

## LOW DROPOUT VOLTAGE REGULATOR

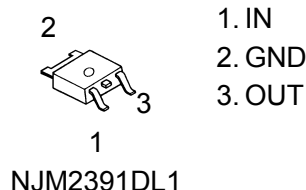
### ■ GENERAL DESCRIPTION

The NJM2391 is low dropout voltage regulators featuring high precision voltage.

It is suitable for Notebook PCs, PC cards and hard disks where 3.3V need to be generated from 5V supply.

A small TO-252 package is adopted for the space saving.

### ■ PACKAGE OUTLINE



- 1. IN
- 2. GND
- 3. OUT

### ■ FEATURES

- Output Current  $I_o(\text{max.})=1\text{A}$
- High Precision Output Voltage  $V_o\pm 1\%$
- Low Dropout Voltage  $\Delta V_{I-O} = 1.1\text{V typ. At } I_o=1\text{A}$
- Internal Excessive Voltage Protection Circuit
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline TO-252

### ■ ABSOLUTE MAXIMUM RATINGS

( $T_a=25^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V^+$	+10	V
Power Dissipation	$P_D$	TO-252 8 ( $T_c=25^\circ\text{C}$ ) 0.8( $T_a\leq 25^\circ\text{C}$ )	W
Operating Temperature	$T_{opr}$	-40 ~ +85	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-50 ~ +125	$^\circ\text{C}$

### ■ OUTPUT VOLTAGE RANK LIST

Device Name	$V_{OUT}$
NJM2391DL1-25	2.5V
NJM2391DL1-26	2.6V
NJM2391DL1-28	2.85V
NJM2391DL1-03	3.0V
NJM2391DL1-33	3.3V
NJM2391DL1-35	3.5V
NJM2391DL1-05	5.0V

■ ELECTRICAL CHARACTERISTICS (C<sub>IN</sub>=0.1μF, Co=10μF, T<sub>j</sub>=25°C)

Measurement is to be conducted is pulse testing

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Vo=2.5V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =5.5V, I <sub>o</sub> =0.01A	2.475	2.5	2.525	V
Line Regulation	ΔV <sub>O</sub> -V <sub>IN</sub>	V <sub>IN</sub> =4V~9V, I <sub>o</sub> =1A	-	-	50	mV
Load Regulation	ΔV <sub>O</sub> -I <sub>o</sub>	V <sub>IN</sub> =5.5V, I <sub>o</sub> =0~1A	-	-	50	mV
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =5.5V, I <sub>o</sub> =0A	-	2.3	4.0	mA
Ripple Rejection	RR	V <sub>IN</sub> =5.5V, e <sub>in</sub> =2V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =0.5A	53	63	-	dB
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =1A	-	1.1	1.2	V
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =5.5V, I <sub>o</sub> =0.5A BW=10Hz~100kHz	-	85	185	μV
Vo=2.6V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =5.6V, I <sub>o</sub> =0.01A	2.574	2.60	2.626	V
Line Regulation	ΔV <sub>O</sub> -V <sub>IN</sub>	V <sub>IN</sub> =4.1V~9.1V, I <sub>o</sub> =1A	-	-	52	mV
Load Regulation	ΔV <sub>O</sub> -I <sub>o</sub>	V <sub>IN</sub> =5.6V, I <sub>o</sub> =0~1A	-	-	52	mV
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =5.6V, I <sub>o</sub> =0A	-	2.3	4.0	mA
Ripple Rejection	RR	V <sub>IN</sub> =5.6V, e <sub>in</sub> =2V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =0.5A	53	63	-	dB
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =1A	-	1.1	1.2	V
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =5.6V, I <sub>o</sub> =0.5A BW=10Hz~100kHz	-	87	187	μV
Vo=2.85V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =5.85V, I <sub>o</sub> =0.01A	2.82	2.85	2.88	V
Line Regulation	ΔV <sub>O</sub> -V <sub>IN</sub>	V <sub>IN</sub> =4.35V~9.35V, I <sub>o</sub> =1A	-	-	57	mV
Load Regulation	ΔV <sub>O</sub> -I <sub>o</sub>	V <sub>IN</sub> =5.85V, I <sub>o</sub> =0~1A	-	-	57	mV
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =5.85V, I <sub>o</sub> =0A	-	2.3	4.0	mA
Ripple Rejection	RR	V <sub>IN</sub> =5.85V, e <sub>in</sub> =2V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =0.5A	53	63	-	dB
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =1A	-	1.1	1.2	V
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =5.85V, I <sub>o</sub> =0.5A BW=10Hz~100kHz	-	90	190	μV
Vo=3V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =6V, I <sub>o</sub> =0.01A	2.97	3.00	3.03	V
Line Regulation	ΔV <sub>O</sub> -V <sub>IN</sub>	V <sub>IN</sub> =4.5V~9.5V, I <sub>o</sub> =1A	-	-	60	mV
Load Regulation	ΔV <sub>O</sub> -I <sub>o</sub>	V <sub>IN</sub> =6V, I <sub>o</sub> =0~1A	-	-	60	mV
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =6V, I <sub>o</sub> =0A	-	2.3	4.0	mA
Ripple Rejection	RR	V <sub>IN</sub> =6V, e <sub>in</sub> =2V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =0.5A	52	62	-	dB
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =1A	-	1.1	1.2	V
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =6V, I <sub>o</sub> =0.5A BW=10Hz~100kHz	-	95	195	μV

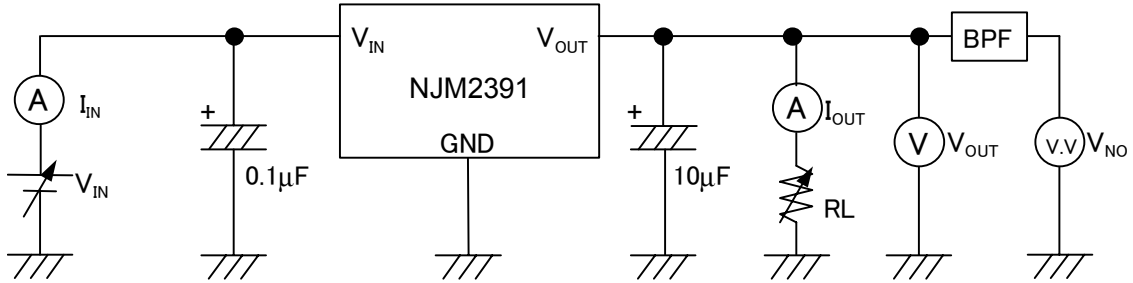
**■ ELECTRICAL CHARACTERISTICS (C<sub>IN</sub>=0.1μF, Co=10μF, T<sub>j</sub>=25°C)**

Measurement is to be conducted is pulse testing

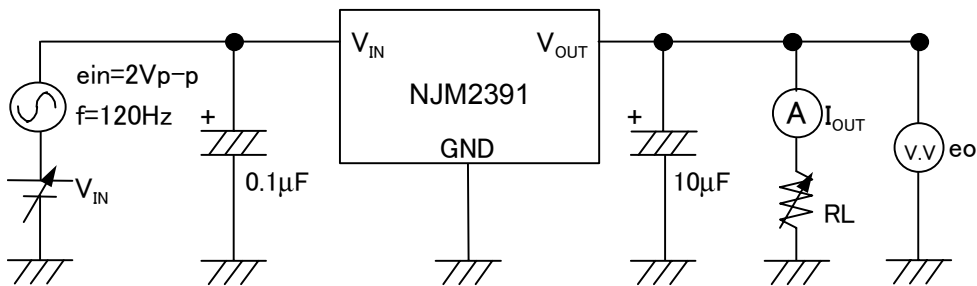
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Vo=3.3V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =6.3V, I <sub>o</sub> =0.01A	3.267	3.30	3.333	V
Line Regulation	ΔV <sub>O</sub> -V <sub>IN</sub>	V <sub>IN</sub> =4.8V~9.8V, I <sub>o</sub> =1A	–	–	66	mV
Load Regulation	ΔV <sub>O</sub> -I <sub>o</sub>	V <sub>IN</sub> =6.3V, I <sub>o</sub> =0~1A	–	–	66	mV
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =6.3V, I <sub>o</sub> =0A	–	2.3	4.0	mA
Ripple Rejection	RR	V <sub>IN</sub> =6.3V, e <sub>in</sub> =2V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =0.5A	52	62	–	dB
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =1A	–	1.1	1.2	V
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =6.3V, I <sub>o</sub> =0.5A BW=10Hz~100kHz	–	100	200	μV
Vo=3.5V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =6.5V, I <sub>o</sub> =0.01A	3.465	3.50	3.535	V
Line Regulation	ΔV <sub>O</sub> -V <sub>IN</sub>	V <sub>IN</sub> =5V~10V, I <sub>o</sub> =1A	–	–	70	mV
Load Regulation	ΔV <sub>O</sub> -I <sub>o</sub>	V <sub>IN</sub> =6.5V, I <sub>o</sub> =0~1A	–	–	70	mV
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =6.5V, I <sub>o</sub> =0A	–	2.3	4.0	mA
Ripple Rejection	RR	V <sub>IN</sub> =6.5V, e <sub>in</sub> =2V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =0.5A	52	62	–	dB
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =1A	–	1.1	1.2	V
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =6.5V, I <sub>o</sub> =0.5A BW=10Hz~100kHz	–	105	205	μV
Vo=5V Version Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =8V, I <sub>o</sub> =0.01A	4.95	5.00	5.05	V
Line Regulation	ΔV <sub>O</sub> -V <sub>IN</sub>	V <sub>IN</sub> =6.5V~9.5V, I <sub>o</sub> =1A	–	–	60	mV
Load Regulation	ΔV <sub>O</sub> -I <sub>o</sub>	V <sub>IN</sub> =8V, I <sub>o</sub> =0~1A	–	–	100	mV
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =8V, I <sub>o</sub> =0A	–	2.3	4.0	mA
Ripple Rejection	RR	V <sub>IN</sub> =8V, e <sub>in</sub> =2V <sub>P-P</sub> f=120Hz, I <sub>o</sub> =0.5A	50	60	–	dB
Dropout Voltage	ΔV <sub>I-O</sub>	I <sub>o</sub> =1A	–	1.1	1.2	V
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =8V, I <sub>o</sub> =0.5A BW=10Hz~100kHz	–	150	260	μV

■ TEST CIRCUIT

- 1. Output Voltage / Line Regulation / Load Regulation
- Quiescent Current / Dropout Voltage / Output Noise Voltage

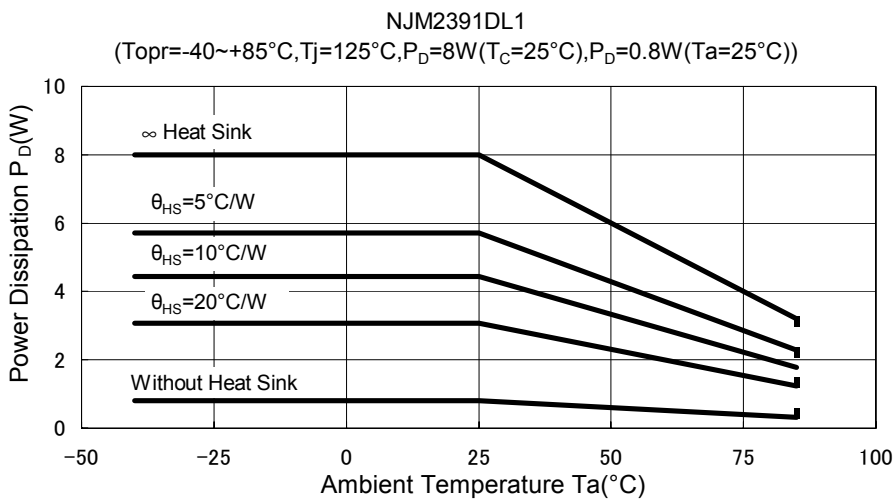


2. Ripple Rejection

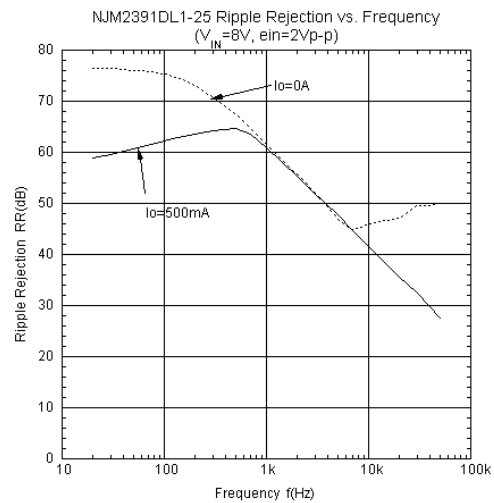
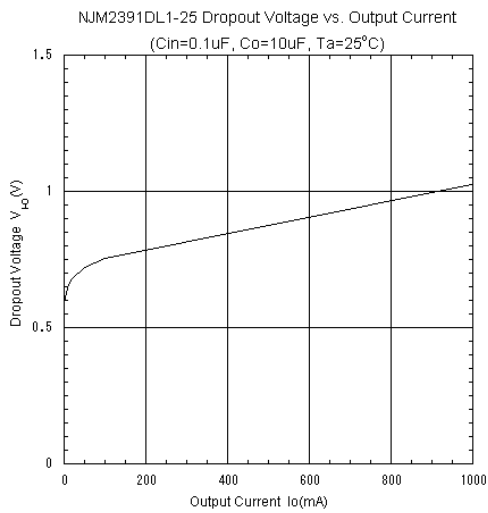
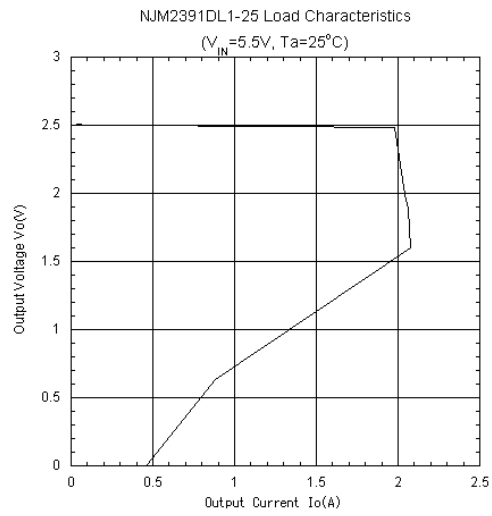
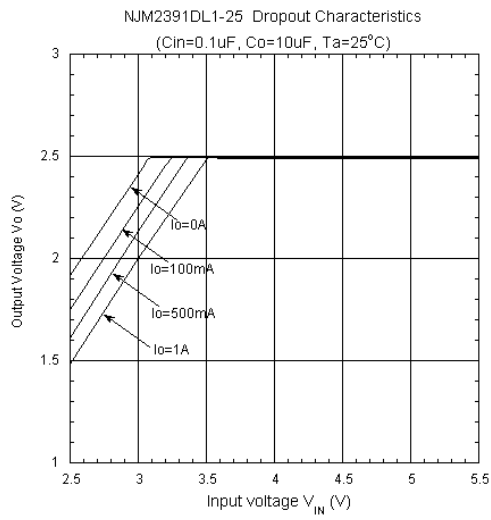


$$RR = 20 \log_{10} [e_{in}/e_o] \text{ (dB)}$$

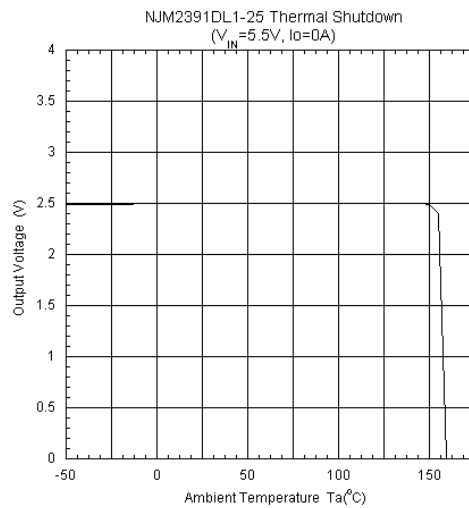
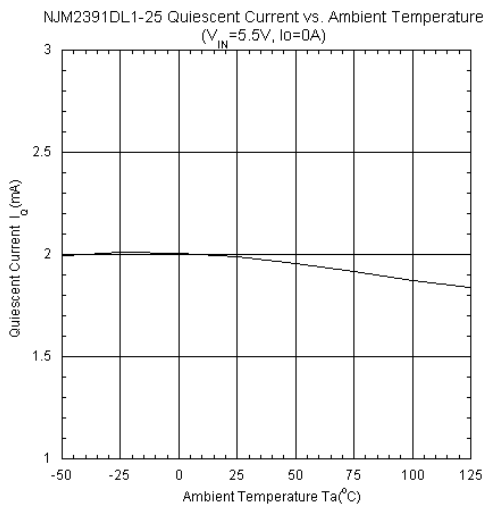
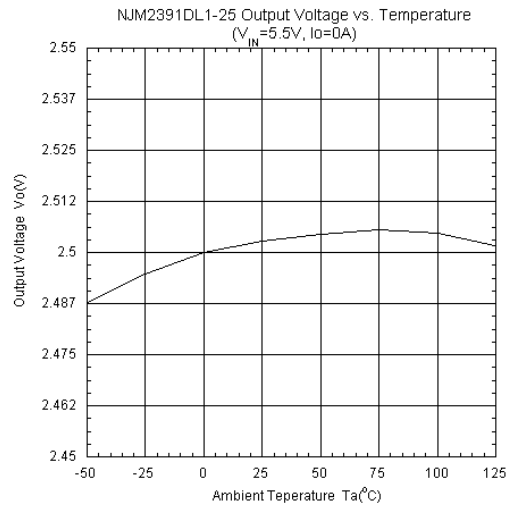
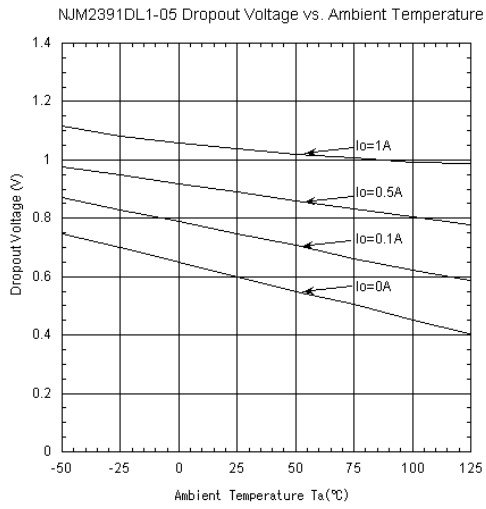
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



■ ELECTRICAL CHARACTERISTICS



## ELECTRICAL CHARACTERISTICS



**[CAUTION]**

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