

## SERIES REGULATOR WITH RESET FUNCTION

### ■ GENERAL DESCRIPTION

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

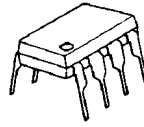
In case of shut down or output voltage drop, the IC generates reset signal to a microcomputer.

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

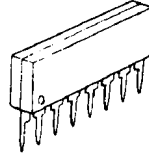
### ■ FEATURES

- 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 / DD**    **NJM78LR05BM / CM / DM**



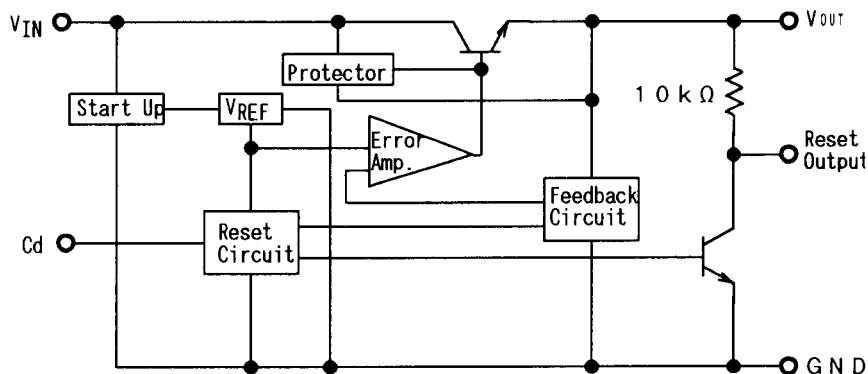
**NJM78LR05BL / CL / DL**    **NJM78LR05BU / CU / DU**

### ■ RESET THRESHOLD VOLTAGE LINE-UP

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

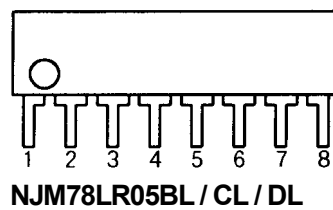
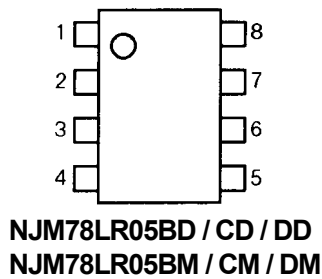
"X" is package suffix.

### ■ BLOCK DIAGRAM



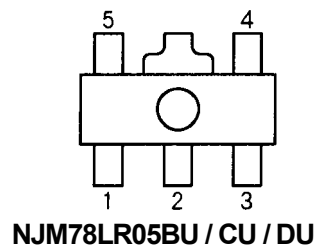
# NJM78LR05

## ■ 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]

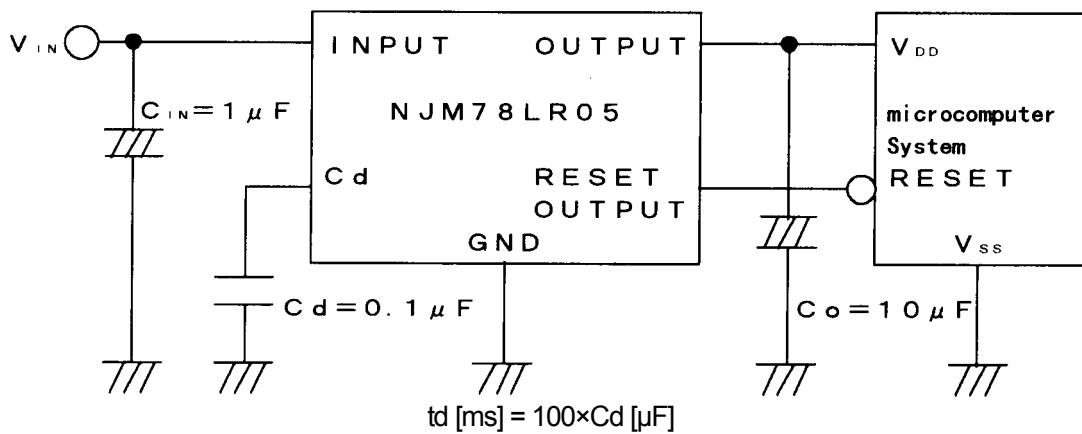
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	$V_O$	$I_O=1mA$	4.80	5.00	5.20	V
Quiescent Current	$I_Q$	$I_O=100mA$	-	1.40	3.40	mA
Output Short Current	$I_{OSC}$	OUTPUT-GND short	150	300	450	mA
Line Regulation 1	$\Delta V_O / V_{IN1}$	$7V \leq V_{IN} \leq 18V$	-	6.0	65.0	mV
Line Regulation 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	$\Delta V_{FO}$		-	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

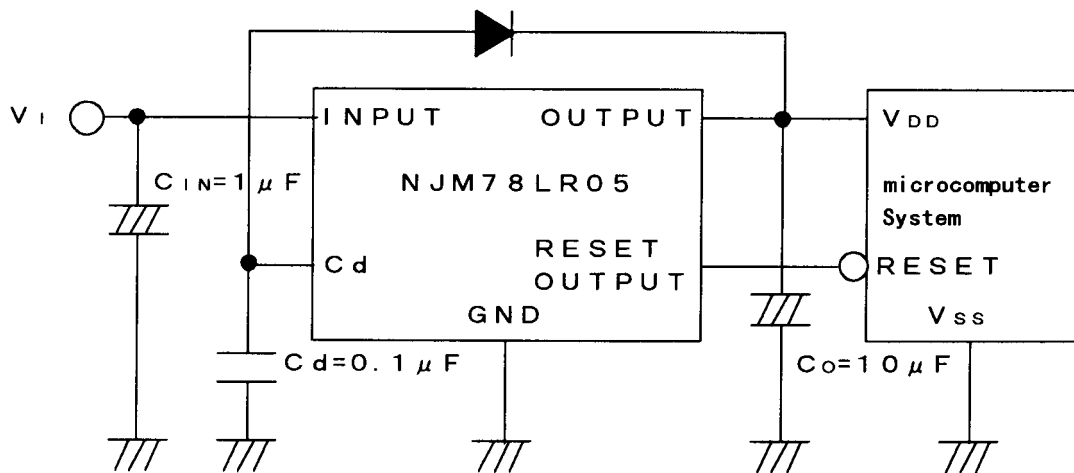
## APPLICATION CIRCUIT



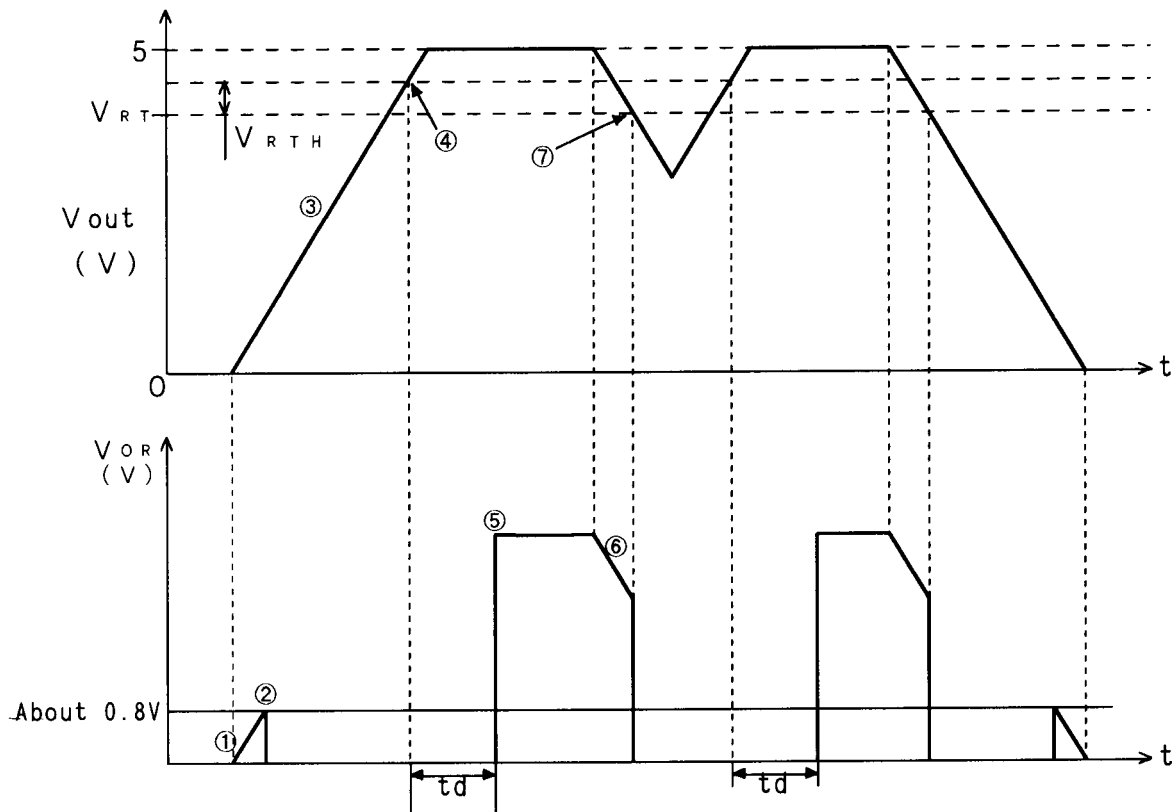
Note 1 : When the capacitance  $C_d$  is too large, the actual delay time is shorter than the calculated result because an electrical charge of  $C_d$  is discharged incompletely.

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

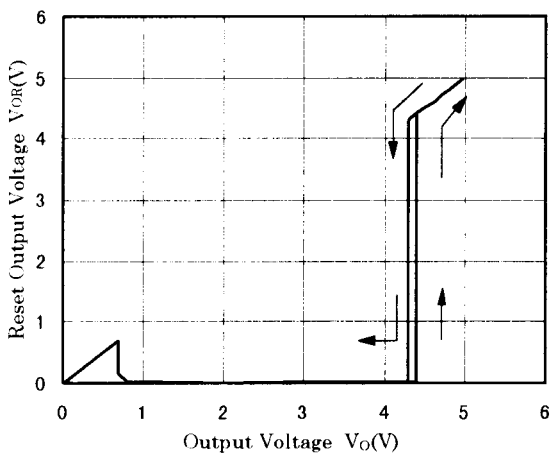


- ①When the input voltage is up to about 0.8V, some voltage is outputted at the reset output because the **NJM78LR05** operation is unstable.
- ②When the input voltage goes over about 0.8V, the reset output becomes "L".
- ③The output voltage is rising up with the input voltage.
- ④When the output voltage 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".

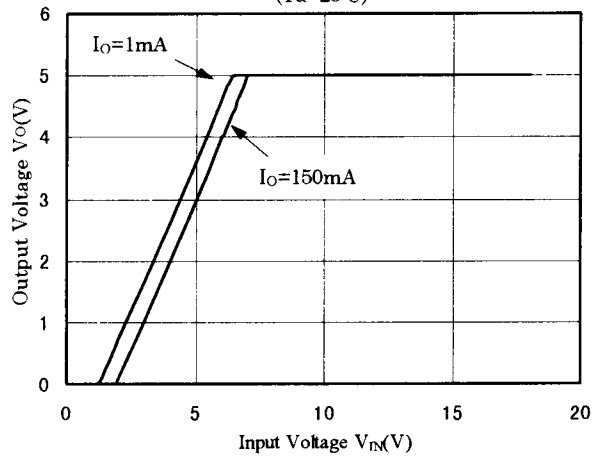
# NJM78LR05

## ■ TYPICAL CHARACTERISTICS

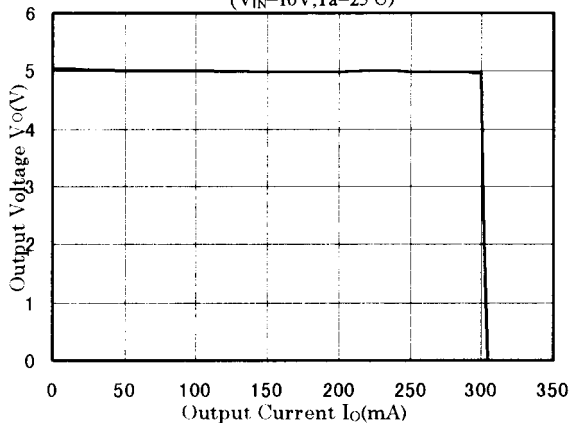
**Reset Output Voltage vs. Output Voltage**  
( $I_O=40\text{mA}$ ,  $T_a=25^\circ\text{C}$ )



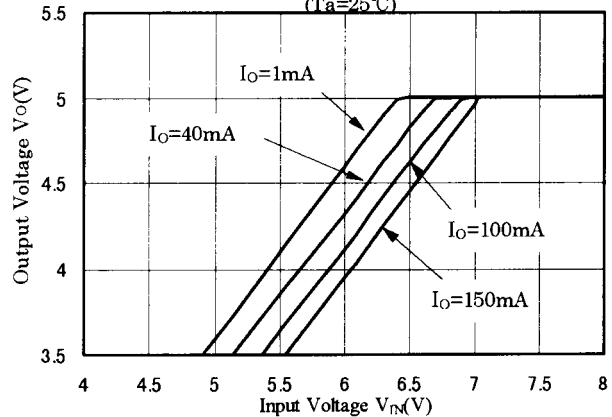
**Line Regulation**  
( $T_a=25^\circ\text{C}$ )



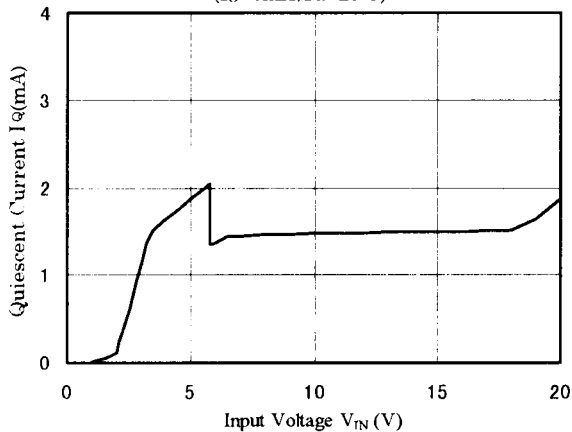
**Load Regulation**  
( $V_{IN}=10\text{V}$ ,  $T_a=25^\circ\text{C}$ )



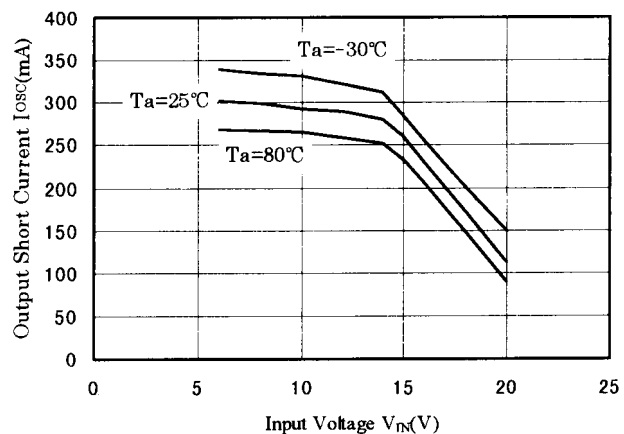
**Dropout Voltage**  
( $T_a=25^\circ\text{C}$ )



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



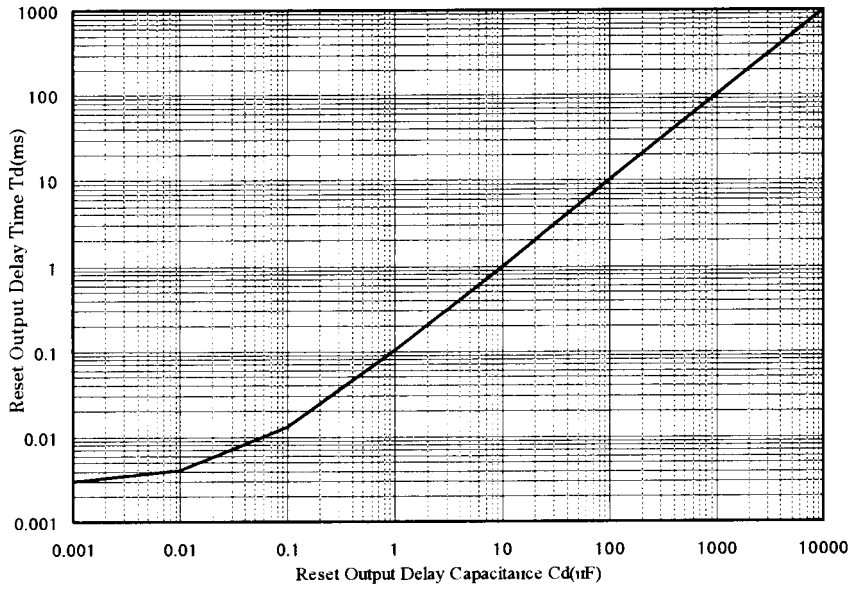
**Output Short Current vs. Input Voltage**



## ■ TYPICAL CHARACTERISTICS

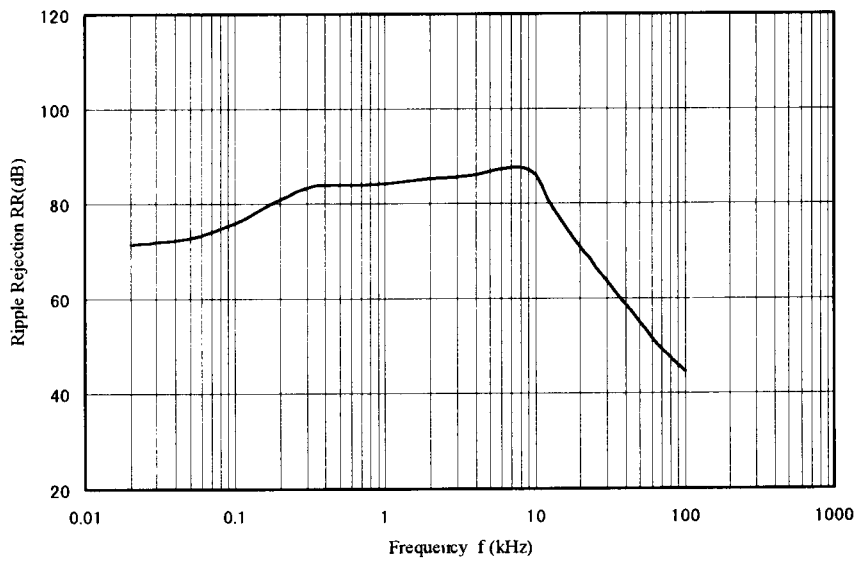
### Reset Output Delay Time vs. Reset Output Delay Capacitance

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



### Ripple Rejection vs. Frequency

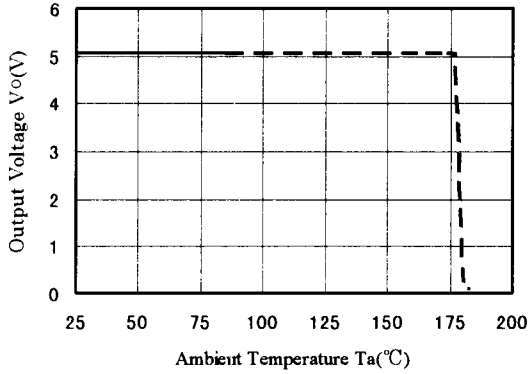
( $V_{IN}=10V, I_O=40mA, e_{nr}=1V_{PP}, C_O=10\mu F, T_a=25^\circ C$ )



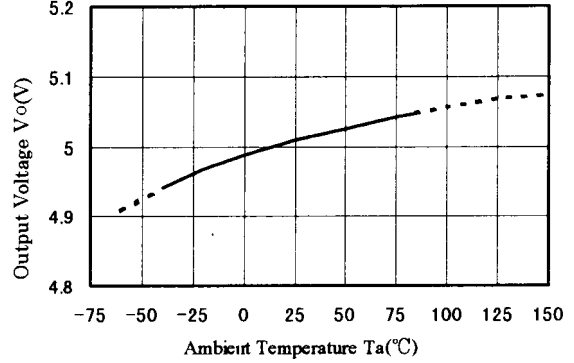
# NJM78LR05

## ■ TYPICAL CHARACTERISTICS

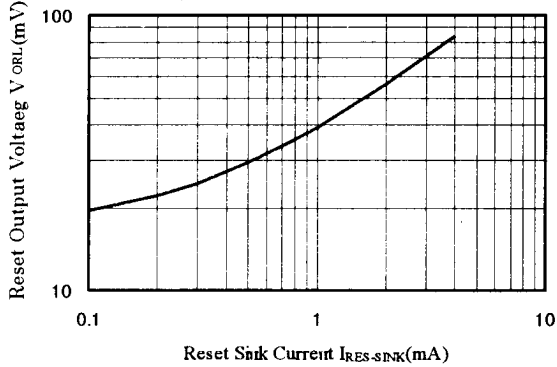
**Thermal Shutdown**  
( $V_{IN}=10V, I_o=0mA$ )



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



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



**[CAUTION]**

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.