Adjustable Low Dropout Regulator w/Reverse Current Protection

**GENERAL DESCRIPTION**

The NJM11100 is a 240mA output low dropout adjustable type voltage regulator. The available setting voltage range is very wide from 1.3V to 17V. This product has Reverse Current Protection without external SBD. Advanced Bipolar technology achieves low noise, high ripple rejection and high supply voltage. It is suitable for various applications such as car AVN, any consumer products and so on.

**FEATURES**

- Output Voltage Setting Range: 1.3V to 17V
- Reference Voltage Accuracy: ±1.0%
- Output Current: 240mA (min.) 320mA (typ.)
- Correspond to Low ESR capacitor (MLCC): 1.0µF: (Vo≥1.4V)
- Low Dropout Voltage: 0.2V (typ.) @Io=200mA
- Input Voltage Range: 2.1V to 18V
- ON/OFF Control
- Reverse Current Protection Circuit
- Thermal Shutdown Circuit
- Over Current Protection Circuit (OCP)
- Bipolar Technology
- Direct Replacement to TK11100 (180 degree rotated)
- Package Outline: SOT-23-6-1, DFN6-H1 (ESON6-H1)

**PIN CONFIGURATION**

1. CONTROL
2. GND
3. Noise Bypass
4. VOUT
5. VADJ
6. VIN

Should be noted the device direction when replacing from TK11100.

1. VIN
2. VADJ
3. VOUT
4. Noise Bypass
5. GND
6. CONTROL

Exposed Pad (Rear PAD) should be connect to GND

**BLOCK DIAGRAM**

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### ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>MAXIMUM RATING</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>V_IN</td>
<td>–0.3 to +20</td>
<td>V</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>V_OUT</td>
<td>–0.3 to +19</td>
<td>V</td>
</tr>
<tr>
<td>Control Pin Voltage</td>
<td>V_CONT</td>
<td>–0.3 to +20</td>
<td>V</td>
</tr>
<tr>
<td>Output Adjust Pin Voltage</td>
<td>V_ADJ</td>
<td>–0.3 to –4</td>
<td>V</td>
</tr>
<tr>
<td>Noise Bypass Pin Voltage (*5)</td>
<td>V_NB</td>
<td>–0.3 to –4</td>
<td>V</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>P_D</td>
<td>SOT-23-6 510(*1), 710(*2)</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DFN6-H1 450(*3), ESON6-H1 1200(*4)</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>Topr</td>
<td>–40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>Tstg</td>
<td>–40 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

(*1): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JDEC standard, 2Layers)
(*2): Mounted on glass epoxy board. (76.2×114.3×1.6mm: based on EIA/JDEC standard, 4Layers), internal Cu area: 74.2×74.2mm
(*3): Mounted on glass epoxy board (101.5×114.5×1.6mm: based on EIA/JEDEC standard, 2Layers FR-4, with Exposed Pad)
(*4): Mounted on glass epoxy board (101.5×114.5×1.6mm: based on EIA/JEDEC standard, 4Layers FR-4, with Exposed Pad)
(*5): Mounted on glass epoxy board (101.5×114.5×1.6mm: based on EIA/JEDEC standard, 4Layers FR-4, with Exposed Pad)

### RECOMMENDED OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>TEST CONDITION</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage Range</td>
<td>V_IN</td>
<td></td>
<td>2.1</td>
<td>-</td>
<td>18</td>
<td>V</td>
</tr>
<tr>
<td>Output Voltage Range</td>
<td>V_OUT</td>
<td></td>
<td>1.3</td>
<td>-</td>
<td>17</td>
<td>V</td>
</tr>
</tbody>
</table>

### ELECTRICAL CHARACTERISTICS

(Unless other noted, V_IN=4V, R1=51kΩ, R2=68kΩ, C_IN=0.1μF, C_O=1.0μF, V_O=1.4V, C_p=0.01μF, C_fb=100pF, Ta=25°C)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>TEST CONDITION</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Voltage</td>
<td>V_ref</td>
<td>I_o=30mA</td>
<td>–1.0%</td>
<td>1.25</td>
<td>+1.0%</td>
<td>V</td>
</tr>
<tr>
<td>Quiescent Current</td>
<td>I_Q</td>
<td>I_o=0mA, except I_cont</td>
<td>-</td>
<td>200</td>
<td>260</td>
<td>μA</td>
</tr>
<tr>
<td>Quiescent Current at OFF-state</td>
<td>I_Q(OF)</td>
<td>V_CONT=0V</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>Ground Current</td>
<td>I_GND</td>
<td>I_o=50mA</td>
<td>-</td>
<td>0.75</td>
<td>1.5</td>
<td>mA</td>
</tr>
<tr>
<td>Output Current</td>
<td>I_O</td>
<td>V_O=0.3V</td>
<td>240</td>
<td>320</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Line Regulation</td>
<td>ΔV_O/ΔV_IN</td>
<td>V_IN= V_O+1V to V_O+6V, I_o=30mA</td>
<td>-</td>
<td>-</td>
<td>0.10</td>
<td>%/V</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>ΔV_O/ΔI_O</td>
<td>I_o=0 to 200mA</td>
<td>-</td>
<td>-</td>
<td>0.01</td>
<td>%/mA</td>
</tr>
<tr>
<td>Dropout Voltage (*6)</td>
<td>ΔV_O</td>
<td>I_o=200mA</td>
<td>-</td>
<td>0.2</td>
<td>0.35</td>
<td>V</td>
</tr>
<tr>
<td>Control Voltage at ON-state</td>
<td>V_CONT(ON)</td>
<td></td>
<td>1.6</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Control Voltage at OFF-state</td>
<td>V_CONT(OFF)</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.6</td>
<td>V</td>
</tr>
<tr>
<td>Control Current</td>
<td>I_CONT</td>
<td>V_CONT=1.6V</td>
<td>-</td>
<td>3</td>
<td>12</td>
<td>μA</td>
</tr>
<tr>
<td>Ripple Rejection</td>
<td>RR</td>
<td></td>
<td>-</td>
<td>75</td>
<td>-</td>
<td>dB</td>
</tr>
<tr>
<td>Average Temperature</td>
<td>ΔV_O/ΔTa</td>
<td>Ta=0°C to +85°C, I_o=30mA</td>
<td>-</td>
<td>±35</td>
<td>-</td>
<td>ppm/°C</td>
</tr>
<tr>
<td>Coefficient of Output</td>
<td>Voltage</td>
<td></td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>μVrms</td>
</tr>
</tbody>
</table>

(*6): Except setting Output Voltage less than 2.1V.
POWER DISSIPATION vs. AMBIENT TEMPERATURE

SOT-23-6-1 Power Dissipation
(Top=−40 to +85°C, Tj=150°C)

DFN6-H1(ESON6-H1) Power Dissipation
(Top=−40 to +85°C, Tj=150°C)
TEST CIRCUIT

(*7): \( V_O < 1.4 \text{V} \): 2.2\( \mu \text{F} \)
**TYPICAL APPLICATION**

1. In the case where ON/OFF Control is not required:

   ![Circuit Diagram](image)

   Connect CONTROL pin to V_IN pin
   (*8): V_O < 1.4V: 2.2μF

2. In use of ON/OFF CONTROL:

   ![Circuit Diagram](image)

   State of CONTROL pin:
   - "H" → output is enabled.
   - "L" or "open" → output is disabled.
   (*9): V_O < 1.4V: 2.2μF

   [Output voltage setting formula]
   \[
   V_{OUT} = V_{ref} \times \frac{R1 + R2}{R1}
   \]
   \[
   V_{ref\ (typ)} = 1.25V
   \]
   \[
   1.3V \leq V_{OUT\ (typ)} \leq 17.0V
   \]

   R1 value should be selected between 1kΩ and 120kΩ.
**Input Capacitor $C_{IN}$**

Input Capacitor $C_{IN}$ is required to prevent oscillation and reduce power supply ripple for applications when high power supply impedance or a long power supply line.

Therefore, use the recommended $C_{IN}$ value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and $V_{IN}$ as shortest path as possible to avoid the problem.

**Output Capacitor $C_{O}$ (MLCC)**

Output capacitor ($C_{O}$) will be required for a phase compensation of the internal error amplifier. The capacitance and the equivalent series resistance (ESR) influence to stable operation of the regulator.

Use of a smaller $C_{O}$ may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

On the other hand, Use of a larger $C_{O}$ reduces output noise and ripple output, and also improves output transient response when rapid load change.

Therefore, use the recommended $C_{O}$ value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and $V_{OUT}$ as shortest path as possible for stable operation.

The recommended capacitance depends on the output voltage rank. Especially, low voltage regulator requires larger $C_{O}$ value.

In addition, you should consider varied characteristics of capacitor (a frequency characteristic, a temperature characteristic, a DC bias characteristic and so on) and unevenness peculiar to a capacitor supplier enough.

When selecting $C_{O}$, recommend that have withstand voltage margin against output voltage and superior temperature characteristic though this product is designed stability works with wide range ESR of capacitor including low ESR products.

**Noise bypass Capacitor $C_{p}$**

Noise bypass capacitor $C_{p}$ reduces noise generated by band-gap reference circuit. Noise level and ripple rejection will be improved when larger $C_{p}$ is used. Use of smaller $C_{p}$ value may cause oscillation.

Use the $C_{p}$ recommended value larger (refer to conditions of ELECTRIC CHARACTERISTIC) to avoid the problem.

**Reverse Current Protection**

NJM11100 is built in Reverse Current Protection circuit.

So external Schottky barrier diode(SBD) is not required that this circuit prevents the large reverse current due to the output voltage being higher than the input voltage.
**CHARACTERISTICS**

**Quiescent Current vs. Input Voltage**

<table>
<thead>
<tr>
<th>Input Voltage [V]</th>
<th>Quiescent Current [µA] @Ta=25ºC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>VOUT=1.3V</td>
</tr>
<tr>
<td>5</td>
<td>VOUT=3V</td>
</tr>
<tr>
<td>10</td>
<td>VOUT=17V</td>
</tr>
</tbody>
</table>

- Output is open when Co, R1 & R2 are as follows:
  - Co=2.2µF
  - R1=51kΩ
  - R2=2kΩ
- Cfb=100pF
- Include Icont

- VOUT=1.3V: Co=2.2µF, R1=51kΩ, R2=2kΩ
- VOUT=3.0V: Co=1.0µF, R1=51kΩ, R2=68kΩ
- VOUT=17V: Co=1.0µF, R1=51kΩ, R2=640kΩ

**Load Regulation vs. Output Current**

- @Ta=25ºC
- Specified values:
  - VOUT=1.3V: CO=2.2µF, R1=51kΩ, R2=2kΩ
  - VOUT=3.0V: CO=1.0µF, R1=51kΩ, R2=68kΩ
  - VOUT=17V: CO=1.0µF, R1=51kΩ, R2=640kΩ

**Dropout Voltage vs. Output Current**

<table>
<thead>
<tr>
<th>Output Current [mA]</th>
<th>Dropout Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>VOUT=17V</td>
</tr>
<tr>
<td>50</td>
<td>VOUT=3V</td>
</tr>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td></td>
</tr>
</tbody>
</table>

- @Ta=25ºC
- Specified values:
  - VOUT=1.3V: CO=2.2µF, R1=51kΩ, R2=2kΩ
  - VOUT=3.0V: CO=1.0µF, R1=51kΩ, R2=68kΩ
  - VOUT=17V: CO=1.0µF, R1=51kΩ, R2=640kΩ
### CHARACTERISTICS

**Output Voltage vs. Input Voltage**

- **$V_{OUT}=1.3V$**
  - Io=30mA
  - Io=100mA
  - Io=200mA

- **$V_{OUT}=3.0V$**
  - Io=30mA
  - Io=200mA

**Output Voltage vs. Input Voltage**

- **$V_{OUT}=17V$**
  - Io=30mA

**Control Current vs. Control Voltage**

- **$V_{IN}=V_{OUT}+1V$**
  - This characteristic is shared by all voltage ranks.

**Control Voltage vs. Output Voltage**

- **$V_{OUT}=3.0V$**

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CHARACTERISTICS

Ground Pin Current vs. Output Current

- @Ta=25ºC
- Cin=0.1µF
- Co, R1 & R2: refer to right table
- Cfb=100pF

\[ V_{IN} = 2.3V \]
\[ V_{OUT} = 1.3V \]  
\[ V_{IN} = 4V \]
\[ V_{OUT} = 3V \]

\[ V_{IN} = 18V \]
\[ V_{OUT} = 17V \]

Over Current Protection Characteristic

- @Ta=25ºC
- Cin=0.1µF (Ceramic)
- C0=2.2µF (Ceramic)
- R1=51kΩ
- R2=2kΩ
- Cfb=100pF  

\[ V_{OUT} = 1.3V \]

- @Ta=25ºC
- Cin=0.1µF (Ceramic)
- C0=1µF (Ceramic)
- R1=51kΩ
- R2=68kΩ
- Cfb=100pF  

\[ V_{OUT} = 3V \]

- @Ta=25ºC
- Cin=0.1µF (Ceramic)
- C0=1µF (Ceramic)
- R1=51kΩ
- R2=640kΩ
- Cfb=100pF  

\[ V_{OUT} = 17V \]
CHARACTERISTICS

Ripple Rejection Ratio vs. Frequency

For $V_{OUT}=1.3V$

- $I_{O}=0mA$
- $I_{O}=10mA$
- $I_{O}=30mA$
- $I_{O}=100mA$
- $I_{O}=200mA$

Frequency [Hz]

Ripple Rejection Ratio [dB]

@ $T_a=25^\circ C$

- $V_{IN}=2.3V$
- $e_i=200mVrms$
- $C_{O}=2.2uF$ (Ceramic)
- $R_1=51k\Omega$
- $R_2=2k\Omega$
- $C_{fb}=100pF$

For $V_{OUT}=3.0V$

- $I_{O}=0mA$
- $I_{O}=10mA$
- $I_{O}=30mA$
- $I_{O}=200mA$

Frequency [Hz]

Ripple Rejection Ratio [dB]

@ $T_a=25^\circ C$

- $V_{IN}=4V$
- $e_i=200mVrms$
- $C_{O}=1uF$ (Ceramic)
- $R_1=51k\Omega$
- $R_2=68k\Omega$
- $C_{fb}=100pF$

For $V_{OUT}=17V$

- $I_{O}=30mA$
- $I_{O}=0mA$
- $I_{O}=200mA$

Frequency [Hz]

Ripple Rejection Ratio [dB]

@ $T_a=25^\circ C$

- $V_{IN}=18V$
- $e_i=200mVrms$
- $C_{O}=1uF$ (Ceramic)
- $R_1=51k\Omega$
- $R_2=640k\Omega$
- $C_{fb}=100pF$

For $V_{OUT}=3.0V$, $C_{O}$ variable

- $C_{O}=1uF$ (Ceramic)
- $C_{O}=2.2uF$ (Ceramic)
- $C_{O}=4.7uF$ (Ceramic)

Frequency [Hz]

Ripple Rejection Ratio [dB]

@ $T_a=25^\circ C$

- $V_{IN}=4V$
- $e_i=200mVrms$
- $R_1=51k\Omega$
- $R_2=68k\Omega$
- $C_{fb}=100pF$
- $I_{O}=10mA$
CHARACTERISTICS

Ripple Rejection Ratio vs. Output Current

$V_{OUT} = 1.3V$

- $f = 1kHz$
- $f = 10kHz$

$Ta = 25ºC$
$V_{IN} = 2.3V$
$ein = 200mVrms$
$C_{o} = 1uF (Ceramic)$

$R_{ip} = 1kHz$
$R_{ip} = 10kHz$

$Ripple Rejection Ratio vs. Output Current$

$V_{OUT} = 3.0V$

- $f = 1kHz$
- $f = 10kHz$

$Ta = 25ºC$
$V_{IN} = 4V$
$ein = 200mVrms$
$C_{o} = 1.0uF (Ceramic)$

$Ripple Rejection Ratio vs. Output Current$

$V_{OUT} = 17V$

- $f = 1kHz$
- $f = 10kHz$

$Ta = 25ºC$
$V_{IN} = 18V$
$ein = 200mVrms$
$C_{o} = 1.0uF (Ceramic)$
CHARACTERISTICS

Output Noise Voltage vs. Output Current

$V_{OUT}=1.3V$

Output Current [mA] vs. Output Noise Voltage [μVrms]

- $T_a=25^\circ C$
- $V_{IN}=2.3V$
- $C_{in}=0.1uF$ (Ceramic)
- $C_{o}=2.2uF$ (Ceramic)
- $R_1=51k\Omega$
- $R_2=2k\Omega$
- $C_{fb}=100pF$
- LPF: 80Hz

Output Current [mA] vs. Output Noise Voltage [μVrms]

$V_{OUT}=3.0V$

- $T_a=25^\circ C$
- $V_{IN}=4.0V$
- $C_{in}=0.1uF$ (Ceramic)
- $C_{o}=1.0uF$ (Ceramic)
- $R_1=51k\Omega$
- $R_2=68k\Omega$
- $C_{fb}=100pF$
- LPF: 80Hz

Output Current [mA] vs. Output Noise Voltage [μVrms]

$V_{OUT}=17V$

- $T_a=25^\circ C$
- $V_{IN}=18V$
- $C_{in}=0.1uF$ (Ceramic)
- $C_{o}=1.0uF$ (Ceramic)
- $R_1=51k\Omega$
- $R_2=640k\Omega$
- $C_{fb}=100pF$
- LPF: 80Hz

Output Noise Voltage vs. Noise Bypsa Capacitance

$V_{OUT}=3.0V$

- $T_a=25^\circ C$
- $V_{IN}=4.0V$
- $C_{in}=0.1uF$ (Ceramic)
- $C_{o}=1.0uF$ (Ceramic)
- $R_1=51k\Omega$
- $R_2=68k\Omega$
- $C_{fb}=100pF$
- $I_o=10mA$

Noise Bypass Capacitance [F] vs. Output Noise Voltage [μVrms]
CHARACTERISTICS

Equivalent Series Resistance vs. Output Current

\( V_{OUT} = 1.3V \)

Output Current [mA]  
Equivalent Series Resistance [Ω]

\( V_{IN} = 18V \)  
\( V_{IN} = 2.3V \)

\( T_a = 25^\circ C \)

\( C_{in} = 0.1uF \) (Ceramic)  
\( R_1 = 51kΩ \)  
\( R_2 = 2kΩ \)  
\( C_{fb} = 100pF \)

\( V_{OUT} = 3.0V \)

Output Current [mA]  
Equivalent Series Resistance [Ω]

\( V_{IN} = 18V \)  
\( V_{IN} = 4V \)

\( T_a = 25^\circ C \)

\( C_{in} = 0.1uF \) (Ceramic)  
\( R_1 = 51kΩ \)  
\( R_2 = 68kΩ \)  
\( C_{fb} = 100pF \)

\( V_{OUT} = 17V \)

Output Current [mA]  
Equivalent Series Resistance [Ω]

\( V_{IN} = 18V \)

\( T_a = 25^\circ C \)

\( C_{in} = 0.1uF \) (Ceramic)  
\( R_1 = 51kΩ \)  
\( R_2 = 640kΩ \)  
\( C_{fb} = 100pF \)
## CHARACTERISTICS

### Reference Voltage vs. Ambient Temperature

Reference Voltage [V] vs. Ambient Temperature [°C]

- **@Cin=0.1μF**
- **Cout=1.0μF**
- **R1=51kΩ**
- **R2=68kΩ**
- **Cfb=100pF**
- **Cp=0.01μF**
- **Vin=4V**
- **Io=30mA**

### Output Voltage vs. Ambient Temperature

Output Voltage [V] vs. Ambient Temperature [°C]

- **Vout=3V**

### Quiesent Current vs. Ambient Temperature

Quiesent Current [μA] vs. Ambient Temperature [°C]

- **Vout=3V**

### Ground Current vs. Ambient Temperature

Ground Current [mA] vs. Ambient Temperature [°C]

- **Vout=3V**

### Dropout Voltage vs. Ambient Temperature

Dropout Voltage [V] vs. Ambient Temperature [°C]

- **Iout=30mA**
- **Iout=100mA**
- **Iout=200mA**

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# CHARACTERISTICS

## Control Current vs. Ambient Temperature

<table>
<thead>
<tr>
<th>Ambient Temperature [ºC]</th>
<th>Control Current [µA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>0.1</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>50</td>
<td>8</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>150</td>
<td>10</td>
</tr>
</tbody>
</table>

@: Cin=0.1uF, C0=1.0uF, R1=51kΩ, R2=68kΩ, Cfb=100pF, Cp=0.01µF, Vin=4V, Voc=1.6V

## Control Voltage vs. Temperature

<table>
<thead>
<tr>
<th>Ambient Temperature [ºC]</th>
<th>Control Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>50</td>
<td>1.4</td>
</tr>
<tr>
<td>100</td>
<td>1.0</td>
</tr>
<tr>
<td>150</td>
<td>0.6</td>
</tr>
</tbody>
</table>

@: Cin=0.1uF, C0=1.0uF, R1=51kΩ, R2=68kΩ, Cfb=100pF, Cp=0.01µF, Vin=4V, Voc=4V

## Line Regulation vs. Ambient Temperature

<table>
<thead>
<tr>
<th>Ambient Temperature [ºC]</th>
<th>Line Regulation [%/V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>-0.1</td>
</tr>
<tr>
<td>0</td>
<td>0.02</td>
</tr>
<tr>
<td>50</td>
<td>0.04</td>
</tr>
<tr>
<td>100</td>
<td>0.06</td>
</tr>
<tr>
<td>150</td>
<td>0.08</td>
</tr>
</tbody>
</table>

@: Cin=0.1uF, C0=1.0uF, R1=51kΩ, R2=68kΩ, Cfb=100pF, Cp=0.01µF, Vin=4V to 9V, Io=30mA

## Load Regulation vs. Ambient Temperature

<table>
<thead>
<tr>
<th>Ambient Temperature [ºC]</th>
<th>Load Regulation [%/mA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>0.01</td>
</tr>
<tr>
<td>0</td>
<td>0.02</td>
</tr>
<tr>
<td>50</td>
<td>0.03</td>
</tr>
<tr>
<td>100</td>
<td>0.04</td>
</tr>
<tr>
<td>150</td>
<td>0.05</td>
</tr>
</tbody>
</table>

@: Cin=0.1uF, C0=1.0uF, R1=51kΩ, R2=68kΩ, Cfb=100pF, Cp=0.01µF, Vin=4V, Io=0mA to 200mA

## Output Peak Current vs. Ambient Temperature

<table>
<thead>
<tr>
<th>Ambient Temperature [ºC]</th>
<th>Output Peak Current [mA]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>100</td>
</tr>
<tr>
<td>0</td>
<td>200</td>
</tr>
<tr>
<td>50</td>
<td>300</td>
</tr>
<tr>
<td>100</td>
<td>400</td>
</tr>
<tr>
<td>150</td>
<td>500</td>
</tr>
</tbody>
</table>

@: Cin=0.1uF, C0=1.0uF, R1=51kΩ, R2=68kΩ, Cfb=100pF, Cp=0.01µF, Vin=Vout typ × 90%, Io=30mA

## Thermal Shutdown Characteristic

<table>
<thead>
<tr>
<th>Ambient Temperature [ºC]</th>
<th>Output Voltage [V]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>100</td>
<td>1.5</td>
</tr>
<tr>
<td>150</td>
<td>2</td>
</tr>
<tr>
<td>200</td>
<td>2.5</td>
</tr>
</tbody>
</table>

@: Cin=0.1uF, C0=1.0uF, R1=51kΩ, R2=68kΩ, Cfb=100pF, Cp=0.01µF, Vin=4V, Io=30mA
CHARACTERISTICS

ON/OFF Transient Response (tr)

\( V_{OUT} = 3V, \ V_{IN} = 4V, \ C_P = 0.001uF, \ C_{fb} = 100pF \),
\( R_1 = 51k\Omega, \ R_2 = 68k\Omega, \ Io = 30mA \)

\[ \begin{align*}
\text{Output Voltage} & \quad \text{Time [\( \mu s \)]} \\
\text{Control Voltage} & \quad \text{Output Voltage} \\
C = 1uF & \quad \text{Time [\( \mu s \)]} \\
C = 2.2uF & \quad \text{Output Voltage} \\
C = 4.7uF &
\end{align*} \]

ON/OFF Transient (tr)

\( V_{OUT} = 3V, \ V_{IN} = 4V, \ C_P = 0.01uF, \ C_{fb} = 100pF \),
\( R_1 = 51k\Omega, \ R_2 = 68k\Omega, \ Io = 30mA \)

\[ \begin{align*}
\text{Output Voltage} & \quad \text{Time [\( \mu s \)]} \\
\text{Control Voltage} & \quad \text{Output Voltage} \\
C = 1uF & \quad \text{Time [\( \mu s \)]} \\
C = 2.2uF & \quad \text{Output Voltage} \\
C = 4.7uF &
\end{align*} \]

ON/OFF Transient Response (tr)

\( V_{OUT} = 3V, \ V_{IN} = 4V, \ C_P = 0.1uF, \ C_{fb} = 100pF \),
\( R_1 = 51k\Omega, \ R_2 = 68k\Omega, \ Io = 30mA \)

\[ \begin{align*}
\text{Output Voltage} & \quad \text{Time [\( \mu s \)]} \\
\text{Control Voltage} & \quad \text{Output Voltage} \\
C = 0.1uF & \quad \text{Time [\( \mu s \)]} \\
C = 0.1uF & \quad \text{Output Voltage} \\
C = 0.1uF &
\end{align*} \]
**CHARACTERISTICS**

### Line Tangent Response

- $V_{OUT} = 3V$
- $C_p = 0.01 \mu F$
- $C_{fb} = 100pF$
- $C_{IN} = 0.1 \mu F$
- $C_o = 1.0 \mu F$
- $R_1 = 51k\Omega$
- $R_2 = 68k\Omega$
- $I_o = 30mA$

### Load Tangent Response

- $V_{OUT} = 3V$
- $V_{IN} = 4V$
- $C_p = 0.01 \mu F$
- $C_{fb} = 100pF$
- $C_{IN} = 0.1 \mu F$
- $C_o = 1.0 \mu F$
- $R_1 = 51k\Omega$
- $R_2 = 68k\Omega$

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**New Japan Radio Co., Ltd.**

Ver.2015-02-27
NOTES
All linear dimensions are in millimeters.
DFN6-H1 (ESON6-H1)

UNIT: mm

NOTES
All linear dimensions are in millimeters.
[CAUTION]

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