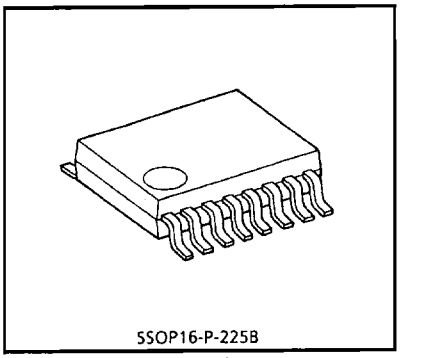
TENTATIVE DATA

SYSTEM REGULATOR IC FOR CORDLESS TELEPHONE

2 independent regulators and microcomputer power on a chip, very suitable for a handset of cordless telephone.



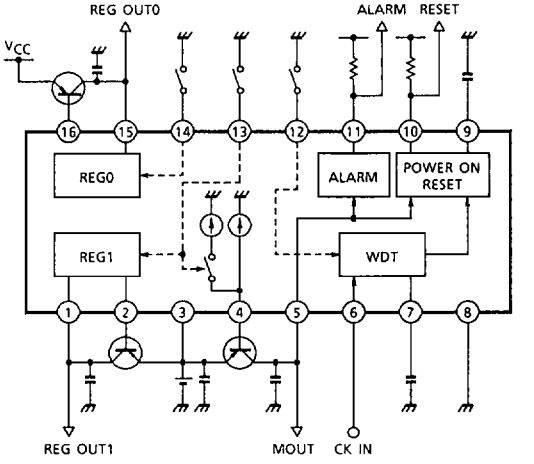
SSOP16-P-225B

Weight : 0.07g (Typ.)

FEATURES

- Watch-dog-timer function
- 2 independent regulators
- Battery alarm function
- Power on reset
- Battery saving switches
- Very small package : SSOP16 pin (0.65mm pitch)

BLOCK DIAGRAM



TA31087FN-1

FUNCTIONS AND OPERATION

The power supply block consists of REG0 for the transmitter block, REG1 for the receiver block, and VM for the microcontroller block.
The power supplies for the blocks are controlled by logical combinations of the reset pulse output by the watchdog timer and the BS0 and BS1 terminals (pin 14 and pin 13), and the voltage drop detection output of the RESET block.
This allows easy power control at times of intermittent reception when microcontroller abnormalities occur or when in battery save mode.

1. REG0, REG1 blocks

   REG0 and REG1, which are used to produce a stable 2.2V from the 2.5V power supply, are configured almost identically.
   When the BS0 terminal is open, REG0 is in battery save mode.
   When the BS1 terminal is open, REG1 is in battery save mode.
   The current consumption in battery save mode is almost 0μA in both blocks.
   To secure stable operation, ensure load current I_{OUT} is 2mA or higher.

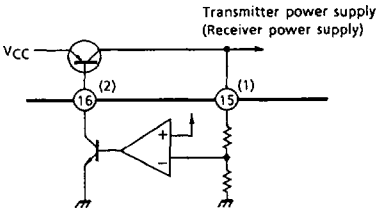


Figure 1

2. VM block

   The TRB2 terminal drives the external PNP transistor, making the collector an unregulated power supply for the microcontroller.
   The drive current is switched by the BS1 terminal and can minimize current consumption at intermittent reception.
   During resets with the watchdog timer, the drive current is 0μA and the microcontroller power supply is turned off.

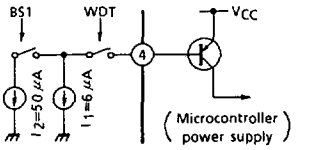


Figure 2

3. RESET block

   When the voltage of the DETIN terminal (pin 5) is 1.9V or below, low-level voltage is output to the RST terminal (pin 10) and REG0 and REG1 are in battery save mode.
   The detect voltage has a hysteresis of about 200mV.
   When the DETIN terminal voltage rises at power-on, the power-on reset function outputs low-level voltage to the RST terminal for a period corresponding to the time constant of the TC terminal (pin 9), thus preventing malfunction of the microcontroller.
   The power-on reset time TPR is determined by equation (1).
   $T_{PR} = 730 \times C_{T2}$ (μF) ms $\cdots$ (1)

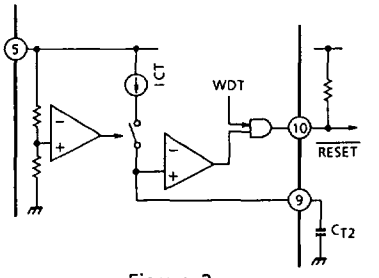


Figure 3

4. ALARM block

When the voltage of the DETIN terminal falls to 2.25V or below, low-level voltage is output to the ALM terminal (pin 11).
To prevent fluctuation, the ALM terminal output has a hysteresis of about 50mV.

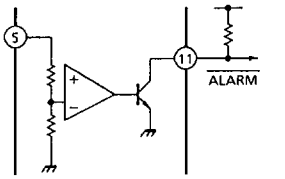
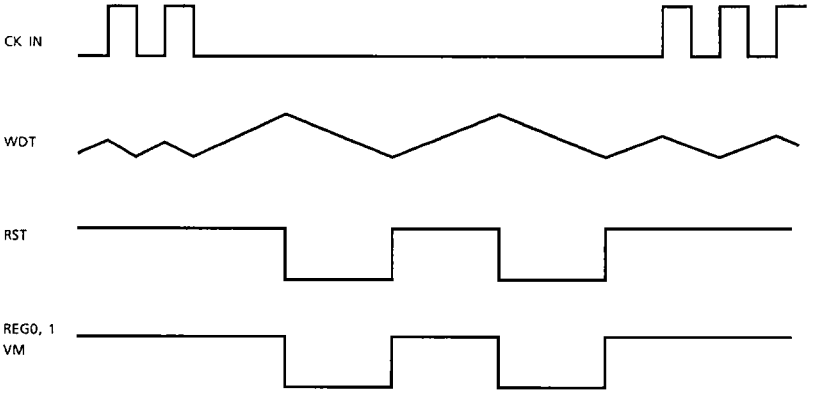


Figure 4

5. WDT block

The clock signal is input to the CKIN terminal (pin 6) to monitor the microcontroller.
If clock signals are not received for a longer period than the monitor time set by the time constant of the WDT terminal (pin 7), the watchdog timer intermittently outputs low-level voltage (reset pulse) to the RST terminal and, with the same intermittent timing, turns off output of the REG0, REG1, and VM blocks.
If the watchdog timer function is not used, the BSW terminal (pin 12) can be set to open to turn off the WDT block. When off, the current consumption of the watchdog timer is almost 0μA.
Figure 1 shows the timings when external capacitor $C_{T1} = 1\mu F$.



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTICS	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	7	V
Power Dissipation	P_D	560	mW
Operating Temperature	T_{opr}	−20~70	°C
Storage Temperature	T_{stg}	−50~150	°C

REGULATOR AND PERIPHERAL

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 2.5V, Ta = 25°C)

Total characteristics

CHARACTERISTICS		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage		V_{opr}	—	—	—	2.5	5.0	V
Current Consumption	Battery save	I_{CC} (BS)	—	BS0, BS1 Open Short BSW to GND	150	256	390	μA
	Stand by	I_{CC} (STB)	—	BS0 Open Short BS1, BSW to GND	190	310	440	μA
	Talk	I_{CC} (T)	—	Short BS0, BS1, BSW to GND	230	364	570	μA

Current consumption condition : Excluding VM sink current (pin 4 open)
V_{CC} – DETIN short, WDT (pin 7) fix 0.6V when BSW is 0V

Regulators (Tr. 2SA1204-Y)

Tr. Base Sink Current		I_{SINK} (R-B)	—	V_{TRB} = 2.5V	0.4	1	—	mA
Tr. Base Leak Current		I_{LEAK} (R-B)	—	Battery Save	—	0	5	μA
Output Voltage		V_{REG}	—	I_{OUT} = 30mA	2.10	2.20	2.30	V
Load Reguration		ΔV_{REG1}	—	I_{OUT} = 0~30mA	—	10	—	mV
Power Supply Voltage		ΔV_{REG2}	—	V_{CC} = 2.5~5.0V	—	15	—	mV

Microcomputer supply

Sink Current 1	I_1	I_{SINK} (M1)	—	—	4	7	—	μA
	$I_1 + I_2$	I_{SINK} (M2)	—	—	35	60	—	μA
Leak Current		I_{LEAK} (M)	—	—	—	0	5	μA

Alarm

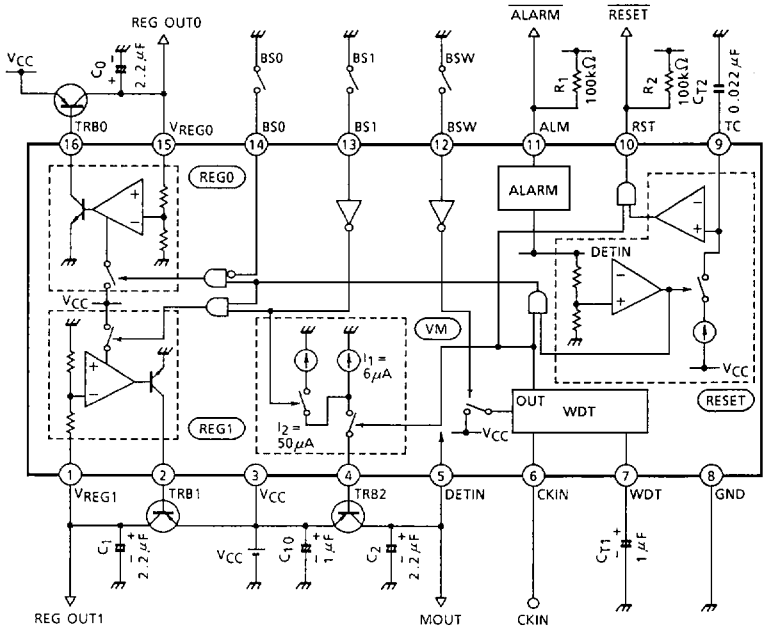
Derection Voltage	V_{TH-H} (A)	—	—	2.18	2.30	2.42	V
	V_{TH-L} (A)	—	—	2.13	2.25	2.37	V
Hysteresis Range	V_{HYS} (A)	—	—	—	50	—	mV
Output Sink Current	I_{SINK} (A)	—	V_{ALM} = 0.2V	100	170	—	μA
Output Leak Current	I_{LEAK} (A)	—	—	—	0	5	μA

Reset

Derection Voltage	V_{TH-H} (R)	—	—	1.98	2.10	2.22	V
	V_{TH-L} (R)	—	—	1.78	1.90	2.02	V
Hysteresis Range	V_{HYS} (R)	—	—	—	200	—	mV
Output Sink Current	I_{SINK} (R)	—	V_{RST} = 0.2V	100	200	—	μA
Output Leak Current	I_{LEAK} (R)	—	—	—	0	5	μA
C_T Charge Current	I_{CHG} (R)	—	—	1.1	1.9	2.7	μA
Power On Reset Time	T_{PR}	—	C_{T2} = 0.022μF	—	15	—	ms

CHARACTERISTICS	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Watch dog timer							
Current Consumption	I_{CC} (W)	—	—	—	70	130	μA
Input Clock Threshold Voltage	V_{TH} (W)	—	—	—	0.65	0.77	V
WDT Oscillation Frequency	f_{OSC} (W)	—	—	0.08	0.17	0.26	Hz
WDT Charge Current	I_{CHG} (W)	—	C_{T1} = 1μF	—	120	—	nA
WDT CT Discharge Current	I_{DCHG} (W)	—	—	—	160	—	nA
CKIN Terminal Input Current	I_{CKIN}	—	V_{CKIN} = 5V	0.2	0.3	0.4	mA
Switches							
Battery Save Threshold 1	$V_{BS0\sim1}$	—	—	—	—	0.2	V
Battery Save Threshold 2	V_{BS} (W)	—	—	—	—	0.2	V

TEST CIRCUIT



◎ If oscillation occur in the low temperature, please use tantalum capacitor.
◎ Capacitors (C_0, C_1) of REG output are the nearest collector of Transistor, and please shorten a wiring between capacitors and ground.