佑 華 微 電 子 股 份 有 限 公 司

AMSRA003A

DATA SHEET

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1.0 一般規格

AMSRA003A 是一顆簡單的單晶片錄放音 IC，可藉由不同的震盪頻率來調整錄音時間從 2 秒到 4 秒，只能用來儲存一段錄音信息。此 IC 已內建了低通濾波器(LPF)來減少錄音時的噪音，並建有 PWM 輸出來直接推動喇叭或蜂鳴片以降低功率消耗。此外，它還提供一個錄放音的 LED 指示燈。此 IC 非常適合用於攜帶式的錄音設備、玩具和其他消費性的產品。

2.0 特性

(1) 單一工作電壓範圍: 2.4 ~ 5.5 伏特。(在此範圍內，可採用單一 Rosc 電阻值)

(2) 震盪模式: R oscillator.

(3) 低靜態電流, <1uA@3V.

(4) 內建SRAM記憶體以供錄音，可經由調整震盪電阻來選擇不同的取樣頻率以獲得不同的錄音時間。

取樣頻率	**4.0KHz**	**5.0KHz**	**5.3KHz**	***6.0KHz***	**6.4KHz**	**7.0KHz**	**8.0KHz**
錄音時間	4.0 秒	3.2 秒	3.0 秒	*2.7 秒*	2.5 秒	2.3 秒	2.0 秒

(5) 內建低通濾波器線路(LPF)。

(6) 有兩個輸入按鍵供錄音和放音使用。

- Rec_L: Level/Hold 觸發錄音。
- Play_E: Edge/Unhold 觸發放音，具有Toggle on/off 功能。*(當持續按住此按鍵時，錄音信息會連續播放)*

(7) 有一個輸出訊號來顯示錄放音，可用來接LED或推馬達。

(8) 在開始錄音時會先有一聲'嗶'聲提示，而當記憶體耗盡或停止錄音時則會有兩聲'嗶'聲提示。

(9) 可選擇的單端或雙端PWM輸出，雙端PWM輸出可直接推動喇叭或蜂鳴片。

(10) 數位串列輸入/輸出，可用來預錄或輸出信息。*(如需使用此特殊功能，請聯絡佑華公司或其代理商)*

1.0 General Description

The AMSRA003A is a simple SRAM recording/playback IC. The duration of recording can be adjusted from 2 to 4 seconds by changing the oscillation frequency. This device can only store one section of message. There is on-chip Low Pass Filter (LPF) to reduce the environment noise while recording. For low power consumption, AMSRA003A provides PWM output to drive speaker or buzzer directly. It also provides one output pin for recording/playback LED indicator. The device is ideal for use in portable voice recorders, toys, and many other consumer applications.

2.0 Features

(1) Single power supply can operate from 2.4~5.5V.

(2) Oscillation mode: R oscillator.

(3) Low standby current, <1uA@3V.

(4) Built-in SRAM for voice recording. Adjust OSC resistor value from 4k~8KHz sample rate to select different voice duration.

Sample Rate	**4.0KHz**	**5.0KHz**	**5.3KHz**	***6.0KHz***	**6.4KHz**	**7.0KHz**	**8.0KHz**
Duration	4.0 sec	3.2 sec	3.0 sec	*2.7 sec*	2.5 sec	2.3 sec	2.0 sec

(5) Built-in Low Pass Filter (LPF) circuits.

(6) Two input triggers for recording and playback.
- Rec_L: Level/Hold trigger for voice recording.
- Play_E: Edge/Unhold trigger for voice playback, Toggle on/off function. *(Continuously playing voice if keeping key pressed)*

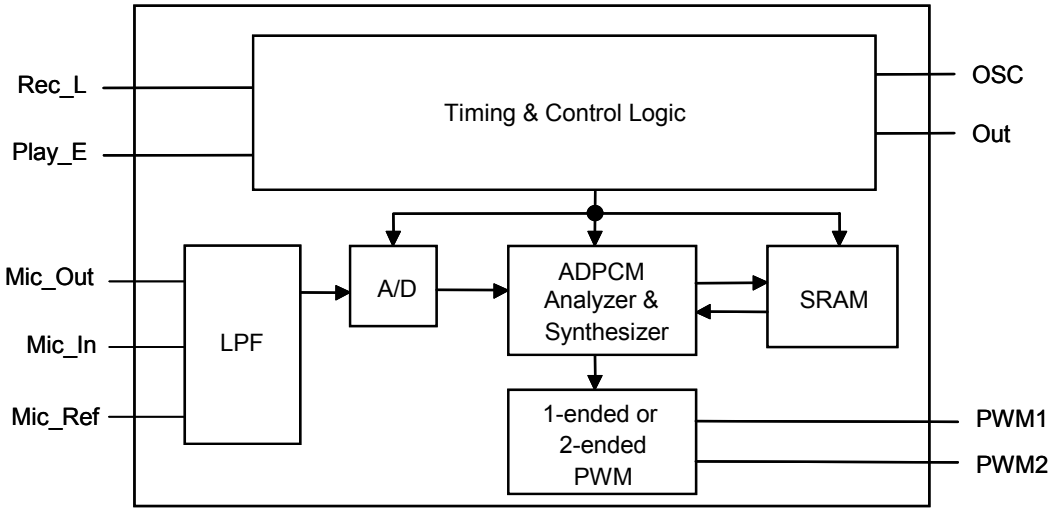
(7) One output signal for recording/playback indicator which can drive LED or motor.

(8) Play 'Bi' sound at the beginning of recording and play 'Bi-Bi' sound while memory full or recording stop.

(9) User-selectable 1-ended/2-ended PWM output.

(10) Digital Serial Input/Output for pre-recording message and data output. *(Contact Alpha for this special function.)*

3.0 Block Diagram

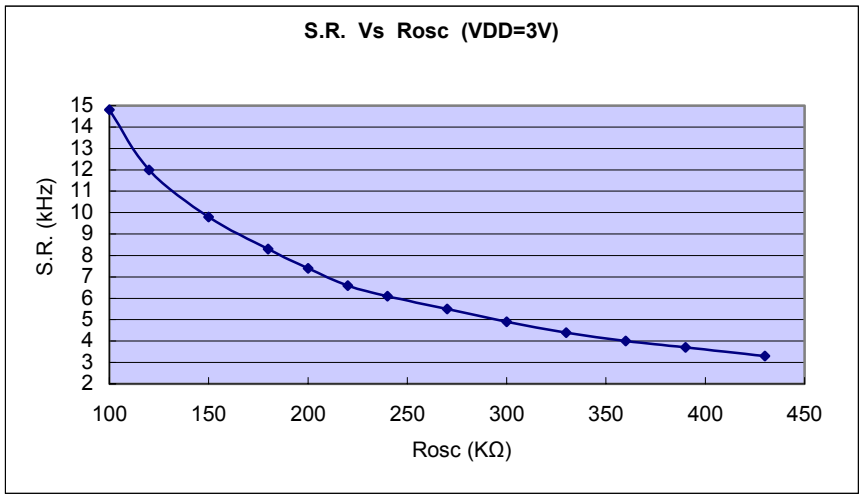


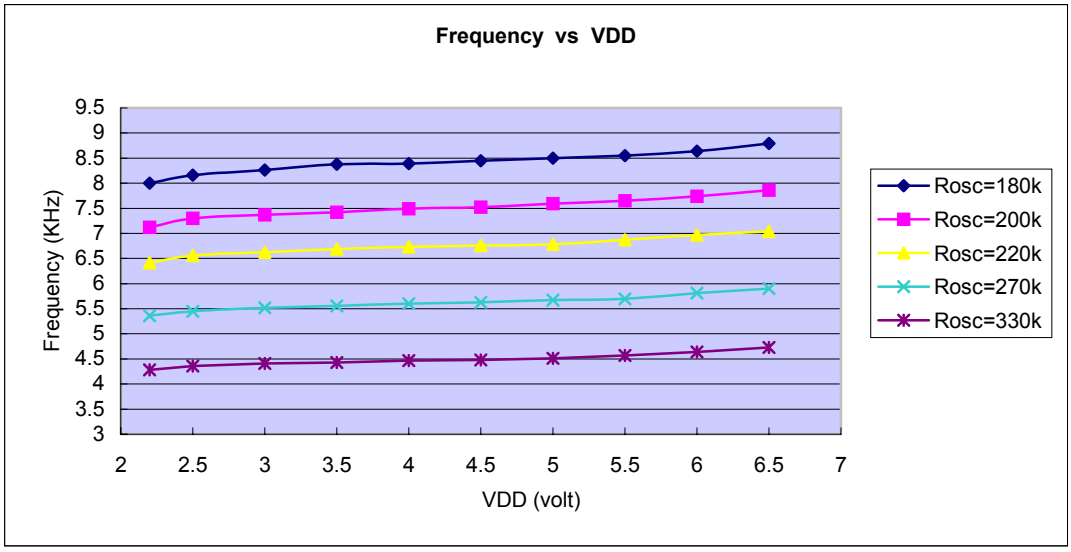
4.0 Pad Description

Pad Name	Pin Attr.	Description
VDD1~2	Power	Possitive power
GND1~2	Power	Negative power
OSC	I	R oscillator input. Floating for internal oscillation.
PWM1	O	PWM1 output. Connect this pin to GND when 1-ended PWM output.
PWM2	O	PWM2 output. 1-ended PWM output.
Mic_Ref	I	Microphone input as voltage reference
Mic_In	I	Microphone input as MIC pre-amplifier
Mic_Out	O	Microphone output as MIC pre-amplifier
Rec_L	I	Trigger input for recording, *Level*/Hold mode.
Play_E	I	Trigger input for playback, *Edge*/Unhold/Irretrigger mode. (i.e. One-shot)
Test	I	Test pin for internal test.
Out	O	Recording/Playback indicator, low active.

5.0 DC Characteristics (at Rosc=240kΩ, SR=6kHz)

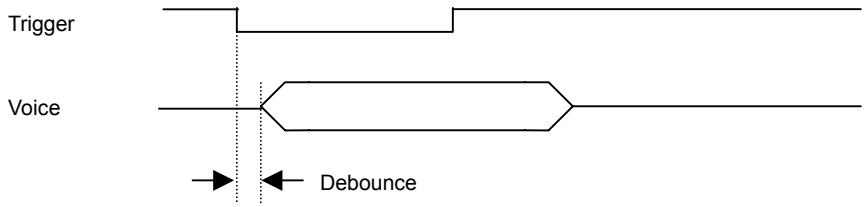
Symbol	Parameter		VDD	Min.	Typ.	Max.	Unit	Condition
VDD	Operating voltage		-	2.4	3	5.5	V	Depending on Freq.
I_{sb}	Supply current	Standby	3	-	-	1	uA	Sleep mode.
			4.5	-	-	2		
I_{op1}		Operating1	3	-	1.0	-	mA	Recording, No load
			4.5	-	5.0	-		
I_{op2}		Operating2	3	-	0.2	-	mA	Playback, No load
			4.5	-	0.4	-		
I_{il}	Input current (Internal pull-high 300kΩ)		3	-	6	-	uA	Vil=0v
			4.5	-	16	-		
I_{ol}	Output-low current (Open-drain)		3	-	24	-	mA	Vol=0.75V
			4.5	-	52	-		Vol=1.50V
I_{PWM}	PWM output current		3	-	40	-	mA	Load=8 ohms
			4.5	-	60	-		
dF/F	Frequency stability			-5	-	5	%	$\frac{Fosc(5.5v- 2.4v)}{Fosc (5.5v)}$
dF/F	Fosc lot variation			-10	-	10	%	Different lot wafer





6.0 Timing Diagram

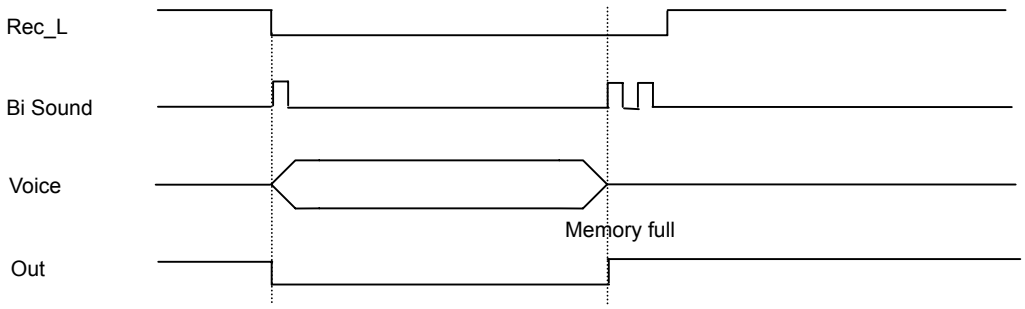
(1) Debounce Time

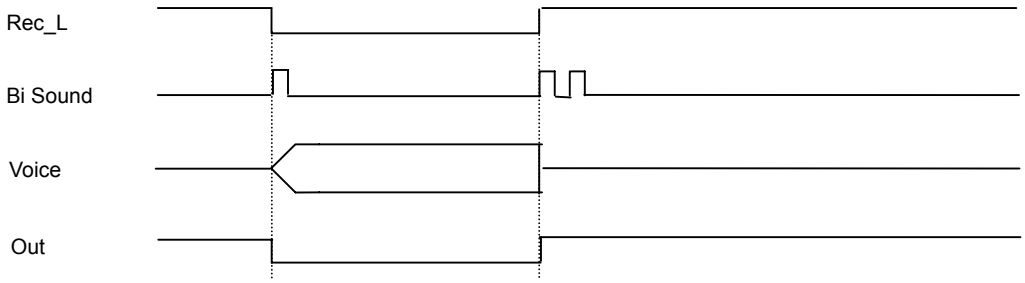


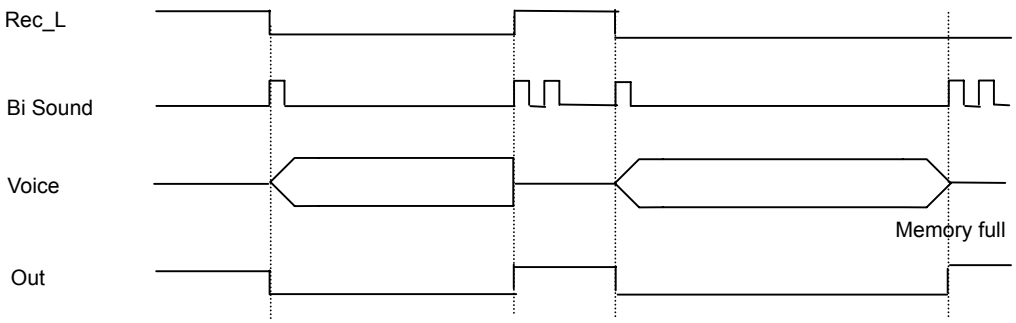
※ Debounce time is configured by 6 kHz S.R and the value is fixed. That is, Slow debounce=20ms. **(No Fast debounce)**

(2) Recording Mode

Level Trigger

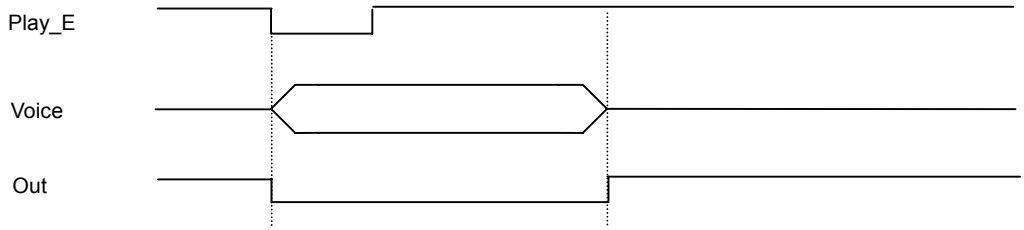


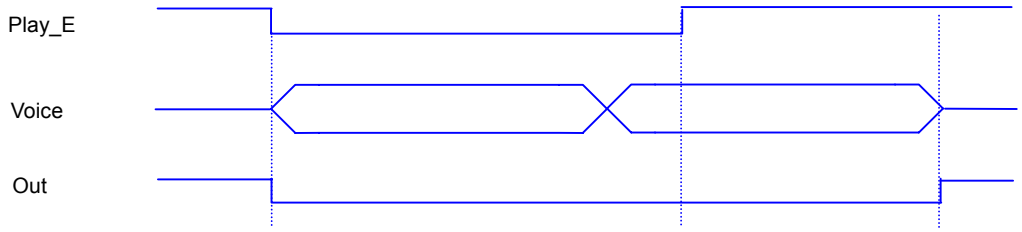




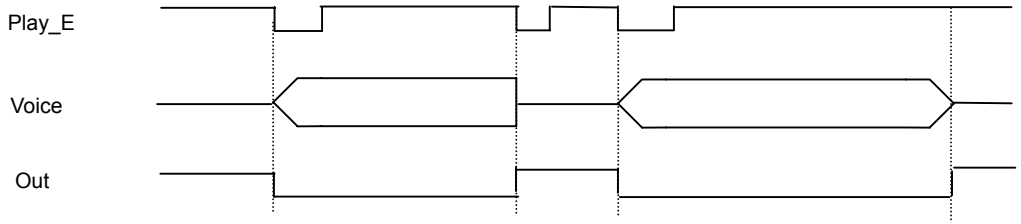
(3) Playback Mode

Edge Trigger



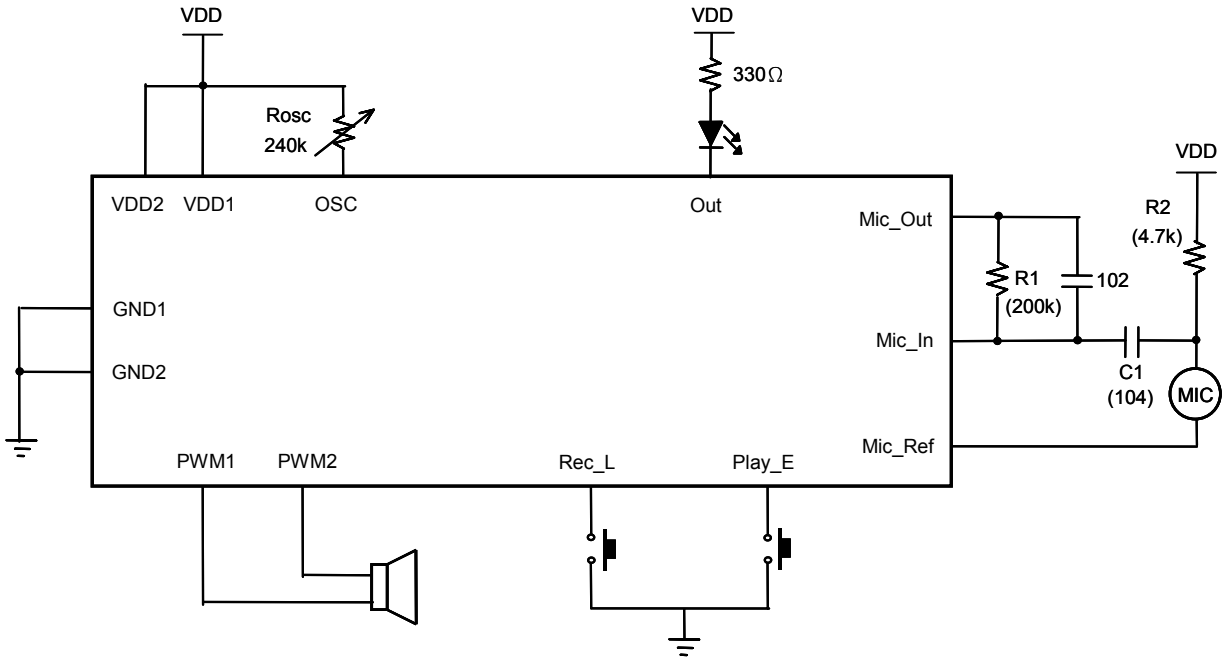


* Voice will be played continuously if keeping key pressed.



7.0 Application Circuit

a. PWM Direct Drive (MIC_SPK Alone, 2-Ended PWM)

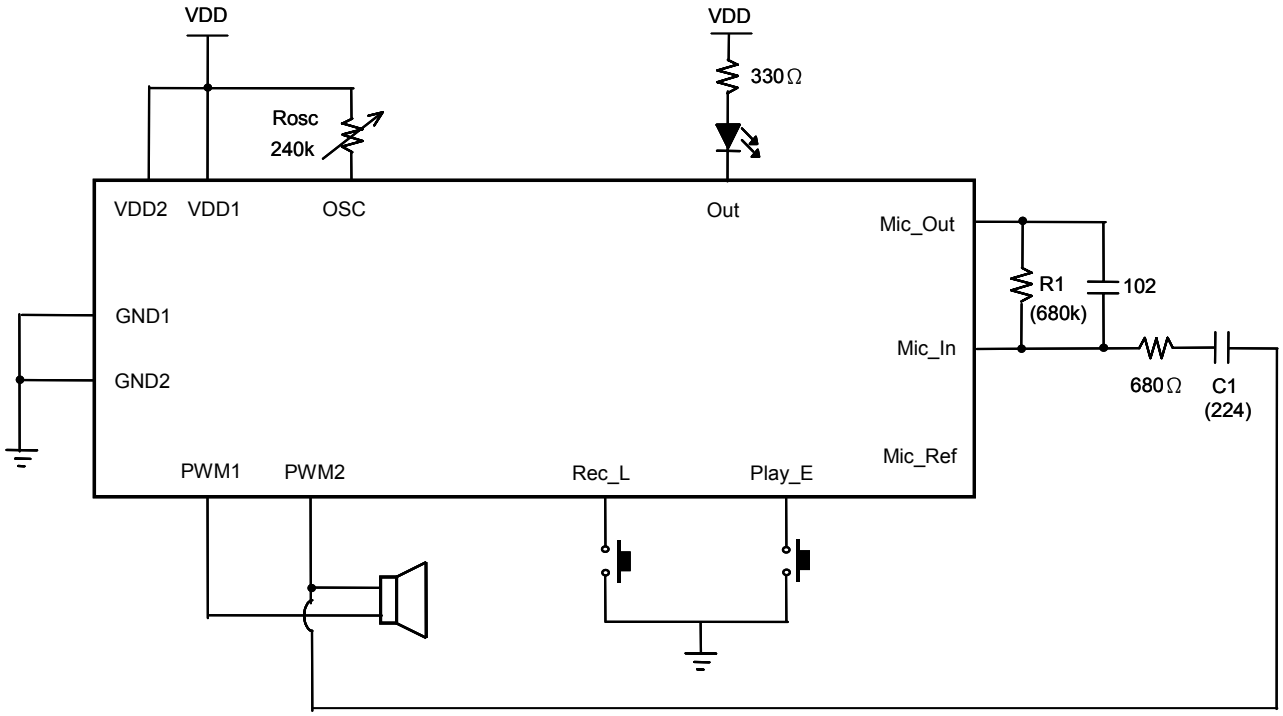


* R1 is used to control the gain of OP-Amp. A bigger R1 value will lead to larger voice volume. (100K~300KΩ)

* R2 is used to match the different microphone. A bigger R2 value will lead to larger voice volume and noise. (2K~4.7KΩ)

* C1 is used to control the gain and noise. A bigger C1 value will lead to larger voice volume and noise. (0.047u~0.1uF)

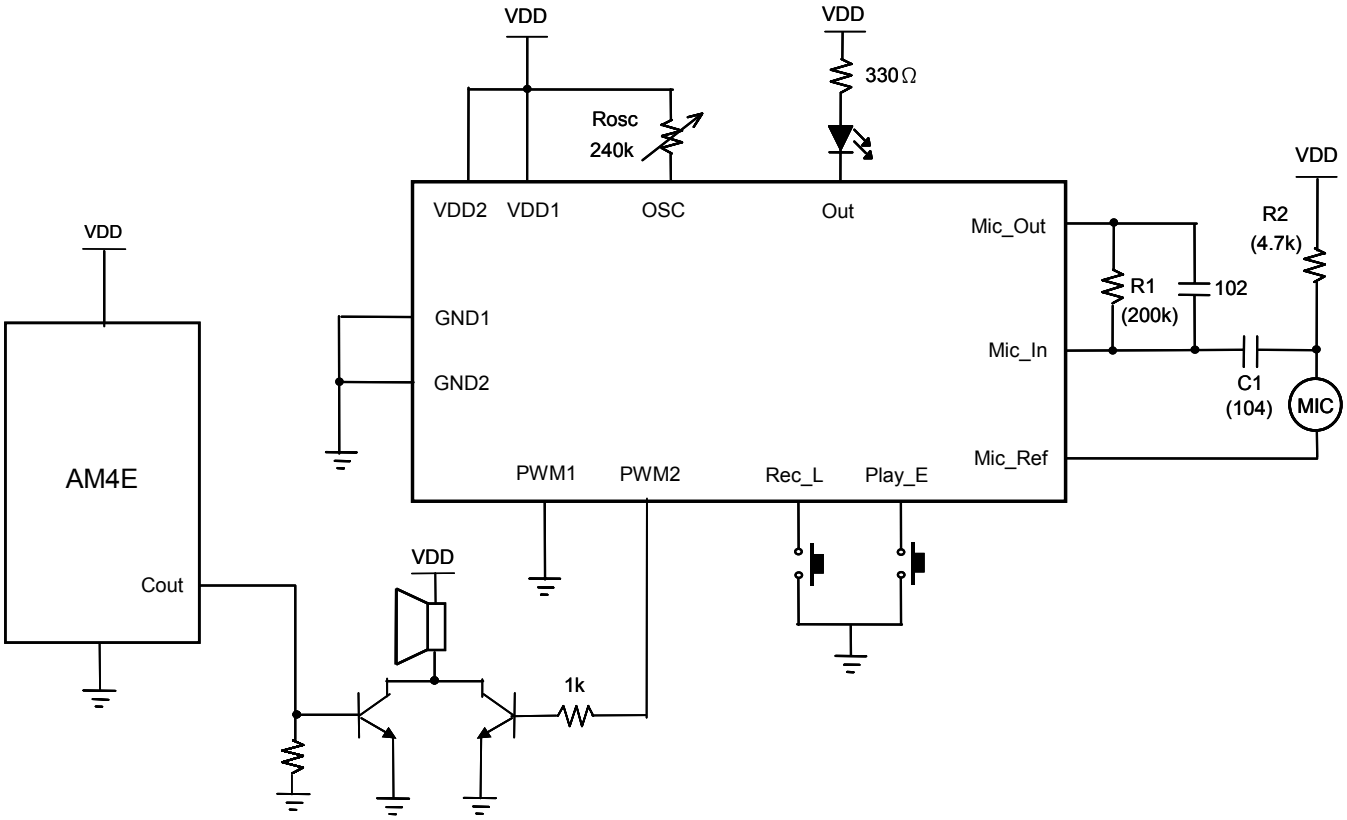
b. PWM Direct Drive (MIC_SPK Shared, 2-Ended PWM)



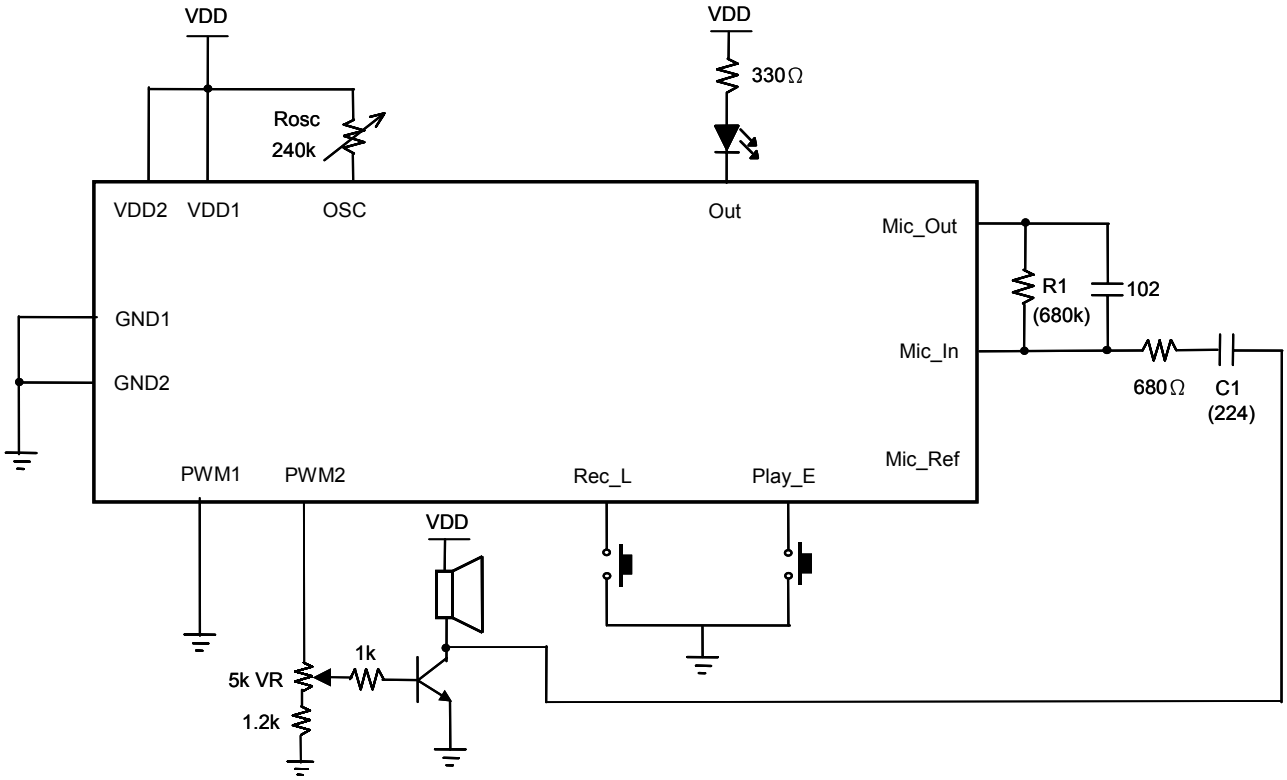
* R1 is used to control the gain of OP-Amp. A bigger R1 value will lead to larger voice volume. (470K~820KΩ)

* C1 is used to control the gain and noise. A bigger C1 value will lead to larger voice volume and noise. (0.1u~0.22uF)

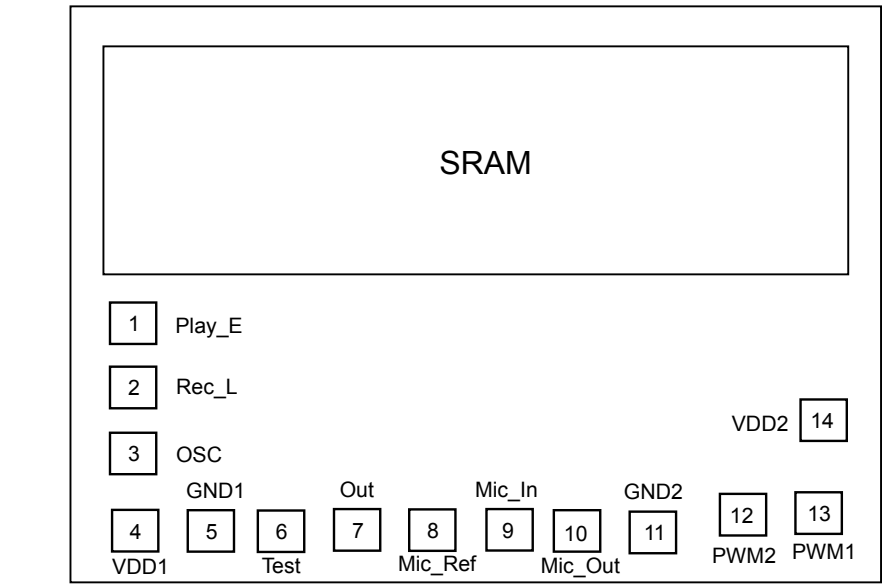
c. Mixing with AM4E Cout (MIC_SPK Alone, 1-Ended PWM)



d. Volume Control (MIC_SPK Shared, 1-Ended PWM)



8.0 Bonding Diagram



* The IC substrate must be connected to VDD.

Pad #	Pad Name	X	Y	Pad #	Pad Name	X	Y
1	Play_E	85	474	**8**	Mic_Ref	574	85
2	Rec_L	85	351	**9**	Mic_In	700	85
3	OSC	85	225	**10**	Mic_Out	817	85
4	VDD1	86	79	**11**	GND2	938	85
5	GND1	207	79	**12**	PWM2	1077	108
6	Test	319	85	**13**	PWM1	1198	108
7	Out	446	85	**14**	VDD2	1201	309