



### ◆ Description

**APT305** is a 5 Sec Easy Use Speech IC .It Support PWM voice output with high quality speech , There are 5 second Voice Length under 6 KHz sampling and 4 bit hardware compression. Its internal built-in a oscillator for system clock **without an external resistor**. Maximum 12 voice groups. One Group contain several steps(voice section ); **Maximum 700 steps** for all the Groups. **Each Step** can be define **Trigger Mode, Output Status, Voice Section, Mute length, I/O Type** & **Simple Programming Function**. User can select **8bit / 5bit / 4bit** data compression. **Support two mode trigger IC** (Stand Alone, Serial Trigger Mode). Easy use development system is for function selection and voice combination . PC download the ROM code by the USB Port .

### ◆ Functions

- MAX voice file : 700
- MAX Trigger Groups : 12
- Power On Trigger Group :1
- MAX Step : 700
- Signal step mute length : 0.64 s ( 6k sample rate )
- Operating Voltage range: 2.4V ~ 3.6V
- Total Voice Duration : 5" (30K Samples)
- I/O pin : 2
- Voice output : PWM
- Sequential Key : TG1 -> 8 Groups.  
TG2 -> 4 Groups.
- Debounce time : 50 us or 10 ms
- On/Off function : only for all TG PIN
- Step can change Trigger I/O Type, Trigger Mode & Output Status.
- Hardware Trigger Group Repeat function.
- **Simple Programming Function :**
  - (a) Write data to working register.
  - (b) Working Register Increasing.
  - (c) Step Jump by Working Register / Volume Status.



● **Three Mode Trigger IC :**

- Key Stand-alone Trigger Mode :

- A. Edge/Level
- B. Hold/Unhold
- C. Retrigger/Irretrigger

- Serial Trigger Mode :

Combinations of TG1 and TG2 to trigger maximum 13 Voice Group.

● **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.

**H. PWM for LED Dimming Control.**

● **Play rate level :**

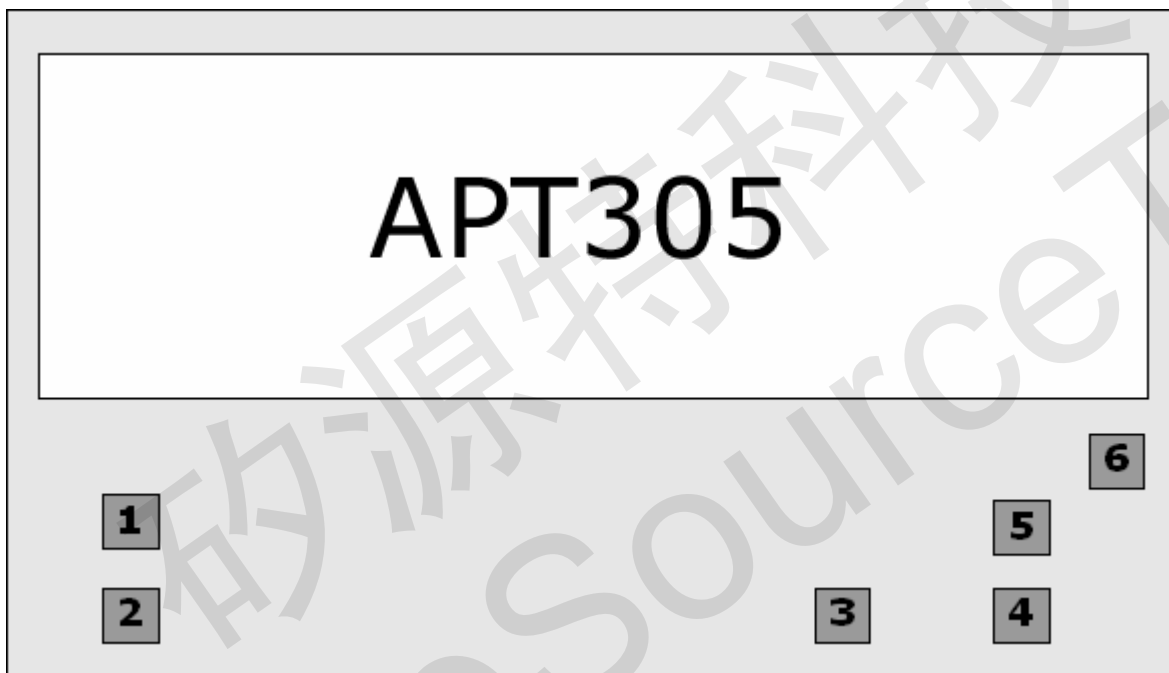
APT305 can provide different play rate in one code as follow below  
Reference Sample Rate.

3K, 3.2K, 3.31K, 3.42K, 3.55K, 3.69K, 3.84K, 4K, 4.17K, 4.36K, 4.57K,  
4.8K, 5.05K, 5.33K, 5.64K, 6K, 6.4K, 6.85K, 7.38K, 8K, 8.72K, 9.6K,  
10.66K, 12K, 13.71K, 16K, 19.2K, 24K,32K.



## ◆ APT305 Pad Location

CHIP SIZE= X :982um Y:606um



NO.	PAD NAME	X	Y	NO.	PAD NAME	X	Y
1	TG2	-401	-142	4	PWM1	311	-241
2	TG1	-401	-227	5	PWM2	311	-157
3	VSS	107	-224	6	VDD	435	-59



## ◆ PIN Descriptions

PIN NAME	I/O	Function
TG1	INPUT	Key Stand-alone Trigger Mode : TG1 is used to trigger the maximum 8 Voice Group one by one sequentially.
		Serial Trigger Mode : TG1 is used to trigger the maximum 8 Voice Group.
	OUTPUT	As Output PIN , Output the BUSY or Flash Signal ./By Code Control
TG2	INPUT	Key Stand-alone Trigger Mode : TG2 is used to trigger the maximum 4 Voice Group one by one sequentially.
		Serial Trigger Mode : TG2 is used to trigger the maximum 4 Voice Group.
PWM1	OUTPUT	As a PWM PIN , can Directly drive the Speaker .
PWM2	OUTPUT	As a PWM PIN , can Directly drive the Speaker .
VDD	INPUT	Power Supply PIN , @ 2.4~3.6 V Working Voltage.
VSS	INPUT	Connected to Ground.



## ◆ APT305 Application Circuit

### APT305 3V Stand-alone Mode

PWM

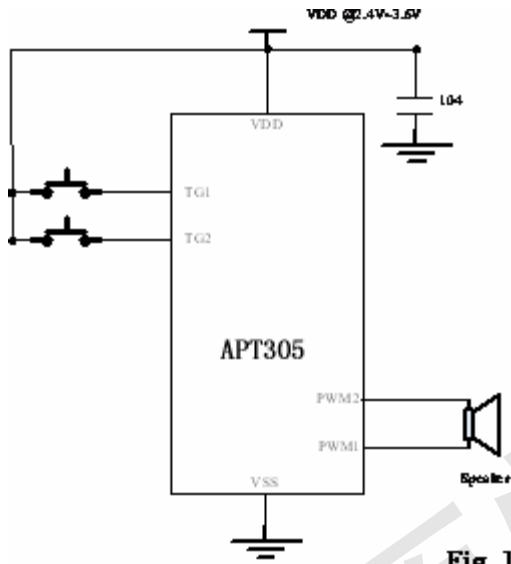


Fig. 1



**APT305 3V Serial Mode**

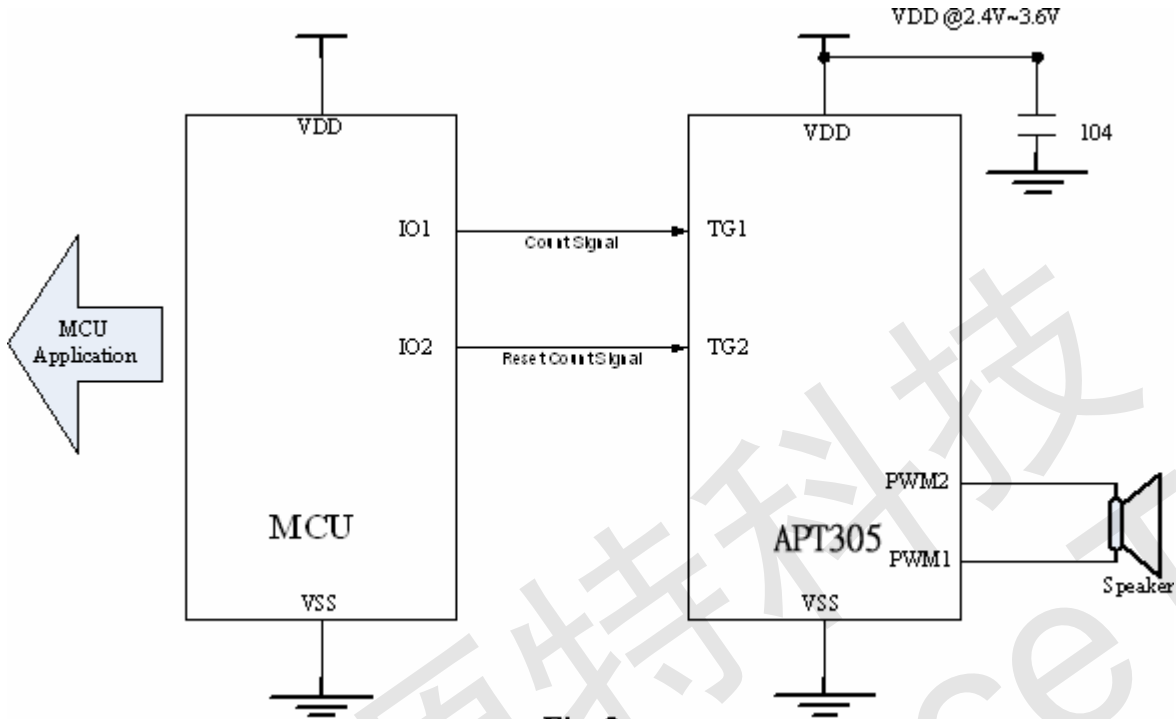
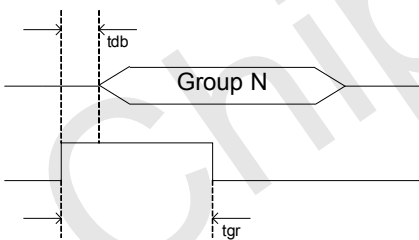


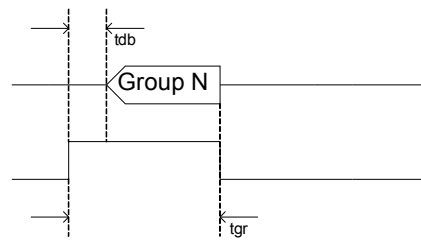
Fig. 2

**◆ APT305 Trigger Timing**

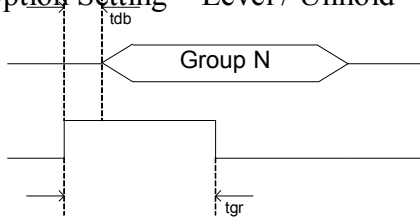
(a) Trigger Pulse Width < Group Length  
Option Setting = Edge / Unhold



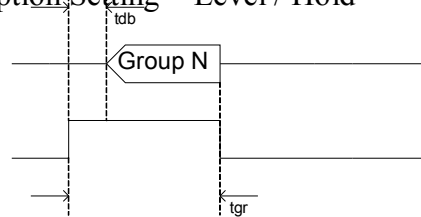
(b) Trigger Pulse Width < Group Length  
Option Setting = Edge / Hold



(c) Trigger Pulse Width < Group Length  
Option Setting = Level / Unhold



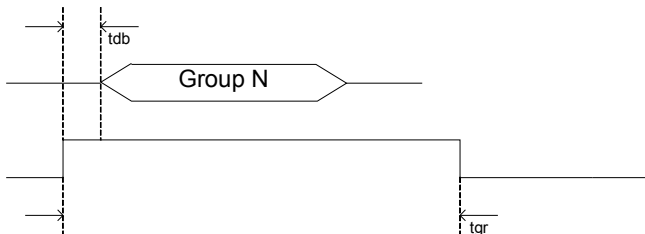
(d) Trigger Pulse Width < Group Length  
Option Setting = Level / Hold





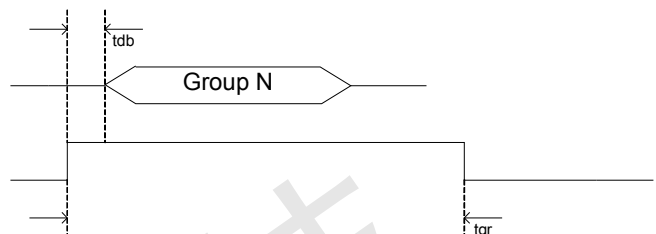
(e) Trigger Pulse Width > Group Length

Option Setting = Edge / Unhold



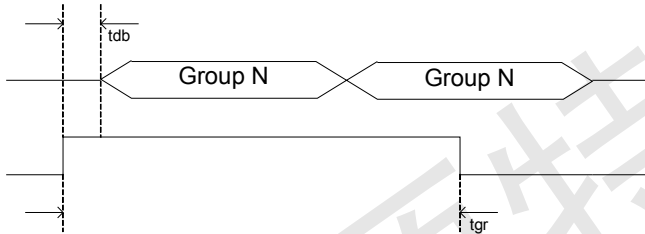
(f) Trigger Pulse Width > Group Length

Option Setting = Edge / Hold



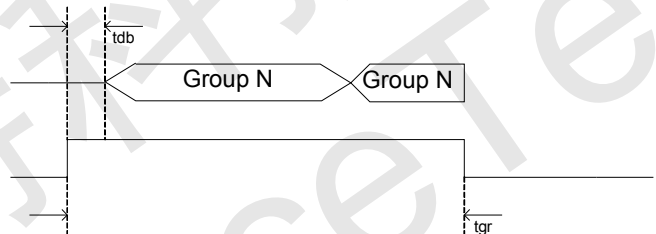
(g) Trigger Pulse Width > Group Length

Option Setting = Level / Unhold



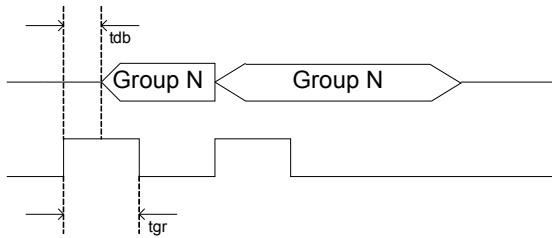
(h) Trigger Pulse Width > Group Length

Option Setting = Level / Hold

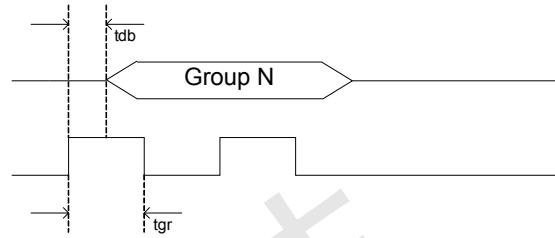




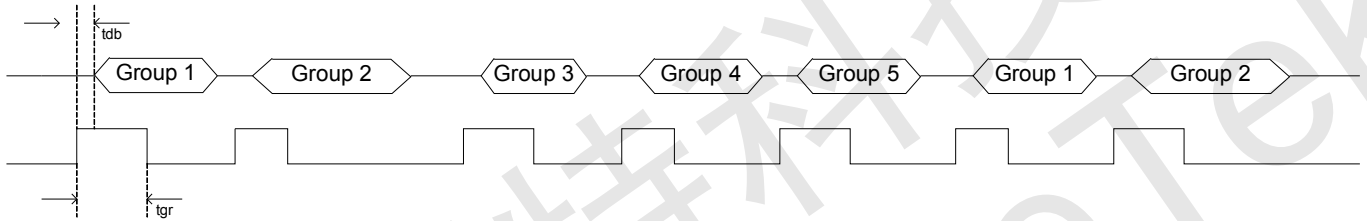
(i) Option Setting = Retrigger



(j) Option Setting = Irretrigger



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



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## ◆ APT305 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''

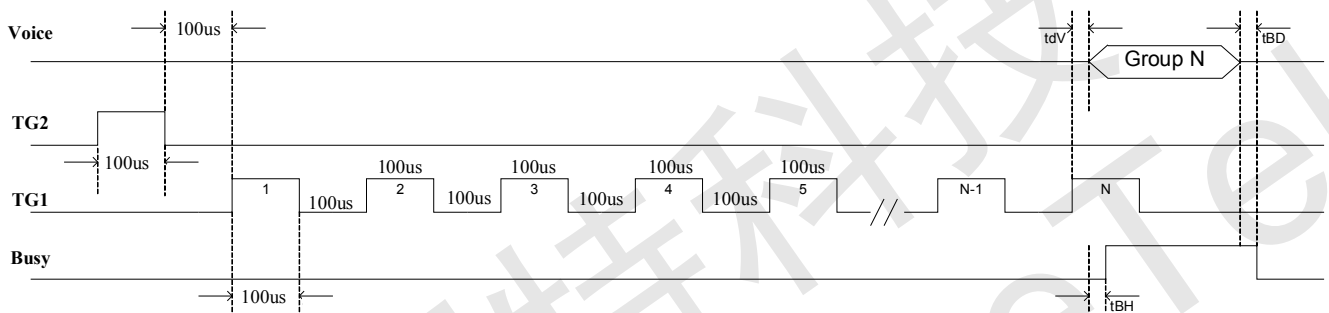
= 8''

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



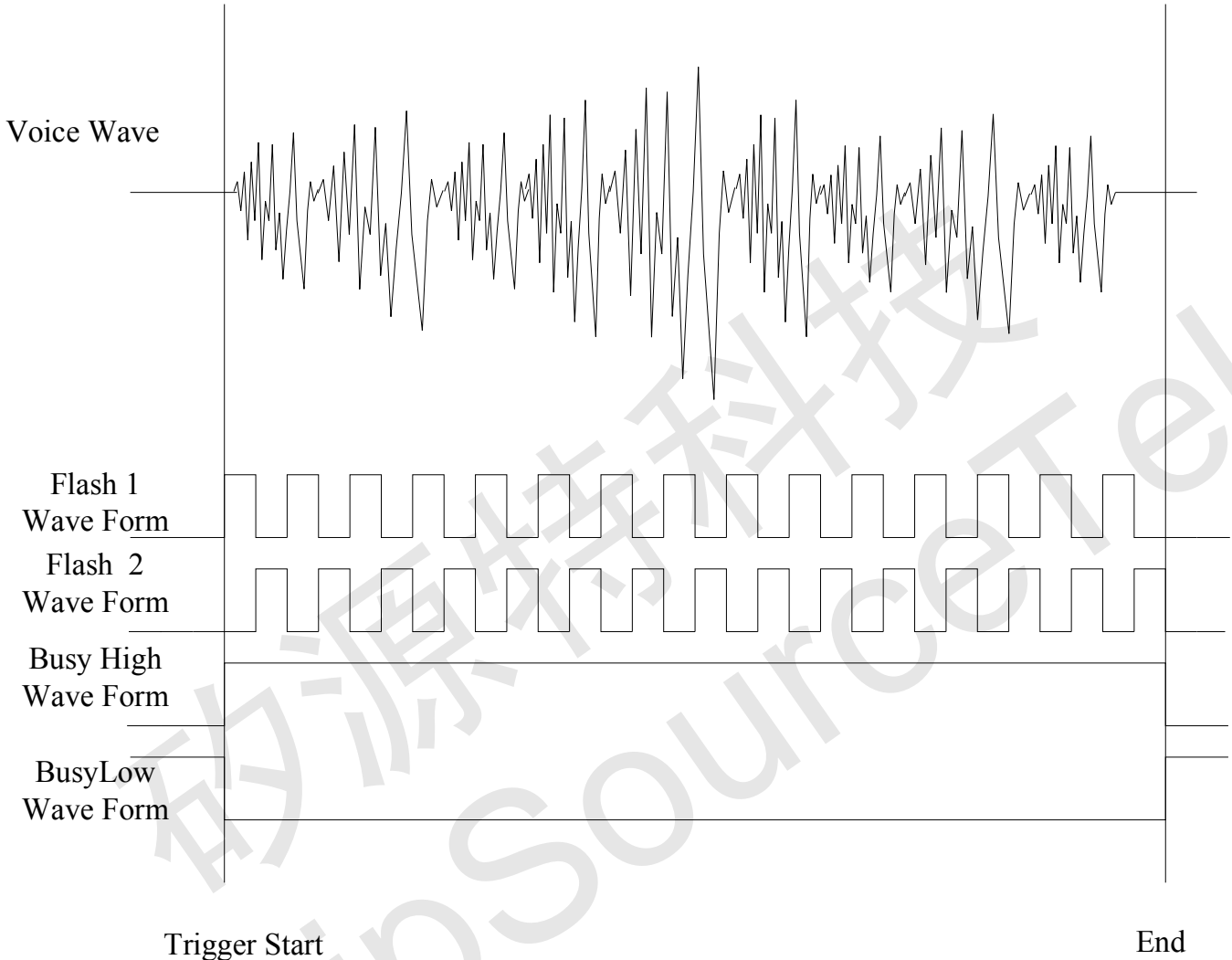
## ◆ APT305 Serial Mode Timing

### ● PWM





## ◆ APT305 Voice Wave & Output Status



## ◆ DC Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Condition
Operating voltage	VDD	2.4	<b>3.0</b>	3.6	V	
Standby current	I <sub>sb</sub>		<b>1</b>	5	uA	VDD=3V,no load
Operating current	I <sub>op</sub>		<b>600</b>		uA	VDD=3V,no load
Drive current of Output	I <sub>od</sub>		<b>10</b>		mA	VDD=3V VOUT=0.6V
Sink current of Output	I <sub>os</sub>		<b>30</b>		mA	VDD=3V



						VOUT=2.4V
Drive current of PWM	Iod		<b>200</b>	mA	VDD=3V,VOUT=1.5V	
Sink current of PWM	Ios		<b>200</b>	mA	VDD=3V,VOUT=1.5V	

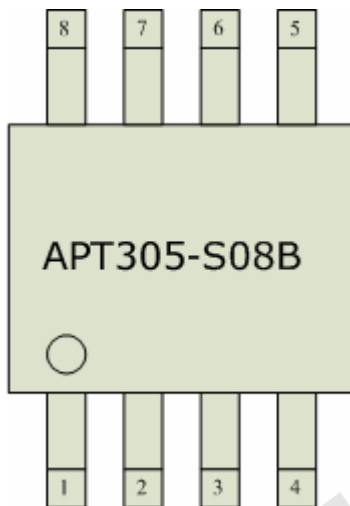
## ◆ AC Electrical Characteristics

Symbol	Characteristic	Rating			Unit
		Min.	Typ.	Max.	
tdb	Key Trigger debounce time (long)	14			ms
tdb	Key Trigger debounce time (short)	50			us
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



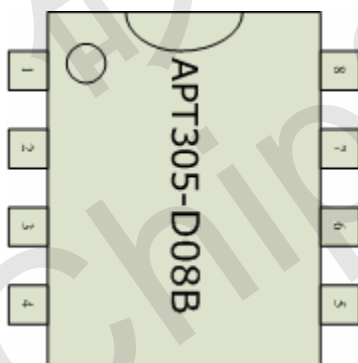
## ◆ APT305 Package Information

### APT305-S08B



PIN	NAME
1	NC
2	TG2
3	TG1
4	VSS
5	PWM1
6	PWM2
7	VDD
8	NC

### APT305-D08B



PIN	NAME
1	NC
2	TG2
3	TG1
4	VSS
5	PWM1
6	PWM2
7	VDD
8	NC



## ◆ Writer Mapping Description

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

OTP Writer Power Board Pin Mapping Table			
DIP 20	PAD Name	TG005-S08B	TG005-D08B
1 – VPP	1-TG2	2-TG2	2-TG2
2 – DIO1	2-TG1	3-TG1	3-TG1
3 – DIO2	x		
4 – GND	3-VSS	4-VSS	4-VSS
19 – CLK	4-PWM1	5-PWM1	5-PWM1
20 – VCC	6-VDD	7-VDD	7-VDD

## ◆ Writer Board Slot Location

