ICs for Audio Common Use

AN7170
18W Audio Power Amplifier Circuit

■ Overview
The AN7170 is an integrated circuit manufactured by high voltage process designed for power amplifier of bus, track amplifier. Wide operating supply voltage range with output of 18W at 26.4V. It can be widely used for bus, truck amp., car stereo, home entertainment stereo set and TV sound multiplex output.

■ Features
- High output power : \( P_\text{O} = 18\text{W} \)
- High surge voltage : \( V_\text{CC (surge)} = 60\text{V (max.)} \)
- Wide supply voltage range : \( V_\text{CC (opr)} = 8 \sim 35\text{V} \)
- Incorporating protection circuits (overvoltage, overcurrent, temperature, load short)
- Incorporating automatic operating point stabilizer circuit
- Low distortion, low 1/f noise

![Block Diagram](image-url)

[11-Lead SIP Package (HSIP011-P-0000)]
**AN7170**

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### Absolute Maximum Ratings (Ta= 25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage (at no signal)</td>
<td>VCC</td>
<td>35</td>
<td>V</td>
</tr>
<tr>
<td>Supply Voltage (at operation)</td>
<td>VCC</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>Peak Supply Voltage Note 1)</td>
<td>VCC(max)</td>
<td>60</td>
<td>V</td>
</tr>
<tr>
<td>Supply Current</td>
<td>Icc</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Power Dissipation Note 2)</td>
<td>Pd</td>
<td>31.25</td>
<td>W</td>
</tr>
<tr>
<td>Operating Ambient Temperature</td>
<td>Top</td>
<td>– 30 – + 75</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>Tstg</td>
<td>– 55 – + 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Note 1) Pulse Voltage application t = 0.2s  
Note 2) Ta = 25°C (θj – c = 4°C/W)

### Electrical Characteristics (Vcc = 26.4V, f = 1kHz, Ta= 25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>min.</th>
<th>typ.</th>
<th>max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quescent Circuit Current</td>
<td>Icc</td>
<td>Vref 0 mV</td>
<td>40</td>
<td>75</td>
<td>160</td>
<td>mA</td>
</tr>
<tr>
<td>Voltage Gain</td>
<td>Gv</td>
<td>Vref 3 mV</td>
<td>51</td>
<td>53</td>
<td>55</td>
<td>dB</td>
</tr>
<tr>
<td>No Distortion Maximum Output</td>
<td>Po</td>
<td>THD=1%</td>
<td>8</td>
<td>9.5</td>
<td>—</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>THD=10%</td>
<td>10.5</td>
<td>12</td>
<td>—</td>
<td>W</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>THD</td>
<td>Vref 3 mV</td>
<td>—</td>
<td>0.1</td>
<td>0.7</td>
<td>%</td>
</tr>
<tr>
<td>Output Noise Voltage</td>
<td>Vnout</td>
<td>Rg = 10kΩ, DIN A Filter</td>
<td>—</td>
<td>0.7</td>
<td>1.5</td>
<td>mV</td>
</tr>
<tr>
<td>Ripple Rejection Ratio</td>
<td>RR</td>
<td>Vref 0 mV, Rg = 0Ω</td>
<td>—</td>
<td>40</td>
<td>—</td>
<td>dB</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>Zin</td>
<td>—</td>
<td>30</td>
<td>—</td>
<td>—</td>
<td>kΩ</td>
</tr>
</tbody>
</table>

(Rg = 8Ω)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>min.</th>
<th>typ.</th>
<th>max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Distortion Maximum Output</td>
<td>Po</td>
<td>THD=1%</td>
<td>—</td>
<td>13</td>
<td>—</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>THD=10%</td>
<td>—</td>
<td>18</td>
<td>—</td>
<td>W</td>
</tr>
</tbody>
</table>

(Rg = 4Ω)

### Pin Descriptions

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Pin No.</th>
<th>Pin Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Output</td>
<td>7</td>
<td>Input</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td>8</td>
<td>GND (Input)</td>
</tr>
<tr>
<td>3</td>
<td>GND (Output)</td>
<td>9</td>
<td>Ripple Filter</td>
</tr>
<tr>
<td>4</td>
<td>Bootstrap</td>
<td>10</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>Phase Compensation</td>
<td>11</td>
<td>VCC</td>
</tr>
<tr>
<td>6</td>
<td>Negative Feedback</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Panasonic
ICs for Audio Common Use

AN7170

VCC = 24V, RL = 4Ω
f = 1kHz, GV = 53dB

PO, PD, THD – Vi

GV, THD – f

GV, THD – f

PO, PO, THD – Vi

PO – Ta

P0 – VCC

P0, PO, THD – Vi

PO – PO

Panasonic

(1) Tc = Ta (θj – c = 4°C/W)
(2) With a 100cm² × 3mm Al heat sink (black color coated) or a 200cm² × 2mm Al heat sink (not lacquered)
(3) With a 100cm² × 2mm Al heat sink (not lacquered)

Output Power PO (W), Power Dissipation PD (W), Total Harmonic Distortion THD (%)

Input Voltage Vi (mV)

Frequency f (Hz)

Supply Voltage VCC (V)

Ambient Temperature Ta (°C)

Voltage Gain GV (dB)

Total Harmonic Distortion THD (%)

P0 = 2W
P0 = 4W
P0 = 2W
GV = 53dB
GV = 46dB
GV = 53dB
GV = 46dB

VCC = 24V
RL = 4Ω
RL = 8Ω

PO - Tc

PD - PO

PO - VCC

PD - Tc

PO - PO

PO - PO

Output Voltage PO (W)

Frequency f (Hz)

Input Voltage Vi (mV)

Frequency f (Hz)

Frequency f (Hz)

Supply Voltage VCC (V)

Supply Voltage VCC (V)

Voltage Gain GV (dB)

Voltage Gain GV (dB)

Total Harmonic Distortion THD (%)

Total Harmonic Distortion THD (%)

P0 = 2W
P0 = 4W
P0 = 2W
GV = 53dB
GV = 46dB
GV = 53dB
GV = 46dB

VCC = 24V
RL = 4Ω
RL = 8Ω

PO - Tc

PD - PO

PO - VCC

PD - Tc

PO - PO

PO - PO

Output Voltage PO (W)

Frequency f (Hz)

Input Voltage Vi (mV)

Frequency f (Hz)

Frequency f (Hz)

Supply Voltage VCC (V)

Supply Voltage VCC (V)

Voltage Gain GV (dB)

Voltage Gain GV (dB)

Total Harmonic Distortion THD (%)

Total Harmonic Distortion THD (%)

P0 = 2W
P0 = 4W
P0 = 2W
GV = 53dB
GV = 46dB
GV = 53dB
GV = 46dB

VCC = 24V
RL = 4Ω
RL = 8Ω

PO - Tc

PD - PO

PO - VCC

PD - Tc

PO - PO

PO - PO

Output Voltage PO (W)

Frequency f (Hz)

Input Voltage Vi (mV)

Frequency f (Hz)

Frequency f (Hz)

Supply Voltage VCC (V)

Supply Voltage VCC (V)

Voltage Gain GV (dB)

Voltage Gain GV (dB)

Total Harmonic Distortion THD (%)

Total Harmonic Distortion THD (%)

P0 = 2W
P0 = 4W
P0 = 2W
GV = 53dB
GV = 46dB
GV = 53dB
GV = 46dB

VCC = 24V
RL = 4Ω
RL = 8Ω

PO - Tc

PD - PO

PO - VCC

PD - Tc

PO - PO

PO - PO

Output Voltage PO (W)

Frequency f (Hz)

Input Voltage Vi (mV)

Frequency f (Hz)

Frequency f (Hz)

Supply Voltage VCC (V)

Supply Voltage VCC (V)

Voltage Gain GV (dB)

Voltage Gain GV (dB)

Total Harmonic Distortion THD (%)

Total Harmonic Distortion THD (%)

P0 = 2W
P0 = 4W
P0 = 2W
GV = 53dB
GV = 46dB
GV = 53dB
GV = 46dB

VCC = 24V
RL = 4Ω
RL = 8Ω
Application Circuit

*1. 82Ω at Gv = 46dB, R = 0 at Gv = 53dB
*2. 12pF at Gv = 46dB, 8pF at Gv = 53dB
(C = 0 is allowable for frequency characteristics adjustment in high band)

Printed Circuit Board Layout

Panasonic