



# 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.

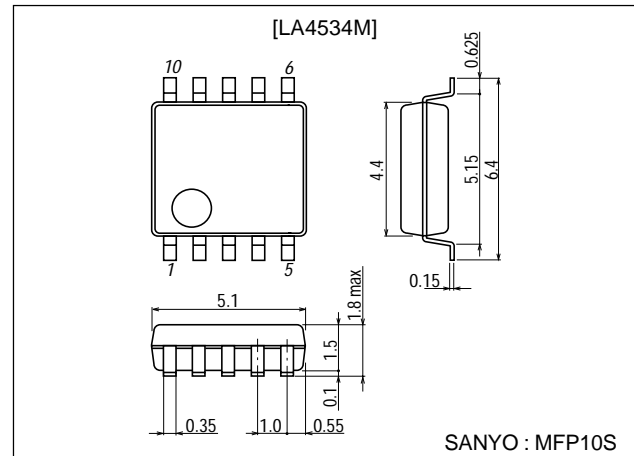
### Features

- 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 <sub>CC</sub> max	Quiescent time	4.5	V
Allowable power dissipation	P <sub>d</sub> max		300	mW
Operating temperature	T <sub>opr</sub>		-20 to +75	°C
Storage temperature	T <sub>stg</sub>		-40 to +125	°C

#### Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>		3.0	V
Operating supply voltage range	V <sub>CC op</sub>		1.6 to 4.0	V
Recommended load impedance	R <sub>L</sub>		16 to 32	Ω

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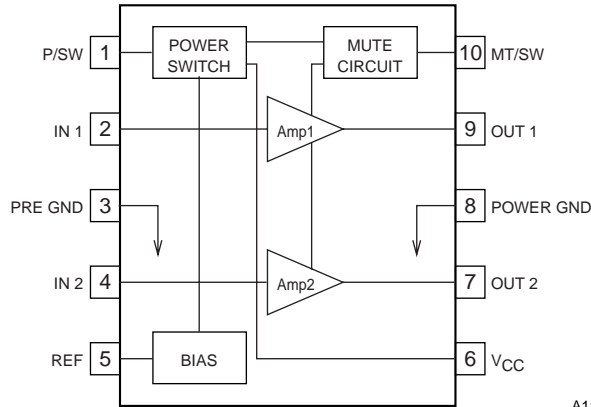
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## Operating Characteristics at $T_a = 25^\circ\text{C}$ , $R_L=16\Omega$ , $R_g=600\Omega$

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	$\mu\text{A}$
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	$\Delta\text{VG1}$	$V_{CC}=2.4\text{V}$ , $f=1\text{kHz}$ , $V_O=-10\text{dBm}$			1.0	dB
	$\Delta\text{VG2}$	$V_{CC}=1.6\text{V}$ , $f=1\text{kHz}$ , $V_O=-20\text{dBm}$			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	$\mu\text{V}$
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	$\mu\text{A}$
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	$\mu\text{A}$
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.

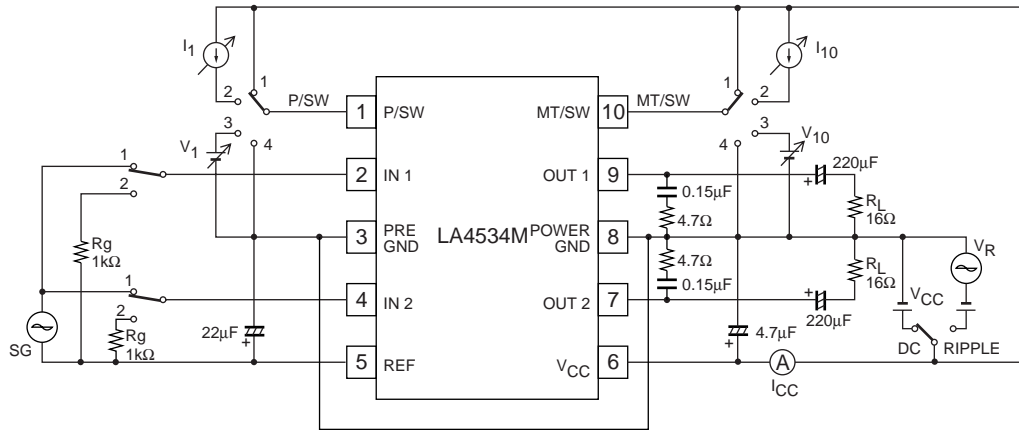
## Equivalent Circuit Block Diagram



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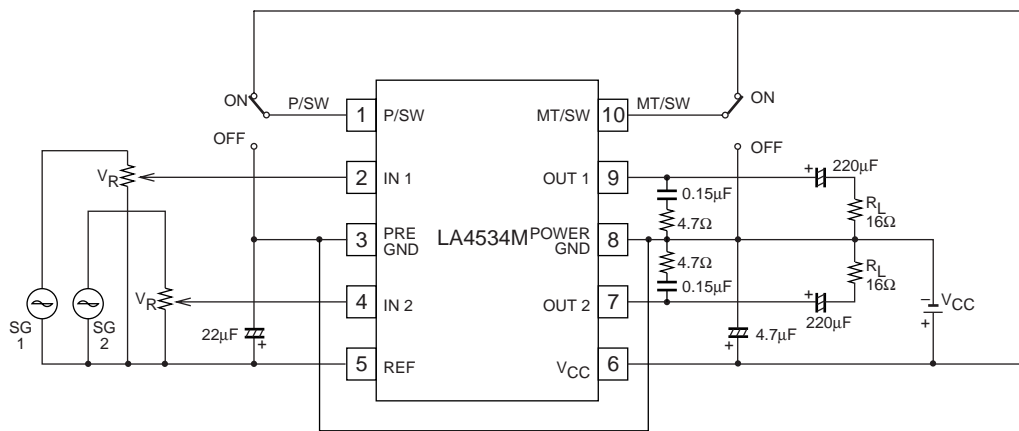
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## Test Circuit



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## Sample Application Circuit



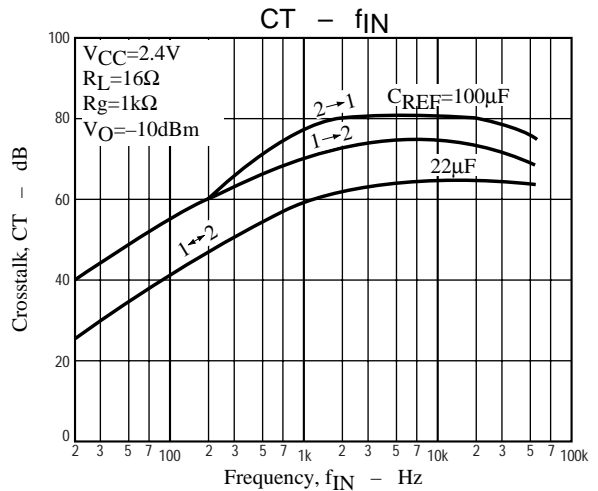
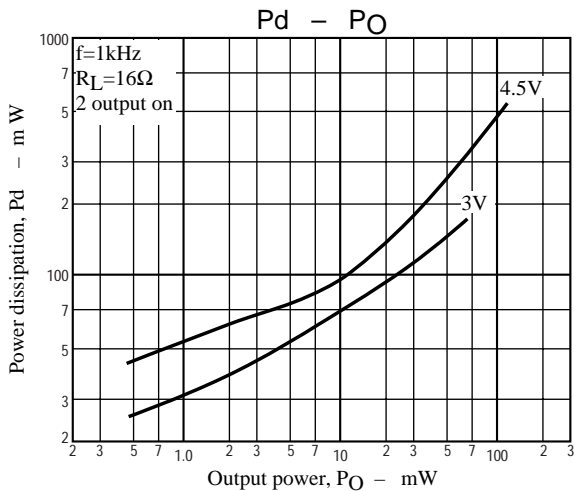
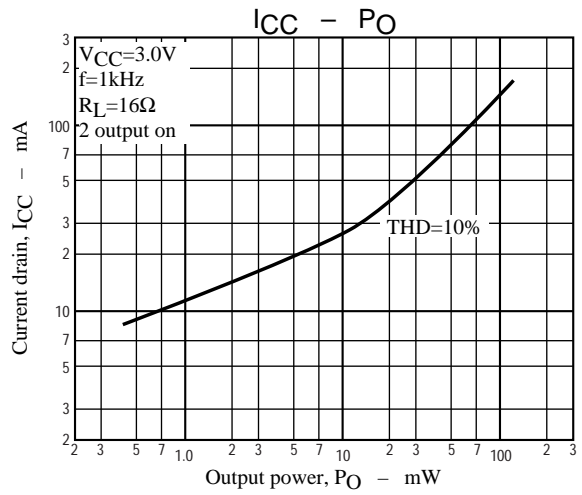
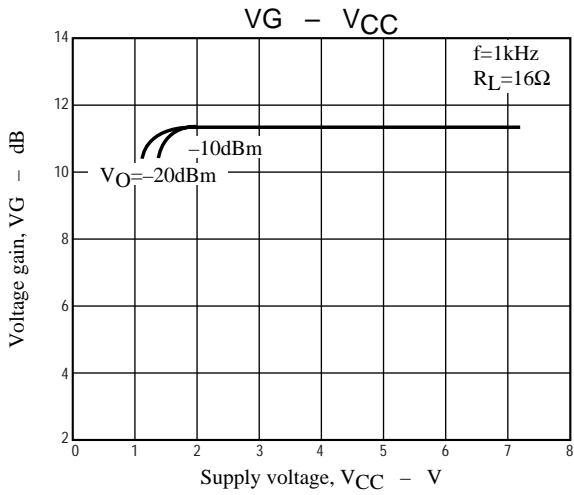
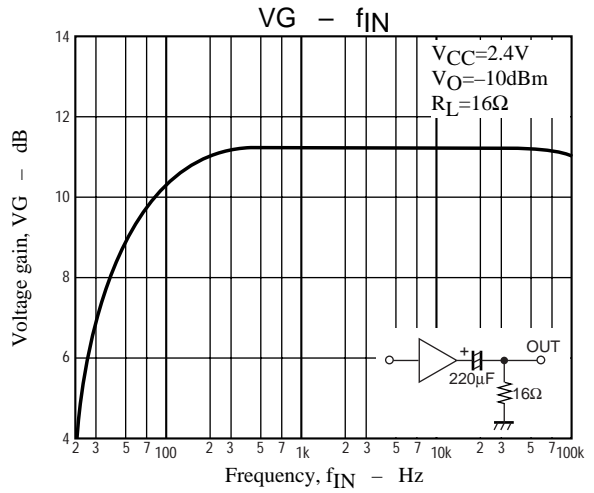
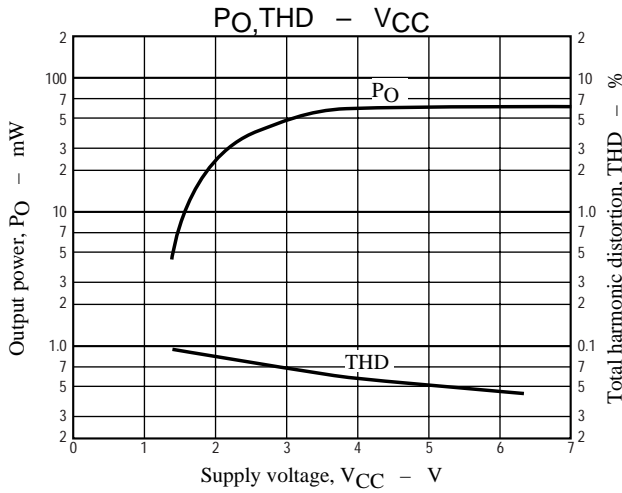
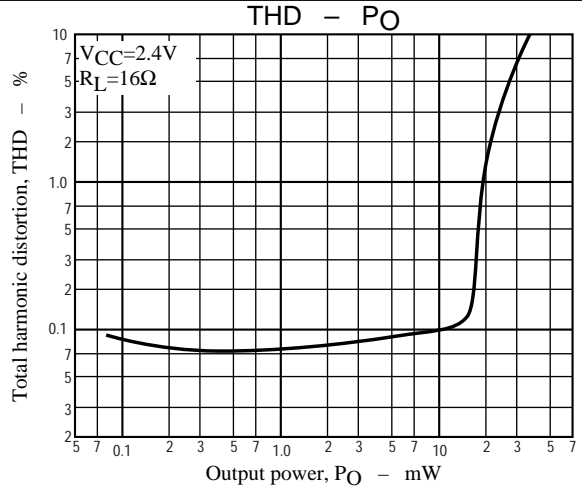
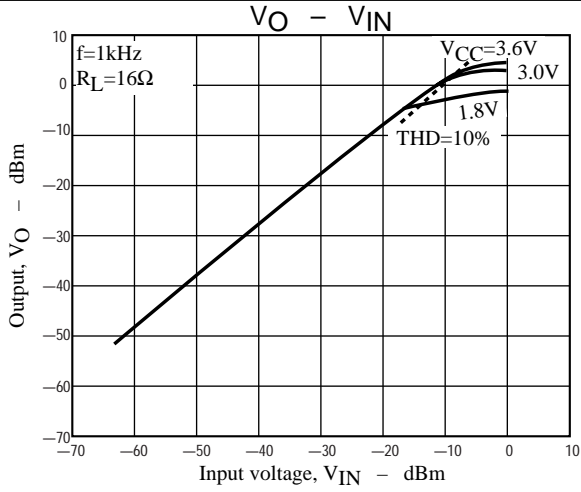
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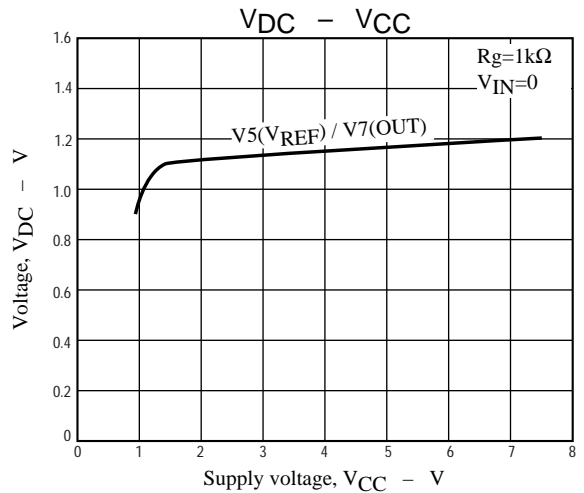
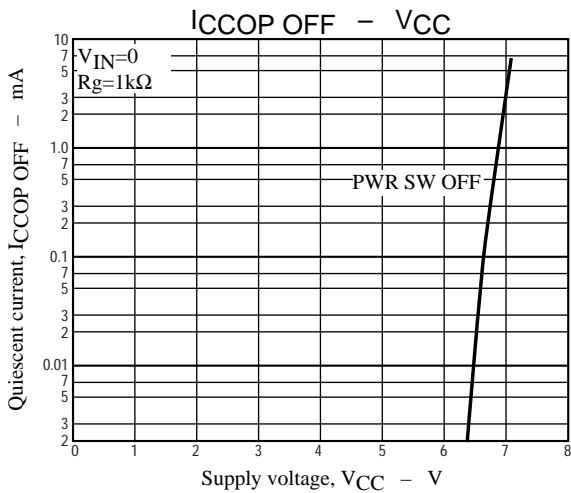
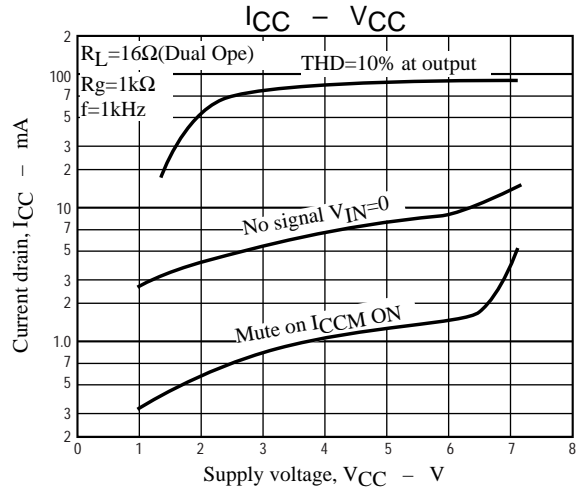
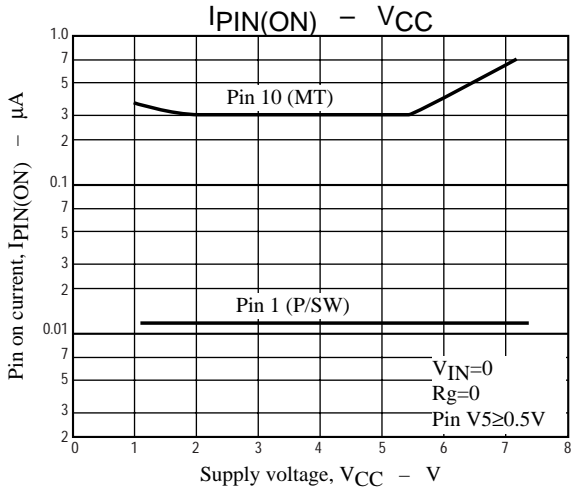
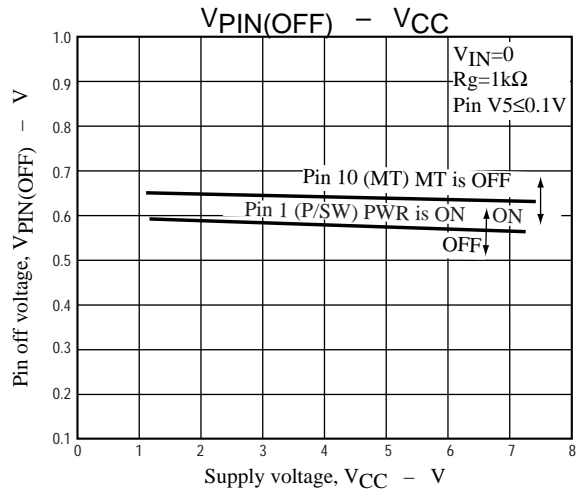
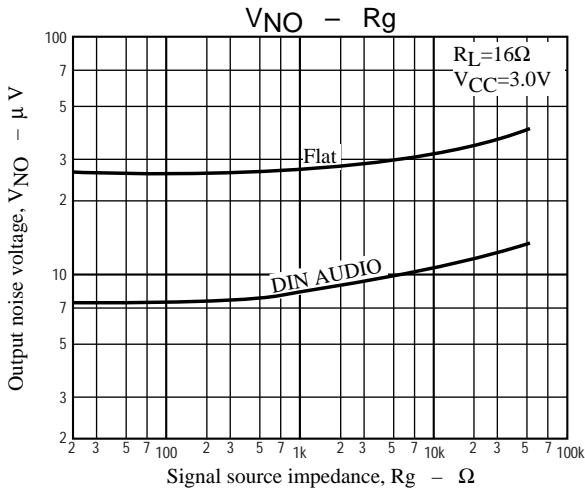
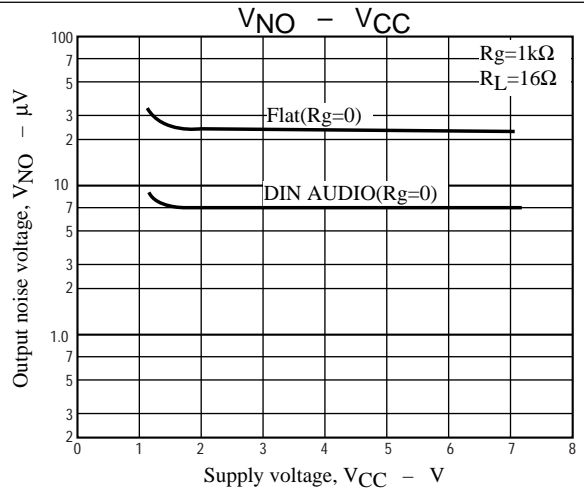
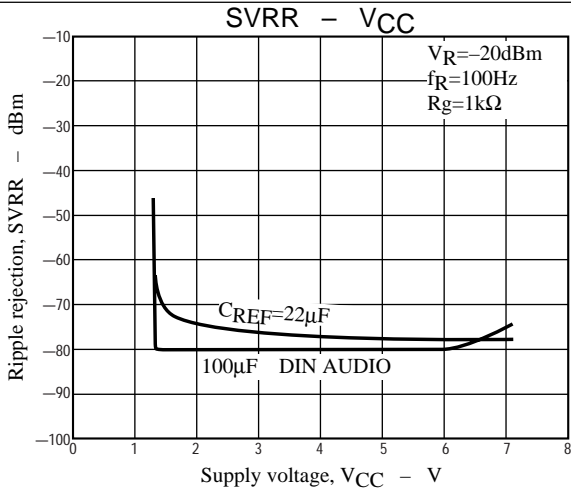
## Pin Functions ( $V_{CC}=3.0V$ )

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

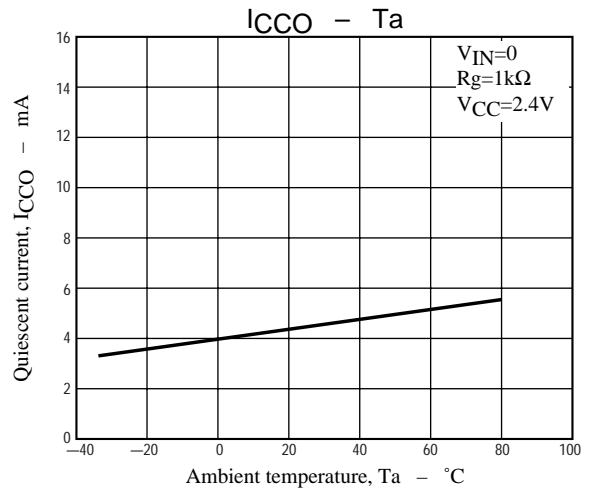
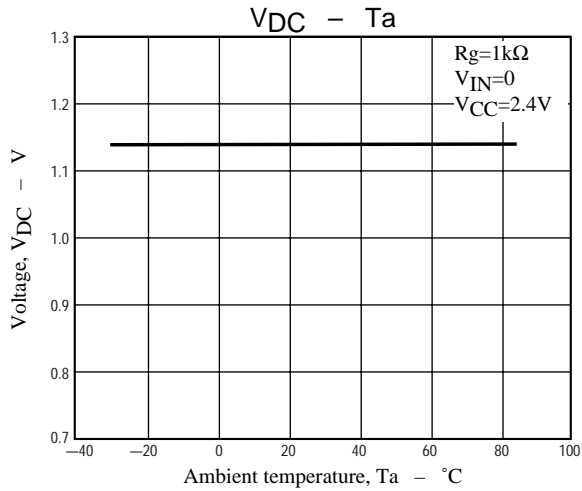
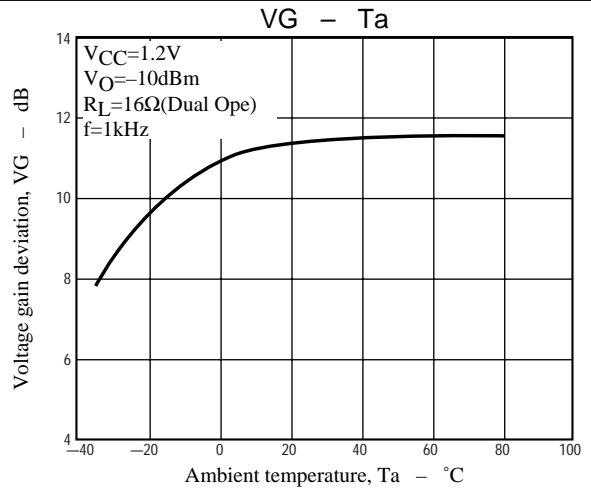
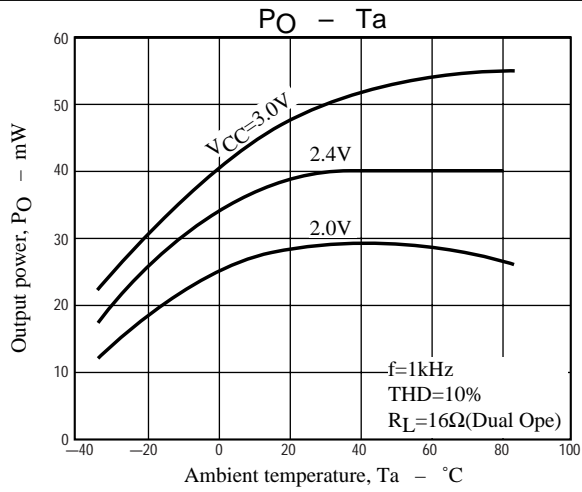
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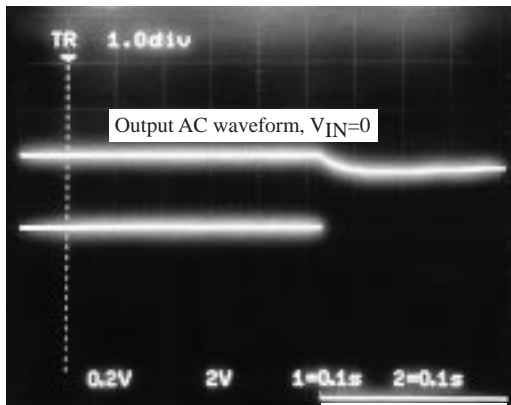
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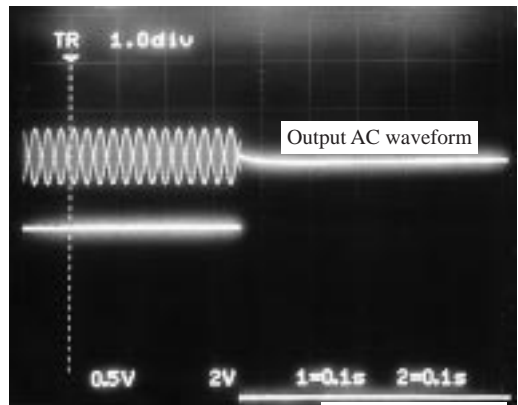


P.SW OFF



P.SW DC waveform

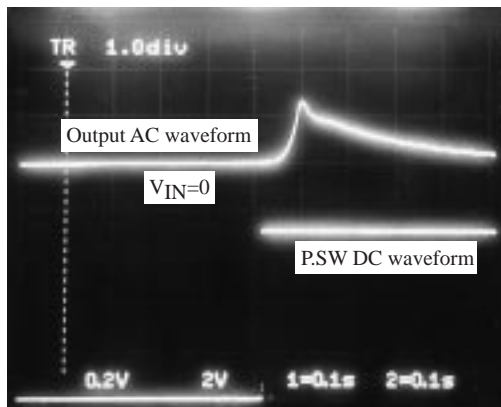
P.SW OFF



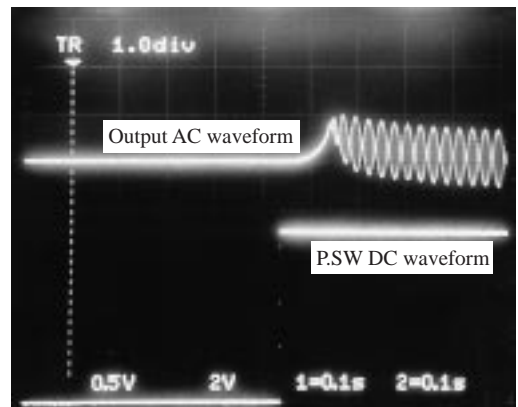
P.SW DC waveform

P.SW OFF

P.SW ON



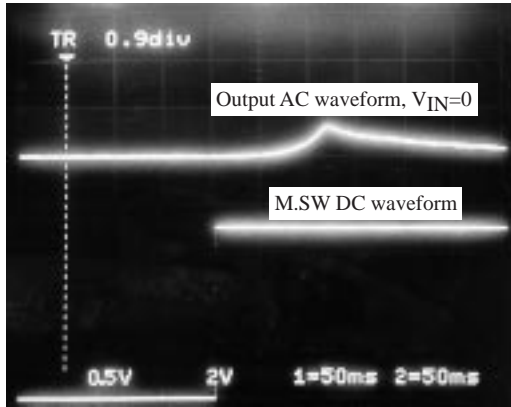
P.SW ON



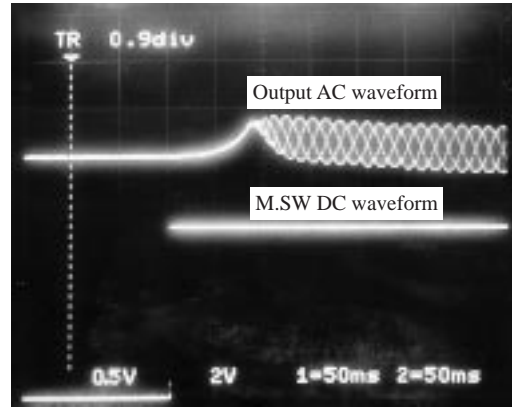
P.SW ON

# LA4534M

M.SW OFF

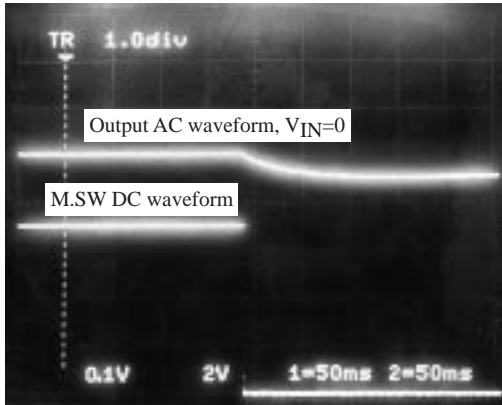


M.SW OFF

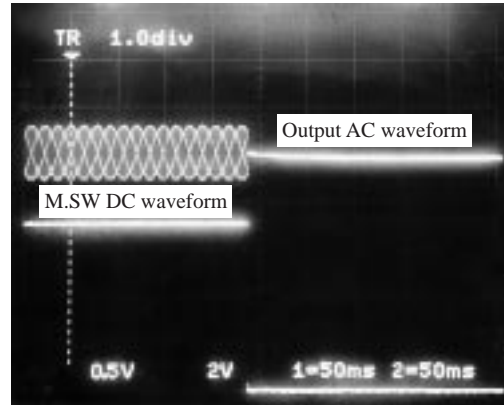


M.SW OFF

M.SW ON



M.SW ON

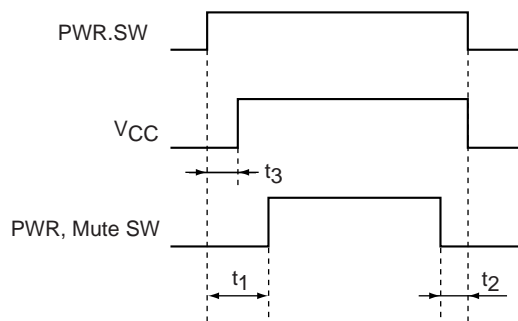


M.SW ON

## 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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