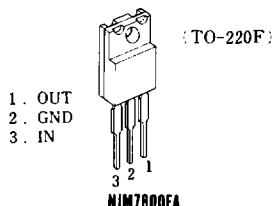


NJM7800

The NJM7800 series of monolithic 3-Terminal Positive Voltage Regulators is 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 over 1A output current. They are intended as fixed voltage regulators in a wide range of applications including local (on card) regulation for elimination of 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.

■ Package Outline



The radiation fin is connected pin2.

■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Maximum Rating		Unit
Input Voltage	V _{IN}	7805 ~ 7809	35	V
		7812 ~ 7815	35	
		7818 ~ 7824	40	
Storage Temperature Range	T _{stg}	-40 ~ +125		°C
Operating Temperature Range	Operating Junction Temperature	T _j	-30 ~ +150	°C
	Operating Ambient Temperature	T _{opr}	-30 ~ +75	
Power Dissipation	P _D	16 (T _C ≤ 70°C)		W

■ Thermal Characteristics

Thermal Resistance	Junction-to-Ambient Temperature	θ _{ja}	60	°C/W
	Junction-to-Case	θ _{jc}	5	

6

■ Electrical Characteristics (C_I = 0.33μF, C_O = 0.1μF, T_j = 25°C) Measurement is to be conducted in pulse testing.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
NJM7805FA ✓ 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	—	4.2	6.0	mA
Load Regulation	ΔV _O -I _O	V _{IN} =10V, I _O =0.005~1.5A	—	15	50	mV
Line Regulation	ΔV _O -V _{IN}	V _{IN} =7~25V, I _O =0.5A	—	3	50	mV
Ripple Rejection	RR	V _{IN} =10V, I _O =0.5A, e _{in} =2V _{P-P} , f=120Hz	68	78	—	dB
Output Noise Voltage	V _{NO}	V _{IN} =10V, BW=10Hz~100kHz, I _O =0.5A	—	45	—	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =10V, I _O 5mA	—	-0.5	—	mV/°C

■ Electrical Characteristics ($T_j = 25^\circ\text{C}$, $C_1 = 0.33\mu\text{F}$, $C_o = 0.1\mu\text{F}$)

Measurement is to be conducted in pulse testing.

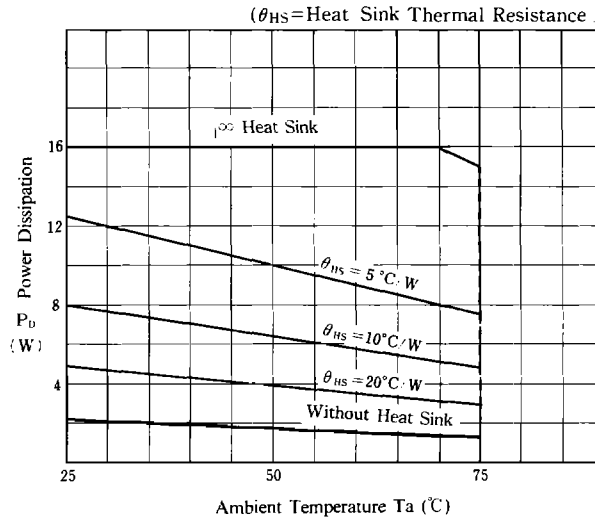
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
NJM7806FA ✓						
Output Voltage	V_O	$V_{IN} = 11\text{V}$, $I_O = 0.5\text{A}$	5.75	6.0	6.25	V
Quiescent Current	I_Q	$V_{IN} = 11\text{V}$, $I_O = 0\text{mA}$	—	4.3	6.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN} = 11\text{V}$, $I_O = 0.005 \sim 1.5\text{A}$	—	15	60	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN} = 8 \sim 25\text{V}$, $I_O = 0.5\text{A}$	—	5	60	mV
Ripple Rejection	RR	$V_{IN} = 11\text{V}$, $I_O = 0.5\text{A}$, $e_{in} = 2\text{V}_{P-P}$, $f = 120\text{Hz}$	65	75	—	dB
Output Noise Voltage	V_{NO}	$V_{IN} = 11\text{V}$, $BW = 10\text{Hz} \sim 100\text{kHz}$, $I_O = 0.5\text{A}$	—	45	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$V_{IN} = 11\text{V}$, $I_O = 5\text{mA}$	—	-0.6	—	$\text{mV}/^\circ\text{C}$
NJM7808FA ✓						
Output Voltage	V_O	$V_{IN} = 14\text{V}$, $I_O = 0.5\text{A}$	7.7	8.0	8.3	V
Quiescent Current	I_Q	$V_{IN} = 14\text{V}$, $I_O = 0\text{mA}$	—	4.3	6.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN} = 14\text{V}$, $I_O = 0.005 \sim 1.5\text{A}$	—	15	80	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN} = 10.5 \sim 25\text{V}$, $I_O = 0.5\text{A}$	—	6	80	mV
Ripple Rejection	RR	$V_{IN} = 14\text{V}$, $I_O = 0.5\text{A}$, $e_{in} = 2\text{V}_{P-P}$, $f = 120\text{Hz}$	62	72	—	dB
Output Noise Voltage	V_{NO}	$V_{IN} = 14\text{V}$, $BW = 10\text{Hz} \sim 100\text{kHz}$, $I_O = 0.5\text{A}$	—	55	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$V_{IN} = 14\text{V}$, $I_O = 5\text{mA}$	—	-0.8	—	$\text{mV}/^\circ\text{C}$
NJM7809FA ✓						
Output Voltage	V_O	$V_{IN} = 15\text{V}$, $I_O = 0.5\text{A}$	8.65	9.0	9.35	V
Quiescent Current	I_Q	$V_{IN} = 15\text{V}$, $I_O = 0\text{mA}$	—	4.3	6.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN} = 15\text{V}$, $I_O = 0.005 \sim 1.5\text{A}$	—	15	90	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN} = 11.5 \sim 25\text{V}$, $I_O = 0.5\text{A}$	—	7	90	mV
Ripple Rejection	RR	$V_{IN} = 15\text{V}$, $I_O = 0.5\text{A}$, $e_{in} = 2\text{V}_{P-P}$, $f = 120\text{Hz}$	62	72	—	dB
Output Noise Voltage	V_{NO}	$V_{IN} = 15\text{V}$, $BW = 10\text{Hz} \sim 100\text{kHz}$, $I_O = 0.5\text{A}$	—	60	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$V_{IN} = 15\text{V}$, $I_O = 5\text{mA}$	—	-0.9	—	$\text{mV}/^\circ\text{C}$
NJM7812FA ✓						
Output Voltage	V_O	$V_{IN} = 19\text{V}$, $I_O = 0.5\text{A}$	11.5	12.0	12.5	V
Quiescent Current	I_Q	$V_{IN} = 19\text{V}$, $I_O = 0\text{mA}$	—	4.3	6.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN} = 19\text{V}$, $I_O = 0.005 \sim 1.5\text{A}$	—	25	120	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN} = 14.5 \sim 30\text{V}$, $I_O = 0.5\text{A}$	—	10	120	mV
Ripple Rejection	RR	$V_{IN} = 19\text{V}$, $I_O = 0.5\text{A}$, $e_{in} = 2\text{V}_{P-P}$, $f = 120\text{Hz}$	62	71	—	dB
Output Noise Voltage	V_{NO}	$V_{IN} = 19\text{V}$, $BW = 10\text{Hz} \sim 100\text{kHz}$, $I_O = 0.5\text{A}$	—	75	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$V_{IN} = 19\text{V}$, $I_O = 5\text{mA}$	—	-1.2	—	$\text{mV}/^\circ\text{C}$

■ **Electrical Characteristics** ($C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, $T_J = 25^\circ\text{C}$)

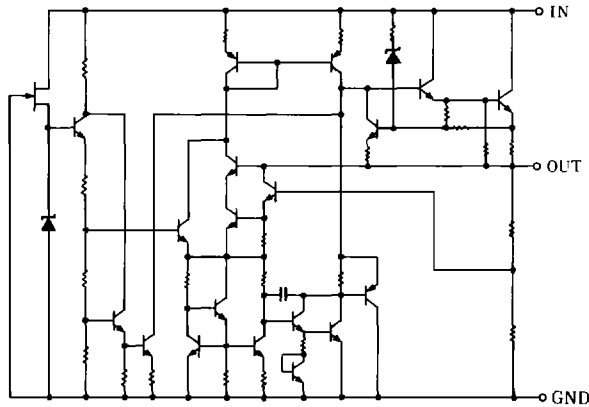
Measurement is to be conducted in pulse testing.

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
NJM7815FA						
Output Voltage	V_O	$V_{IN}=23\text{V}$, $I_O=0.5\text{A}$	14.4	15.0	15.6	V
Quiescent Current	I_Q	$V_{IN}=23\text{V}$, $I_O=0\text{mA}$	—	4.4	6.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=23\text{V}$, $I_O=0.005\sim 1.5\text{A}$	—	35	150	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=17.5\sim 30\text{V}$, $I_O=0.5\text{A}$	—	11	150	mV
Ripple Rejection	RR	$V_{IN}=23\text{V}$, $I_O=0.5\text{A}$, $e_{in}=2\text{V}_{P-P}$, $f=120\text{Hz}$	60	70	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=23\text{V}$, $BW=10\text{Hz}\sim 100\text{kHz}$, $I_O=0.5\text{A}$	—	90	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=23\text{V}$, $I_O=5\text{mA}$	—	-1.5	—	mV/ $^\circ\text{C}$
NJM7818FA						
Output Voltage	V_O	$V_{IN}=27\text{V}$, $I_O=0.5\text{A}$	17.3	18.0	18.7	V
Quiescent Current	I_Q	$V_{IN}=27\text{V}$, $I_O=0\text{mA}$	—	4.5	6.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=27\text{V}$, $I_O=0.005\sim 1.5\text{A}$	—	55	180	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=21\sim 33\text{V}$, $I_O=0.5\text{A}$	—	15	180	mV
Ripple Rejection	RR	$V_{IN}=27\text{V}$, $I_O=0.5\text{A}$, $e_{in}=2\text{V}_{P-P}$, $f=120\text{Hz}$	59	69	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=27\text{V}$, $BW=10\text{Hz}\sim 100\text{kHz}$, $I_O=0.5\text{A}$	—	100	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=27\text{V}$, $I_O=5\text{mA}$	—	-1.8	—	mV/ $^\circ\text{C}$
NJM7820FA						
Output Voltage	V_O	$V_{IN}=29\text{V}$, $I_O=0.5\text{A}$	19.2	20.0	20.8	V
Quiescent Current	I_Q	$V_{IN}=29\text{V}$, $I_O=0\text{mA}$	—	4.5	6.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=29\text{V}$, $I_O=0.005\sim 1.5\text{A}$	—	61	200	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=23\sim 35\text{V}$, $I_O=0.5\text{A}$	—	16	200	mV
Ripple Rejection	RR	$V_{IN}=29\text{V}$, $I_O=0.5\text{A}$, $e_{in}=2\text{V}_{P-P}$, $f=120\text{Hz}$	58	68	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=29\text{V}$, $BW=10\text{Hz}\sim 100\text{kHz}$, $I_O=0.5\text{A}$	—	120	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=29\text{V}$, $I_O=5\text{mA}$	—	-2.0	—	mV/ $^\circ\text{C}$
NJM7824FA						
Output Voltage	V_O	$V_{IN}=33\text{V}$, $I_O=0.5\text{A}$	23.0	24.0	25.0	V
Quiescent Current	I_Q	$V_{IN}=33\text{V}$, $I_O=0\text{mA}$	—	4.6	6.0	mA
Load Regulation	ΔV_O-I_O	$V_{IN}=33\text{V}$, $I_O=0.005\sim 1.5\text{A}$	—	65	240	mV
Line Regulation	ΔV_O-V_{IN}	$V_{IN}=27\sim 38\text{V}$, $I_O=0.5\text{A}$	—	18	240	mV
Ripple Rejection	RR	$V_{IN}=33\text{V}$, $I_O=0.5\text{A}$, $e_{in}=2\text{V}_{P-P}$, $f=120\text{Hz}$	56	66	—	dB
Output Noise Voltage	V_{NO}	$V_{IN}=33\text{V}$, $BW=10\text{Hz}\sim 100\text{kHz}$, $I_O=0.5\text{A}$	—	120	—	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=33\text{V}$, $I_O=5\text{mA}$	—	-2.4	—	mV/ $^\circ\text{C}$

■ Power Dissipation vs. Ambient Temperature

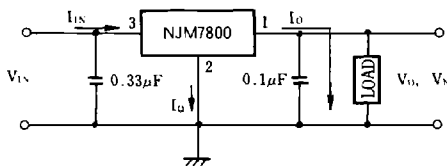


■ Equivalent Circuit

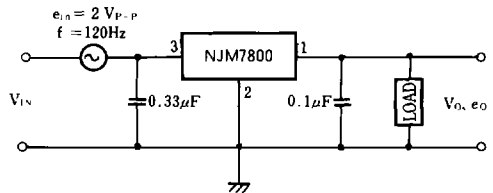


■ Test Circuit

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



$$I_Q = I_{IS} - I_O$$

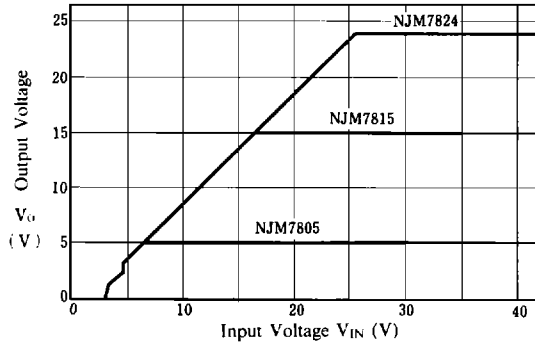


$$RR = 20 \log_{10} \left(\frac{e_{in}}{e_o} \right) \text{ (dB)}$$

■ Typical Characteristics

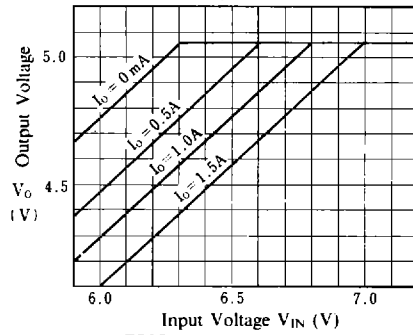
NJM7805/15/24 Output Characteristics

($I_O = 0.5A$, $T_j = 25^\circ C$)



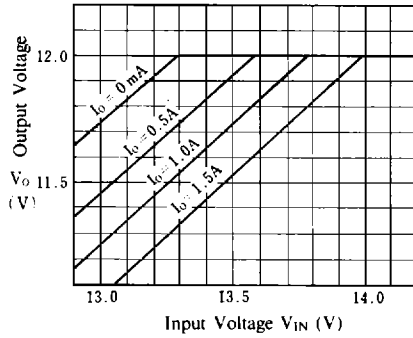
NJM7805 Dropout Characteristics

($T_j = 25^\circ C$)



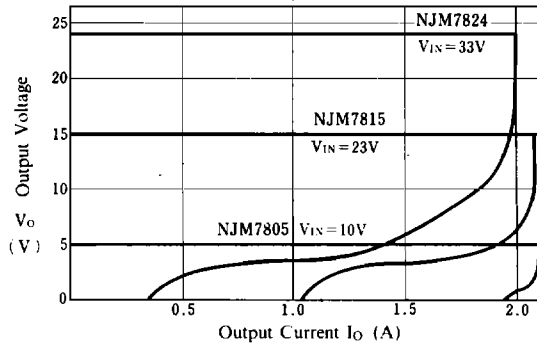
NJM7812 Dropout Characteristics

($T_j = 25^\circ C$)



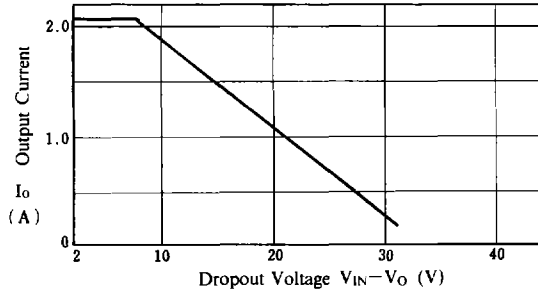
NJM7805/15/24 Load Characteristics

($T_j = 25^\circ C$)

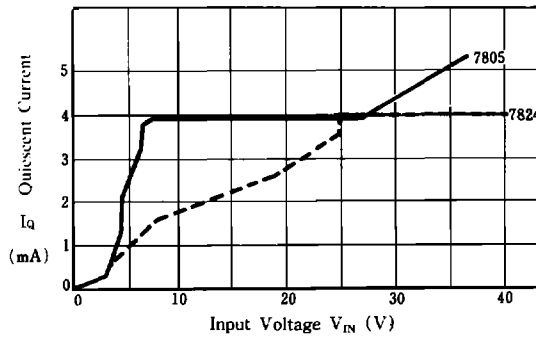


■ Typical Characteristics

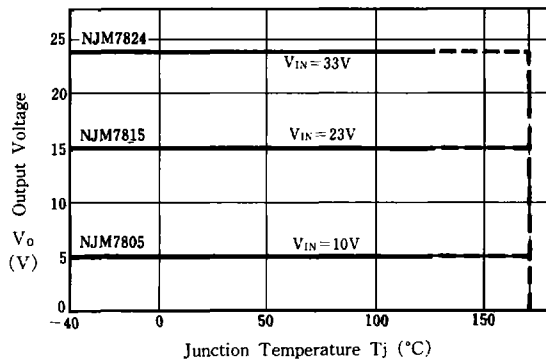
NJM7800 Series Short Circuit Output Current
($T_j = 25^\circ\text{C}$, ∞ Heat Sink)



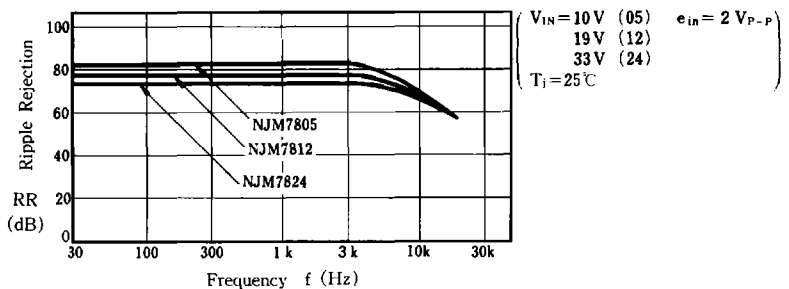
NJM7805/24 Quiescent Current vs. Input Voltage
($T_j = 25^\circ\text{C}$)



NJM7805/15/24 Output Voltage vs. Junction Temperature



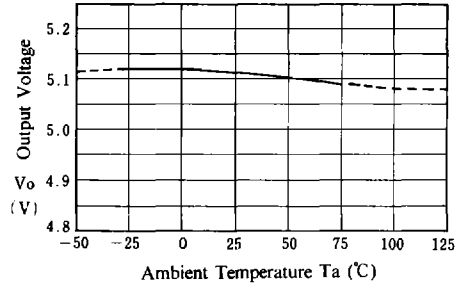
NJM7805/12/24 Ripple Rejection vs. Frequency



6

■ Typical Characteristics

NJM7805 Output Voltage vs. Temperature



NJM7808 Output Voltage vs. Temperature

