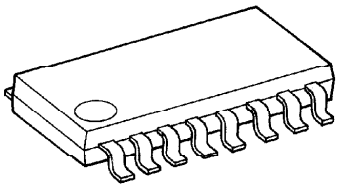
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8008F

VOLTAGE REGULATOR WITH WAKE UP TIMER

The TA8008F is designed for microcomputer systems.
It incorporates a highly accurate constant-voltage power supply (5 ± 0.15V), wake up timer which can make low current consumption of the system and various system reset function in a chip.
The wake up timer starts CPU system and etc. in periodically and decrease average current consumption.
Starting period can be set with external capacitor.
The watchdog timer works while the system is working.
The TA8008F incorporates current limiter of 600mA (Typ.), so it is possible to build the system easily without external protection circuits and detection resistors.



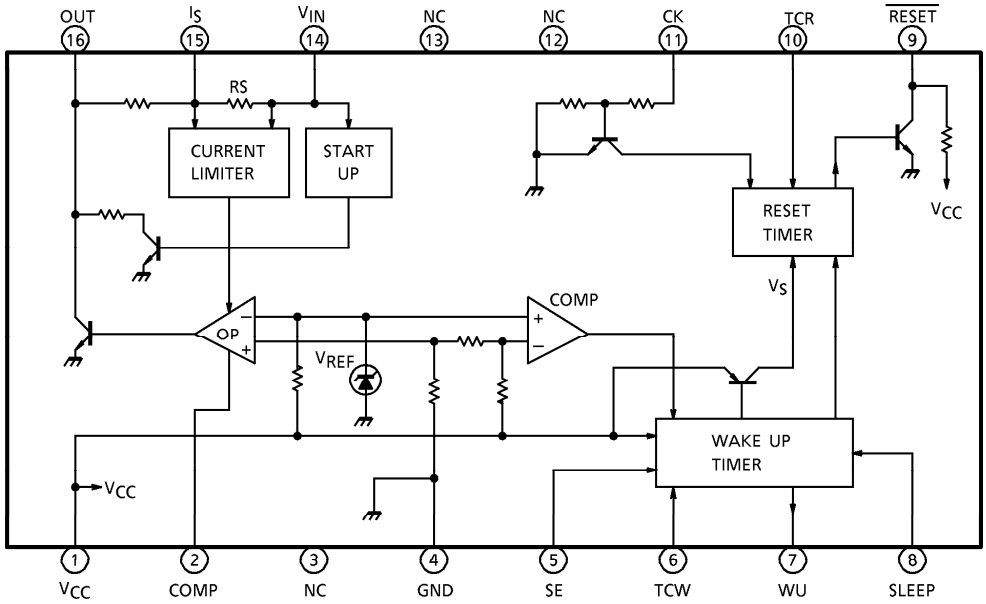
SSOP16-P-225-1.00A

Weight : 0.14g (Typ.)

FEATURES

- Accurate output : 5 ± 0.15V (Ta = −40~105°C)
- Low standby current : 0.95mA (Max.)
- Wake up timer incorporated : It is possible to set the periodical time with external capacitor.
- Reset function : Power on reset (The power on reset function can be selected for its function through the SE pin.)
  Watchdog reset
- Current limiter incorporated : 600mA (Typ.)
- External parts are a few.
- Plastic SSOP 16 Pin Package.

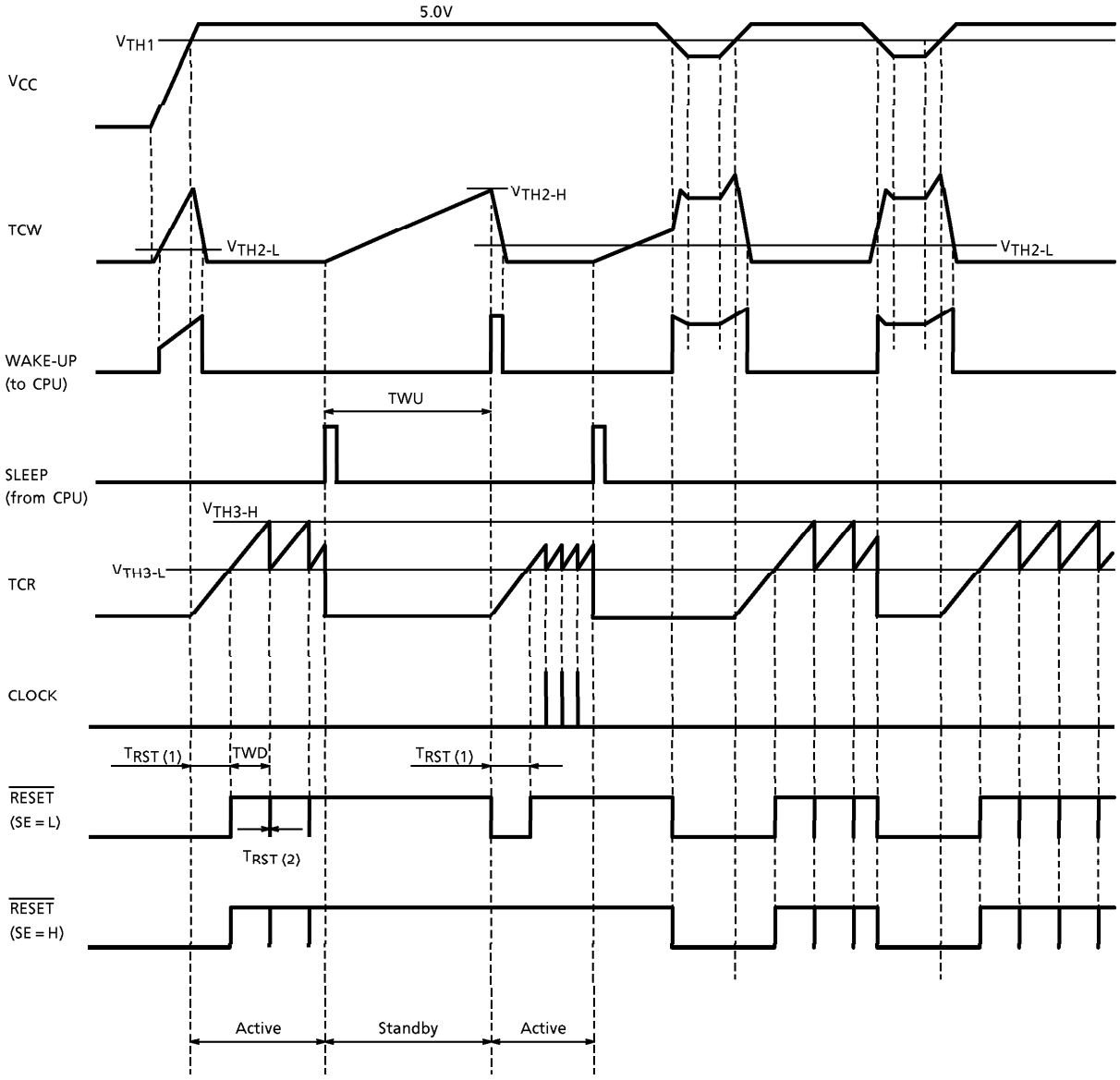
BLOCK DIAGRAM AND PIN LAYOUT



PIN DESCRIPTION

PIN No.	SYMBOL	DESCRIPTION
1	V_{CC}	5V constant-voltage pin. Power supply pin for inside circuits. The output voltage 5V is also detected.
2	COMP	Phase compensation pin for output stabilization.
3	NC	Not connected.
4	GND	Grounded.
5	SE	The power on reset function is controlled by this pin when the mode is changed active from standby. SE = H : The reset signal is output on every mode's change (standby→active). SE = L : The reset signal is output only when the power supply starts.
6	TCW	Pin for setting a time for the wake up timer. A capacitor is connected to this pin. It incorporates a 10μA (Typ.) constant-current, so external resistor is not needed. The wake up time is approximately calculated by the following formula : TWU = 400 × CW (ms) TWU : wake up time, CW : capacitor connected to 6 pin (μF)
7	WU	This pin outputs the wake up signal which starts the CPU. When 8 pin receives the sleep signal, this pin outputs wake up signal after TWU time which is set by TCW.
8	SLEEP	When the CPU goes into sleep mode, this pin receives the signal which comes from the CPU. If wake up function is not necessaly : • Connected to "L" 5V power supply and all reset timers work. • Connected to "H" Become to be standby mode.
9	$\overline{\text{RESET}}$	Power-on / watchdog timer reset pin. • Generates a reset signal which is determined by the C of the TCR pin. • Intermittently generates reset pulses if no clock is supplied to the CK pin. The $\overline{\text{RESET}}$ signal is the output from the collector of an NPN transistor with a pull-up resistor.
10	TCR	Pin for setting a time for the reset timer and watchdog timer. It connects to a resistor and capacitor. The charging and discharging are done with internal 100μA (Typ.) constnat-current and 1kΩ resistor, so external pull-up resistor and etc. are not needed.
11	CK	Clock input pin for the watchdog timer. If it is used for a power-on reset timer only, it is connected to the 9 pin ($\overline{\text{RESET}}$).
12, 13	NC	Not connected.
14	V_{IN}	Power supply pin for the current limiter and the startup circuit which turns on 5V power.
15	I_S	Detection pin for the current limiter. It incorporates current detection resistor (30mΩ) between V_{IN} and I_S. The load current exceeding 600mA activates the current limiter.
16	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 recommended maximum I_{OUT} is 8mA, an output current of 320mA is assured if the external transistor has an h_{FE} of 40 or more.

TIMING CHART



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	PIN	RATING	UNIT
Input Voltage	V_{IN1}	V_{IN}, I_S	60 (1s)	V
	V_{IN2}	CK, SLEEP	$-5 \sim V_{CC}$	
	V_{IN3}	SE	$-0.5 \sim V_{CC}$	
Output Current	I_{OUT1}	OUT	10	mA
	I_{OUT2}	WU	−1	
	I_{OUT2}	$\overline{\text{RESET}}$	2	
Output Voltage	V_{OUT1}	OUT	60 (1s)	V
	V_{OUT2}	$\overline{\text{RESET}}$	V_{CC}	
Power Dissipation	P_D	—	600	mW
Operating Temperature	T_{opr}	—	−40~105	°C
Storage Temperature	T_{stg}	—	−55~150	°C
Lead Temperature Time	T_{sol}	—	260 (10s)	°C

ELECTRICAL CHARACTERISTICS (V_{IN} = 6~18V, I_{LOAD} = 10mA, Ta = −40~105°C)

(1) DC CHARACTERISTICS

CHARACTERISTICS	SYMBOL	PIN	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{REG}	V_{CC}		4.85	5.0	5.15	V
Line Regulation		V_{CC}	V_{IN} = 5.5~40V	—	0.1	0.5	%
Load Regulation		V_{CC}	I_{LOAD} = 1~50mA	—	0.1	0.5	%
Temperature Coefficient		V_{CC}		—	0.01	—	% / °C
Input Current	I_{IN}	SE, SLEEP	V_{IN} = 0~5V	—	—	5	μA
Input Voltage	V_{IH}	SE, SLEEP		2	—	—	V
	V_{IL}			—	—	0.3	
Output Leakage Current	I_{LEAK}	$\overline{RESET}$	V_{OUT} = 5V	—	—	5	μA
		WU	V_{OUT} = 0V	−5	—	—	
Output Voltage	V_{OL}	$\overline{RESET}$	I_{OL} = 1mA	—	—	0.5	V
	V_{OH}	WU	I_{OH} = 1mA	V_{CC} − 0.5	—	—	
Input Current	I_{IN}	TCW, TCR	V_{IN} = 0~3.5V	−3	—	3	μA
Threshold Voltage	V_{TH2-H}	TCW		—	V_{REG} × 80%	—	V
	V_{TH2-L}			—	V_{REG} × 20%	—	
	V_{TH3-H}	TCR		—	V_{REG} × 80%	—	
	V_{TH3-L}			—	V_{REG} × 40%	—	
Input Current	I_{IN}	CK	V_{IN} = 5V	—	0.17	0.35	mA
Input Voltage	V_{IH}	CK		2	—	—	V
	V_{IL}			—	—	0.5	
Reset Detect Voltage	V_{TH1}			V_{REG} × 89%	V_{REG} × 92%	V_{REG} × 95%	
Standby Current	I_{ST}	V_{CC}		—	0.5	0.95	mA
Power Supply Current	I_{CC}	V_{CC}		—	2.8	5.0	mA
Current Limiter Detection	I_{LMT}	I_S		—	600	—	mA

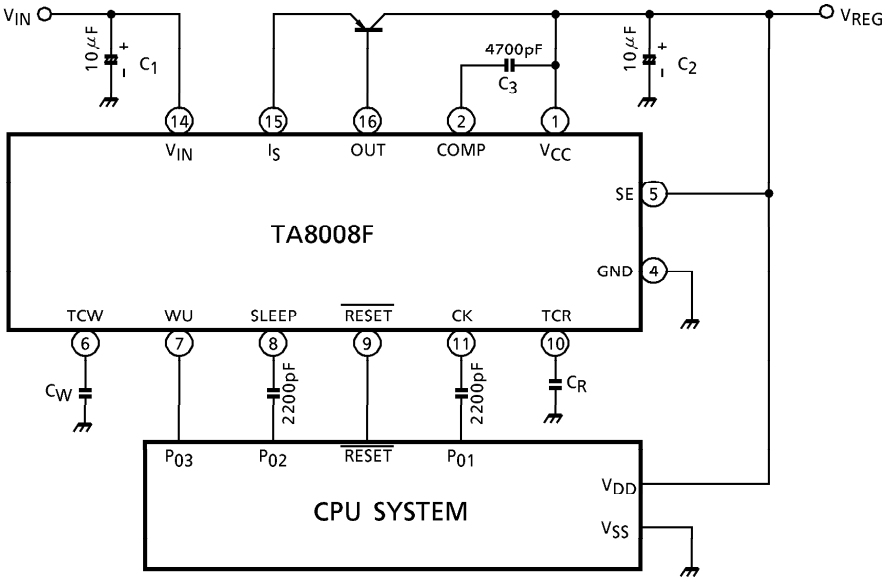
(2) AC CHARACTERISTICS

CHARACTERISTICS	SYMBOL	PIN	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Wake Up Timer	TWU	WU		275 × CW	400 × CW	580 × CW	ms
Watchdog Timer	TWD	$\overline{RESET}$		13 × CR	20 × CR	30 × CR	
Reset Timer (1)	$T_{RST(1)}$			10 × CR	16 × CR	24 × CR	
Reset Timer (2)	$T_{RST(2)}$			0.3 × CR	0.7 × CR	1.5 × CR	
Sleep Pulse Width	T_{SLEEP}	SLEEP		3	—	—	μs
Clock Pulse Width	TW	CK		3	—	—	

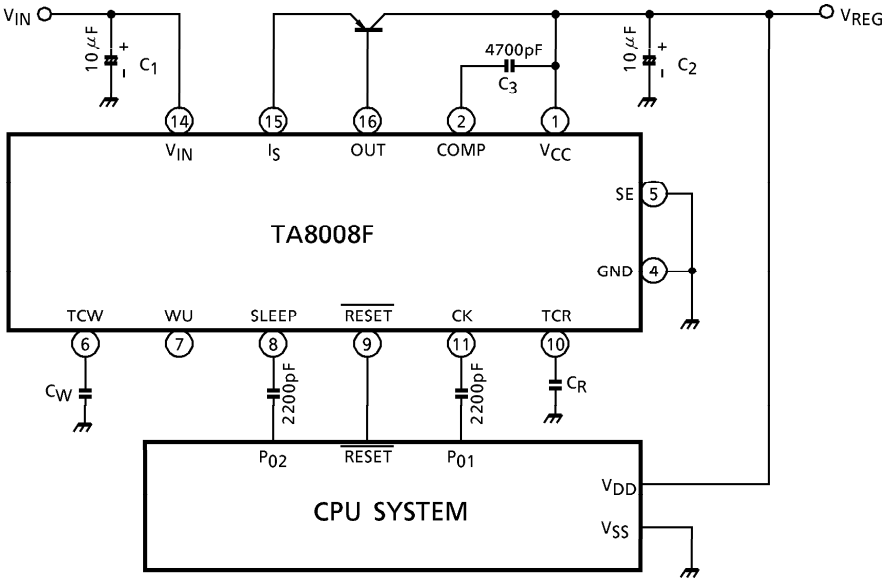
* UNIT ; CR, CW (μF)

EXAMPLE OF APPLICATION CIRCUIT

1. Example for using the wake up signal to start the CPU system.



2. Example for using the reset signal to start the CPU system.

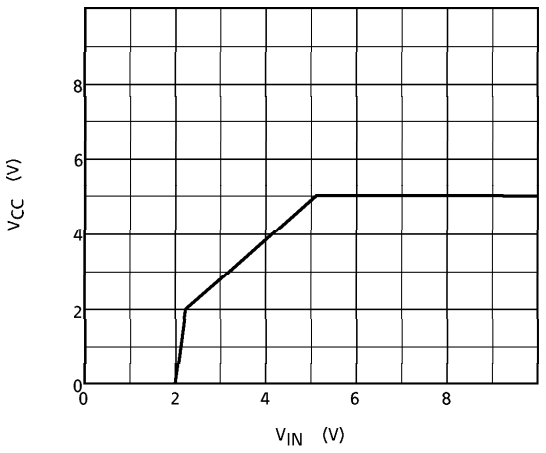


(*) Cautions for wiring

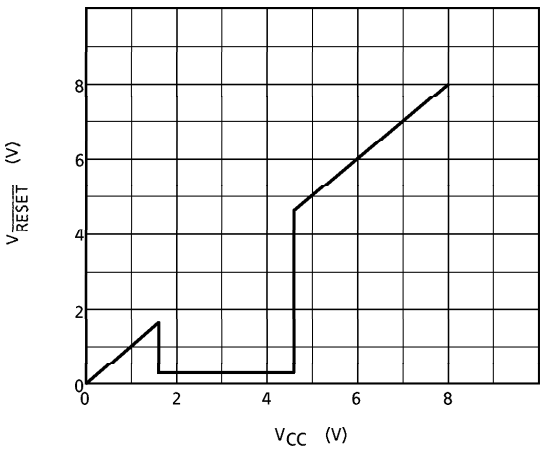
1. C_1 and C_2 are for absorbing disturbance, noise, etc. Connect them as close as the IC as possible.
2. C_3 is for phase compensation. Also, connect C_3 close to the IC.

TYPICAL CHARACTERISTIC

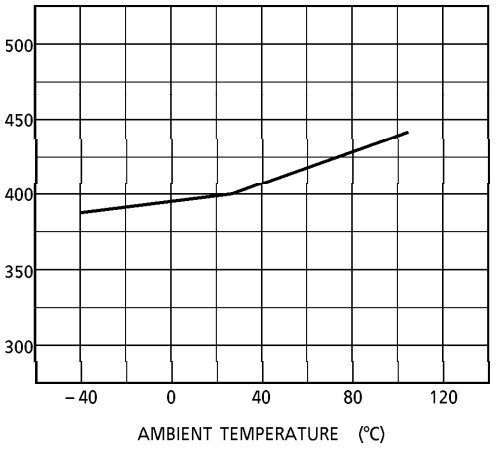
INPUT – OUTPUT CHARACTERISTIC (RL = 500Ω)



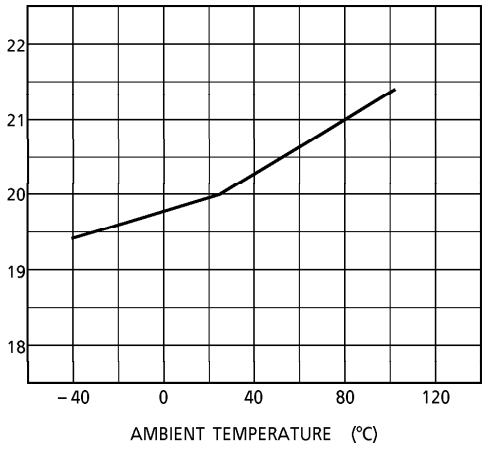
RESET OUTPUT CHARACTERISTIC



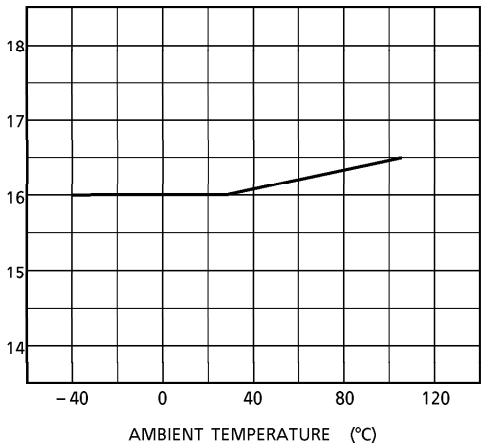
TWU TIME COEFFICIENT CHARACTERISTIC



TWD TIME COEFFICIENT CHARACTERISTIC



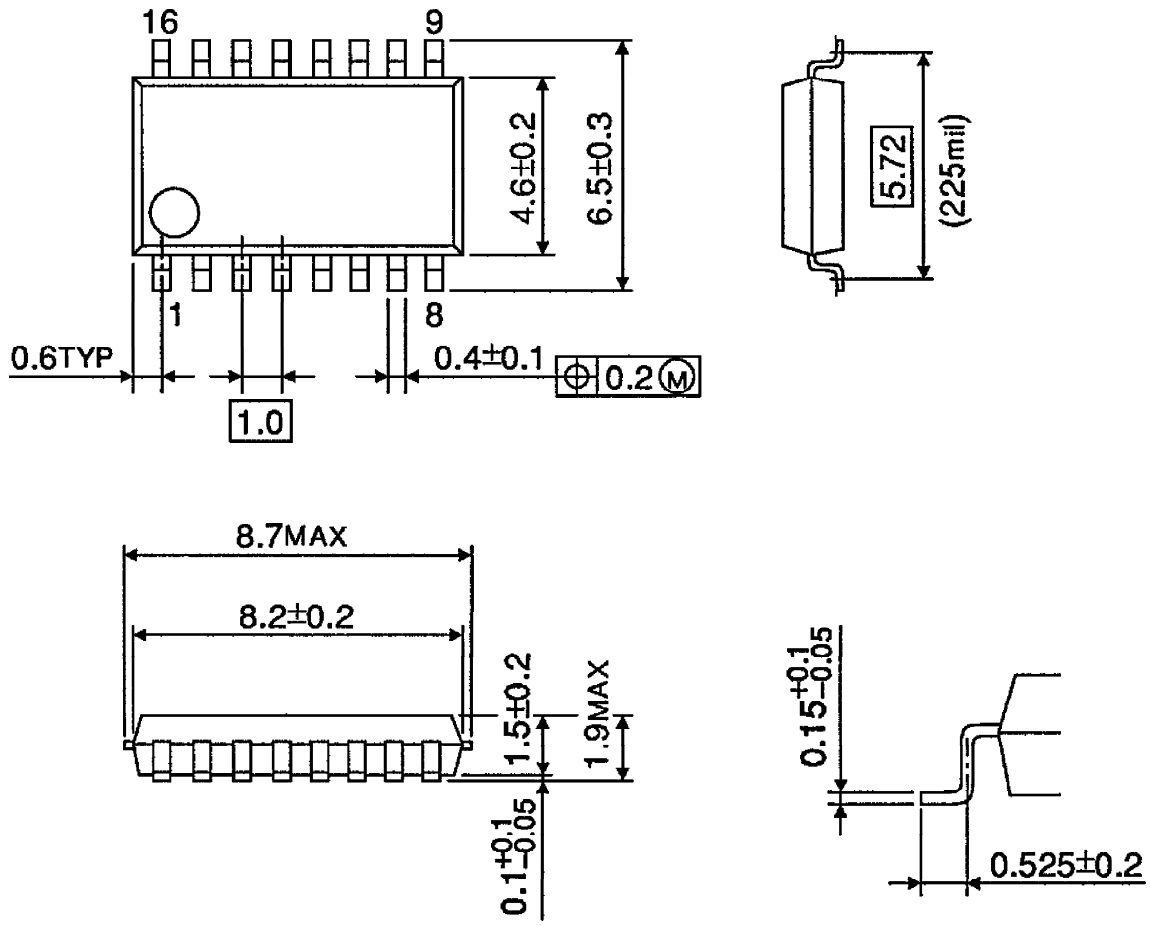
TRST (1) TIME COEFFICIENT CHARACTERISTIC



OUTLINE DRAWING

SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)