

#### **Features**

- Low power consumption
- Low temperature coefficient
- Built-in hysteresis characteristic
- High input voltage (up to 8V)
- Output voltage accuracy:

 $\pm 2\%$ @VDET $\geqslant$ 2.5mV

 $\pm$ 50mV@VDET<2.5mV

SOT23-3 and SOT23 package

### **Applications**

- Battery checkers
- Level selectors
- Power failure detectors
- Microcomputer reset
- Battery memorybackup
- Non-volatile RAM signal storage protectors

### **General Description**

The HE61C series devices are a set of three terminal low power voltage detectors implemented in CMOS technology. Each voltage detector in the series detects a particular fixed voltage ranging from 0.9V to 5.0V. The voltage detectors consist of a high-precision and low power consumption standard voltage source as well as a comparator,

hysteresis circuit, and an output driver (CMOS inverter or NMOS open drain). CMOS technology ensures low power consumption.

Although designed primarily as fixed voltage detectors, these devices can be used with external components to detect user specified threshold voltages.

### **Selection Table**

Part No.	Det. Voltage	Hys. Width	Output	Tolerance	Package
HE61CC0902MR	0.9V	4%	CMOS	$\pm 50 \text{mV}$	
HE61CN0902MR	0.9V	4%	NMOS	$\pm 50 \text{mV}$	
HE61CC1002MR	1.0V	4%	CMOS	±50mV	
HE61CN1002MR	1.0V	4%	NMOS	$\pm 50 \text{mV}$	
	•••		•••		
HE61CC2402MR	2.4V	4%	CMOS	$\pm 50 \text{mV}$	SOT23-3
HE61CN2402MR	2.4V	4%	NMOS	$\pm 50 \text{mV}$	SOT23
HE61CC2502MR	2.5V	4%	CMOS	±2%	
HE61CN2502MR	2.5V	4%	NMOS	±2%	
	•••		•••	±2%	
HE61CC5002MR	5.0V	4%	CMOS	±2%	
HE61CN5002MR	5.0V	4%	NMOS	±2%	

Ver1.1 1 Jul 26,2017



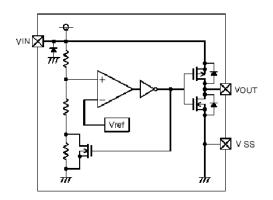
### **Order Information**

HE61C1234567

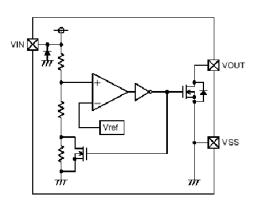
Designator	Symbol	Description
	С	CMOS output
(1)	N	NMOS output
23	VOUT	Output Voltage(0.9~5.0V)
45	02	Standard
6	М	Package:SOT23-3
6	N	Package:SOT23
7	R	RoHS/Pb Free
	G	Halogen Free

## **Block Diagram**

### (1) CMOS Output



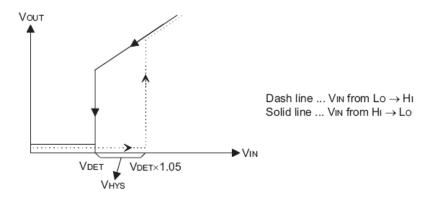
### (2) N-ch Open Drain Output



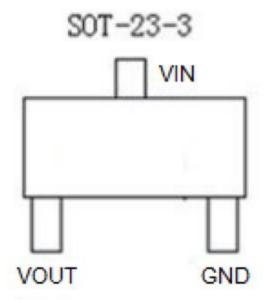


# **Output Table & Curve**

$V_{DD}$	V <sub>DD</sub> >V <sub>DET</sub> (+)	V <sub>DD</sub> ≪V <sub>DET</sub> (-)
V <sub>OUT</sub>	Hi-Z	V <sub>SS</sub>

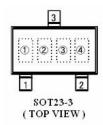


## **Pin Assignment**





## **Marking Rule**



# ① Represents integer of detect voltage and CMOS Output

MARK	CONFIGURATION	VOLTAGE (V)
А	CMOS	0.X
В	CMOS	1.X
С	CMOS	2.X
D	CMOS	3.X
Е	CMOS	4.X
F	CMOS	5.X
H	CMOS	6.X

#### N-Channel Open Drain Output

MARK	CONFIGURATION	VOLTAGE (V)
K	N-ch	0.X
Ē	N-ch	1.X
М	N-ch	2.X
N	N-ch	3.X
Р	N-ch	4.X
R	N-ch	5.X
S	N-ch	6.X

#### ②Represents decimal number of detect voltage

MARK	VOLTAGE (V)	MARK	VOLTAGE (V)
0	X.0	5	X.5
1	X.1	6	X.6
2	X.2	7	X.7
3	X.3	8	X.8
4	X.4	9	X.9

#### ③ Represents accuracy

MARK	ACCURACY
3	2%
1	1%

(Represents production lot number Based on the internal standard. (G, I, J, O, Q, W excepted)



### **Absolute Maximum Ratings**

Supply Voltage ......-0.3 V to 8 V Storage Temperature .....-50  $^{\circ}$ C to 125  $^{\circ}$ C Operating Temperature .....-40  $^{\circ}$ C to 85  $^{\circ}$ C

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

### **Thermal Information**

Symbol	Parameter	Package	Max.	Unit
θ ЈА	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT23-3	500	°C/W
P <sub>D</sub>	Power Dissipation	SOT23-3	0.20	W

Note:  $P_D$  is measured at  $Ta = 25 ^{\circ}C$ 

### **Electrical Characteristics**

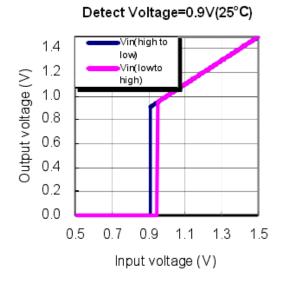
 $V_{DF}=0.8V\sim5.0V$  Ta=25°C

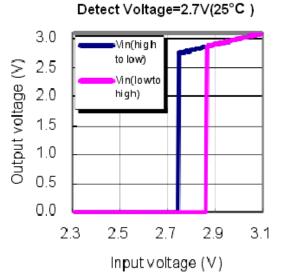
Symbol	Parameter	Te	est Conditions	Min.	Тур.	Max.	Unit
	Datastian Valtaga	V	<sub>DF</sub> =0.9V~2.4V	V <sub>DET</sub> -0.05	$V_{DET}$	V <sub>DET</sub> +0.05	V
V <sub>DET</sub>	Detection Voltage	V	<sub>DF</sub> =2.5V~5.0V	V <sub>DET</sub> *0.98	$V_{DET}$	V <sub>DET</sub> *1.02	V
V <sub>HYS</sub>	Hysteresis Width		-	0.02*V <sub>DET</sub>	0.05*V <sub>DET</sub>	0.10*V <sub>DET</sub>	V
		Vin=1.5V		-	0.7	2.3	μА
		Vin=2.0V		-	0.8	2.7	
$I_{DD}$	Operating Current	Vin=3.0V		-	0.9	3.0	
		Vin=4.0V		-	1.0	3.2	
			Vin=5.0V	-	1.1	3.6	
$V_{DD}$	Operating Voltage	-	-	0.7	-	10	V
loL	Output Sink Current	2V	V <sub>OUT</sub> =0.2V	0.5	1	-	mA
$rac{\Delta V_{DET}}{V_{DF}\Delta T_a}$	Temperature Coefficient	-	-25℃ <ta<125℃< td=""><td>-</td><td>±100</td><td>-</td><td>ppm/°C</td></ta<125℃<>	-	±100	-	ppm/°C



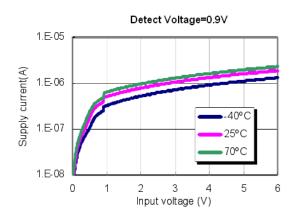
### **Typical Performance Characteristics**

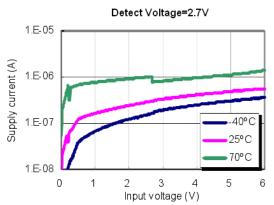
(1) Output Voltage vs Input voltage





(2) Supply Current vs. Input Voltage





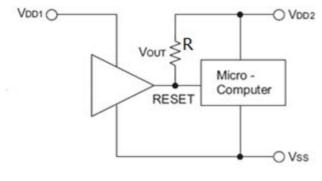


## **Application Circuits**

### **Microcomputer Reset Circuit**

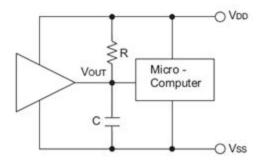
Normally a reset circuit is required to protect the microcomputer system from malfunctions due to power line interruptions. The following examples show how different output configurations perform a reset function in various systems.

NMOS open drain output application for separate power supply



R=47K

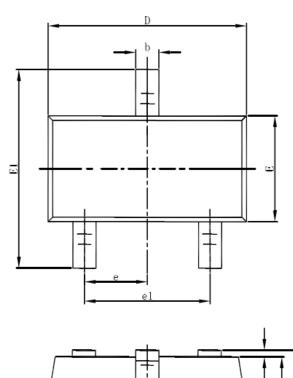
NMOS open drain output application with R-C delay

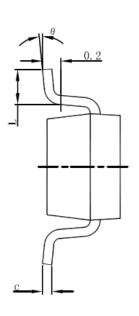




# **Package Information**

# 3-pin SOT23-3 Outline Dimensions

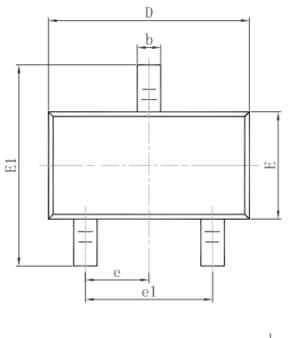


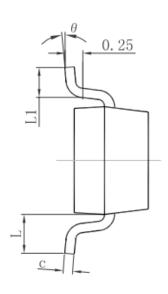


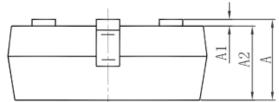
Cumb ol	Dimensions Ir	n Millimeters	Dimensions	In Inches
Symbol	Min	Max	Min	Max
Α	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
С	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
е	0.950	0.950(BSC)		BSC)
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



## 3-pin SOT23 Outline Dimensions







Symbol	Dimensions	Dimensions In Millimeters		s In Inches
Symbol	Min.	Max.	Min.	Max.
Α	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
С	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
е	0.950 TYP.		0.037	TYP.
e1	1.800	2.000	0.071	0.079
L	0.550	REF.	F. 0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

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