TOSHIBA TA8005S

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8005S

5V VOLTAGE REGULATOR WITH WATCHDOG TIMER

The TA8005S is an IC specially designed for microcomputer systems. It incorporates a highly accurate constant-voltage power supply (5 ± 0.25V) and various system reset functions. For system reset, it monitors the output voltage of $V_{REG} \times 85\%$ and has a watchdog timer which can self-diagnose the microcomputer system so that program runaway can be prevented. Since its bias current is as small as 1.4mA (max.), it can

be connected directly to an automotive battery.

FEATURES

: 5 ± 0.25V Accurate output Low bias current : 1.4mA (max.)

Power-on reset timer incorporated

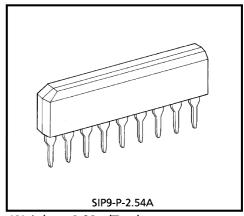
Watchdog timer incorporated

 Wide operating voltage range : 40V (max.)

• Operating temperature range : from -40 to 85°C

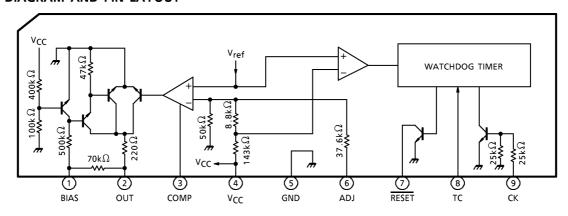
Output voltage adjusting pin attached

Small SIP-9 pin



Weight: 0.92g (Typ.)

BLOCK DIAGRAM AND PIN LAYOUT



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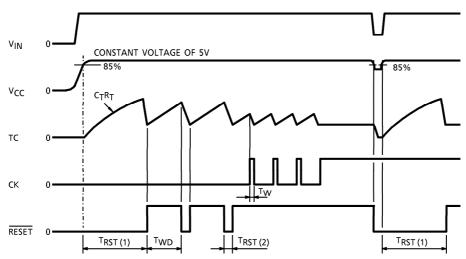
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PIN DESCRIPTION

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. When V_{CC} rises above 3.0V, the starting current is absorbed in the internal circuit; instead, I_{OUT} is supplied via V_{CC} .
2	OUT	Connected to the base of an external PNP transistor so that the output voltage is stabilized. Power supply design suitable for particular load capacities is thus possible. Since the recommended maximum IOUT is 5mA, an output current of 300mA is assured if the external transistor has an HFE of 60 or more.
3	COMP	Phase compensation pin for output stabilization
4	VCC	Power supply pin for internal circuit. The output voltage can also be detected at this pin.
5	GND	Grounded
6	ADJ	Output voltage adjusting pin. The voltage will increase when a resistor is inserted between ADJ and GND. It will reduce when a resistor is inserted between ADJ and VCC. It will become 10V when ADJ and GND are directly connected.
7	RESET	 NPN transistor open-collector output. (1) The signal goes low when the output drops below 85% of the specified level. (2) The pin supplies a reset signal determined by the CR combination connected to the TC pin. (3) The pin supplies reset pulses intermittently if no clock is given to the CK pin. This function is useful when the IC is used as a watchdog timer for a microcomputer system.
8	TC	Time setting pin for the reset and watchdog timers
9	СК	Input pin for watchdog timer. The pin is pulled up to V_{CC} if the IC is used only as a power-on reset timer.

TIMING CHART



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
CID WOLCE ENGINE	31111302		0
Input Voltage	V _{IN1}	60 (1s)	V
Input voitage	V _{IN2}	−5~V _{CC}	\ \ \
Output Current	IOUT1	10	mA
Output Current	I _{OUT2}	4] IIIA
Output Voltage	V _{OUT1}	60 (1s)	V
Output voltage	V _{OUT2}	16]
Power Dissipation	PD	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_{IN1} V_{IN2}

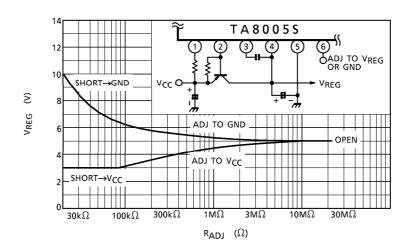
: BIAS input : CK input IOUT1, VOUT1 : OUT output IOUT2, VOUT2 : RESET output

ELECTRICAL CHARACTERISTICS ($V_{IN} = 6$ to 17V, Ta = -40 to 85°C)

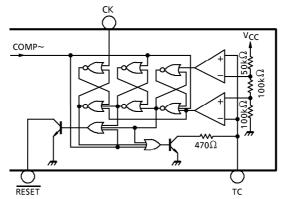
	(- 1/		•	•					
CHARACTERISTIC	SYMBOL	PIN	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	V_{REG}	Vcc	_	_	4.75	5.0	5.25	V	
Line Regulation	_	Vcc	_	V _{IN} = 6~40V	_	0.1	0.5	%	
Load Regulation	_	Vcc	_	I _{LOAD} = 1~50mA	_	0.1	0.5	%	
Temperature Coefficient	_	Vcc	_	_	_	0.01	_	% /°C	
Output Voltage	VOL	RESET	_	I _{OL} = 2mA	_	_	0.5	V	
Output Leakage Current	ILEAK	RESET	_	V _{OUT} = 10V	_	_	5	μ A	
Input Current	IN	TC	_	V _{IN} = 0~3.5V	-3	_	3	μΑ	
	VIH	TC		RESET High to Low	_	80% ×		V	
Threshold Voltage			_			V _{REG}			
Threshold voltage	VIL		_	RESET Low to High	_	40% ×			
						V _{REG}			
Input Current	I _{IN}	CK	_	V _{IN} = 5V	_	0.18	0.4	mA	
Input Voltage	VIH	CK	_	_	2	_	_	V	
Imput Voltage	V _{IL}	CK	_	_	_	_	0.5		
Reset Detect Voltage		V _{CC}	_		82% ×	85% ×	88% ×	V	
Reset Detect Voltage				_	V _{REG}	V _{REG}	V_{REG}		
Standby Current	Ις	Vcc	_	V _{IN} = 14V		0.85	1.4	mA	
Watchdog Timer	T _{WD}	RESET	_	_	0.9×	1.1 ×	1.3 ×	_	
Waterial g Timer					C _T R _T	C _T R _T	C_TR_T		
Reset Timer (1)	T _{RST (1)} RES	RESET	RESET —	_	1.3 ×	1.6×	1.9×	_]	
Meset Timer (1)		NESE!			CTRT	C _T R _T	CTRT		
Reset Timer (2)	T _{RST} (2) RESET	l	_	150×	300×	600×	_		
	T _{RST} (2)				C _T	CT	C _T		
Clock Pulse Width	TW	CK	_	_	3	_	_	μ s	

Note: Reset timer (1): Power-on reset time Reset timer (2): Watchdog reset time

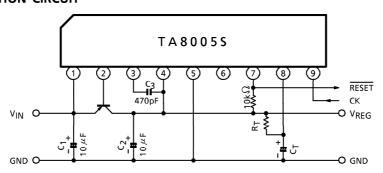
ADJ ADJUSTING RESISTOR DATA



RESET TIMER EQUIVALENT CIRCUIT



EXAMPLE OF APPLICATION CIRCUIT



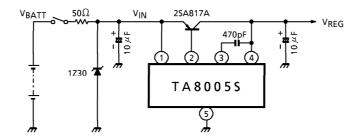
- * Cautions for Wiring
 - 1. C₁ and C₂ are for absorbing disturbance, noise, etc. Connect them as close to the IC as possible.
 - 2. C_3 is for phase compensation. Also, connect C_3 close to the IC.

120 Vpeak LOAD DUMP

Note: No protection is needed if a voltage above 60V is not applied.

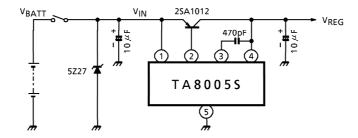
1. Low Output Current Circuit

 $I_{LOAD} = 10$ mA Max., $V_{BATT} = 6 \sim 17$ V

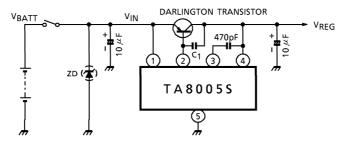


2. High Output Current Circuit

 $I_{LOAD} = 300 \text{mA} \text{ Max.}, V_{BATT} = 6 \sim 17 \text{V}$



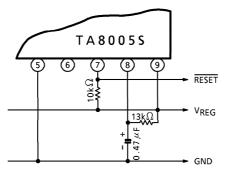
EXAMPLE OF APPLICATION CIRCUIT USING DARLINGTON TRANSISTOR



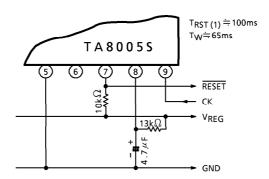
- * Insert a C₁ value according to the working condition - typically above 2000pF.
 - Insert ZD when necessary.

APPLICATION CIRCUIT OF WATCHDOG/RESET TIMER

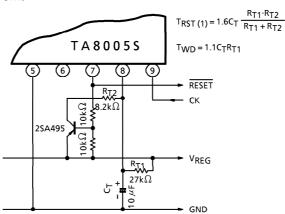
1. $T_{RST(1)} = 10 \text{ms} \cdot \cdot \cdot \cdot \cdot \cdot \text{Power-On Reset Timer}$



2. T_{RST (1)} ≒1.5T_{WD}



3. $T_{RST(1)} = 100 \text{ms}, T_{WD} = 300 \text{ms}$



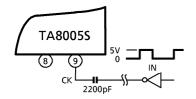
4. Recommended Conditions

PART NAME	MIN.	MAX.	UNIT
CT	0.01	100	μ F
R _T	5	100	kΩ
R _{T1}	_	100	kΩ
R _{T1} // R _{T2} (Note)	5	_	kΩ

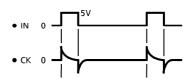
(Note : $R_{T1} // R_{T2} = (R_{T1} \times R_{T2}) / (R_{T1} + R_{T2})$

CK INPUT APPLICATION CIRCUIT

Capacitor Coupling



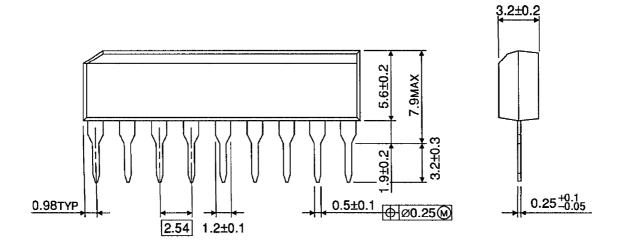
Timing Chart

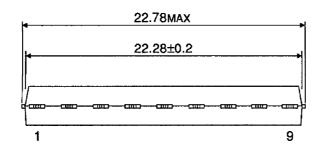


The capacitor coupling allows reset pulses to be supplied intermittently from the $\overline{\text{RESET}}$ pin whether the input level (IN) is high or low.

OUTLINE DRAWING SIP9-P-2.54A

Unit: mm





Weight: 0.92g (Typ.)