



# LA4536M

## 5V CD Headphone-stereo Power Amplifier

The LA4536M is a low noise, low distortion headphone-stereo power IC designed for use on a portable CD.

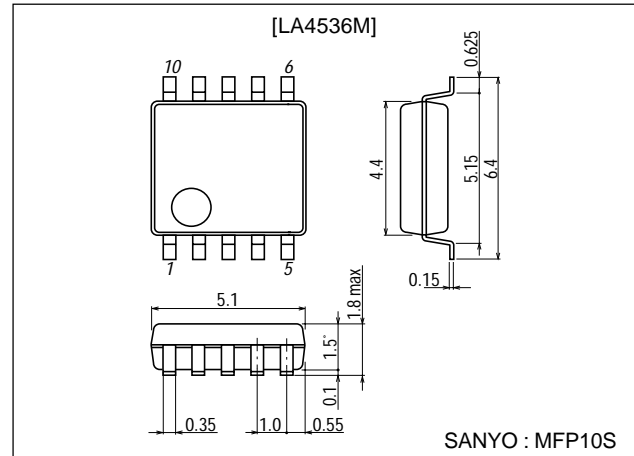
### Features

- 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	No signal	6.0	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 Characteristics at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V <sub>CC</sub>		5.0	V
Operating supply voltage range	V <sub>CC op</sub>		4.0 to 6.0	V
Recommended load impedance	R <sub>L</sub>		16 to 32	Ω

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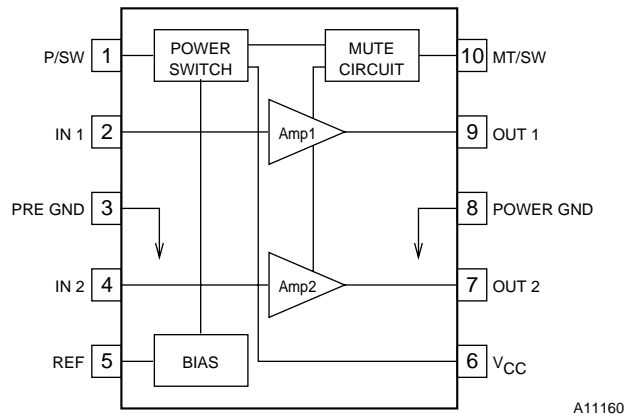
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## Operating Characteristics at $T_a = 25^\circ\text{C}$ , $R_L = 16\Omega$ , $R_g = 600\Omega$

Parameter	Symbol	Conditions	Ratings			Unit	Note
			min	typ	max		
Quiescent current	$I_{CCO1}$	$V_{CC} = 5.0\text{V}$ , no signal		1.0	20	mA	
	$I_{CCO2}$	$V_{CC} = 6.0\text{V}$ , pin 10, GND		1.1	4.0	mA	
	$I_{CCO3}$	$V_{CC} = 6.0\text{V}$ , pin 1, GND			1.0	$\mu\text{A}$	
Voltage gain	VG	$V_{CC} = 5.0\text{V}$ , $f = 1\text{kHz}$ , $V_O = -10\text{dBm}$	9	11	13	dB	
Voltage gain variations	$\Delta V_{G1}$	$V_{CC} = 5.0\text{V}$ , $f = 1\text{kHz}$ , $V_O = -10\text{dBm}$			1.0	dB	
	$\Delta V_{G2}$	$V_{CC} = 4.0\text{V}$ , $f = 1\text{kHz}$ , $V_O = -20\text{dBm}$			1.0	dB	
Total harmonic distortion	THD	$V_{CC} = 5.0\text{V}$ , $f = 1\text{kHz}$ , $P_O = 1\text{mW}$		0.02	0.24	%	
Output power	$P_O$	$V_{CC} = 5.0\text{V}$ , $f = 1\text{kHz}$ , THD=10%	40	100		mW	
Crosstalk	CT	$V_{CC} = 5.0\text{V}$ , $f = 1\text{kHz}$ , $R_g = 1\text{k}\Omega$ , $V_O = -10\text{dBm}$	40	60		dB	
Ripple rejection	SVRR	$V_{CC} = 4.0\text{V}$ , $f = 100\text{Hz}$ , $R_g = 1\text{k}\Omega$ , $V_O = -20\text{dBm}$ , BPF=100Hz	45	65		dB	
Output noise voltage	$V_{NO}$	$V_{CC} = 6.0\text{V}$ , $R_g = 1\text{k}\Omega$ , BPF=20Hz to 20Hz		7	20	$\mu\text{V}$	
Power off effect	$V_{O(off)}$	$V_{CC} = 4.0\text{V}$ , $f = 100\text{Hz}$ , Pin 1 to GND, $V_{IN} = -10\text{dBm}$			-80	dBm	
Mute effect	$V_{O(MT)}$	$V_{CC} = 4.0\text{V}$ , $f = 100\text{Hz}$ , Pin 1 to GND, $V_{IN} = -10\text{dBm}$			-80	dBm	
Power on current sensitivity	$I_{1(on)}$	$V_{CC} = 5.0\text{V}$ , $V_5 \geq 0.85\text{V}$		0.05	2.0	$\mu\text{A}$	
Power off voltage sensitivity	$V_{1(off)}$	$V_{CC} = 5.0\text{V}$ , $V_5 \leq 0.1\text{V}$	0.5	0.6		V	
Mute off current sensitivity	$I_{10(off)}$	$V_{CC} = 5.0\text{V}$ , $V_5 \geq 0.85\text{V}$		0.2	2.0	$\mu\text{A}$	
Mute on voltage sensitivity	$V_{10(on)}$	$V_{CC} = 5.0\text{V}$ , $V_5 \leq 0.1\text{V}$	0.5	0.65		V	

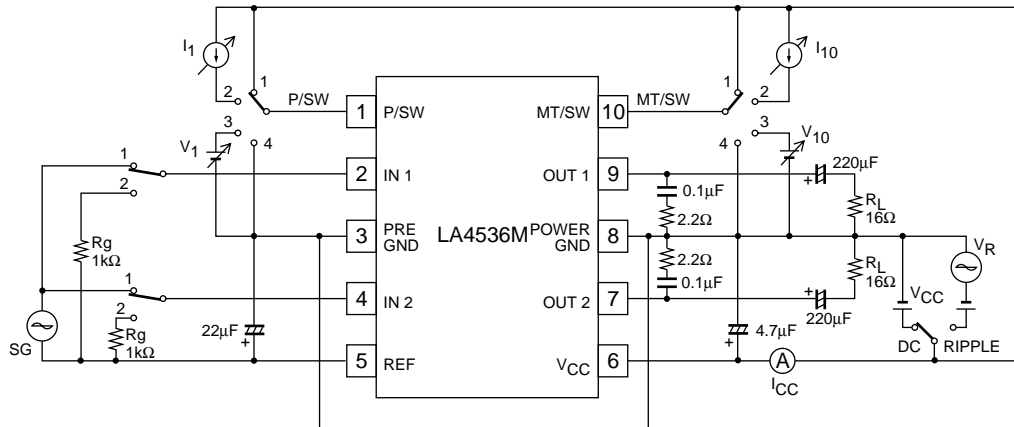
\*1 : Quiescent current is the current flowing into pin 6. The current flowing into pin 1 and pin 10 is at the maximum value and calculated from the equation  $(V_{\text{pin}} - 0.5\text{V}) / 16[\text{V}/\text{k}\Omega]$ , increasing total current.

## Equivalent Circuit Block Diagram



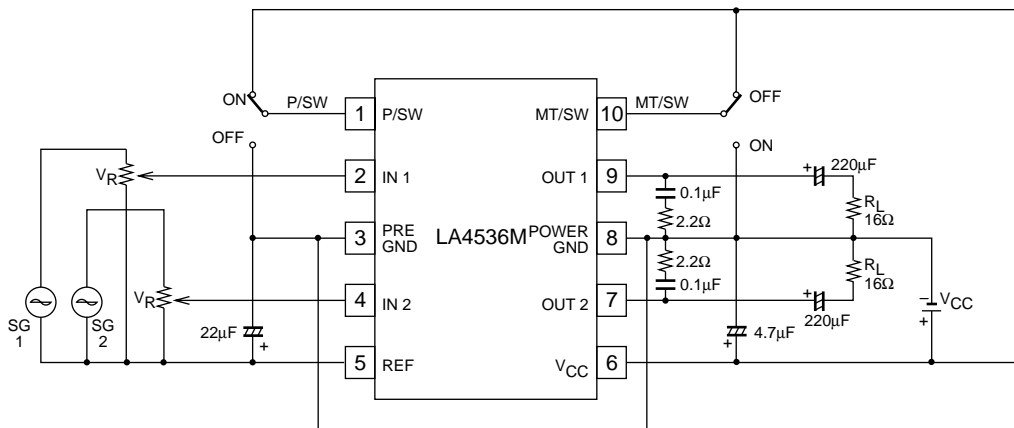
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## Test Circuit



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## Sample Application Circuit



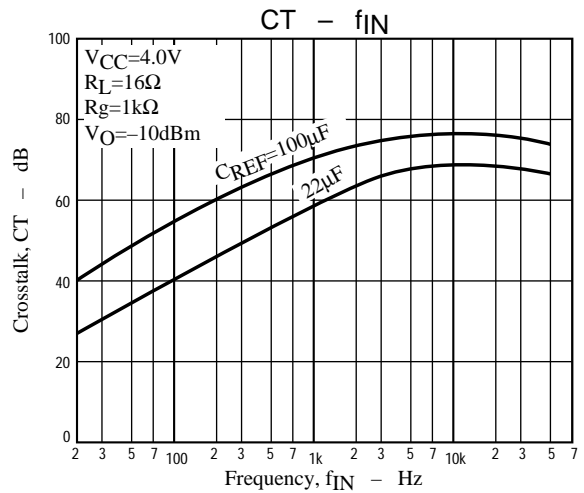
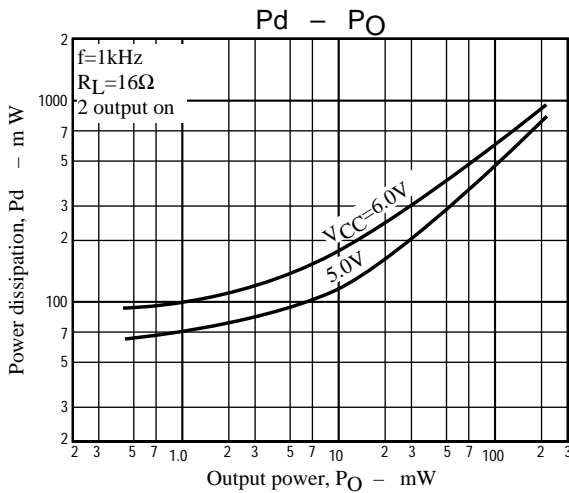
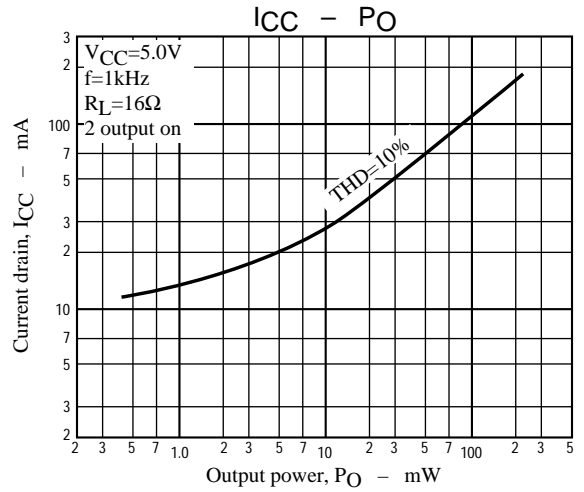
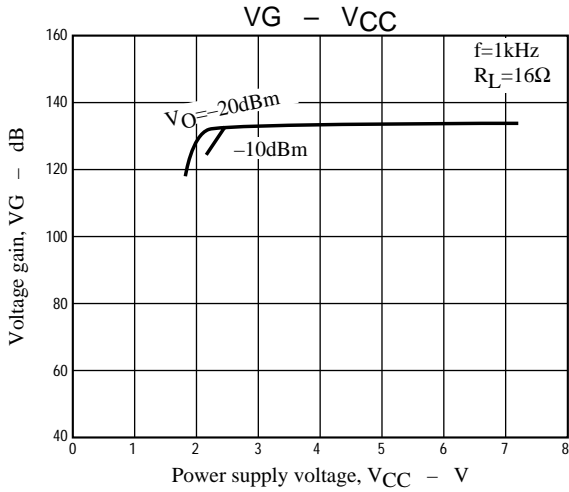
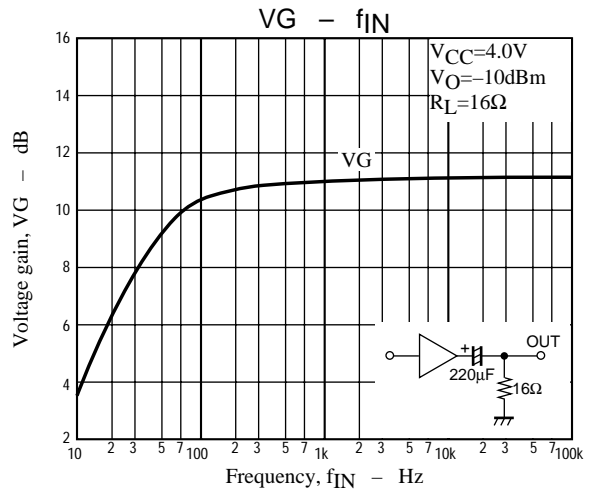
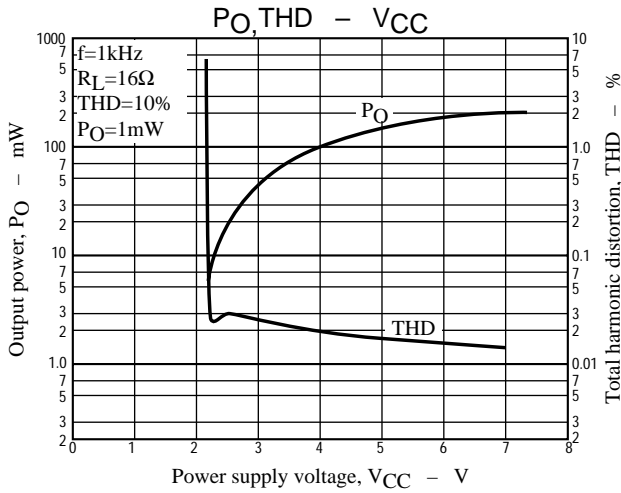
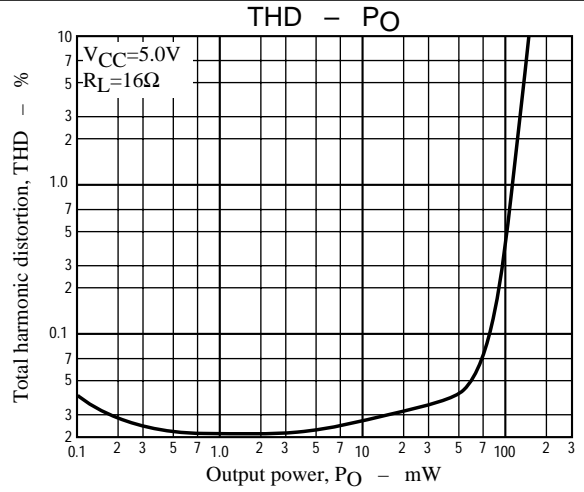
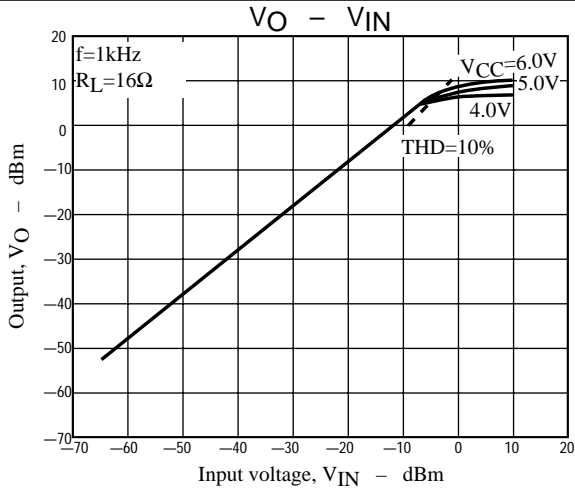
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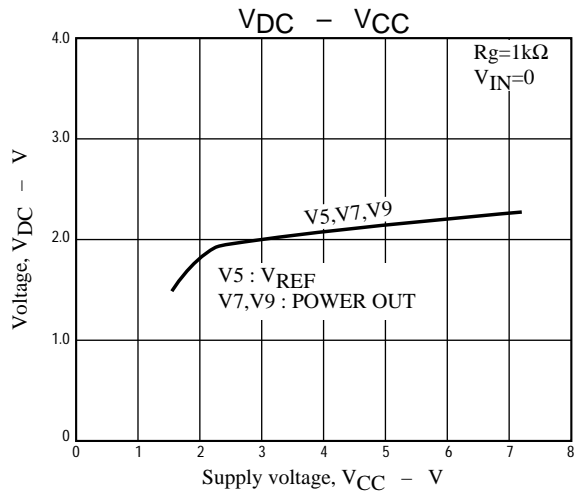
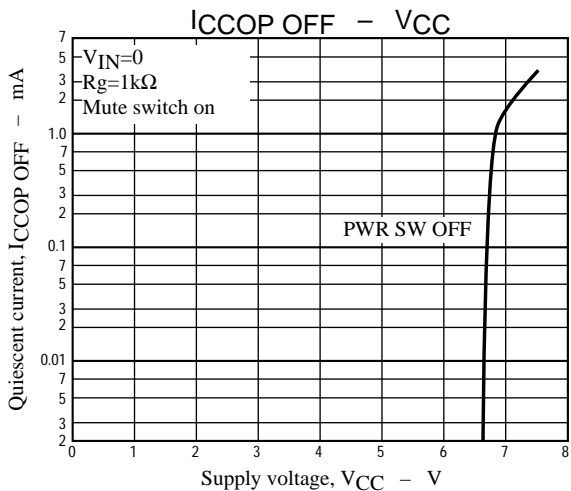
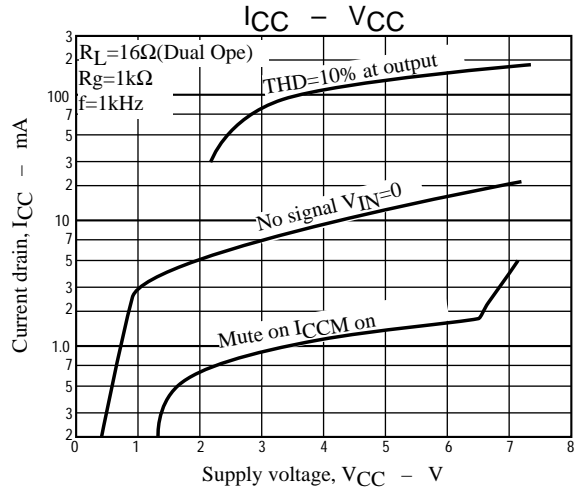
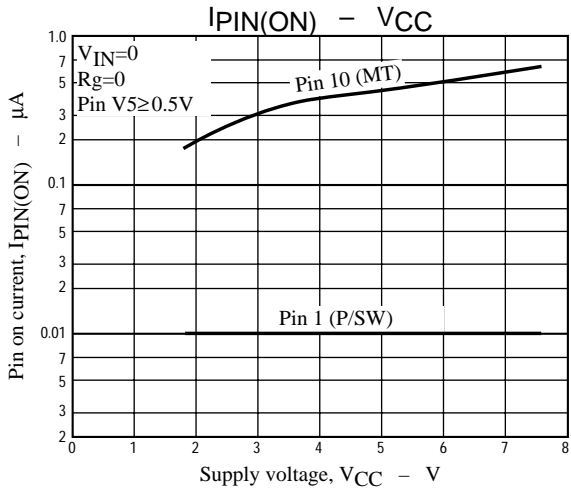
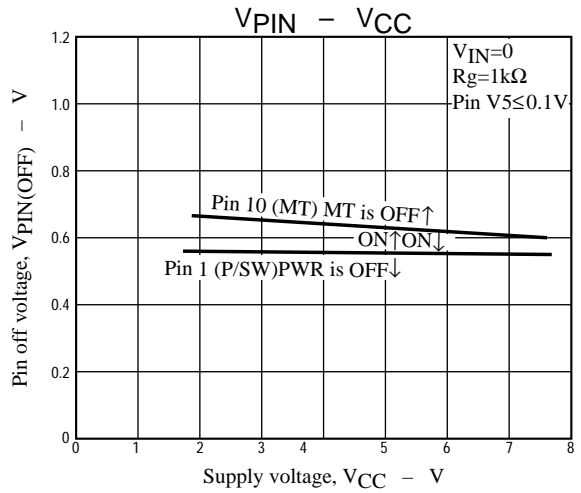
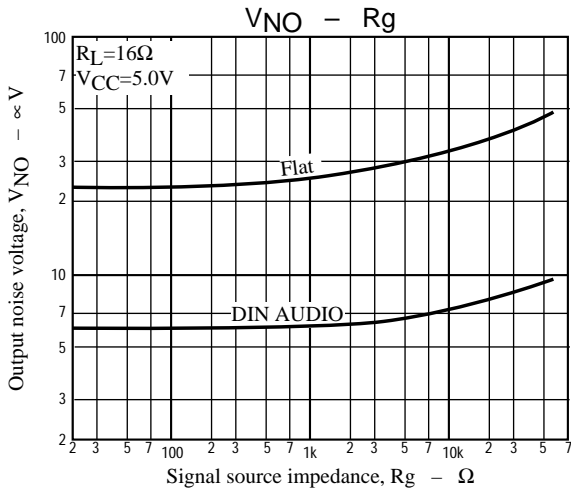
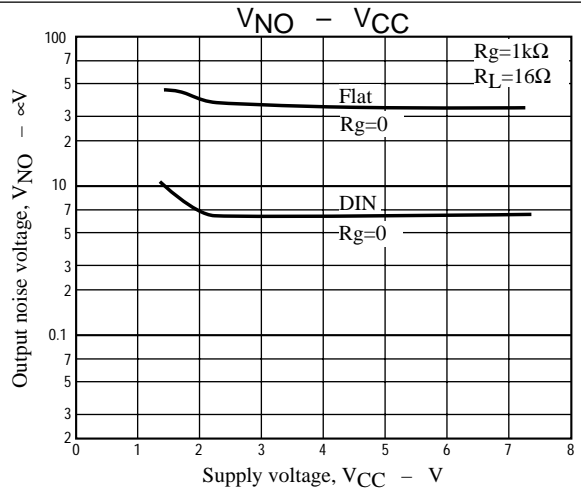
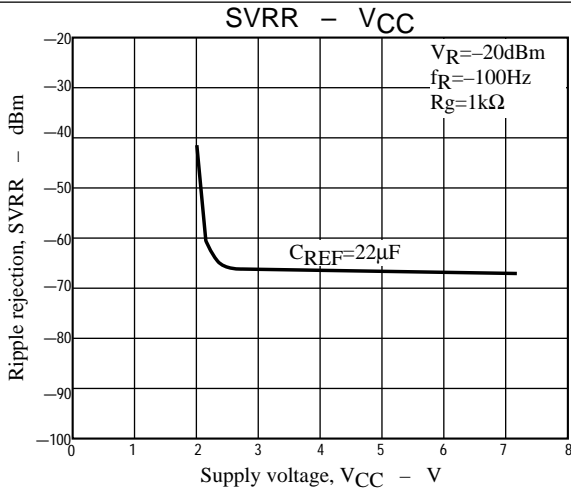
## Pin Functions ( $V_{CC}=5.0V$ )

Pin No.	Symbol	Pin voltage	Equivalent circuit	Pin function
1	P/SW1			<ul style="list-style-type: none"> <li>The system runs 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	2.1 2.1		<ul style="list-style-type: none"> <li>Input pin connection.</li> <li>Input impedance is 10kΩ.</li> </ul>
3	PRE GND			
5	REF	2.1		<ul style="list-style-type: none"> <li>2.1V fixed bias is applied to this pin.</li> </ul>
6	$V_{CC}$			
7 9	OUT2 OUT1	2.1 2.1		<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>

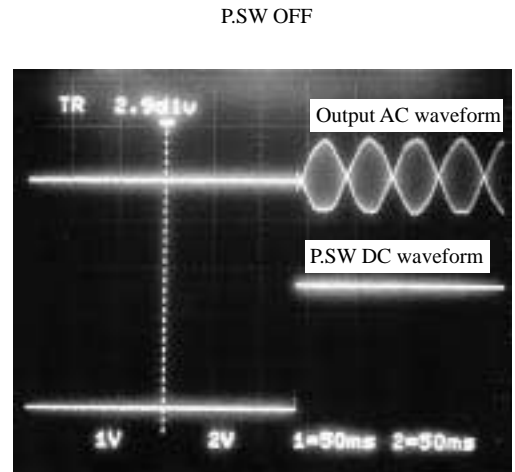
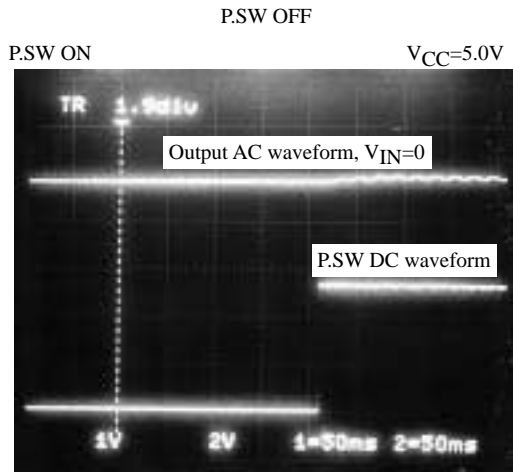
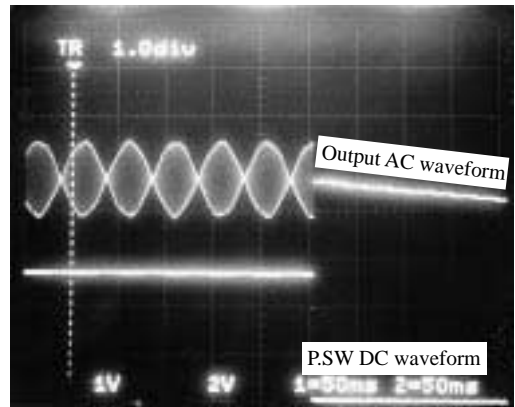
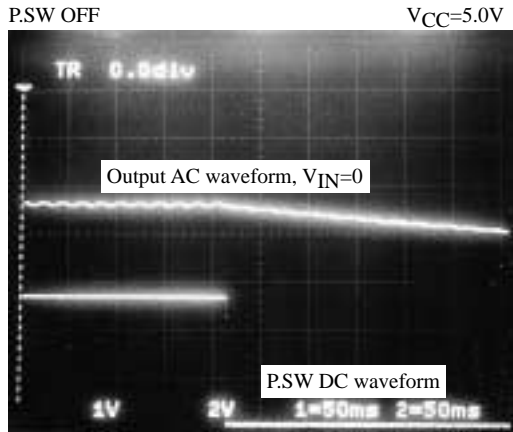
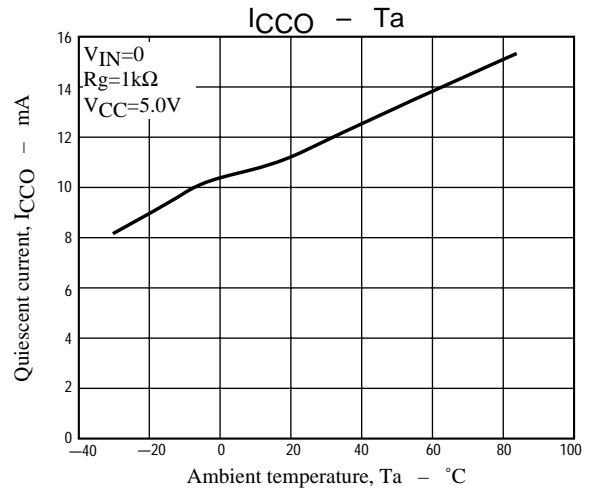
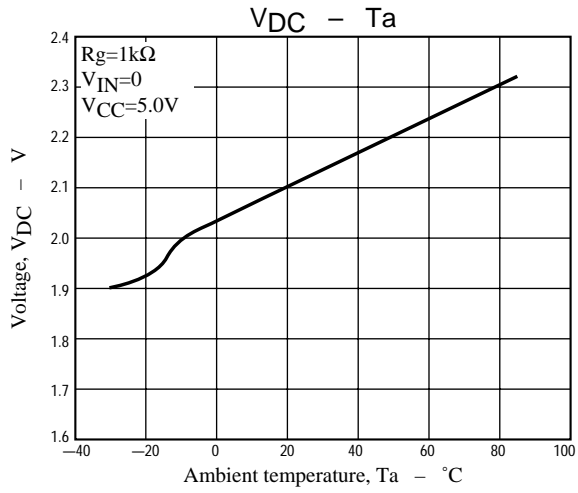
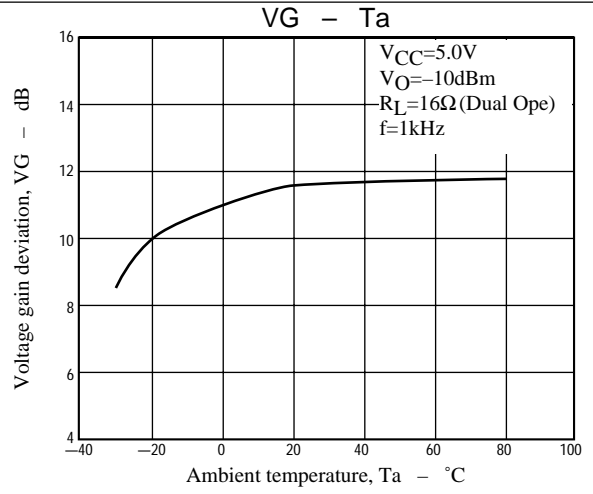
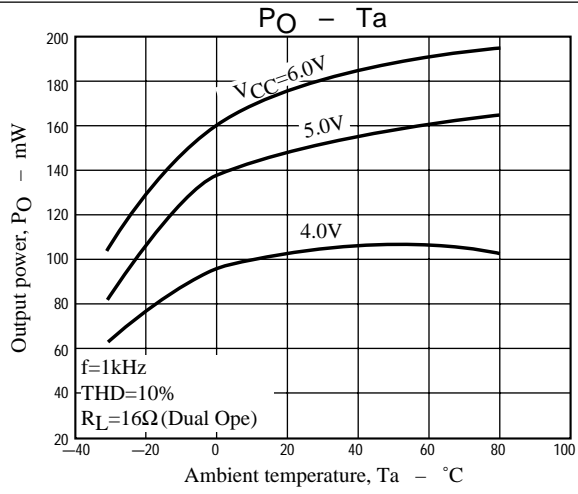
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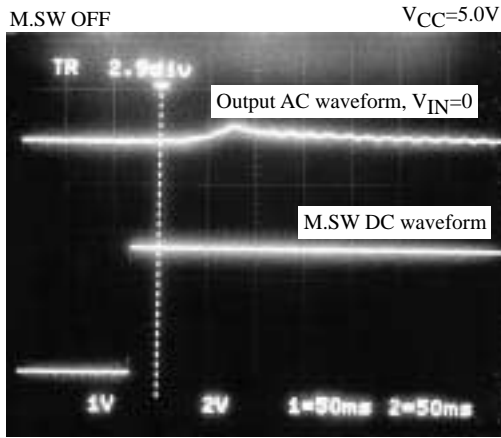
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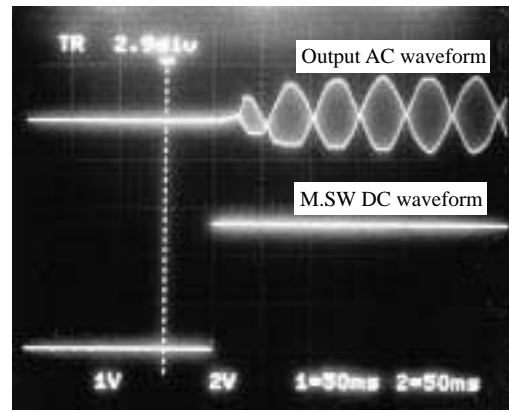
P.S.W ON

P.S.W ON

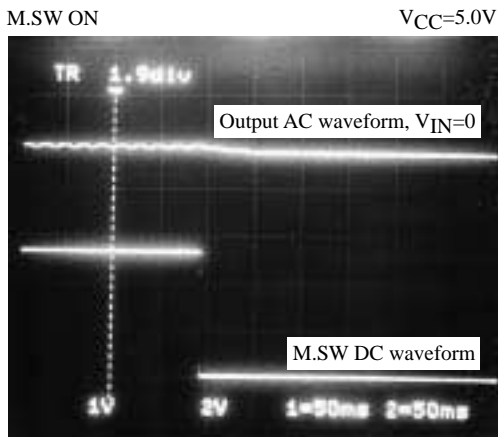
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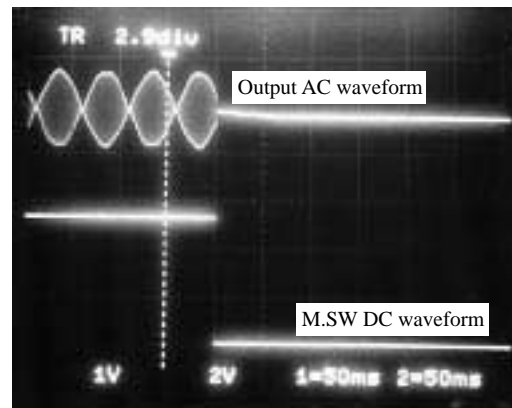
1V/div M.SW OFF



M.SW OFF



1V/div M.SW ON

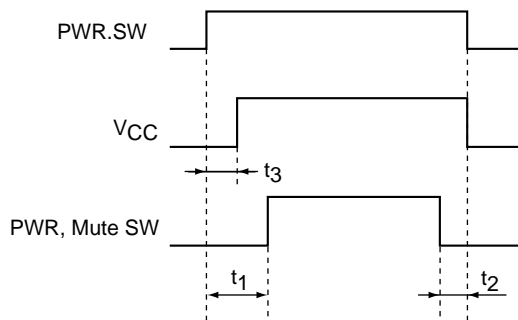


M.SW ON

## Application Notes

### Popping noise reduction

The switching sequence shown below can minimize the popping noise.



A11163

To minimize popping noise, the PWR mute switch should be turned on t<sub>1</sub> (about 0.1s) after power-on and turned off t<sub>2</sub> (about 0.1s) before power-off. Turn on and off the PWR mute switch by applying V<sub>CC</sub> with the PWR be in no state.



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