AIC1680

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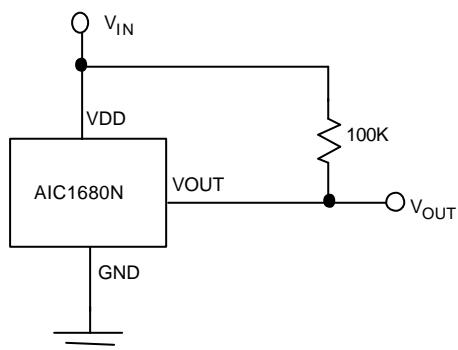
- Battery Checker for Battery-Operated Systems.
- CPU & Logic Circuit Reset.
- Memory Back-up Circuit.
- Level Discriminator.
- Power Failure Detector.

■ DESCRIPTION

The AIC 1680 is an accurate, ultra-low power consumption voltage detector IC, fabricated with advanced CMOS process. The AIC1680 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)

Analog Integrations Corporation   4F, 9 Industry E. 9th Rd, Science-Based Industrial Park, Hsinchu, Taiwan   DS-1680-01 012102
TEL: 886-3-5772500   FAX: 886-3-5772510   www.analog.com.tw

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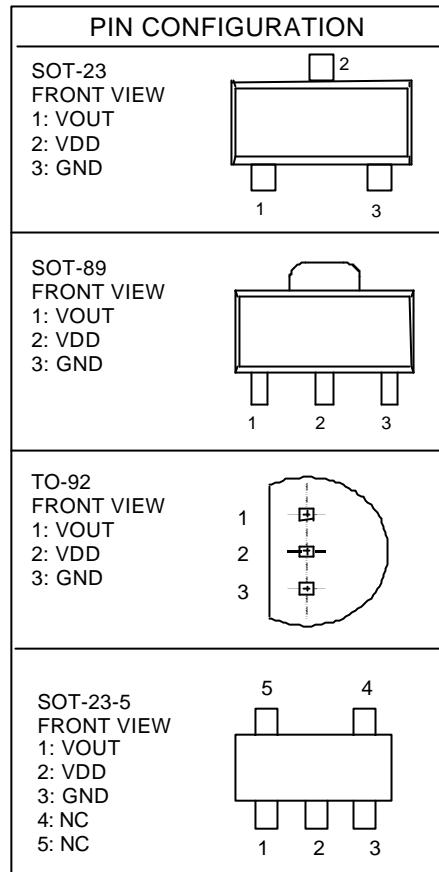
■ ORDERING INFORMATION

AIC1680X-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: AIC1680N-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
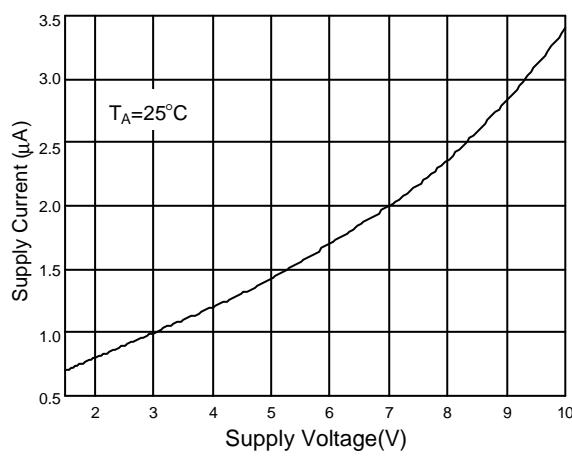
Fig. 1   Supply Current vs. Supply Voltage

■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

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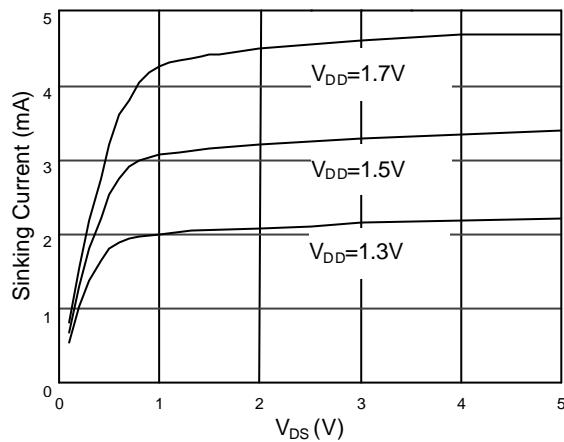

Fig. 2 V_{DET}=1.8V
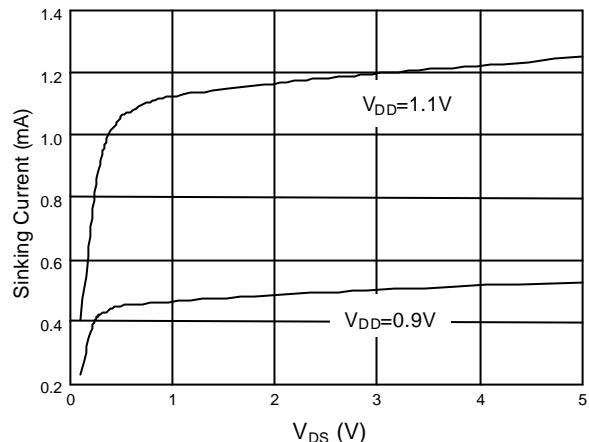

Fig. 3 V_{DET}=1.8V
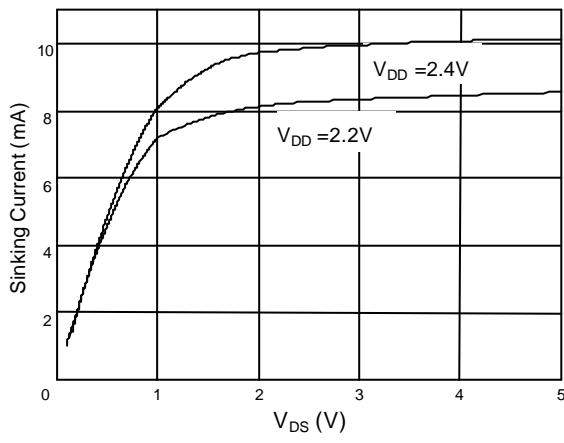

Fig. 4 V_{DET}=2.5V
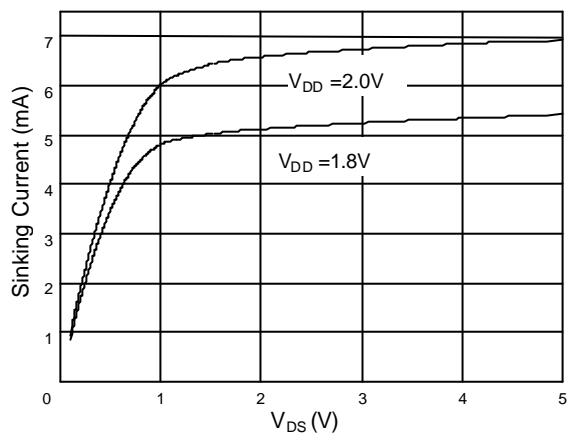
Fig. 5 V_{DET}=2.5V
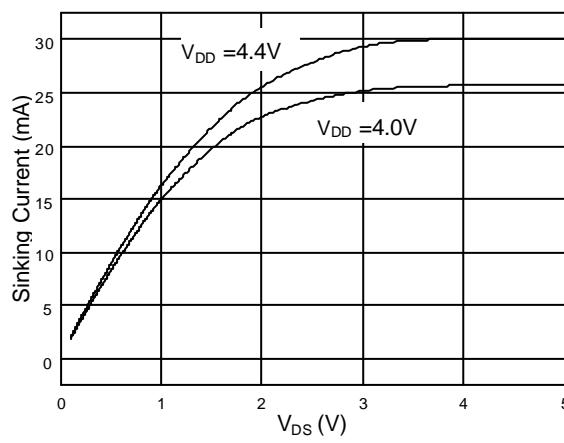

Fig. 6 V_{DET}=4.5V
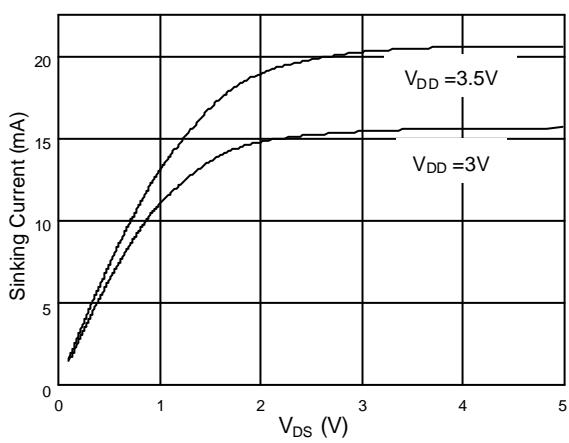
Fig. 7 V_{DET}=4.5V

■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

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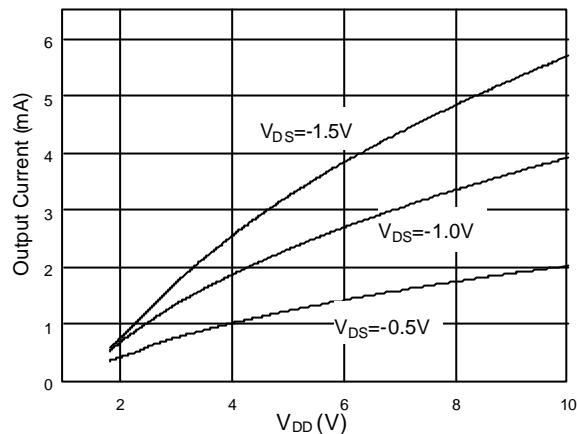

Fig. 8 V_{DET}=1.8V
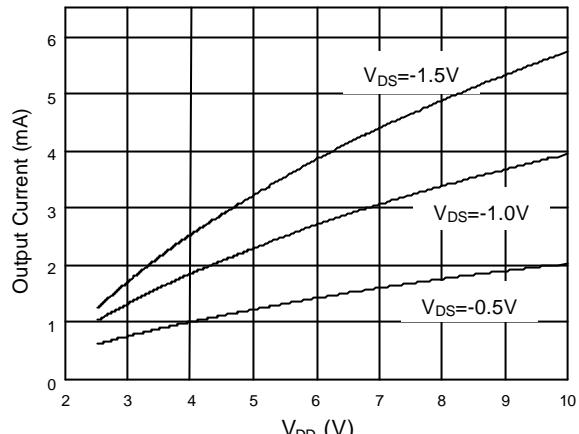
Fig. 9 V_{DET}=2.5V
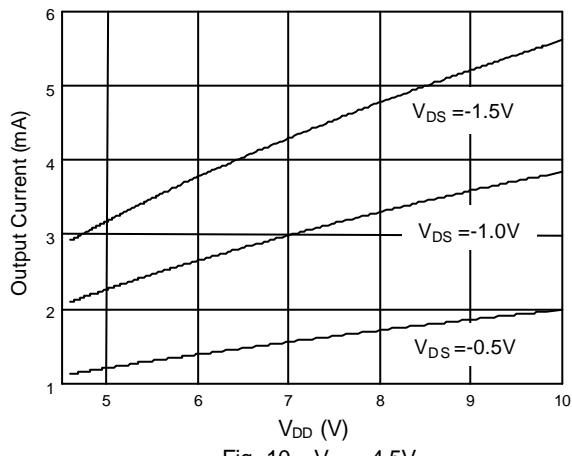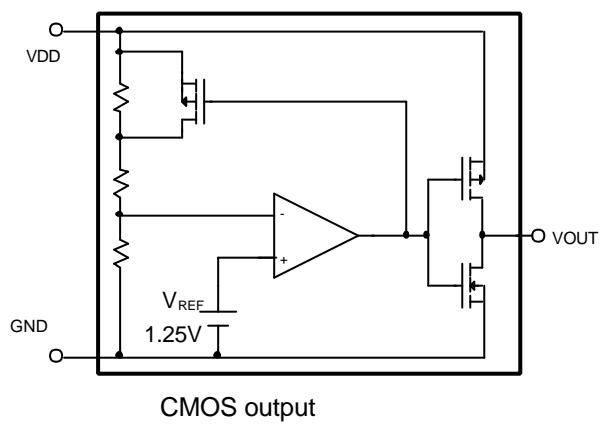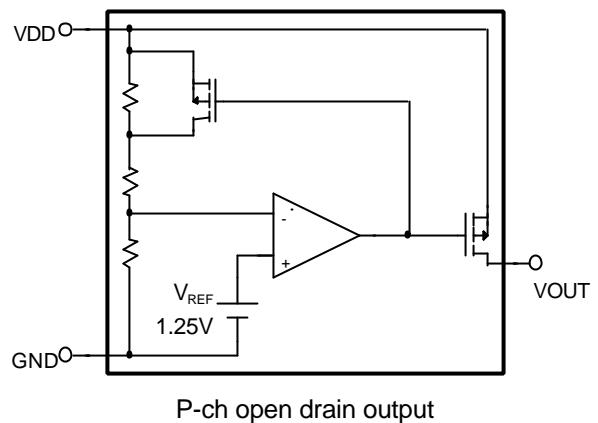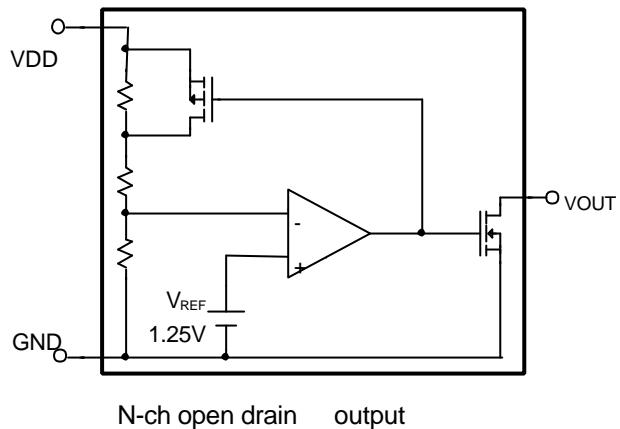
Fig. 10 V_{DET}=4.5V

■ BLOCK DIAGRAM

N-ch open drain   output

P-ch open drain output

CMOS output

■ PIN DESCRIPTIONS

VDD   - Power Supply and Detected Voltage Input.
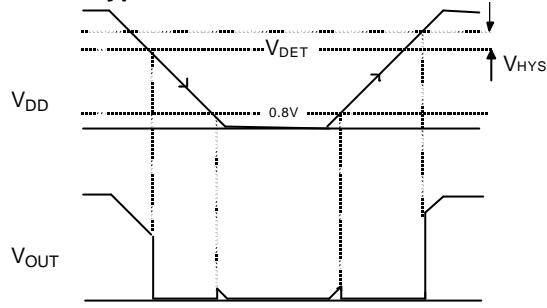
GND   - Ground.

VOUT   - Detector Output

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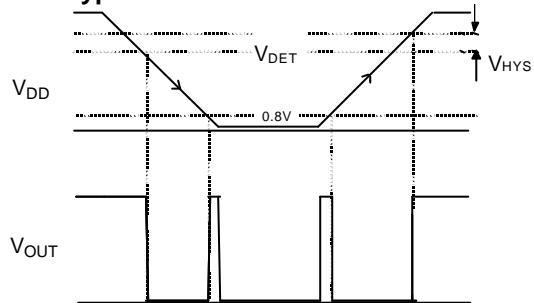
The timing diagram of V_{DD} and V_{OUT} is shown as below:

CMOS Type
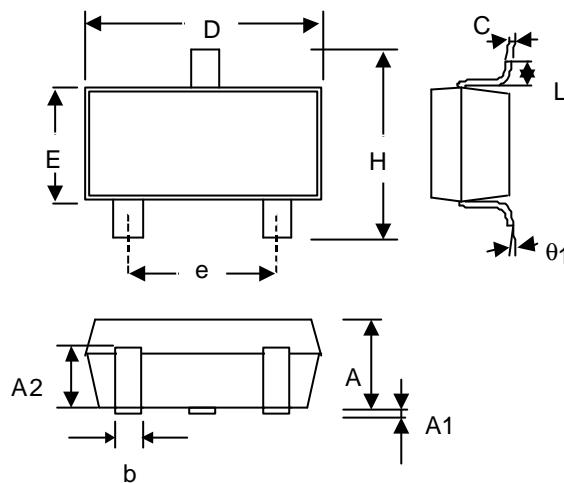
The guaranteed minimun operation voltage is 1.5V. As the supply voltage (V_{DD}) is reduced below 1.5V, the performance degrades, N-ch or P-ch driving ca-pacity degrades, and the supply current decreases. AIC1680 isn't functioning when V_{DD} down to 0.8V.

N-Ch Type

■ PHYSICAL DIMENSIONS

- ● **SOT-23 (unit: mm)**
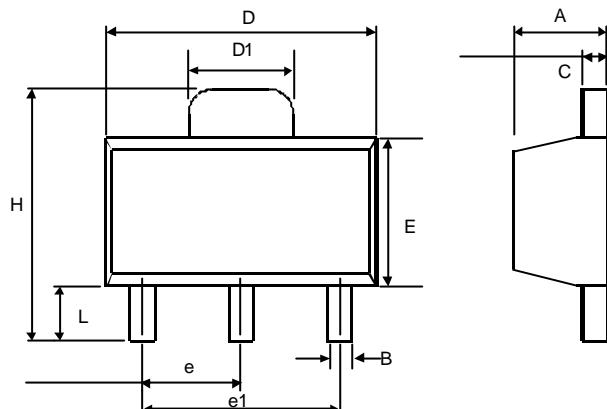
| SYMBOL	MIN	MAX
A	1.00	1.30
A1	—	0.10
A2	0.70	0.90
b	0.35	0.50
C	0.10	0.25
D	2.70	3.10
E	1.40	1.80
e	1.90 (TYP)	
H	2.60	3.00
L	0.37	—
θ1	1°	9°

- ● **SOT-23 Marking**

Part No.	Marking
AIC1680-N16CU	U16N
AIC1680-P16CU	U16P
AIC1680-C16CU	U16C
AIC1680-N17CU	U17N
AIC1680-P17CU	U17P
AIC1680-C17CU	U17C
………. (0.1V INCREMENT)	

Part No.	Marking
AIC1680-N59CU	U59N
AIC1680-P59CU	U59P
AIC1680-C59CU	U59C
AIC1680-N60CU	U60N
AIC1680-P60CU	U60P
AIC1680-C60CU	U60C

- **SOT-89 (unit: mm)**
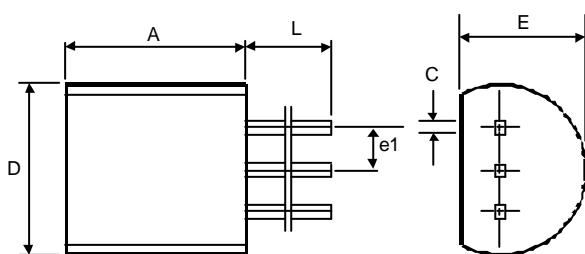
SYMBOL	MIN	MAX
A	1.40	1.60
B	0.36	0.48
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 (TYP.)	
e1	3.00 (TYP.)	
H	3.94	4.25
L	0.89	1.20

- **SOT-89 Marking**

Part No.	Marking
AIC1680-N16CX	X16N
AIC1680-P16CX	X16P
AIC1680-C16CX	X16C
AIC1680-N17CX	X17N
AIC1680-P17CX	X17P
AIC1680-C17CX	X17C
………. (0.1V INCREMENT)	
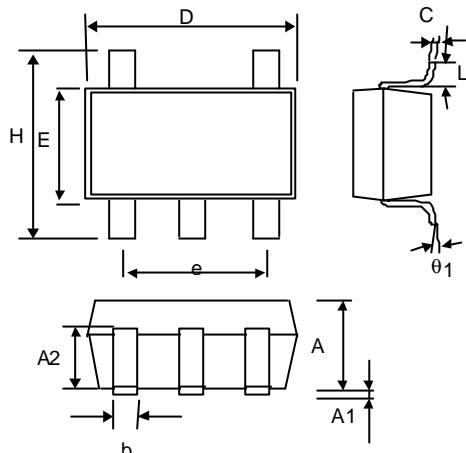
Part No.	Marking
AIC1680-N59CX	X59N
AIC1680-P59CX	X59P
AIC1680-C59CX	X59C
AIC1680-N60CX	X60N
AIC1680-P60CX	X60P
AIC1680-C60CX	X60C

- **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
AIC1680-N16CV	V16N
AIC1680-P16CV	V16P
AIC1680-C16CV	V16C
AIC1680-N17CV	V17N
AIC1680-P17CV	V17P
AIC1680-C17CV	V17C
...........(0.1V INCREMENT)	

Part No.	Marking
AIC1680-N59CV	V59N
AIC1680-P59CV	V59P
AIC1680-C59CV	V59C
AIC1680-N60CV	V60N
AIC1680-P60CV	V60P
AIC1680-C60CV	V60C