MN1382S

CMOS IC for Voltage Detection

■ Overview

The MN1382S are elements that monitor the power supply voltage supplied to microcomputers and other LSI systems and issue reset signals for initializing the system after the power is first applied or for preventing runaway operation when the supply voltage fluctuates.

This is a CMOS output, choose the ideal element for your application from the series' wide selection of detection ranks (16 ranks 2.0 V to 4.7 V).

There is other output type, N-channel open drain output (MN13821S) and inverted CMOS output (MN13822S).

■ Features

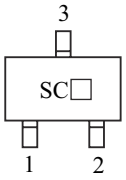
- Three-pin element requiring no adjustment
- Wide selection of detection ranks (16 ranks 2.0 V to 4.7 V)
- Highly precise detection voltage
- Detection voltage with hysteresis characteristic
  - ΔVD = 50 mV for ranks C to K
  - ΔVD = 100 mV for ranks L to T
- Low current consumption: I_{DD} = 1 μA (typ.) for V_{DD} = 5 V
- Low fluctuation in detection voltage with tempera-ture (1 mV/°C (typ.))

■ Applications

- Battery checkers
- Power outage detectors
- Level discriminators
- Memory backup systems
- Microcomputer reset circuits
- Reset circuits for other electronic circuits

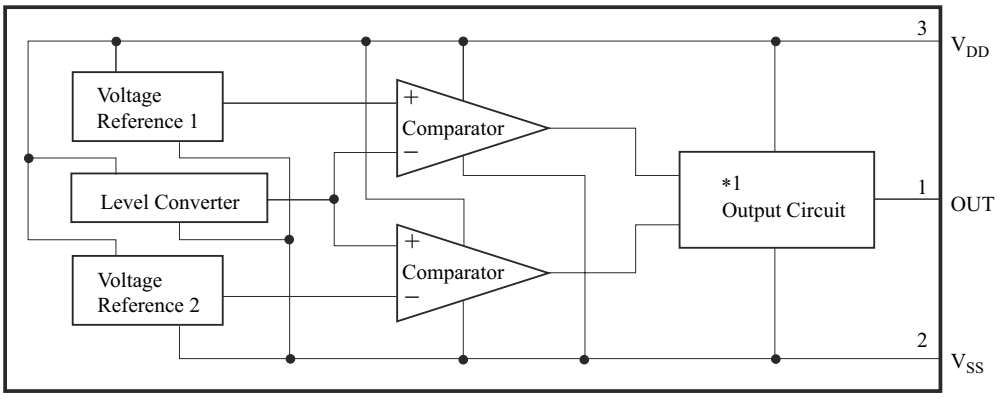
■ Package

- Code
  MINI-3DC
- Pin name
  - 1: Out Reset signal output pin
  - 2: V_{SS} Ground pin
  - 3: V_{DD} Power supply pin



Note) Rank symbol will be marked on the package in the □ area.

■ Block Diagram



Note) *1: Circuits vary slightly depending on the output type (CMOS output, N-channel open drain output, or inverted CMOSoutput)

■ Detection Ranks (on Voltage)

Rank	Detection Voltage for Drop in Power Supply Voltage V_{DL}		Unit	Detection Voltage Hysteresis Width ΔVD		Unit
	Min	Max		Min	max	
C	2.0	2.2	V	50	300	mV
D	2.1	2.3				
E	2.2	2.4				
F	2.3	2.5				
G	2.4	2.6				
H	2.5	2.7				
J	2.6	2.9				
K	2.8	3.1				
L	3.0	3.3		100		
M	3.2	3.5				
N	3.4	3.7				
P	3.6	3.9				
Q	3.8	4.1				
R	4.0	4.3				
S	4.2	4.5				
T	4.4	4.7				

■ Absolute Maximum Ratings V_{SS} = 0 V, T_a = 25°C

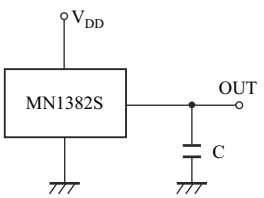
Parameter	Symbol	Rating	Unit
Power supply voltage	V_{DD}	7.0	V
Output voltage	V_O	– 0.3 to V_{DD} + 0.3	V
Operating ambient temperature	T_{opr}	–20 to +70	°C
Storage temperature	T_{stg}	–55 to +125	°C

■ Recommended Operating Conditions V_{SS} = 0 V, T_a = 25°C

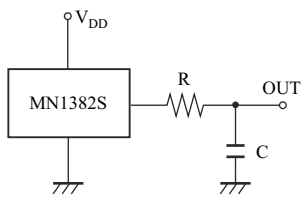
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Power supply voltage	V_{DD}	See Figures 1 and 4	1.5		6.0	V

■ Application Circuit Example

Sample Circuit 1



Sample Circuit 2



Note) Connect resistors, capacitors, and the like only to the output pin on the MN1382S element.

Note that connect-ing them to the power source pins changes V_{DH}, V_{DL}, and ΔVD. Select the values of R and C to match the application.

■ Electrical Characteristics

• DC Characteristics V_{SS} = 0 V, T_a = –20°C to +70°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Power supply current	I_{DD}	V_{DD} = 5 V *, Load resistor 10 kΩ		1	5	μA
Detection voltage for drop in power supply voltage	V_{DL}	T_a = 25°C See Figures 1 and 4	For particulars, see the detection voltage rank table.			V
Detection voltage hysteresis width	ΔVD					mV
High level output voitage	V_{OH}	I_{OH} = –40 μA	0.8 V_{DD}		V_{DD}	V
Low level output voitage	V_{OL}	V_{DD} = 1.8 V, I_{OH} = 0.7 mA	V_{SS}		0.4	V

Note) *: This includes the output pin's leakage current.

• AC Characteristics V_{SS} = 0 V, T_a = 25°C

Parameter	Symbol	Conditions	Rank	Allowable Value (typ)	Unit
Reset release time	t_{OH}	See Figures 2 and 3	C	3.0	μs
			D		
			E		
			F		
			G		
			H		
			J		
			K		
			L		
			M	4.0	
			N		
			P		
			Q		
			R		
			S		
			T		
Reset time	t_{OL}	See Figures 2 and 3	C	250.0	μs
			D		
			E		
			F		
			G	115.0	
			H		
			J		
			K		
			L	70.0	
			M	15.0	
			N		
			P		
			Q		
			R		
			S		
			T		

■ Reference Data

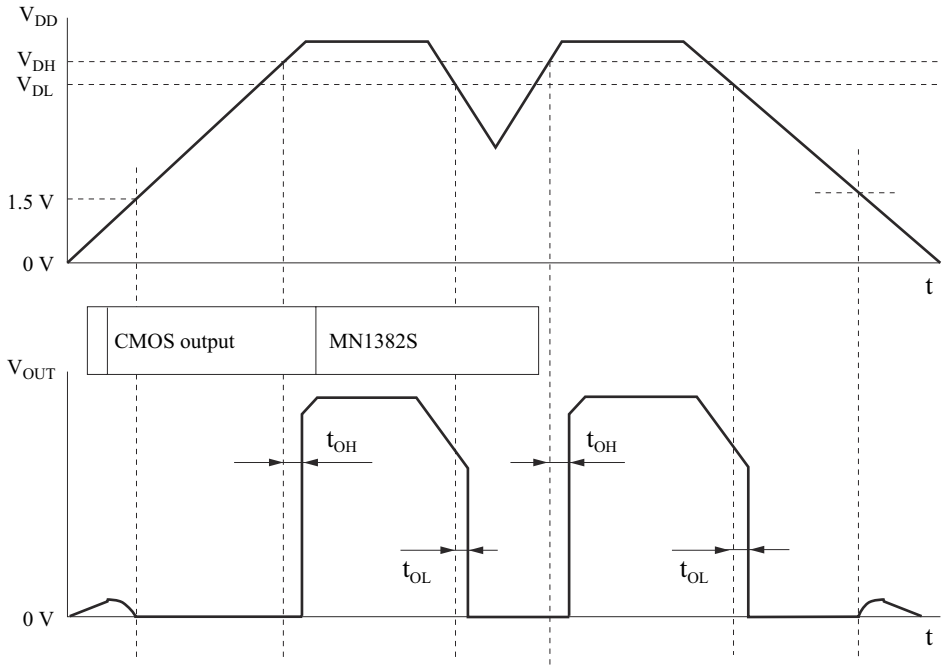


Figure 1. Description of Operation

Note) 1. Output cannot be specified for power supply voltages under 1.5 V because operation is not guaranteed for that range.

2. V_{DL} : Detection voltage for drop in power supply voltage

V_{DH} : Detection voltage for rise in power supply voltage

t_{OL} : Time lag between the time that the power supply voltage reaches the detection voltage (V_{DL} or V_{DH}) and the time that theoutput pin (OUT) goes to Low level.

t_{OH} : Time lag between the time that the power supply voltage reaches the detection voltage (V_{DL} or V_{DH}) and the time that theoutput pin (OUT) goes to High level.

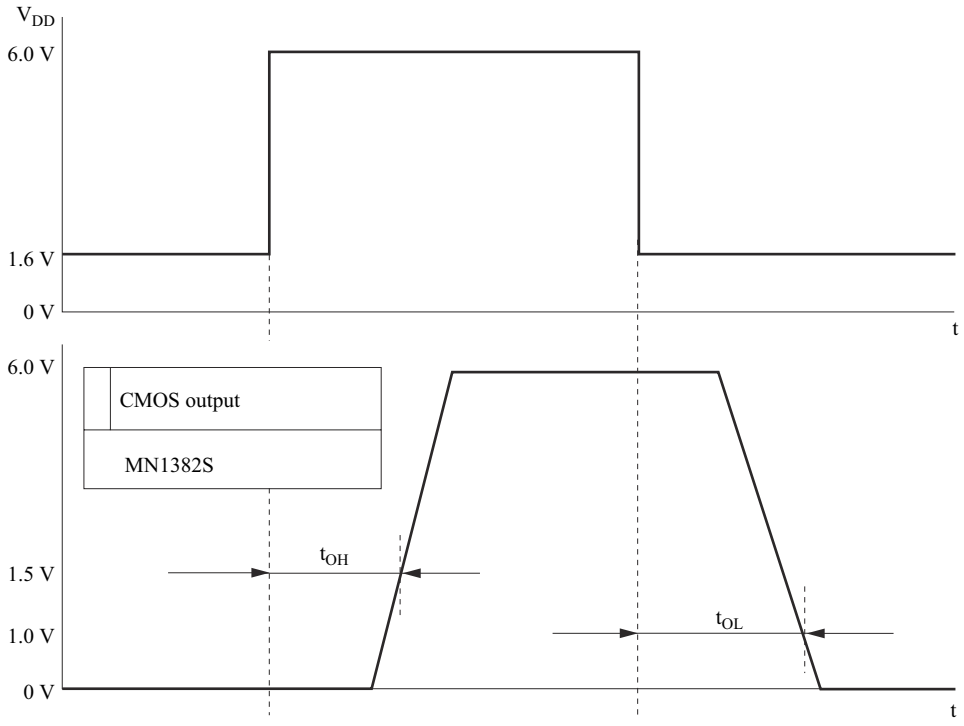


Figure 2. Description chart of Measuring the Output Characteristics

■ Reference Data (Continued)

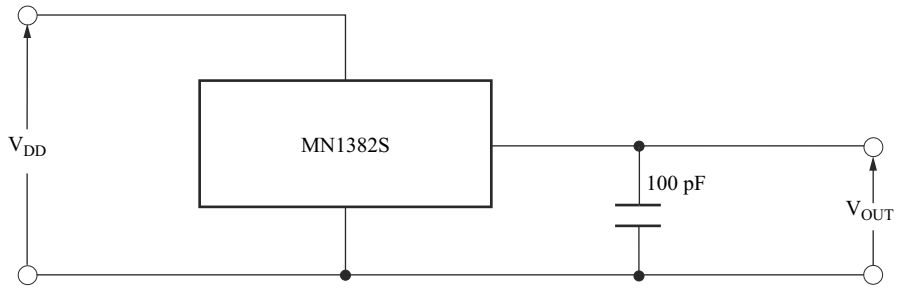


Figure 3. Circuit for Measuring the Output Characteristics

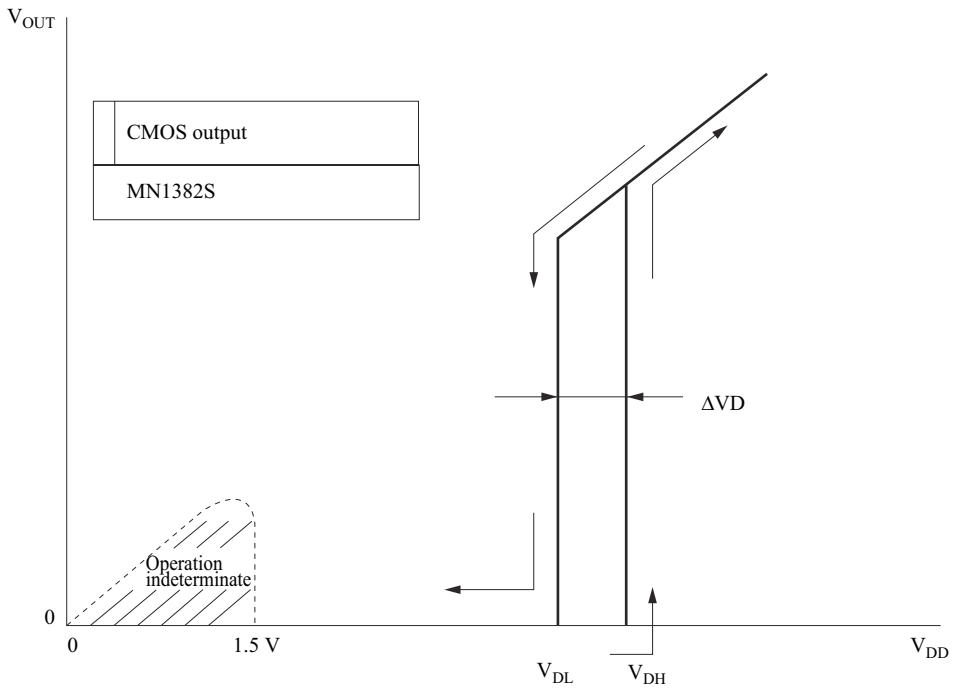


Figure 4. Description chart for Measuring the I/O Characteristics

Note) 1. Output cannot be specified for power supply voltages under 1.5 V because operation is not guaranteed for that range.
2. V_{DL} : Detection voltage for drop in power supply voltage
V_{DH} : Detection voltage for rise in power supply voltage

■ Reference Characteristics

The following characteristics curves represent results from a specific sample therefore they do not guarantee thecharacteristics for the final product.

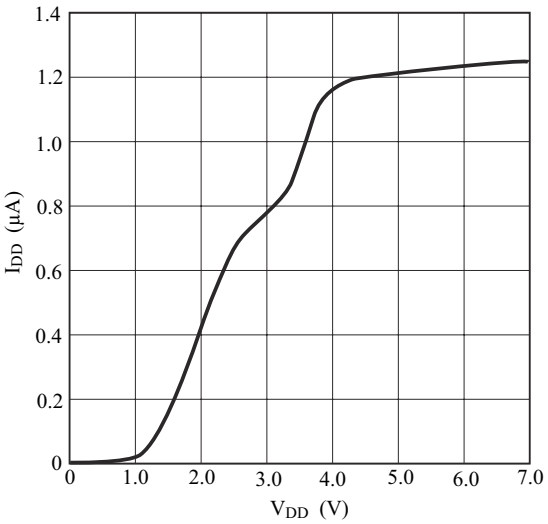


Figure 5-a I_{DD} — V_{DD} Characteristic (Rank Q)

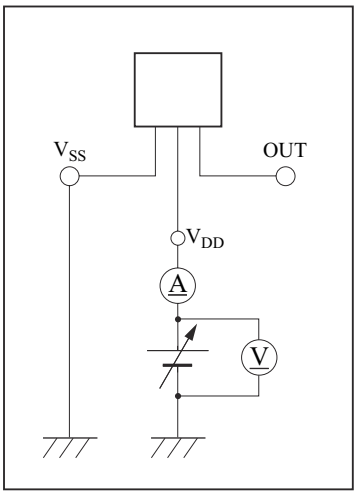


Figure 5-b Measurement Circuit

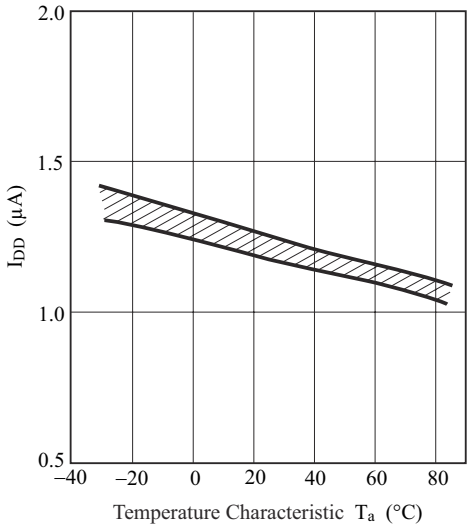


Figure 6-a I_{DD} — Temperature Characteristic (Rank Q)

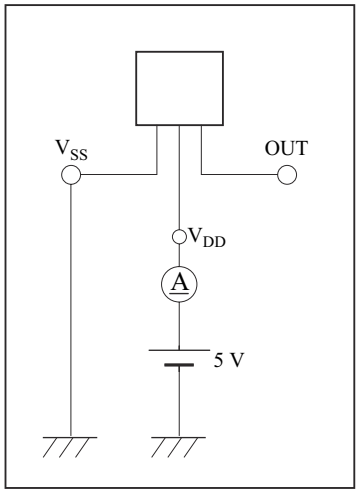


Figure 6-b Measurement Circuit

■ Reference Characteristics (Continued)

The following characteristics curves represent results from a specific sample therefore they do not guarantee thecharacteristics for the final product.

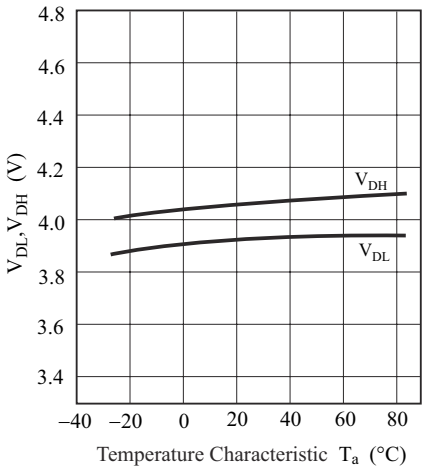


Figure7-a V_{DL} — V_{DH} Temperature Characteristic (Rank Q)

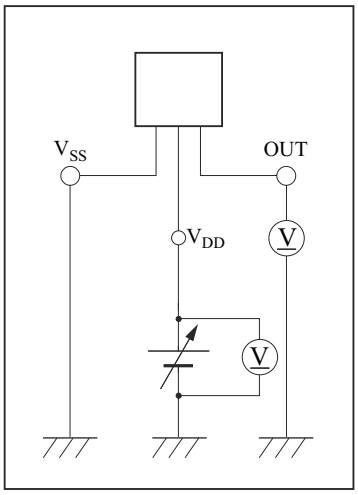


Figure 7-b Measurement Circuit

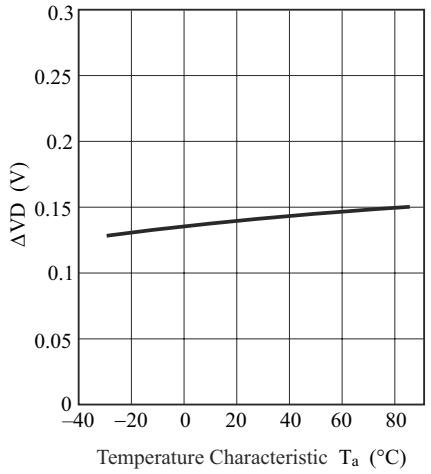


Figure 8-a ΔVD Temperature Characteristic (Rank Q)

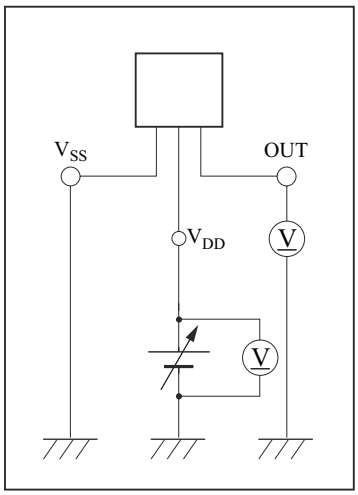


Figure 8-b Measurement Circuit

■ Reference Characteristics (Continued)

The following characteristics curves represent results from a specific sample therefore they do not guarantee thecharacteristics for the final product.

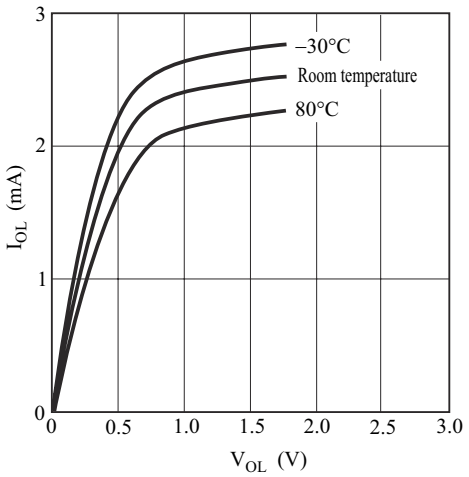


Figure 9-a I_{OL} — V_{DL} Characteristic

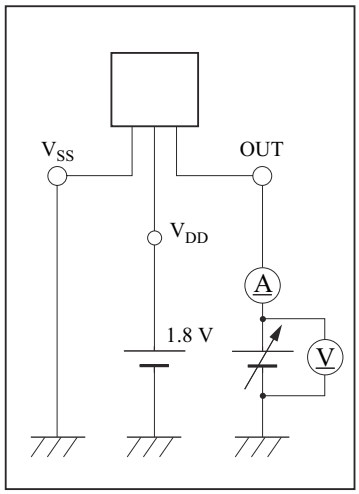


Figure 9-b Measurement Circuit

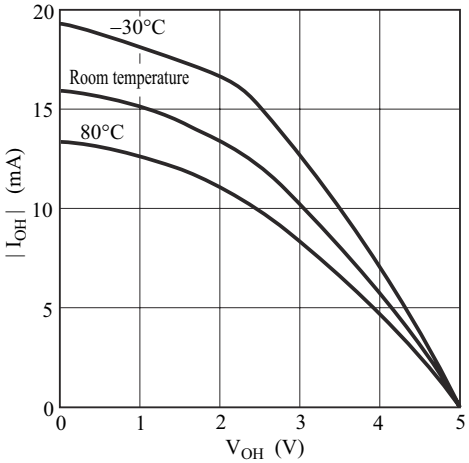


Figure 10-a I_{OH} — V_{OH} Characteristic

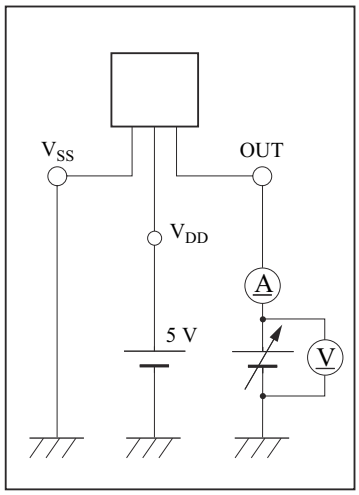


Figure 10-b Measurement Circuit

■ Reference Characteristics (Continued)

The following characteristics curves represent results from a specific sample therefore they do not guarantee thecharacteristics for the final product.

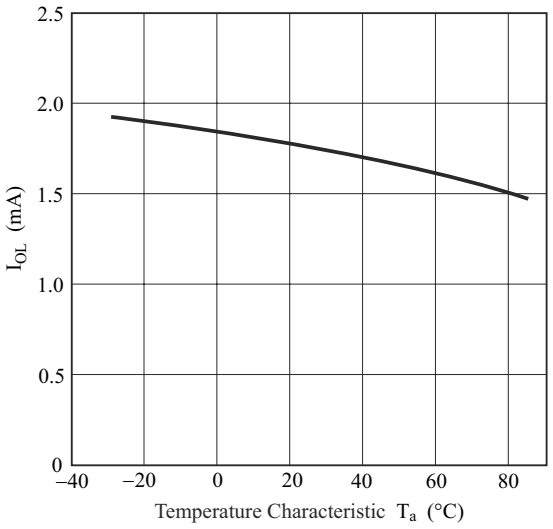


Figure 11-a I_{OL} — Temperature Characteristic

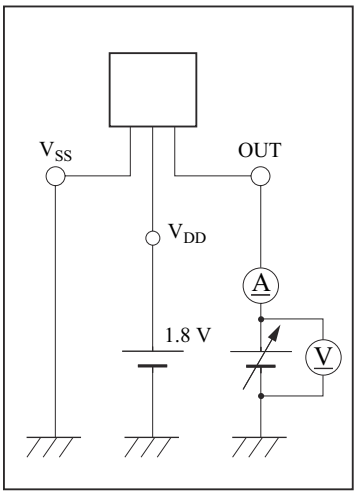


Figure 11-b Measurement Circuit

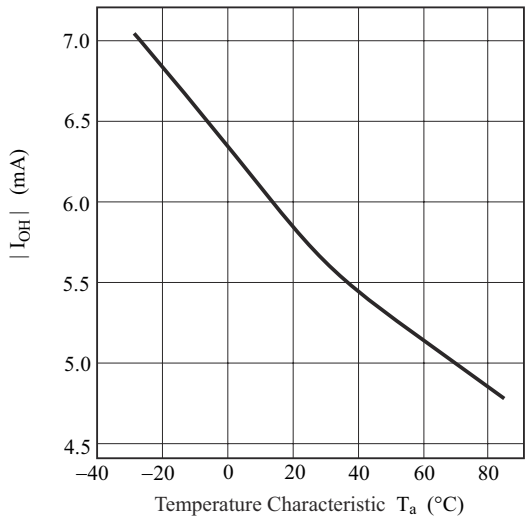


Figure 12-a I_{OH} — Temperature Characteristic

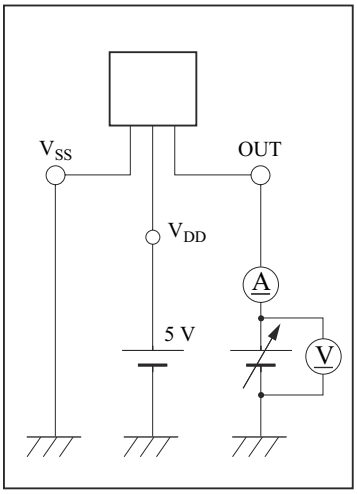
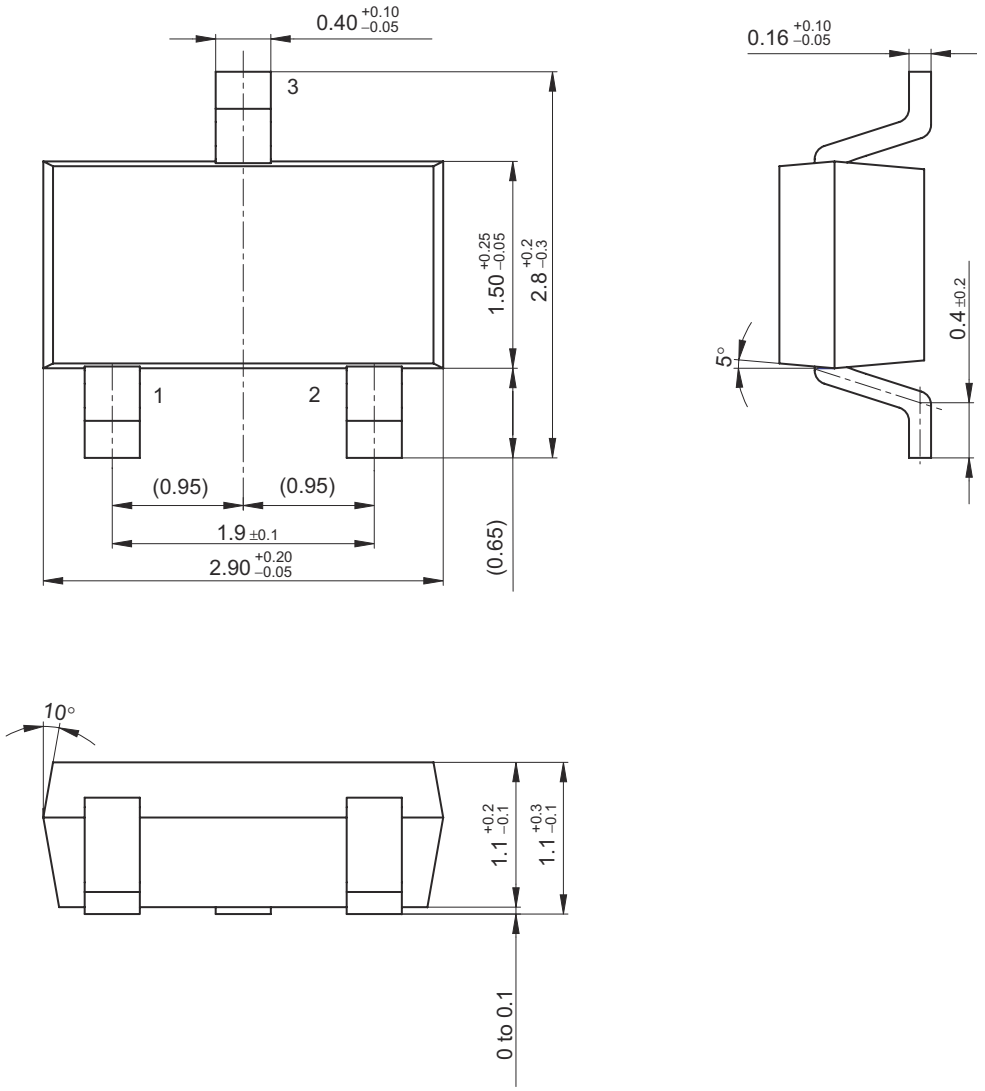


Figure 12-b Measurement Circuit

MINI-3DC


0.40 +0.10 −0.05
3
1
2
1.50 +0.25 −0.05
2.8 +0.2 −0.3
(0.95)
(0.95)
1.9 ±0.1
2.90 +0.20 −0.05
(0.65)
0.16 +0.10 −0.05
5°
0.4 ±0.2
10°
1.1 +0.2 −0.1
1.1 +0.3 −0.1
0 to 0.1