深圳市富满电子有限公司
SHENZHEN FUMAN ELECTRONICS CO., LTD.

TC31106D(文件编号：S&CIC1001) One-Decimal Clinical Thermometer

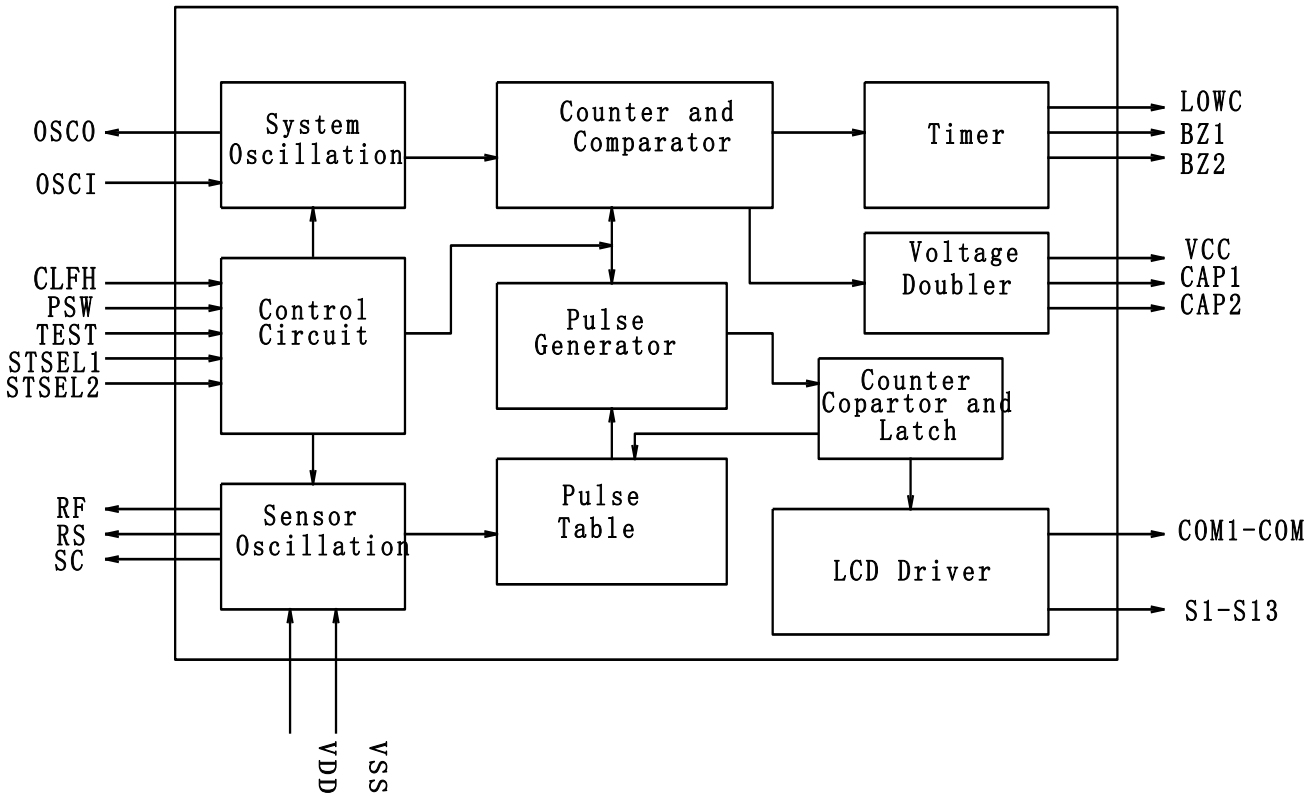
Features

- Single-chip CMOS construction
- Measurement range: 32.0 ~42.9 ℃ (90 ℉ ~109.9 ℉)
- Measurement accuracy: ±0.1 ℃(±0.2 ℉)
- Resolution: 0.1 ℃ (0.1 ℉)
- Single 1.5V battery operation
- Highest temperature hold
- Round off function
- Multi stable time selection: 4s/8s/16s/32s
- Automatic power off
- One ON/OFF switch input key
- Bonding option for ℃ and ℉
- Display the last time measured temperature
- Alarm warning for fever
- Buzzer output: 6k/8kHz
- For various sensor application, change one layer only

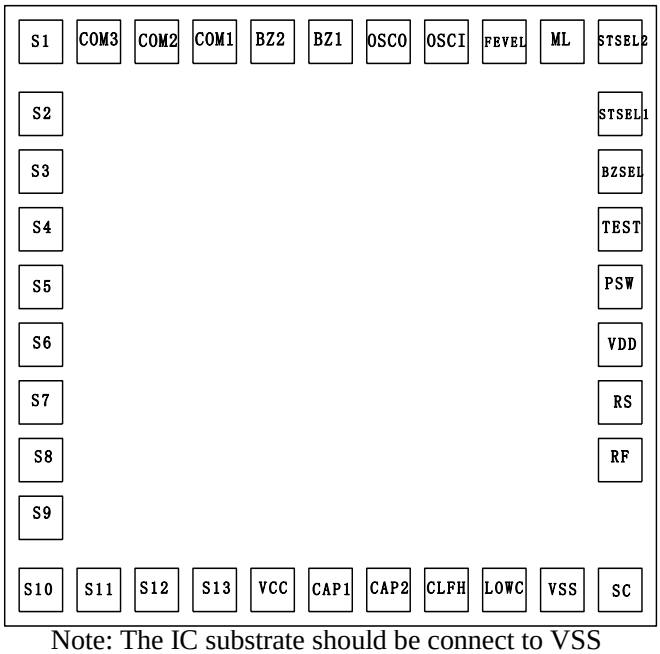
General Description

The SC31106D is CMOS digital clinical thermometer IC for measuring body temperature from 32.0 ℃ ~ 42.9 ℃ (90 ℉ ~ 109.9 ℉). It also provides stable alarm, fever alarm, automatic power off and the memory function of the last time measured temperature. The chip provides multi stable time for various of the mister also. The other electronic components are LCD display, the mister, 1.5V battery, ON/OFF switch, buzzer, resistors and capacitors.

Block Diagram



Pad Assignment



Note: The IC substrate should be connect to VSS

Pad Coordinates

Pad No.	Pad Name	X (um)	Y (um)	Pad No.	Pad Name	X (um)	Y (um)
1	S1	-575.00	559.90	20	SC	575.00	-560.00
2	S2	-575.00	415.45	21	RF	575.00	-274.55
3	S3	-575.00	300.45	22	RS	575.00	-159.55
4	S4	-575.00	185.45	23	VDD	575.00	-44.55
5	S5	-575.00	70.45	24	PSW	575.00	70.45
6	S6	-575.00	-44.55	25	TEST	575.00	185.45
7	S7	-575.00	-159.55	26	BZSEL	575.00	300.45
8	S8	-575.00	-274.55	27	STSEL1	575.00	415.45
9	S9	-575.00	-389.55	28	STSEL2	575.00	559.90
10	S10	-575.00	-560.00	29	ML	460.00	559.90
11	S11	-460.00	-560.00	30	FEVEL	345.00	559.90
12	S12	-345.00	-560.00	31	OSCI	230.00	559.90
13	S13	-230.00	-560.00	32	OSCO	115.00	559.90
14	VCC	-115.00	-560.00	33	BZ1	0.00	559.90
15	CAP1	0.00	-560.00	34	BZ2	-115.00	559.90
16	CAP2	115.00	-560.00	35	COM1	-230.00	559.90
17	CLFH	230.00	-560.00	36	COM2	-345.00	559.90
18	LOWC	345.00	-560.00	37	COM3	-460.00	559.90
19	VSS	460.00	-560.00				

Pad Description

<table>
<tr><th>Pad No.</th><th>Pad Name</th><th>I/O</th><th>Function</th></tr>
<tr><td>1~13</td><td>S1~S13</td><td>O</td><td>LCD segment driver</td></tr>
<tr><td>14</td><td>VCC</td><td>O</td><td>Generated 3V voltage</td></tr>
<tr><td>15</td><td>CAP1</td><td>O</td><td>For positive voltage pumping, NMOS open drain output</td></tr>
<tr><td>16</td><td>CAP2</td><td>O</td><td>For positive voltage pumping, inverter output</td></tr>
<tr><td>17</td><td>CLFH</td><td>I</td><td>Selection of ℃ or ℉ CLFH = open or VDD: ℃ CLFH = VSS: ℉</td></tr>
<tr><td>18</td><td>LOWC</td><td>I/O</td><td>For the supply voltage detector; output?</td></tr>
<tr><td>19</td><td>VSS</td><td>-</td><td>Negative power supply</td></tr>
<tr><td>20</td><td>SC</td><td>I/O</td><td>Common point, NMOS open drain</td></tr>
<tr><td>21</td><td>RF</td><td>O</td><td>Connect to reference resistor, PMOS open drain</td></tr>
<tr><td>22</td><td>RS</td><td>O</td><td>Connect to sensor resistor, PMOS open drain</td></tr>
<tr><td>23</td><td>VDD</td><td>-</td><td>Positive power supply</td></tr>
<tr><td>24</td><td>PSW</td><td>I</td><td>Power ON/OFF input, toggle active</td></tr>
<tr><td>25</td><td>TEST</td><td>I</td><td>For the test of production.
TEST = open or VDD: LCD display the highest value
TEST = VSS: LCD display the real time value</td></tr>
<tr><td>26</td><td>BZSEL</td><td>I</td><td>Buzzer output frequency selection
BZSEL = open or VDD: 8KHz
BZSEL = VSS: 6KHz</td></tr>
<tr><td>27
28</td><td>STSEL1
STSEL2</td><td>I</td><td>Stable time selection (STSEL1, STSEL2 is bonding option)
<table>
<tr><td>ST</td><td>STSEL1</td><td>STSEL2</td></tr>
<tr><td>4 sec</td><td>VSS</td><td>VDD or open</td></tr>
<tr><td>8 sec</td><td>VDD or open</td><td>VSS</td></tr>
<tr><td>16 sec</td><td>VDD or open</td><td>VDD or open</td></tr>
<tr><td>32 sec</td><td>VSS</td><td>VSS</td></tr>
</table></td></tr>
<tr><td>29</td><td>ML</td><td>I</td><td>Memory function option
ML = open or VDD: Without memory function
ML = VSS: With memory function. The last measurement value
Will be displayed after power on.</td></tr>
<tr><td>30</td><td>FEVEL</td><td>I</td><td>Fever function option
FEVEL = open or VDD: with fever function
FEVEL = VSS: without fever function</td></tr>
<tr><td>31</td><td>OSCI</td><td>I</td><td>For system oscillator input</td></tr>
<tr><td>32</td><td>OSCO</td><td>O</td><td>For system oscillator input</td></tr>
<tr><td>33</td><td>BZ1</td><td>O</td><td>Buzzer output 1</td></tr>
<tr><td>34</td><td>BZ2</td><td>O</td><td>Buzzer output 2</td></tr>
<tr><td>35~37</td><td>COM1~
COM3</td><td>O</td><td>LCD common driver</td></tr>
</table>

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Absolute Maximum Ratings

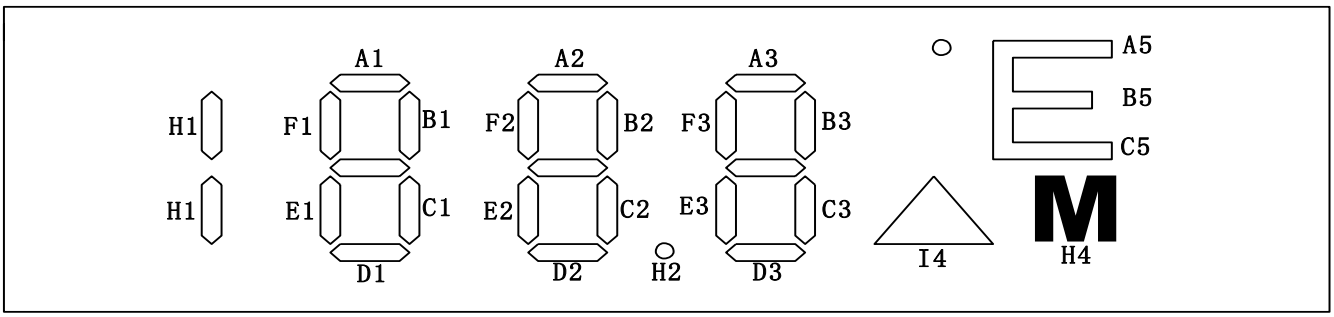
Supply voltage..... 0V to 2.0V
Input voltage..... VSS–0.5V to VDD+0.5V
Operation Temperature..... –20℃ to +75℃
Storage Temperature..... –55℃ to +125℃

***Note:** Stress above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		VDD	Conditions				
VDD	Operating voltage	-	-	1.3	1.5	1.65	V
IDD	Operating current	1.5V	No load	-	20	50	uA
ISTB	Standby current	1.5V	OSC OFF	-	-	1.0	uA
Fosc		1.5V	ROSC = 1.1MΩ	25.6	32	38.4	KHz
R℃	Temperature measurement Accuracy at range 35 ℃~39 ℃	-	VDD = 1.3V~1.5V	-0.1	-	0.1	℃
R℉	Temperature measurement Accuracy at range 95℉~102℉	-	VDD = 1.3V~1.5V	-0.2	-	0.2	℉

LCD Electrode Pattern –



Name	-	-	-	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13
COM1	COM1	-	-	F1	A1	B1	F2	A2	B2	F3	A3	B3				A5
COM2	-	COM2	-	E1	G1	C1	E2	G2	C2	E3	G3	C3				B5
COM3	-	-	COM3	H1	D1			D2	H2	H4	D3	I4				C5

Note: The LCD uses 3V and 1/3 duty, 1/2 bias
For one-digital decimal: COM1, COM2, COM3, S1, S2, S3, S4, S5, S6, S7, S8, S9, S13.

Functional Description

- Power SW: push PSW switch to power on or power off.
- When power on: push the switch, a "BI" sound for 0.125sec will be generated.

a. The LCD firstly all segments are on about 2sec.

b. After a. LCD shows the last-time temperature about 2sec. (If the memory function is optioned)

c. After b., LCD shows the self-test temperature (37.0±0.1℃) about 1 sec. The ℃ or ℉ mark will flash at the speed of 1Hz.

d. After c., LCD shows the higher measured temperature always, the ℃ (℉) mark will flash at the speed of 1Hz.

e. If the temperature < 32.0℃ (or 90.0℉), the display show Lo℃ (or Lo ℉).

f. If the temperature ≥ 43.0°C (or 109.9°F), The display show Hi °C (or Hi °F).

g. The LCD always show the higher temperature during the temperature measurement.

h. After power on, the measurement time is over 16 sec and the measured temperature does not change within the stable time, the measurement will be over and the ℃ (℉) mark flash stop.

i. For SC31106D, when measurement is over and if the temperature ≥37.8 ℃ (100°F). In this case the buzzer alarms "BI-BI-BI--- BI-BI-BI---" for 10 sec, as follows:

BI --- BI --- BI ---------- BI ---

BI: 0.125sec

---: 0.125sec

----------: 0.375sec

if the temperature < 37.80°C (100°F), the buzzer alarms "BI-BI-BI-BI-" for 10 sec, as follows:

BI --- BI---

BI: 0.5sec

---: 0.5sec

j. It will automatically power off after measurement is stable and the system is still on more than 8 min 40sec(Fsys=32kHz)

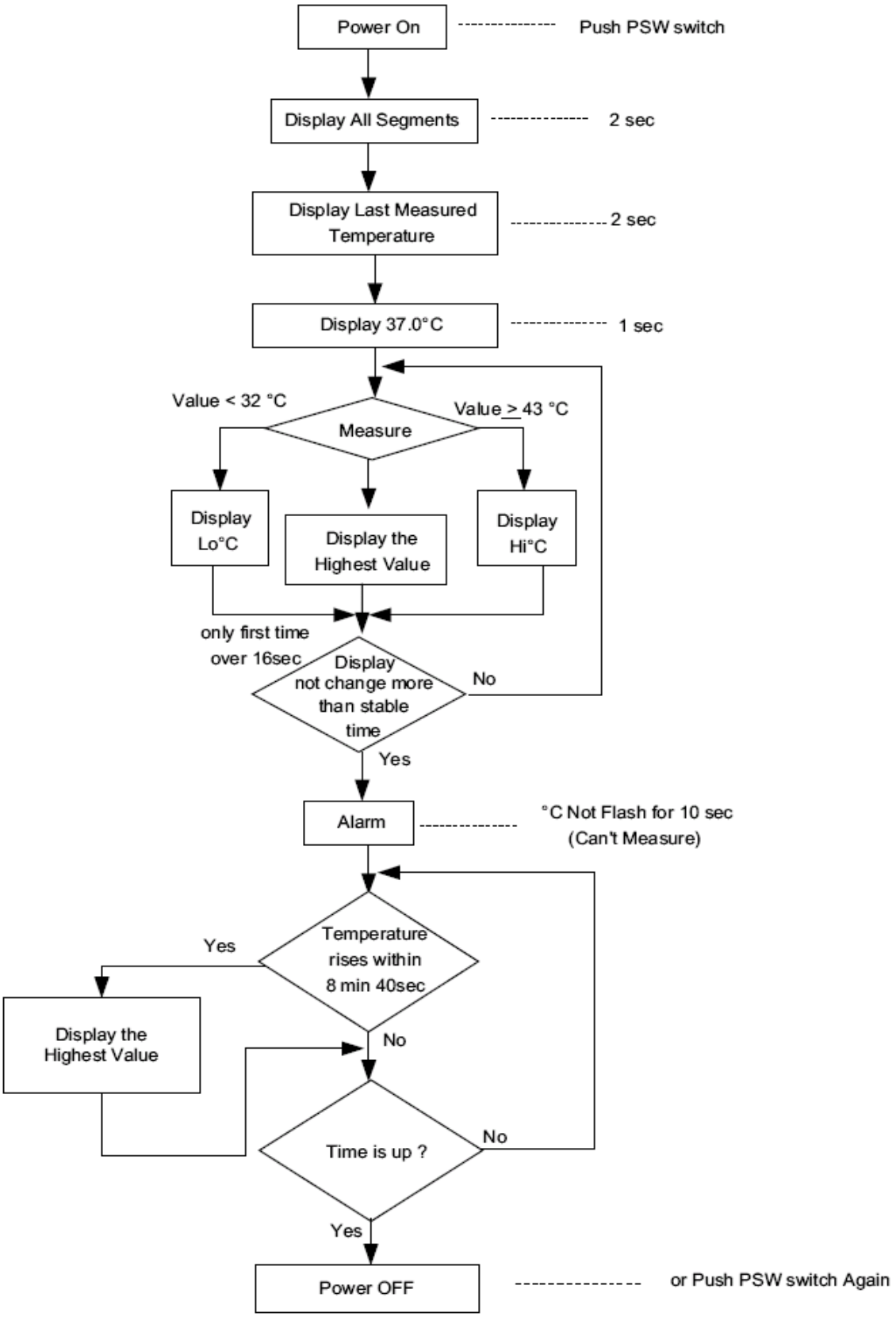
k. When measurement is over and the beep sound is terminated, if the temperature rises within 8 min 40 sec, the measurement will start again, but the ℃ mark will not flash and the buzzer will not output also.

l. During bi sound is on 10 sec, the temperature is not measurement.

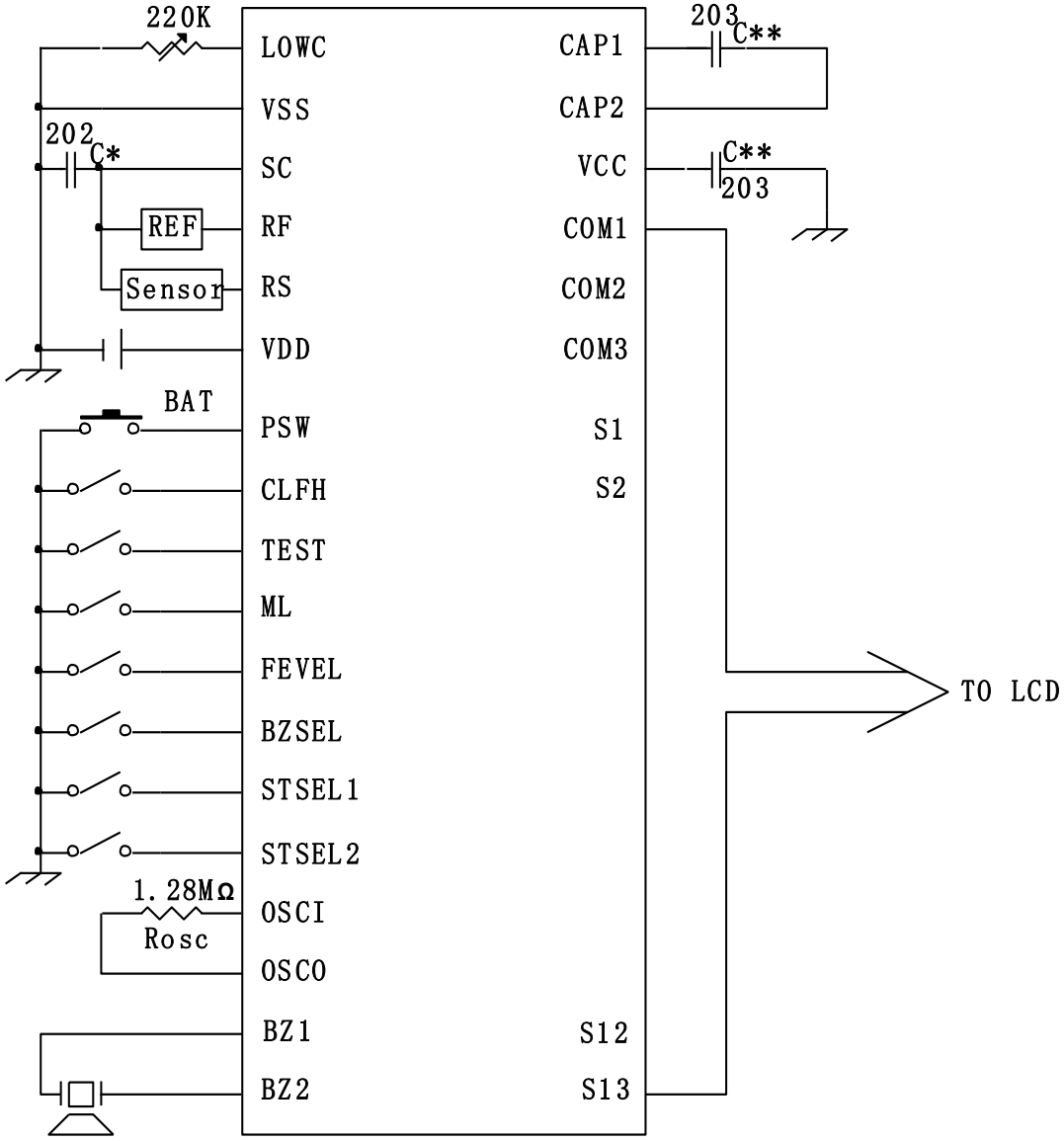
- When power off: the stand-by current ≤1μA.
- The frequency of buzzer is 6k(VSS) or 8kHz (Open or VDD) by pin option.
- Measurement to 0.1 degree at ℃.
- Sensor use 503ET.
- Reference resistor is the value sensor in 37.0 ℃.
- The low battery and "M" flag can not display when the temperature show Hi or Lo.
- When battery voltage is low, the battery mark "▲" flashes at the speed of 1Hz and the measurement maybe not accurate. The low TEST pin connect to Vss, the measured temperature will be the actual temperature of voltage detect: 1.35V±0.05V.
- During the process of mass production, in order to adjust the reference resistance (RF), let the measured environment. The LCD can be up or down changed, not always show the higher one.
- There are 4 kinds of stable time to be selected; 4 sec, 8 sec, 16 sec and 32 sec.

Time	STSEL1	STSEL2
4 sec	VSS	VDD/or open
8 sec	VDD/or open	VSS
16 sec	VDD/or open	VDD/or open
32 sec	VSS	VSS

Flow Chart


Power On
Push PSW switch
Display All Segments
2 sec
Display Last Measured Temperature
2 sec
Display 37.0°C
1 sec
Value < 32 °C
Measure
Value ≥ 43 °C
Display Lo°C
Display the Highest Value
Display Hi°C
only first time over 16sec
Display not change more than stable time
No
Yes
Alarm
°C Not Flash for 10 sec (Can't Measure)
Temperature rises within 8 min 40sec
Yes
Display the Highest Value
No
Time is up ?
No
Yes
Power OFF
or Push PSW switch Again

Application Circuit



Note:

REF=30.01kΩ

C* = 272~202

C** = 103~104

RBAT = 220K

1.35V±0.05V