

## VOLTAGE DETECTOR

### ■ GENERAL DESCRIPTION

The NJU7706/07 is a high precision voltage detector with a built-in delay time generator of fixed time.

The detection voltage is fixed internally with an accuracy of 1.0%, and three delay times 50ms, 100ms and 200ms are available.

NJU7706 is Nch. Open Drain and NJU7707 of output form is a C-MOS output.

### ■ PACKAGE OUTLINE

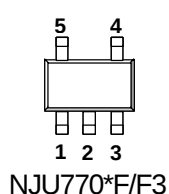


NJU7706/07F

### ■ FEATURES

- |                                        |                                                        |
|----------------------------------------|--------------------------------------------------------|
| ● High Precision Detection Voltage     | ±1.0%                                                  |
| ● Low Quiescent Current                | 1.8μA typ.                                             |
| ● Detection Voltage Range              | 1.5 ~ 6.0V(0.1V step)                                  |
| ● Delay Time(Built-in Fixed Type)      | 50ms /100ms /200ms(Built-in Fixed Type)                |
| ● ON/OFF switch of delay time (DS pin) |                                                        |
| ● Manual Reset                         | 2type: Active "H" / Active "L"                         |
| ● Output Circuit Form                  | NJU7706: Nch. Open Drain type<br>NJU7707: C-MOS Output |
| ● Package Outline                      | SOT-23-5 (MTP5)                                        |

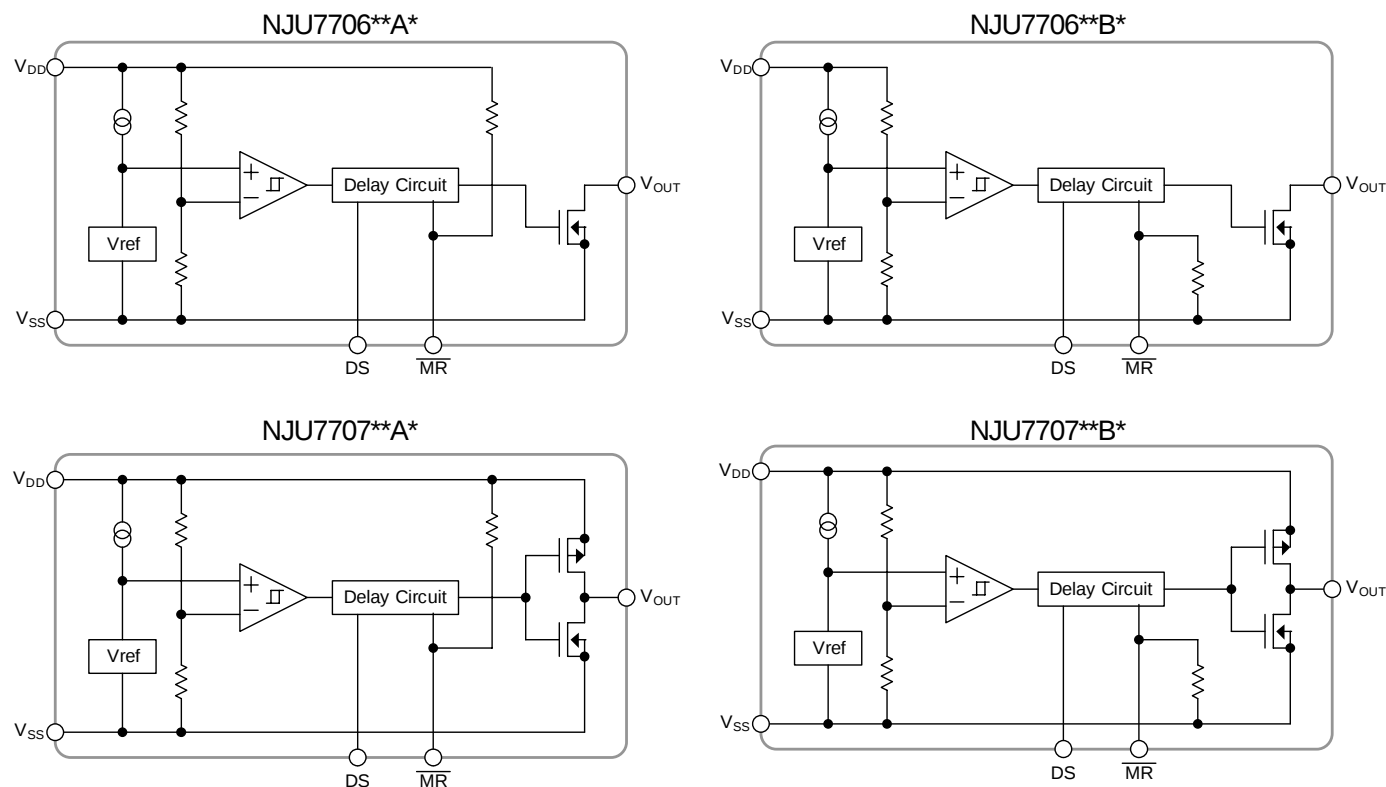
### ■ PIN CONFIGURATION



#### PIN FUNCTION

- 1.DS
- 2.V<sub>SS</sub>
- 3.MR
- 4.V<sub>OUT</sub>
- 5.V<sub>DD</sub>

■ EQUIVALENT CIRCUIT



■ DETECTION VOLTAGE RANK LIST

| Device Name     | $V_{DET}$ | MR Logic   | Delay Time |
|-----------------|-----------|------------|------------|
| NJU7706/07F39A1 | 3.9V      | Active "L" | 50mS       |
| NJU7706/07F42A1 | 4.2V      | Active "L" | 50mS       |

| Device Name     | $V_{DET}$ | MR Logic   | Delay Time |
|-----------------|-----------|------------|------------|
| NJU7706/07F15A1 | 1.5V      | Active "L" | 100mS      |
| NJU7706/07F22A1 | 2.2V      | Active "L" | 100mS      |
| NJU7706/07F27A1 | 2.7V      | Active "L" | 100mS      |
| NJU7706/07F29A1 | 2.9V      | Active "L" | 100mS      |
| NJU7706/07F42A1 | 4.2V      | Active "L" | 100mS      |
| NJU7706/07F06A1 | 6.0V      | Active "L" | 100mS      |

| Device Name     | $V_{DET}$ | MR Logic   | Delay Time |
|-----------------|-----------|------------|------------|
| NJU7706/07F39A1 | 3.9V      | Active "L" | 200mS      |
| NJU7706/07F42A1 | 4.2V      | Active "L" | 200mS      |

| Device Name     | $V_{DET}$ | MR Logic   | Delay Time |
|-----------------|-----------|------------|------------|
| NJU7706/07F27B1 | 2.7V      | Active "H" | 100mS      |

■ NJU7706

■ 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     | $P_D$     | 200                   | mW   |
| Operating Temperature | $T_{opr}$ | -40 ~ +85             | °C   |
| Storage Temperature   | $T_{stg}$ | -40 ~ +125            | °C   |

■ ELECTRICAL CHARACTERISTICS

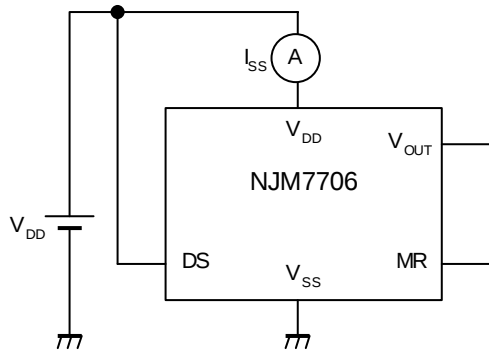
(Ta=25°C)

| PARAMETER                                 | SYMBOL                       | TEST CONDITION                            | MIN.                                 | TYP.      | MAX.         | UNIT      |
|-------------------------------------------|------------------------------|-------------------------------------------|--------------------------------------|-----------|--------------|-----------|
| Detection Voltage                         | $V_{DET}$                    |                                           | -1.0%                                | —         | +1.0%        | V         |
| Hysteresis Voltage                        | $V_{HYS}$                    |                                           | 70                                   | 90        | 130          | mV        |
| Quiescent Current                         | $I_{SS}$                     | $V_{DD}=V_{DET}+1V$                       | $V_{DET}=1.5V \sim 1.9V$ Version     | —         | 1.0          | 1.7       |
|                                           |                              |                                           | $V_{DET}=2.0V \sim 6.0V$ Version     | —         | 1.3          | 2.2       |
| Output Current                            | $I_{OUT}$                    | $Nch, V_{DS}=0.5V$                        | $V_{DD}=1.2V$                        | 0.75      | 2.0          | —         |
|                                           |                              |                                           | $V_{DD}=2.4V$ ( $\geq 2.7V$ Version) | 4.5       | 7.0          | —         |
| Output Leak Current                       | $I_{LEAK}$                   | $V_{DD}=V_{OUT}=9V$                       | —                                    | —         | 0.1          | $\mu A$   |
| Detection Voltage Temperature Coefficient | $\Delta V_{DET} / \Delta Ta$ | $Ta=0 \sim +85^\circ C$                   | —                                    | $\pm 100$ | —            | ppm/°C    |
| Delay Time 1                              | $t_{d1}$                     | $V_{DD}=V_{DET}+1V, DS="L" \text{ Level}$ | NJU7706F***1                         | 42.5      | 50           | 57.5      |
|                                           |                              |                                           | NJU7706F***2                         | 85        | 100          | 115       |
|                                           |                              |                                           | NJU7706F***3                         | 170       | 200          | 230       |
| Delay Time 2                              | $t_{d2}$                     | $V_{DD}=V_{DET}+1V, DS="H" \text{ Level}$ | 25                                   | 50        | 300          | $\mu S$   |
| Input Voltage of DS pin                   | $V_{DS\_H}$                  |                                           | 1.5                                  | —         | $V_{DD}$     | V         |
|                                           | $V_{DS\_L}$                  |                                           | 0                                    | —         | 0.3          | V         |
| Input Voltage of MR pin (Active "L")      | $V_{MR\_H}$                  |                                           | 1.5                                  | —         | $V_{DD}$     | V         |
|                                           | $V_{MR\_L}$                  |                                           | 0                                    | —         | 0.3          | V         |
| Input Voltage of MR pin (Active "H")      | $V_{MR\_H}$                  |                                           | $V_{DD}-0.3$                         | —         | $V_{DD}$     | V         |
|                                           | $V_{MR\_L}$                  |                                           | 0                                    | —         | $V_{DD}-1.5$ | V         |
| Impedance of MR pin                       | $R_{MR}$                     |                                           | 1.0                                  | 2.0       | 3.0          | $M\Omega$ |
| Operating Voltage (*note 1)               | $V_{DD}$                     | $R_L=100k\Omega$                          | 0.8                                  | —         | 9            | V         |

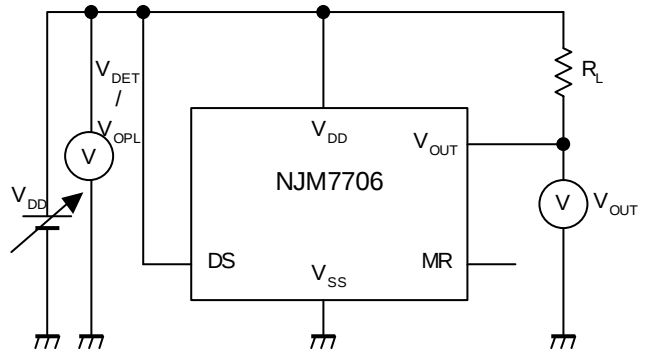
(\*note 1): The minimum Operating Voltage( $V_{OPL}$ ) indicates the same value of the output voltage( $V_{OUT}$ ) on condition that  $V_{OUT}$  becomes 10% or less of the input voltage( $V_{DD}$ ).

## ■ TEST CIRCUIT

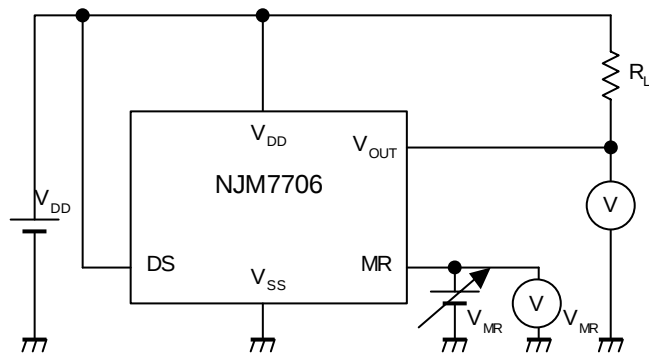
### ● Circuit Operating Current TEST CIRCUIT



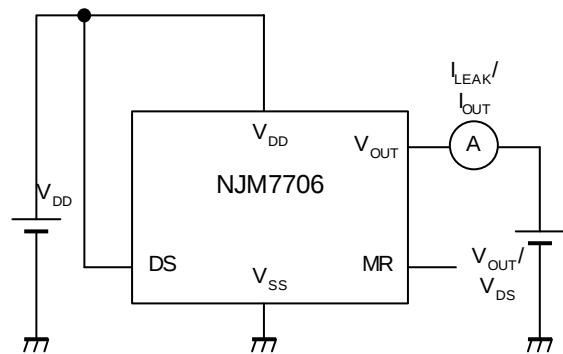
### ● Detection voltage/Minimum operating voltage TEST CIRCUIT



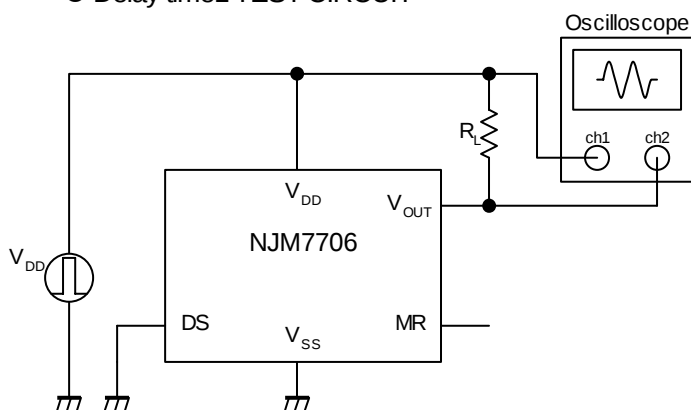
### ● MR pin Input voltage TEST CIRCUIT



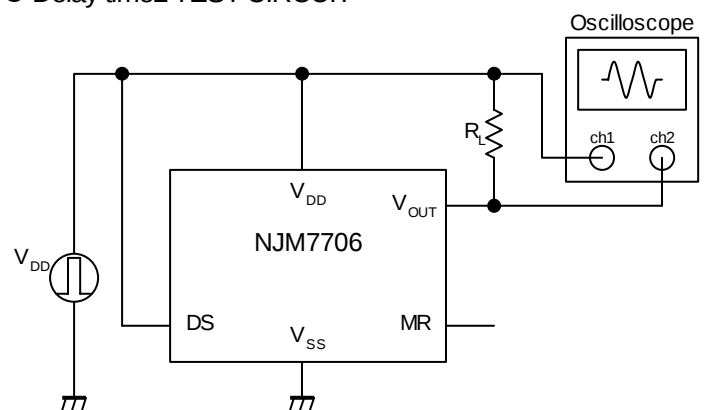
### ● Leak current / Output current TEST CIRCUIT



### ● Delay time1 TEST CIRCUIT

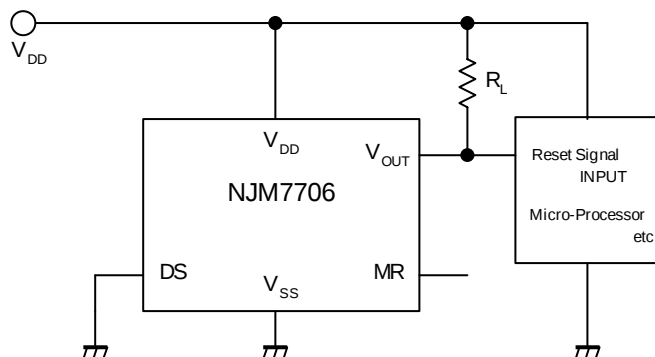


### ● Delay time2 TEST CIRCUIT

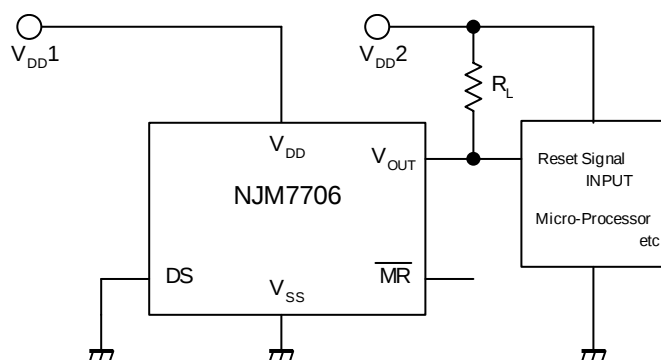


## ■ TYPICAL APPLICATION

### ① Power Supply Monitor Circuit



### ② Power Supply Monitor Circuit ( $V_{DD}$ line SEPARATE)



## ■ NJU7707

### ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER             | SYMBOL    | RATINGS                      | UNIT |
|-----------------------|-----------|------------------------------|------|
| Input Voltage         | $V_{DD}$  | +10                          | V    |
| Output Voltage        | $V_{OUT}$ | $V_{SS}-0.3 \sim V_{DD}+0.3$ | V    |
| Output Current        | $I_{OUT}$ | 50                           | mA   |
| Power Dissipation     | $P_D$     | 200                          | mW   |
| Operating Temperature | $T_{opr}$ | -40 ~ +85                    | °C   |
| Storage Temperature   | $T_{stg}$ | -40 ~ +125                   | °C   |

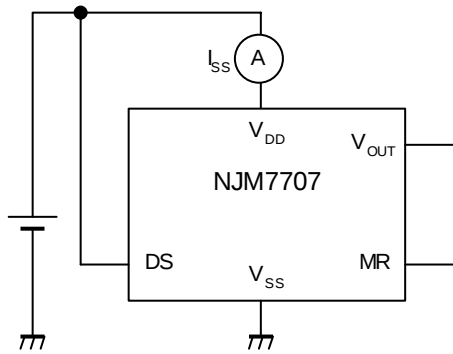
### ■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

| PARAMETER                                 | SYMBOL                        | TEST CONDITION                       | MIN.         | TYP.      | MAX.         | UNIT       |
|-------------------------------------------|-------------------------------|--------------------------------------|--------------|-----------|--------------|------------|
| Detection Voltage                         | $V_{DET}$                     |                                      | -1.0%        | —         | +1.0%        | V          |
| Hysteresis Voltage                        | $V_{HYS}$                     |                                      | 70           | 90        | 130          | mV         |
| Quiescent Current                         | $I_{SS}$                      | $V_{DD}=V_{DET}+1V$                  |              |           |              | $\mu A$    |
|                                           |                               | $V_{DET}=1.5V \sim 1.9V$ Version     | —            | 1.0       | 1.7          |            |
|                                           |                               | $V_{DET}=2.0V \sim 6.0V$ Version     | —            | 1.3       | 2.2          |            |
| Output Current                            | $I_{OUT}$                     | Nch, $V_{DS}=0.5V$                   |              |           |              | $mA$       |
|                                           |                               | $V_{DD}=1.2V$                        | 0.75         | 2.0       | —            |            |
|                                           |                               | $V_{DD}=2.4V$ ( $\geq 2.7V$ Version) | 4.5          | 7.0       | —            |            |
|                                           |                               | Pch, $V_{DS}=0.5V$                   |              |           |              |            |
|                                           |                               | $V_{DD}=4.8V$ ( $\leq 3.9V$ Version) | 2.0          | 3.5       | —            |            |
|                                           |                               | $V_{DD}=6.0V$ (4.0V ~ 5.6V Version)  | 2.5          | 4.0       | —            |            |
|                                           |                               | $V_{DD}=8.4V$ ( $\geq 5.7V$ Version) | 3.0          | 5.0       | —            |            |
| Detection Voltage Temperature Coefficient | $\Delta V_{DET} / \Delta T_a$ | $T_a=0 \sim +85^\circ C$             | —            | $\pm 100$ | —            | ppm/°C     |
| Delay Time 1                              | $t_{d1}$                      | $V_{DD}=V_{DET}+1V$ , DS="L Level"   |              |           |              |            |
|                                           |                               | NJU7707F***1                         | 42.5         | 50        | 57.5         | mS         |
|                                           |                               | NJU7707F***2                         | 85           | 100       | 115          | mS         |
|                                           |                               | NJU7707F***3                         | 170          | 200       | 230          | mS         |
| Delay Time 2                              | $t_{d2}$                      | $V_{DD}=V_{DET}+1V$ , DS="H Level"   | 25           | 50        | 300          | $\mu S$    |
| Input Voltage of DS pin                   | $V_{DS\_H}$                   |                                      | 1.5          | —         | $V_{DD}$     | V          |
|                                           | $V_{DS\_L}$                   |                                      | 0            | —         | 0.3          | V          |
| Input Voltage of MR pin (Active "L")      | $V_{MR\_H}$                   |                                      | 1.5          | —         | $V_{DD}$     | V          |
|                                           | $V_{MR\_L}$                   |                                      | 0            | —         | 0.3          | V          |
| Input Voltage of MR pin (Active "H")      | $V_{MR\_H}$                   |                                      | $V_{DD}-0.3$ | —         | $V_{DD}$     | V          |
|                                           | $V_{MR\_L}$                   |                                      | 0            | —         | $V_{DD}-1.5$ | V          |
| Impedance of MR pin                       | $R_{MR}$                      |                                      | 1.0          | 2.0       | 3.0          | M $\Omega$ |
| Operating Voltage (*note 2)               | $V_{DD}$                      | $R_L=100k\Omega$                     | 0.8          | —         | 9            | V          |

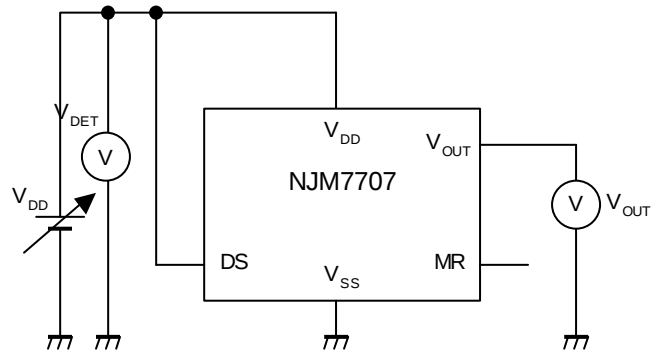
(\*note 2): The minimum Operating Voltage( $V_{OPL}$ ) indicates the same value of the output voltage( $V_{OUT}$ ) on condition that  $V_{OUT}$  becomes 10% or less of the input voltage( $V_{DD}$ ).

## ■ TEST CIRCUIT

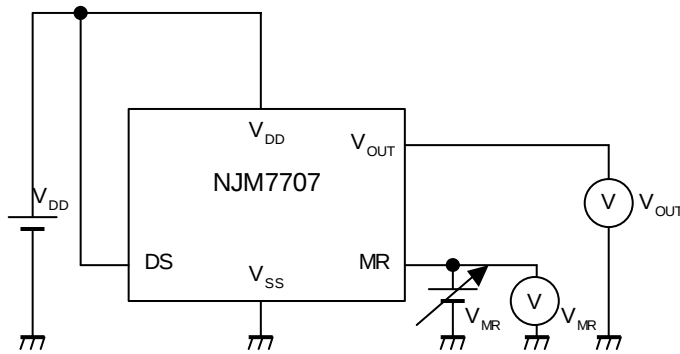
### ● Circuit Operating Current TEST CIRCUIT



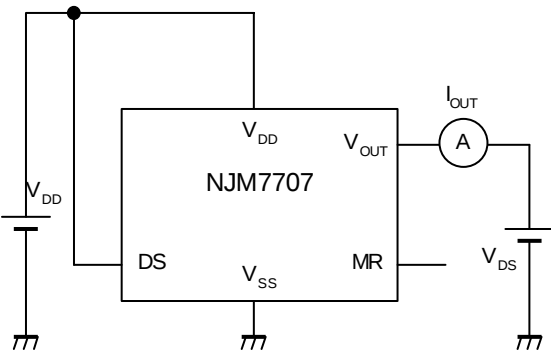
### ● Detection voltage TEST CIRCUIT



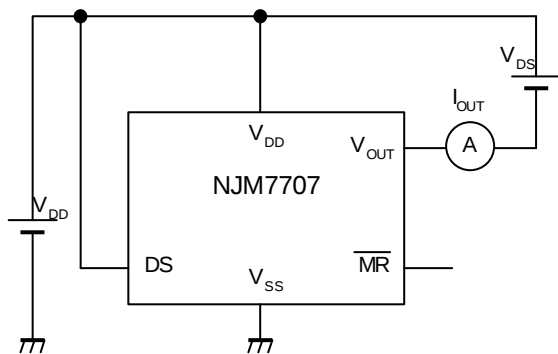
### ● MR pin Input voltage TEST CIRCUIT



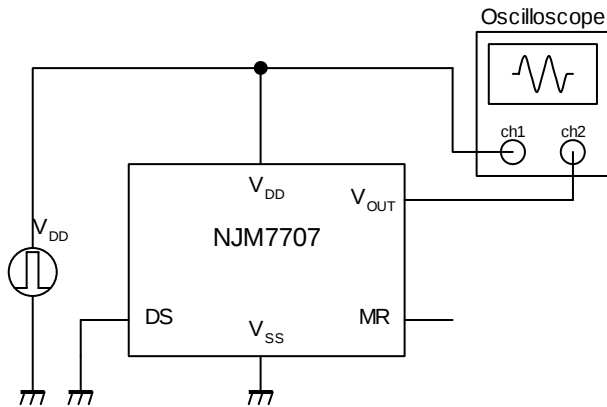
### ● Nch Output current TEST CIRCUIT



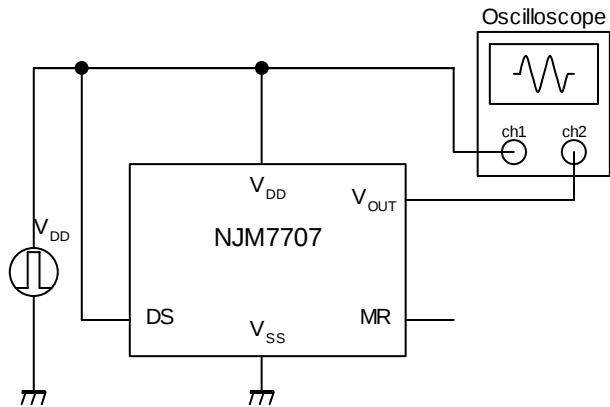
### ● Pch Output current TEST CIRCUIT



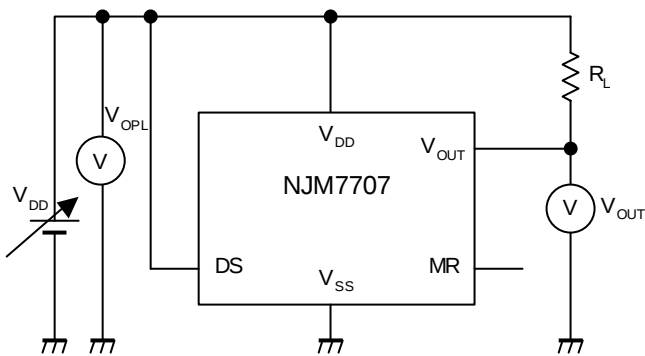
## ● Delay time1 TEST CIRCUIT



## ● Delay time2 TEST CIRCUIT

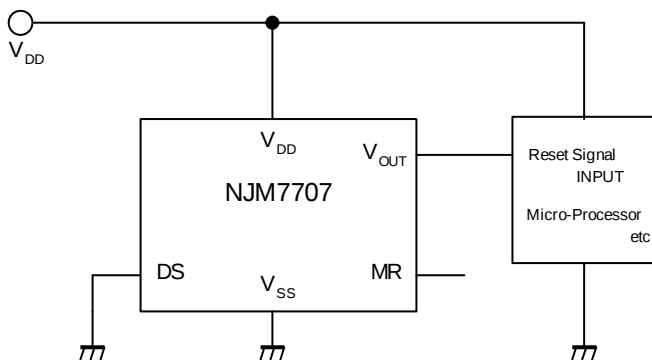


## ● Minimum operating voltage TEST CIRCUIT



## ■ TYPICAL APPLICATION

### ① Power Supply Monitor Circuit (VDD line COMMON)



[CAUTION]

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Электрон  
Связь**

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Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

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