

## LOW DROPOUT VOLTAGE REGULATOR

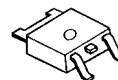
### ■ GENERAL DESCRIPTION

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

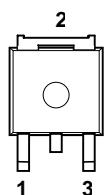


NJM2391DL1

### ■ 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

### ■ PIN CONFIGURATION



PIN FUNCTION

- 1.  $V_{IN}$
- 2. GND
- 3.  $V_{OUT}$

NJM2391DL1

### ■ 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, C<sub>O</sub>=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	$\Delta V_o/\Delta V_{IN}$	V <sub>IN</sub> =4V~9V, I <sub>o</sub> =1A	–	–	50	mV
Load Regulation	$\Delta V_o/\Delta I_o$	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	$\Delta V_{I-O}$	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	$\Delta V_o/\Delta V_{IN}$	V <sub>IN</sub> =4.1V~9.1V, I <sub>o</sub> =1A	–	–	52	mV
Load Regulation	$\Delta V_o/\Delta I_o$	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	$\Delta V_{I-O}$	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	$\Delta V_o/\Delta V_{IN}$	V <sub>IN</sub> =4.35V~9.35V, I <sub>o</sub> =1A	–	–	57	mV
Load Regulation	$\Delta V_o/\Delta I_o$	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	$\Delta V_{I-O}$	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	$\Delta V_o/\Delta V_{IN}$	V <sub>IN</sub> =4.5V~9.5V, I <sub>o</sub> =1A	–	–	60	mV
Load Regulation	$\Delta V_o/\Delta I_o$	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	$\Delta V_{I-O}$	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

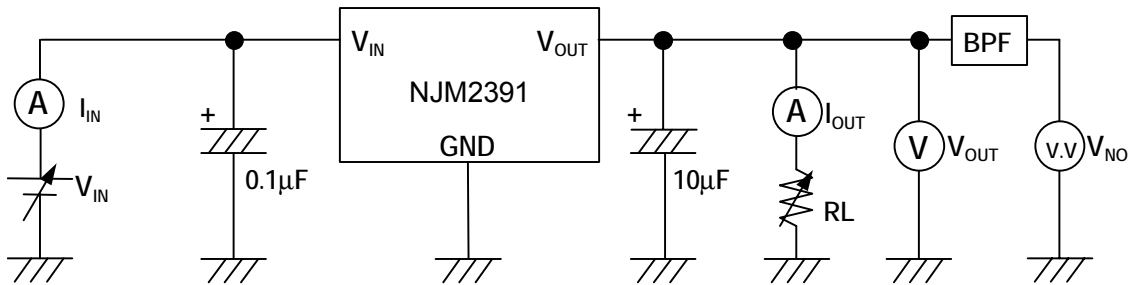
**■ ELECTRICAL CHARACTERISTICS ( $C_{IN}=0.1\mu F$ ,  $C_o=10\mu F$ ,  $T_j=25^\circ C$ )**

Measurement is to be conducted is pulse testing

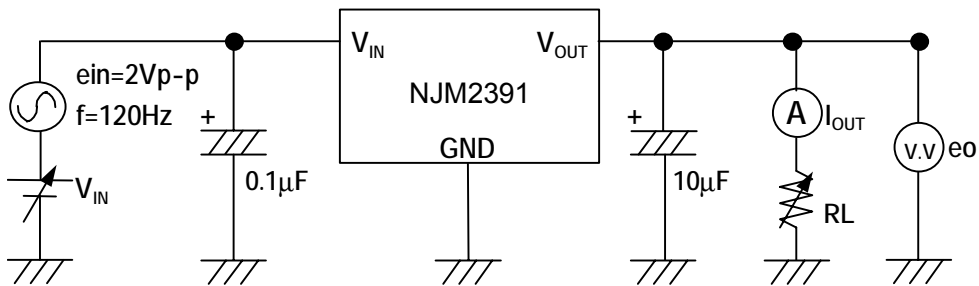
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Vo=3.3V Version Output Voltage	$V_O$	$V_{IN}=6.3V$ , $I_o=0.01A$	3.267	3.30	3.333	V
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=4.8V\sim 9.8V$ , $I_o=1A$	–	–	66	mV
Load Regulation	$\Delta V_o/\Delta I_o$	$V_{IN}=6.3V$ , $I_o=0\sim 1A$	–	–	66	mV
Quiescent Current	$I_Q$	$V_{IN}=6.3V$ , $I_o=0A$	–	2.3	4.0	mA
Ripple Rejection	RR	$V_{IN}=6.3V$ , $e_{in}=2V_{P-P}$ $f=120Hz$ , $I_o=0.5A$	52	62	–	dB
Dropout Voltage	$\Delta V_{I-O}$	$I_o=1A$	–	1.1	1.2	V
Output Noise Voltage	$V_{NO}$	$V_{IN}=6.3V$ , $I_o=0.5A$ $BW=10Hz\sim 100kHz$	–	100	200	$\mu V$
Vo=3.5V Version Output Voltage	$V_O$	$V_{IN}=6.5V$ , $I_o=0.01A$	3.465	3.50	3.535	V
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=5V\sim 10V$ , $I_o=1A$	–	–	70	mV
Load Regulation	$\Delta V_o/\Delta I_o$	$V_{IN}=6.5V$ , $I_o=0\sim 1A$	–	–	70	mV
Quiescent Current	$I_Q$	$V_{IN}=6.5V$ , $I_o=0A$	–	2.3	4.0	mA
Ripple Rejection	RR	$V_{IN}=6.5V$ , $e_{in}=2V_{P-P}$ $f=120Hz$ , $I_o=0.5A$	52	62	–	dB
Dropout Voltage	$\Delta V_{I-O}$	$I_o=1A$	–	1.1	1.2	V
Output Noise Voltage	$V_{NO}$	$V_{IN}=6.5V$ , $I_o=0.5A$ $BW=10Hz\sim 100kHz$	–	105	205	$\mu V$
Vo=5V Version Output Voltage	$V_O$	$V_{IN}=8V$ , $I_o=0.01A$	4.95	5.00	5.05	V
Line Regulation	$\Delta V_o/\Delta V_{IN}$	$V_{IN}=6.5V\sim 9.5V$ , $I_o=1A$	–	–	60	mV
Load Regulation	$\Delta V_o/\Delta I_o$	$V_{IN}=8V$ , $I_o=0\sim 1A$	–	–	100	mV
Quiescent Current	$I_Q$	$V_{IN}=8V$ , $I_o=0A$	–	2.3	4.0	mA
Ripple Rejection	RR	$V_{IN}=8V$ , $e_{in}=2V_{P-P}$ $f=120Hz$ , $I_o=0.5A$	50	60	–	dB
Dropout Voltage	$\Delta V_{I-O}$	$I_o=1A$	–	1.1	1.2	V
Output Noise Voltage	$V_{NO}$	$V_{IN}=8V$ , $I_o=0.5A$ $BW=10Hz\sim 100kHz$	–	150	260	$\mu V$

■ TEST CIRCUIT

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

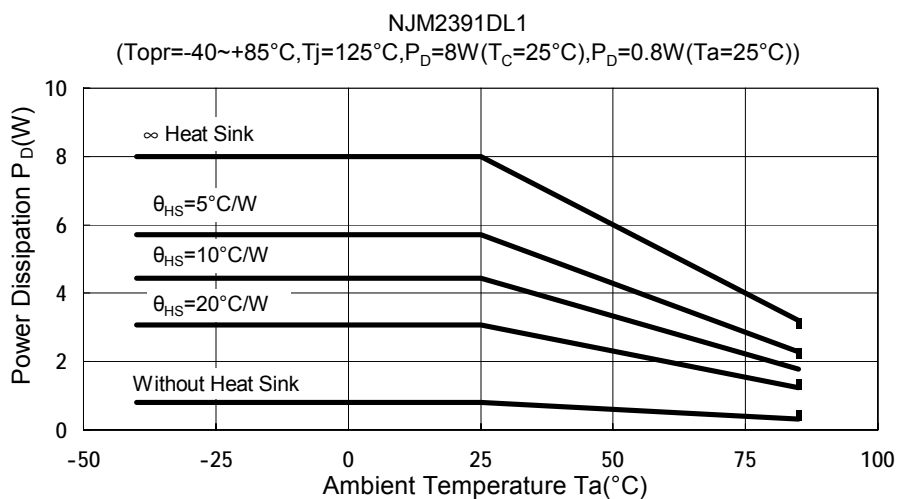


2. Ripple Rejection

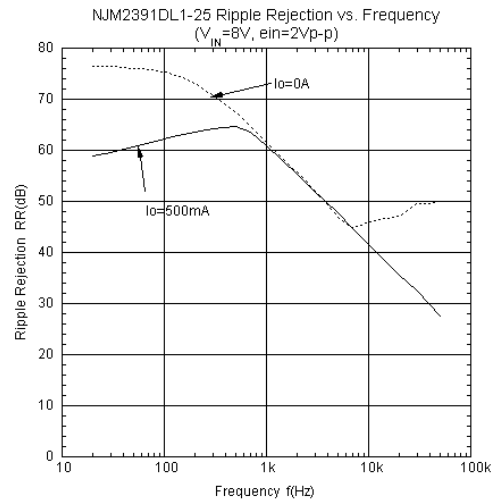
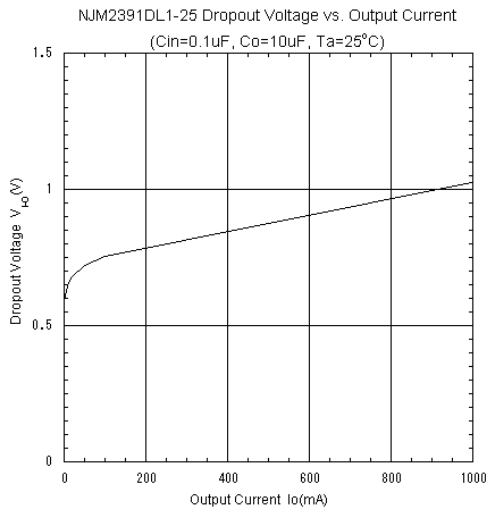
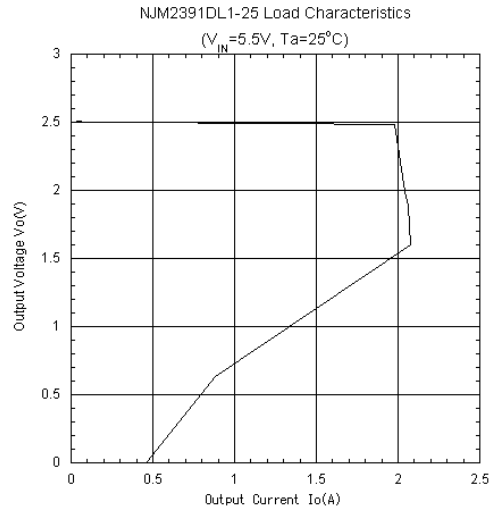
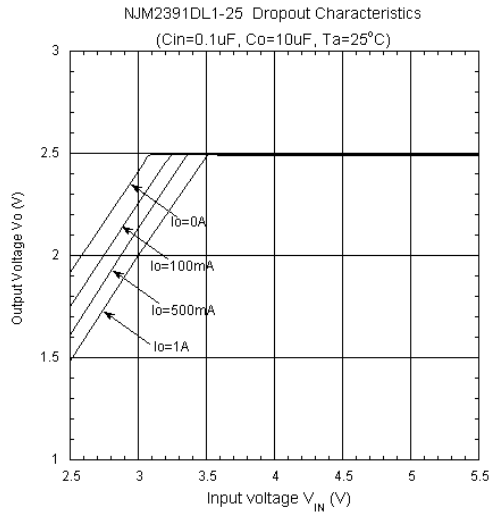


$$RR = 20 \log_{10} [e_{in}/e_o] \text{ (dB)}$$

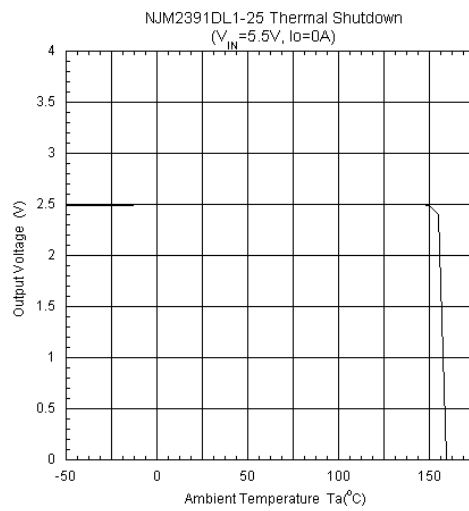
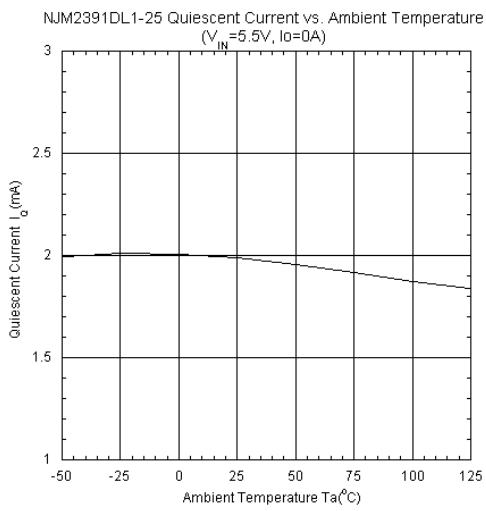
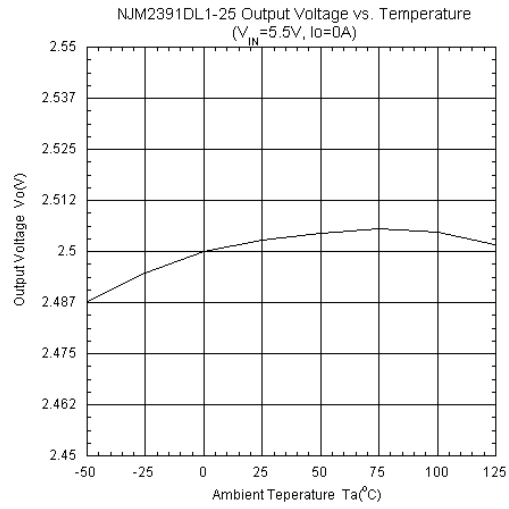
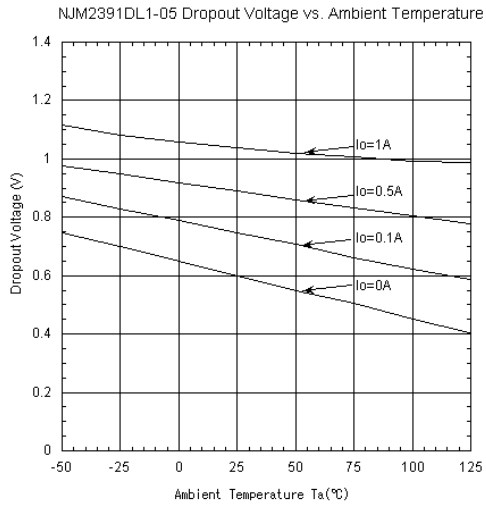
■ POWER DISSIPATION vs. AMBIENT TEMPERATURE



■ ELECTRICAL CHARACTERISTICS



## ELECTRICAL CHARACTERISTICS



**[CAUTION]**

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