

# VOICE OTP IC

## aP58M1 – 42sec

### **APLUS INTEGRATED CIRCUITS INC.**

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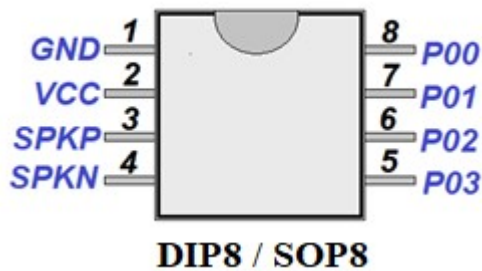
**Feature :**

- 8 bit DSP
- System speed 48MHz.
- Built-in 1M bit (128 K Bytes) OTP memory
- Built-in 1K bit(128 Bytes)SRAM
- Built-in 12/13 bit PWM
- Built-in 2 x 8bit Timer
- Built-in 8 I/O
- Built-in 2.0V 80mA LDO
- Built-in 4 channel MIDI.
- Built-in Watch-Dog Timer circuit
- Built-in PWM 8Ω/0.18W to drive speaker
- Operation voltage : 2.2V~5.0V

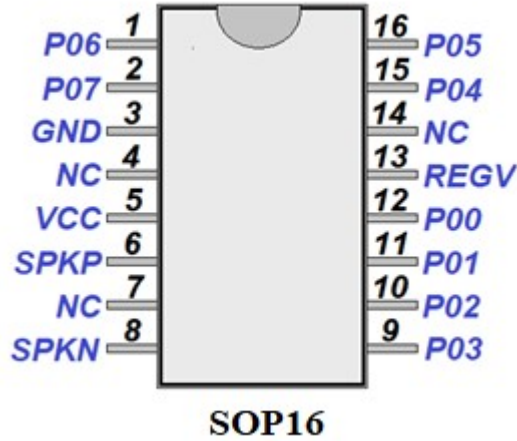
**Duration :**

<i>aP58M1 body --- sample rate 4688 Hz</i>					
<i>Coding</i>	<i>AD5</i>	<i>AD6</i>	<i>AD8</i>	<i>PCM10</i>	<i>PCM16</i>
<i>durations</i>	<i>42sec</i>	<i>35sec</i>	<i>26sec</i>	<i>20.9sec</i>	<i>17.5sec</i>

**Pin Assignment :**



<i>Pin No.</i>	<i>Designation</i>	<i>I/O</i>	<i>Description</i>
1	GND	P	System Ground
2	VCC	P	Chip Power
3	SPKP	O	Speaker Output
4	SPKN	O	Speaker Output
5	P0 [ 3 ] / VPP / Reset	I/O	Port-0 I/O Bit3. or VPP or EXT Reset pin
6	P0 [ 2 ]	I/O	Port-0 I/O Bit2.
7	P0 [ 1 ]	I/O	Port-0 I/O Bit1.
8	P0 [ 0 ]	I/O	Port-0 I/O Bit0



Pin No.	Designation	I/O	Description
1	P0 [ 6 ]	I/O	Port-0 I/O Bit6.
2	P0 [ 7 ]	I/O	Port-0 I/O Bit7.
3	GND	P	System Ground.
4	NC		
5	VCC	P	Chip Power.
6	SPKP	O	Speaker Output.
7	NC		
8	SPKN	O	Speaker Output
9	P0 [ 3 ] / VPP / Reset	I/O	Port-0 I/O Bit3. Or VPP or EXT Reset pin
10	P0 [ 2 ]	I/O	Port-0 I/O Bit2.
11	P0 [ 1 ]	I/O	Port-0 I/O Bit1.
12	P0 [ 0 ]	I/O	Port-0 I/O Bit0.
13	REGV	P	Digital Power. ( <b>LDO voltage output</b> ).
14	NC		
15	P0 [ 4 ]	I/O	Port-0 I/O Bit4.
16	P0 [ 5 ]	I/O	Port-0 I/O Bit5.

**Group Options :**

Selectable options that affect each individual group are called Group Options. They are:

Edge or Level trigger.

Unholdable or Holdableoption.

Re-triggerable or Non-retriggerable option.

Stop pulse disable or enable.

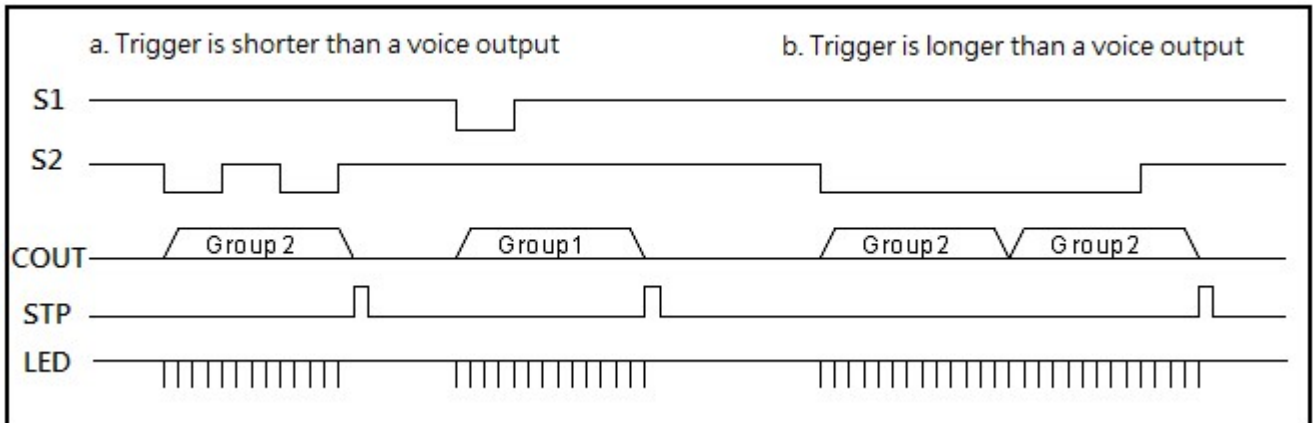


Fig. 1 Level, Unholdable, Non-retriggerable

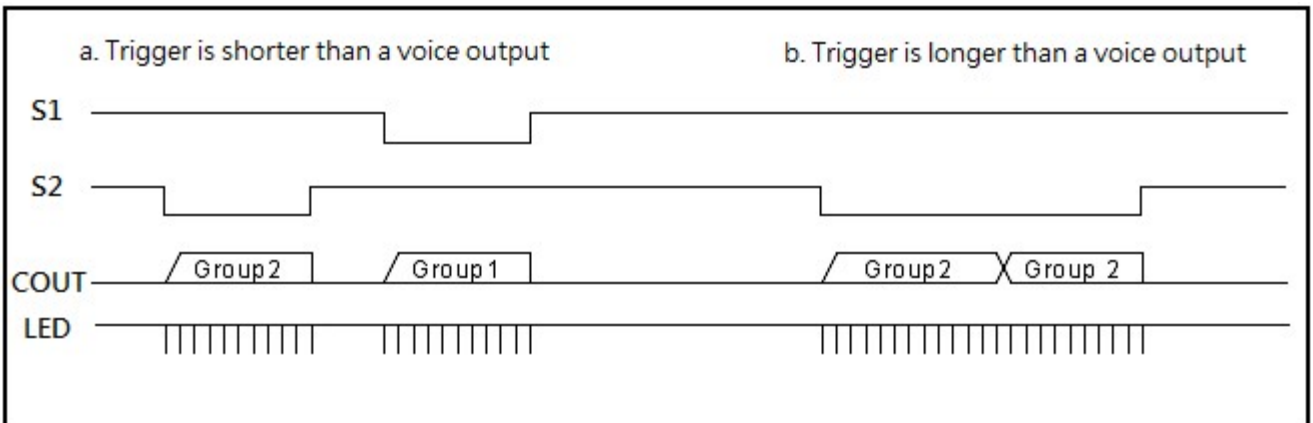


Fig. 2 Level Holdable

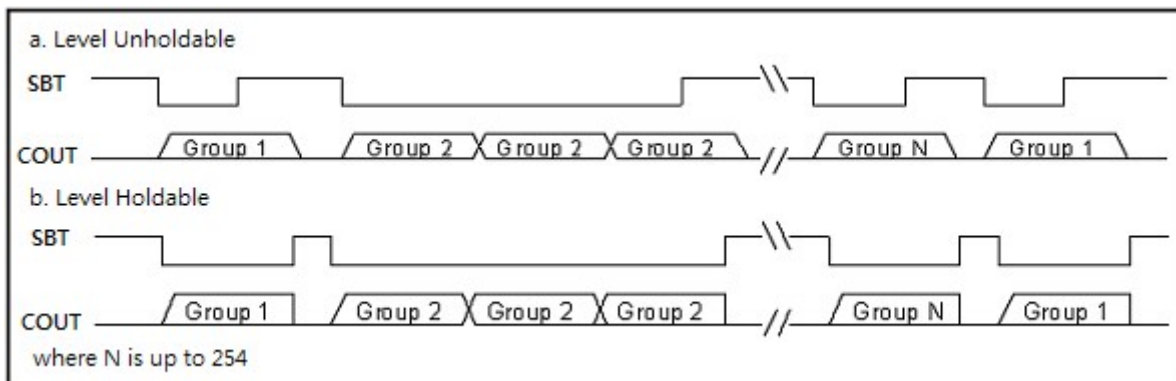


Fig. 3 SBT sequential trigger with Level Holdable and Unholdable

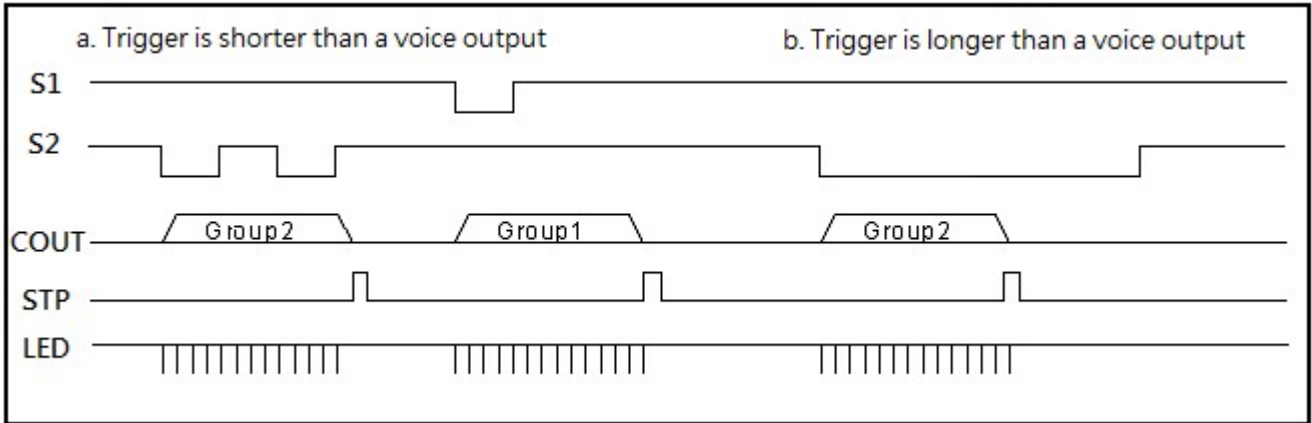


Fig. 4 Edge, Unholdable, Non-retrigger

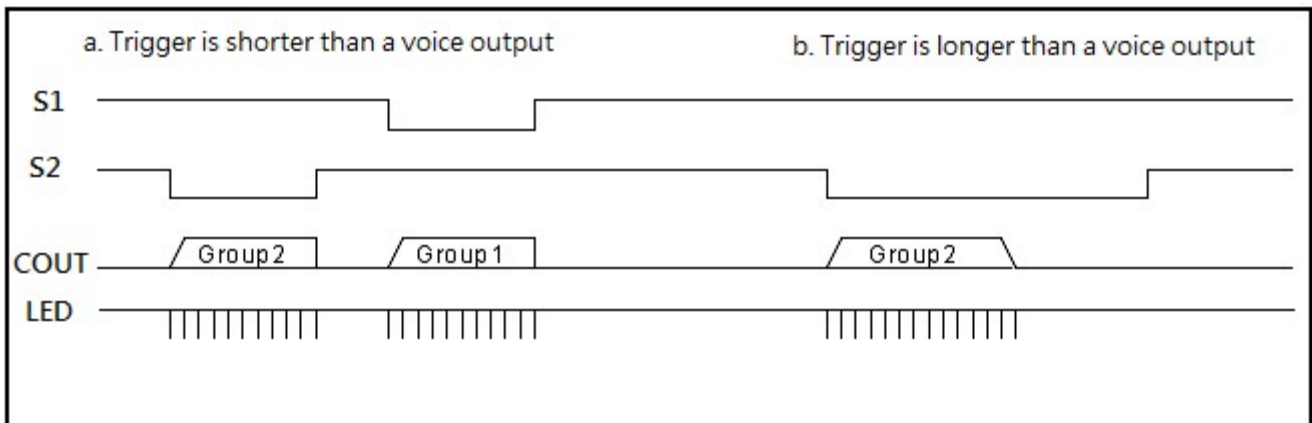


Fig. 5 Edge, Holdable

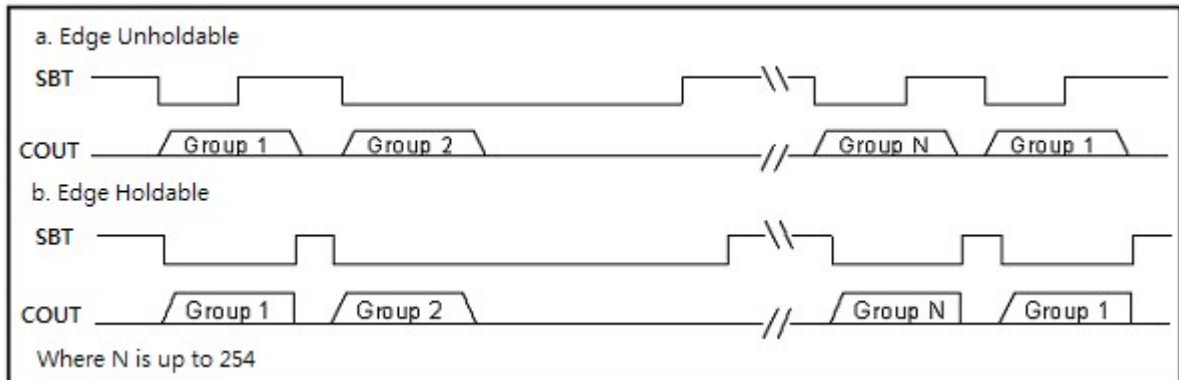


Fig. 6 SBT sequential trigger with Edge Holdable and Unholdable

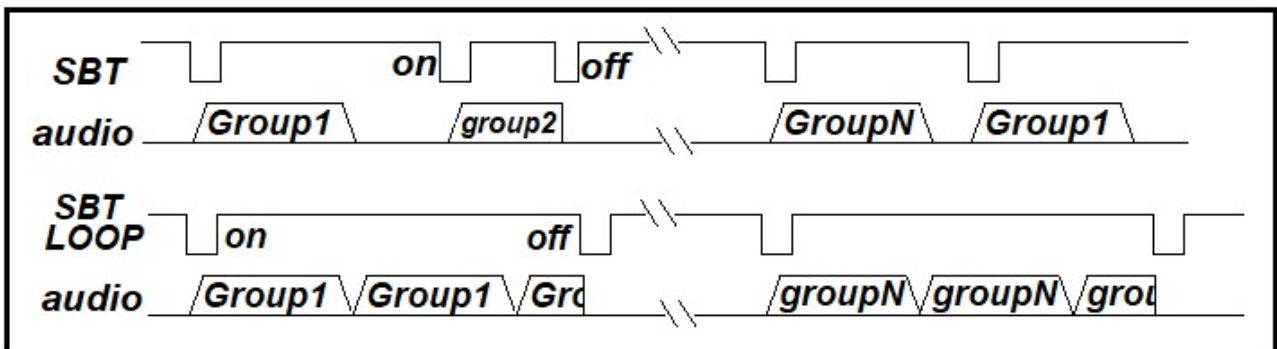


Fig. 7 SBT sequential trigger with On/Off

**Trigger Mode**

There are 7 trigger modes

- SBT Mode.
- Key Mode.
- Key(Matrix) Mode.
- MP3 Mode.
- 1-Wire Mode.
- 2-Wire Mode.
- 3-Wire Mode.

• **SBT Mode :**

Maximum Voice Groups : 254 for each I/O. All I/O can be chosen input or output. Each Voice Group can have its independent trigger options (See Fig. 1,2,4 and 5 ). SBT mode has an additional on/off function. (See Fig. 7 ).

P00	P01	P02	P03	P04 ~ P07
SEQ/VOL/OUT	SEQ/VOL/OUT	SEQ/VOL/OUT	SEQ/VOL/Reset/OUT	SEQ/VOL/OUT

**SEQ** : Sequential Play (See Fig. 3 and 6).

**VOL** : Volume Control

**Output** :BusyH , BusyL , 3Hz , 6Hz , LED-dyna , StopH , StopL

• **Key Mode :**

All I/O can be chosen input or output .Each Voice Group can have its independent trigger options (See Fig. 1,2,4 and 5 ).

	P00	P01	P02	P03	P04 ~ P07
<b>1 key</b>	Key in	Out	Out	Out/Reset	Out
<b>3 key</b>	Key in	Key in	Out	Out/Reset	Out
<b>7 key</b>	Key in	Key in	Key in	Out/Reset	Out
<b>15 key</b>	Key in	Key in	Key in	Key in	Out

**Output** :BusyH , BusyL , 3Hz , 6Hz , LED-dyna , StopH , StopL

**1 key setting :**

Voice Group	P00
SW1	0

**3 keys setting :**

Voice Group	P00	P01
SW1	0	1
SW2	1	0
SW3	0	0

**7 keys setting :**

Voice Group	P00	P01	P02
SW1	0	1	1
SW2	1	0	1
SW3	1	1	0
SW4	0	0	1
SW5	1	0	0
SW6	0	1	0
SW7	0	0	0

**15 keys setting :**

Voice Group	P00	P01	P02	P03
SW1	0	1	1	1
SW2	1	0	1	1
SW3	1	1	0	1
SW4	1	1	1	0
SW5	0	0	1	1
SW6	1	0	0	1
SW7	1	1	0	0
SW8	0	1	1	0
SW9	0	1	0	1
SW10	1	0	1	0
SW11	0	0	0	1
SW12	0	0	1	0
SW13	0	1	0	0
SW14	1	0	0	0
SW15	0	0	0	0

- Key(Matrix) Mode :**

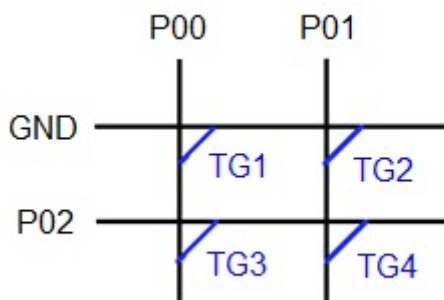
The sound group is triggered by combining P00 to P07 and GND in a matrix. All I/O scan be chosen input or output. Each Voice Group can have its independent trigger option (see Figures 1, 2, 4 and 5 ).

	P00	P01	P02	P03	P04	P05	P06	P07
<b>4MKey</b>	Scan in	Scan in	Scan Out	Vol/Reset/Out	--	--	--	--
<b>6MKey</b>	Scan in	Scan in	Scan in	Scan out	--	--	--	--
<b>9MKey</b>	Scan in	Scan in	Scan in	Vol/Reset/Out	Scan out	Scan out	--	--
<b>12MKey</b>	Scan in	Scan in	Scan in	Vol/Reset/Out	Scan out	Scan out	Scan out	--
<b>16MKey</b>	Scan in	Scan in	Scan in	Vol/Reset/Out	Scan in	Scan out	Scan out	Scan out
<b>20MKey</b>	Scan in	Scan in	Scan in	Scan in	Scan out	Scan out	Scan out	Scan out

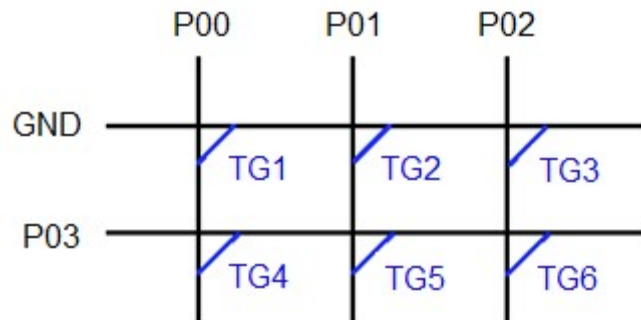
**Output :** BusyH , BusyL , 3Hz , 6Hz , LED-dyna , StopH , StopL

**VOL :** Volume Control

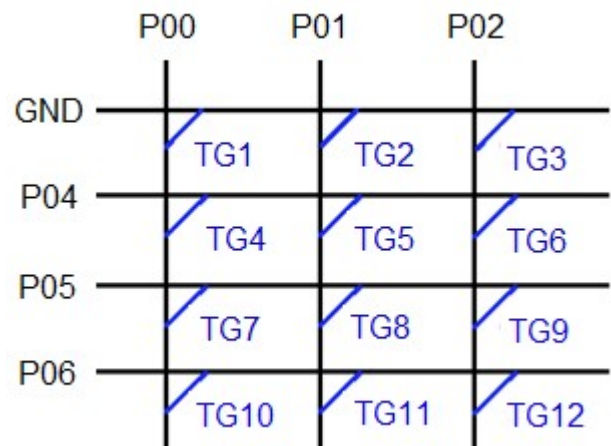
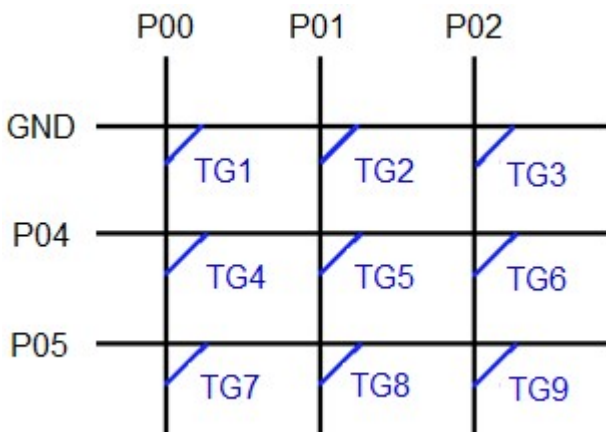
**4MKeys :** In(P00 , P01)xOut (GND,P02)



**6MKeys :** In(P00 , P01 , P02)xOut (GND , P03)

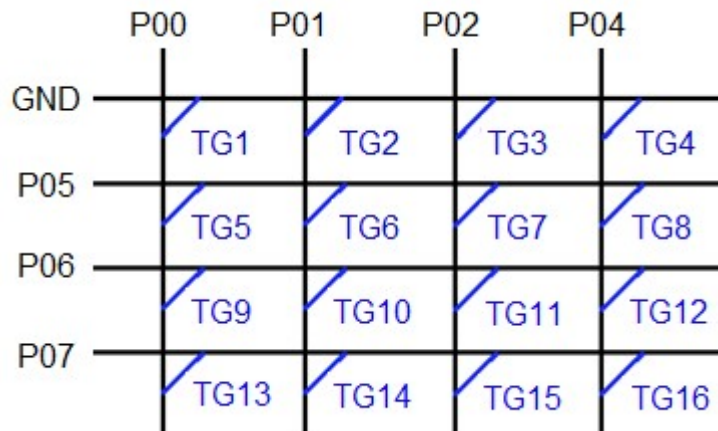


**9MKeys:** In(P00,P01,P02)xOut (GND,P04,P05) **12MKeys:** In(P00,P01,P02)xOut (GND,P04,P05,P06)

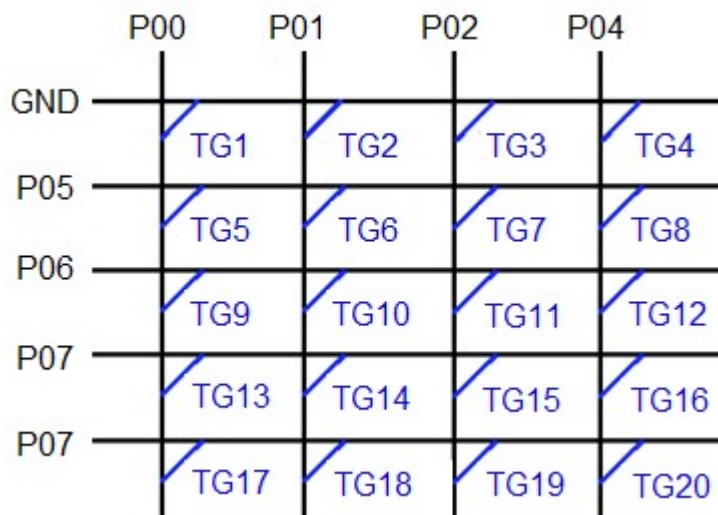




**16MKeys: In(P00 , P01 , P02 , P04) x Out (GND , P05 , P06 , P07)**



**20MKeys: In(P00 , P01 , P02 , P03) x Out (GND , P04 , P05 , P06 , P07)**



• **MP3 Mode**

User can start to Play or Pause the voice by P00 pin, and Backward or Forward play by P01 pin or P02 pin, up to 254 Voice Sections.

P00	P01	P02	P03	P04 ~ P07
Play/pause	backward	forward	Reset / Vol / Out	Vol / Out

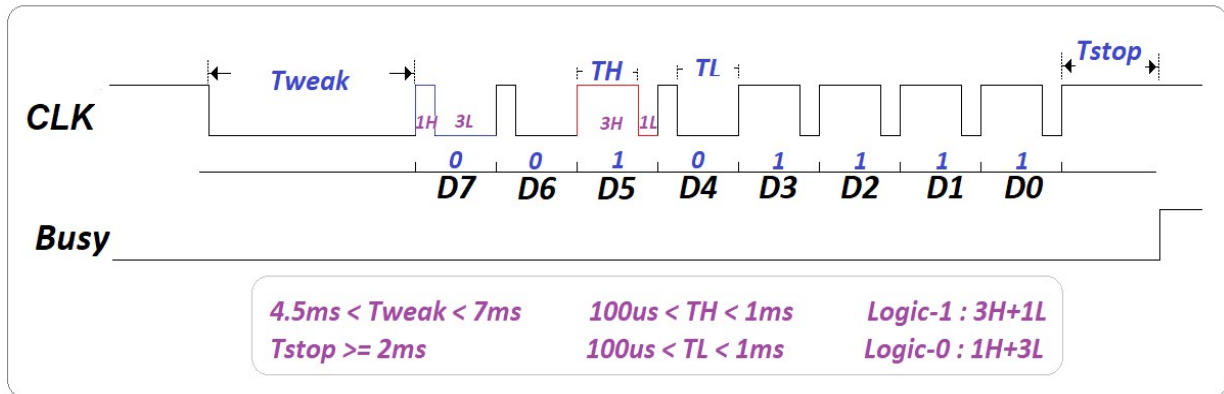
**VOL** : Volume Control

**Output** :BusyH , BusyL , 3Hz , 6Hz , LED-dyna , StopH , StopL

• 1-wire mode :

P00	P01	P02	P03	P04 ~ P07
Rx	Out	Out	Out/Reset	Out

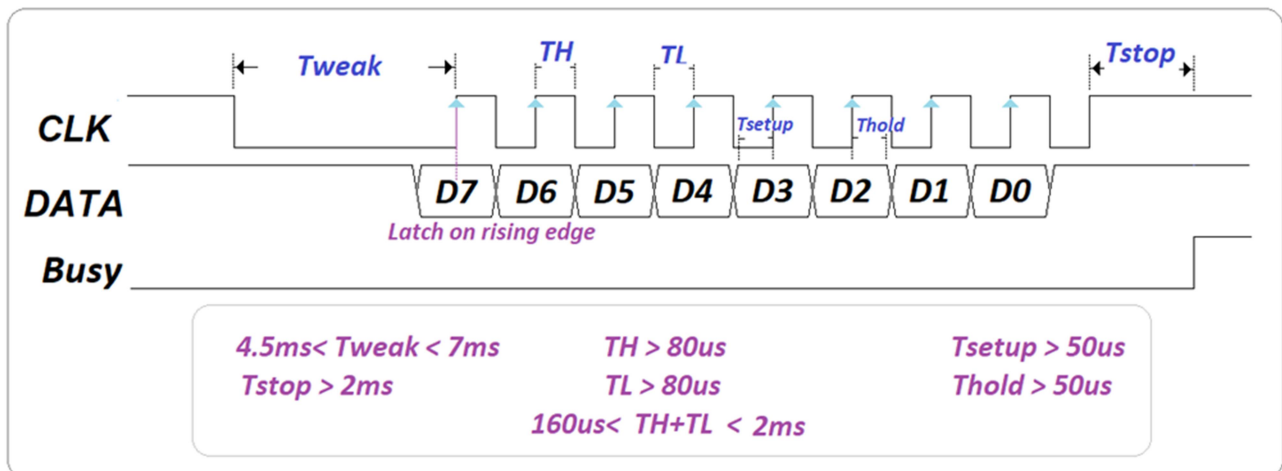
Output :BusyH , BusyL , 3Hz , 6Hz , LED-dyna , StopH , StopL



• 2-wire mode :

P00	P01	P02	P03	P04 ~ P07
Sdata	Sclk	Out	Out/Reset	Out

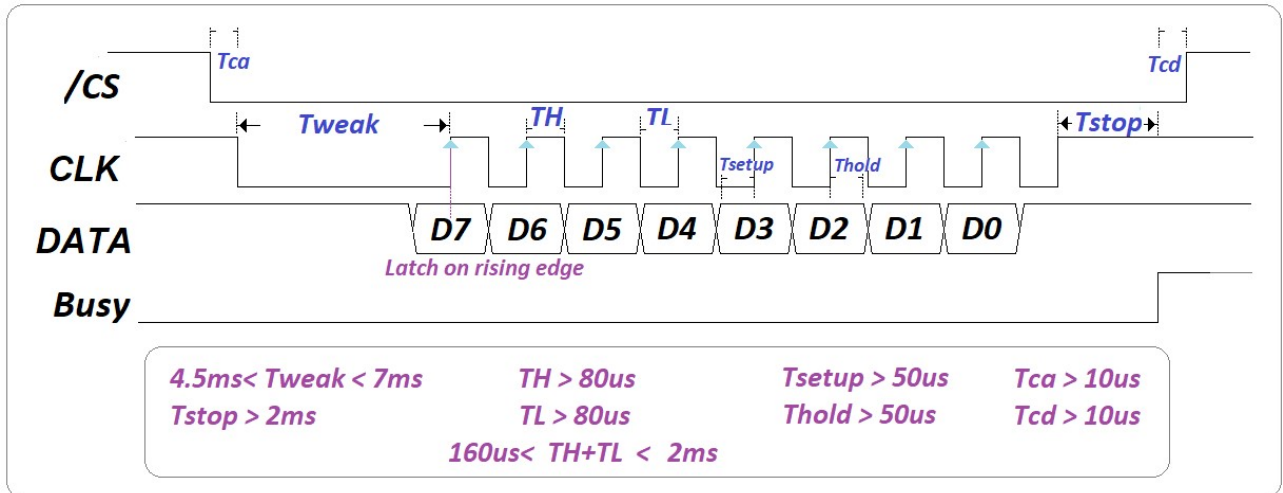
Output :BusyH , BusyL , 3Hz , 6Hz , LED-dyna , StopH , StopL



• 3-wire mode :

<b>P00</b>	<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04 ~ P07</b>
Sdata	Sclk	Cs	Out/Reset	Out

Output : BusyH , BusyL , 3Hz , 6Hz , LED-dyna , StopH , StopL



Command :

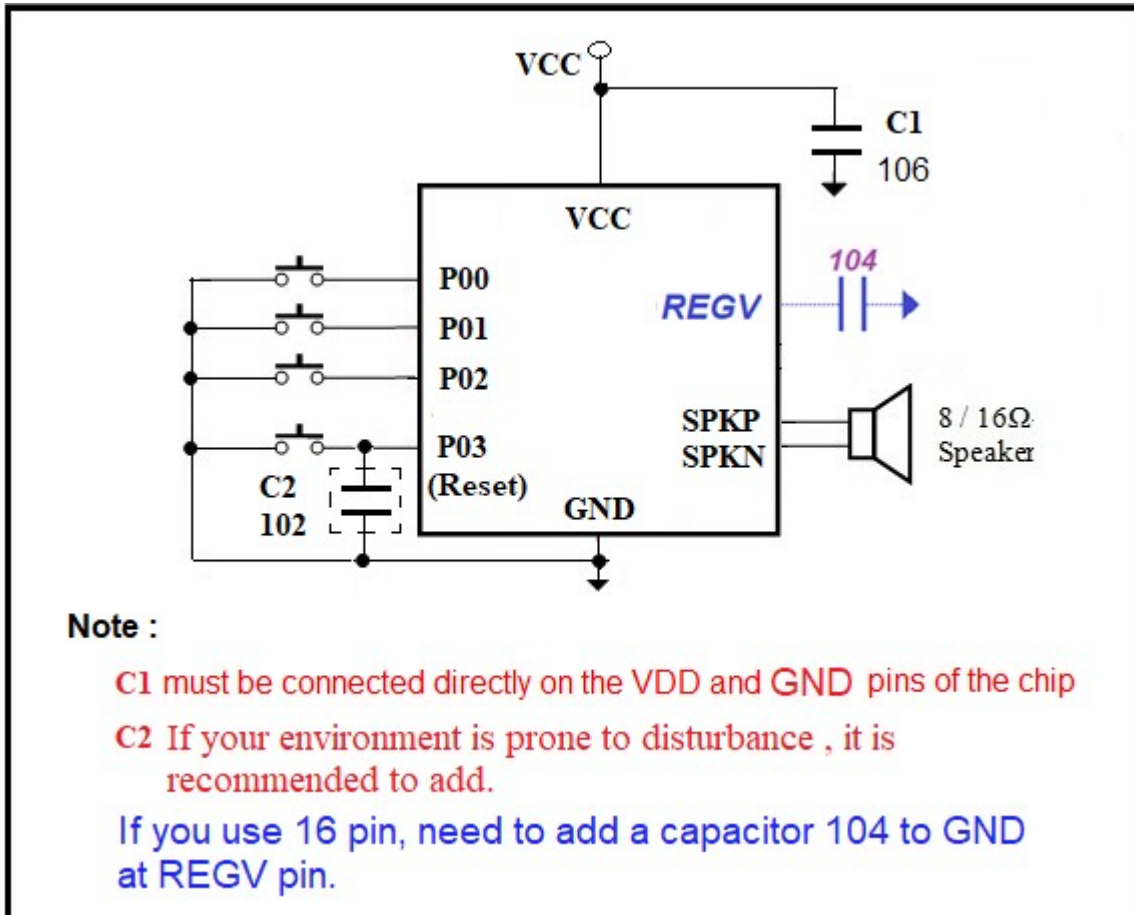
command	D7	D6	D5	D4	D3	D2	D1	D0
play sentence(n)	01 ~ DF							
set volume (n)	E				n			
reserved	F0 ~ F7							
repeat off	F8							
repeat on	F9							
Vol-	FA							
Vol+	FB							
Play Next	FC							
Play Previous	FD							
Pause / Resume	FE							
Stop	FF							

DC Characteristics (VCC = 3.0V , VDD = 2.0V , GND = 0V , TA = 25°C)

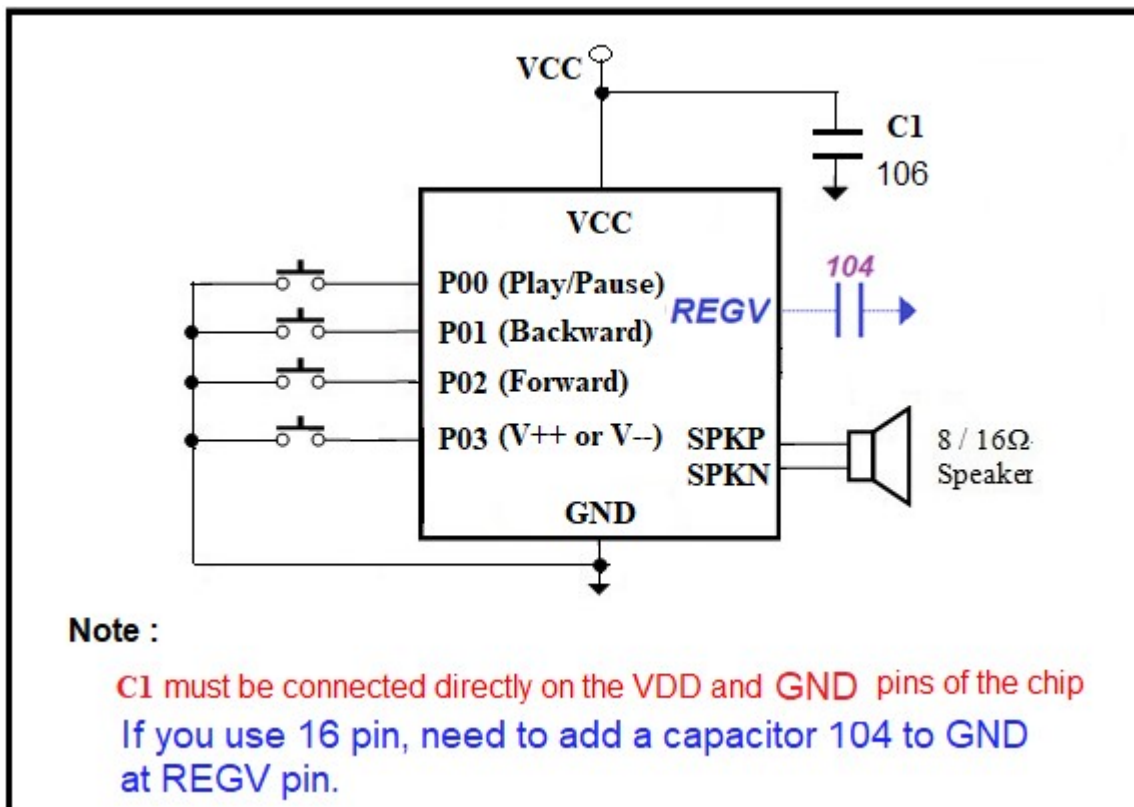
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
PORT0[2:0]	Driving Current	2		12	mA	VOH=2.7
PORT0[3]	Driving Current		2		mA	VOH=2.7
SPKP/SPKN	Driving Current			200	mA	RL = 8Ω @3.0V
SPKP/SPKN	Driving Current			320	mA	RL = 8Ω @4.5V
PORT0[2:0]	Sink Current	2		12	mA	VOL=0.3
PORT0[3]	Sink Current		2		mA	VOL=0.3
SPKP/SPKN	Sink Current			200	mA	RL = 8Ω @3.0V
SPKP/SPKN	Sink Current			320	mA	RL = 8Ω @4.5V
I_STD	Standby Current	0.5	1	2	uA	<2uA @<4.5V <3uA @4.5~5.1V

■ TYPICAL APPLICATIONS :

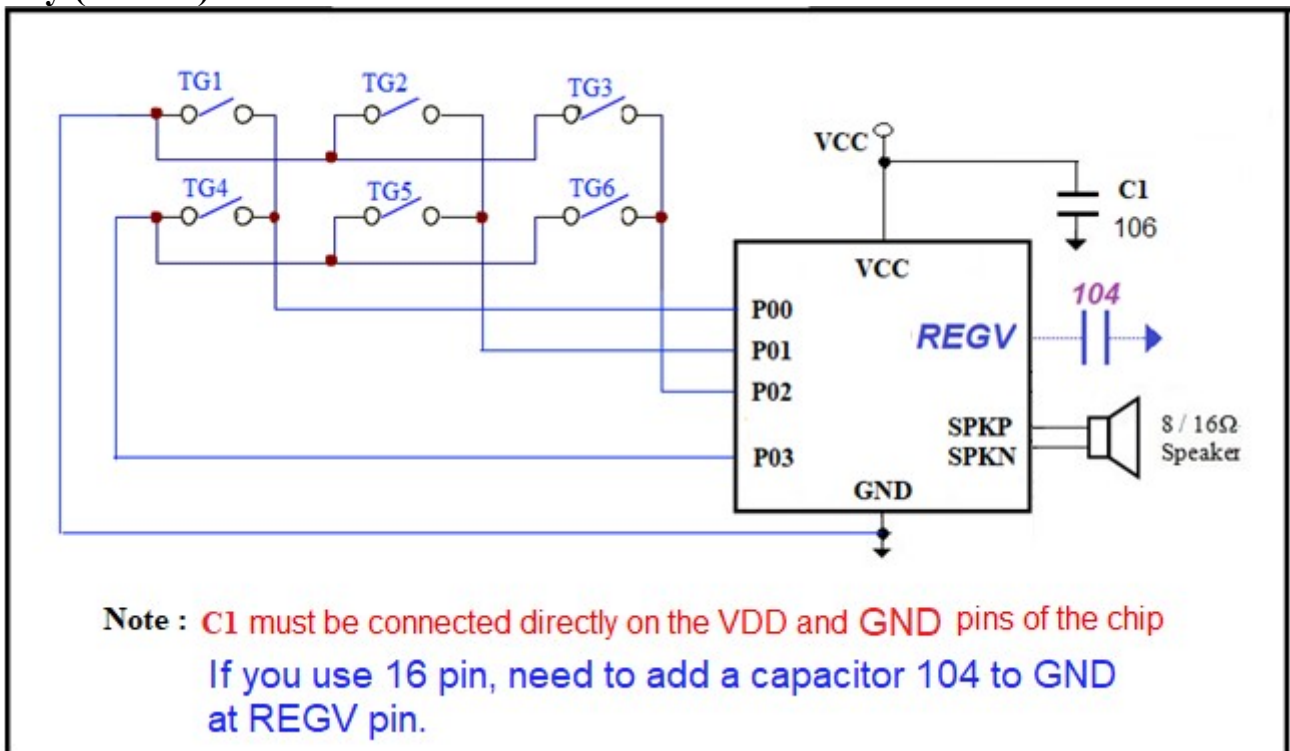
**KEY Mode and SBT Mode**



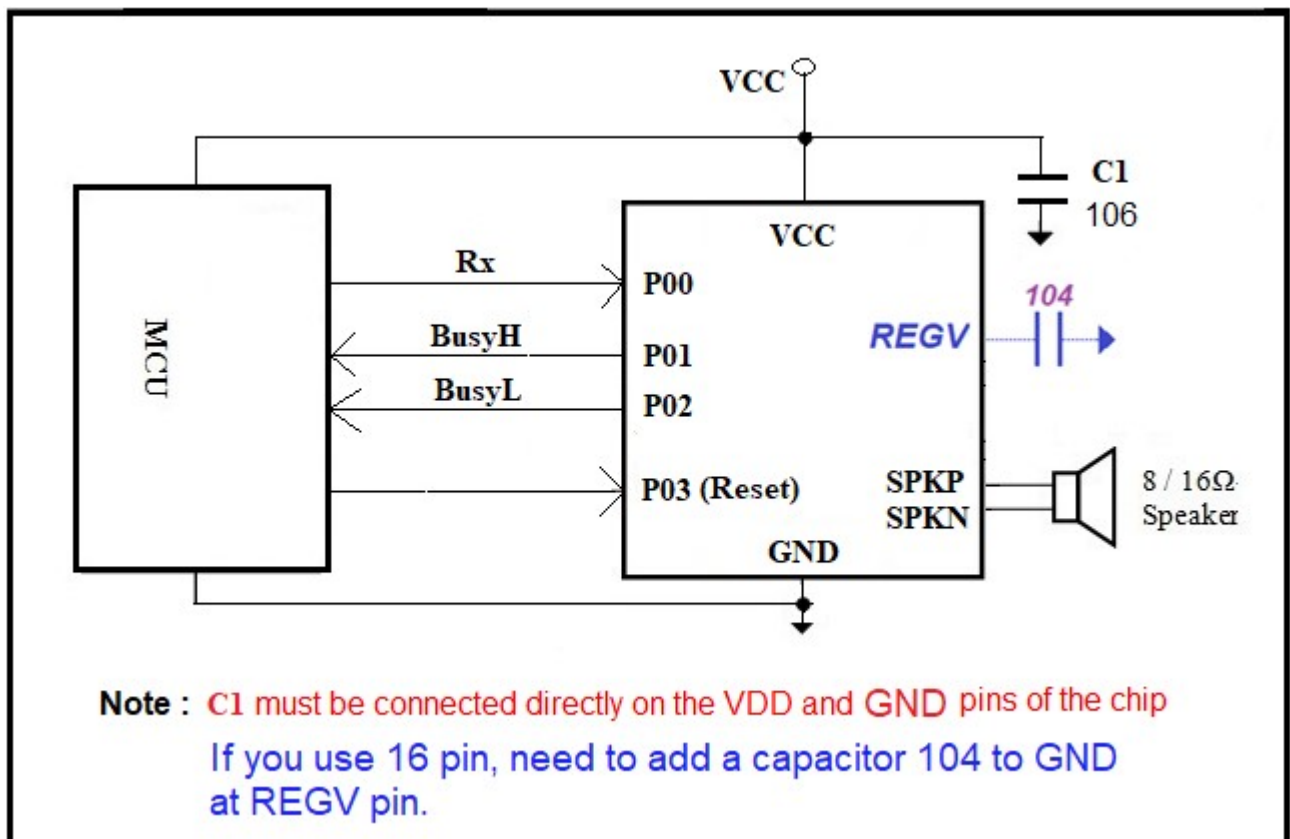
**MP3 Mode**



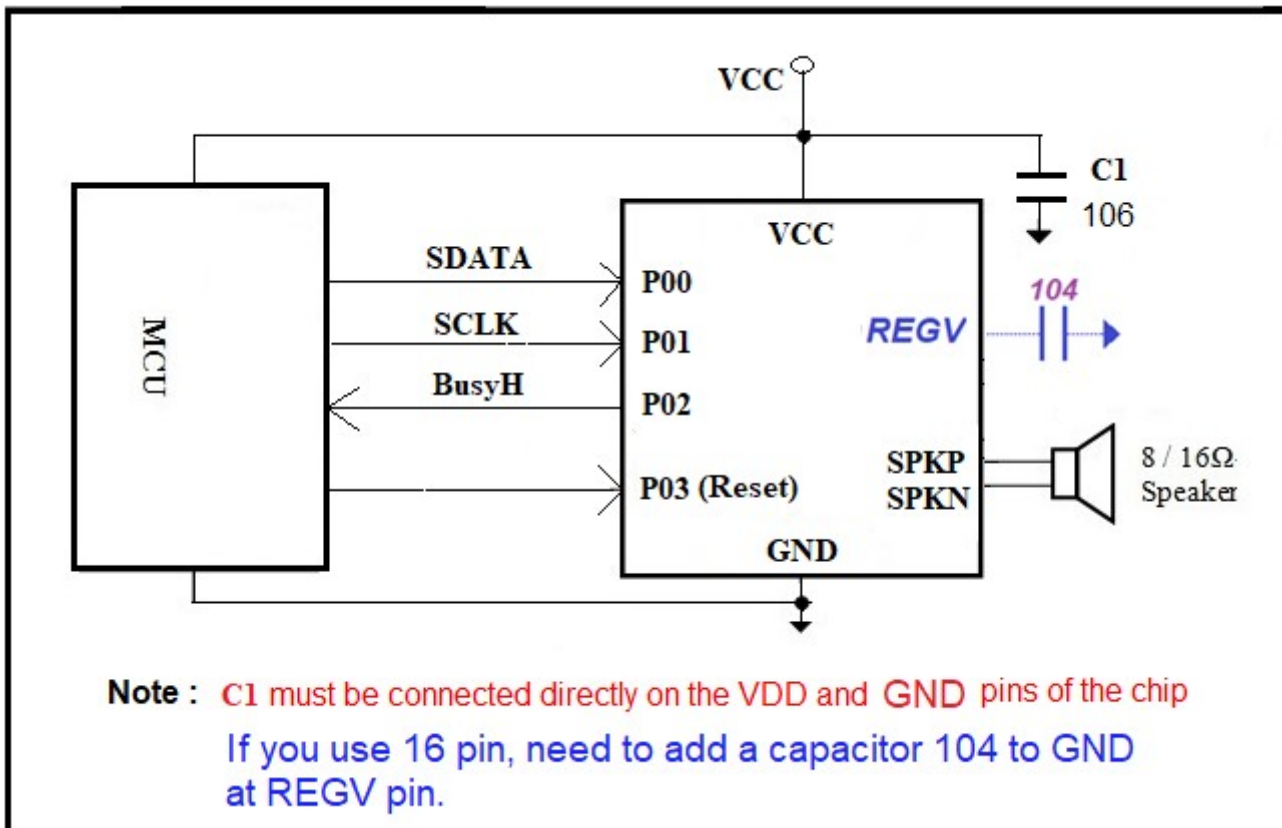
### Key (Matrix) Mode



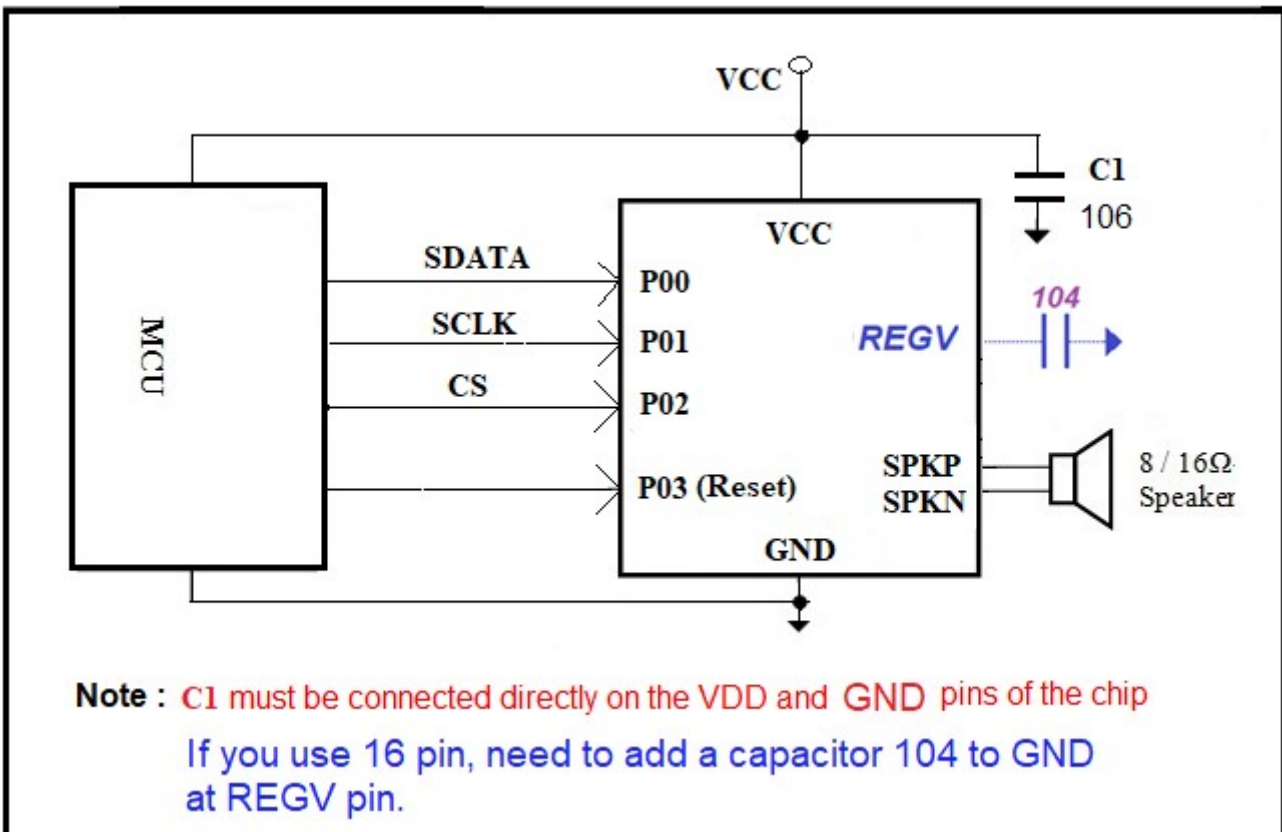
### 1-Wire



2-Wire

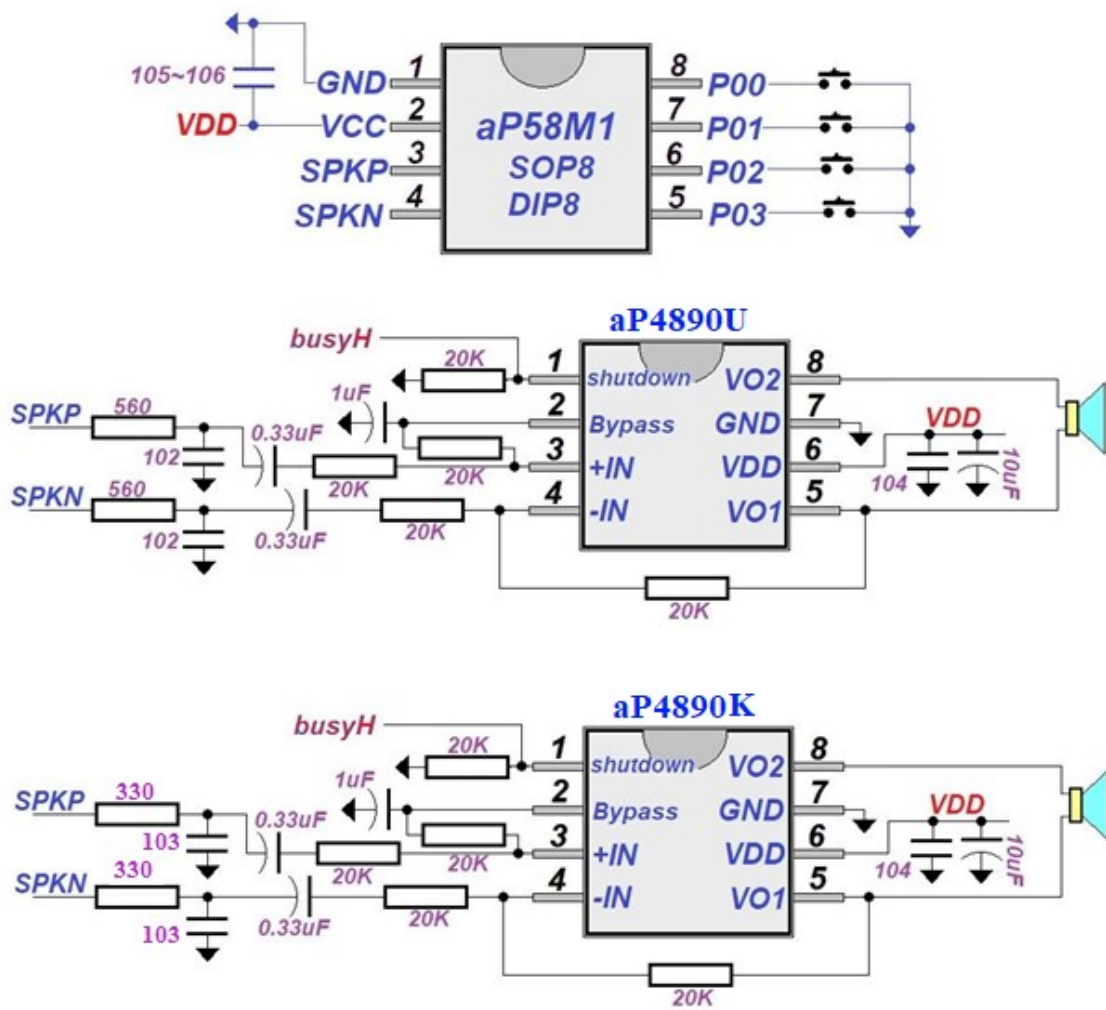


3-Wire



Amplify Application Circuit : aP4890K(1.4W X 8Ω) and aP4890U(1.7W X 8Ω)

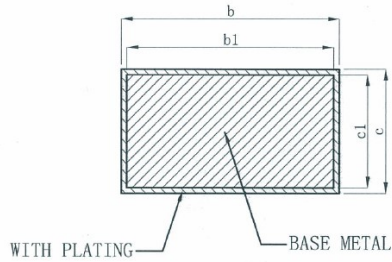
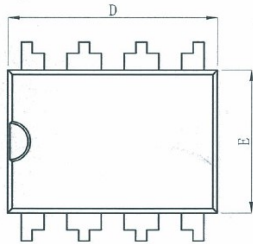
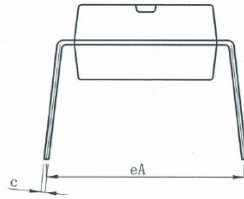
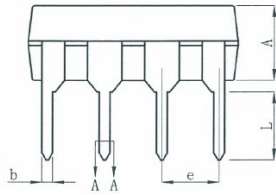
**PWM AMP. circuit :**





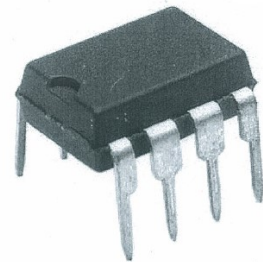
**PACKAGES DIMENSION OUTLINES**

**DIP8**



SECTION A-A

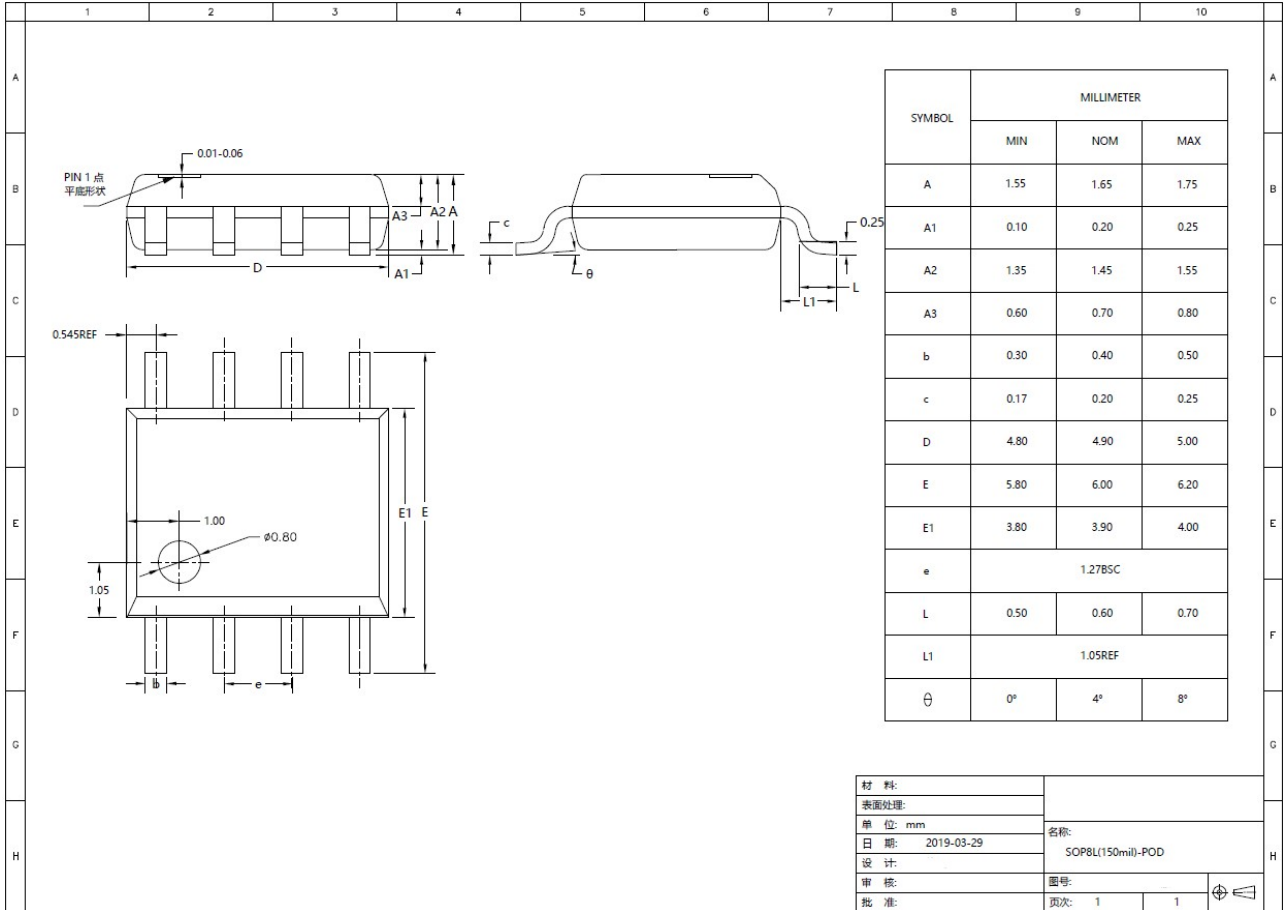
symbol	millimeter		
	Min	Nom	Max
A	3.20	3.30	3.40
b	0.44	---	0.53
b1	0.43	0.46	0.49
c	0.25	---	0.30
c1	0.24	0.25	0.26
D	9.20	9.30	9.40
E	6.30	6.40	6.50
e	2.54BSC		
eA	8.30	8.80	9.30
L	3.00	---	---



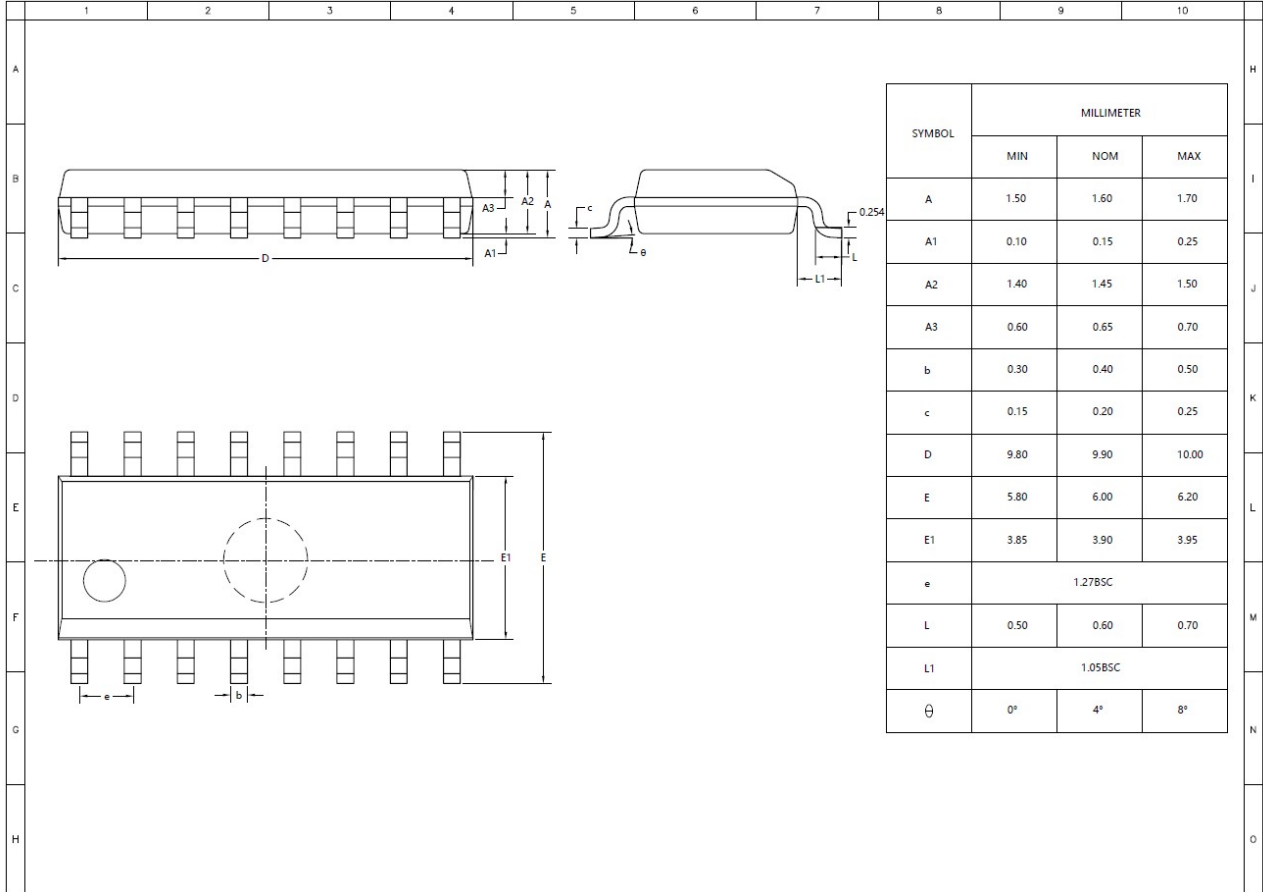
**Note:**

1. All dimension are in mm;
2. Dim D & E does not include plastic flash;  
Flash: Plastic residual around body edge after dejunk/singulation.
3. Dim b does not include dambar protrusion/intrusion.
4. Plating thickness 0.007-0.020 mm.

**SOP8**



**SOP16**



**History**

<b>Version no.</b>	<b>Date</b>	<b>Description</b>
1.0	12/12/2022	Internal Initial APLUS Release.
1.1	09/05/2024	Page10: 2-wire mode contril timing data pin modify to initial HIGH Page11: 3-wire mode contril timing data pin modify to initial HIGH