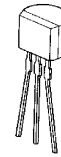


3-TERMINAL POSITIVE VOLTAGE REGULATOR

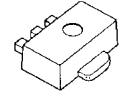
■ GENERAL DESCRIPTION

NJM78L00 is 3-terminal positive voltage regulator.
 NJM78L00 series is mounted in EMP8 package of the surface mount package.
 The EMP8 package possible flow soldering.

■ PACKAGE OUTLINE



NJM78L00A



NJM78L00UA

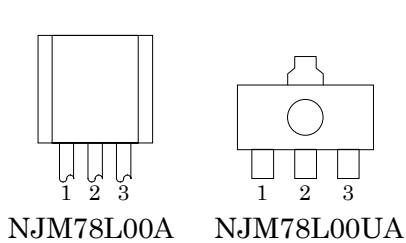


NJM78L00EA
(5V,9V,12V)

■ FEATURES

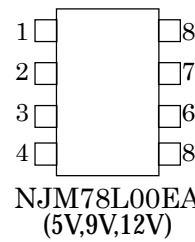
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guaranteed 100mA Output Current
- Bipolar Technology
- Package Outline T0-92,SOT-89,EMP8

■ PIN CONFIGURATION



PIN FUNCTION

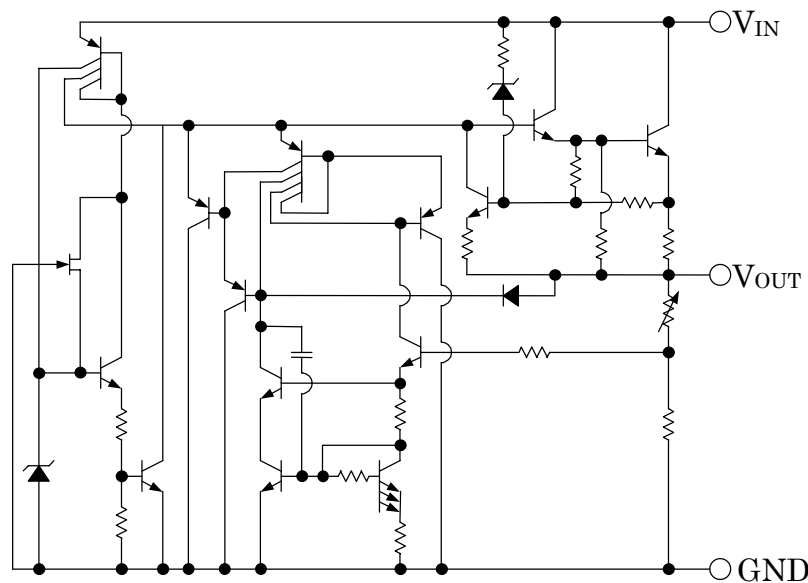
- 1. OUT
- 2. GND
- 3. IN



PIN FUNCTION

- 1. OUT
- 2. GND
- 3. GND
- 4. NC
- 5. NC
- 6. GND
- 7. GND
- 8. IN

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS	UNIT
Input Voltage	V _{IN}	(78L02A ~ 78L09A) 30 (78L12A ~ 78L15A) 35 (78L18A ~ 78L24A) 40	V
Power Dissipation	P _D	(TO-92) 500 (EMP8) 350 (SOT-89) 300	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-40 ~ +150	°C

■ ELECTRICAL CHARACTERISTICS(C_{IN}=0.33μF,Co=0.1μF,Tj=25°C)

Measurement is to be conducted is pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM78L02A						
Output Voltage	V _O	V _{IN} =9V, I _O =40mA	2.47	2.6	2.73	V
Line Regulation1	ΔV _O -V _{IN} 1	V _{IN} =4.75V ~ 20V, I _O =40mA	-	-	125	mV
Line Regulation2	ΔV _O -V _{IN} 2	V _{IN} =5V ~ 20V, I _O =40mA	-	-	100	mV
Load Regulation1	ΔV _O -I _O 1	V _{IN} =9V, I _O =1 ~ 40mA	-	-	25	mV
Load Regulation2	ΔV _O -I _O 2	V _{IN} =9V, I _O =1 ~ 100mA	-	-	50	mV
Quiescent Current	I _Q	V _{IN} =9V, I _O =0mA	-	2.0	6	mA
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =9V, I _O =1mA	-	0.2	-	mV/°C
Ripple Rejection	RR	6V < V _{IN} < 16V, I _O =40mA e _{in} =1Vp-p, f=120Hz	43	73	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =9V, BW=10Hz ~ 100kHz I _O =40mA	-	35	-	μV
NJM78L03A(*1)						
Output Voltage	V _O	V _{IN} =9V, I _O =40mA	2.85	3.0	3.15	V
Line Regulation1	ΔV _O -V _{IN} 1	V _{IN} =5V ~ 20V, I _O =40mA	-	-	125	mV
Line Regulation2	ΔV _O -V _{IN} 2	V _{IN} =6V ~ 20V, I _O =40mA	-	-	100	mV
Load Regulation1	ΔV _O -I _O 1	V _{IN} =9V, I _O =1 ~ 40mA	-	-	25	mV
Load Regulation2	ΔV _O -I _O 2	V _{IN} =9V, I _O =1 ~ 100mA	-	-	50	mV
Quiescent Current	I _Q	V _{IN} =9V, I _O =0mA	-	2.0	6	mA
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =9V, I _O =1mA	-	0.2	-	mV/°C
Ripple Rejection	RR	6V < V _{IN} < 16V, I _O =40mA e _{in} =1Vp-p, f=120Hz	43	72	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =9V, BW=10Hz ~ 100kHz, I _O =40mA	-	40	-	μV
NJM78L05A(*3)						
Output Voltage	V _O	V _{IN} =10V, I _O =40mA	4.75	5.0	5.25	V
Line Regulation1	ΔV _O -V _{IN} 1	V _{IN} =7V ~ 20V, I _O =40mA	-	-	200	mV
Line Regulation2	ΔV _O -V _{IN} 2	V _{IN} =8V ~ 20V, I _O =40mA	-	-	150	mV
Load Regulation1	ΔV _O -I _O 1	V _{IN} =10V, I _O =1 ~ 40mA	-	-	30	mV
Load Regulation2	ΔV _O -I _O 2	V _{IN} =10V, I _O =1 ~ 100mA	-	-	60	mV
Quiescent Current	I _Q	V _{IN} =10V, I _O =0mA	-	2.0	6	mA
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =10V, I _O =1mA	-	0.4	-	mV/°C
Ripple Rejection	RR	8V < V _{IN} < 18V, I _O =40mA e _{in} =1Vp-p, f=120Hz	40	69	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =10V, BW=10Hz ~ 100kHz I _O =40mA	-	70	-	μV

 (*1):SOT-89 package only.
 (*2):TO-92 package only.
 (*3):SOT-89,TO-92, EMP8

■ ELECTRICAL CHARACTERISTICS($C_{IN}=0.33\mu F, C_o=0.1\mu F, T_j=25^\circ C$)
 Measurement is to be conducted is pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM78L06A						
Output Voltage	V_o	$V_{IN}=12V, I_o=40mA$	5.7	6.0	6.3	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=8.5V \sim 20V, I_o=40mA$	-	-	200	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=9V \sim 20V, I_o=40mA$	-	-	150	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=12V, I_o=1 \sim 40mA$	-	-	40	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=12V, I_o=1 \sim 100mA$	-	-	80	mV
Quiescent Current	I_Q	$V_{IN}=12V, I_o=0mA$	-	2.0	6	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=12V, I_o=1mA$	-	0.5	-	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$9V < V_{IN} < 20V, I_o=40mA$ $e_{in}=1V_{p-p}, f=120Hz$	40	67	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=12V, BW=10Hz \sim 100kHz$ $I_o=40mA$	-	80	-	μV
NJM78L62A(*2)						
Output Voltage	V_o	$V_{IN}=12.2V, I_o=40mA$	5.89	6.2	6.51	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=8.7V \sim 20.2V, I_o=40mA$	-	-	200	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=9.2V \sim 20.2V, I_o=40mA$	-	-	150	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=12.2V, I_o=1 \sim 40mA$	-	-	40	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=12.2V, I_o=1 \sim 100mA$	-	-	85	mV
Quiescent Current	I_Q	$V_{IN}=12.2V, I_o=0mA$	-	2.0	6	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=12.2V, I_o=1mA$	-	0.5	-	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$9.2V < V_{IN} < 20.2V, I_o=40mA$ $e_{in}=1V_{p-p}, f=120Hz$	40	67	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=12.2V, BW=10Hz \sim 100kHz$ $I_o=40mA$	-	85	-	μV
NJM78L07A						
Output Voltage	V_o	$V_{IN}=13V, I_o=40mA$	6.65	7.0	7.35	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=9.5V \sim 22V, I_o=40mA$	-	-	210	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=10V \sim 22V, I_o=40mA$	-	-	160	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=13V, I_o=1 \sim 40mA$	-	-	45	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=13V, I_o=1 \sim 100mA$	-	-	90	mV
Quiescent Current	I_Q	$V_{IN}=13V, I_o=0mA$	-	2.1	6	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=13V, I_o=1mA$	-	0.55	-	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$10V < V_{IN} < 20V, I_o=40mA$ $e_{in}=1V_{p-p}, f=120Hz$	39	66	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=13V, BW=10Hz \sim 100kHz$ $I_o=40mA$	-	100	-	μV
NJM78L08A						
Output Voltage	V_o	$V_{IN}=14V, I_o=40mA$	7.6	8.0	8.4	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=10.5V \sim 23V, I_o=40mA$	-	-	225	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=11V \sim 23V, I_o=40mA$	-	-	175	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=14V, I_o=1 \sim 40mA$	-	-	50	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=14V, I_o=1 \sim 100mA$	-	-	100	mV
Quiescent Current	I_Q	$V_{IN}=14V, I_o=0mA$	-	2.1	6	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=14V, I_o=1mA$	-	0.6	-	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$11V < V_{IN} < 20V, I_o=40mA$ $e_{in}=1V_{p-p}, f=120Hz$	39	66	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=14V, BW=10Hz \sim 100kHz$ $I_o=40mA$	-	115	-	μV

(*1):SOT-89 package only.

(*2):TO-92 package only.

(*3):SOT-89,TO-92, EMP8

■ ELECTRICAL CHARACTERISTICS($C_{IN}=0.33\mu F, C_o=0.1\mu F, T_j=25^\circ C$)
 Measurement is to be conducted is pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM78L09A(*3)						
Output Voltage	V_o	$V_{IN}=15V, I_o=40mA$	8.55	9.0	9.45	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=11.5V \sim 23V, I_o=40mA$	—	—	250	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=12V \sim 23V, I_o=40mA$	—	—	200	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=15V, I_o=1 \sim 40mA$	—	—	50	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=15V, I_o=1 \sim 100mA$	—	—	100	mV
Quiescent Current	I_Q	$V_{IN}=15V, I_o=0mA$	—	2.1	6	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=15V, I_o=1mA$	—	0.65	—	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$12V < V_{IN} < 21V, I_o=40mA$ $e_{in}=1Vp-p, f=120Hz$	38	65	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=15V, BW=10Hz \sim 100kHz$ $I_o=40mA$	—	125	—	μV
NJM78L10A						
Output Voltage	V_o	$V_{IN}=16V, I_o=40mA$	9.5	10.0	10.5	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=13V \sim 25V, I_o=40mA$	—	—	250	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=14V \sim 25V, I_o=40mA$	—	—	200	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=16V, I_o=1 \sim 40mA$	—	—	50	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=16V, I_o=1 \sim 100mA$	—	—	100	mV
Quiescent Current	I_Q	$V_{IN}=16V, I_o=0mA$	—	2.1	6	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=16V, I_o=1mA$	—	0.7	—	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$13V < V_{IN} < 22V, I_o=40mA$ $e_{in}=1Vp-p, f=120Hz$	37	64	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=16V, BW=10Hz \sim 100kHz$ $I_o=40mA$	—	135	—	μV
NJM78L12A(*3)						
Output Voltage	V_o	$V_{IN}=19V, I_o=40mA$	11.4	12.0	12.6	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=14.5V \sim 27V, I_o=40mA$	—	—	250	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=16V \sim 27V, I_o=40mA$	—	—	200	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=19V, I_o=1 \sim 40mA$	—	—	50	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=19V, I_o=1 \sim 100mA$	—	—	100	mV
Quiescent Current	I_Q	$V_{IN}=19V, I_o=0mA$	—	2.1	6.5	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=19V, I_o=1mA$	—	0.9	—	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$15V < V_{IN} < 25V, I_o=40mA$ $e_{in}=1Vp-p, f=120Hz$	37	62	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=19V, BW=10Hz \sim 100kHz$ $I_o=40mA$	—	160	—	μV
NJM78L15A						
Output Voltage	V_o	$V_{IN}=23V, I_o=40mA$	14.3	15.0	15.7	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=17.5V \sim 30V, I_o=40mA$	—	—	300	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=20V \sim 30V, I_o=40mA$	—	—	250	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=23V, I_o=1 \sim 40mA$	—	—	75	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=23V, I_o=1 \sim 100mA$	—	—	150	mV
Quiescent Current	I_Q	$V_{IN}=23V, I_o=0mA$	—	2.2	6.5	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=23V, I_o=1mA$	—	1.0	—	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$18.5V < V_{IN} < 28.5V, I_o=40mA$ $e_{in}=1Vp-p, f=120Hz$	34	60	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=23V, BW=10Hz \sim 100kHz$ $I_o=40mA$	—	190	—	μV

(*1):SOT-89 package only.

(*2):TO-92 package only.

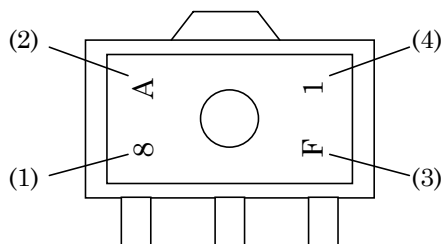
(*3):SOT-89,TO-92, EMP8

■ ELECTRICAL CHARACTERISTICS($C_{IN}=0.33\mu F, C_o=0.1\mu F, T_j=25^\circ C$)
 Measurement is to be conducted is pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM78L18A						
Output Voltage	V_o	$V_{IN}=27V, I_o=40mA$	17.1	18.0	18.9	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=22V \sim 33V, I_o=40mA$	-	-	320	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=23V \sim 33V, I_o=40mA$	-	-	270	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=27V, I_o=1 \sim 40mA$	-	-	80	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=27V, I_o=1 \sim 100mA$	-	-	160	mV
Quiescent Current	I_Q	$V_{IN}=27V, I_o=0mA$	-	2.2	6.5	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=27V, I_o=1mA$	-	1.1	-	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$23V < V_{IN} < 33V, I_o=40mA$ $e_{in}=1Vp-p, f=120Hz$	33	59	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=27V, BW=10Hz \sim 100kHz$ $I_o=40mA$	-	230	-	μV
NJM78L20A						
Output Voltage	V_o	$V_{IN}=29V, I_o=40mA$	19.0	20.0	21.0	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=23V \sim 34V, I_o=40mA$	-	-	330	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=24V \sim 34V, I_o=40mA$	-	-	280	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=29V, I_o=1 \sim 40mA$	-	-	90	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=29V, I_o=1 \sim 100mA$	-	-	180	mV
Quiescent Current	I_Q	$V_{IN}=29V, I_o=0mA$	-	2.3	7	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=29V, I_o=1mA$	-	1.2	-	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$24V < V_{IN} < 34V, I_o=40mA$ $e_{in}=1Vp-p, f=120Hz$	32	58	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=29V, BW=10Hz \sim 100kHz$ $I_o=40mA$	-	250	-	μV
NJM78L24A						
Output Voltage	V_o	$V_{IN}=33V, I_o=40mA$	22.8	24	25.2	V
Line Regulation1	ΔV_o-V_{IN1}	$V_{IN}=27V \sim 38V, I_o=40mA$	-	-	350	mV
Line Regulation2	ΔV_o-V_{IN2}	$V_{IN}=28V \sim 38V, I_o=40mA$	-	-	300	mV
Load Regulation1	ΔV_o-I_o1	$V_{IN}=33V, I_o=1 \sim 40mA$	-	-	100	mV
Load Regulation2	ΔV_o-I_o2	$V_{IN}=33V, I_o=1 \sim 100mA$	-	-	200	mV
Quiescent Current	I_Q	$V_{IN}=33V, I_o=0mA$	-	2.3	7	mA
Average Temperature	$\Delta V_o/\Delta T$	$V_{IN}=33V, I_o=1mA$	-	1.4	-	mV/°C
Coefficient of Output Voltage						
Ripple Rejection	RR	$27.5V < V_{IN} < 37.5V, I_o=40mA$ $e_{in}=1Vp-p, f=120Hz$	32	57	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=33V, BW=10Hz \sim 100kHz$ $I_o=40mA$	-	280	-	μV

(*1):SOT-89 package only.
 (*2):TO-92 package only.
 (*3):SOT-89,TO-92, EMP8

■ SOT-89 MARK



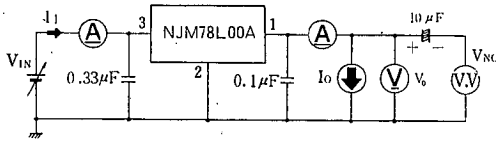
- (1) 8 : Positive Output
 - (2) Vo Rank
 - (3) The end of A.D.
 - (4) Production Mouth
- Oct. ... X
 Nov. ... Y
 Dec. ... Z

NJM78L02A	8	A
NJM78L03A	8	B
NJM78L05A	8	C
NJM78L06A	8	E
NJM78L62A	8	Z
NJM78L07A	8	F
NJM78L08A	8	G
NJM78L09A	8	H
NJM78L10A	8	J
NJM78L12A	8	K
NJM78L15A	8	L
NJM78L18A	8	M
NJM78L20A	8	N
NJM78L24A	8	P

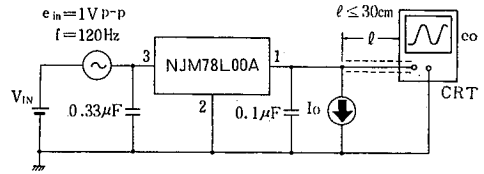
NJM78L00

■ TEST CIRCUIT

1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage, Peak Output/Short-Circuit Current
2. Ripple Rejection

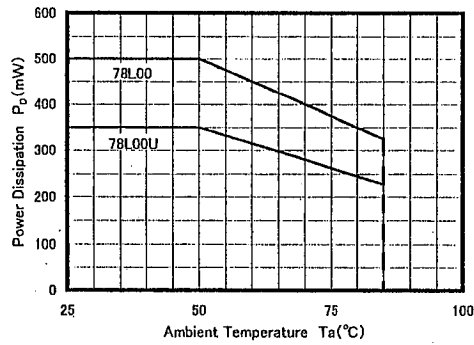


○ Measurement is to be conducted in pulse testing.
 ○ $I_Q = I_1 - I_0$



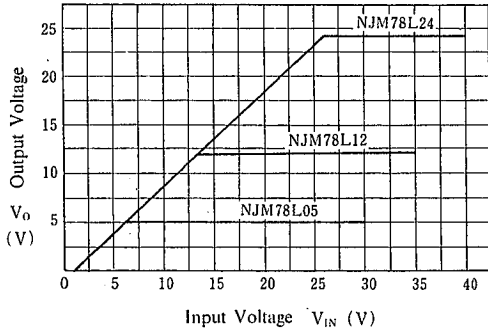
$$RR = 20 \log_{10} \left(\frac{e_{in}}{e_o} \right) \text{ (dB)}$$

■ AMBIENT TEMPERATURE VS. POWER DISSIPATION

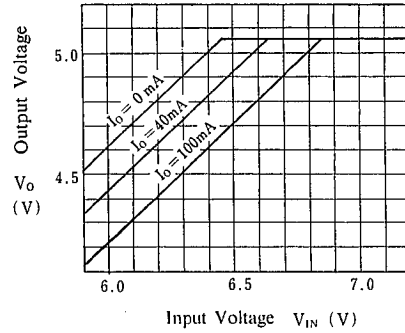


■ TYPICAL CHARACTERISTICS

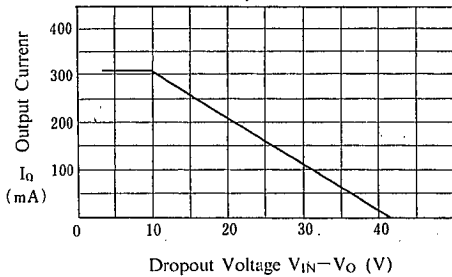
NJM78L05/L12/L24
Output Characteristics
 ($I_O = 0 \text{ mA}$, $T_j = 25^\circ\text{C}$)



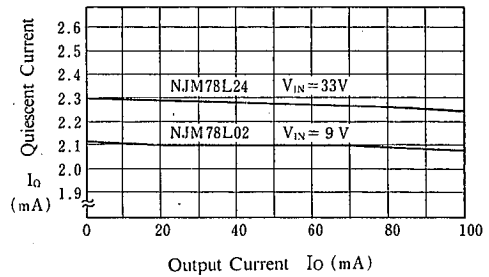
NJM78L05 Dropout Characteristics
 ($T_j = 25^\circ\text{C}$)



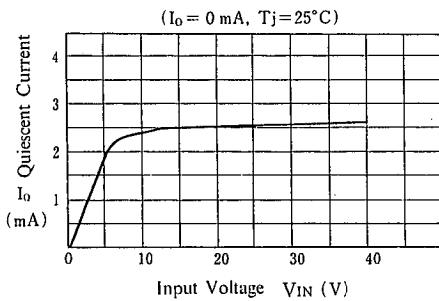
NJM78L00 Series Short Circuit
Output Current
 ($T_j = 25^\circ\text{C}$)



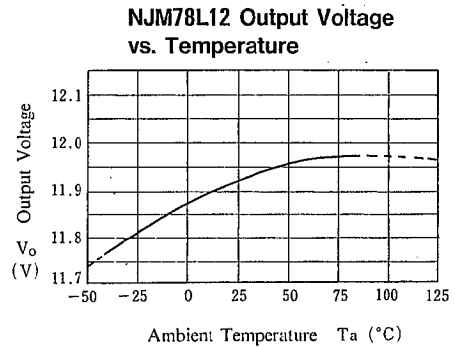
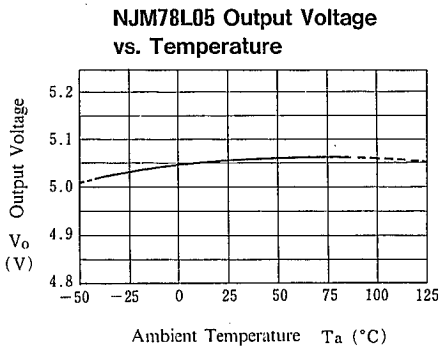
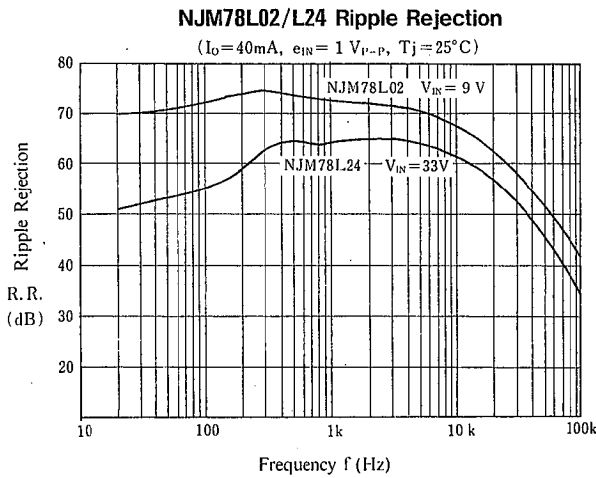
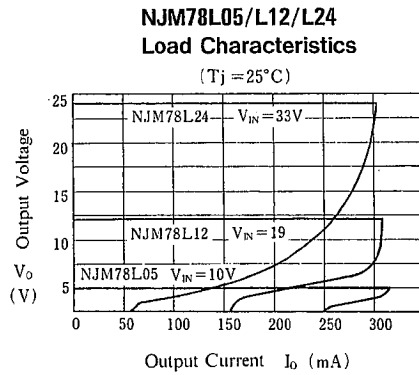
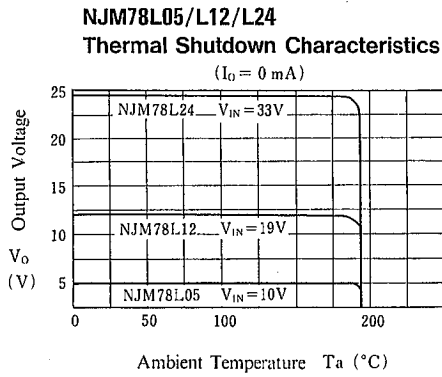
NJM78L02/L24 Quiescent Current
vs. Output Current
 ($T_j = 25^\circ\text{C}$)



NJM78L05 Quiescent Current
vs. Input Voltage
 ($I_O = 0 \text{ mA}$, $T_j = 25^\circ\text{C}$)



■ TYPICAL CHARACTERISTICS



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MEMO

[CAUTION]

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