

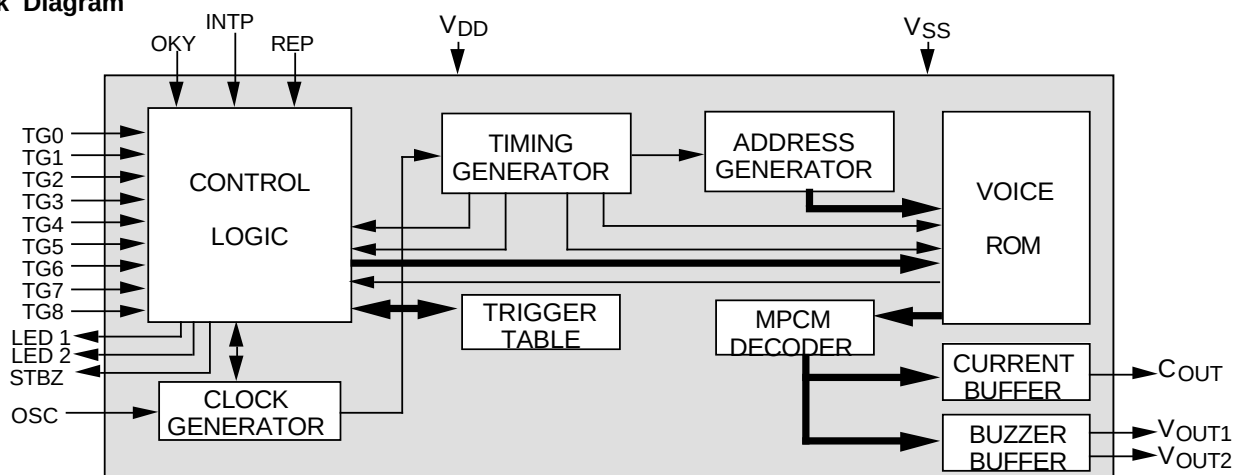
## Features

- Single power supply can operate at 2.4V through 6V.
- Current output can drive 8 ohm speaker with a transistor, Vout can drive buzzer directly.
- The voice content is stored up to 6 seconds and can be separated to 9 sections.
- Nine trigger input pins are provided. Each trigger pin can access a phrase instead of simple section. A phrase is composed of one or more than one section(s) and called a section - combination of sections.
- Total section number of all phrases is up to 64.
- Total duration of all sections with mute is up to 24 seconds.
- Interrupt function (INTP) stops the audio output at once.
- Playall function (OKY) plays all 9 phrases one by one by single trigger.
- Sequential function (OKY): one trigger plays next phrase of 9 phrases circularly.
- 2 LED function with 6 or 3 Hz flash is provided to tell the audio status in alternate flash.
- A STOP pulse comes out when audio signal is finished.
- CDS input interface with debounce is provided for 9 trigger pins, OKY pin and INTP pin.
- Extra pad for REPEAT playing.
- Mask option for either real Busy or Ground Busy on BUSY signal.
- Mask option for 10ms, 0.4ms, 10us on debounce time.
- Mask option for either PLAYALL or SEQUENTIAL for one-key function.
- Separate option setting on 9 individual trigger pins and OKY pin for below four masks:
  - a. Mask option for either Level or Edge trigger type.
  - b. Mask option for either Holdable or Unholdable output type.
  - c. Mask option for either BUSY output or STOP pulse on STBZ output.
  - d. Mask option for either Retrigger or Irretrigger .

## Description

The MSS0605 is a monolithic CMOS VLSI ASIC that can memorize voice up to 6 seconds using MOSEL qualified coding method (MPCM). It can play 9 phrases instead of 9 simple sections. Most of the necessary circuit are built in like oscillator, ROM, DAC and interface logic. 2 LEDs and separate option setting is provided . Customer voice data will be edited and built in by mask programming during the device fabrication.

## Block Diagram



**Pad Description**

| Pad No. | Signal Name       | I/O   | Function                                               |
|---------|-------------------|-------|--------------------------------------------------------|
| 1       | INTP              | I     | Interrupt input, internal pull low, high active        |
| 2       | OKY               | I     | One key function input, internal pull low, high active |
| 3       | TG8               | I     | Trigger 8 input, internal pull low, high active        |
| 4       | TG7               | I     | Trigger 7 input, internal pull low, high active        |
| 5       | TG6               | I     | Trigger 6 input, internal pull low, high active        |
| 6       | TG5               | I     | Trigger 5 input, internal pull low, high active        |
| 7       | TG4               | I     | Trigger 4 input, internal pull low, high active        |
| 8       | TG3               | I     | Trigger 3 input, internal pull low, high active        |
| 9       | TG2               | I     | Trigger 2 input, internal pull low, high active        |
| 10      | TG1               | I     | Trigger 1 input, internal pull low, high active        |
| 11      | TG0               | I     | Trigger 0 input, internal pull low, high active        |
| 12      | OSC               | I     | Oscillator Resistor input                              |
| 13      | V <sub>DD</sub>   | Power | Positive power supply                                  |
| 14      | C <sub>OUT</sub>  | O     | Audio signal current output (for speaker)              |
| 15      | V <sub>OUT1</sub> | O     | Audio signal voltage output (for buzzer)               |
| 16      | V <sub>OUT2</sub> | O     | Audio signal voltage output (for buzzer)               |
| 17      | LED 1             | O     | LED signal output , sink current output.               |
| 18      | LED 2             | O     |                                                        |
| 19      | STBZ              | O     | One shot stop signal output / BUSY signal output       |
| 20      | V <sub>SS</sub>   | Power | Negative power supply                                  |
| 21      | REP               | I     | High use as repeat                                     |
| 22      | NC                | NC    | No connection                                          |

**DC Characteristics**

| Symbol          | Parameter                                            |           | Min. | Typ. | Max. | Unit | Condition                                           |
|-----------------|------------------------------------------------------|-----------|------|------|------|------|-----------------------------------------------------|
| I <sub>SB</sub> | Supply Current                                       | Stand by  | —    | 0.1  | 1    | μA   | V <sub>DD</sub> = 4.5V, I/O Open                    |
| I <sub>OP</sub> |                                                      | Operating | —    | —    | 200  |      |                                                     |
| I <sub>IH</sub> | Input Current<br>TG0~TG8, OKY,<br>INTP, REP          |           | —    | 10   | —    | μA   | V <sub>DD</sub> = 4.5V                              |
| I <sub>IL</sub> |                                                      |           | —    | 0    | —    |      |                                                     |
| I <sub>OH</sub> | O/P Current<br>V <sub>OUT1</sub> , V <sub>OUT2</sub> | Drive     | —    | -13  | —    | mA   | V <sub>DD</sub> = 4.5V, V <sub>O/P</sub> = 0V       |
| I <sub>OL</sub> |                                                      | Sink      | —    | 13   | —    |      | V <sub>DD</sub> = 4.5V, V <sub>O/P</sub> = 4.5V     |
| I <sub>CO</sub> | Output Current (C <sub>OUT</sub> )                   |           | —    | 2.5  | —    | mA   | V <sub>DD</sub> = 3V, V <sub>O/P</sub> = 0V         |
|                 |                                                      |           | —    | 3.8  | —    |      | V <sub>DD</sub> = 4.5V, V <sub>O/P</sub> = 0V       |
|                 |                                                      |           | —    | 5.0  | —    |      | V <sub>DD</sub> = 6.0V, V <sub>O/P</sub> = 0V       |
| I <sub>OL</sub> | Output Current<br>LED1, LED2                         |           | —    | 13   | —    | mA   | V <sub>DD</sub> = 4.5V, V <sub>O/P</sub> = 4.5V     |
| I <sub>OH</sub> | Output Current<br>STOP / BUSY                        |           | —    | -8   | —    | mA   | V <sub>DD</sub> = 4.5V, V <sub>O/P</sub> = 0V       |
| I <sub>OL</sub> |                                                      |           | —    | 8    | —    |      | V <sub>DD</sub> = 4.5V, V <sub>O/P</sub> = 4.5V     |
| ΔF/F            | Frequency Stability                                  |           | —    | 5    | —    | %    | $\frac{F_{osc}(4.5V) - F_{osc}(4V)}{F_{osc}(4.5V)}$ |
| ΔF/F            | Fosc Variation                                       |           | —    | 10   | —    | %    | V <sub>DD</sub> = 4.5V, R <sub>osc</sub> = 1.2MΩ    |

## Absolute Maximum Rating

| Symbol               | Rating                                 | Unit |
|----------------------|----------------------------------------|------|
| $V_{DD} \sim V_{SS}$ | -0.5 ~ +7.0                            | V    |
| $V_{IN}$             | $V_{SS} - 0.3 < V_{IN} < V_{DD} + 0.3$ | V    |
| $V_{OUT}$            | $V_{SS} < V_{OUT} < V_{DD}$            | V    |
| T (Operating)        | -10 ~ +60                              | °C   |
| T (Storage)          | -55 ~ +125                             | °C   |

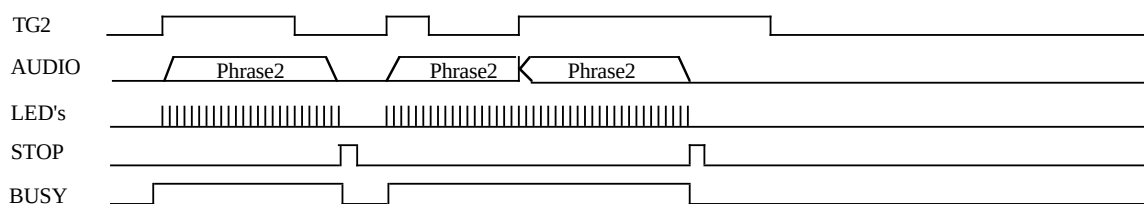
## AC Characteristics

| Timing     |                    | Min. | Typ. | Max. | Unit |
|------------|--------------------|------|------|------|------|
| $T_{STOP}$ | Stop pulse         | 20   | —    | —    | ms   |
| $T_P$      | Power rise up time | —    | —    | 1    | ms   |
| $T_R$      | Power Ripple width | —    | —    | 1    | ms   |

## Timing Diagram

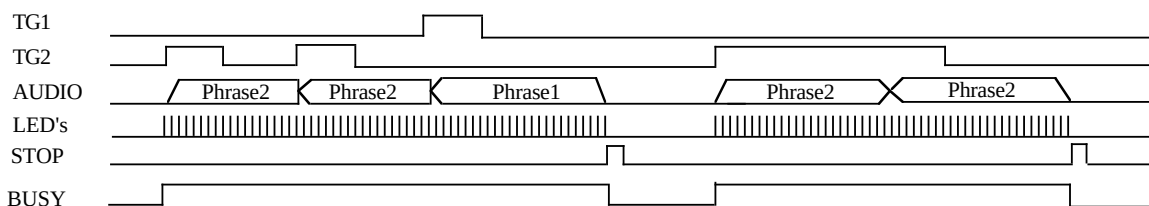
## I. Edge/Unholdable/Retrigger Trigger Mask

- a. When trigger is shorter than a whole section output    b. When trigger is longer than a whole section output



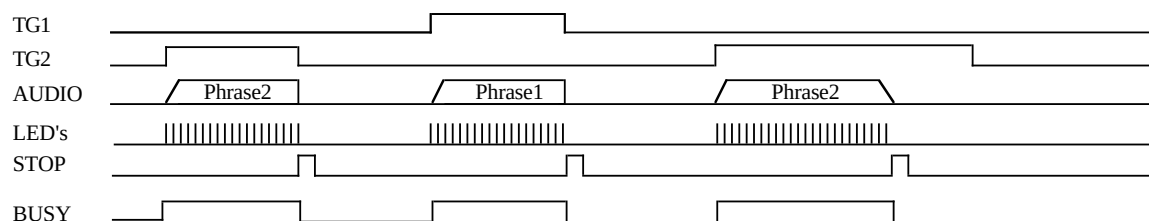
## II. Level/Unholdable/Retrigger Trigger Mask

- a. When trigger is shorter than a whole section output    b. When trigger is longer than a whole section output



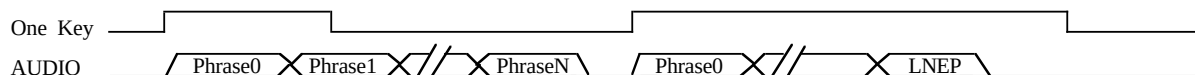
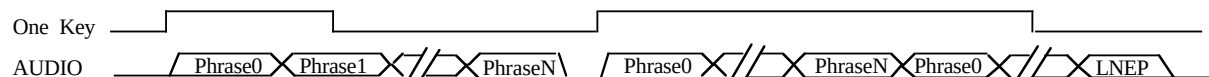
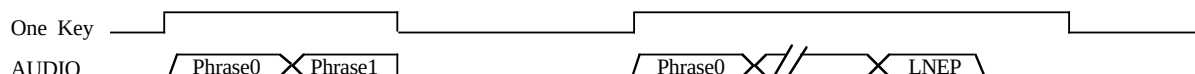
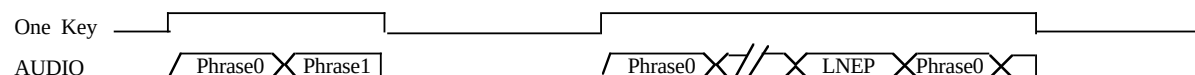
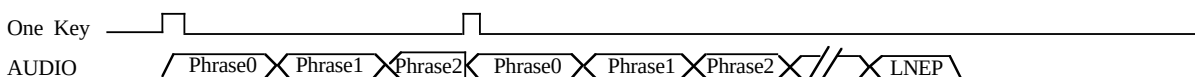
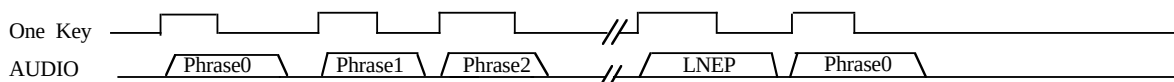
## III. Edge/Holdable/Retrigger Trigger Mask

- a. When trigger is shorter than a whole section output    b. When trigger is longer than a whole section output

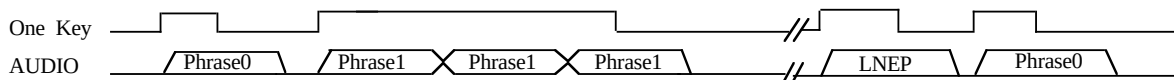
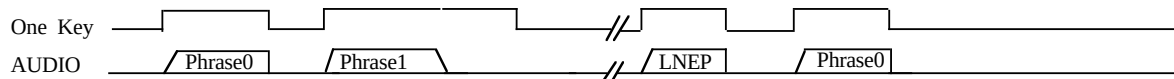
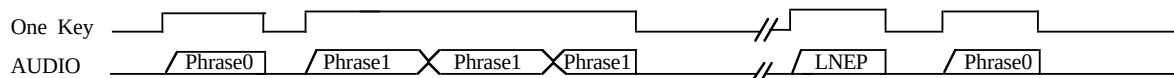
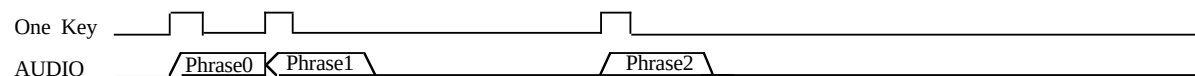


**IV. Level/Holdable/Retrigger Trigger Mask**

- a. When trigger is shorter than a whole section output      b. When trigger is longer than a whole section output

**V. One Key Pin Play All Function****a.EDGE / UNHOLD****b.LEVEL / UNHOLD****c.EDGE / HOLD****d.LEVEL / HOLD****e.RETRIGGER****VI. One Key Pin Sequential Play Function****a.EDGE / UNHOLD**

LNEP = The last Non-Empty Phrase

**b.LEVEL / UNHOLD****c.EDGE / HOLD****d.LEVEL / HOLD****e.RETRIGGER**

Timing diagram showing the relationship between TG1, Interrupt, and AUDIO signals. The diagram illustrates that the Interrupt signal is active (high) during the first and third audio phrases, while TG1 is active (high) during the first and second audio phrases.

Timing diagram showing the relationship between TG0, REP, and AUDIO signals. TG0 has two high pulses. REP has three high pulses. AUDIO shows two phrases: 'Phrase0' and 'Phrase0' followed by 'Phrase0' and 'Phrase0' with 'X' marks between them.

Timing diagram showing TG and AUDIO signals. TG has a pulse followed by a period  $T_T$  (3 optional intervals). AUDIO starts during the  $T_T$  period.

The schematic diagram illustrates the internal structure of the PIC16F505 microcontroller. The central component is the PIC core, labeled "PIC SIZE = 90 X 90 um". The core is surrounded by various internal blocks, including the CPU, memory, and peripheral modules. The diagram shows the connection of the microcontroller to external components and pins.

**Internal Components and Connections:**

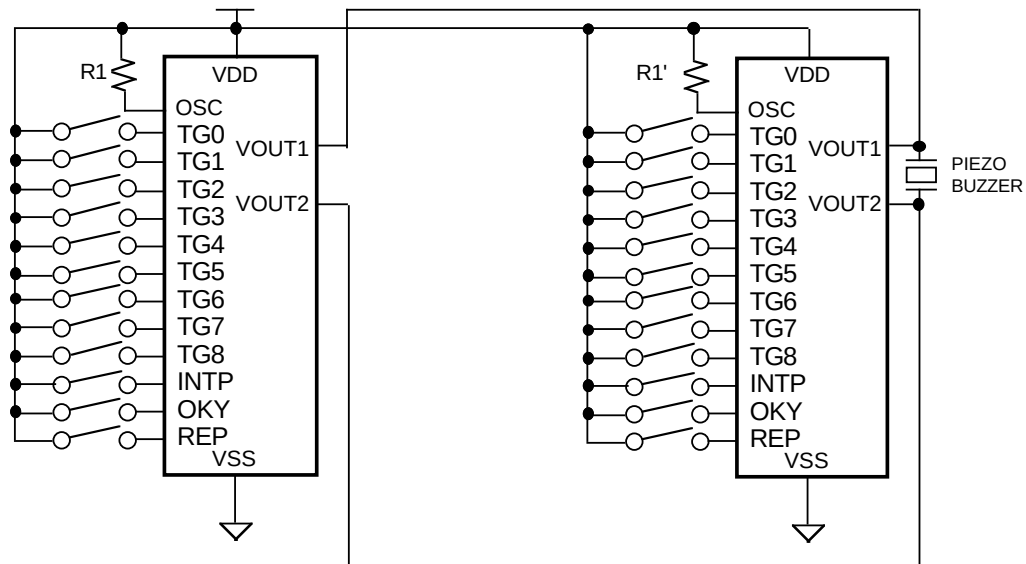
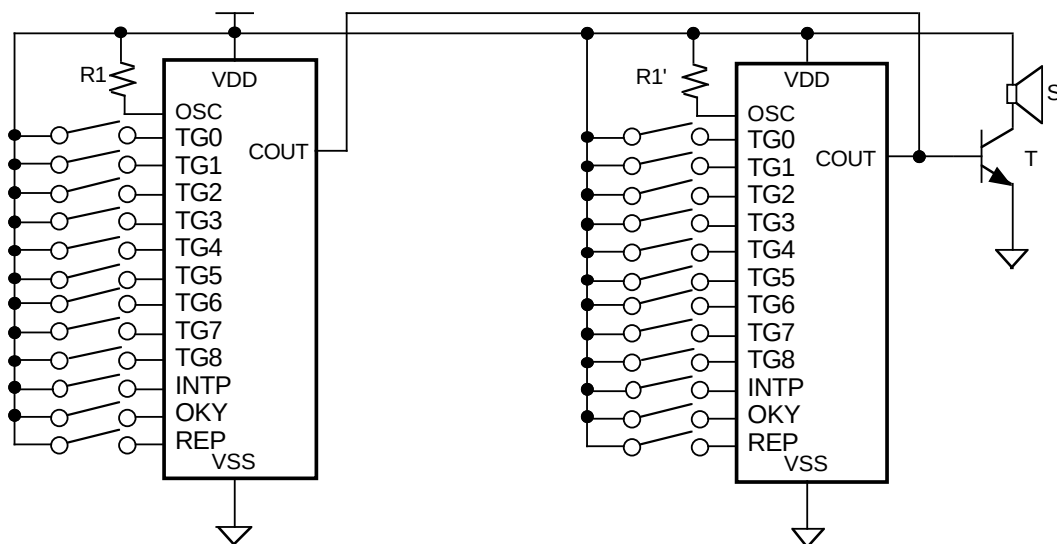
- Power Supply:** The core is connected to VDD and VSS (ground). A decoupling capacitor C<sub>out</sub> is connected between VDD and VSS.
- Resistors:** Resistors R1 and R2 are connected to the VDD and VSS pins, respectively.
- LEDs:** LEDs LED1 and LED2 are connected to the VDD and VSS pins, respectively.
- Transistors:** Transistors T1 through T8 are connected to the VDD and VSS pins, respectively.
- Diodes:** Diodes D1 and D2 are connected to the VDD and VSS pins, respectively.

**External Connections and Pins:**

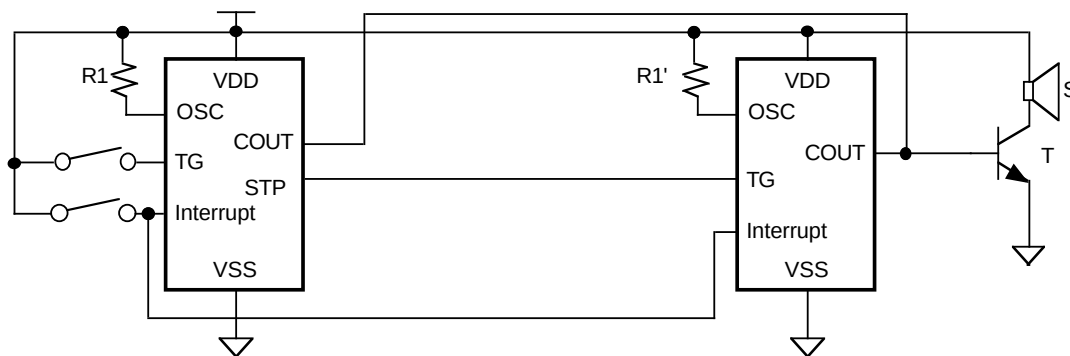
- Pin 1 (VDD):** Connected to the positive power supply.
- Pin 2 (VSS):** Connected to ground.
- Pin 3 (VDD):** Connected to the positive power supply.
- Pin 4 (VSS):** Connected to ground.
- Pin 5 (VDD):** Connected to the positive power supply.
- Pin 6 (VSS):** Connected to ground.
- Pin 7 (VDD):** Connected to the positive power supply.
- Pin 8 (VSS):** Connected to ground.
- Pin 9 (VDD):** Connected to the positive power supply.
- Pin 10 (VSS):** Connected to ground.
- Pin 11 (VDD):** Connected to the positive power supply.
- Pin 12 (VSS):** Connected to ground.
- Pin 13 (VDD):** Connected to the positive power supply.
- Pin 14 (VSS):** Connected to ground.
- Pin 15 (VDD):** Connected to the positive power supply.
- Pin 16 (VSS):** Connected to ground.
- Pin 17 (VDD):** Connected to the positive power supply.
- Pin 18 (VSS):** Connected to ground.
- Pin 19 (VDD):** Connected to the positive power supply.
- Pin 20 (VSS):** Connected to ground.
- Pin 21 (VDD):** Connected to the positive power supply.
- Pin 22 (VSS):** Connected to ground.
- Pin 23 (VDD):** Connected to the positive power supply.
- Pin 24 (VSS):** Connected to ground.
- Pin 25 (VDD):** Connected to the positive power supply.
- Pin 26 (VSS):** Connected to ground.
- Pin 27 (VDD):** Connected to the positive power supply.
- Pin 28 (VSS):** Connected to ground.
- Pin 29 (VDD):** Connected to the positive power supply.
- Pin 30 (VSS):** Connected to ground.
- Pin 31 (VDD):** Connected to the positive power supply.
- Pin 32 (VSS):** Connected to ground.
- Pin 33 (VDD):** Connected to the positive power supply.
- Pin 34 (VSS):** Connected to ground.
- Pin 35 (VDD):** Connected to the positive power supply.
- Pin 36 (VSS):** Connected to ground.
- Pin 37 (VDD):** Connected to the positive power supply.
- Pin 38 (VSS):** Connected to ground.
- Pin 39 (VDD):** Connected to the positive power supply.
- Pin 40 (VSS):** Connected to ground.
- Pin 41 (VDD):** Connected to the positive power supply.
- Pin 42 (VSS):** Connected to ground.
- Pin 43 (VDD):** Connected to the positive power supply.
- Pin 44 (VSS):** Connected to ground.
- Pin 45 (VDD):** Connected to the positive power supply.
- Pin 46 (VSS):** Connected to ground.
- Pin 47 (VDD):** Connected to the positive power supply.
- Pin 48 (VSS):** Connected to ground.
- Pin 49 (VDD):** Connected to the positive power supply.
- Pin 50 (VSS):** Connected to ground.
- Pin 51 (VDD):** Connected to the positive power supply.
- Pin 52 (VSS):** Connected to ground.
- Pin 53 (VDD):** Connected to the positive power supply.
- Pin 54 (VSS):** Connected to ground.
- Pin 55 (VDD):** Connected to the positive power supply.
- Pin 56 (VSS):** Connected to ground.
- Pin 57 (VDD):** Connected to the positive power supply.
- Pin 58 (VSS):** Connected to ground.
- Pin 59 (VDD):** Connected to the positive power supply.
- Pin 60 (VSS):** Connected to ground.
- Pin 61 (VDD):** Connected to the positive power supply.
- Pin 62 (VSS):** Connected to ground.
- Pin 63 (VDD):** Connected to the positive power supply.
- Pin 64 (VSS):** Connected to ground.
- Pin 65 (VDD):** Connected to the positive power supply.
- Pin 66 (VSS):** Connected to ground.
- Pin 67 (VDD):** Connected to the positive power supply.
- Pin 68 (VSS):** Connected to ground.
- Pin 69 (VDD):** Connected to the positive power supply.
- Pin 70 (VSS):** Connected to ground.
- Pin 71 (VDD):** Connected to the positive power supply.
- Pin 72 (VSS):** Connected to ground.
- Pin 73 (VDD):** Connected to the positive power supply.
- Pin 74 (VSS):** Connected to ground.
- Pin 75 (VDD):** Connected to the positive power supply.
- Pin 76 (VSS):** Connected to ground.
- Pin 77 (VDD):** Connected to the positive power supply.
- Pin 78 (VSS):** Connected to ground.
- Pin 79 (VDD):** Connected to the positive power supply.
- Pin 80 (VSS):** Connected to ground.
- Pin 81 (VDD):** Connected to the positive power supply.
- Pin 82 (VSS):** Connected to ground.
- Pin 83 (VDD):** Connected to the positive power supply.
- Pin 84 (VSS):** Connected to ground.
- Pin 85 (VDD):** Connected to the positive power supply.
- Pin 86 (VSS):** Connected to ground.
- Pin 87 (VDD):** Connected to the positive power supply.
- Pin 88 (VSS):** Connected to ground.
- Pin 89 (VDD):** Connected to the positive power supply.
- Pin 90 (VSS):** Connected to ground.
- Pin 91 (VDD):** Connected to the positive power supply.
- Pin 92 (VSS):** Connected to ground.
- Pin 93 (VDD):** Connected to the positive power supply.
- Pin 94 (VSS):** Connected to ground.
- Pin 95 (VDD):** Connected to the positive power supply.
- Pin 96 (VSS):** Connected to ground.
- Pin 97 (VDD):** Connected to the positive power supply.
- Pin 98 (VSS):** Connected to ground.
- Pin 99 (VDD):** Connected to the positive power supply.
- Pin 100 (VSS):** Connected to ground.

**NOTE : \* SUBTRATE is VDD**

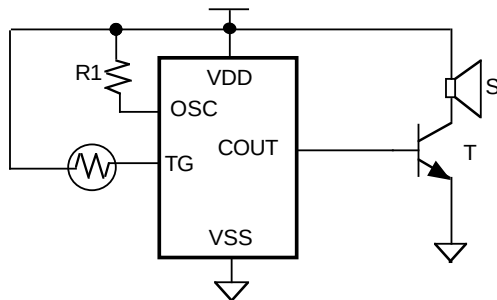
## 2. Parallel Application



### 3. Cascade Application

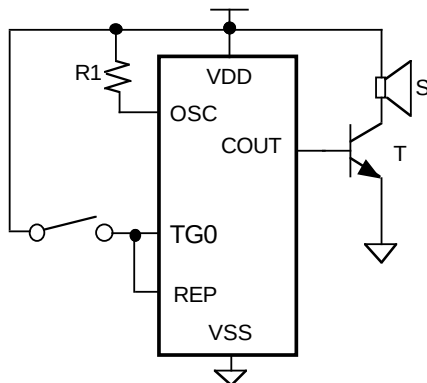


### 4. CDS Application



### 5. Edge Mode Change To Level Mode for TG0

(The pin "REP" connects to VDD)



- Note: 1.  $R1 = 1.2 \text{ M}\Omega$ ,  $T(\text{transistor}) = \beta > 130$ ,  $R2 = 470 \Omega$ ,  $S(\text{speaker}) = 1/4 \text{ w}, 8 \Omega$ ; all typical.  
 2.  $R2=470\Omega$  ( typical ) to bypass extra current into base to get rid of waveform saturation on collector .  
 3. Piezo buzzer resonant frequency being around 1K Hz is recommended.  
 4. Input switch could be replaced by CDS.  
 5. COUP, VOUT1, VOUT2 are tristate during stand by state.