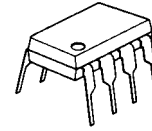


## SYSTEM RESET IC

### ■ 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.

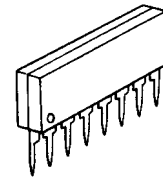
### ■ PACKAGE OUTLINE



**NJM2103D**



**NJM2103M**

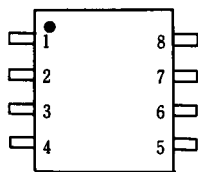


**NJM2103L**

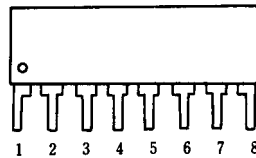
### ■ FEATURES

- Precise Detection of Supply Voltage Down ( $V_{SA}=4.2V\pm 2.5\%$ )
- Possible Detection of Optional Voltage Down ( $V_{SB}=1.22V\pm 1.5\%$ )
- Possible Detection of Optional Over-loading ( $I_{CC}\leq 560\mu A@V_{SB}=5V$ )
- Low Operating Current
- Reference Voltage can be taken out. ( $V^+=0.8V$  Typ.)
- Low Reset Validated Voltage
- Voltage Detection with Hysteresis Feature
- Package Outline DIP8, DMP8, SIP8
- Bipolar Technology

### ■ PIN CONFIGURATION



**NJM2103D**  
**NJM2103M**

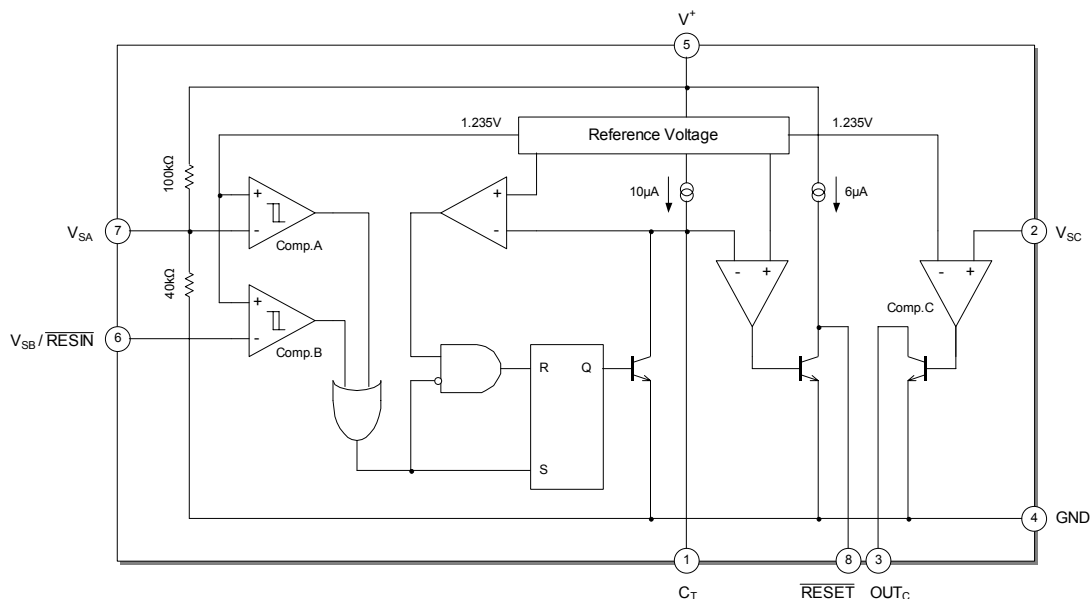


**NJM2103L**

### PIN FUNCTION

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

### ■ BLOCK DIAGRAM



# NJM2103

## ■ ABSOLUTE MAXIMUM RATINGS

( $T_a=25^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V^+$	20	V
Power Dissipation	$P_D$	(DIP8) 500 (DMP8) 300 (SIP8) 800	mW mW 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	$T_{opr}$	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to +125	$^\circ\text{C}$

## ■ ELECTRICAL CHARACTERISTICS

### ● DC CHARACTERISTICS

( $V^+=5.0\text{V}$ ,  $V_{SB}=0\text{V}$ ,  $V_{SC}=0\text{V}$ ,  $T_a=25^\circ\text{C}$ )

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current (1)	$I_{CC1}$	$V_{SB}=5\text{V}$	-	380	560	$\mu\text{A}$
Operating Current (2)	$I_{CC2}$		-	460	700	$\mu\text{A}$
$V_{SA}$ 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
$V_{SA}$ Hysteresis 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	$\Delta V_{SBL}$	$V^+=3.5$ to $18\text{V}$	-	3	10	mV
$V_{SB}$ Hysteresis Width	$V_{HRSB}$		14	28	42	mV
$V_{SB}$ Input Current (1)	$I_{IHB}$	$V_{SB}=5\text{V}$	-	0	250	nA
$V_{SB}$ Input Current (2)	$I_{ILB}$		-	20	250	nA
High Level $\overline{\text{RESET}}$ Output Voltage	$V_{OHR}$	$I_{\overline{\text{RESET}}}=-5\mu\text{A}$ , $V_{SB}=5\text{V}$	4.5	4.9	-	$\mu\text{V}$
$\overline{\text{RESET}}$ Output Saturating Voltage (1)	$V_{OLR1}$	$I_{\overline{\text{RESET}}}=2\text{mA}$	-	0.20	0.40	V
$\overline{\text{RESET}}$ Output Saturating Voltage (2)	$V_{OLR2}$	$I_{\overline{\text{RESET}}}=10\text{mA}$	-	0.30	0.50	V
$\overline{\text{RESET}}$ Output Sink Current	$I_{\overline{\text{RESET}}}$	$V_{OLR}=1.0\text{V}$	20	80	-	mA
$C_T$ Charge Current	$I_{CT}$	$V_{SB}=5\text{V}$ , $V_{CT}=0.5\text{V}$	6.0	9.5	13.0	$\mu\text{A}$
$V_{SC}$ Input Current (1)	$I_{IHC}$	$V_{SC}=5\text{V}$	-	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	$\Delta V_{SC}$	$V^+=3.5$ to $13.5\text{V}$	-	3	10	mV
$\text{OUT}_C$ Output Leak Current	$I_{OHC}$	$V_{OHC}=13.5\text{V}$	-	0	1	$\mu\text{A}$
$\text{OUT}_C$ Output Saturation Voltage	$V_{OLC}$	$I_{\text{OUT}}=4\text{mA}$ , $V_{SC}=5\text{V}$	-	0.10	0.40	V
$\text{OUT}_C$ Output Sink Current	$I_{\text{OUTC}}$	$V_{OLC}=1.0\text{V}$ , $V_{SC}=5\text{V}$	6	20	-	mA
$\overline{\text{RESET}}$ Guarantee Minimum Supply Voltage	$V_L^+$	$V_{OLR}=0.4\text{V}$ , $I_{\overline{\text{RESET}}}=200\mu\text{A}$	-	0.8	1.2	V

### ● AC CHARACTERISTICS

( $V^+=5.0\text{V}$ ,  $V_{SB}=5.0\text{V}$ ,  $V_{SC}=0\text{V}$ ,  $C_T=0.01\mu\text{F}$ ,  $T_a=25^\circ\text{C}$ )

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

## ■ 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.	

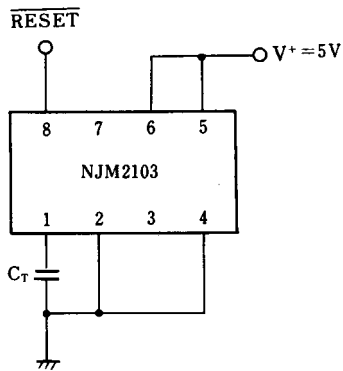
# NJM2103

## ■ TERMINAL FUNCTION

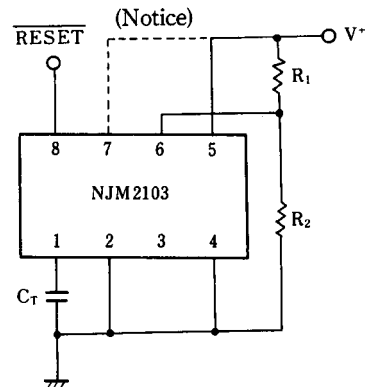
PIN NO.	SYMBOL	FUNCTION	INSIDE EQUIVALENT CIRCUIT
4	GND	Ground	
5	V <sup>+</sup>	Operating Voltage	
6	V <sub>SB</sub> /RESIN	Comparator B Input	
7	V <sub>SA</sub>	Comparator A Input	
8	RESET	Reset Output Internalizing pull up resistor	

## APPLICATION CIRCUIT

### 1) 5V Supply Voltage Monitor



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

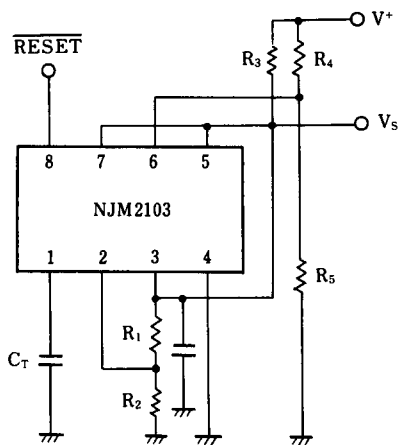


$$\text{Detecting Voltage} \doteq \left(1 + \frac{R_1}{R_2}\right) \times V_{SB}$$

(Notice)

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

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

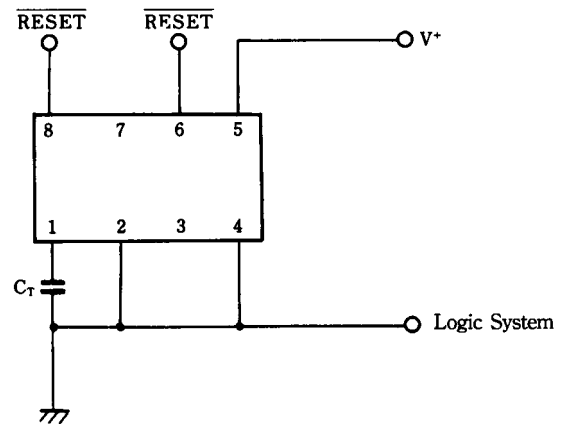


$$\text{Detecting Voltage} \doteq \left(1 + \frac{R_4}{R_5}\right) \times V_{SB}$$

$$\text{Constant Voltage Output } V_S \doteq \left(1 + \frac{R_1}{R_2}\right) \times V_{SC}$$

$$\overline{\text{RESET}} \text{ Output} \doteq \begin{cases} V_S \text{ (High Level)} \\ OV \text{ (Low Level)} \end{cases}$$

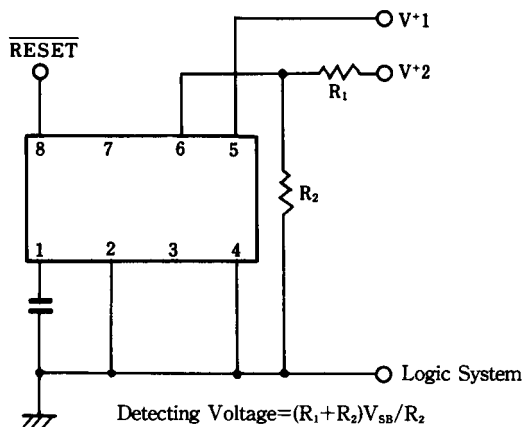
### 4) Compulsory Reset



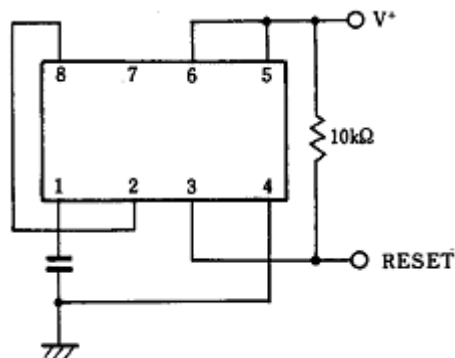
Input Reset signal TTL level to  $V_{SB}$  - terminal

# NJM2103

5) 5V,  $V_{CC} < 12V$  Supply Voltage Monitor

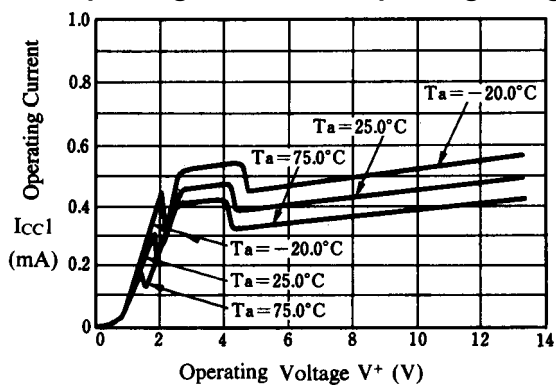


6) Non-Inverting Reset

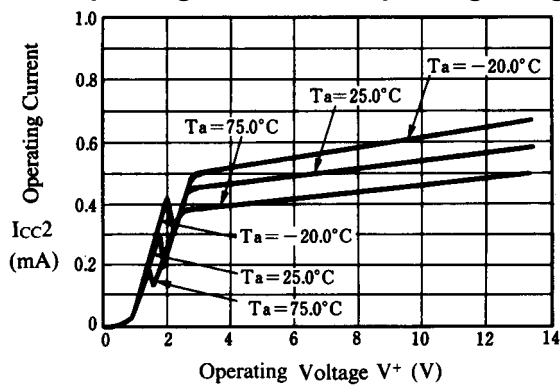


## ■ TYPICAL CHARACTERISTICS

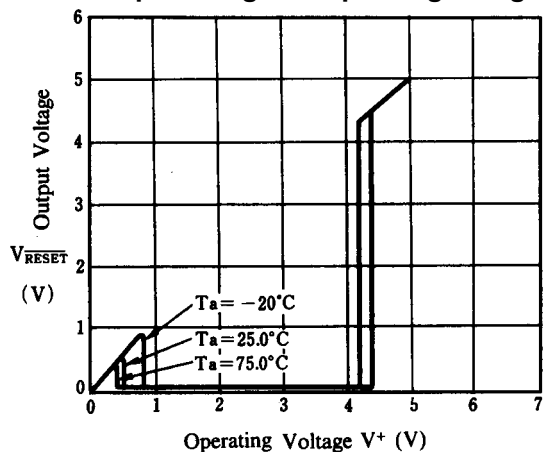
Operating Current 1 vs. Operating Voltage



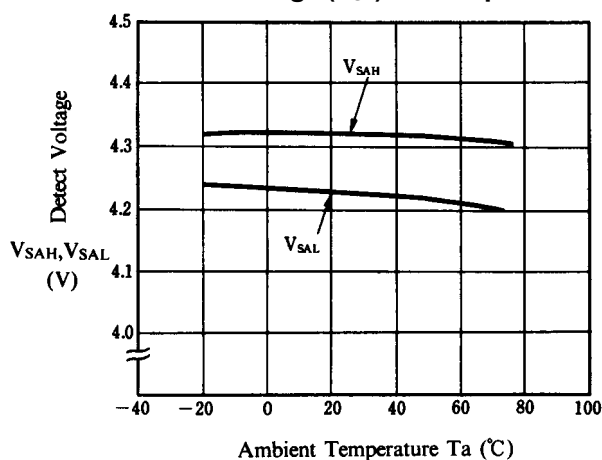
Operating Current 2 vs. Operating Voltage



Output Voltage vs. Operating Voltage

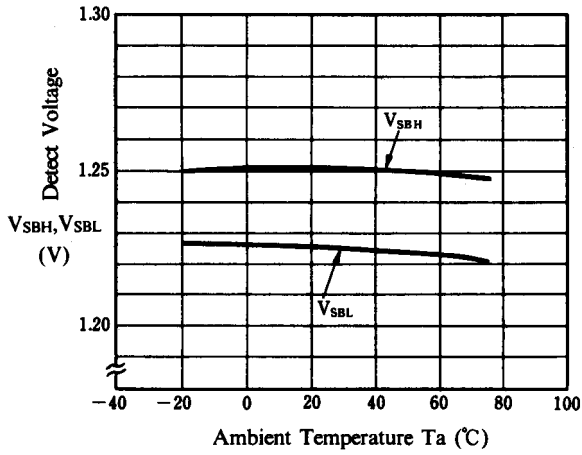


Detect Voltage ( $V_{SA}$ ) vs. Temperature

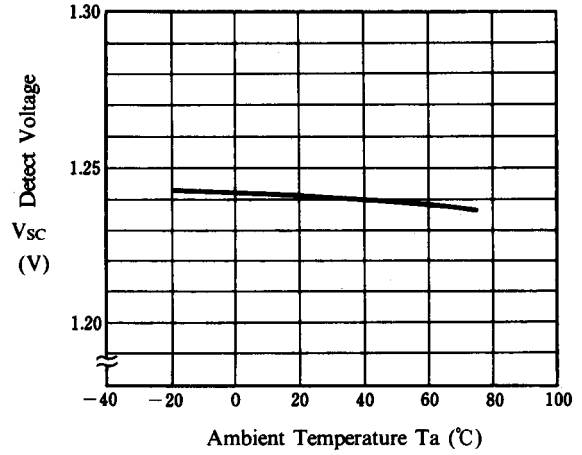


## ■ TYPICAL CHARACTERISTICS

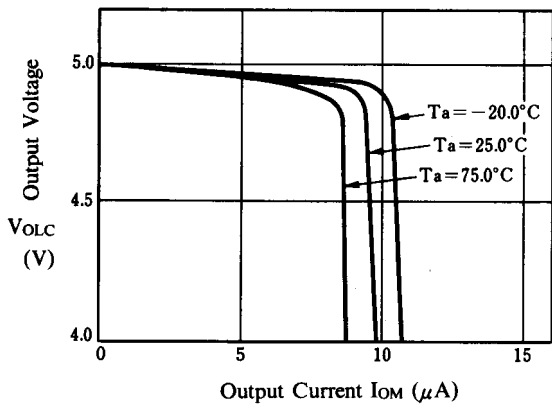
Detect Voltage ( $V_{SA}$ ) vs. Temperature



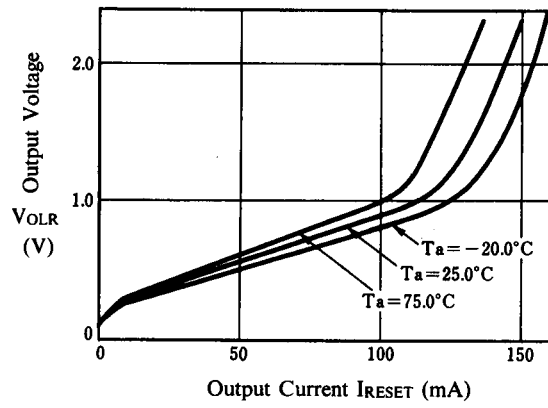
Detect Voltage ( $V_{SC}$ ) vs. Temperature



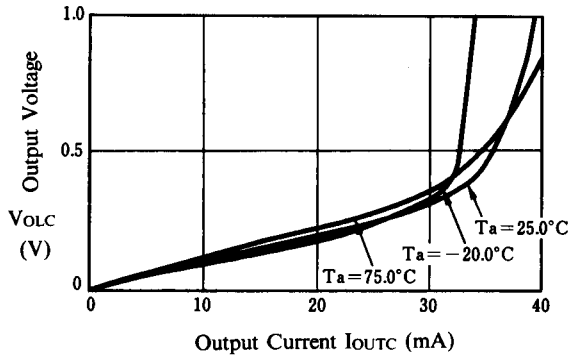
Output Voltage vs. Output Current



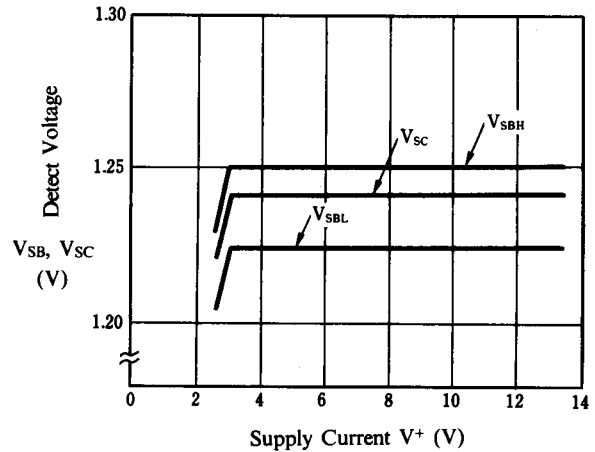
Output Voltage vs. Output Current



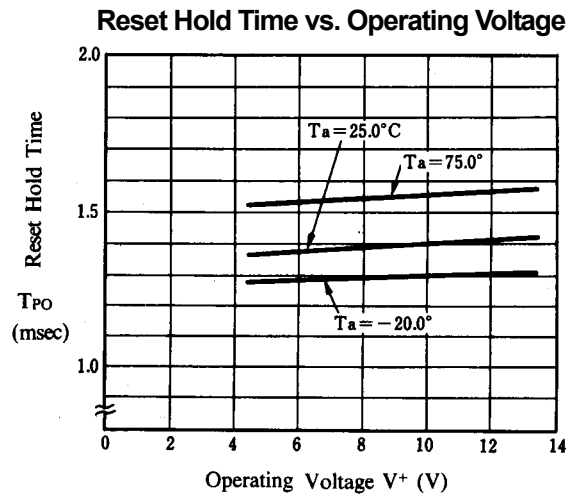
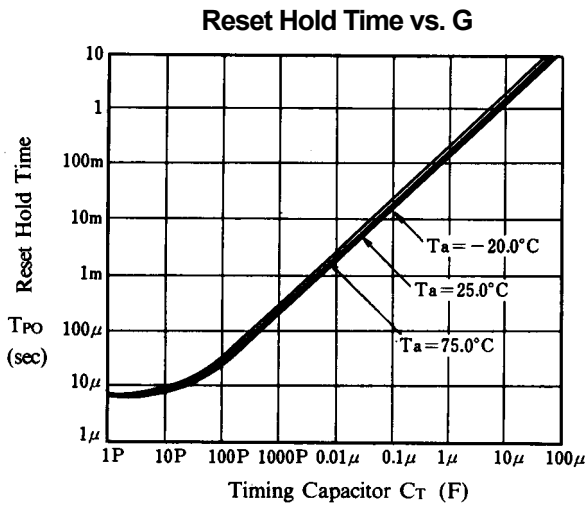
Output Voltage ( $OUT_C$ ) vs. Output Current ( $I_{OUTC}$ )



Detect Voltage ( $V_{SB}$ ,  $V_{SC}$ ) vs. Supply Voltage



## ■ TYPICAL CHARACTERISTICS



**[CAUTION]**

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