3-TERMINAL NEGATIVE VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

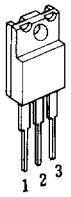
The NJM79M00 series of 3-Terminal Negative Voltage Regulators are constructed using the New JRC Planar epitaxial process. These regulators employ internal current limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they 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 TO-220F, TO-252
- Bipolar Technology

■ PACKAGE OUTLINE

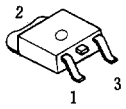
(TO-220F)



NJM79M00FA

1. COMMON
2. IN
3. OUT

(TO-252)

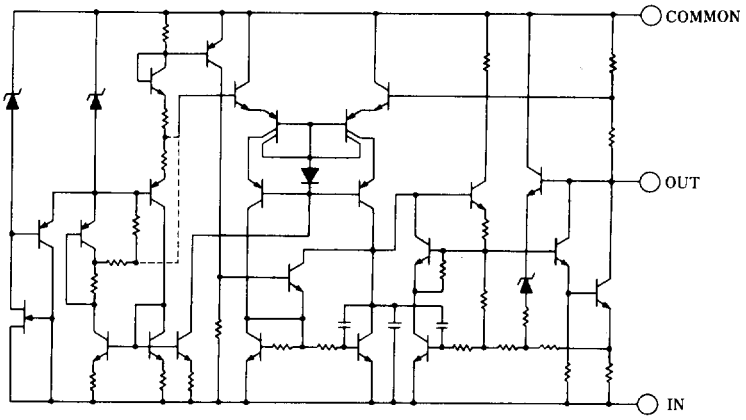


NJM79M00PLA

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	
Storge Temperature Range	T_{stg}	TO-220F	−40~+125		°C
		TO-252	−40~+150		
Operating Temperature Range	Operating Junction Temperature		Tj	TO-220F −30~+125	°C
				TO-252 −30~+150	
	Operating Junction Temperature		Topr	−30~+75	
Power Dissipation	P_D	7.5($T_C \leqq 75$°C)			W

■ THERMAL CHARACTERISTICS

			TO220F	TO252	
Thermal Resistance	Junction-to-Ambient Temperature	θja	60	125	°C/W
	Junction-to-Case	θjc	7	12.5	

■ ELECTRICAL CHARACTERISTICS (T_j=25°C. C_{IN}=2.2 μF, Co=1.0 μF.)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M05FA						
Output Voltage	V_O	V_{IN}=−10V, I_O=0.35A	−4.8	−5.0	−5.2	V
Quiescent Current	I_Q	V_{IN}=−10V, I_O=0mA	—	2.2	5.0	mA
Load Regulation	ΔV_O-I_O	V_{IN}=−10V, I_O=0.005~0.5A	—	35	50	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−7~−25V, I_O=0.35A	—	5	50	mV
Ripple Rejection	RR	V_{IN}=−10V,I_O=0.35A,e_{in}=$2V_{P-P}$,f=120Hz	50	58	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−10V,I_O=0.35A,BW=10Hz~100kHz	—	100	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	V_{IN}=−10V, I_O=5mA	—	−0.4	—	mV/°C

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■ ELECTRICAL CHARACTERISTICS (T_j=25℃, C_{IN}=2.2 μF, Co=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	$\Delta V_O/\Delta T$	V_{IN}=−11V, I_O=5mA	—	−0.5	—	mV/℃
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	$\Delta V_O/\Delta T$	V_{IN}=−14V, I_O=5mA	—	−0.7	—	mV/℃
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	$\Delta V_O/\Delta T$	V_{IN}=−15V, I_O=5mA	—	−0.8	—	mV/℃
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	$\Delta V_O/\Delta T$	V_{IN}=−19V, I_O=5mA	—	−0.4	—	mV/℃

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

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M15FA						
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	$\Delta V_O/\Delta T$	V_{IN}=−23V, I_O=5mA	—	−0.5	—	mV/℃
NJM79M18FA						
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	$\Delta V_O/\Delta T$	V_{IN}=−27V, I_O=5mA	—	−0.6	—	mV/℃
NJM79M24FA						
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	$\Delta V_O/\Delta T$	V_{IN}=−33V, I_O=5mA	—	−0.8	—	mV/℃

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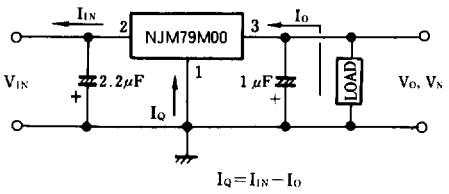
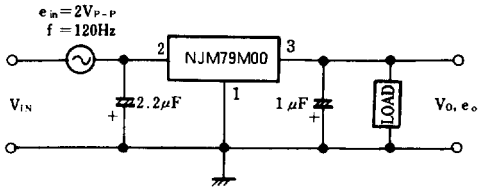
■ TEST CIRCUIT

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



$I_Q = I_{IN} - I_O$

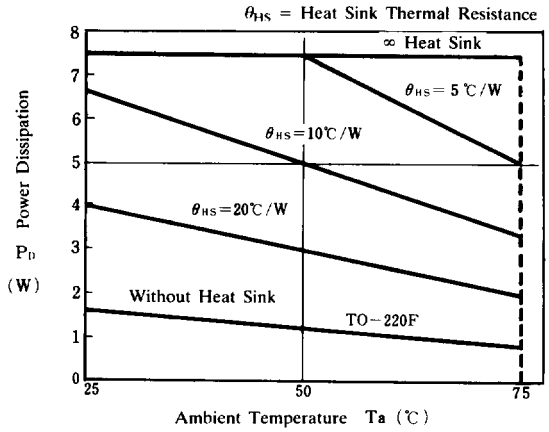
2. Ripple Rejection



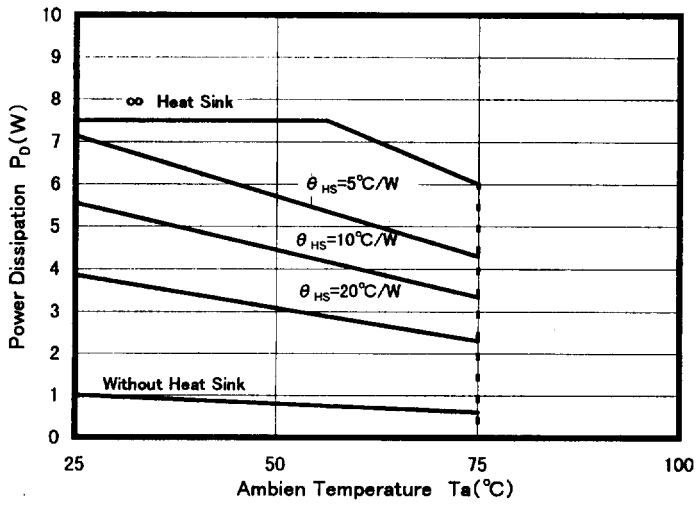
$$RR = 20\log_{10}\left(\frac{e_{in}}{e_o}\right)\ (dB)$$

■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

NJM79M00FA

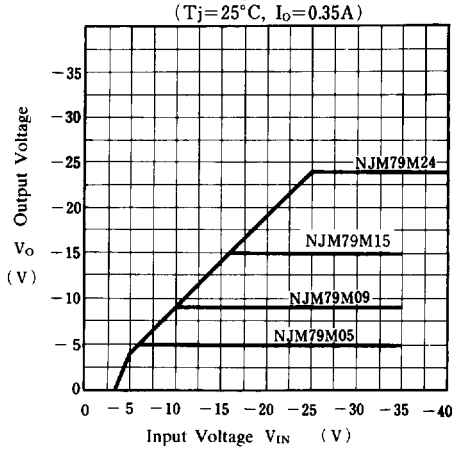


NJM79M00DLA

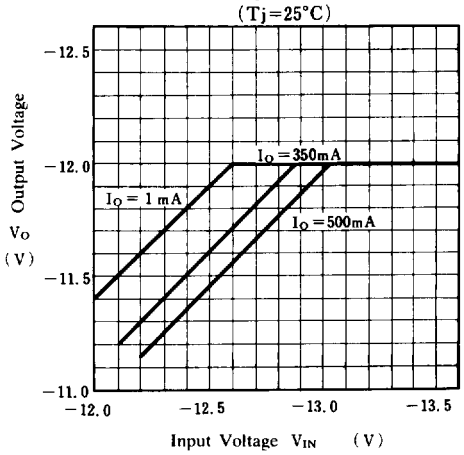


■ TYPICAL CHARACTERISTICS

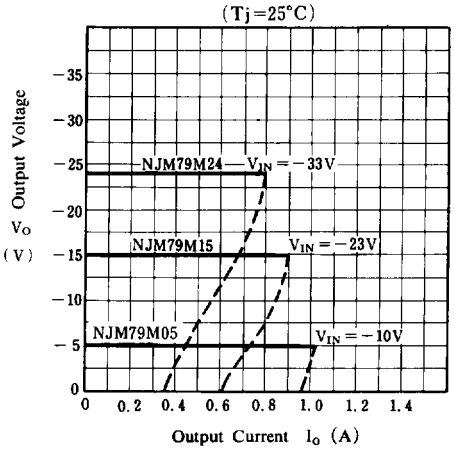
NJM79M00 Output Characteristics
(Tj=25°C, I_O=0.35A)



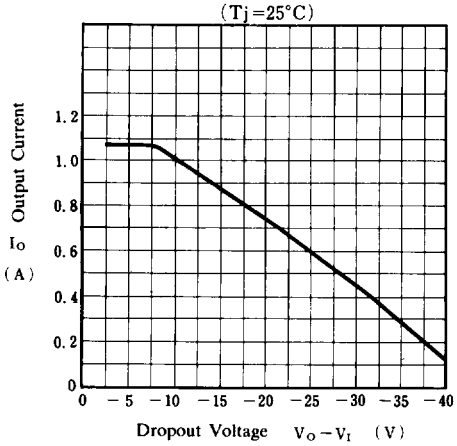
NJM79M12 Output Voltage vs. Low Input Voltage
(Tj=25°C)



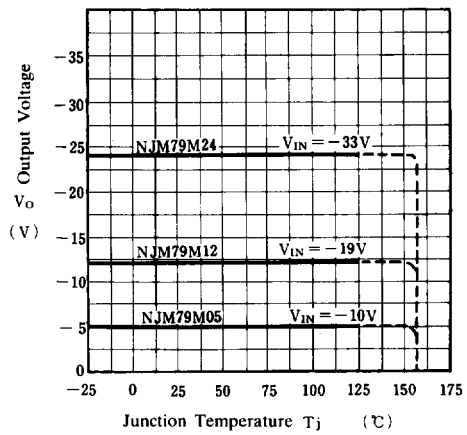
NJM79M05/15/24 Load Characteristics
(Tj=25°C)



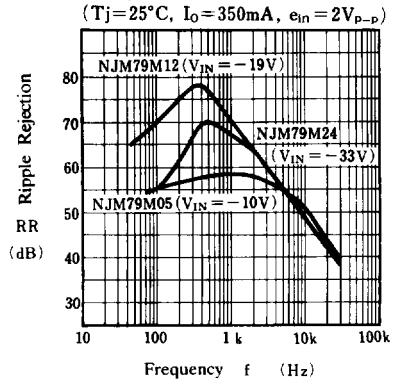
NJM79M00 Series Short Circuit Output Current
(Tj=25°C)



NJM79M05/12/24 Output Voltage vs. Junction Temperature



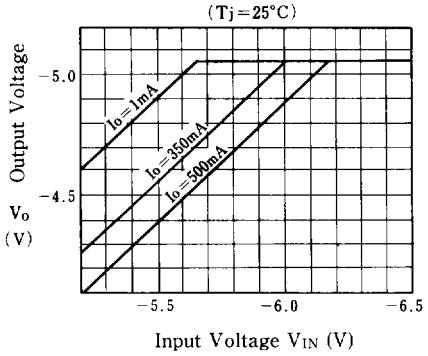
NJM79M05/15/24 Ripple Rejection vs. Frequency
(Tj=25°C, I_O=350mA, e_{in}=$2V_{p-p}$)



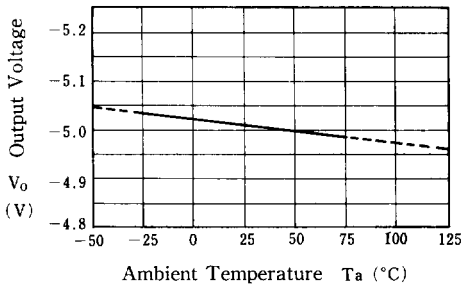
■ TYPICAL CHARACTERISTICS

NJM79M05 Dropout Characteristics

(Tj=25°C)

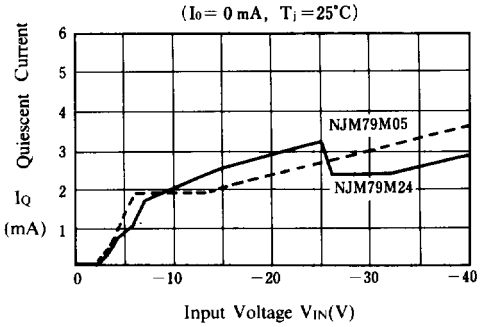


NJM79M05 Output Voltage vs. Temperature



Quiescent Current vs. Input Voltage

(Io= 0 mA, Tj=25°C)



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