**FEATURES**
- Low Cost
- Current Feedback Amplifier
- Differential Gain: 0.01%, $R_L = 150\,\Omega$, $V_S = \pm 5\,\text{V}$
- Differential Phase: 0.09°, $R_L = 150\,\Omega$, $V_S = \pm 5\,\text{V}$
- Flat to 30MHz, 0.1dB
- 100MHz Bandwidth on $\pm 5\,\text{V}$
- Wide Supply Range: $\pm 2\,\text{V}(4\,\text{V})$ to $\pm 14\,\text{V}(28\,\text{V})$
- Low Power: 85mW at $\pm 5\,\text{V}$

**APPLICATIONS**
- RGB Cable Drivers
- Composite Video Cable Drivers
- Gain Blocks in IF Stages

**DESCRIPTION**
The LT1252 is a low cost current feedback amplifier for video applications. The LT1252 is ideal for driving low impedance loads such as cables and filters. The wide bandwidth and high slew rate of this amplifier make driving RGB signals between PCs and workstations easy. The linearity of the LT1252 is outstanding; it is unsurpassed for driving composite video.

The LT1252 is available in the 8-pin DIP and the S8 surface mount package. For higher performance and shutdown operation, see the LT1227. For dual and quad amplifiers with similar performance see the LT1253/LT1254.

**TYPICAL APPLICATION**

$$A_V = 1 + \frac{R_F}{R_G} \quad BW = 100\,\text{MHz}$$

At Amplifier Output:
6dB Less at $V_{OUT}$

$V_S = \pm 5\,\text{V}$
$A_V = 2$
$R_L = 150\,\Omega$
$V_O = 1\,\text{V}$
### Absolute Maximum Ratings

- Total Supply Voltage ($V^+ \text{ to } V^-$) ........................................ 28V
- Input Current ........................................................................... ±15mA
- Output Short-Circuit Duration (Note 1) ........... Continuous
- Operating Temperature Range ....................... 0°C to 70°C
- Storage Temperature Range ...................... −65°C to 150°C
- Junction Temperature (Note 2) ..................... 150°C
- Lead Temperature (Soldering, 10 sec) ......... 300°C

### Package/Order Information

<table>
<thead>
<tr>
<th>ORDER PART NUMBER</th>
<th>TOP VIEW</th>
<th>PART MARKING</th>
<th>ORDER PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT1252CS8</td>
<td>TOP VIEW</td>
<td>S8 PACKAGE</td>
<td>LT1252CN8</td>
</tr>
<tr>
<td></td>
<td>8-LEAD PLASTIC SO</td>
<td>8-LEAD PLASTIC DIP</td>
<td></td>
</tr>
</tbody>
</table>

- NC
- −IN
- +IN
- V−
- V+
- NC

### Electrical Characteristics

$0°C \leq T_A \leq 70°C$, $V_S = \pm 5V$ to $\pm 12V$, unless otherwise noted.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{OS}$</td>
<td>Input Offset Voltage</td>
<td></td>
<td>5</td>
<td>15</td>
<td></td>
<td>mV</td>
</tr>
<tr>
<td>$+I_B$</td>
<td>Noninverting Bias Current</td>
<td></td>
<td>1</td>
<td>15</td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>$-I_B$</td>
<td>Inverting Bias Current</td>
<td></td>
<td>20</td>
<td>100</td>
<td></td>
<td>µA</td>
</tr>
<tr>
<td>$A_{VOL}$</td>
<td>Large-Signal Voltage Gain</td>
<td>$V_S = \pm 5V$, $V_O = \pm 2V$, $R_L = 150Ω$</td>
<td>560</td>
<td>1500</td>
<td></td>
<td>V/V</td>
</tr>
<tr>
<td>PSRR</td>
<td>Power Supply Rejection Ratio</td>
<td>$V_S = \pm 3V$ to $\pm 12V$</td>
<td>60</td>
<td>70</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>CMRR</td>
<td>Common-Mode Rejection Ratio</td>
<td>$V_S = \pm 5V$, $V_{CM} = \pm 2V$</td>
<td>55</td>
<td>65</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>$V_{OUT}$</td>
<td>Maximum Output Voltage Swing</td>
<td>$V_S = \pm 12V$, $R_L = 500Ω$</td>
<td>±7.0</td>
<td>±10.5</td>
<td>±2.5</td>
<td>±3.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_S = \pm 5V$, $R_L = 150Ω$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{OUT}$</td>
<td>Maximum Output Current</td>
<td></td>
<td>30</td>
<td>55</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>$I_S$</td>
<td>Supply Current</td>
<td></td>
<td>8.5</td>
<td>18</td>
<td></td>
<td>mA</td>
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<tr>
<td>$R_{IN}$</td>
<td>Input Resistance</td>
<td></td>
<td>1</td>
<td>10</td>
<td></td>
<td>MΩ</td>
</tr>
<tr>
<td>$C_{IN}$</td>
<td>Input Capacitance</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Power Supply Range</td>
<td>Dual</td>
<td>Single</td>
<td>$±2$</td>
<td>$±12$</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>SR</td>
<td>Input Slew Rate</td>
<td>$A_V = 1$</td>
<td>125</td>
<td></td>
<td></td>
<td>V/µs</td>
</tr>
<tr>
<td></td>
<td>Output Slew Rate</td>
<td>$A_V = 2$</td>
<td>250</td>
<td></td>
<td></td>
<td>V/µs</td>
</tr>
</tbody>
</table>
### Electrical Characteristics

$0^\circ C \leq T_A \leq 70^\circ C$, $V_S = \pm 5V$ to $\pm 12V$, unless otherwise noted.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$t_r$</td>
<td>Small-Signal Rise Time</td>
<td>$V_S = \pm 12V$, $A_V = 2$</td>
<td>3.5</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>Rise and Fall Time</td>
<td>$V_S = \pm 5V$, $A_V = 2$, $V_{OUT} = 1V_{P-P}$</td>
<td>5.2</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>$t_p$</td>
<td>Propagation Delay</td>
<td>$V_S = \pm 5V$, $A_V = 2$</td>
<td>3.5</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
</tbody>
</table>

**Note 1:** A heat sink may be required to keep the junction temperature below absolute maximum when the output is shorted indefinitely.

**Note 2:** $T_J$ is calculated from the ambient temperature $T_A$ and power dissipation $P_D$ according to the following formulas:

- LT1252CN8: $T_J = T_A + (P_D \times 100^\circ C/W)$
- LT1252CS8: $T_J = T_A + (P_D \times 150^\circ C/W)$

### Typical AC Performance

#### Bandwidth

<table>
<thead>
<tr>
<th>$V_S$</th>
<th>$A_V$</th>
<th>$R_L$</th>
<th>$R_F$</th>
<th>$R_G$</th>
<th>SMALL SIGNAL $-3dB$ BW (MHz)</th>
<th>SMALL SIGNAL $-0.1dB$ BW (MHz)</th>
<th>SMALL SIGNAL PEAKING (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\pm 12$</td>
<td>1</td>
<td>150</td>
<td>2370</td>
<td>None</td>
<td>282</td>
<td>45</td>
<td>1.9</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>-1</td>
<td>1000</td>
<td>1100</td>
<td>1100</td>
<td>58</td>
<td>17</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>-1</td>
<td>150</td>
<td>909</td>
<td>909</td>
<td>73</td>
<td>34</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>2</td>
<td>1000</td>
<td>1210</td>
<td>1210</td>
<td>253</td>
<td>20</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>2</td>
<td>150</td>
<td>909</td>
<td>909</td>
<td>142</td>
<td>38</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>5</td>
<td>1000</td>
<td>1000</td>
<td>249</td>
<td>73</td>
<td>25</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>5</td>
<td>150</td>
<td>866</td>
<td>215</td>
<td>75</td>
<td>31</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>10</td>
<td>1000</td>
<td>909</td>
<td>100</td>
<td>67</td>
<td>26</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>-1</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>50</td>
<td>11</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>1</td>
<td>1000</td>
<td>2210</td>
<td>None</td>
<td>260</td>
<td>10</td>
<td>2.4</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>-1</td>
<td>150</td>
<td>1300</td>
<td>None</td>
<td>232</td>
<td>50</td>
<td>0.8</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>2</td>
<td>1000</td>
<td>768</td>
<td>84.5</td>
<td>69</td>
<td>32</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>2</td>
<td>150</td>
<td>787</td>
<td>787</td>
<td>100</td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>5</td>
<td>1000</td>
<td>825</td>
<td>205</td>
<td>62</td>
<td>21</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>5</td>
<td>150</td>
<td>698</td>
<td>174</td>
<td>66</td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>10</td>
<td>1000</td>
<td>750</td>
<td>82.5</td>
<td>58</td>
<td>22</td>
<td>0.1</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>10</td>
<td>150</td>
<td>619</td>
<td>68.1</td>
<td>60</td>
<td>30</td>
<td>0.1</td>
</tr>
</tbody>
</table>

#### NTSC Video (Note 1)

<table>
<thead>
<tr>
<th>$V_S$</th>
<th>$A_V$</th>
<th>$R_L$</th>
<th>$R_F$</th>
<th>$R_G$</th>
<th>DIFFERENTIAL GAIN</th>
<th>DIFFERENTIAL PHASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\pm 12$</td>
<td>2</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>0.02%</td>
<td>0.02°</td>
</tr>
<tr>
<td>$\pm 12$</td>
<td>2</td>
<td>150</td>
<td>1000</td>
<td>1000</td>
<td>0.03%</td>
<td>0.04°</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>2</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>0.02%</td>
<td>0.08°</td>
</tr>
<tr>
<td>$\pm 5$</td>
<td>2</td>
<td>150</td>
<td>1000</td>
<td>1000</td>
<td>0.01%</td>
<td>0.09°</td>
</tr>
</tbody>
</table>

**Note 1:** Differential Gain and Phase are measured using a Tektronix TSG 120 YC/NTSC signal generator and a Tektronix 1780R Video Measurement Set. The resolution of this equipment is 0.1% and 0.1°. Ten identical amplifier stages were cascaded giving an effective resolution of 0.01% and 0.01°.
LT1252

TYPICAL PERFORMANCE CHARACTERISTICS

Supply Current vs Supply Voltage

Input Common-Mode Limit vs Temperature

Output Saturation Voltage vs Temperature

Settling Time to 10mV vs Output Step

2nd and 3rd Harmonic Distortion vs Frequency

Power Supply Rejection vs Frequency

Spot Noise Voltage and Current vs Frequency

Output Impedance vs Frequency

Output Short-Circuit Current vs Junction Temperature
TYPICAL PERFORMANCE CHARACTERISTICS

±12V Frequency Response

±5V Frequency Response

VS = ±12V
AV = 1
RL = 150Ω
RF = 2.37kΩ

VS = ±5V
AV = 1
RL = 150Ω
RF = 1.3kΩ

VS = ±12V
AV = 2
RL = 150Ω
RF = 909Ω
RG = 909Ω

VS = ±5V
AV = 2
RL = 150Ω
RF = 787Ω
RG = 787Ω

VS = ±12V
AV = 10
RL = 150Ω
RF = 768Ω
RG = 84.5Ω

VS = ±5V
AV = 10
RL = 150Ω
RF = 619Ω
RG = 68.1Ω
LT1252

TYPICAL PERFORMANCE CHARACTERISTICS

Transient Response

\[
\begin{align*}
V_S &= \pm 5V \\
AV &= 1 \\
R_L &= 150\,\Omega \\
R_F &= 619\,\Omega \\
V_O &= 1V
\end{align*}
\]

\[
\begin{align*}
V_S &= \pm 5V \\
AV &= 10 \\
R_L &= 150\,\Omega \\
R_F &= 619\,\Omega \\
V_O &= 1.5V
\end{align*}
\]

TYPICAL APPLICATIONS

Single Supply AC-Coupled Amplifier

Noninverting

\[
\begin{align*}
&5V \\
22\,\mu F &\quad 10k \\
V_{IN} &\quad + \\
LT1252 &\quad - \\
&4.7\,\mu F \\
&\quad 510\,\Omega \\
&\quad 51\,\Omega \\
&\quad 10k \\
&\quad 10k \\
&\quad 220\,\mu F \\
&\quad 51\,\Omega
\end{align*}
\]

\[
AV = 11 \\
BW = 14Hz \text{ to } 60MHz
\]

Single Supply AC-Coupled Amplifier

Inverting

\[
\begin{align*}
&5V \\
4.7\,\mu F &\quad 10k \\
V_{IN} &\quad + \\
LT1252 &\quad - \\
&510\,\Omega \\
&\quad 51\,\Omega \\
&\quad 10k \\
&\quad 10k \\
&\quad 2.2\,\mu F \\
&\quad 220\,\mu F \\
&\quad 51\,\Omega \\
&\quad 510\,\Omega
\end{align*}
\]

\[
AV = \frac{510\,\Omega}{R_S + 51\,\Omega} = 10 \\
BW = 14Hz \text{ to } 60MHz
\]

Half Wave Rectifier

\[
\begin{align*}
&750\,\Omega \\
&750\,\Omega \\
&750\,\Omega \\
&1N5712 \\
&\quad + \\
LT1252 &\quad - \\
&\quad 1N5712 \\
&\quad V_{OUT}
\end{align*}
\]
Simplified Schematic

N8 Package
8-Lead Plastic DIP

Dimensions in inches (millimeters) unless otherwise noted.

S8 Package
8-Lead Plastic SOIC
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