OUTLINE

The R1121N 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 R1121N 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. 35μA
- Standby Mode ................................................................. Typ. 0.1μA
- Dropout Voltage .............................................................. Typ. 0.2V (I_{\text{OUT}}=100mA)
- Ripple Rejection ............................................................. Typ. 70dB (f=1kHz)
- Temperature-Drift Coefficient of Output Voltage .......... Typ. ±100ppm/°C
- Line Regulation ............................................................... Typ. 0.05%/V
- Output Voltage Accuracy.................................................. ±2.0%
- Output Voltage Range..................................................... 1.5V to 5.0V (0.1V steps)
  (For other voltages, please refer to MARK INFORMATIONS.)
- Package ................................................................. SOT-23-5 (Mini-mold)
- Built-in chip enable circuit ( 2 types: A: active “L”, B: active “H”)
- Pin-out ................................................................. Similar to the TK112, TK111

APPLICATIONS

- Power source for cellular phones such as GSM, CDMA and various kinds of PCSs.
- Power source for domestic appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.
**BLOCK DIAGRAM**

![Block Diagram](image)

**SELECTION 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>R1121Nxx1-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  
(B) "H" active
PIN CONFIGURATION

SOT-23-5

PIN DESCRIPTION

<table>
<thead>
<tr>
<th>Pin No</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V_{OUT}</td>
<td>Output pin</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>Ground Pin</td>
</tr>
<tr>
<td>3</td>
<td>V_{DD}</td>
<td>Input Pin</td>
</tr>
<tr>
<td>4</td>
<td>CE or CE</td>
<td>Chip Enable Pin</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td>No Connection</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>V_{IN}</td>
<td>Input Voltage</td>
<td>9.0</td>
<td>V</td>
</tr>
<tr>
<td>V_{CE}</td>
<td>Input Voltage (CE or CE Pin)</td>
<td>-0.3 ~ V_{IN}+0.3</td>
<td>V</td>
</tr>
<tr>
<td>V_{OUT}</td>
<td>Output Voltage</td>
<td>-0.3 ~ V_{IN}+0.3</td>
<td>V</td>
</tr>
<tr>
<td>I_{OUT}</td>
<td>Output Current</td>
<td>200</td>
<td>mA</td>
</tr>
<tr>
<td>P_{D}</td>
<td>Power Dissipation (SOT-23-5)</td>
<td>420</td>
<td>mW</td>
</tr>
<tr>
<td>Topt</td>
<td>Operating Temperature Range</td>
<td>-40 ~ 85</td>
<td>°C</td>
</tr>
<tr>
<td>Tstg</td>
<td>Storage Temperature Range</td>
<td>-55 ~ 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

- **R1121Nxx1A**

<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>V\text{OUT}</td>
<td>Output Voltage</td>
<td>(V_{\text{IN}} = \text{Set \ VOUT} + 1\text{V}) (1\text{mA} \leq I_{\text{OUT}} \leq 30\text{mA})</td>
<td>V\text{OUT} \times0.98</td>
<td>V\text{OUT} \times1.02</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>I\text{OUT}</td>
<td>Output Current</td>
<td>Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta V\text{OUT}/\Delta I\text{OUT})</td>
<td>Load Regulation</td>
<td>(V_{\text{IN}} = \text{Set \ VOUT} + 1\text{V}) (1\text{mA} \leq I_{\text{OUT}} \leq 80\text{mA})</td>
<td>12</td>
<td>40</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>V\text{DIFF}</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>I\text{SS}</td>
<td>Supply Current</td>
<td>(V_{\text{IN}} = \text{Set \ VOUT} + 1\text{V})</td>
<td>35</td>
<td>70</td>
<td></td>
<td>\mu\text{A}</td>
</tr>
<tr>
<td>I\text{STANDBY}</td>
<td>Supply Current (Standby)</td>
<td>(V_{\text{IN}} = V_{\text{CE}} = \text{Set \ VOUT} + 1\text{V})</td>
<td>0.1</td>
<td>1.0</td>
<td></td>
<td>\mu\text{A}</td>
</tr>
<tr>
<td>(\Delta V\text{OUT}/\Delta V\text{IN})</td>
<td>Line Regulation</td>
<td>(\text{Set \ VOUT} + 0.5\text{V} \leq V_{\text{IN}} \leq 8.0\text{V}) (I_{\text{OUT}} = 30\text{mA})</td>
<td>0.05</td>
<td>0.20</td>
<td></td>
<td>%/\text{V}</td>
</tr>
<tr>
<td>RR</td>
<td>Ripple Rejection</td>
<td>(f = 1\text{kHz}, \text{Ripple} 0.5\text{Vp-p} \ V_{\text{IN}} = \text{Set \ VOUT} + 1\text{V})</td>
<td>70</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>V\text{IN}</td>
<td>Input Voltage</td>
<td>(2.0 \leq V_{\text{IN}} \leq 8.0\text{V})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\Delta V\text{OUT}/\Delta T_{\text{OPT}})</td>
<td>Output Voltage Temperature Coefficient</td>
<td>(I_{\text{OUT}} = 30\text{mA}) (-40^\circ\text{C} \leq T_{\text{OPT}} \leq 85^\circ\text{C})</td>
<td>±100</td>
<td></td>
<td></td>
<td>ppm/°C</td>
</tr>
<tr>
<td>I\text{sc}</td>
<td>Short Current Limit</td>
<td>(V_{\text{OUT}} = 0\text{V})</td>
<td>50</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>R\text{PU}</td>
<td>CE Pull-up Resistance</td>
<td>(2.5 \leq R_{\text{PU}} \leq 10.0) (\Omega)</td>
<td>5.0</td>
<td>10.0</td>
<td></td>
<td>\Omega</td>
</tr>
<tr>
<td>V\text{CHE}</td>
<td>CE Input Voltage “H”</td>
<td></td>
<td>1.5</td>
<td>V_{\text{IN}}</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>V\text{CEL}</td>
<td>CE Input Voltage “L”</td>
<td></td>
<td>0.00</td>
<td>0.25</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>en</td>
<td>Output Noise</td>
<td>(\text{BW}=10\text{Hz to }100\text{kHz})</td>
<td>30</td>
<td></td>
<td></td>
<td>\mu\text{Vrms}</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.
**R1121Nxx1B**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Item</th>
<th>Conditions</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>$V_{IN} = \text{Set VOUT} + 1\text{V}$</td>
<td>$V_{OUT}$</td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1\text{mA} \leq I_{OUT} \leq 30\text{mA}$</td>
<td>$V_{OUT}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOUT</td>
<td>Output Current</td>
<td>Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE</td>
<td>$I_{OUT}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ΔVOUT/ΔIOUT</td>
<td>Load Regulation</td>
<td>$V_{IN} = \text{Set VOUT} + 1\text{V}$</td>
<td></td>
<td>12</td>
<td>40</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1\text{mA} \leq I_{OUT} \leq 80\text{mA}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VDIFF</td>
<td>Dropout Voltage</td>
<td>Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE</td>
<td>$V_{OUT}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS</td>
<td>Supply Current</td>
<td>$V_{IN} = \text{Set VOUT} + 1\text{V}$</td>
<td></td>
<td>35</td>
<td>70</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE} = \text{GND}$</td>
<td>$I_{SSTANDBY}$</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>$V_{IN} = \text{Set VOUT} + 1\text{V}$</td>
<td>$I_{OUT} = 30\text{mA}$</td>
<td>0.05</td>
<td>0.20</td>
<td></td>
<td>%/V</td>
</tr>
<tr>
<td>RR</td>
<td>Ripple Rejection</td>
<td>$f = 1\text{kHz}$, $\text{Ripple} \ 0.5\text{Vp-p}$</td>
<td>$I_{OUT} = 30\text{mA}$</td>
<td>70</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>VIN</td>
<td>Input Voltage</td>
<td>$2.0 \leq V_{IN} \leq 8.0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>ΔVOUT/ΔTopt</td>
<td>Output Voltage</td>
<td>$I_{OUT} = 30\text{mA}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ppm/°C</td>
</tr>
<tr>
<td></td>
<td>Temperatue Coefficient</td>
<td>$-40^\circ \text{C} \leq T_{OPT} \leq 85^\circ \text{C}$</td>
<td>$I_{SSTANDBY}$</td>
<td>50</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>ISC</td>
<td>Short Current Limit</td>
<td>$V_{OUT} = 0\text{V}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPD</td>
<td>CE Pull-down Resistance</td>
<td>$V_{OUT} = 0\text{V}$</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>$1.5 \leq V_{IN} \leq V_{OUT}$</td>
<td></td>
<td>1.5</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>VCEL</td>
<td>CE Input Voltage &quot;L&quot;</td>
<td>$0.00 \leq V_{IN} \leq 0.25\text{V}$</td>
<td></td>
<td>0.00</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></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.
ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

Topt = 25°C

<table>
<thead>
<tr>
<th>Output Voltage Vout (V)</th>
<th>Output Current Iout (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>Min.</td>
</tr>
<tr>
<td>1.5 ≤ Vout ≤ 1.7</td>
<td>100</td>
</tr>
<tr>
<td>1.8 ≤ Vout ≤ 5.0</td>
<td>100</td>
</tr>
</tbody>
</table>

VIN - VOUT = 1.0V

Topt = 25°C

<table>
<thead>
<tr>
<th>Output Voltage Vout (V)</th>
<th>Dropout Voltage Vdiff (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>Min.</td>
</tr>
<tr>
<td>1.5</td>
<td>0.50</td>
</tr>
<tr>
<td>1.6</td>
<td>0.40</td>
</tr>
<tr>
<td>1.7</td>
<td>0.30</td>
</tr>
<tr>
<td>1.8 ≤ Vout ≤ 1.9</td>
<td>0.60</td>
</tr>
<tr>
<td>2.0 ≤ Vout ≤ 2.4</td>
<td>0.35</td>
</tr>
<tr>
<td>2.5 ≤ Vout ≤ 2.7</td>
<td>0.24</td>
</tr>
<tr>
<td>2.8 ≤ Vout ≤ 3.3</td>
<td>0.20</td>
</tr>
<tr>
<td>3.4 ≤ Vout ≤ 5.0</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Note: When set Output Voltage is equal or less than 2.0V, VIN should be equal or more than 2.0V.

OPERATION

In these ICs, fluctuation of output voltage, Vout 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.
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

**R1121N181B**

- **Output Voltage VOUT (V):**
  - VIN = 2.1V, Topt = 25°C
  - Output Current IOUT (mA):
    - 0, 200, 300, 400, 500, 100

**R1121N301B**

- **Output Voltage VOUT (V):**
  - VIN = 3.3V, Topt = 25°C
  - Output Current IOUT (mA):
    - 0, 200, 300, 400, 500, 100

**R1121N401B**

- **Output Voltage VOUT (V):**
  - VIN = 4.3V, Topt = 25°C
  - Output Current IOUT (mA):
    - 0, 200, 300, 400, 500, 100

**R1121N501B**

- **Output Voltage VOUT (V):**
  - VIN = 5.3V, Topt = 25°C
  - Output Current IOUT (mA):
    - 0, 200, 300, 400, 500, 100

2) Output Voltage vs. Input Voltage

**R1121N181B**

- **Output Voltage VOUT (V):**
  - VIN = 2.1V, Topt = 25°C
  - Output Current IOUT (mA):
    - 1mA, 30mA, 50mA

**R1121N301B**

- **Output Voltage VOUT (V):**
  - VIN = 3.3V, Topt = 25°C
  - Output Current IOUT (mA):
    - 1mA, 30mA, 50mA
3) Dropout Voltage vs. Output Current

**R1121N401B**

- Topt = 25°C
- Dropout Voltage VDIF (V) vs. Input Voltage V_in (V)
- Output Current I_out (mA): 1mA, 30mA, 50mA

**R1121N501B**

- Topt = 25°C
- Dropout Voltage VDIF (V) vs. Input Voltage V_in (V)
- Output Current I_out (mA): 1mA, 30mA, 50mA

**R1121N181B**

- Topt = 85°C
- Dropout Voltage VDIF (V) vs. Output Current I_out (mA)
- Temperature: 25°C, -40°C

**R1121N301B**

- Topt = 85°C
- Dropout Voltage VDIF (V) vs. Output Current I_out (mA)
- Temperature: 25°C, -40°C

**R1121N401B**

- Topt = 85°C
- Dropout Voltage VDIF (V) vs. Output Current I_out (mA)
- Temperature: 25°C, -40°C

**R1121N501B**

- Topt = 85°C
- Dropout Voltage VDIF (V) vs. Output Current I_out (mA)
- Temperature: 25°C, -40°C
4) Output Voltage vs. Temperature

**R1121N181B**

- $V_{IN} = 2.8V$
- $I_{OUT} = 30mA$

**R1121N301B**

- $V_{IN} = 4.0V$
- $I_{OUT} = 30mA$

**R1121N401B**

- $V_{IN} = 5.0V$
- $I_{OUT} = 30mA$

**R1121N501B**

- $V_{IN} = 6.0V$
- $I_{OUT} = 30mA$

5) Supply Current vs. Input Voltage

**R1121N181B**

- $T_{OPT} = 25^\circ C$

**R1121N301B**

- $T_{OPT} = 25^\circ C$
6) Supply Current vs. Temperature

**R1121N401B**  
$V_{IN} = 5.0V$

**R1121N501B**  
$V_{IN} = 6.0V$

**R1121N181B**  
$V_{IN} = 2.8V$

**R1121N301B**  
$V_{IN} = 2.8V$

**R1121N501B**  
$V_{IN} = 2.8V$
7) Dropout Voltage vs. Set Output Voltage

R1121Nxx1B

<table>
<thead>
<tr>
<th>Dropout Voltage VDIF (V)</th>
<th>Set Output Voltage Vreg (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>0.1</td>
<td>2.0</td>
</tr>
<tr>
<td>0.2</td>
<td>3.0</td>
</tr>
<tr>
<td>0.3</td>
<td>4.0</td>
</tr>
<tr>
<td>0.4</td>
<td>5.0</td>
</tr>
</tbody>
</table>

IOUT = 150mA
IOUT = 100mA
IOUT = 50mA
IOUT = 30mA
IOUT = 10mA

8) Ripple Rejection vs. Frequency

R1121N181B

VIN = 2.8Vdc + 0.5Vp-p
COUT = tantal 1.0μF

<table>
<thead>
<tr>
<th>Frequency f (kHz)</th>
<th>Ripple Rejection RR (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>80</td>
</tr>
<tr>
<td>1.0</td>
<td>70</td>
</tr>
<tr>
<td>10.0</td>
<td>60</td>
</tr>
<tr>
<td>100.0</td>
<td>50</td>
</tr>
</tbody>
</table>

IOUT = 1mA
IOUT = 30mA
IOUT = 50mA

R1121N181B

VIN = 4.0Vdc + 0.5Vp-p
COUT = tantal 2.2μF

<table>
<thead>
<tr>
<th>Frequency f (kHz)</th>
<th>Ripple Rejection RR (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>80</td>
</tr>
<tr>
<td>1.0</td>
<td>70</td>
</tr>
<tr>
<td>10.0</td>
<td>60</td>
</tr>
<tr>
<td>100.0</td>
<td>50</td>
</tr>
</tbody>
</table>

IOUT = 1mA
IOUT = 30mA
IOUT = 50mA

R1121N301B

VIN = 2.8Vdc + 0.5Vp-p
COUT = tantal 1.0μF

<table>
<thead>
<tr>
<th>Frequency f (kHz)</th>
<th>Ripple Rejection RR (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>80</td>
</tr>
<tr>
<td>1.0</td>
<td>70</td>
</tr>
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<td>10.0</td>
<td>60</td>
</tr>
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<td>100.0</td>
<td>50</td>
</tr>
</tbody>
</table>

IOUT = 1mA
IOUT = 30mA
IOUT = 50mA

R1121N301B

VIN = 4.0Vdc + 0.5Vp-p
COUT = tantal 2.2μF

<table>
<thead>
<tr>
<th>Frequency f (kHz)</th>
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</tr>
</thead>
<tbody>
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<td>50</td>
</tr>
</tbody>
</table>

IOUT = 1mA
IOUT = 30mA
IOUT = 50mA
9) Ripple Rejection vs. Input Voltage (DC bias)

**R1121N401B**

- **VIN** = 5.0Vdc + 0.5Vp-p
- **COUT** = tantal 1.0μF

**R1121N401B**

- **VIN** = 5.0Vdc + 0.5Vp-p
- **COUT** = tantal 2.2μF

**R1121N301B**

- **IOUT** = 1mA
- **COUT** = 2.2μF

**R1121N301B**

- **IOUT** = 10mA
- **COUT** = 2.2μF

**R1121N301B**

- **IOUT** = 50mA
- **COUT** = 2.2μF
10) Line Transient Response

R1121N301B

- $I_{OUT} = 30\text{mA}$
- $t_r = t_f = 5\ \mu\text{s}$
- $C_{OUT} = \text{Tantalum 1.0}\mu\text{F}$

Input Voltage

Output Voltage

Time $t$ ($\mu\text{s}$)

Output Voltage $V_{OUT}$ (V)

Input Voltage $V_{IN}$ (V)

0 20 40 60 80 100 120

0 1 2 3 4 5 6

R1121N301B

- $I_{OUT} = 30\text{mA}$
- $t_r = t_f = 5\ \mu\text{s}$
- $C_{OUT} = \text{Tantalum 2.2}\mu\text{F}$

Input Voltage

Output Voltage

Time $t$ ($\mu\text{s}$)

Output Voltage $V_{OUT}$ (V)

Input Voltage $V_{IN}$ (V)

0 20 40 60 80 100 120

0 1 2 3 4 5 6

R1121N301B

- $I_{OUT} = 30\text{mA}$
- $t_r = t_f = 5\ \mu\text{s}$
- $C_{OUT} = \text{Tantalum 6.8}\mu\text{F}$

Input Voltage

Output Voltage

Time $t$ ($\mu\text{s}$)

Output Voltage $V_{OUT}$ (V)

Input Voltage $V_{IN}$ (V)

0 20 40 60 80 100 120

0 1 2 3 4 5 6
11) Load Transient Response

R1121N301B

Vin=4V
CIN=Tantalum 1μF
COUT=Tantalum 1.0μF

Output Voltage VOUT (V)
Output Current IOUT (mA)

Time t (μs)

R1121N301B

Vin=4V
CIN=Tantalum 1μF
COUT=Tantalum 2.2μF

R1121N301B

Vin=4V
CIN=Tantalum 1μF
COUT=Tantalum 6.8μF

Output Voltage VOUT (V)
Output Current IOUT (mA)
TECHNICAL NOTES

When using these ICs, be sure to 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) in the range described as follows:

$\frac{\text{Vout}}{\text{Iout}}$  
$\frac{\text{Vin}}{\text{Vin}}$  
$\text{CE}$  
$\text{GND}$  
$\text{ESR}$  
$\text{Ceramic Capacitor}$  
$1 \mu\text{F}$  

Measuring Circuit for white noise; R1121N301B

The relationship between $I_{OUT}$ (output current) and ESR of output capacitor is shown in the graphs below. The conditions when the white noise level is under 40mV (Avg.) are indicated by the hatched area in the graph. (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 the same external components as the ones to be used on the PCB.)

<Measurement conditions>
(1) $V_{IN}=4\text{V}$
(2) Frequency Band: 10Hz to 1MHz
(3) Temperature: 25°C
· Make VDD and GND lines sufficient. If their impedance is high, noise pick up or incorrect operation may result.
· Connect the capacitor with a capacitance of 1μF or more between VDD and GND as close as possible.
· Set external components, especially the output capacitor, as close as possible to the ICs and make wiring as short as possible.

TYPICAL APPLICATION
Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment. Ricoh has been providing RoHS compliant products since April 1, 2006 and Halogen-free products since April 1, 2012.

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