

SERIES REGULATOR WITH RESET FUNCTION

■ GENERAL DESCRIPTION

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

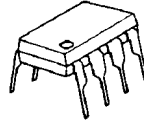
In case of shut down or output voltage drop, the IC generates reset signal to a microcomputer.

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

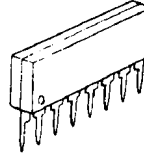
■ FEATURES

- 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**



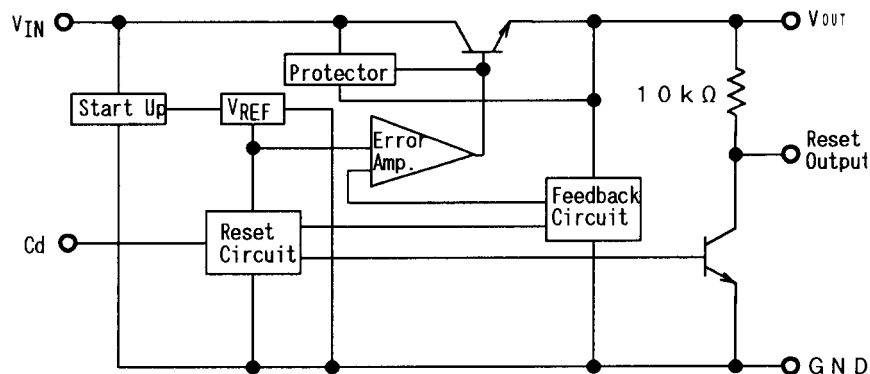
NJM78LR05BL / CL / DL **NJM78LR05BU / CU / DU**

■ RESET THRESHOLD VOLTAGE LINE-UP

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

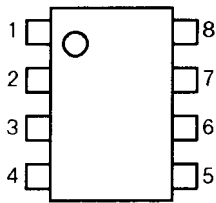
“X” is package suffix.

■ BLOCK DIAGRAM

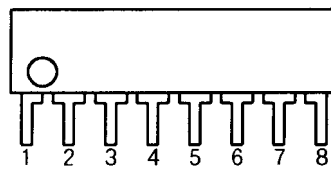


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■ PIN CONFIGURATION



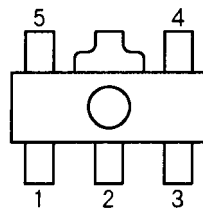
NJM78LR05BD / CD / DD
NJM78LR05BM / CM / DM



NJM78LR05BL / CL / DL

PIN FUNCTION

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



NJM78LR05BU / CU / DU

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]

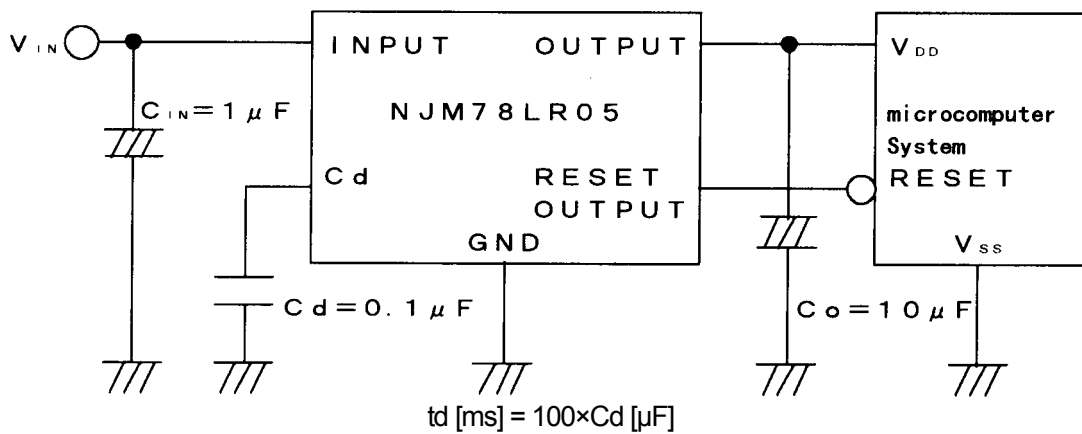
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	$I_O=1mA$	4.80	5.00	5.20	V
Quiescent Current	I_Q	$I_O=100mA$	-	1.40	3.40	mA
Output Short Current	I_{OSC}	OUTPUT-GND short	150	300	450	mA
Line Regulation 1	$\Delta V_O / V_{IN1}$	$7V \leq V_{IN} \leq 18V$	-	6.0	65.0	mV
Line Regulation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

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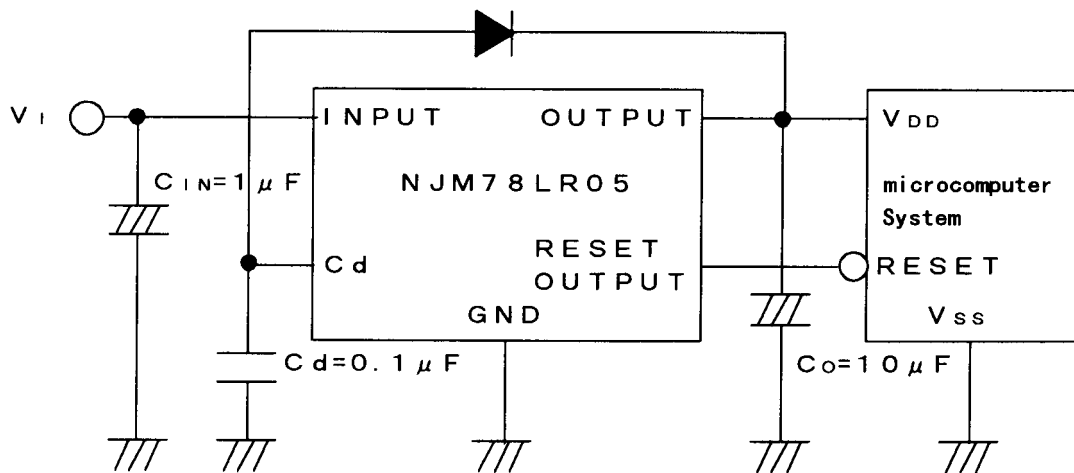
APPLICATION CIRCUIT



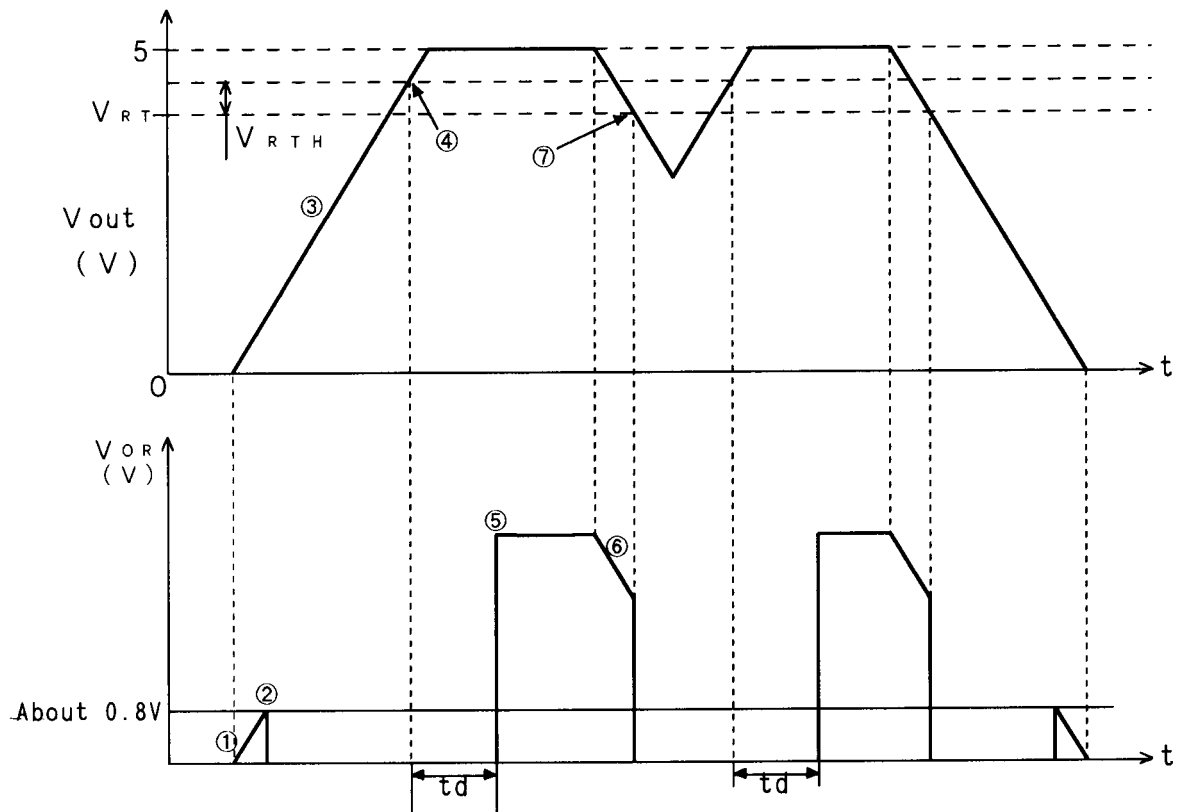
Note 1 : When the capacitance C_d is too large, the actual delay time is shorter than the calculated result because an electrical charge of C_d is discharged incompletely.

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

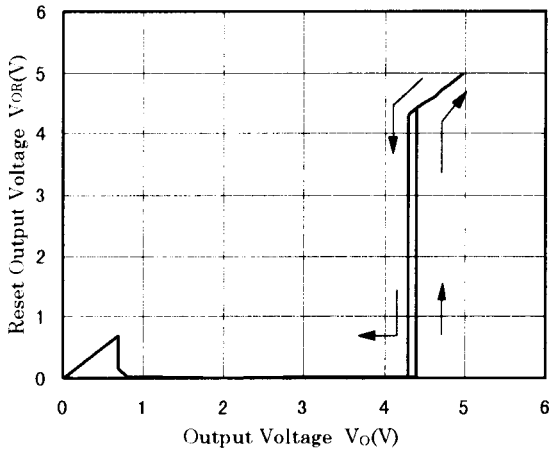


- ①When the input voltage is up to about 0.8V, some voltage is outputted at the reset output because the **NJM78LR05** operation is unstable.
- ②When the input voltage goes over about 0.8V, the reset output becomes "L".
- ③The output voltage is rising up with the input voltage.
- ④When the output voltage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

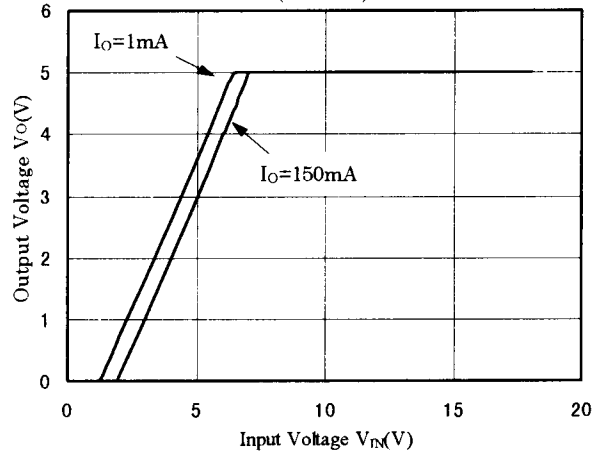
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■ TYPICAL CHARACTERISTICS

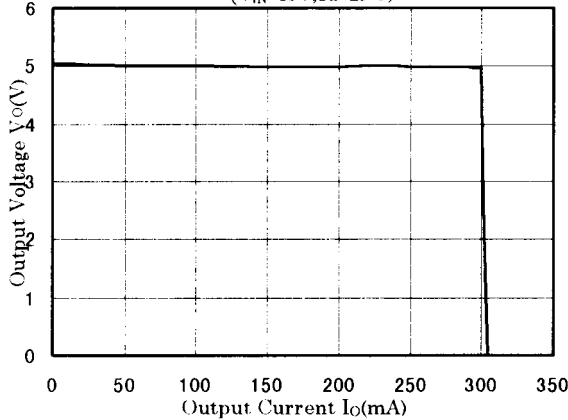
Reset Output Voltage vs. Output Voltage
($I_O=40\text{mA}$, $T_a=25^\circ\text{C}$)



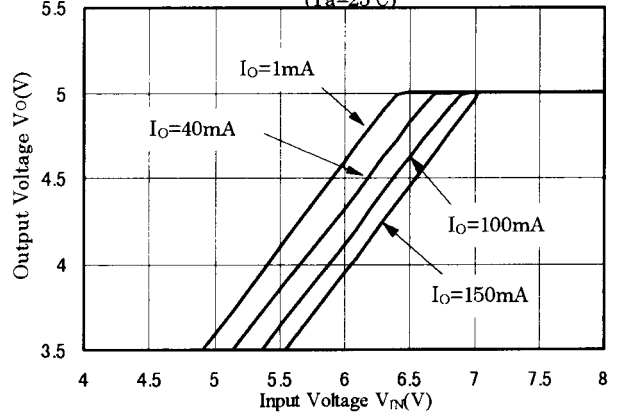
Line Regulation
($T_a=25^\circ\text{C}$)



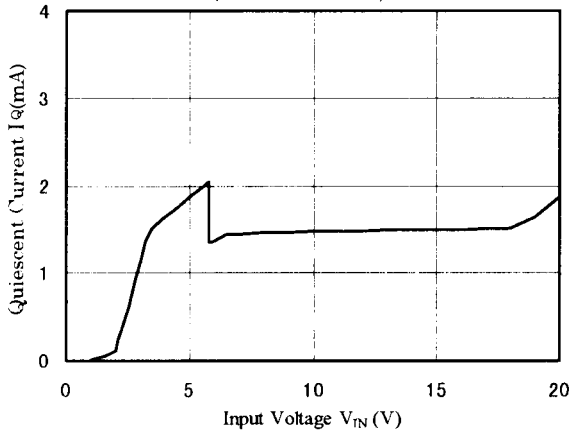
Load Regulation
($V_{IN}=10\text{V}$, $T_a=25^\circ\text{C}$)



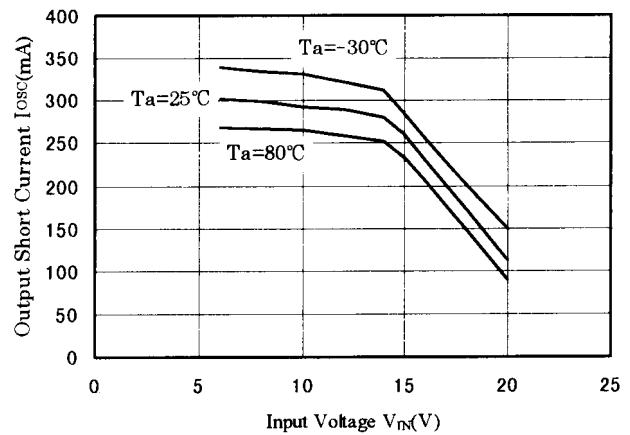
Dropout Voltage
($T_a=25^\circ\text{C}$)



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



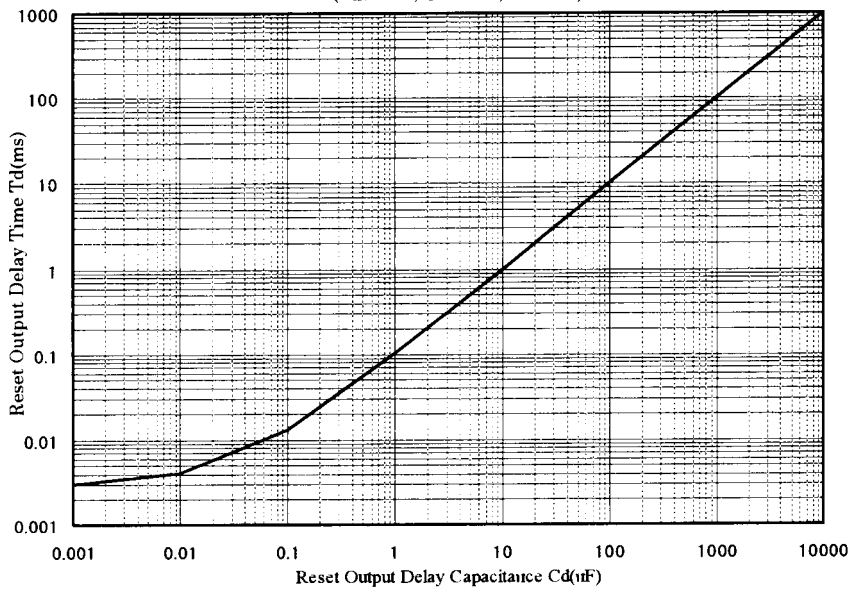
Output Short Current vs. Input Voltage



■ TYPICAL CHARACTERISTICS

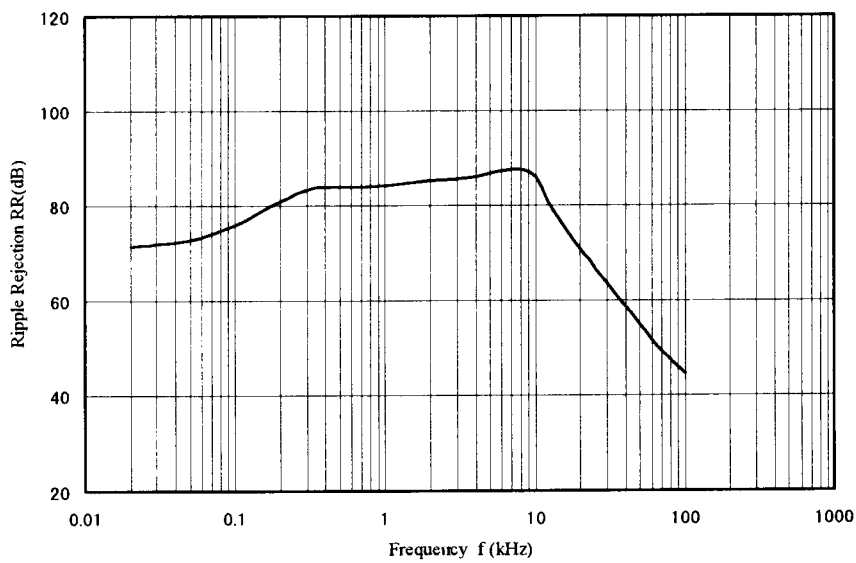
Reset Output Delay Time vs. Reset Output Delay Capacitance

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



Ripple Rejection vs. Frequency

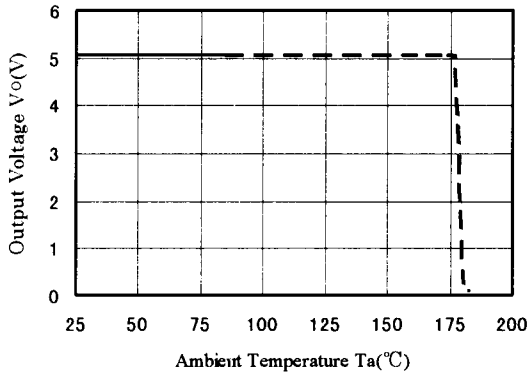
($V_{IN}=10V, I_O=40mA, e_{nr}=1V_{P-P}, C_O=10\mu F, T_a=25^\circ C$)



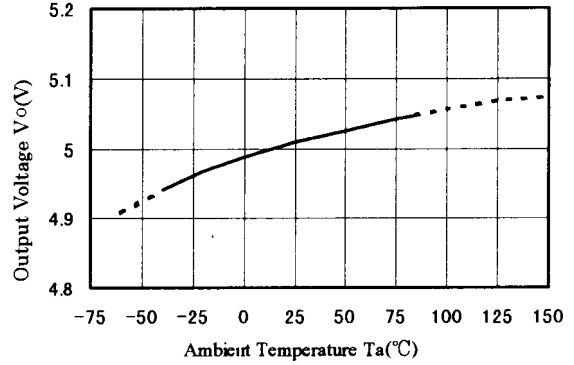
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■ TYPICAL CHARACTERISTICS

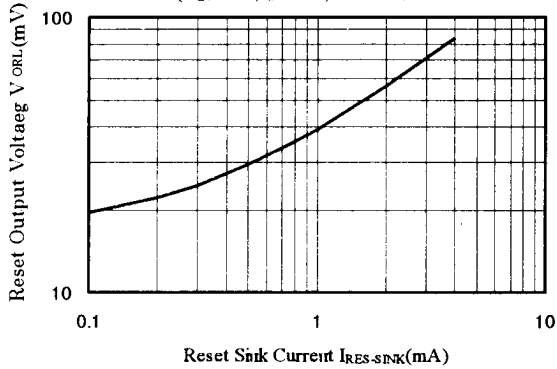
Thermal Shutdown
($V_{IN}=10V, I_o=0mA$)



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]

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