

## VOLTAGE DETECTOR

### ■ GENERAL DESCRIPTION

The NJU7700/01 is a high precision and low quiescent current voltage detector.

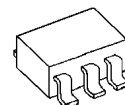
The detection voltage is internally fixed with an accuracy of 1.0%.

The NJU7700/01 are useful for preventing malfunction of microcomputer or DSP etc. through detect a drop in voltage of battery or power supply.

NJU7700 is Nch. Open Drain and NJU7701 is a C-MOS output type.

Small packaging makes NJU7700 and NJU7701 suitable for space conscious applications.

### ■ PACKAGE OUTLINE



NJU7700/01F

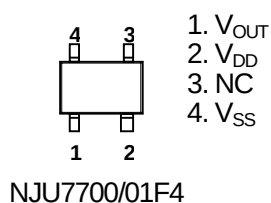
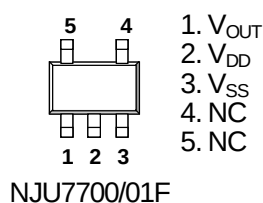


NJU7700/01F4

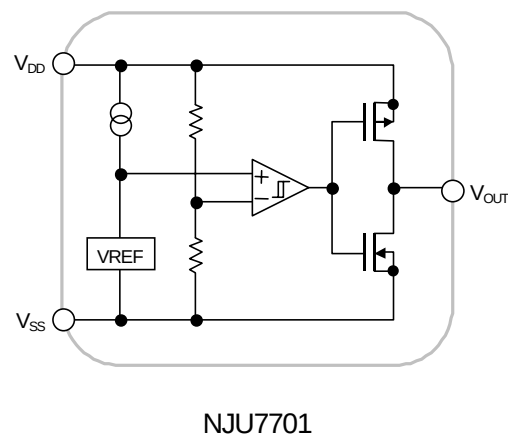
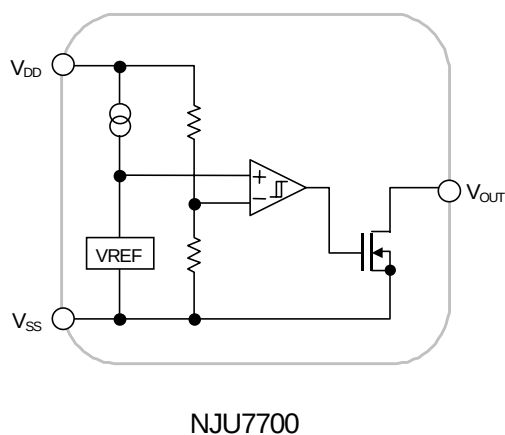
### ■ FEATURES

- High Precision Detection Voltage  $\pm 1.0\%$
- Low Quiescent Current  $0.8\mu\text{A typ. (V}_{\text{DET}} = 3\text{V version)}$
- Detection Voltage Range  $1.3\text{--}6.0\text{V (0.1V Step)}$
- Output Configuration  
 NJU7700: Nch. Open Drain type  
 NJU7701: C-MOS Output type
- CMOS Technology
- Package Outline  
 SOT-23-5 : NJU7700/01F  
 SC-82AB : NJU7700/01F4

### ■ PIN CONFIGURATION



### ■ EQUIVALENT CIRCUIT



# NJU7700/01

## ■ DETECTION VOLTAGE RANK LIST

| Device Name    | V <sub>DET</sub> | Device Name    | V <sub>DET</sub> | Device Name    | V <sub>DET</sub> | Device Name    | V <sub>DET</sub> |
|----------------|------------------|----------------|------------------|----------------|------------------|----------------|------------------|
| NJU770*F4-/F13 | 1.3V             | NJU770*F4-/F23 | 2.3V             | NJU770*F4-/F32 | 3.2V             | NJU770*F4-/F43 | 4.3V             |
| NJU770*F4-/F15 | 1.5V             | NJU770*F4-/F24 | 2.4V             | NJU770*F4-/F33 | 3.3V             | NJU770*F4-/F44 | 4.4V             |
| NJU770*F4-/F16 | 1.6V             | NJU770*F4-/F25 | 2.5V             | NJU770*F4-/F34 | 3.4V             | NJU770*F4-/F45 | 4.5V             |
| NJU770*F4-/F17 | 1.7V             | NJU770*F4-/F26 | 2.6V             | NJU770*F4-/F35 | 3.5V             | NJU770*F4-/F47 | 4.7V             |
| NJU770*F4-/F18 | 1.8V             | NJU770*F4-/F27 | 2.7V             | NJU770*F4-/F36 | 3.6V             | NJU770*F4-/F05 | 5.0V             |
| NJU770*F4-/F19 | 1.9V             | NJU770*F4-/F28 | 2.8V             | NJU770*F4-/F38 | 3.8V             | NJU770*F4-/F52 | 5.2V             |
| NJU770*F4-/F02 | 2.0V             | NJU770*F4-/F29 | 2.9V             | NJU770*F4-/F39 | 3.9V             | NJU770*F4-/F55 | 5.5V             |
| NJU770*F4-/F21 | 2.1V             | NJU770*F4-/F03 | 3.0V             | NJU770*F4-/F04 | 4.0V             | NJU770*F4-/F06 | 6.0V             |
| NJU770*F4-/F22 | 2.2V             | NJU770*F4-/F31 | 3.1V             | NJU770*F4-/F42 | 4.2V             |                |                  |

## ■ NJU7700

### ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER             | SYMBOL           | RATINGS                  |         | UNIT |
|-----------------------|------------------|--------------------------|---------|------|
| Input Voltage         | V <sub>DD</sub>  | +10                      |         | V    |
| Output Voltage        | V <sub>OUT</sub> | V <sub>SS</sub> -0.3~+10 |         | V    |
| Output Current        | I <sub>OUT</sub> | 50                       |         | mA   |
| Power Dissipation     | P <sub>D</sub>   | F : SOT-23-5             | 200(*1) | mW   |
|                       |                  | F4 : SC-82AB             | 250(*2) |      |
| Operating Temperature | Topr             | -40 ~ +85                |         | °C   |
| Storage Temperature   | Tstg             | -40 ~ +125               |         | °C   |

(\*1) : Device itself

(\*2) : Mounted on glass epoxy board based on EIA/JEDEC. (114.3x76.2x1.6mm: 2Layers)

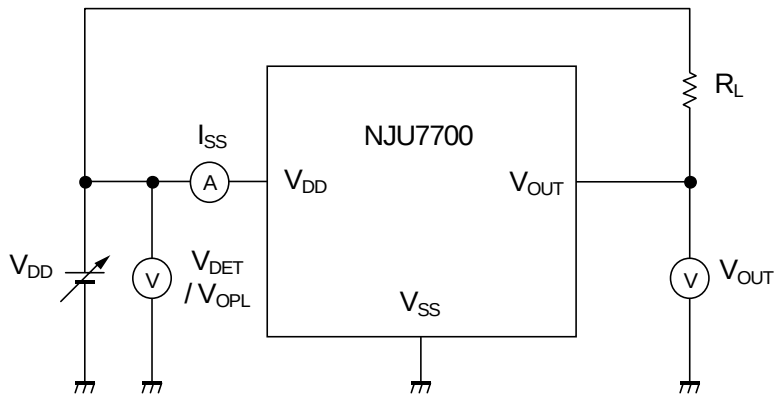
### ■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

| PARAMETER                                 | SYMBOL                   | TEST CONDITION                        | MIN.                                  | TYP.                      | MAX.                      | UNIT   |
|-------------------------------------------|--------------------------|---------------------------------------|---------------------------------------|---------------------------|---------------------------|--------|
| Detection Voltage                         | V <sub>DET</sub>         |                                       | -1.0%                                 | —                         | +1.0%                     | V      |
| Hysteresis Voltage                        | V <sub>HYS</sub>         |                                       | V <sub>DET</sub><br>×0.03             | V <sub>DET</sub><br>×0.05 | V <sub>DET</sub><br>×0.08 | V      |
| Quiescent Current                         | I <sub>SS</sub>          | V <sub>DD</sub> =V <sub>DET</sub> +1V | V <sub>DET</sub> =1.3V~1.7V Version   | —                         | 0.5                       | μA     |
|                                           |                          |                                       | V <sub>DET</sub> =1.8V~6.0V Version   | —                         | 0.8                       | μA     |
| Output Current                            | I <sub>OUT</sub>         | Nch, V <sub>DS</sub> =0.5V            | V <sub>DD</sub> =1.2V                 | 0.75                      | 2.0                       | mA     |
|                                           |                          |                                       | V <sub>DD</sub> =2.4V (≥2.7V Version) | 4.5                       | 7.0                       | mA     |
| Output Leak Current                       | I <sub>LEAK</sub>        | V <sub>DD</sub> =V <sub>OUT</sub> =9V | —                                     | —                         | 0.1                       | μA     |
| Detection Voltage Temperature Coefficient | Δ V <sub>DET</sub> / ΔTa | Ta=0 ~ +85°C                          | —                                     | ±100                      | —                         | ppm/°C |
| Operating Voltage(*3)                     | V <sub>DD</sub>          | R <sub>L</sub> =100kΩ                 | 0.8                                   | —                         | 9                         | V      |

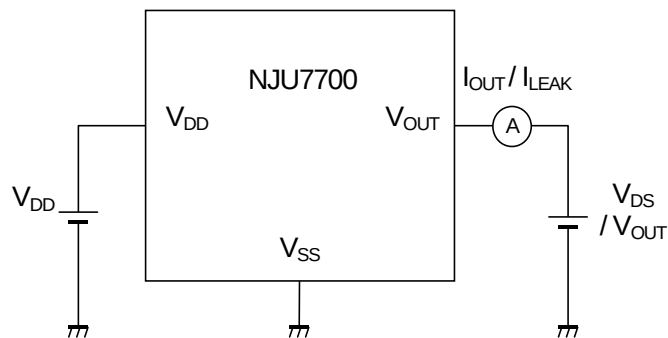
(\*3): The minimum Operating Voltage(V<sub>OP1</sub>) indicates the same value of the input voltage(V<sub>DD</sub>) on condition that V<sub>OUT</sub> becomes 10% or less of the input voltage(V<sub>DD</sub>).

## ■ TEST CIRCUIT

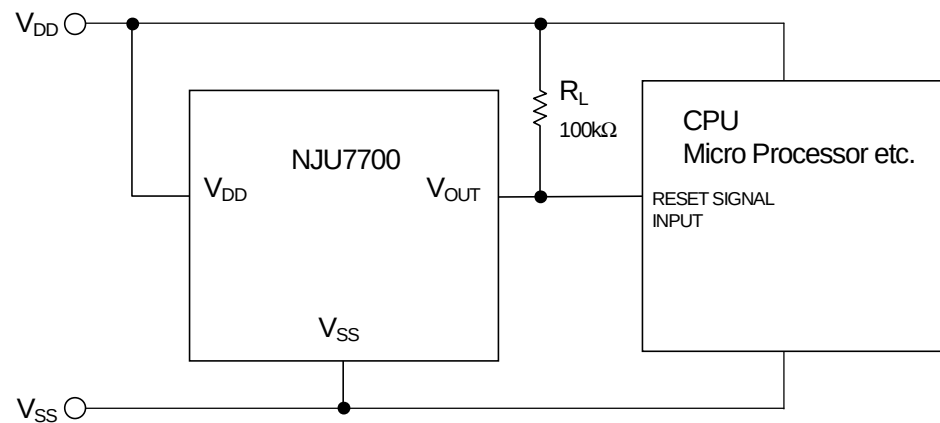
### ① COMMON TEST CIRCUIT



### ② OUTPUT CURRENT/OUTPUT LEAK CURRENT TEST CIRCUIT



## ■ TYPICAL APPLICATION



# NJU7700/01

## ■ NJU7701

### ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER             | SYMBOL    | RATINGS                      |         | UNIT |
|-----------------------|-----------|------------------------------|---------|------|
| Input Voltage         | $V_{DD}$  | +10                          |         | V    |
| Output Voltage        | $V_{OUT}$ | $V_{SS}-0.3 \sim V_{DD}+0.3$ |         | V    |
| Output Current        | $I_{OUT}$ | 50                           |         | mA   |
| Power Dissipation     | $P_D$     | F : SOT-23-5                 | 200(*4) | mW   |
|                       |           | F4 : SC-82AB                 | 250(*5) |      |
| Operating Temperature | $T_{opr}$ | -40 ~ +85                    |         | °C   |
| Storage Temperature   | $T_{stg}$ | -40 ~ +125                   |         | °C   |

(\*4) : Device itself

(\*5) : Mounted on glass epoxy board based on EIA/JEDEC. (114.3x76.2x1.6mm: 2Layers)

### ■ ELECTRICAL CHARACTERISTICS

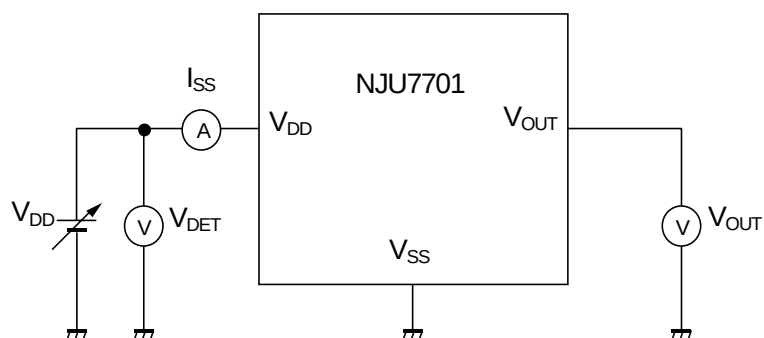
(Ta=25°C)

| PARAMETER                                 | SYMBOL                        | TEST CONDITION           |                                      | MIN.                  | TYP.                  | MAX.                  | UNIT   |
|-------------------------------------------|-------------------------------|--------------------------|--------------------------------------|-----------------------|-----------------------|-----------------------|--------|
| Detection Voltage                         | $V_{DET}$                     |                          |                                      | -1.0%                 | —                     | +1.0%                 | V      |
| Hysteresis Voltage                        | $V_{HYS}$                     |                          |                                      | $V_{DET} \times 0.03$ | $V_{DET} \times 0.05$ | $V_{DET} \times 0.08$ | V      |
| Quiescent Current                         | $I_{SS}$                      | $V_{DD}=V_{DET}+1V$      | $V_{DET}=1.3V \sim 1.7V$ Version     | —                     | 0.5                   | 1.0                   | μA     |
|                                           |                               |                          | $V_{DET}=1.8V \sim 6.0V$ Version     | —                     | 0.8                   | 1.6                   | μA     |
| Output Current                            | $I_{OUT}$                     | Nch, $V_{DS}=0.5V$       | $V_{DD}=1.2V$                        | 0.75                  | 2.0                   | —                     | mA     |
|                                           |                               |                          | $V_{DD}=2.4V$ ( $\geq 2.7V$ Version) | 4.5                   | 7.0                   | —                     | mA     |
|                                           |                               | Pch, $V_{DS}=0.5V$       | $V_{DD}=4.8V$ ( $\leq 3.9V$ Version) | 2.0                   | 3.5                   | —                     | mA     |
|                                           |                               |                          | $V_{DD}=6.0V$ (4.0V~5.6V Version)    | 2.5                   | 4.0                   | —                     | mA     |
|                                           |                               |                          | $V_{DD}=8.4V$ ( $\geq 5.7V$ Version) | 3.0                   | 5.0                   | —                     | mA     |
| Detection Voltage Temperature Coefficient | $\Delta V_{DET} / \Delta T_a$ | $T_a=0 \sim +85^\circ C$ |                                      | —                     | $\pm 100$             | —                     | ppm/°C |
| Operating Voltage(*6)                     | $V_{DD}$                      | $R_L=100k\Omega$         |                                      | 0.8                   | —                     | 9                     | V      |

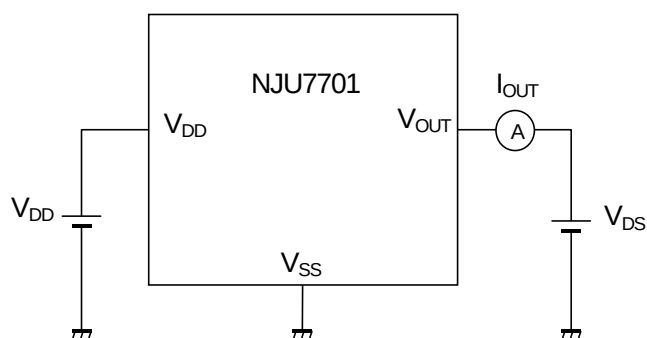
(\*6): The minimum Operating Voltage( $V_{OPL}$ ) indicates the same value of the input voltage( $V_{DD}$ ) on condition that  $V_{OUT}$  becomes 10% or less of the input voltage( $V_{DD}$ ).

## ■ TEST CIRCUIT

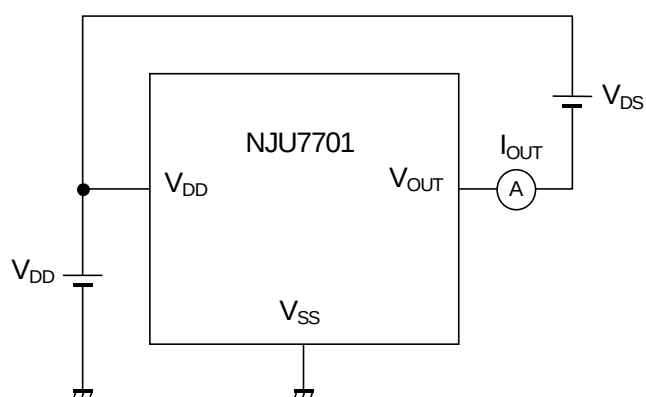
### ① COMMON TEST CIRCUIT



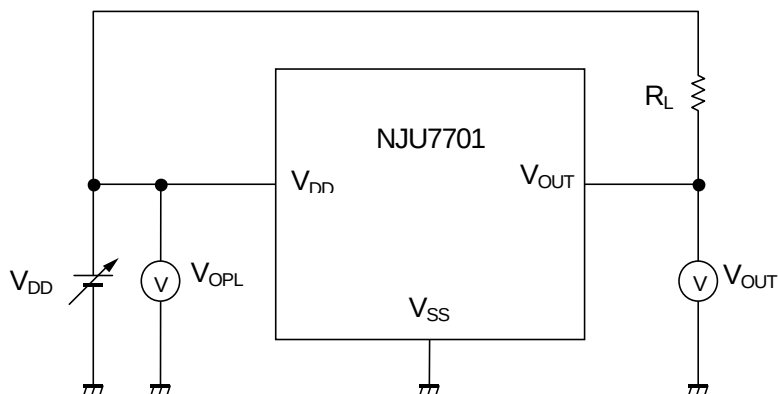
### ② Nch OUTPUT CURRENT TEST CIRCUIT



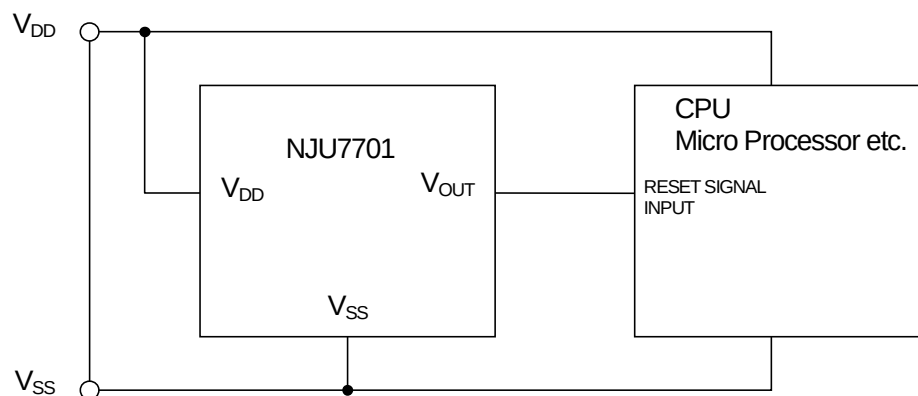
### ③ Pch OUTPUT CURRENT TEST CIRCUIT



## ④ MINIMUM OPERATING VOLTAGE TEST CIRCUIT

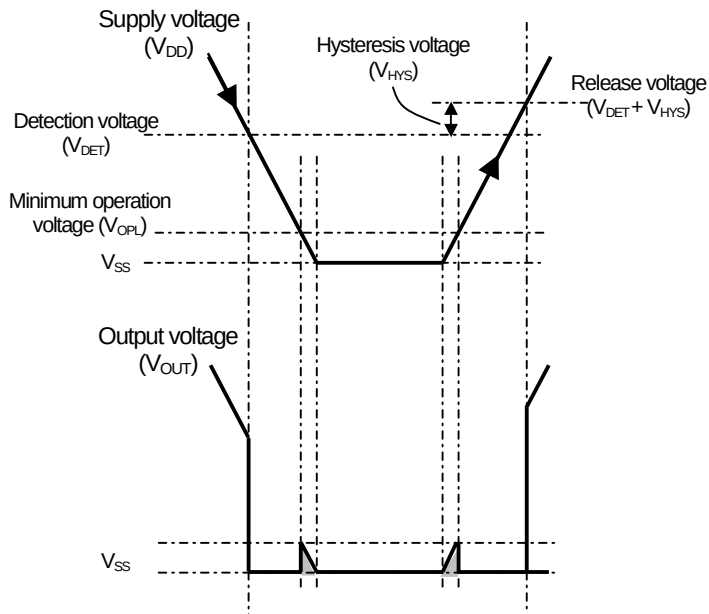


## ■ TYPICAL APPLICATION



## ■ FUNCTIONAL DESCRIPTION

### (1) Basic operation



(1) When supply voltage ( $V_{DD}$ ) drops below detection voltage ( $V_{DET}$ ), Output voltage ( $V_{OUT}$ ) changes "H" to "L" to alert reset state.

(2) The reset state is kept while  $V_{DD}$  is lower than release voltage. The release voltage is a sum of  $V_{DET}$  and Hysteresis voltage ( $V_{HYS}$ ). Please refer to the (\*7) below.

(3) When  $V_{DD}$  becomes higher than the release voltage, then  $V_{OUT}$  changes from "L" to "H" to resume normal state.

(\*7)  $V_{HYS}$  is to avoid unstable  $V_{OUT}$  state caused by rapid voltage change at nearby  $V_{DET}$ .

(\*8): C-MOS output product (NJU7701) : When  $V_{DD}$  less than  $V_{OPL}$ ,  $V_{OUT}$  is free of the shaded region.

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