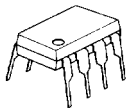
# SYSTEM RESET IC

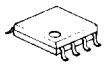
## ■ GENERAL DESCRIPTION

NJM2103 is supply voltage supervisory IC to detect the abnormal conditions, such as shut down of all supply voltages at once, or sudden voltage down and then generate the reset signal. It supervises both 5V supply voltage and the voltage optionally set up.

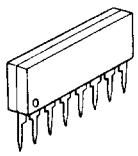
## ■ PACKAGE OUTLINE



NJM2103D



NJM2103M

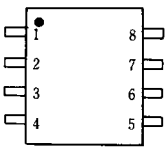


NJM2103L

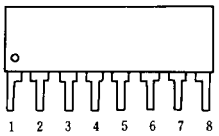
## ■ FEATURES

- Precise Detection of Supply Voltage Down ($V_{SA}$=4.2V±2.5%)
- Possible Detection of Optional Voltage Down ($V_{SB}$=1.22V±1.5%)
- Possible Detection of Optional Over-loading
- Low Operating Current ($I_{CC}$≦500 μA @$V_{SB}$=5V)
- Reference Voltage can be taken out.
- Low Reset Validated Voltage ($V^+$=0.8V Typ.)
- Voltage Detection with Hystersis Feature
- Package Outline DIP8, DMP8, SIP8
- Bipolar Technology

## ■ PIN CONFIGURATION




NJM2103D
NJM2103M

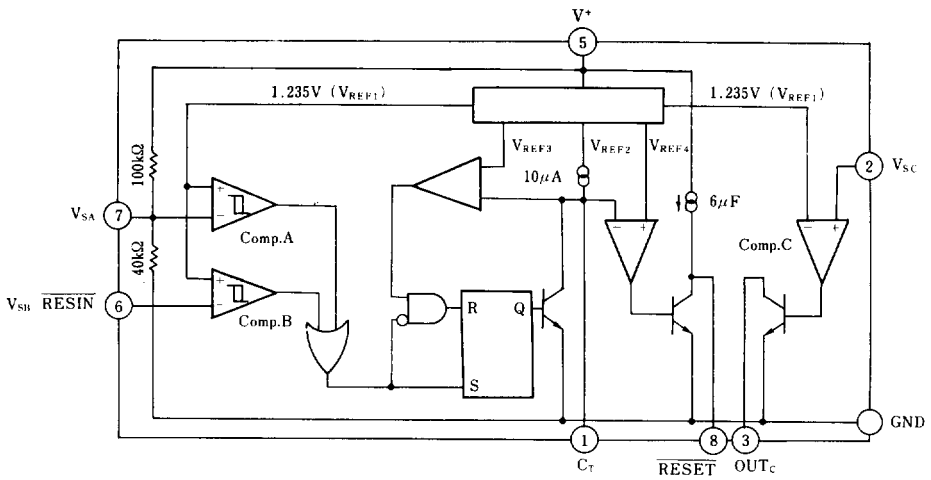



NJM2103L

PIN FUNCTION

1. $C_T$
2. $V_{SC}$
3. $OUT_C$
4. GND
5. $V^+$
6. $V_{SB}$/$\overline{RESIN}$
7. $V_{SA}$
8. $\overline{RESET}$

## ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---|---|---|---|
| Supply Voltage | $V^+$ | 20 | V |
| Power Dissipation | $P_D$ | (DIP8) 500 | mW |
| | | (DM8) 300 | mW |
| | | (SIP8) 800 | mW |
| Input Voltage A | $V_{SA}$ | $V^+$+0.3(<20) | V |
| Input Voltage B | $V_{SB}$ | 20 | V |
| Input Voltage C | $V_{SC}$ | 20 | V |
| Operating Temperature Range | Topr | −20~+75 | ℃ |
| Storage Temperature Range | Tstg | −40~+125 | ℃ |

## ■ ELECTRICAL CHARACTERISTICS

### • DC CHARACTERISTICS

($V^+$=5.0Vk $V_{SB}$=0V, $V_{SC}$=0V, Ta=25℃)

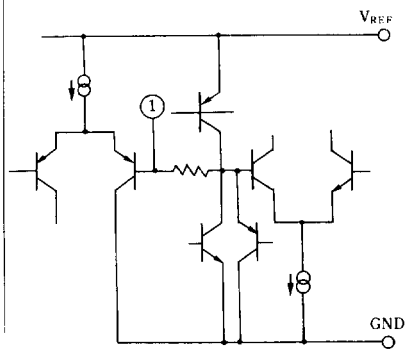
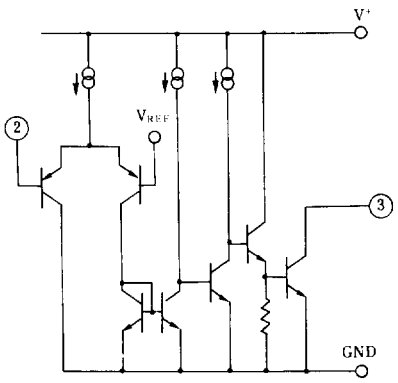
| PARAMETER | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Operating Current (1) | $I_{CC1}$ | $V_{SB}$=5V | — | 380 | 560 | μA |
| Operating Current (2) | $I_{CC2}$ | | — | 460 | 700 | μA |
| $V_{SA}$ Detecting Voltage (1) | $V_{SAL}$ | $V^+$ fall time $V_{SB}$=$V^+$ | 4.10 | 4.20 | 4.30 | V |
| $V_{SA}$ Detecting Voltage (2) | $V_{SAH}$ | $V^+$ rise time $V_{SB}$=$V^+$ | 4.20 | 4.30 | 4.40 | V |
| $V_{SA}$ Hysterisis Width | $V_{HRSA}$ | | 50 | 100 | 150 | mV |
| $V_{SB}$ Detecting Voltage | $V_{SBL}$ | $V_{SB}$ fall time | 1.202 | 1.220 | 1.238 | V |
| $V_{SB}$ Detecting Supply Voltage Fluctuation | $\Delta V_{SBL}$ | $V^+$=3.5~18V | — | 3 | 10 | mV |
| $V_{SB}$ Hysterisis Width | $V_{HRSB}$ | | 14 | 28 | 42 | mV |
| $V_{SB}$ Input Current (1) | $I_{IHB}$ | $V_{SB}$=5V | — | 0 | 250 | nA |
| $V_{SB}$ Input Current (2) | $I_{ILB}$ | | — | 20 | 250 | nA |
| High Level $\overline{\text{RESET}}$ Output Voltage | $V_{OHR}$ | $I_{RESET}$=−5μA, $V_{SB}$=5V | 4.5 | 4.9 | — | μV |
| $\overline{\text{RESET}}$ Output Saturating Voltage(1) | $V_{OLR1}$ | $I_{RESET}$=2mA | — | 0.20 | 0.40 | V |
| $\overline{\text{RESET}}$ Output Saturating Voltage(2) | $V_{OLR2}$ | $I_{RESET}$=10mA | — | 0.30 | 0.50 | V |
| $\overline{\text{RESET}}$ Output Sink Current | $I_{RESET}$ | $V_{OLR}$=1.0V | 20 | 80 | — | mA |
| $C_T$ Charge Current | $I_{CT}$ | $V_{SB}$=5V, VCT=0.5V | 6.0 | 9.5 | 13.0 | μA |
| $V_{SC}$ Input Current (1) | $I_{IHC}$ | $V_{SC}$=5V | — | 0 | 500 | nA |
| $V_{SC}$ Input Current (2) | $I_{ILC}$ | | — | 50 | 500 | nA |
| $V_{SC}$ Detecting Voltage | $V_{SC}$ | | 1.215 | 1.235 | 1.255 | V |
| $V_{SC}$ Detecting Supply Voltage Fluctuation | $\Delta V_{SC}$ | $V^+$=3.5~13.5V | — | 3 | 10 | mV |
| $OUT_C$ Output Leak Current | $I_{OHC}$ | $V_{OHC}$=13.5V | — | 0 | 1 | μA |
| $OUT_C$ Output Saturation Voltage | $V_{OLC}$ | $I_{OUT}$=4mA, $V_{SC}$=5V | — | 0.10 | 0.40 | V |
| $OUT_C$ Output Sink Current | | | | | | |
| RESET Guarantee Minimum | $I_{OUTC}$ | $V_{OLC}$=1.0V, $V_{SC}$=5V | 6 | 20 | — | mA |
| Supply Voltage | $V^+_L$ | $V_{OLR}$=0.4V, $I_{RESET}$=200μA | — | 0.8 | 1.2 | V |

### • AC CHARACTERISTICS

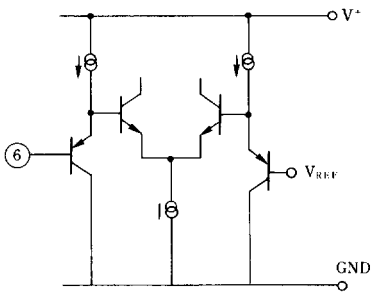
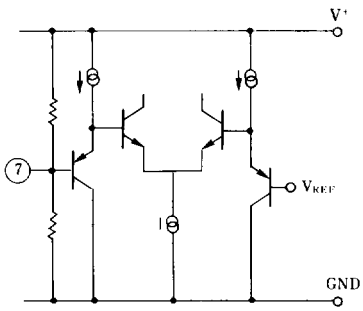
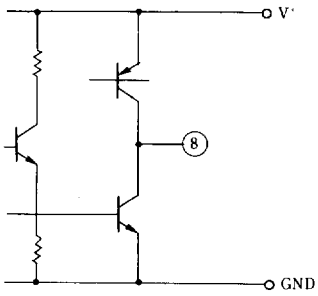
($V^+$=5.0V $V_{SB}$=5.0V, $V_{SC}$=0V, CT=0.01 μF, Ta=25℃)

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_{SA}$ Input Pulse Width | $t_{PIA}$ | | — | 3.0 | — | μs |
| $V_{SB}$ Input Pulse Width | $t_{PIB}$ | | — | 1.5 | — | μs |
| $\overline{\text{RESET}}$ Output Pulse Width | $t_{PO}$ | $V_{SB}$=$V^+$ | — | 1.5 | — | ms |
| $\overline{\text{RESET}}$ Rise Time | $t_r$ | $V_{SB}$=$V^+$, $R_L$=2.2kΩ, $C_I$=100pF | — | 1.0 | — | μs |
| $\overline{\text{RESET}}$ Fall Time | $t_f$ | $V_{SB}$=$V^+$, $R_L$=2.2kΩ, $C_L$=100pF | — | 0.1 | — | μs |
| Output Delay Time | $t_{PD}$ | $V_{SB}$ fall time | — | 2 | — | μs |
| Output Delay Time | $t_{PHL}$ | $V_{SC}$ rise time, $R_L$=2.2kΩ, $C_L$=100pF | — | 0.5 | — | μs |
| Output Delay Time | $t_{PLH}$ | $V_{SC}$ fall time, $R_L$=2.2kΩ, $C_L$=100pF | — | 1.0 | — | μs |

## ■ TERMINAL FUNCTION

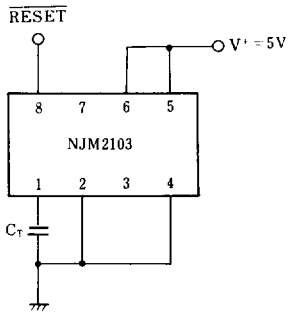
| PIN NO. | SYMBOL | FUNCTION | INSIDE EQUIVALENT CIRCUIT |
|---|---|---|---|
| 1 | $C_T$ | Pin Connection to Capacitor, Set the reset holding time. |   |
| 2 | $V_{SC}$ | Comparator Input |   |
| 3 | $OUT_C$ | Open Collector Output of Comparator C. | |

## ■ TERMINAL FUNCTION

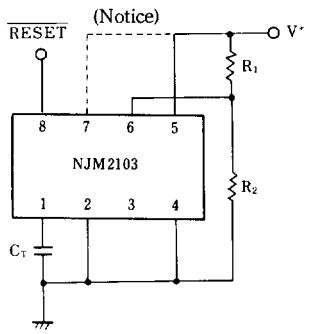
| PIN NO. | SYMBOL | FUNCTION | INSIDE EQUIVALENT CIRCUIT |
|---|---|---|---|
| 4 | GND | Ground | |
| 5 | $V^+$ | Operating Voltage | |
| 6 | $V_{SB}/\overline{RESIN}$ | Comparator B Input |   |
| 7 | $V_{SA}$ | Comparator A Input |   |
| 8 | $\overline{RESET}$ | Reset Output<br>Internalizing pull up resistor |   |

## ■ APPLICATION CIRCUIT

1) 5V Supply Voltage Monitor




2) Monitoring of Optional Supply Voltage ($V^+ \leqq 13.5V$)

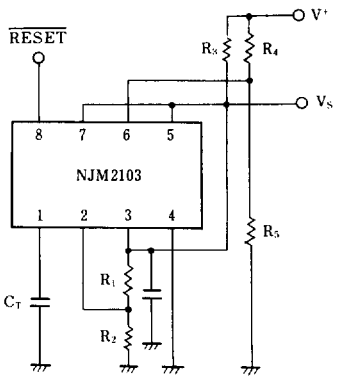



Detecting Voltage $\fallingdotseq (1+\frac{R_1}{R_2}) \times V_{SB}$

(Notice)

If it were that $V^+$ indicates under 4.50V, Connect 7 pin to $V^+$

3) Monitoring of Optional Supply Voltage ($V^+ > 13.5V$)

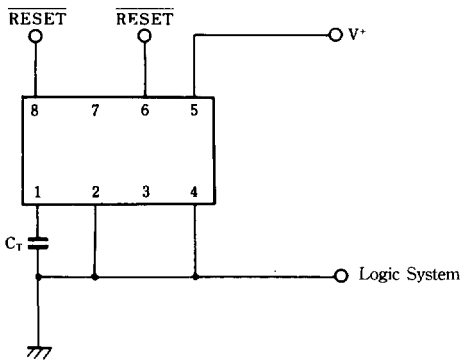



Detecting Voltage $\fallingdotseq (1+\frac{R_4}{R_5}) \times V_{SB}$

Constant Voltage Output $V_S \fallingdotseq (1+\frac{R_1}{R_2}) \times V_{SC}$

$\overline{\text{RESET}}$ Output $\fallingdotseq \begin{cases} V_S & \text{(High Level)} \\ 0V & \text{(Low Level)} \end{cases}$

4) Compulsry Reset




Input Reset signal TTL level to $V_{SB}$-terminal

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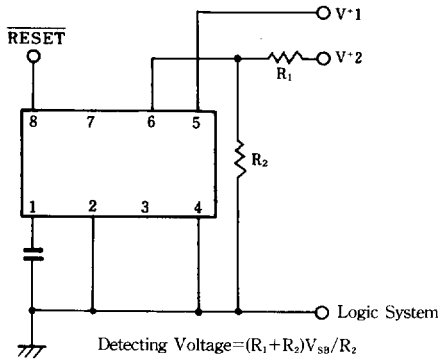
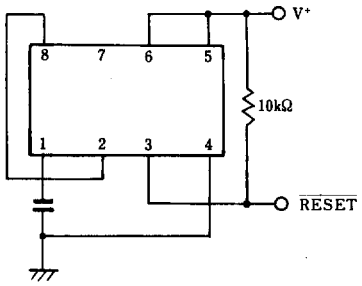
5) 5V,Vcc<12V Supply Voltage Monttor



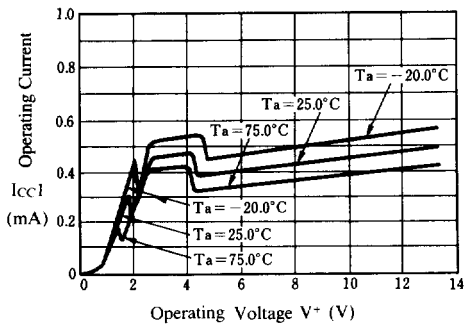

Detecting Voltage=$(R_1+R_2)V_{SS}/R_2$

6) Non-Inverting Reset

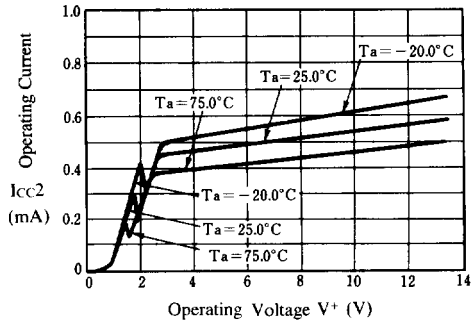


## ■ TYPICAL CHARACTERISTICS

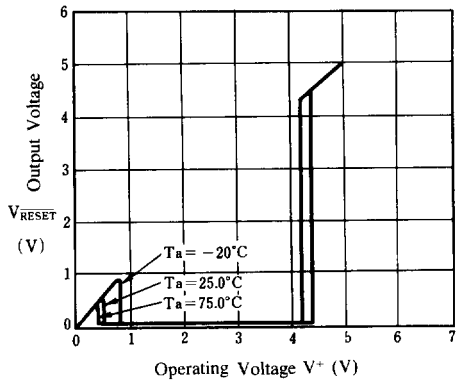
**Operating Current 1 vs. Operating Voltage**



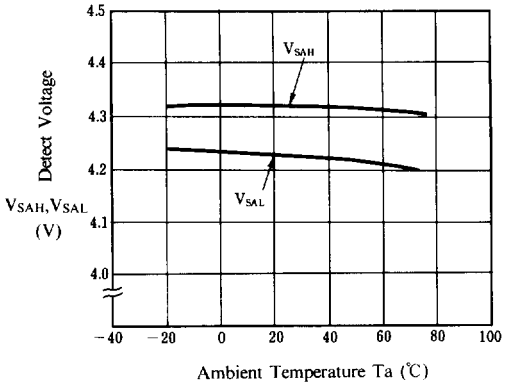

**Operating Current 2 vs. Operating Voltage**



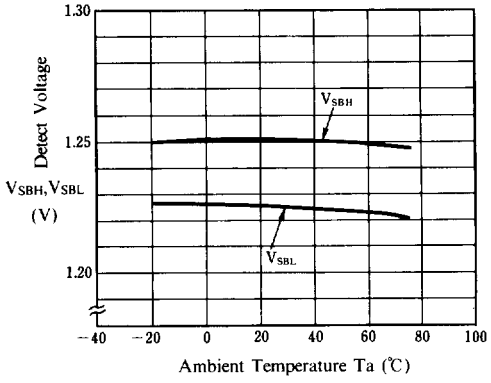

**Output Voltage vs. Operating Voltage**



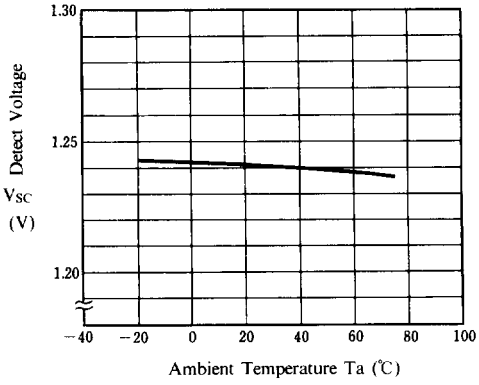

**Detect Voltage ($V_{SA}$) vs. Temperature**




**Detect Voltage ($V_{SA}$) vs. Temperature**

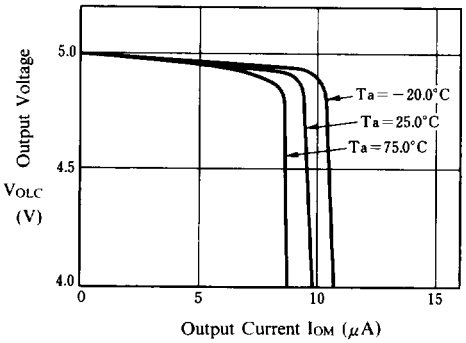



**Detect Voltage ($V_{SC}$) vs. Temperature**

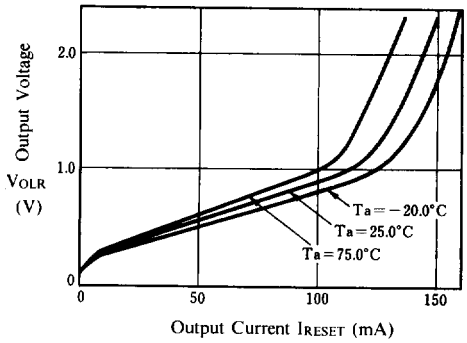


## ■ TYPICAL CHARACTERISTICS

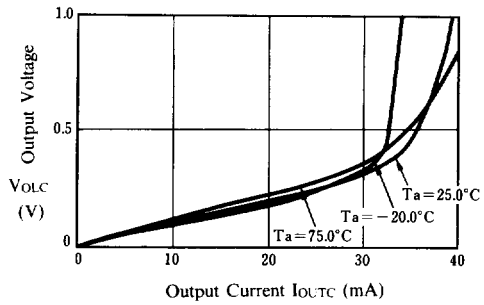
**Output Voltage vs. Output Current**



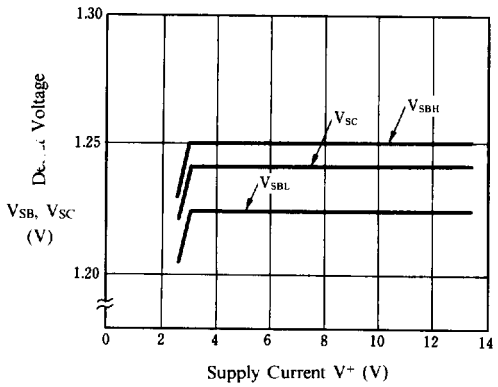

**Output Voltage vs. Output Current**



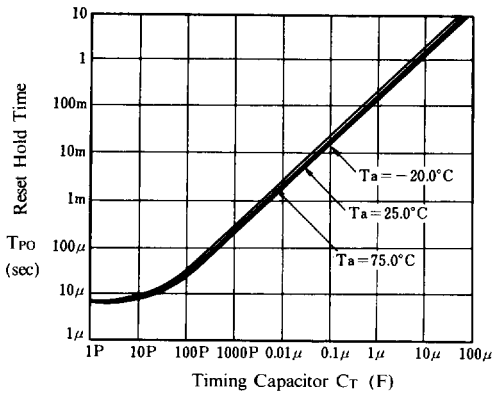

**Output Voltage (OUTC) vs. Output Current (IOUTC)**



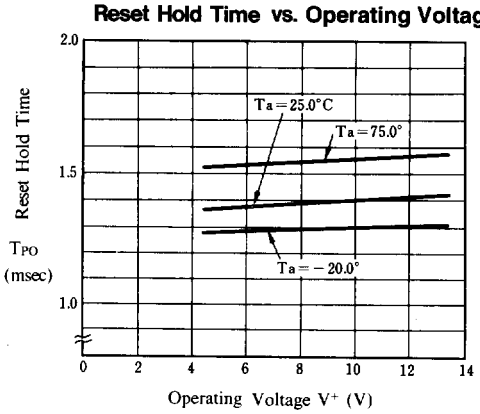

**Detect Voltage (VSB, VSC) vs. Supply Voltage**




**Reset Hold Time vs. G**




**Reset Hold Time vs. Operating Voltage**

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