



九齊科技股份有限公司

Nyquest Technology Co., Ltd.

DATA SHEET

NY3W Series (OTP)

3 I/O Single-Chip Speech Synthesizer with Power PWM Driver

Version 1.0

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Revision History

<i>Version</i>	<i>Date</i>	<i>Description</i>	<i>Modified Page</i>
1.0	2014/08/20	First release.	-

1. 概述

NY3W系列產品為單晶片CMOS語音合成 IC，是九齊科技為了支援大音量輸出的語音IC所專門開發的嵌入式EPROM架構的OTP IC (One Time Programmable)，共有5個母體分別為 NY3W010AS8、NY3W016AS8、NY3W035AS8、NY3W065AS8 和 NY3W087AS8。具有3個I/O腳，利用精準的內阻震盪故不需外加震盪電阻，只有一組PWM輸出，故無須再外加任何零件。語音合成方式為 4-bit/5-bit mixed 或 5-bit Advanced DPCM，搭配 9-bit 或 10-bit Power PWM 硬體輸出，可以提供很好的音質。藉由OTP燒錄過程中更換Code資料，可自行將不同的語音資料寫入EPROM中。用戶可使用簡便的 *Q-Speech* 和 *Quick-IO* 工具軟體來快速地進行開發，然後使用 *Q-Writer* 軟體搭配 *OTP_Writer* 硬體來進行非常快速的OTP燒錄。

2. 功能

(1). 寬廣的工作電壓：1.6V ~ 6.8V。

(2). 共有5個母體，ROM大小及秒數(@6kHz)如下：

P/N	NY3W010AS8	NY3W016AS8	NY3W035AS8	NY3W065AS8	NY3W087AS8
4-bit	11F00H	1DF00H	3DF00H	7DF00H	A1F00H
	12.25s	20.44s	42.28s	85.97s	110.55s
5-bit	E599H	17F33H	318CCH	64C00H	818CCH
	9.80s	16.35s	33.83s	68.78s	88.44s

(3). 有3個I/O腳: OKY/O3、IO1和IO2 可分別選作輸入腳或是輸出腳。

(4). 語音最多可被分割成768個語音段(Voice Section)，每段長度可不同。每一個語音段的最大長度和最小長度都沒有限制。

(5). 最多有1536個語音格(Voice Step)，可規劃成128個語音組(Voice Sentence)，OKY/O3、IO1、IO2和POP能分別指定 128、1、1、1 個語音組(Sentence)。每一語音格(Step)可指定任一個語音段(Section)和 IO1、IO2、OKY/O3 的輸出搭配(當IOx設為輸出時)。

(6). 只有內建一組準確的頻率振盪器(+/- 1.0% 誤差)，並無提供外部震盪電阻選項。共有28種不同播放速度可供選擇，每一個語音格(Voice Step)可選擇不同的播放速度來使用。

1	2	3	4	5	6	7	8	9	10
24.0kHz	20.0kHz	17.1kHz	15.0kHz	13.3kHz	12.0kHz	10.9kHz	10.0kHz	9.2kHz	8.6kHz
11	12	13	14	15	16	17	18	19	20
8.0kHz	7.5kHz	7.1kHz	6.7kHz	6.3kHz	6.0kHz	5.7kHz	5.5kHz	5.2kHz	5.0kHz
21	22	23	24	25	26	27	28		
4.8kHz	4.6kHz	4.4kHz	4.3kHz	4.1kHz	4.0kHz	3.9kHz	3.8kHz		

(7). 輸入腳的輸入選項：

(a). 任一輸入腳可分別選擇 Edge/Level, Hold/Unhold, Retrigger/Irretrigger 不同的觸發方式組合。

(b). 任一輸入腳可分別選擇 CDS+1.5M、CDS、1.5M 的下拉電阻 或 Floating。(CDS+1.5M選項: 當按鍵按下時，IC內部為 1.5M 的下拉電阻；而當按鍵放開時，IC內部為 300K+1.5M 並聯 的下拉電阻 約250K。CDS: 當按鍵按下時，IC內部為 Floating；而當按鍵放開時，IC內部為 300K 的下拉電阻。)

(c). 任一輸入腳可分別選擇Debounce時間：Long - 提供一般按鍵使用；Short - 提供彈跳開關使用。

(d). OKY/O3輸入腳最多有128個Sentence的One-Key sequential 或 random 的選擇，在 One-Key sequential 時並可選擇Sentence的播放順序在其他按鍵被觸發後是否要Reset。

(e). 只有一個輸入腳可選擇是否有 Toggle On/Off 的功能 (1st 觸發 → 播放，2nd 觸發 → 停止，.....)。

※ 注意：按鍵輸入的優先順序為 OKY/O3 > IO1 > IO2 > POP。

(8). 所有的輸出腳都有以下 4 種輸出電流選項：

- (a). Normal Sink Current Output (一般灌電流輸出)：輸出腳接LED到VDD。(I_{ol}=20mA/30mA @V_{DD}=3V/4.5V)
- (b). Large Sink Current Output (大灌電流輸出)：輸出腳接LED到VDD。(I_{ol}=58mA/75mA @V_{DD}=3V/4.5V)
- (c). Constant Sink Current Output (定灌電流輸出)：輸出腳接LED到VDD，VDD=3V和4.5V的輸出電流為恆定電流，不會因為VDD不同而影響到LED亮度。(I_{ol}=20mA/22mA @V_{DD}=3V/4.5V)
- (d). Drive Current Output (拉電流輸出)：輸出腳接LED到GND。(I_{oh}=7mA/10mA @V_{DD}=3V/4.5V)

(9). 所有的輸出腳都有以下 9 種輸出訊號選項：

- (a). Stop_Low pulse：停止播放時送出低位準脈衝。
- (b). Stop_High pulse：停止播放時送出高位準脈衝。(注意：OKY/O3 不支援此選項)
- (c). Busy_High active：播放時送出高位準訊號。(Drive輸出) (注意：OKY/O3 不支援此選項)
- (d). Busy_Low active：播放時送出低位準訊號。(Sink輸出)
- (e). LED 1.5Hz flash：播放時 LED 1.5Hz Sink輸出閃爍。
- (f). LED 3Hz flash：播放時 LED 3Hz Sink輸出閃爍。
- (g). LED 6Hz flash：播放時 LED 6Hz Sink輸出閃爍。
- (h). LED dynamic 1/2：播放時 LED根據1/2聲音位準做Sink輸出動態閃爍。
- (i). QIO訊號：可隨聲音作任意的輸出變化，IO1和IO2各有兩組QIO訊號，每一個語音格(Step)可選擇兩組QIO訊號的其中一組，而OKY/O3並沒有提供QIO選項。用戶使用此功能需先開啓Quick-IO編輯器來做QIO訊號編輯。

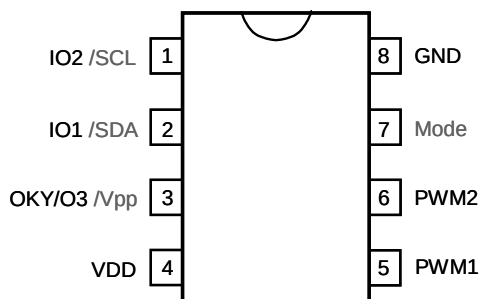
※ 注意：LED 1.5Hz / 3Hz / 6Hz flash 是指以 6kHz 的播放速度 時LED閃爍的頻率；不同的播放速度，LED閃爍的頻率也會不同。

(10). 特殊功能選項 “模式切換” (Mode-Switch)：有兩種功能模式，可使用IO1輸入來當作模式切換開關(Mode-Switch)，模式一(IO1→GND) 與 模式二(IO1→VDD) 的所有輸出型態(Output Type)只能相同，但是I/O功能和語音內容可以不同。

(11). 特殊功能選項 “上電播放” (Power-On-Play, POP)：電池一上電立即播放一次”上電播放語音組”(POP Sentence)，觸發模式固定為 Edge / Unhold / Retrigger。如果POP結合 Power-On-Loop (POL) 功能，則上電會循環播放”上電播放語音組”(POP Sentence)。如果POP結合 Power-On-Loop Interrupt (POP Interrupt) 功能，則上電播放時有其他按鍵被觸發，上電播放會立即停止並播放該按鍵所指定的語音組。如果POP結合 Mode-Switch功能，則當模式切換後會先執行上電播放。

(12). 特殊功能選項 “按鍵優先順序” (2-Key Priority)：使用者可以決定先後按下兩鍵的優先播放順序，有2種順序選項：First Key (前鍵優先) 和 Last Key (後鍵優先)。First Key為先按的按鍵優先，為一般正常的操作；Last Key則為後按的按鍵優先，然而Last Key只支援OKY/O3，使用者可以根據應用需求來使用Last Key。

- (13). 特殊功能選項 "觸發反向" (TG-Invert)：當語音格選取Invert功能時，在播放該段聲音時，原本輸入觸發的Retrigger/Irretrigger模式會反轉。使用者可以根據需求在適當的語音格插入Invert功能，以改變觸發模式。
- (14). 特殊功能選項 "隨機列表播放" (Table Random)：當使用者需要可以平均的隨機播放好幾個語音組時可以選擇此功能。第一次觸發OKY，會隨機選擇 OKY Sentences Table 內的其中一個語音組來播放，之後的OKY觸發，則在第一次觸發的語音組之後循序播放。
- (15). 特殊功能選項 "暫停/恢復播放" (Pause-Resume)：在播放OKY的語音組時，當OKY按鍵一被觸發，則語音組會暫停播放，此時LED全滅，IC會進入睡眠狀態(Sleep Mode)，靜態電流非常小(0.05uA)，再次觸發OKY則會從之前語音組暫停的地方恢復播放。
※ 注意：Pause-Resume 不能和 Toggle On/Off 功能同時存在。
- (16). 特殊功能選項 "內部觸發" (Internal-Feedback)：當OKY/O3 的聲音播放中被重覆觸發或聲音播放結束時，利用內部的Stop_High-Pulse信號來自動觸發 OKY/O3 的下一個語音組(Internal-Feedback Path)，播放該語音組一次。
※ 注意：當啟動此功能時，OKY/O3 只能當做輸入腳。
- (17). 特殊功能選項 "防干擾Debounce" (Anti-Noise Debounce)：設定輸入腳的訊號觸發需要先偵測到一段低電平(Low)的Debounce時間，才會進行正常的高電平(High)觸發的Debounce偵測。此功能可以用來避免外部的馬達雜訊干擾，並不會因為按鍵過程中的觸發訊號被雜訊拉低，導致IC重複觸發。
※ 注意：當啟動此功能時，所有輸入口都會被設定為 Anti-Noise Debounce 功能。
- (18). 序列觸發功能(Serial-Trigger): 在 Edge/Unhold/Retrigger 觸發模式下，使用OKY的 One-Key Sequential 和 Reset 功能，並設定觸發Debounce時間為Short Debounce，這樣就可以利用外部序列訊號輸入來控制OKY的特定Sentence播放，通常搭配外部MCU來控制。
- (19). 一組 9-bit 或 10-bit 的 Power PWM 輸出，可直接驅動4Ω、8Ω、16Ω、32Ω、64Ω的喇叭或蜂鳴片。
※ 注意：由於Power PWM 的輸出功率很大，0.25W喇叭會被燒毀，請搭配0.5W以上的喇叭。
- (20). 支援低壓復位(LVR=1.5V)功能。
- (21). 提供特殊的快速燒錄模式，以加快OTP燒錄時間。
- (22). 支援特殊的ICP (In Circuit Programming) 燒錄功能，以方便客戶先組裝PCBA模組再進行燒錄。
- (23). 提供可程式的Code資料保護模式。(當Security-Bit 被燒斷後，資料將無法讀取。)
- (24). 僅提供 SOP-8 封裝出貨。



1. GENERAL DESCRIPTION

The NY3W series are single-chip voice synthesizing CMOS IC. They are OTP (One Time Programmable) IC with embedded EPROM, which are designed to support speech IC with **loud volume output** application. There are 5 bodies: NY3W010AS8, NY3W016AS8, NY3W035AS8, NY3W065AS8 and NY3W087AS8. Each body has three I/O pins. Through accurate internal oscillation, external R_{osc} is unnecessary. There is only one PWM output for voice. Thus no external component is required. Using 4-bit/5-bit mixed or 5-bit Advanced DPCM algorithm with 9-bit or 10-bit Power PWM hardware output, it can produce outstanding quality voices. Thru OTP programming, customer's speech data can be written into EPROM by different code data. Besides, two interactive software developing tools of "Q-Speech" & "Quick-IO" are user-friendly and quick for programming, then users can use "Q-Writer" software along with "OTP_Writer" hardware to write BIN code into OTP very fast.

2. FEATURES

(1). Wide operating voltage: 1.6V ~ 6.8V.

(2). There are 5 bodies. ROM size and speech duration @ 6kHz are as following.

P/N	NY3W010AS8	NY3W016AS8	NY3W035AS8	NY3W065AS8	NY3W087AS8
4-bit	11F00H	1DF00H	3DF00H	7DF00H	A1F00H
	12.25s	20.44s	42.28s	85.97s	110.55s
5-bit	E599H	17F33H	318CCH	64C00H	818CCH
	9.80s	16.35s	33.83s	68.78s	88.44s

(3). Three I/O pins: OKY/O3, IO1 and IO2 can be either input or output pin.

(4). The total voice duration can be partitioned up to maximum 768 *Voice Sections*. Each *Voice Section* length is flexible and each maximum or minimum *Voice Section* length is unlimited.

(5). Total maximum 1536 *Voice Steps* are available for 128 *Voice Sentences*. OKY/O3, IO1, IO2 and POP can be assigned 128, 1, 1 and 1 *Sentences* independently. Each *Step* can specify one *Voice Section* and enable/disable IO1, IO2 and OKY/O3 output option if IOx is set as output.

(6). Only build in an accurate internal oscillator of +/- 1.0% tolerance, no external R oscillator. There are normally 28 kinds of options for play speed, and each *Step* can select any one of them independently.

1	2	3	4	5	6	7	8	9	10
24.0kHz	20.0kHz	17.1kHz	15.0kHz	13.3kHz	12.0kHz	10.9kHz	10.0kHz	9.2kHz	8.6kHz
11	12	13	14	15	16	17	18	19	20
8.0kHz	7.5kHz	7.1kHz	6.7kHz	6.3kHz	6.0kHz	5.7kHz	5.5kHz	5.2kHz	5.0kHz
21	22	23	24	25	26	27	28		
4.8kHz	4.6kHz	4.4kHz	4.3kHz	4.1kHz	4.0kHz	3.9kHz	3.8kHz		

(7). Input option for input pins.

(a). Each input can select Edge/Level, Hold/Unhold and Retrigger/Irretrigger trigger modes.

(b). Each input can select CDS+1.5M、CDS、1.5M pull-low resistor or Floating type.

(CDS+1.5M option: Only 1.5M pull-low resistance at key-pressed, and 300K+1.5M in parallel pull-low resistance around 250K at key-released. CDS option: Floating at key-pressed, and 300K pull-low resistance at key-released.)

(c). Each input can select Debounce time: Long debounce for push-button. Short debounce for fast switch.

(d). OKY/O3 input can select One-Key Sequential or Random for maximum 128 Sentences. At One-Key Sequential, the Reset function of playing Sentence sequence can be selected or not when other keys are triggered.

(e). Only one input pin can select Toggle On/Off function (1st Trigger → play, 2nd trigger → stop,).

※ *Note: Input priority is OKY/O3 > IO1 > IO2 > POP.*

(8). There are 4 kinds of output current option for output pins.

(a). Normal Sink Current output: Output is connected a LED with VDD. ($I_{ol}=20\text{mA}/30\text{mA}$ @VDD=3V/4.5V)

(b). Large Sink Current output: Output is connected a LED with VDD. ($I_{ol}=58\text{mA}/75\text{mA}$ @VDD=3V/4.5V)

(c). Constant Sink Current output: Output is connected a LED with VDD. Whenever VDD is 3V or 4.5V, the output current is constant and LED brightness is uniform. ($I_{ol}=20\text{mA}/22\text{mA}$ @VDD=3V/4.5V)

(d). Drive Current output: Output is connected a LED with GND. ($I_{oh}=7\text{mA}/10\text{mA}$ @VDD=3V/4.5V)

(9). There are 9 kinds of output signal option for output pins.

(a). Stop_Low pulse: Low active stop-pulse output whenever device stop playing.

(b). Stop_High pulse: high active stop-pulse output whenever device stop playing. *(Not available for OKY/O3)*

(c). Busy_High active: high active signal output during playing. (Drive output) *(Not available for OKY/O3)*

(d). Busy_Low active: low active signal output during playing. (Sink output)

(e). LED 1.5Hz flash: 1.5Hz sink signal output to drive LED during playing.

(f). LED 3Hz flash: 3Hz sink signal output to drive LED during playing.

(g). LED 6Hz flash: 6Hz sink signal output to drive LED during playing.

(h). LED dynamic 1/2: according to 1/2 sound level, dynamic sink signal output to drive LED during playing.

(i). QIO signal: arbitrary output with voice. For IO1 and IO2, there are two sets of QIO signal. Each Voice Step can select one set of QIO signal. *And for OKY/O3, there is no QIO signal to select.* User can edit the QIO signal by “Quick-IO” editor.

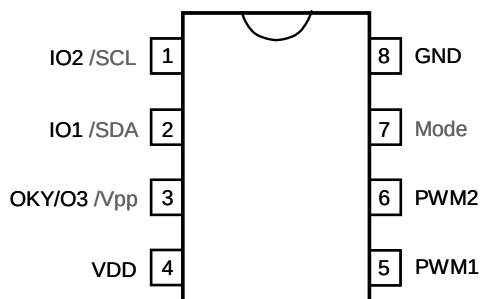
※ *Note: Where (e) ~ (g) is the LED flash rate at 6kHz sample rate. For different play speed, the LED flash rate is different from original 1.4Hz, 3Hz or 6Hz.*

(10). “Mode-Switch” special function: There are two kinds of functional modes that can be switched by IO1 input (Mode-Switch). For Mode-1 (IO1 → GND) and Mode-2 (IO1→VDD), the output type of I/O setting is the same, but I/O function and voice can be different.

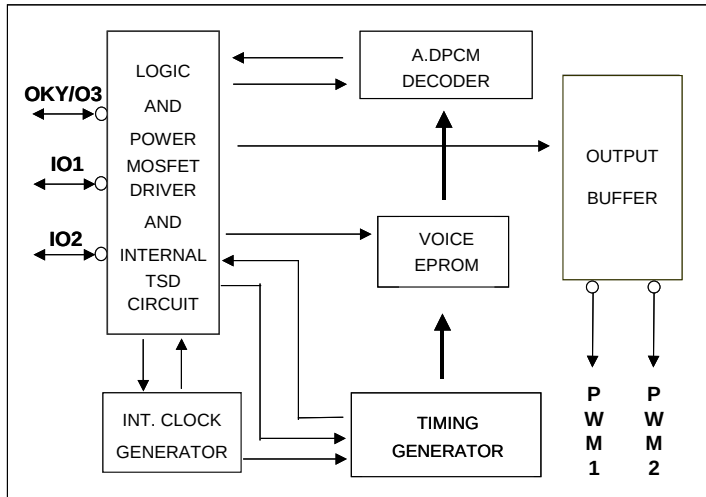
(11). “Power-On-Play” special function (POP): When power is on, play the POP Sentence one time. The trigger mode is fixed as Edge / Unhold / Retrigger. To cooperate with Power-On-Loop function, the POP Sentence will be played in loop until other key-trigger happened. When other key is triggered, it stops playing the POP Sentence and immediately plays the assigned sentence of triggered key.

(12). “2-Key Priority” special function: Users can decide the priority of 2 different keys when both keys are pressed at the same time. There are two kinds of priority option: First Key and Last Key. For First Key, the prior pressed key is first priority to play voice, and it's normal operation. As for Last Key, the later pressed key is first priority to play voice, and it only supports OKY/O3 input pins. Users can use Last Key option according to application requirement.

- (13). “*TG-Invert*” special function: When one *Voice Step* is optioned with Invert function, the trigger mode of Retrigger/Irretrigger will be inverted during playing that *Voice Section*. Users can insert Invert function in specific steps according to application requirement to change the trigger mode.
- (14). “*Table Random*” special function: When users need to play several sentences randomly and averagely, this function can be applied. At first trigger of OKY, one random sentence will be played from OKY Sentences Table. After that, the played sentences for following OKY triggers will be sequential.
- (15). “*Pause-Resume*” special function: When playing OKY sentence, if key is triggered, the sentence playing will be paused, all LEDs are turned off and IC will enter sleep mode. At this moment, the standby current is very small about 0.05uA. To trigger OKY again, the sentence will resume and play sentence from the pause point.
※ Note: Pause-Resume function cannot co-exist with Toggle On/Off function.
- (16). “*Internal-Feedback*” special function: When the playing sentence of OKY/O3 is stopped or over, continue to play the next sentence of OKY/O3 through internal Stop_High-Pulse signal (Internal-Feedback Path).
※ Note: When enable this function, OKY/O3 is fixed as input pin.
- (17). “*Anti-Noise Debounce*” special function: For a right trigger detection, the trigger signal needs a low-level Debounce time in advance of normal Debounce detection for high-level signal. It is used to prevent noise interference such like motor noise. With this function, the trigger signal won't result in double-trigger which usually occur when noise pull the high signal to low.
※ Note: When enable this function, all inputs are optioned as Anti-Noise Debounce function.
- (18). Serial-Trigger function: In Edge/Unhold/Retrigger mode, by using the One-Key Sequential and Reset functions of OKY and setting the Debounce time to be short, IC can access external serial clock signal to playback the specific Sentence of OKY. Usually it cooperates with an external MCU.
- (19). One 9-bit or 10-bit **Power PWM** output. It can directly drive 4, 8, 16, 32, 64Ω speaker or piezo-buzzer.
※ Note: Due to large power of Power PWM output, 0.25W speaker will be damaged and 0.5W or above speaker is suggested.
- (20). Low Voltage Reset (LVR=1.5V) is supported.
- (21). A unique fast writing mode is provided to speed up OTP writing time.
- (22). A special **ICP** (In Circuit Programming) writing function is supported for user to fabricate PCBA in advance.
- (23). Programmable code protection is provided. *(When the Security-Bit is burnt down, data can't be read.)*
- (24). Only SOP-8 package type is available.



3. BLOCK DIAGRAM



4. PIN DESCRIPTION

Pin Name	Pin No.	ATTR.	Description
IO2 /SCL	1	I/O	Output or input pin. To be input, active high.
IO1 /SDA	2	I/O	Output or input pin. To be input, active high.
OKY/O3 /VPP	3	I	Input pin, active high, or positive high power for OTP programming.
VDD	4	Power	Positive power.
PWM1	5	O	Power PWM output 1.
PWM2	6	O	Power PWM output 2.
Mode	7	O	No connection, or select programming mode for OTP programming.
GND	8	Power	Negative power.

5. DEVELOPMENT & DEMONSTRATION

User can use “Q-Speech” & “Quick-IO” software to develop the desired functions. After finishing the code programming, user will get 2 files of “.bin” and “.htm”, the binary file and function check list. Through “OTP_Writer” operation, user can download the “.bin” file into **NY3W_FDB** flash demo board to demonstrate the NY3W function. Then customer can make production by NY3W OTP chip directly. For more details, please refer to “Q-Speech” & “Quick-IO” user manual.

Flash Demo board	NY3W_FDB-08
Max. demo body	NY3W087AS8

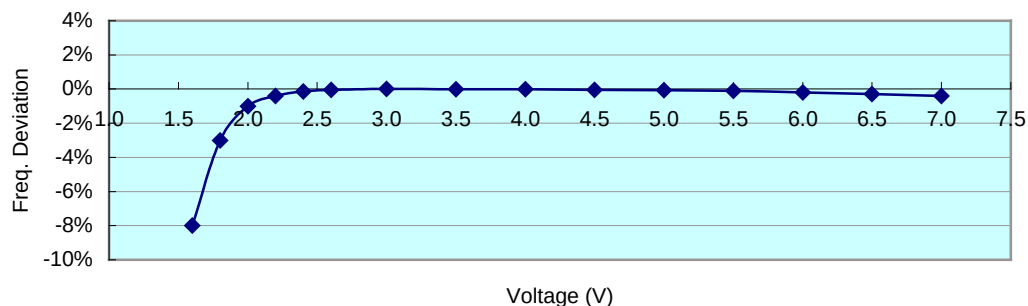
6. ABSOLUTE MAXIMUM RATING

Symbol	Rating	Unit
VDD~GND	-0.5 ~ +7.0	V
V _{in}	GND-0.3 < V _{in} < VDD+0.3	V
V _{out}	GND < V _{out} < VDD	V
T _{op} (operating)	-40 ~ +85	°C
T _{st} (storage)	-55 ~ +160	°C

7. DC CHARACTERISTICS

Symbol	Parameter	VDD	Min.	Typ.	Max.	Unit	Condition
VDD	Operating voltage	--	1.6	3.0	6.8	V	1.54MHz
I _{SB}	Standby current	3.0		0.1	0.5	uA	LVR and POP disabled
		4.5		0.1	0.5		
		3.0		0.8			LVR or POP enabled
		4.5		1.8			
I _{OP}	Operating current	3.0		1.6		mA	No load.
		4.5		2.4			
I _{IH}	Input current (1.5M ohms pull-low)	3.0		2		uA	V _{IL} =VDD
		4.5		5			
	Input current (300K ohms pull-low)	3.0		30		uA	
		4.5		85			
I _{OH}	Output drive current (IO1, IO2 & OKY/O3)	3.0		-7		mA	V _{OH} =2.0V
		4.5		-11			V _{OH} =3.5V
I _{OL}	Output normal sink current (IO1, IO2 & OKY/O3)	3.0		22		mA	V _{OL} =1.0V
		4.5		33			
	Output large sink current (IO1, IO2 & OKY/O3)	3.0		58		mA	
		4.5		83			
	Output constant sink current (IO1, IO2 & OKY/O3)	3.0		20		mA	
		4.5		21			
I _{PWM}	Power PWM output current	3.0		120		mA	Load=8 ohms
		4.5		200			
ΔF/F	Frequency deviation by voltage drop	3.0		0.3		%	$\frac{F_{osc}(3.0v)-F_{osc}(2.4v)}{F_{osc}(3v)}$
		4.5		-0.1			$\frac{F_{osc}(4.5v)-F_{osc}(3.0v)}{F_{osc}(4.5v)}$
	Frequency lot deviation	--	-1		1	%	$\frac{F_{max}(VDD)-F_{min}(VDD)}{F_{max}(VDD)}$
Fosc	Oscillation Frequency	--	1.31	1.54	1.60	MHz	VDD=1.6~6.8V

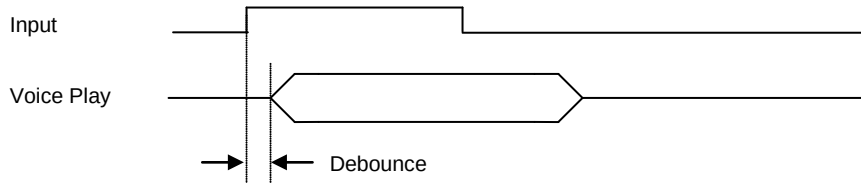
Voltage vs Freq. Deviation (SR=6.0KHz@3V)



8. TIMING DIAGRAM

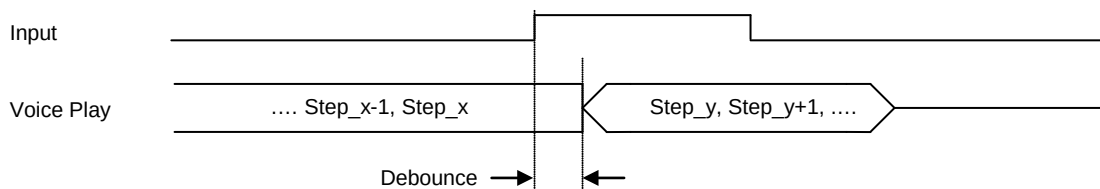
(1) Debounce Time

(a). Trigger while no playing voice



※ Debounce time is configured by 7.2 kHz S.R and the value is fixed. That is, Long debounce=17ms, Short debounce = 42us

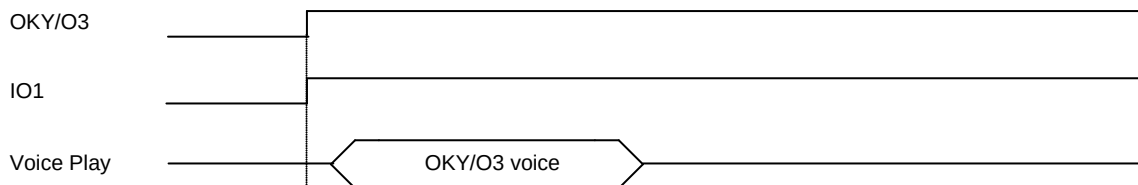
(b). Trigger While playing voice



※ Debounce Time is configured by the S.R. of Step_x. At S.R. = 6kHz, Long debounce = 20ms, Short debounce = 50us

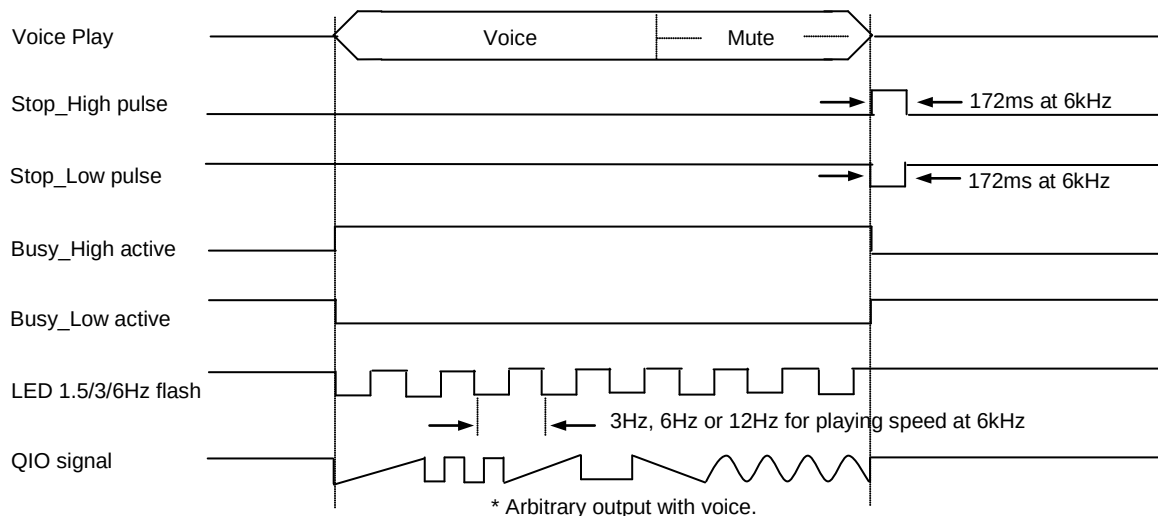
For example, if Step_x S.R. = 8kHz, Long debounce = $20\text{ms} \times (6\text{k}/8\text{k}) = 15\text{ms}$, Short debounce = $50\text{us} \times (6\text{k}/8\text{k}) = 37.5\text{us}$

(2) Input Priority



※ Priority: OKY/O3 > IO1 > IO2 > POP

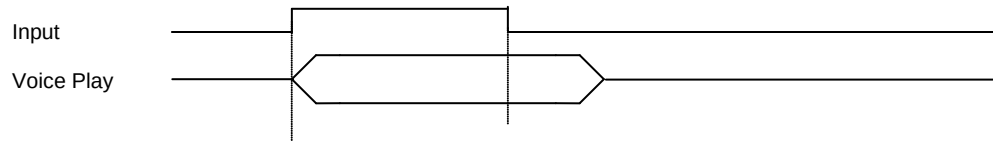
(3) Output Signal



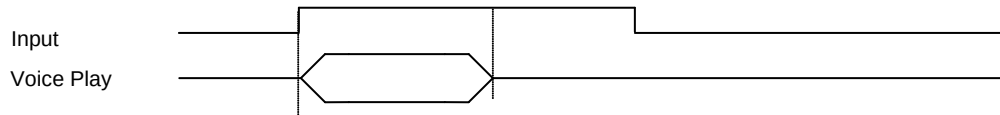
LED dynamic 1/2: When the voice amplitude is higher than 1/2 level, LED will be ON, i.e. output signal is low.

(4) Basic Operation

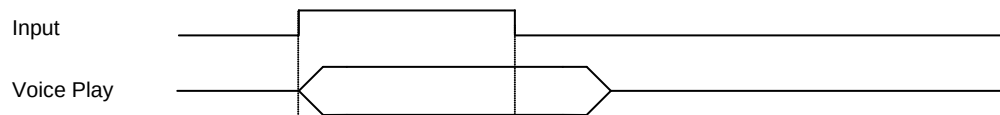
(a). Edge mode, Edge trigger



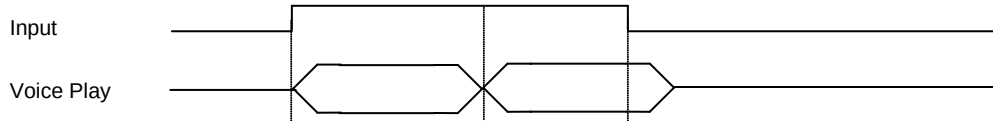
(b). Edge mode, Level trigger



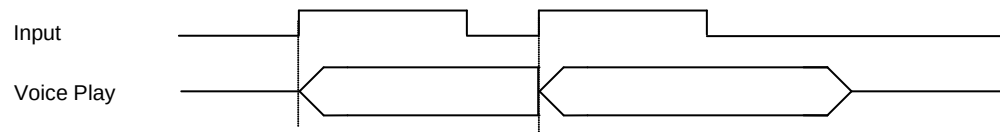
(c). Level mode, Edge trigger



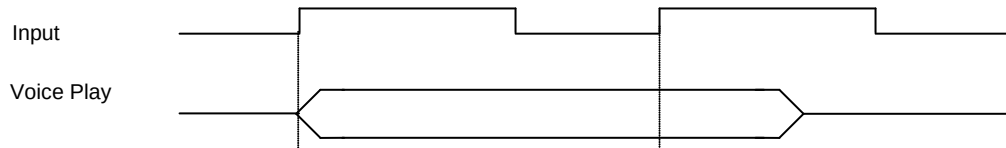
(d). Level mode, Level trigger



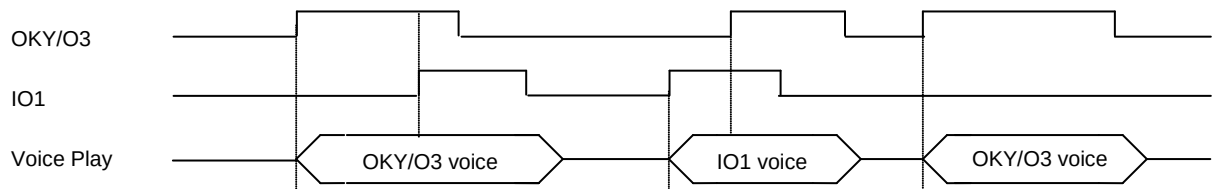
(e). Retrigger mode



(f). Irretrigger mode



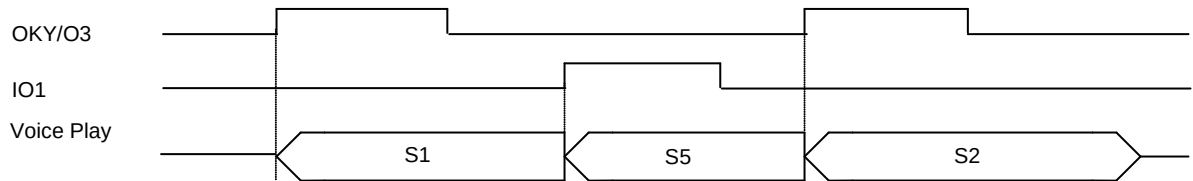
(g). Retrigger mode, first key priority



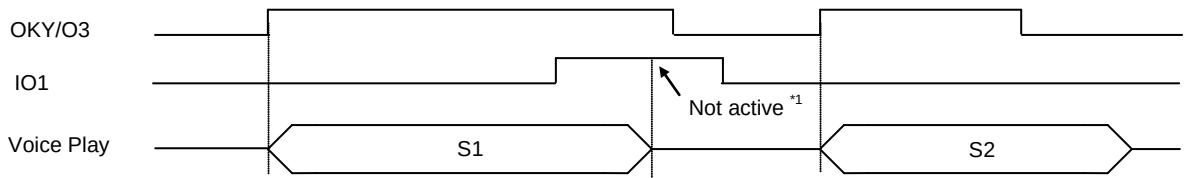
(5) Advanced Operation

(a). Different Input Reload (OKY is in Sequential mode)

(a-1) OKY (E/U/R) = S1 S2 S3 S4, IO1(E/U/R) = S5 (S1 means Sentence 1)

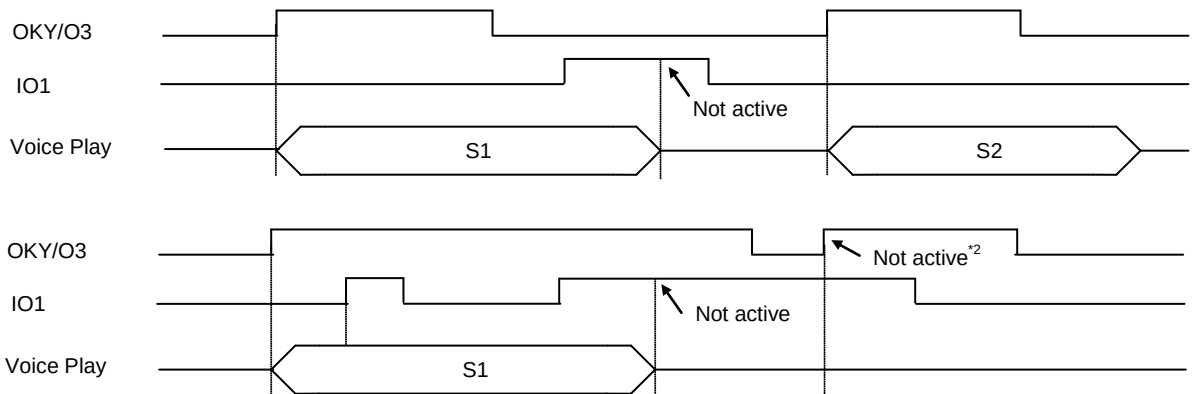


(a-2) OKY (E/U/R) = S1 S2 S3 S4, IO1 (L/x/x) = S5



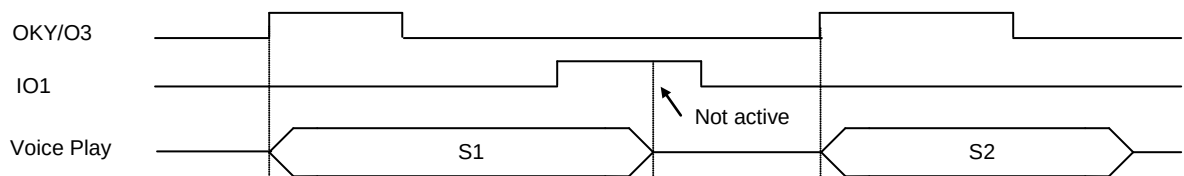
*1: If you press IO1 during OKY/O3 voice playing, at the moment of S1 end, the trigger mode follows

(a-3) OKY (E/U/I) = S1 S2 S3 S4, IO1 (E/x/x) = S5

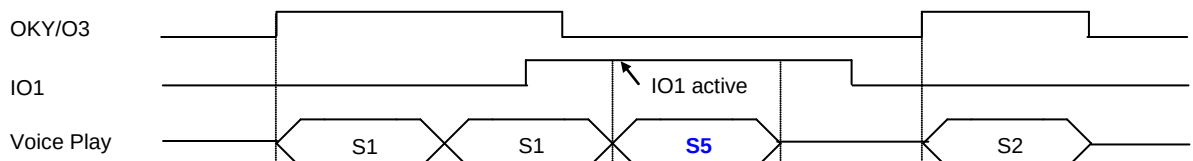


*2: Because IO1 signal is still high in the same time IC can't accept the OKY/O3 Edge signal.

(a-4) OKY (E/U/I) = S1 S2 S3 S4, IO1 (L/x/x) = S5



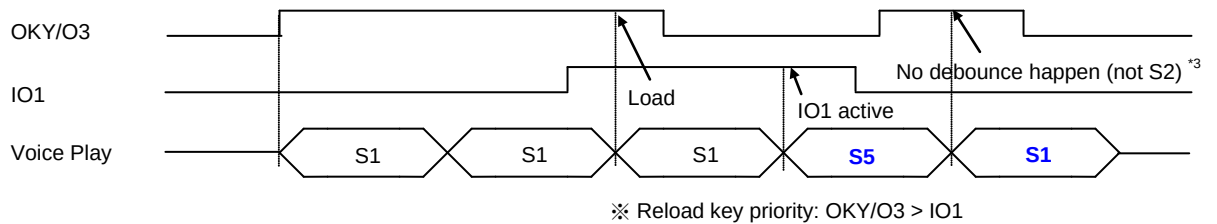
(a-5) OKY (L/U/x) = S1 S2 S3 S4, IO1 (E/x/x) = S5



※ In the time of Sentence end: When S1 end, the trigger mode follows OKY/O3 (L/U/x). When S5 end, it follows IO1 (E/x/x).

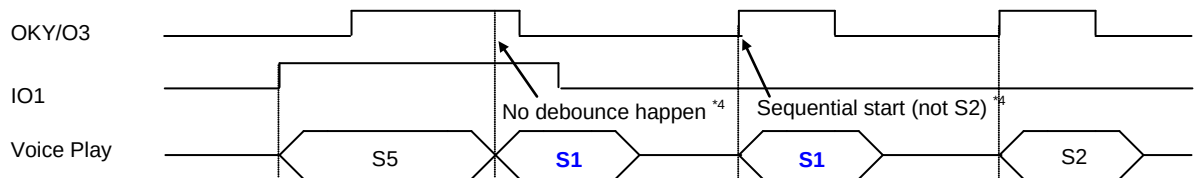
※ Once S5 is played (just leave S1 ending), the trigger mode follows IO1 (E/x/x) immediately.

(a-6) OKY (L/U/x) = S1 S2 S3 S4, IO1 (L/U/I) = S5



*3: In OKY/O3 mode, Sequential number is counted only if there is debounce happened.

(a-7) OKY (L/U/x) = S1 S2 S3 S4, IO1 (L/U/x) = S5

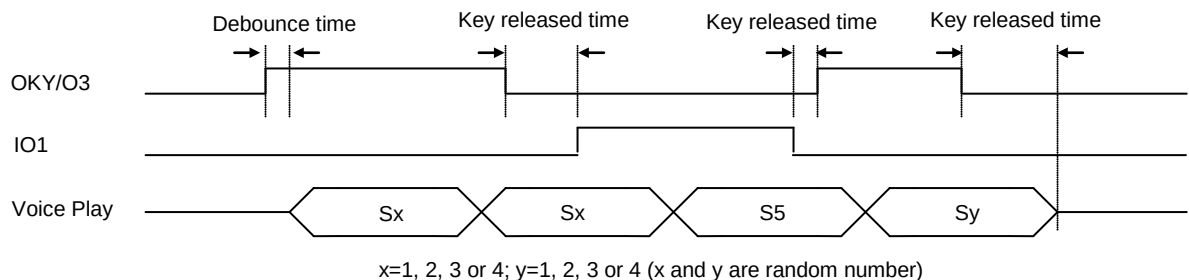


*4: In OKY mode, 1st trigger without debounce and Sequential number is still "1". 2nd trigger with debounce, after trigger the Sequential number become "2".

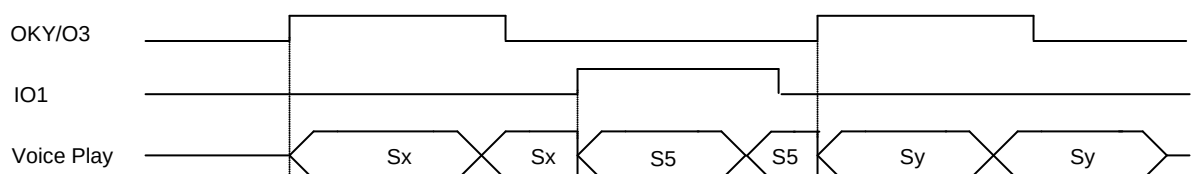
(b). Random Function

(b-1) OKY (L/U/I) = S1 S2 S3 S4, IO1 (L/U/I) = S5

Random (or Sequential) number is counted during "debounce time" or "key released time". But the first-time trigger only relies on "debounce time" due to no "key release time".

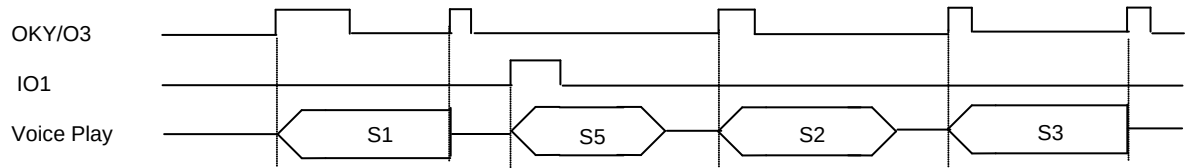


(b-2) OKY (L/U/R) = S1 S2 S3 S4, IO1 (L/U/R) = S5

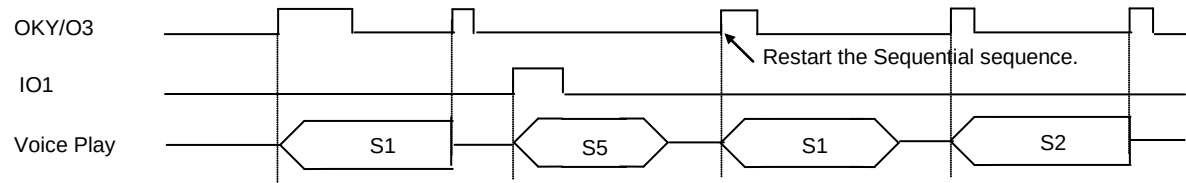


(c). Toggle On/Off Function

(c-1) OKY (E/U/R) = S1 S2 S3 S4, IO1 (E/U/R) = S5 (OKY is Sequential mode **without Reset**)



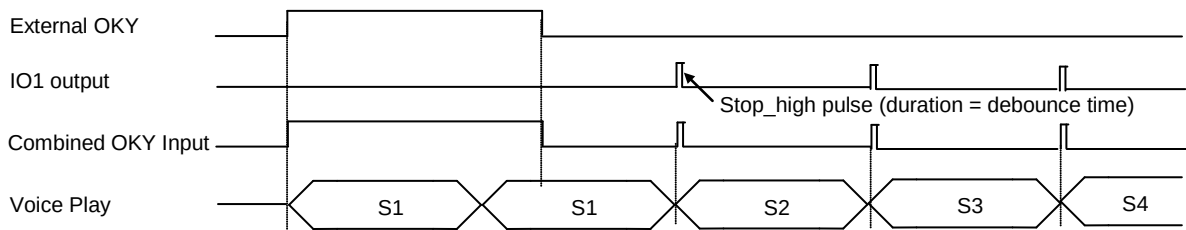
(c-2) OKY (E/U/R) = S1 S2 S3 S4, IO1 (E/U/R) = S5 (OKY is Sequential mode **with Reset**)



※ When OKY Sequential counter is going, to trigger other inputs will reset OKY Sequential sequence.

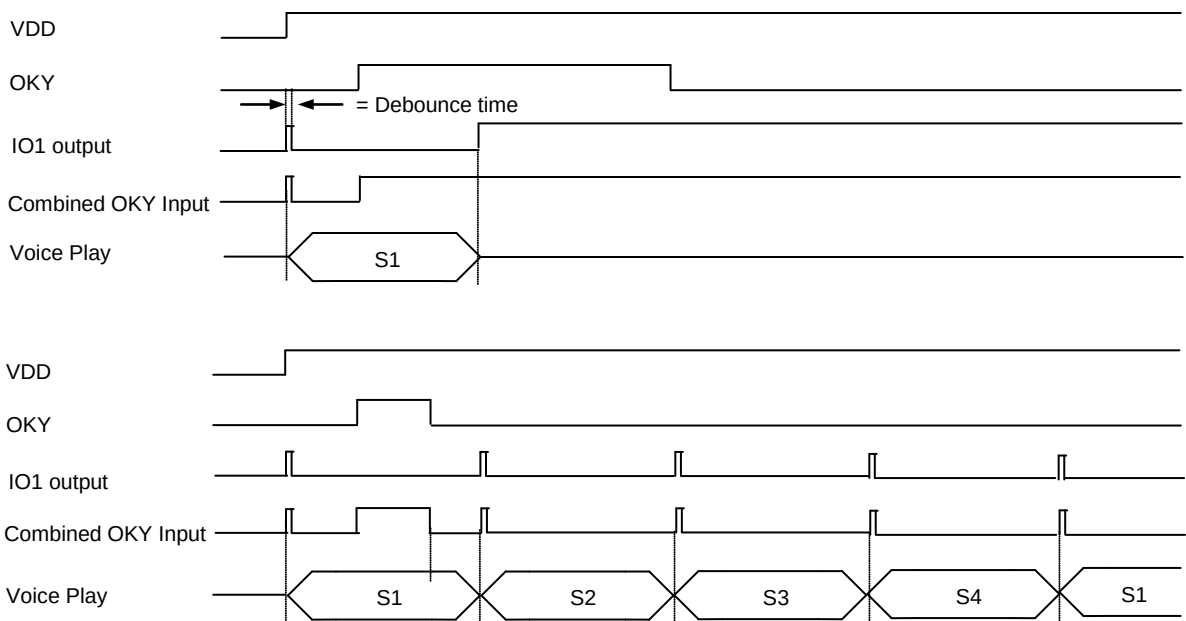
(d). External Feedback Function (IO1 is output and connected to OKY input)

(d-1) OKY (L/U/I) = S1 S2 S3 S4, IO1=Stop_high pulse (When voice ends, IO1 shows a high pulse.)



※ Originally the duration of Stop_high pulse is 172ms at 6kHz, but the high signal will trigger voice and turn low after debounce.

(d-2) OKY (E/U/I) = S1 S2 S3 S4, IO1= Busy_low (When not playing voice, IO1 is high.)

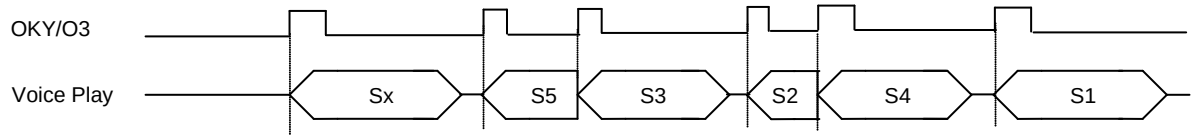


※ When power on, IO1 will generate a high pulse at Busy_low status and the duration is equal to debounce time.

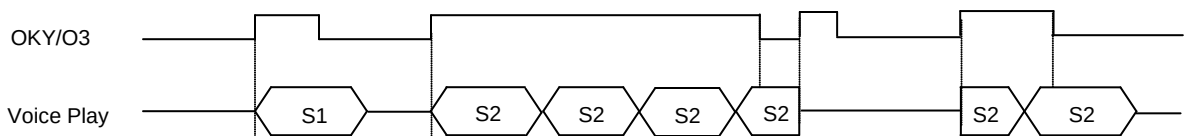
(e). Table-Random Function

When power in on, a random number is counted automatically. The first-time trigger will play the sentence of random number (Sx), and the next trigger will be sequential.

OKY (E/U/R) = S3 S2 S5 S4 S1 S3 S2 Sx S5 S3 S2 S4 S1 S3 S2 S5 S1 S4 S5 S3 S1 S2


(f). Pause-Resume Function

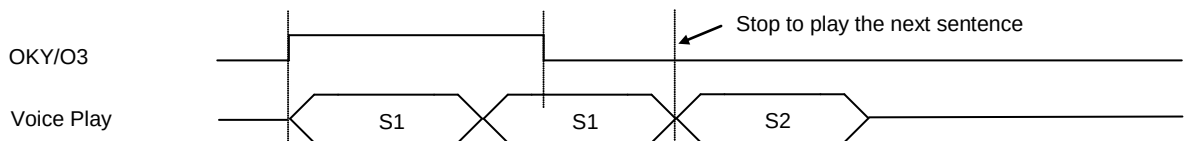
OKY (L/U/R) = S1 S2


(g). Internal-Feedback Function (OKY/O3 is fixed as input)

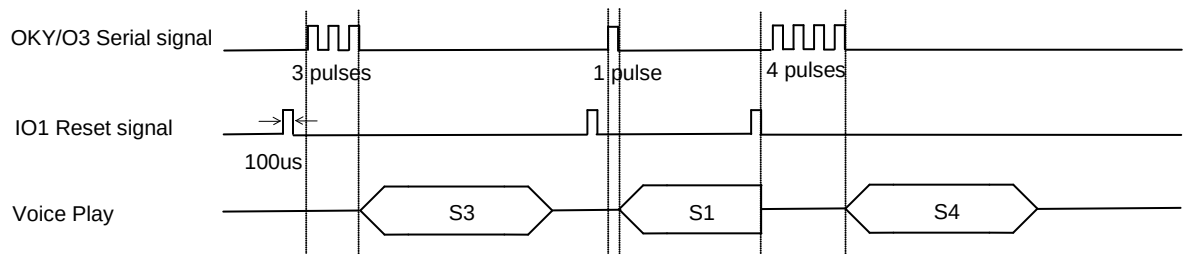
Each sentence can assign an Internal-Feedback Path to play the next sentence after OKY's sentence stop.

OKY (L/U/I) = S1 S2 S3 S4, Internal-Feedback Path = OKY/O3 → OKY/O3

If S1 is optioned with Internal-Feedback Path,


(h). Serial-Trigger Function (All inputs must be set as short debounce)

OKY (E/U/R) =S1 S2 S3 S4, IO1 (E/U/R) =S5 (OKY Reset is enabled, and S5 is a short mute Sentence)

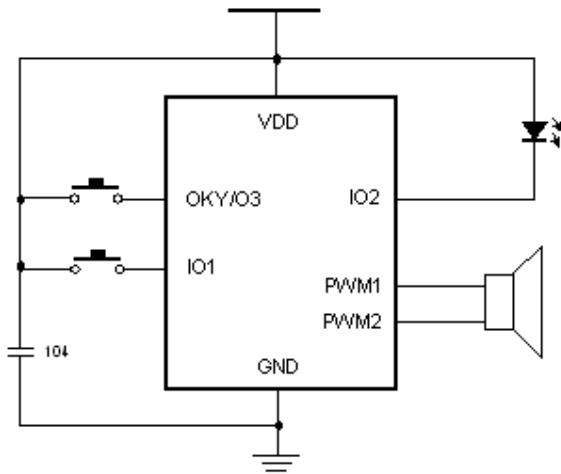


※ The pulse width must be longer than 50us (i.e. short debounce time), and users can set the typical pulse width as 100us.

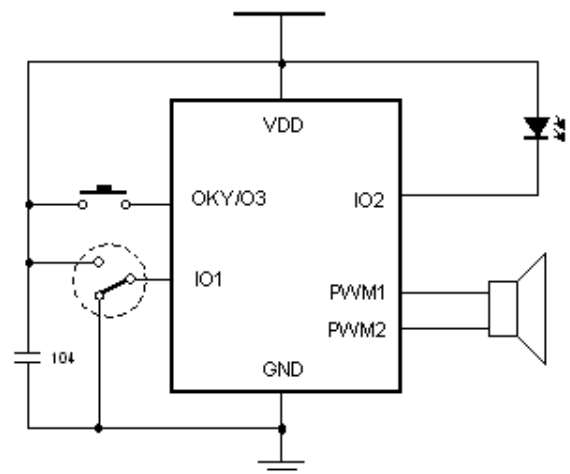
※ The above is the simplest 2-wire control by external MCU. If necessary, user can use 3-wire control with Busy_High output signal to do feedback.

9. APPLICATION

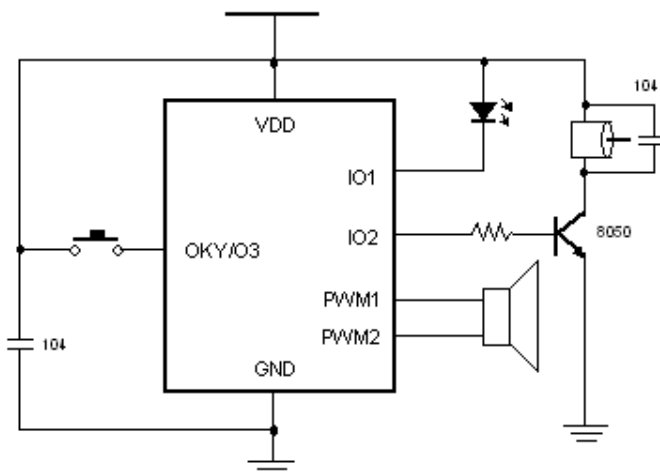
(1) 2 trigger, 1 LED (Sink)



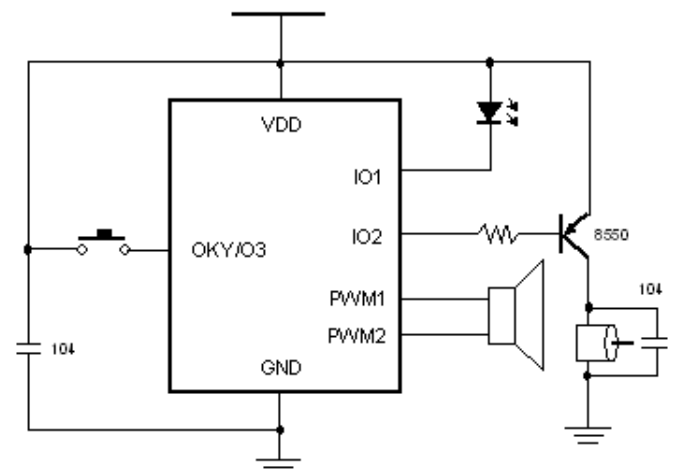
(2) 1 trigger with Mode Switch, 1 LED (Sink)



(3) 1 trigger with 1 LED (Sink) and 1 motor (Drive)

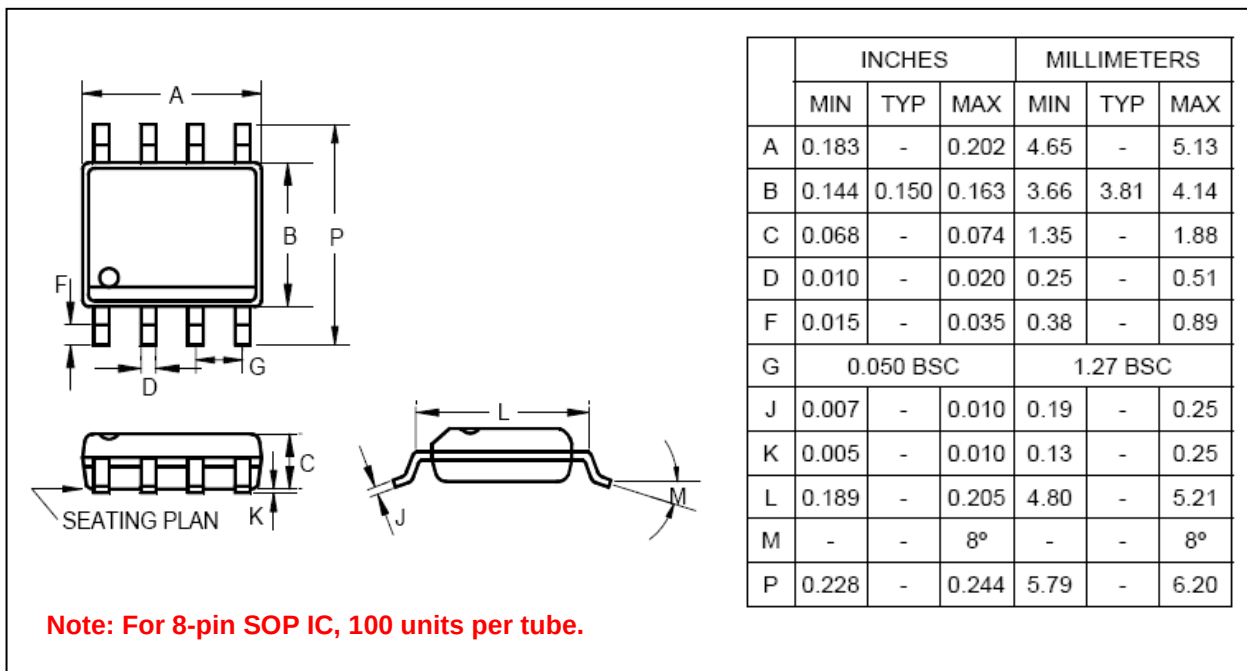


(4) 1 trigger with 1 LED (Sink) and 1 motor (Sink)



10. PACKAGE DIMENSION

8-Pin Plastic SOP (150 mil)



11. ORDERING INFORMATION

P/N	Shipping Type	Remarks
NY3W010AS8	SOP-8	Width 150 mil.
NY3W016AS8	SOP-8	Width 150 mil.
NY3W035AS8	SOP-8	Width 150 mil.
NY3W065AS8	SOP-8	Width 150 mil.
NY3W087AS8	SOP-8	Width 150 mil.