

■ INTRODUCTION

SN68016 is a 16 seconds single chip voice synthesizer IC which contains I/O pins and a tiny controller. By programming through the tiny controller, user's applications including section combination, trigger modes, output status, and other logic functions can then be easily implemented.

■ FEATURES

- ◆ Single power supply 2.4V - 5.1V
- ◆ Built in a tiny controller
- ◆ 16 seconds voice capacity are provided
- ◆ One 4-bit input port and two 4-bit I/O ports are provided
- ◆ 64*4 bits RAM are provided
- ◆ Maximum 16k program ROM is provided
- ◆ Readable ROM code data
- ◆ Built in a high quality speech synthesizer
- ◆ Adaptive playing speed from 2.5k-20kHz is provided
- ◆ Built in a dual tone melody generator
- ◆ Speech/Dual tone melody mixer is provided
- ◆ Fixed current D/A output is provided to drive external connected transistor for sound output
- ◆ Low Voltage Reset

■ PIN ASSIGNMENT

| Symbol | I/O | Function Description |
|-----------------|-----|--------------------------------------|
| P10 | I | Bit0 of input port 1 |
| P11 | I | Bit1 of input port 1 |
| P12 | I | Bit2 of input port 1 |
| P13 | I | Bit3 of input port 1 |
| P20 | I/O | Bit0 of I/O port 2 |
| P21 | I/O | Bit1 of I/O port 2 |
| P22 | I/O | Bit2 of I/O port 2 |
| P23 | I/O | Bit3 of I/O port 2 |
| P30 | I/O | Bit0 of I/O port 3 |
| P31 | I/O | Bit1 of I/O port 3 |
| P32 | I/O | Bit2 of I/O port 3 |
| P33 | I/O | Bit3 of I/O port 3 |
| V _{DD} | I | Positive power supply |
| OSC | I | Oscillation component connection pin |
| TEST | I | For testing only |
| V _{SS} | I | Negative power supply |
| V _O | O | D/A current output |

■ ABSOLUTE MAXIMUM RATING

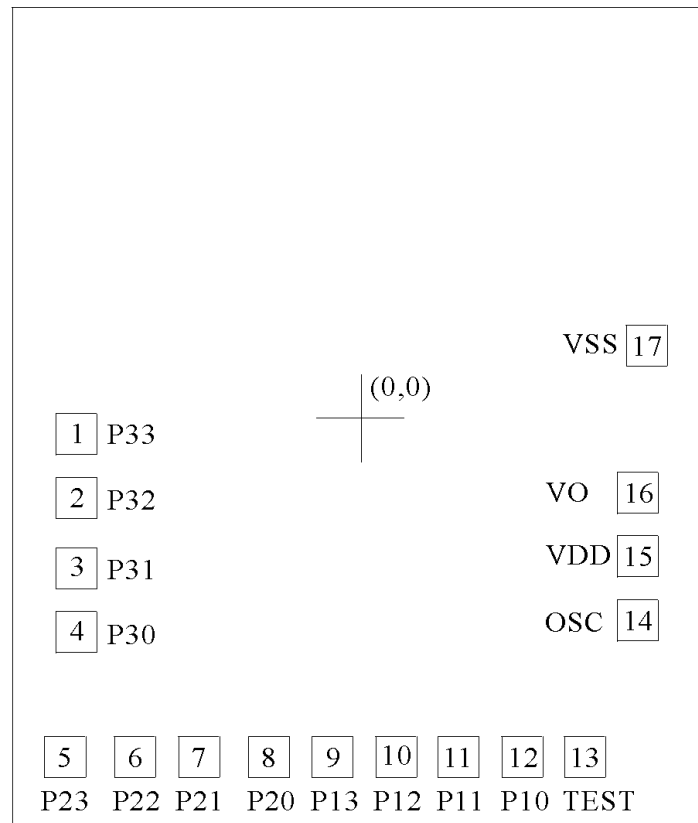
| Items | Symbol | Min | Max | Unit. |
|-----------------------|-----------|--------------|--------------|-------|
| Supply Voltage | V_{DD} | -0.3 | 6.0 | V |
| Input Voltage | V_{IN} | $V_{SS}-0.3$ | $V_{DD}+0.3$ | V |
| Operating Temperature | T_{OP} | -20.0 | 70.0 | °C |
| Storage Temperature | T_{STG} | -55.0 | 125.0 | °C |

■ ELECTRICAL CHARACTERISTICS

| Item | Sym. | Min. | Typ. | Max. | Unit | Condition |
|------------------------|-----------|------|------|------|---------|-----------------------|
| Operating Voltage | V_{DD} | 2.4 | 3.0 | 5.1 | V | |
| Standby Current | I_{SBY} | - | - | 2.0 | μA | $V_{DD}=3V$, no load |
| Operating Current | I_{OPR} | - | - | 250 | μA | $V_{DD}=3V$, no load |
| Input Current of P1 | I_i | - | 3 | - | μA | $V_{DD}=3V$ |
| Drive Current of P2,P3 | I_{OD} | 1.5 | 2 | - | mA | $V_{DD}=3V, V_O=2.4V$ |
| Sink Current of P2,P3 | I_{OS} | 2.0 | 3 | - | mA | $V_{DD}=3V, V_O=0.4V$ |
| D/A Output Current | I_{VO} | 2.0 | 3.0 | 4.0 | mA | $V_{DD}=3V, V_O=0.7V$ |
| Oscillation Freq. | F_{OSC} | - | 1.0 | - | MHz | $V_{DD}=3V$ |

■ **BONDING PAD LOCATION**

| Pad No. | Pad Name | X(um) | Y(um) | Pad No. | Pad Name | X(um) | Y(um) |
|---------|----------|-------|-------|---------|----------|-------|-------|
| 1 | P33 | -624 | -36 | 10 | P12 | 77 | -744 |
| 2 | P32 | -624 | -176 | 11 | P11 | 214 | -744 |
| 3 | P31 | -624 | -330 | 12 | P10 | 354 | -744 |
| 4 | P30 | -624 | -470 | 13 | TEST | 491 | -744 |
| 5 | P23 | -649 | -744 | 14 | OSC | 607 | -445 |
| 6 | P22 | -496 | -744 | 15 | VDD | 607 | -304 |
| 7 | P21 | -355 | -744 | 16 | VO | 607 | -165 |
| 8 | P20 | -202 | -744 | 17 | VSS | 627 | 158 |
| 9 | P13 | -63 | -744 | | | | |



(1530,1800)um

SN68016

Note : The substrate **MUST** be connected to Vss in PCB layout.