佑華微電子股份有限公司

AM9AB SERIES
Data sheet

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Rev 2.1 2002/10/29

一般規格:

AM9AB0030, AM9AB0036, AM9AB0038, SA1AA0035
乃一單晶CMOS VLSI 語音合成器，它以LOGPCM編碼方式，合成長達3秒之語音。
藉由製造過程中更換光罩，將客戶需要之語音資料編寫入ROM中。

特性：

1. 單一工作電壓範圍爲2.4 - 5 伏特。
2. 單一語音長度可達3秒時間。
3. (語音+靜音時間) 最多可達5.3秒，並可重複8次(在6kHz取樣頻率下)。
4. 一個觸發輸入(TG)：內含電阻式史密特輸入(270K-1M)可外接光敏電阻(CDS)使用。 具兩種防止誤動作(DEBOUNCE)時間：10ms-提供一般手動操作；50us-提供跳動開關使用。
   A>50us, B>10ms, C>IO1(VDD=50us GND=10ms), D>IO2(VDD=50us GND=10ms), E>IO3(VDD=50us,GND=10ms)
   ※當IO1、IO2、IO3做輸入控制時，只能選用C，D，E三項。
5. 自動選擇振盪器電阻。
   外部或內部振盪電阻選擇：
   (1)若外部有振盪電阻，IC將使用外部振盪電阻。若沒有外部振盪電阻，IC將自動選用內部振盪電阻。
   注意：在觸發前必須決定要使用外部或內部振盪電阻。
   (2)可由光罩選擇設定IO2爲輸入控制，若IO2=VDD則爲外接振盪電阻; 若IO2=GND則爲內建振盪電阻。
   (3)內部振盪電阻頻率選擇：(光罩選擇)。

For AM9AB0030, AM9AB0036, AM9AB0038:

電阻選選擇 / 振盪器項選 / 播放速度	A	B	C	D	E	F	G	H	I	J	K	L	M
6	12.4	12	11	9.8	8.8	8.1	7.5	7.1	6.6	6	5.7	5.5	5
7.5	15.5	15	13.8	12.3	11	10.1	9.4	8.9	8.3	7.5	7.1	6.9	6.3
10	20.7	20	18.3	16.3	14.7	13.5	12.5	11.8	11	10	9.5	9.2	8.3

For SA1AA0035:

電阻選選擇 / 振盪器項選 / 播放速度	A	B	C	D	E	F	G	H	I	J	K	L	M
6	9.4	9.1	8.3	7.4	6.7	6.1	5.7	5.4	5	4.5	4.3	4.2	3.8
7.5	11.7	11.4	10.5	9.3	8.3	7.6	7.1	6.7	6.3	5.7	5.4	5.2	4.8
10	15.7	15.2	13.8	12.3	11.1	10.2	9.5	8.9	8.3	7.6	7.2	7.0	6.3

※ VDD=3V。

6. 播放模式的光罩選擇：

邊緣觸發 / 位準觸發 (EDGE / LEVEL)	保持 / 非保持 (HOLD / UNHOLD)	後段蓋前段 / 無後段蓋前段 (RETRIGGER / IRRETRIGGER)
☐ 邊緣觸發	☐ 保持	☐ 後段蓋前段
☐ 位準觸發	☐ 非保持	☐ 無後段蓋前段
☐ IO1 (VDD-邊緣觸發 ，GND-位準觸發)	☐ IO1 (VDD-保持，GND-非保持)	☐ IO1(VDD-後段蓋前段,GND-無後段蓋前段)
☐ IO2 (VDD-邊緣觸發 ，GND-位準觸發)	☐ IO2 (VDD-保持，GND-非保持)	☐ IO2(VDD-後段蓋前段,GND-無後段蓋前段)
☐ IO3 (VDD-邊緣觸發 ，GND-位準觸發)	☐ IO3 (VDD-保持，GND-非保持)	☐ IO3(VDD-後段蓋前段,GND-無後段蓋前段)

※ 欲選用IO1、IO2、或IO3當外部控制選項時, 其先決條件爲在I/O接腳選擇時設定成爲可做輸入控制選擇。

7. IO1、IO2、IO3可做下列選擇：

For AM9AB0030:

IO1輸出選擇	IO2輸出選擇	IO3輸出選擇
☐ COUT	☐ PWM1	☐ PWM2
☐ 停止播放時送出高位準脈衝	☐ 停止播放時送出高位準脈衝	☐ 停止播放時送出高位準脈衝
☐ 停止播放時送出低位準脈衝	☐ 停止播放時送出低位準脈衝	☐ 停止播放時送出低位準脈衝
☐ 播放時送出高位準訊號	☐ 播放時送出高位準訊號	☐ 播放時送出高位準訊號
☐ 播放時送出低位準訊號	☐ 播放時送出低位準訊號	☐ 播放時送出低位準訊號
☐ 3HZ	☐ 3HZ	☐ 3HZ
☐ 6HZ	☐ 6HZ	☐ 6HZ
☐ LED動態 1/4位準訊號	☐ LED動態 1/4位準訊號	☐ LED動態 2/4位準訊號
☐ LED動態 2/4位準訊號	☐ LED動態 2/4位準訊號	☐ LED動態 2/4位準訊號
☐ LED動態 3/4位準訊號	☐ LED動態 3/4位準訊號	☐ LED動態 3/4位準訊號
☐ 可做輸入控制選擇	☐ 可做輸入控制選擇	☐ 可做輸入控制選擇

For AM9AB0036, AM9AB0038, SA1AA0035:

IO1輸出選擇	IO2輸出選擇	IO3輸出選擇
☐ COUT	☐ PWM1	☐ PWM2
☐ 停止播放時送出高位準脈衝	☐ 停止播放時送出高位準脈衝	☐ 停止播放時送出高位準脈衝
☐ 停止播放時送出低位準脈衝	☐ 停止播放時送出低位準脈衝	☐ 停止播放時送出低位準脈衝
☐ 播放時送出高位準訊號	☐ 播放時送出高位準訊號	☐ 播放時送出高位準訊號
☐ 播放時送出低位準訊號	☐ 播放時送出低位準訊號	☐ 播放時送出低位準訊號
☐ 3HZ	☐ 3HZ	☐ 3HZ
☐ 1.5HZ	☐ 1.5HZ	☐ 1.5HZ
☐ 0.75HZ	☐ 0.75HZ	☐ 0.75HZ
☐ 6HZ	☐ 6HZ	☐ 6HZ
☐ LED動態 1/4位準訊號	☐ LED動態 1/4位準訊號	☐ LED動態 2/4位準訊號
☐ LED動態 2/4位準訊號	☐ LED動態 2/4位準訊號	☐ LED動態 2/4位準訊號
☐ LED動態 3/4位準訊號	☐ LED動態 3/4位準訊號	☐ LED動態 3/4位準訊號
☐ 可做輸入控制選擇	☐ 可做輸入控制選擇	☐ 可做輸入控制選擇

COUT：具有四種光罩選擇【☐1.5mA；☐3mA；☐4.5mA；☐I/O3 (GND-3mA, VDD-4.5mA)】。

PWM1、PWM2：必須同時選用，可直接推蜂鳴片或驅動8、32 or 64 歐姆喇叭。

3HZ, 1.5HZ, 0.75HZ, 6HZ, 動態 1/4、2/4、3/4位準訊號：LED使用。

(Drive 0.5mA，Sink 10mA；3V)

可做輸入控制選擇：內部爲PULL GND (0.5uA, 3V)。
※對所有的 I/O 埠而言 ，動態位準訊號應選爲同樣(1/4、2/4、3/4)設定。
※如 IO2 和 IO3 選擇相同 LED 6HZ,3HZ,1.5HZ,0.75HZ 之模式時它們將交互閃爍。
※若選擇 LED 動態輸出將使 LED 隨語音訊號強弱閃爍。
※使用I/O選項做輸入控制選擇時，利用打線 (Bonding) 或兩段式選擇開關
(Toggle Switch)可用來控制：邊緣觸發/位準觸發
保持 / 非保持
後段蓋前段 / 無後段蓋前段
10ms/50us防止誤動作(DEBOUNCE)時間，內部或外部選擇振盪電阻。

GENERAL DESCRIPTION:

The AM9AB0030, AM9AB0036, AM9AB0038, SA1AA0035 is a single-chip synthesizing CMOS VLSI that can synthesize voice up to 3 seconds using ALPHA qualified coding algorithm (LOGPCM).
Customer speech data will be edited and programmed into ROM by changing one mask during the device fabrication.

FEATURES:

1. Single power supply can operate from 2.4v through 5v.

2. The total voice duration is about 3 seconds for one phrase.

3. Voice + mute length could up to 5.3 seconds, could repeat up to 8 times.

4. 1 trigger input (TG): with resistive schmitt input (270--- 1M) for CDS interface.
Has two debounce time : 10 ms, 50 us. with following mask option
A>50us, B>10ms, C>IO1(VDD-50US,GND-10ms), D>IO2(VDD-50us,GND-10ms), E>IO3(VDD-50us,GND-10ms)
C, D, E could only be selected when IO1,IO2,IO3 are mask option selected as control input.

5.Automatic Rosc selection :
Enable - the device will use external Rosc if it has external Rosc; the device will use internal Rosc automatically if it hasn't external Rosc (it must be determined before power on).
Disable - use external Rosc only. IO2 - VDD : disable GND : enable
Internal Rosc options : one of 13 internal Rosc options with different playback speed .

For AM9AB0030, AM9AB0036, AM9AB0038:

playback speed=6.0khz : a>12.4k ; b>12k ; c>11k ; d>9.8k ; e>8.8k ; f>8.1k ; g>7.5k ; h>7.1k ; i>6.6k ; j>6.0k ; k>5.7k ; l>5.5k ; m>5.0k hz . (Vdd=3v)
playback speed=7.5khz : a>15.5k ; b>15k ; c>13.8k ; d>12.3k ; e>11k ; f>10.1k ; g>9.4k ; h>8.9k ; i>8.3k ; j>7.5k ; k>7.1k ; l>6.9k ; m>6.3k hz . (Vdd=3v)
playback speed=10khz : a>20.7k ; b>20k ; c>18.3k ; d>16.3k ; e>14.7k ; f>13.5k ; g>12.5k ; h>11.8k ; i>11k ; j>10k ; k>9.5k ; l>9.2k ; m>8.3k hz . (Vdd=3v)

For SA1AA0035:

playback speed=6.0khz : a>9.4k ; b>9.1k ; c>8.3k ; d>7.4k ; e>6.7k ; f>6.1k ; g>5.7k ; h>5.4k ; i>5.0k ; j>4.5k ; k>4.3k ; l>4.2k ; m>3.8k hz . (Vdd=3v)
playback speed=7.5khz : a>11.7k ; b>11.4k ; c>10.5k ; d>9.3k ; e>8.3k ; f>7.6k ; g>7.1k ; h>6.7k ; i>6.3k ; j>5.7k ; k>5.4k ; l>5.2k ; m>4.8k hz . (Vdd=3v)
playback speed=10khz : a>15.7k ; b>15.2k ; c>13.8k ; d>12.3k ; e>11.1k ; f>10.2k ; g>9.5k ; h>8.9k ; i>8.3k ; j>7.6k ; k>7.2k ; l>7.0k ; m>6.3k hz . (Vdd=3v)

6. Playing mode : EDGE/LEVEL, HOLD/UNHOLD, RETRIGGER/IRRETRIGGER.
With following mask options :

* EDGE/LEVEL	* HOLD/UNHOLD	* RETRIGGERING/IRRETRIGGER
A>EDGE	A>HOLD	A>IRRETRIGGER
B>LEVEL	B>UNHOLD	B>RETRIGGER
C>IO1(VDD-edge, GND-level)	C>IO1(VDD-hold, GND-unhold)	C>IO1(VDD-irretrigger, GND-retrigger)
D>IO2(VDD-edge, GND-level)	D>IO2(VDD-hold, GND-unhold)	D>IO2(VDD-irretrigger, GND-retrigger)
E>IO3(VDD-edge, GND-level)	E>IO3(VDD-hold, GND-unhold)	E>IO3(VDD-irretrigger, GND-retrigger)

C,D,E; COULD ONLY BE SELECTED WHEN IO1,IO2,IO3 ARE MASK_OPTION SELECTED AS CONTROL INPUT

7. 3 I/O pins with following options :

For AM9AB0036, AM9AB0038, SA1AA0035:

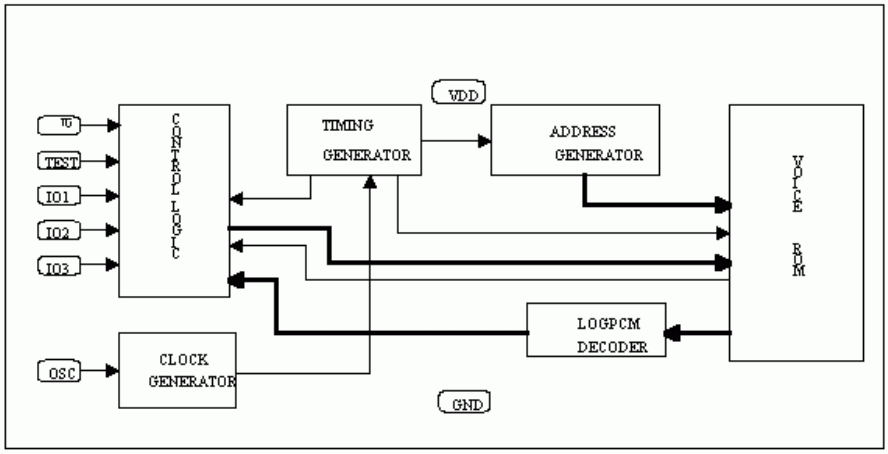
* IO1	* IO2	* IO3
A>COUT, B>STOPH, C>STOPL	A>PWM1, B>STOPH, C>STOPL	A>PWM2, B>STOPH, C>STOPL
D>BUSYH, E>BUSYL, F>3HZ G>1.5HZ	D>BUSYH, E>BUSYL, F>3HZ, G>1.5HZ	D>BUSYH, E>BUSYL, F>3HZ, G>1.5HZ
H>0.75HZ, I>6HZ	H>0.75HZ, I>6HZ	H>0.75HZ, I>6HZ
J>DYNA1/4, K>DYN2/4, L>DYN3/4	J>DYNA1/4, K>DYN2/4, L>DYN3/4	J>DYNA1/4, K>DYN2/4, L>DYN3/4
M>USED AS OPTION CONTROL INPUT	M>USED AS OPTION CONTROL INPUT	M>USED AS OPTION CONTROL INPUT

For AM9AB0030:

* IO1	* IO2	* IO3
A>COUT B>STOPH C>STOPL	A>PWM1 B>STOPH C>STOPL	A>PWM2 B>STOPH C>STOPL
D>BUSYH E>BUSYL F>3HZ G>6HZ	D>BUSYH E>BUSYL F>3HZ G>6HZ	D>BUSYH E>BUSYL F>3HZ G>6HZ
H>DYNA1/4 I>DYN2/4 J>DYN3/4	H>DYNA1/4 I>DYN2/4 J>DYN3/4	H>DYNA1/4 I>DYN2/4 J>DYN3/4
K>USED AS OPTION CONTROL INPUT	K>USED AS OPTION CONTROL INPUT	K>USED AS OPTION CONTROL INPUT

COUT: 3 CURRENT OUTPUT LEVELS, WITH 4 MASK OPTIONS (1.5mA;3mA;4.5mA;IO3<GND-3mA,VDD-4.5mA>)
PWM1, PWM2: MUST BE SELECTED ON THE SAME TIME , DIRECT DRIVING BUZZER OR 32 OR 64 ohm SPEAKER.
STOPH,STOPL: 40 ms HIGH/LOW OUTPUT WHEN DEVICE STOP PLAYING.(drive 0.5ma,sink 10ma;3v)
BUSYH, BUSYL: HIGH/LOW OUTPUT DURING DEVICE PLAYING (drive 0.5ma,sink 10ma;3v)
6Hz, 3hz, 1.5hz, 0.75hz, DYNA1/4,2/4,3/4: LED DRIVING. (drive 0.5ma,sink 10ma;3v)
USED AS OPTION CONTROL INPUT: INTERNAL PULL GND (0.5uA,3V)
* FOR ALL THE IO OPTIONS THE DYNAMIC SHOULD CHOICE SAME LEVEL.
* IF IO2 AND IO3 ARE BOTH AT 6HZ THEY WILL FLASH ALTERNATIVELY.
*WHEN USED AS OPTION CONTROL INPUT,THEY COULD BE USED TO CONTROL FOLLOWING OPTIONS BY BONDING OR TOGGLE SWITCH. EDGE/LEVEL, HOLD/UNHOLD, RETRIGGER/IRRETRIGGER, 10ms/50us DEBOUNCE, External or Internal Rosc SELECTION.

BLOCK DIAGRAM:



PIN DESCRIPTION:

PAD NAME	PIN ATTR.	FUNCTION
VDD,VDD1	POWER	POSITIVE POWER SUPPLY.
OSC	I	OSCILLATOR INPUT (180K ohm CONNECT TO VDD).
TEST	I	TEST PAD,FOR PRODUCTION TESTING (TEST HIGH FOR TESTING)
TG	I	TRIGGER INPUT, INTERNAL PULL LOW (HIGH ACTIVE).
IO1,IO2,IO3	I/O	AUDIO SIGNAL; STATUS OUTPUT; OPTION CONTROL INPUT.
GND,GND1	POWER	NEGATIVE POWER SUPPLY.

ABSOLUTE MAXIMUM RATING:

SYMBOL	RATING	UNIT
VDD~VSS	-0.5~+7.0	V
VIN (FOR ALL INPUT)	VSS-0.3<VIN<VDD+0.3	V
VOUT (FOR ALL OUTPUT)	GND<VOUT<VDD	V
T (OPERATING)	0~+70	℃
T (STORAGE)	-25~+75	℃

DC CHARACTERISTICS:

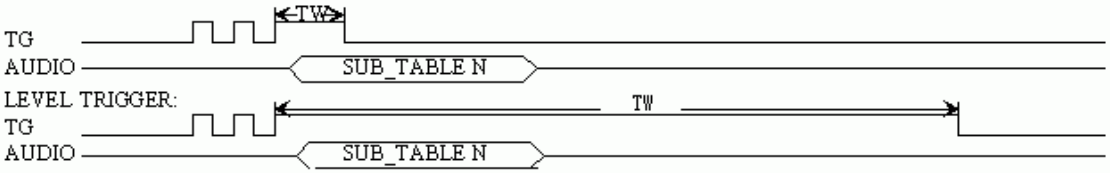
SYMBOL	PARAMETER		MIN.	TYP.	MAX.	UNIT	CONDITION
VDD	OPERATING VOLTAGE		2.4	3	5	V	
Isb	SUPPLY CURRENT	STANDBY			0.1	uA	VDD=3V ,I/O OPEN (WITH Rosc)
Iop		OPERATING			200		
Iih	TG				15	uA	VDD=3V
Iil				0			
Ico	IO1 USE AS CURRENT OUT (FULL SCALE)		-1.2	-1.5	-1.8	mA	VDD=3V, V O/P=0.7V
			-2.4	-3	-3.6		
			-3.6	-4.5	-5.4		
Iih	IO1,IO2,IO3 USE AS CONTROL INPUT				0.5	uA	VDD=3V
Iil				0			
Ioh	IO1,IO2,IO3 USE AS STATUS OUTPUT DURING OPERATING			min:0.5 max:0.9		mA	VDD=3V, V O/P=0V
Iol			8	10	12		VDD=3V, V O/P=3V
dF/F	FREQUENCY STABILITY		-10		10	%	$\frac{Fosc(3v)-Fosc(2.4v)}{Fosc(3v)}$
dF/F	Fosc VARIATION		-10		10	%	VDD=3V,Rosc=300K

TIMING DIAGRAM:

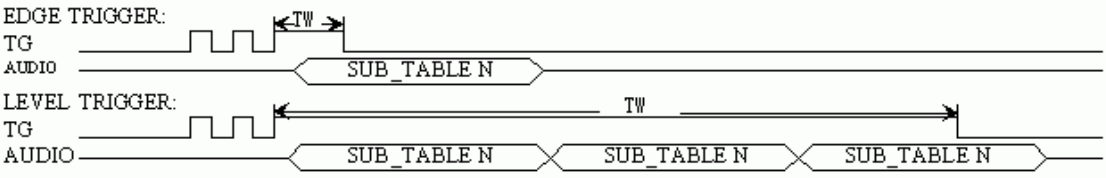
1.>EDGE/LEVEL

EDGE MODE:

EDGE TRIGGER:

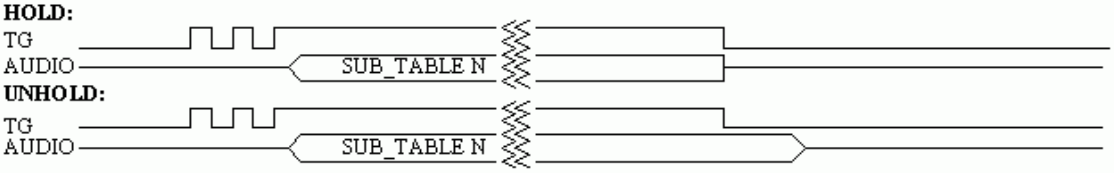


LEVEL MODE:



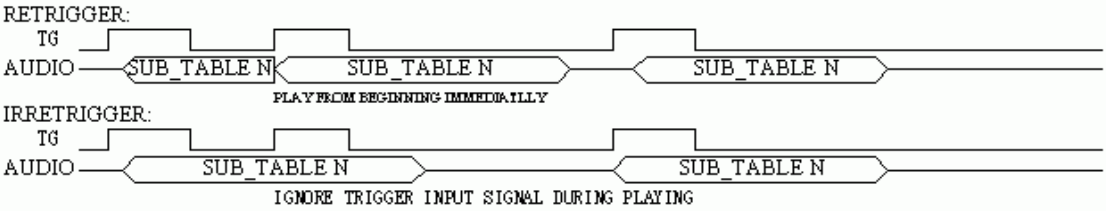
* NOTE:Tw IS THE MINIMUM INPUT PULSE WIDTH > DEBOUNCE TIME (10 ms or 50 us)

2.>HOLD/UNHOLD

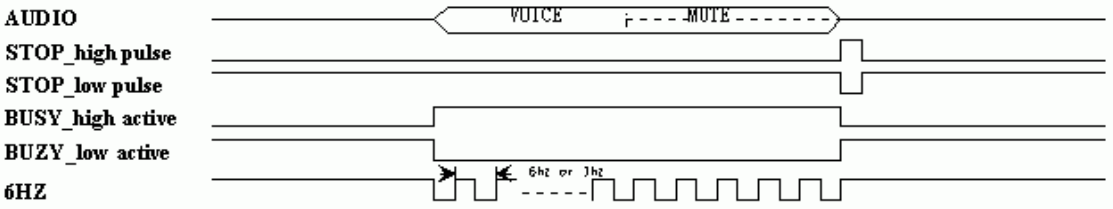


*NOTE:BOTH EDGE AND LEVEL HAVE HOLD AND UNHOLD OPTION.

3.>RETRIGGERABLE/IRRETRIGGERABLE



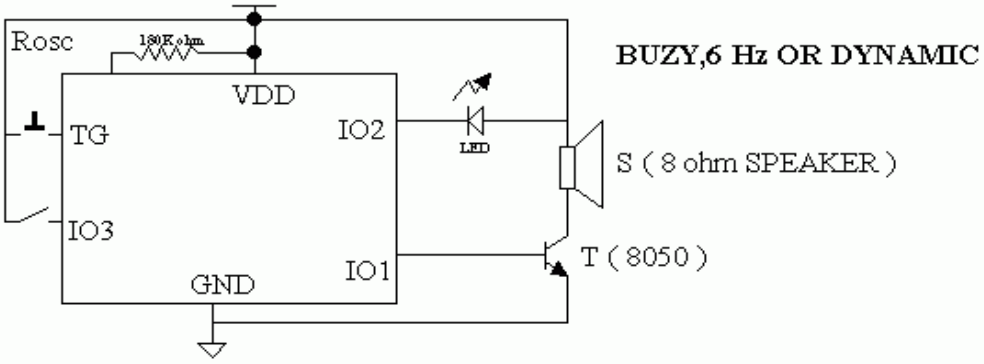
4.>STATUS OUTPUT(IO1;IP2;IO3)



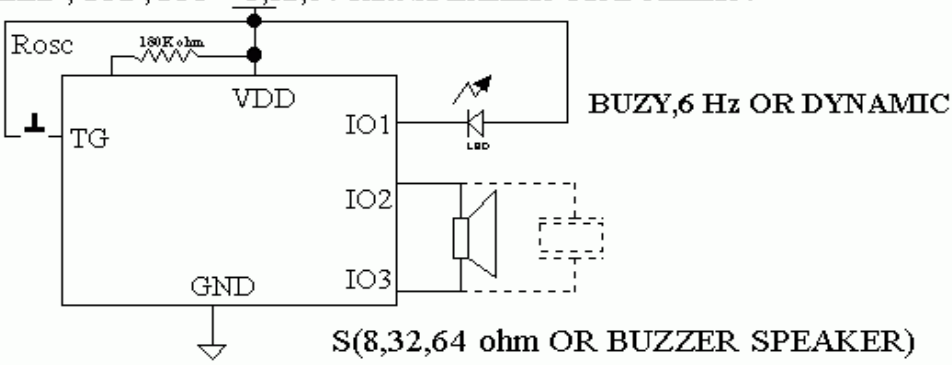
DYNAMIC: Partition the voice amplitude 8 steps (01234567);
1/4:0,7 LED on. 2/4:0.1.6.7 LED on. 3/4:0.1.2.5.6.7 LED on.
LED on means status output low.

APPLICATION CIRCUIT:

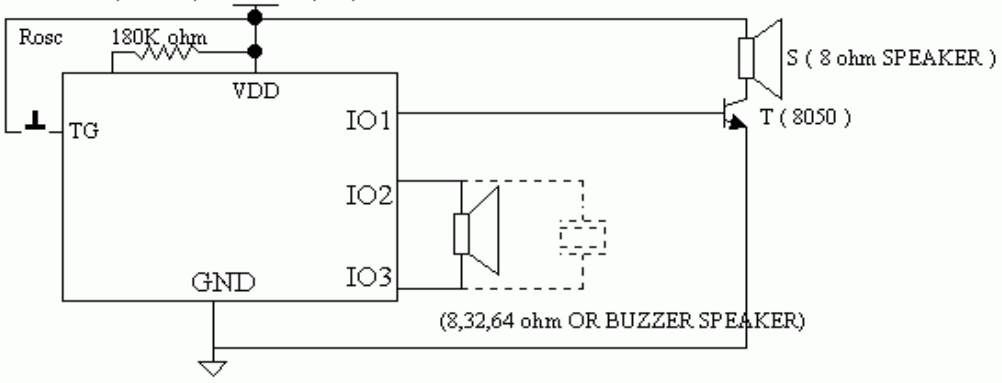
A> IO1 -- COUT ; IO2 -- LED ; IO3 -- CONTROL INPUT.



B> IO1 -- LED ; IO2 , IO3 -- 8,32,64 ohm SPEAKER OR BUZZER .

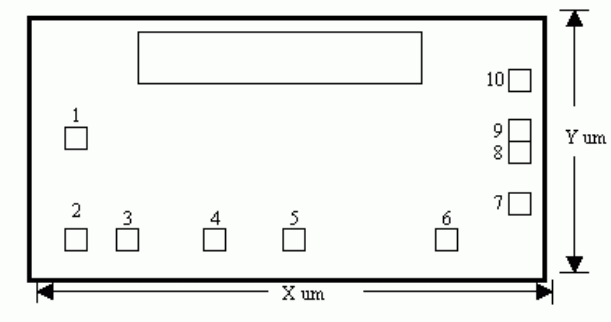


C> IO1 – COUT ; IO2 , IO3 -- 8,32,63 ohm SPEAKER OR BUZZER .



NOTE: 1>Rosc=300K ohm (TYPICAL). Tbata=130 (TYPICAL).
2>BUZZER:RESONANT FREQUENCY SHOULD AROUND 1KHz.
3>INPUT SWITCH COULD BE REPLACE BY CDS.
4>COUT,PWM1,PWM2 ARE TRISTATE DURING STANDBY.

BONDING DIAGRAM :



Die Size :

Product	X	Y	PAD Size (um^2)	SUBTRATE	Unit
AM9AB0030	1360	890	80*80	GND	um
AM9AB0036 AM9AB0038 SA1AA0035	1380	910	80*80	GND	um

Pad Location:

PIN NO.	NAME	AM9AB0030 AM9AB0036 AM9AB0038 SA1AA0035	
		X	Y
1	VDD1	-560.59	41.11
2	OSC	-560.59	-293.18
3	TEST	-439.69	-293.18
4	TG	-318.79	-293.18
5	IO1	-197.89	-293.18
6	VDD	119.18	-321.26
7	IO2	528.94	-200.43
8	GND	529.33	-74.2
9	GND1	529.33	6.4
10	IO3	529.33	158.18

NOTE : (1) All data and specifications are subject to change without notice. UNIT : um
(2) Both VDD and VDD1 be connected to positive power supply; GND and GND1 be connected to negative power supply for avoid power supply noise during operation.
(3) 0.1 uf capacitor connected between positive and negative power supply were subjected for operating stability.