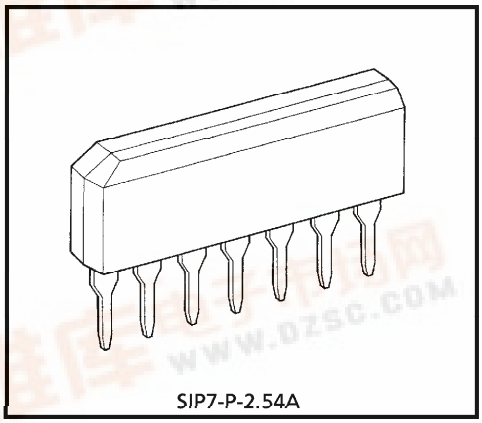
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

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 ± 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 ± 0.25V.



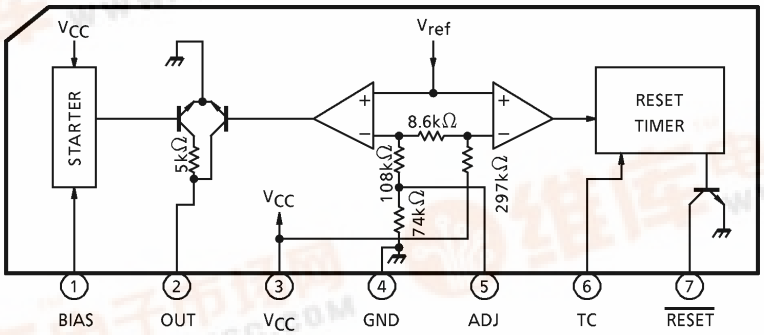
SJP7-P-2.54A

Weight : 0.7g (Typ.)

FEATURES

- Accurate output : 5 ± 0.5V (TA8002AS : 5 ± 0.25V)
- Standby output : 3.5V
- Low bias current : 150μA (Typ.)
- Power-on reset timer
- Operating temperature range : from −40 to 85°C
- Wide operating voltage range : 40V (max.)
- Small SIP-7 pin

BLOCK DIAGRAM AND PIN LAYOUT



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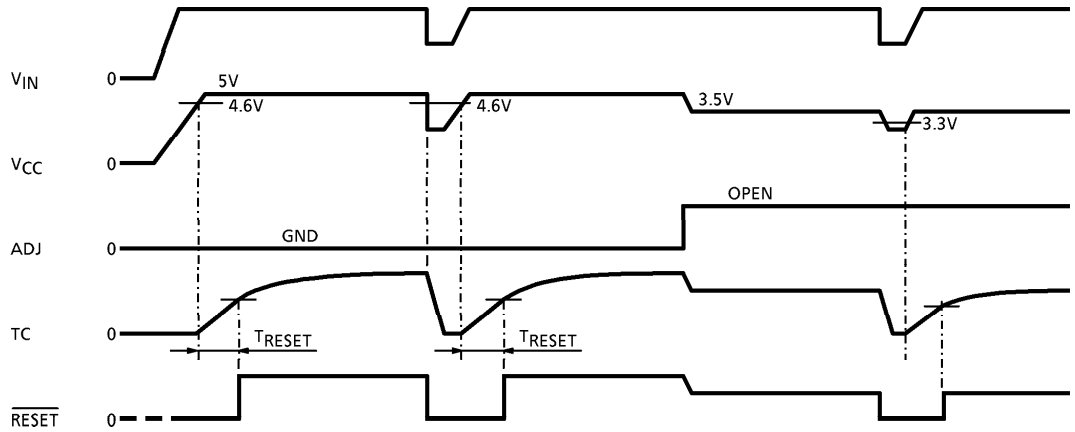
PIN DESCRIPTION

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} (pin 1) $\geqq 30 \times (V_{IN} - 0.7) / (200 + R_1)$ (mA) where R_1 is the external resistance attached to pin 1 (kΩ). 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}.

Mode	ADJ Pin	Output Voltage V_{REG}
Standby	OPEN	3.5V
Normal	GND	5.0V

6	TC	Time setting pin for reset timer
7	$\overline{RESET}$	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}	40	V
Output Current	I_{OUT1}	0.5	mA
	I_{OUT2}	1	mA
Output Voltage	V_{OUT1}	40	V
	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

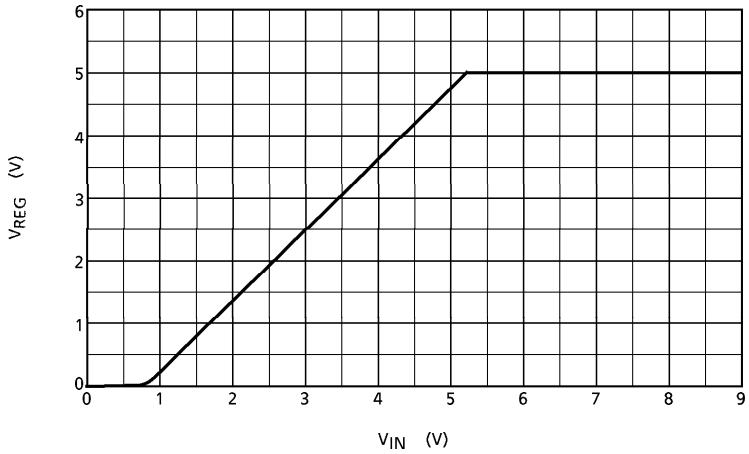
Note : V_{IN} : BIAS input
I_{OUT1}, V_{OUT1} : OUT output
I_{OUT2}, V_{OUT2} : $\overline{RESET}$ output

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

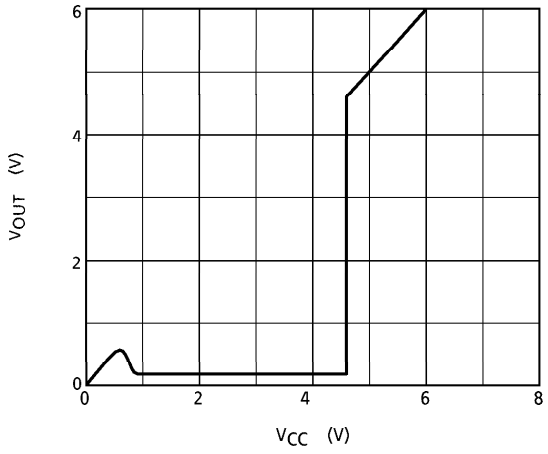
CHARACTERISTIC	SYMBOL	PIN	TEST CIR-CUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{REG}	V_{CC}	1	—	TA8002S	4.5	5.0	5.5	V
			1		TA8002AS	4.75	5.0	5.25	
Line Regulation	—	V_{CC}	—	V_{IN} = 7~40V		—	0.1	0.5	%
Load Regulation	—	V_{CC}	—	I_{LOAD} = 2~10mA		—	0.1	0.5	%
Temperature Coefficient	—	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}	5	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	—		—	$0.4 \times C_T R_T$	—	—

TYPICAL CHARACTERISTICS

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

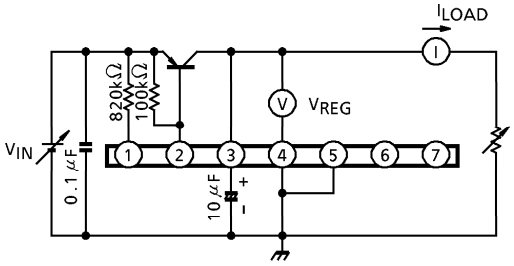


2. Reset Characteristic

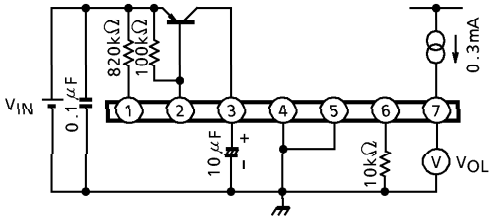


TEST CIRCUIT

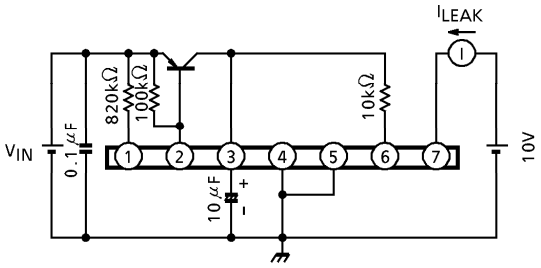
1. V_{REG}



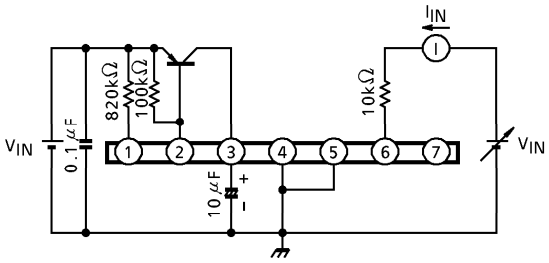
2. V_{OL} ($\overline{RESET}$)



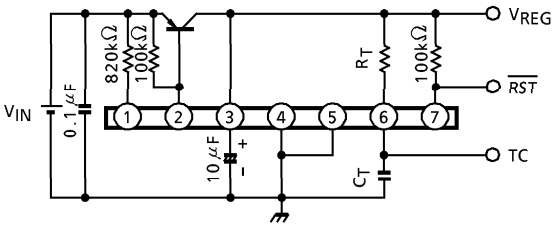
3. I_{LEAK} ($\overline{RESET}$)

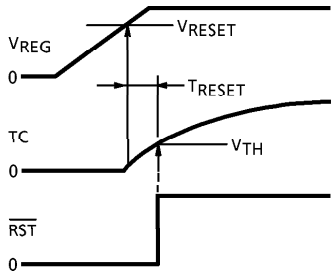


4. I_{IN} (TC)

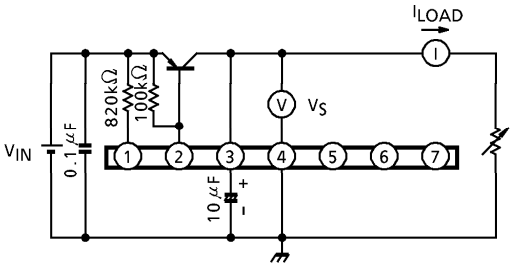


5. V_{RESET}, V_{TH}, T_{RESET}

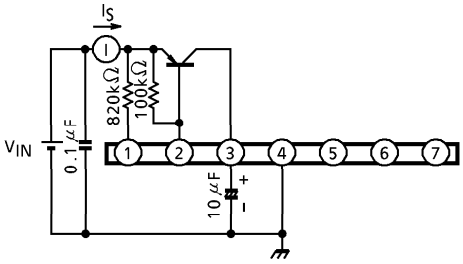




6. V_S



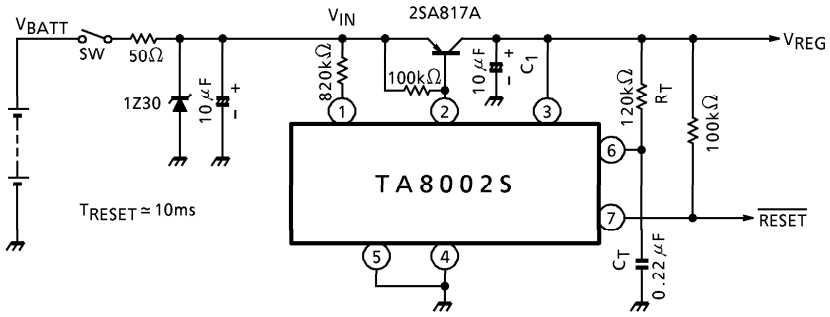
7. I_S



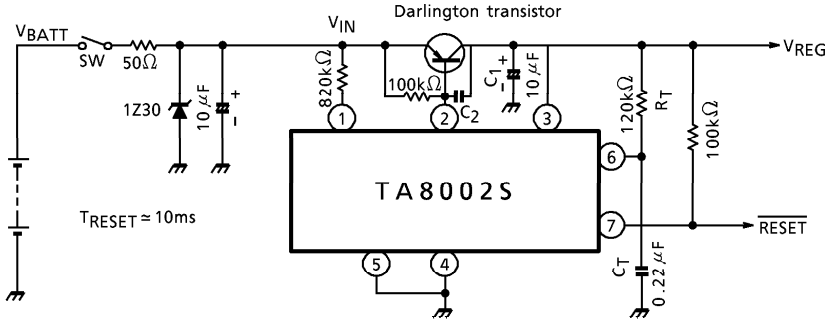
EXAMPLE OF APPLICATION CIRCUIT

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

1. 5V Standard Circuit

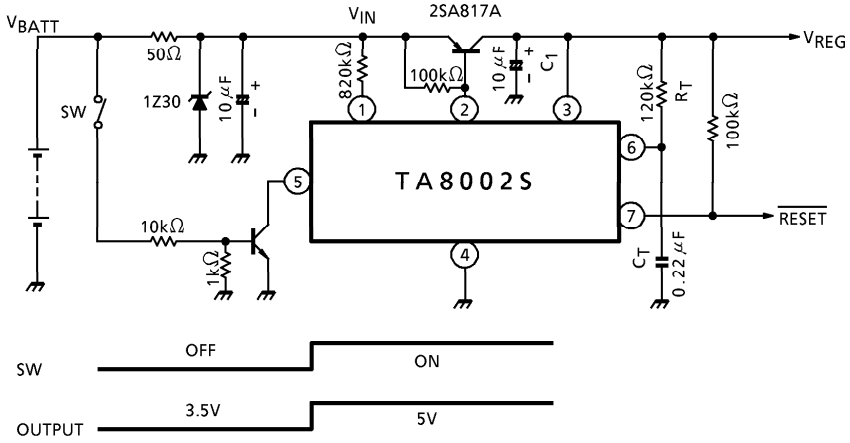


2. Application Circuit Using Darlington Transistor



* Select a C_2 value according to the working condition -- typically above 2000pF.

3. Backup Circuit

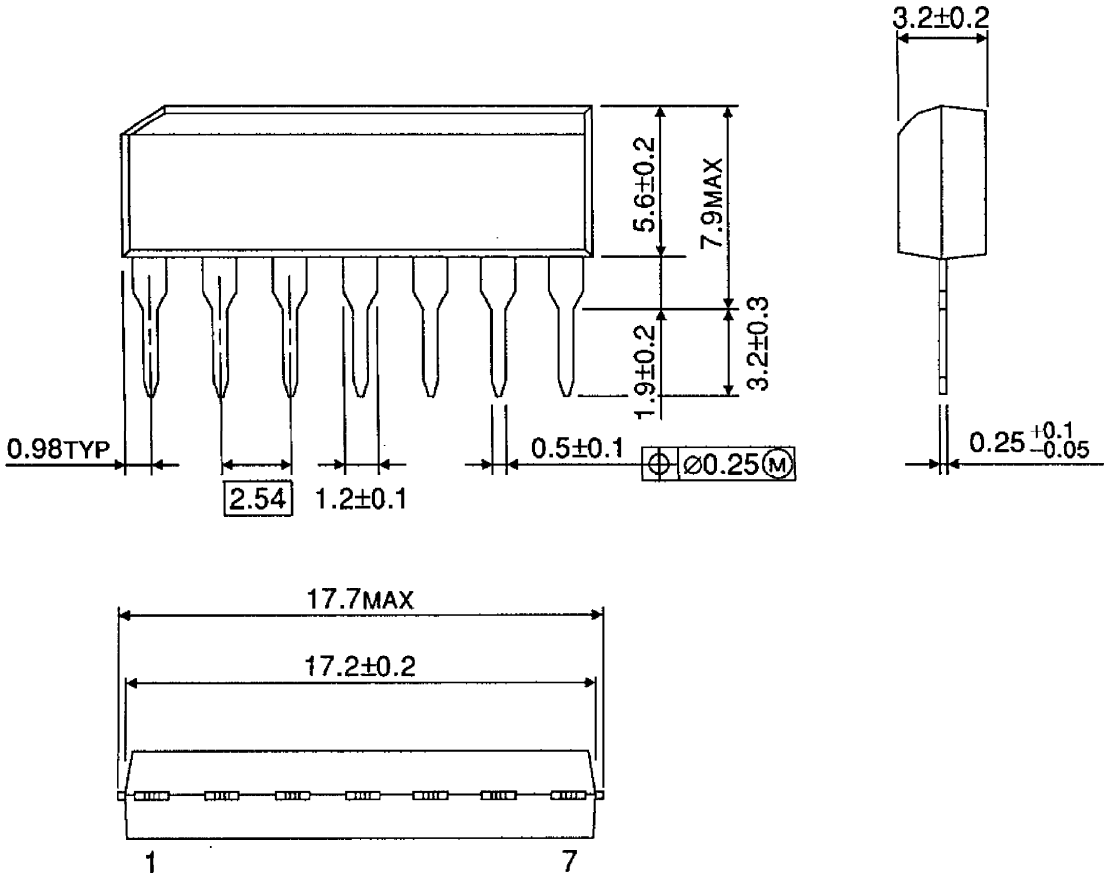


* Use an output capacitor C_1 which has a low temperature dependence (such as a tantalum capacitor). Connect it as close to the IC as possible.

OUTLINE DRAWING

SIP7-P-2.54A

Unit : mm



Weight : 0.7g (Typ.)