

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 fixed internally with an accuracy of 1.0%.

NJU7712 is Nch. Open Drain and NJU7713 of output circuit form is a C-MOS output.

■ PACKAGE OUTLINE



NJU7712/13F

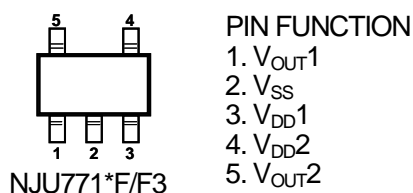


NJU7712/13F3

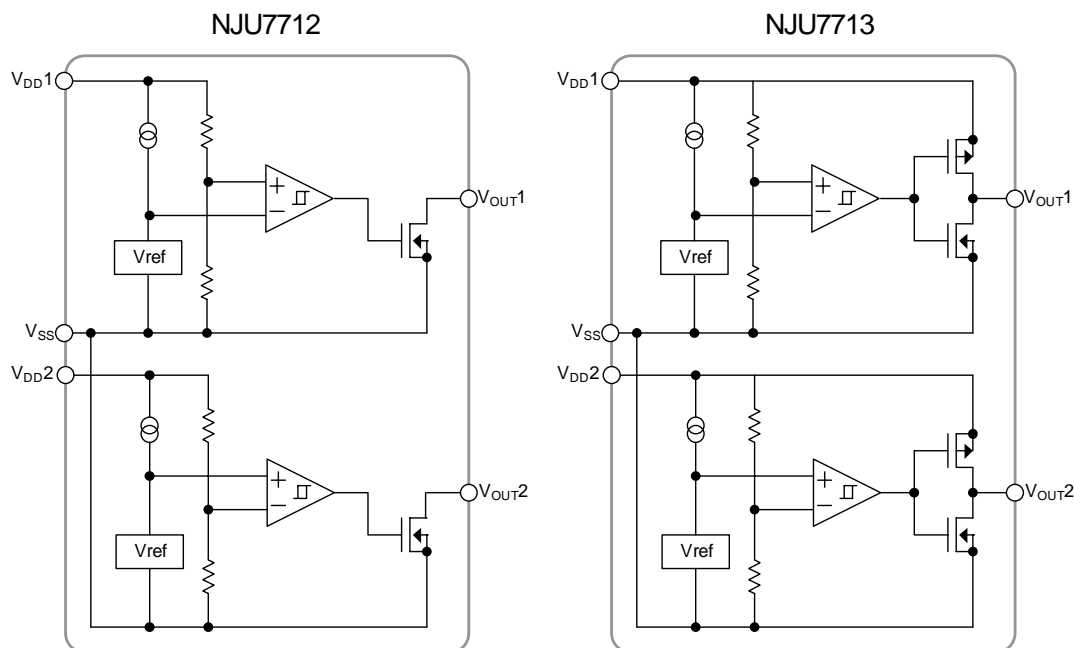
■ FEATURES

- High Precision detection Voltage $\pm 1.0\%$
- Low Quiescent Current $0.8\mu\text{A}(\text{per } 1\text{ch})$
- 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 Circuit Form
 NJU7712: Nch. Open Drain Type
 NJU7713: C-MOS Output Type
- CMOS Technology
- Package Outline SOT-23-5 (MTP5) / SC88A

■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



■ DETECTION VOLTAGERANK LIST

Device Name	Package	V _{DET}	
		CH1	CH2
NJU7712/13F4227	SOT-23-5 (MTP5)	4.2V	2.7V
NJU7712/13F0613		6.0V	1.3V
NJU7712/13F3-4227	SC88A	4.2V	2.7V
NJU7712/13F3-0613		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	200(MTP5)	mW
		250(SC88A(*note 1))	
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C

(*note 1): On board, 50mm×50mm×1.6mm glass epoxy baseplate.

■ 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	μA
			V _{DET1} =1.8V ~ 6.0V Version	0.8	1.6	μA
Output Current	I _{OUT1}	Nch, V _{DS1} =0.5V	V _{DD1} =4.8V(≤4.3V Version)	6	13	mA
			V _{DD1} =7.0V	8	18	mA
Output Leak Current	I _{LEAK1}	V _{DD1} =V _{OUT1} =9V	—	—	0.1	μA
Detection Voltage Temperature Coefficient	ΔV _{DET1} /ΔTa	Ta=0 ~ +85°C	—	±100	—	ppm/°C
Operating Voltage (*note 2)	V _{DD1}	R _{L1} =100kΩ	0.8	—	9	V

(*note 2): 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}).

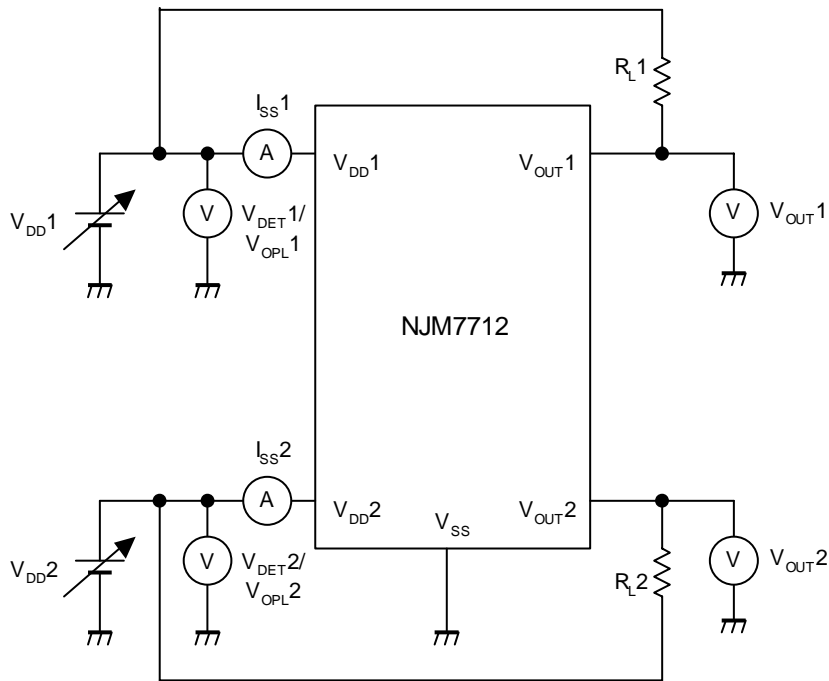
(2ch: Low Voltage Detect, Ta=25°C)

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	μA
			V _{DET2} =1.8V ~ 6.0V Version	0.8	1.6	μA
Output Current	I _{OUT2}	Nch, V _{DS2} =0.5V	V _{DD2} =1.2V	0.75	2.0	mA
			V _{DD2} =2.4V (≥4.3V Version)	4.5	7.0	mA
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 (*note 3)	V _{DD2}	R _{L2} =100kΩ	0.8	—	9	V

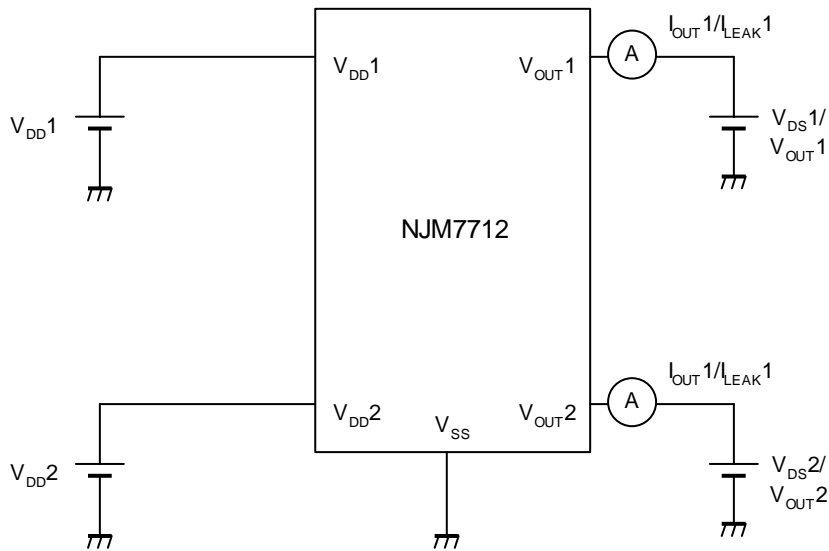
(*note 3): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

① COMMON TEST CIRCUIT

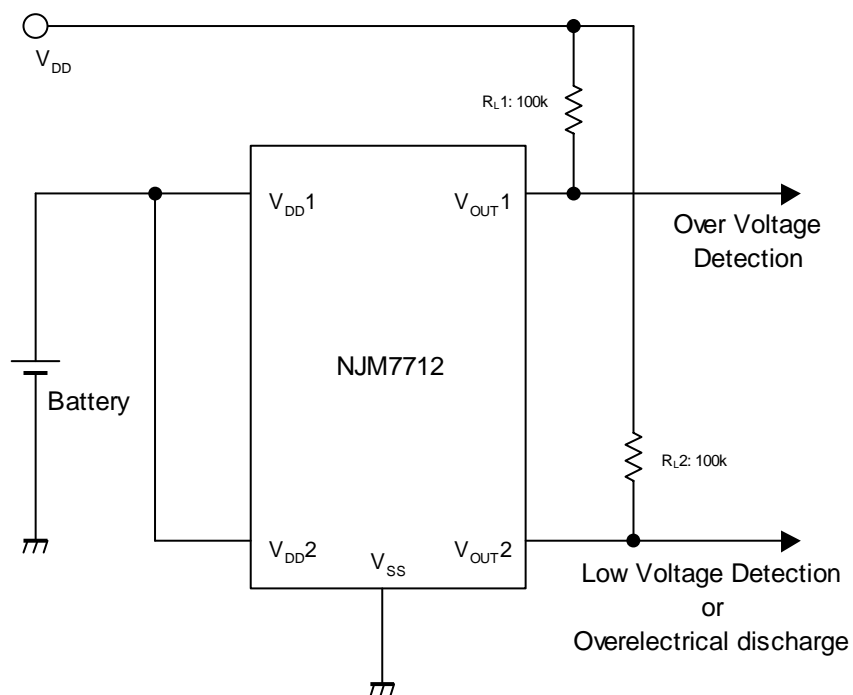


② OUTPUT CURRENT / LEAK CURRENT TEST CIRCUIT

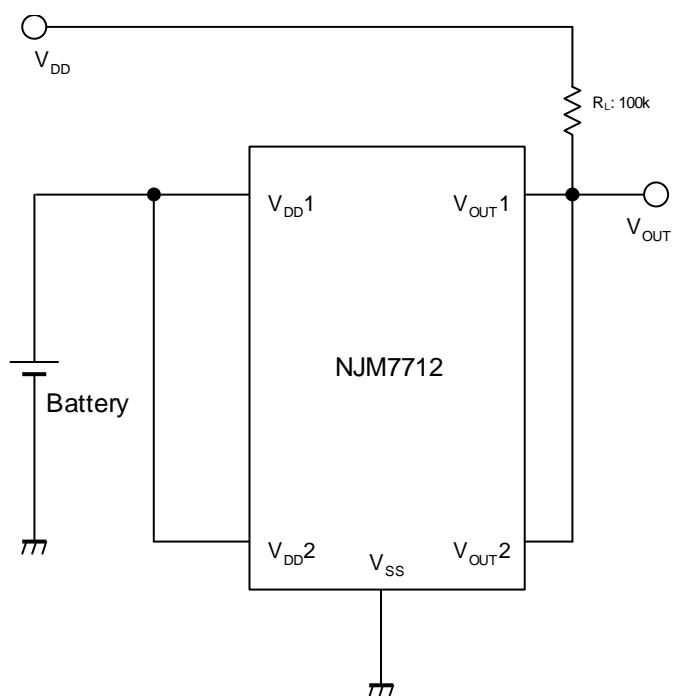


■ TYPICAL APPLICATION

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 ~ +10	V
Output Current	I _{OUT}	50	mA
Power Dissipation	P _D	200(MTP5)	mW
		250(SC88A(*note 1))	
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C

(*note 1): On board, 50mm×50mm×1.6mm glass epoxy baseplate.

■ ELECTRICAL CHARACTERISTICS

(1ch: Over Voltage Detect, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V _{DET} 1			-1.0%	—	+1.0%	V
Hysterisis Voltage	V _{HYS} 1			V _{DET} x0.03	V _{DET} x0.05	V _{DET} x0.08	V
Quiescent Current	I _{SS} 1	V _{DD} 1=V _{DET} 1+1V	V _{DET} 1=1.5V ~ 1.7V Version	—	0.5	1.0	μA
			V _{DET} 1=1.8V ~ 6.0V Version	—	0.8	1.6	μA
Output Current	I _{OUT} 1	Nch, V _{DS} 1=0.5V	V _{DD} 1=4.8V(≤4.3V Version)	6	13	—	mA
			V _{DD} 1=7.0V	8	18	—	mA
		Pch, V _{DS} 1=0.5V	V _{DD} 1=1.4V	0.1	0.4	—	mA
			V _{DD} 1=2.4V(≥2.7V Version)	0.6	1.6	—	mA
Detection Voltage Temperature Coefficient	ΔV _{DET} 1/ΔTa	Ta=0 ~ +85°C		—	±100	—	ppm/°C
Operating Voltage (*note 4)	V _{DD} 1	R _L 1=100kΩ		1.2	—	9	V

(*note 4): 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}).

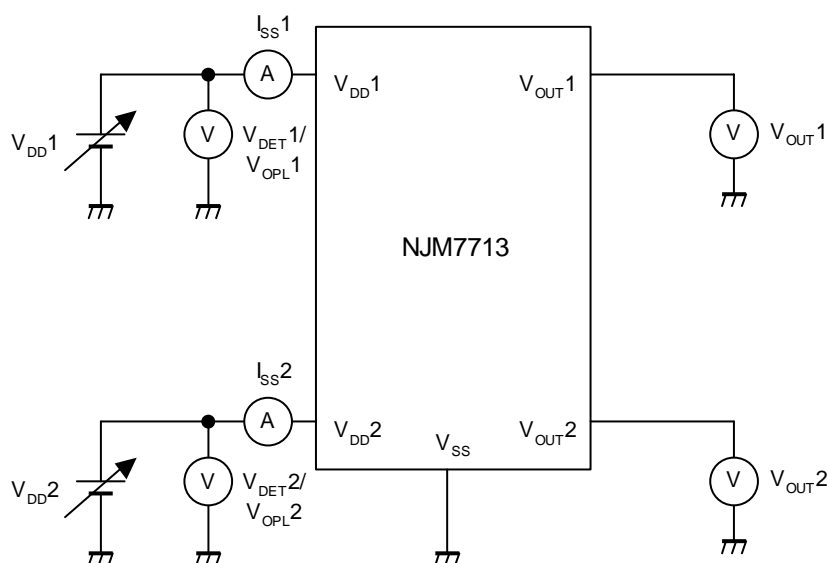
(2ch: Low Voltage detect, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V _{DET2}			-1.0%	—	+1.0%	V
Hysterisis Voltage	V _{HYS2}			V _{DET} x0.03	V _{DET} x0.05	V _{DET} x0.08	V
Quiescent Current	I _{SS2}	V _{DD2} =V _{DET2} +1V	V _{DET2} =1.5V ~ 1.7V Version	—	0.5	1.0	μA
			V _{DET2} =1.8V ~ 6.0V Version	—	0.8	1.6	μA
Output Current	I _{OUT2}	Nch, V _{DS2} =0.5V	V _{DD2} =4.8V(≤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 (≥5.7V Version)	3.0	5.0	—	mA
Detection Voltage Temperature Coefficient	ΔV _{DET2} /ΔTa	Ta=0 ~ +85°C		—	±100	—	ppm/°C
Operating Voltage (*note 5)	V _{DD2}	R _{L2} =100kΩ		0.8	—	9	V

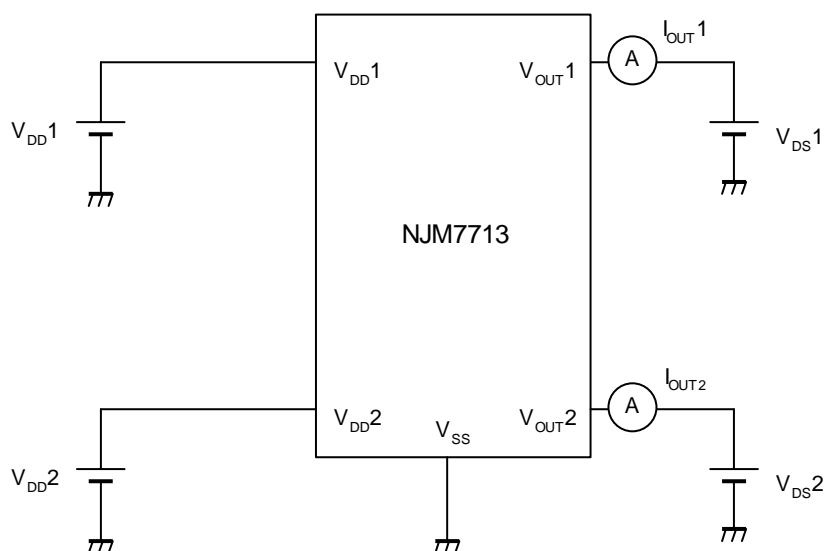
(*note 5): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

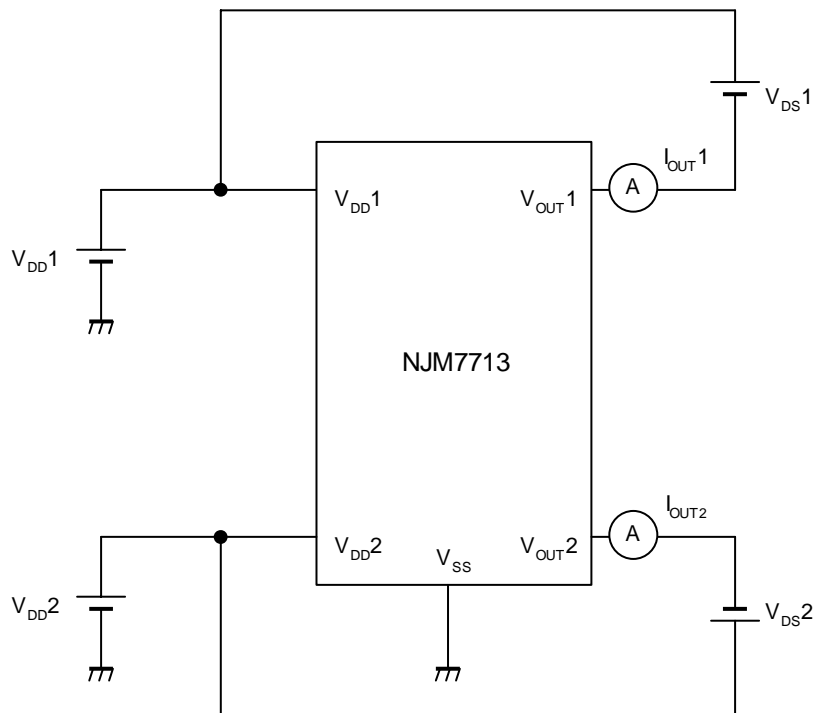
① COMMON TEST CIRCUIT



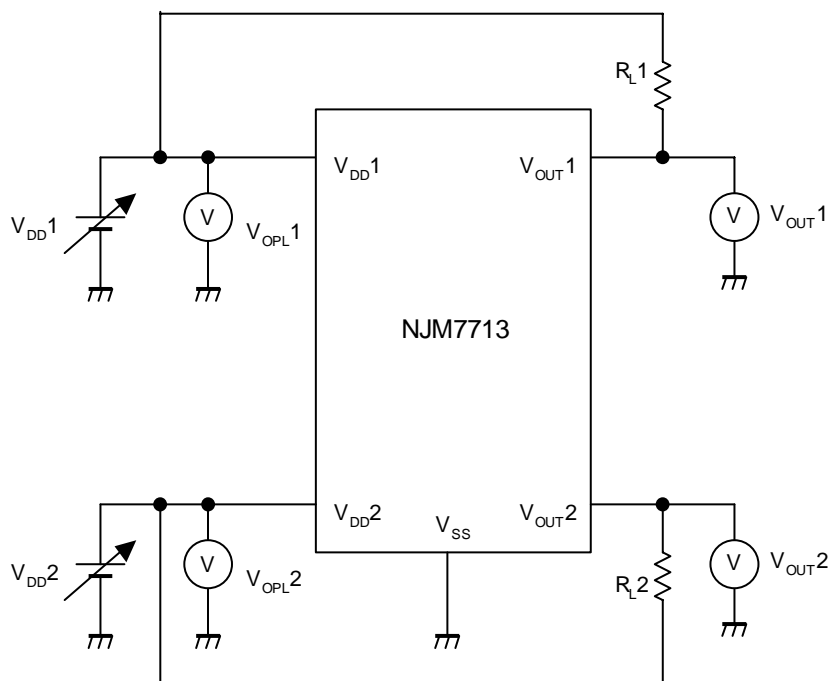
② Nch OUTPUT CURRENT TEST CIRCUIT



③ Pch OUTPUT CURRENT TEST CIRCUIT

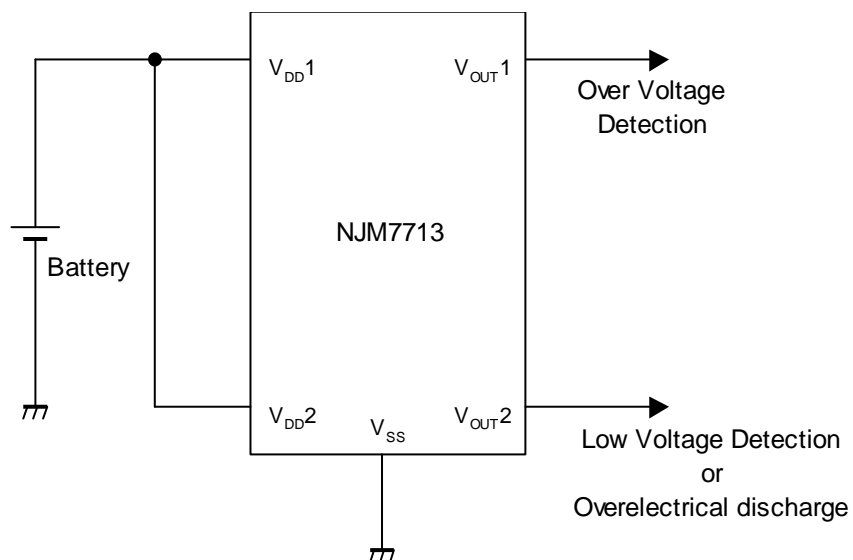


④ MINIMUM OPERATING VOLTAGE TEST CIRCUIT



■ TYPICAL APPLICATION

① Battery voltage supervision



[CAUTION]

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