



LA4534M

3V CD Headphone-stereo Power Amplifier

The LA4534M is a low noise, low distortion headphone-stereo power IC designed for use in a portable CD.

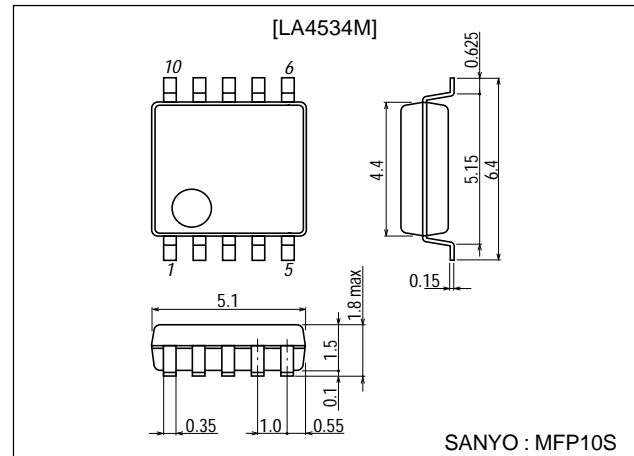
Features

- Less current drain.
- Accept 16Ω load drive.
- Excellent voltage reduction characteristic.
- Excellent ripple rejection.
- Power switch function and built-in muting circuit.
- Low noise (7μV), low gain (11dB).

Package Dimensions

unit:mm

3086A-MFP10S



Specifications

Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|----------------|-------------|------|
| Maximum supply voltage | V _{CC} max | Quiescent time | 4.5 | V |
| Allowable power dissipation | P _d max | | 300 | mW |
| Operating temperature | T _{opr} | | -20 to +75 | °C |
| Storage temperature | T _{stg} | | -40 to +125 | °C |

Operating Conditions at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|--------------------------------|--------------------|------------|------------|------|
| Recommended supply voltage | V _{CC} | | 3.0 | V |
| Operating supply voltage range | V _{CC op} | | 1.6 to 4.0 | V |
| Recommended load impedance | R _L | | 16 to 32 | Ω |

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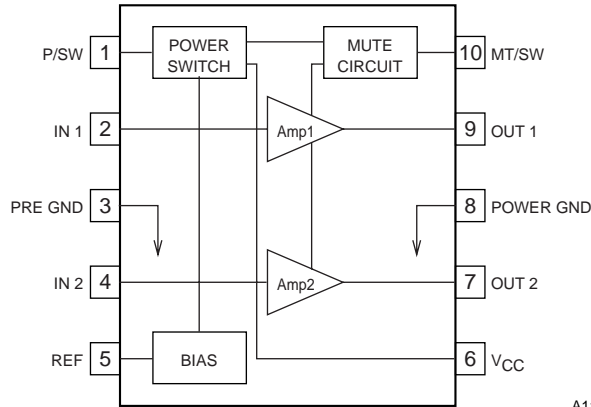
LA4534M

Operating Characteristics at $T_a = 25^\circ\text{C}$, $R_L=16\Omega$, $R_g=600\Omega$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|-------------------------------|---------------------|---|---------|------|------|---------------|
| | | | min | typ | max | |
| Quiescent current | I_{CCO1} | $V_{CC}=2.4\text{V}$, Quiescent time | | 5.4 | 10 | mA |
| | I_{CCO2} | $V_{CC}=4.5\text{V}$, pin 10 to GND | | 1.1 | 2.0 | mA |
| | I_{CCO3} | $V_{CC}=4.5\text{V}$, pin 1 to GND | | | 1.0 | μA |
| Voltage gain | VG1 | $V_{CC}=2.4\text{V}$, $f=1\text{kHz}$, $V_O=-10\text{dBm}$ | 9 | 11 | 13 | dB |
| | VG2 | $V_{CC}=1.6\text{V}$, $f=1\text{kHz}$, $V_O=-20\text{dBm}$ | 9 | 11 | 13 | dB |
| Voltage gain variations | ΔVG1 | $V_{CC}=2.4\text{V}$, $f=1\text{kHz}$, $V_O=-10\text{dBm}$ | | | 1.0 | dB |
| | ΔVG2 | $V_{CC}=1.6\text{V}$, $f=1\text{kHz}$, $V_O=-20\text{dBm}$ | | | 1.0 | dB |
| Total harmonic distortion | THD | $V_{CC}=2.0\text{V}$, $f=1\text{kHz}$, $P_O=1\text{mW}$ | | 0.08 | 0.24 | % |
| Output power | P_O | $V_{CC}=3.0\text{V}$, $f=1\text{kHz}$, THD=10% | 25 | 50 | | mW |
| Crosstalk | CT | $V_{CC}=2.4\text{V}$, $f=1\text{kHz}$, $R_g=1\text{k}\Omega$, $V_O=-10\text{dBm}$ | 40 | 50 | | mW |
| Ripple rejection | SVRR | $V_{CC}=1.6\text{V}$, $f=100\text{Hz}$, $R_g=1\text{k}\Omega$, $V_R=-20\text{dBm}$, BPF=100Hz | 50 | 70 | | dB |
| Output noise voltage | V_{NO} | $V_{CC}=4.5\text{V}$, $R_g=1\text{k}\Omega$, BPF=20Hz to 20kHz | | 7 | 20 | μV |
| Power off effect | $V_{O(\text{off})}$ | $V_{CC}=1.6\text{V}$, $f=100\text{Hz}$, Pin 1 to GND, $V_{IN}=-10\text{dBm}$ | | | -80 | dBm |
| Mute effect | $V_{O(\text{MT})}$ | $V_{CC}=1.6\text{V}$, $f=100\text{Hz}$, Pin 10 to GND, $V_{IN}=-10\text{dBm}$ | | | -80 | dBm |
| Power on current sensitivity | $I1(\text{on})$ | $V_{CC}=1.5\text{V}$, $V_5 \geq 0.85\text{V}$ | | 0.05 | 1.0 | μA |
| Power off voltage sensitivity | $V1(\text{off})$ | $V_{CC}=1.5\text{V}$, $V_5 \leq 0.1\text{V}$ | 0.5 | 0.6 | | V |
| Mute off current sensitivity | $I10(\text{off})$ | $V_{CC}=1.5\text{V}$, $V_5 \geq 0.85\text{V}$ | | 0.2 | 1.0 | μA |
| Mute on voltage sensitivity | $V10(\text{on})$ | $V_{CC}=1.5\text{V}$, $V_5 \leq 0.1\text{V}$ | 0.5 | 0.65 | | V |

Note : Quiescent current is the current flowing into pin 6. The current flowing into pin 1 and pin 10 is at the maximum value and calculated from the equation $(V_{\text{pin}} - 0.5\text{V}) / 16[\text{V}/\text{k}\Omega]$, increasing total current.

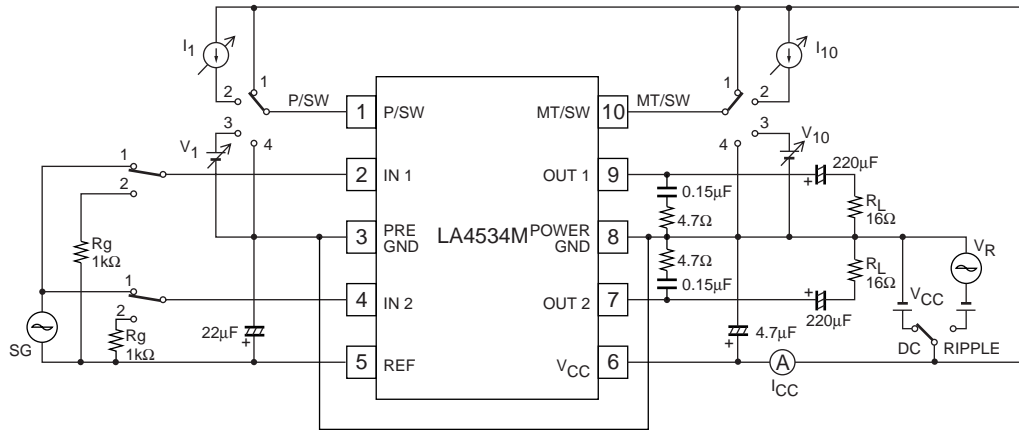
Equivalent Circuit Block Diagram



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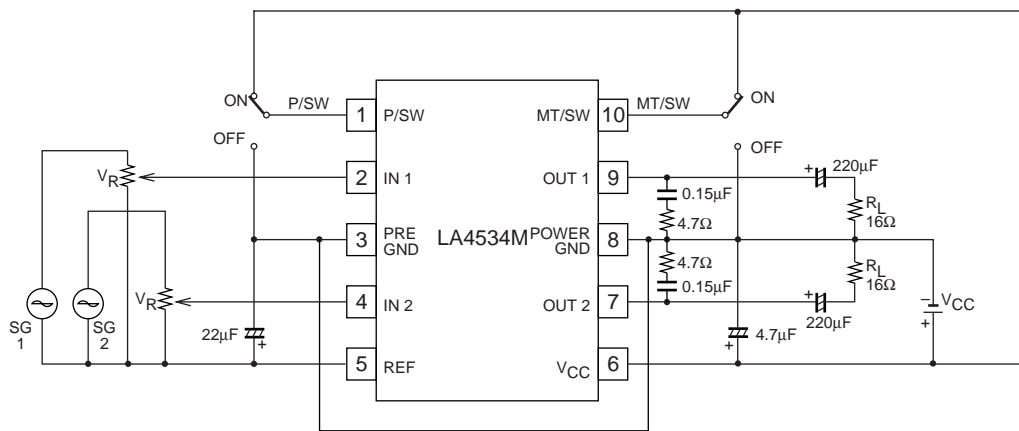
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Test Circuit



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Sample Application Circuit



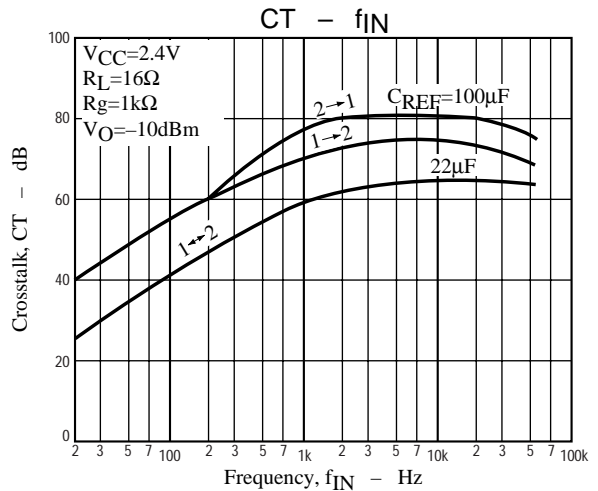
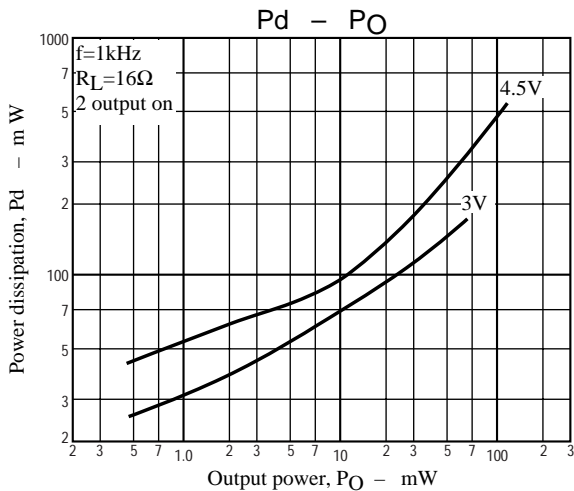
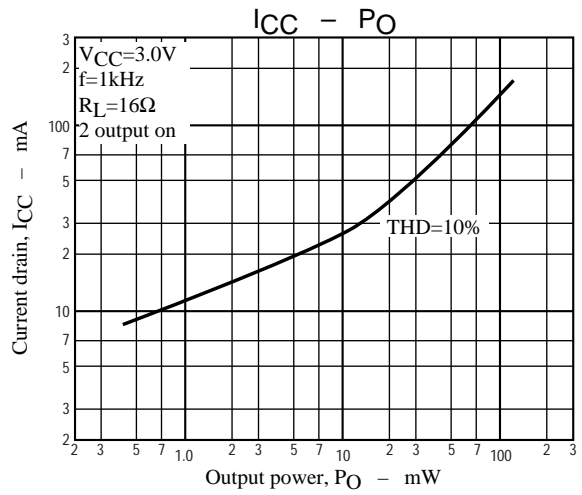
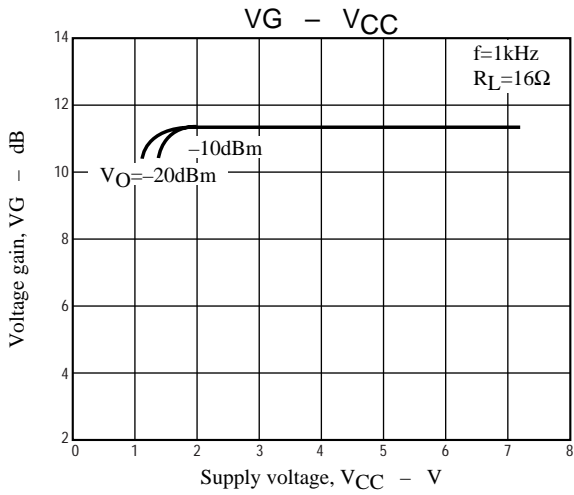
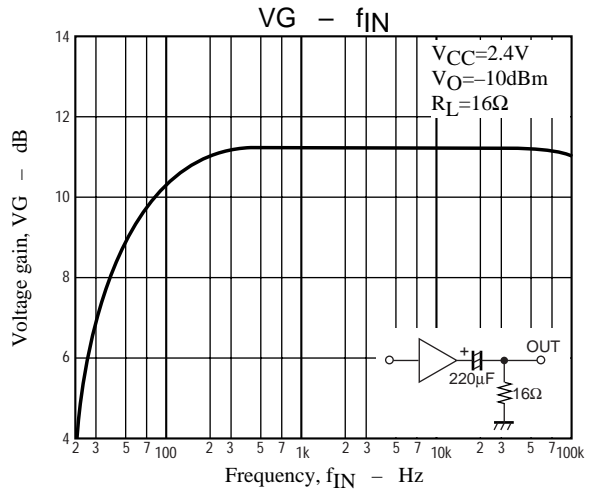
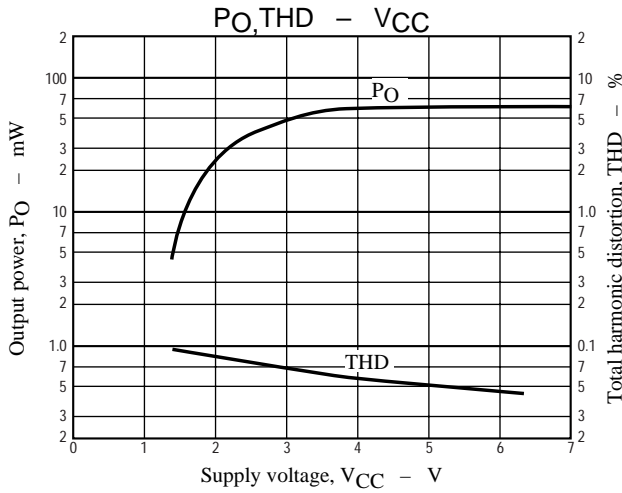
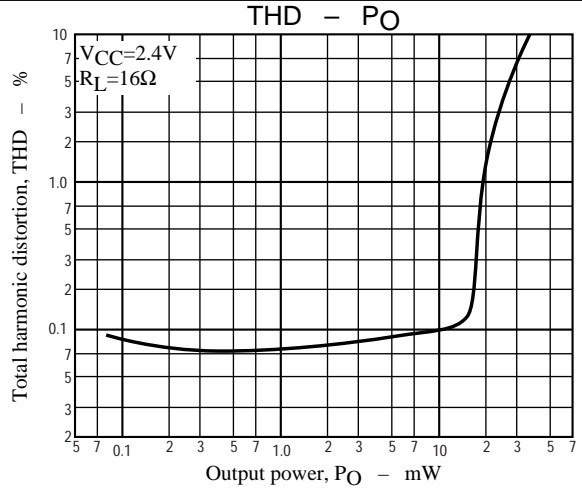
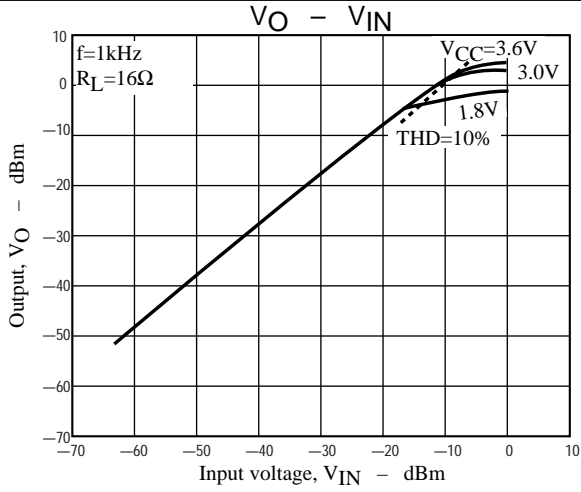
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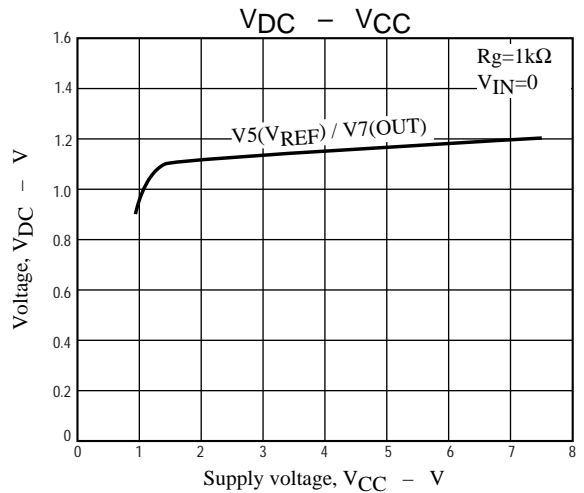
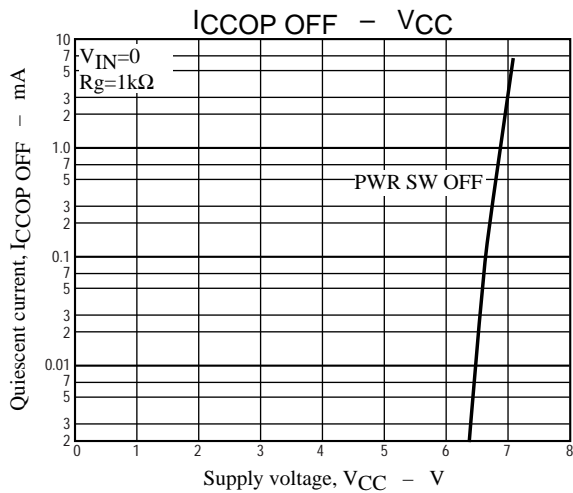
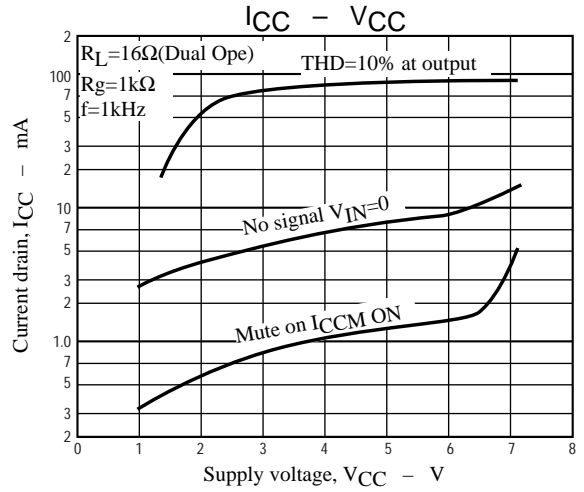
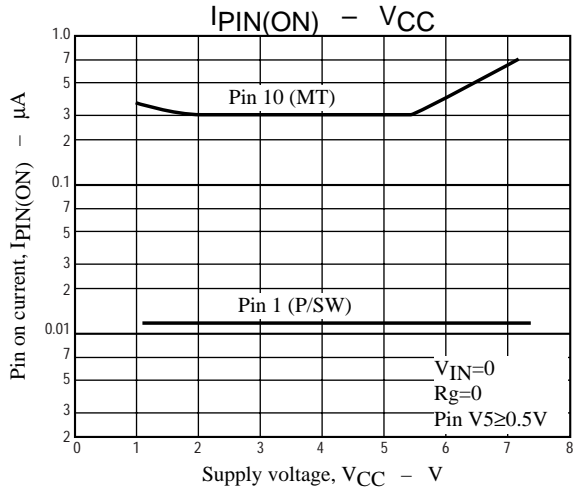
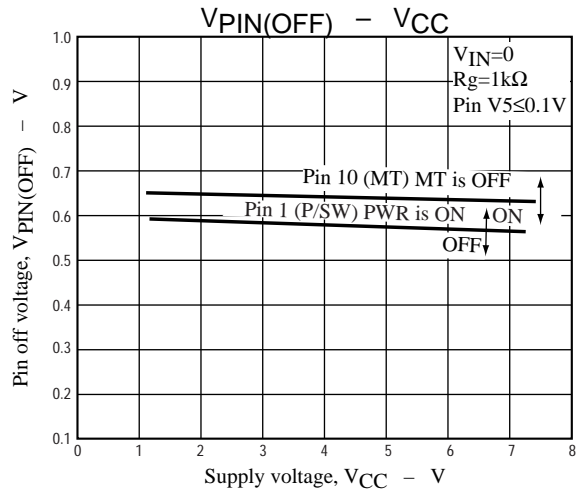
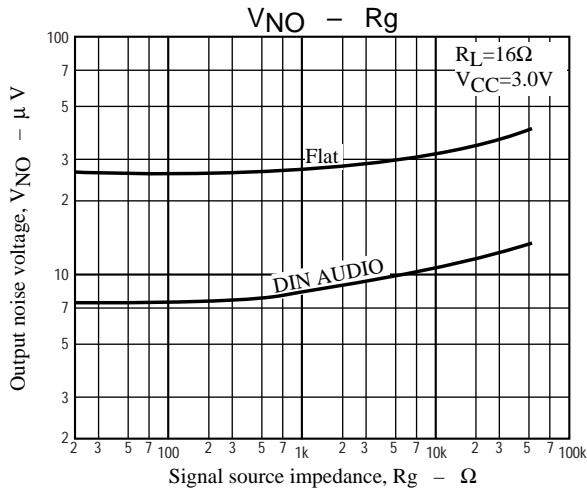
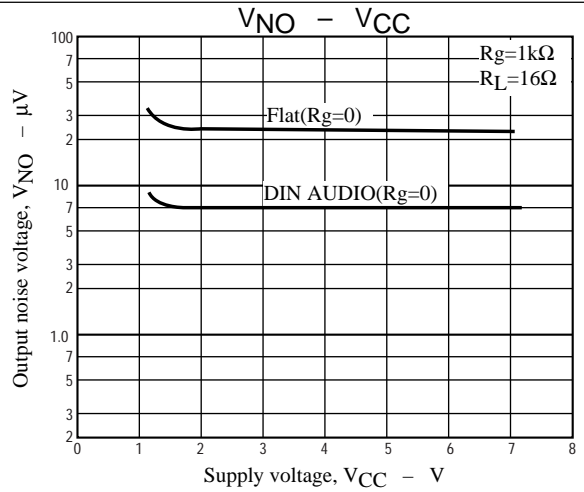
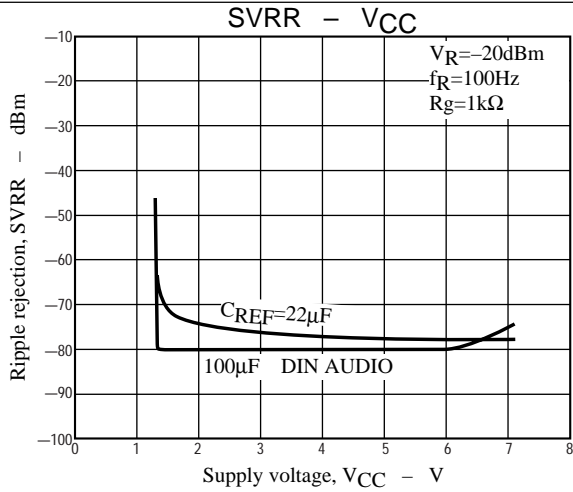
Pin Functions ($V_{CC}=3.0V$)

| Pin No. | Symbol | Pin voltage (V) | Equivalent circuit | Pin function |
|---------|--------------|-----------------|--------------------|---|
| 1 | P/SW1 | | | <ul style="list-style-type: none"> The system turns on when the V_{CC} is applied to this pin and turns off by connecting this pin to GND. |
| 2 4 | IN1 IN2 | 1.1 1.1 | | <ul style="list-style-type: none"> Input pin connection. Input impedance is 10kΩ. |
| 3 | PRE GND | | | |
| 5 | REF | 1.1 | | <ul style="list-style-type: none"> 1.1V fixed bias is applied to this pin. |
| 6 | V_{CC} | 3.0 | | |
| 7 9 | OUT2 OUT1 | 1.1 1.1 | | <ul style="list-style-type: none"> Output pin connection. |
| 8 | POWER GND | | | |
| 10 | MT/SW | | | <ul style="list-style-type: none"> The muting function turns on when this pin is connected to GND and turns off by applying the V_{CC} to this pin. |

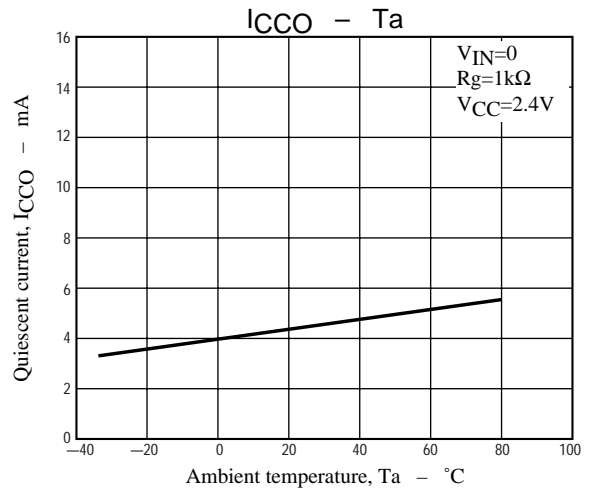
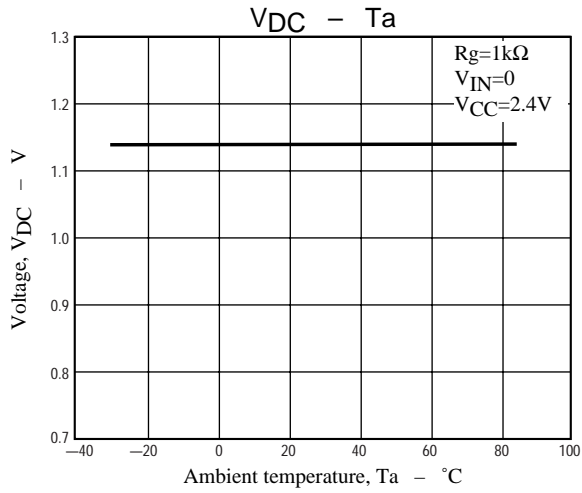
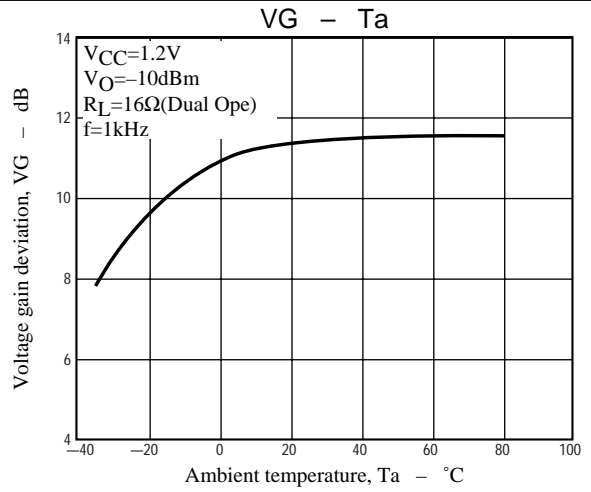
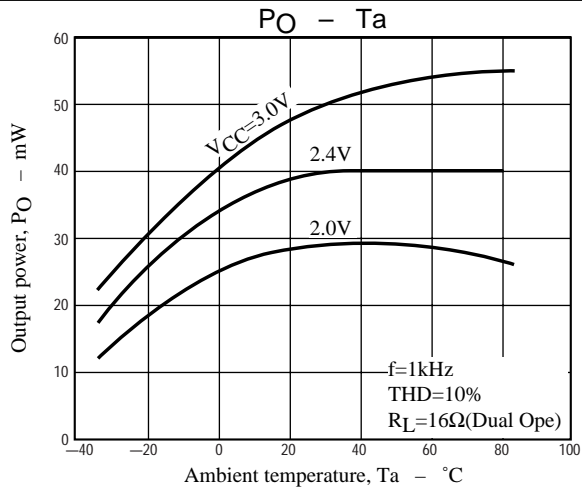
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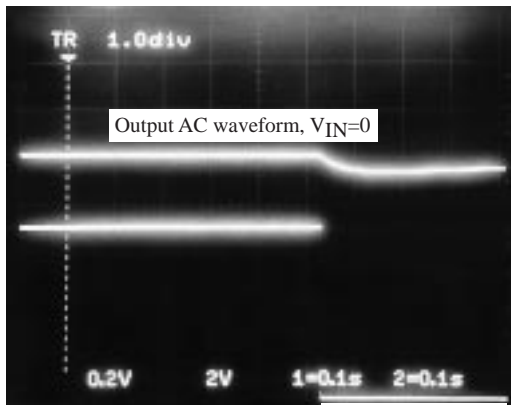
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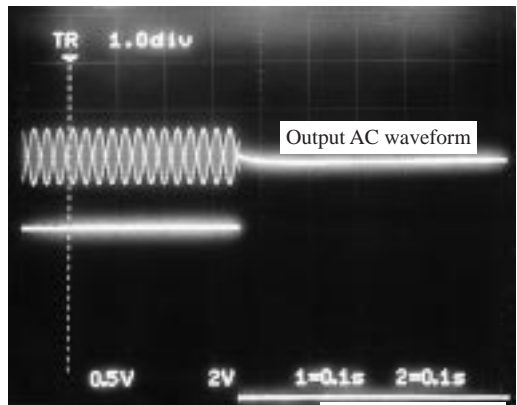


P.S.W OFF



P.S.W DC waveform

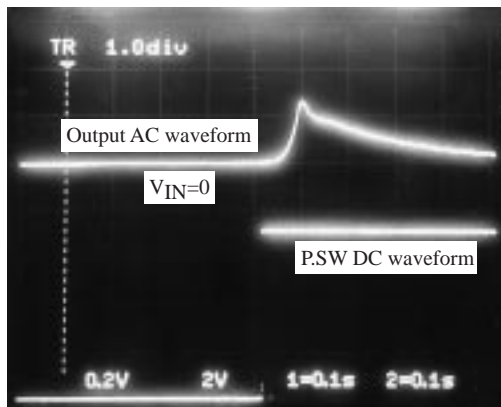
P.S.W OFF



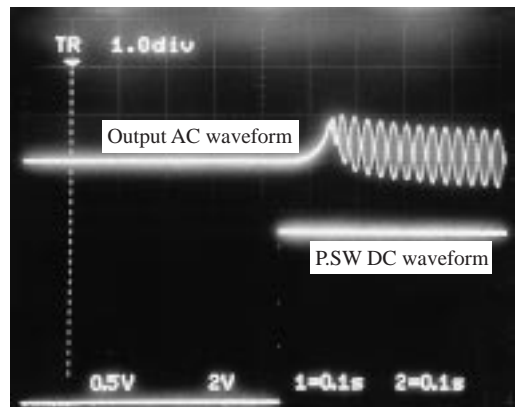
P.S.W DC waveform

P.S.W OFF

P.S.W ON



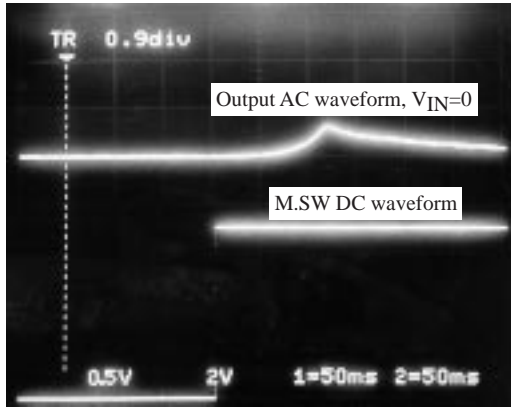
P.S.W ON



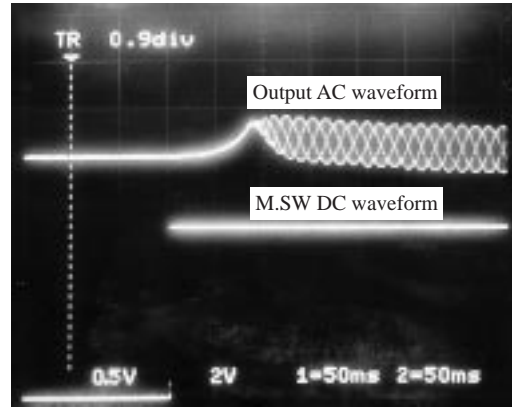
P.S.W ON

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M.SW OFF

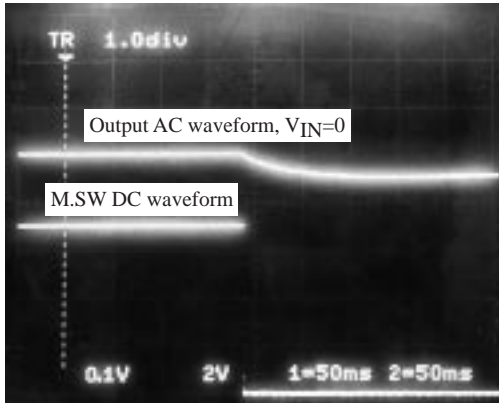


M.SW OFF

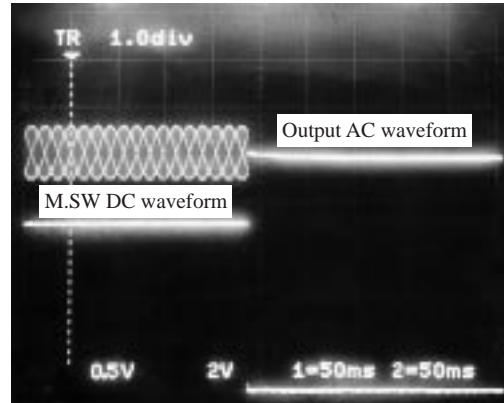


M.SW OFF

M.SW ON



M.SW ON

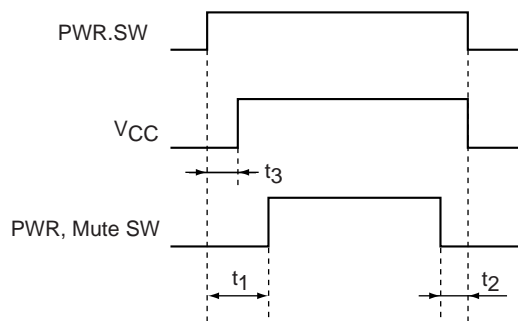


M.SW ON

Application Notes

- Popping noise reduction

The switching sequence shown below can minimize popping noise.



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To minimize popping noise, the PWR mute switch should be turned on t_1 (about 0.1s) after power-on and turned off t_2 (about 0.1s) before power-off. Turn on and off the PWR mute switch by applying V_{CC} with the PWR be is no state.

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