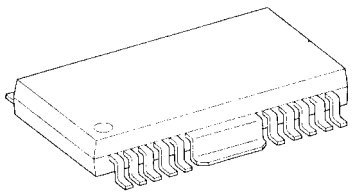
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8042F

5V VOLTAGE REGULATOR WITH WATCHDOG TIMER

The TA8042F is an IC specially designed for microcomputer systems. It features an accurate reference voltage of 5 ± 0.15V and various system reset functions. The system reset includes a voltage monitor capable of switching between 4.6V and 4.2V and a watchdog timer for self-diagnosing the system, to prevent a system runaway. The protective functions include a reverse battery polarity, current limiter, and overheat protection. The low standby current of 1.2mA (max.) enables direct connection to a car battery.



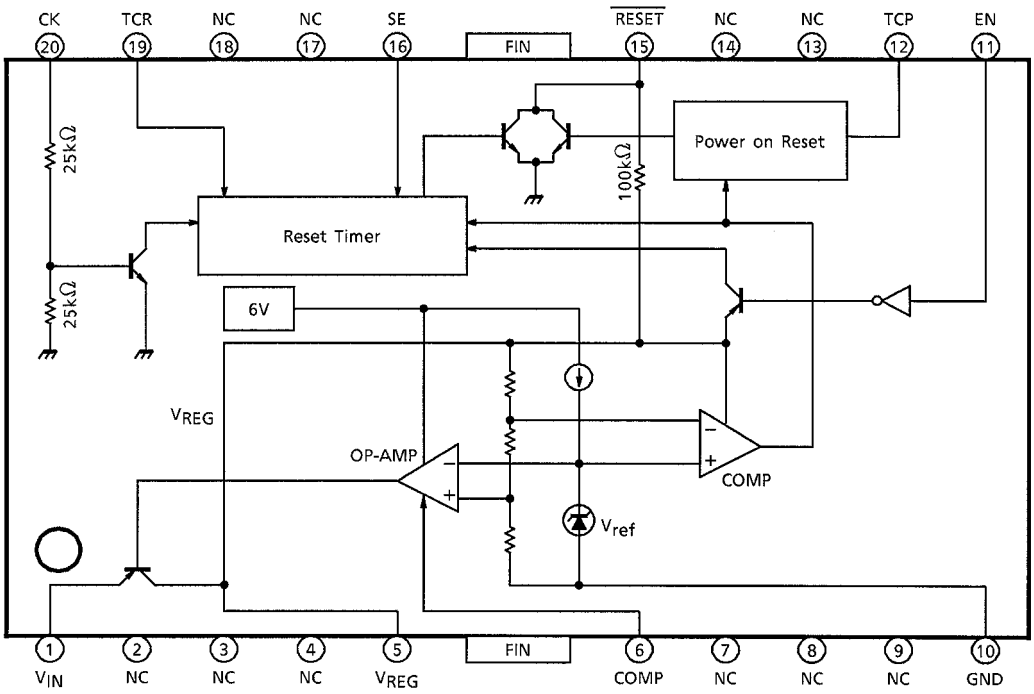
HSOP20-P-450-1.00

Weight: 0.79 g (typ.)

FEATURES

- Accurate output : 5V ± 0.15V
- Output power transistor attached : Current capacity 100mA (max.)
- Low standby current : 1.2mA (max.)
- Low input-output voltage : 0.8V (max)
- Protection functions : Reverse battery polarity, overheat protection, current limiter
- Reset functions : Power-on reset (output timing switching), watchdog low voltage detection
- HSOP-20 pin power flat package

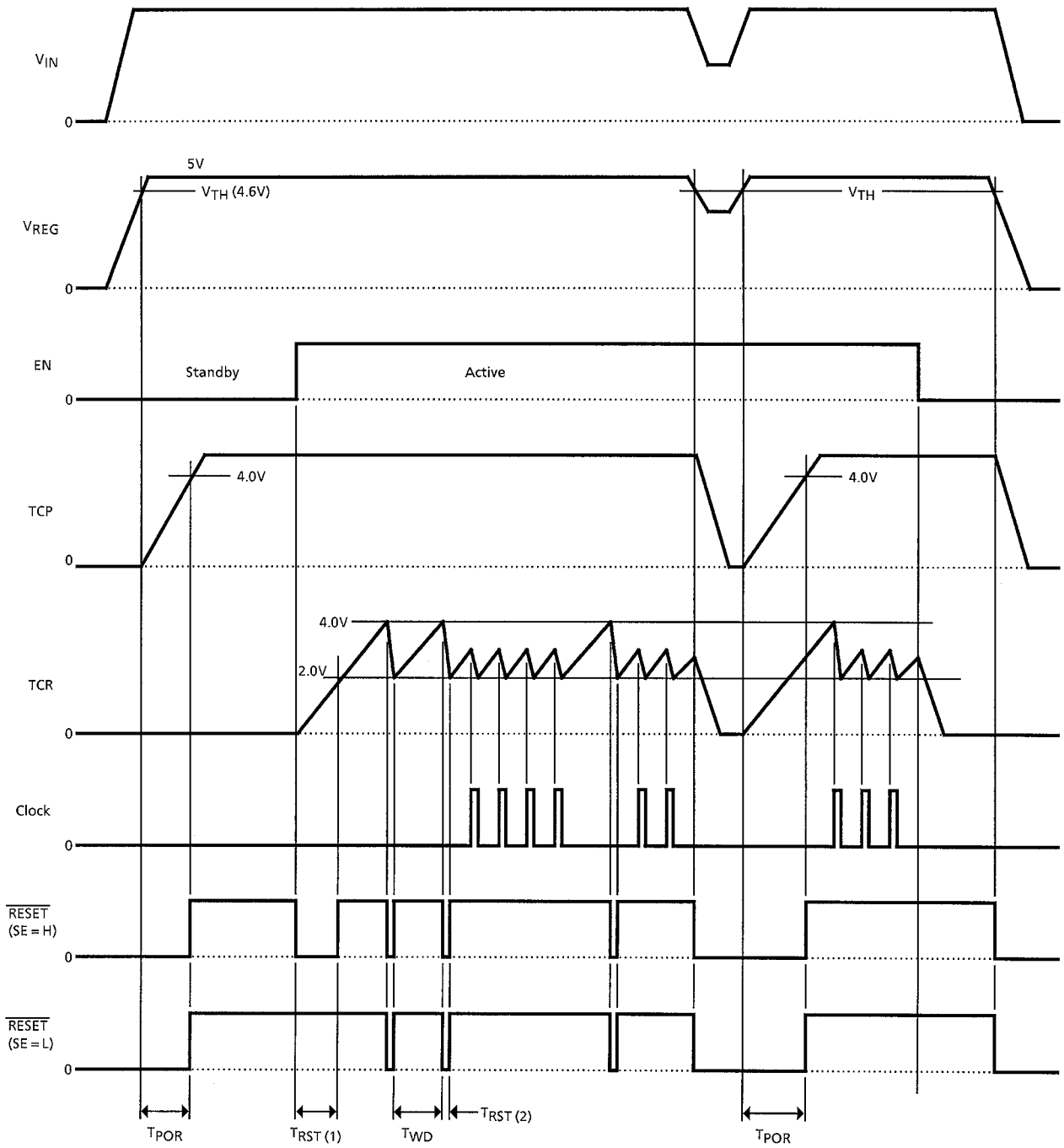
BLOCK DIAGRAM AND PIN LAYOUT



PIN DESCRIPTION

PIN No.	SYMBOL	DESCRIPTION
1	V_{IN}	Power supply input pin
5	V_{REG}	5V rated voltage power supply output pin with a current capacity of 100mA (max.). Also serves as the reset timer power supply pin.
6	COMP	Phase compensation pin for stabilization of output.
10	GND	Grounded
11	EN	Reset timer function ON / OFF control pin. Set to "H" for active mode and "L" for standby mode (current consumption reduced to 1.2mA or less).
12	TCP	Time setting pin for the power-on reset timer when the power is on. Condenser CP connects to GND. Condenser charged with internal rated current.
15	$\overline{\text{RESET}}$	Reset output pin for watchdog timer. ・ Pin supplies reset timer signal as selected by TCR pin condenser. ・ Pin supplies reset pulses intermittently if no clock is given to the CK pin. NPN transistor collector output with pull-up resistor.
16	SE	Pin engages power-on reset when changing from standby to active mode. Pin engages power-on reset when Rsel = "H", and does not engage reset when Rsel = "L".
19	TCR	Time setting pin for the reset timer and watchdog timer. Condenser C_T connects to GND. Condenser charged with internal rated current.
20	CK	Clock input pin for watchdog timer. Pin 15 ($\overline{\text{RESET}}$) is connected if the IC is used only as a power-on reset timer.
2, 3, 4, 7, 8, 9, 13, 14, 17, 18	N.C	Non-connected pin. (Electrically, this pin is completely open.)

TIMING CHART



Note: See Electrical Characteristics for symbols in the timing chart.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	PIN	RATING	UNIT
Input Voltage	V_{IN1}	V_{IN}, EN	60 (1s)	V
	V_{IN2}	V_{IN}	−30 (Note 1)	
	V_{IN3}	CK	−5~V_{REG}	
	V_{IN4}	SE	−0.3~V_{REG}	
Output Current	I_{LOAD}	V_{REG}	100	mA
	I_{OUT}	$\overline{RESET}$	2	
Output Voltage	V_{OUT}	$\overline{RESET}$	V_{REG}	V
Power Dissipation	P_D	—	2 (Note 2)	W
Operating Temperature	T_{opr}	—	−40~105	°C
Storage Temperature	T_{stg}	—	−55~150	°C
Lead Temperature-time	T_{sol}	—	260 (10s)	°C

Note1: Reverse battery
Note2: When using 50×50×1.6mm, 50% Cu board

ELECTRICAL CHARACTERISTICS (V_{IN} = 6 to 18V, I_{LOAD} = 10mA, Tc = −40 to 110°C)

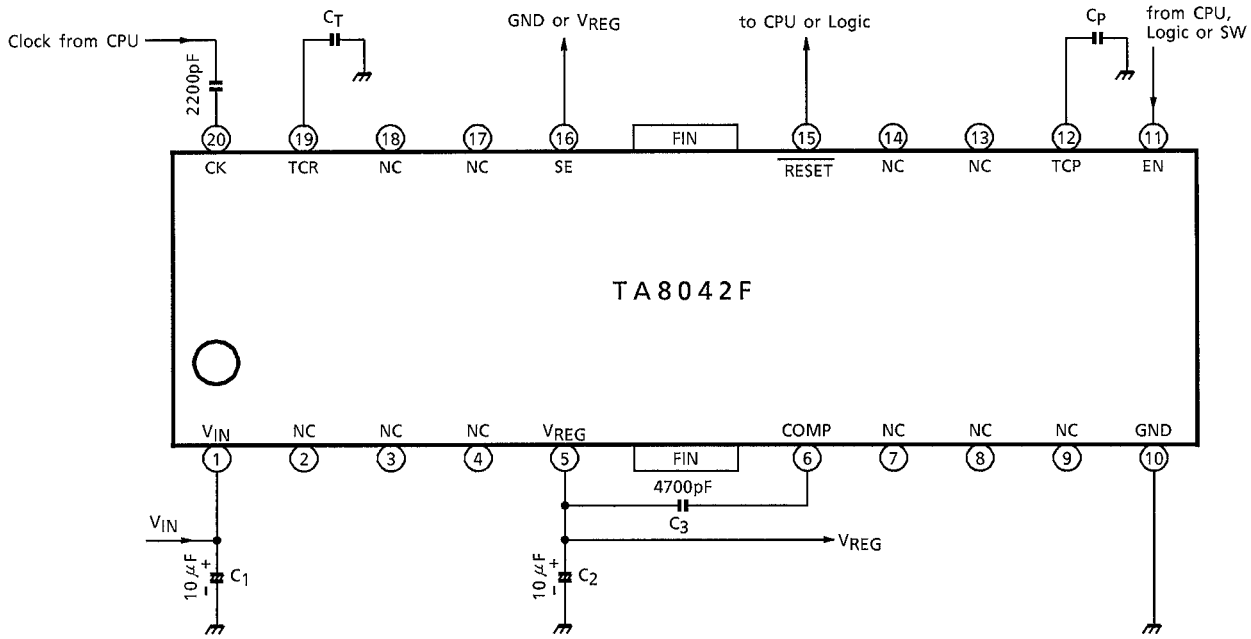
CHARACTERISTIC	SYMBOL	PIN	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Output Voltage	V_{REG}	V_{REG}	—		4.85	5.0	5.15	V
Line Regulation	V_{LINE}	V_{REG}	—	V_{IN} = 5.5~40V	—	0.1	0.5	%
Load Regulation	V_{LOAD}	V_{REG}	—	I_{LOAD} = 1~50mA	—	0.1	0.5	%
Temperature Coefficient		V_{REG}	—		—	0.01	—	% / °C
Input-output Voltage	V_{DROP}	V_{REG}	—	I_{LOAD} = 100mA	—	0.3	0.8	V
Current Limiter	I_{LIMIT}	V_{REG}	—		—	200	—	mA
Overheat Detection	T_{SD}		—		—	150	—	°C
Input Current	I_{IN}	EN	—	V_{IN} = 0~5V	—	—	5	μA
Input Voltage	V_{IH}				2.0	—	—	V
	V_{IL}				—	—	1.0	
Output Voltage	V_{OL}	$\overline{RESET}$	—	I_{OL}=1mA	—	—	0.5	V
Charging Current	I_{IN}	TCR	—	V_{IN} = 0~3.5V	—	50	—	μA
Threshold Voltage	V_{IH}	TCR	—		—	V_{REG} ×80%	—	V
	V_{IL}				—	V_{REG} ×40%	—	
Input Current	I_{IN}	CK	—	V_{IN} = 5V	—	0.17	0.35	mA
Input Voltage	V_{IH}	CK	—		2.0	—	—	V
	V_{IL}				—	—	0.5	
Charging Current	I_{IN}	TCP	—	V_{IN} = 0~3.5V	—	50	—	μA
Threshold Voltage	V_{TH}				—	V_{REG} ×80%	—	V
Reset Detection Voltage	V_{TH}		—		—	V_{REG} ×92%	—	V
	V_{TH-V}				—	4.6	—	
Standby Current	I_{ST}	V_{IN}	—	V_{IN} = 14V, EN = “L”	—	0.5	1.2	mA
Current Consumption	I_{CC}	V_{IN}	—	V_{IN} = 14V, EN = “H”	—	2.4	3.8	mA

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

CHARACTERISTIC	SYMBOL	PIN	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Power-on Reset Timer	T_{POR}	$\overline{RESET}$	—		50×C_P	80×C_P	110×C_P	ms
Watchdog Timer	T_{WD}	$\overline{RESET}$			15×C_T	22×C_T	35×C_T	
Reset Timer (1)	$T_{RST\ (1)}$	$\overline{RESET}$			10×C_T	20×C_T	30×C_T	
Reset Timer (2)	$T_{RST\ (2)}$	$\overline{RESET}$			0.3×C_T	0.7×C_T	1.8×C_T	
Clock Pulse Width	T_W	CK	—		3	—	—	μs

Note: C_T C_P is measured in units of μF.

EXAMPLE OF APPLICATION CIRCUIT



*: Cautions for Wiring:
C_1 and C_2 are for absorbing disturbances, noise, etc. C_3 is for phase compensation.
Connect each condenser as close to the IC as possible.

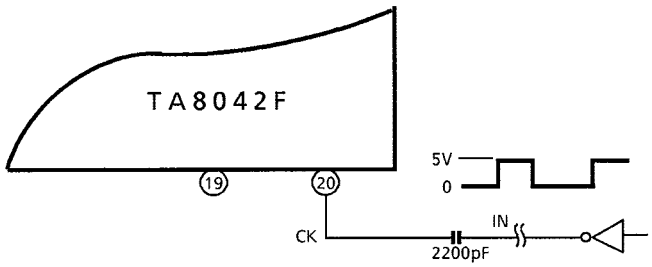
*: To use Fin, short it to GND.

RECOMMENDED CONDITIONS

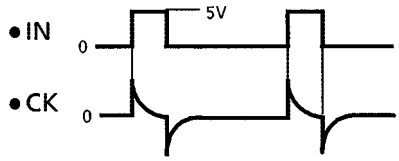
PART NAME	MIN	MAX	UNIT
C_T	0.01	100	μF
C_P	0.01	100	μF

APPLICATION CIRCUIT FOR CK INPUT

Capacitor Coupling



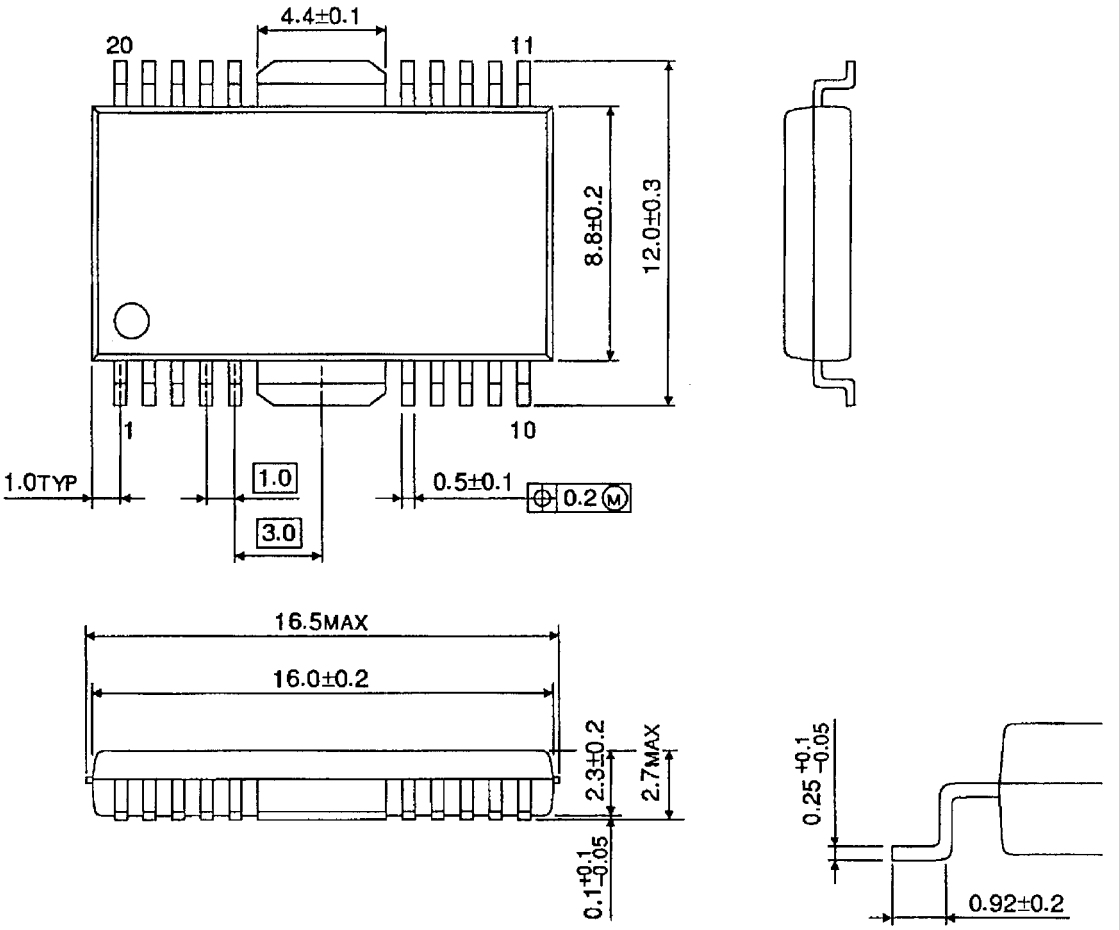
Timing Chart



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.

PACKAGE DIMENSIONS

HSOP20-P-450-1.00 Unit : mm



Weight: 0.79g (Typ.)

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