

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 $\pm 2.5\%$.
- 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

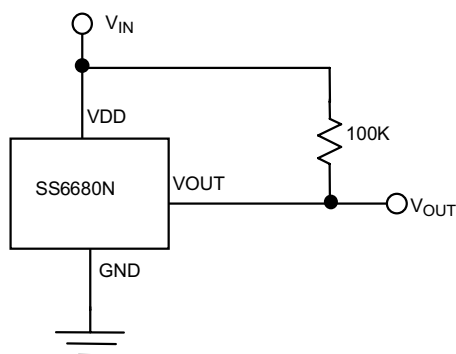
- Battery Checker for Battery-Operated Systems.
- CPU & Logic Circuit Reset.
- Memory Back-up Circuit.
- Level Discriminator.
- Power Failure Detector.

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.

TYPICAL APPLICATION CIRCUIT



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

ORDERING INFORMATION

SS6680X-XXCXXX

PACKING TYPE
 TR: TAPE & REEL
 TB: TUBE
 BG: BAG

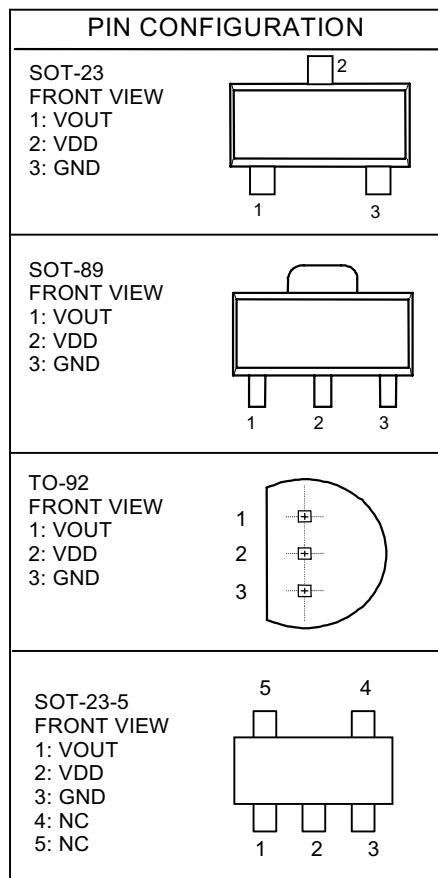
PACKAGE TYPE
 U: SOT-23
 X: SOT-89
 Z: TO-92
 V: SOT-23-5

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



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 ($T_A=25^{\circ}\text{C}$)

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	$V_{DD}=2.0\text{V}$ $V_{DD}=3.0\text{V}$ $V_{DD}=4.5\text{V}$ $V_{DD}=6.0\text{V}$ $V_{DD}=10.0\text{V}$	I_{DD}		0.7 0.9 1.3 1.8 3.2	1.1 1.5 2.0 2.7 4.8	μA
Operation Voltage		V_{DD}	1.5		10	V
Output Current	$V_{DS}=0.5\text{V}, V_{DD}=2.4\text{V}$ $V_{DS}=0.5\text{V}, V_{DD}=3.6\text{V}$ $V_{DS}=0.5\text{V}, V_{DD}=4.6\text{V}$ $V_{DS}=0.5\text{V}, V_{DD}=6.0\text{V}$	$I_{OUT} (\text{Nch})$		3.24 5.85 7.74 10.44		mA
Output Current	$V_{DS}=-2.1\text{V}, V_{DD}=4.5\text{V}$	$I_{OUT} (\text{Pch})$		3.5		mA
Temperature Coefficient				± 150		ppm/ $^{\circ}\text{C}$
Output Delay Time		T_{DELAY}			200	μS

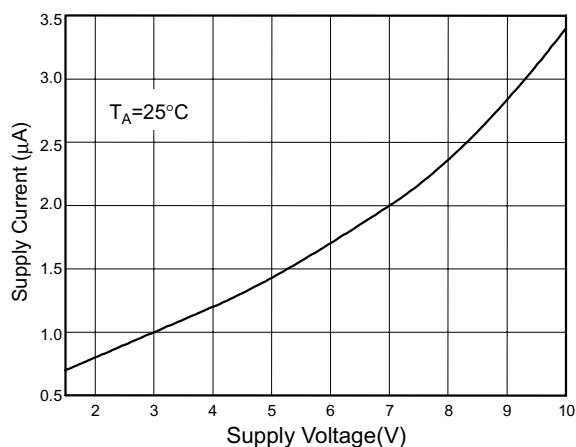
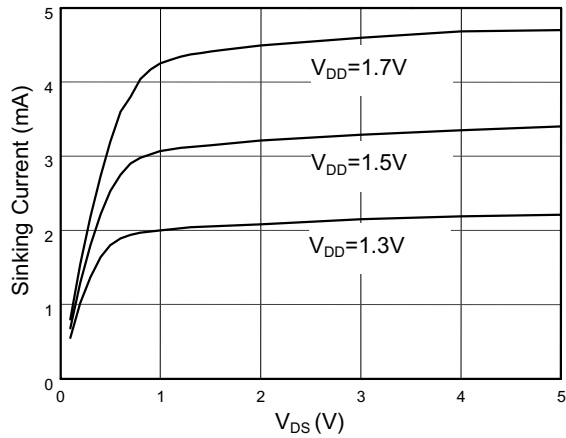
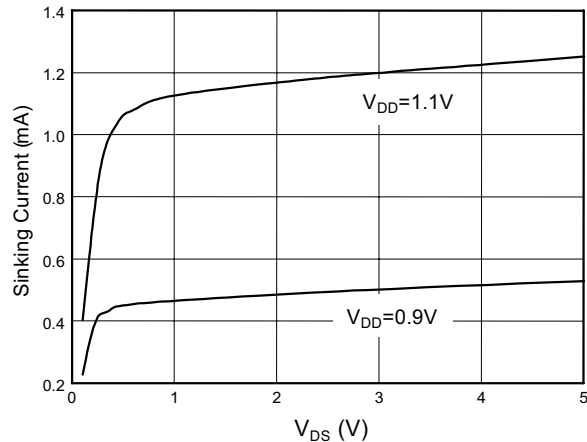
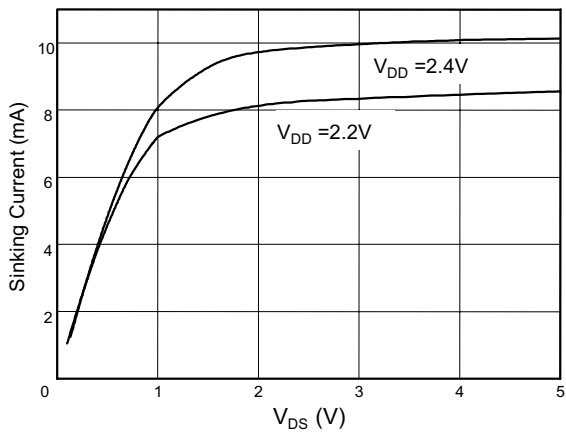
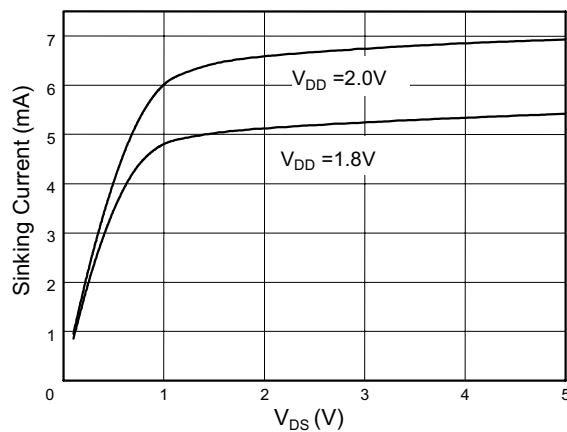
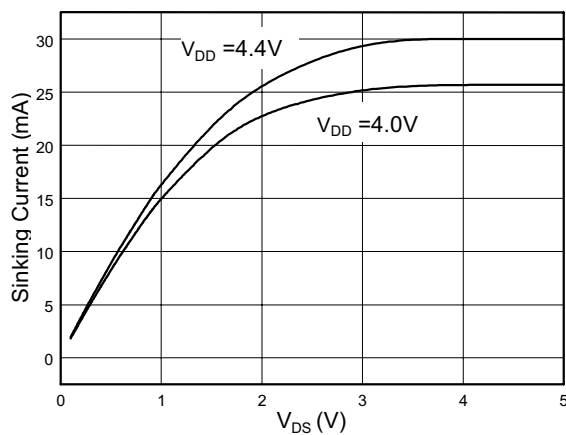
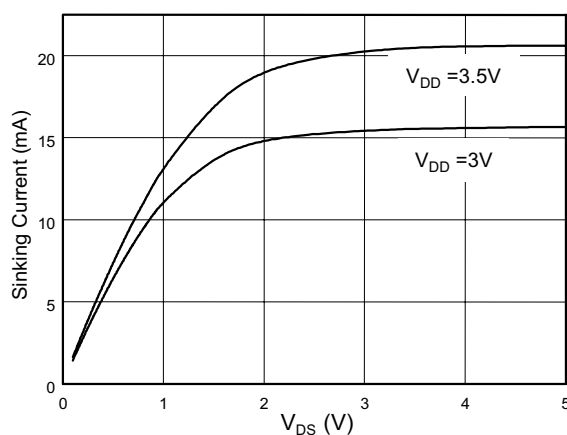
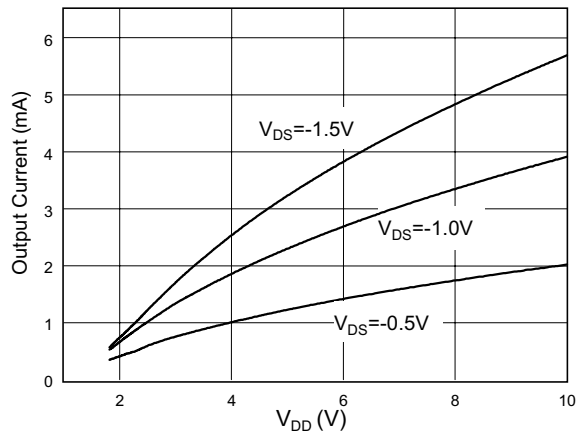
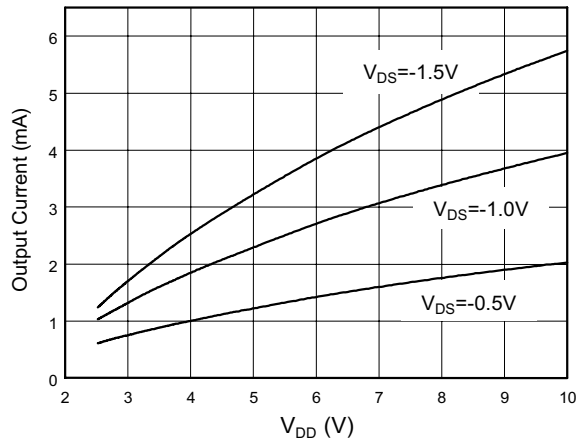
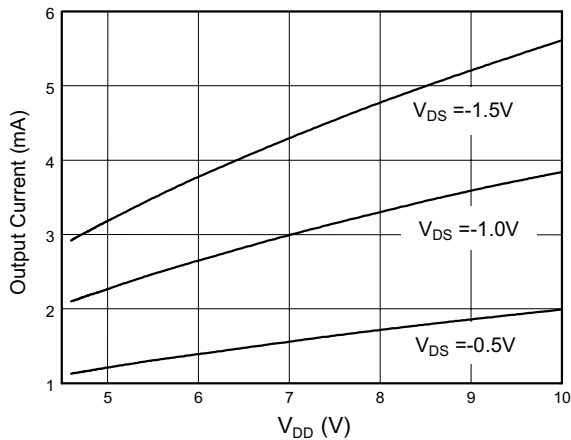
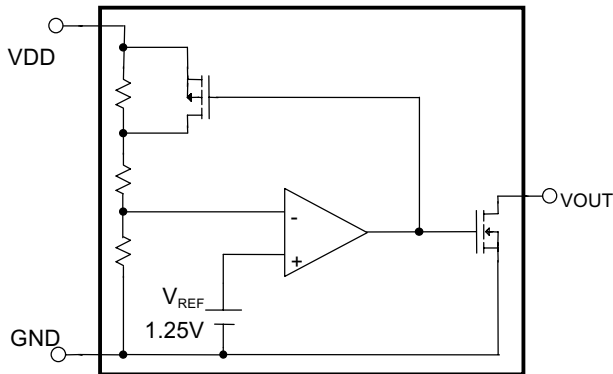
TYPICAL PERFORMANCE CHARACTERISTICS


Fig. 1 Supply Current vs. Supply Voltage

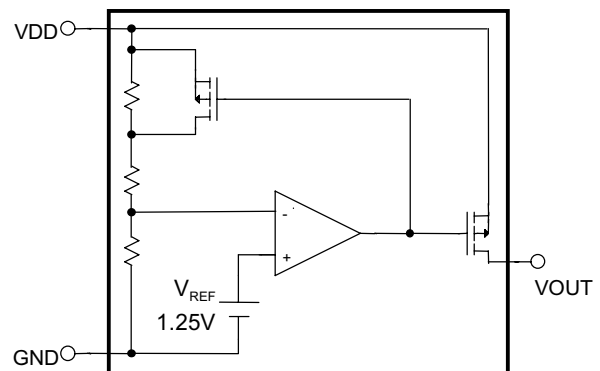
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)
N-ch Driver Sinking Current vs. V_{DS}

 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 $V_{DET}=4.5V$

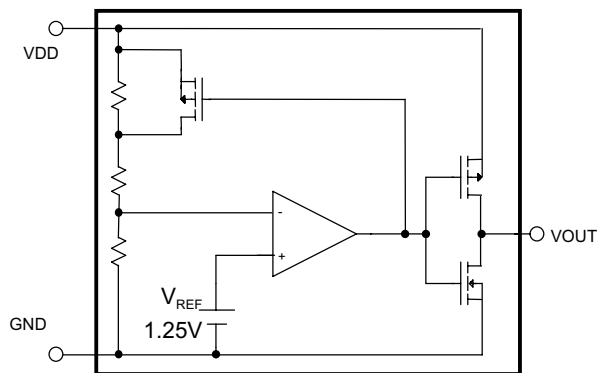
■ BLOCK DIAGRAM



N-ch open drain output



P-ch open drain output



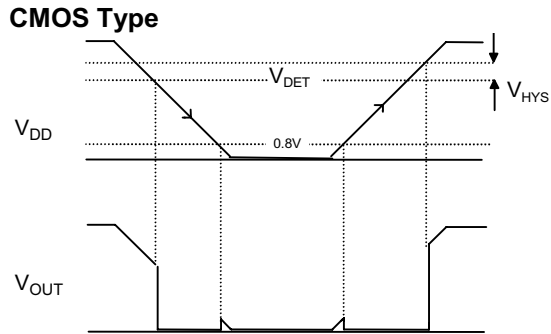
CMOS output

■ PIN DESCRIPTIONS

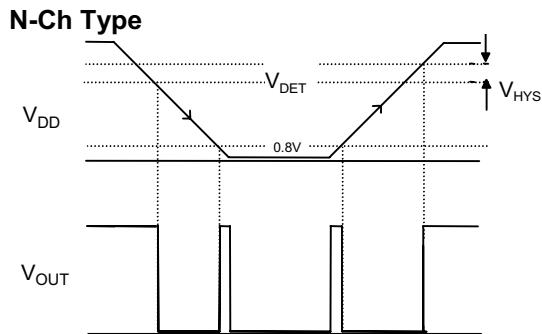
- VDD - Power Supply and Detected Voltage Input.
- GND - Ground.
- VOUT - Detector Output

■ APPLICATION INFORMATIONS

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

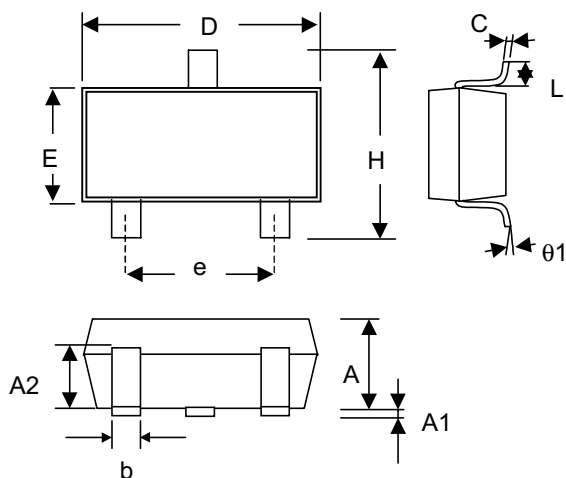


The guaranteed minimum operation voltage is 1.5V. As the supply voltage (V_{DD}) is reduced below 1.5V, the performance degrades, N-ch or P-ch driving capacity degrades, and the supply current decreases. SS6680 isn't functioning when V_{DD} down to 0.8V.



■ PHYSICAL DIMENSIONS

- SOT-23 (unit: mm)



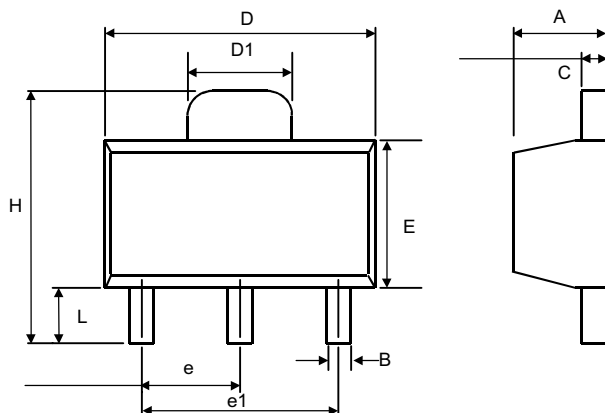
SYMBOL	MIN	MAX
A	1.00	1.30
A1	—	0.10
A2	0.70	0.90
b	0.35	0.50
C	0.10	0.25
D	2.70	3.10
E	1.40	1.80
e	1.90 (TYP)	
H	2.60	3.00
L	0.37	—
θ1	1°	9°

- 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)**



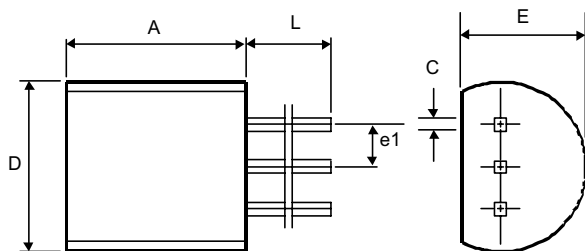
SYMBOL	MIN	MAX
A	1.40	1.60
B	0.36	0.48
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 (TYP.)	
e1	3.00 (TYP.)	
H	3.94	4.25
L	0.89	1.20

- **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)	

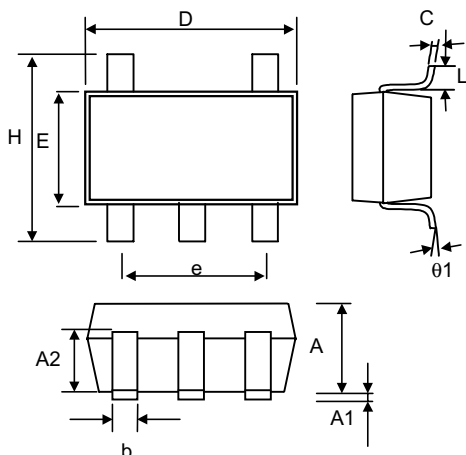
Part No.	Marking
SS6680-N59CX	X59N
SS6680-P59CX	X59P
SS6680-C59CX	X59C
SS6680-N60CX	X60N
SS6680-P60CX	X60P
SS6680-C60CX	X60C

- **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	—
$\theta 1$	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

Information furnished by Silicon Standard Corporation is believed to be accurate and reliable. However, Silicon Standard Corporation makes no guarantee or warranty, express or implied, as to the reliability, accuracy, timeliness or completeness of such information and assumes no responsibility for its use, or for infringement of any patent or other intellectual property rights of third parties that may result from its use. Silicon Standard reserves the right to make changes as it deems necessary to any products described herein for any reason, including without limitation enhancement in reliability, functionality or design. No license is granted, whether expressly or by implication, in relation to the use of any products described herein or to the use of any information provided herein, under any patent or other intellectual property rights of Silicon Standard Corporation or any third parties.