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SERIES REGULATOR WITH RESET FUNCTION

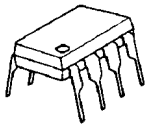
■ GENERAL DESCRIPTION

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.

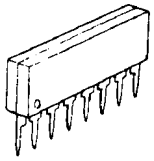
That is suitable for items with microcomputer, such as TV sets, remote controller, refrigerator and others.

■ PACKAGE OUTLINE



NJM78LR05BD / CD / DD

NJM78LR05BM / CM / DM



NJM78LR05BL / CL / DL

NJM78LR05BU / CU / DU

■ FEATURES

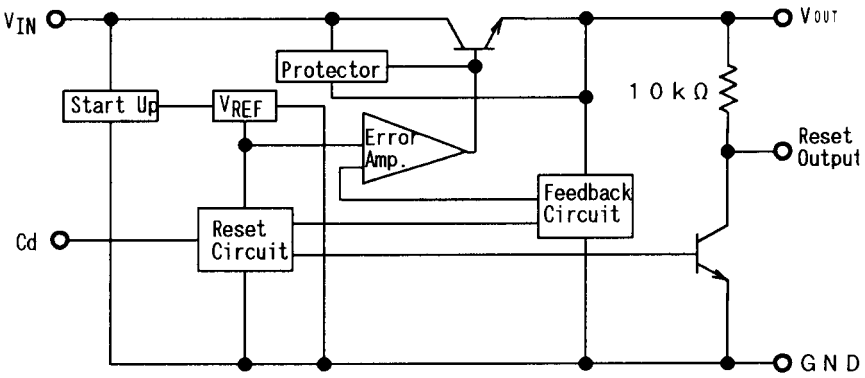
- Output Current I_O=150mA max.
- Reset Function Including
- Reset Delay Time can be Adjusted by an External Capacitance.
- Internal Over Current Protection
- Thermal Shut Down
- Bipolar Technology
- package Outline DIP8, DMP8, SIP8, SOT-89 (5Pin)

■ RESET THRESHOLD VOLTAGE LINE-UP

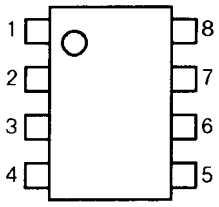
Reset Threshold Voltage	Version	Part Number
4.0V	D	NJM78LR05DX
4.2V	C	NJM78LR05CX
4.3V	B	NJM78LR05BX

"X" is package suffix.

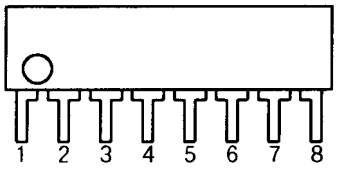
■ BLOCK DIAGRAM



■ PIN CONFIGURATION

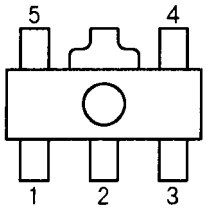


NJM78LR05BD / CD / DD
NJM78LR05BM / CM / DM



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

(T_a=25°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	°C
Storage Temperature Range	T_{stg}	-50 to +150	°C

*At on PC board.

■ RECOMMENDED OPERATING CONDITIONS

(T_a=25°C)

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

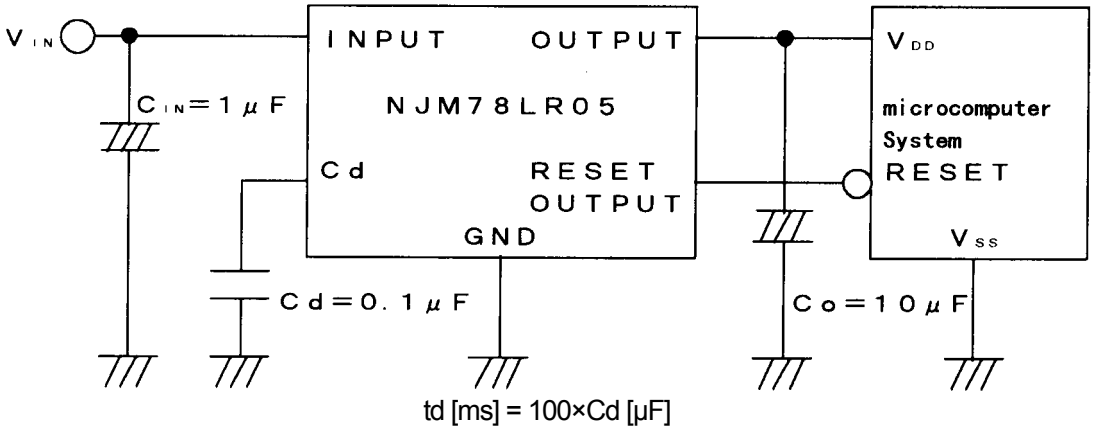
■ ELECTRICAL CHARACTERISTICS

(V_{IN}=10V, I_O=40mA, C_{IN}=1µF, C_O=10µF, T_a=25°C)

[Power Supply Block]

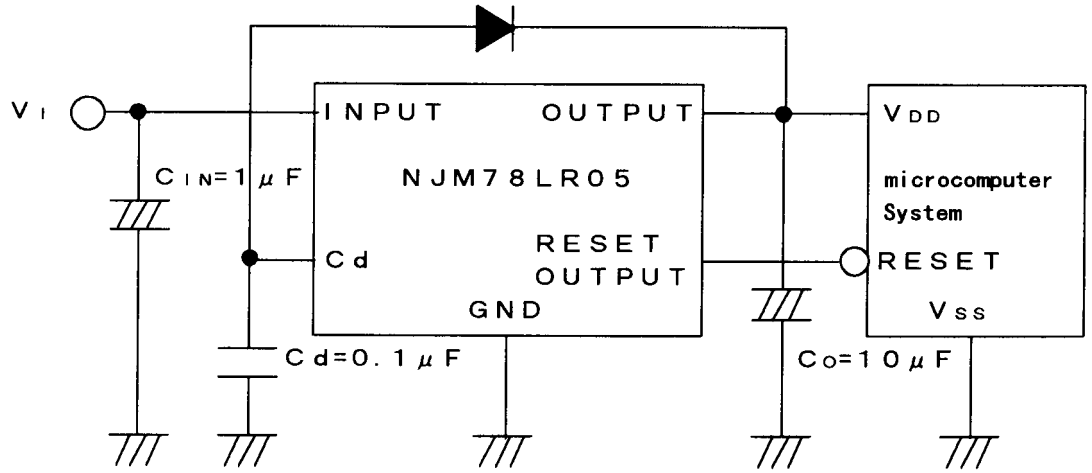
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	I_O=1mA	4.80	5.00	5.20	V
Quiescent Current	I_Q	I_O=100mA	-	1.40	3.40	mA
Output Short Current	I_{OSC}	OUTPUT-GND short	150	300	450	mA
Line Regulation 1	$\Delta V_O / V_{IN}1$	7V ≤ V_{IN} ≤ 18V	-	6.0	65.0	mV
Line Regulation 2	$\Delta V_O / V_{IN}2$	8V ≤ V_{IN} ≤ 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 ≤ f ≤ 100kHz, I_O=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, 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	td	Cd=0.1µF	7.50	10.0	12.5	ms

■ APPLICATION CIRCUIT

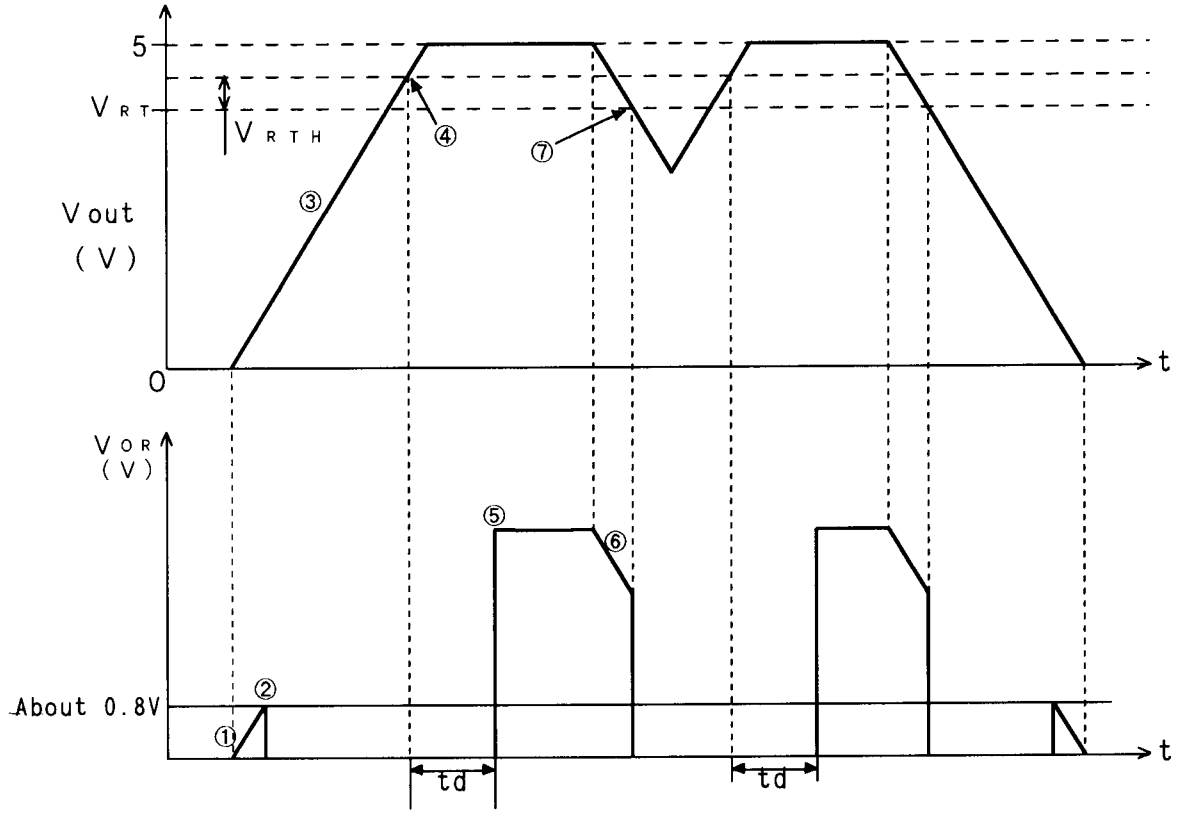


td [ms] = 100×Cd [μF]

Note 1 : 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”.

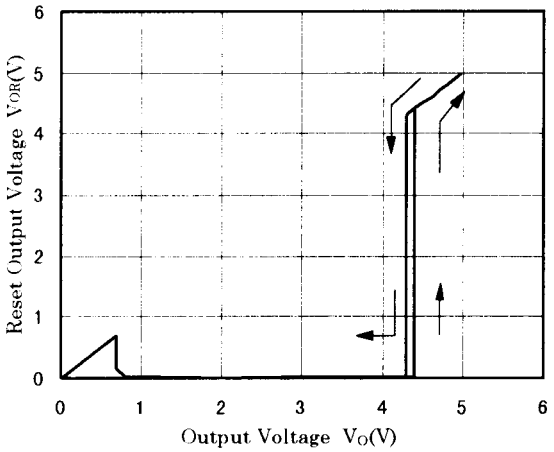
⑥ The output voltage is falling down with the input voltage.

⑦ When the output voltage is less than V_{RT}, the reset output becomes “L”.

■ TYPICAL CHARACTERISTICS

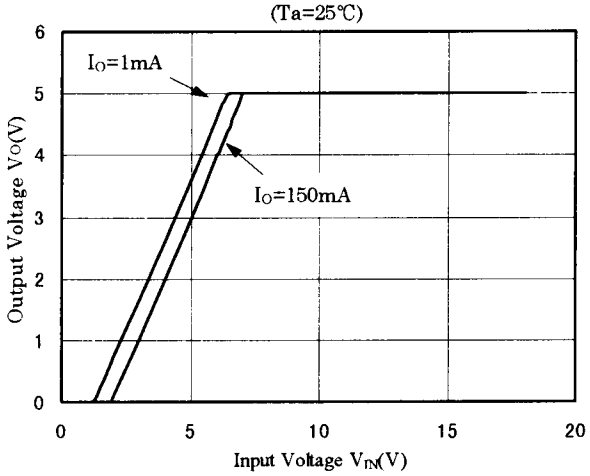
Reset Output Voltage vs. Output Voltage

(I_O=40mA,Ta=25℃)



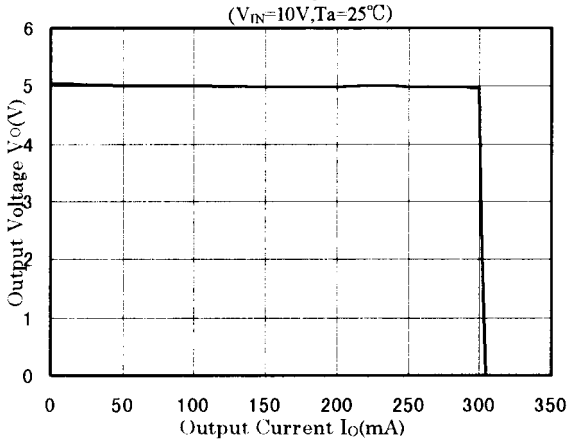
Line Regulation

(Ta=25℃)



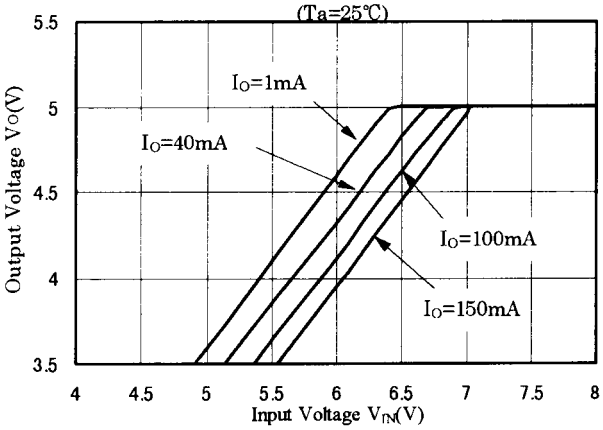
Load Regulation

(V_{IN}=10V,Ta=25℃)



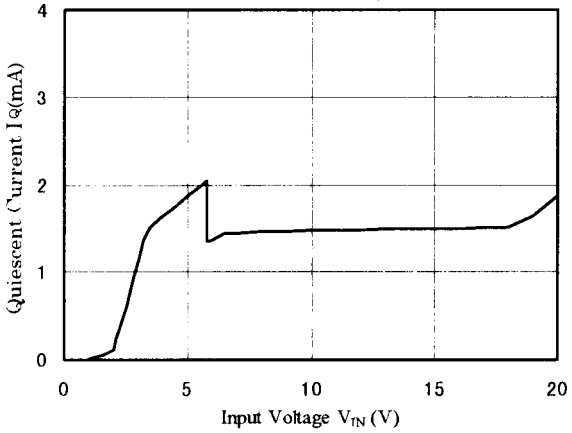
Dropout Voltage

(Ta=25℃)

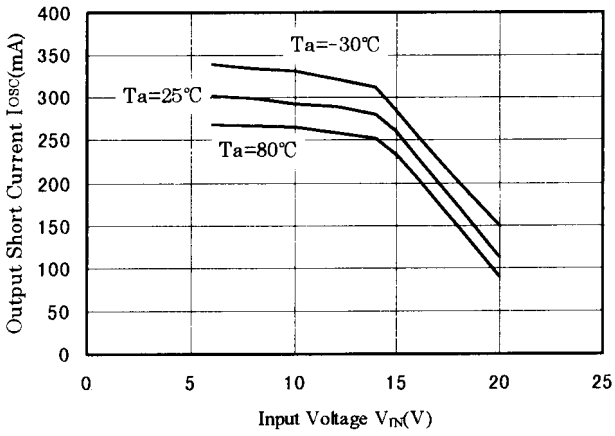


Quiescent Current vs. Input Voltage

(I_O=0mA,Ta=25℃)



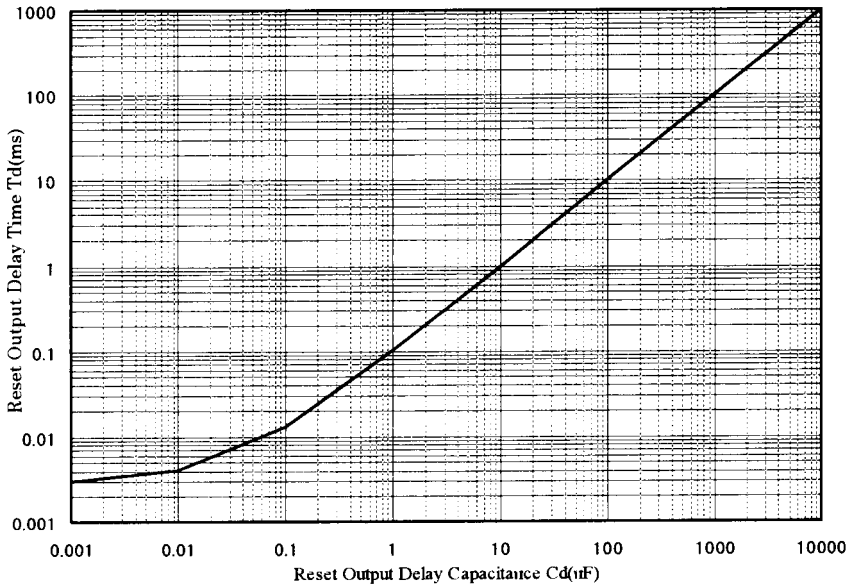
Output Short Current vs. Input Voltage



■ TYPICAL CHARACTERISTICS

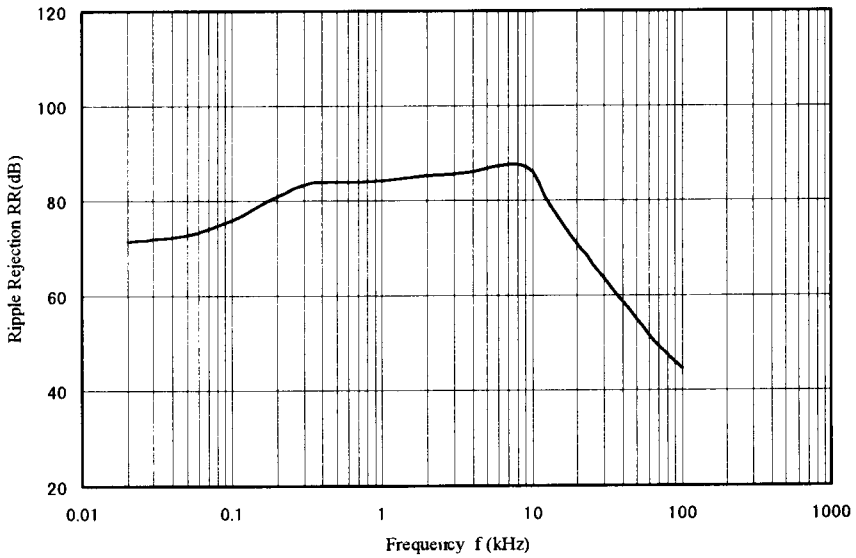
Reset Output Delay Time vs. Reset Output Delay Capacitance

(V_{IN}=10V,I_O=40mA,Ta=25℃)



Ripple Rejection vs. Frequency

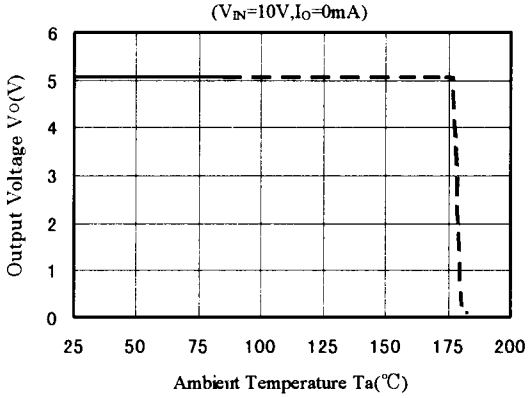
(V_{IN}=10V,I_O=40mA,ein=1V_{P-P},C_O=10μF,Ta=25℃)



■ TYPICAL CHARACTERISTICS

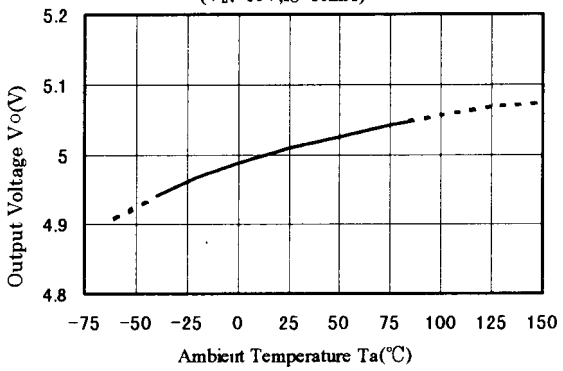
Thermal Shutdown

(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℃)