

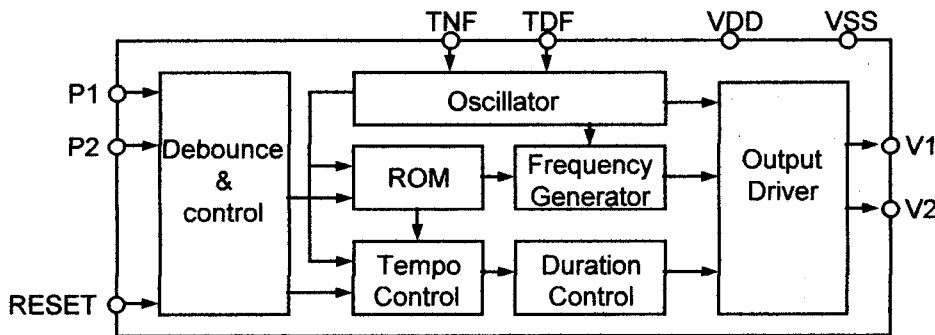
GENERAL DESCRIPTION

The C57021 is a silicon-gate CMOS LSI for playing musical tune through an external piezo-electric buzzer. The melody can be customized by a ROM mask. Only a battery and a piezo-electric buzzer are needed to build a low cost and long battery-life module for use in melody greeting cards or toys, etc. It can also be used to make door bells, etc. by driving speaker through an external transistor.

FEATURES

- Supply range (1.2 ~ 3.6V).
- Built in RC oscillator, no external trimmer required.
- No external parts besides battery and buzzer.
- Low standby power dissipation.
- 5 operation modes selectable by bonding.
- Wide frequency range: G3~B7 (196~3951Hz).
- 16 mask programmable tempos (45~714).
- Direct drive piezoelectric buzzer.
- Can drive speaker through external transistor.
- Support CdS input trigger.
- Debounce circuit included.
- 128-word note ROM.
- Each note can be individually programmed to be staccato or legato.

BLOCK DIAGRAM



PIN DESCRIPTION

| SYMBOL | DESCRIPTION |
|--------|---|
| VDD | Positive power supply |
| VSS | Negative power supply |
| P1/P2 | Trigger inputs with built-in pull down resistor |
| V1/V2 | Buzzer push-pull outputs |
| TNF | Test frequency input (for testing only) |
| TDF | Bidirectional test pad (for testing only) |
| RESET | Master reset (for testing only) |

ABSOLUTE MAXIMUM RATINGS

| Parameter | Value | Unit |
|--|-------------------|------|
| Power supply voltage (VDD - Vss) | - 0.3 ~ + 2.5 | V |
| Voltage applied to any pin with respect to Vss | - 0.2 ~ VDD + 0.2 | V |
| Storage temperature | - 55 ~ + 125 | °C |
| Operation temperature | 0 ~ + 70 | °C |

Note: If absolute maximum ratings are exceeded, the device may be permanently damaged. Functional operation should be restricted to conditions indicated in the operational section of this specification. Prolonged exposure to higher than operational voltages or temperature could affect reliability.

Although all inputs are protected against electrostatic discharge, care must be taken in handling the chip to avoid damage by the building up of electrostatic charge.

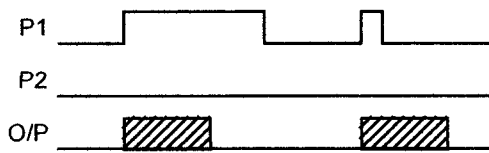
ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, VDD = 1.5V, Ta = 25 °C)

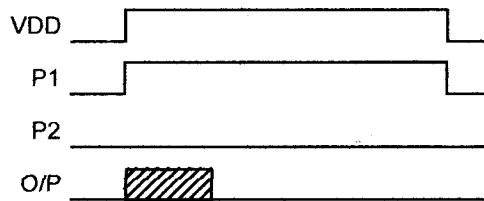
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test Condition |
|----------------------------------|------------------|------|------|------|------|--------------------------|
| Operating voltage | VDD | 1.2 | 1.5 | 3.6 | V | – |
| Oscillator frequency | fosc | 78 | 97.5 | 117 | KHz | – |
| Power supply current (standby) | I _{DD1} | – | 0.1 | 1 | μA | All inputs open |
| Power supply current (operating) | I _{DD2} | – | - | 100 | μA | No load |
| Input current (at P1, P2) | I _{IL} | - | 1.3 | - | μA | V _{in} = 0.4V |
| | I _{IH} | - | 1.7 | - | μA | V _{in} = 1.5V |
| Output current (at V1, V2) | I _{OL} | - | 2.5 | – | mA | V _{out} = 0.75V |
| | I _{OH} | - | -2.5 | – | mA | V _{out} = 0.75V |

OPERATION MODES

1) Mode 1 (Edge Trigger)



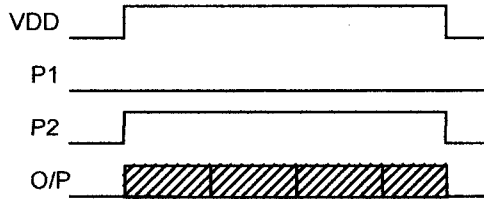
4) Mode 4 (Power up One Shot)



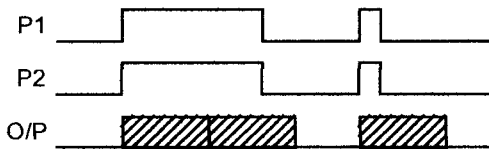
2) Mode 2 (Level Hold)



5) Mode 5 (Card Mode)



3) Mode 3 (Level Trigger)



MUSICAL SPECIFICATION

1) Note and Rest Duration

| | | | | | | | | |
|------|--|--|--|--|--|--|--|--|
| NOTE | | | | | | | | |
| REST | | | | | | | | |

Available durations

8 available note and rest durations are provided. Other duration can be programmed by adding an extension code on the following address. Longer rest can be programmed by adding another rest on the following address.

2) Tempo

16 mask programmable tempos

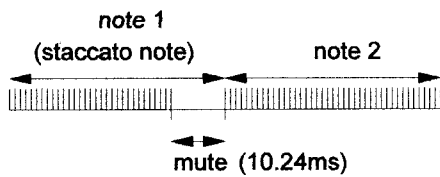
|  | Tempo |
|---|-------------|
| 45 | Adagissimo |
| 48 | |
| 51 | |
| 55 | Largo |
| 60 | |
| 65 | |
| 71 | |
| 80 | Larghetto |
| 90 | |
| 102 | Adagio |
| 119 | |
| 143 | Andante |
| 179 | Presto |
| 238 | |
| 357 | |
| 714 | Prestissimo |

Duration of 
 = 60/Tempo(value under  column)(sec)

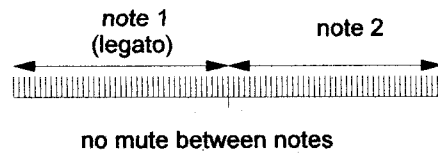
3) Staccato/Legato

Each note can be individually programmed to be staccato or legato.

For staccato note:

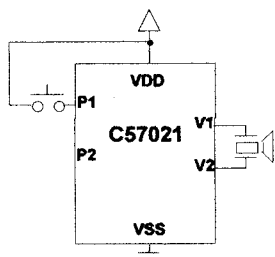


For legato note:

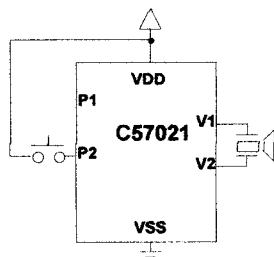


APPLICATION

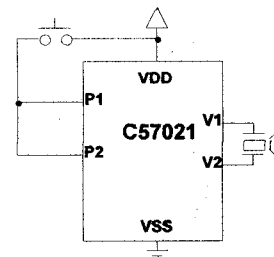
1) Basic Applications



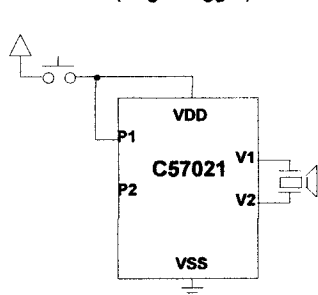
Mode 1 (Edge Trigger)



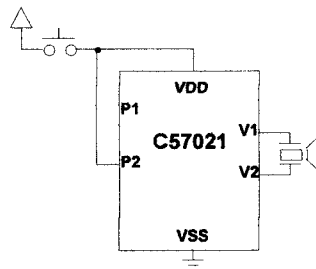
Mode 2 (Level Hold)



Mode 3 (Level Trigger)

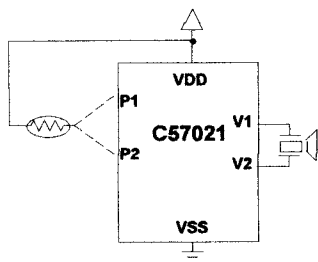


Mode 4 (Power up One Shot)

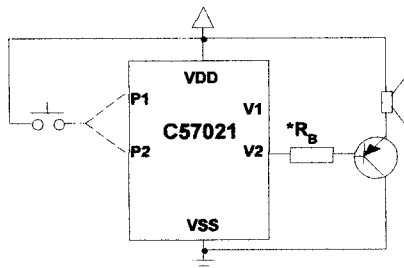


Mode 5 (Card Mode)

2) Cds Application

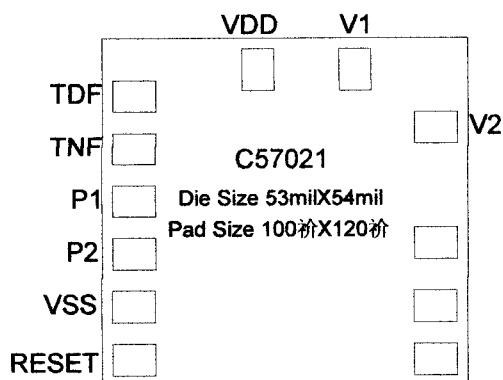


3) Driving Speaker Application



* R_B : This resistor is chosen so that the transistor will operate at saturation region when V2 is high, typically 1K Ω .

PAD ASSIGNMENT



| Pad Name | Coordinate |
|----------|--------------|
| TNF | -571 143 |
| TDF | -571 323 |
| VDD | -153.2 471.4 |
| V1 | 181.2 475.4 |
| V2 | 478.5 354.2 |
| RESET | -571 -592.5 |
| VSS | -571 -412.5 |
| P2 | -571 -230.5 |
| P1 | -571 -50.5 |

NOTE : Substrate should be connected to VSS or left floating.

C5702 Song Option List

| Option I.D. | Content |
|-------------|--|
| 1 | Happy birthday |
| 2 | It's a small world |
| 3 | Beep beep beep (Six Times) |
| 4 | London bridge is falling down + Twinkle twinkle little star + Are you sleeping brother John + Row row row your boat |
| 5 | Love story + Love me tender + Let me call you sweet heart |
| 7 | Jingle bell + Santa Claus is coming to town + We wish you a merry Christmas |
| 8 | Für Elise |
| 9 | Jingle bell + Silent Night |
| 10 | Feliz Navidad & We Wish You Merry Christmas |
| 12 | Las Mananitas |
| 13 | Love story |
| 14 | Door bell |
| 15 | Jiao xiang yue (Symphony) |
| 16 | Ai yue (Sorrow Music) |
| 17 | The Song Box |
| 20 | Happy Birthday (Play Twice) |
| 21 | I Just Call To Say I Love You |
| 25 | Oh, Susana |
| 26 | Happy Birthday |
| 27 | Oh, Susana |
| 32 | Home, Sweet Home |
| 35 | Telephone Ring Sound |
| 37 | The West Minster Chimes |
| 39 | The West Minster Chimes |
| 40 | Macarena |
| 41 | For Longer Than Forever |
| 42 | Hello Kitty |
| 45 | SM0002A |
| 46 | The Merry-Go-Round Broke Down |
| 48 | Jingle Bell |
| 49 | London Bridge is Falling Down |
| 50 | Cielito Lindo |

C5702 Song Option List

| Option I.D. | Content |
|-------------|---|
| 51 | Joy |
| 52 | Bach |
| 53 | Canadian National Anthem |
| 54 | Evening Prayer |
| 55 | Goose Lake |
| 101 | Tai yang zui hong, mao zhu xi zui qin (The sun is the reddest, Chairman Mao is the best) |
| 102 | Tong fang hong (East Red) |
| 103 | Chun jiang hua ye (Spring River and Flower Night) |
| 104 | Shi wu de yue liang (The moon on August 15th.) |
| 106 | Gan wen lu zai he fang (Ask Which direction we go) |
| 107 | Ji Gong zhuan (Song of Ji Gong) |
| 108 | Lan hua cao (Lan Hua Grass) |
| 109 | Jin she kuang wu (Gold snakes dances) |
| 114 | Ke wang (Expectation) |
| 117 | Nan Ni wuan (Nan Ni wuan is name of a country) |
| 118 | Xiang feng he bi xiang shi (Meeting No need to knowing) |
| 119 | Xiu jin bian (making golden flags) |
| 120 | Shi jie zhen xi xiao, shi jie zhi you ma ma hao (The world is small + Mother is the best Person in the world) |
| 121 | Kang ding qing ge (Kang ding Loving songs) |
| 122 | Chao Yuan qing ge (Chao Yuan loving songs) |
| 123 | Liu Yang he (River Liu Yang) |
| 125 | Joy to the world+ Deck the halis+ Silent night, holy night |
| 131 | Pearly shells |
| 132 | Ding, Ding, Dong (Sound of ding ding dong) |
| 133 | Japanese Song "Fanfare" |
| 134 | Thailand Song |
| 135 | (Custom-made Product) |

Jan 14, 2002.