



深圳市环芯半导体有限公司

电话 Tel: 0755-28149272

传真 Fax: 29018191

地址 Add: 深圳市宝安区龙华东环一路港之都大厦 633

邮编 Ps.: 518109

Http://www.ATChip.Com

Combinations of TG1 and TG2 to trigger maximum 64 Voice Group.

- CPU Command Mode :

User command through TG1, TG2, TG11 & TG12 with serial CPU Interface to control the Multi-Playback function.

- **Output status** (for each Output pin):

- A. Stand by Status. (High/Low Status)
- B. Busy Low Active.
- C. Busy High Active.
- D. LED Flash at 6 Hz.
- E. LED Flash at 3 Hz.
- F. LED Flash at 1.5 Hz.
- G. LED Flash at 0.75 Hz.

- **Play rate level :**

AC8020 can provide different play rate in one code as follow

| Play rate(K) | Play rate(K) |
|--------------|--------------|
| 3 | 6 |
| 3.2 | 6.4 |
| 3.31 | 6.85 |
| 3.42 | 7.38 |
| 3.55 | 8 |
| 3.69 | 8.72 |
| 3.84 | 9.6 |
| 4 | 10.66 |
| 4.17 | 12 |
| 4.36 | 13.71 |
| 4.57 | 16 |
| 4.8 | 19.2 |
| 5.05 | 24 |
| 5.33 | |
| 5.64 | |



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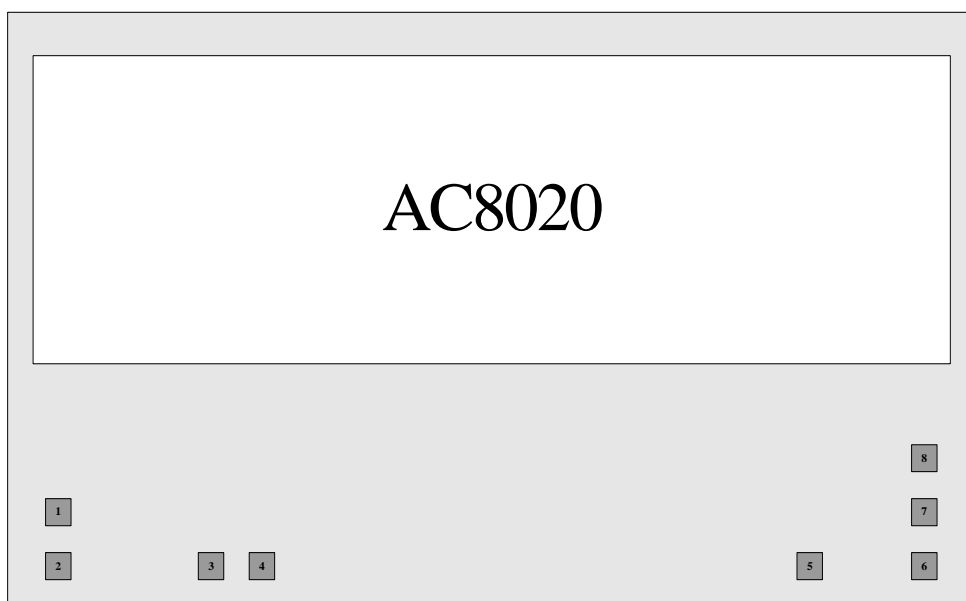
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◆ AC8020 Pad Location

CHIP SIZE: (0, 0) (1734,715) UM



| NO | PAD NAME | X | Y | NO | PAD NAME | X | Y |
|----|----------|------|------|----|----------|-----|------|
| 1 | TG2 | -777 | -184 | 5 | VSS | 443 | -267 |
| 2 | TG1 | -777 | -269 | 6 | PWM2 | 794 | -289 |
| 3 | TG11 | -606 | -268 | 7 | VDD | 797 | -204 |
| 4 | TG12 | -521 | -268 | 8 | PWM1 | 794 | -119 |



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◆ PIN Descriptions

| PIN NAME | I/O | Function |
|-------------|--------|---|
| TG1 | INPUT | Key Stand-alone Trigger Mode : TG1 is used to trigger the maximum 32 Voice Group one by one sequentially. |
| | | Serial Trigger Mode : TG1 is used to trigger the maximum 64 Voice Group. |
| | | CPU Command Mode : TG1 is used as Data Input Pin (CS). |
| TG2 | INPUT | Key Stand-alone Trigger Mode : TG2 is used to trigger the maximum 21 Voice Group one by one sequentially. |
| | | Serial Trigger Mode : TG2 is used to trigger the maximum 64 Voice Group |
| | | CPU Command Mode : TG2 is used as Clock Pin (CLK). |
| TG11 | INPUT | Key Stand-alone Trigger Mode : TG11 is used trigger Only One Group. |
| | | CPU Command Mode : TG11 is used as Data Input Pin (DIO1). |
| | OUTPUT | As Output PIN , Output the BUSY or Flash Signal . |
| TG12 | INPUT | Key Stand-alone Trigger Mode : TG12 is used trigger Only One Group. |
| | | CPU Command Mode . TG12 is used as Selected Pin (DIO2). |
| | OUTPUT | As Output PIN , Output the BUSY or Flash Signal. |
| PWM1 | OUTPUT | As a PWM PIN , can Directly drive the Speaker . |
| PWM2 | OUTPUT | As a PWM PIN , can Directly drive the Speaker . |
| | | As a DAC PIN , 8 bit D/A Current Output. |
| VDD | INPUT | Power Supply PIN , @ 2.4~3.6 V Working Voltage. |
| VSS | INPUT | Connected to Ground. |



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◆ AC8020 Application Circuit

AC8020 3V Stand-alone Mode

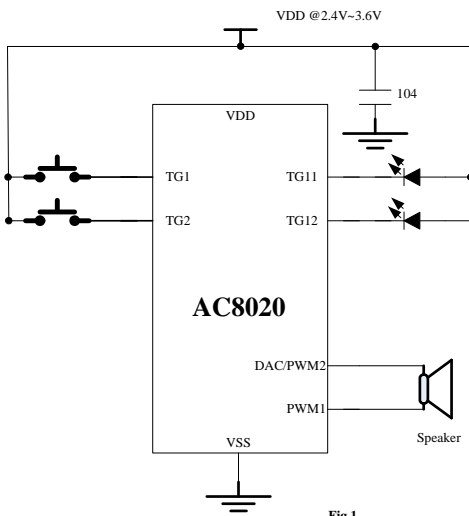


Fig.1

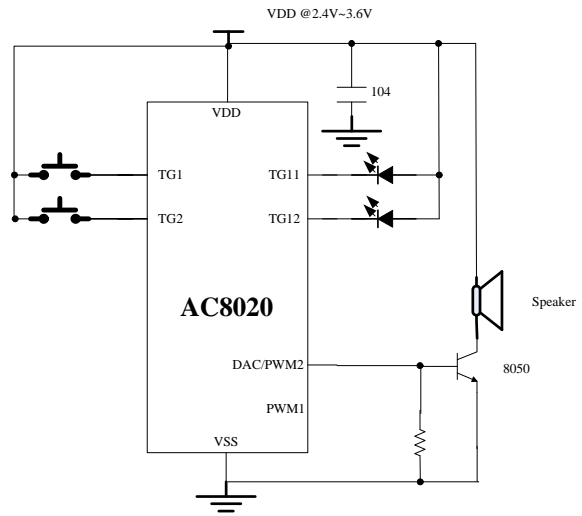


Fig.2



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AC8020 3V Serial Mode

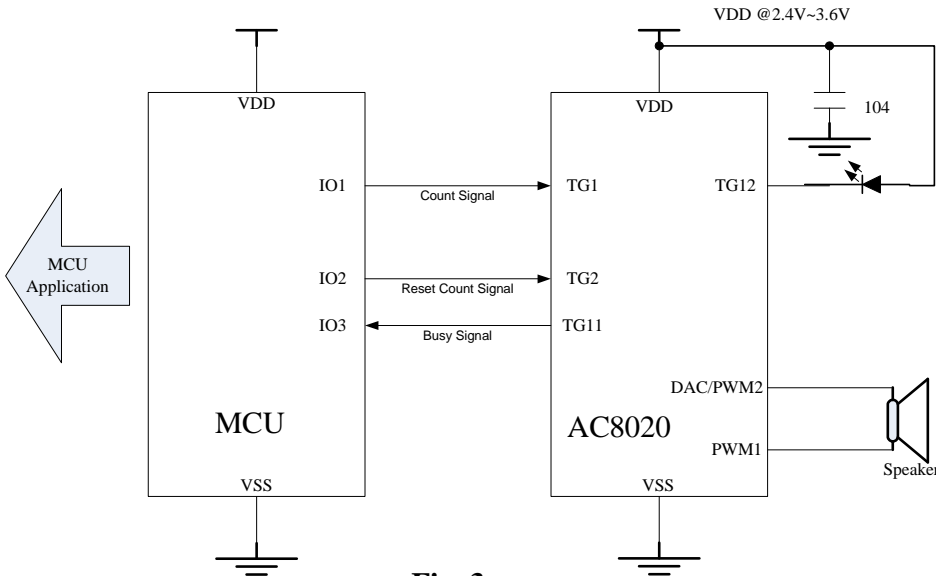


Fig. 3

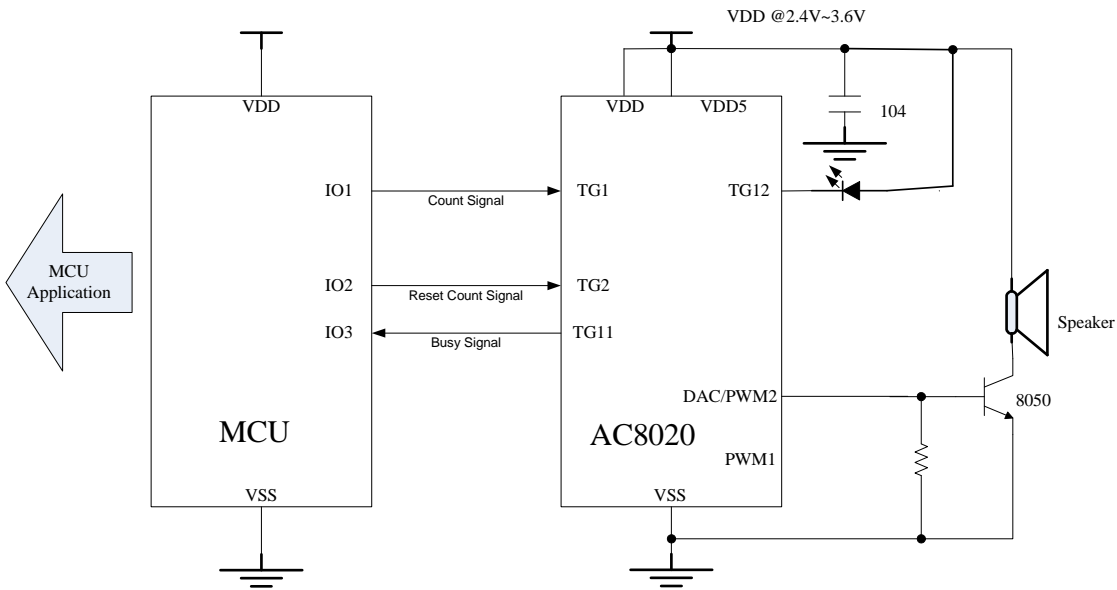


Fig. 4



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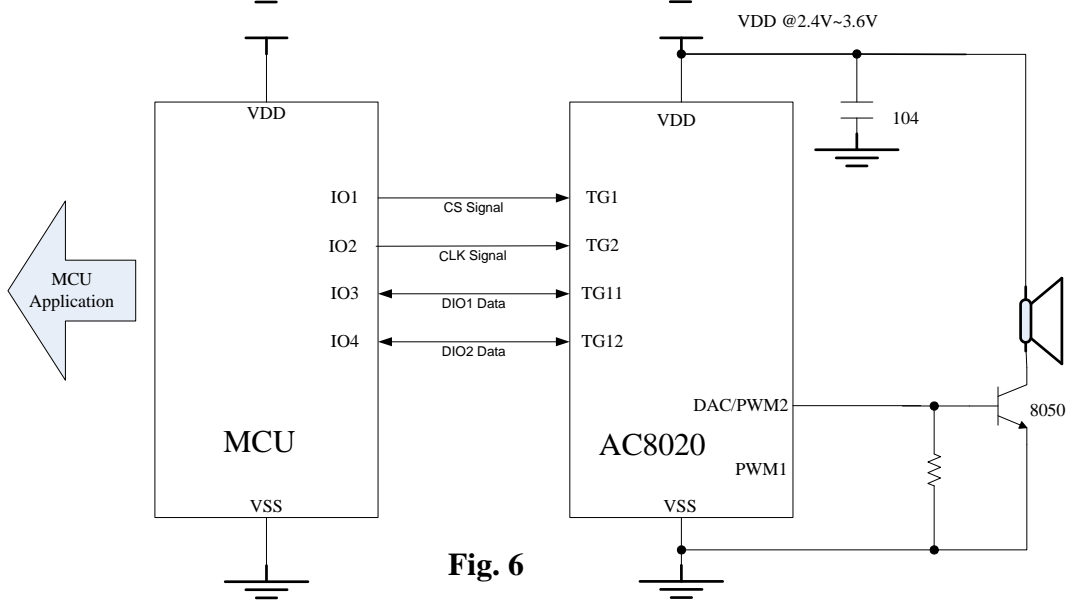
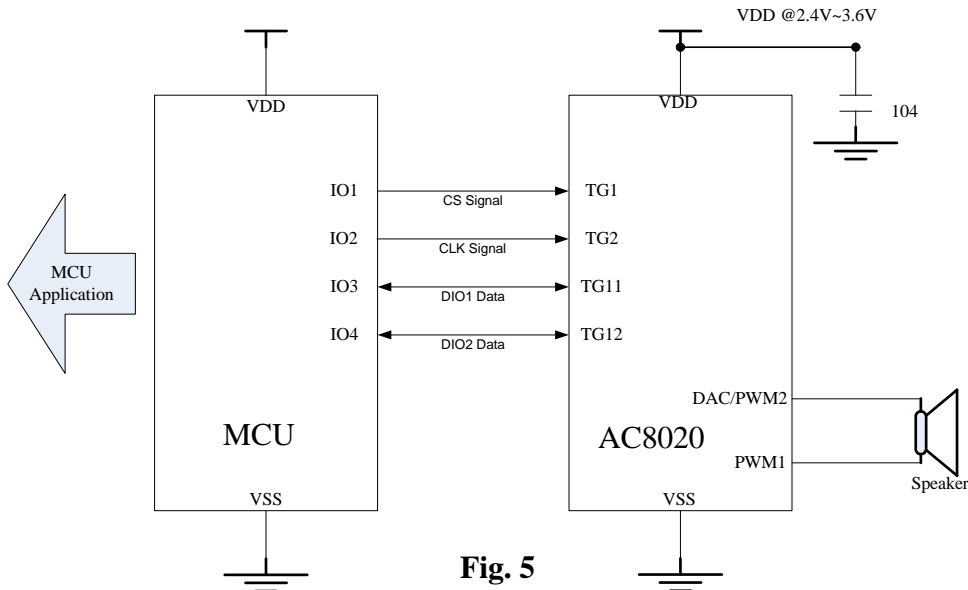
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AC8020 3V CPU Mode





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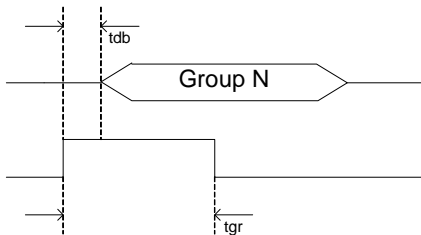
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◆ AC8020 Trigger Timing

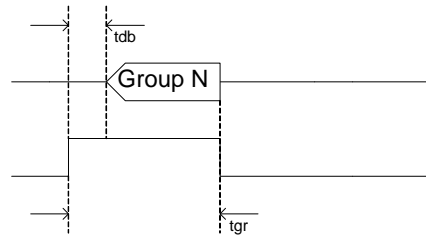
(a) Trigger Pulse Width < Group Length

Option Setting = Edge / Unhold



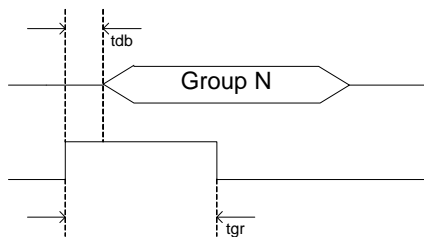
(b) Trigger Pulse Width < Group Length

Option Setting = Edge / Hold



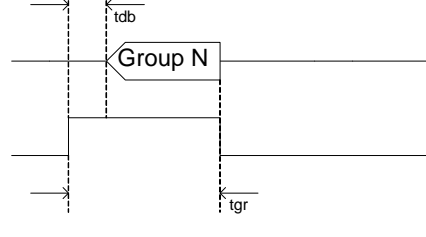
(c) Trigger Pulse Width < Group Length

Option Setting = Level / Unhold



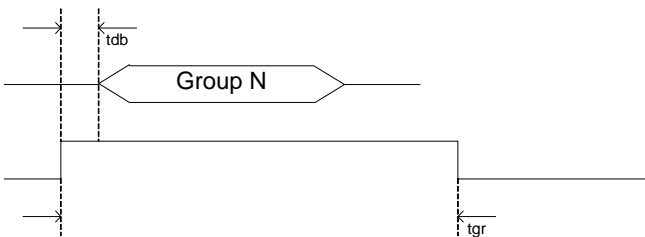
(d) Trigger Pulse Width < Group Length

Option Setting = Level / Hold



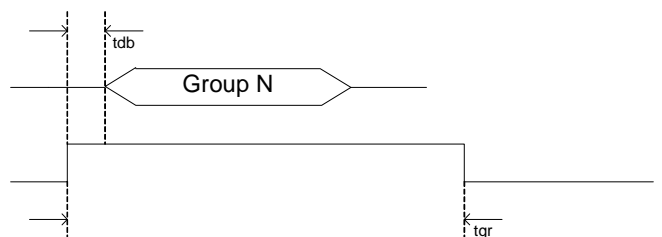
(e) Trigger Pulse Width > Group Length

Option Setting = Edge / Unhold



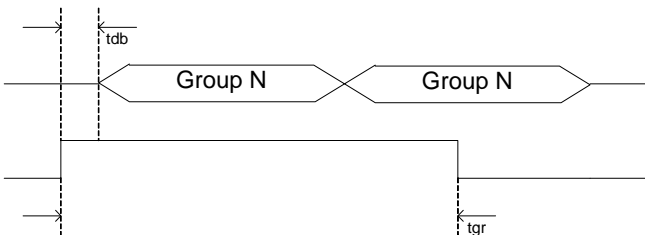
(f) Trigger Pulse Width > Group Length

Option Setting = Edge / Hold



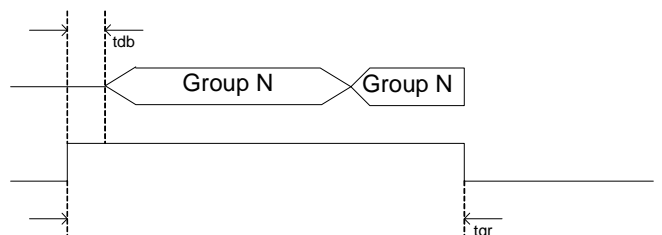
(g) Trigger Pulse Width > Group Length

Option Setting = Level / Unhold



(h) Trigger Pulse Width > Group Length

Option Setting = Level / Hold





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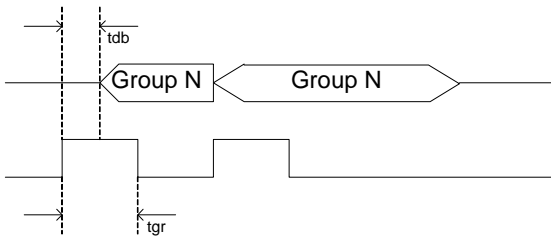
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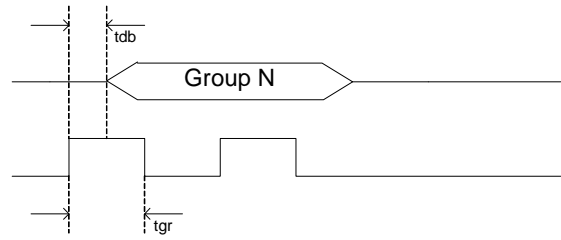
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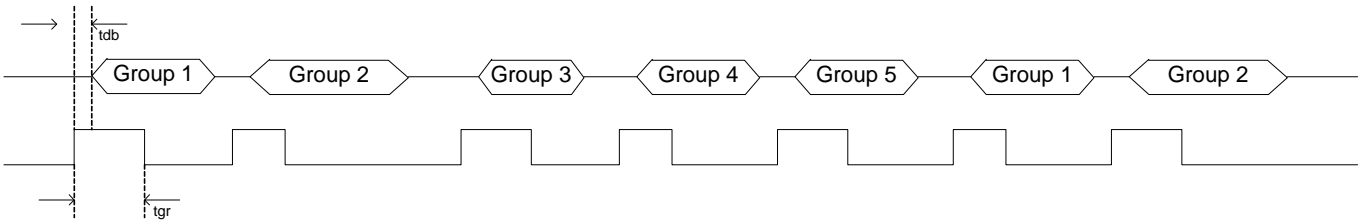
(i) Option Setting = Retrigger



(j) Option Setting = Irretrigger



(k) TG1 = Sequential Trigger & From Group1~Group5





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◆ AC8020 Trigger Voice Combination Example

| Voice File | Description |
|--------------|--------------------|
| Voice File A | Hello (1.5") |
| Voice File B | Good Morning (3") |
| Voice File C | John (1") |
| Voice File D | Tom (1") |
| Voice File E | Mary (1.5") |
| | |
| | |

Group1 = Step1 + Step 2

Group 2 = Step3 + Step 4 + Step 5

Group 3 = Step 6 + Step 7

Group1 = Hello John

Group 2= Hello Tom Good Morning

Group 3 = Good Morning Mary

Step1 = Voice File A

Step 2 = Voice File C

Step 3 = Voice File A

Step 4 = Voice File D

Step 5 = Voice File B

Step 6 = Voice File B

Step 7 = Voice File E

Total use 3 Group , 7 Steps

Voice duration= Hello + Good Morning + John + Tom + Mary

= 1.5" + 3" + 1" + 1" + 1.5"

= 8"

Total duration = 8" (20"-8" = 32" space are free , can add more Voice File)



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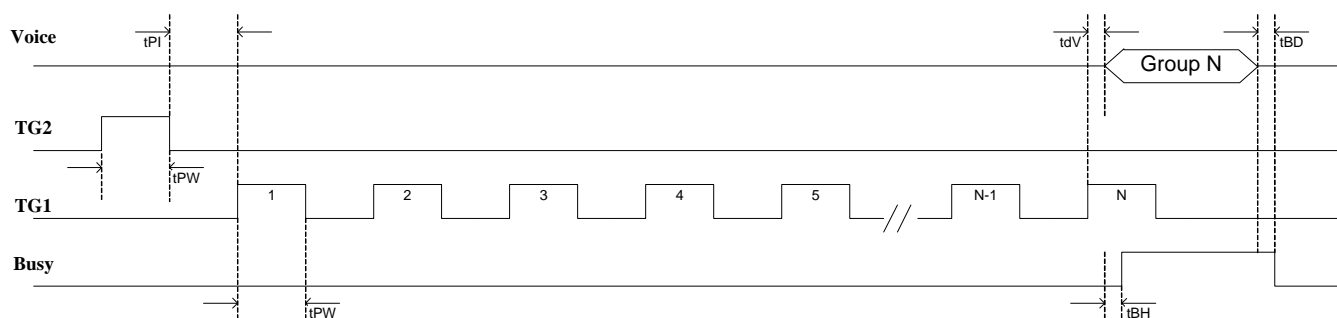
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◆ AC8020 Serial Mode Timing



TG1=Edge/Unhold/Retrigger

TG2=Reset PIN



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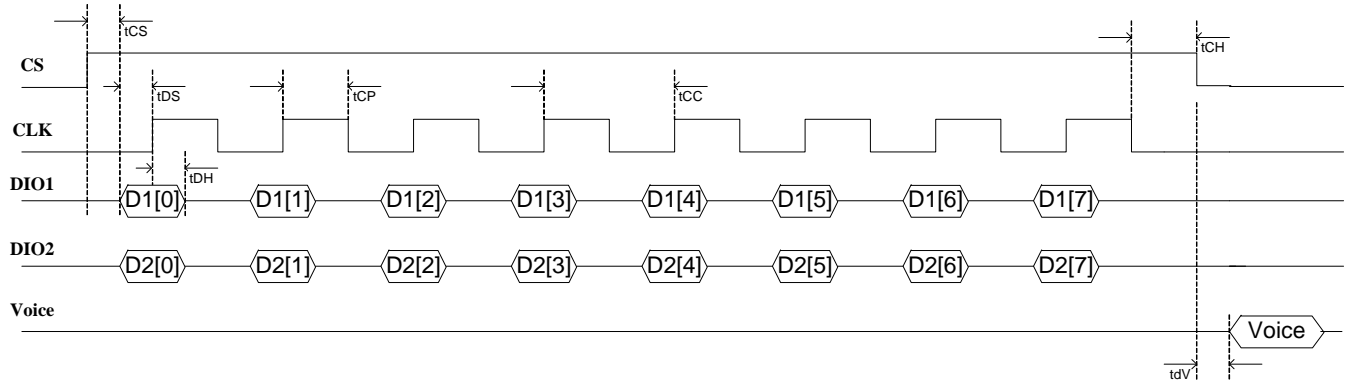
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◆ AC8020 CPU Mode Timing



| Command | PIN | HEX | [7] | [6] | [5] | [4] | [3] | [2] | [1] | [0] | Description |
|---------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| START | DIO1 | A5h | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Wake up the chip |
| | DIO2 | 05h | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | |
| END | DIO1 | 81h | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Power down the chip into standby status |
| | DIO2 | 05h | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | |
| RESET | DIO1 | 83h | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Stop the Playback and wait a new command |
| | DIO2 | 02h | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | |
| PAUSE | DIO1 | 83h | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Pause the Playback and hold at the Voice data |
| | DIO2 | 07h | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | |
| RESUME | DIO1 | 05h | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Resume Playback from the previous Voice data |
| | DIO2 | 07h | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | |

Play Address Command is generated by the Tool.



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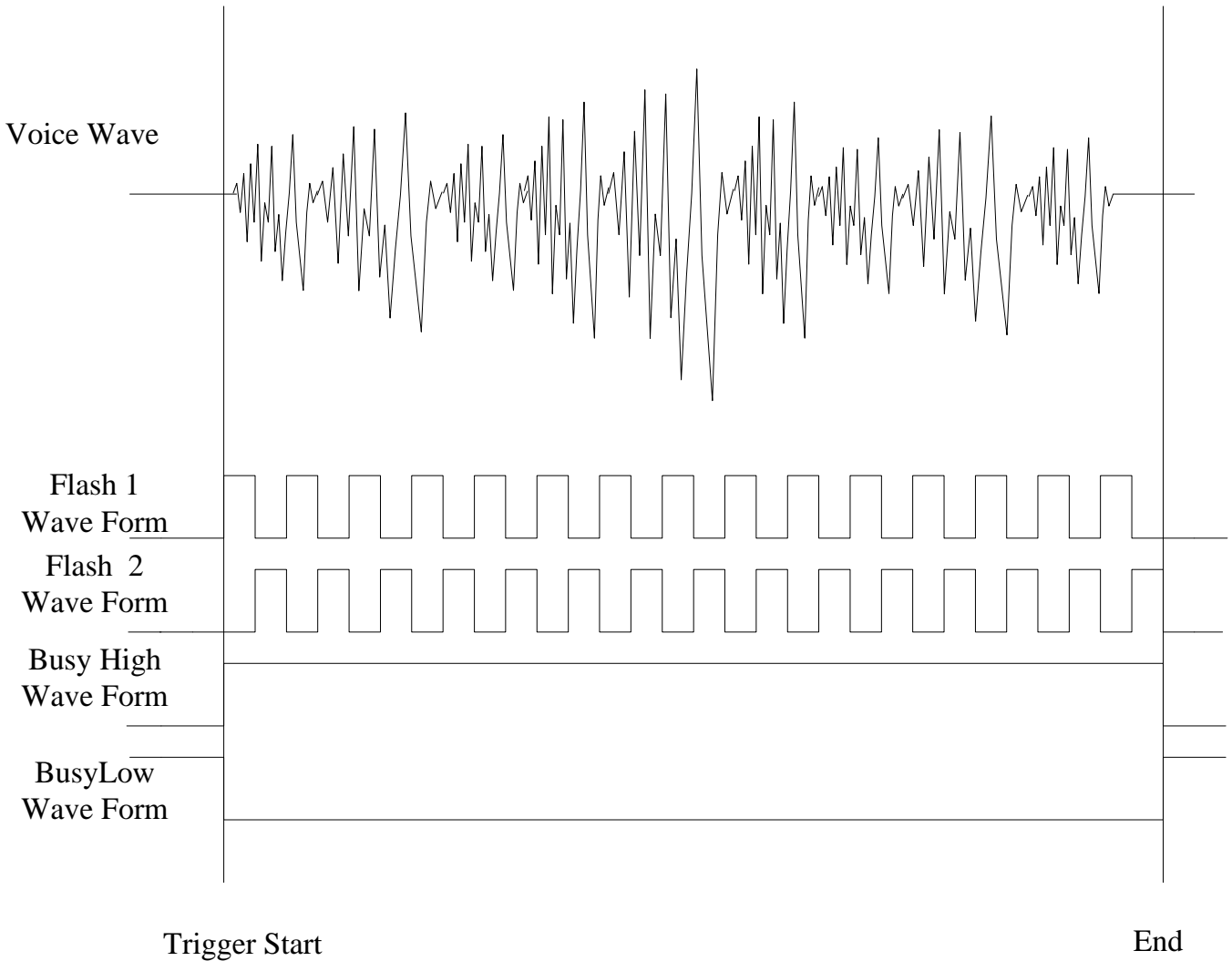
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◆ AC8020 Voice Wave & Output Status





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◆ DC Electrical Characteristics

| Item | Symbol | Min | Typ | Max | Unit | Condition |
|-------------------------|-----------------|-----|-----|-----|------|---------------------|
| Operating voltage | VDD | 2.4 | 3.0 | 3.6 | V | |
| Standby current | I _{sb} | | 1 | 5 | uA | VDD=3V,no load |
| Operating current | I _{op} | | 600 | | uA | VDD=3V,no load |
| Drive current of Output | I _{od} | | 10 | | mA | VDD=3V VOUT=0.6V |
| Sink current of Output | I _{os} | | 30 | | mA | VDD=3V VOUT=2.4V |
| Drive current of PWM | I _{od} | | 200 | | mA | VDD=3V,VOUT=1.5V |
| Sink current of PWM | I _{os} | | 200 | | mA | VDD=3V,VOUT=1.5V |
| | | | | | | |



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◆ AC Electrical Characteristics

| Symbol | Characteristic | Rating | | | Unit |
|--------|-----------------------------------|--------|------|------|------|
| | | Min. | Typ. | Max. | |
| tdb | Key Trigger debounce time (long) | 14 | | | ms |
| tdb | Key Trigger debounce time (short) | 50 | | | us |
| tgr | Key Trigger Pulse width | | | | |
| tPW | Serial Mode Input Pulse Width | 100 | | | us |
| tPI | The interval of two pulse | 100 | | | us |
| tBH | Busy signal output hold time | 200 | | | us |
| tBD | Busy signal output delay time | 200 | | | us |
| tdV | Voice output delay time | 200 | | | us |
| tCS | Chip Select setup time | 1 | | | us |
| tDS | Data In setup time | 1 | | | us |
| tDH | Data In hold time | 1 | | | us |
| tCP | Clock Pulse Width | 1 | | | us |
| tCC | Clock Cycle time | 2 | | | us |
| tCH | Chip Select hold time | 1 | | | us |



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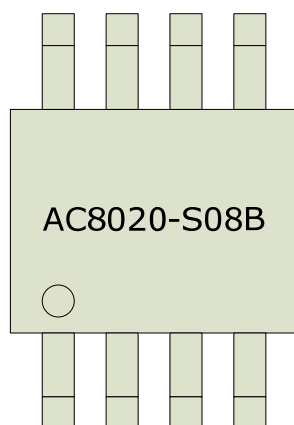
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◆ AC8020 Package Information

AC8020-S08B



| PIN | NAME |
|-----|----------|
| 1 | TG2 |
| 2 | TG1 |
| 3 | TG11 |
| 4 | TG12 |
| 5 | VSS |
| 6 | PWM2/DAC |
| 7 | VDD |
| 8 | PWM1 |



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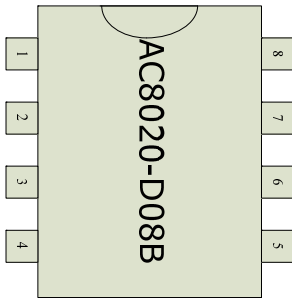
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AC8020-D08B



| PIN | NAME |
|-----|----------|
| 1 | TG2 |
| 2 | TG1 |
| 3 | TG11 |
| 4 | TG12 |
| 5 | VSS |
| 6 | PWM2/DAC |
| 7 | VDD |
| 8 | PWM1 |

◆ Writer Mapping Description

Writer Pin : **TG2,TG1,TG11,VSS,PWM2,PWM1,VDD**

| DIP 48 | PAD Name | AC8020-SO8B | AC8020-D08B |
|-----------|----------|-------------|-------------|
| 10 - RSTN | | | |
| 11 - GND | 5-VSS | 5-VSS | 5-VSS |
| 12 - SCK | 6-PWM2 | 6-PWM2 | 6-PWM2 |
| 13 - CS | 8-PWM1 | 8-PWM1 | 8-PWM1 |
| 14 - VCC | 7-VDD | 7-VDD | 7-VDD |
| 36 - TEST | | | |
| 37 - VPP | 1-TG2 | 1-TG2 | 1-TG2 |
| 38 - DIO1 | 2-TG1 | 2-TG1 | 2-TG1 |
| 39 - DIO2 | 3-TG11 | 3-TG11 | 3-TG11 |



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◆ Writer Board Slot Location

