■ GENERAL DESCRIPTION :

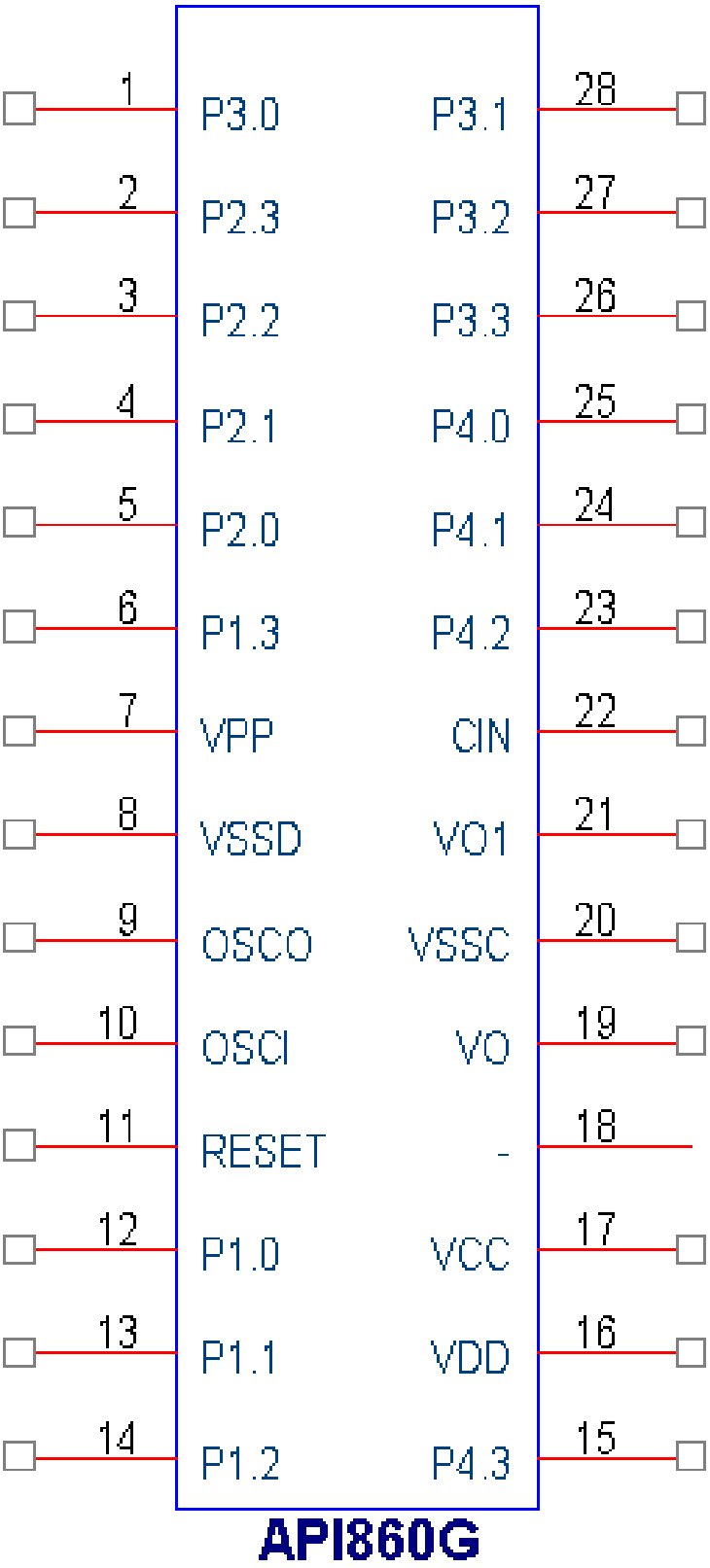
API860G is **63 seconds** single chip high quality **voice synthesizer IC** which contains one 4-bit Input port, three 4-bit I/O ports and a 4 bits CPU controller. By programming through the 4 bits CPU controller, user's application includes section combination, trigger mode, control outputs, keyboard matrix and other logic function can be easily implemented.

■ FEATURES :

- Single power supply.
- Crystal/Ring oscillator option.
- 63 seconds voice capacity.
- I/O port : 4 I + 12 I / O (But only P1 and P2 can wake up)
- Power down mode for saving power consumption.
- Reset pin available.
- Single ROM for voice program. Maximum 32 K program addressing size available.
- Readable ROM data.
- One 6 bit timer overflow control is provided.
- Two stack for subroutine call.
- 5 bits ASPCM synthesis.
- 38K Hz modulation for IR transmission.
- 15 steps volume control.
- Direct Drive/traditional DAC.
- 8 bits resolution D/A.

■ PIN DESCRIPTIONS :

Symbol	I/O	Function
P1.0	I	Bit 0 of Port 1.
P1.1	I	Bit 1 of Port 1.
P1.2	I	Bit 2 of Port 1.
P1.3	I	Bit 3 of Port 1.
P2.0	I/O	Bit 0 of Port 2.
P2.1	I/O	Bit 1 of Port 2.
P2.2	I/O	Bit 2 of Port 2.
P2.3	I/O	Bit 3 of Port 2.
P3.0	I/O	Bit 0 of Port 3.
P3.1	I/O	Bit 1 of Port 3.
P3.2	I/O	Bit 2 of Port 3. The pin can generate 38KHz square wave.
P3.3	I/O	Bit 3 of Port 3. The pin can be treated as an LED output flashing with volume
P4.0	I/O	Bit 0 of Port 4
P4.1	I/O	Bit 0 of Port 4
P4.2	I/O	Bit 0 of Port 4
P4.3	I/O	Bit 0 of Port 4
VDD	I	Positive digital power supply.
OSCI	I	Ring oscillator/crystal input pin.
RESET	I	Reset Pin.
OSCO	O	Crystal output pin.
TEST	I	For testing only.
VSSD	I	Negative digital power supply.
VCC	I	Positive analog power supply.
VSSC	I	Negative analog power supply.
VO	O	Constant current output / Push Pull voice output.
VO1	O	Push Pull voice output.


1
P3.0
P3.1
28
2
P2.3
P3.2
27
3
P2.2
P3.3
26
4
P2.1
P4.0
25
5
P2.0
P4.1
24
6
P1.3
P4.2
23
7
VPP
CIN
22
8
VSSD
VO1
21
9
OSCO
VSSC
20
10
OSCI
VO
19
11
RESET
-
18
12
P1.0
VCC
17
13
P1.1
VDD
16
14
P1.2
P4.3
15
API860G

■ ABSOLUTE MAXIMUM RATINGS :

Items	Sym.	Min.	Max.	Unit
Supply Voltage	VDD-VSS	-0.3	6.0	V
Input Voltage	VIN VSS	-0.3	VDD+0.3	V
Operating Temperature	TOP	0.0	70.0	oC
Storage Temperature	TSTG	-25.0	+125.0	oC

■ ELECTRICAL CHARACTERISTICS (25oC, VDD=3.0 Volts unless otherwise specified)

Parameter	Sym.	Min.	Typ.	Max.	Unit	Condition
Operating voltage	VDD	2.4	3.0	5.1	V	
Standby current	IDDS	-	-	2.0	µA	VDD=3V
Operating current	IDDO	-	180	350	µA	VDD=3V, No load, constant current D/A operate
Operating current	IDDO	-	3	6	mA	VDD=3V, No load, push-pull current D/A operate
Drive current of P2,P3,P4	IOD	2.0	3.0	-	mA	VDD=3V, VO=2.4V
Sink current of P2 (before KEYB)	IOS	-	3.0	10.0	µA	VDD=3V, VO=3V
Sink current of P2 (after KEYB)	IOS	2.3	3.5	-	mA	VDD=3V, VO=0.4V
Sink current of P3,P4	IOS	2.3	3.5	-	mA	VDD=3V, VO=0.4V
Input current of P1	IIH	-	3.0	10.0	µA	VDD=3V
Output current of VO	IVO	4.0	5.0	6.4	mA	VDD=3V, VO=0.7V
		4.0	5.3	6.7	mA	VDD=4.5V, VO=0.7V
Output current of VO,VO1		120	150	-	mA	VDD IVO =3V, VO=V1=0.7V
Oscillation resistor	R	-	470	-	KΩ	VDD=3V
			100	-	KΩ	VDD=3V
Oscillation frequency	FOSC	1.08	1.2	1.32	MHz	VDD=2.2~5.5V

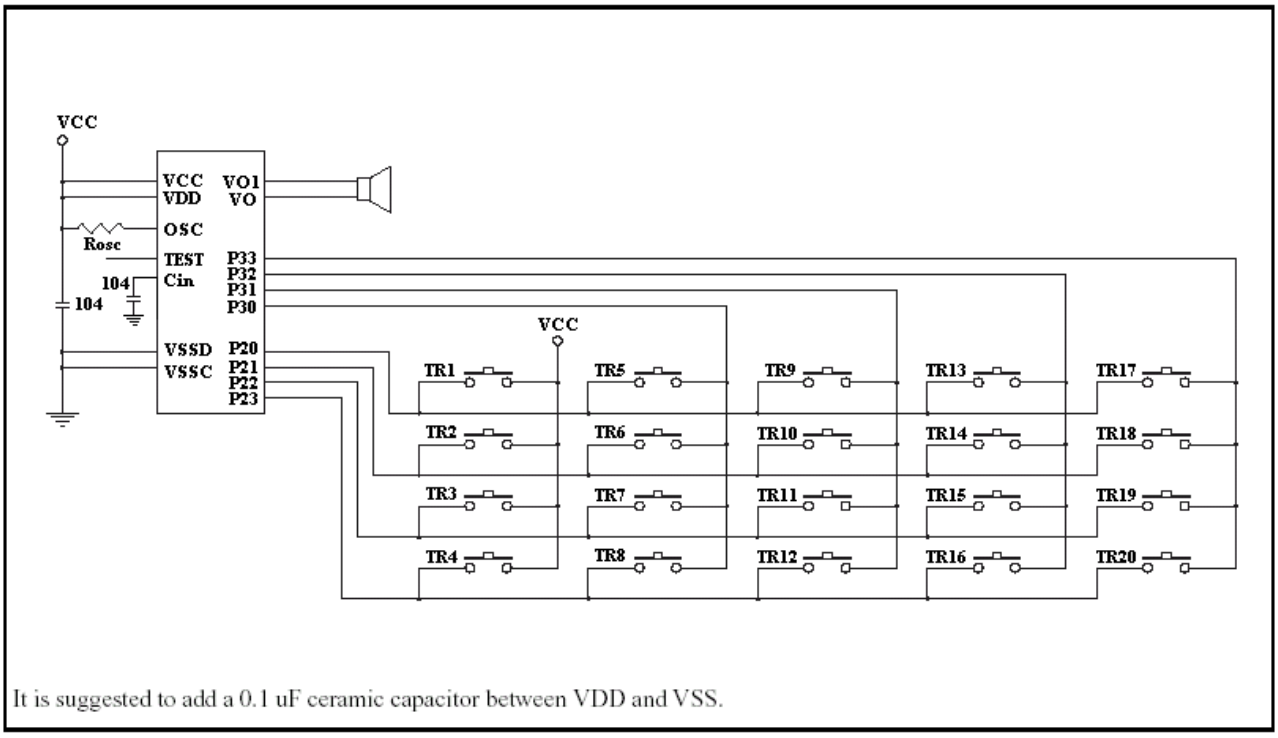
■ APPLICATION CIRCUIT :

In the following application circuits:

*1 : For heavy loading application, adding an electrolytic capacitor between Vcc and Ground is recommended.
The recommended value for button cell application is 10µF.

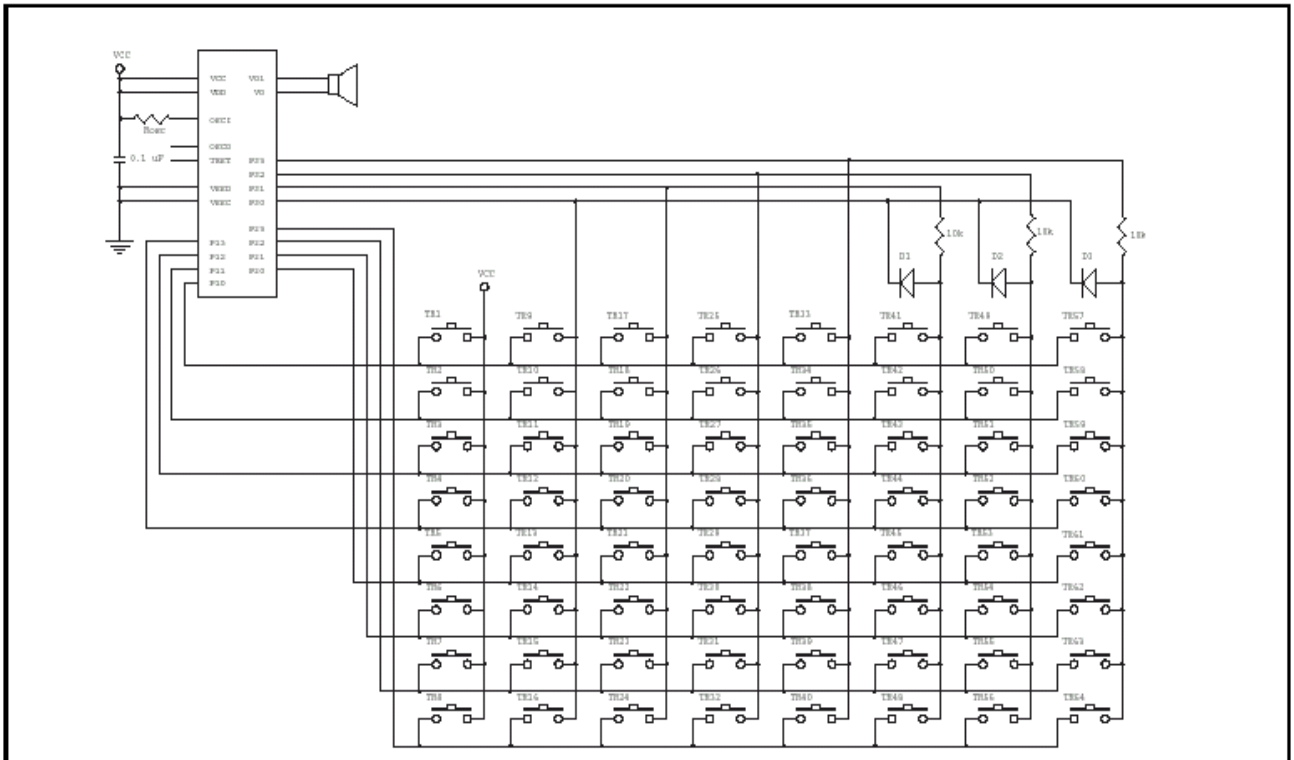
*2 : The recommended value for button cell application is 750,or less.

- **20-key Application Circuit**

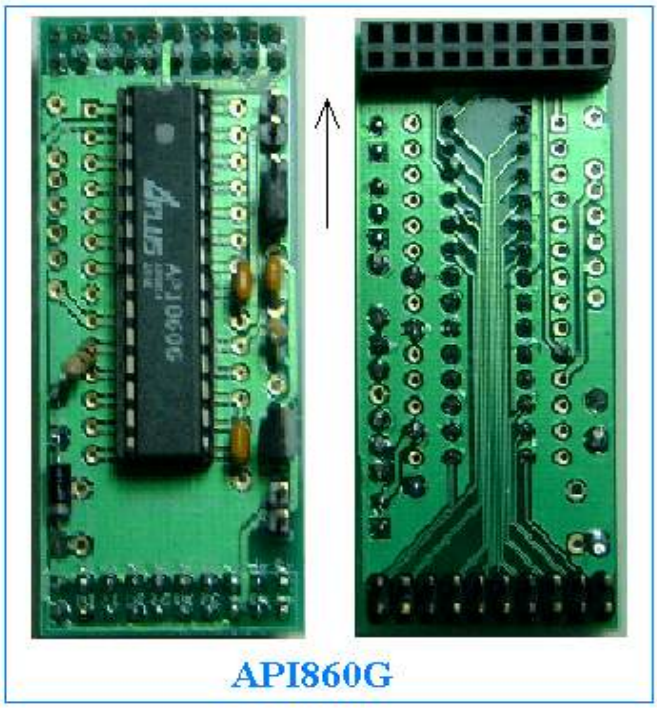
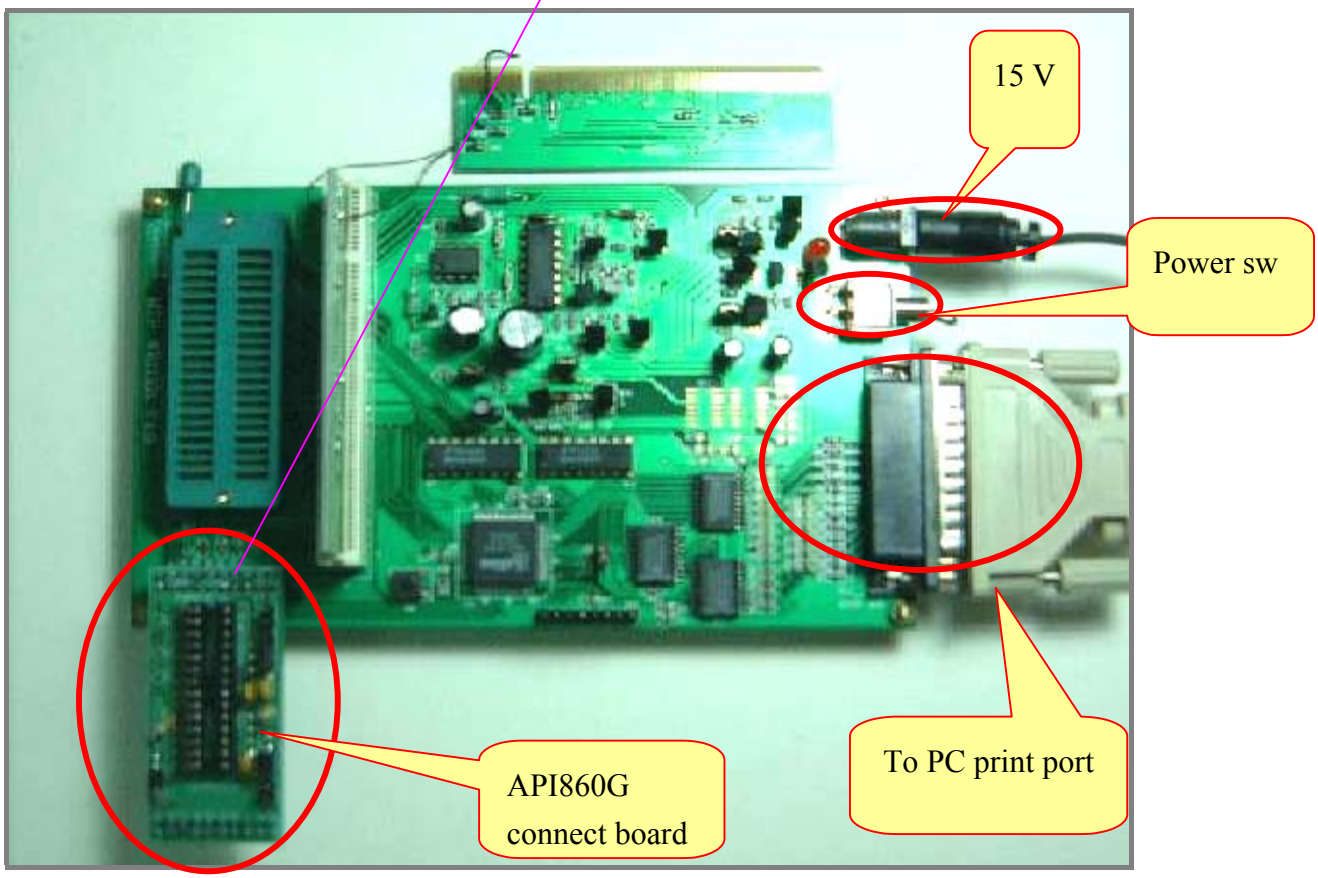


It is suggested to add a 0.1 uF ceramic capacitor between VDD and VSS.

- **64-key Application Circuit**



It is suggested to add a 0.1 uF ceramic capacitor between VDD and VSS.

■ Download board operation :

1. **Connect to the PC print port .**
2. **Put a API860G IC on the socket .**
3. **Power supple: 15V.**
4. **Turn on the power sw .**
5. **Press the programming button to burn the IC .**
   (Use the MTP Writer software.)