

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

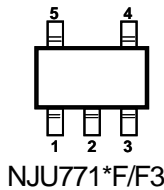


NJU7712/13F3

■ 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

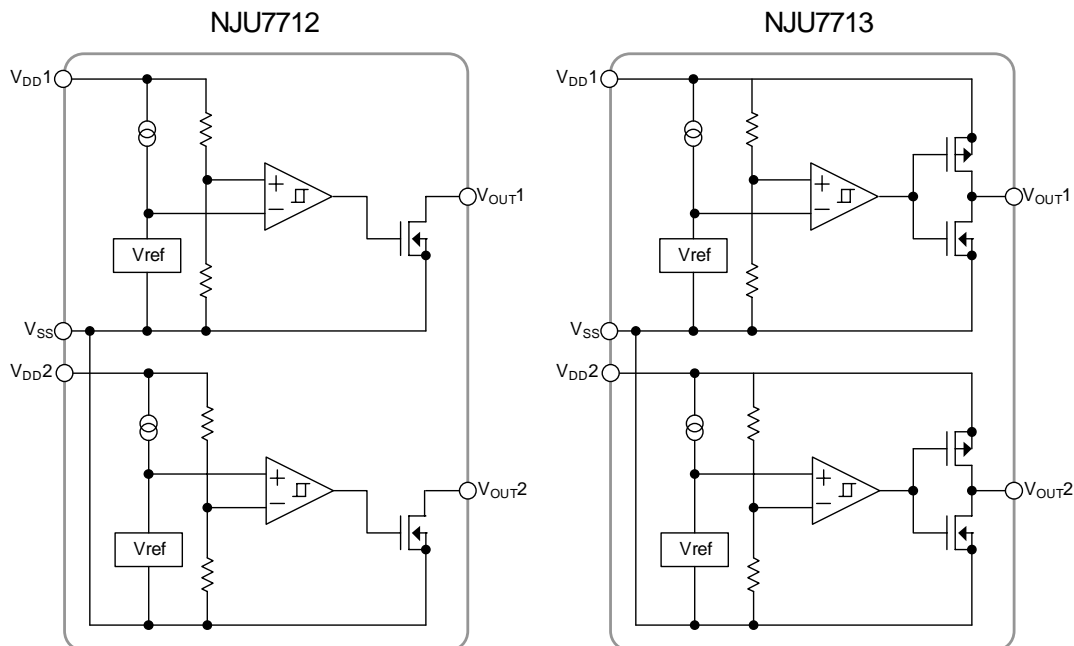
■ PIN CONFIGURATION



PIN FUNCTION

1. $V_{\text{OUT}1}$
2. V_{SS}
3. $V_{\text{DD}1}$
4. $V_{\text{DD}2}$
5. $V_{\text{OUT}2}$

■ EQUIVALENT CIRCUIT



NJU7712/13

■ 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}).

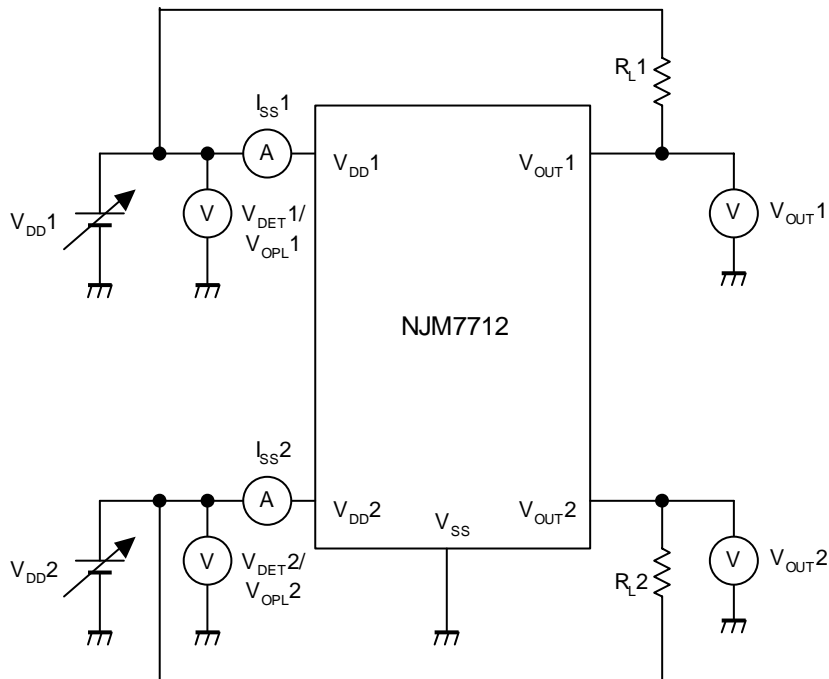
(2ch: Low Voltage Detect, Ta=25°C)

| 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 | |

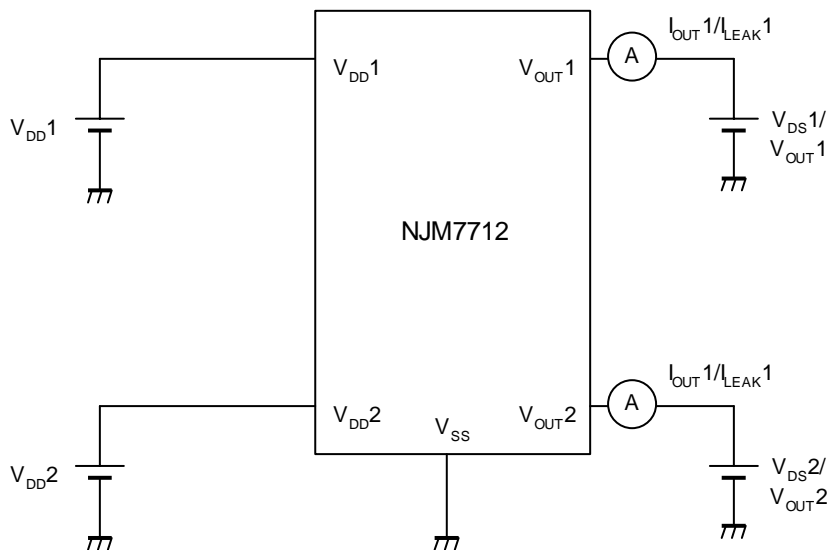
(*note 3): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

① COMMON TEST CIRCUIT

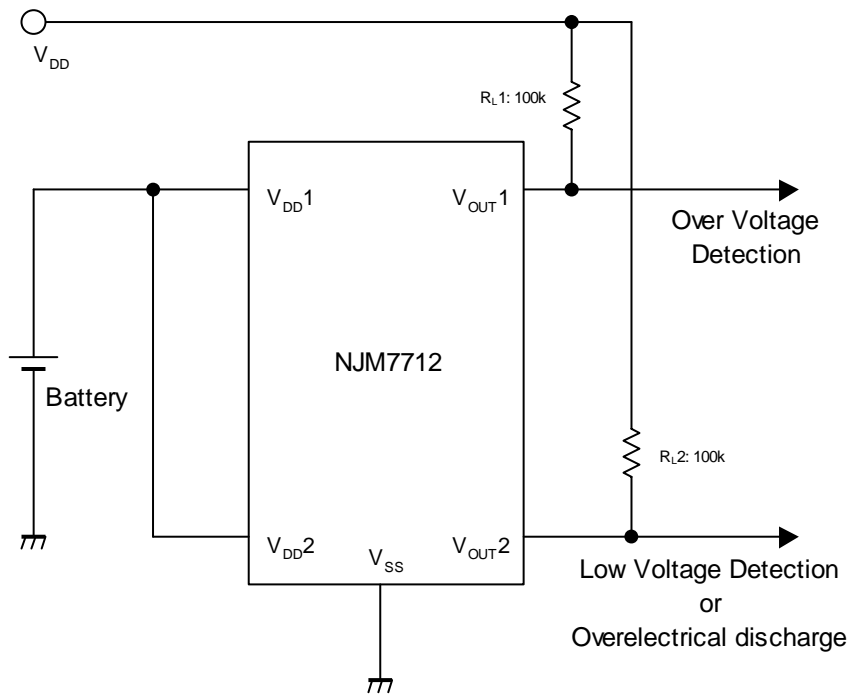


② OUTPUT CURRENT / LEAK CURRENT TEST CIRCUIT

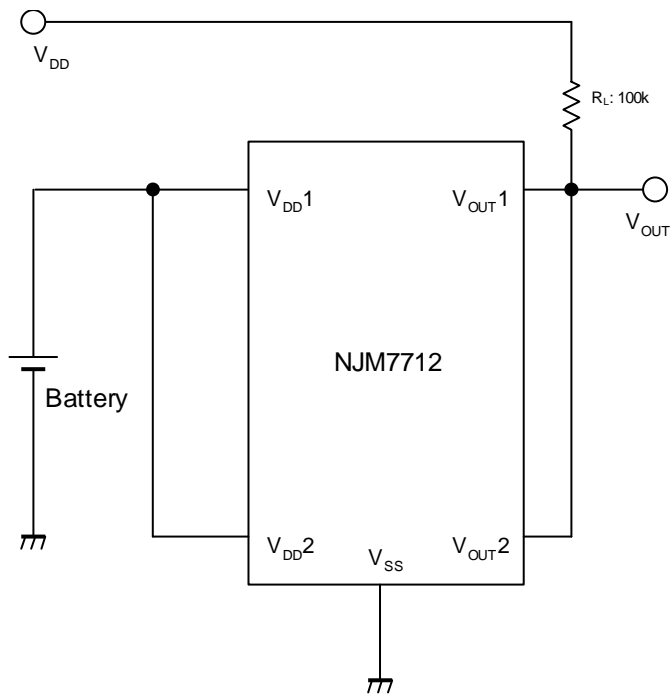


■ TYPICAL APPLICATION

① Battery voltage supervision



② Window Comparator



NJU7712/13

■ 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 _{DET1} | | -1.0% | - | +1.0% | V | |
| Hysterisis Voltage | V _{HYS1} | | V _{DET} x0.03 | V _{DET} x0.05 | V _{DET} x0.08 | 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 |
| | | Pch, V _{DS1} =0.5V | V _{DD1} =1.4V | 0.1 | 0.4 | - | mA |
| | | | V _{DD1} =2.4V(≥2.7V Version) | 0.6 | 1.6 | - | mA |
| Detection Voltage Temperature Coefficient | ΔV _{DET1} /ΔTa | Ta=0 ~ +85°C | - | ±100 | - | ppm/°C | |
| Operating Voltage (*note 4) | V _{DD1} | R _{L1} =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}).

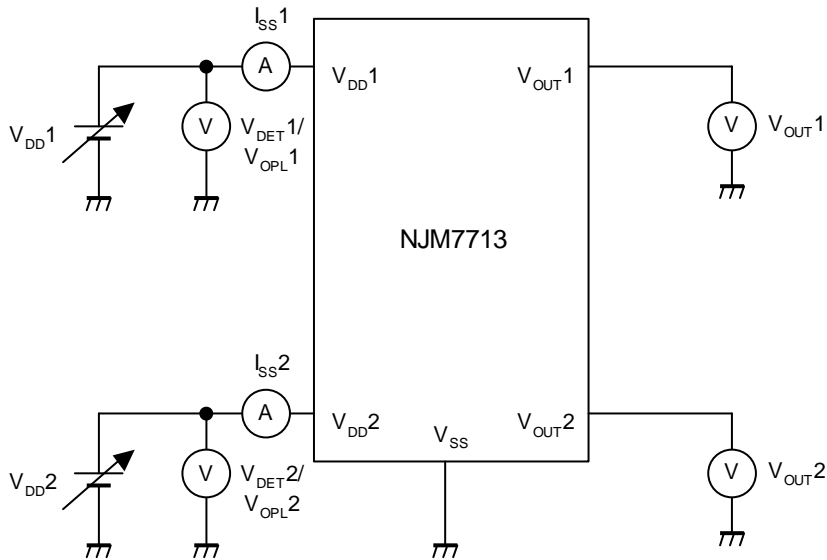
(2ch: Low Voltage detect, Ta=25°C)

| 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 |
| | | | V _{DD2} =1.4V | 2.0 | 3.5 | - | mA |
| | | Pch, V _{DS2} =0.5V | 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 | |

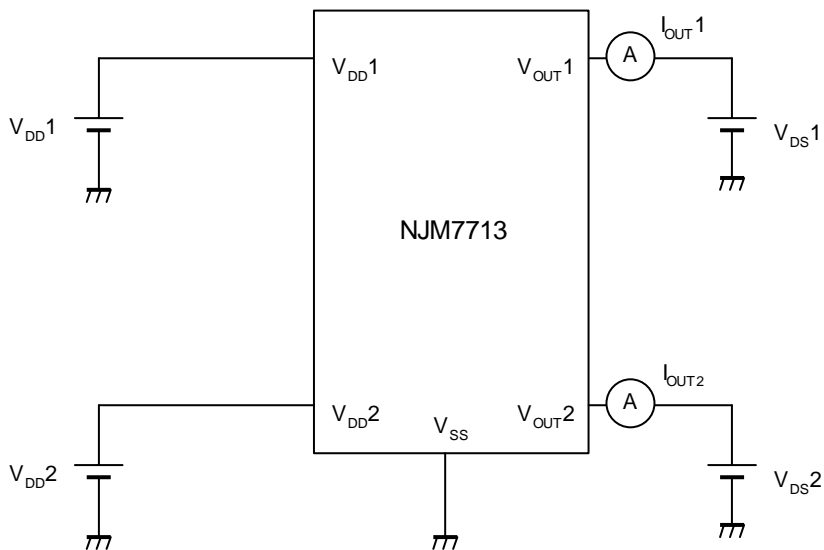
(*note 5): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

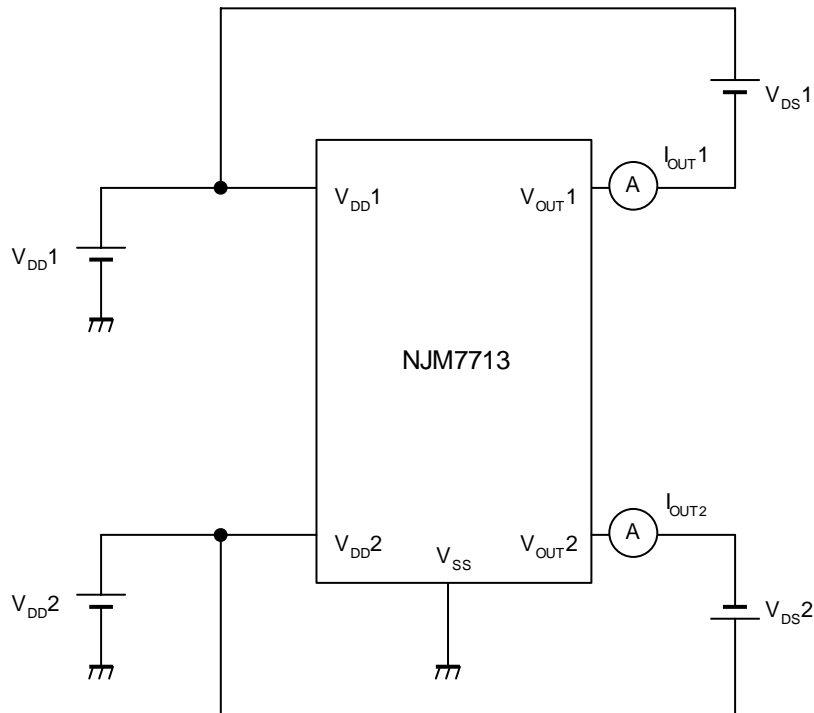
① COMMON TEST CIRCUIT



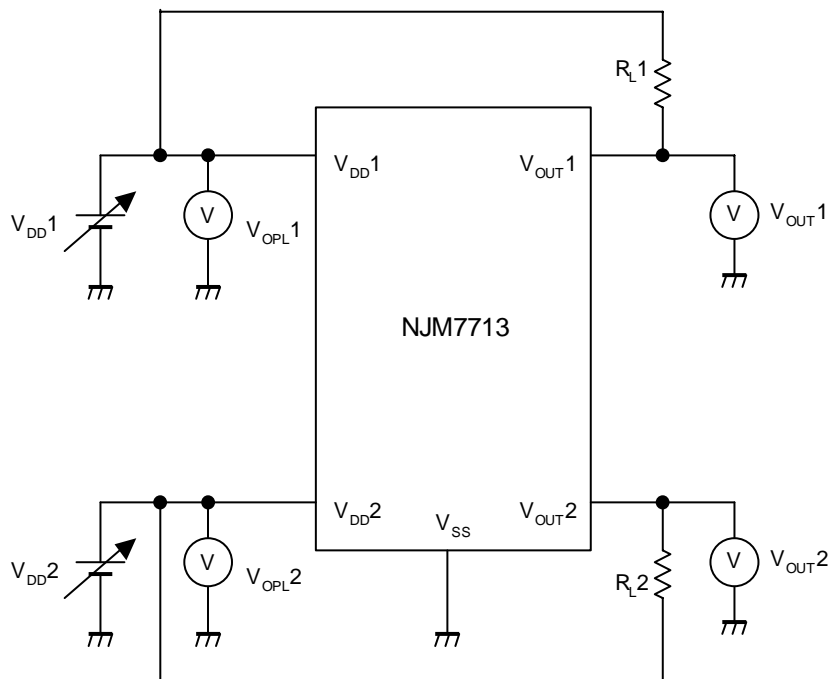
② Nch OUTPUT CURRENT TEST CIRCUIT



③ Pch OUTPUT CURRENT TEST CIRCUIT

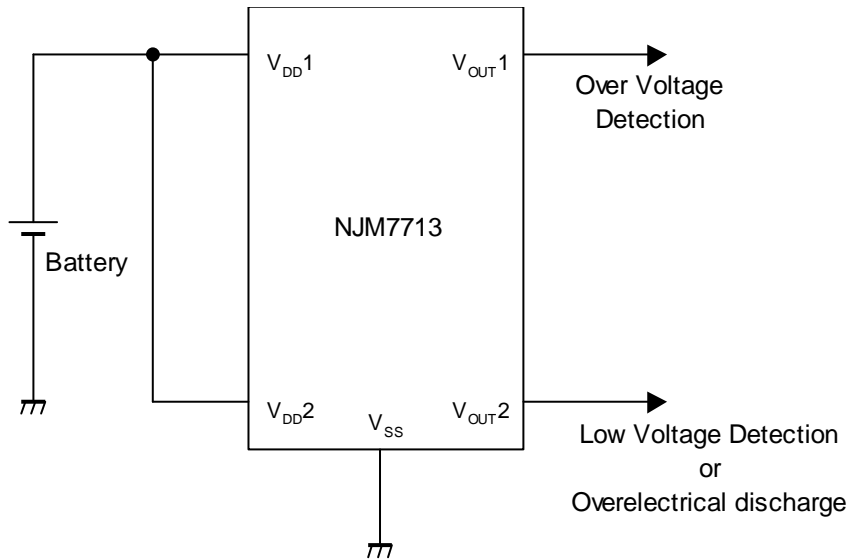


④ MINIMUM OPERATING VOLTAGE TEST CIRCUIT



■ TYPICAL APPLICATION

① Battery voltage supervision



[CAUTION]

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