

## SERIES REGULATOR WITH RESET FUNCTION

### ■ GENERAL DESCRIPTION

The **NJM78LR05** is a series regulator with reset function.

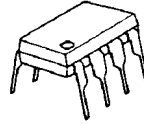
In case of shut down or output voltage drop, the IC generates reset signal to a microcomputer.

That is suitable for items with microcomputer, such as TV sets, remote controller, refrigerator and others.

### ■ FEATURES

- Output Current  $I_o=150\text{mA max.}$
- Reset Function Including
- Reset Delay Time can be Adjusted  
by an External Capacitance.
- Internal Over Current Protection
- Thermal Shut Down
- Bipolar Technology
- package Outline DIP8, DMP8, SIP8, SOT-89 (5Pin)

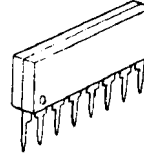
### ■ PACKAGE OUTLINE



**NJM78LR05BD / CD**



**NJM78LR05BM / CM / DM**



**NJM78LR05BL / CL**



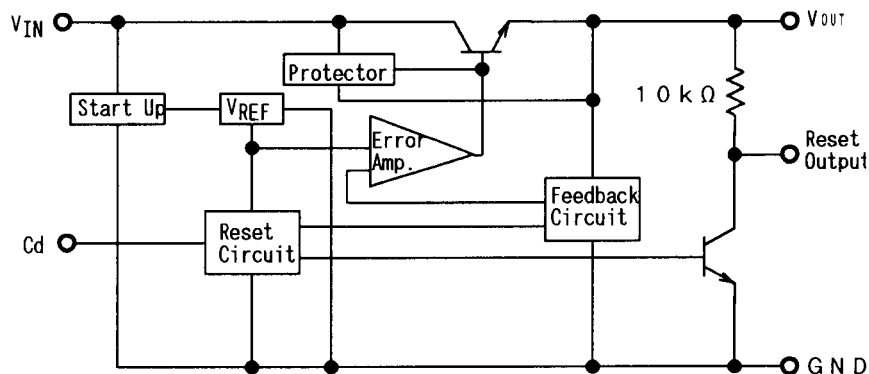
**NJM78LR05BU / CU / DU**

### ■ RESET THRESHOLD VOLTAGE LINE-UP

Reset Threshold Voltage	Version	Part Number
4.0V	D	NJM78LR05DX
4.2V	C	NJM78LR05CX
4.3V	B	NJM78LR05BX

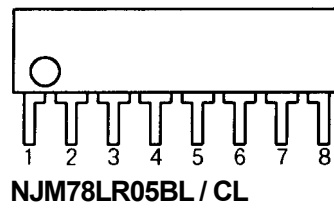
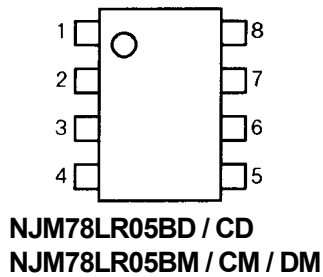
"X" is package suffix.

### ■ BLOCK DIAGRAM



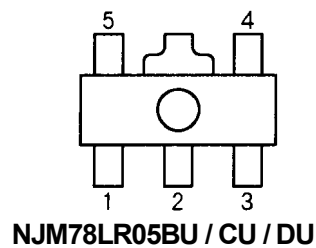
# NJM78LR05

## ■ PIN CONFIGURATION



### PIN FUNCTION

1. INPUT
2. NC
3. Cd
4. NC
5. GND
6. RESET-OUTPUT
7. NC
8. OUTPUT



### PIN FUNCTION

1. Cd
2. GND
3. RESET-OUTPUT
4. OUTPUT
5. INPUT

## ■ ABSOLUTE MAXIMUM RATINGS

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

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Input Voltage	$V_{IN}$	+20	V
Power Dissipation	$P_D$	(DIP-8) 500 (DMP8) 500* (SIP8) 800 (SOT-89) 350	mW
Operating Temperature Range	$T_{opr}$	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-50 to +150	$^\circ\text{C}$

\*At on PC board.

## ■ RECOMMENDED OPERATING CONDITIONS

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

PARAMETER	SYMBOL	CONDITIONS	UNIT
Input Voltage	$V_{IN}$	7.5 to 18	V
Output Current	$I_o$	1 to 100	mA

## ■ ELECTRICAL CHARACTERISTICS

( $V_{IN}=10V$ ,  $I_O=40mA$ ,  $C_{IN}=1\mu F$ ,  $C_O=10\mu F$ ,  $T_a=25^\circ C$ )

[Power Supply Block]

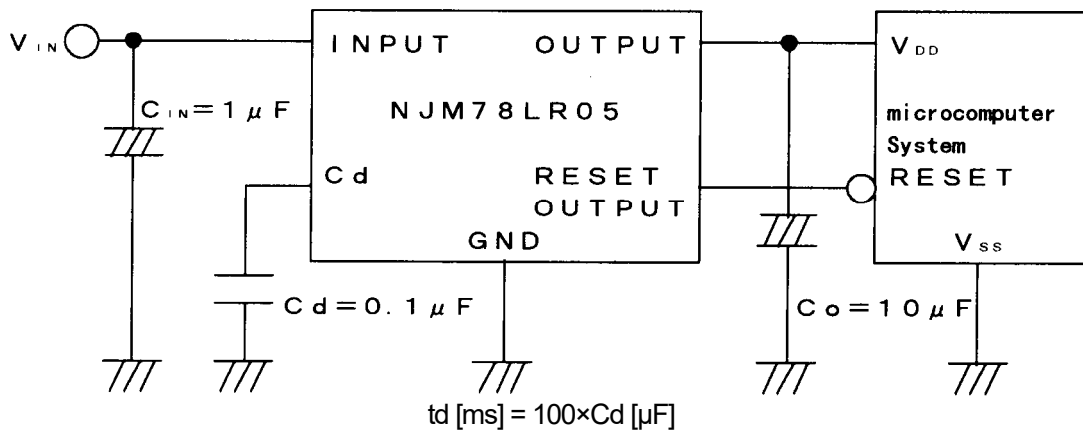
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$I_O=1mA$	4.80	5.00	5.20	V
Quiescent Current	$I_Q$	$I_O=100mA$	-	1.40	3.40	mA
Output Short Current	$I_{osc}$	OUTPUT-GND short	150	300	450	mA
Line Regulation 1	$\Delta V_O / V_{IN1}$	$7V \leq V_{IN} \leq 18V$	-	6.0	65.0	mV
Line Regulation 2	$\Delta V_O / V_{IN2}$	$8V \leq V_{IN} \leq 18V$	-	3.0	42.0	mV
Load Regulation 1	$\Delta V_O / I_{O1}$	$I_O=1$ to 100mA	-	9.0	60.0	mV
Load Regulation 2	$\Delta V_O / I_{O2}$	$I_O=1$ to 40mA	-	3.0	30.0	mV
Ripple Rejection	RR	$f=120Hz$ , $e_{in}=1V_{P-P}$ , $V_{IN}=8$ to 18V	-	79	-	dB
Output Noise Voltage	$V_{NO}$	$10Hz \leq f \leq 100kHz$ , $I_O=1mA$	-	80	-	$\mu V$
Dropout Voltage	$\Delta V_{F-O}$		-	1.5	2.2	V

[Reset Block]

(H) Reset Output Voltage	$V_{ORH}$		4.80	5.00	5.20	V
(L) Reset Output Voltage	$V_{ORL}$	$V_{IN}=3V$ , $I_O=1mA$	-	10	200	mV
Reset Threshold Voltage	$V_{RT}$	B Version	4.12	4.30	4.48	V
		C Version	4.03	4.20	4.37	
		D Version	3.84	4.00	4.16	
Reset Threshold Hysteresis Voltage	$V_{RTH}$		50	100	200	mV
Reset Output Delay Time	$t_d$	$C_d=0.1\mu F$	7.50	10.0	12.5	ms

# NJM78LR05

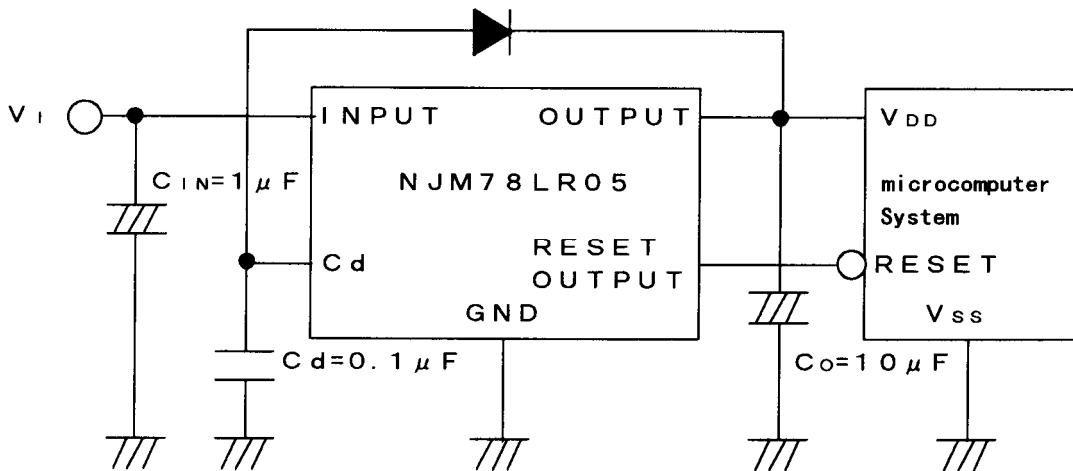
## APPLICATION CIRCUIT



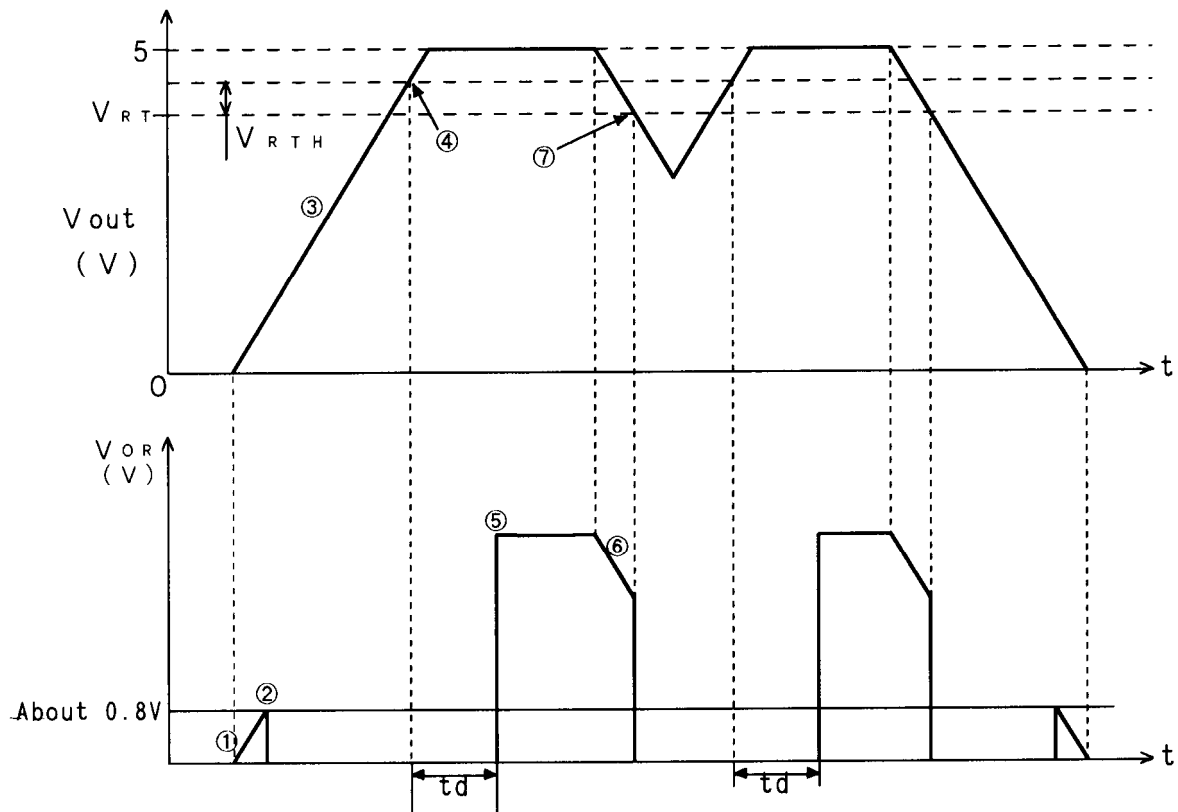
Note 1 : When the capacitance  $C_d$  is too large, the actual delay time is shorter than the calculated result because an electrical charge of  $C_d$  is discharged incompletely.

Solution of above problem :

- (1) Connect SBD between output terminal and  $C_d$  terminal. Please refer to the following circuit.
- (2) Select larger capacitance,  $C_{IN}$  than  $C_d$ .



## ■ TIMING CHART

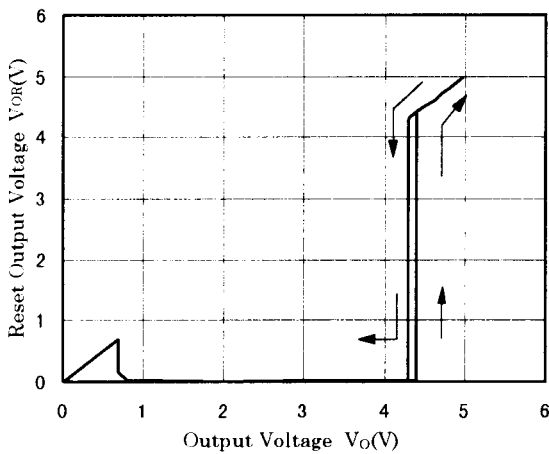


- ①When the input voltage is up to about 0.8V, some voltage is outputted at the reset output because the **NJM78LR05** operation is unstable.
- ②When the input voltage goes over about 0.8V, the reset output becomes "L".
- ③The output voltage is rising up with the input voltage.
- ④When the output voltage goes over ( $V_{RT} + V_{RTH}$ ), the delay circuit of reset output activates.  
 $V_{RT}$  : Reset Threshold Voltage  
 $V_{RTH}$  : Reset Threshold Hysteresis Voltage
- ⑤After the reset output delay time  $t_d$  has passed, the reset output becomes "H".
- ⑥The output voltage is falling down with the input voltage.
- ⑦When the output voltage is less than  $V_{RT}$ , the reset output becomes "L".

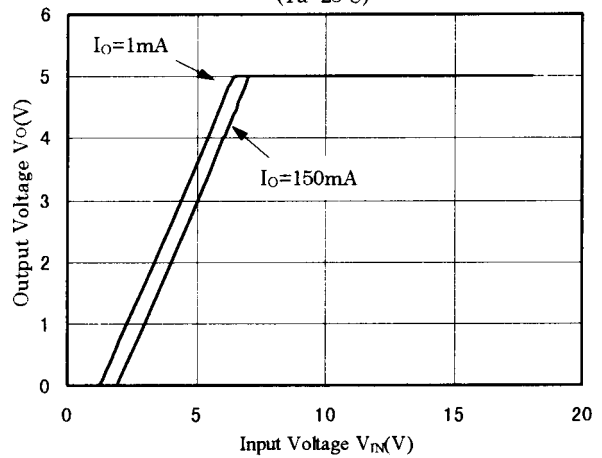
# NJM78LR05

## ■ TYPICAL CHARACTERISTICS

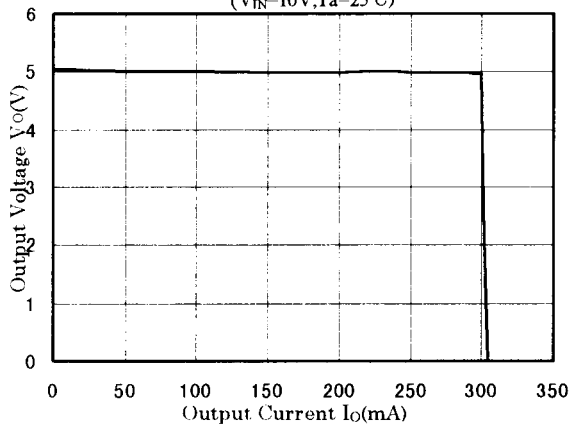
**Reset Output Voltage vs. Output Voltage**  
( $I_O=40\text{mA}, T_a=25^\circ\text{C}$ )



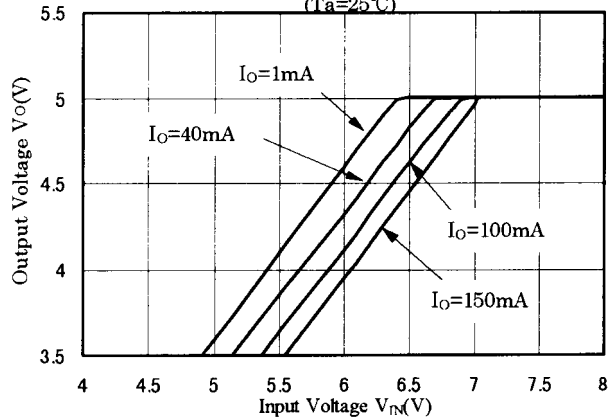
**Line Regulation**  
( $T_a=25^\circ\text{C}$ )



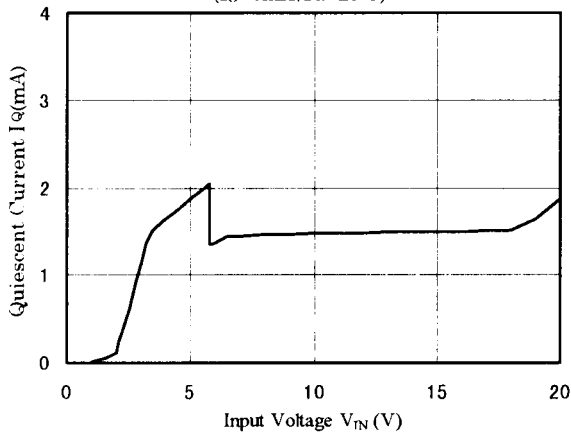
**Load Regulation**  
( $V_{IN}=10\text{V}, T_a=25^\circ\text{C}$ )



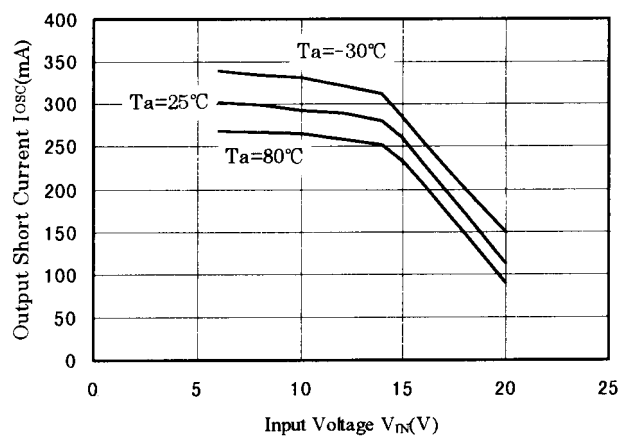
**Dropout Voltage**  
( $T_a=25^\circ\text{C}$ )



**Quiescent Current vs. Input Voltage**  
( $I_O=0\text{mA}, T_a=25^\circ\text{C}$ )



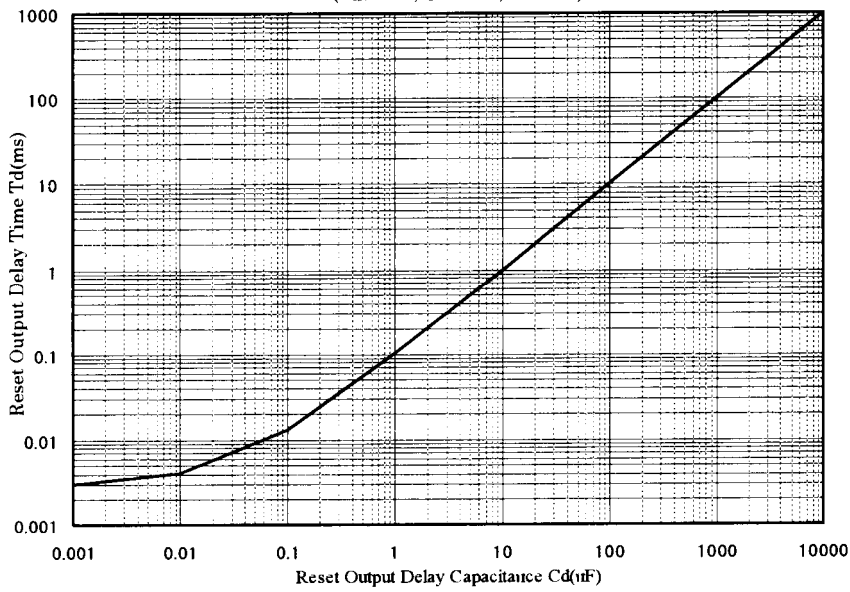
**Output Short Current vs. Input Voltage**



## ■ TYPICAL CHARACTERISTICS

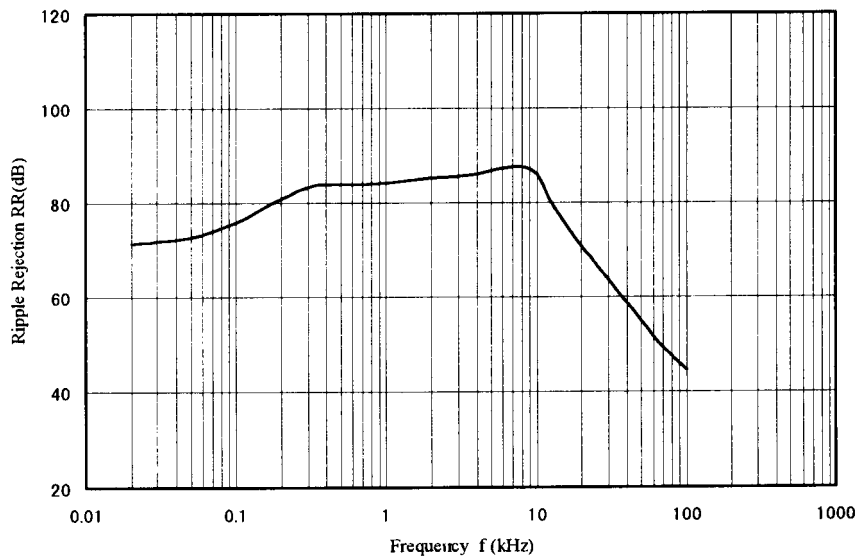
### Reset Output Delay Time vs. Reset Output Delay Capacitance

( $V_{IN}=10V, I_O=40mA, T_a=25^\circ C$ )



### Ripple Rejection vs. Frequency

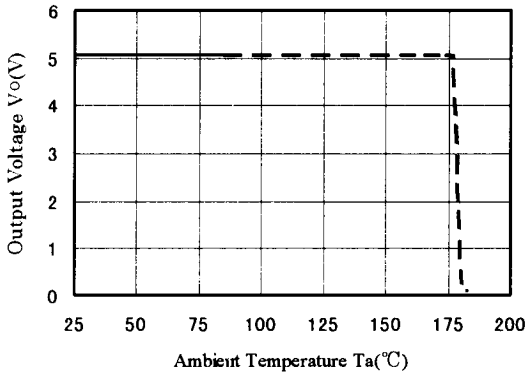
( $V_{IN}=10V, I_O=40mA, \text{enr}=1V_{P-P}, C_O=10\mu F, T_a=25^\circ C$ )



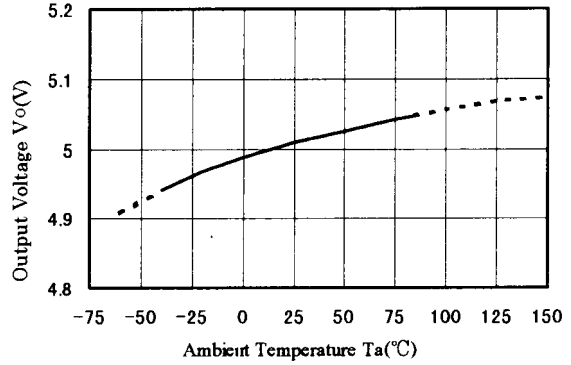
# NJM78LR05

## ■ TYPICAL CHARACTERISTICS

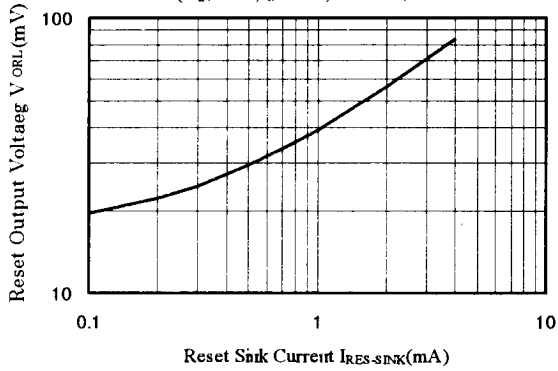
**Thermal Shutdown**  
( $V_{IN}=10V, I_o=0mA$ )



**Output Voltage vs. Ambient Temperature**  
( $V_{IN}=10V, I_o=10mA$ )



**Reset Output Voltage vs. Reset Sink Current**  
( $V_{IN}=10V, I_o=5mA, T_a=25°C$ )



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