

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 a fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

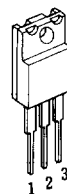
■ FEATURES

- 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

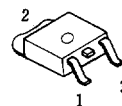
(TO-220F)



NJM79M00FA

1. COMMON
2. IN
3. OUT

(TO-252)

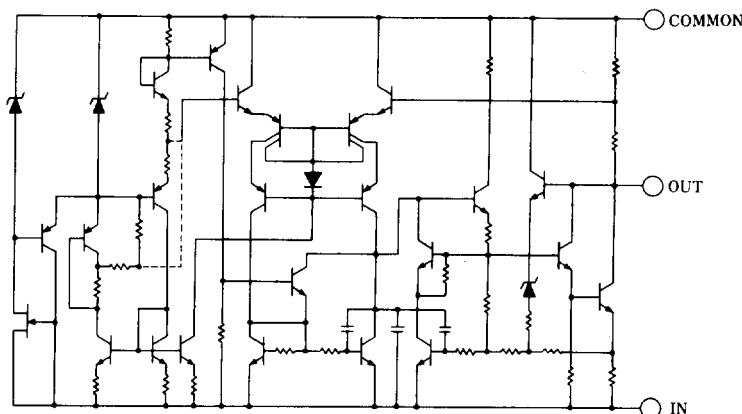


NJM79M00PLA

1. COMMON
2. IN
3. OUT

(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~+125	°C
		TO-252	-40~+150	
Operating Temperature Range	Operating Junction Temperature	T_j	TO-220F -30~+125	°C
	Operating Junction Temperature	T_{opr}	TO-252 -30~+150 -30~+75	
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
NJM79M05FA						
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	$V_{IN}=-10\text{V}$, $I_O=0.35\text{A}$, $e_n=2\text{V}_{p-p}$, $f=120\text{Hz}$	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
NJM79M06FA						
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
NJM79M08FA						
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
NJM79M09FA						
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
NJM79M12FA						
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



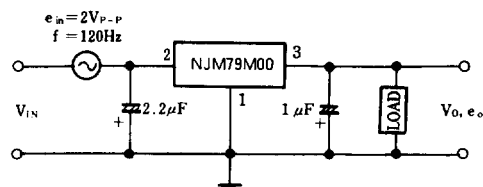
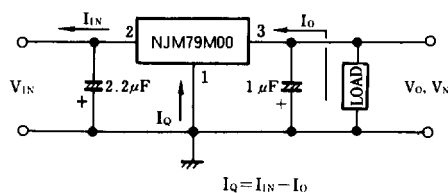
■ **ELECTRICAL CHARACTERISTICS** ($T_j=25^\circ\text{C}$, $C_{IN}=2.2\ \mu\text{F}$, $C_o=1.0\ \mu\text{F}$) Measurement is to be conducted in pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M15FA						
Output Voltage	V_O	$V_{IN}=-23\text{V}$, $I_O=0.35\text{A}$	-14.4	-15.0	-15.6	V
Quiescent Current	I_Q	$V_{IN}=-23\text{V}$, $I_O=0\text{mA}$	—	2.7	6.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=-23\text{V}$, $I_O=0.005\sim 0.5\text{A}$	—	30	150	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=-17.5\sim -30\text{V}$, $I_O=0.35\text{A}$	—	3	80	mV
Ripple Rejection	RR	$V_{IN}=-23\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{P-P}$, $f=120\text{Hz}$	54	70	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-23\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$	—	170	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-23\text{V}$, $I_O=5\text{mA}$	—	-0.5	—	mV/ $^\circ\text{C}$
NJM79M18FA						
Output Voltage	V_O	$V_{IN}=-27\text{V}$, $I_O=0.35\text{A}$	-17.3	-18.0	-18.7	V
Quiescent Current	I_Q	$V_{IN}=-27\text{V}$, $I_O=0\text{mA}$	—	2.7	6.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=-27\text{V}$, $I_O=0.005\sim 0.5\text{A}$	—	35	180	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=-21\sim -33\text{V}$, $I_O=0.35\text{A}$	—	4	80	mV
Ripple Rejection	RR	$V_{IN}=-27\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{P-P}$, $f=120\text{Hz}$	54	69	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-27\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$	—	200	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-27\text{V}$, $I_O=5\text{mA}$	—	-0.6	—	mV/ $^\circ\text{C}$
NJM79M24FA						
Output Voltage	V_O	$V_{IN}=-33\text{V}$, $I_O=0.35\text{A}$	-23.0	-24.0	-25.0	V
Quiescent Current	I_Q	$V_{IN}=-33\text{V}$, $I_O=0\text{mA}$	—	2.7	6.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=-33\text{V}$, $I_O=0.005\sim 0.5\text{A}$	—	40	240	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=-27\sim -38\text{V}$, $I_O=0.35\text{A}$	—	5	80	mV
Ripple Rejection	RR	$V_{IN}=-33\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{P-P}$, $f=120\text{Hz}$	54	66	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-33\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$	—	300	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-33\text{V}$, $I_O=5\text{mA}$	—	-0.8	—	mV/ $^\circ\text{C}$



■ TEST CIRCUIT

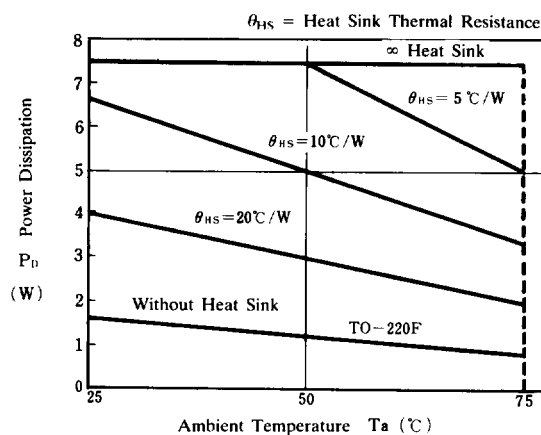
1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage



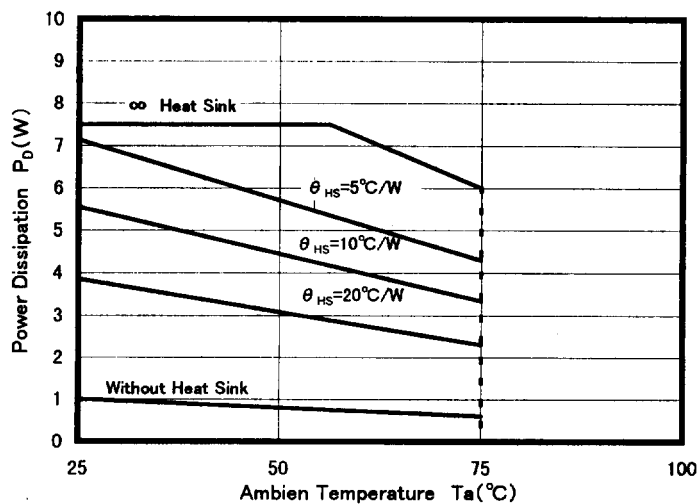
$$RR = 20 \log_{10} \left(\frac{e_{in}}{e_o} \right) \text{ (dB)}$$

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

NJM79M00FA



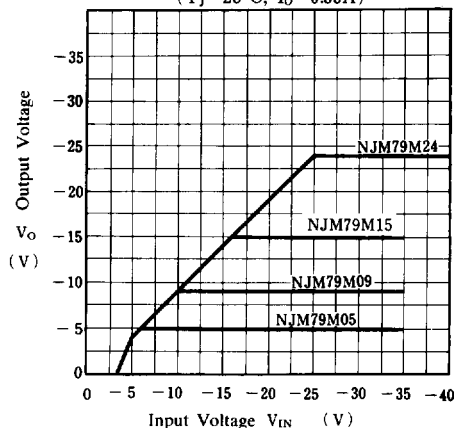
NJM79M00DLA



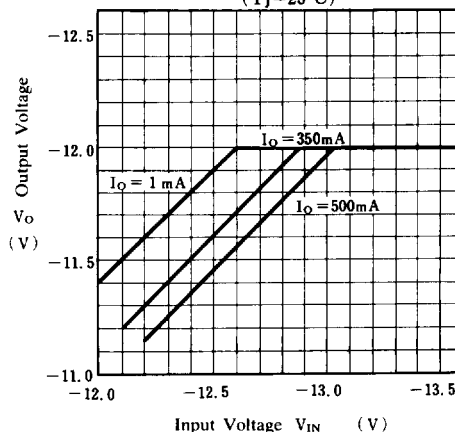


■ TYPICAL CHARACTERISTICS

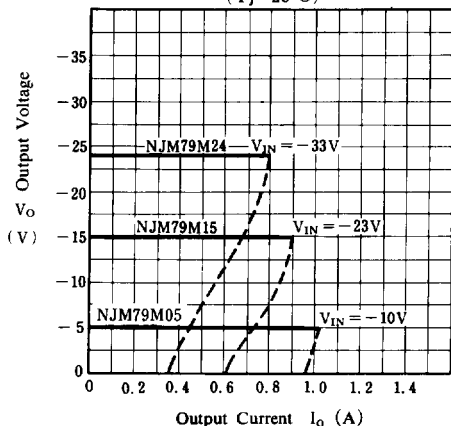
NJM79M00 Output Characteristics
($T_j = 25^\circ\text{C}$, $I_o = 0.35\text{A}$)



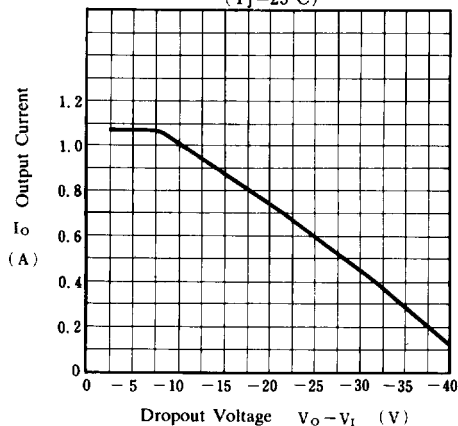
NJM79M12 Output Voltage vs. Low Input Voltage
($T_j = 25^\circ\text{C}$)



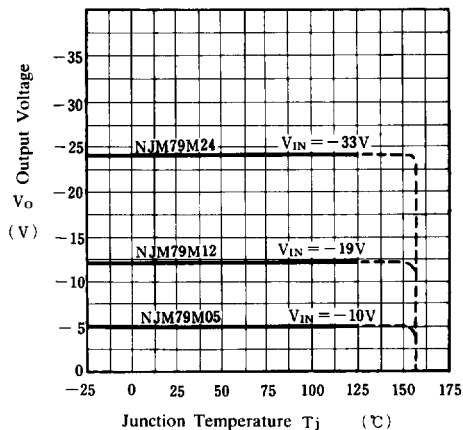
NJM79M05/15/24 Load Characteristics
($T_j = 25^\circ\text{C}$)



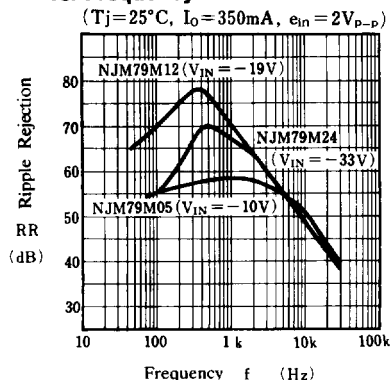
NJM79M00 Series Short Circuit Output Current
($T_j = 25^\circ\text{C}$)



NJM79M05/12/24 Output Voltage vs. Junction Temperature



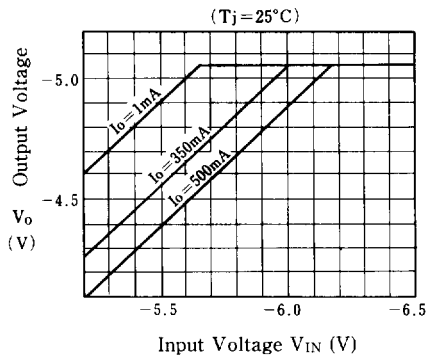
NJM79M05/15/24 Ripple Rejection vs. Frequency



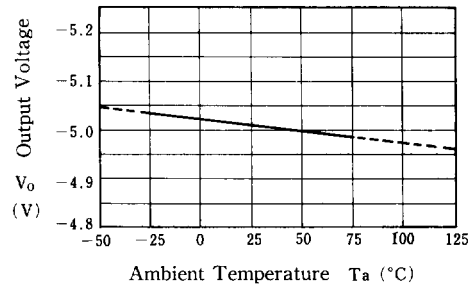


■ TYPICAL CHARACTERISTICS

NJM79M05 Dropout Characteristics



NJM79M05 Output Voltage vs. Temperature



Quiescent Current vs. Input Voltage

