Low Dropout Voltage Regulator with Reset

**GENERAL DESCRIPTION**

The NJM2801 is a low dropout voltage regulator with reset function.

It provides up to 150mA of logic supply, and the reset function monitors output voltage of the regulator with 1% accuracy.

It is suitable for local power supply and reset for small microcontroller and other logic chips.

**FEATURES**

- Output Voltage Accuracy \( V_o = \pm 1.0\% \)
- Reset Voltage Accuracy \( V_{RT} = \pm 1.0\% \)
- Adjust reset delay time with external capacitor.
- Ripple Rejection 60dB typ. (f=1kHz)
- Output Voltage Monitor type
- Open Collector Output
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Bipolar Technology
- Package Outline SOT89-5 (NJM2801U/U1), SOT-23-5(NJU2801F)

**PIN CONFIGURATION**

![PIN CONFIGURATION Diagram](image)

**EQUIVALENT CIRCUIT**

![EQUIVALENT CIRCUIT Diagram](image)
### OUTPUT VOLTAGE/ DETECTION VOLTAGE

<table>
<thead>
<tr>
<th>Device Name</th>
<th>Output Voltage</th>
<th>Detection Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJM2801U1-/U/F3328</td>
<td>3.3V</td>
<td>2.8V</td>
</tr>
<tr>
<td>NJM2801U1-/U/F0543</td>
<td>5.0V</td>
<td>4.3V</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>RATINGs</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>VIN</td>
<td>+14</td>
<td>V</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>Pd</td>
<td>SOT-23-5</td>
<td>350(*1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SOT89-5</td>
<td>200(*2)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Topr</td>
<td>−40→+85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>Tstg</td>
<td>−40→+125</td>
<td>°C</td>
</tr>
</tbody>
</table>

(*1): Mounted on glass epoxy board based on EIA/JEDEC. (114.3x76.2x1.6mm: 2Layers)
(*2): Device itself.

### ELECTRICAL CHARACTERISTICS (Vin=Vo+1V, Cin=0.1μF, Co=1μF (Vo≤2.6V: Co=2.2μF) 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>Quiescent Current</td>
<td>Io</td>
<td>Io=0mA</td>
<td>–</td>
<td>250</td>
<td>350</td>
<td>μA</td>
</tr>
<tr>
<td>Regulator Block</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Voltage</td>
<td>Vo</td>
<td>Io=30mA</td>
<td>−1.0%</td>
<td>–</td>
<td>+1.0%</td>
<td>V</td>
</tr>
<tr>
<td>Output Current</td>
<td>Io</td>
<td>Vo-0.3V</td>
<td>150</td>
<td>200</td>
<td>–</td>
<td>mA</td>
</tr>
<tr>
<td>Line Regulation</td>
<td>∆Vo/∆Vin</td>
<td>Vin=Vo+1V–Vo+6V, Io=30mA</td>
<td>–</td>
<td>–</td>
<td>0.10</td>
<td>%/V</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>∆Vo/∆Io</td>
<td>Io=0–100mA</td>
<td>–</td>
<td>–</td>
<td>0.03</td>
<td>%/mA</td>
</tr>
<tr>
<td>Dropout Voltage</td>
<td>∆Vin</td>
<td>Io=60mA</td>
<td>–</td>
<td>0.10</td>
<td>0.18</td>
<td>V</td>
</tr>
<tr>
<td>Ripple Rejection</td>
<td>RR</td>
<td>ein=200mVRms, f=1kHz, Io=10mA, Vo=3V</td>
<td>–</td>
<td>60</td>
<td>–</td>
<td>dB</td>
</tr>
<tr>
<td>Output Voltage Temperature</td>
<td>∆Vo/∆T</td>
<td>Ta=0–85°C, Io=10mA</td>
<td>–</td>
<td>±50</td>
<td>–</td>
<td>ppm/°C</td>
</tr>
<tr>
<td>Coefficient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Noise Voltage</td>
<td>Vno</td>
<td>f=10Hz–100kHz, Io=10mA, Vo=3V</td>
<td>–</td>
<td>45</td>
<td>–</td>
<td>μVrms</td>
</tr>
<tr>
<td>Reset Block</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage Detection</td>
<td>Vrt</td>
<td>Vin=H→L</td>
<td>−1.0%</td>
<td>–</td>
<td>+1.0%</td>
<td>V</td>
</tr>
<tr>
<td>Hysteresis Voltage</td>
<td>Vrth</td>
<td>Vin=H→L→H</td>
<td>Vrth×3%</td>
<td>Vrth×5%</td>
<td>Vrth×8%</td>
<td>V</td>
</tr>
<tr>
<td>Low Level Output Voltage</td>
<td>rol</td>
<td>Vin=Vr-0.5V, Rl=100kΩ</td>
<td>–</td>
<td>100</td>
<td>300</td>
<td>mV</td>
</tr>
<tr>
<td>Output Leak Current</td>
<td>iorh</td>
<td>Vin=Vr+0.5V</td>
<td>–</td>
<td>–</td>
<td>0.1</td>
<td>μA</td>
</tr>
<tr>
<td>On time Output Current</td>
<td>iorl</td>
<td>Vin=Vr-0.5V, Rl=0Ω</td>
<td>5</td>
<td>–</td>
<td>–</td>
<td>mA</td>
</tr>
<tr>
<td>Reset Output Delay Time</td>
<td>td</td>
<td>Vr=(Vr-0.5V)→(Vr+0.5V), Cg=0.1μF</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>ms</td>
</tr>
<tr>
<td>Operation Voltage Limit</td>
<td>vopl</td>
<td>Vr=0.4V</td>
<td>–</td>
<td>0.9</td>
<td>–</td>
<td>V</td>
</tr>
</tbody>
</table>

The above specification is a common specification for all output voltages.
Therefore, it may be different from the individual specification for a specific output voltage.
When the pull-up of the Vor is carried out to Vin through resistance.
**TEST CIRCUIT**

![Test Circuit Diagram]

*3 \( V_{os} \leq 2.6 \text{V} \): \( C_{o} = 2.2 \mu \text{F} \) (Ceramic)

**TYPICAL APPLICATIONS**

![Typical Applications Diagram]

*4 \( V_{os} \leq 2.6 \text{V} \): \( C_{o} = 2.2 \mu \text{F} \)

**POWER DISSIPATION vs. AMBIENT TEMPERATURE**

![Power Dissipation Graph]

NJM2801F Power Dissipation
(Topr=-40~+85°C, \( T_j = 125°C \))

- On Board(114.3×76.2×1.6mm, FR-4)
- Device itself
NJM2801

ELECTRICAL CHARACTERISTICS

Output Voltage vs. Input Voltage

Output Voltage: $V_o (V)$
Input Voltage: $V_{IN} (V)$

Output Voltage vs. Output Current

Output Current: $I_o (mA)$
Input Voltage: $V_{IN} (V)$

Ground Pin Current vs. Output Current

Ground Pin Current: $I_{GN} (mA)$
Output Current: $I_o (mA)$

Dropout Voltage vs. Output Current

Dropout Voltage: $dV_{I-O} (V)$
Output Current: $I_o (mA)$

Load Regulation vs. Output Current

Load Regulation: $dV_o/dI_o (mV)$
Output Current: $I_o (mA)$

Peak Output Current vs. Input Voltage

Peak Output Current: $I_{O(MAX)} (mA)$
Input Voltage: $V_{IN} (V)$
ELECTRICAL CHARACTERISTICS

Quiescent Current vs. Input Voltage

Output Noise Voltage vs. Output Current

Ripple Rejection Ratio vs. Frequency

Dropout Voltage vs. Temperature
ELECTRICAL CHARACTERISTICS

NJM2801_5V
Quiescent Current v.s. Temperature
@: VIN=6V
Output is open.
Co=1 µF (Ceramic)

Load Regulation v.s. Temperature
@: VIN=6V
Io=0-100mA
CL=1 µF (Ceramic)

Line Regulation v.s. Temperature
@: dVIN=6-11V
Io=30mA
Co=1 µF (Ceramic)

Short Circuit Current v.s. Temperature
@: VIN=6V
Output is short to ground.
Co=1 µF (Ceramic)

Output Leak Current v.s. Temperature
VIN=4.8V
Co=1 µF
Cd=0.1 µF
RL=100kΩ

ON Output Current v.s. Temperature
VIN=3.8V
Co=1 µF
Cd=0.1 µF
RL=0Ω
### ELECTRICAL CHARACTERISTICS

**Reset Output Delay Time v.s Temperature**

- **VIN = 3.8V to 4.8V**
- **CO = 1µF**
- **CD = 0.1µF**

![Graph](image1.png)

**Operation Voltage Limit v.s Temperature**

- **VIN = 0.4V**
- **CO = 1µF**
- **CD = 0.1µF**

![Graph](image2.png)

**Low Level Output Voltage v.s Temperature**

- **VIN = 3.8V**
- **CO = 1µF**
- **CD = 0.1µF**
- **RL = 100kΩ**

![Graph](image3.png)

**Voltage Detection v.s Temperature**

- **VIN = H to L**
- **CO = 1µF**
- **CD = 0.1µF**

![Graph](image4.png)

**Hysteresis Voltage v.s Temperature**

- **VIN = H to L to H**
- **CO = 1µF**
- **CD = 0.1µF**

![Graph](image5.png)
ELECTRICAL CHARACTERISTICS

NJM2801_5V

Input Transient Response

Output Voltage : \( V_o \) [V]
Input Voltage : \( V_{IN} \) [V]
Time : \( t \) [\( \mu \)s]

@ \( T_a = 25^\circ \text{C} \)
\( I_o = 30 \text{mA} \)
\( C_o = 1 \mu \text{F} \) (Ceramic)

NJM2801_5V

Load Transient Response

Output Voltage : \( V_o \) [V]
Output Current : \( I_o \) [mA]
Time : \( t \) [\( \mu \)s]

@ \( T_a = 25^\circ \text{C} \)
\( V_{IN} = 6 \text{V} \)
\( C_o = 1 \mu \text{F} \) (Ceramic)

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