

**TOSHIBA**

**TA8007F**

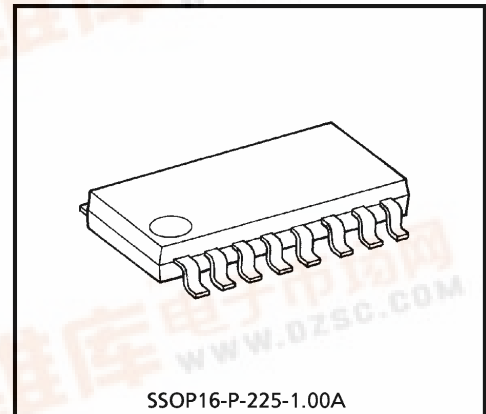
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA8007F

## 5V VOLTAGE REGULATOR WITH WATCHDOG TIMER

The TA8007F is an IC specially designed for microcomputer systems. It incorporates a highly accurate constant-voltage power supply ( $5 \pm 0.15V$ ) and various system reset functions. For system reset, it monitors the output voltage of  $V_{REG} \times 92\%$  and has a watchdog timer which can self-diagnose the microcomputer system so that program runaway can be prevented. It also has other monitor functions for checking the operation of the microcomputer system.

Since its standby current is as small as 1.2mA (Max.), it can be connected directly to an automotive battery.



SSOP16-P-225-1.00A

Weight : 0.14g (Typ.)

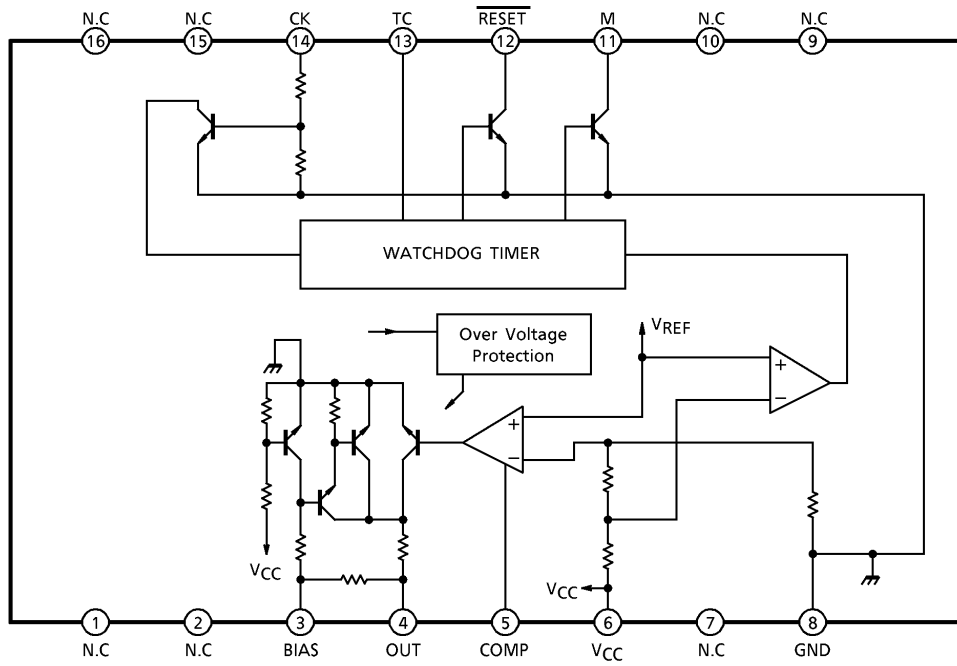
### FEATURES

- Accurate output :  $5 \pm 0.15V$
- Low standby current : 1.2mA (Max.)
- Power-on reset timer and watchdog timer incorporated, as well as reset and monitor outputs
- Wide operating voltage range : 35V (Max.)
- Wide operating temperature range : from  $-40$  to  $105^{\circ}C$
- Flat package SSOP 16 pin.

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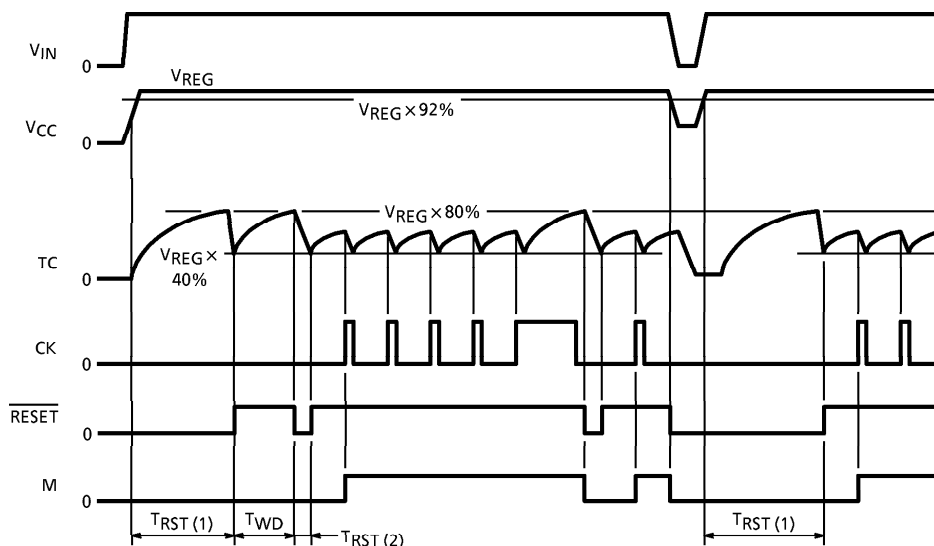
**BLOCK DIAGRAM AND PIN LAYOUT**



## PIN DESCRIPTION

PIN No.	SYMBOL	DESCRIPTION
1, 2	N.C	Not connected.
3	BIAS	Power supply pin for the start-up circuit which activates the overvoltage detection circuit and the 5V power supply.
4	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 $I_{OUT}$ is 5mA, an output current of 300mA is assured if the external transistor has an $h_{FE}$ of 60 or more.
5	COMP	Phase compensation pin for output stabilization.
6	$V_{CC}$	Power supply pin for the power supply section and reset timers. The output voltage $V_{REG}$ can also be detected at this pin.
7	N.C	Not connected.
8	GND	Grounded
9, 10	N.C	Not connected.
11	M	NPN transistor open-collector output This signal is low while pulses come from pin 12 ( $\overline{RESET}$ output) ; it becomes high when pulses no longer come from pin 12. This function can be used for monitoring the operation of the microcomputer system.
12	$\overline{RESET}$	NPN transistor open-collector output. (1) The signal goes low when the output voltage drops below 92%. (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.
13	TC	Time setting pin for the reset and watchdog timers. The resistor $R_T$ leads to $V_{CC}$ , and the capacitor $C_T$ leads to GND.
14	CK	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.
15, 16	N.C	Not connected.

TIMING CHART



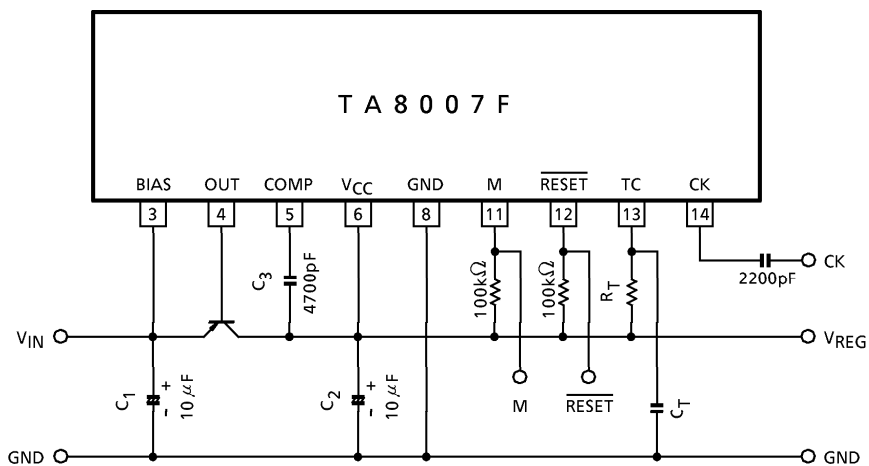
MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	PIN	RATING	UNIT
Input Voltage	$V_{IN1}$	BIAS	60 (1s)	V
	$V_{IN2}$	CK	-5~ $V_{CC}$	
Output Current	$I_{OUT1}$	OUT	10	mA
	$I_{OUT2}$	$\overline{\text{RESET}}$ , M	2	
Output Voltage	$V_{OUT1}$	OUT	60 (1s)	V
	$V_{OUT2}$	$\overline{\text{RESET}}$	16	
Power Dissipation	$P_D$	—	600	mW
Operating Temperature	$T_{opr}$	—	-40~105	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	—	-55~150	$^\circ\text{C}$
Lead Temperature-time	$T_{sol}$	—	260 (10s)	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ( $V_{IN} = 6 \sim 18V$ ,  $I_{LOAD} = 10mA$ ,  $T_a = -40 \sim 105^\circ C$ )

CHARACTERISTIC	SYMBOL	PIN	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_{REG}$	$V_{CC}$	—	—	4.85	5.0	5.15	V
Line Regulation	$V_{LINE}$	$V_{CC}$	—	$V_{IN} = 5.5 \sim 35V$	—	0.1	0.5	%
Load Regulation	$V_{LOAD}$	$V_{CC}$	—	$I_{LOAD} = 1 \sim 50mA$	—	0.1	0.5	%
Temperature Coefficient	—	$V_{CC}$	—	—	—	0.01	—	% / °C
Output Voltage	$V_{OL}$	$\overline{RESET}$ , M	—	$I_{OL} = 1mA$	—	—	0.5	V
Output Leakage Current	$I_{LEAK}$	$\overline{RESET}$ , M	—	$V_{OUT} = 10V$	—	—	5	$\mu A$
Input Current	$I_{IN}$	TC	—	$V_{IN} = 0 \sim 3.5V$	-3	—	3	$\mu A$
Threshold Voltage	$V_{IH}$	TC	—	—	—	$V_{REG} \times 80\%$	—	V
	$V_{IL}$		—	—	—	$V_{REG} \times 40\%$	—	
Input Current	$I_{IN}$	CK	—	$V_{IN} = 5V$	—	0.14	0.3	mA
Input Voltage	$V_{IH}$	CK	—	—	2	—	—	V
	$V_{IL}$		—	—	—	—	0.5	
Reset Detect Voltage	—	$V_{CC}$	—	—	$V_{REG} \times 89\%$	$V_{REG} \times 92\%$	$V_{REG} \times 95\%$	V
Standby Current	$I_{ST}$	$V_{CC}$	—	$V_{IN} = 14V$	—	0.6	1.2	mA
Overvoltage Detection	$V_{SD}$	BIAS	—	—	—	40	—	V
Watchdog Timer	$T_{WD}$	$\overline{RESET}$	—	—	$0.9 \times C_{TRT}$	$1.1 \times C_{TRT}$	$1.3 \times C_{TRT}$	—
Reset Timer (1)	$T_{RST} (1)$	$\overline{RESET}$	—	—	$1.3 \times C_{TRT}$	$1.6 \times C_{TRT}$	$1.9 \times C_{TRT}$	—
Reset Timer (2)	$T_{RST} (2)$	$\overline{RESET}$	—	—	$300 \times C_T$	$700 \times C_T$	$1500 \times C_T$	—
Clock Pulse Width	$T_W$	CK	—	—	3	—	—	$\mu S$

EXAMPLE OF APPLICATION CIRCUIT

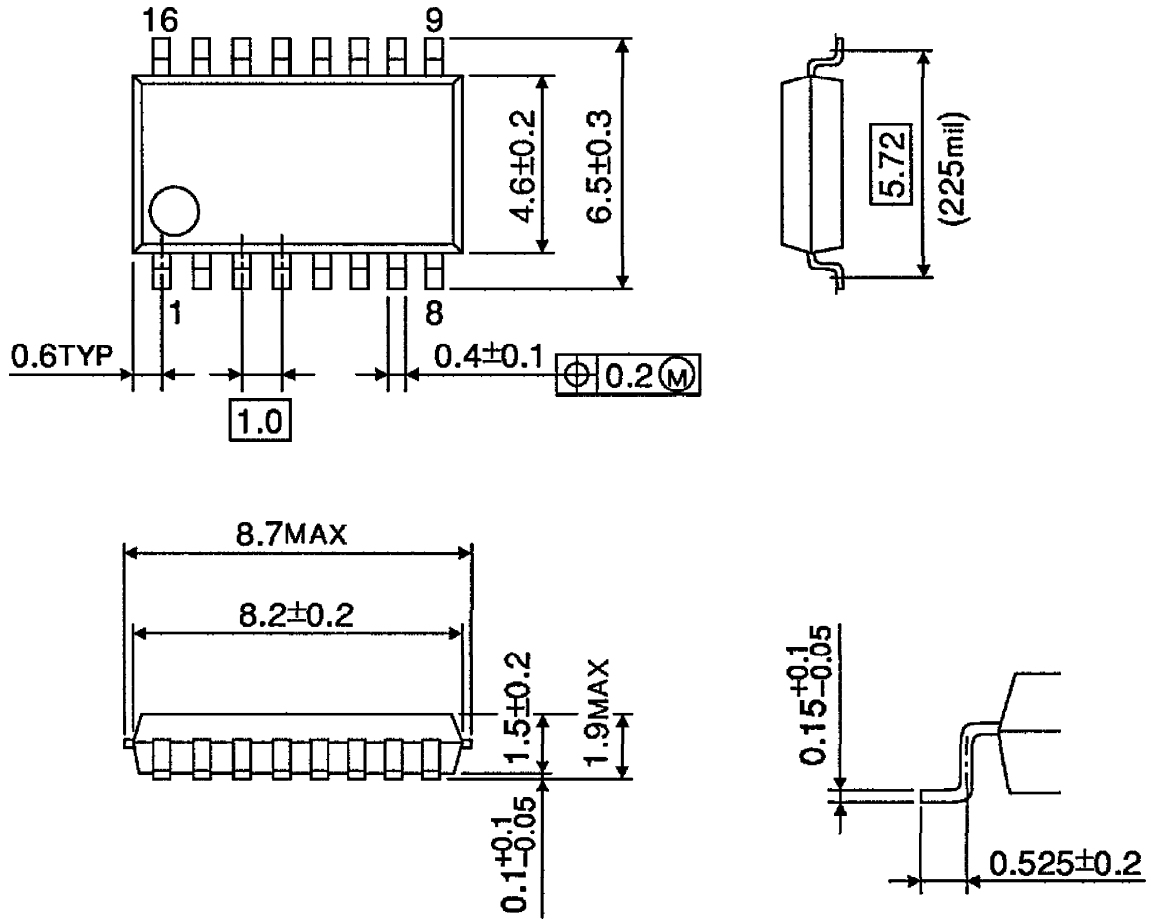


(\*) Cautions for Wiring

1.  $C_1$  and  $C_2$  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.

OUTLINE DRAWING  
SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)