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:

Edege/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:
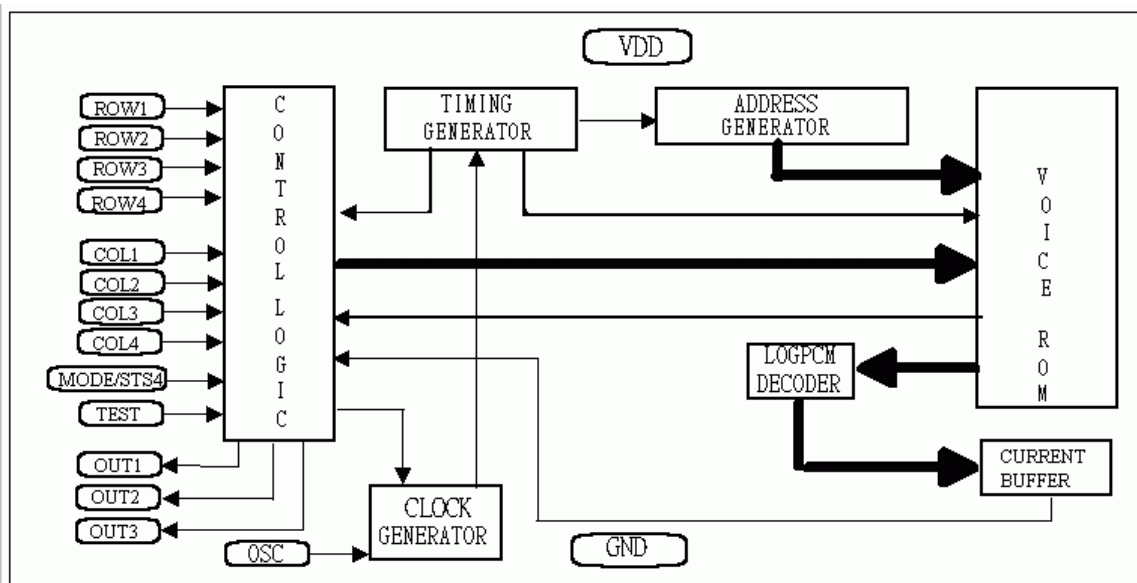
1. 一般規格:

　　AV1232E、AV1832D、AV2432C，皆爲單晶片 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). 單一工作電壓範圍爲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腳選擇爲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)皆爲非致能。

(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	ºC
Tst (storage)	-25 ~ +85	ºC

6. DC CHARACTERISTICS:

Symbol	Parameter		Min.	Typ.	Max.	Unit	Condition
Vdd	Operating voltage		2.4	3.0	6.4	V	
Isb	Supply current	Standby			1	uA	Vdd=3V, I/O open
Iop		Operating			200		(with Rosc or OSC grounded)
Iih	Input current: ALONE mode ROW1~4, COL1~4 (CDS+1M pull low)				5	uA	Vdd=3V
Iil				0			
Iih	Input current: ALONE mode ROW1~4, COL1~4 (CDS+10M pull low)				0.3	uA	Vdd=3V
Iil				0			
Iih	Input current: Mode input				0.5	uA	Vdd=3V
Iil				0			
Ioh	Output current: MATRIX mode (RWO1~4)			-0.6		mA	Vdd=3V
Iol				10			
Ioh	PWM1, PWM2 output current			-30		mA	Vdd=3V, Vop=2.4V
Iol				30			Vdd=3V, Vop=0.6V
Icout	Cout output current (Full scale)		-1.2	-1.5	-1.8	mA	Vdd=3V, Vop=0.7V
			-2.4	-3.0	-3.6		
			-3.6	-4.5	-5.4		
Ioh	STS1~4 output current			-0.6		mA	Vdd=3V, Vop=0V
Iol			8	10	12		Vdd=3V, Vop=3V
dF/F	Frequency stability		-5		5	%	$\dfrac{Fosc(3v)-Fosc(2.4v)}{Fosc(3v)}$
dF/F	Fosc lot variation		-10		10	%	Vdd=3V, Rosc=180KΩ

7. TIMING DIAGRAM:

1.>EDGE/LEVEL

EDGE MODE:

EDGE TRIGGER: |←TW→|
An/Mn
AUDIO — SUB_TABLE N

LEVEL TRIGGER: |← TW →|
An/Mn
AUDIO — SUB_TABLE N

LEVEL MODE:

EDGE TRIGGER: |←TW→|
An/Mn
AUDIO — SUB_TABLE N

LEVEL TRIGGER: |← TW →|
An/Mn
AUDIO — SUB_TABLE N / SUB_TABLE N / SUB_TABLE N
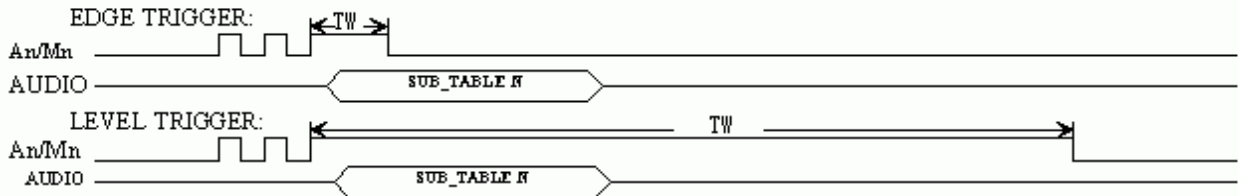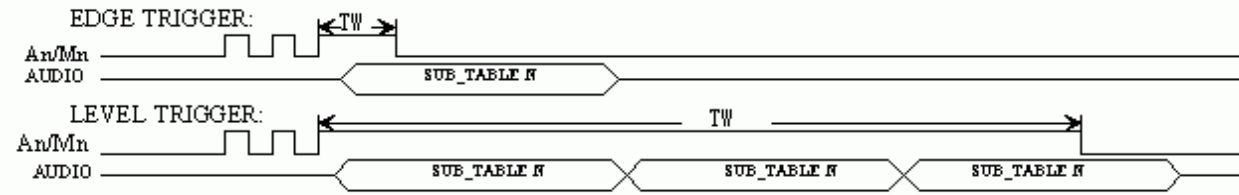
* NOTE:Tw IS THE MINIMUM INPUT PULSE WIDTH > DEBOUNCE TIME (10 ms or 50us)

2.>HOLD/UNHOLD

HOLD:
An/Mn
AUDIO — SUB_TABLE N

UNHOLD:
An/Mn
AUDIO — SUB_TABLE N

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

3.>RETRIGGERABLE/IRRETRIGGERABLE

RETRIGGER:
An/Mn
AUDIO — SUB_TABLE N / SUB_TABLE N / SUB_TABLE N

PLAY FROM BEGINNING IMMEDIATLLY

IRRETRIGGER:
An/Mn
AUDIO — SUB_TABLE N / SUB_TABLE N
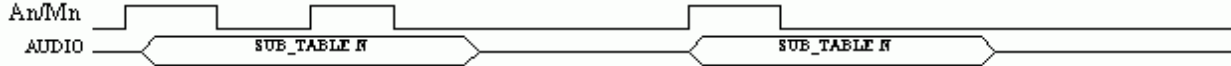
IGNORE TRIGGER INPUT SIGNAL DURING PLAYING

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

AUDIO — VOICE ┄┄ MUTE ┄┄
STOP_high pulse |← 40 ms
STOP_low pulse
BUSY_high active
busy high ,except mute
busy_low active
busy low ,except mute
led_fix flash at mute |← 6hs or 3hs
led_fix on at mute
led_fix off at mute
dynamic busy low — time of busy_low is optional in each step
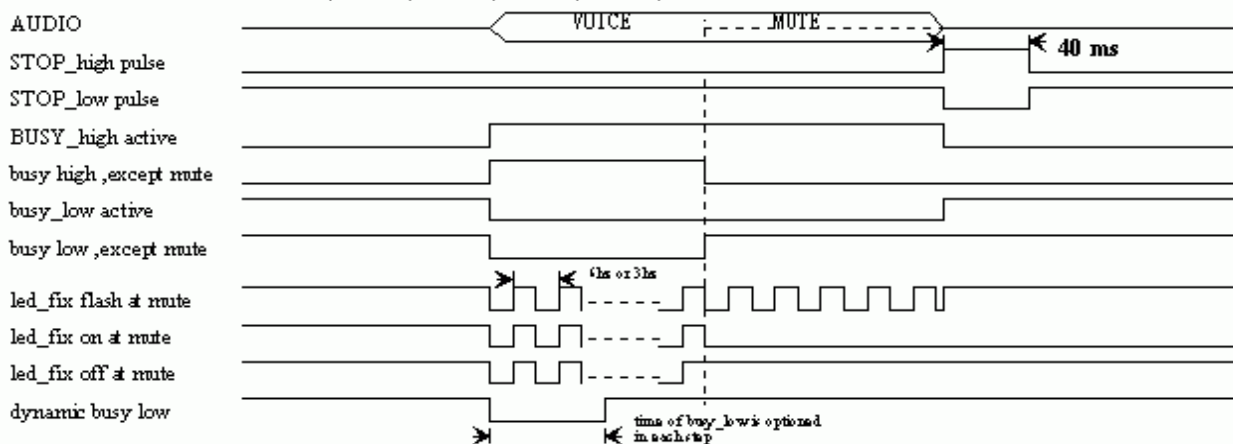
DYNAMIC: Partition the voice amplitude 8 steps (01234567);
1/4 0,7 LED on. 2/4:0.1.6.7 LED on. 3/4:0.1.2.5 6.7 LED on.
LED on means status output low. : every beginning of voice step will reset status signal ..

5> PRIORITY :

A1/M1
A2/M2
A3/M3
A4/M4
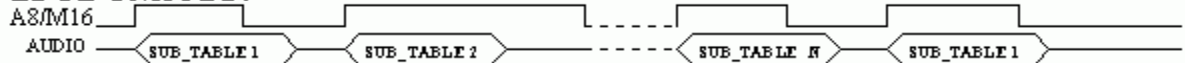AUDIO | SUB_TABLE 1 | SUB_TABLE 2 | SUB_TABLE 3 | SUB_TABLE 4 | SUB_TABLE 3 | SUB_TABLE 2 |
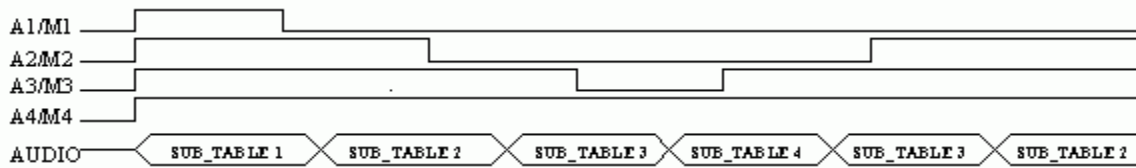
NOTE : PRIORITY A1>A2>A3>A4>A5>A6>A7>A8
M1>M2>M3>M4 ; M5>M6>M7>M8 ; M9>M10>M11>M12 ; M13>M14>M15>M16

The device will detect the input priority at start playing or level repeat.
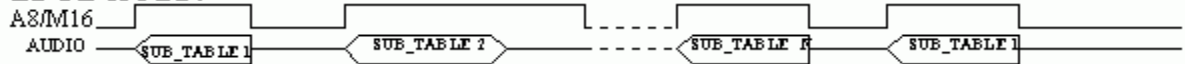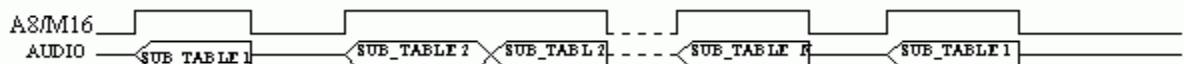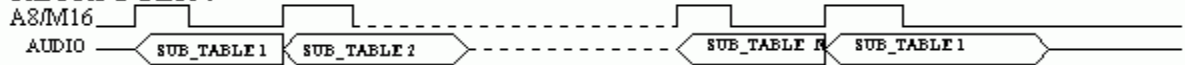
6.> SEQUENTIAL :

EDGE-UNHOLD:
A8/M16
AUDIO SUB_TABLE 1   SUB_TABLE 2   - - - -   SUB_TABLE N   SUB_TABLE 1

LEVEL-UNHOLD:
A8/M16
AUDIO SUB_TABLE 1   SUB_TABLE 2 SUB_TABLE 2 - - - SUB_TABLE N   SUB_TABLE 1

EDGE-HOLD:
A8/M16
AUDIO SUB_TABLE 1   SUB_TABLE 2   - - - -   SUB_TABLE N   SUB_TABLE 1

LEVEL-HOLD:
A8/M16
AUDIO SUB_TABLE 1   SUB_TABLE 2 SUB_TABLE 2 - - - SUB_TABLE N   SUB_TABLE 1

RETRIGGER :
A8/M16
AUDIO SUB_TABLE 1   SUB_TABLE 2   - - - - - - - -   SUB_TABLE N SUB_TABLE 1

IRRETRIGGER :
A8/M16
AUDIO   SUB_TABLE 1   - - - -   SUB_TABLE N   SUB_TABLE 1

* Sequential combined with MODE input :
MODE
A8/M16
AUDIO   SUB_TABLE N   - - - - - - - -   SUB_TABLE N+16
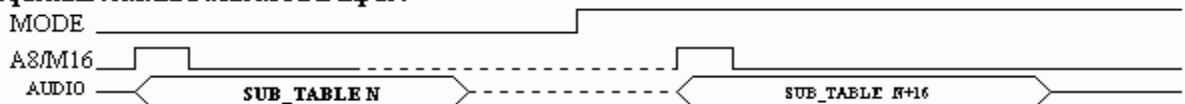
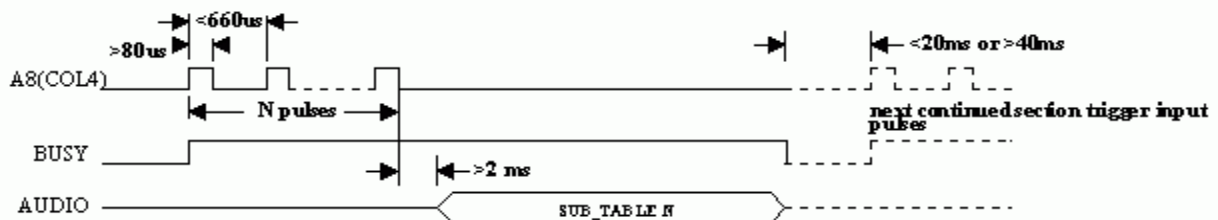## 7.> CPU_INTERFACE : addressing access mode by input pulse count (A8)

In this mode , some of the mask_options must set as follow :
MATRIX/ALONE -> ALONE ; SEQUENTIAL/NORMAL -> SEQUENTIAL ; sequential not combined with MODE ;
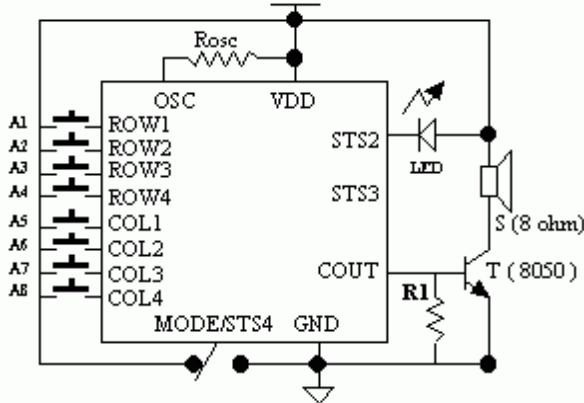RESET/UNRESET -> RESET
The A8 input playing mode as right , EDGE/LEVEL -> EDGE ; HOLD/UNHOLD -> UNHOLD ;
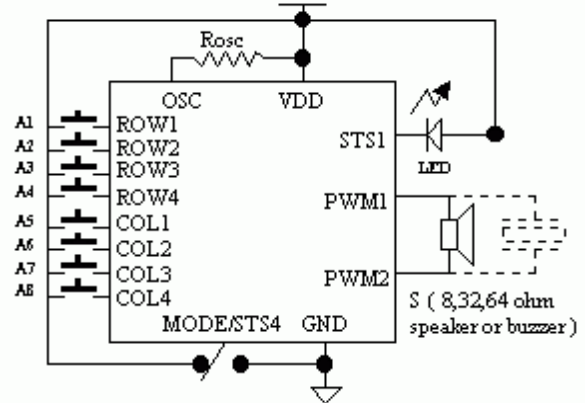RETRIGGER/IRRETRIGGER -> RETRIGGRR

>80us   <660us   <20ms or >40ms
A8(COL4)
        |—— N pulses ——| next continued section trigger input
BUSY   pulses
              |—>2 ms
AUDIO   SUB_TABLE N   - - - - - - - - - - - -

All the timing are base on 6khz sample rate .
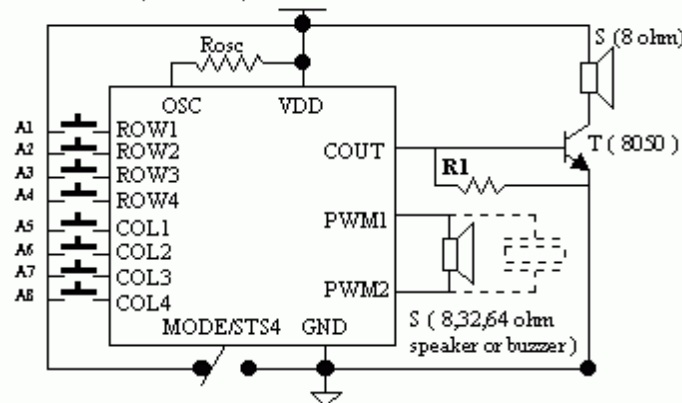
8. APPLICATION CIRCUIT:
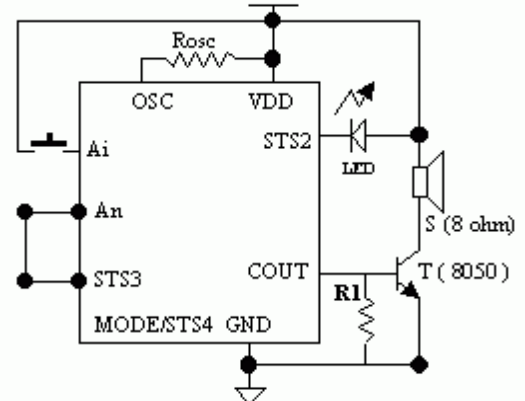
A> ALONE , COUT , LED DRIVING :.
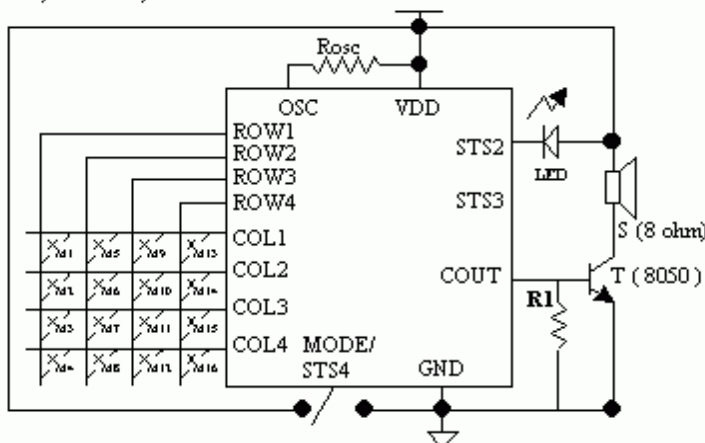
**B> ALONE , PWM , LED DRIVING :.**

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:
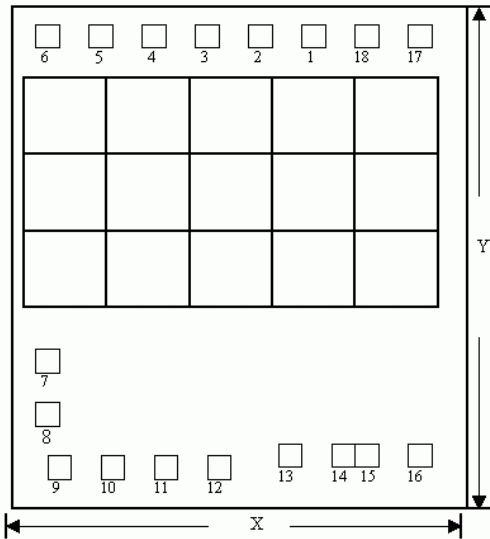
Chip size:

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

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