

### General Description

The AP061C series is a series of high-precision voltage detectors developed using CMOS process. The detection voltage is fixed internally with an accuracy of  $\pm 2.0\%$ . Two output forms, Nch open-drain and CMOS output, are available. Ultra-low current consumption and miniature package lineup can meet demand from the portable device applications.

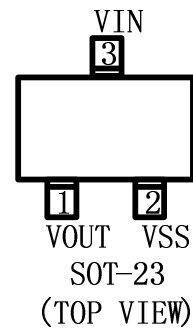
### Applications

- Battery checkers
- Power failure detectors
- Power monitor for portable equipments such as pagers, calculators, electronic notebooks and remote controllers.
- Constant voltage power monitor for cameras, video equipments and communication devices.
- Power monitor for microcomputers and reset for CPUs.

### Features

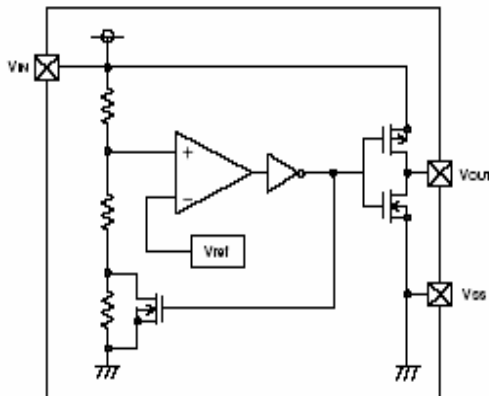
- Ultra-low current consumption  $0.8 \mu\text{A}$  typ. ( $V_{in}=1.5\text{V}$ )
- High-precision detection voltage  $\pm 2.0\%$
- Operating voltage range  $0.7\text{V}$  to  $8\text{V}$
- Detection voltage  $1.5\text{V}$  to  $6.0\text{V}$  ( $0.1\text{V}$  step)
- Output form Nch open-drain output (Active Low) or CMOS output (Active Low)
- Small package: SOT23-3

### Package

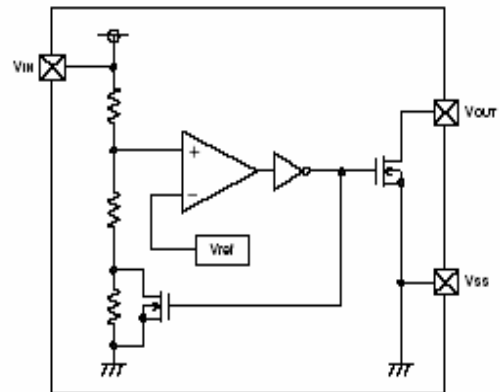


### Block Diagrams

(1) CMOS Output Products



(2) Nch Open-drain Output Products

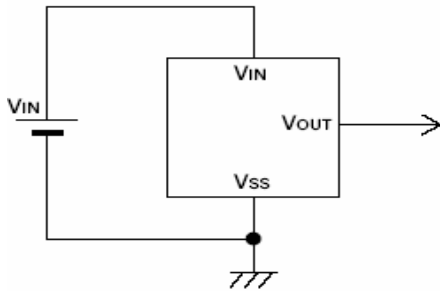


### Order Information

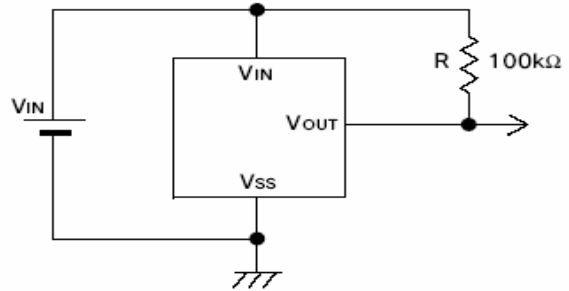
Part Number	Top Mark	Package	Description
AP061CC2502MR	AKXY	SOT23-3L	2.5V CMOS output
AP061CC2702MR	AMXY	SOT23-3L	2.7V CMOS output
AP061CC2802MR	ANXY	SOT23-3L	2.8V CMOS output
AP061CC3302MR	ASXY	SOT23-3L	3.3V CMOS output
AP061CC4302MR	AcXY	SOT23-3L	4.3V CMOS output

AP061CN3302MR	BSXY	SOT23-3L	3.3V Nch Open-Drain output
AP061CN3002MR	BPXY	SOT23-3L	3.0V Nch Open-Drain output
AP061CN2502MR	BKXY	SOT23-3L	2.5V Nch Open-Drain output
AP061CN2702MR	BMXY	SOT23-3L	2.7V Nch Open-Drain output
AP061CN3602MR	BVXY	SOT23-3L	3.6V Nch Open-Drain output
AP061CN4202MR	BbXY	SOT23-3L	4.2V Nch Open-Drain output

## Typical Application Circuit



CMOS Output



Nch Open-drain Output

## Absolute Maximum Ratings

Ta=25°C

Item	Symbol	Absolute maximum ratings	unit
Power supply voltage	Vin	8	V
Output current	Iout	50	mA
Output voltage	CMOS	Vss-0.3~Vin+0.3	V
	N-ch	Vss-0.3~8	
Power dissipation	SOT23-3	150	mW
	SOT89-3	500	
	SSOT-24	150	
	TO-92	300	
Operating ambient temperature	Topr	-40~+85	°C

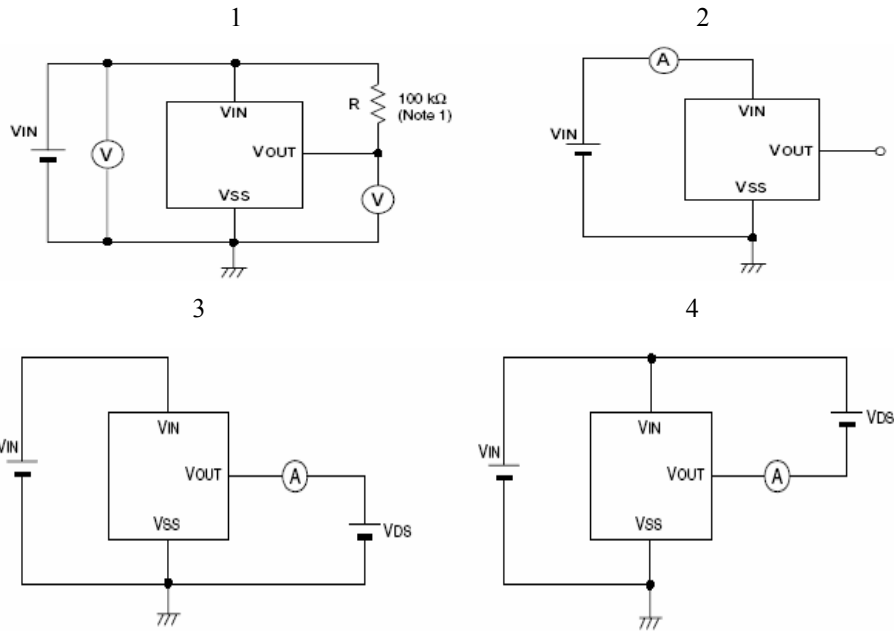
## Electrical Characteristics

VDF (T) = 1.6 to 6.0V ±2%

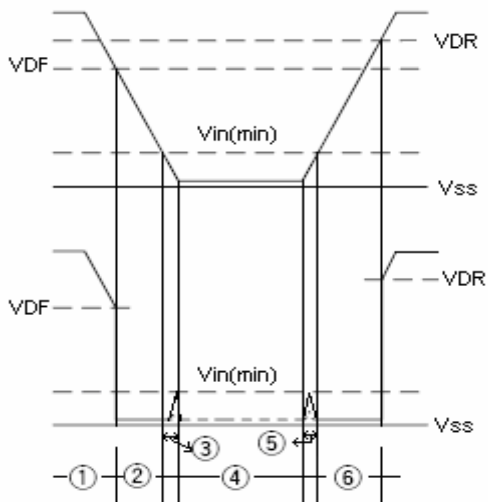
Item	Symbol	Condition	Min.	Typ.	Max.	unit	Test circuit
Detection voltage	VDF		VDF x0.98	VDF	VDF x1.02	V	1
Release voltage	VHYS		VDF x0.02	VDF x0.05	VDF x0.08	V	1
Current consumption	Iss	Vin=1.5V		0.8	2.4	uA	2
		=2.0V		0.9	2.8		
		=3.0V		1.0	3.1		
		=4.0V		1.1	3.3		
		=5.0V		1.2	3.7		
Operating voltage	Vin	VDF=1.60~6.0V	0.7		8	V	1
		Nch Vin=1.0V	1.0	2.2			

Output current	Iout	Vds=0.5V	Vin=2.0V	3.0	7.7		mA	3
			Vin=3.0V	5.0	10.1			
			Vin=4.0V	6.0	11.5			
			Vin=5.0V	7.0	13.0			
			Pch vds=2.1 vin=8.0		-10	-2		4
temperature coefficient		-40~+85°C		±100			ppm/°C	

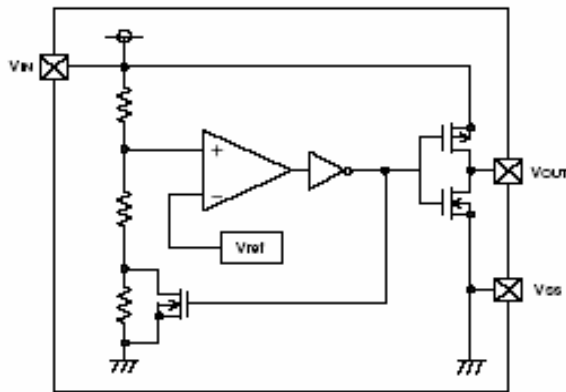
## Test circuit



## Timing Chart



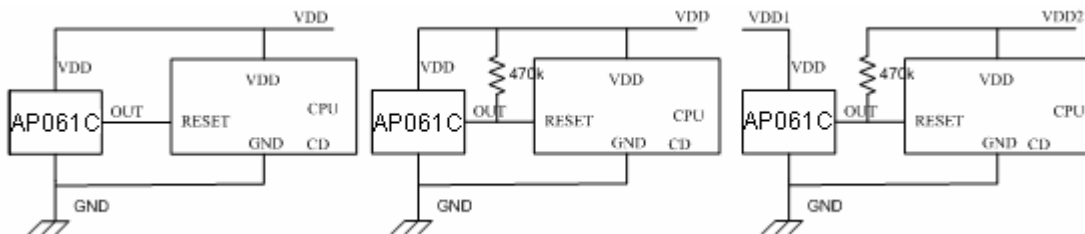
## Operation



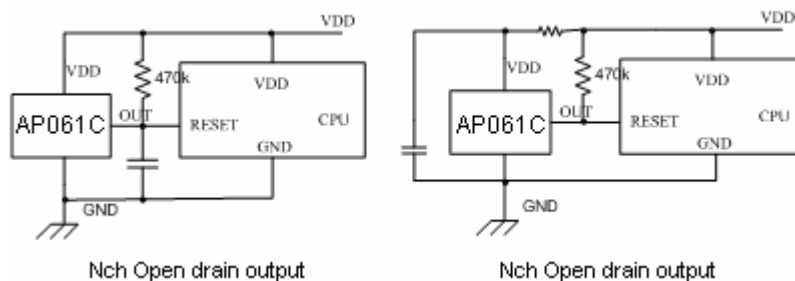
- 1-1. When the power supply voltage (VDD) is higher than the release voltage (VDF), the Nch transistor is OFF and the Pch transistor is ON to provide VDD (high) at the output.
- 1-2. When the power supply voltage (VDD) is lower than the release voltage (VDF), the Nch transistor is ON and the Pch transistor is OFF to provide VSS (low) at the output.
- 1-3. When the VDD falls below the minimum operating voltage, the output becomes undefined, or goes to the VDD when the output is pulled up to the VDD.
- 1-4. The VSS level appears when the VDD is VSS level.
- 1-5. The VSS level appears when the VDD rises above the minimum operating voltage. The VSS level still appears even when the VDD surpasses  $-VDF$ , as long as it does not exceed the release voltage  $+VDF$ .
- 1-6. When the VDD rises above  $+VDF$  the Nch transistor becomes OFF and the Pch transistor becomes ON to provide VDD level at the output.

## Application Circuit Examples

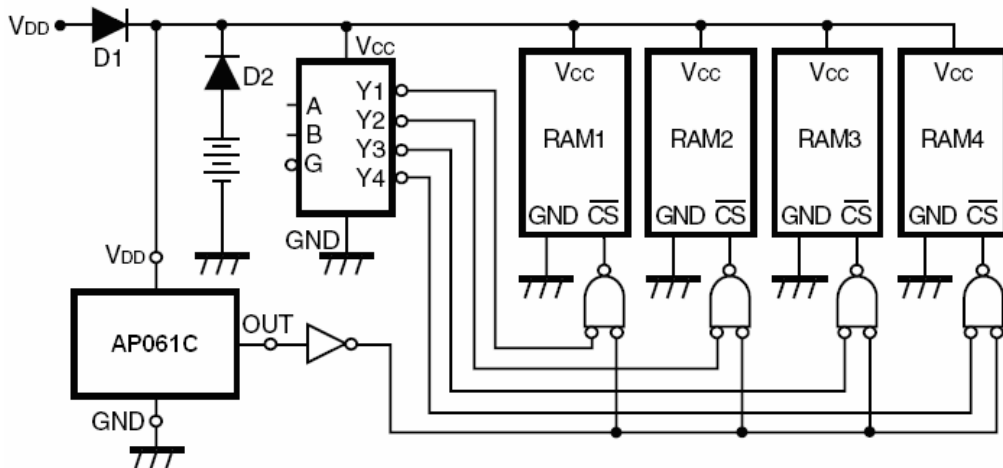
### • Microcomputer Reset Circuits



### • Power-on Reset Circuit

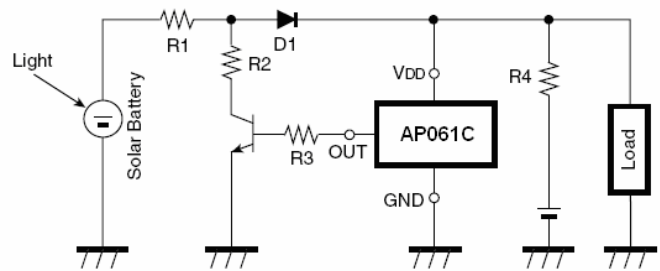
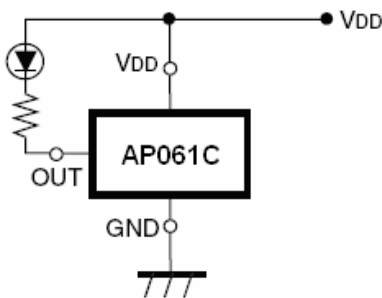


### • Memory back-up circuit

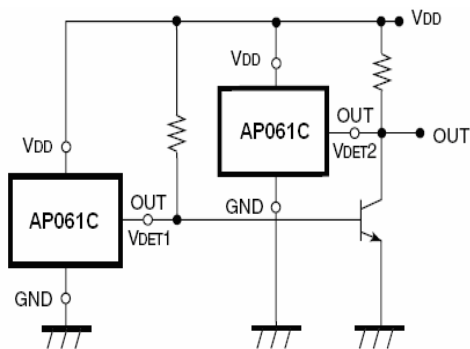


### • Overcharge protect circuit

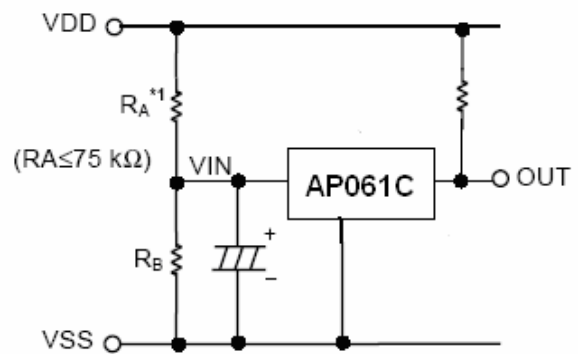
### • Power failure detectors



### • Window Comparator Circuit

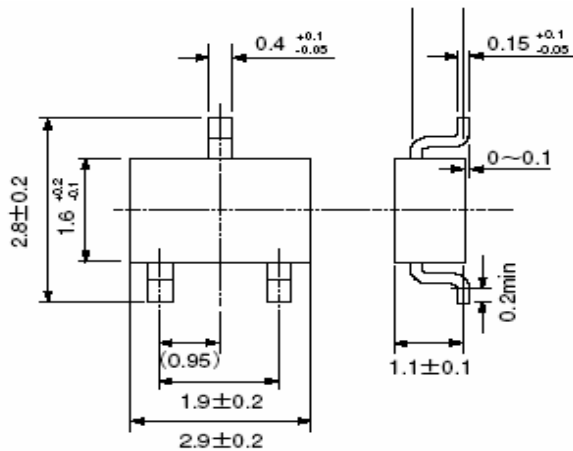


### • Detector Adjustable Circuit



## PACKAGE INFORMATION

SOT23-3L



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