

**1. GENERAL DESCRIPTION:**

The AV1232E, AV1832D, AV2432C are single-chip voice synthesizing CMOS IC. They can synthesize voice up to 12, 18 and 24 seconds, using APLUS 5-bit LOGPCM algorithm. Customer speech data can be edited and programmed into ROM by changing one mask during the device fabrication.

**2. FEATURES:**

- (1). Single power supply can operate from 2.4V to 5V.
- (2). The total voice duration is about 12, 18 or 24 seconds those can be partitioned up to 32 voice\_sections. Each voice\_section length is flexible.
- (3). Each voice\_section can select 4 kinds of End\_Address (i.e. 4 kinds of playing\_length), the longest playing\_length is the voice+mute length. The voice+mute length can be up to 22 seconds for each voice\_section ( at 6kHz sample rate ).
- (4). Total 255 voice\_steps are available for 32 sub\_tables. For each voice\_step, it can specify one voice\_section, one playing\_length of voice\_section, one kind of playback speed and STS1, STS2, STS3, STS4 output enable options.

8 kinds of playback speed: 1>5.0k ; 2>5.6k ; 3>6.2k ; 4>7.0k ; 5>8.0k ; 6>9.4k ; 7>11.3k ; 8>14.1k Hz  
( With Rosc= 180k ohms at Vdd= 3V )

STS1, 2, 3, 4 output enable options: each output pin with one control bit. ( "0" → enable, "1" → disable )

- (5). Three trigger input mode: MATRIX, ALONE and CPU\_INTERFACE. ( Mask option )

In MATRIX and ALONE, there are Mode, Priority and Debounce selections.

One control input pin "MODE/STS4" can be used as Mode selection or STS4. ( Mask option )

MATRIX mode: 4x4 matrix inputs ; M1~M16 (ROW1~4 x COL1~4)

⊙Mode selection: Mode=0 → subtable1~16 ; Mode=1 → subtable17~32.

⊙Priority: M1>M2>M3>M4 ; M5>M6>M7>M8 ; M9>M10>M11>M12 ; M13>M14>M15>M16.

⊙Debounce: 11ms or 1ms.

ALONE mode: 8 alone inputs ; A1~A8 (ROW1~4 + COL1~4)

⊙Mode selection: Mode=0 → subtable1~8 ; Mode=1 → subtable9~16

⊙Priority: A1>A2>A3>A4>A5>A6>A7>A8.

⊙Debounce: 10ms or 50us

Each alone input can choose 1M+CDS, 10M or 10M+CDS pull-low input type.

If MODE/STS4 is selected for STS4 output, MATRIX is only subtable1~16 available and ALONE is only subtable1~8 available.

In these 2 modes, all the trigger input can be assign as different playing mode with following options:

Edge/Level; Hold/UnHold; Retrigger/Irretrigger.

- CPU\_INTERFACE mode: Addressing access mode by input pulse count. In this mode, A1~A7 (ROW1~4, COL1~3) are disable, A8 (COL4) can be access up to 32 subtables.

(6). The A8 or M16 can be selected as NORMAL, SEQUENTIAL or CPU\_INTERFACE. ( Mask option )

- NORMAL: normal mode as in item (5).
- SEQUENTIAL: can be selected to combine with MODE input or not. ( Mask option )

(A). If A8 or M16 is in SEQUENTIAL and is combined with MODE input:

MODE=0 : the device will response by one subtable sequentially and cyclically, from subtable1 to user defined end subtable (subtable n, n=1~16).

MODE=1 : the device will response by one subtable sequentially and cyclically, from subtable 17 to user defined end subtable (subtable n, n=17~32).

The number of subtables (used in sequence) in MODE=1 and MODE=0 must be equal; this number must be less than 16.

(B). If A8 or M16 is in SEQUENTIAL and is not combined with MODE input:

The device will response by one subtable sequentially and cyclically, from subtable1 to user defined end subtable (subtable n, n=1~32).

The relationship between SEQUENTIAL ( A8/M16 ) and other inputs ( A1~A7 / M1~M15 ) can be selected as RESET or UNRESET. ( Mask option )

- RESET: once the other inputs are triggered, the SEQUENTIAL sequence will reset to subtable 1.
- UNRESET: SEQUENTIAL sequence and other inputs are independent.

(7). Four STS pins have the following options: ( Mask option )

- OUT1: Cout (Current output) or STS1 output
- OUT2: PWM1 or STS2 output
- OUT3: PWM2 or STS3 output
- MODE/STS4: MODE selection or STS4 output

Cout has 3 current output levels: 1>1.5mA ; 2>3mA ; 3>4.5mA. ( full scale ; Vdd=3V )

PWM1 and PWM2 must be selected on the same time, they can directly drive buzzer or 8, 16, 32 or 64 ohms speaker.

(8). Four status outputs ( STS1, STS2, STS3, STS4 ):

STS1

- a). Cout
- b). stop high\_pulse
- c). stop low\_pulse
- d). busy high\_active
- e). busy low\_active
- f). LED 6Hz (flash at mute)
- g). LED 3Hz (flash at mute)
- h). LED 1.5Hz (flash at mute)
- i). LED 0.75Hz (flash at mute)
- j). LED 6Hz (off at mute )
- k). LED 3Hz (off at mute)
- l). LED 1.5Hz (off at mute )
- m).LED 0.75Hz (off at mute)
- n). LED dybzl 0.34sec.
- o). LED dybzl 0.68sec.
- p). LED dybzl 1.02sec.
- q). busy high, except mute
- r). busy low, except mute

STS2

- a). PWM1
- b). stop high\_pulse
- c). stop low\_pulse
- d). busy high\_active
- e). busy low\_active
- f). LED 6Hz (flash at mute)
- g). LED 3Hz (flash at mute)
- h). LED 1.5Hz (flash at mute)
- i). LED 0.75Hz (flash at mute)
- j). LED 6Hz (on at mute)
- k). LED 3Hz (on at mute)
- l). LED 1.5Hz (on at mute)
- m).LED 0.75Hz (on at mute)
- n). LED 6Hz (off at mute)
- o). LED 3Hz (off at mute)
- p). LED 1.5Hz (off at mute)
- q). LED 0.75Hz (off at mute)
- r). LED dynamic 1/4
- s). LED dynamic 2/4
- t). LED dynamic 3/4

STS3

- a> PWM2
- b> stop high\_pulse
- c> stop low\_pulse
- d> busy high\_active
- e> busy low\_active
- f> LED 6Hz (flash at mute)
- g> LED 3Hz (flash at mute)
- h> LED 1.5Hz (flash at mute)
- i> LED 0.75Hz (flash at mute)
- j> LED 6Hz (off at mute )
- k> LED 3Hz (off at mute)
- l> LED 1.5Hz (off at mute )
- m>LED 0.75Hz (off at mute)
- n> LED dybzl 0.34sec.
- o> LED dybzl 0.68sec.
- p> LED dybzl 1.02sec.
- q> busy high, except mute
- r> busy low, except mute

STS4

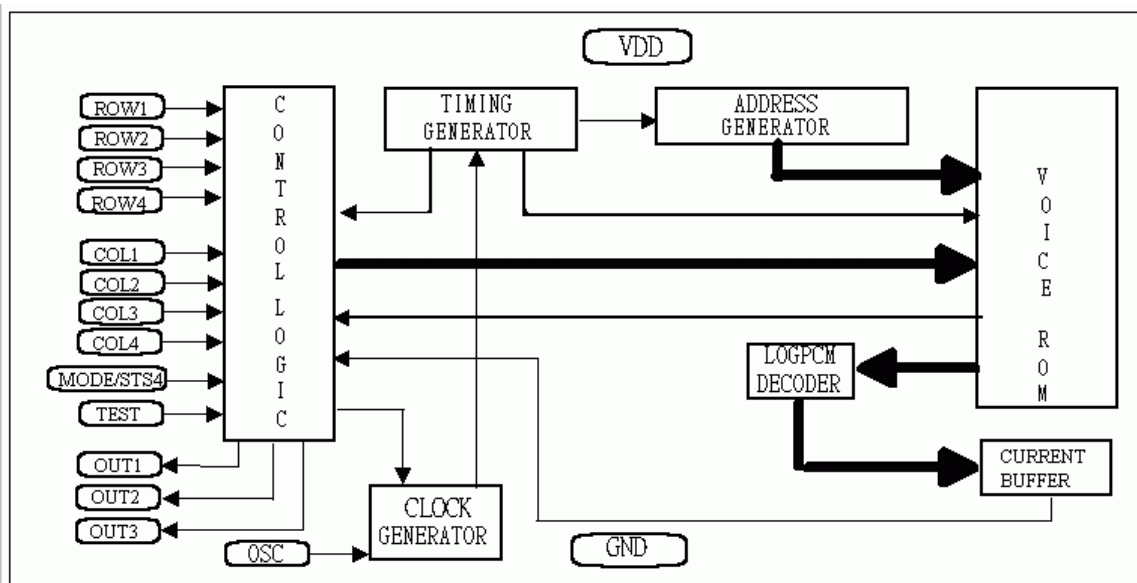
- a). mode
- b). stop high\_pulse
- c). stop low\_pulse
- d). busy high\_active
- e). busy low\_active
- f). LED 6Hz (flash at mute)
- g). LED 3Hz (flash at mute)
- h). LED 1.5Hz (flash at mute)
- i). LED 0.75Hz (flash at mute)
- j). LED 6Hz (on at mute)
- k). LED 3Hz (on at mute)
- l). LED 1.5Hz (on at mute)
- m).LED 0.75Hz (on at mute)
- n). LED 6Hz (off at mute)
- o). LED 3Hz (off at mute)
- p). LED 1.5Hz (off at mute)
- q). LED 0.75Hz (off at mute)
- r). LED dynamic 1/4
- s). LED dynamic 2/4
- t). LED dynamic 3/4

- ※ If both STS1(STS3) and STS2(STS4) are in 6Hz or 3Hz mode, they will flash alternatively.
- ※ For STS1 and STS3 options, the DYBZL must selected same level.
- ※ For STS2 and STS4 options, the DYNAMIC must selected same level.
- ※ STS4 was enabled only when the MODE/STS4 is in STS4 option.
- ※ For each voice\_step, the STS1, STS2, STS3, STS4 can be mask\_selected as active or inactive.
- ※ If select flash at mute of STS1(STS3), can select 3Hz or 1.5Hz or 0.75Hz.
- ※ If select flash at mute of STS2(STS4), can select 3Hz or 1.5Hz or 0.75Hz.
- ※ If both select off at mute of STS1(STS2,STS3,STS4) or on at mute of STS2(STS4), can only select 3Hz or 1.5Hz or 0.75Hz at the same level.

(9). Oscillator selection:

- (A). External oscillator: Connect OSC pin to Vdd with a resister, Rosc.
- (B). Internal oscillator: Connect OSC pin to GND.
- (C). There are 8 playback speeds for options whether selecting external or internal oscillator.
- ※ When external Rosc is 180k ohms at 3V, there are 8 kinds of playback speed as in item (4). If you change the value of Rosc, the 8 kinds of playback speed will be changed accordingly and equally. Therefore, you can change the Rosc to change the range of 8 playback\_speeds.

### 3. BLOCK DIAGRAM:



**1. 一般規格:**

AV1232E、AV1832D、AV2432C，皆為單晶片 CMOS 語音合成 IC。他們以 5-bit LOGPCM 編碼方式，合成長達 12、18、24 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。

**2. 特性:**

- (1). 單一工作電壓範圍為2.4 ~ 5 伏特。
- (2). 語音總長度可達 12，18，24 秒，且可被分割成32個語音段(voice\_section)，每段長度可不同。
- (3). 每一個的語音段可以有四種不同的結束點 (即有4種播放時間的選擇)，而最長的播放時間是每一段”語音+靜音”的時間。其中每一段的”語音+靜音”時間 最多可達22秒。(在6kHz取樣頻率下)。
- (4). 具有255個語音格(voice\_step)，可規劃成32語音組(sub\_table)。每一語音格可指定一語音段，播放速度，和 STS1、STS2、STS3、STS4 輸出致能或非致能。

8種播放速度選項: 1> 5.0k; 2> 5.6k; 3> 6.2k; 4> 7.0k; 5> 8.0k; 6> 9.4k; 7> 11.3k; 8> 14.1k Hz  
( Vdd=3V ; Rosc=180k ohms )。

STS1，2，3，4 致能選擇: 每一種由一個控制位元控制(“0” → 致能； “1” → 非致能)。

- (5). 有3種觸發輸入模式: 矩陣 (Matrix) 觸發，單獨 (Alone)觸發，或 串列式CPU觸發。(光罩選擇)  
在矩陣觸發和單獨觸發模式，各有MODE模式選擇，優先順序以及防止誤動作時間的選項。

”MODE/STS4” 腳可選擇輸入MODE控制模式或 STS4輸出。(光罩選擇)

矩陣觸發：4×4矩陣輸入，M1~M16 (ROW1~4 x COL1~4)

◎MODE模式選擇：MODE=0，對應至語音組1~16；MODE=1，對應至語音組17~32。

◎優先順序：M1>M2>M3>M4; M5>M6>M7>M8; M9>M10>M11>M12; M13>M14>M15>M16

◎防止誤動作(DEBOUNCE)時間：11ms--提供一般手動操作; 1ms--提供較敏感的動作。

單獨觸發：八個單獨輸入，A1~A8 (ROW1~4 + COL1~4)

◎MODE模式選擇：MODE=0，對應至語音組1~8；MODE=1，對應至語音組9~16。

◎優先順序：A1>A2>A3>A4>A5>A6>A7>A8

◎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。

每個單獨輸入皆可選擇 1M+CDS，10M 或 10M+CDS pull-low 的輸入方式。

如果MODE/STS4腳選擇為STS4輸出，則矩陣觸發只對應至語音組1~16或單獨觸發只對應至語音組1~8。

以上2種觸發，每一輸入可選擇不同觸發方式(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 / 非後段蓋前段(Retrigger/Irretrigger)。

串列式CPU觸發：以輸入腳A8 (COL4) 當作連接其它CPU界面的輸入腳，此時其它的輸入腳(ROW1~4, COL1~3)皆為非致能。

(6). A8或M16可由光罩選擇設定為一般觸發(Normal)，順序觸發(Sequential) 或 串列式CPU觸發。

一般觸發(Normal)：A8或M16的觸發如第5項所示。

順序觸發功能 (Sequential)：可選擇是否配合MODE輸入使用。

(A). 當A8或M16設定為單鍵觸發，而且結合MODE輸入使用：

MODE=0：一經觸發將由第1語音組 (subtable 1) 至設定之語音組 (subtable n；n=1~16)，每次觸發播放一語音組且按順序循環播放。

MODE=1：一經觸發將由第17語音組 (subtable 17) 至設定之語音組 (subtable n；n=17~32)，每次觸發播放一語音組且按順序循環播放。

循環播放之語音組數在 MODE=0 與 MODE=1 須相同，且語音組數需小於16組。

(B).當A8或M16設定為單鍵輸入，但不配合MODE輸入控制使用：

一經觸發將由第1組 (subtable 1) 至設定之語音組 (subtable n；n=1~32)，每次觸發播放一語音組且按順序循環播放。

順序觸發 (A8或M16) 開始動作後，若有其它輸入觸發(A1~A7 / M1~M15)，則可經光罩選擇將順序觸發定義為『可重置或不可重置』。

◎ 可重置(RESET)：若有其它輸入觸發，順序觸發功能的循環將被重置回第1語音組。

◎ 不可重置(UNRESET)：順序觸發功能的循環不受其他鍵觸發影響。

(7). STS1/Cout，STS2/PWM1，STS3/PWM2，MODE/STS4 可作以下選擇：( 光罩選擇 )

STS1/Cout：可選擇為Cout或STS1狀態輸出。

STS2/PWM1：可選擇為PWM1或STS2狀態輸出。

STS3/PWM2：可選擇為 PWM2或STS3狀態輸出。

MODE/STS4：可選擇為 MODE控制輸入或STS4狀態輸出。

Cout 有3種電流輸出: 1> 1.5mA；2> 3mA；3>4.5mA ( Vdd=3V，full scale )。

PWM1，PWM2須同時選擇，可直接驅動 buzzer 或 8、16、32、64 ohms speaker。

(8). STS1, STS2, STS3 及 STS4 可做以下輸出選擇：

 STS1輸出的選擇

- a). Cout聲音輸出
- b). 停止播放時送出高位準脈衝.
- c). 停止播放時送出低位準脈衝.
- d). 播放時送出高位準訊號.
- e). 播放時送出低位準訊號.
- f). LED 6HZ(靜音時閃爍).
- g). LED 3HZ(靜音時閃爍).
- h). LED 1.5HZ(靜音時閃爍).
- i). LED 0.75HZ(靜音時閃爍).
- j). LED 6HZ(靜音時熄滅).
- k). LED 3HZ(靜音時熄滅).
- l). LED 1.5HZ(靜音時熄滅).
- m). LED 0.75HZ(靜音時熄滅).
- n). LED動態送出低位準脈衝 0.34秒(每一語音格).
- o). LED動態送出低位準脈衝 0.68秒(每一語音格).
- p). LED動態送出低位準脈衝 1.02秒(每一語音格).
- q). 播放時(靜音除外)送出高位準訊號.
- r). 播放時(靜音除外)送出低位準訊號.

 STS2輸出的選擇

- a). PWM1聲音輸出
- b). 停止播放時送出高位準脈衝.
- c). 停止播放時送出低位準脈衝.
- d). 播放時送出高位準訊號.
- e). 播放時送出低位準訊號.
- f). LED 6HZ(靜音時閃爍).
- g). LED 3HZ(靜音時閃爍).
- h). LED 1.5HZ(靜音時閃爍).
- i). LED 0.75HZ(靜音時閃爍).
- j). LED 6HZ(靜音時亮著).
- k). LED 3HZ(靜音時亮著).
- l). LED 1.5HZ(靜音時亮著).
- m). LED 0.75HZ(靜音時亮著).
- n). LED 6HZ(靜音時熄滅)訊號.
- o). LED 3HZ(靜音時熄滅)訊號.
- p). LED 1.5HZ(靜音時熄滅)訊號.
- q). LED 0.75HZ(靜音時熄滅)訊號.
- r). LED動態 1/4位準訊號.
- s). LED動態 2/4位準訊號.
- t). LED動態 3/4位準訊號.

 STS3輸出的選擇

- a). PWM2聲音輸出
- b). 停止播放時送出高位準脈衝.
- c). 停止播放時送出低位準脈衝.
- d). 播放時送出高位準訊號
- e). 播放時送出低位準訊號
- f). LED 6HZ(靜音時閃爍).
- g). LED 3HZ(靜音時閃爍).
- h). LED 1.5HZ(靜音時閃爍).
- i). LED 0.75HZ(靜音時閃爍).
- j). LED 6HZ(靜音時熄滅).
- k). LED 3HZ(靜音時熄滅).
- l). LED 1.5HZ(靜音時熄滅).
- m). LED 0.75HZ(靜音時熄滅).
- n). LED動態送出低位準脈衝 0.34秒(每一語音格).
- o). LED動態送出低位準脈衝 0.68秒(每一語音格).
- p). LED動態送出低位準脈衝 1.02秒(每一語音格).
- q). 播放時(靜音除外)送出高位準訊號.
- r). 播放時(靜音除外)送出低位準訊號.

 STS4輸出的選擇

- a). MODE選擇
- b). 停止播放時送出高位準脈衝.
- c). 停止播放時送出低位準脈衝.
- d). 播放時送出高位準訊號.
- e). 播放時送出低位準訊號.
- f). LED 6HZ(靜音時閃爍).
- g). LED 3HZ(靜音時閃爍).
- h). LED 1.5HZ(靜音時閃爍).
- i). LED 0.75HZ(靜音時閃爍).
- j). LED 6HZ(靜音時亮著).
- k). LED 3HZ(靜音時亮著).
- l). LED 1.5HZ(靜音時亮著).
- m). LED 0.75HZ(靜音時亮著).
- n). LED 6HZ(靜音時熄滅).
- o). LED 3HZ(靜音時熄滅).
- p). LED 1.5HZ(靜音時熄滅).
- q). LED 0.75HZ(靜音時熄滅).
- r). LED動態 1/4位準訊號.
- s). LED動態 2/4位準訊號.
- t). LED動態 3/4位準訊號.

- ※ 如STS1(STS3)和STS2(STS4)選擇相同的 LED 6Hz 或 LED 3Hz 或 LED 1.5Hz 或 LED 0.75 Hz 之模式時，它們將交互閃爍。
  - ※ 若STS1，STS3同時選擇 LED動態送出低位準脈衝(每一語音格)，須選擇同一位準。
  - ※ 若STS2，STS4同時選擇 LED動態位準訊號，須選擇同一位準。
  - ※ STS1，STS2，STS3及STS4可由光罩選擇對每一語音格(voice\_step)致能或非致能。
  - ※ 狀態輸出方式請以時序圖為準。
  - ※ 選擇 STS1(STS3) 的靜音閃爍時，可選擇 3Hz，1.5Hz 或 0.75Hz的輸出。
  - ※ 選擇 STS2(STS4) 的靜音閃爍時，可選擇 3Hz，1.5Hz 或 0.75Hz的輸出。
  - ※ 選擇 STS1( STS2，STS3，STS4 )的靜音時熄滅和選擇 STS2( STS4) 的靜音時熄滅 或 靜音時亮著，僅可選擇單一位準 3Hz，1.5Hz 或 0.75Hz的輸出。
- (9). 選擇頻率振盪器：
- (A). 選擇外部電阻可調式頻率振盪器：將 OSC 外接電阻到正電源。
  - (B). 選擇內建頻率振盪器：將 OSC 接地。
  - (C). 不管選擇內阻或是外阻均有八種播放速度可供選擇。
- ※ 外接電阻值為180k ohms 時(在 3V 工作電壓下)，八種播放速度如第4項所示。當改變此外接電阻值，則八種播放速度會全部等比例改變，因此你可以用外接電阻來改變八種播放速度的範圍。



**4. PAD DESCRIPTION:**

Pad Name	Pad No.	ATTR.	Function
Vdd, Vdd1	1, 12	Power	Positive power supply.
OSC	2	I	Oscillator input (180K ohms connect to Vdd).
Test	17	I	Test pad for IC testing.
MODE/STS4	18	I/O	MODE: Mode selection, STS4: status output
ROW1~4	7~10	I/O	Output for MATRIX mode; Input for ALONE mode
COL1~4	3~6	I	Trigger input, internal pull low ( High active )
OUT1	11	O	Status output (STS1), or Audio output ( Current output: Cout )
OUT2	13	O	Status output (STS2), or Audio output ( PWM1 output )
OUT3	16	O	Status output (STS3), or Audio output ( PWM2 output )
GND, GND1	14, 15	Power	Negative power supply.

**5. ABSOLUTE MAXIMUM RATING:**

Symbol	Rating	Unit
Vdd~Vss	-0.5 ~ +7.0	V
Vin	Vss-0.3 < Vin < Vdd+0.3	V
Vout	GND < Vout < Vdd	V
Top (operating)	0 ~ +70	°C
Tst (storage)	-25 ~ +85	°C

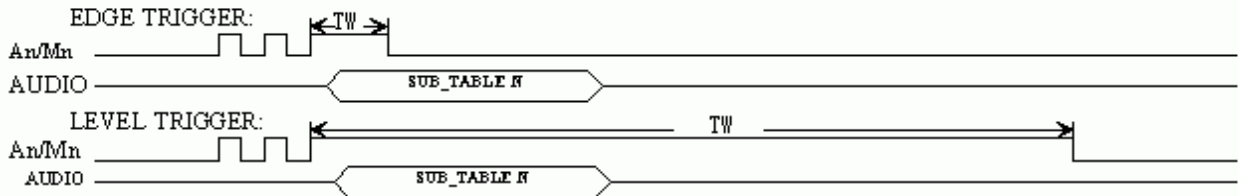
**6. DC CHARACTERISTICS:**

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition	
Vdd	Operating voltage	2.4	3.0	6.4	V		
I <sub>sb</sub>	Supply current	Standby		1	uA	Vdd=3V, I/O open (with R <sub>osc</sub> or OSC grounded)	
I <sub>op</sub>		Operating		200			
I <sub>ih</sub>	Input current: ALONE mode ROW1~4, COL1~4 ( CDS+1M pull low )			5	uA	Vdd=3V	
I <sub>il</sub>			0				
I <sub>ih</sub>	Input current: ALONE mode ROW1~4, COL1~4 ( CDS+10M pull low )			0.3	uA	Vdd=3V	
I <sub>il</sub>			0				
I <sub>ih</sub>	Input current: Mode input			0.5	uA	Vdd=3V	
I <sub>il</sub>			0				
I <sub>oh</sub>	Output current: MATRIX mode (RWO1~4)		-0.6		mA	Vdd=3V	
I <sub>ol</sub>			10				
I <sub>oh</sub>	PWM1, PWM2 output current		-30		mA	Vdd=3V, V <sub>op</sub> =2.4V	
I <sub>ol</sub>			30			Vdd=3V, V <sub>op</sub> =0.6V	
I <sub>cout</sub>	Cout output current ( Full scale )		-1.2	-1.5	-1.8	mA	Vdd=3V, V <sub>op</sub> =0.7V
			-2.4	-3.0	-3.6		
			-3.6	-4.5	-5.4		
I <sub>oh</sub>	STS1~4 output current		-0.6		mA	Vdd=3V, V <sub>op</sub> =0V	
I <sub>ol</sub>		8	10	12		Vdd=3V, V <sub>op</sub> =3V	
dF/F	Frequency stability	-5		5	%	$\frac{F_{osc(3v)} - F_{osc(2.4v)}}{F_{osc(3v)}}$	
dF/F	Fosc lot variation	-10		10	%	Vdd=3V, R <sub>osc</sub> =180KΩ	

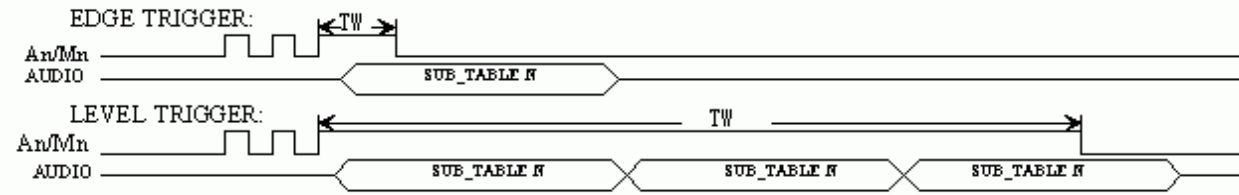
### 7. TIMING DIAGRAM:

#### 1.>EDGE/LEVEL

##### EDGE MODE:



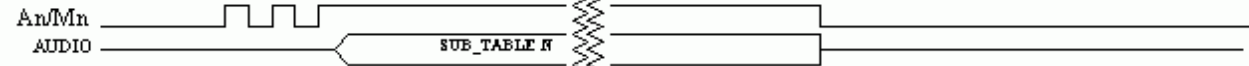
##### LEVEL MODE:



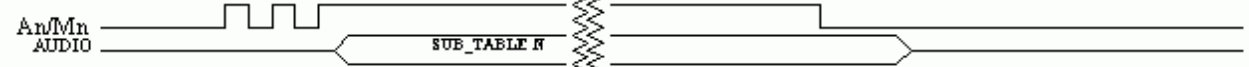
\* NOTE: TW IS THE MINIMUM INPUT PULSE WIDTH > DEBOUNCE TIME (10ms or 50us )

#### 2.>HOLD/UNHOLD

##### HOLD:



##### UNHOLD:



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

#### 3.>RETRIGGERABLE/IRRETRIGGERABLE

##### RETRIGGER:



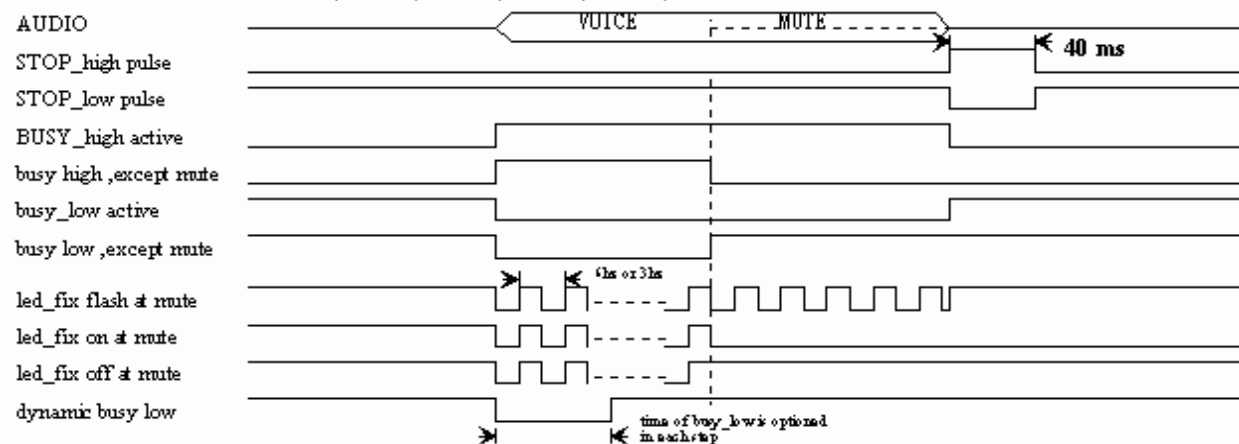
PLAY FROM BEGINNING IMMEDIATELY

##### IRRETRIGGER:



IGNORE TRIGGER INPUT SIGNAL DURING PLAYING

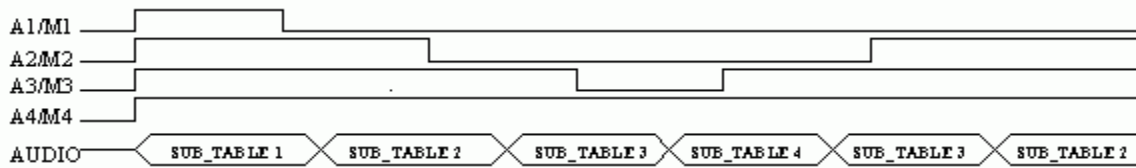
#### 4.>STATUS OUTPUT(STS1,STS2,STS3,STS4)



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. : every beginning of voice step will reset status signal ..

### 5-> PRIORITY :

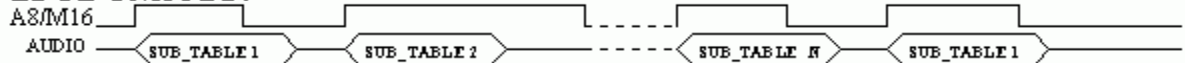


NOTE : PRIORITY A1>A2>A3>A4>A5>A6>A7>A8  
M1>M2>M3>M4 ; M5>M6>M7>M8 ; M9>M10>M11>M12 ; M13>M14>M15>M16

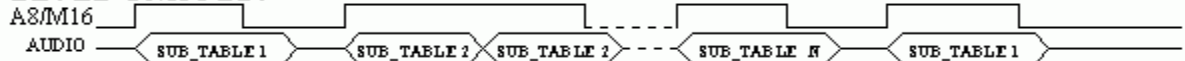
The device will detect the input priority at start playing or level repeat.

### 6-> SEQUENTIAL :

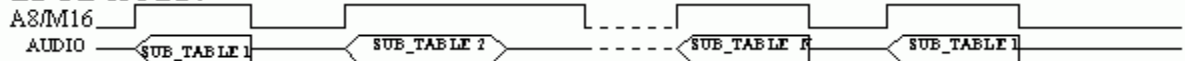
#### EDGE-UNHOLD:



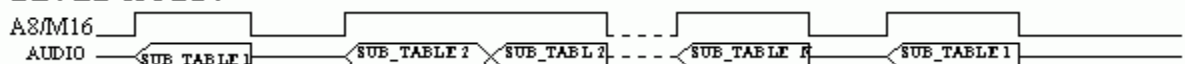
#### LEVEL-UNHOLD:



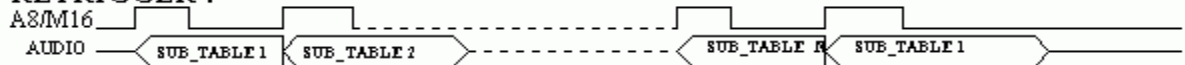
#### EDGE-HOLD:



#### LEVEL-HOLD:



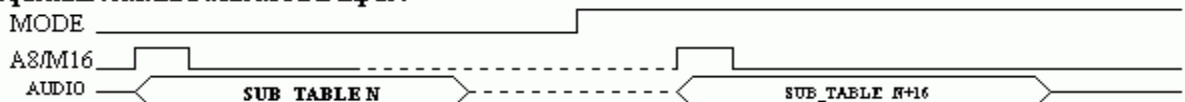
#### RETRIGGER :



#### IRRETRIGGER :



### \* Sequential combined with MODE input :



### 7-> CPU\_INTERFACE : addressing access mode by input pulse count (A8)

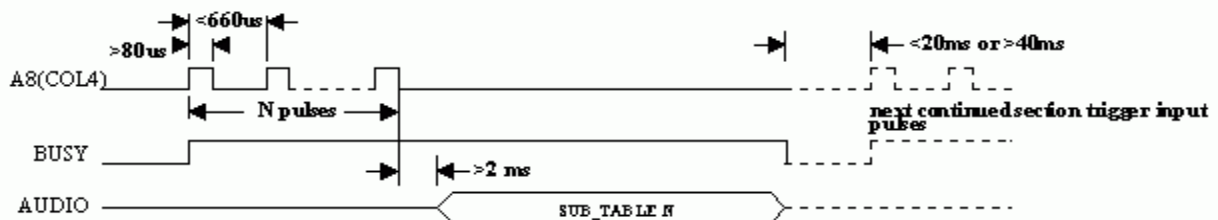
In this mode , some of the mask\_options must set as follow :

MATRIX/ALONE -> ALONE ; SEQUENTIAL/NORMAL -> SEQUENTIAL ; sequential not combined with MODE ;

RESET/UNRESET -> RESET

The A8 input playing mode as right , EDGE/LEVEL -> EDGE ; HOLD/UNHOLD -> UNHOLD ;

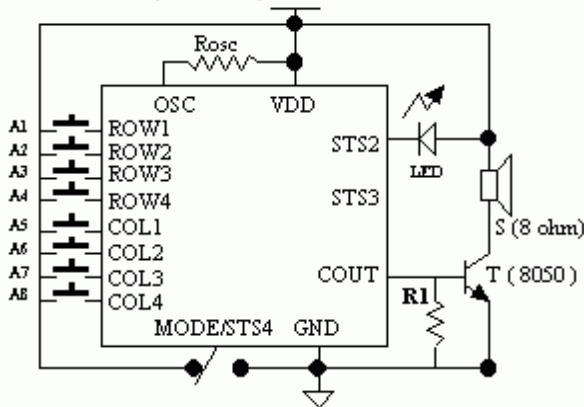
RETRIGGER/IRRETRIGGER -> RETRIGGRR



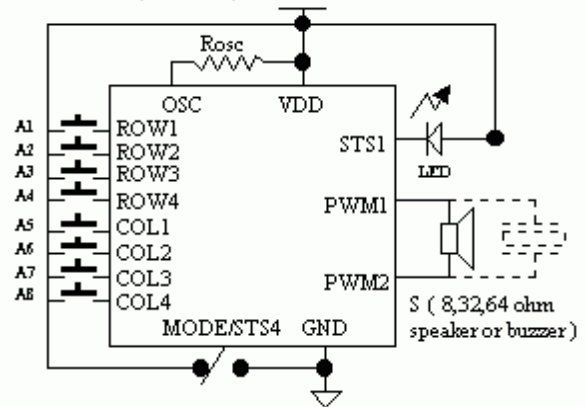
All the timing are base on 6khz sample rate .

### 8. APPLICATION CIRCUIT:

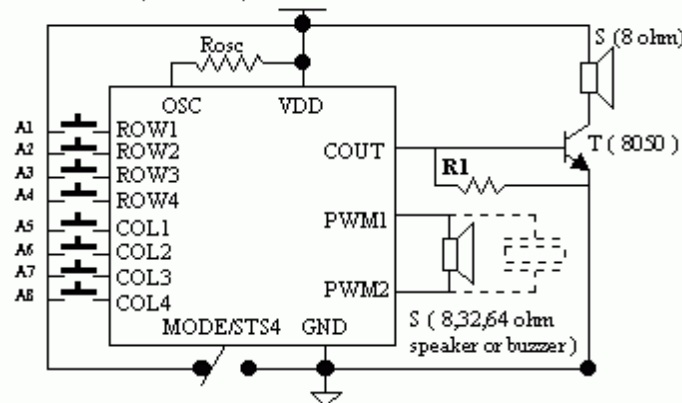
A> ALONE , COUT , LED DRIVING :



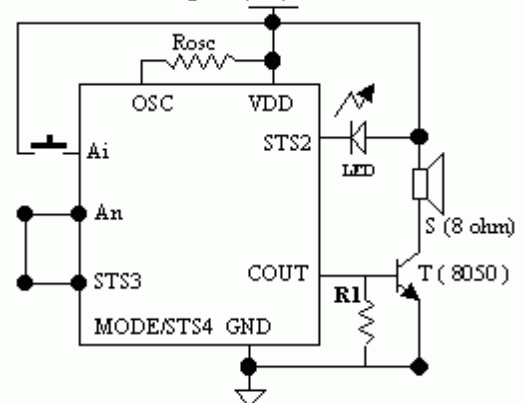
B> ALONE , PWM , LED DRIVING :



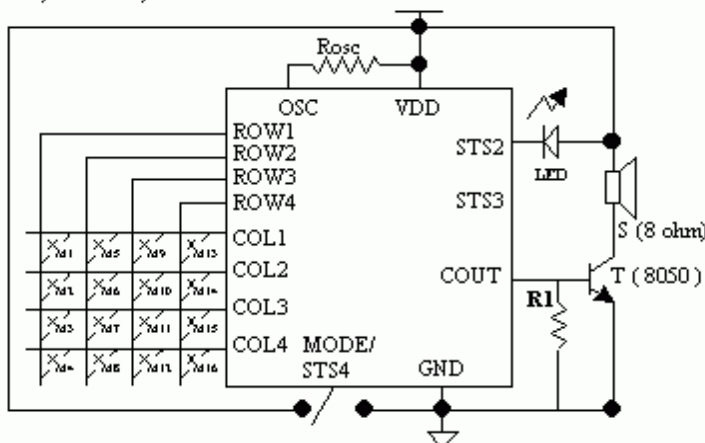
C> ALONE , COUT , PWM :



D> ALONE , use stop\_high pulse to trigger other TG input (An) :

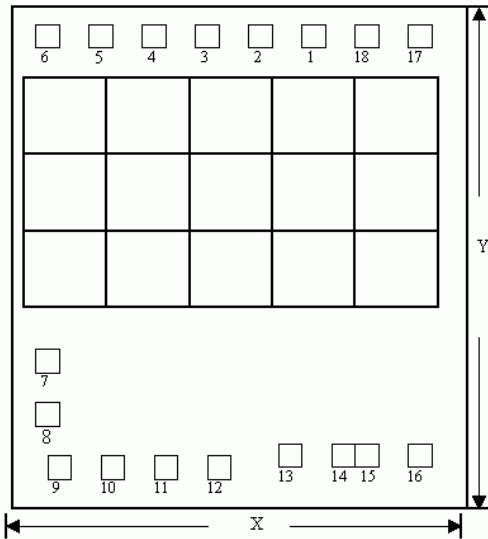


E> MATRIX , COUT , LED DRIVING :



NOTE: 1>Rosc=180K ohm ( typical ) or use internal Rosc (it must be determined before operation )  
 Tbata=100 ( typical ) . R1=1k needed only when wish to lower the power consumption .  
 2>BUZZER.resonant frequency should around 1KHz.  
 3>COUT,PWM1,PWM2 are tristate during standby.

9. BONDING DIAGRAM:



**Chip size:**

AV1232E: X=1120 um, Y=2480 um

AV1832D: X=1120 um, Y=2480 um

AV2432C: X=1120 um, Y=2480 um

**Pad size:** 80 um x 80 um

※ The IC substrate must be connected to GND.

10. PAD LOCATION:

Pad NO.	Pad Name	AVxx32A Series	
		X	Y
1	Vdd1	293.4	2018.5
2	OSC	77.7	2012.8
3	COL4	-207.7	2012.8
4	COL3	-408.7	2012.8
5	COL2	-609.7	2012.8
6	COL1	-810.7	2012.8
7	ROW4	-770.2	-1500.4
8	ROW3	-770.2	-1708.4
9	ROW2	-797.8	-2012.8
10	ROW1	-589.8	-2012.8
11	OUT1	-381.4	-2012.8
12	Vdd	-106.5	-2018.5
13	OUT2	165.3	-1906.8
14	GND	391.2	-1906.8
15	GND1	536.2	-1906.8
16	OUT3	762.1	-1906.8
17	Test	806.5	2012.8
18	MODE/STS4	605.1	2012.8