OUTLINE

The R1112N Series are CMOS-based voltage regulator ICs with high output voltage accuracy, extremely low supply current, low ON-resistance, and high Ripple Rejection. Each of these voltage regulator ICs consists of a voltage reference unit, an error amplifier, resistors, a current limit circuit, and a chip enable circuit.

These ICs perform with low dropout voltage and a chip enable function. The line transient response and load transient response of the R1112N Series are excellent, thus these ICs are very suitable for the power supply for hand-held communication equipment.

The output voltage of these ICs is fixed with high accuracy. Since the package for these ICs is SOT-23-5 (Mini-mold) package, high density mounting of the ICs on boards is possible.

FEATURES

• Supply Current ................................................................. Typ. 100μA
• Standby Current .............................................................. Typ. 0.1μA
• Dropout Voltage .............................................................. Typ. 0.19V (IOUT=100mA 3.0V Output type)
• Ripple Rejection ............................................................. Typ. 80dB(f=1kHz)
• Temperature-Drift Coefficient of Output Voltage .......... Typ. ±100ppm/°C
• Line Regulation .............................................................. Typ. 0.05%/V
• Output Voltage Accuracy ............................................... ±2.0%
• Excellent Dynamic Response
• Package ................................................................. SOT-23-5(Mini-mold)
• Output Voltage ............................................................. 1.5V to 5.0V (0.1V steps)
  (For other voltages, please refer to MARK INFORMATIONS.)
• Built-in chip enable circuit .................................. (2 types; A: active “Low”, B: active “High”)
• Pin-out ................................................................. Similar to the LP2980/LP2985
• Built-in fold-back protection circuit ......................... Typ.30mA (Current at short mode)
• Ceramic capacitors recommended to be used with this IC

APPLICATIONS

• Power source for cellular phones such as GSM, CDMA and various kinds of PCSs.
• Power source for electrical appliances such as cameras, VCRs and camcorders.
• Power source for battery-powered equipment.
**SELECTED GUIDE**

The output voltage, the active type for the ICs can be selected at the user’s request.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Package</th>
<th>Quantity per Reel</th>
<th>Pb Free</th>
<th>Halogen Free</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1112Nxx1*-TR-FE</td>
<td>SOT-23-5</td>
<td>3,000 pcs</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

xx: The output voltage can be designated in the range from 1.5V(15) to 5.0V(50) in 0.1V steps. (For other voltages, please refer to MARK INFORMATIONS.)

* : Designation of Active Type.
  (A) "L" active type
  (B) "H" active type
PIN CONFIGURATION

PIN DESCRIPTION

<table>
<thead>
<tr>
<th>Pin No</th>
<th>Symbol</th>
<th>Pin Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VDD</td>
<td>Input Pin</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground Pin</td>
</tr>
<tr>
<td>3</td>
<td>CE or CE</td>
<td>Chip Enable Pin</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>VOUT</td>
<td>Output pin</td>
</tr>
</tbody>
</table>

ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIN</td>
<td>Input Voltage</td>
<td>7.0</td>
<td>V</td>
</tr>
<tr>
<td>VCE</td>
<td>Input Voltage(CE or CE Pin)</td>
<td>-0.3 to VIN+0.3</td>
<td>V</td>
</tr>
<tr>
<td>VOUT</td>
<td>Output Voltage</td>
<td>-0.3 to VIN+0.3</td>
<td>V</td>
</tr>
<tr>
<td>IOUT</td>
<td>Output Current</td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td>Pd</td>
<td>Power Dissipation</td>
<td>250</td>
<td>mW</td>
</tr>
<tr>
<td>Topt</td>
<td>Operating Temperature Range</td>
<td>-40 to 85</td>
<td>°C</td>
</tr>
<tr>
<td>Tstg</td>
<td>Storage Temperature Range</td>
<td>-55 to 125</td>
<td>°C</td>
</tr>
</tbody>
</table>

*) For Power Dissipation, please refer to PACKAGE INFORMATION.

ABSOLUTE MAXIMUM RATINGS
Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field.
The functional operation at or over these absolute maximum ratings is not assured.
## ELECTRICAL CHARACTERISTICS

### **R1112Nxx1A**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOUT</td>
<td>Output Voltage</td>
<td>$V_{IN} = Set\ VOUT + 1V$</td>
<td>$V_{OUT}$</td>
<td>$V_{OUT}$</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1 mA \leq I_{OUT} \leq 30 mA$</td>
<td>$\times 0.98$</td>
<td>$\times 1.02$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOUT</td>
<td>Output Current</td>
<td>$V_{IN} = Set\ VOUT = 1.0V$</td>
<td>150</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>ΔVOUT/ΔIOUT</td>
<td>Load Regulation</td>
<td>$V_{IN} = Set\ VOUT + 1V$</td>
<td>12</td>
<td>40</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>VDROP</td>
<td>Dropout Voltage</td>
<td>Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS</td>
<td>Supply Current</td>
<td>$V_{IN} = Set\ VOUT + 1V$</td>
<td>100</td>
<td>170</td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>Istandby</td>
<td>Supply Current (Standby)</td>
<td>$V_{IN} = V_{CE} = Set\ VOUT + 1V$</td>
<td>0.1</td>
<td>1.0</td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>ΔVOUT/ΔVIN</td>
<td>Line Regulation</td>
<td>$Set\ VOUT + 0.5V \leq V_{IN} \leq 6.0V$</td>
<td>0.05</td>
<td>0.20</td>
<td></td>
<td>%/V</td>
</tr>
<tr>
<td>RR</td>
<td>Ripple Rejection</td>
<td>$f = 1\ kHz$, Ripple 0.5Vp-p</td>
<td>80</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>VIN</td>
<td>Input Voltage</td>
<td>$V_{IN} = Set\ VOUT + 1V$</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>ΔVOUT/ΔTopt</td>
<td>Output Voltage</td>
<td>$I_{OUT} = 30 mA$</td>
<td>$\pm 100$</td>
<td></td>
<td></td>
<td>ppm/°C</td>
</tr>
<tr>
<td>ISC</td>
<td>Short Current Limit</td>
<td>$V_{OUT} = 0V$</td>
<td>30</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>RPU</td>
<td>CE Pull-up Resistance</td>
<td></td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
<td>MΩ</td>
</tr>
<tr>
<td>VCEH</td>
<td>CE Input Voltage &quot;H&quot;</td>
<td></td>
<td>1.5</td>
<td></td>
<td>$V_{IN}$</td>
<td>V</td>
</tr>
<tr>
<td>VCEL</td>
<td>CE Input Voltage &quot;L&quot;</td>
<td></td>
<td>0</td>
<td>0.25</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>en</td>
<td>Output Noise</td>
<td>BW=10Hz to 100kHz</td>
<td>30</td>
<td></td>
<td></td>
<td>µVrms</td>
</tr>
</tbody>
</table>

### RECOMMENDED OPERATING CONDITIONS **(ELECTRICAL CHARACTERISTICS)**

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.
### RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

### ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

<table>
<thead>
<tr>
<th>Output Voltage $V_{OUT}$ (V)</th>
<th>Dropout Voltage $V_{DIF}$ (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>Typ.</td>
</tr>
<tr>
<td>$1.5 \leq V_{OUT} \leq 1.6$</td>
<td>0.32</td>
</tr>
<tr>
<td>$1.7 \leq V_{OUT} \leq 1.8$</td>
<td>0.28</td>
</tr>
<tr>
<td>$1.9 \leq V_{OUT} \leq 2.3$</td>
<td>0.25</td>
</tr>
<tr>
<td>$2.4 \leq V_{OUT} \leq 2.7$</td>
<td>0.20</td>
</tr>
<tr>
<td>$2.8 \leq V_{OUT} \leq 5.0$</td>
<td>0.19</td>
</tr>
</tbody>
</table>

$\Delta V_{OUT} / \Delta I_{OUT}$

- For $V_{IN} = Set V_{OUT} + 1V$
- $1mA \leq I_{OUT} \leq 80mA$

$\Delta V_{OUT} / \Delta V_{IN}$

- For $V_{IN} = Set V_{OUT} + 1V$
- $0.5V \leq V_{IN} \leq 6.0V$
- $I_{OUT} = 30mA$

$\Delta V_{OUT} / \Delta T$

- For $I_{OUT} = 30mA$
- $-40^\circ \leq T_{OPT} \leq 85^\circ$

$\Delta V_{OUT} / \Delta I$

- $I_{OUT} = 100mA$
- $V_{OUT} = 0V$

$\Delta V_{OUT} / \Delta T$

- $I_{OUT} = 100mA$
- $V_{OUT} = 0V$

<table>
<thead>
<tr>
<th>Condition</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta V_{OUT} / \Delta I$</td>
<td>0.32</td>
<td>0.55</td>
</tr>
<tr>
<td>$\Delta V_{OUT} / \Delta T$</td>
<td>0.28</td>
<td>0.47</td>
</tr>
<tr>
<td>$\Delta V_{OUT} / \Delta V_{IN}$</td>
<td>0.25</td>
<td>0.35</td>
</tr>
<tr>
<td>$\Delta V_{OUT} / \Delta V_{CE}$</td>
<td>0.20</td>
<td>0.29</td>
</tr>
<tr>
<td>$\Delta V_{OUT} / \Delta V_{CE}$</td>
<td>0.19</td>
<td>0.26</td>
</tr>
</tbody>
</table>

* The products of the Set Vout ≤ 1.8V, the operation may become unstable in case of $V_{IN} \leq 2.0V$, so please use the products on condition that $V_{IN} \geq 2.0V$. 

**Note:** The products of the Set Vout ≤ 1.8V, the operation may become unstable in case of $V_{IN} \leq 2.0V$, so please use the products on condition that $V_{IN} \geq 2.0V$. 

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**R1112Nxx1B**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| VOUT   | Output Voltage | $V_{IN} = Set V_{OUT} + 1V$

**Topt = 25°C**

$1mA \leq I_{OUT} \leq 30mA$

- $V_{OUT} \times 0.98$
- $V_{OUT} \times 1.02$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Iout   | Output Current | $V_{IN} = Set V_{OUT} = 1.0V$

**Topt = 25°C**

$1mA \leq I_{OUT} \leq 30mA$

- $V_{OUT} \times 0.98$
- $V_{OUT} \times 1.02$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| ΔVout/ΔIout | Load Regulation | $V_{IN} = Set V_{OUT} + 1V$

**Topt = 25°C**

$1mA \leq I_{OUT} \leq 80mA$

- $12$
- $40$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Vdif   | Dropout Voltage | Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

**Topt = 25°C**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Istandby | Supply Current | $V_{IN} = Set V_{OUT} + 1V$

**Topt = 25°C**

$1mA \leq I_{OUT} \leq 30mA$

- $0.1$
- $1.0$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| ΔVout/ΔVin | Line Regulation | $V_{IN} = Set V_{OUT} + 1V$

**Topt = 25°C**

$V_{CE} = GND$

- $0.05$
- $0.20$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| RR | Ripple Rejection | $f = 1kHz$, Ripple 0.5V/p-p

**Topt = 25°C**

- $80$
- $dB$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Vn | Input Voltage | $V_{IN} = Set V_{OUT} + 1V$

**Topt = 25°C**

$1mA \leq I_{OUT} \leq 30mA$

- $0.05$
- $0.20$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| ΔVout/ΔT | Output Voltage | $V_{OUT} = 0V$

**Topt = 25°C**

$-40^\circ \leq T_{OPT} \leq 85^\circ$

- $100$
- $ppm/^{\circ}C$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Isc | Short Current Limit | $V_{OUT} = 0V$

**Topt = 25°C**

- $30$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| Rpd | CE Pull-down Resistance | $V_{OUT} = 0V$

**Topt = 25°C**

- $2.5$
- $5.0$
- $10.0$
- $M \Omega$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| ΔVout/ΔR | CE Input Voltage "H" | $V_{CE} = V_{IN}$

**Topt = 25°C**

- $1.5$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| ΔVout/ΔV | CE Input Voltage "L" | $V_{CE} = 0V$

**Topt = 25°C**

- $0.25$

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
</table>
| en | Output Noise | BW=10Hz to 100kHz

**Topt = 25°C**

- $30$
- $\mu V_{rms}$
In these ICs, fluctuation of the output voltage, $V_{OUT}$, is detected by feedback registers R1, R2, and the result is compared with a reference voltage by the error amplifier, so that a constant voltage is output. A current limit circuit for protection in short mode and a chip enable circuit, are included.

**TECHNICAL NOTES**

When using these ICs, consider the following points:

**Phase Compensation**

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, be sure to use a capacitor $C_{OUT}$ with good frequency characteristics and ESR (Equivalent Series Resistance).

We use Ceramic Capacitors for evaluation of these ICs.

Recommended Capacitors:
- GRM40X5R225K6.3 (Murata)
- GRM40-034X5R335K6.3 (Murata)
- GRM40-034X5R475K6.3 (Murata)

(Note: When the additional ceramic capacitors are connected to the Output Pin with Output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)

**PCB Layout**

Make $V_{DD}$ and GND lines sufficient. If their impedance is high, picking up the noise or unstable operation may result. Connect a capacitor with a capacitance value of 2.2μF or more between $V_{DD}$ and GND pin as close as possible.

Set external components, especially output capacitor as close as possible to the ICs and make wiring as short as possible.
TEST CIRCUITS

Fig.1 Standard test Circuit

Fig.2 Supply Current Test Circuit

Fig.3 Ripple Rejection, Line Transient Response Test Circuit

Fig.4 Load Transient Response Test Circuit
TYPICAL CHARACTERISTICS

1) Output Voltage vs. Output Current

### R1112N151B

<table>
<thead>
<tr>
<th>VIN (V)</th>
<th>0</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
<td>1.8</td>
<td>1.0</td>
<td>0.8</td>
</tr>
<tr>
<td>2.5</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.4</td>
<td>1.6</td>
</tr>
<tr>
<td>3.5</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
</tr>
</tbody>
</table>

### R1112N201B

<table>
<thead>
<tr>
<th>VIN (V)</th>
<th>0</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td>2.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>2.5</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>3.0</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### R1112N301B

<table>
<thead>
<tr>
<th>VIN (V)</th>
<th>0</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3</td>
<td>3.5</td>
<td>3.0</td>
<td>2.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>3.5</td>
<td>2.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>4.0</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### R1112N401B

<table>
<thead>
<tr>
<th>VIN (V)</th>
<th>0</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3</td>
<td>5.0</td>
<td>4.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>4.5</td>
<td>4.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>5.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
<td>0.5</td>
<td>0.2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

### R1112N501B

<table>
<thead>
<tr>
<th>VIN (V)</th>
<th>0</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3</td>
<td>6.0</td>
<td>5.0</td>
<td>4.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>5.5</td>
<td>5.0</td>
<td>4.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>6.0</td>
<td>4.0</td>
<td>3.0</td>
<td>2.0</td>
<td>1.0</td>
<td>0.5</td>
<td>0.2</td>
</tr>
</tbody>
</table>
2) Output Voltage vs. Input Voltage

**R1112N151B**

**R1112N201B**

**R1112N301B**

**R1112N401B**

**R1112N501B**

Limited Product
3) Dropout Voltage vs. Output Current

**R1112N151B**

- Dropout Voltage $V_{DIF} (V)$
  - $T_{opt} = -40^\circ C$
  - $T_{opt} = 25^\circ C$
  - $T_{opt} = 85^\circ C$

**Output Current $I_{OUT} (mA)$**

```plaintext
0 50 100 150
0.600 0.500 0.400 0.300 0.200 0.100 0.000
```

**R1112N201B**

- Dropout Voltage $V_{DIF} (V)$
  - $T_{opt} = -40^\circ C$
  - $T_{opt} = 25^\circ C$
  - $T_{opt} = 85^\circ C$

**Output Current $I_{OUT} (mA)$**

```plaintext
0 50 100 150
0.600 0.500 0.400 0.300 0.200 0.100 0.000
```

**R1112N301B**

- Dropout Voltage $V_{DIF} (V)$
  - $T_{opt} = -40^\circ C$
  - $T_{opt} = 25^\circ C$
  - $T_{opt} = 85^\circ C$

**Output Current $I_{OUT} (mA)$**

```plaintext
0 50 100 150
0.600 0.500 0.400 0.300 0.200 0.100 0.000
```

**R1112N401B**

- Dropout Voltage $V_{DIF} (V)$
  - $T_{opt} = -40^\circ C$
  - $T_{opt} = 25^\circ C$
  - $T_{opt} = 85^\circ C$

**Output Current $I_{OUT} (mA)$**

```plaintext
0 50 100 150
0.600 0.500 0.400 0.300 0.200 0.100 0.000
```

**R1112N501B**

- Dropout Voltage $V_{DIF} (V)$
  - $T_{opt} = -40^\circ C$
  - $T_{opt} = 25^\circ C$
  - $T_{opt} = 85^\circ C$

**Output Current $I_{OUT} (mA)$**

```plaintext
0 50 100 150
0.600 0.500 0.400 0.300 0.200 0.100 0.000
```
4) Output Voltage vs. Temperature

**R1112N151A/B**

\[ \text{Output Voltage } V_{OUT} (V) \]

- \( \text{VIN} = 2.5 \) V, \( \text{CIN} = 1 \mu \text{F} \)
- \( \text{COUT} = 2.2 \mu \text{F} \)
- \( \text{IOUT} = 30 \text{mA} \)

**R1112N201A/B**

\[ \text{Output Voltage } V_{OUT} (V) \]

- \( \text{VIN} = 3.0 \) V, \( \text{CIN} = 1 \mu \text{F} \)
- \( \text{COUT} = 2.2 \mu \text{F} \)
- \( \text{IOUT} = 30 \text{mA} \)

**R1112N301A/B**

\[ \text{Output Voltage } V_{OUT} (V) \]

- \( \text{VIN} = 4.0 \) V, \( \text{CIN} = 1 \mu \text{F} \)
- \( \text{COUT} = 2.2 \mu \text{F} \)
- \( \text{IOUT} = 30 \text{mA} \)

**R1112N401A/B**

\[ \text{Output Voltage } V_{OUT} (V) \]

- \( \text{VIN} = 5.0 \) V, \( \text{CIN} = 1 \mu \text{F} \)
- \( \text{COUT} = 2.2 \mu \text{F} \)
- \( \text{IOUT} = 30 \text{mA} \)

**R1112N501A/B**

\[ \text{Output Voltage } V_{OUT} (V) \]

- \( \text{VIN} = 6.0 \) V, \( \text{CIN} = 1 \mu \text{F} \)
- \( \text{COUT} = 2.2 \mu \text{F} \)
- \( \text{IOUT} = 30 \text{mA} \)
5) Supply Current vs. Input Voltage

**R1112N151B**

![Supply Current vs. Input Voltage Graph for R1112N151B](image)

**R1112N201B**

![Supply Current vs. Input Voltage Graph for R1112N201B](image)

**R1112N301B**

![Supply Current vs. Input Voltage Graph for R1112N301B](image)

**R1112N401B**

![Supply Current vs. Input Voltage Graph for R1112N401B](image)

**R1112N501B**

![Supply Current vs. Input Voltage Graph for R1112N501B](image)
6) Supply Current vs. Temperature

R1112N151A/B

\[ V_{IN}=2.5 \, V \quad C_{IN}=1\mu F \]
\[ C_{OUT}=2.2\mu F \]

R1112N201A/B

\[ V_{IN}=3.0 \, V \quad C_{IN}=1\mu F \]
\[ C_{OUT}=2.2\mu F \]

R1112N301A/B

\[ V_{IN}=4.0 \, V \quad C_{IN}=1\mu F \]
\[ C_{OUT}=2.2\mu F \]

R1112N401A/B

\[ V_{IN}=5.0 \, V \quad C_{IN}=1\mu F \]
\[ C_{OUT}=2.2\mu F \]

R1112N501A/B

\[ V_{IN}=6.0 \, V \quad C_{IN}=1\mu F \]
\[ C_{OUT}=2.2\mu F \]
7) Ripple Rejection vs. Frequency

**R1112N151A/B**

- $V_{in}=2.5V+0.5V_{p-p}$
- $C_{out}=2.2\mu F$
- $I_{out}=30mA$

**R1112N201A/B**

- $V_{in}=3.0V+0.5V_{p-p}$
- $C_{out}=2.2\mu F$
- $I_{out}=30mA$

**R1112N301A/B**

- $V_{in}=4.0V+0.5V_{p-p}$
- $C_{out}=2.2\mu F$
- $I_{out}=30mA$

**R1112N401A/B**

- $V_{in}=5.0V+0.5V_{p-p}$
- $C_{out}=2.2\mu F$
- $I_{out}=30mA$

**R1112N501A/B**

- $V_{in}=6.0V+0.5V_{p-p}$
- $C_{out}=2.2\mu F$
- $I_{out}=30mA$
8) Ripple Rejection vs. Input Voltage (DC bias)

R1112N301B

---

Ripple Rejection RR (dB)

Input Voltage VIN (V)

3.10 3.20 3.30 3.40

COUT=Ceramic 2.2μF

IOUT=1mA

f=400Hz

f=1kHz

f=10kHz

Ripple Rejection RR (dB)

Input Voltage VIN (V)

3.10 3.20 3.30 3.40

COUT=Ceramic 2.2μF

IOUT=10mA

f=400Hz

f=1kHz

f=10kHz

Ripple Rejection RR (dB)

Input Voltage VIN (V)

3.10 3.20 3.30 3.40

COUT=Ceramic 2.2μF

IOUT=50mA

f=400Hz

f=1kHz

f=10kHz

9) Input Transient Response

R1112N501B

Topt=25°C

---

Vin

Vout

Vin=2.5V→3.5V

Iout=30mA

Cin=none

Cout=2.2μF

tr=tf=5μs
VIN=3.0V→4.0V
IOUT=30mA
CIN=none
COUT=2.2μF
tr/τf=5μs

VIN=4.0V→5.0V
IOUT=30mA
CIN=none
COUT=2.2μF
tr/τf=5μs

VIN=5.0V→6.0V
IOUT=30mA
CIN=none
COUT=2.2μF
tr/τf=5μs
10) Load Transient Response

**R1112N501B**

Topt=25°C

VIN=6.0V ↔ 7.0V

IOUT=30mA

CIN=none

COUT=2.2μF

tr/τf=5μs

**R1112N151B**

Topt=25°C

IOUT=50mA ↔ 100mA

VIN=2.5V

CIN=2.2μF

COUT=2.2μF

tr/τf=5μs

**R1112N201B**

Topt=25°C

IOUT=50mA ↔ 100mA

VIN=3.0V

CIN=2.2μF

COUT=2.2μF

tr/τf=5μs
R112N

R112N301B
 Tek Run : 2.50MS/s Average

I_{out}=50mA \leftrightarrow 100mA
V_{IN}=4.0V
C_{IN}=2.2\mu F
C_{OUT}=2.2\mu F
\text{tr/\tau}=5\mu s

R112N401B
 Tek Run : 2.50MS/s Average

I_{out}=50mA \leftrightarrow 100mA
V_{IN}=6.0V
C_{IN}=2.2\mu F
C_{OUT}=2.2\mu F
\text{tr/\tau}=5\mu s

R112N501B
 Tek Run : 2.50MS/s Average

I_{out}=50mA \leftrightarrow 100mA
V_{IN}=4.0V
C_{IN}=2.2\mu F
C_{OUT}=2.2\mu F
\text{tr/\tau}=5\mu s

Topt=25°C

Limited Product
TECHNICAL NOTES

When using these ICs, consider the following points:

In these ICs, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, be sure to use a capacitor $C_{OUT}$ with good frequency characteristics and ESR (Equivalent Series Resistance) of which is in the range described as follows:

![Ceramic Cap.](image)

Spectrum Analyzer

$V_{OUT}$

Vin

GND

Measuring Circuit for white noise; R1112N301B

The relationship between $I_{OUT}$ (the output current) and ESR of the output capacitor is shown in the graphs below. The conditions when the white noise level is under 40μV (Avg.) are indicated by the hatched area in the graph.

(Note: When additional ceramic capacitors are connected to the output pin with the output capacitor for phase compensation, operation might be unstable. Because of this, test these ICs with the same external components as the ones to be used on the PCB.)

<Measuring Conditions>
(1)$V_{IN}=V_{OUT}+1V$
(2)Frequency band: 10Hz to 1MHz
(3)Temperature: 25°C

![Graph 1](image)

R1112N151B $C_{OUT}=2.2\mu F, C_{IN}=2.2\mu F$

![Graph 2](image)

R1112N151B $C_{OUT}=4.7\mu F, C_{IN}=2.2\mu F$
TYPICAL APPLICATION

(External Components)
Output Capacitor; Ceramic 2.2μF (Set Output Voltage in the range from 2.5 to 5.0V)
Ceramic 4.7μF (Set Output Voltage in the range from 1.5 to 2.5V)
Input Capacitor; Ceramic 2.2μF
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