

## SYSTEM RESET IC

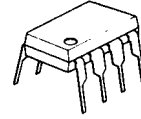
### ■ GENERAL DESCRIPTION

The **NJM2102** Possesses two functions. One is to detect a voltage which decays from the desired voltage and generate a warning signal. And also, the **NJM2102** holds the warning signal for a certain term after the specified voltage is obtained or recovered. The other one (Watch Dog Timer) is to identify missing clocks of microprocessors. Therefore, it should be said that the **NJM2102** is ideal to protect any microprocessors from the fales operations induced by undesired condition.

### ■ FEATURES

- Internal Watch Dog Timer
- Precise Detection of Supply Voltage Down (4.2V  $\pm$ 2.5%)
- Package Outline DIP8, DMP8, SIP8
- Bipolar Technology

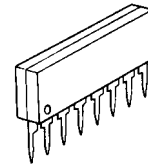
### ■ PACKAGE OUTLINE



**NJM2102D**  
(DIP8)

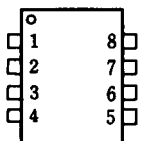


**NJM2102M**  
(DMP8)

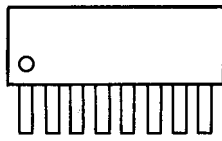


**NJM2102L**  
(SIP8)

### ■ PIN CONFIGURATION



**NJM2102D**  
**NJM2102M**

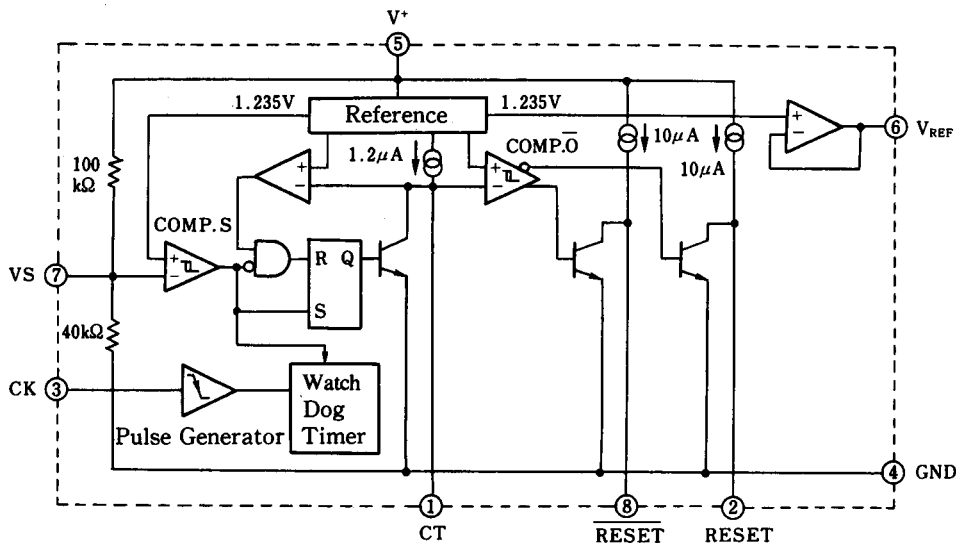


**NJM2102L**

#### PIN FUNCTION

1.  $C_T$
2. RESET
3. CK
4. GND
5.  $V^+$
6.  $V_{REF}$
7.  $V_S$
8.  $\overline{RESET}$

### ■ BLOCK DIAGRAM



# NJM2102

## ■ ABSOLUTE MAXIMUM RATINGS

(T<sub>a</sub>=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup>	20.0	V
Input Voltage	V <sub>S</sub>	V <sup>+</sup> +0.3 (<20.0)	V
Input Voltage	V <sub>CK</sub>	20.0	V
Power Dissipation	P <sub>D</sub>	(DIP8) 500 (DMP8) 300 (SIP8) 800	mW
Operating Temperature Range	T <sub>opr</sub>	-40 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

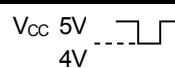
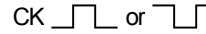
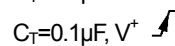
## ■ ELECTRICAL CHARACTERISTICS

(V<sup>+</sup>=5V, T<sub>a</sub>=25°C)

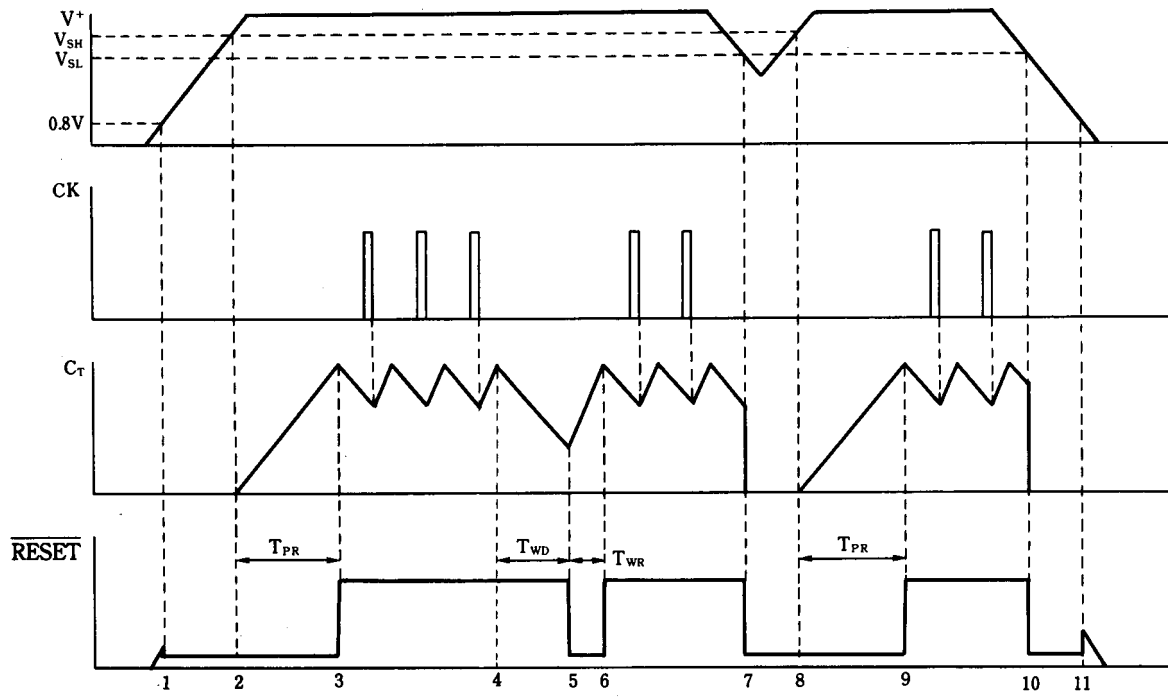
PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current	I <sub>CC</sub>	Watch Dog Timer Operating	-	0.65	1.00	mA
Detection Voltage 1	V <sub>SL</sub>	Falling Down Supply Voltage	4.10	4.20	4.30	V
Detection Voltage 2	V <sub>SH</sub>	Rising Up Supply Voltage	4.20	4.30	4.40	V
Hysteresis Width	V <sub>HYS</sub>	V <sub>HYS</sub> = V <sub>SL</sub> - V <sub>SH</sub>	50	100	150	mV
Reference Voltage	V <sub>REF</sub>		1.217	1.235	1.253	V
Supply Voltage Regulation	ΔV <sub>REF1</sub>	V <sup>+</sup> = 3.5V to 18V	-10	+3	+10	mV
Reference Voltage Load Regulation	ΔV <sub>REF2</sub>	I <sub>OUT</sub> = -200μA to +5μA	-5	-	+5	mV
CK Input Threshold Voltage	V <sub>TH</sub>		0.70	1.24	1.90	V
CK Input Current 1	I <sub>IH</sub>	V <sub>CK</sub> = 5.0V	-	0	1.0	μA
CK Input Current 2	I <sub>IL</sub>	V <sub>CK</sub> = 0.0V	-1.0	-0.1	-	μA
C <sub>T</sub> Charge Current 1	I <sub>CTC1</sub>	V <sub>CT</sub> = 1.0V Watch Dog Timer Operating	20	50	110	μA
C <sub>T</sub> Charge Current 2	I <sub>CTC2</sub>	V <sub>CT</sub> = 0.0V Power ON Reset Operating	0.6	1.4	3.0	μA
C <sub>T</sub> Discharge Current 1	I <sub>CTD1</sub>	V <sub>CT</sub> = 1.0V Watch Dog Timer Operating	6	9	13	μA
C <sub>T</sub> Discharge Current 2	I <sub>CTD2</sub>	V <sub>CT</sub> = 0.0V Power ON Reset Operating	100	600	-	μA
High Level Output Voltage 1	V <sub>OH1</sub>	V <sub>S</sub> =Open. I <sub>RESET</sub> = -5μA	4.5	4.9	-	V
High Level Output Voltage 2	V <sub>OH2</sub>	V <sub>S</sub> =0V, I <sub>RESET</sub> = -5mA	4.5	4.9	-	V
Output Saturation Voltage 1	V <sub>OL1</sub>	V <sub>S</sub> =0V, I <sub>RESET</sub> = 3mA	-	0.2	0.4	V
Output Saturation Voltage 2	V <sub>OL2</sub>	V <sub>S</sub> =0V, I <sub>RESET</sub> = 10mA	-	0.3	0.5	V
Output Saturation Voltage 3	V <sub>OL3</sub>	V <sub>S</sub> =Open. I <sub>RESET</sub> =3mA	-	0.2	0.4	V
Output Saturation Voltage 4	V <sub>OL4</sub>	V <sub>S</sub> =Open. I <sub>RESET</sub> =10mA	-	0.3	0.5	V
Output Sink Current 1	I <sub>OL1</sub>	V <sub>S</sub> =0V, V <sub>RESET</sub> = 1.0V	20	70	-	mA
Output Sink Current 2	I <sub>OL2</sub>	V <sub>S</sub> =Open. V <sub>RESET</sub> = 1.0V	20	70	-	mA
RESET Minimum Supply Voltage 1	V <sub>CCL1</sub>	V <sub>RESET</sub> = 0.4V, I <sub>RESET</sub> = 0.2mA	-	0.8	1.2	V
RESET Minimum Supply Voltage 2	V <sub>CCL2</sub>	V <sub>RESET</sub> = V <sup>+</sup> -0.1V, R <sub>L</sub> (2Pin-GND)=1MΩ	-	0.8	1.2	V

## AC CHARACTERISTICS

(V<sup>+</sup>=5V, T<sub>a</sub>=25°C)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
V <sup>+</sup> Input Pulse Width	T <sub>PI</sub>	V <sub>CC</sub> 5V  4V	-	10	-	μS
CK Input Pulse Width	T <sub>CKW</sub>	CK 	-	1.8	-	μS
CK Input Frequency	T <sub>CK</sub>		-	12	-	μS
Watch Dog Timer Watching Time	T <sub>WD</sub>	C <sub>T</sub> =0.1μF	-	10	-	mS
Watch Dog Timer Reset Time	T <sub>WR</sub>	C <sub>T</sub> =0.1μF	-	2	-	mS
Reset Signal Hold Time	T <sub>PR</sub>	C <sub>T</sub> =0.1μF, V <sup>+</sup> 	-	100	-	mS
Propagation Delay from V <sup>+</sup>	T <sub>PD1</sub>	RESET Pin, R <sub>L</sub> =2.2kΩ, C <sub>L</sub> =100pF	-	2	-	μS
Propagation Delay from V <sup>+</sup>	T <sub>PD2</sub>	RESET Pin R <sub>L</sub> =2.2kΩ, C <sub>L</sub> =100pF	-	3	-	μS
Output Rise Time	t <sub>r</sub>	R <sub>L</sub> =2.2kΩ, C <sub>L</sub> =100pF	-	1.0	-	μS
Output Fall Time	t <sub>f</sub>	R <sub>L</sub> =2.2kΩ, C <sub>L</sub> =100pF	-	0.1	-	μS

## ■ TIMING CHART



# NJM2102

## ■ TERMINAL FUNCTION

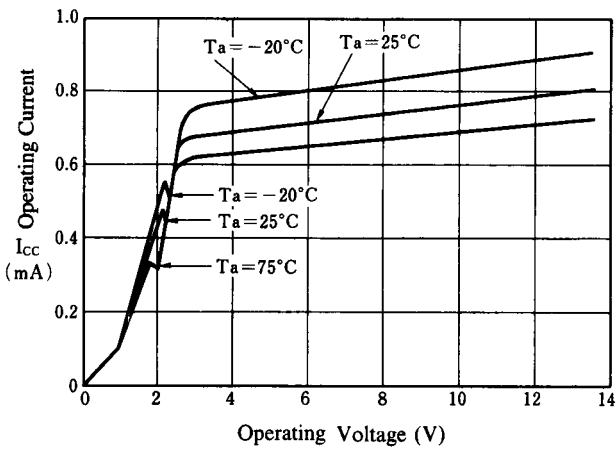
PIN. NO	SYMBOL	FUNCTION	INSIDE EQUIVALENT CIRCUIT
1	$C_T$	Pin Connection to Capacitor, Set the reset holding time	
2	RESET	Reset Output	
3	CK	Clock Input	

## ■ TERMINAL FUNCTION

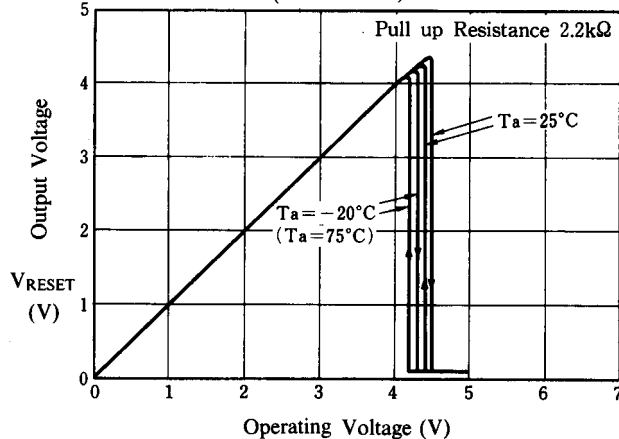
PIN. NO	SYMBOL	FUNCTION	INSIDE EQUIVALENT CIRCUIT
4	GND	Ground	
5	V <sup>+</sup>	Operating Voltage	
6	V <sub>REF</sub>	Ref Amp Output	
7	V <sub>S</sub>	Comparator S Input	
8	$\overline{\text{RESET}}$	Reset Output Internal pull up resistor	

## ■ TYPICAL CHARACTERISTICS

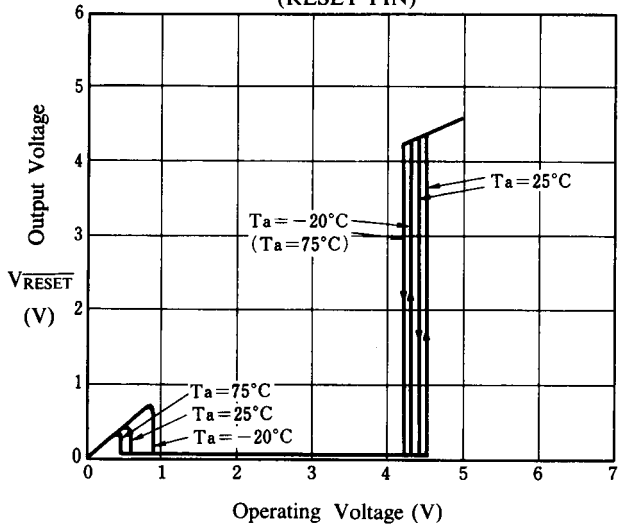
### Operating Current vs. Operating Voltage



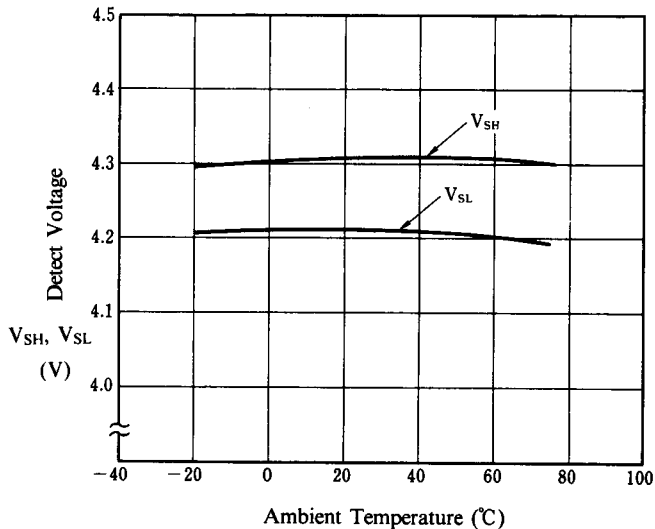
### Output Voltage vs. Operating Voltage (RESET PIN)



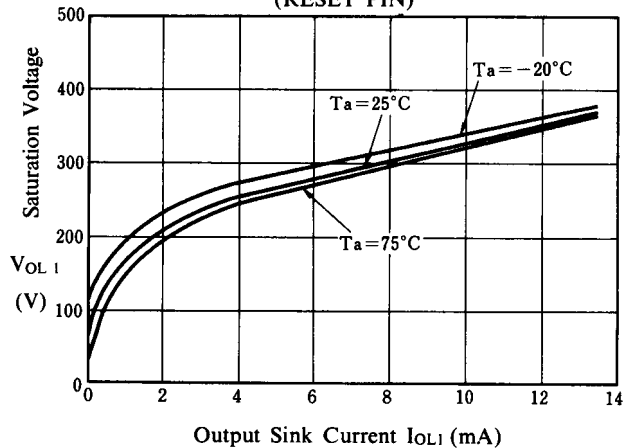
### Output Voltage vs. Operating Voltage (RESET PIN)



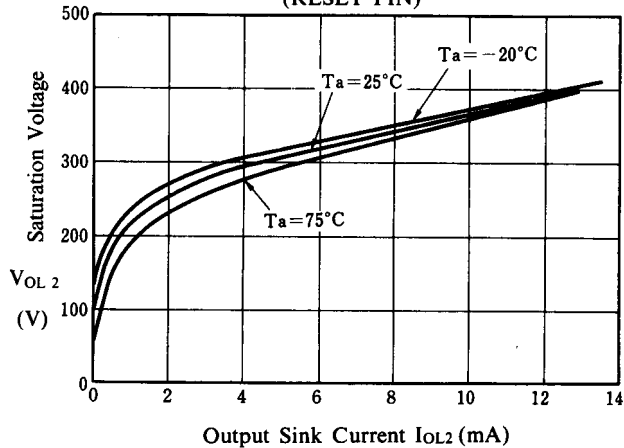
### Detect Voltage vs. Ambient Temperature



### Saturation Voltage vs. Output Sink Current (RESET PIN)

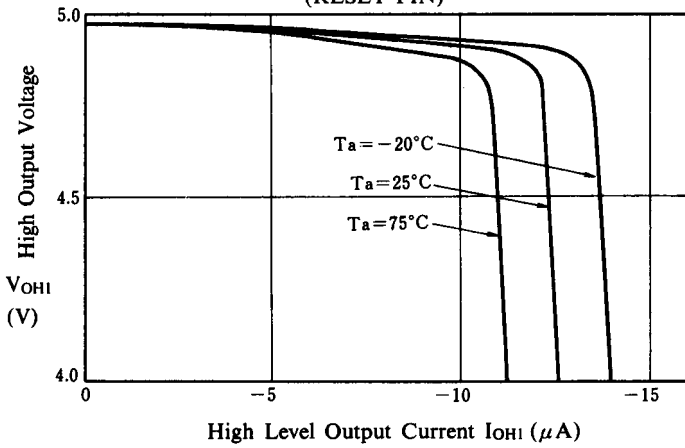


### Saturation Voltage vs. Output Sink Current (RESET PIN)

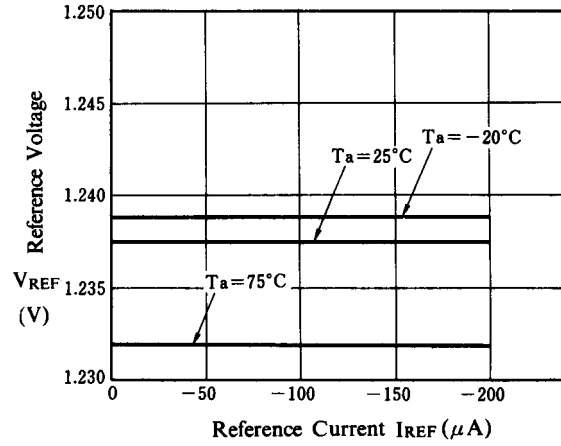


## ■ TYPICAL CHARACTERISTICS

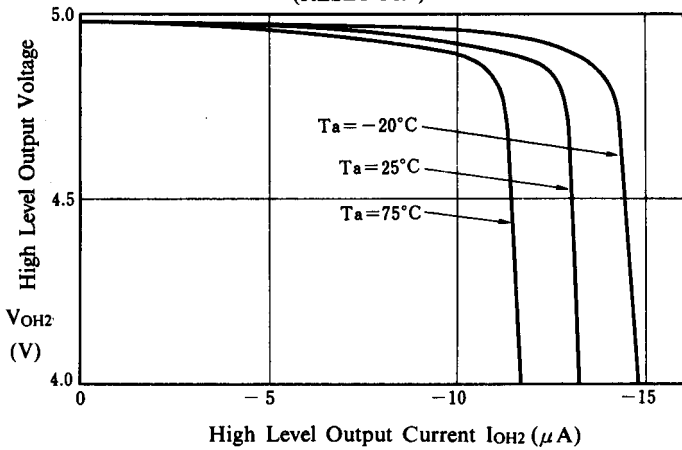
### High Level Output Voltage vs. High Level Output Current (RESET PIN)



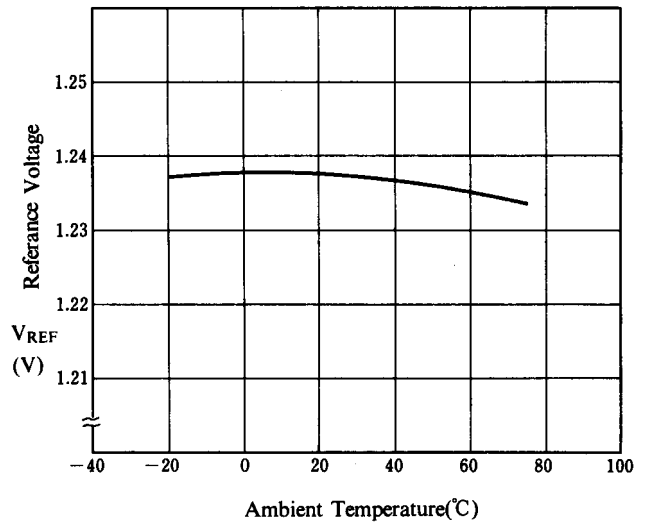
### Reference Voltage vs. Reference Current



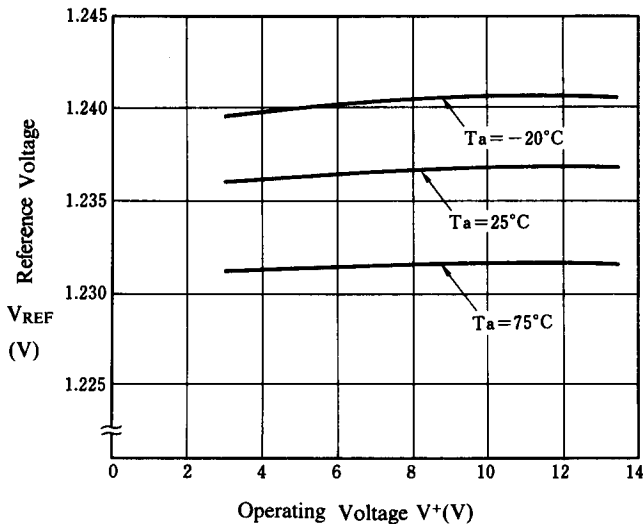
### High Output Voltage vs. High Level Output Current (RESET PIN)



### Reference Voltage vs. Ambient Temperature

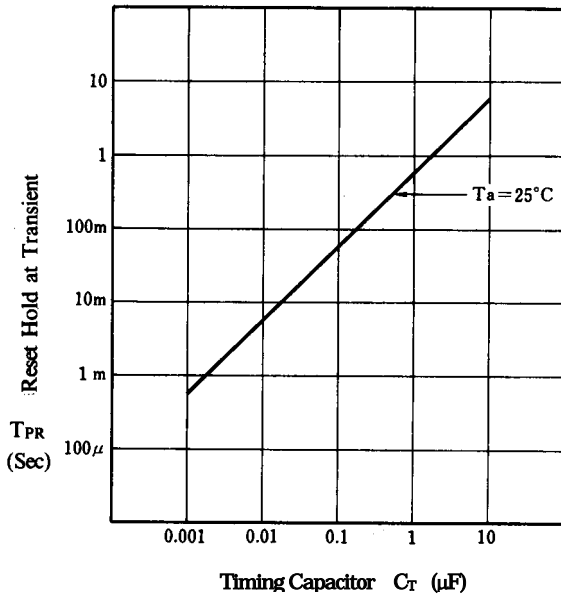


### Reference Voltage vs. Operating Voltage

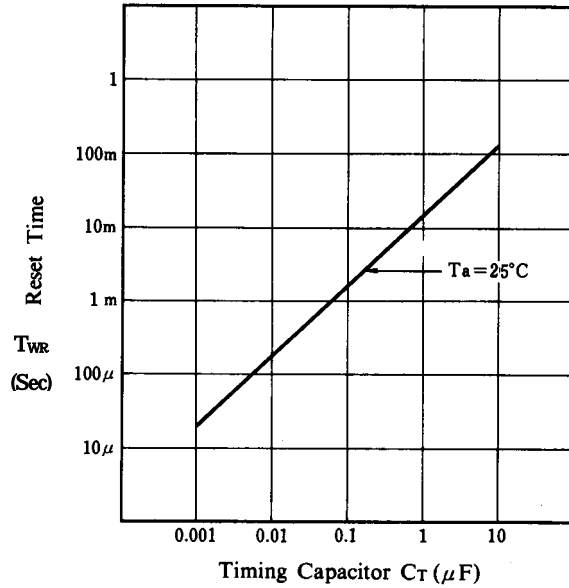


## ■ TYPICAL CHARACTERISTICS

### Reset Hold Time at Transient

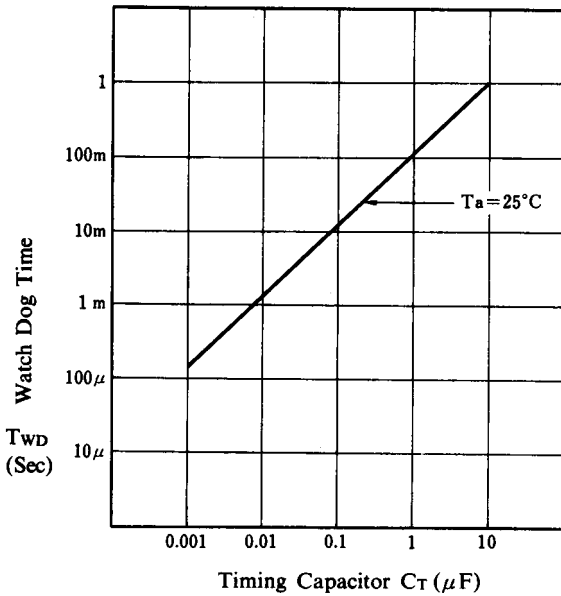


### Reset Time

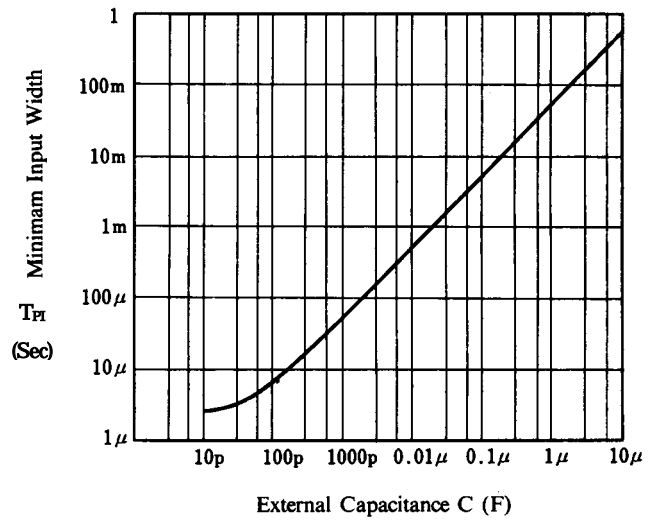


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### Watch Dog Timer observation time



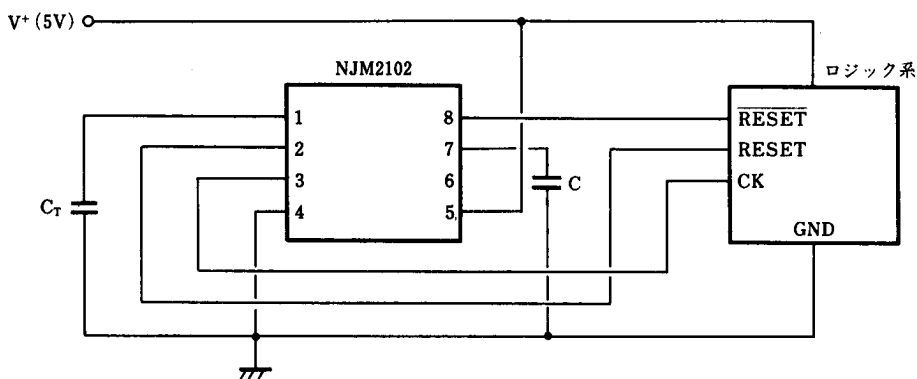
### Minimum Input Pulse Width vs. C





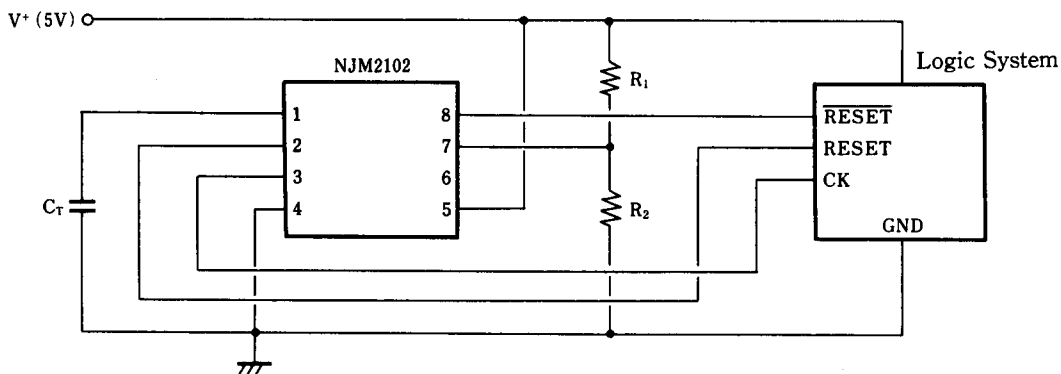
## APPLICATION CIRCUIT

### 1. 5V Supply Voltage Supervisory and Watch-dog timer



- Voltage Supply is detected through  $V_S$ . Detected Voltage is  $V_{SH}$ ,  $V_{SL}$ .
- If minimum input pulse width  $T_{PI}$  needs extend, add external capacitor  $C$  between  $V_S$  terminal and GND. (Please refer to TYPICAL CHARACTERISTICS : Minimum Input Pulse Width vs  $C$ )

### 2. 5V Supply Voltage Supervisory (Externally fine tuning type)

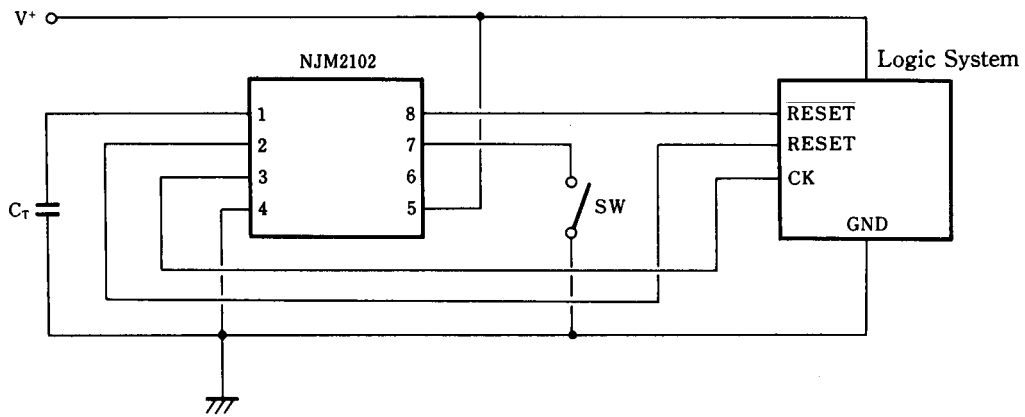


- $V_S$  detecting Voltage can be externally adjusted.
- Detecting Voltage can be decided by divider resistor of IC inside. Detecting Voltage can be set by external  $R_1$ ,  $R_2$ . The external resistor  $R_1$ ,  $R_2$  are required to be set in value less than 1 / 10 in comparing to dividing resistor of IC inside. Please refer to following Table.

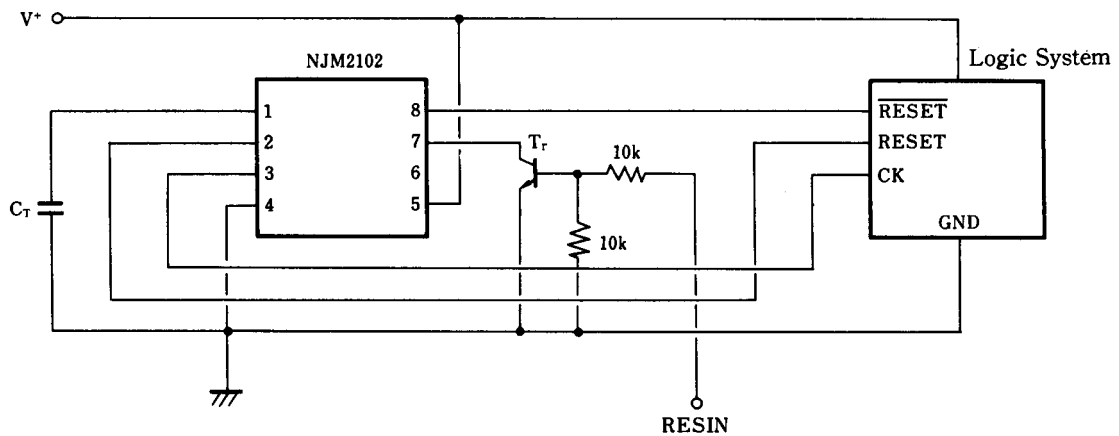
$R_1(k\Omega)$	$R_2(k\Omega)$	Detecting Voltage : $V_{SL}(V)$	Detecting Voltage : $V_{SH}(V)$
10	3.9	4.34	4.44
9.1	3.9	4.08	4.18

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## 3. Compulsory Resetting attached (Reset Hold attached)



- \*Pin 7 to be grounded when SW. ON. RESET (8pin) become Low : RESET (pin2) become HIGH.



- By putting signal in the RESET pin, and Tr swich ON  $\overline{\text{RESET}}$  pin become LOW and RESET pin HIGH.

[CAUTION]  
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