VOLTAGE DETECTOR

■ GENERAL DESCRIPTION

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

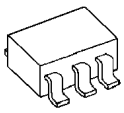
The detection voltage is internally fixed with an accuracy of 1.0%.

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



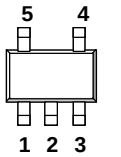
NJU7700/01F

NJU7700/01F4

■ FEATURES

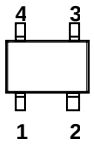
● High Precision Detection Voltage	±1.0%
● Low Quiescent Current	0.8μA typ. (V_{DET} =3V version)
● Detection Voltage Range	1.3~6.0V(0.1V Step)
● Output Configuration	NJU7700: Nch. Open Drain type NJU7701: C-MOS Output type
● CMOS Technology	
● Package Outline	SOT-23-5 : NJU7700/01F SC-82AB : NJU7700/01F4

■ PIN CONFIGURATION



1. V_{OUT}
2. V_{DD}
3. V_{SS}
4. NC
5. NC

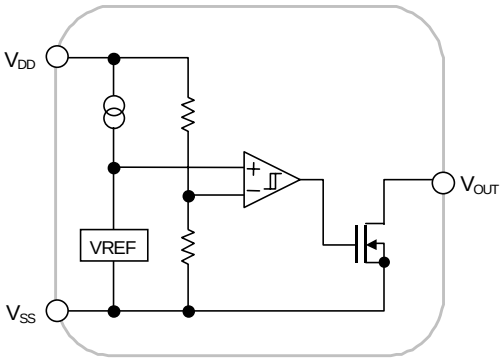
NJU7700/01F



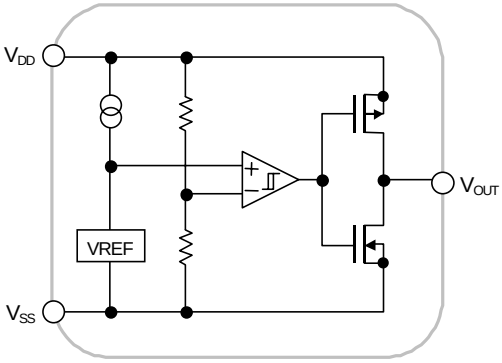
1. V_{OUT}
2. V_{DD}
3. NC
4. V_{SS}

NJU7700/01F4

■ EQUIVALENT CIRCUIT



NJU7700



NJU7701

■ DETECTION VOLTAGE RANK LIST

Device Name	V_{DET}	Device Name	V_{DET}	Device Name	V_{DET}	Device Name	V_{DET}
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_{DD}	+10		V
Output Voltage	V_{OUT}	V_{SS}-0.3~+10		V
Output Current	I_{OUT}	50		mA
Power Dissipation	P_D	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)

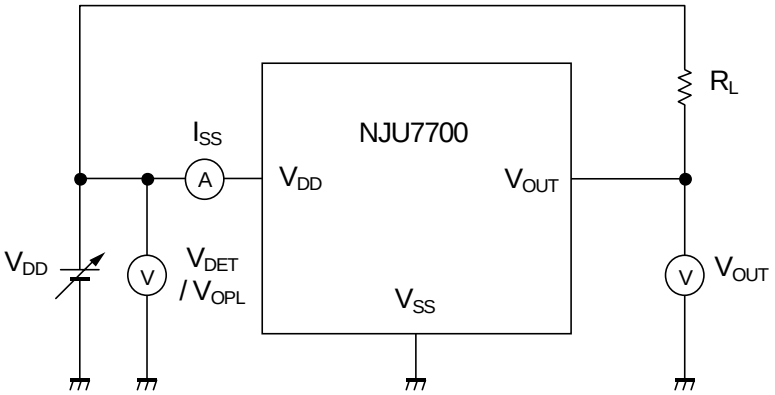
■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V_{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

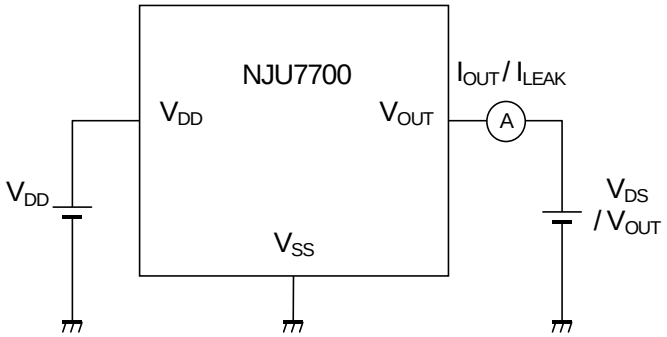
(*3): The minimum Operating Voltage(V_{OPL}) indicates the same value of the input voltage(V_{DD}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

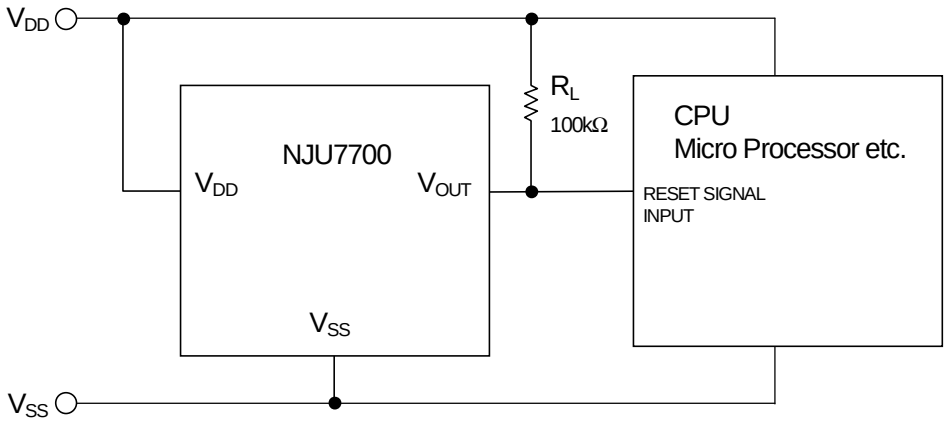
① COMMOM TEST CIRCUIT



② OUTPUT CURRENT/OUTPUT LEAK CURRENT TEST CIRCUIT



■ TYPICAL APPLICATION



■ 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 ~ 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	Topr	–40 ~ +85		°C
Storage Temperature	Tstg	–40 ~ +125		°C

(*4) : Device itself

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

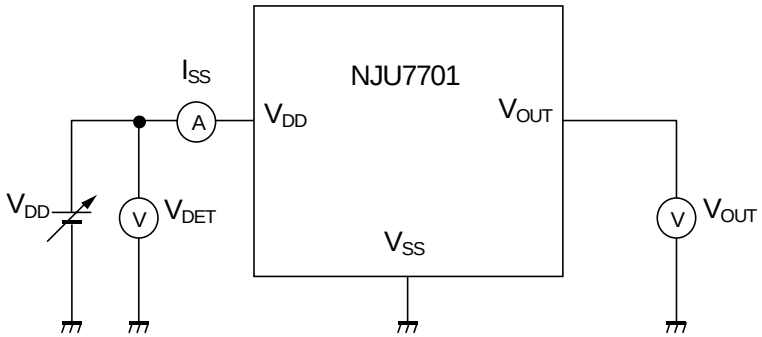
■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V_{DET}			-1.0%	–	+1.0%	V
Hysteresis Voltage	V_{HYS}			V_{DET} ×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(*6)	V_{DD}	R_L=100kΩ		0.8	–	9	V

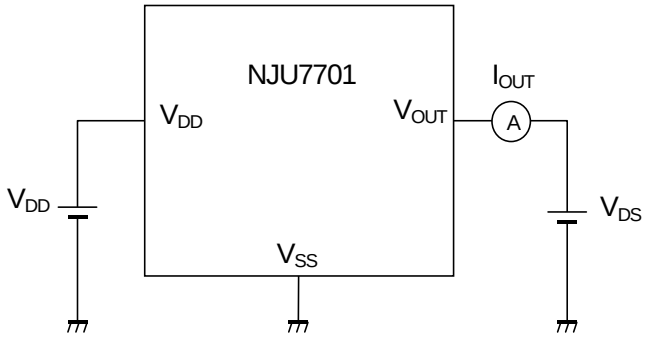
(*6): The minimum Operating Voltage(V_{OPL}) indicates the same value of the input voltage(V_{DD}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

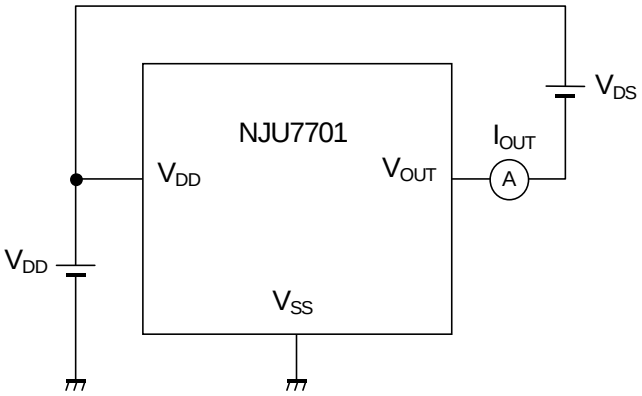
① COMMON TEST CIRCUIT



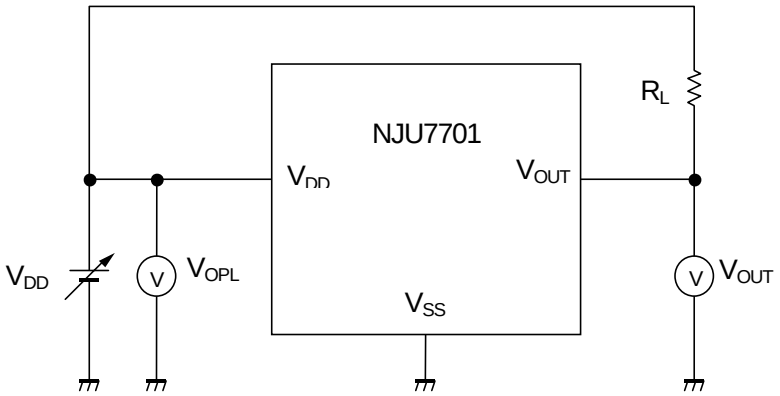
② Nch OUTPUT CURRENT TEST CIRCUIT



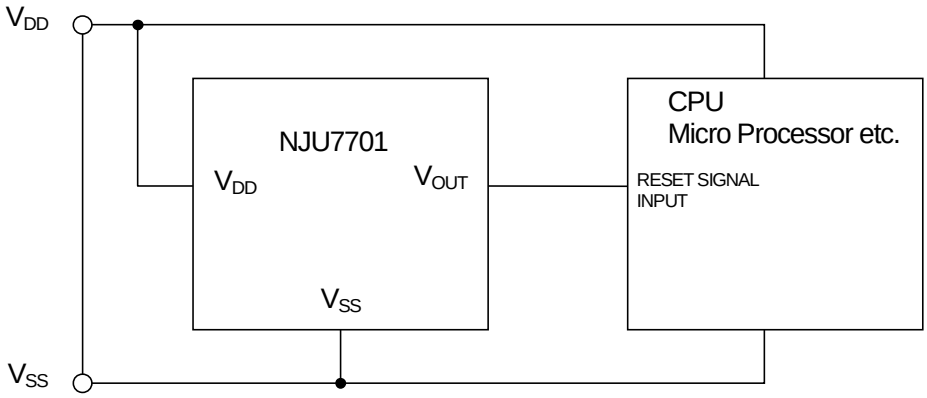
③ Pch OUTPUT CURRENT TEST CIRCUIT



④ MINUMUM OPERATING VOLTAGE TEST CIRCUIT

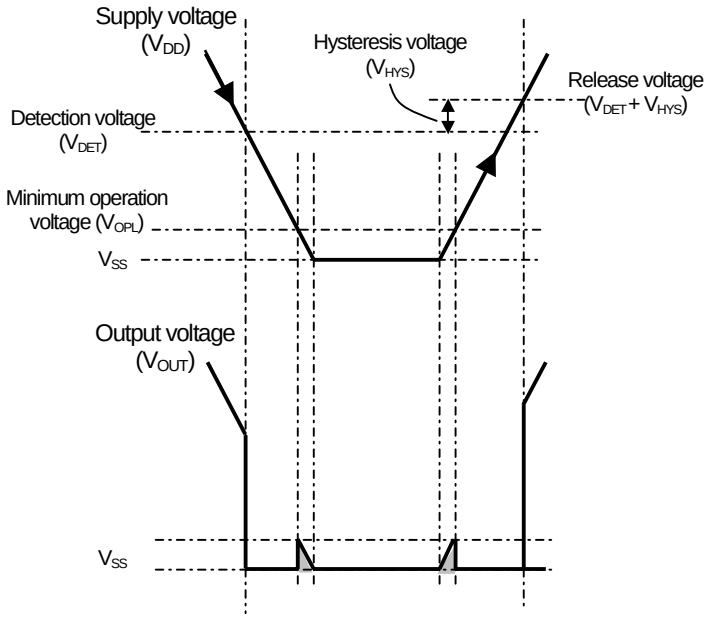


■ TYPICAL APPLICATION



■ 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 (NJU7701) : When V_{DD} less than V_{OPL}, V_{OUT} is free of the shaded region.