NJM7900

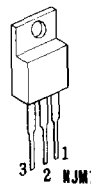
The NJM7900 series of Monolithic 3-Terminal Negative Regulators is constructed using the New JRC Planar epitaxial process. These negative regulators are intended as complements to the popular NJM7800 series of positive voltage regulators, and they are available in the same voltage options from −5 to −24V. The 7900 series employ internal current-limiting, safe-area protection, and thermal shutdown, making the virtually indestructible.

■ Features

- Output Current In Excess of 1A
- No External Components
- Internal Thermal Overload Protection
- Internal Short circuit current limiting

■ Package Outline

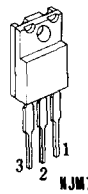
(TO-220)



1. OUT
2. IN
3. COMMON

NJM79XXA

(TO-220F)



NJM79XXFA

The radiation fin is connected to Pin 2.

■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Maximum Rating		Unit
Input Voltage	V_{IN}	7905 ~ 7909	−35	V
		7912 ~ 7915	−35	
		7918 ~ 7924	−40	
Storage Temperature Range	T_{stg}	−40 ~ +125		°C
Operating Temperature Range	Operating Junction Temperature	T_J	−30 ~ +125	°C
	Operating Ambient Temperature	T_{opr}	−30 ~ +75	
Power Dissipation	P_D	16 ($T_c \leqq 45°C$)		W

■ Thermal Characteristics

Thermal Resistance	Junction-to-Ambient Temperature	θja	70(TO-220) 60(TO-220F)	°C/W
	Junction-to-Case	θjc	5	

■ Electrical Characteristics (T_j=25°C, C_{IN}=2.2μF, C_O=1.0μF)

Measurement is to be conducted in pulse testing.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
NJM7905A/FA						
Output Voltage	V_O	V_{IN}=−10V, I_O=0.5A	−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=0.005~1.5A	—	50	80	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−7~−25V, I_O=0.5A	—	5	50	mV
Ripple Rejection	RR	V_{IN}=−10V, I_O=0.5A, e_{in}=2V_{p-p}, f=120Hz	54	73	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−10V, I_O=0.5A, BW=10Hz~100kHz	—	105	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	V_{IN}=−10V, I_O=5mA	—	−0.4	—	mV/°C

■ Electrical Characteristics (T_j=25°C, C_{IN}=2.2μF, Co=1.0μF)

Measurement is to be conducted in pulse testing.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
NJM7906A/FA						
Output Voltage	V_O	V_{IN}=−11V, I_O=0.5A	−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=0.005~1.5A	—	50	90	mA
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−8~−25V, I_O=0.5A	—	5	60	mV
Ripple Rejection	RR	V_{IN}=−11V, I_o=0.5A, e_{in}=2V_{p-p}, f=120Hz	54	72	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−11V, I_O=0.5A, BW=10Hz~100kHz	—	135	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	V_{IN}=−11V, I_O=5mA	—	−0.5	—	mV/°C
NJM7908A/FA						
Output Voltage	V_O	V_{IN}=−14V, I_O=0.5A	−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=0.005~1.5A	—	60	110	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−10.5~−25V, I_O=0.5A	—	8	80	mV
Ripple Rejection	RR	V_{IN}=−14, I_O=0.5A, e_{in}=2V_{p-p}, f=120Hz	54	68	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−14V, I_O=0.5A, BW=10Hz~100kHz	—	180	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	V_{IN}=−14V, I_O=5mA	—	−0.7	—	mV/°C
NJM7909A/FA						
Output Voltage	V_O	V_{IN}=−15V, I_O=0.5A	−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=0.005~1.5A	—	60	120	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−11.5~−25V, I_O=0.5A	—	8	90	mV
Ripple Rejection	RR	V_{IN}=−15V, I_O=0.5A, e_{in}=2V_{p-p}, f=120Hz	54	67	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−15V, I_O=0.5A, BW=10Hz~100kHz	—	195	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	V_{IN}=−15V, I_O=5mA	—	−0.8	—	mV/°C
NJM7912A/FA						
Output Voltage	V_O	V_{IN}=−19V, I_O=0.5A	−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	—	60	150	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−14.5~−30V, I_O=0.5A	—	3	120	mV
Ripple Rejection	RR	V_{IN}=−19V, I_O=0.5A, e_{in}= 2V_{p-p}, f=120Hz	54	71	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−19V, I_O=0.5A, BW=10Hz~100kHz	—	230	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_o/\Delta T$	V_{IN}=−19V, I_o=5mA	—	−0.4	—	mV/°C

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■ Electrical Characteristics (T_j=25°C, C_{IN}=2.2μF, Co=1.0μF)

Measurement is to be conducted in pulse testing.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
NJM7915A/FA						
Output Voltage	V_O	V_{IN}=−23V, I_O=0.5A	−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=0.005~1.5A	—	60	180	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−17.5~−30V, I_O=0.5A	—	3	150	mV
Ripple Rejection	RR	V_{IN}=−23V, I_O=0.5A, e_{in}=2$V_{p\text{-}p}$, f=120Hz	54	70	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−23V, I_O=0.5A, BW=10Hz~100kHz	—	260	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	V_{IN}=−23V, I_O=5mA	—	−0.5	—	mV/°C
NJM7918A/FA						
Output Voltage	V_O	V_{IN}=−27V, I_O=0.5A	−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=0.005~1.5A	—	60	210	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−21~−33V, I_O=0.5A	—	4	180	mV
Ripple Rejection	RR	V_{IN}=−27V, I_O=0.5A, e_{in}=2$V_{p\text{-}p}$, f=120Hz	54	69	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−27V, I_O=0.5A, BW=10Hz~100kHz	—	300	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	V_{IN}=−27V, I_O=5mA	—	−0.6	—	mV/°C
NJM7924A/FA						
Output Voltage	V_O	V_{IN}=−33V, I_O=0.5A	−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=0.005~1.5A	—	60	270	mV
Line Regulation	ΔV_O-V_{IN}	V_{IN}=−27~−38V, I_O=0.5A	—	5	240	mV
Ripple Rejection	RR	V_{IN}=−33V, I_O=0.5A, e_{in}=2$V_{p\text{-}p}$, f=120Hz	54	66	—	dB
Output Noise Voltage	V_{NO}	V_{IN}=−33V, I_O=0.5A, BW=10Hz~100kHz	—	360	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	V_{IN}=−33V, I_O=5mA	—	−0.8	—	mV/°C

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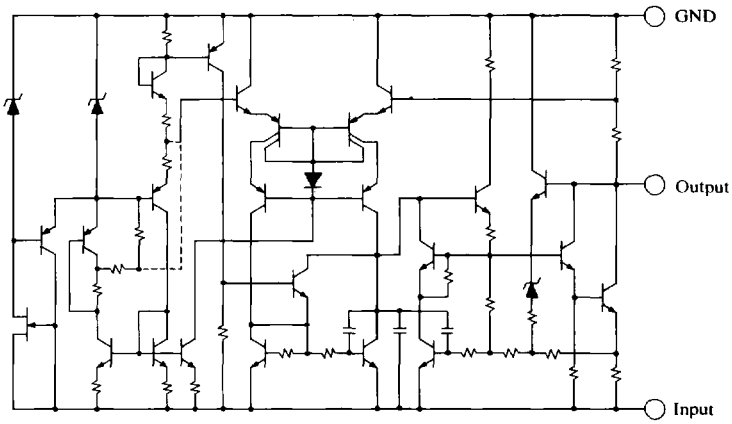
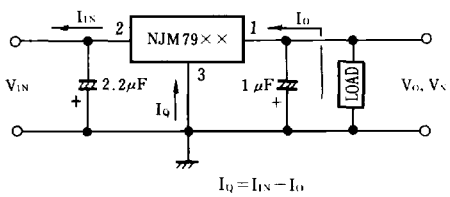
■ Equivalent Circuit



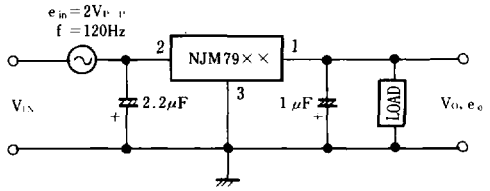
■ Test Circuit

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



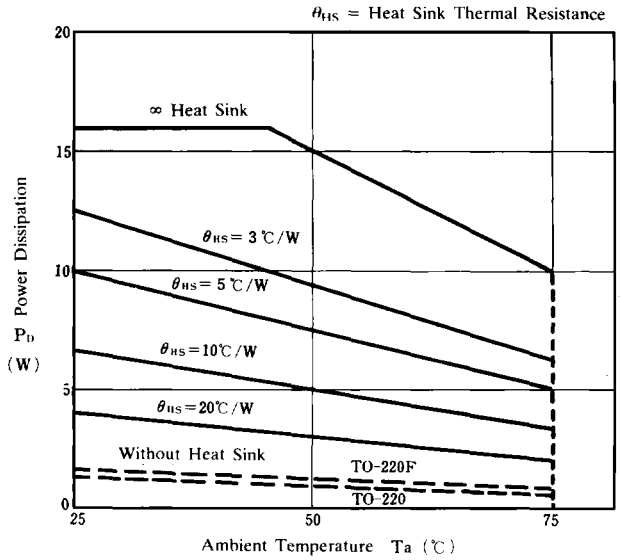
$I_Q = I_{IN} - I_O$

2. Ripple Rejection



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

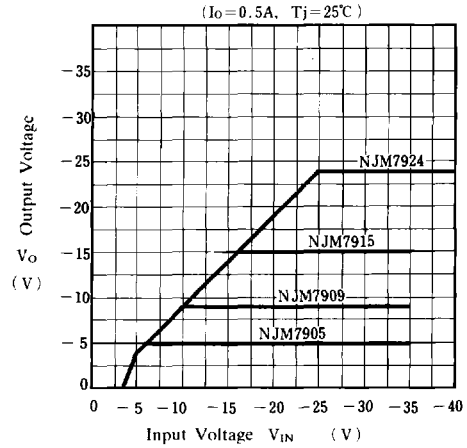
■ Power Dissipation vs. Ambient Temperature



■ Typical Characteristics

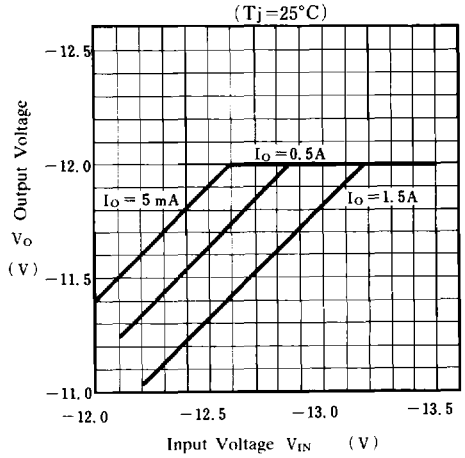
NJM7900 Output Voltage vs. Low Input Voltage

(I_O=0.5A, Tj=25℃)



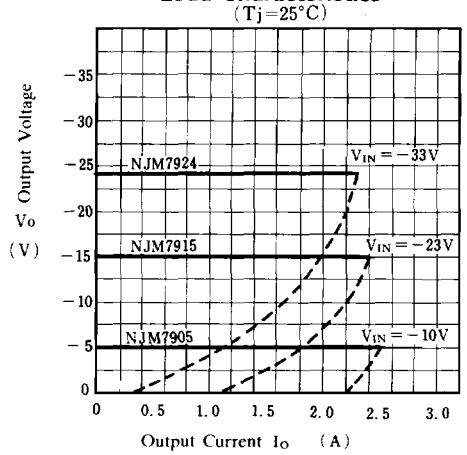
NJM7912 Output Voltage vs. Low Input Voltage

(Tj=25°C)



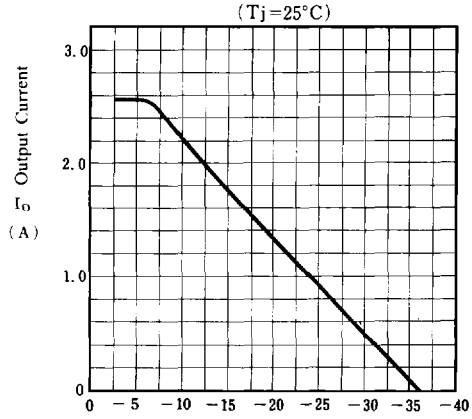
NJM7905/15/24 Load Characteristics

(Tj=25°C)

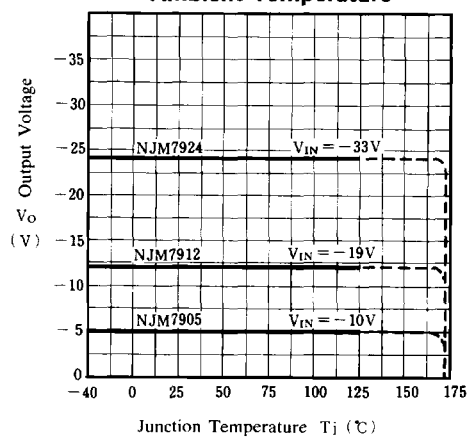


NJM7900 Series Short Circuit Output Current

(Tj=25°C)



NJM7905/12/24 Output Voltage vs. Ambient Temperature



NJM7905/15/24 Ripple Rejection vs. Frequency

(I_O=500mA, e_{in}=$2V_{p-p}$, Tj=25°C)