Ultra Low Power Voltage Detector

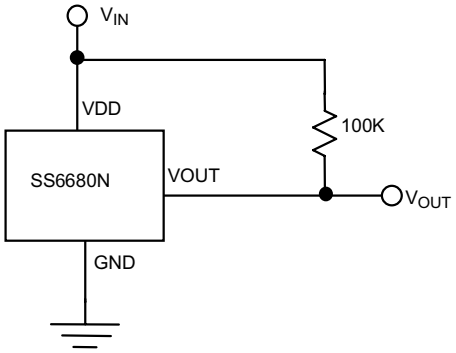
FEATURES

- Ultra-Low Quiescent Current.
- 1.5V to 10.0V Input Voltage Operation.
- Flexible Detection Voltage Setting
  0.1V Step in the Range of 1.6V to 6.0V
- High Detection Voltage Accuracy at ±2.5%.
- Built-In Detection Voltage Hysteresis.
- Three Output Types: N-ch, P-ch and CMOS.
- Space Saving Packages: TO-92, SOT-89, SOT-23 and SOT23-5.

APPLICATIONS

- Battery Checker for Battery-Operated Systems.
- CPU & Logic Circuit Reset.
- Memory Back-up Circuit.
- Level Discriminator.
- Power Failure Detector.

TYPICAL APPLICATION CIRCUIT



Voltage Level Indicator
(N-ch Open-Drain Output)

DESCRIPTION

The SS6680 is an accurate, ultra-low power consumption voltage detector IC, fabricated with advanced CMOS process. The SS6680 consists of a comparator, a voltage reference unit, a resistor divider, two output drivers, and a hysteresis circuit.

The consumption current is so low that it can often be ignored when compared to the battery self-discharge current. The values of detection and hysteresis voltage are set internally and are accurately controlled by trimming techniques. There are three types of output: N-ch open-drain, P-ch open-drain, and CMOS. Four types of package, TO-92, SOT-89, SOT-23 and SOT-23-5, are available to save board space.

ORDERING INFORMATION

SS6680X-XXCXXX

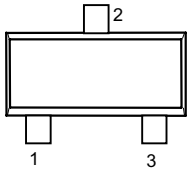
- PACKING TYPE
  - TR: TAPE & REEL
  - TB: TUBE
  - BG: BAG
- PACKAGE TYPE
  - U: SOT-23
  - X: SOT-89
  - Z: TO-92
  - V:SOT-23-5
- DETECTION VOLTAGE OPTIONAL
  - 16: 1.6V
  - 17: 1.7V
  - :
  - :
  - 60: 6.0V
- OUTPUT TYPE
  - N: N-ch Open Drain
  - P: P-ch Open Drain
  - C: CMOS

Example: SS6680N-16CUTR

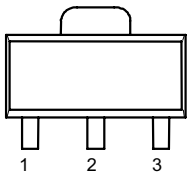
→ N-ch open drain version, in SOT-23 Package & Tape & Reel Packing Type

PIN CONFIGURATION

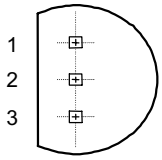
SOT-23
FRONT VIEW
1: VOUT
2: VDD
3: GND



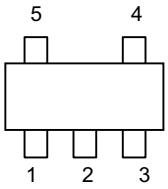
SOT-89
FRONT VIEW
1: VOUT
2: VDD
3: GND



TO-92
FRONT VIEW
1: VOUT
2: VDD
3: GND



SOT-23-5
FRONT VIEW
1: VOUT
2: VDD
3: GND
4: NC
5: NC



ABSOLUTE MAXIMUM RATING

Supply Voltage (VDD) 10V

Output Voltage ..... V_{DD}-0.3 to 10V

Operating Temperature Range ..... -30°C ~ 80°C

Storage Temperature Range ..... - 65°C ~ 150°C

Lead Temperature (Soldering) 10 sec. .....260°C

Output Current 20mA

ELECTRICAL CHARACTERISTICS (T_A=25°C)

PARAMETER	TEST CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Detector Voltage		V_{DET}	0.975	1.0	1.025	V_{DET}
Detector Threshold Hysteresis		V_{HYS}	0.03	0.05	0.07	V_{DET}
Supply Current	V_{DD}=2.0V	I_{DD}		0.7	1.1	µA
	V_{DD}=3.0V			0.9	1.5	
	V_{DD}=4.5V			1.3	2.0	
	V_{DD}=6.0V			1.8	2.7	
	V_{DD}=10.0V			3.2	4.8	
Operation Voltage		V_{DD}	1.5		10	V
Output Current	V_{DS}=0.5V, V_{DD}=2.4V	I_{OUT} (Nch)		3.24		mA
	V_{DS}=0.5V, V_{DD}=3.6V			5.85		
	V_{DS}=0.5V, V_{DD}=4.6V			7.74		
	V_{DS}=0.5V, V_{DD}=6.0V			10.44		
Output Current	V_{DS}=-2.1V, V_{DD}=4.5V	I_{OUT} (Pch)		3.5		mA
Temperature Coefficience				±150		ppm/°C
Output Delay Time		T_{DELAY}			200	µS

TYPICAL PERFORMANCE CHARACTERISTICS

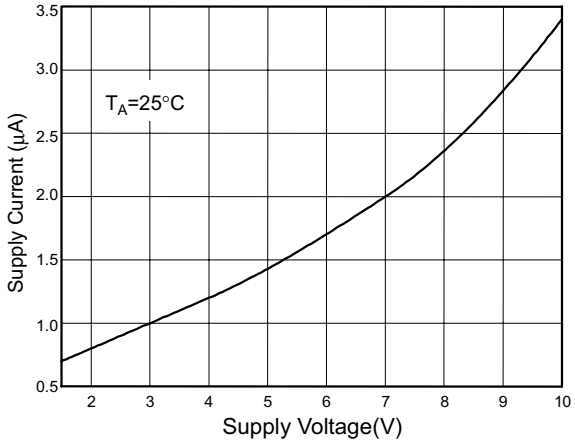


Fig. 1 Supply Current vs. Supply Voltage

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

N-ch Driver Sinking Current vs. V_{DS}

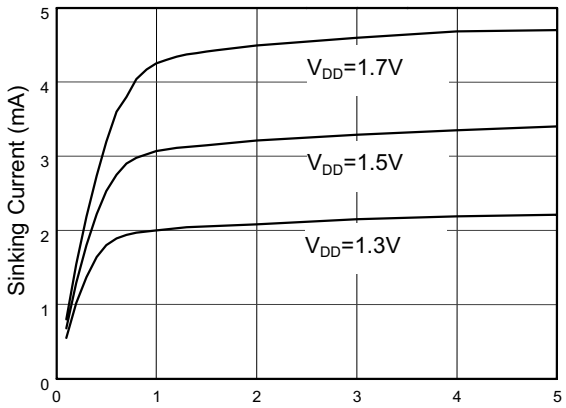


Fig. 2 V_{DET}=1.8V

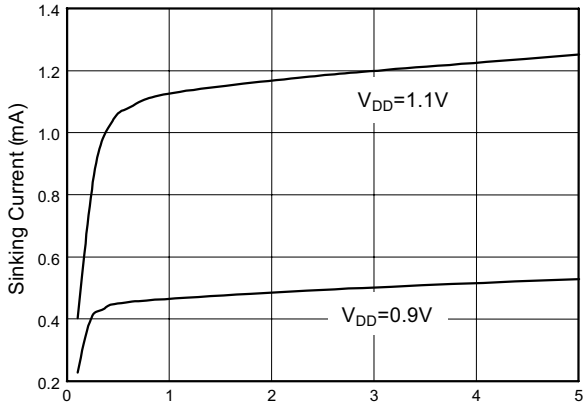


Fig. 3 V_{DET}=1.8V

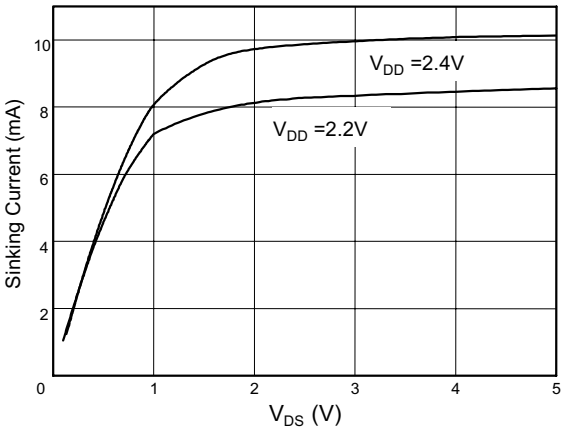


Fig. 4 V_{DET}=2.5V

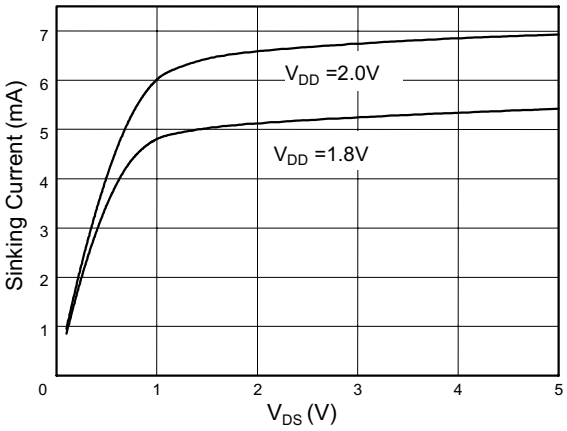


Fig. 5 V_{DET}=2.5V

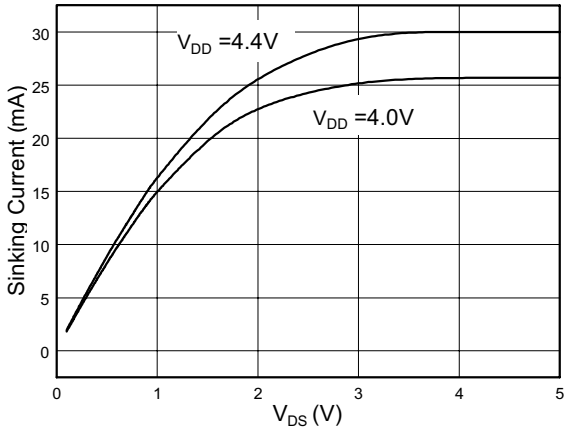


Fig. 6 V_{DET}=4.5V

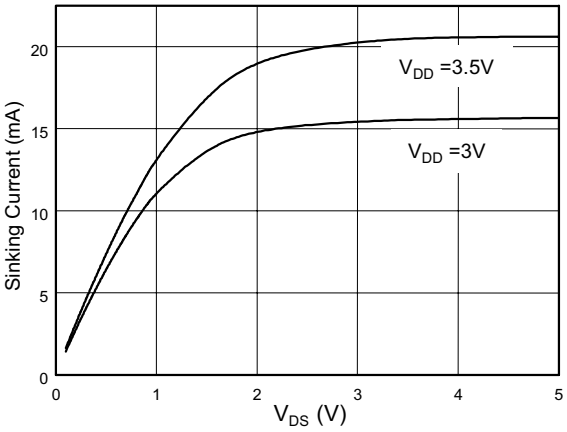


Fig. 7 V_{DET}=4.5V

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

P-ch Driver Output Current vs. V_{DS}

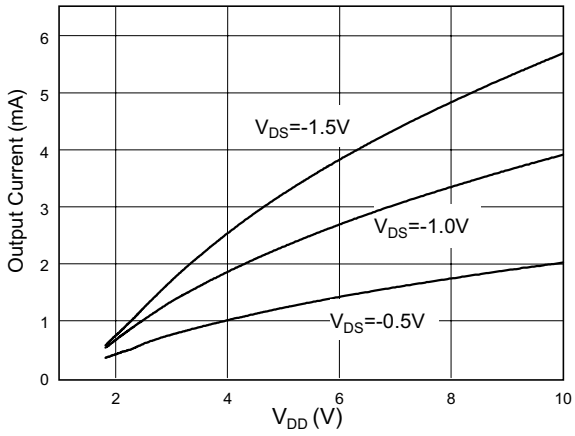


Fig. 8 V_{DET}=1.8V

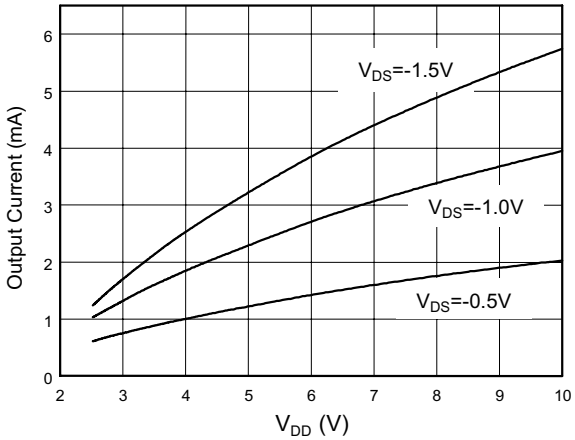


Fig. 9 V_{DET}=2.5V

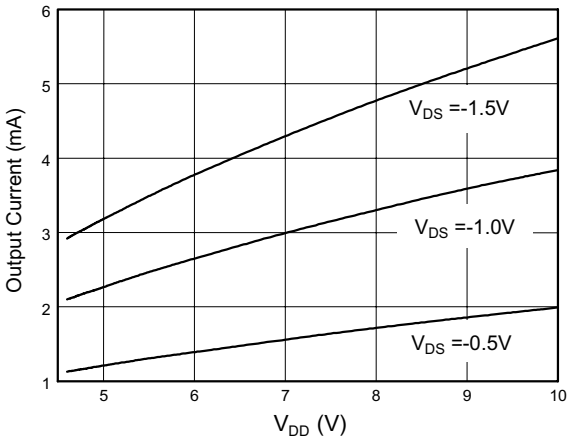
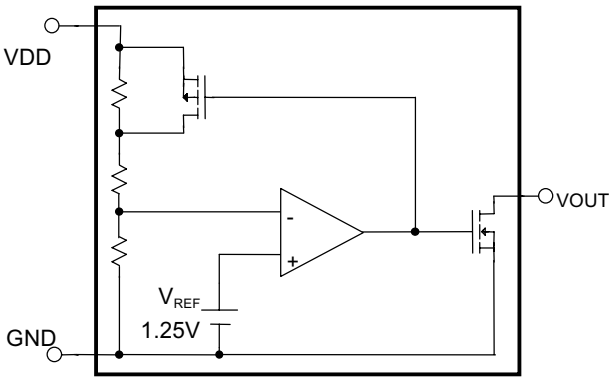
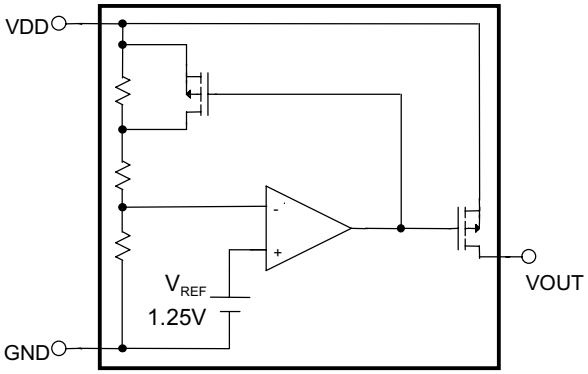


Fig. 10 V_{DET}=4.5V

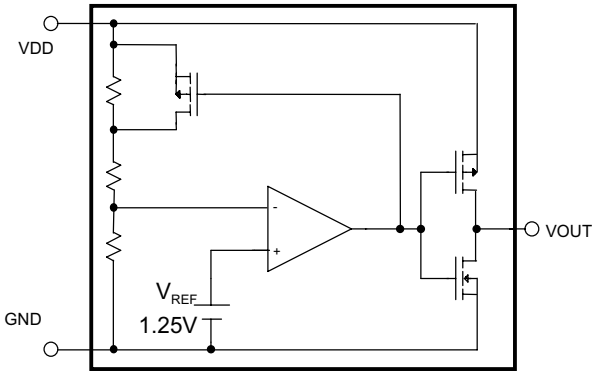
BLOCK DIAGRAM



N-ch open drain output



P-ch open drain output



CMOS output

PIN DESCRIPTIONS

VDD - Power Supply and Detected Voltage Input.

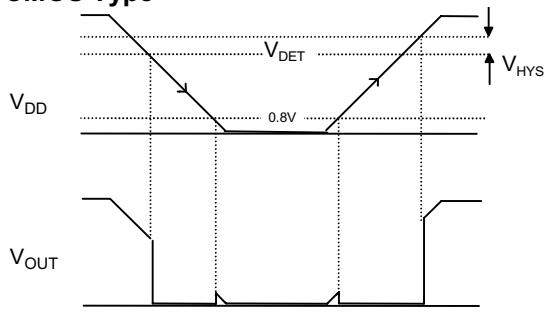
GND - Ground.

VOUT - Detector Output

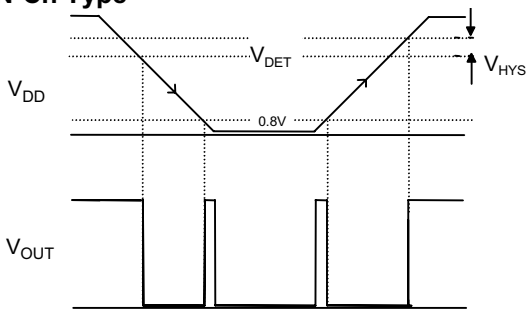
APPLICATION INFORMATIONS

The timing diagram of V_{DD} and V_{OUT} is shown as below:

CMOS Type



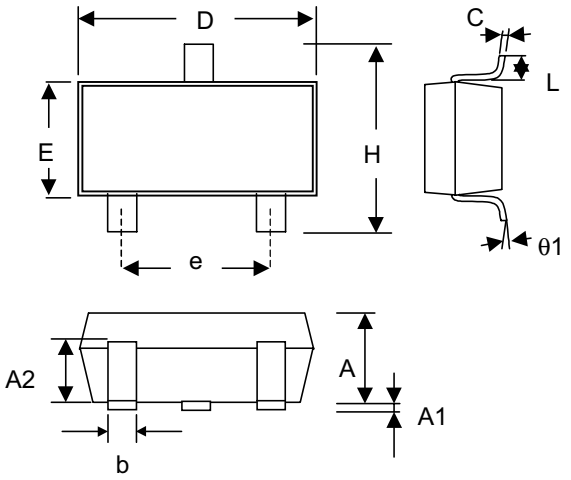
N-Ch Type



The guaranteed minimun operation voltage is 1.5V. As the supply voltage (V_{DD}) is reduced below 1.5V, the performance degrades, N-ch or P-ch driving capacity degrades, and the supply current decreases. SS6680 isn't functioning when V_{DD} down to 0.8V.

PHYSICAL DIMENSIONS

- **SOT-23 (unit: mm)**



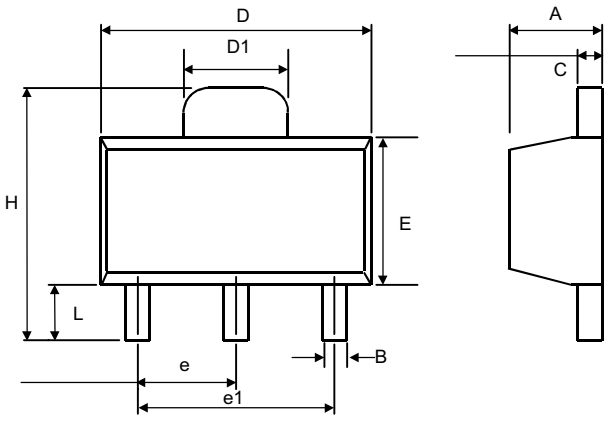
SYMBOL	MIN	MAX
A	1.00	1.30
A1	—	0.10
A2	0.70	0.90
b	0.35	0.50
C	0.10	0.25
D	2.70	3.10
E	1.40	1.80
e	1.90 (TYP)	
H	2.60	3.00
L	0.37	—
θ1	1°	9°

- **SOT-23 Marking**

Part No.	Marking
SS6680-N16CU	U16N
SS6680-P16CU	U16P
SS6680-C16CU	U16C
SS6680-N17CU	U17N
SS6680-P17CU	U17P
SS6680-C17CU	U17C
……. (0.1V INCREMENT)	

Part No.	Marking
SS6680-N59CU	U59N
SS6680-P59CU	U59P
SS6680-C59CU	U59C
SS6680-N60CU	U60N
SS6680-P60CU	U60P
SS6680-C60CU	U60C

- **SOT-89 (unit: mm)**



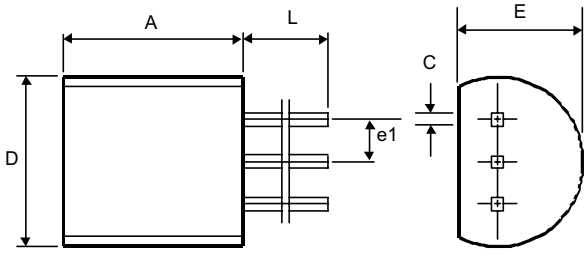
SYMBOL	MIN	MAX
A	1.40	1.60
B	0.36	0.48
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 (TYP.)	
e1	3.00 (TYP.)	
H	3.94	4.25
L	0.89	1.20

- **SOT-89 Marking**

Part No.	Marking
SS6680-N16CX	X16N
SS6680-P16CX	X16P
SS6680-C16CX	X16C
SS6680-N17CX	X17N
SS6680-P17CX	X17P
SS6680-C17CX	X17C
…… (0.1V INCREMENT)	

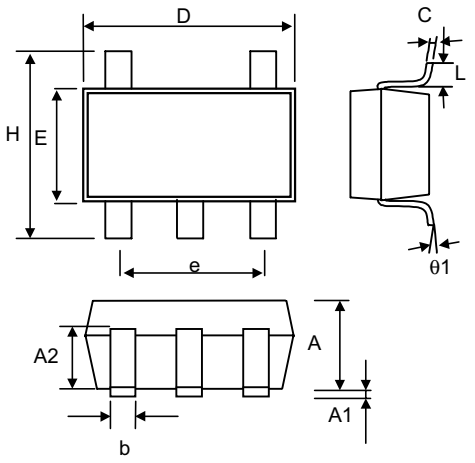
Part No.	Marking
SS6680-N59CX	X59N
SS6680-P59CX	X59P
SS6680-C59CX	X59C
SS6680-N60CX	X60N
SS6680-P60CX	X60P
SS6680-C60CX	X60C

- **TO-92 (unit: mm)**



SYMBOL	MIN	MAX
A	4.32	5.33
C	0.38 (TYP.)	
D	4.40	5.20
E	3.17	4.20
e1	1.27 (TYP.)	
L	12.7	-

- **SOT-23-5 (unit: mm)**



SYMBOL	MIN	MAX
A	1.00	1.30
A1	—	0.10
A2	0.70	0.90
b	0.35	0.50
C	0.10	0.25
D	2.70	3.10
E	1.40	1.80
e	1.90 (TYP)	
H	2.60	3.00
L	0.37	—
θ1	1°	9°

- **SOT-23-5 Marking**

Part No.	Marking
SS6680-N16CV	V16N
SS6680-P16CV	V16P
SS6680-C16CV	V16C
SS6680-N17CV	V17N
SS6680-P17CV	V17P
SS6680-C17CV	V17C
……. (0.1V INCREMENT)	

Part No.	Marking
SS6680-N59CV	V59N
SS6680-P59CV	V59P
SS6680-C59CV	V59C
SS6680-N60CV	V60N
SS6680-P60CV	V60P
SS6680-C60CV	V60C

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