QUAD CURRENT MODE SINGLE-SUPPLY OPERATIONAL AMPLIFIER

NJM2900/3900

The NJM2900/3900 consist of four independent, dual input, internally compensated amplifiers which were designed specifically to operate off of a single power supply voltage and to provide a large output voltage swing. These amplifiers make use of a current mirror to achieve the non-inverting input function. Application areas include: ac amplifiers, RC active filters, low frequency triangle, squarewave and pulse waveform generation circuits, tachometers and low speed, high voltage digital logic gates.

- **Package Outline**

- **Absolute Maximum Ratings** \((T_a=25^\circ C)\)

<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>Supply Voltage</td>
<td>(V^+)</td>
<td>(2900)</td>
<td>+36V</td>
<td>+18V</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>(V^-)</td>
<td>(3900)</td>
<td>+32V</td>
<td>+16V</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Power Dissipation</td>
<td>(P_D)</td>
<td>(N-Type)</td>
<td>500mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(M.E-Type)</td>
<td>300mW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Current</td>
<td>(I_{IN})</td>
<td></td>
<td>20mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>(T_{OP})</td>
<td>(2900)</td>
<td>-40(^\circ)C to +85(^\circ)C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3900)</td>
<td>-20(^\circ)C to +75(^\circ)C</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>(T_{ST})</td>
<td></td>
<td>-40(^\circ)C to +125(^\circ)C</td>
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<td></td>
</tr>
</tbody>
</table>

- **Electrical Characteristics** \((T_a=25^\circ C, V^+=+15V)\)

Note 1: The output sink current capacity can be increased by over-driving the inverting input.

Note 2: This standard shows the current amplification degree of a current mirror when NJM2900/3900 serves as a non-inverting amplifier.

Note 3: The \(V_{BE}\) matching of input stage transistors is designed to meet a mirror current of about 10\(\mu\)A.

Note 4: The input clamp transistor is designed in such a way as the input voltage is not lower than about 0.3V. If the negative input current exceeds 4mA, the output may drop to a low voltage.
**Equivalent Circuit**

![Equivalent Circuit Diagram]

**Typical Application** \((V^+ - 15V)\)

**Voltage Control Current Source (Transconductance Amp.)**

**Triangle/Square Wave Generator**

**Inverting Amplifier**

**V_{BB} Bias**

**Stepped wave generator/Pulse Counter**

**Auxiliary Amp. for In Supplier**

**Band Bass Active Filter**

**Differential input signal detecting circuit**

**Non-Inverting Amplifier**

**Double Voltage \((V^+/V^- = \pm 15V)\)**

**Non inverting AC Amp.**

**AC Amp.**
- Typical Characteristics

**Mirror Gain vs. Temperature**
\( V^+ = 15V, \ I_{N} = 10\mu A \)

![Graph of Mirror Gain vs. Temperature](image)

**Maximum Mirror Current vs. Temperature**
\( V^+ = 15V, \ A_i \geq 0.90 \)

![Graph of Maximum Mirror Current vs. Temperature](image)

**Voltage Gain vs. Frequency**
\( V^+ = 15V, \ T_a = 25^{\circ}C \)

![Graph of Voltage Gain vs. Frequency](image)

**Voltage Gain vs. Supply Voltage**
\( T_a = 25^{\circ}C \)

![Graph of Voltage Gain vs. Supply Voltage](image)

**Voltage Gain vs. Temperature**
\( V^+ = 15V, \ R_L = \infty \)

![Graph of Voltage Gain vs. Temperature](image)

**Input Current vs. Temperature**
\( V^+ = 15V \)

![Graph of Input Current vs. Temperature](image)