

## VOLTAGE DETECTOR

### ■ GENERAL DESCRIPTION

The NJU7702/03 is a high precision and low quiescent current voltage detector.

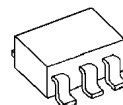
The detection voltage is internally fixed with an accuracy of 1.0%.

The NJU7702/03 are useful for preventing malfunction of microcomputer or DSP etc. through detect a drop in voltage of battery or power supply.

NJU7702 is Nch. Open Drain and NJU7703 is a C-MOS output type.

Small packaging makes NJU7702 and NJU7703 suitable for space conscious applications.

### ■ PACKAGE OUTLINE



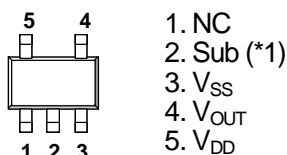
NJU7702/03F

### ■ 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  $1.3\sim 6.0\text{V}(0.1\text{V Step})$
- Output Configuration  
NJU7702: Nch. Open Drain type  
NJU7703: C-MOS Output type
- CMOS Technology
- Package Outline SOT-23-5

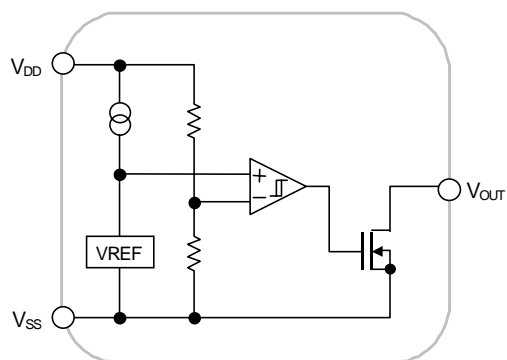
### ■ PIN CONFIGURATION

NJU7702/03F

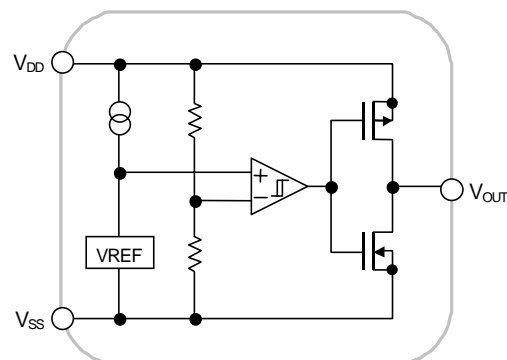


(\*1): Connect Sub terminal to GND.

### ■ EQUIVALENT CIRCUIT



NJU7702



NJU7703

# NJU7702/03

## ■ DETECTION VOLTAGE RANK LIST

3Device Name	V <sub>DET</sub>
NJU7702/03F13	1.3V
NJU7702/03F27	2.7V
NJU7702/03F28	2.8V
NJU7702/03F03	3.0V
NJU7702/03F31	3.1V
NJU7702/03F42	4.2V
NJU7702/03F06	6.0V

## ■ NJU7702

### ■ 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>	200(*2)	mW
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C

(\*2) : Device itself

## ■ ELECTRICAL CHARACTERISTICS

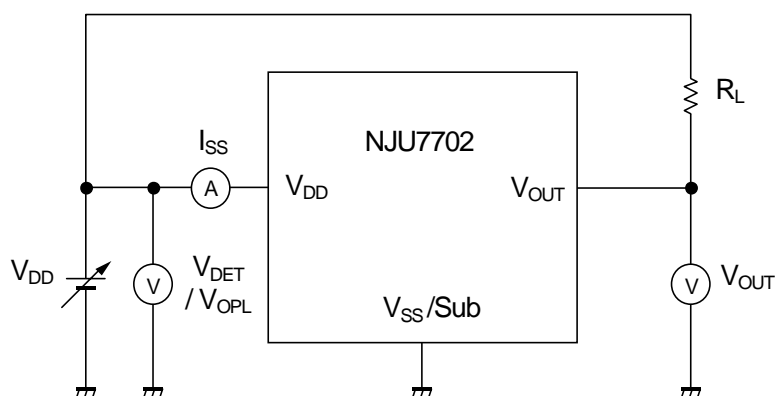
(Ta=25°C)

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> ×0.03	V <sub>DET</sub> ×0.05	V <sub>DET</sub> ×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	1.0	μA
			V <sub>DET</sub> =1.8V~6.0V Version	–	0.8	1.6	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

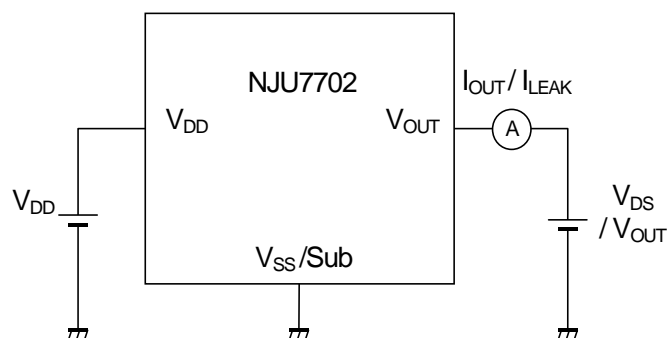
(\*3): The minimum Operating Voltage(V<sub>OPL</sub>) indicates the same value of the input voltage(V<sub>DD</sub>) on condition that V<sub>OUT</sub> becomes 10% or less of the input voltage(V<sub>DD</sub>).

## ■ TEST CIRCUIT

### ① COMMON TEST CIRCUIT

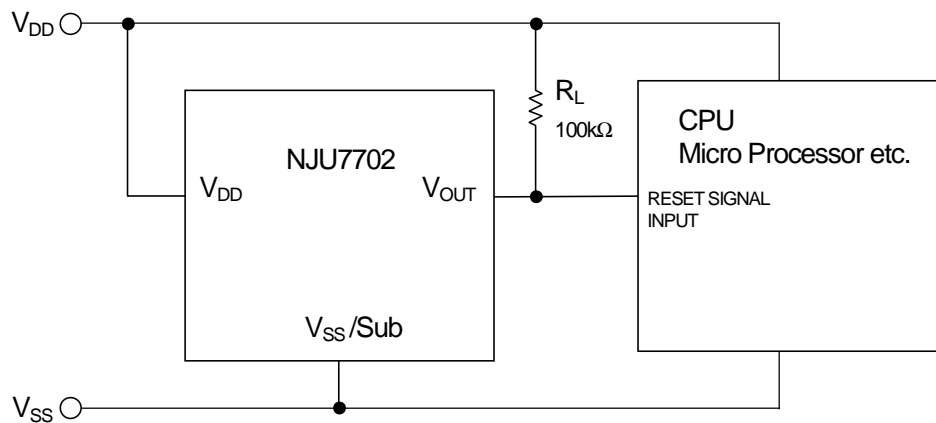


### ② OUTPUT CURRENT/OUTPUT LEAK CURRENT TEST CIRCUIT

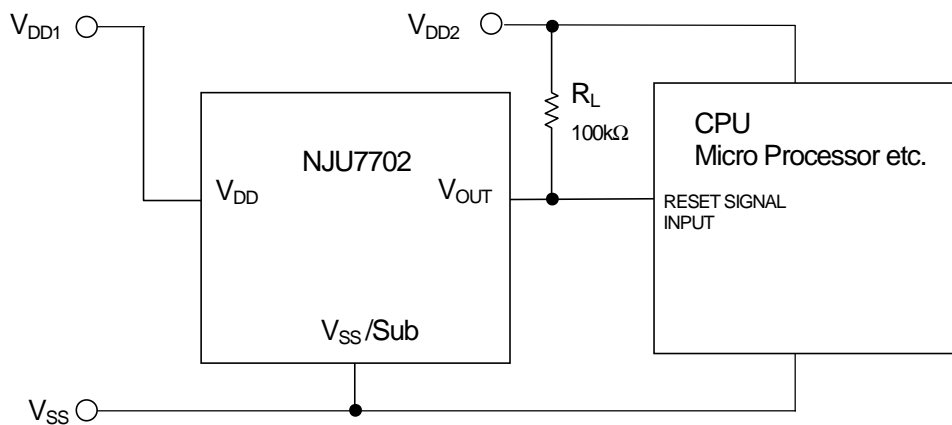


## ■ TYPICAL APPLICATION

① In case of using one power supply.



② In case of using two power supply.



## ■ NJU7703

### ■ 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	$P_D$	200(*4)	mW
Operating Temperature	$T_{opr}$	-40 ~ +85	°C
Storage Temperature	$T_{stg}$	-40 ~ +125	°C

(\*4) : Device itself

### ■ ELECTRICAL CHARACTERISTICS

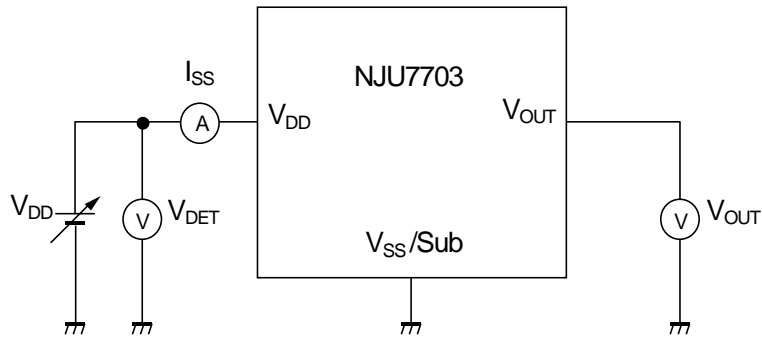
(Ta=25°C)

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> ×0.03	V <sub>DET</sub> ×0.05	V <sub>DET</sub> ×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	1.0	μA
			V <sub>DET</sub> =1.8V~6.0V Version	–	0.8	1.6	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
		Pch, V <sub>DS</sub> =0.5V	V <sub>DD</sub> =4.8V (≤3.9V Version)	2.0	3.5	–	mA
			V <sub>DD</sub> =6.0V (4.0V~5.6V Version)	2.5	4.0	–	mA
			V <sub>DD</sub> =8.4V (≥5.7V Version)	3.0	5.0	–	mA
Detection Voltage Temperature Coefficient	Δ V <sub>DET</sub> /ΔTa	Ta=0 ~ +85°C		–	±100	–	ppm/°C
Operating Voltage (*5)	V <sub>DD</sub>	R <sub>L</sub> =100kΩ		0.8	–	9	V

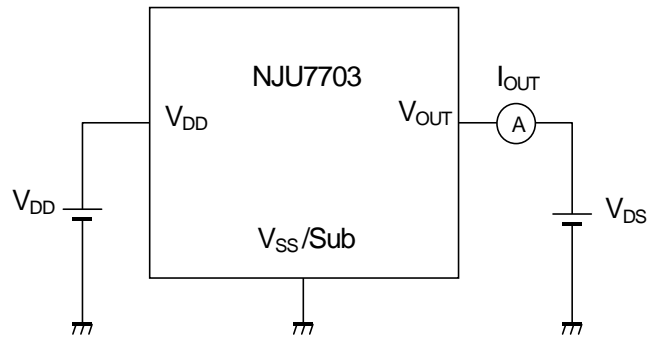
(\*5): The minimum Operating Voltage( $V_{OPL}$ ) indicates the same value of the input voltage( $V_{DD}$ ) on condition that  $V_{OUT}$  becomes 10% or less of the input voltage( $V_{DD}$ ).

## ■ TEST CIRCUIT

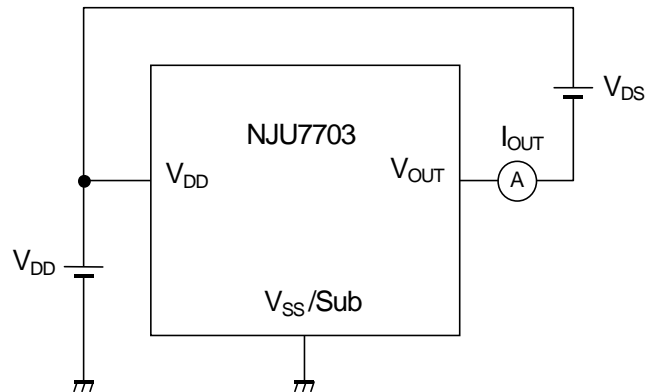
### ① COMMON TEST CIRCUIT



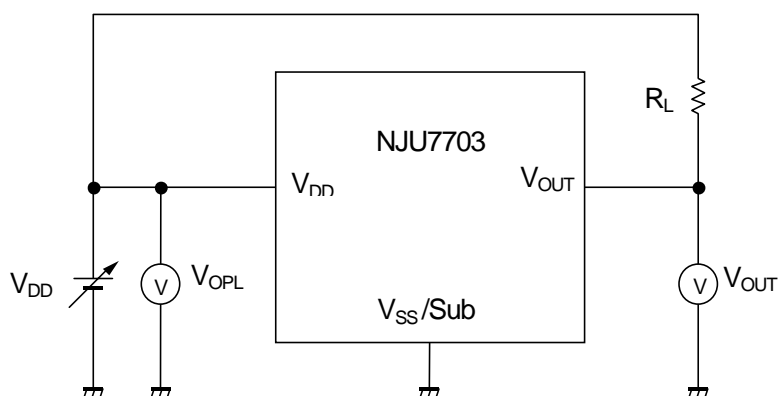
### ② Nch OUTPUT CURRENT TEST CIRCUIT



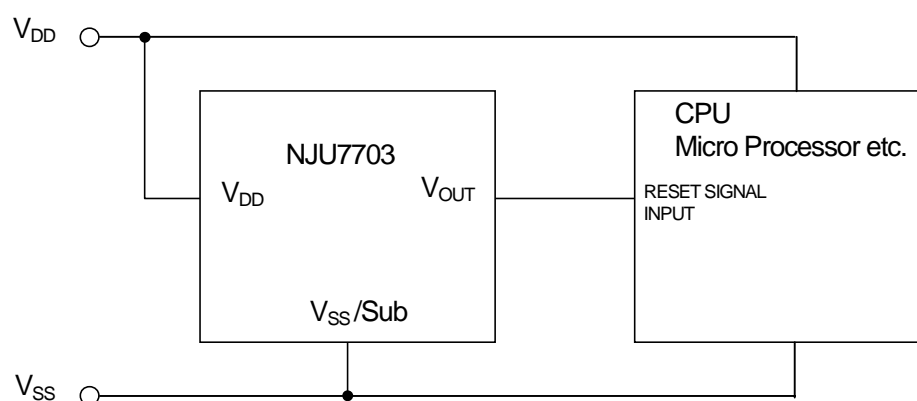
### ③ Pch OUTPUT CURRENT TEST CIRCUIT



## ④ MINIMUM OPERATING VOLTAGE TEST CIRCUIT

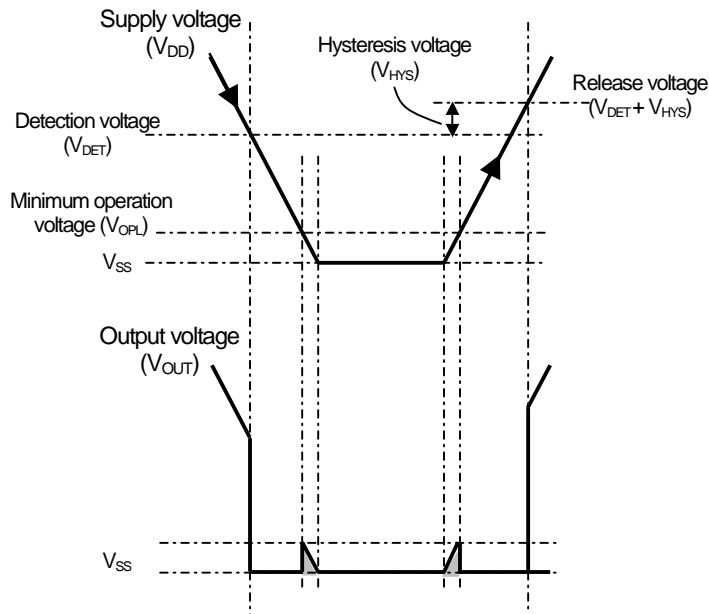


## ■ TYPICAL APPLICATION



## ■ 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 (NJU7703) : When  $V_{DD}$  less than  $V_{OPL}$ ,  $V_{OUT}$  is free of the shaded region.

#### [CAUTION]

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