

2ch VOLTAGE DETECTOR

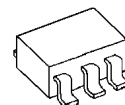
■ GENERAL DESCRIPTION

The NJU7712/13 is a 2ch low quiescent current voltage detector featuring high precision detection voltage.

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

NJU7712 is Nch. Open Drain and NJU7713 is a C-MOS output type.

■ PACKAGE OUTLINE



NJU7712/13F

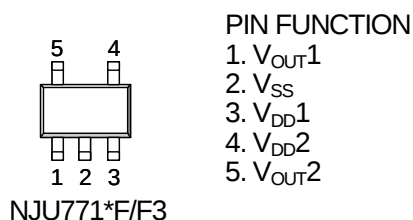


NJU7712/13F3

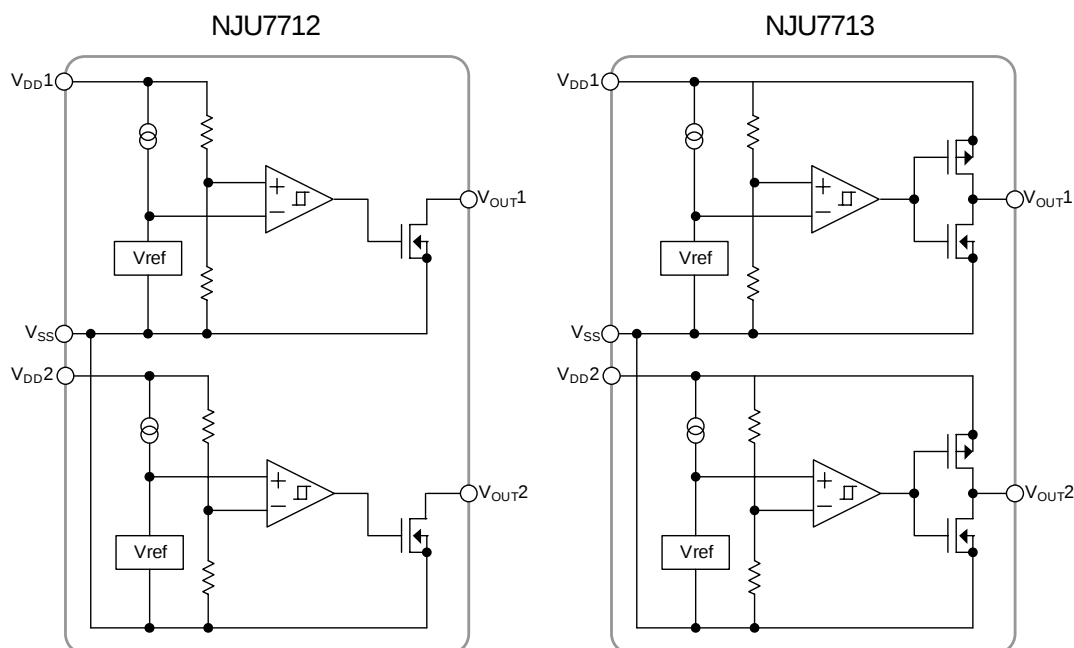
■ FEATURES

- High Precision detection Voltage $\pm 1.0\%$
- Low Quiescent Current $0.8\mu\text{A typ. (per 1ch)}$
- Detection Voltage Range $1.5 \sim 6.0\text{V} (0.1\text{V step})$ It applies only to 1ch(Over Voltage Detect).
 $1.3 \sim 6.0\text{V} (0.1\text{V step})$ It applies only to 2ch(Low Voltage Detect).
- 1ch: Over Voltage Detect, 2ch: Low Voltage Detect
- Output Configuration
 NJU7712: Nch. Open Drain Type
 NJU7713: C-MOS Output Type
- CMOS Technology
- Package Outline SOT-23-5 / SC88A

■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



NJU7712/13

■ DETECTION VOLTAGERANK LIST

●NJU7712

Device Name	Package	V _{DET}	
		CH1	CH2
NJU7712F4227	SOT-23-5	4.2V	2.7V
NJU7712F0613		6.0V	1.3V
NJU7712F3-4227	SC88A	4.2V	2.7V
NJU7712F3-0613		6.0V	1.3V

●NJU7713

Device Name	Package	V _{DET}	
		CH1	CH2
NJU7713F0433	SOT-23-5	4.0V	3.3V
NJU7713F4227		4.2V	2.7V
NJU7713F0613		6.0V	1.3V
NJU7713F3-0433	SC88A	4.0V	3.3V
NJU7713F3-4227		4.2V	2.7V
NJU7713F3-0613		6.0V	1.3V

■ NJU7712

■ 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	SOT-23-5	350(*1)
			200(*2)
		SC88A	250(*1)
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C

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

(*2) : Device itself

■ ELECTRICAL CHARACTERISTICS

(1ch: Over Voltage Detect, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Detection Voltage	V _{DET1}		-1.0%	—	+1.0%	V
Hysteresis Voltage	V _{HYS1}		V _{DET} ×0.03	V _{DET} ×0.05	V _{DET} ×0.08	V
Quiescent Current	I _{SS1}	V _{DD1} =V _{DET1} +1V	V _{DET1} =1.5V ~ 1.7V Version	—	0.5	1.0
			V _{DET1} =1.8V ~ 6.0V Version	—	0.8	1.6
Output Current	I _{OUT1}	Nch, V _{DS1} =0.5V	V _{DD1} =4.8V(≤4.3V Version)	6	13	—
			V _{DD1} =7.0V	8	18	—
Output Leak Current	I _{LEAK1}	V _{DD1} =1V, V _{OUT1} =9V	—	—	0.1	μA
Detection Voltage Temperature Coefficient	ΔV _{DET1} /ΔTa	Ta=0 ~ +85°C	—	±100	—	ppm/°C
Operating Voltage (*3)	V _{DD1}	R _{L1} =100kΩ	0.8	—	9	V

(*3): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 90% or less of the input voltage(V_{DD}).

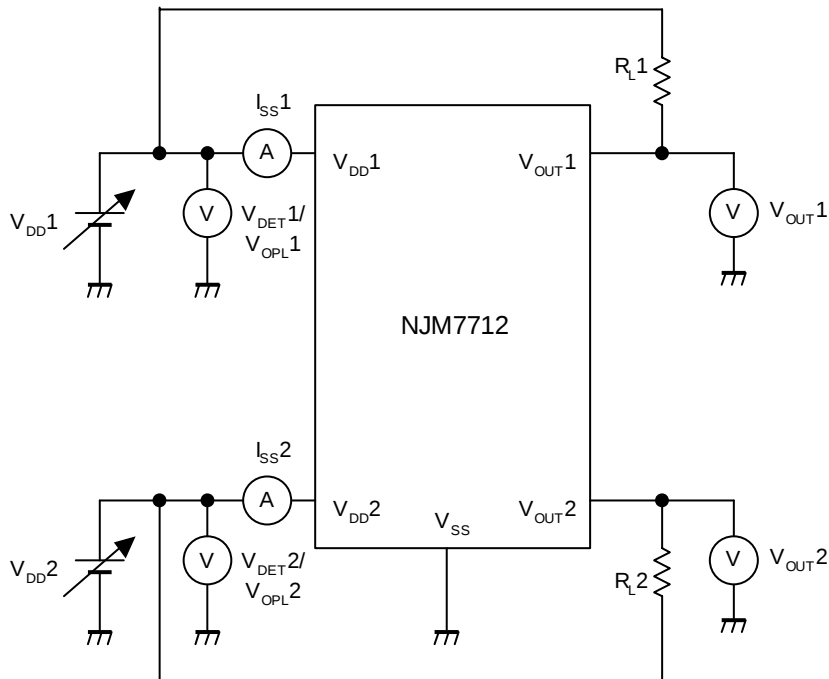
(2ch: Low Voltage Detect, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Detection Voltage	V _{DET2}		-1.0%	—	+1.0%	V
Hysteresis Voltage	V _{HYS2}		V _{DET} ×0.03	V _{DET} ×0.05	V _{DET} ×0.08	V
Quiescent Current	I _{SS2}	V _{DD2} =V _{DET2} +1V	V _{DET2} =1.3V ~ 1.7V Version	—	0.5	1.0
			V _{DET2} =1.8V ~ 6.0V Version	—	0.8	1.6
Output Current	I _{OUT2}	Nch, V _{DS2} =0.5V	V _{DD2} =1.2V	0.75	2.0	—
			V _{DD2} =2.4V (≥2.7V Version)	4.5	7.0	—
Output Leak Current	I _{LEAK2}	V _{DD2} =V _{OUT2} =9V	—	—	0.1	μA
Detection Voltage Temperature Coefficient	ΔV _{DET2} /ΔTa	Ta=0 ~ +85°C	—	±100	—	ppm/°C
Operating Voltage (*4)	V _{DD2}	R _{L2} =100kΩ	0.8	—	9	V

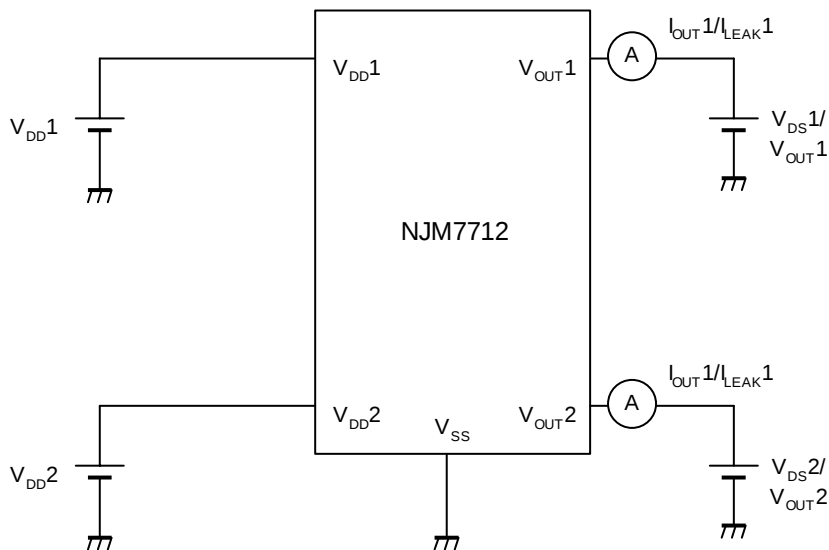
(*4): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

① COMMON TEST CIRCUIT

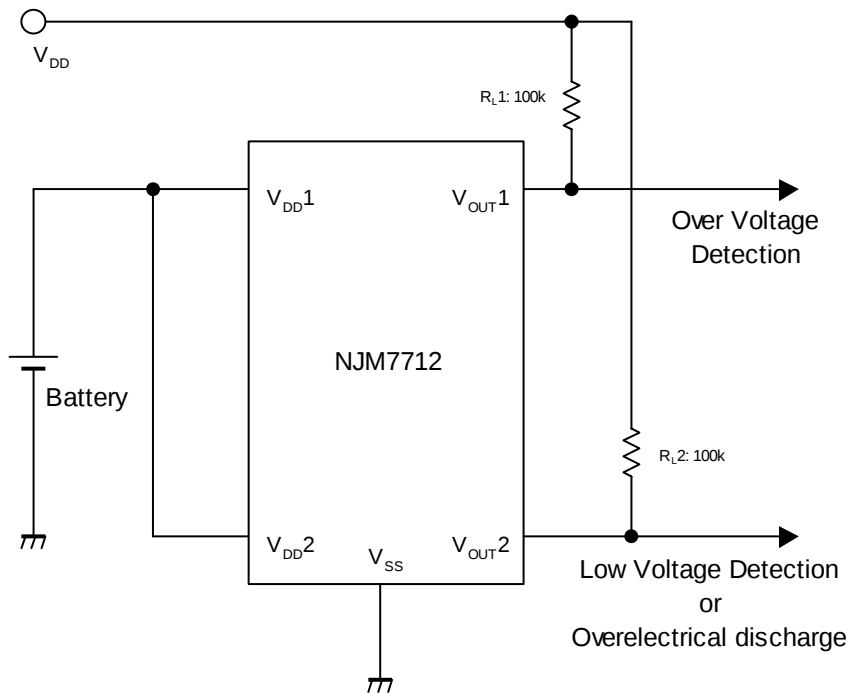


② OUTPUT CURRENT / LEAK CURRENT TEST CIRCUIT

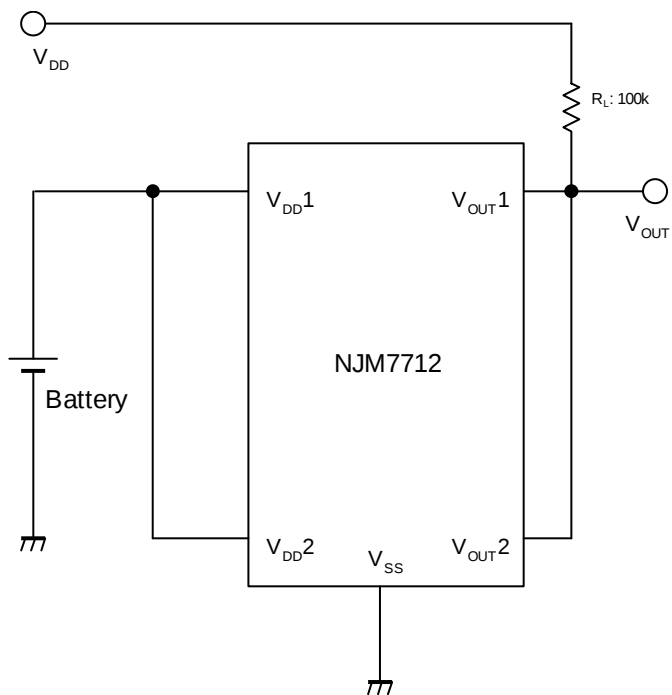


■ TYPICAL APPLICATION

① Battery voltage supervision



② Window Comparator



■ NJU7713

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{DD}	+10	V
Output Voltage	V_{OUT}	$V_{SS}-0.3 \sim +10$	V
Output Current	I_{OUT}	50	mA
Power Dissipation	P_D	SOT-23-5	350(*5)
			200(*6)
		SC88A	250(*5)
Operating Temperature	T_{opr}	-40 ~ +85	°C
Storage Temperature	T_{stg}	-40 ~ +125	°C

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

(*6) : Device itself

■ ELECTRICAL CHARACTERISTICS

(1ch: Over Voltage Detect, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Detection Voltage	V_{DET1}		-1.0%	—	+1.0%	V
Hysteresis Voltage	V_{HYS1}		$V_{DET} \times 0.03$	$V_{DET} \times 0.05$	$V_{DET} \times 0.08$	V
Quiescent Current	I_{SS1}	$V_{DD1}=V_{DET1}+1V$	$V_{DET1}=1.5V \sim 1.7V$ Version	0.5	1.0	μA
			$V_{DET1}=1.8V \sim 6.0V$ Version	0.8	1.6	μA
Output Current	I_{OUT1}	Nch, $V_{DS1}=0.5V$	$V_{DD1}=4.8V(\leq 4.3V$ Version)	6	13	mA
			$V_{DD1}=7.0V$	8	18	mA
		Pch, $V_{DS1}=0.5V$	$V_{DD1}=1.4V$	0.1	0.4	mA
			$V_{DD1}=2.4V(\geq 2.7V$ Version)	0.6	1.6	mA
Detection Voltage Temperature Coefficient	$\Delta V_{DET1}/\Delta T_a$	Ta=0 ~ +85°C	—	±100	—	ppm/°C
Operating Voltage (*7)	V_{DD1}	$R_L1=100k\Omega$	1.2	—	9	V

(*7): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 90% or less of the input voltage(V_{DD}).

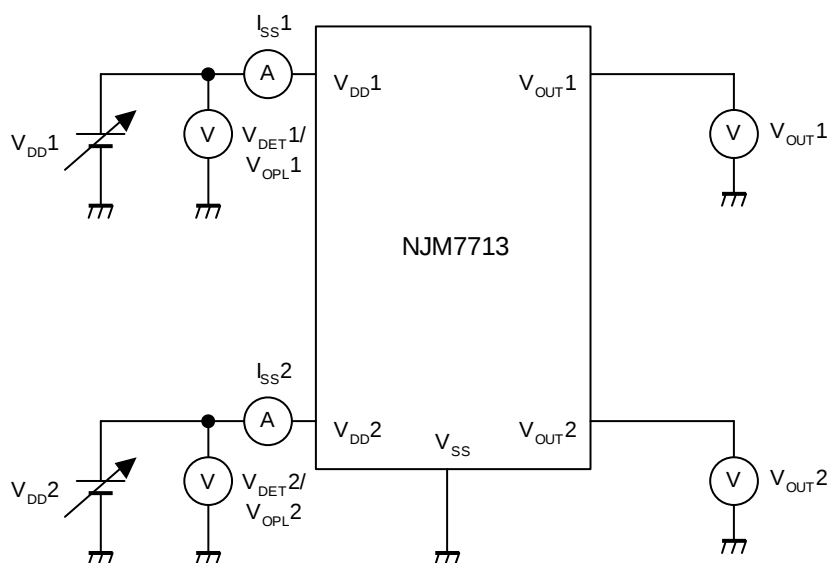
(2ch: Low Voltage detect, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Detection Voltage	V_{DET2}		-1.0%	—	+1.0%	V
Hysteresis Voltage	V_{HYS2}		$V_{DET} \times 0.03$	$V_{DET} \times 0.05$	$V_{DET} \times 0.08$	V
Quiescent Current	I_{SS2}	$V_{DD2}=V_{DET2}+1V$	$V_{DET2}=1.3V \sim 1.7V$ Version	0.5	1.0	μA
			$V_{DET2}=1.8V \sim 6.0V$ Version	0.8	1.6	μA
Output Current	I_{OUT2}	Nch, $V_{DS2}=0.5V$	$V_{DD2}=4.8V(\leq 4.3V$ Version)	0.75	2.0	mA
			$V_{DD2}=7.0V$	4.5	7.0	mA
		Pch, $V_{DS2}=0.5V$	$V_{DD2}=1.4V$	2.0	3.5	mA
			$V_{DD2}=2.4V$ (4.0V~5.6V Version)	2.5	4.0	mA
			$V_{DD2}=8.4V (\geq 5.7V$ Version)	3.0	5.0	mA
Detection Voltage Temperature Coefficient	$\Delta V_{DET2}/\Delta T_a$	Ta=0 ~ +85°C	—	±100	—	ppm/°C
Operating Voltage (*8)	V_{DD2}	$R_L2=100k\Omega$	0.8	—	9	V

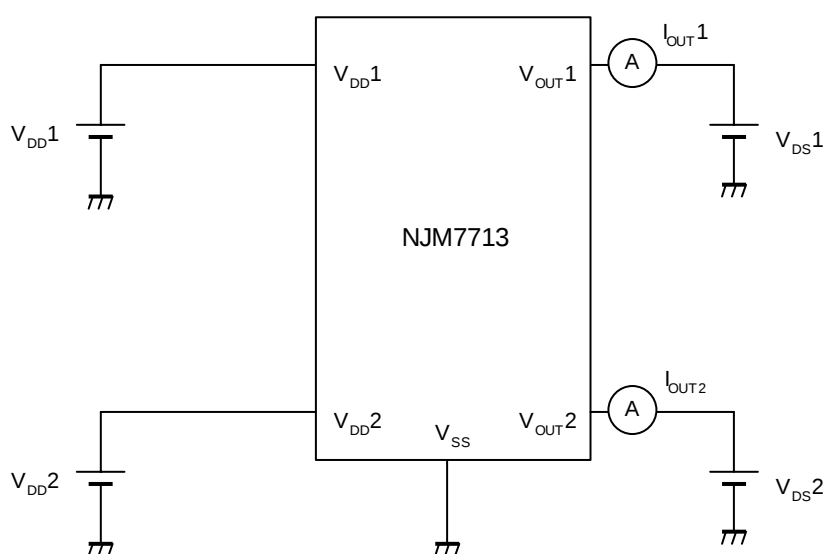
(*8): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

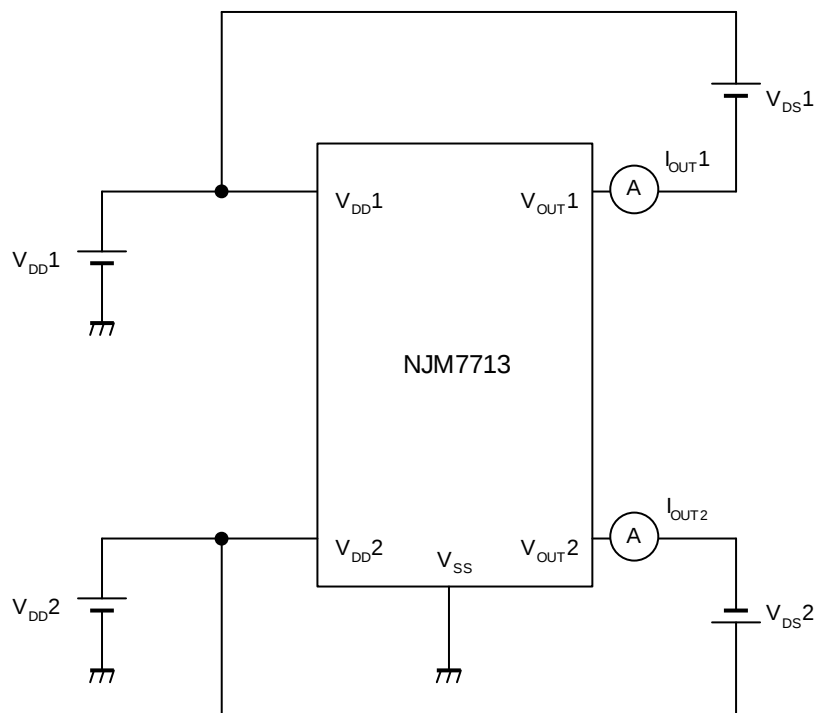
① COMMON TEST CIRCUIT



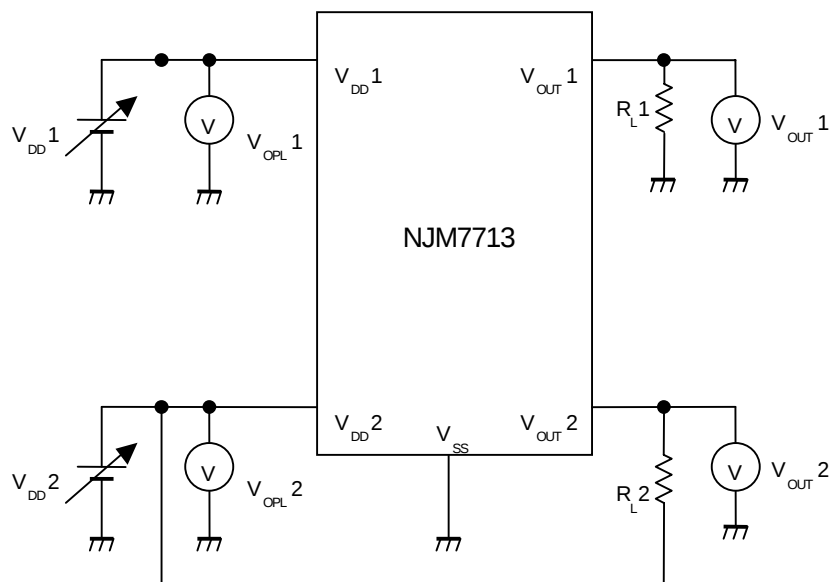
② Nch OUTPUT CURRENT TEST CIRCUIT



③ Pch OUTPUT CURRENT TEST CIRCUIT

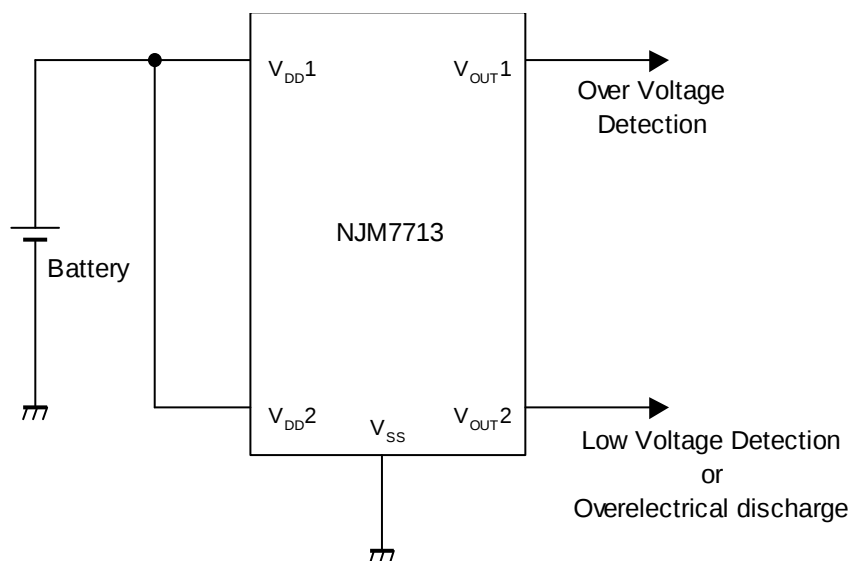


④ MINIMUM OPERATING VOLTAGE TEST CIRCUIT



■ TYPICAL APPLICATION

① Battery voltage supervision



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