

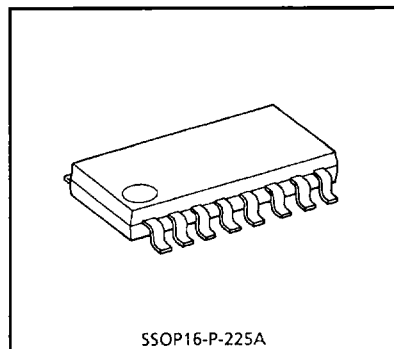
REGULATOR AND PERIPHERAL

SYSTEM REGULATOR IC FOR CORDLESS TELEPHONE

3 independent regulators on a chip, very suitable for a handset of cordless telephone.

FEATURES

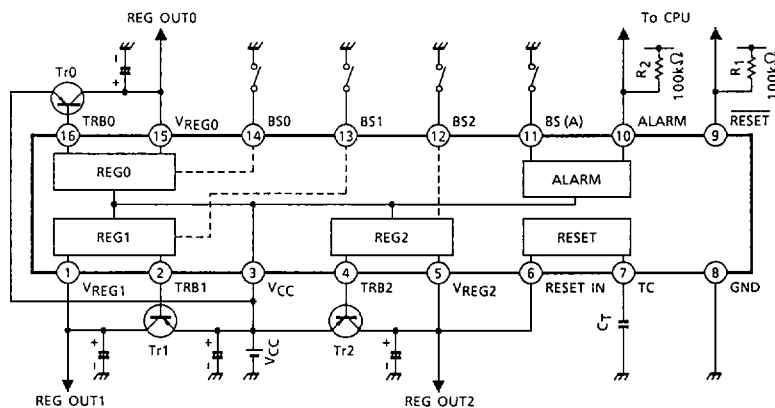
- 3 regulators, independent one another
- Battery alarm function
- Power on reset
- Battery saving switches
- Very small current consumption
- Small package SSOP 16 pin (1mm pitch)



SSOP16-P-225A

Weight : 0.14g (Typ.)

BLOCK DIAGRAM



Handle with care to prevent devices from deterioration by static electricity.

TA31086F-1

REGULATOR AND PERIPHERAL

DESCRIPTION FOR EACH BLOCK

(The values in the figures are typical.)

1. Regulator

REG0, REG1 and REG2 have all the same construction, and can be power saving state separately.

Maximum output current I_O (MAX) is decided by h_{FE} of the external Tr.

$$I_O \text{ (MAX)} \approx h_{FE} \times I_B$$

2. Alarm

ALARM terminal outputs high level voltage when the power supply voltage V_{CC} decreases to V_{TH-L} (A), output is the open-collector style, so pull up to V_{CC} or V_{REG} etc.

The range of hysteresis is about 50mV.

3. Reset

$\overline{\text{RESET}}$ terminal outputs low level voltage when the voltage less than V_{TH-L} (R) adds to RESET IN terminal.

Output is the open-collector style, so pull up to V_{CC} or V_{REG} etc.

RESET IN terminal is also the power supply to $\overline{\text{RESET}}$ block, so possible to be battery saving state if RESET IN terminal is open. (Because of the diodes for protection as the right figure, avoid adding higher voltage than V_{CC} .)

Although the voltage of RESET IN terminal rises up to V_{TH-H} (R), $\overline{\text{RESET}}$ signal is cancelled with a delay time decided by time constant of the external C_T . (Power on Reset)

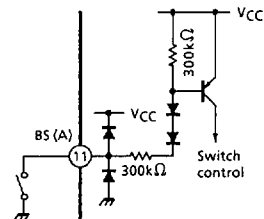
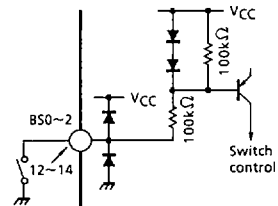
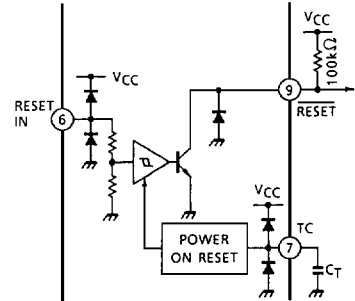
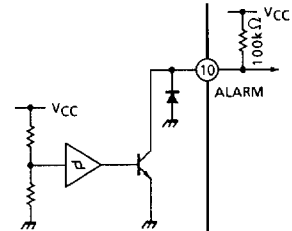
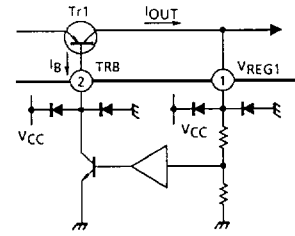
$$T_{PR} \approx 2.6 C_T / I_{CT} \text{ (s)}$$

4. Switch

BS0~2, BS (A) terminals are all low active.

When open or V_{CC} , each block goes to power saving state.

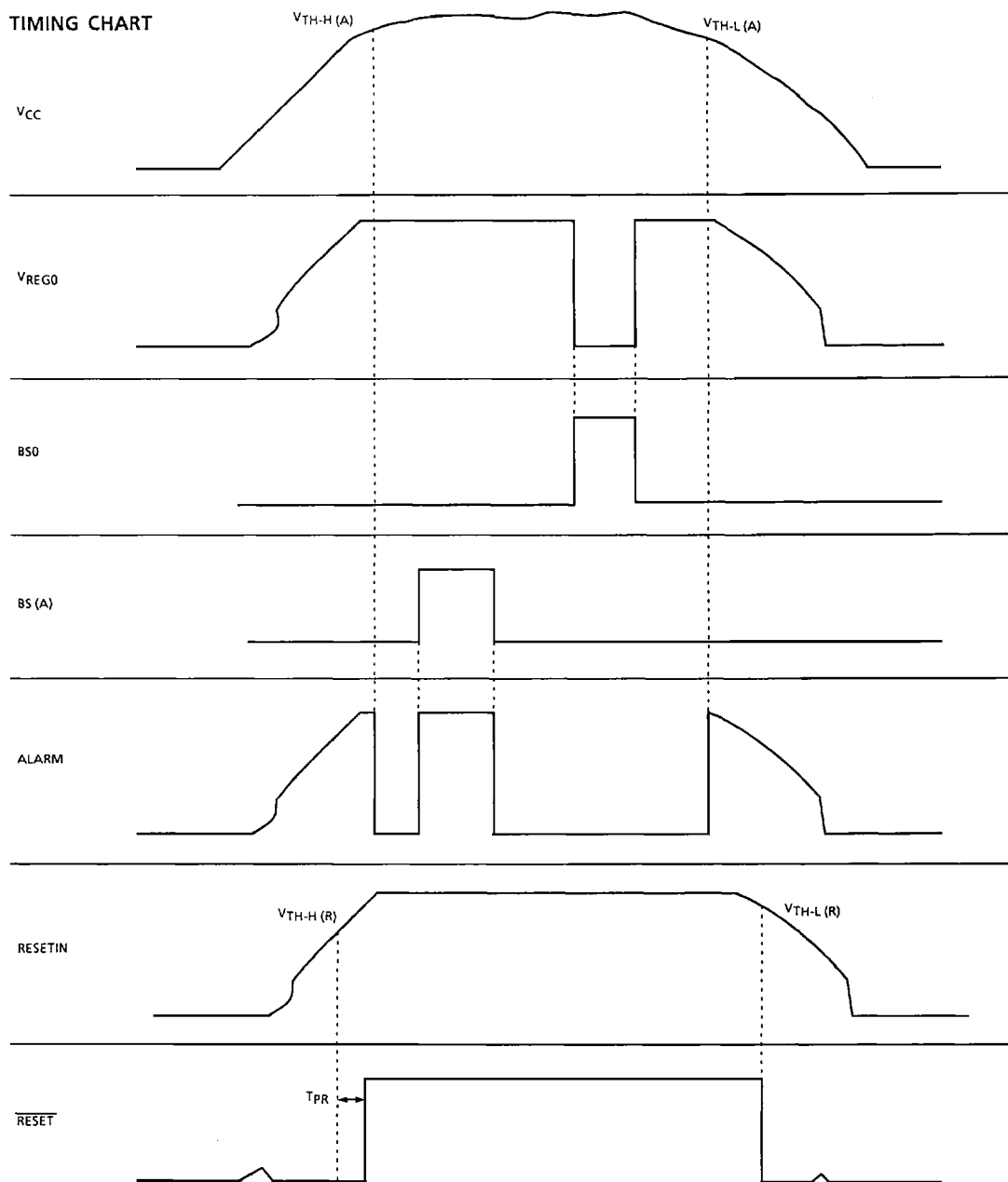
And avoid adding higher voltage than V_{CC} because of the diodes for protection as the right figures.



TA31086F-2

REGULATOR AND PERIPHERAL

TIMING CHART



TA31086F-3

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MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	12	V
Power Dissipation	P _D	350	mW
Operating Temperature	T _{opr}	-20~70	°C
Storage Temperature	T _{stg}	-50~150	°C

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, V_{CC} = 3.6V, Ta = 25°C)

Total characteristics

CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V _{opr}	—	—	—	3.6	10	V
Quiescent Current	I _{CC}	1	All blocks are Active, R _{L(A)} = R _{L(R)} = 100kΩ	180	480	750	μA

Regulators (Tr. 2SA1204-Y)

Quiescent Current	I _{CC} (REG)	—	I _{OUT} = 0mA	40	110	170	μA
Tr. Base Sink Current	I _B	3	V _{TRB} = 3.6V	400	950	—	μA
Tr. Base Leak Current	I _{LEAK}	—	V _{TRB} = 3.6V, Battery saving mode	—	0	10	μA
Output Voltage	V _{REG}	2	I _{OUT} = 30mA	3.05	3.2	3.35	V
Load Regulation	ΔV _{REG1}	—	I _{OUT} = 0~50mA	—	10	—	mV
Power Supply Regulation	ΔV _{REG2}	—	V _{CC} = 3.6~10V, I _{OUT} = 30mA	—	5	—	mV

Alarm

Quiescent Current	I _{CC} (A)	4	Alarm block only, R _{L(A)} = 100kΩ	30	75	120	μA
Alarm Detection Voltage (H)	V _{TH-H} (A)	4	—	3.25	3.40	3.55	V
Alarm Detection Voltage (L)	V _{TH-L} (A)	4	—	3.20	3.35	3.50	V
Hysteresis Range	V _{HYS} (A)	—	—	—	70	—	mV
Output Sink Current	I _{SINK} (A)	5	V _{ALM} = 0.2V	100	250	—	μA
Output Leak Current	I _{LEAK}	—	V _{ALM} = 3.0~10V, V _{CC} = 3.0V	—	0	10	μA

Reset

Quiescent Current	I _{CC} (R)	6	Reset block only, R _{L(R)} = 100kΩ	30	75	120	μA
Reset Detection Voltage (H)	V _{TH-H} (R)	6	—	2.65	2.80	2.95	V
Reset Detection Voltage (L)	V _{TH-L} (R)	6	—	2.60	2.75	2.90	V
Hysteresis Range	V _{HYS} (R)	—	—	—	45	—	mV
Output Sink Current	I _{SINK} (R)	7	V _{RST} = 0.2V, V _{RESET IN} = 2.5V	100	300	—	μA
Output Leak Current	I _{LEAK} (R)	—	V _{RST} = 3.0~10V, V _{RESET IN} = 3.0V	—	0	10	μA
CT Charge Current	I _{CT}	8	—	0.8	1.6	3.0	μA
Power On Reset Time	T _{PR}	—	C _T = 10000pF	—	16	—	ms

TA31086F-4

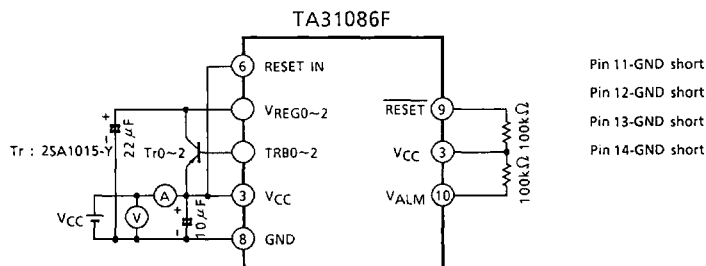
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Switches

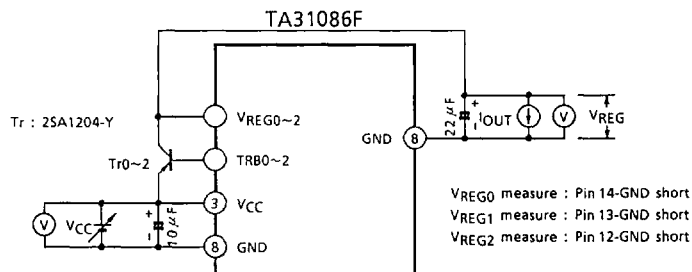
CHARACTERISTIC	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Battery Save Threshold 1	$V_{BS0\sim2}$	—	—	—	—	0.2	V
Battery Save Threshold 2	$V_{BS(A)}$	—	—	—	—	0.2	V

TEST CIRCUIT

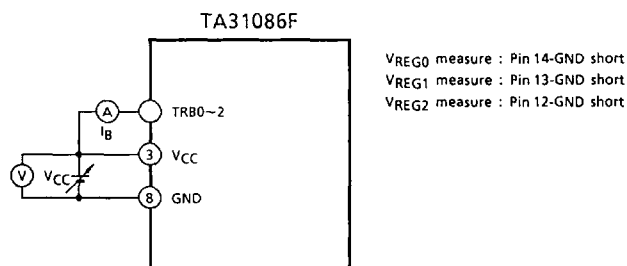
(1) I_{CC}



(2) $V_{REG0\sim2}$



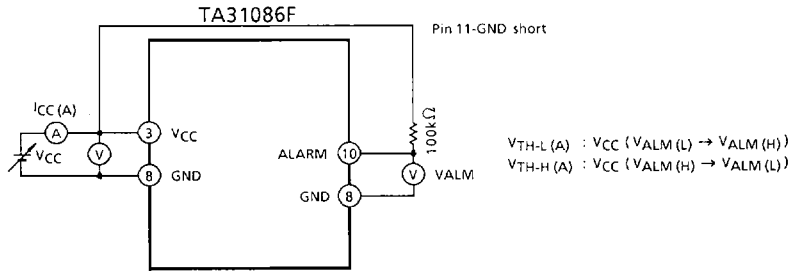
(3) $I_{B0\sim2}$



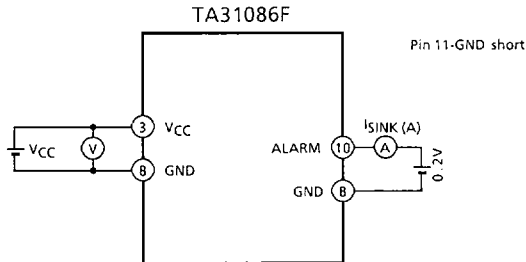
TA31086F-5

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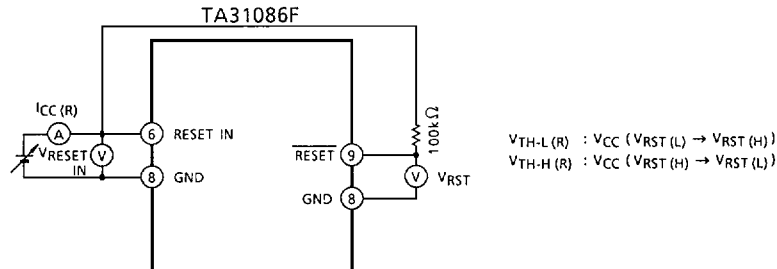
(4) $V_{TH-}(A)$, $I_{CC}(A)$



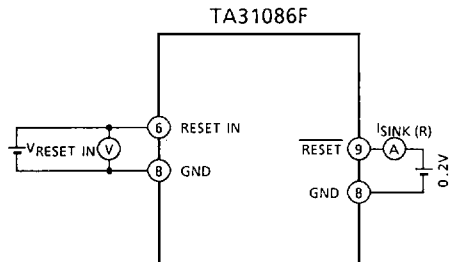
(5) $I_{SINK}(A)$



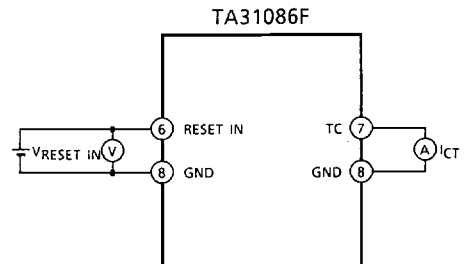
(6) $V_{TH-}(R)$, $I_{CC}(R)$



(7) $I_{SINK}(R)$

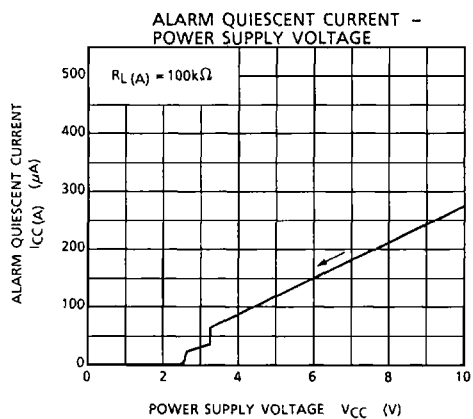
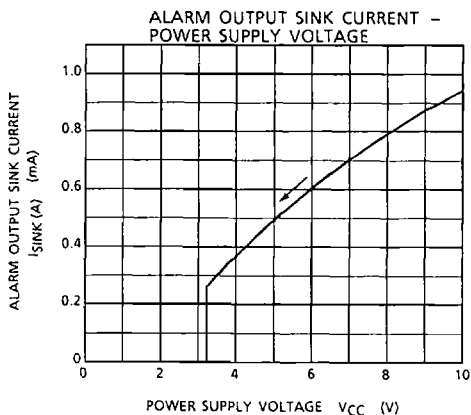
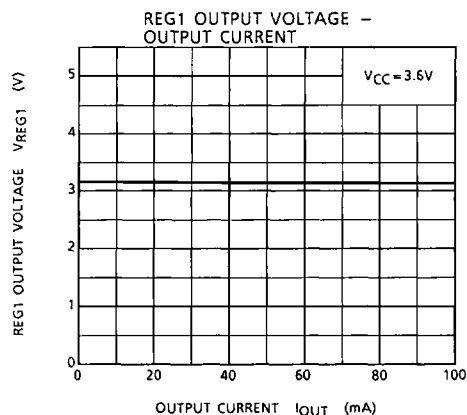
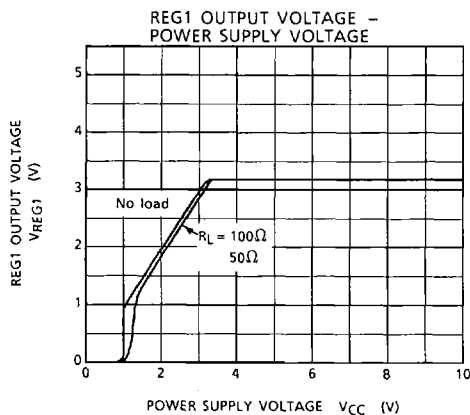
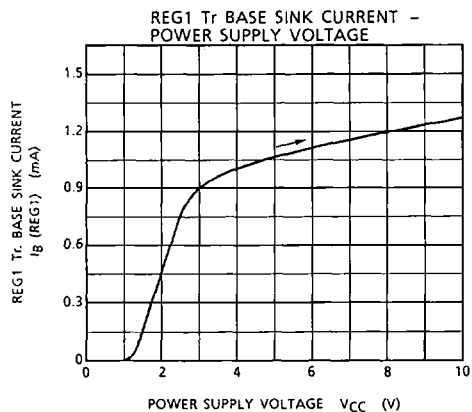
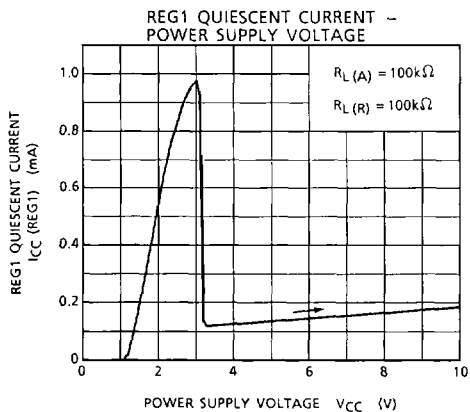


(8) I_{CT}



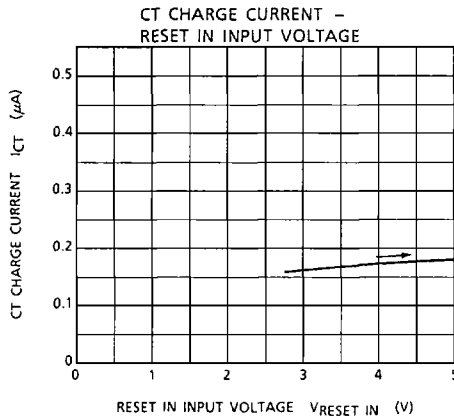
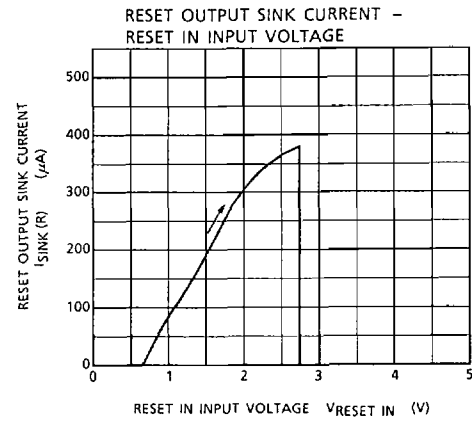
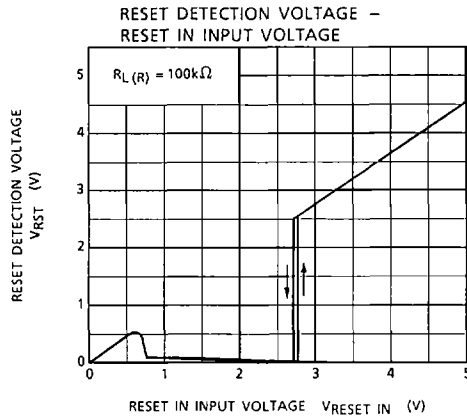
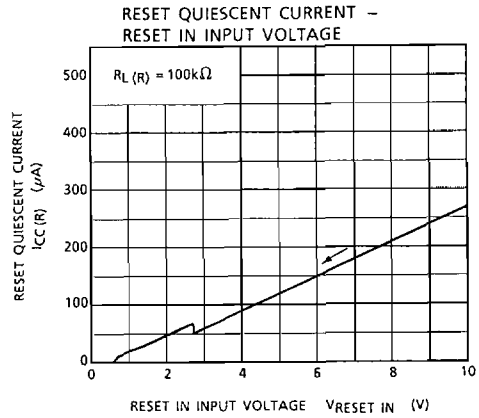
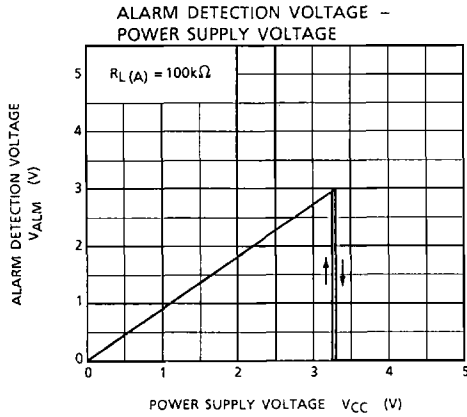
TA31086F-6

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TA31086F-7

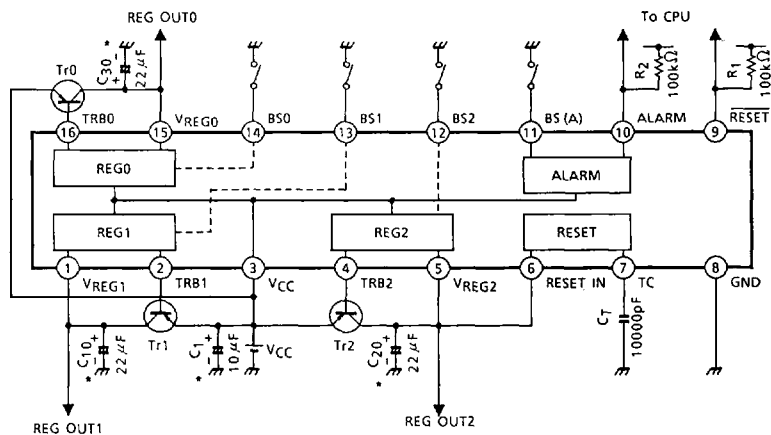
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TA31086F-8

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APPLICATION CIRCUIT



Tr0~2 2SA1204-Y

- * If oscillation occur in the low temperature, please use tantalum capacitor.
- * Capacitors (C10, C20, C30) of REG output are the nearest collector of transistor, and please shorten a wiring between capacitors and ground.

TA31086F-9