SERIES REGULATOR WITH RESET FUNCTION

■ GENERAL DESCRIPTION

The NJM78LR05 is a series regulator with reset function.

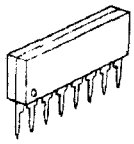
In case of shut down or output voltage drop, the IC generates reset signal to a microcomputer.

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

■ PACKAGE OUTLINE

NJM78LR05BD/CD/DD

NJM78LR05BM/CM/DM



NJM78LR05BL/CL/DL

NJM78LR05BU/CU/DU

■ FEATURES

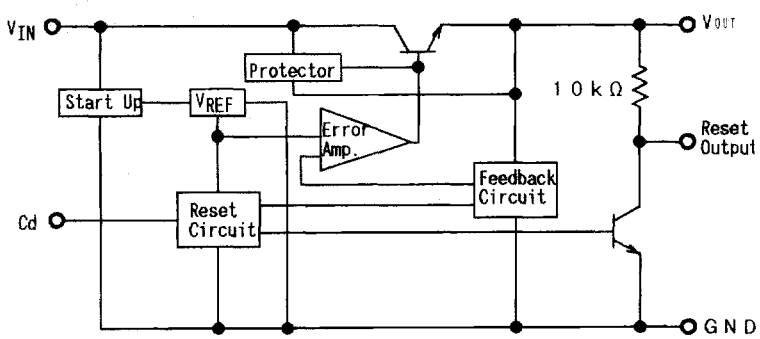
- ●Output Current　　Io=150mA max.
- ●Reset Function Including
- ●Reset Delay Time can be Adjusted by an External Capacitance.
- ●Internal Over Current Protection
- ●Thermal Shut Down
- ●Bipolar Technology
- ●Package Outline　DIP8, DMP8, SIP8, SOT-89(5Pin)

■ RESET THRESHOLD VOLTAGE LINE-UP

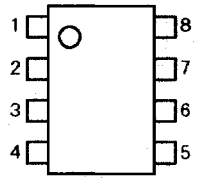
Reset Threshold Voltage	Version	Part Number
4.0V	D	NJM78LR05DX
4.2V	C	NJM78LR05CX
4.3V	B	NJM78LR05DX

"X" is package suffix.

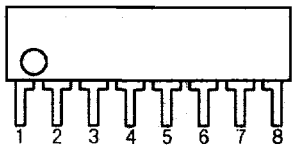
■ BLOCK DIAGRAM



■ PIN CONFIGURATION

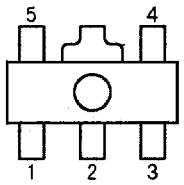


NJM78LR05BD/CD/DD
NJM78LR05BM/CM/DM



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 (Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Input Voltage	V_{IN}	+20	V
Power Dissipation	P_D	(DIP8) 500 (DMP8) 500※ (SIP8) 800 (SOT-89) 350	mW
Operating Temperature Range	T_{opr}	−40～+85	°C
Storage Temperature Range	T_{stg}	−50～+150	°C

※At on PC board.

■ RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

PARAMETER	SYMBOL	CONDITIONS	UNIT
Input Voltage	V_{IN}	7.5～18	V
Output Current	Io	1～100	mA

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■ ELECTRICAL CHARACTERISTICS (V_{IN}=10V, Io=40mA, C_{IN}=1μF, Co=10μF, Ta=25°C)

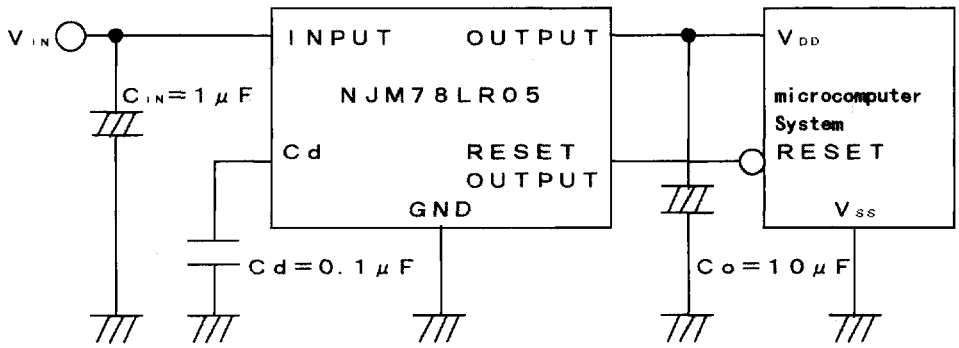
〔Power Supply Block〕

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	Vo	Io=1mA	4.80	5.00	5.20	V
Quiescent Current	I_Q	Io=100mA	—	1.40	3.40	mA
Output Short Current	I_{OSC}	OUTPUT-GND short	150	300	450	mA
Line Regulation 1	$\Delta Vo/V_{IN}1$	7V≦V_{IN}≦18V	—	6.0	65.0	mV
Line Regulation 2	$\Delta Vo/V_{IN}2$	8V≦V_{IN}≦18V	—	3.0	42.0	mV
Load Regulation 1	$\Delta Vo/Io1$	Io=1～100mA	—	9.0	60.0	mV
Load Regulation 2	$\Delta Vo/Io2$	Io=1～40mA	—	3.0	30.0	mV
Ripple Rejection	RR	f=120Hz, e_{in}=1V_{P-P}, V_{IN}=8～18V	—	79	—	dB
Output Noise Voltage	V_{NO}	10Hz≦f≦100kHz, Io=1mA	—	80	—	μV
Dropout Voltage	ΔV_{I-O}		—	1.5	2.2	V

〔Reset Block〕

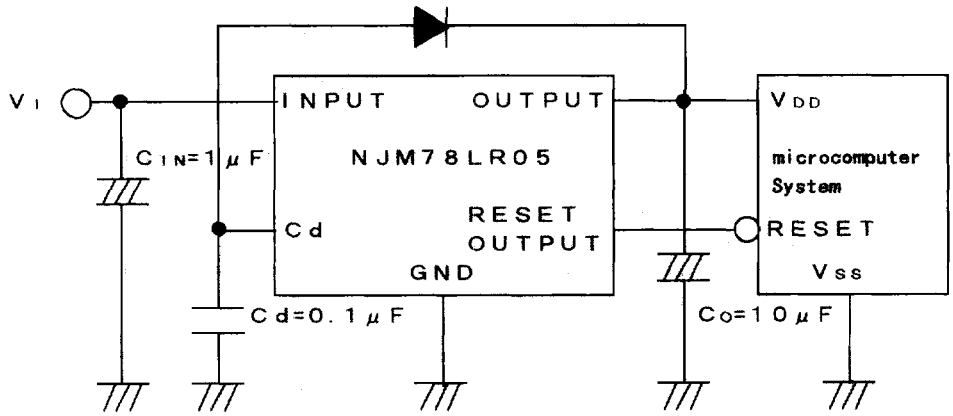
(H) Reset Output Voltage	V_{ORH}		4.80	5.00	5.20	V
(L) Reset Output Voltage	V_{ORL}	V_{IN}=3V, Io=1mA	—	10	200	mV
Reset Threshold Voltage	V_{RT}	B Version	4.12	4.30	4.48	V
		C Version	4.03	4.20	4.37	
		D Version	3.84	4.00	4.16	
Reset Threshold Hysteresis Voltage	V_{RTH}		50	100	200	mV
Reset Output Delay Time	td	Cd=0.1μF	7.50	10.0	12.5	ms

■ APPLICATION CIRCUIT

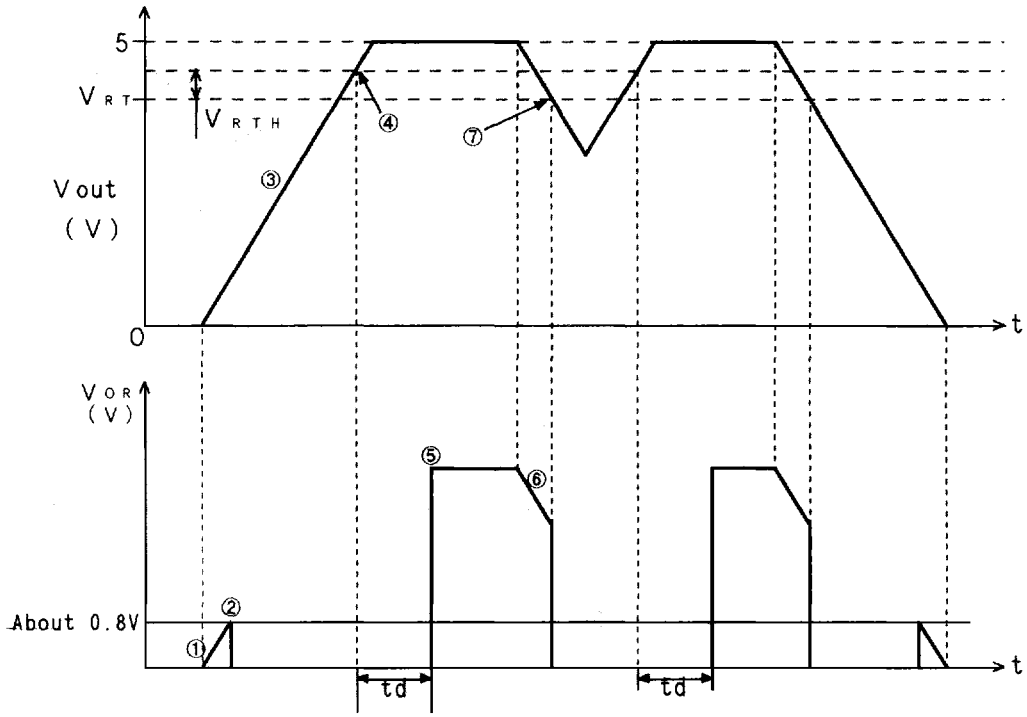


$$td\ [ms] = 100 \times Cd\ [\mu F]$$

Note1: When the capacitance Cd is too large, the actual delay time is shorter than the calculated result because an electrical charge of Cd is discharged incompletely.
Solution of above problem:
(1) Connect SBD between output terminal and Cd terminal. Please refer to the fallowing circuit.
(2) Select larger capacitance, C_{IN} than Cd.



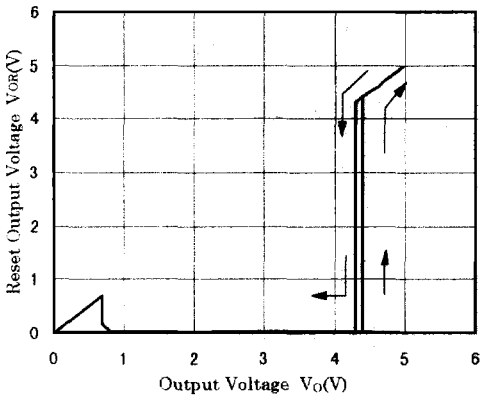
■ TIMING CHART



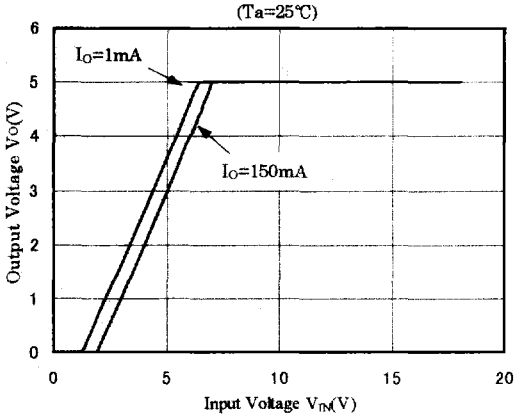
① When the input voltage is up to about 0.8V, some voltage is outputted at the reset output because the NJM78LR05 operation is unstable.
② When the input voltage goes over about 0.8V , the reset output becomes "L".
③ The output voltage is rising up with the input voltage.
④ When the output voltage goes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

■ TYPICAL CHARACTERISTICS

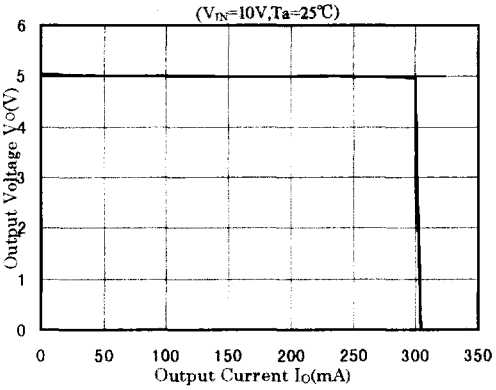
Reset Output Voltage vs.Output Voltage
(I_O=40mA,Ta=25℃)



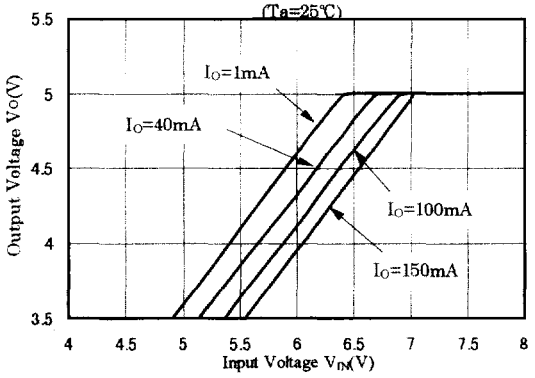
Line Regulation
(Ta=25℃)



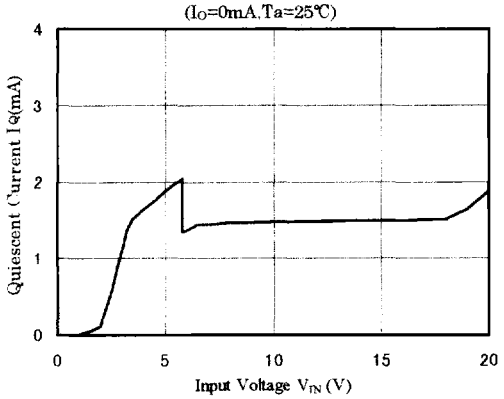
Load Regulation
(V_{IN}=10V,Ta=25℃)



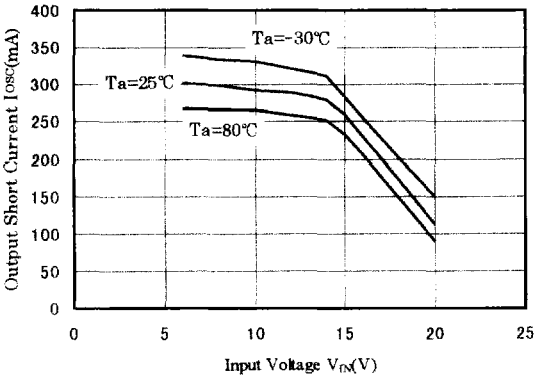
Dropout Voltage
(Ta=25℃)



Quiescent Current vs. Input Voltage
(I_O=0mA,Ta=25℃)



Output Short Current vs. Input Voltage



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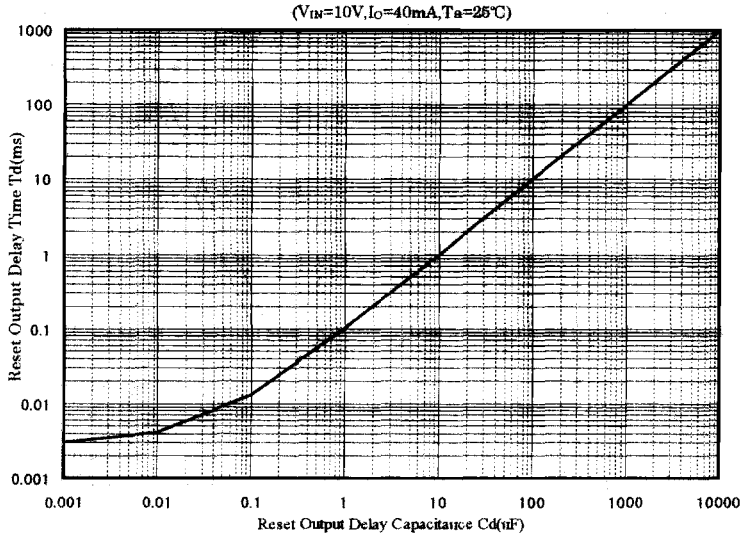
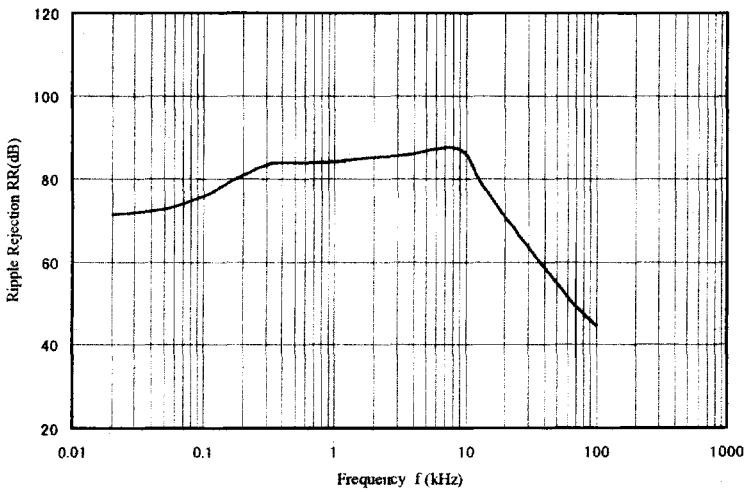
■ TYPICAL CHARACTERISTICS

Reset Output Delay Time vs. Reset Output Delay Capacitance
(V_{IN}=10V,I_O=40mA,Ta=25℃)



Ripple Rejection vs. Frequency
(V_{IN}=10V,I_O=40mA,cin=1V_{P-P},C_O=10μF,Ta=25℃)



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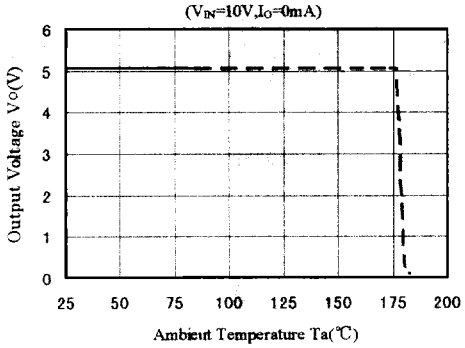
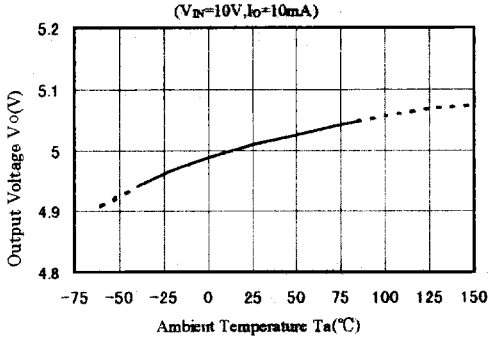
■ TYPICAL CHARACTERISTICS

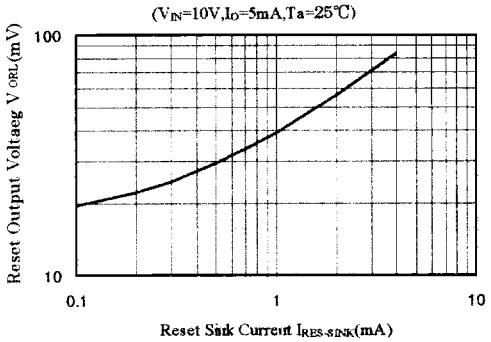
Thermal Shutdown
(V_{IN}=10V,I_O=0mA)



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



Reset Output Voltage vs. Reset Sink Current
(V_{IN}=10V,I_O=5mA,Ta=25℃)



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