VOLTAGE DETECTOR

■ GENERAL DESCRIPTION

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

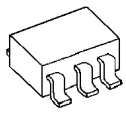
The detection voltage is internally fixed with an accuracy of 1.0%.

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



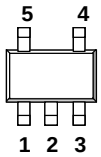
NJU7702/03F

■ FEATURES

● High Precision Detection Voltage	±1.0%
● Low Quiescent Current	0.8μA typ. (V_{DET} =3V version)
● Detection Voltage Range	1.3~6.0V(0.1V Step)
● Output Configuration	NJU7702: Nch. Open Drain type
	NJU7703: C-MOS Output type
● CMOS Technology	
● Package Outline	SOT-23-5

■ PIN CONFIGURATION

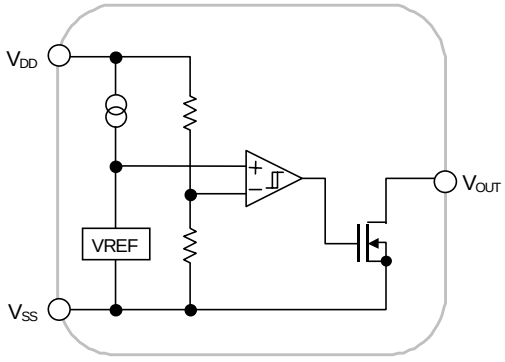
NJU7702/03F



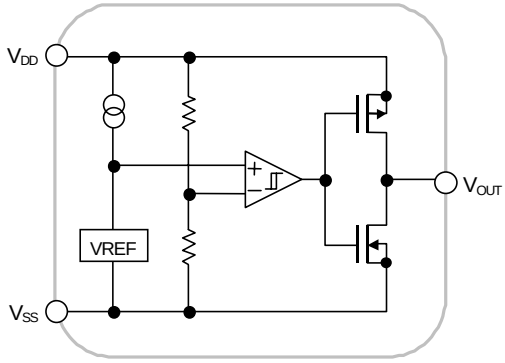
1. NC
2. Sub (*1)
3. V_{SS}
4. V_{OUT}
5. V_{DD}

(*1): Connect Sub terminal to GND.

■ EQUIVALENT CIRCUIT



NJU7702



NJU7703

■ DETECTION VOLTAGE RANK LIST

3Device Name	V_{DET}
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_{DD}	+10	V
Output Voltage	V_{OUT}	V_{SS}-0.3~+10	V
Output Current	I_{OUT}	50	mA
Power Dissipation	P_D	200(*2)	mW
Operating Temperature	Topr	–40 ~ +85	°C
Storage Temperature	Tstg	–40 ~ +125	°C

(*2) : Device itself

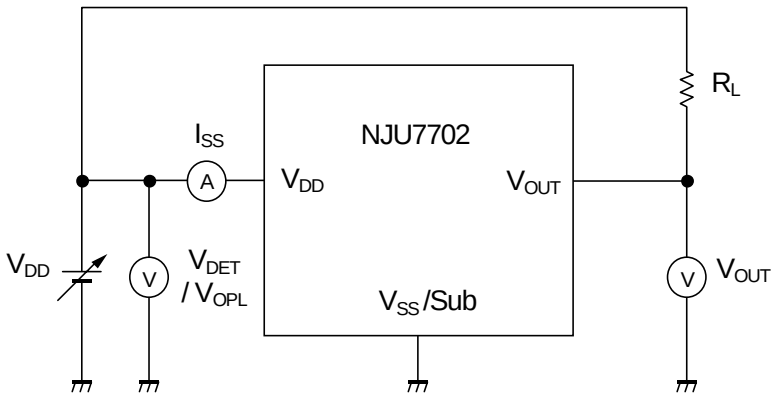
■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V_{DET}			-1.0%	–	+1.0%	V
Hysteresis Voltage	V_{HYS}			V_{DET} ×0.03	V_{DET} ×0.05	V_{DET} ×0.08	V
Quiescent Current	I_{SS}	V_{DD}=V_{DET}+1V	V_{DET}=1.3V~1.7V Version	–	0.5	1.0	µA
			V_{DET}=1.8V~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 (≥2.7V Version)	4.5	7.0	–	mA
Output Leak Current	I_{LEAK}	V_{DD}=V_{OUT}=9V		–	–	0.1	µA
Detection Voltage Temperature Coefficient	$\Delta V_{DET}/\Delta Ta$	Ta=0 ~ +85°C		–	±100	–	ppm/°C
Operating Voltage (*3)	V_{DD}	R_L=100kΩ		0.8	–	9	V

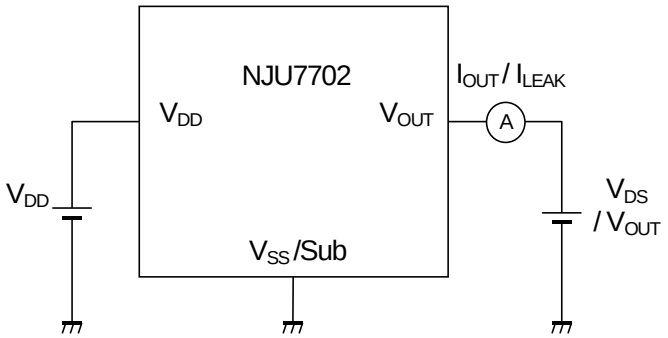
(*3): The minimum Operating Voltage(V_{OPL}) indicates the same value of the input voltage(V_{DD}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

① COMMOM TEST CIRCUIT

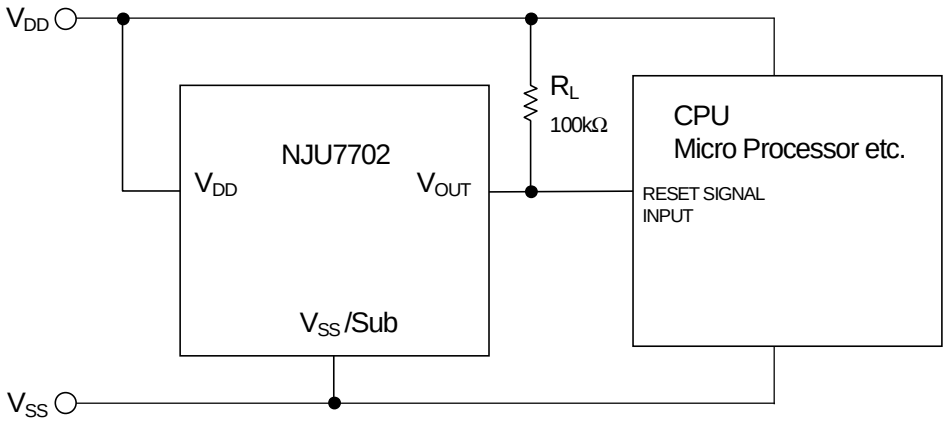


② OUTPUT CURRENT/OUTPUT LEAK CURRENT TEST CIRCUIT

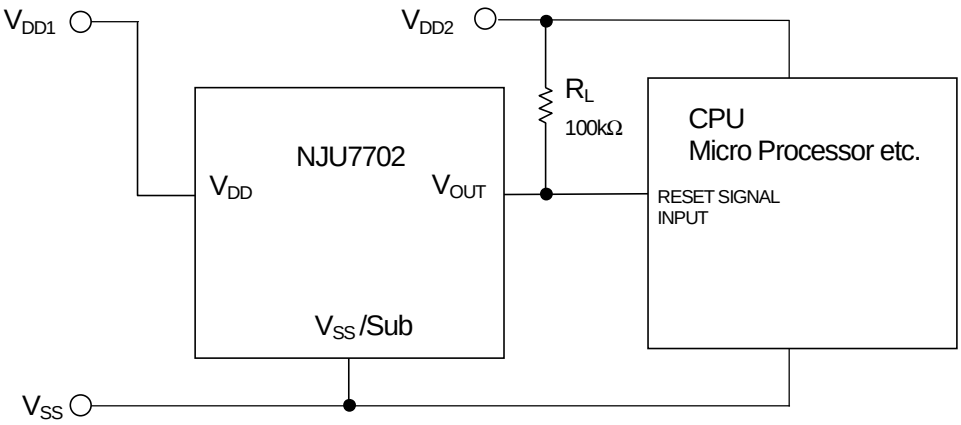


■ TYPICAL APPLICATION

① In case of using one power supply.



②In 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 ~ V_{DD}+0.3	V
Output Current	I_{OUT}	50	mA
Power Dissipation	P_D	200(*4)	mW
Operating Temperature	Topr	–40 ~ +85	°C
Storage Temperature	Tstg	–40 ~ +125	°C

(*4) : Device itself

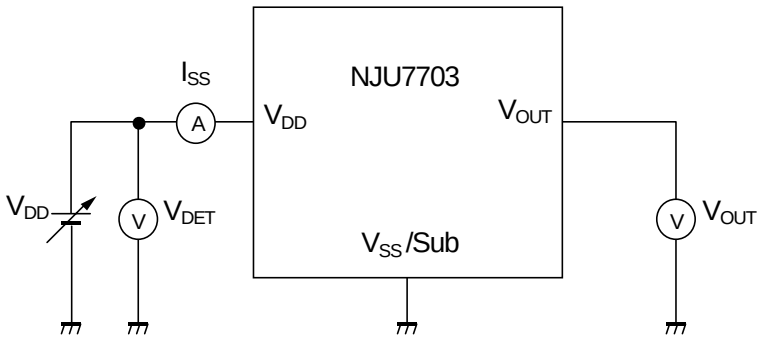
■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V_{DET}			-1.0%	–	+1.0%	V
Hysteresis Voltage	V_{HYS}			V_{DET} ×0.03	V_{DET} ×0.05	V_{DET} ×0.08	V
Quiescent Current	I_{SS}	V_{DD}=V_{DET}+1V	V_{DET}=1.3V~1.7V Version	–	0.5	1.0	μA
			V_{DET}=1.8V~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 (≥2.7V Version)	4.5	7.0	–	mA
		Pch,V_{DS}=0.5V	V_{DD}=4.8V (≤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 (≥5.7V Version)	3.0	5.0	–	mA
Detection Voltage Temperature Coefficient	$\Delta V_{DET}/\Delta Ta$	Ta=0 ~ +85°C		–	±100	–	ppm/°C
Operating Voltage (*5)	V_{DD}	R_L=100kΩ		0.8	–	9	V

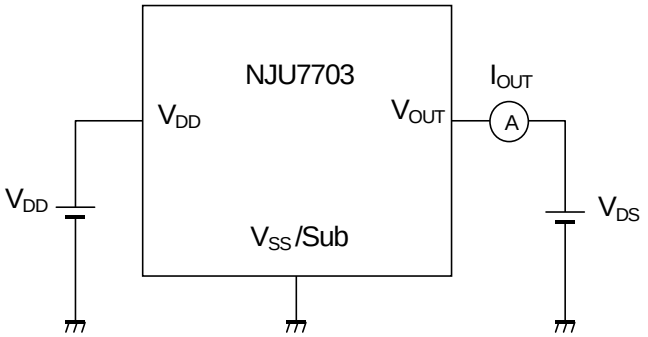
(*5): The minimum Operating Voltage(V_{OPL}) indicates the same value of the input voltage(V_{DD}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

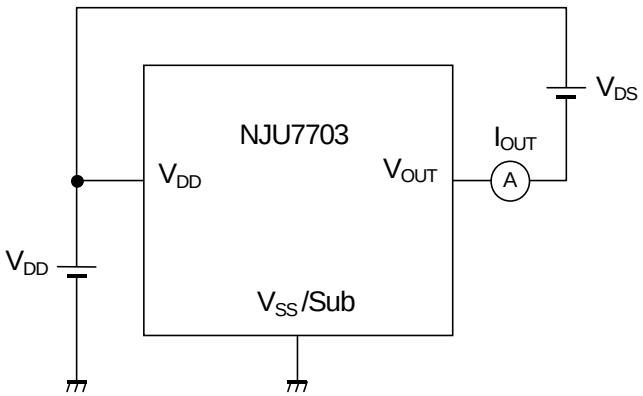
① COMMON TEST CIRCUIT



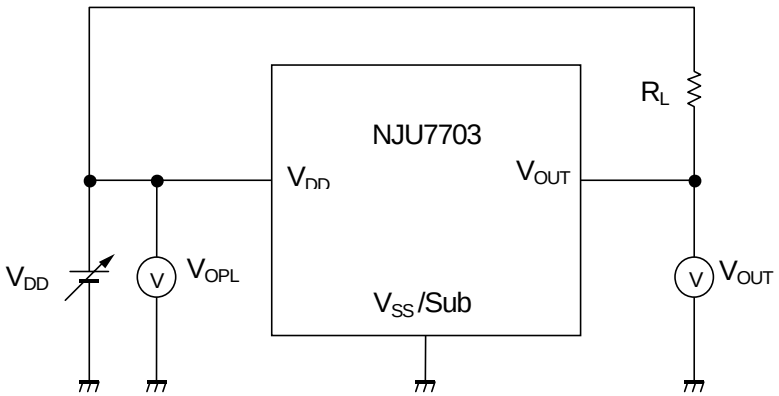
② Nch OUTPUT CURRENT TEST CIRCUIT



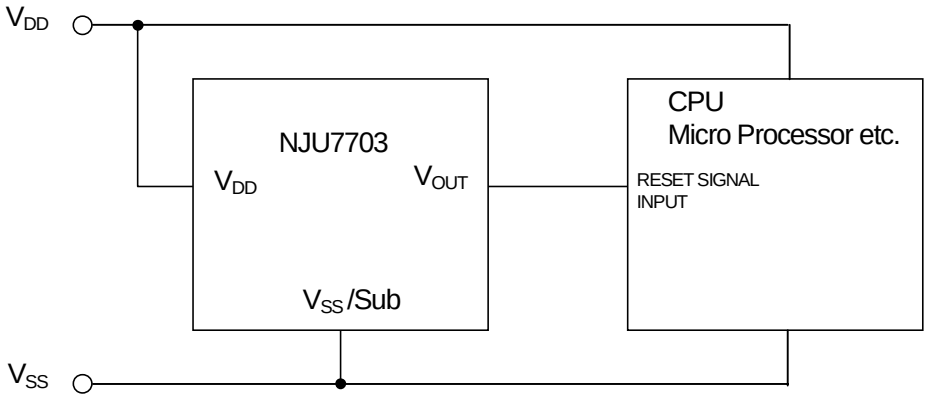
③ Pch OUTPUT CURRENT TEST CIRCUIT



④ MINUMUM OPERATING VOLTAGE TEST CIRCUIT

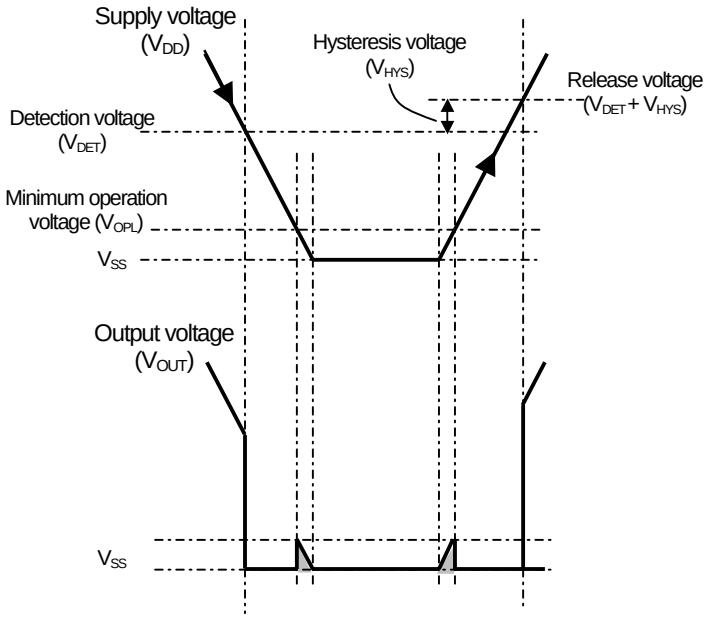


■ TYPICAL APPLICATION



■ 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 Hysterisis 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.