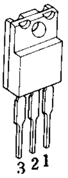
NJM2930

The NJM2930 3-terminal positive voltage regulator features an ability to source 150mA of output current (100mA: L-Type) with an input-output differential of 0.6V or less. Efficient use of low input voltages obtained, for example, from an automotive battery during cold crank conditions, allows 5V circuitry to be properly powered with supply voltages as low as 5.6V.

Familiar regulator features such as current limit and thermal overload protection are also provided.

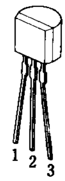
■ Package Outline



1. Output
2. GND
3. Input

NJM2930

(TO-220F)



1. Input
2. GND
3. Output

NJM2930L

(TO-92)

■ Absolute Maximum Ratings (Ta=25°C)

Operating Input Voltage Range	V_{IN}	26V
Input Overvoltage Protection	V_{PR}	40V
Input Reverse Voltage	V_{INR1} (100ms)	−12V
Input Reverse Voltage	V_{INR2} (DC)	−6V
Maximum Output Current	I_{OM} (TO-92)	100mA
	(TO-220F)	150mA
Power Dissipation	P_D (TO-92)	500mW
	(TO-220F) (Note)	7.5W
Operating Temperature Range	T_{opr}	−30~75°C
Storage Temperature Range	T_{stg}	−40~125°C

(note) Case Temperature: T_{case}≦75°C, Thermal Resistance: θ_{jc}=5°C/W TYP.

■ Electrical Characteristics

NJM2930/NJM2930L-05 (Tj=25°C, V_{IN}=14V, C_2=10μF)

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_O	6V≦V_{IN}≦26V, 5mA≦I_O≦150mA	*1	4.5	5	5.5	V
〃	V_O	6V≦V_{IN}≦26V, 5mA≦I_O≦100mA	*2	4.5	5	5.5	V
Line Regulation	ΔV_O-V_I	9V≦V_{IN}≦16V, I_O=5mA		—	7	25	mV
〃	ΔV_O-V_I	6V≦V_{IN}≦26V, I_O=5mA		—	30	80	mV
Load Regulation	ΔV_O-I_O	5mA≦I_O≦150mA	*1	—	14	50	mV
〃	ΔV_O-I_O	5mA≦I_O≦100mA	*2	—	14	50	mV
Quiescent Current	I_{Q1}	I_O=10mA		—	4	7	mA
〃	I_{Q2}	I_O=150mA	*1	—	30	40	mA
〃	I_{Q3}	I_O=100mA	*2	—	25	40	mA
Dropout Voltage	ΔV_{I-O}	I_O=150mA	*1	—	0.3	0.6	V
〃	ΔV_{I-O}	I_O=100mA	*2	—	0.25	0.6	V
Output Noise Voltage	V_{ON}	BW=10Hz~100kHz, I_O=150mA	*1	—	140	—	μVrms
〃	V_{ON}	BW=10Hz~100kHz, I_O=40mA, V_{IN}=10V	*2	—	140	—	μVrms
Ripple Rejection	R.R	f=120Hz, I_O=150mA	*1	—	56	—	dB
〃	R.R	f=120Hz, I_O=40mA, V_{IN}=10V	*2	—	56	—	dB

*1: NJM2930 *2: NJM2930L

Note

All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques (T_W≦10ms, duty cycle≦5%). Output voltage changes due to changes in internal temperature must be taken into account separately.

NJM2930/NJM2930L-08 (Tj=25°C, V_{IN}=14V, C_2=10μF)

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_O	9.4V≦V_{IN}≦26V, 5mA≦I_O≦150mA	*1	7.2	8	8.8	V
Output Voltage	V_O	9.4V≦V_{IN}≦26V, 5mA≦I_O≦100mA	*2	7.2	8	8.8	V
Line Regulation	ΔV_O-V_I	9.4V≦V_{IN}≦16V, I_O=5mA		—	12	50	mV
Line Regulation	ΔV_O-V_I	9.4V≦V_{IN}≦26V, I_O=5mA		—	50	100	mV
Load Regulation	ΔV_O-I_O	5mA≦I_O≦150mA	*1	—	25	50	mV
Load Regulation	ΔV_O-I_O	5mA≦I_O≦100mA	*2	—	25	50	mV
Quiescent Current	I_{Q1}	I_O=10mA		—	4	7	mA
Quiescent Current	I_{Q2}	I_O=150mA	*1	—	30	40	mA
Quiescent Current	I_{Q3}	I_O=100mA	*2	—	25	40	mA
Dropout Voltage	ΔV_{I-O}	I_O=150mA	*1	—	0.3	0.6	V
Dropout Voltage	ΔV_{I-O}	I_O=100mA	*2	—	0.25	0.6	V
Output Noise Voltage	V_{ON}	BW=10Hz~100kHz, I_O=150mA	*1	—	170	—	μVrms
Output Noise Voltage	V_{ON}	BW=10Hz~100kHz, I_O=40mA	*2	—	170	—	μVrms
Ripple Rejection	R.R	f=120Hz, I_O=150mA	*1	—	52	—	dB
Ripple Rejection	R.R	f=120Hz, I_O=40mA	*2	—	52	—	dB

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NJM2930/NJM2930L-85 (Tj=25°C, V_{IN}=14V, C_2=10μF)

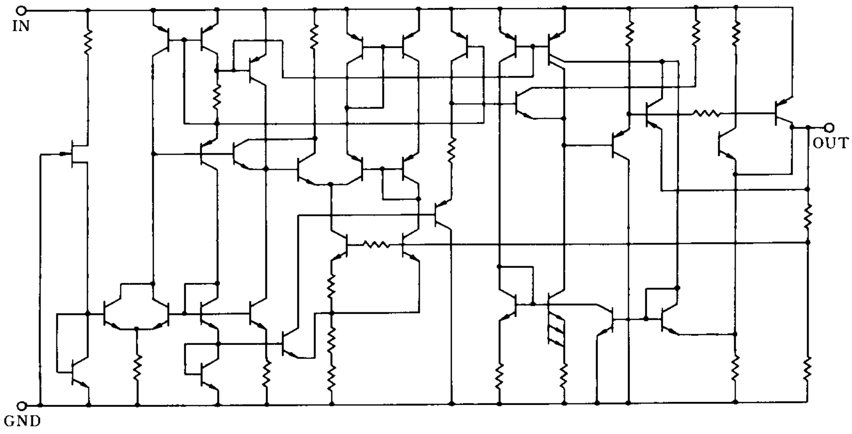
Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Unit
Output Voltage	V_O	9.95V≦V_{IN}≦26V, 5mA≦I_O≦150mA	*1	7.65	8.5	9.35	V
Output Voltage	V_O	9.95V≦V_{IN}≦26V, 5mA≦I_O≦100mA	*2	7.65	8.5	9.35	V
Line Regulation	ΔV_O-V_I	9.95V≦V_{IN}≦16V, I_O=5mA		—	12	50	mV
Line Regulation	ΔV_O-V_I	9.95V≦V_{IN}≦26V, I_O=5mA		—	50	100	mV
Load Regulation	ΔV_O-I_O	5mA≦I_O≦150mA	*1	—	25	50	mV
Load Regulation	ΔV_O-I_O	5mA≦I_O≦100mA	*2	—	25	50	mV
Quiescent Current	I_{Q1}	I_O=10mA		—	4	7	mA
Quiescent Current	I_{Q2}	I_O=150mA	*1	—	30	40	mA
Quiescent Current	I_{Q3}	I_O=100mA	*2	—	25	40	mA
Dropout Voltage	ΔV_{I-O}	I_O=150mA	*1	—	0.3	0.6	V
Dropout Voltage	ΔV_{I-O}	I_O=100mA	*2	—	0.25	0.6	V
Output Noise Voltage	V_{ON}	BW=10Hz~100kHz, I_O=150mA	*1	—	170	—	μVrms
Output Noise Voltage	V_{ON}	BW=10Hz~100kHz, I_O=40mA	*2	—	170	—	μVrms
Ripple Rejection	R.R	f=120Hz, I_O=150mA	*1	—	52	—	dB
Ripple Rejection	R.R	f=120Hz, I_O=40mA	*2	—	52	—	dB

*1: NJM2930 *2: NJM2930L

Note

All characteristics except noise voltage and ripple rejection ratio are measured using pulse techniques (T_W≦10ms, duty cycle≦5%). Output voltage changes due to changes in internal temperature must be taken into account separately.

■ **Equivalent Circuit**

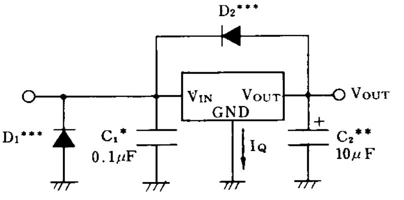


■ **Standard Application Examples**

* This NJM2930 is required when the mounting position is separated from the power filter.

** Use an aluminum electrolytic capacitor or a tantalum capacitor as C_2. The temperature guarantee range of capacitors should be down to −30°C. A capacity value of 10μF is a minimum requirement for improving the stability and transient response. Mount it at a position as close to the leads as possible.

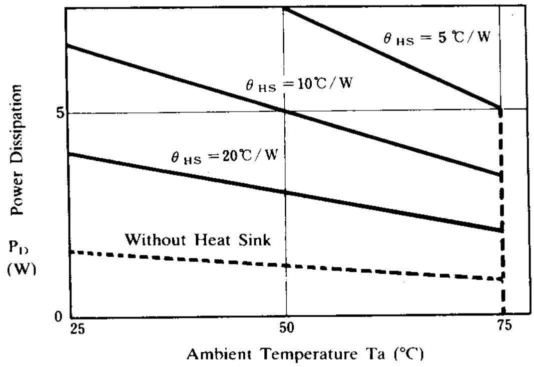
*** When application on automobile car operation, the minus pulse might be input on IC. In this case, however, the pulse might trigger to latch up. If it were that, this kind of latching up might be continued, the IC would burn up into defective in many cases. It is advisable to apply D1,D2 as described in the drawing, in order to prevent from making any troubles. It is important to make devices D1, D2 against V_{IN} to be able to stand for brake down voltage, current volume, and then less volume for Vf.



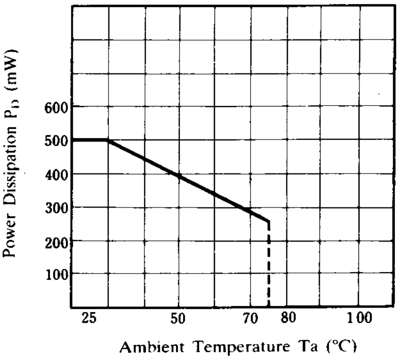
■ **Power Dissipation vs. Ambient Temperature**

NJM2930 (TO-220F)

@θ_{HS} = Heat Sink Thermal Resistance ∞ Heat Sink



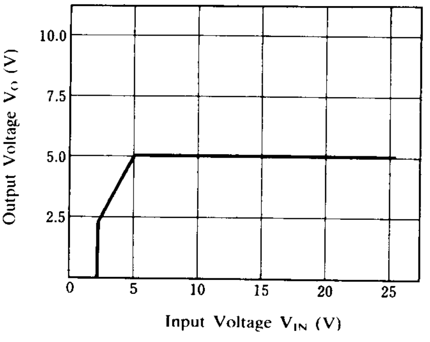
NJM2930L (TO-92)



■ Typical Characteristics

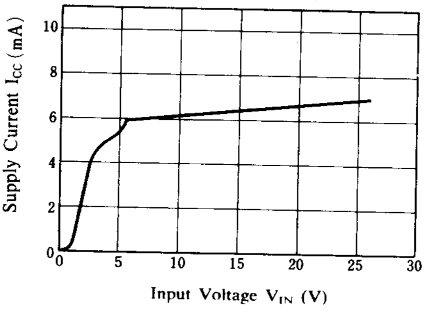
NJM2930-05/L05 Output Voltage

(Tj =25°C, I_O=0mA)



NJM2930-05/L05 I_{CC}-V_{IN}

(Tj=25°C, I_O=0mA)



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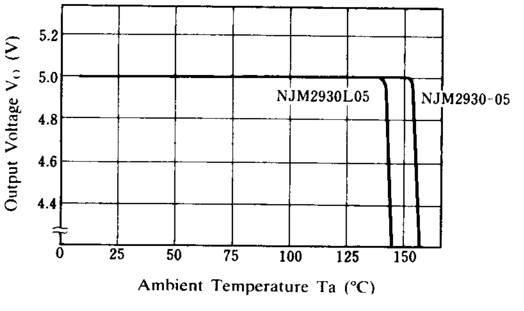
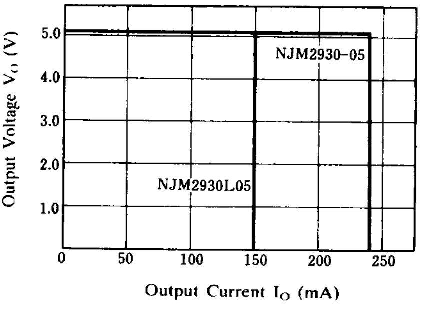
NJM2930-05/L05 Thermal Shutdown

(V_{IN}=14V, I_O=50mA)



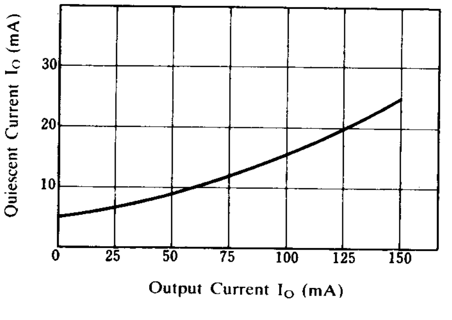
NJM2930-05/L05 Output Current vs. Output Voltage

(V_{IN}=14V, Tj=25°C)



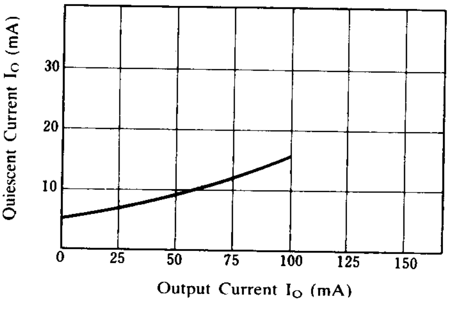
NJM2930L05 Output Current vs. Quiescent Current

(V_{IN}=14V, Tj=25°C)



NJM2930-05 Output Current vs. Quiescent Current

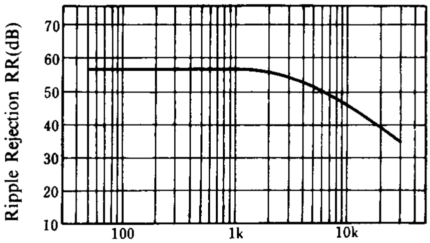
(V_{IN}=14V, Tj=25°C)



■ Typical Characteristics

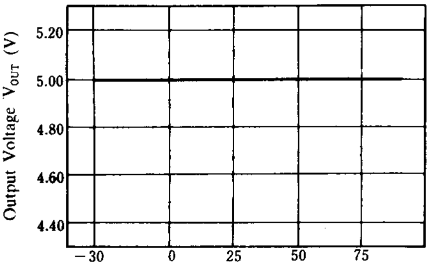
NJM2930-05/L05 Ripple Rejection vs. Frequency

(Ta=25°C, V_{IN}=14V, I_O=40mA, e_{in}=2V_{P-P})



NJM2930-05/L05 Output Voltage

(V_{IN}=14V, I_O=1mA)



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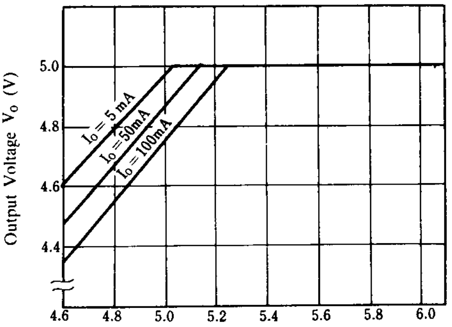
NJM2930L05 Dropout Voltage

(Tj=25°C)



NJM2930-05 Dropout Voltage

(Tj=25°C)