

May 1997

2.7" VOICE ROM

## Features

- Single power can operate at 2.4 V through 6 V.
- Current output can directly drive either buzzer or speaker without a transistor.
- Built-in Oscillating Resistor.
- Single section, 2.79 seconds (4380h).
- Speech with mute (behind) is up to 21.1 seconds (20000h).
- Repeat function that can repeat up to 8 times.
- To turn on LED in sink connection.
- Automatic power down.
- CDS interface is provided.

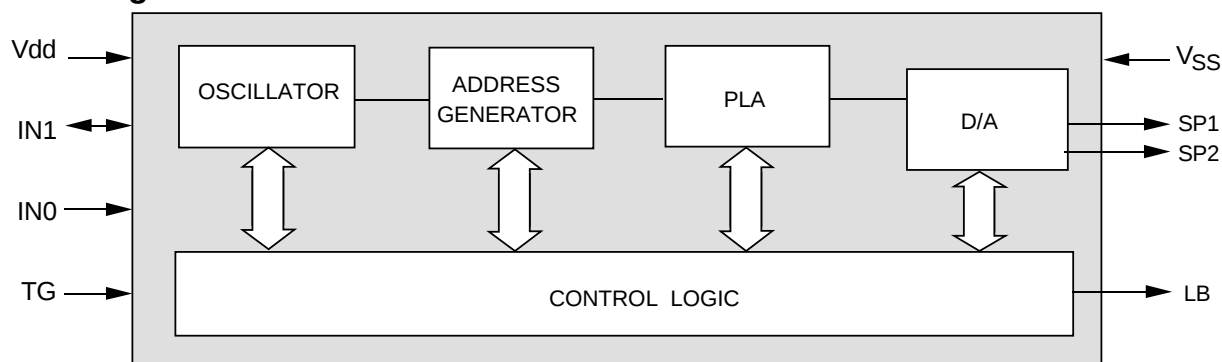
## Mask options

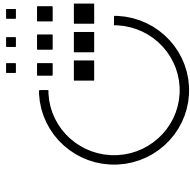
- Either level or edge trigger type at pin TG.
- Either LED flasher or BUSY output at pin LED/BZ.
- Either 6200Hz or 8400Hz S.R. for built-in Rosc.
- Either holdable output or not.
- Either retriggerable output or not.
- Either fixed or dynamic type on LED flasher.
- Either 3Hz or 6Hz LED fixed flasher, (S.R. dependent).
- Either Fast or Slow debounce time.

## General Description

The MSS0271 is a single-chip CMOS LSI demands minimal external components and memorizes voice up to 2.88 seconds (at 6 KHz S.R.) using the MOSEL qualified coding method (MPCM-4). The chip contains most of the necessary circuit like oscillator, PLA, D/A converter, buzzer buffer, control and timing logic. Therefore, it can apply to various voice systems with minimum external parts. Customer speech data will be edited and programmed into PLA by changing one mask during the device fabrication.

## Block Diagram





## Pad Description

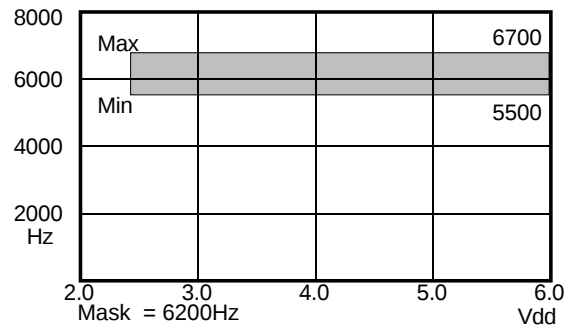
| P20 COB pin # | P28 COB pin # | Pad# | Symbol | Active | i/o | Names                                              |
|---------------|---------------|------|--------|--------|-----|----------------------------------------------------|
| 1             | 1             | 1    | TG     | high   | i   | trigger to play sound, internal pull low           |
| 3             | 3             | 2    | LB     |        | o   | LED flasher output or high true Busy signal output |
| 5             | 7             | 3    | IN0    |        | i   | input control 0                                    |
| 7             | 11            | 4    | IN1    |        | i/o | input control 1                                    |
| 14            | 19            | 5    | NC     |        |     | no connection                                      |
| 15            | 21            | 6    | SP2    |        | o   | speaker drive 2                                    |
| 16            | 23            | 7    | Vss    |        |     | ground                                             |
| 17            | 24            | 8    | SP1    |        | o   | speaker drive 1                                    |
| 18            | 26            | 9    | Vdd    |        |     | positive power supply                              |

## Absolute Maximum Rating

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

Operation beyond Absolute Maximal Rating can adversely affect device reliability

## FOSC Characteristics

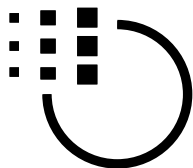


## Operating Conditions

| Symbol | Description                    | Min. | typ. | Max | Unit | Remarks |
|--------|--------------------------------|------|------|-----|------|---------|
| TA     | Ambient temperature under bias | -10  |      | 60  | °C   |         |
| VCC    | supply voltage                 | 2.4  |      | 6.0 | V    |         |
| SR     | sample rate                    |      | 6200 |     | Hz   | or 8400 |

## AC Characteristics at 4.5 V, 6200 Hz SR

| Symbol | Parameter                   | Valid    | Min. | typ. | Max | Unit | Remarks                 |
|--------|-----------------------------|----------|------|------|-----|------|-------------------------|
| T T1   | trigger pulse width         | TG       |      | 5    |     | mS   | slow debounce time, SRD |
| T T2   | trigger pulse width         | TG       |      | 1    |     | uS   | fast debounce time, SRD |
| T PUD  | power up delay              | Vdd, TG  |      | 0    |     | uS   |                         |
| T THLO | trigger high to LED on      | TG, LED  |      |      |     | uS   | mask = edge, SRD        |
| T THZH | trigger high to busy high   | TG, BUSY |      |      |     | uS   | mask = edge, SRD        |
| T THAS | trigger high to audio start | TG, SPs  |      |      |     | uS   | mask = edge, SRD        |
| T TLLF | trigger low to LED off      | TG, LED  |      | 0    |     | uS   | mask = level, SRD       |
| T TLZL | trigger low to busy low     | TG, BUSY |      | 0    |     | uS   | mask = level, SRD       |
| T THAE | trigger low to audio end    | TG, SPs  |      | 0    |     | uS   | mask = level, SRD       |
| T AELF | audio end to LED off        | TG, LED  |      | 0    |     | uS   | holdable output, SRD    |
| T AEZL | audio end to busy low       | TG, BUSY |      | 0    |     | uS   | holdable output, SRD    |
| T IWR1 | interval when repeat        | SPs      |      | 0    |     | uS   | inside sentence         |
| T IWR2 | interval when repeat        | SPs      |      | 322  |     | uS   | between sentences, SRD  |
| T LED3 | LED on time at 3 Hz         | LED      |      | 161  |     | mS   | SRD                     |
| T LED6 | LED on time at 6 Hz         | LED      |      | 81   |     | mS   | SRD                     |
| T P    | power rise up time          | Vdd      |      |      | 1   | mS   |                         |
| T R    | power ripple width          | Vdd      |      |      | 1   | mS   |                         |

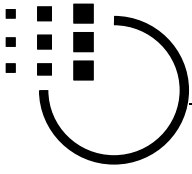
**DC Characteristics at 4.5 V**

| Symbol | Parameter                      | Valid | Min. | typ. | Max | Unit | conditions                  |
|--------|--------------------------------|-------|------|------|-----|------|-----------------------------|
| I SB   | standby I                      | Vdd   |      |      | 1   | uA   |                             |
| I OP   | operation I                    | Vdd   |      |      | 200 | uA   |                             |
| I IH   | input high I                   | TG    |      | 10   | 20  | uA   |                             |
| I IL   | input low I                    | TG    |      |      | 2   | uA   |                             |
| I LED  | output low I                   | LED   |      | 9    |     | mA   |                             |
| I OH   | output high I                  | BUSY  |      | -8   |     | mA   |                             |
| I OL   | output low I                   | BUSY  |      | 8    |     | mA   |                             |
| I OHS  | output high drive I            | SPs   |      | -90  |     | mA   |                             |
| I OLS  | output low sink I              | SPs   |      | 200  |     | mA   |                             |
| I LEDT | threshold sound to turn LED on |       |      | 75   |     | %    | of IOHS                     |
| R TG   | pull low R                     | TG    | 23   |      |     | Kohm |                             |
| d F/F  | frequency stability            |       |      |      | 5   | %    | [F(4.5V) - F(4V)] / F(4.5V) |
| d F/F  | frequency variation            |       |      |      | 10  | %    |                             |

Note: A bulk capacitor 0.1uF across the Vdd to Vss is demanded.

**DC Characteristics at 3.0 V**

| Symbol | Parameter                      | Valid | Min. | typ. | Max | Unit | conditions                |
|--------|--------------------------------|-------|------|------|-----|------|---------------------------|
| I SB   | standby I                      | Vdd   |      |      | 1   | uA   |                           |
| I OP   | operation I                    | Vdd   |      |      | 150 | uA   |                           |
| I IH   | input high I                   | TG    |      | 5    | 15  | uA   |                           |
| I IL   | input low I                    | TG    |      | 1    | 2   | uA   |                           |
| I LED  | output low I                   | LED   |      | 8    |     | mA   |                           |
| I OH   | output high I                  | BUSY  |      | -3   |     | mA   |                           |
| I OL   | output low I                   | BUSY  |      | 3    |     | mA   |                           |
| I OHS  | output high drive I            | SPs   |      | -45  |     | mA   |                           |
| I OLS  | output low sink I              | SPs   |      | 100  |     | mA   |                           |
| I LEDT | threshold sound to turn LED on |       |      | 75   |     | %    | of IOHS                   |
| R TG   | pull low R                     | TG    | 20   |      |     | Kohm |                           |
| d F/F  | frequency stability            |       |      |      | 5   | %    | [F(3V) - F(2.7V)] / F(3V) |
| d F/F  | frequency variation            |       |      |      | 10  | %    |                           |



## Signals

### SP+ and SP-

They are tristate during standby.

They are not at standby current when the data is in the middle.

These two pins can drive buzzer or speaker, 8 ohm or 16 ohm, directly. The speaker used should have its band width (BW) at the center of your sound frequency domain or you are unable to play your sound good by this speaker.

For instance, you have your sound spans over frequency from 100 Hz through 10 KHz. A speaker with BW meets requirement will play this sound good. A speaker with BW narrower than requirement (either has higher low-cut or lower high-cutoff) will distort the sound very much because that most of the energy of the playback sound is unable to be played by this speaker.

This pair has zero output when sound data is zero. This pair has full output when sound data is the highest. This pair has half of full output when sound is silence at middle data value. This pair has half of full output when playing sound at appended memory-less mute.

The output depends on Vdd bias very much.

Herein zero output does not mean zero potential, neither ground.

It is recommended to select voltage source carefully and do not supply this chip with a voltage potential source in poor flatness or in poor drive capability.

What the poor source means either its potential drops as the load varies or its potential drops as its capacity exhausted.

The speaker characteristics and housing impacts the loudness very much.

### TG

This is a high true activating signal input pin. An internal pull low R TG is built in.

There is no schmit trigger circuit implemented.

### IN0 and IN1

They should be bonded to ground both regularly.

While abnormal lot (pitch shifted) is encountered, special bonding could be done herein.

### LB

This pin could be optionally masked as either high true Busy signal or LED flasher which is turned on in sink way by I LED. Refers to paragraphs "Mask option" and "terms". Up to 3 types of LED flasher could be chosen.

## Terms

### Audio

Audio means the signal from the pin pair SP+ and SP-.

Due to a sophisticated architecture, there demands no ramp up (or ramp down) to eliminate the pop noise at the sound starting and ending.

### Ramp up and Ramp down

See the explanation of Audio.

### Sample Rate

All the AC parameters depend on sample rate except three - t PUD, t P and t R. The numbers mentioned in this data sheet are based on 6 KHz sample rate if not specified. Higher SR has quicker LED flasher, quicker response. Lower SR has slower LED flasher, slower response.

### Retriggerable TG

Retriggerable TG means the sound played could be terminated immediately while further TG activated and play the sound from the very beginning.

### Holdable and retriggerable

This combination allows user controlling both the output and the input. Its output is holdable and the input could retrigger the former. This is an exquisite feature. It is not provided on this single trigger voice chip.

### Fix flash LED

Fix 3 Hz flash means this pin turns LED lamp on for T LED3 and then turns it off for T LED3 alternately. Fix 6 Hz flash means quicker, it turns on T LED6 and then turns off T LED6.

The 3 Hz as well as 6 Hz is sample rate dependent.

When repeatedly playing a word, interesting LED flash may happen in concatenation. The word length may not be the multiples of T LED3 (or T LED6), a new flash cycle will start before the last flash cycle terminates.

### Dymanic Flash LED

The LED turns on whenever the sound amplitude (the current from SPs) is over a certain threshold potential (I LEDT). The sound potential could be measured in data value as an alternative.

### Debounce time

Either Fast or Slow debounce are provided by mask options. The Fast debounce acknowledges very short trigger. So, the sound will play "sensitively". User should be very carefully to choose trigger switch while "Fast debounce" is specified.

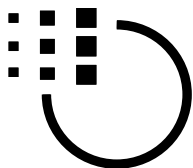
## Application Notes

### Speaker

The typical application speaker is 8 ohm, 1/4 watt. Refers to above paragraph SP+ and SP- for more description on required speaker.

### Buzzer

The recommended resonant frequency should be 1 KHz to get the best sound response. The response BW also should be fit to the required sound band width. Refer to above paragraph SP+ and SP- for more description.

**Choice of sample rate**

The sample rate should be chosen before chip manufactured. Two sample rates are provided on S0271 - either 6200 KHz or 8400 KHz. User is able to select them on the attached PRF (product request form).

**Rosc**

No external Rosc is required.

**Audio band amplifier transistor**

No amplifier transistor is demanded.

**PCB layout**

To minimize the interference, the route from trigger switch to chip should be as short as possible. The route of trigger signal is recommended to as far away as possible to speaker output.

**CDS as trigger**

to be defined.

**Power On play**

This chip provides power on play function. User should be noted that the time parameter T PUD is zero. To connect the trigger to Vdd, the sound will be played whenever power is turned on.

**Cascading**

Cascading chips to have longer duration is possible by special wiring but not recommended.

**Paralleling**

Paralleling chips to have more triggers is possible by special wiring but not recommended.

**Bulk Capacitor**

A bulk capacitor 0.1uF across the Vdd to Vss is demanded when using 4.5V (or higher) working voltage. At every working voltage, the value of bulk capacitor should be less than or equal to 0.47uF.

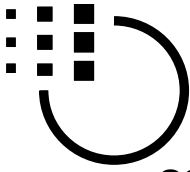
**Bonding change while Rosc shifts**

MVI S0271 provides reliable built-in Rosc by advance technology. In case Rosc is shifted (pitch shifted), the bonding change is able to bias Rosc into nominal value. The bonding changes are described on page 11/12.

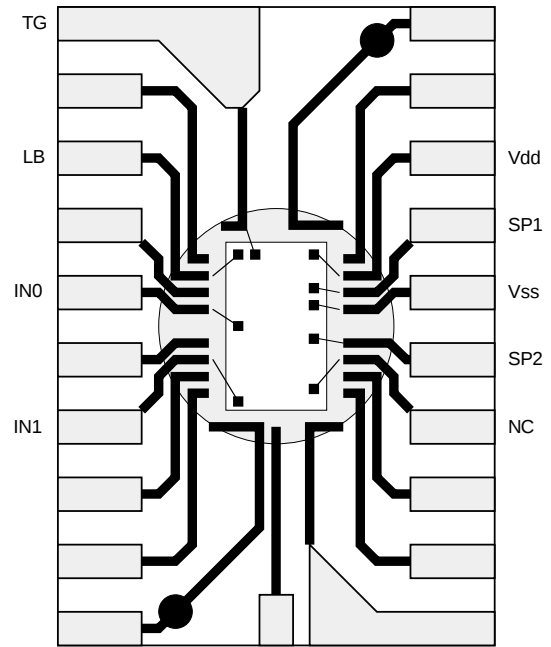
While the pitch shift encountered even it is rarely, the part number will have a postfix letter-capital "Z" while the lot number will have the two letter extension simultaneously. The two-letter extension could be "LH", "HL" or "HH". This two-letter extension tells how the bonding should be done which are described on page 11/12.

**Standard Code Line Up**

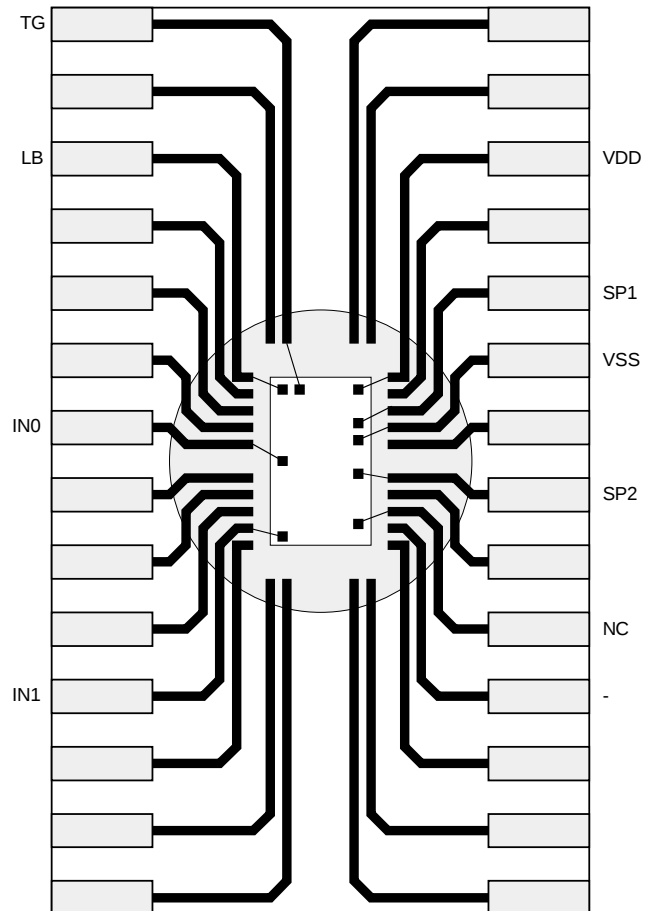
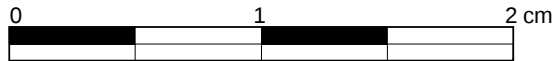
|   | Code# | Title                     | Times to Repeat | Times to Play | Trigger |        |        | LB       | Deb. | SR (Hz) | Remarks |
|---|-------|---------------------------|-----------------|---------------|---------|--------|--------|----------|------|---------|---------|
| 1 | 002   | Ho, Ho, Ho, Merry X'mas!! | 0               | 1             | Edge    | Unhold | Irret. | Busy     | Fast | 6.2 K   |         |
| 2 | 010   | Happy Hollween!!          | 1               | 2             | Edge    | Unhold | Irret. | Busy     | Fast | 6.2 K   |         |
| 3 | 017   | Barking Dog               | 2               | 3             | Edge    | Unhold | Irret. | Busy     | Fast | 8.4 K   |         |
| 4 | 018   | Screaming Girl            | 0               | 1             | Edge    | Unhold | Irret. | 6 Hz LED | Fast | 8.4 K   |         |
| 5 | 020   | Croaking Frog             | 2               | 3             | Edge    | Unhold | Irret. | 3 Hz LED | Slow | 6.2 K   |         |
| 6 | 021   | Sound of Cow              | 1               | 2             | Level   | Unhold | Irret. | 3 Hz LED | Slow | 6.2 K   |         |

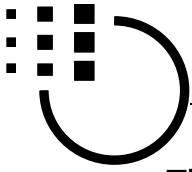
**COB Information****Model Number : M9220 (P20)**

[for codes 050 and later]

**Model Number : M9228 (P28)**

[for codes 001~049]





## Timing Critical

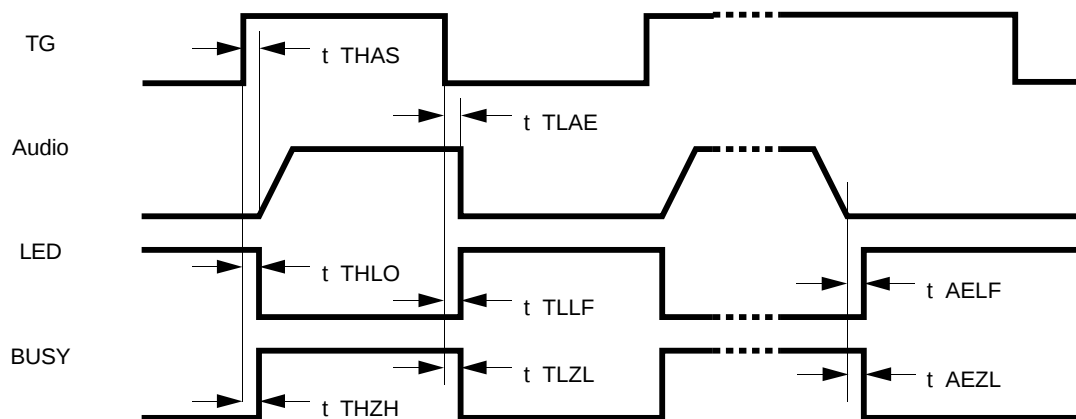
### Acceptable Power on Signal & Ripple



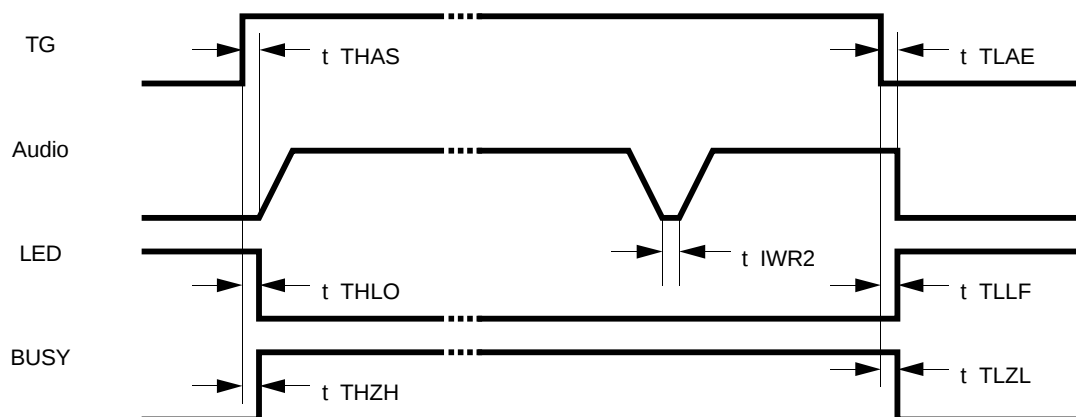
### Power Up Delay

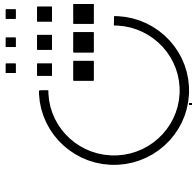


### To play



### To play repeatedly

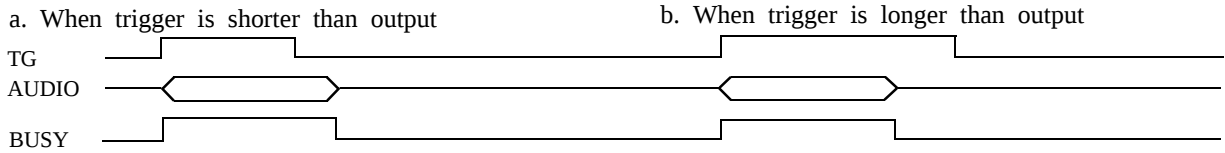




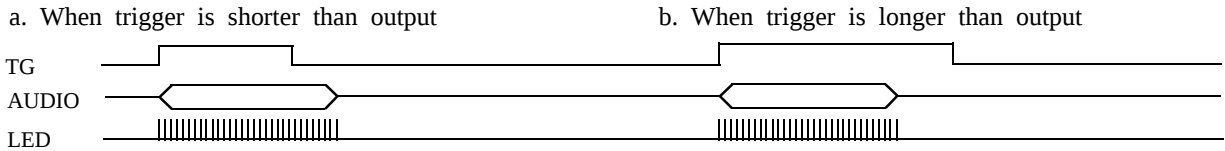
## Timing Diagram

### I. Edge Trigger Mask

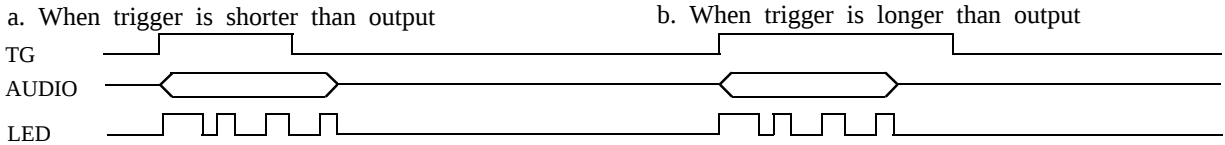
#### I.1. Unholdable output with BUSY



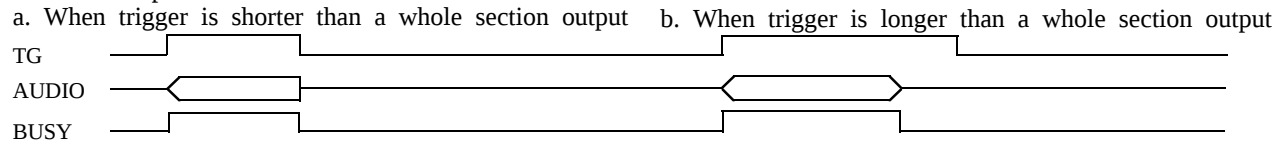
#### I.2. Unholdable output with Fixed-Type LED Flasher



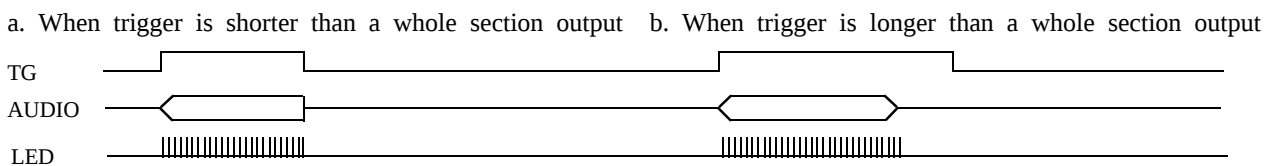
#### I.3. Unholdable output with Dynamic-Type LED Flasher



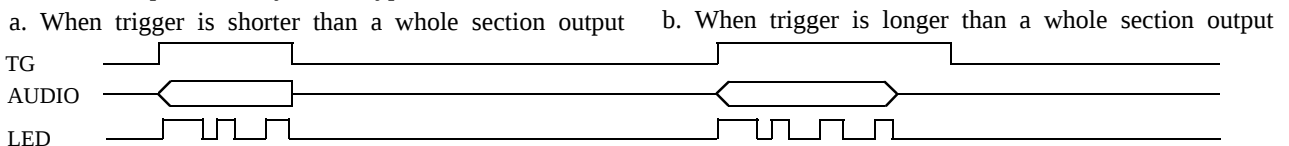
#### I.4. Holdable output with BUSY



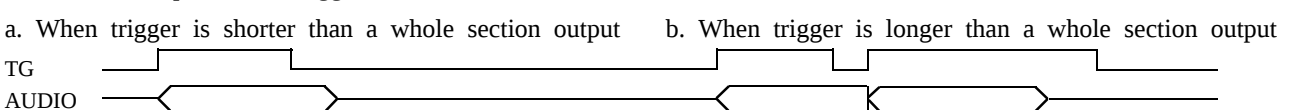
#### I.5. Holdable output with Fixed-Type LED Flasher

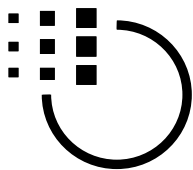


#### I.6. Holdable output with Dynamic-Type LED Flasher



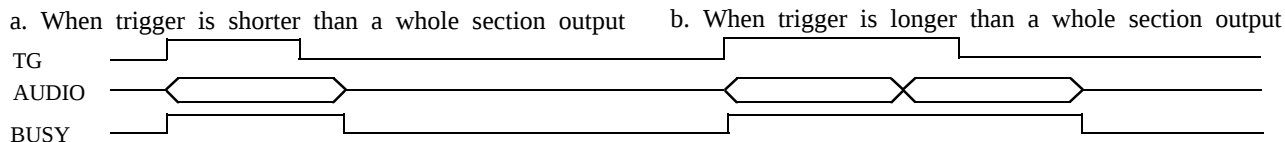
#### I.7. Unholdable output with Retrigger



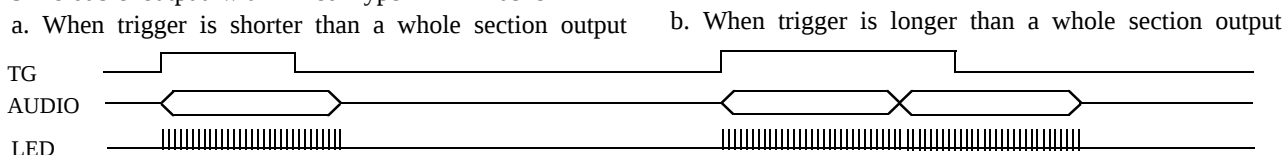


## II. Level Trigger Mask

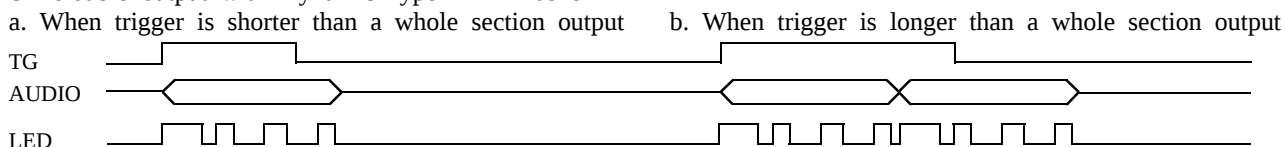
### II.1. Unholdable output with BUSY output



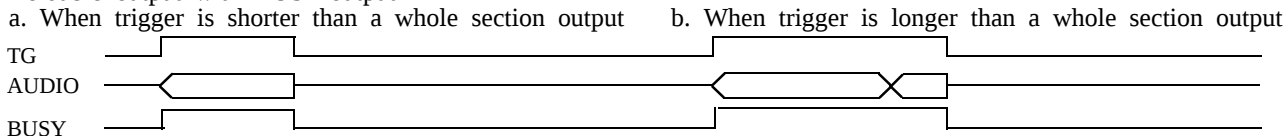
### II.2. Unholdable output with Fixed-Type LED Flasher



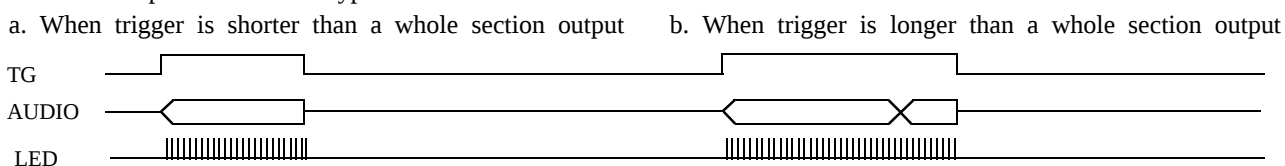
### II.3. Unholdable output with Dynamic-Type LED Flasher



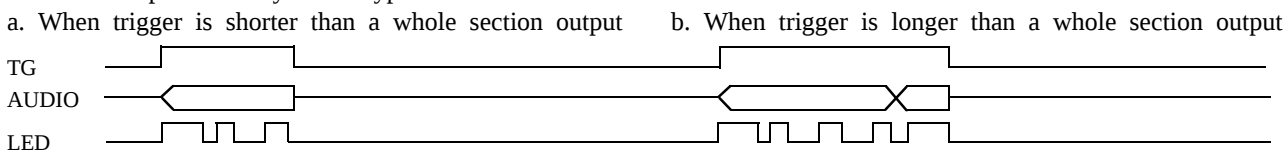
### II.4. Holdable output with BUSY output



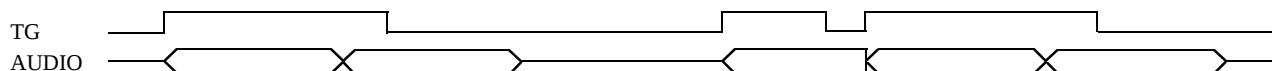
### II.5. Holdable output with Fixed-Type LED Flasher

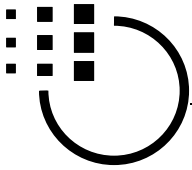


### II.6. Holdable output with Dynamic-Type LED Flasher

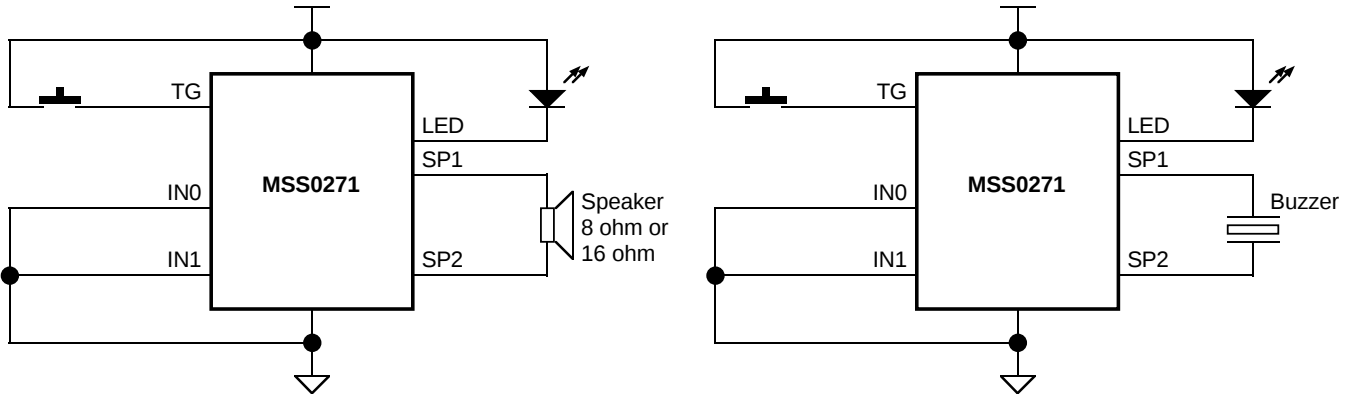


### II.7. Unholdable output with Retrigger

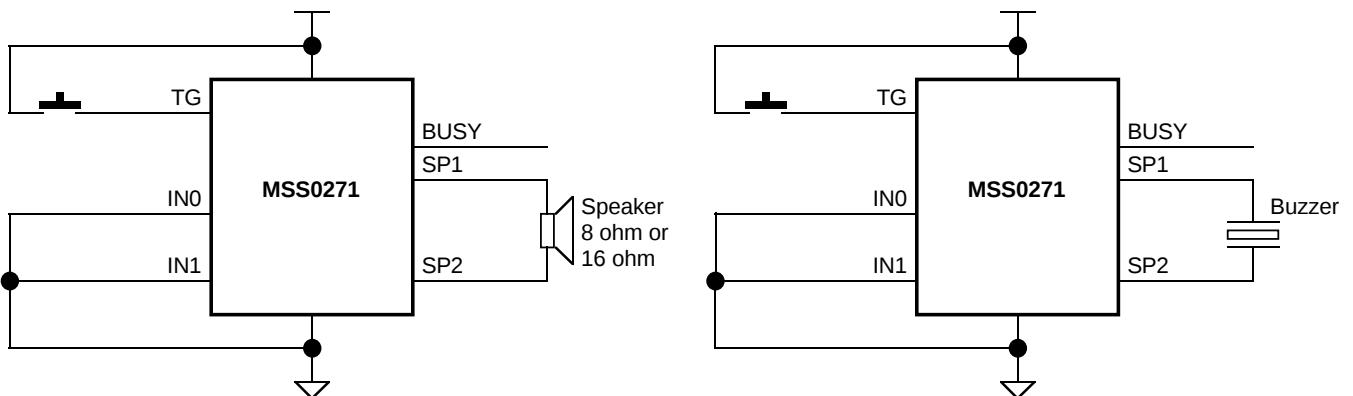




## I. Typical Application Circuit I, Rosc less, LED output

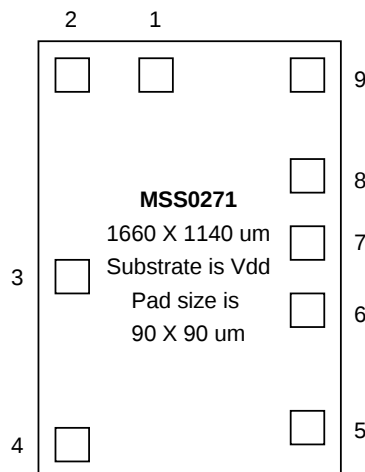


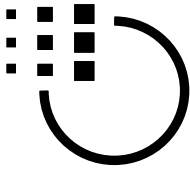
## II. Typical Application Circuit II, Rosc less, Busy output



### Pad Information

| Pad# | Signal | X    | Y    |
|------|--------|------|------|
| 1    | TG     | -669 | -170 |
| 2    | LB     | -663 | -409 |
| 3    | IN0    | 67   | -409 |
| 4    | IN1    | 656  | -409 |
| 5    | NC     | 570  | 390  |
| 6    | SP2    | 195  | 390  |
| 7    | Vss    | -63  | 390  |
| 8    | SP1    | -322 | 390  |
| 9    | Vdd    | -681 | 390  |





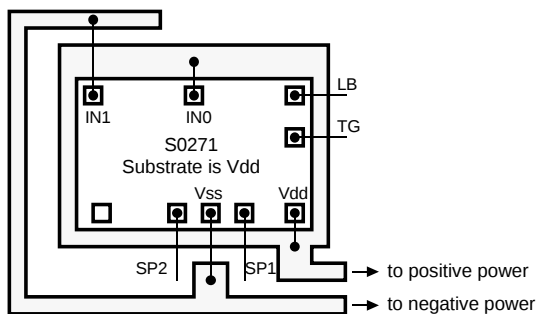
## Bonding to Offset the Shifted Pitch

Below three special bonding means are used to offset the shifted pitch (frequency) and let it perform normally. This happens only for those chip lots have their part number with postfix letter "Z". To not use these special bonding means on normal part is strongly recommended.

Of course, the copper route may have different layout on PCB (printed circuit board). It should be decided by user himself. Below shows only what we recommended, not restricted.

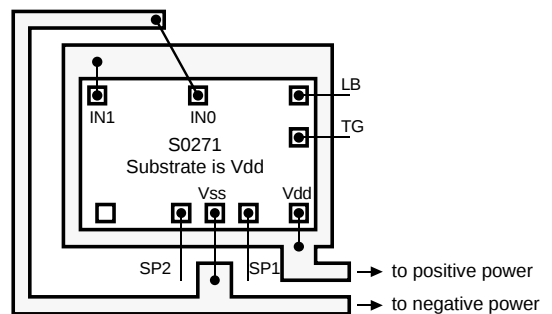
### I. Type LH Bonding

For lot number with extension letters "LH"



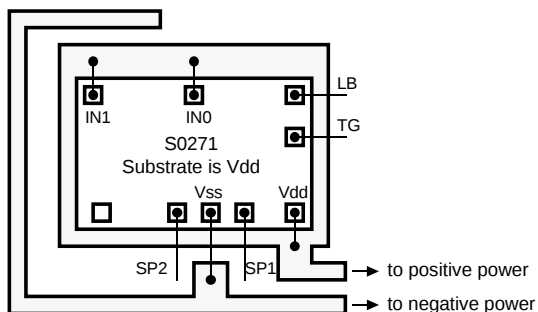
### II. Type HL Bonding

For lot number with extension letters "HL"



### III. Type HH Bonding

For lot number with extension letters "HH"



Revision history:  
pid 257\* 12/96  
pid 257\*\* 02/97  
pid 257\*\*\* 05/97

#### Taiwan

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Science - based Industrial Park,  
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FAX: 886-3-5772788  
FAX: 886-3-5784732  
Mdm: 886-3-578-0493

<http://www.moselvitelic.com>

#### Taipei

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Ming Chung E. Road,  
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Taiwan, ROC

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FAX: 886-2-5451214  
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#### China

(Vitellic HKG ShenZhen)  
Room #209,  
#19 ZhenHua road,  
ShenZhen, China

TEL: 86-755-334-5766  
FAX: 86-755-332-3995  
Mdm: 86-755-332-3995

#### Hongkong

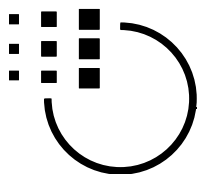
#19 Dai Fu Street,  
Taipo Industrial Estate,  
Taipo, N.T.  
Hongkong  
TEL: 852-2388-8277 (MKO)  
TEL: 852-2665-4883  
FAX: 852-2664-2406  
FAX: 852-2770-8011 (MKO)  
Mdm: 852-2388-0244 (MKO)

#### U.S.A.

#3910 North First Street,  
San Jose, CA. 65134-1501  
U.S.A.  
TEL: 1-408-433-6000  
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#### Japan

Rm. 302, Annex-G, 1-31-10  
Higashi-Nakano  
Nakano-Ku, Tokyo 164  
Japan  
TEL: 81-3-3365-2851  
FAX: 81-3-3365-2836



To : Mosel Vitelic Inc. 886-3-578-4732 (fax)  
 Attn : Sales & Marketing Department

## Product Request Form

I hereby request MVI to start preparing produce **MSS0271** which is specified as below description. I already read this data sheet PID257 \*\*\* and understand **MSS0271** completely and know how to specify to fit my requirement. Its voice storage limitation is 4380h.

| General Descriptions      |                                                                                                                                                                                                                                                             | Chip descriptions                                                                                                                                                                                                                                  |                 |                                                                                                                                                                                                                                                                                                                        |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Customer                  | Cannot proceed when empty                                                                                                                                                                                                                                   | Title:                                                                                                                                                                                                                                             | Output Device   | <input type="checkbox"/> Buzzer (F fr =1KHz)<br><input type="checkbox"/> Speaker (0.25W, 16 ohm, 1" diam.)<br><input type="checkbox"/> Speaker (0.25W, 8 ohm, 1" diam.)<br><input type="checkbox"/> Other: _____                                                                                                       |
| Agent                     |                                                                                                                                                                                                                                                             | <input type="checkbox"/> Edge <input type="checkbox"/> Level<br><input type="checkbox"/> Built-in Rosc at 6200 Hz<br><input type="checkbox"/> Built-in Rosc at 8400 Hz                                                                             |                 |                                                                                                                                                                                                                                                                                                                        |
| Sales Repr'tives          | Who is MVI sales you contact ?                                                                                                                                                                                                                              | <input type="checkbox"/> Debounce = Slow, T T1<br><input type="checkbox"/> Debounce = Fast, T T2                                                                                                                                                   |                 |                                                                                                                                                                                                                                                                                                                        |
| Providing to MVI          | <input type="checkbox"/> 8-bit PCM sound files<br><input type="checkbox"/> .WAV sound files<br><input type="checkbox"/> DAT or equivalent<br><input type="checkbox"/> application is special, see our written memo<br><input type="checkbox"/> Others _____ | <input type="checkbox"/> Holdable & Irretriggerable<br><input type="checkbox"/> Unholdable & Irretriggerable<br><input type="checkbox"/> Unholdable & Retriggerable<br><input type="checkbox"/> No use & don't care                                | Working Voltage | <input type="checkbox"/> 2.5 V <input type="checkbox"/> 3.5 V<br><input type="checkbox"/> 3.0 V <input type="checkbox"/> 4.0 V<br><input type="checkbox"/> 4.5 V w/Bulk Cap.<br><input type="checkbox"/> 5.0 V w/Bulk Cap.<br><input type="checkbox"/> 5.5 V w/Bulk Cap.<br><input type="checkbox"/> 6.0 V w/Bulk Cap. |
| Service Required from MVI | <input type="checkbox"/> EPROMs with data inside<br><input type="checkbox"/> files to be programmed into EPROM<br><input type="checkbox"/> emulation board & Eprom<br><input type="checkbox"/> Confirm table<br><input type="checkbox"/> Others _____       | <input type="checkbox"/> LB = Busy output<br><input type="checkbox"/> LB = dynamic LED flasher<br><input type="checkbox"/> LB = 3Hz LED flasher<br><input type="checkbox"/> LB = 6Hz LED falsher<br><input type="checkbox"/> No use and don't care |                 |                                                                                                                                                                                                                                                                                                                        |

| Voice content | Voice Length  | Mute length (behind) | Total Length | repeat times | total play times |
|---------------|---------------|----------------------|--------------|--------------|------------------|
|               | S<br>≤2.79 s  | S                    | 00h          |              |                  |
|               | 00h<br>≤4380h | 00h                  | ≤20000h      | 0≤           | ≤7 1≤ ≤8         |

Company Name : \_\_\_\_\_

Fax number : \_\_\_\_\_

Signature : \_\_\_\_\_

Date : \_\_\_\_\_

Department/Section : \_\_\_\_\_

Position Title : \_\_\_\_\_