

GENERAL DESCRIPTION

EM57P300 is a tiny-controlled-based voice/dual tone melody/dual tone sound effect Ics which contain all the function of EM57000 series and has an OTP (One Time Programmable) ROM inside.

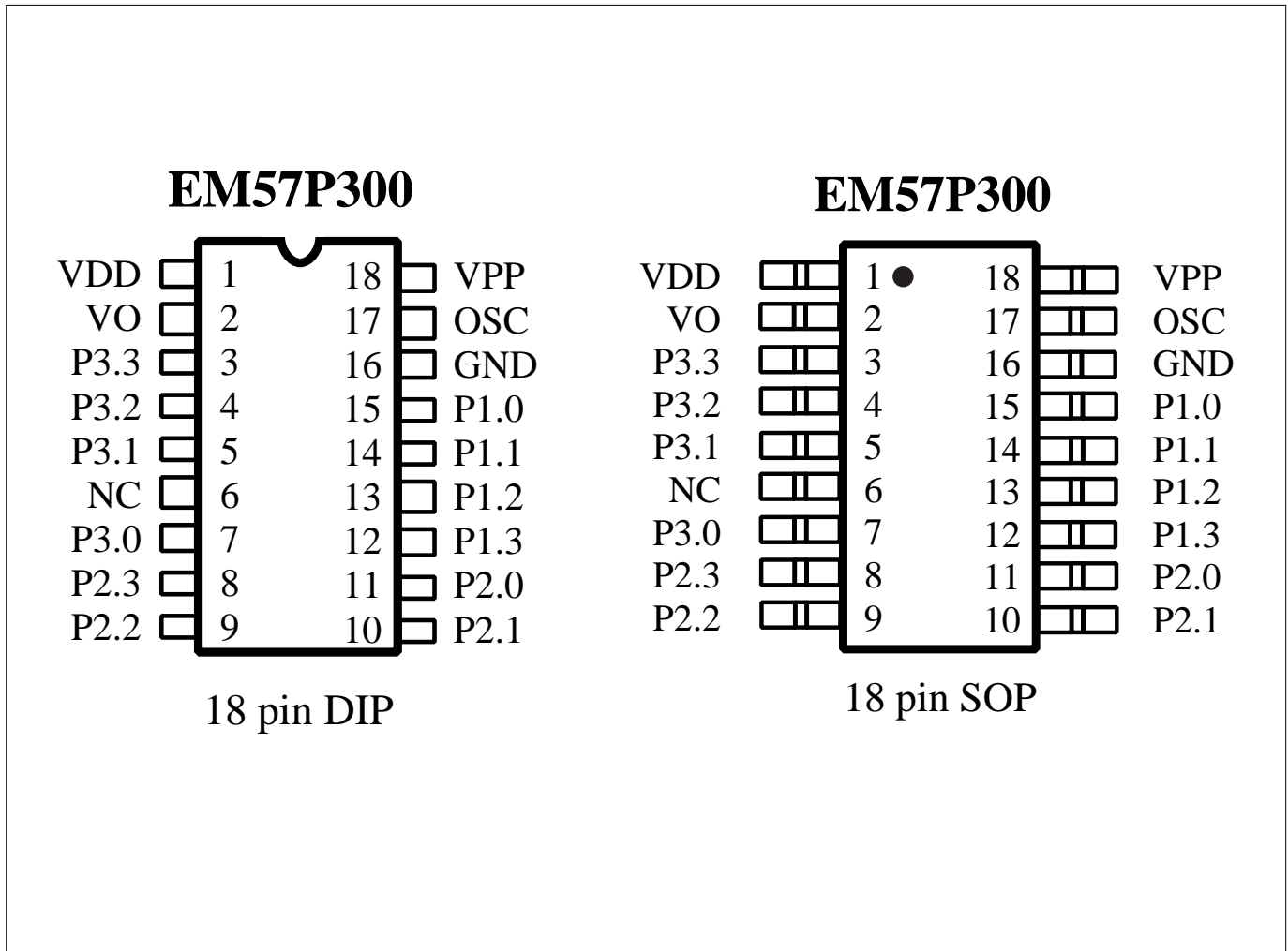
FEATURES

- EM57P300 – ROM : 64k x 10 bits (21 sec@6K sample rate).
- Working Voltage 2.4V ~ 5.1V.
- One 4-bit input port, two 4-bit I/O ports, and 32x4 bits RAM.
- 8k (maximum) program ROM.
- One 6-bit timer overflow control.
- ASPCM synthesizer and dual tone melody/sound effect generator.
- 4k~32k Hz playing speed for voice play-back.
- Multiple tempos for dual tone melody/sound effect play-back.
- Variable beats for dual tone melody/sound effect play-back.
- Multiple levels of volume control.
- Fixed current D/A output to drive external connected transistor for voice output.

PIN DESCRIPTIONS

| Pin NO. | I/O | Symbol | Function |
|---------|-----|------------------------------|--|
| 1 | I | VDD | Positive power supply. |
| 2 | O | VO | Voice output. |
| 3 | I/O | P3.3 | Bit 3 of Port 3. |
| 4 | I/O | P3.2 | Bit 2 of Port 3. |
| 5 | I/O | P3.1 | Bit 1 of Port 3. |
| 6 | | NC | No connect |
| 7 | I/O | P3.0 | Bit 0 of Port 3. |
| 8 | I/O | P2.3 | Bit 3 of Port 2. |
| 9 | I/O | P2.2 | Bit 2 of Port 2. |
| 10 | I/O | P2.1/Dout | Bit 1 of Port 2 / Program data output signal |
| 11 | I/O | P2.0/Din | Bit 0 of Port 2 / Program data input signal |
| 12 | I | P1.3/Din.out.clk/Mode option | Bit 3 of Port 1 / Program control signal |
| 13 | I | P1.2/OEB/Mode option | Bit 2 of Port 1 / Program control signal |
| 14 | I | P1.1/PGMB/Mode option | Bit 1 of Port 1 / Program control signal |
| 15 | I | P1.0/ACLK | Bit 0 of Port 1 / Program control signal |
| 16 | I | VSS | Negative power supply. |
| 17 | I | OSC | Oscillation component connection pin. |
| 18 | I | TEST/Vpp | Test/Programing. |

PIN ASSIGNMENT



DC PROGRAMMING CHARACTERISTICS ($V_{DD} = 5V + 0.5v$, $V_{pp} = 12.5V + 0.5v$)

| Items | Sym. | Min. | Max. | Unit | Test Conditions |
|---------------------|----------|------|----------------|---------|--|
| Input high voltage | V_{IH} | 2.2 | $V_{DD} + 1.0$ | V | |
| Input low voltage | V_{IL} | -0.3 | 0.8 | V | |
| Input current | I_{IN} | - | 10 | μA | $V_{DD} = 5V$, $V_{IN} = 0 \sim V_{DD}$ |
| Output high voltage | V_{OH} | 2.4 | - | V | $I_{OH} = 400\mu A$ |
| Output low volatge | V_{OL} | - | 0.4 | V | $I_{OL} = 2.1mA$ |
| VDD supply current | I_{DD} | - | 100 | mA | $V_{DD} = 5V$ |
| VPP supply current | I_{PP} | - | 50 | mA | $V_{PP} = 12.5V$ |

ABSOLUTE MAXIMUM RATINGS

| Items | Sym. | Min. | Max. | Unit |
|-----------------------|-----------------|--------------|--------------|------|
| Supply Voltage | $V_{DD}-V_{SS}$ | -0.3 | 6.0 | V |
| Input Voltage | V_{IN} | $V_{SS}-0.3$ | $V_{DD}+0.3$ | V |
| Operating Temperature | T_{OP} | -20 | 70 | °C |
| Storage Temperature | T_{STG} | -55 | +125 | °C |

ELECTRICAL CHARACTERISTICS ($V_{DD} = 3V, 25^{\circ}C$ unless otherwise specified)

| Parameter | Sym. | Min. | Typ. | Max. | Unit | Condition |
|------------------------|-----------|------|------|------|------------|--|
| Operating voltage | V_{DD} | 2.4 | 3.0 | 5.1 | V | |
| Standby current | I_{DDS} | - | - | 1.0 | μA | $V_{DD}=3V$ |
| Operating current | I_{DDO} | - | - | 280 | μA | $V_{DD}=3V$, No load |
| Drive current of P2,P3 | I_{OD} | 1.0 | - | - | mA | $V_{DD}=3V, V_O=2.4V$ |
| Sink current of P2, P3 | I_{OS} | 1.6 | - | - | mA | $V_{DD}=3V, V_O=0.4V$ |
| Output current of VO | I_{VO} | 2.0 | 3.0 | 4.0 | mA | $V_{DD}=3V, V_O=0.7V$ (Step 7) (for EM57P300) |
| | | 2.5 | 3.5 | 4.5 | mA | $V_{DD}=3V, V_O=0.7V$ (Step 7) (for EM57P300A/B/C, and EM57Q300A) |
| Oscillation resistor | R_{OSC} | - | 1.0 | - | M Ω | $V_{DD}=3V$ (for EM57P300) |
| | | - | 510 | - | K Ω | $V_{DD}=3V$ (for EM57P300A) |
| | | - | 470 | - | K Ω | $V_{DD}=3V$ (for EM57P300B) |
| | | - | 560 | - | K Ω | $V_{DD}=3V$ (for EM57P300C) |
| | | - | 510 | - | K Ω | $V_{DD}=3V$ (for EM57Q300A) |
| Oscillator frequency | F_{osc} | 0.90 | 1.0 | 1.10 | MHz | $V_{DD}=3V, R_{OSC}=1M\Omega$ (for EM57P300) |
| | | 0.95 | 1.0 | 1.05 | MHz | $V_{DD}=3V, R_{OSC}=510K\Omega$ (for EM57P300A) |
| | | 0.95 | 1.0 | 1.05 | MHz | $V_{DD}=3V, R_{OSC}=470K\Omega$ (for EM57P300B) |
| | | 0.95 | 1.0 | 1.05 | MHz | $V_{DD}=3V, R_{OSC}=560K\Omega$ (for EM57P300C) |
| | | 0.90 | 1.0 | 1.10 | MHz | $V_{DD}=3V, R_{OSC}=510K\Omega$ (for EM57Q300A) |

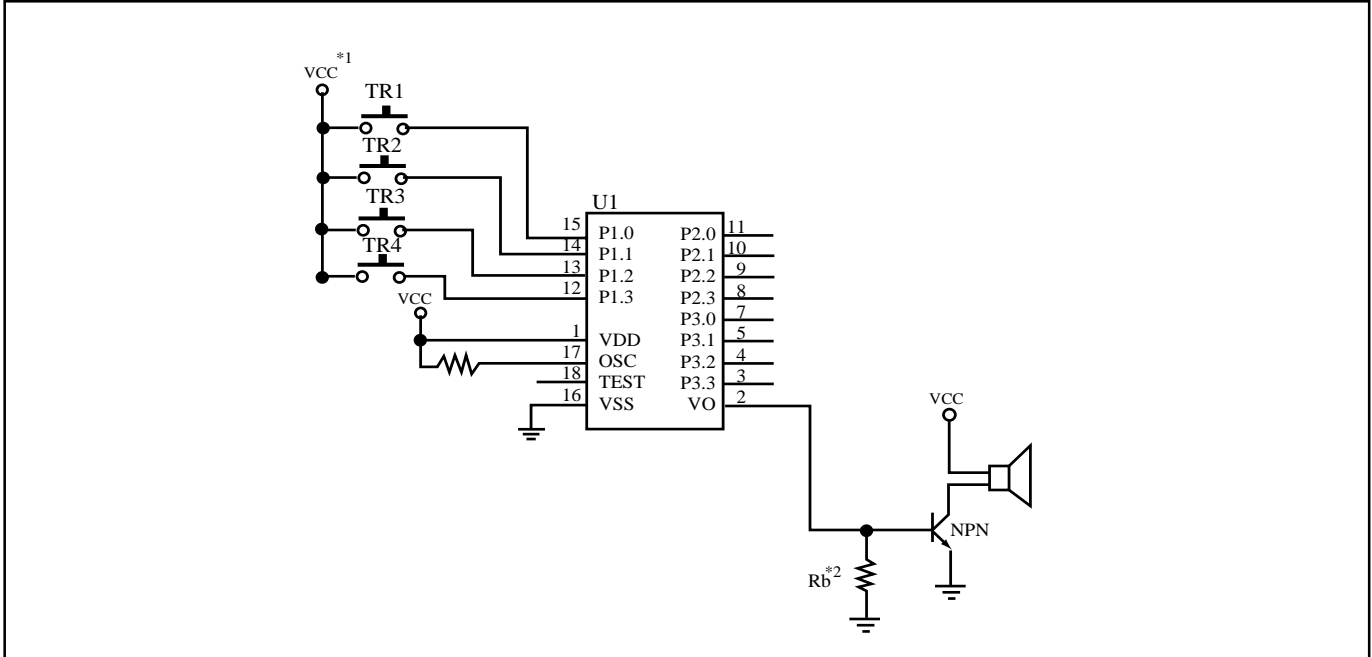
Note : The functions of EM57P300, EM57P300A, EM57P300B, EM57P300C, and EM57Q300A are the same, except for the values of their oscillation resistor, oscillator frequency, and output current of VO as listed above.

APPLICATION CIRCUIT

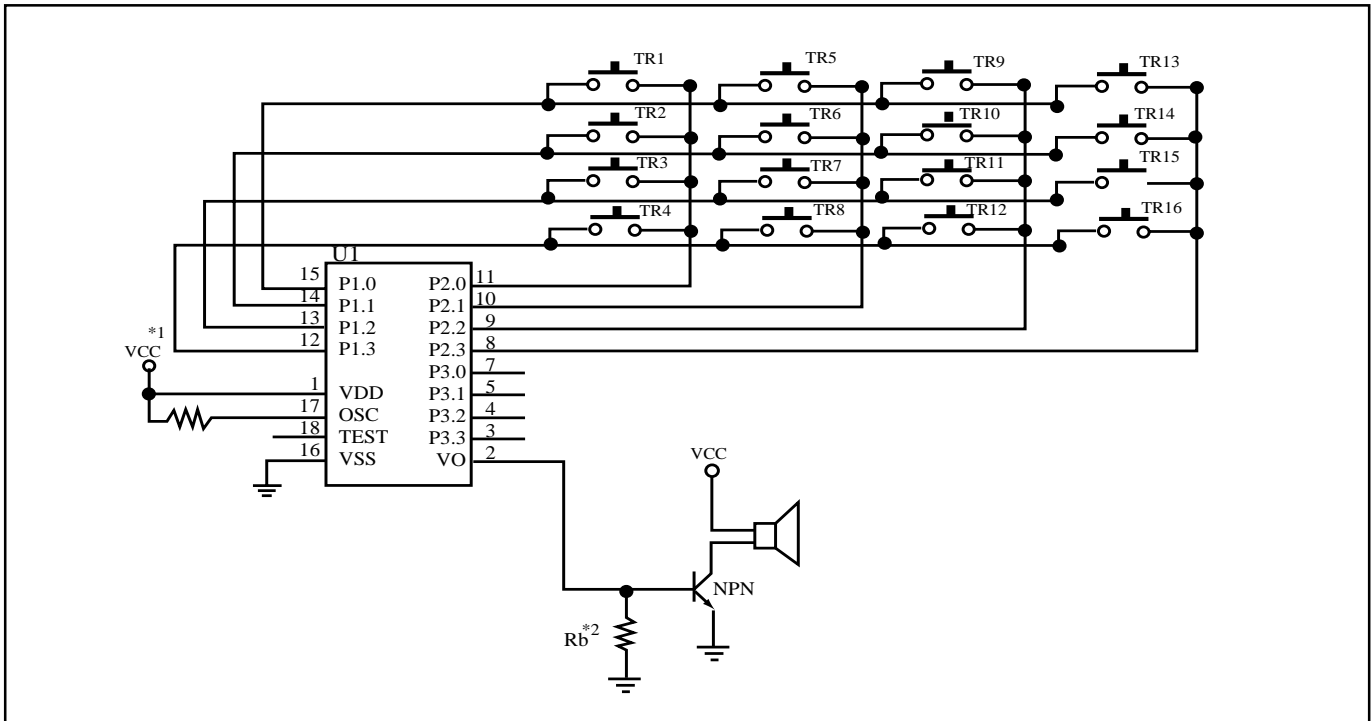
In the following application circuits:

- *1 : For heavy loading application, adding an electrolytic capacitor between Vcc and Ground is recommended. The recommended value for button cell application is 10 μ F.
- *2 : The recommended value for button cell application is 750 Ω or less.

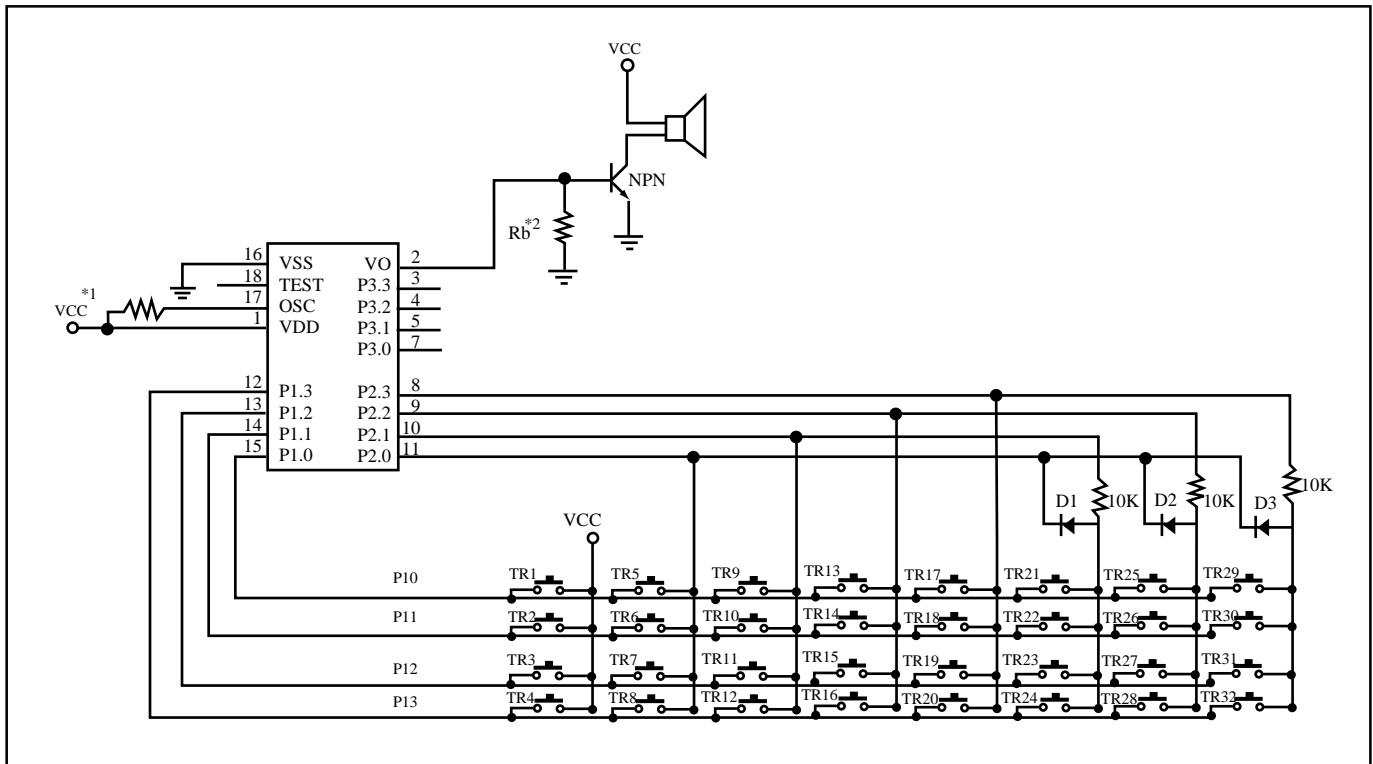
4-key Application Circuit



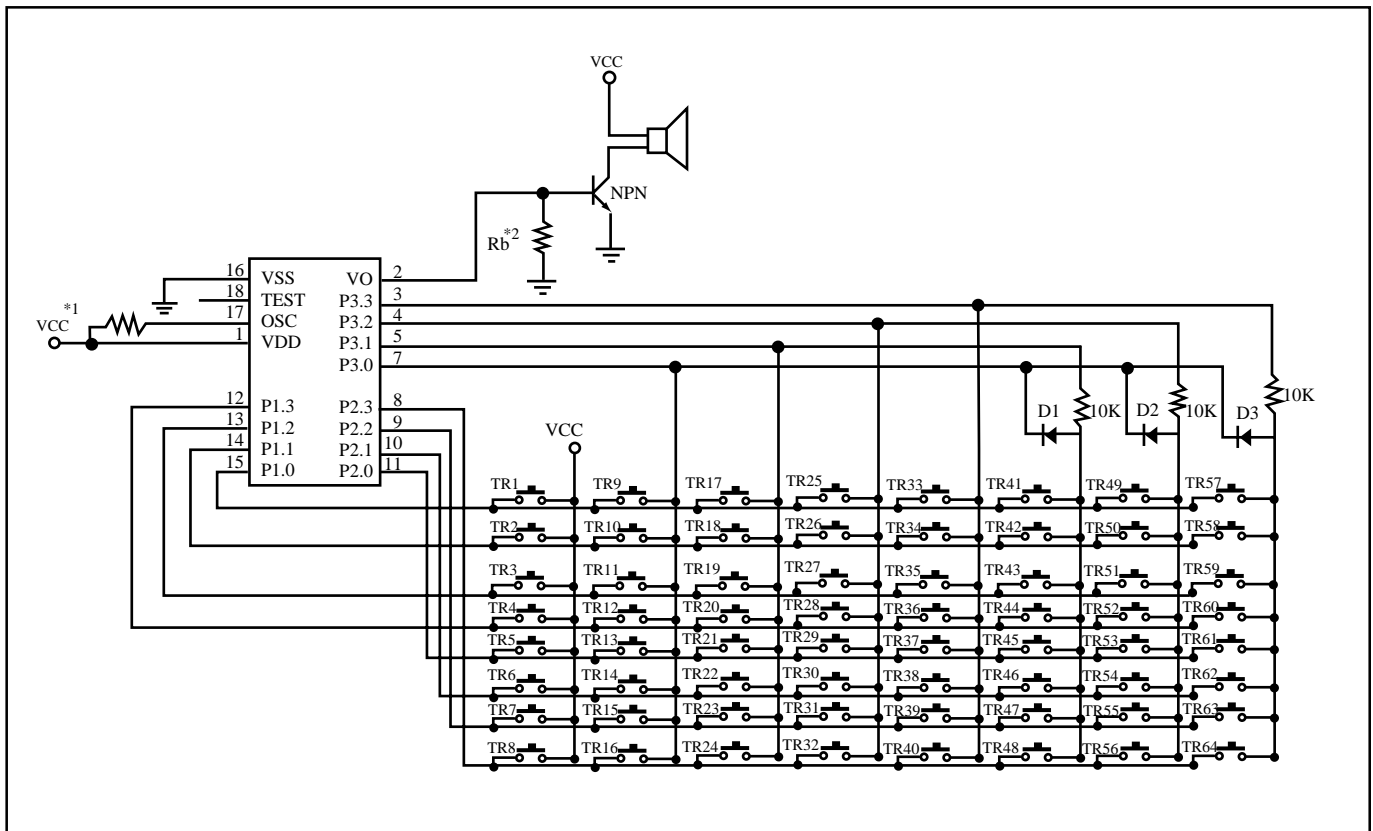
16-key Application Circuit



32-key Application Circuit

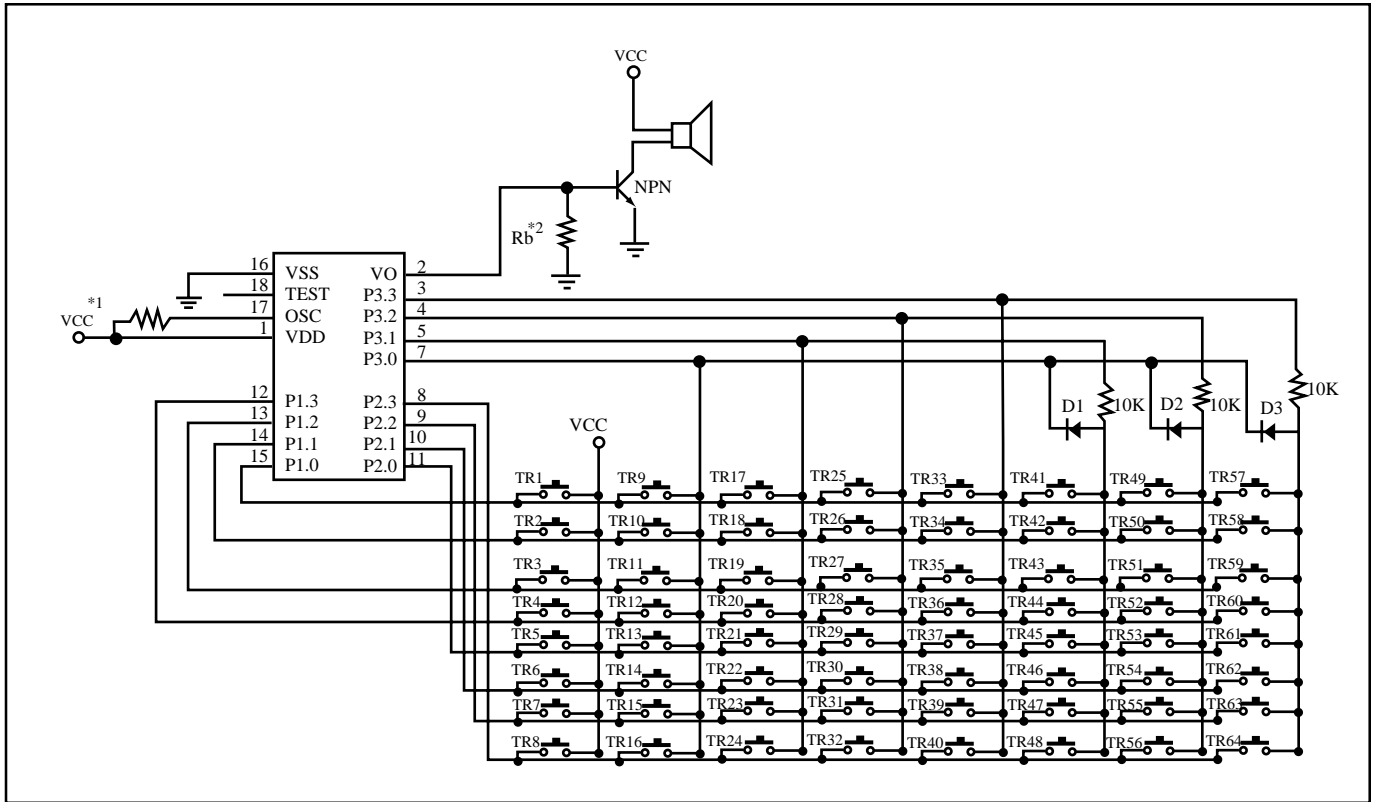


64-key Application Circuit

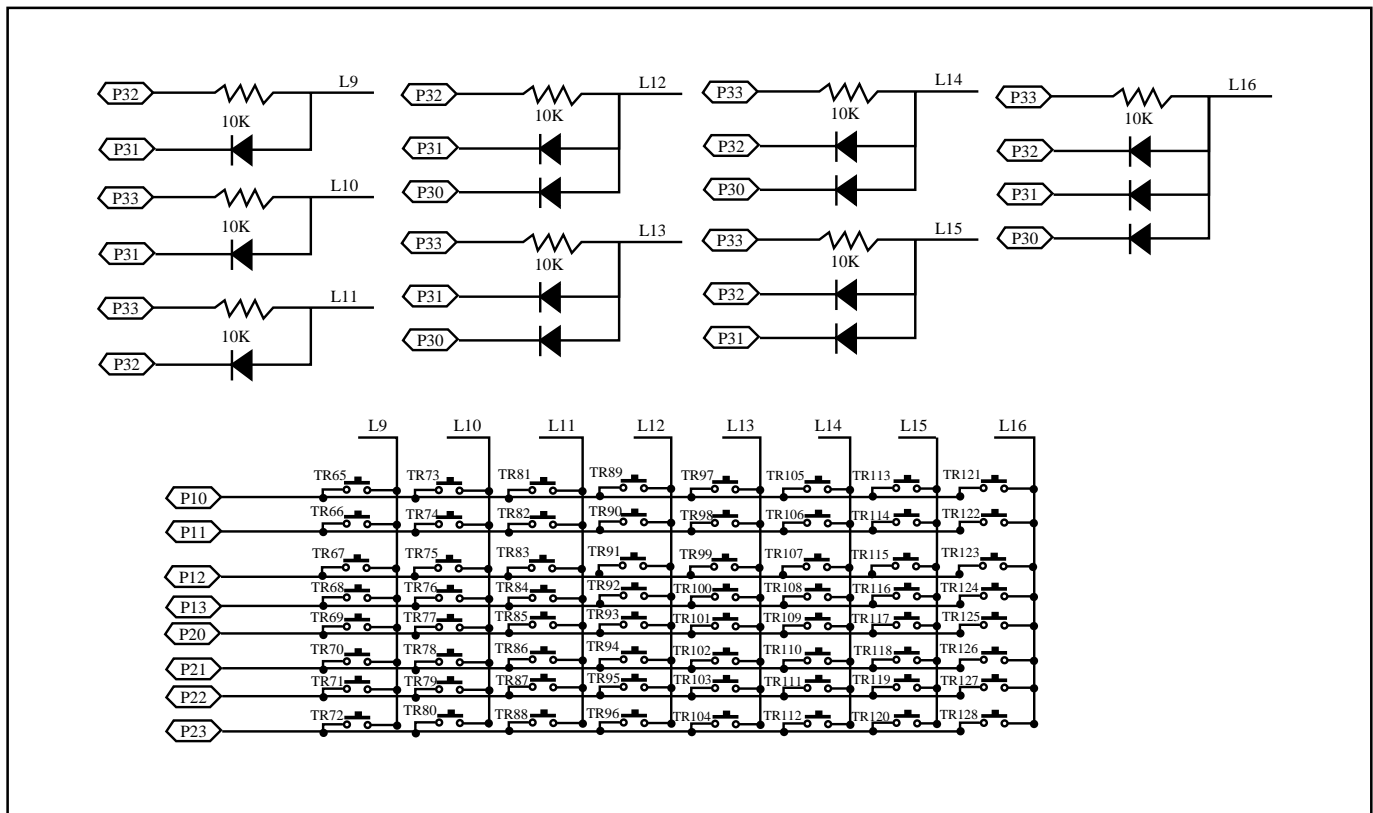


* This specification are subject to be changed without notice.

128-key Application Circuit (A)

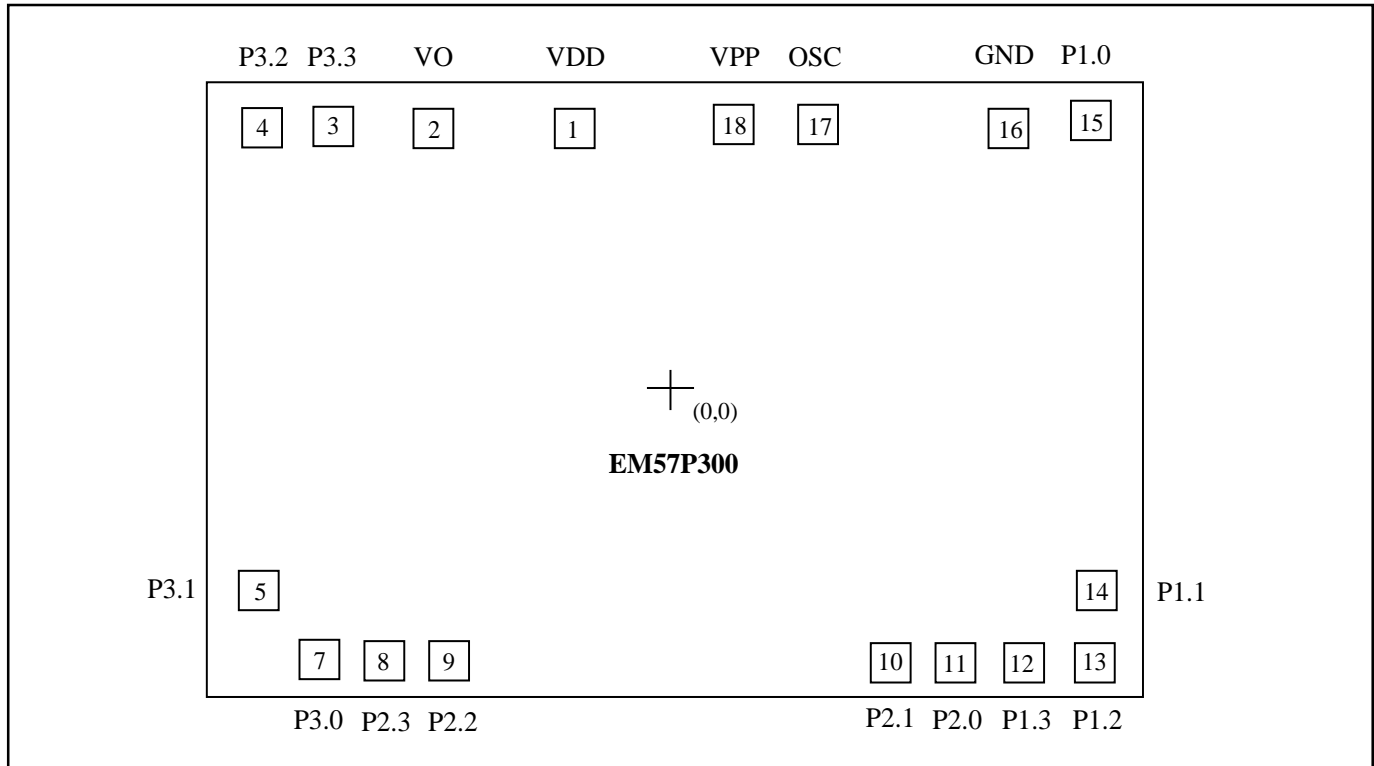


128-key Application Circuit (B)



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PAD DIAGRAM

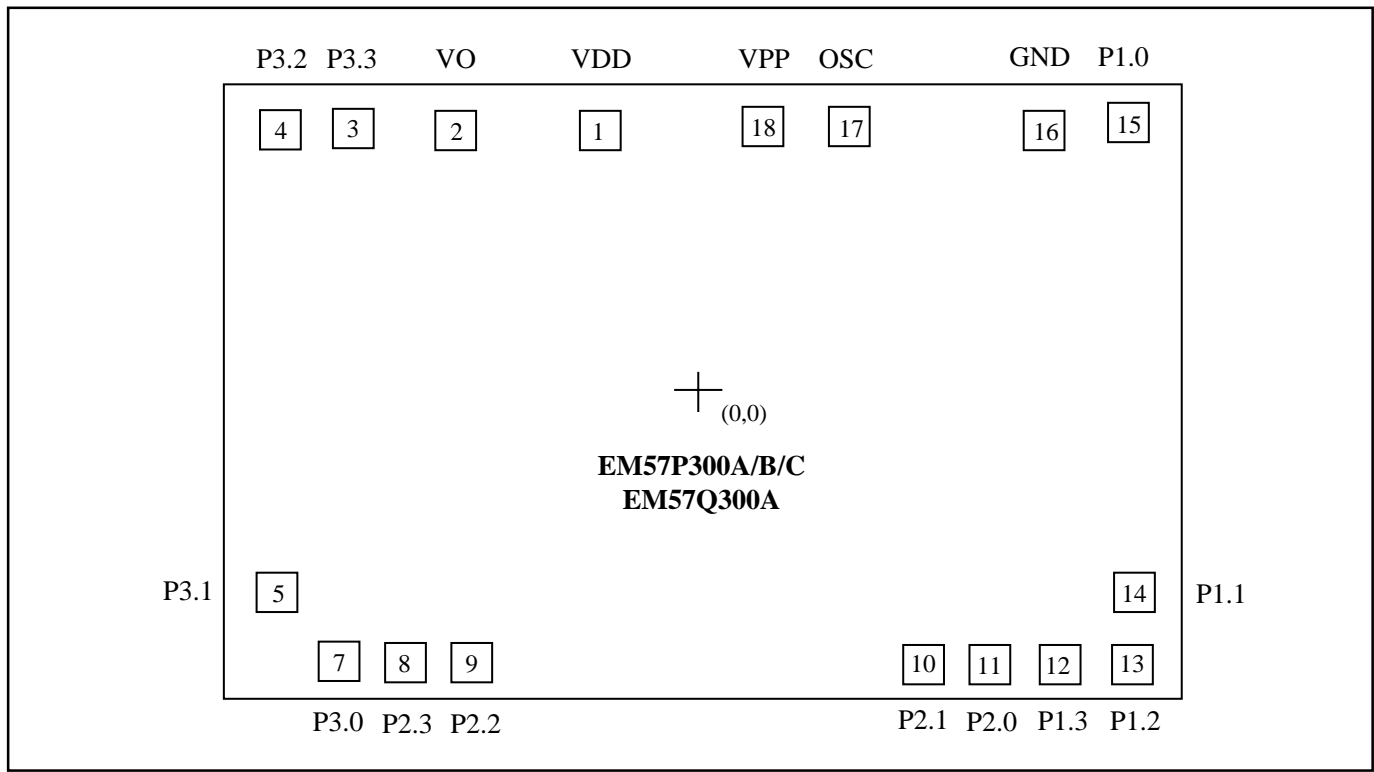


Chip Size : 3000 x 2100 um

For PCB layout, IC substrate must be connected to Vss.

| Pad No. | Symbol | X | Y |
|---------|--------|---------|--------|
| 1 | VDD | -158.4 | 824.1 |
| 2 | VO | -695.9 | 849.0 |
| 3 | P3.3 | -1077.0 | 849.0 |
| 4 | P3.2 | -1278.3 | 849.0 |
| 5 | P3.1 | -1310.0 | -741.5 |
| 6 | NC | | |
| 7 | P3.0 | -1128.5 | -850.0 |
| 8 | P2.3 | -951.3 | -850.0 |
| 9 | P2.2 | -780.0 | -850.0 |
| 10 | P2.1 | 752.2 | -850.0 |
| 11 | P2.0 | 923.5 | -850.0 |
| 12 | P1.3 | 1107.7 | -850.0 |
| 13 | P1.2 | 1284.0 | -850.0 |
| 14 | P1.1 | 1284.0 | -721.5 |
| 15 | P1.0 | 1246.7 | 849.0 |
| 16 | GND | 1014.6 | 824.1 |
| 17 | OSC | 342.9 | 849.0 |
| 18 | VPP | 182.7 | 849.0 |

PAD DIAGRAM



Chip Size : 3000 x 2100 um

For PCB layout, IC substrate must be connected to Vss.

| Pad No. | Symbol | X | Y |
|---------|--------|---------|--------|
| 1 | VDD | -218.4 | 822.7 |
| 2 | VO | -745.9 | 847.6 |
| 3 | P3.3 | -1107.0 | 847.6 |
| 4 | P3.2 | -1288.3 | 847.6 |
| 5 | P3.1 | -1313.6 | -736.4 |
| 6 | NC | | |
| 7 | P3.0 | -1132.1 | -845.0 |
| 8 | P2.3 | -954.9 | -845.0 |
| 9 | P2.2 | -783.6 | -845.0 |
| 10 | P2.1 | 750.8 | -845.0 |
| 11 | P2.0 | 922.1 | -845.0 |
| 12 | P1.3 | 1106.3 | -845.0 |
| 13 | P1.2 | 1287.6 | -845.0 |
| 14 | P1.1 | 1287.6 | -716.4 |
| 15 | P1.0 | 1256.7 | 847.6 |
| 16 | GND | 847.0 | 822.7 |
| 17 | OSC | 267.9 | 847.6 |
| 18 | VPP | 112.7 | 847.6 |