

3-TERMINAL NEGATIVE VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

The NJM79M00 series of 3-Terminal Negative Voltage Regulators are constructed using the New JRC Planar epitaxial process. These regulators employ internal current limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver up to 500mA output current. They are intended as fixed voltage regulators in a wide range of applications including local (on-card) regulation for elimination of noise and distribution problems associated with single point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

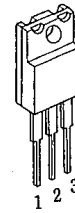
■ FEATURES

- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guarantee'd 500mA Output Current
- Package Outline
- Bipolar Technology

TO-220F, TO-252

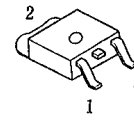
■ PACKAGE OUTLINE

(TO-220F)



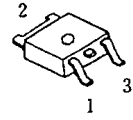
NJM79M00FA

(TO-252)



NJM79M00DLA

(TO-252)



NJM79M00DL1A

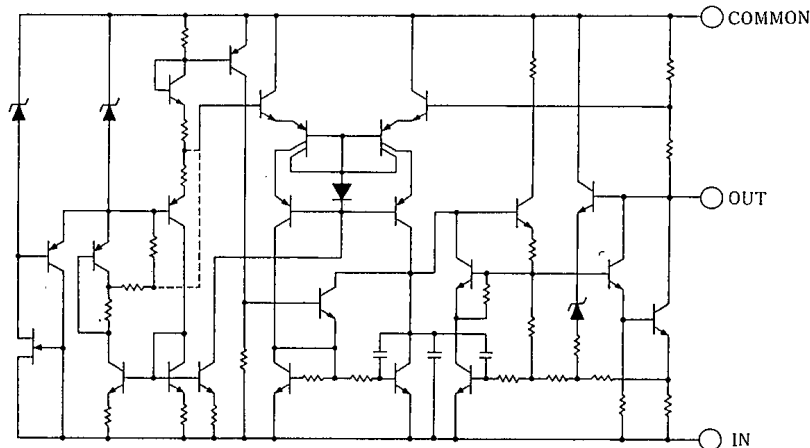
1. COMMON
2. IN
3. OUT

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2. IN
3. OUT

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2. IN
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(note) The radiation fin is connected to Pin 2.

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM RATINGS		UNIT
Input Voltage	V_{IN}	79M05~79M09	-35	V
		79M12~79M15	-35	
		79M18~79M24	-40	
Storage Temperature Range	T_{stg}	TO-220F	-40~+150	°C
		TO-252	-40~+150	
Operating Temperature Range	Operating Junction Temperature	T_j	TO-220F -30~+150 TO-252 -30~+150	°C
	Operating Junction Temperature	T_{opr}	-40~+85	
Power Dissipation	P_D	7.5($T_c \leq 75^\circ\text{C}$)		W

■ THERMAL CHARACTERISTICS

Thermal Resistance	Junction-to-Ambient Temperature	θ_{ja}	TO220F	TO252	°C/W
			60	125	
	Junction-to-Case	θ_{jc}	7	12.5	

■ ELECTRICAL CHARACTERISTICS ($T_j=25^\circ\text{C}$, $C_{IN}=2.2\ \mu\text{F}$, $C_O=1.0\ \mu\text{F}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M05A						
Output Voltage	V_O	$V_{IN}=-10\text{V}$, $I_O=0.35\text{A}$	-4.8	-5.0	-5.2	V
Quiescent Current	I_Q	$V_{IN}=-10\text{V}$, $I_O=0\text{mA}$	—	2.2	5.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=-10\text{V}$, $I_O=0.005\sim 0.5\text{A}$	—	35	50	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=-7\sim -25\text{V}$, $I_O=0.35\text{A}$	—	5	50	mV
Ripple Rejection	RR	$V_{IN}=-10\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$	50	58	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-10\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$	—	100	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-10\text{V}$, $I_O=5\text{mA}$	—	-0.4	—	mV/°C

■ ELECTRICAL CHARACTERISTICS (T_j=25°C, C_{IN}=2.2 μF, C_O=1.0 μF) Measurement is to be conducted in pulse testing.

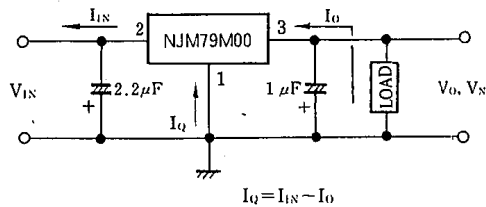
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M06A						
Output Voltage	V _O	V _{IN} =-11V, I _O =0.35A	-5.75	-6.0	-6.25	V
Quiescent Current	I _Q	V _{IN} =-11V, I _O =0mA	—	2.2	5.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =-11V, I _O =0.005~0.5A	—	35	60	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =-8~-25V, I _O =0.35A	—	5	60	mV
Ripple Rejection	RR	V _{IN} =-11V, I _O =0.35A, e _{in} =2V _{p-p} , f=120Hz	50	57	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =-11V, I _O =0.35A, BW=10Hz~100kHz	—	110	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-11V, I _O =5mA	—	-0.5	—	mV/°C
NJM79M08A						
Output Voltage	V _O	V _{IN} =-14V, I _O =0.35A	-7.7	-8.0	-8.3	V
Quiescent Current	I _Q	V _{IN} =-14V, I _O =0mA	—	2.2	5.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =-14V, I _O =0.005~0.5A	—	40	80	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =-10.5~-25V, I _O =0.35A	—	8	80	mV
Ripple Rejection	RR	V _{IN} =-14V, I _O =0.35A, e _{in} =2V _{p-p} , f=120Hz	50	55	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =-14V, I _O =0.35A, BW=10Hz~100kHz	—	130	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-14V, I _O =5mA	—	-0.7	—	mV/°C
NJM79M09A						
Output Voltage	V _O	V _{IN} =-15V, I _O =0.35A	-8.65	-9.0	-9.35	V
Quiescent Current	I _Q	V _{IN} =-15V, I _O =0mA	—	2.2	5.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =-15V, I _O =0.005~0.5A	—	40	90	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =-11.5~-25V, I _O =0.35A	—	8	80	mV
Ripple Rejection	RR	V _{IN} =-15V, I _O =0.35A, e _{in} =2V _{p-p} , f=120Hz	50	54	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =-15V, I _O =0.35A, BW=10Hz~100kHz	—	150	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-15V, I _O =5mA	—	-0.8	—	mV/°C
NJM79M12A						
Output Voltage	V _O	V _{IN} =-19V, I _O =0.35A	-11.5	-12.0	-12.5	V
Quiescent Current	I _Q	V _{IN} =-19V, I _O =0mA	—	2.7	6.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =-19V, I _O =0.005~0.5A	—	30	120	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =-14.5~-30V, I _O =0.35A	—	3	80	mV
Ripple Rejection	RR	V _{IN} =-19V, I _O =0.35A, e _{in} =2V _{p-p} , f=120Hz	54	71	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =-19V, I _O =0.35A, BW=10Hz~100kHz	—	150	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-19V, I _O =5mA	—	-0.4	—	mV/°C

■ ELECTRICAL CHARACTERISTICS (T_j=25°C, C_{IN}=2.2 μF, C_O=1.0 μF) Measurement is to be conducted in pulse testing.

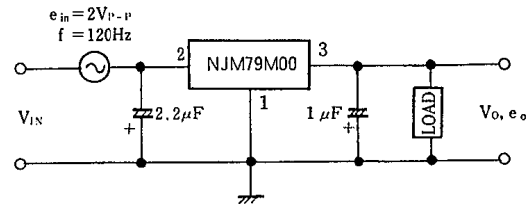
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M15A						
Output Voltage	V _O	V _{IN} =-23V, I _O =0.35A	-14.4	-15.0	-15.6	V
Quiescent Current	I _Q	V _{IN} =-23V, I _O =0mA	—	2.7	6.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =-23V, I _O =0.005~0.5A	—	30	150	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =-17.5~-30V, I _O =0.35A	—	3	80	mV
Ripple Rejection	RR	V _{IN} =-23V, I _O =0.35A, e _{in} =2V _{p-p} , f=120Hz	54	70	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =-23V, I _O =0.35A, BW=10Hz~100kHz	—	170	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-23V, I _O =5mA	—	-0.5	—	mV/°C
NJM79M18A						
Output Voltage	V _O	V _{IN} =-27V, I _O =0.35A	-17.3	-18.0	-18.7	V
Quiescent Current	I _Q	V _{IN} =-27V, I _O =0mA	—	2.7	6.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =-27V, I _O =0.005~0.5A	—	35	180	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =-21~-33V, I _O =0.35A	—	4	80	mV
Ripple Rejection	RR	V _{IN} =-27V, I _O =0.35A, e _{in} =2V _{p-p} , f=120Hz	54	69	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =-27V, I _O =0.35A, BW=10Hz~100kHz	—	200	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-27V, I _O =5mA	—	-0.6	—	mV/°C
NJM79M24A						
Output Voltage	V _O	V _{IN} =-33V, I _O =0.35A	-23.0	-24.0	-25.0	V
Quiescent Current	I _Q	V _{IN} =-33V, I _O =0mA	—	2.7	6.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =-33V, I _O =0.005~0.5A	—	40	240	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =-27~-38V, I _O =0.35A	—	5	80	mV
Ripple Rejection	RR	V _{IN} =-33V, I _O =0.35A, e _{in} =2V _{p-p} , f=120Hz	54	66	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =-33V, I _O =0.35A, BW=10Hz~100kHz	—	300	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-33V, I _O =5mA	—	-0.8	—	mV/°C

■ TEST CIRCUIT

1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage

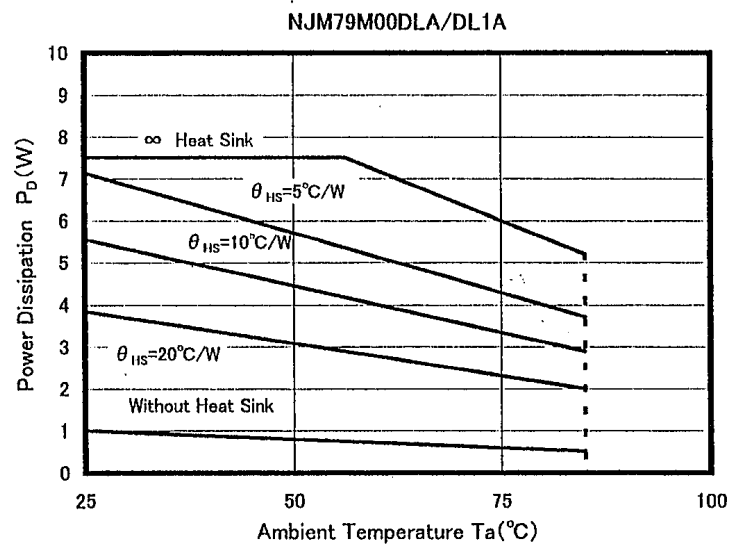
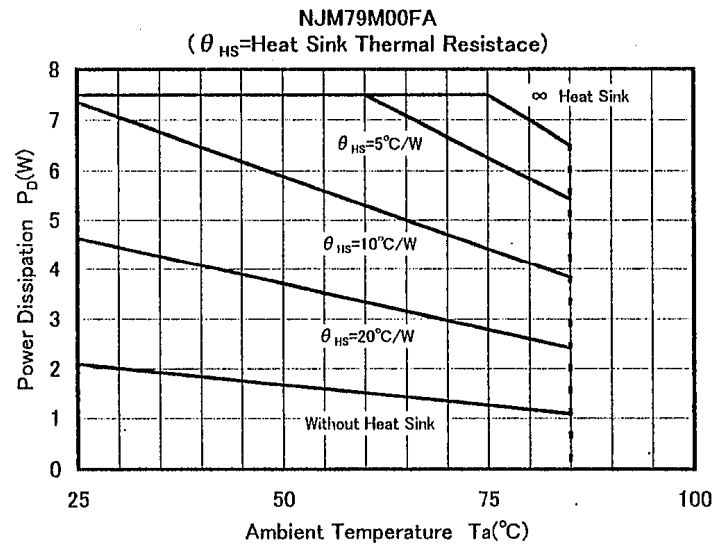


2. Ripple Rejection



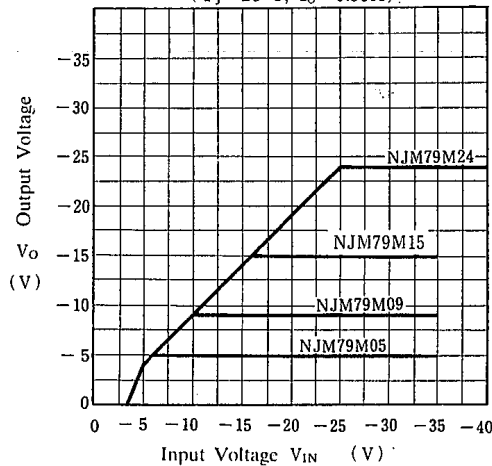
$$RR = 20 \log_{10} \left(\frac{e_{in}}{e_o} \right) \text{ (dB)}$$

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

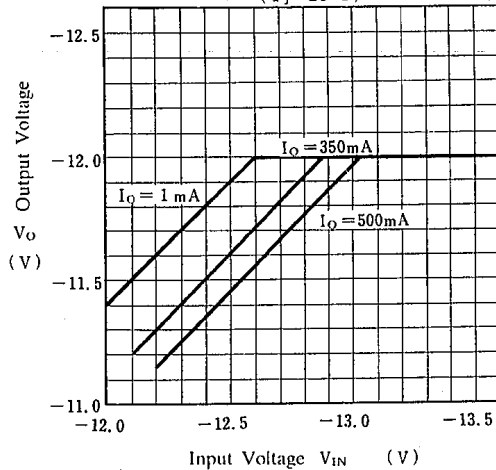


TYPICAL CHARACTERISTICS

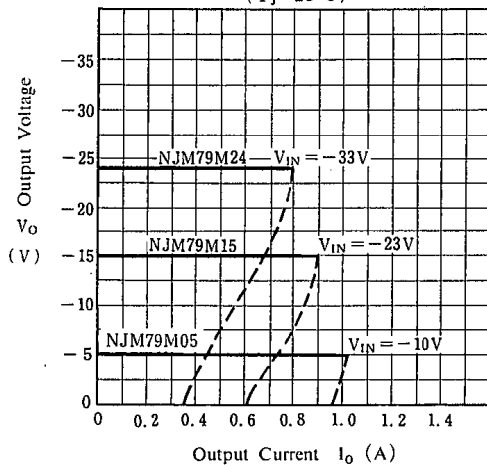
NJM79M00 Output Characteristics
($T_j = 25^\circ\text{C}$, $I_o = 0.35\text{A}$)



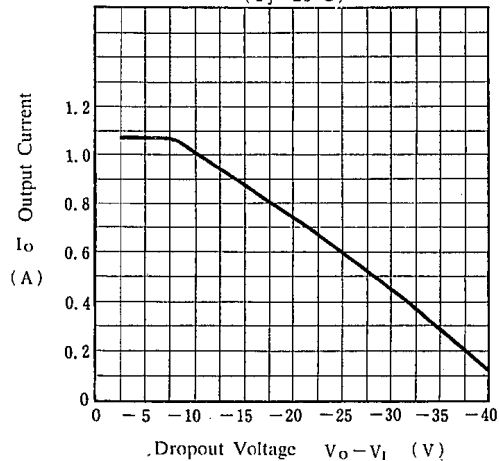
NJM79M12 Output Voltage vs. Low Input Voltage
($T_j = 25^\circ\text{C}$)



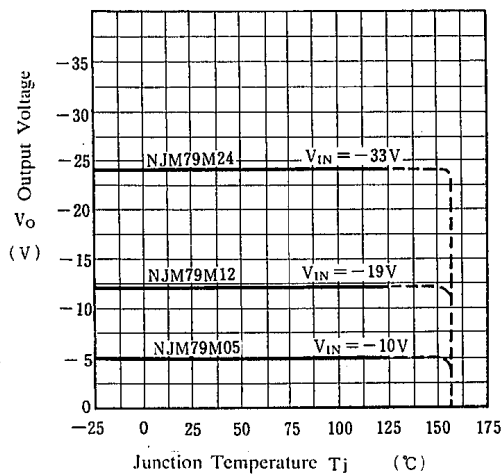
NJM79M05/15/24 Load Characteristics
($T_j = 25^\circ\text{C}$)



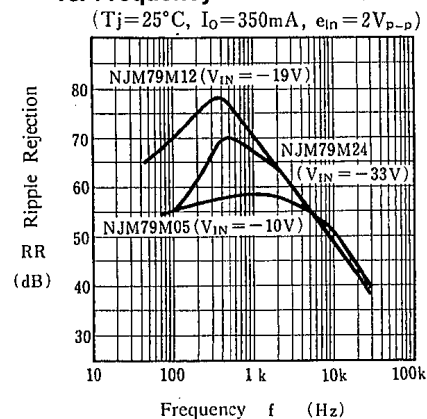
NJM79M00 Series Short Circuit Output Current
($T_j = 25^\circ\text{C}$)



NJM79M05/12/24 Output Voltage vs. Junction Temperature



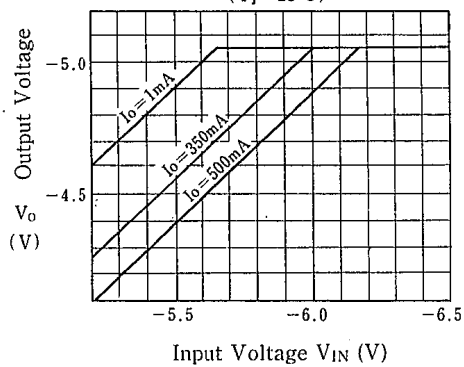
NJM79M05/15/24 Ripple Rejection vs. Frequency



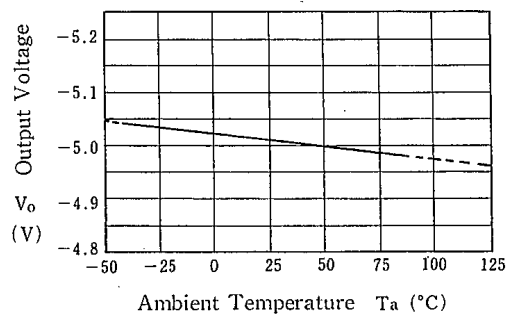
■ TYPICAL CHARACTERISTICS

NJM79M05 Dropout Characteristics

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



NJM79M05 Output Voltage vs. Temperature



Quiescent Current vs. Input Voltage

($I_o = 0\text{ mA}$, $T_j = 25^\circ\text{C}$)

