BA6129F
BA6162/F

VOLTAGE MONITOR ICs

Dimension

● Description

The BA6129F and the BA6162/F are voltage monitoring ICs. The application of these ICs is to monitor voltage applied to a load and react to changes. Two thresholds are monitored. Should the voltage being monitored drop below the first threshold the Voltage Monitor IC outputs signals to switch the load to the standby mode. Should the supply voltage continue to fall the load will be switched from the primary voltage supply to the back-up battery supply. The only operational difference between the BA6129F and the BA6162/F is the magnitude of voltage threshold level one. A rising voltage condition reverses this sequence. Internal circuitry provides hysteresis to prevent instability.

SOP-8

BA6162

● Features

1) Internal automatic switching from V_{cc} to battery back-up.
2) Standby control signals out. CS, CSB and Reset.
3) Low current drain in the Standby mode.
4) Low forward voltage loss in battery back-up mode.
5) Very low external component count.

DIP-8

● Application

Equipments using battery power such as SRAM Memory Cards and Palm top Computers.

●Absolute maximum ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply voltage	Vcc	7.0	V
Output current 1	I_{OUT1}	-30	mA
Output current 2	I_{OUT2}	-200	μA
Power dissipation	P_d	900 *1(BA6162) 550 *2(BA6129F) (BA6162F)	mW
Operating temperature range	T_{opr}	-20 ～ 75	°C
Storage temperature range	T_{stg}	-40 ～ 125	°C

I_{OUT1} is output current of Vcc. I_{OUT2} is output current of V_{BAT}.
*1 Derating is -9.0mW/°C at Ta>25°C
*2 Derating is -5.5mW/°C at Ta>25°C

Table 1

●Block diagram

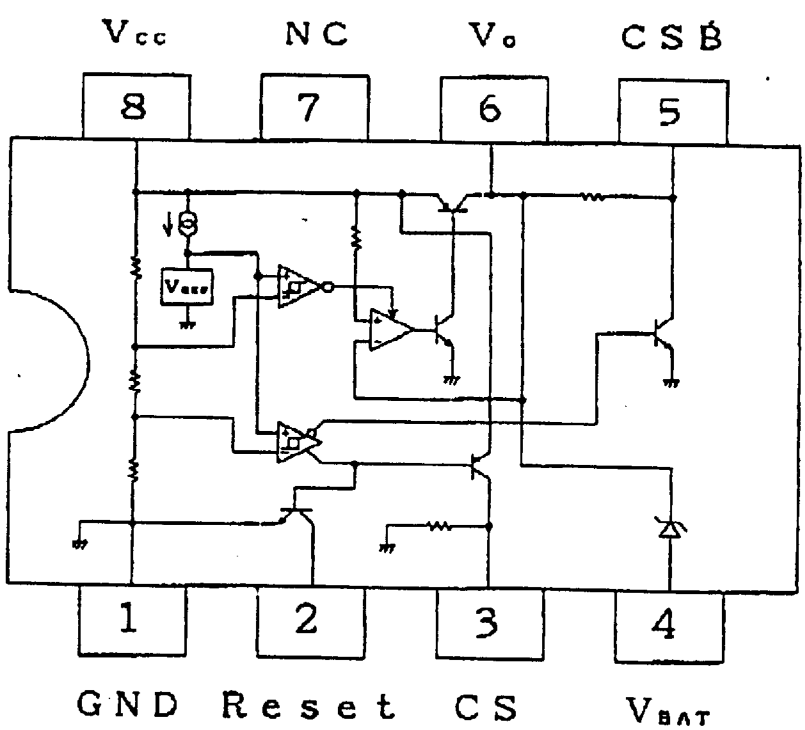

Figure 1

●Pin description

Pin No.	Pin code	Pin function
1	GND	Substrate GND
2	Reset	Reset output
3	CS	CS output
4	V_{BAT}	Battery power supply
5	CSB	CSB output
6	V_o	Power supply output
7	NC	
8	V_{CC}	Power supply

Table 2

●Input/output circuit diagram

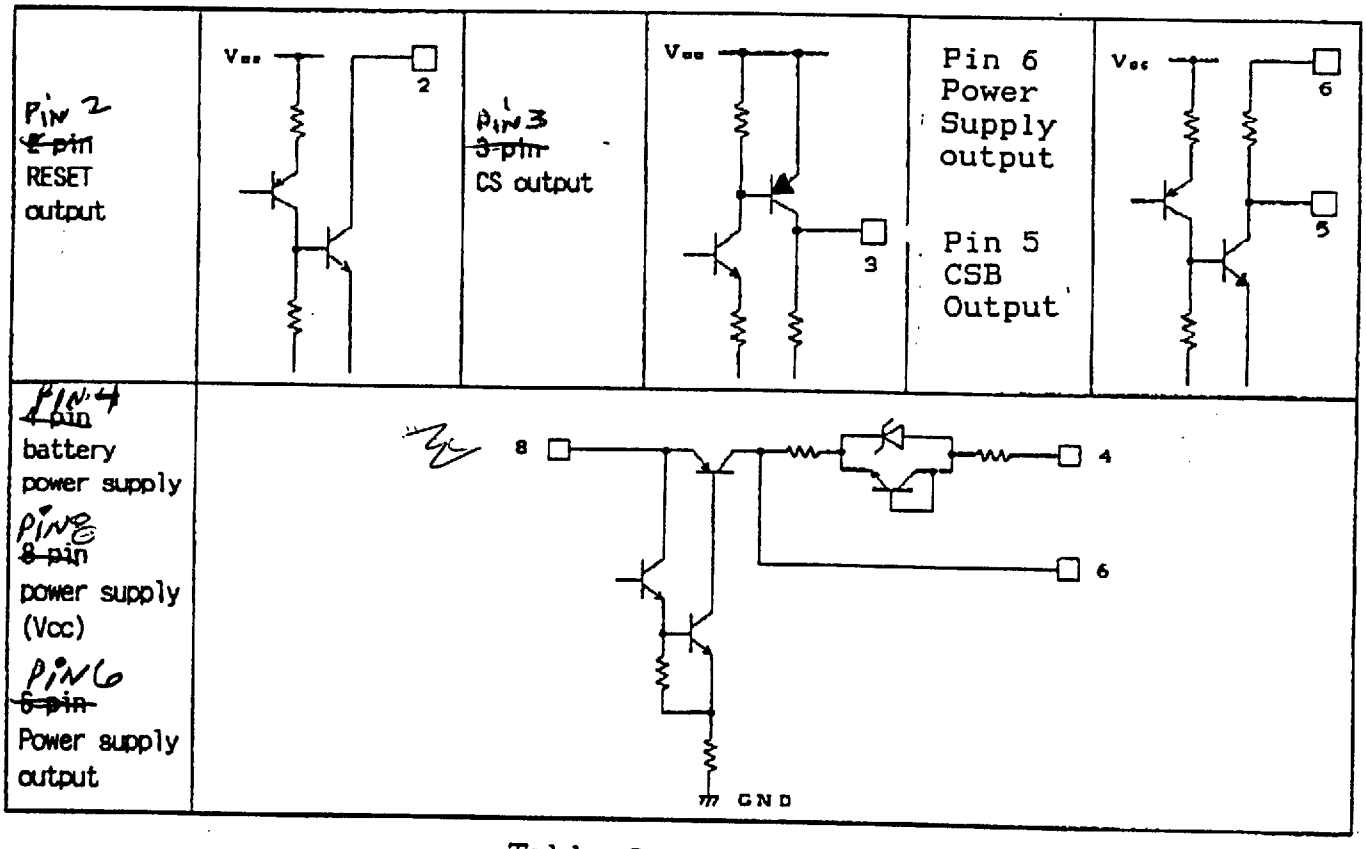

Table 3

●Electrical characteristics

BA6129F (Ta=25°C, VRRES=Vcc=5V, RRES=10kΩ)

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Current drain in Monitor mode	I_{CC}			2.0	mA	V_{CC}=5V, V_{BAT}=3V
Input/output Voltage difference	V_{SAT1}		0.03	0.05	V	V_{CC}=5V, V_{BAT}=3V, I_O=−1mA
Vo output voltage 1	V_{O1}	4.95	4.97		V	V_{CC}=5V, V_{BAT}=3V, I_O=−1mA
Vo output voltage 2	V_{O2}	4.70	4.90		V	V_{CC}=5V, V_{BAT}=3V, I_O=−15mA
Vo output voltage 3	V_{O3}	4.50	4.86		V	V_{CC}=5V, V_{BAT}=3V, I_O=−30mA
Detection voltage	V_S	3.35	3.50	3.65	V	V_{CC}=H→L
Detection hysteresis voltage	V_{SH}		100		mV	V_{CC}=L→H
Reset output voltage L	V_{RESL}			0.4	V	V_{CC}=3V
Reset leakage current	I_{RESH}			0.1	µA	V_{CC}=5V, VR_{RES}=7V
Reset operation limit voltage	V_{OPL}		0.8	1.2	V	V_{CC}=H→L, V_{RES}≦0.4V
CS output voltage L	V_{CSL}			0.1	V	V_{CC}=3V, V_{BAT}=3V, I_{CS}=+1uA
CS output voltage H	V_{CSH}	4.9			V	V_{CC}=5V, V_{BAT}=3V, I_{CS}=−1uA
CSB output voltage L	V_{CSBL}			0.1	V	V_{CC}=5V, V_{BAT}=3V, I_{CSB}=+1uA
CSB output voltage H	V_{CSBH}	Vo−0.1			V	V_{CC}=3V, V_{BAT}=3V, I_{CSB}=−1uA
Detection voltage temperature characteristic	K_{VS}	−0.05		+0.05	%/°C	
Switching voltage	V_B	3.15	3.30	3.45	V	V_{CC}=H→L, V_{BAT}=3V, R_O=200kΩ
Switching hysteresis voltage	V_{BH}		100		mV	V_{CC}=L→H, V_{BAT}=3V, R_O=200kΩ
Switching voltage temperature characteristic	K_{VB}	−0.05		+0.05	%/°C	
Current drain in Back-up mode	I_{CCB}			0.5	µA	V_{CC}=GND, V_{BAT}=3V
Input/output voltage difference 2	V_{SAT2}		0.20	0.30	V	V_{CC}=GND, V_{BAT}=3V, I_O=−1uA
Vo output voltage 4	V_{O4}	2.70	2.80		V	V_{CC}=GND, V_{BAT}=3V, I_O=−1uA
Vo output voltage 5	V_{O5}	2.60	2.67		V	V_{CC}=GND, V_{BAT}=3V, I_O=−100uA
Reverse current	I_{OR}			0.1	µA	V_{CC}=5V, V_{BAT}=GND

Table 4

Note) + Polarity defines current sink
− polarity defines current source

This IC is not designed for radiation-hardened applications.

BA6162/F

(Ta=25°C, VR_{RES}=V_{CC}=5V, R_{RES}=10kΩ)

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Current drain in Monitor mode	I_{CC}			2.0	mA	V_{CC}=5V, V_{BAT}=3V
Input/output Voltage difference	V_{SAT1}		0.03	0.05	V	V_{CC}=5V, V_{BAT}=3V, I_O=−1mA
Vo output voltage 1	V_{O1}	4.95	4.97		V	V_{CC}=5V, V_{BAT}=3V, I_O=−1mA
Vo output voltage 2	V_{O2}	4.70	4.90		V	V_{CC}=5V, V_{BAT}=3V, I_O=−15mA
Vo output voltage 3	V_{O3}	4.50	4.86		V	V_{CC}=5V, V_{BAT}=3V, I_O=−30mA
Detection voltage	V_S	4.00	4.20	4.40	V	V_{CC}=H→L
Detection hysteresis voltage	V_{SH}		100		mV	V_{CC}=L→H
Reset output voltage L	V_{RESL}			0.4	V	V_{CC}=3V
Reset leakage current	I_{RESH}			0.1	μA	V_{CC}=5V, VR_{RES}=7V
Reset operation limit voltage	V_{OPL}		0.8	1.2	V	V_{CC}=H→L, V_{RES}≦0.4V
CS output voltage L	V_{CSL}			0.1	V	V_{CC}=3V, V_{BAT}=3V, I_{CS}=+1uA
CS output voltage H	V_{CSH}	4.9			V	V_{CC}=5V, V_{BAT}=3V, I_{CS}=−1uA
CSB output voltage L	V_{CSBL}			0.1	V	V_{CC}=5V, V_{BAT}=3V, I_{CSB}=+1uA
CSB output voltage H	V_{CSBH}	V_O−0.1			V	V_{CC}=3V, V_{BAT}=3V, I_{CSB}=−1uA
Detection voltage temperature characteristic	K_{VS}	−0.05		+0.05	%/°C	
Switching voltage	V_B	3.15	3.30	3.45	V	V_{CC}=H→L, V_{BAT}=3V, R_O=200kΩ
Switching hysteresis voltage	V_{BH}		100		mV	V_{CC}=L→H, V_{BAT}=3V, R_O=200kΩ
Switching voltage temperature characteristic	K_{VB}	−0.05		+0.05	%/°C	
Current drain in Back-up mode	I_{CCB}			0.5	μA	V_{CC}=GND, V_{BAT}=3V
Input/output voltage difference 2	V_{SAT2}		0.20	0.30	V	V_{CC}=GND, V_{BAT}=3V, I_O=−1uA
Vo output voltage 4	V_{O4}	2.70	2.80		V	V_{CC}=GND, V_{BAT}=3V, I_O=−1uA
Vo output voltage 5	V_{O5}	2.60	2.67		V	V_{CC}=GND, V_{BAT}=3V, I_O=−100uA
Reverse current	I_{OR}			0.1	μA	V_{CC}=5V, V_{BAT}=GND

Table 5

Note) + Polarity defines current sink
− polarity defines current source

This IC is not designed for radiation-hardened applications.

- Test Circuit

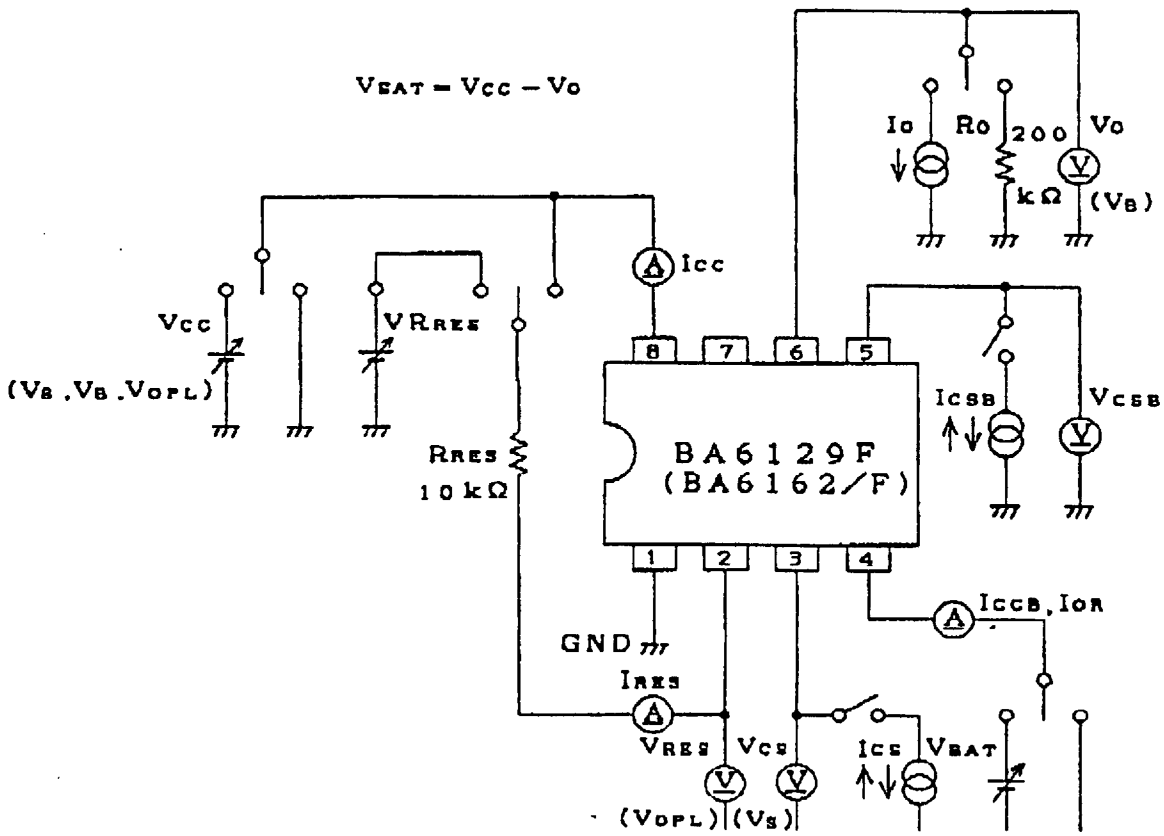

Figure 2

● Operating Description

The BA6129F and BA6162/F have two functions, logic out and power switching. Ref. Table 3.

Logic output configurations:
(1) Reset output - NPN Transistor, Open collector.
(2) CS output - PNP Transistor, Open collector with pull down resistor.
(3) CSB output - NPN Transistor, Open collector with pull up resistor.

Power Switching Configuration:
(1) PNP Power Transistor.
(2) Shot-key barrier diode.

Thresholds are determined by an internal voltage reference and divider network. Hysteresis is controlled by an internal comparator.

A threshold one low voltage condition switches the reset signal low, CS low and CSB high. These signals may be used to set an SRAM circuit to standby.

During normal operation the load is supplied from Vcc via a series PNP power transistor. A threshold two low voltage condition turns off the series pass transistor forward biasing the shot-key diode thus switching the load voltage source from V_{cc} to V_{BAT}.

● Definitions:

Threshold one. - Detection Voltage, V_-.
Threshold two. - Switching Voltage, V_B.

Part Number	Detection Voltage, V_-.
BA6126	V_- = 3.5 V. Typ. when V_{cc} is falling.
	V_- = V_- + 0.1 when V_{cc} is rising.
BA6162/F	V_- = 4.2 V. Typ. when V_{cc} is falling.
	V_- = V_- + 0.1 when V_{cc} is rising.

	Switching Voltage, V_B.
BA6126 and BA6162/F	V_B = 3.3 V. Typ. when V_{cc} is falling.
	V_B = V_B + 0.1 when V_{cc} is rising.

● Voltage Level Diagram

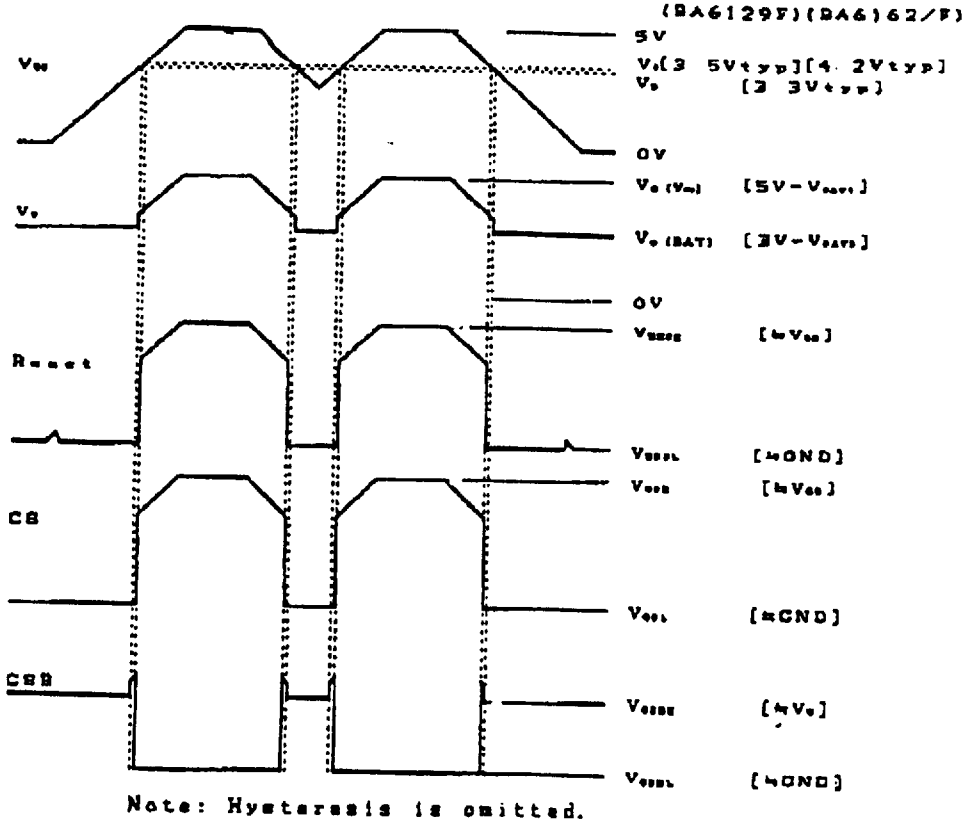

Figure 3

●Application circuit

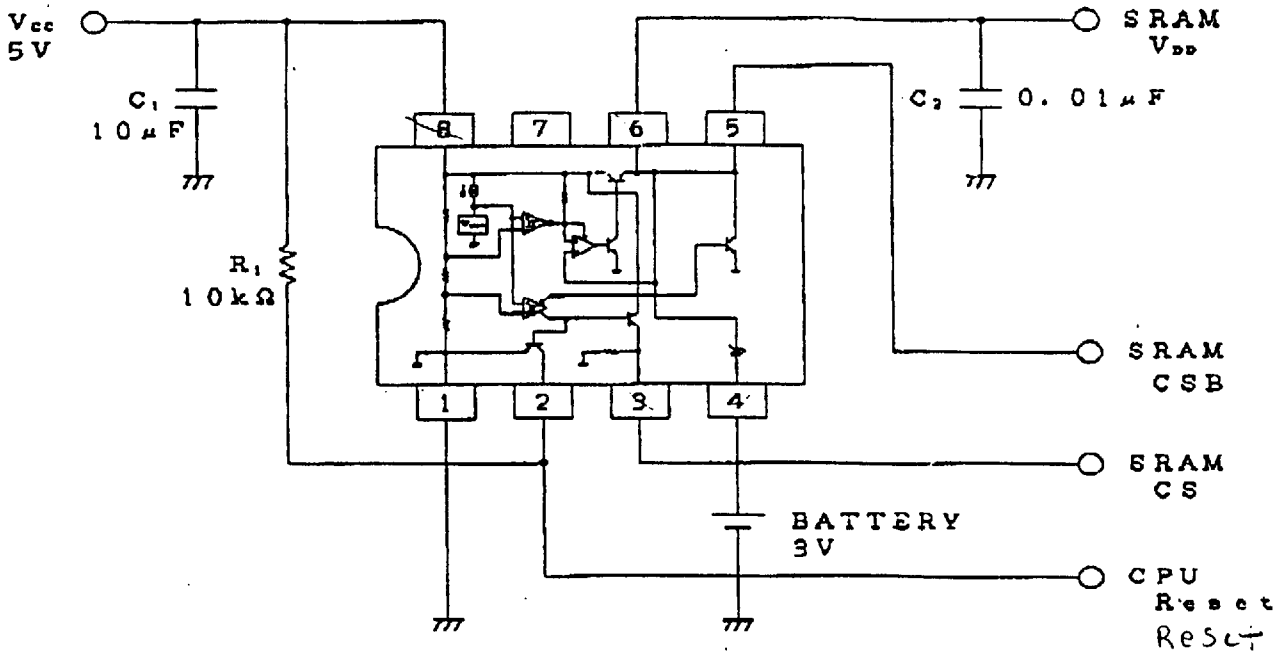

Figure 4

* Caution

1) Power Supply, V_{cc}

The BA6129F and BA6162/F are designed to operate with a V_{cc} of 5 volts. These devices may be operated at other voltages providing the following conditions are met.

$V_S + V_{SH} < V_{cc} < V_{cc}$ max

$V_{cc} - V_{BAT} < 5$ V

V_S= Detection Voltage

V_{SH} = Switching Voltage Hysteresis

2) Battery Voltage, V_{BAT}

The BA6129F and BA6162/F are designed to operate with a V_{BAT} voltage of 3 volts. These devices may be operated at other voltages providing the following conditions are met.

$V_{BAT} < V_S$

$V_{cc} - V_{BAT} < 5$ V