# ONTENTS

## AMENDENT HISTORY

| Version | Date | Description |
|---|---|---|
| **Ver 1.0** | 2016/08/17 | 1. First issue |
| **Ver 1.1** | 2016/09/01 | 1. Add compare between mask IC and OTP |
| **Ver 1.2** | 2016/09/13 | 1. Update working voltage: 2.1V~5.1V<br>2. Add 4.5V Temperature VS. Frequency data<br>3. Add 4.5V standby current |
| **Ver 1.3** | 2016/09/21 | 1. Revise LQFP48 unit |
| **Ver 1.4** | 2016/10/17 | 1. Revise SOP14 package form |
| **Ver 1.5** | 2016/10/26 | 1. Revise SOP8 package information symbol A max data |
| **Ver 1.6** | 2016/11/21 | 1. Add SNC27P060, SNC27P 085, SNC27P120 package form<br>2. Add SNC27P168 package form<br>3. Add SOP16 package information |
| **Ver 1.7** | 2016/11/29 | 1. Update $F_{OSC}$ +-1.5%<br>2. Revise SOP20 package form |
| **Ver 1.8** | 2016/11/30 | 1. Update SNC27P020, SNC27P030<br>2. Revise SNC27P120 package form |
| **Ver 1.9** | 2016/12/12 | 1. Add SNC27P168/SNC27P120 SOP16 package form |
| **Ver 2.0** | 2016/12/21 | 1. Add SNC27P020/030/040 SOP8 and SOP 14 package form |
| **Ver2.1** | 2017/01/24 | 1. Modify ABSOLUTE MAXIMUM RATING<br>2. Modify OTP programming mode voltage<br>3. Modify SNC27P168/060/085/120/040/030/020 SOP8 pin assignment<br>4. Modify SNC27P168/060/085/120/040/030/020 SOP14 pin assignment |
| **Ver2.2** | 2017/02/15 | 1. Revise SNC27P060 & 085 SOP20 P20 / CLK pin |
| **Ver2.3** | 2017/02/20 | 1. Update the capacitor to GND suggest is 0.1uF.<br>2. Update the 3 battery (5V) application circuit. |
| **Ver2.4** | 2017/03/28 | 1. Revise the OTP program voltage to 4.8V |
| **Ver2.5** | 2017/07/25 | 1. Add SNC27P020, SNC27P030, SNC27P040 SOP16<br>2. Add SNC27P400, SNC27P500, SNC27P680 |
| **Ver2.6** | 2017/07/27 | 1. Update ordering example. |
| **Ver2.7** | 2017/08/28 | 1. Update operating current typical data at 3V and 5V<br>2. Update SNC27P400/SNC27P500/SNC27P680 program pin. (no need to connect P23) |

| | | |
|---|---|---|
| | | **3. Notice: SNC27P020 is no LVD function**<br>4. Update SSOP24 package type.<br>5. Add SNC27P332/SNC27P300/SNC27P250/SNC27P200 SOP16 package form. |
| **Ver2.8** | 2017/09/18 | 1. Update package type (revise SSOP24 and LQFP48, add SOP14 type2) |
| **Ver2.9** | 2017/09/22 | 1. Update SNC27P332 SOP16 pin assignment. |
| **Ver3.0** | 2017/12/01 | 1. Modify MARKING AND ORDERING IDENTIFICATION |
| **Ver 3.1** | 2018/02/01 | 1. Add SNC27P750/870/1000 body |
| **Ver3.2** | 2018/06/01 | 1. Modify SNC27P400/500/680 LQFP48 pin assignment.<br>2.Add SNC27P750/870/1000 SOP16 LQFP48 pin assignment. |
| **Ver3.3** | 2018/07/02 | 1. Modify SOP14 type2 package no.<br>SNC27P020JSG-2 => SNC27P020J2SG<br>SNC27P040JSG-2 => SNC27P040J2SG<br>SNC27P085JSG-2 => SNC27P085J2SG<br>SNC27P168SJSG-2 => SNC27P168SJ2SG<br>2. Add new body SNC27P061/SNC27P086 |
| **Ver 3.4** | 2018/09/18 | 1. Add SNC27P680SK2SG SOP16<br>Modify SNC27P1000SKSG SOP16<br>2. Add package type application without separate power<br>Please refer to sector 10.4 Package type application without separate power: |
| **Ver 3.5** | 2018/10/03 | 1.Add SNC27P1000MXG SSOP24<br>2.Add SNC27P061/086/121/169/201/251/301/333 SOP8/SOP16/SSOP24 PIN to PIN |
| **Ver 3.6** | 2019/12/17 | 1. Add Max. standby value. |
| **Ver 3.7** | 2020/05/05 | 1.Add SNC27P041 IC body |
| **Ver 3.8** | 2020/08/24 | 1. Modify Package type application without separate power R=2.2 Page 44 |
| **Ver 3.9** | 2021/06/8 | 1. Set P23 as trim pin of SNC27P041/061/086/121/169 /201/251/301/333 /400/500/680/750/870/1000 |
| **Ver 4.0** | 2023/01/29 | Emphasize the PCB layout distance of capacitor C1(VDD to GND) |
| **Ver 4.1** | 2023/02/08 | Delete SNC27P060/085 SSOP24(MXG) package type. |
| **Ver 4.2** | 2024/06/13 | Add marking definition,F2SG/K2SG/M2SG page 50 |
| **Ver 4.3** | 2024/10/14 | Add SNC27P042 IC body |

# 1. INTRODUCTION

SNC27Pxxx is a one-channel voice synthesizer IC with 12-bit PWM direct drive circuit. It built in a 4-bit tiny controller with one input port and 8~32 I/O ports. By programming through the tiny controller in SNC27Pxxx, user's varied applications including voice section combination; key trigger arrangement, output control, and other logic functions can be easily implemented.

# 2. FEATURES

## 2.1 CPU

- Working Voltage: 2.1V~5.5V
- CPU clock: 1.152MHz **+-1.5%**
- Built in a 4-bit tiny controller
- Duration: 20sec~1000sec@6KHz
- RAM Size: 128*4~192*4 bit
- Maximum 64K*12 bit program size is provided
- I/O Port
  - One Input port P9.0 share with Reset pin
  - Max.32 I/O port, P1, P2, P3, P4, P5, P6,P7,P8
  - High drive/sink current 8mA/16mA@3V : P2, P3, P6
  - Normal drive/sink current 4mA/6mA@3V : P1, P4, P5,P7,P8
- Timer
  - Timer1: 2ms,4ms
  - Watch dog timer(WDT): 110ms
- IR output: The IO pins P2.3 or P1.3 can be modulated with 38.5 KHz carry signal to implement IR function
- Max. 12 sets hardware PWMIO (P2,P3,P6) with 256-level brightness control
  Note: P3/P6 share with the same PWMIO duty
- Low Voltage Reset (LVR)
  - Typical 1.9V with Enable/Disable option
  - Low LVR current when LVR occur
- Low Voltage Detector (LVD)
  - 2 level: 2.2V , 3.2V
- Operating Mode
  - Normal
  - Sleep

## 2.2 Voice Synthesizer

- Single channel speech output
- Support 4-bit ASDPCM and 5-bit ASDPCM algorithm
- One 12-bit PWM output with 8-level volume control for direct drive speaker
- Adaptive playing speed from 4.5k-36kHz is provided
- Hardware Pause/Mute voice playback function is provided
- Up sampling filter is provided to reduce metal noise
- Hardware Event Mark (e1~e63) function is supported

# 3. PRODUCT SELECTION GUIDE

| Part No. | Voice Duration | OTP | RAM | I/O | PWMIO | I/O Port | Voice Channel | AD PCM | LVD 2.2/3.2V |
|---|---|---|---|---|---|---|---|---|---|
| SNC27P020 | 20 | 44K*12 | 128*4 | 1I,8IO | 8 | P2,P3 | 1 | 4bit | N/A* |
| SNC27P030 | 30 | 64K*12 | 128*4 | 1I,8IO | 8 | P2,P3 | 1 | 4bit | V |
| SNC27P040 | 40 | 84K*12 | 128*4 | 1I,8IO | 8 | P2,P3 | 1 | 4bit | V |
| SNC27P042 | 40 | 84K*12 | 128*4 | 1I,8IO | 8 | P2,P3 | 1 | 4bit | V |
| SNC27P060 | 60 | 128K*12 | 128*4 | 1I,12IO | 8 | P1,P2,P3 | 1 | 4bit | V |
| SNC27P085 | 85 | 176K*12 | 128*4 | 1I,12IO | 8 | P1,P2,P3 | 1 | 4bit | V |
| SNC27P041 | 40 | 84K*12 | 128*4 | 1I,16IO | 8 | P1,P2,P3,P6 | 1 | 4/5bit | V |
| SNC27P061 | 60 | 128K*12 | 128*4 | 1I,16IO | 8 | P1,P2,P3,P6 | 1 | 4/5bit | V |
| SNC27P086 | 85 | 176K*12 | 128*4 | 1I,16IO | 8 | P1,P2,P3,P6 | 1 | 4/5bit | V |
| SNC27P120 | 120 | 248K*12 | 128*4 | 1I,16IO | 8 | P1,P2,P3,P6 | 1 | 4/5bit | V |
| SNC27P168 | 168 | 352K*12 | 128*4 | 1I,16IO | 8 | P1,P2,P3,P6 | 1 | 4/5bit | V |
| SNC27P121 | 120 | 248K*12 | 128*4 | 1I,16IO | 8 | P1,P2,P3,P6 | 1 | 4/5bit | V |
| SNC27P169 | 168 | 352K*12 | 128*4 | 1I,16IO | 8 | P1,P2,P3,P6 | 1 | 4/5bit | V |
| SNC27P200 | 200 | 412K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | 4/5bit | V |
| SNC27P250 | 250 | 512K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | 4/5bit | V |
| SNC27P300 | 300 | 616K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | 4/5bit | V |
| SNC27P332 | 332 | 680K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | 4/5bit | V |
| SNC27P201 | 200 | 412K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | 4/5bit | V |
| SNC27P251 | 250 | 512K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | 4/5bit | V |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SNC27P301 | 300 | 616K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | **4/5bit** | V |
| SNC27P333 | 332 | 680K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | **4/5bit** | V |
| SNC27P400 | 400 | 820K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | **4/5bit** | V |
| SNC27P500 | 500 | 1024K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | **4/5bit** | V |
| SNC27P680 | 680 | 1392K*12 | 192*4 | 1I,24IO | 8 | P1,P2,P3,P6 P4,P5 | 1 | **4/5bit** | V |
| SNC27P750 | 750 | 1536K*12 | 192*4 | 1I,32IO | 8 | P1,P2,P3,P6 P4,P5,P7,P8 | 1 | **4/5bit** | V |
| SNC27P870 | 870 | 1780K*12 | 192*4 | 1I,32IO | 8 | P1,P2,P3,P6 P4,P5,P7,P8 | 1 | **4/5bit** | V |
| SNC27P1000 | 1000 | 2048K*12 | 192*4 | 1I,32IO | 8 | P1,P2,P3,P6 P4,P5,P7,P8 | 1 | **4/5bit** | V |

***SNC27P020 is no LVD2.2/3.2V function.**

SNC27xxx is mask IC series, and correspond to SNC27Pxxx OTP.
(e.g. SNC27332 mask IC & SNC27P332 OTP)

The different between SNC27xxx and SNC27Pxxx shows as below:

| Diff. item | SNC27xxx (Mask IC) | SNC27Pxxx (OTP) |
|---|---|---|
| Working Voltage: | 1.8V~5.5V | 2.1V~5.5V* |
| Int. ROSC freq. | +-3.0% @ 3V | +-1.5% @ 3V |
| Pull low resistor | 700KΩ @ 3V<br>380KΩ @ 4.5V | 1300KΩ @ 3V<br>750KΩ @ 4.5V |

*LVD function: SNC27020 has LVD2.2/3.2V function but SNC27P020 is no LVD2.2/3.2V function.
*Using 3 batteries, please refer to sector 10.2.2 In 3 battery application (5V):

# 4. PIN ASSIGNMENT

## ➢ 24IO: SNC27P200/ SNC27P250/ SNC27P300/ SNC27P332/

| Symbol | I/O | Function Description |
|---|---|---|
| RST / P90 / VPP | I | RST=1→ Reset Chip (Active H)<br>Code option:P90 or Reset pin<br>VPP: OTP Programming Voltage |
| P10~P13 | I/O | I/O port 1 |
| P20 / CLK | I/O | Bit 0 of I/O port 2 / OTP mode Synchronized clock input |
| P21 / DATA | I/O | Bit 1 of I/O port 2 / OTP mode data |
| P22 / TRIM | I/O | Bit 2 of I/O port 2 / OTP mode trim output pin |
| P23 | I/O | Bit 3 of I/O port 2 |
| P30~P33 | I/O | I/O port 3 |
| P40~P43 | I/O | I/O port 4 |
| P50~P53 | I/O | I/O port 5 |
| P60~P63 | I/O | I/O port 6 |
| BUO1 / MODE | I/O | PWM output 1 / OTP mode enter define pin (Power on MODE=1→ enter OTP mode) |
| BUO2 | O | PWM output 2 |
| VDD_PWM | P | Positive power supply for PWM |
| GND_PWM | P | Negative power supply for PWM |
| VDDIO | P | Positive power supply for I/O |
| GNDIO | P | Negative power supply for I/O |

Note: Only SNC27P200, SNC27P250, SNC27P300, SNC27P332 OTP mode trim output pin is P22, other series is P23

- **24IO: SNC27P400/ SNC27P500/ SNC27P680
SNC27P201/ SNC27P251/ SNC27P301/ SNC27P333/**

| Symbol | I/O | Function Description |
|---|---|---|
| RST / P90 / VPP | I | RST=1→ Reset Chip (Active H)<br>Code option:P90 or Reset pin<br>VPP: OTP Programming Voltage |
| P10~P13 | I/O | I/O port 1 |
| P20 / CLK | I/O | Bit 0 of I/O port 2 / OTP mode Synchronized clock input |
| P21 / DATA | I/O | Bit 1 of I/O port 2 / OTP mode data / OTP mode IHRC trim output pin* |
| P22 | I/O | Bit 2 of I/O port 2 |
| P23/TRIM | I/O | Bit 3 of I/O port 2/ OTP mode trim output pin |
| P30~P33 | I/O | I/O port 3 |
| P40~P43 | I/O | I/O port 4 |
| P50~P53 | I/O | I/O port 5 |
| P60~P63 | I/O | I/O port 6 |
| BUO1 / MODE | I/O | PWM output 1 / OTP mode enter define pin (Power on MODE=1→ enter OTP mode) |
| BUO2 | O | PWM output 2 |
| VDD_PWM | P | Positive power supply for PWM |
| GND_PWM | P | Negative power supply for PWM |
| VDDIO | P | Positive power supply for I/O |
| GNDIO | P | Negative power supply for I/O |

### 32IO: SNC27P750/SNC27P870/ SNC27P1000

| Symbol | I/O | Function Description |
|---|---|---|
| RST / P90 / VPP | I | RST=1→ Reset Chip (Active H)<br>Code option:P90 or Reset pin<br>VPP: OTP Programming Voltage |
| P10~P13 | I/O | I/O port 1 |
| P20 / CLK | I/O | Bit 0 of I/O port 2 / OTP mode Synchronized clock input |
| P21 / DATA | I/O | Bit 1 of I/O port 2 / OTP mode data / OTP mode IHRC trim output pin* |
| P22 | I/O | Bit 2 of I/O port 2 |
| P23/TRIM | I/O | Bit 3 of I/O port 2/ OTP mode trim output pin |
| P30~P33 | I/O | I/O port 3 |
| P40~P43 | I/O | I/O port 4 |
| P50~P53 | I/O | I/O port 5 |
| P60~P63 | I/O | I/O port 6 |
| P70~P73 | I/O | I/O port 7 |
| P80~P83 | I/O | I/O port 8 |
| BUO1 / MODE | I/O | PWM output 1 / OTP mode enter define pin (Power on MODE=1→ enter OTP mode) |
| BUO2 | O | PWM output 2 |
| VDD_PWM | P | Positive power supply for PWM |
| GND_PWM | P | Negative power supply for PWM |
| VDDIO | P | Positive power supply for I/O |
| GNDIO | P | Negative power supply for I/O |

## ➢ 16IO: SNC27P120/SNC27P168

| Symbol | I/O | Function Description |
|---|---|---|
| RST / P90 / VPP | I | RST=1→ Reset Chip (Active H)<br>Code option:P90 or Reset pin<br>VPP: OTP Programming Voltage |
| P10~P13 | I/O | I/O port 1 |
| P20 / CLK | I/O | Bit 0 of I/O port 2 / OTP mode Synchronized clock input |
| P21 / DATA | I/O | Bit 1 of I/O port 2 / OTP mode data |
| P22 | I/O | Bit 2 of I/O port 2 |
| P23 / TRIM | I/O | Bit 3 of I/O port 2 / OTP mode Trim output pin |
| P30~P33 | I/O | I/O port 3 |
| P60~P63 | I/O | I/O port 6 |
| BUO1 / MODE | I/O | PWM output 1 / OTP mode enter define pin (Power on MODE=1→ enter OTP mode) |
| BUO2 | O | PWM output 2 |
| VDD_PWM | P | Positive power supply for PWM |
| GND_PWM | P | Negative power supply for PWM |
| VDDIO | P | Positive power supply for I/O |
| GNDIO | P | Negative power supply for I/O |

## ➢ 16IO: SNC27P041/SNC27P061/SNC27P086/SNC27P121/SNC27P169

| Symbol | I/O | Function Description |
|---|---|---|
| RST / P90 / VPP | I | RST=1→ Reset Chip (Active H)<br>Code option:P90 or Reset pin<br>VPP: OTP Programming Voltage |
| P10~P13 | I/O | I/O port 1 |
| P20 / CLK | I/O | Bit 0 of I/O port 2 / OTP mode Synchronized clock input |
| P21 / DATA | I/O | Bit 1 of I/O port 2 / OTP mode data / OTP mode IHRC trim output pin* |
| P22 | I/O | Bit 2 of I/O port 2 |
| P23 / TRIM | I/O | Bit 3 of I/O port 2 / OTP mode trim output pin |
| P30~P33 | I/O | I/O port 3 |
| P60~P63 | I/O | I/O port 6 |
| BUO1 / MODE | I/O | PWM output 1 / OTP mode enter define pin (Power on MODE=1→ enter OTP mode) |
| BUO2 | O | PWM output 2 |
| VDD_PWM | P | Positive power supply for PWM |
| GND_PWM | P | Negative power supply for PWM |
| VDDIO | P | Positive power supply for I/O |
| GNDIO | P | Negative power supply for I/O |

## ➢ 12IO: SNC27P060/SNC27P085

| Symbol | I/O | Function Description |
|---|---|---|
| RST / P90 / VPP | I | RST=1→ Reset Chip (Active H)<br>Code option:P90 or Reset pin<br>VPP: OTP Programming Voltage |
| P10~P13 | I/O | I/O port 1 |
| P20 / CLK | I/O | Bit 0 of I/O port 2 / OTP mode Synchronized clock input |
| P21 / DATA | I/O | Bit 1 of I/O port 2 / OTP mode data |
| P22 | I/O | Bit 2 of I/O port 2 |
| P23 / TRIM | I/O | Bit 3 of I/O port 2 / OTP mode trim output pin |
| P30~P33 | I/O | I/O port 3 |
| BUO1 / MODE | I/O | PWM output 1 / OTP mode enter define pin (Power on MODE=1→ enter OTP mode) |
| BUO2 | O | PWM output 2 |
| VDD_PWM | P | Positive power supply for PWM |
| GND_PWM | P | Negative power supply for PWM |
| VDDIO | P | Positive power supply for I/O |
| GNDIO | P | Negative power supply for I/O |

## ➢ 8IO: SNC27P040/SNC27P030/SNC27P020/SNC27P042

| Symbol | I/O | Function Description |
|---|---|---|
| RST / P90 / VPP | I | RST=1→ Reset Chip (Active H)<br>Code option:P90 or Reset pin<br>VPP: OTP Programming Voltage |
| P20 / CLK | I/O | Bit 0 of I/O port 2 / OTP mode Synchronized clock input |
| P21 / DATA | I/O | Bit 1 of I/O port 2 / OTP mode data |
| P22 | I/O | Bit 2 of I/O port 2 |
| P23 / TRIM | I/O | Bit 3 of I/O port 2 / OTP mode trim output pin |
| P30~P33 | I/O | I/O port 3 |
| BUO1 / MODE | I/O | PWM output 1 / OTP mode enter define pin (Power on MODE=1→ enter OTP mode) |
| BUO2 | O | PWM output 2 |
| VDD_PWM | P | Positive power supply for PWM |
| GND_PWM | P | Negative power supply for PWM |
| VDDIO | P | Positive power supply for I/O |
| GNDIO | P | Negative power supply for I/O |

# 5. PACKAGE FORM

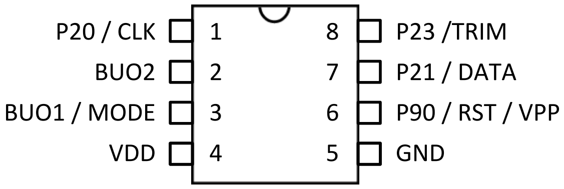
## 5.1 SNC27P041/061/086/121/169/201/251/301/333 Pin to Pin

**SNC27P041/SNC27P061/ SNC27P086/
SNC27P121/ SNC27P169
SNC27P201/ SNC27P251/ SNC27P301/ SNC27P333**

**SOP8**

**SNC27PxxxF2SG**

Support 3IO + 1I :
P20/P21/P23/P90(RST).

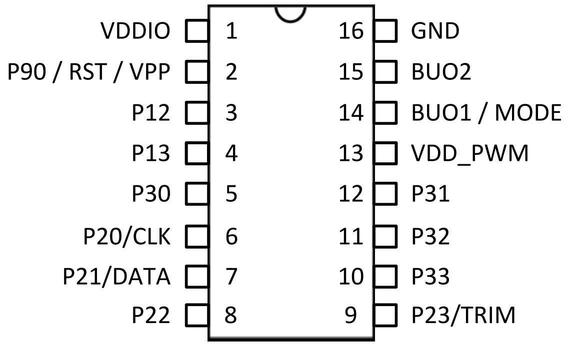



VDD=VDDIO=VDD_PWM
Please take care PCB layout
Please refer to sector 10.4 Package type application without separate power:

**SOP16**

**SNC27PxxxK2SG**

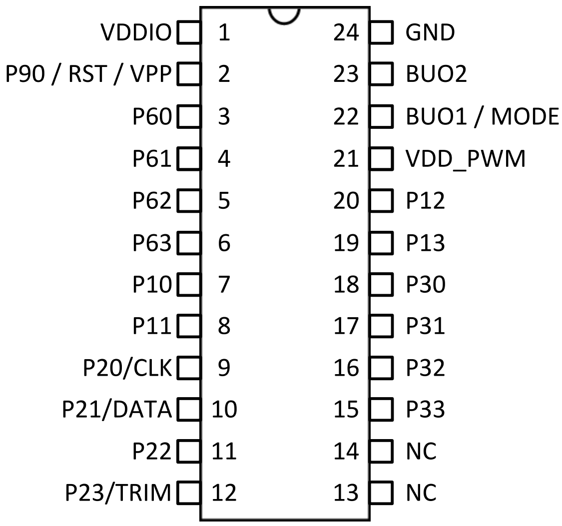
Support 10IO + 1I :
P12/P13/P2/P3/P90(RST).



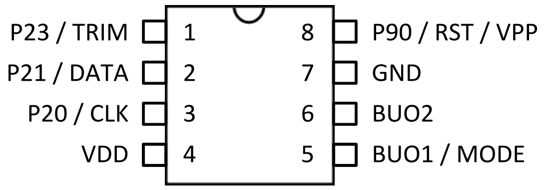
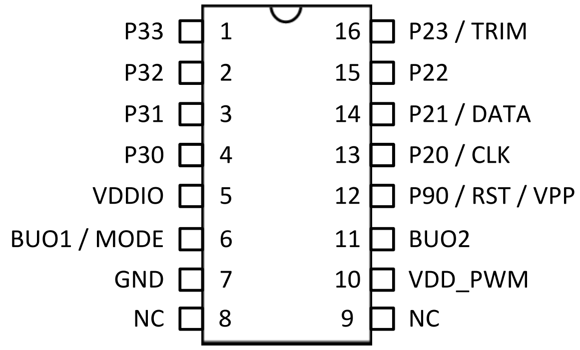

**SSOP24**

**SNC27PxxxM2XG**

Support 16IO + 1I :
P1/P2/P3/P6/P90(RST).



### 5.2 SNC27P042

<table>
<tr><th colspan="2">SNC27P042</th></tr>
<tr>
<td>SOP8<br>SNC27P042FSG<br>Support 3IO + 1I :<br>P20/P21/P23/P90(RST).<br><br>VDD=VDDIO=VDD_PWM<br>Please take care PCB layout<br>Please refer to sector 10.4 Package type application without separate power:</td>
<td>SOP16<br>SNC27P042KSG<br>Support all 8IO + 1I :<br>P2/P3/P90(RST).<br></td>
</tr>
</table>

## 5.3 SNC27P020

**SNC27P020**

**SOP8**
**SNC27P020FSG**
Support 3IO + 1I :
P20/P21/P23/P90(RST).

| | | | |
|---|---|---|---|
| P23 /TRIM | 1 | 8 | P90 / RST / VPP |
| P21 /DATA | 2 | 7 | GND |
| P20 / CLK | 3 | 6 | BUO2 |
| VDD | 4 | 5 | BUO1 / MODE |

VDD=VDDIO=VDD_PWM
Please take care PCB layout
Please refer to sector 10.4 Package type application without separate power:

**SOP14 type1**
**Type1: SNC27P020JSG**
Support all 8IO + 1I :
P2/P3/P90(RST).

| | | | |
|---|---|---|---|
| P20 / CLK | 1 | 14 | P23 /TRIM |
| P33 | 2 | 13 | P22 |
| P32 | 3 | 12 | P21 / DATA |
| P31 | 4 | 11 | P90 / RST / VPP |
| P30 | 5 | 10 | VDDIO |
| GND | 6 | 9 | BUO2 |
| VDD_PWM | 7 | 8 | BUO1 / MODE |

**SOP14 type2**
**Type2: SNC27P020J2SG**
Support all 8IO + 1I :
P2/P3/P90(RST).

| | | | |
|---|---|---|---|
| P20 / CLK | 1 | 14 | P23 / TRIM |
| P33 | 2 | 13 | P22 |
| P32 | 3 | 12 | P21 / DATA |
| P31 | 4 | 11 | P90 / RST / VPP |
| P30 | 5 | 10 | VDDIO |
| VDD_PWM | 6 | 9 | BUO2 |
| BUO1/MODE | 7 | 8 | GND |

**SOP16**
**SNC27P020KSG**
Support all 8IO + 1I :
P2/P3/P90(RST).

| | | | |
|---|---|---|---|
| P33 | 1 | 16 | P23 / TRIM |
| P32 | 2 | 15 | P22 |
| P31 | 3 | 14 | P21 / DATA |
| P30 | 4 | 13 | P20 / CLK |
| VDD | 5 | 12 | P90 / RST / VPP |
| BUO1 / MODE | 6 | 11 | BUO2 |
| GND | 7 | 10 | NC |
| NC | 8 | 9 | NC |

VDD=VDDIO=VDD_PWM
Please take care PCB layout
Please refer to sector 10.4 Package type application without separate power:

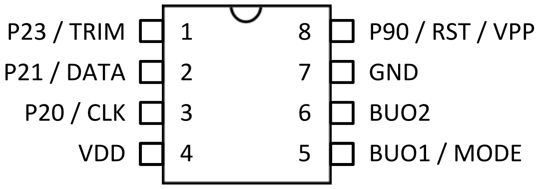
## 5.4 SNC27P030/SNC27P040

**SNC27P030/SNC27P040**

**SOP8**

**SNC27PxxxFSG**

Support 3IO + 1I :
P20/P21/P23/P90(RST).




VDD=VDDIO=VDD_PWM

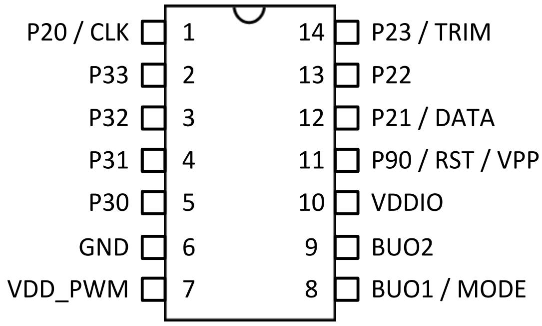
Please take care PCB layout

Please refer to sector 10.4 Package type application without separate power:

**SOP14 type1**

**Type1: SNC27PxxxJSG**

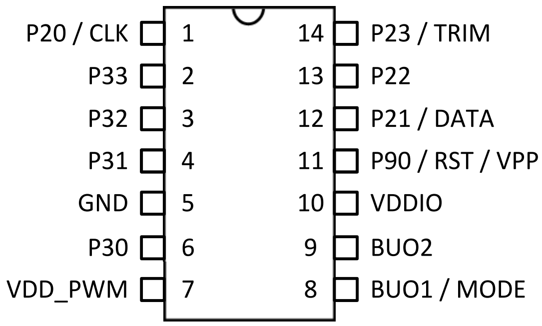
Support all 8IO + 1I :
P2/P3/P90(RST).




**SOP14 type2**

**Type2: SNC27PxxxJ2SG**

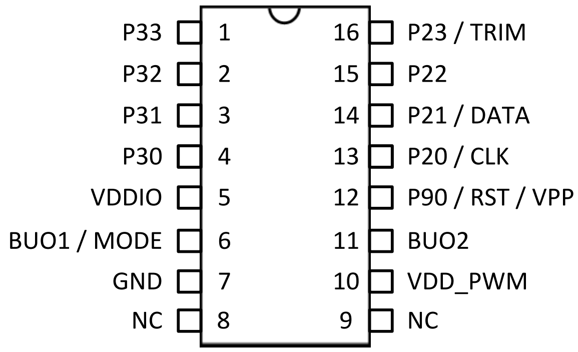
Support all 8IO + 1I :
P2/P3/P90(RST).




**SOP16**

**SNC27PxxxKSG**

Support all 8IO + 1I :
P2/P3/P90(RST).



## 5.5 SNC27P060/SNC27P085

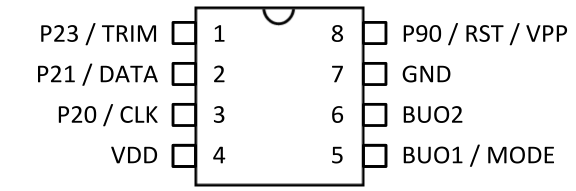
**SNC27P060/SNC27P085**

**SOP8**

**SNC27PxxxFSG**

Support 3IO + 1I :

P20/P21/P23/P90(RST).




VDD=VDDIO=VDD_PWM

Please take care PCB layout

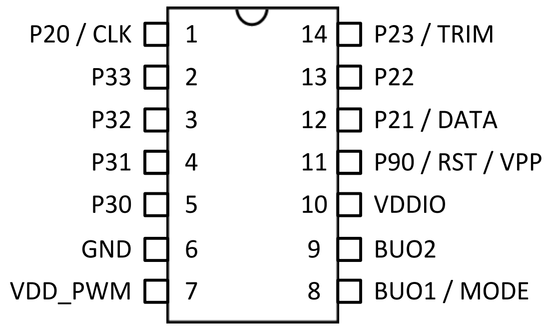
Please refer to sector 10.4 Package type application without separate power:

**SOP14 type1**

**Type1: SNC27PxxxJSG**

Support 8IO + 1I :

P2/P3/P90(RST).

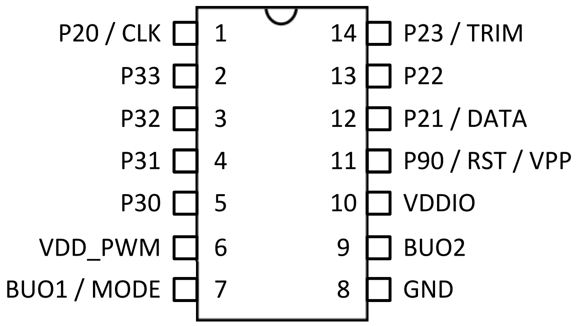



**SOP14 type2**

**Type2: SNC27PxxxJ2SG**

Support 8IO + 1I :

P2/P3/P90(RST).

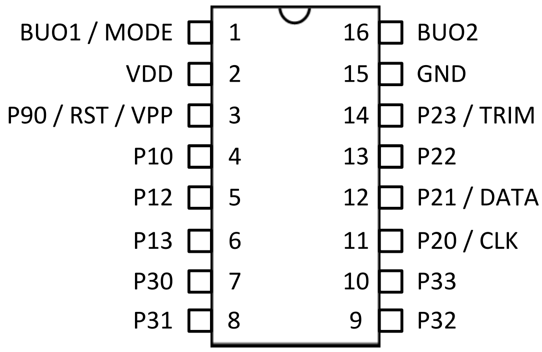



**SOP16**

**SNC27PxxxKSG**

Support 11IO + 1I :

P10/P12/P13/P2/P3/P90(RST).




VDD=VDDIO=VDD_PWM

Please take care PCB layout

Please refer to sector 10.4 Package type application without separate power:

## 5.6 SNC27P120/SNC27P168

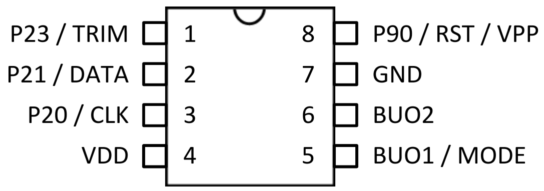
### SNC27P120/SNC27P168

**SOP8**

**SNC27PxxxFSG**

Support 3IO + 1I :

P20/P21/P23/P90(RST).




VDD=VDDIO=VDD_PWM

Please take care PCB layout

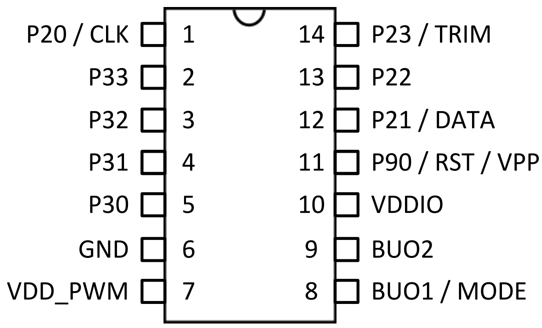
Please refer to sector 10.4 Package type application without separate power:

**SOP14 type1**

**Type1: SNC27PxxxJSG**

Support 8IO + 1I :

P2/P3/P90(RST).

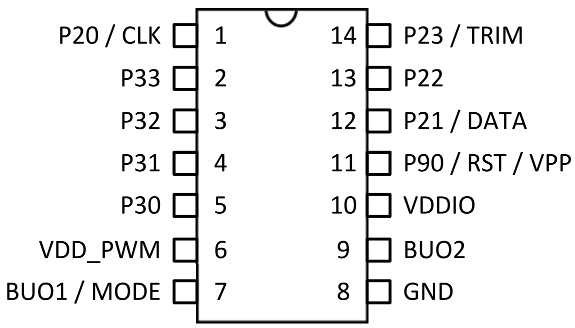



**SOP14 type2**

**Type2: SNC27PxxxJ2SG**

Support 8IO + 1I :

P2/P3/P90(RST).

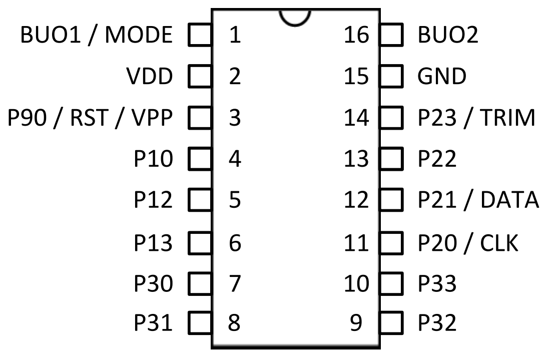



**SOP16**

**SNC27PxxxKSG**

Support 11IO + 1I :

P10/P12/P13/P2/P3/P90(RST).




VDD=VDDIO=VDD_PWM

Please take care PCB layout

Please refer to sector 10.4 Package type application without separate power:

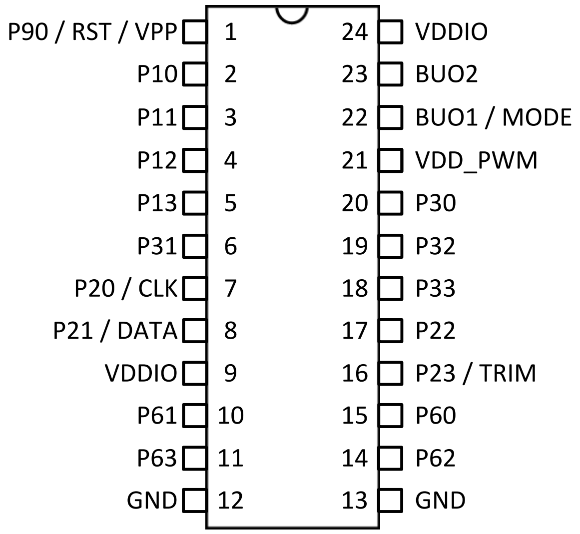
**SNC27P120/SNC27P168**

**SSOP24**

**SNC27PxxxMXG**

Support 16IO + 1I :

P1/P2/P3/P90(RST).



## 5.7 SNC27P200/SNC27P250/SNC27P300/SNC27P332

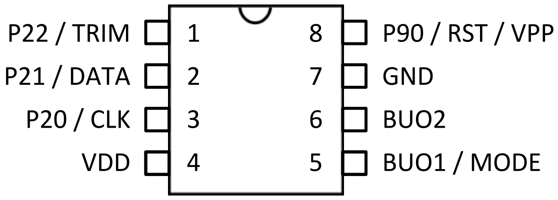
**SNC27P200/SNC27P250/SNC27P300/SNC27P332**

**SOP8**

**SNC27PxxxFSG**

Support 3IO + 1I :

P20/P21/P22/P90(RST).




VDD=VDDIO=VDD_PWM

Please take care PCB layout

Please refer to sector 10.4 Package type application without separate power:

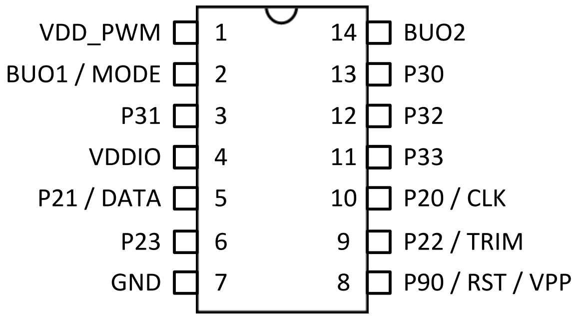
Note: Only SNC27P200, SNC27P250, SNC27P300, SNC27P332 bond P22 for SOP8, other series is P23

**SOP14**

**SNC27PxxxJSG**

Support 8IO + 1I :

P2/P3/P90(RST).

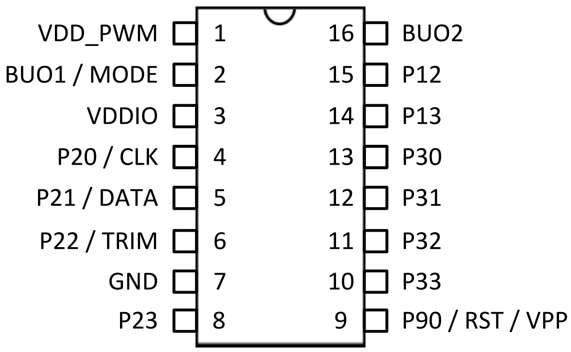



**SOP16**

**SNC27PxxxKSG**

Support 10IO + 1I :

P12/P13/P2/P3/P90(RST).

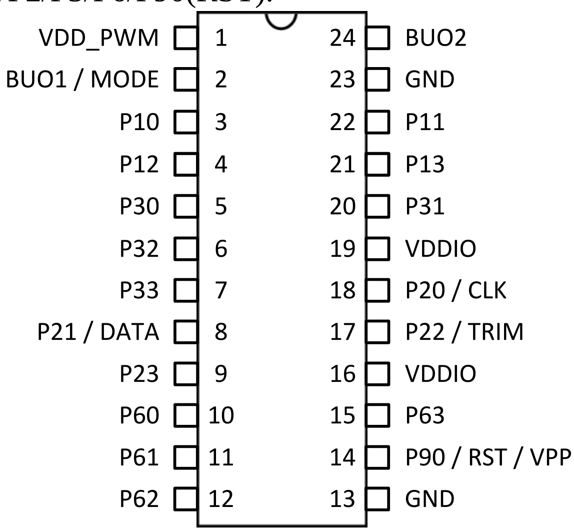



**SSOP24**

**SNC27PxxxMXG**

Support 16IO + 1I :

P1/P2/P3/P6/P90(RST).

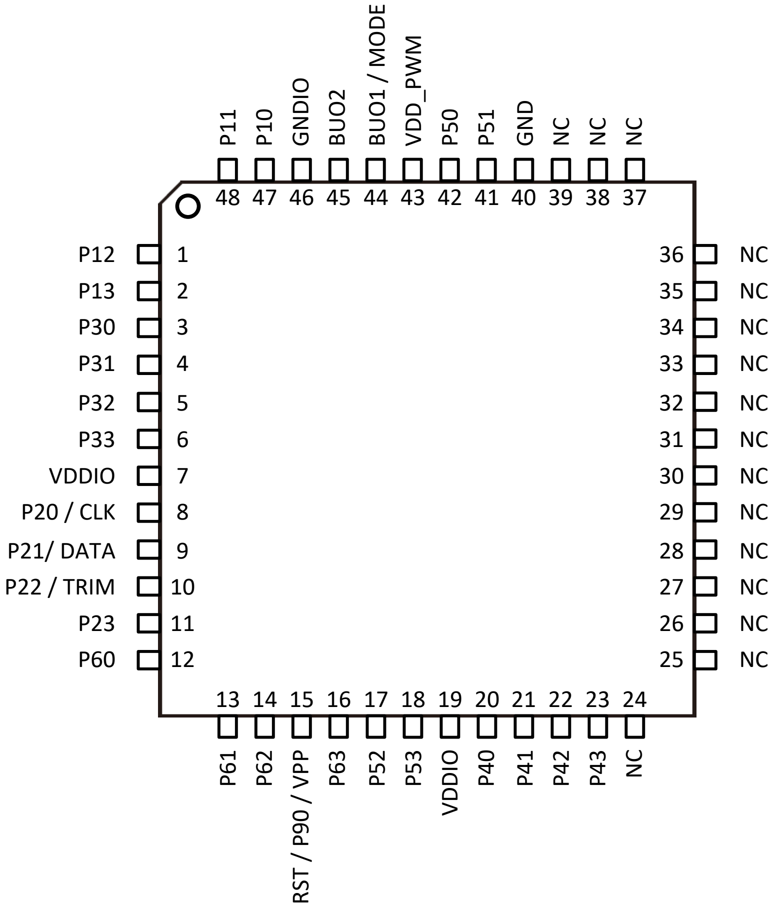


SNC27P200/SNC27P250/SNC27P300/SNC27P332

**LQFP48 SNC27PxxxQFG**

Support all 24IO + 1I :

P1/P2/P3/P4/P5/P6/P90(RST).



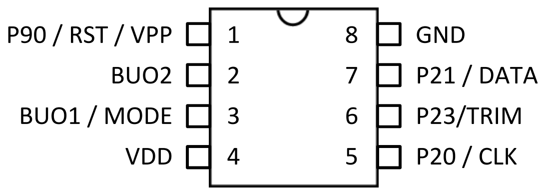
## 5.8 SNC27P400/ SNC27P500/SNC27P680

SNC27P400/SNC27P500/SNC27P680

**SOP8 SNC27PxxxFSG**

Support 3IO + 1I :

P20/P21/P23/P90(RST).




VDD=VDDIO=VDD_PWM

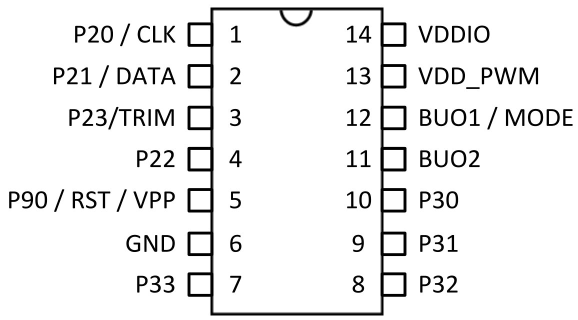
Please take care PCB layout

Please refer to sector 10.4 Package type application without separate power:

**SOP14 SNC27PxxxJSG**

Support 8IO + 1I :

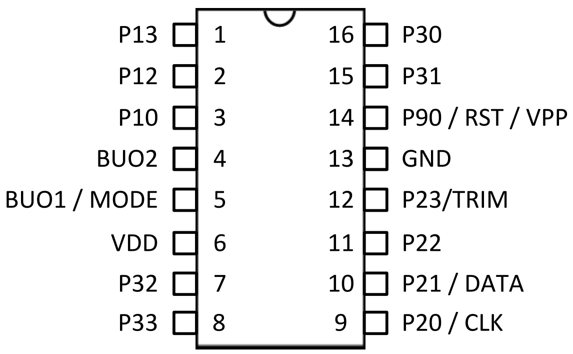
P2/P3/P90(RST).




**SOP16 SNC27PxxxKSG**

Support 11IO + 1I :

P10/P12/P13/P2/P3/P90(RST).




VDD=VDDIO=VDD_PWM

Please take care PCB layout

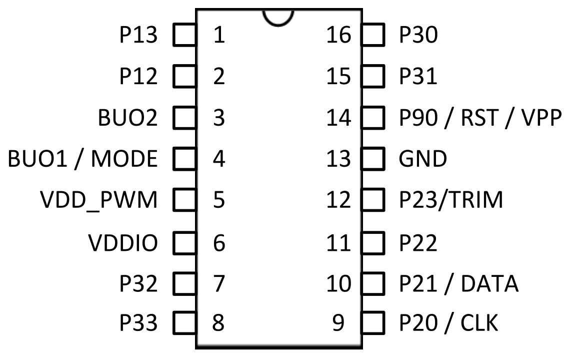
Please refer to sector 10.4 Package type application without separate power:

Recommend SNC27PxxxK2SG

**SOP16 SNC27PxxxK2SG**

Support 10IO + 1I :

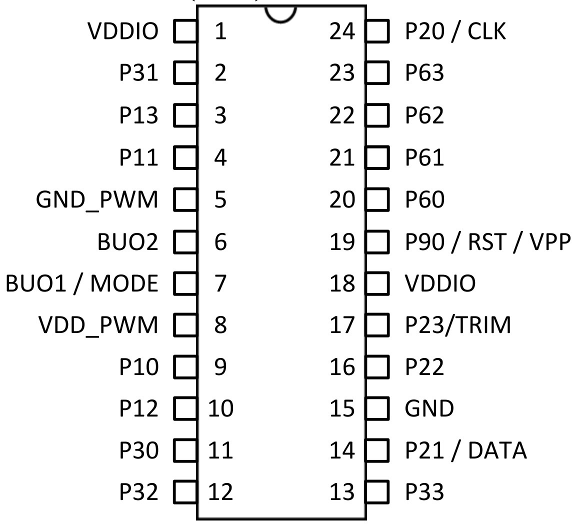
P12/P13/P2/P3/P90(RST).




SNC27P400/SNC27P500/SNC27P680

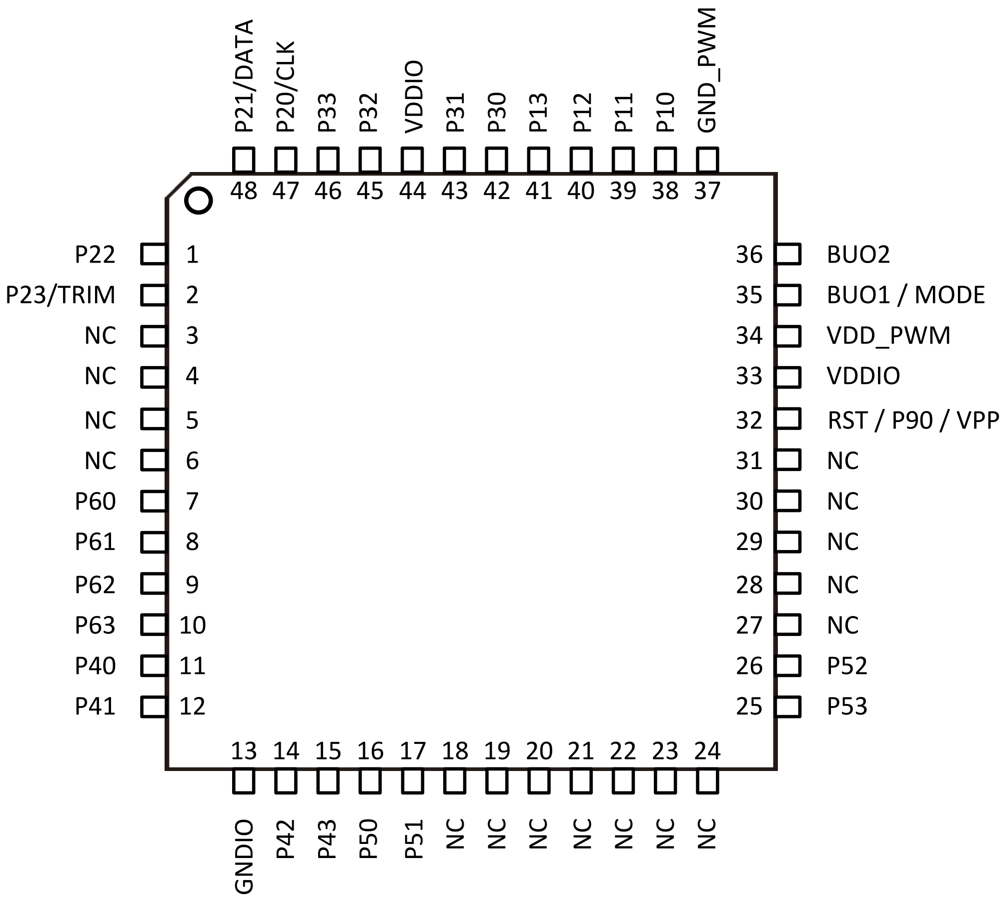
**SSOP24 SNC27PxxxMXG**

Support 16IO + 1I :
P1/P2/P3/P6/P90(RST).




**LQFP48 SNC27PxxxQFG**

Support all 24IO + 1I :P1/P2/P3/P4/P5/P6/P90(RST).

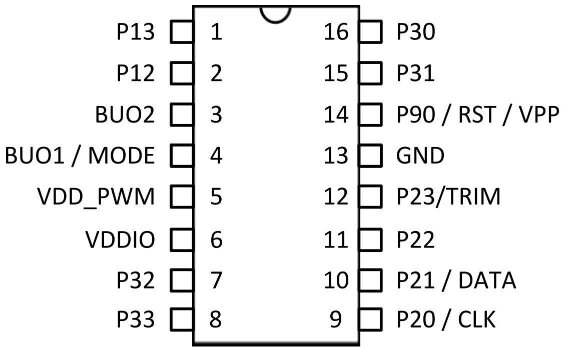



## 5.9 SNC27P750/ SNC27P870/ SNC27P1000

**SOP16 SNC27PxxxKSG**

Support 10IO + 1I :

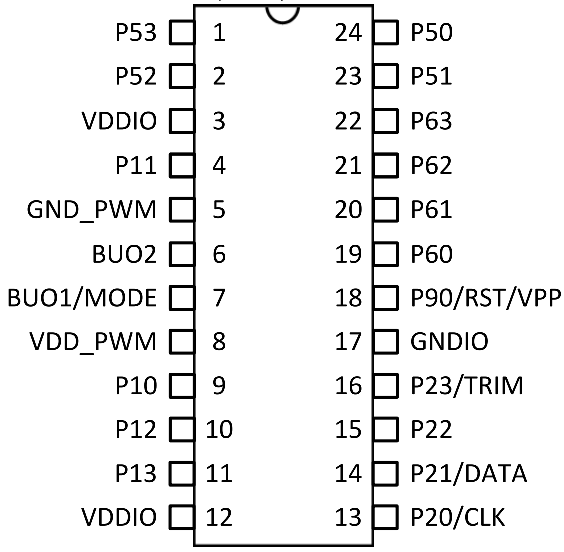
P12/P13/P2/P3/P90(RST).




**SSOP24 SNC27PxxxMXG**

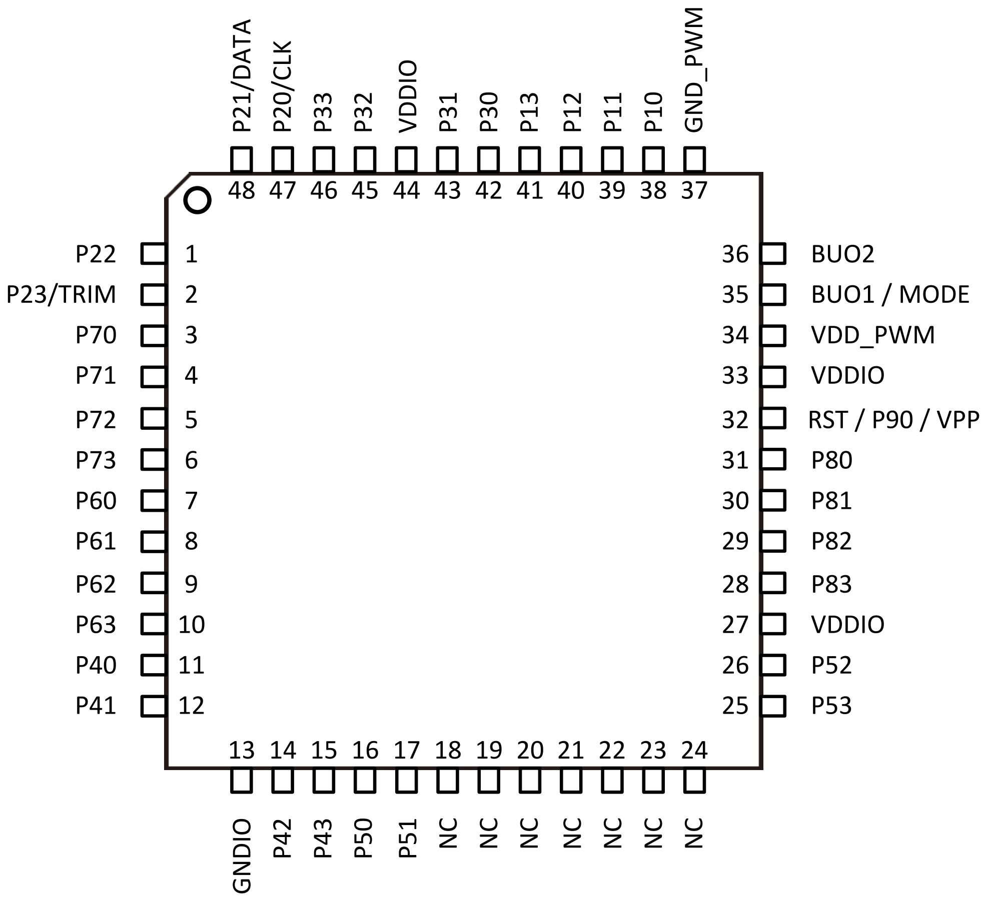
Support 16IO + 1I :

P1/P2/P3/P5/P90(RST).

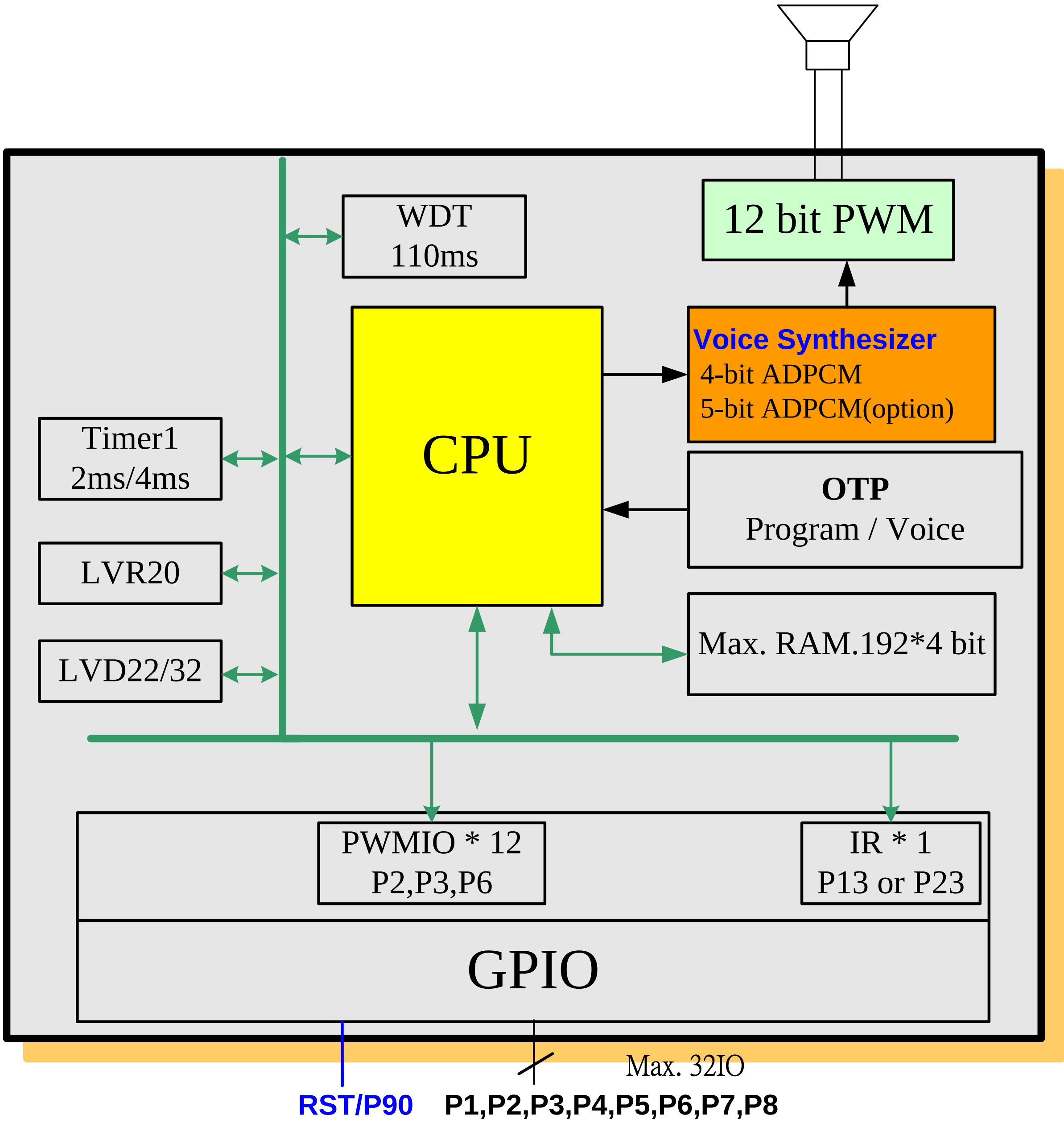



**LQFP48 SNC27PxxxQFG**

Support all 32IO + 1I :P1/P2/P3/P4/P5/P6/P7/P8/P90(RST).




## 6. BLOCK DIAGRAM


12 bit PWM
WDT
110ms
Voice Synthesizer
4-bit ADPCM
5-bit ADPCM(option)
Timer1
2ms/4ms
CPU
OTP
Program / Voice
LVR20
LVD22/32
Max. RAM.192*4 bit
PWMIO * 12
P2,P3,P6
IR * 1
P13 or P23
GPIO
Max. 32IO
RST/P90
P1,P2,P3,P4,P5,P6,P7,P8

# 7. FUNCTION DESCRIPTIONS

## 7.1 Oscillator

SNC27Pxxx build-in internal R type (+-1.5%@3V) oscillator for system clock. The frequency is affected by the voltage and temperature of the system and the following two diagrams is shown up the relation.

The Fig.1 shows up the relationship between the voltage and frequency. (3V is reference point.)
The Fig.2 shows up the relationship between the temperature and frequency at 3V condition.
(3V, 25$^{o}$C is reference point.)
The Fig.3 shows up the relationship between the temperature and frequency at 4.5V condition.
(3V, 25$^{o}$C is reference point.)

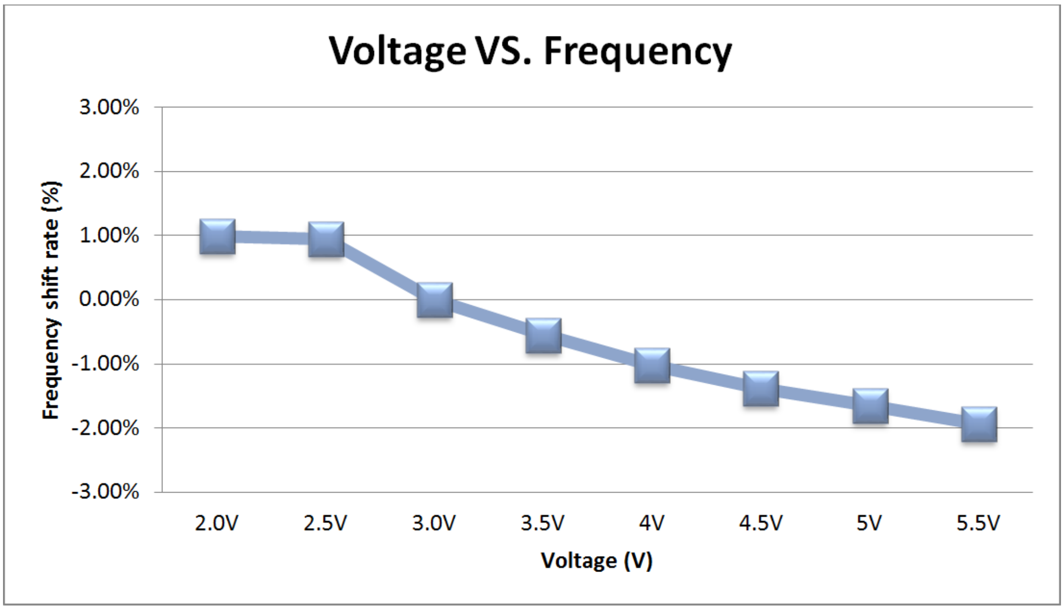



**Fig.1 Voltage VS. Frequency** (3V is reference point.)

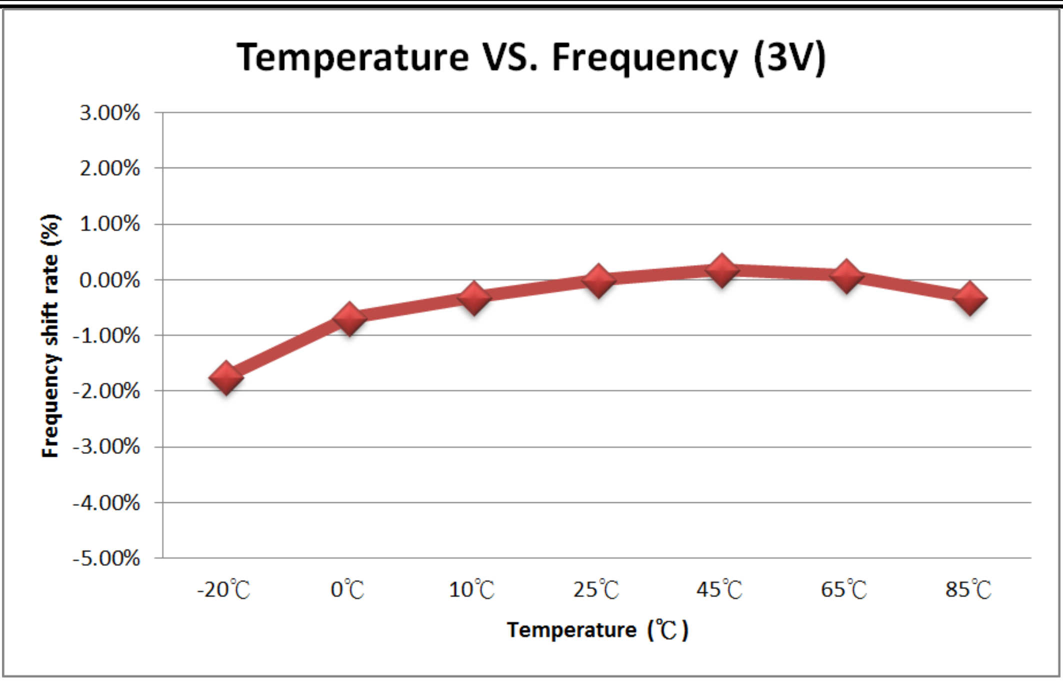



**Fig.2 Temperature VS. Frequency at 3V**

(3V 25°C is reference point.)

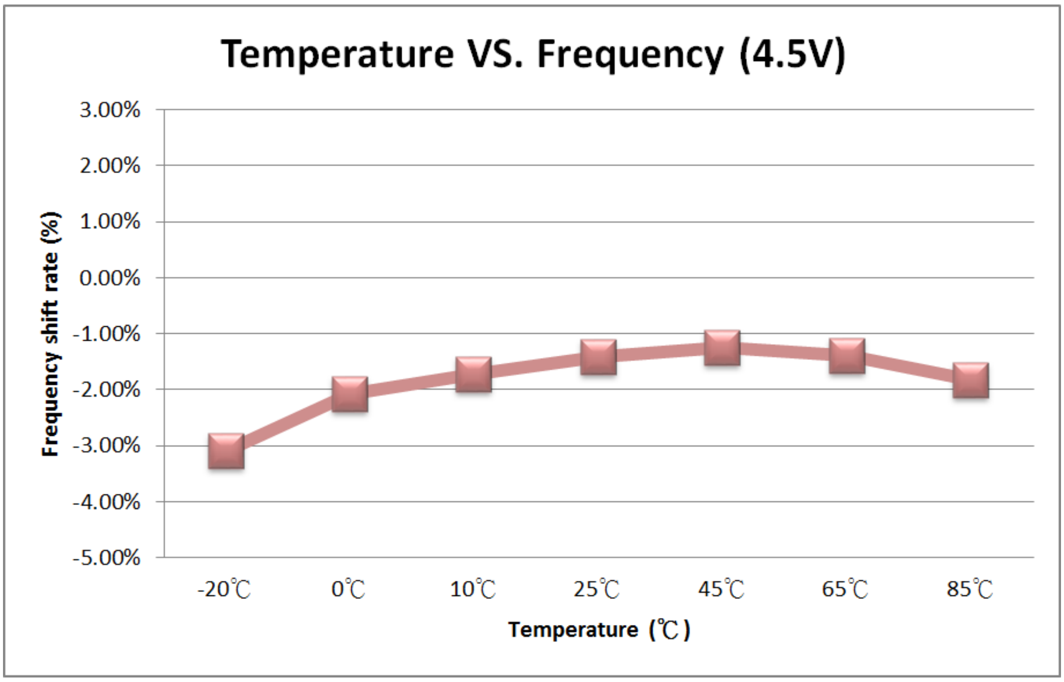



**Fig.3 Temperature VS. Frequency at 4.5V**

(3V 25°C is reference point.)

## 7.2 Program Size

SNC27Pxxx provide 64K*12 bit program size, and OTP size is 44K*12~2048K*12 bit.

| Part No. | Voice Duration @6KHz | Program size | OTP |
|---|---|---|---|
| SNC27P020 | 20 | 44K*12 | 44K*12 |
| SNC27P030 | 30 | 64K*12 | 64K*12 |
| SNC27P040 | 40 | 64K*12 | 84K*12 |
| SNC27P060/061 | 60 | 64K*12 | 128K*12 |
| SNC27P085/086 | 85 | 64K*12 | 176K*12 |
| SNC27P120/121 | 120 | 64K*12 | 248K*12 |
| SNC27P168/169 | 168 | 64K*12 | 352K*12 |
| SNC27P200/201 | 200 | 64K*12 | 412K*12 |
| SNC27P250/251 | 250 | 64K*12 | 512K*12 |
| SNC27P300/301 | 300 | 64K*12 | 616K*12 |
| SNC27P332/333 | 332 | 64K*12 | 680K*12 |
| SNC27P400 | 400 | 64K*12 | 820K*12 |
| SNC27P500 | 500 | 64K*12 | 1024K*12 |
| SNC27P680 | 680 | 64K*12 | 1392K*12 |
| SNC27P750 | 750 | 64K*12 | 1536K*12 |
| SNC27P870 | 870 | 64K*12 | 1780K*12 |
| SNC27P1000 | 1000 | 64K*12 | 2048K*12 |

## 7.3 RAM

SNC27Pxxx contains max. 192 nibble RAM (192 x 4-bits). The 192 nibble RAM is divided into three pages (page 0, page 1 and page 2). In our programming structure, users can use the instructions, PAGE n (n=0 ~2) to switch and indicate the RAM page. Besides, users can use direct mode, M0 ~ M63 in the data transfer type instructions.

| Part No. | RAM |
|---|---|
| SNC27P020 | 128*4 |
| SNC27P030 | 128*4 |
| SNC27P040 | 128*4 |
| SNC27P060/061 | 128*4 |
| SNC27P085/086 | 128*4 |
| SNC27P120/121 | 128*4 |
| SNC27P168/169 | 128*4 |
| SNC27P200/201 | 192*4 |
| SNC27P250/251 | 192*4 |
| SNC27P300/301 | 192*4 |
| SNC27P332/333 | 192*4 |
| SNC27P400 | 192*4 |
| SNC27P500 | 192*4 |
| SNC27P680 | 192*4 |
| SNC27P750 | 192*4 |
| SNC27P870 | 192*4 |
| SNC27P1000 | 192*4 |

## 7.4 Power down Mode

"End" instruction makes the IC entering into Stop Mode will stop the system clock for power savings. Any valid data transition (L→H or H→L) occurring on any IO pin can be used to start the system clock and return to normal operating mode.

## 7.5 Sampling Rate Counter

SNC27Pxxx provide playing speed from 4.5 k-36 kHz. The speech-playing rate can be calculated by the following formula:

Speech Playing Rate = 144/(56-RATE) *KHz*

Rate can be combined together form 2 register RH,RL as followed:

| RH | | RL | | | | |
|---|---|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 | 0 | → RATE |

Table.1 The suggestion of sampling rate as below (**filter function enable**):

| RH | RL | Rate | Playing Rate | RH | RL | Rate | Playing Rate |
|---|---|---|---|---|---|---|---|
| 0x3 | 0x3 | 51 | **14400** | 0x2 | 0xD | 34 | **6545** |
| 0x3 | 0x2 | 50 | **12000** | 0x2 | 0xC | 44 | **6000** |
| 0x3 | 0x1 | 42 | **10286** | 0x2 | 0xB | 43 | **5538** |
| 0x3 | 0x0 | 48 | **9000** | 0x2 | 0xA | 42 | **5143** |
| 0x2 | 0xF | 47 | **8000** | 0x2 | 0x9 | 41 | **4800** |
| 0x2 | 0xE | 46 | **7200** | 0x2 | 0x8 | 40 | **4500** |

Hint: Setting RH/RL is Playing Rate * 2 with filter enable. Please follow table.1 setting (RH/RL).

Table.2 The suggestion of sampling rate as below **(filter function disable):**

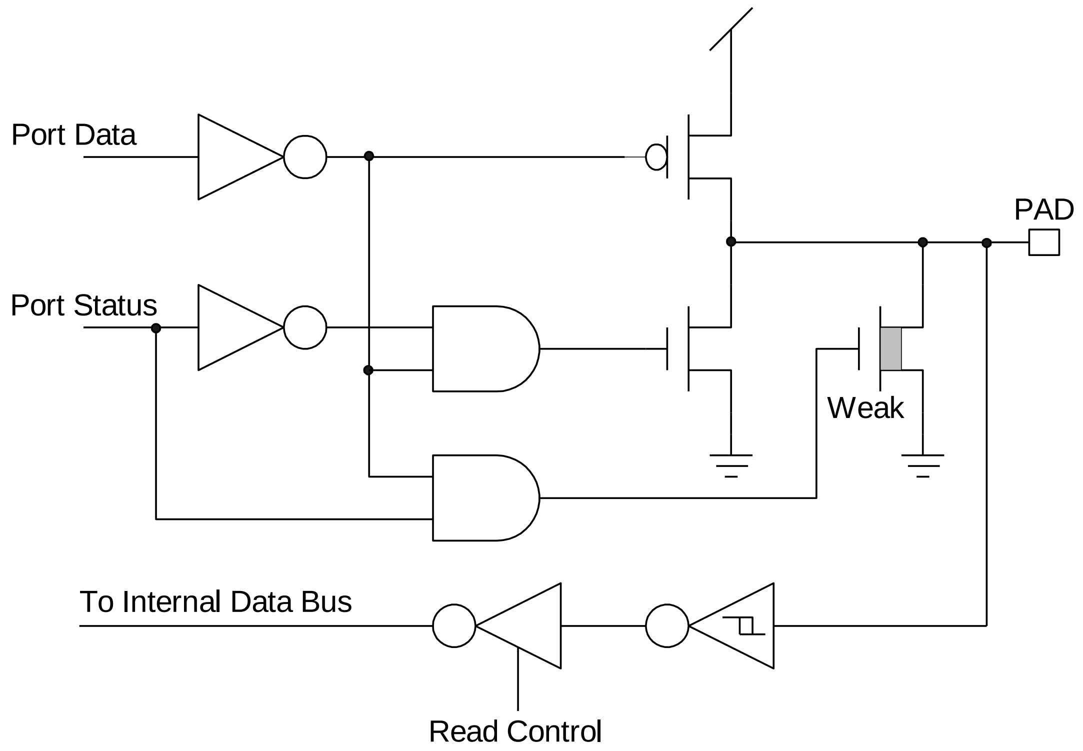
| RH | RL | Rate | Playing Rate | RH | RL | Rate | Playing Rate |
|---|---|---|---|---|---|---|---|
| 0x3 | 0x4 | 52 | **36000** | 0x2 | 0x5 | 37 | **7579** |
| 0x3 | 0x3 | 51 | **28800** | 0x2 | 0x4 | 36 | **7200** |
| 0x3 | 0x2 | 50 | **24000** | 0x2 | 0x3 | 35 | **6857** |
| 0x3 | 0x1 | 49 | **20571** | 0x2 | 0x2 | 34 | **6545** |
| 0x3 | 0x0 | 48 | **18000** | 0x2 | 0x1 | 33 | **6261** |
| 0x2 | 0xF | 47 | **16000** | 0x2 | 0x0 | 32 | **6000** |
| 0x2 | 0xE | 46 | **14400** | 0x1 | 0xF | 31 | **5760** |
| 0x2 | 0xD | 45 | **13091** | 0x1 | 0xE | 30 | **5538** |
| 0x2 | 0xC | 44 | **12000** | 0x1 | 0xD | 29 | **5333** |
| 0x2 | 0xB | 43 | **11077** | 0x1 | 0xC | 28 | **5143** |
| 0x2 | 0xA | 42 | **10286** | 0x1 | 0xB | 27 | **4966** |
| 0x2 | 0x9 | 41 | **9600** | 0x1 | 0xA | 26 | **4800** |
| 0x2 | 0x8 | 40 | **9000** | 0x1 | 0x9 | 25 | **4645** |
| 0x2 | 0x7 | 39 | **8471** | 0x1 | 0x8 | 24 | **4500** |
| 0x2 | 0x6 | 38 | **8000** | | | | |

## 7.6 I/O Ports

SNC27Pxxx built-in maximum 32 I/O pins (port P1, P2, P3, P4, P5, P6, P7 and P8) and 1 input pin (P9.0/RST/VPP). Any I/O can be individually programmed as either input pull low or output. Any valid data transition (H→ L|L→H) of P1/P2/P3/P4/P5/P6/P7/P8 can reactivate the chip when it is in power-down stage.

| Part No. | I/O | Part No. | I/O |
|---|---|---|---|
| SNC27P020 | 1I, 8IO | SNC27P250/251 | 1I, 24IO |
| SNC27P030 | 1I, 8IO | SNC27P300/301 | 1I, 24IO |
| SNC27P040 | 1I, 8IO | SNC27P332/333 | 1I, 24IO |
| SNC27P060 | 1I, 12IO | SNC27P400 | 1I, 24IO |
| SNC27P085 | 1I, 12IO | SNC27P500 | 1I, 24IO |
| SNC27P061 | 1I, 16IO | SNC27P680 | 1I, 24IO |
| SNC27P086 | 1I, 16IO | SNC27P750 | 1I, 32IO |
| SNC27P120/121 | 1I, 16IO | SNC27P870 | 1I, 32IO |
| SNC27P168/169 | 1I, 16IO | SNC27P1000 | 1I, 32IO |
| SNC27P200/201 | 1I, 24IO | | |

**I/O Port Configuration**




***Note:***

(1) ***Weak N-MOS can serve as pull-low resistor.***

(2) ***The driving/sink current of P2/P3/P6 is up to 8mA/16mA***

## 7.7 Multi-function of I/Os

A summary of IO is listed as below:

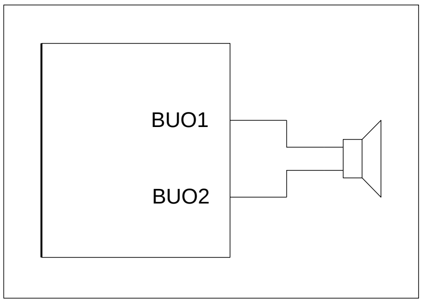
| Function | P9 | P1 | | | | P2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Port** | 0 | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| **PWMIO** | | | | | | V | V | V | V |
| **High drive/sink IO** | | | | | | V | V | V | V |
| **IR** | | | | | V | | | | V |
| **Reset PIN** | V | | | | | | | | |

| Function | P3 | | | | P4 | | | |
|---|---|---|---|---|---|---|---|---|
| **Port** | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| **PWMIO** | V | V | V | V | | | | |
| **High drive/sink IO** | V | V | V | V | | | | |
| **IR** | | | | | | | | |
| **Reset PIN** | | | | | | | | |

| Function | P5 | | | | P6 | | | |
|---|---|---|---|---|---|---|---|---|
| **Port** | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 |
| **PWMIO** | | | | | V | V | V | V |
| **High drive/sink IO** | | | | | V | V | V | V |
| **IR** | | | | | | | | |
| **Reset PIN** | | | | | | | | |

## 7.8 12-bit PWM Output

One PWM output circuit is built-in SNC27Pxxx. The maximum resolution of PWM is 12 bits. Two huge output stage circuits are designed in SNC27Pxxx. With this advanced circuit, the chip is capable of driving speaker directly without external transistors.




PWM Output

SNC27Pxxx provide 8 level volume control shown as below:

| PWMVol[2] | PWMVol[1] | PWMVol[0] | Volume level |
|---|---|---|---|
| 1 | 1 | 1 | 16/16 (0db) |
| 1 | 1 | 0 | 12/16 (-2.5db) |
| 1 | 0 | 1 | 8/16 (-6db) |
| 1 | 0 | 0 | 6/16 (-8.51db) |
| 0 | 1 | 1 | 4/16 (-12db) |
| 0 | 1 | 0 | 3/16 (-14.5db) |
| 0 | 0 | 1 | 2/16 (-18db) |
| 0 | 0 | 0 | 1/16 (-24db) |

## 7.9 Watch Dog Timer

SNC27Pxxx built an internal WDT (Watch Dog Timer). This Watchdog timer would issue resets signal to this chip if it is not cleared before reaching terminal count (110 ms). The watchdog timer is enabled at reset and cannot be disabled.

## 7.10 IR Function

P23 or P13 can be modulated with 38.5KHz square wave before sent out to P23 or P13 pin. The IR signal can be achieved by this modulated signal.

## 7.11 PWM IO control

SNC27Pxxx has support Max. 12 PWM IO (P20~P33, P60~P63). Each I/O has 8 bit independent duty register, and the 8 bit register are compare with 8 bits counter. If set use PWM IO function and internal counter start at 000H, the mapping I/O will set High. The 8 bits counter increment if the same duty registers, that will reset the mapping IO pin.

**Note: P3/P6 share with the same PWMIO duty**

# 8. ABSOLUTE MAXIMUM RATING

| Items | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **Supply Voltage** | $V_{DD}$-$V_{SS}$ | -0.3 | 5.5 | V |
| **Input Voltage** | $V_{IN}$ | $V_{SS}$-0.2 | $V_{DD}$+0.2 | V |
| **Operating Temperature** | $T_{OP}$ | -20 | 85 | ºC |
| **Storage Temperature** | $T_{STG}$ | -40 | 125 | ºC |
| **Junction Temperature** | Tj | -40 | 125 | ºC |

Package Thermal Resistance :
SOP8 150mil-------------------------------------------------------------------Reference Theta JA:98.9° C/W
Human body model ESD Rating[According to EIA/JESD22-A114-B (discharging a 100pF capacitor through a 1.5KΩ series resistor)]-----------------------------------------------------------------Class 1C

# 9. ELECTRICAL CHARACTERISTICS

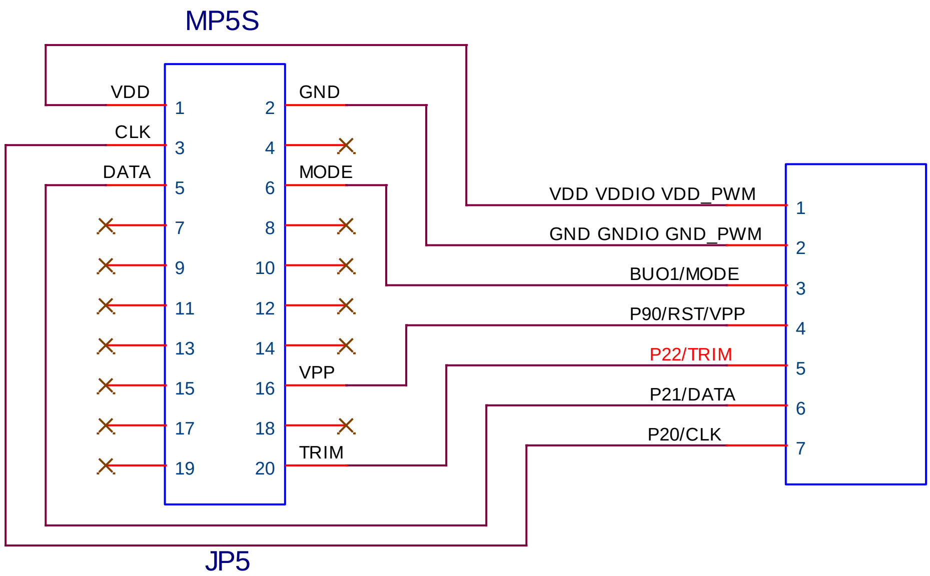
| Item | Sym. | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| **Operating Voltage** | $V_{DD}$ | 2.1 | - | 5.5* | V | *Using 3 battery, please refer to sector 10.2.2 In 3 battery application (5V): |
| **OTP Program Mode external voltage input** | VPP | 8.4 | 8.5 | 8.6 | V | In Normal Mode VPP can be floating or low |
| **OTP Program Mode VDD Voltage** | VDDP | 4.7 | 4.8 | 4.9 | V | |
| **Low Voltage Reset level** | $V_{LVR}$ | 1.8 | 1.9 | 2.0 | V | |
| **Standby current** | $I_{SBY}$ | - | 1 | 2 | uA | $V_{DD}$=3.0V, no load |
| | | - | 3 | 4 | | $V_{DD}$=4.5V, no load |
| **Operating Current** | $I_{OPR}$ | - | 2.5 | - | mA | $V_{DD}$=3.0V, no load |
| | | - | 4.5 | - | | $V_{DD}$=5.0V, no load |
| **GPIO Input High Level** | $V_{IH}$ | - | 2/3VDD | - | V | $V_{DD}$ = 4.5V<br>$V_{DD}$ =3.0V |
| **GPIO Input Low Level** | $V_{IL}$ | - | 1/3VDD | - | V | $V_{DD}$=4.5V<br>$V_{DD}$ =3.0V |
| **Input Pull Low Resistor (P1, P2, P3, P4, P5, P6,P7,P8)** | $R_I$ | - | 1300 | - | KΩ | $V_{DD}$ =3.0V, $V_{IN}$=3.0V |
| | | | 750 | | | $V_{DD}$ =4.5V, $V_{IN}$=4.5V |
| **Drive Current (P1, P4, P5,P7,P8)** | $I_{OD}$ | 3 | 4 | - | mA | $V_{DD}$=3.0V,$V_O$=0.8*VDD |
| | | 6 | 8 | | | $V_{DD}$=4.5V,$V_O$=0.8*VDD |
| **Drive Current (P2, P3, P6)** | $I_{OD}$ | 6 | 8 | - | mA | $V_{DD}$=3.0V,$V_O$=0.8*VDD |
| | | 12 | 16 | | | $V_{DD}$=4.5V,$V_O$=0.8*VDD |
| **Sink Current (P1, P4, P5,P7,P8)** | $I_{OS}$ | 4 | 6 | - | mA | $V_{DD}$=3.0V,$V_O$=0.13*VDD |
| | | 8 | 12 | | | $V_{DD}$=4.5V,$V_O$=0.13*VDD |
| **Sink Current (P2, P3, P6)** | $I_{OS}$ | 10 | 16 | - | mA | $V_{DD}$=3.0V,$V_O$=0.13*VDD |
| | | 20 | 32 | | | $V_{DD}$=4.5V,$V_O$=0.13*VDD |
| **PWM current** | $I_{PWM}$ | - | 200 | - | mA | VDD=3.0V, BUOx=1.5V |
| | | | 350 | | | VDD=4.5V, BUOx=2.25V |
| **CPU Freq.** | $F_{cpu}$ | 1.134 | 1.152 | 1.17 | MHz | $V_{DD}$=3V, Temp.=25ºC<br>Min : -1.5%, Max : +1.5% |

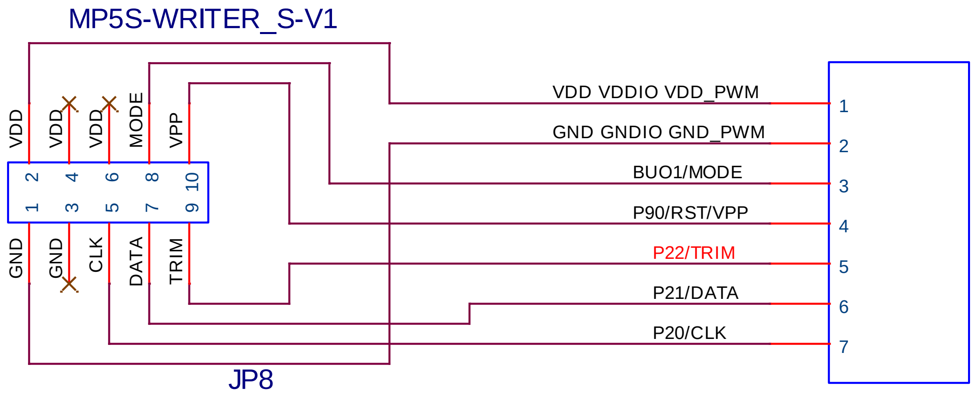
# 10. APPLICATION Circuit

## 10.1 I/F of Programming mode

### 10.1.1. Serial Program I/F.

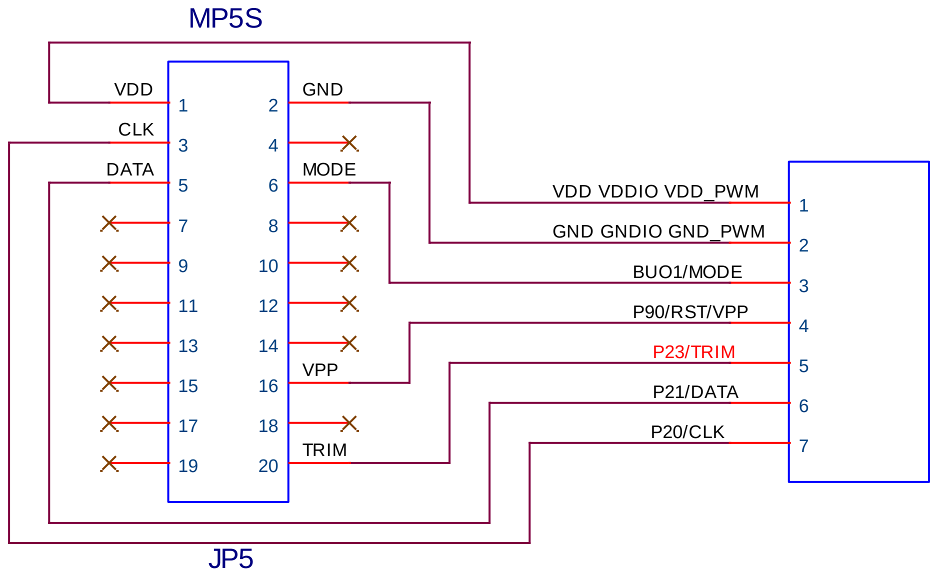
**(1) SNC27P200/ SNC27P250/ SNC27P300/ SNC27P332:**

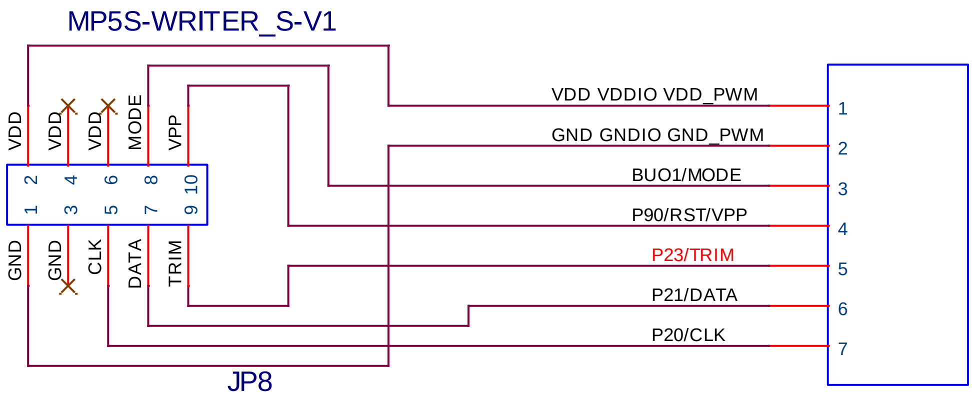



Note: Only SNC27P200, SNC27P250, SNC27P300, SNC27P332 OTP mode TRIM output pin is P22, other series is P23

**(2) SNC27P020/ SNC27P030/SNC27P040/SNC27P060/ SNC27P085/ SNC27P120/ NC27P168/ SNC27P400/ SNC27P500/ SNC27P680/ SNC27P750/SNC27P870/SNC27P1000 SNC27P041/SNC27P061/SNC27P086/ SNC27P121/SNC27P169/ SNC27P201/SNC27P251/SNC27P301/SNC27P333**

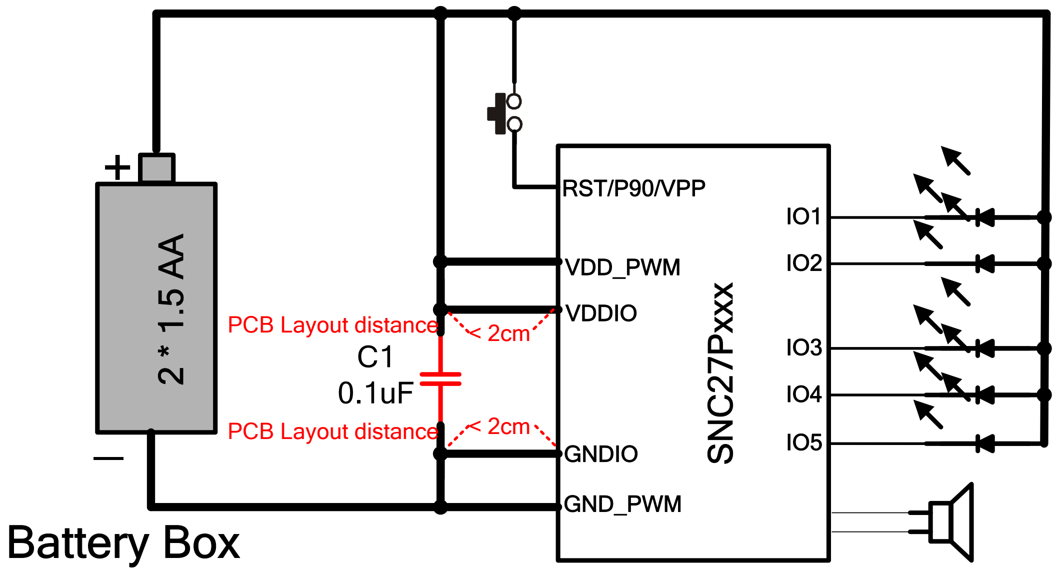



There needs total **7** pins for programming OTP file by SONIX MP5S Writer with serial programming mode.

## 10.2 General application

### 10.2.1. In 2 battery application (3V):

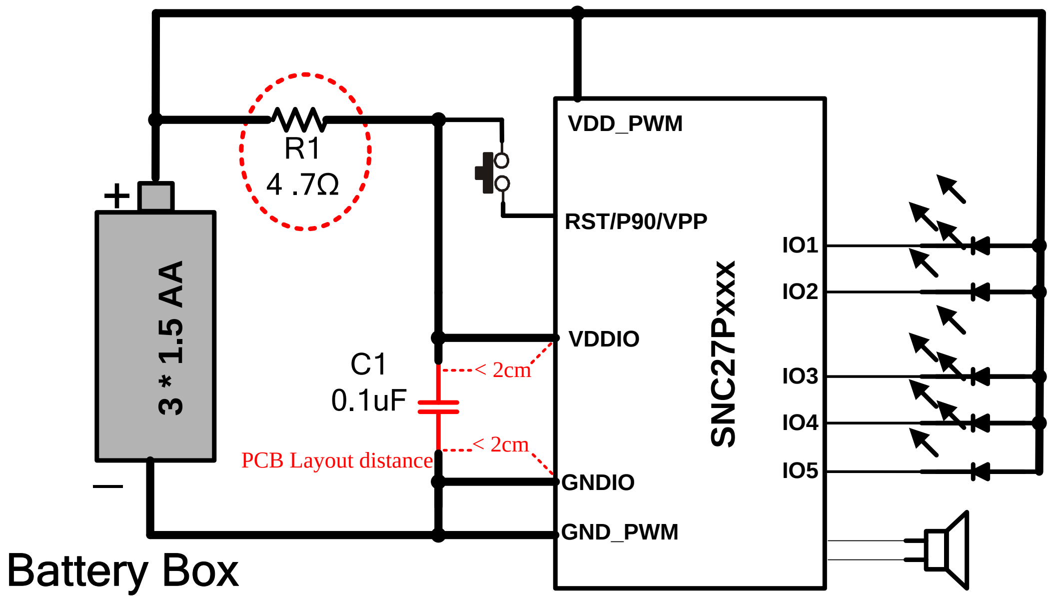



(1) VDDIO connects to source power.

(2) VDD_PWM connects to VDDIO.

(3) **The capacitor C1 (0.1uF) is strongly suggested to be as close to the chip as possible(<2cm). It is must be add capacitor (C1), 0.1uF, it will keep power stable with general application.**

### 10.2.2. In 3 battery application (5V):



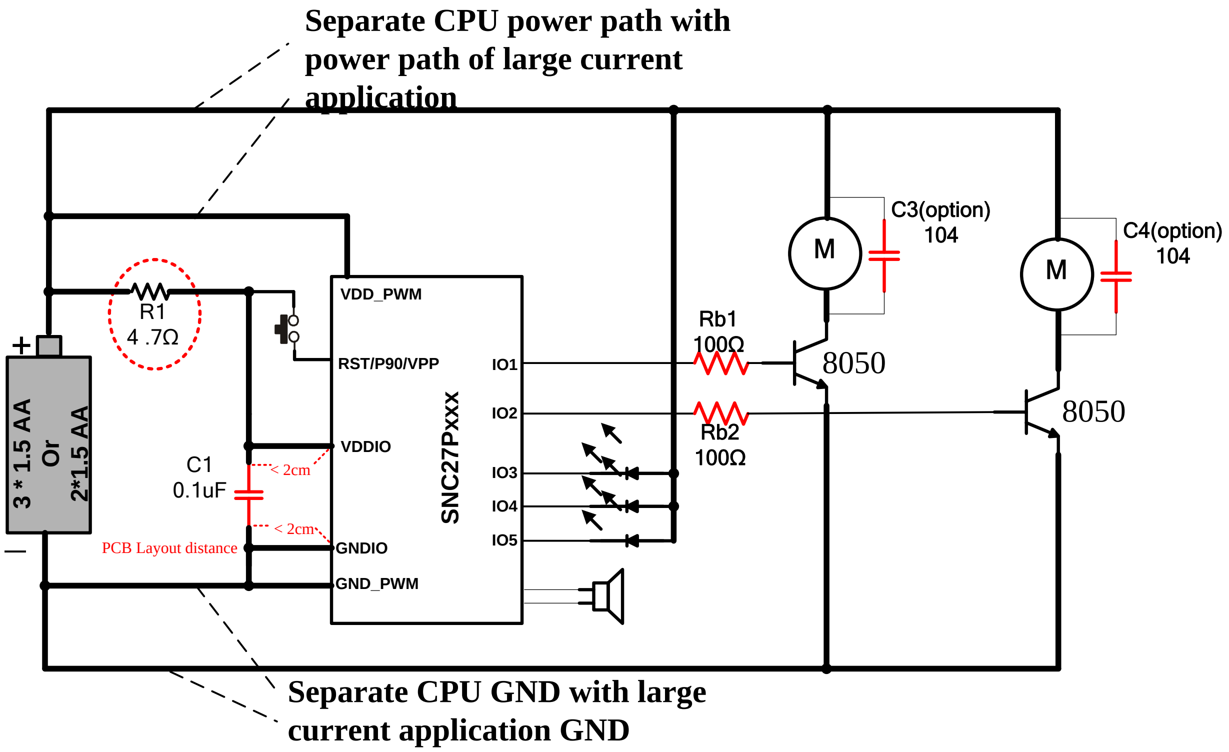

(1) VDD_PWM connects to source power.

(2) **The resistor R1 (4.7Ω) connects VDDIO and power.**

(3) **The capacitor C1 (0.1uF) is strongly suggested to be as close to the chip as possible(<2cm). It is must be add capacitor (C1), 0.1uF, it will keep power stable with general application.**

(4) **The capacitor C1 is suggested using 0.1uF, and user need to adjust the capacitor C1 by project.**

## 10.3 Motor application




**There are some suggestions about PCB layout when use SNC27Pxxx series IC with motor applications.**

**(1) The capacitor C1 (0.1uF) is strongly suggested to be as close to the chip as possible(<2cm).**

**(2) The capacitor C1 is suggested using 0.1uF, and user need to adjust the capacitor C1 by project.**

**(3) The resistor R1 (4.7Ω) connects VDDIO and power.**

(4) Separate IC power path with large current application power path to avoid affect IC working by power drop from large current application.

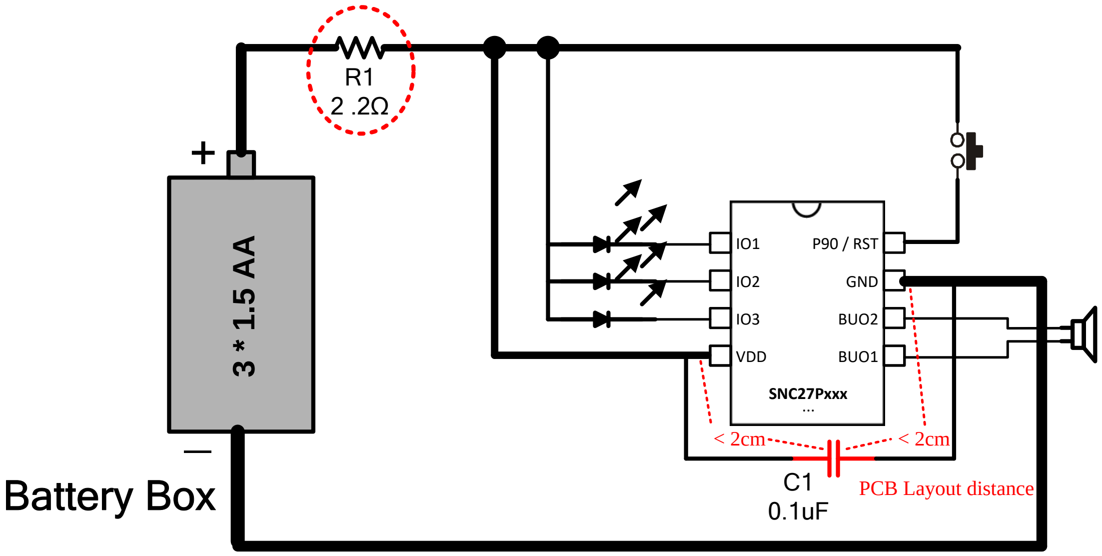
(5) Let power cable thicker, especially for large current application.

(6) C3 and C4 (104) are connected at the positive point and negative point of the motor (Option).

## 10.4 Package type application without separate power:

### 10.4.1. In 3 battery application (5V):

- VDD = VDDIO = VDD_PWM
- Capacitor C1 (0.1uF) is strongly suggested to be as close to the chip as possible.



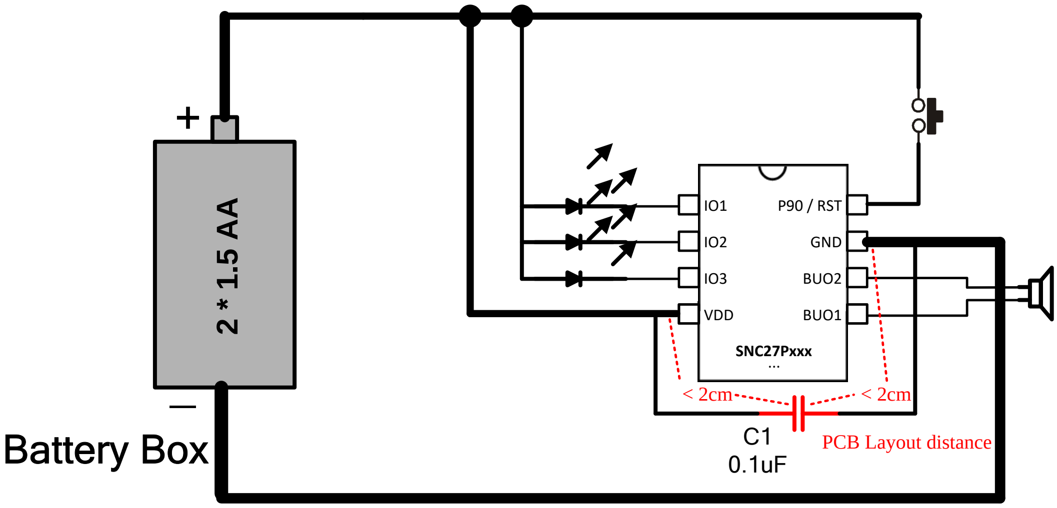

**(1) The resistor R1 (2.2Ω) connects VDD and power.**

**(2) The capacitor C1 (0.1uF) is strongly suggested to be as close to the chip as possible(<2cm). It is must be add capacitor (C1), 0.1uF, it will keep power stable with general application.**

**(3) The capacitor C1 is suggested using 0.1uF, and user need to adjust the capacitor C1 by project.**

### 10.4.2. In 2 battery application (3V):

- VDD = VDDIO = VDD_PWM
- Capacitor C1 (0.1uF) is strongly suggested to be as close to the chip as possible.

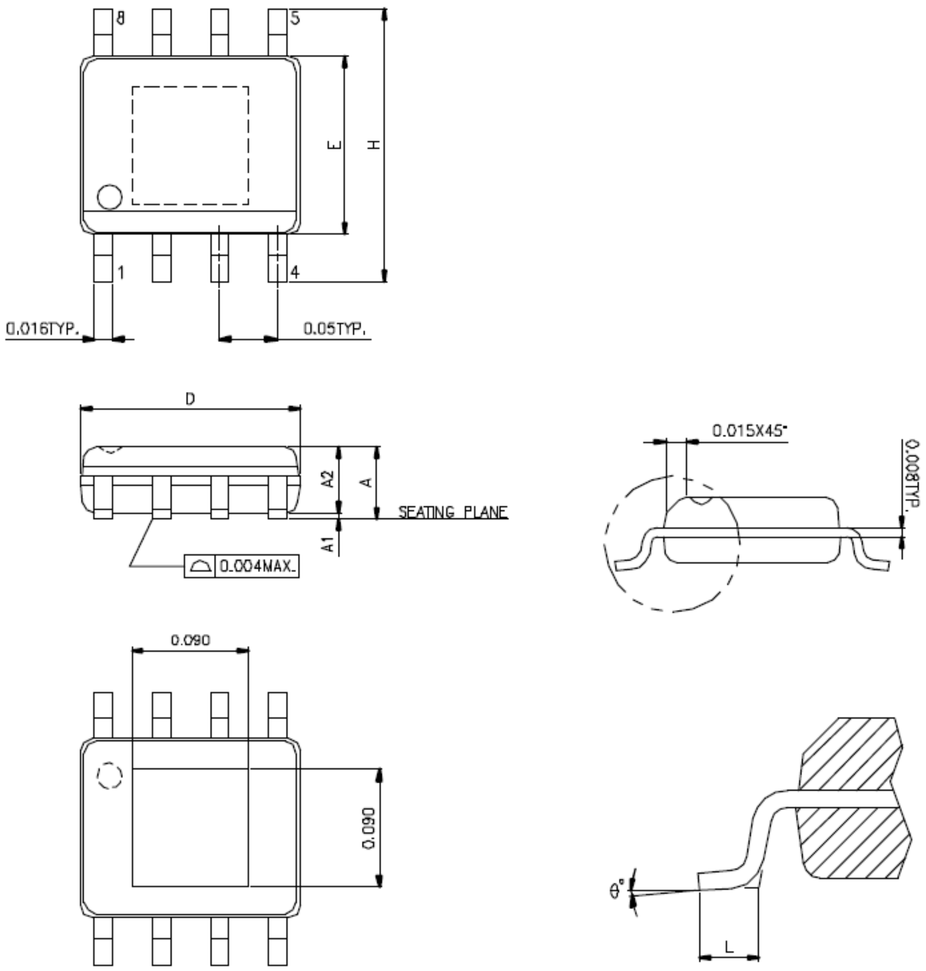



**(1) The capacitor C1 (0.1uF) is strongly suggested to be as close to the chip as possible(<2cm). It is must be add capacitor (C1), 0.1uF, it will keep power stable with general application.**

**(2) The capacitor C1 is suggested using 0.1uF, and user need to adjust the capacitor C1 by project.**

# 11. PACKAGE INFORAMTION

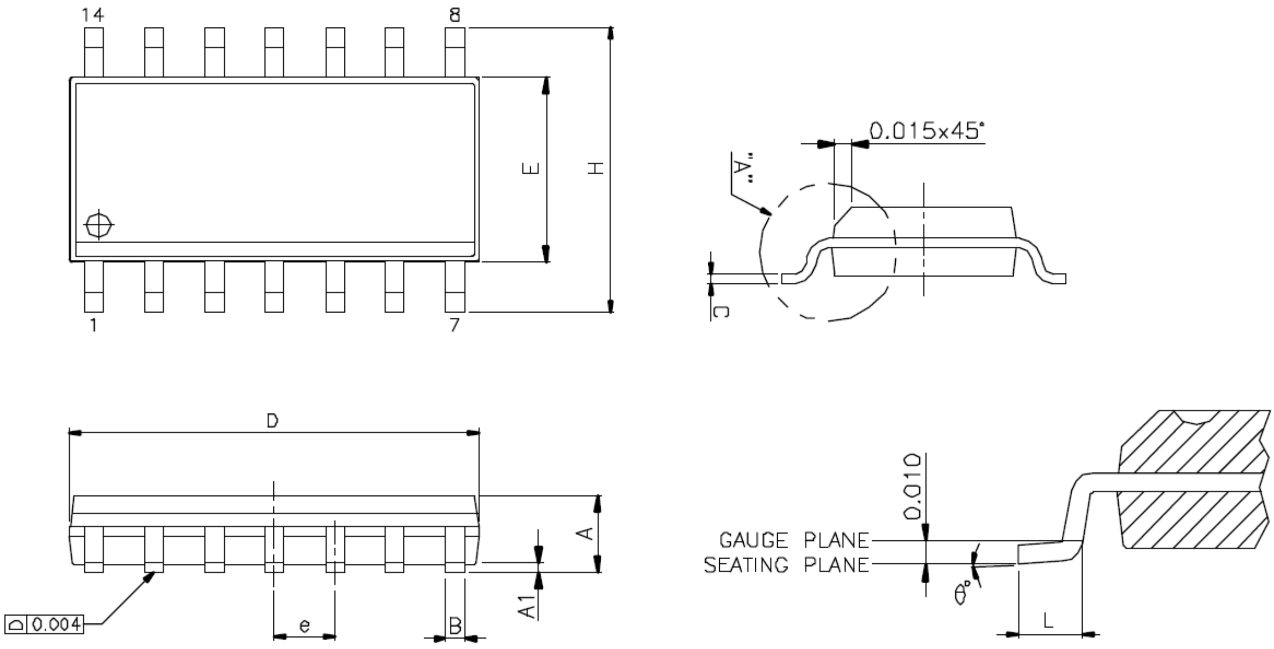
## 11.1 8-pin SOP (150mil)




| Symbols | Min. | Max. |
|---|---|---|
| A | 0.053 | 0.069 |
| A1 | 0.004 | 0.010 |
| A2 | - | 0.059 |
| D | 0.189 | 0.196 |
| E | 0.150 | 0.157 |
| H | 0.228 | 0.244 |
| L | 0.016 | 0.050 |
| θ° | 0 | 8 |

UNIT: INCH

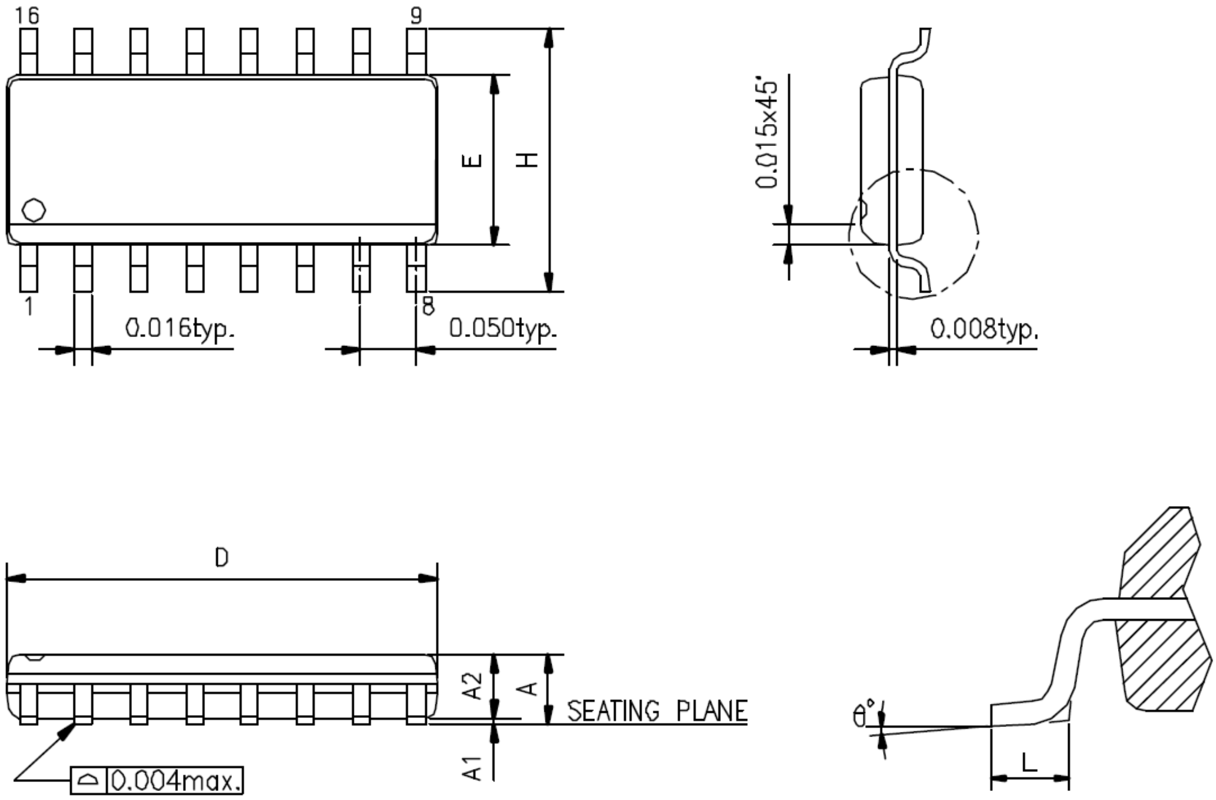
## 11.2 14-pin SOP (150mil)




| Symbols | Min. | Nom. | Max. |
|---|---|---|---|
| A | 0.058 | 0.064 | 0.068 |
| A1 | 0.004 | - | 0.010 |
| B | 0.013 | 0.016 | 0.020 |
| C | 0.0075 | 0.008 | 0.0098 |
| D | 0.336 | 0.341 | 0.344 |
| E | 0.150 | 0.154 | 0.157 |
| e | - | 0.050 | - |
| H | 0.228 | 0.236 | 0.244 |
| L | 0.015 | 0.025 | 0.050 |
| θ° | 0 | - | 8 |

UNIT: INCH

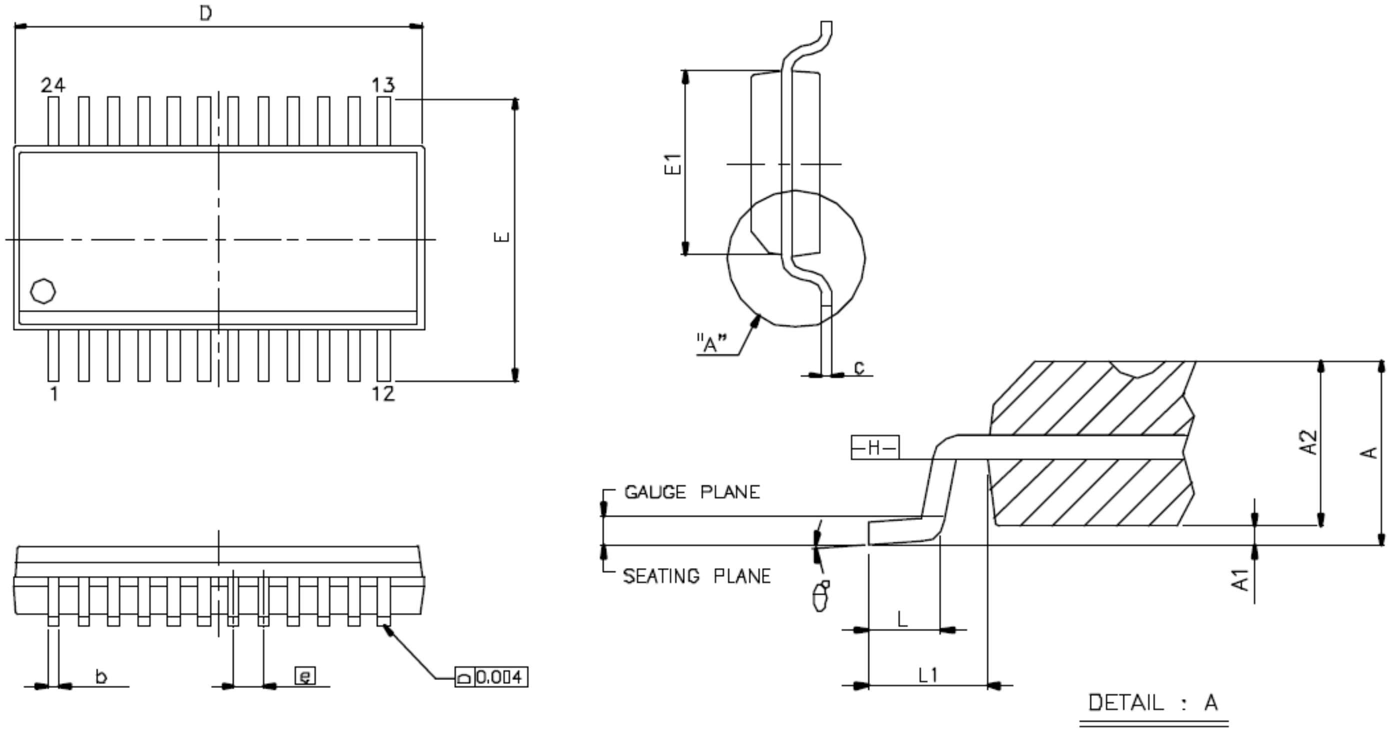
## 11.3 16-pin SOP (150mil)




| Symbols | Min. | Max. |
|---|---|---|
| A | 0.053 | 0.069 |
| A1 | 0.004 | 0.010 |
| A2 | 0.049 | 0.065 |
| D | 0.386 | 0.394 |
| E | 0.150 | 0.157 |
| H | 0.228 | 0.244 |
| L | 0.016 | 0.050 |
| θ° | 0 | 8 |

UNIT: INCH

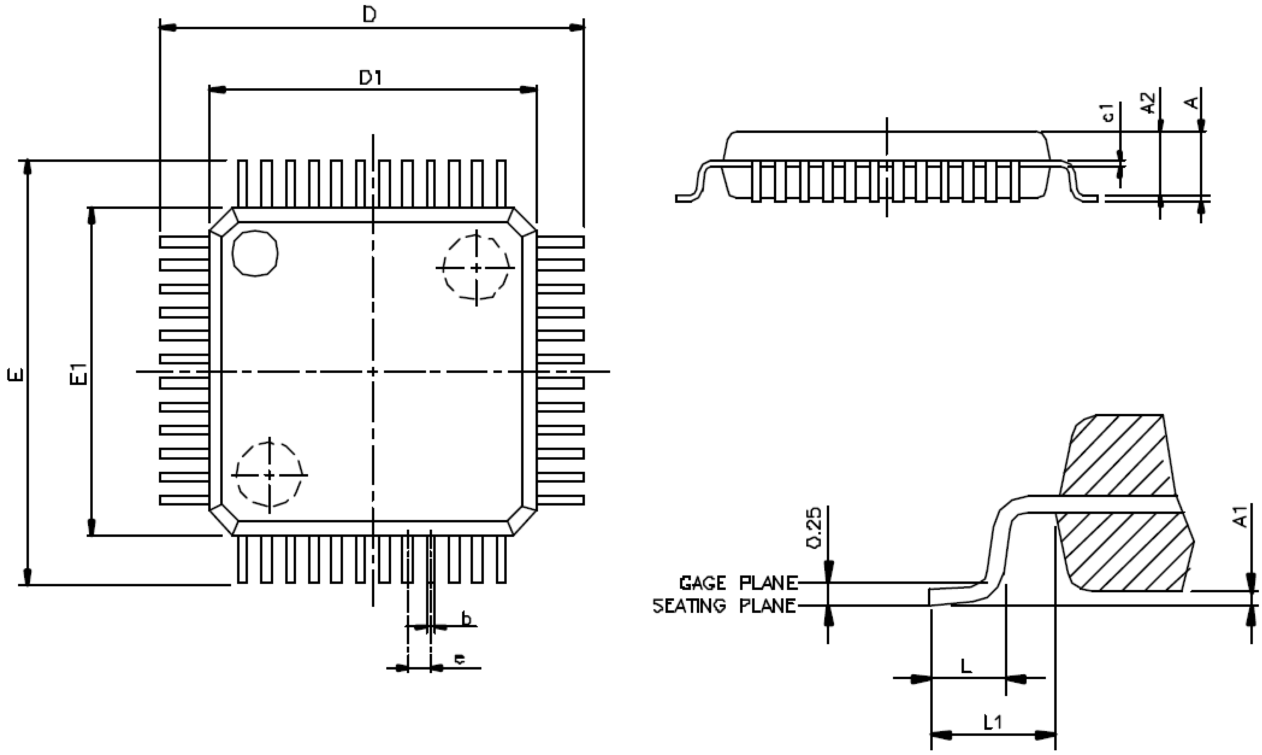
## 11.4 24-pin SSOP (150mil)




| Symbols | Min. | Max. | Max. |
|---|---|---|---|
| A | 0.053 | 0.064 | 0.069 |
| A1 | 0.004 | 0.006 | 0.010 |
| A2 | - | - | 0.059 |
| D | 0.337 | 0.341 | 0.344 |
| E | 0.228 | 0.236 | 0.244 |
| E1 | 0.150 | 0.154 | 0.157 |
| b | 0.008 | - | 0.012 |
| c | 0.007 | - | 0.010 |
| $\boxed{e}$ | 0.025 BASIC | | |
| L | 0.016 | 0.025 | 0.050 |
| L1 | 0.041 BASIC | | |
| θ° | 0 | - | 8 |

UNIT: INCH

## 11.5 48-pin LQFP (7x7x1.4mm)




| Symbols | Min. | Max. |
|---|---|---|
| A | - | 1.6 |
| A1 | 0.05 | 0.15 |
| A2 | 1.35 | 1.45 |
| c1 | 0.09 | 0.16 |
| D | 9.00 BSC | |
| D1 | 7.00 BSC | |
| E | 9.00 BSC | |
| E1 | 7.00 BSC | |
| e | 0.5 BSC | |
| b | 0.17 | 0.27 |
| L | 0.45 | 0.75 |
| L1 | 1 REF | |

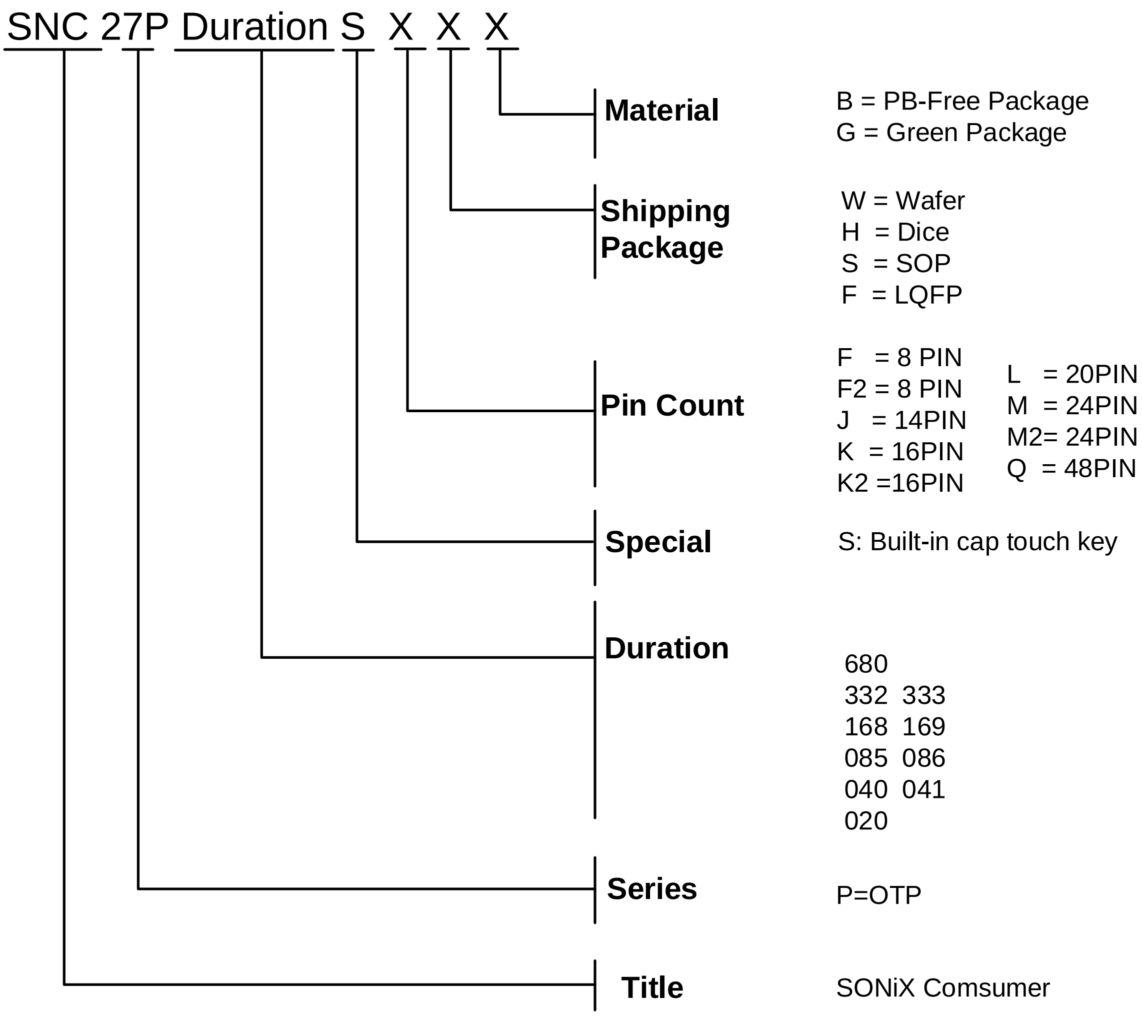
UNIT: MM

# 12. Marking Definition

## 12.1 INTRODUCTION

There are many different types in SNC27Pxxx production line. This note listed the production definition of all SNC27Pxxx for order or obtains information.

## 12.2 MARKING AND ORDERING IDENTIFICATION SYSTEM

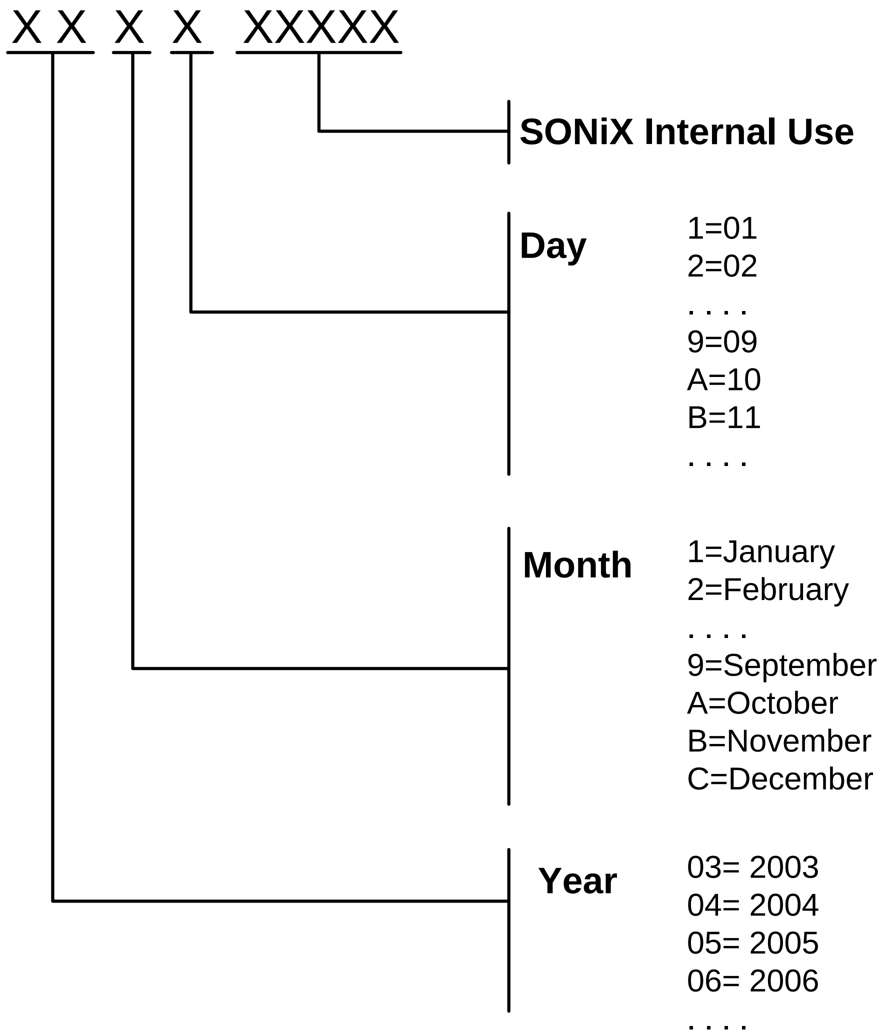


## 12.3 ORDERING EXAMPLE

| Device | Duration | Package | Material | Packing |
|---|---|---|---|---|
| SNC27PxxxF2SG | 40"~332" | SOP8 | Green Package | Tube |
| SNC27PxxxF2SGR | 40"~332" | SOP8 | Green Package | Tape and Reel |
| SNC27PxxxK2SG | 40"~332" | SOP16 | Green Package | Tube |
| SNC27PxxxK2SGR | 40"~332" | SOP16 | Green Package | Tape and Reel |
| SNC27PxxxM2SG | 40"~332" | SSOP24 | Green Package | Tube |
| SNC27PxxxM2SGR | 40"~332" | SSOP24 | Green Package | Tape and Reel |
| SNC27P332SFSG | 332" | SOP8 | Green Package | Tube |
| SNC27P332SFSGR | 332" | SOP8 | Green Package | Tape and Reel |
| SNC27P332SJSG | 332" | SOP14 | Green Package | Tube |
| SNC27P332SKSG | 332" | SOP16 | Green Package | Tube |
| SNC27P332SQFG | 332" | LQFP48 | Green Package | Tube |
| SNC27P332SMXG | 332" | SSOP24 | Green Package | Tube |
| SNC27P332SW | 332" | | | Wafer |
| SNC27P332SH | 332" | | | DICE |
| SNC27P168SFSG | 168" | SOP8 | Green Package | Tube |
| SNC27P168SJSG | 168" | SOP14 | Green Package | Tube |
| SNC27P168SJ2SG | 168" | SOP14 | Green Package | Tube |
| SNC27P168SKSG | 168" | SOP16 | Green Package | Tube |
| SNC27P168SMXG | 168" | SSOP24 | Green Package | Tube |
| SNC27P168SW | 168" | | | Wafer |
| SNC27P168SH | 168" | | | DICE |
| SNC27P085FSG | 85" | SOP8 | Green Package | Tube |
| SNC27P085JSG | 85" | SOP14 | Green Package | Tube |
| SNC27P085J2SG | 85" | SOP14 | Green Package | Tube |
| SNC27P085KSG | 85" | SOP16 | Green Package | Tube |
| SNC27P085MXG | 85" | SSOP24 | Green Package | Tube |
| SNC27P085W | 85" | | | Wafer |
| SNC27P085H | 85" | | | DICE |
| SNC27P040FSG | 40" | SOP8 | Green Package | Tube |
| SNC27P040JSG | 40" | SOP14 | Green Package | Tube |
| SNC27P040J2SG | 40" | SOP14 | Green Package | Tube |
| SNC27P040KSG | 40" | SOP16 | Green Package | Tube |
| SNC27P040W | 40" | | | Wafer |
| SNC27P040H | 40" | | | DICE |
| SNC27P020FSG | 20" | SOP8 | Green Package | Tube |
| SNC27P020JSG | 20" | SOP14 | Green Package | Tube |
| SNC27P020J2SG | 20" | SOP14 | Green Package | Tube |

| | | | | |
|---|---|---|---|---|
| SNC27P020KSG | 20" | SOP16 | Green Package | Tube |
| SNC27P020W | 20" | | | Wafer |
| SNC27P020H | 20" | | | DICE |
| SNC27P680SFSG | 680" | SOP8 | Green Package | Tube |
| SNC27P680SJSG | 680" | SOP14 | Green Package | Tube |
| SNC27P680SKSG | 680" | SOP16 | Green Package | Tube |
| SNC27P680SQFG | 680" | LQFP48 | Green Package | Tube |
| SNC27P680SMXG | 680" | SSOP24 | Green Package | Tube |
| SNC27P680SW | 680" | | | Wafer |
| SNC27P680SH | 680" | | | DICE |
| SNC27P1000SKSG | 1000" | SOP16 | Green Package | Tube |
| SNC27P1000SQFG | 1000" | LQFP48 | Green Package | Tube |
| SNC27P1000SW | 1000" | | | Wafer |
| SNC27P1000SH | 1000" | | | DICE |

## 12.4 DATECODE SYSTEM



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