

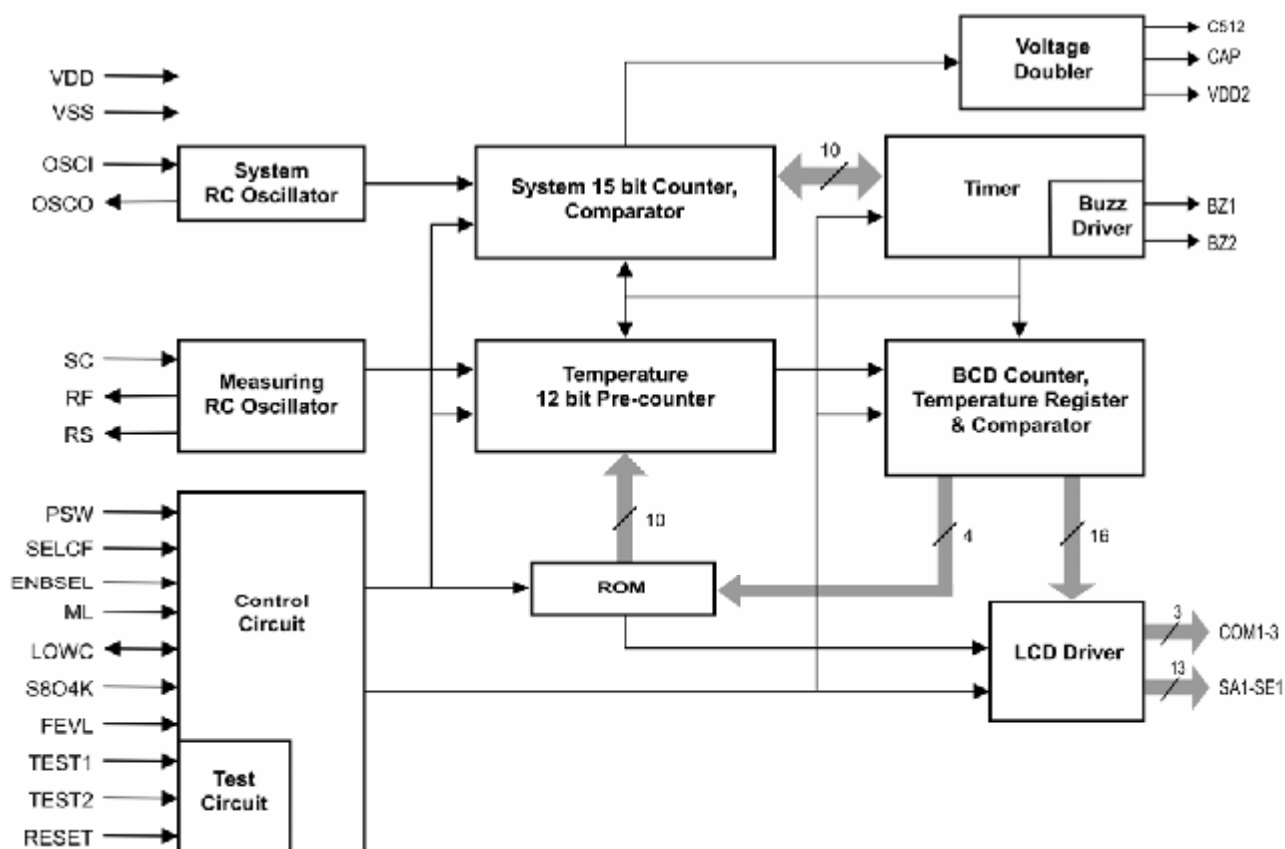
## General Description

The 7005CF is a CMOS digital clinical thermometer IC for measuring body temperature from 32.00°C~43.00°C (89.60°F ~ 109.40°F). IC includes oscillation circuit for temperature thermistor, system oscillation circuit, LCD driver, buzzer driver circuit. It also provides alarm, self-test, auto power off and last time measured temperature functions.

## Features

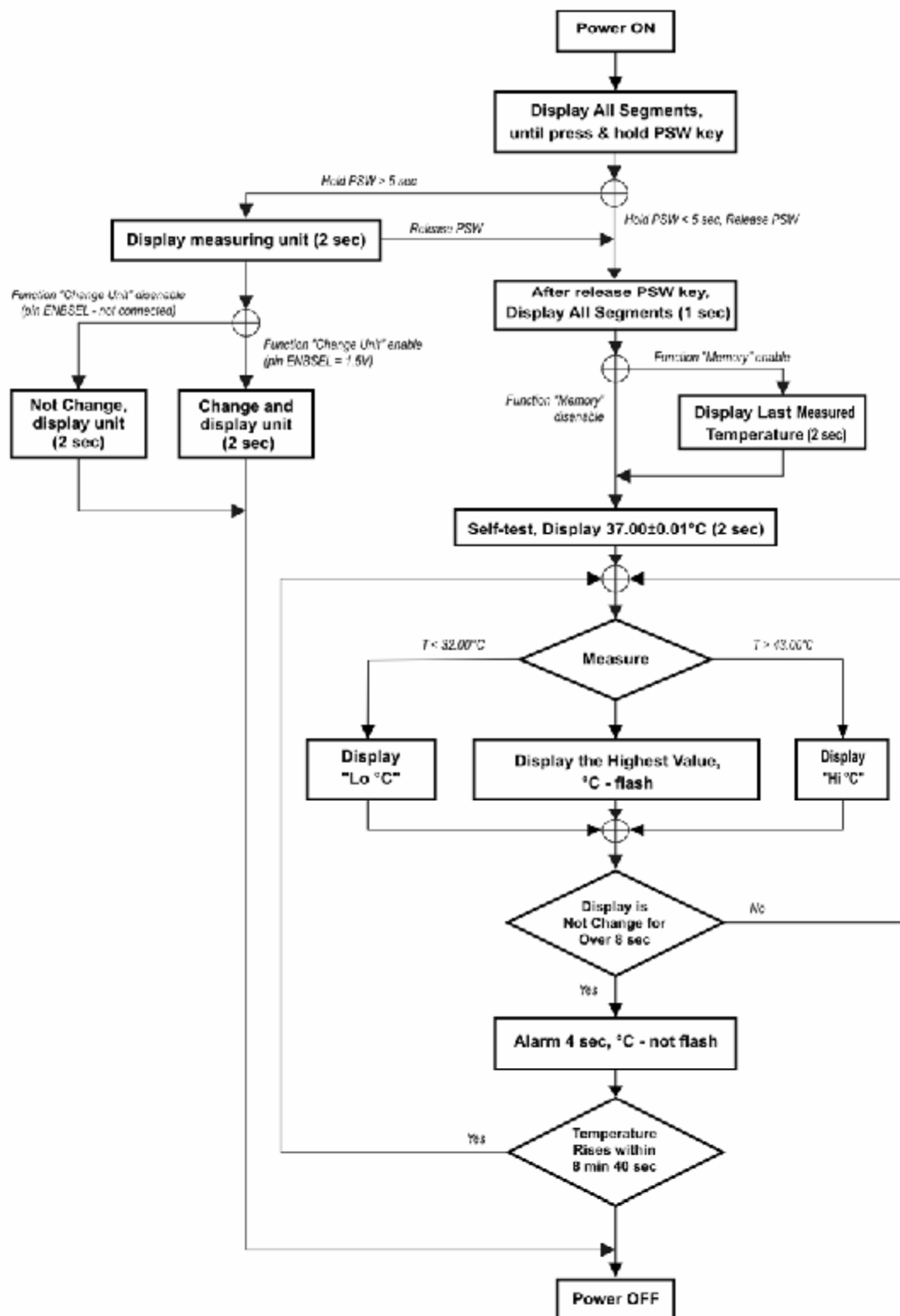
- Single-chip CMOS construction
- Single 1.5V battery operation
- Temperature measurement method – piecewise-linear approximation
- Measurement range: +32.00°C ~ +43.00°C or 89.60°F ~ 109.40°F
- Measurement accuracy: ±0.1°C or ±0.18°F
- Resolution: 0.01°C (0.01°F)
- Auto self-test
- Alarm warning for fever
- Highest temperature hold
- Auto power off after 8 min 40 sec
- One-key input switch for ON/OFF and change measuring unit °C/°F
- Displays last time measured temperature

## Block Diagram





### Flow Chart



## Functional Description

- Power ON/OFF: push switch PSW to turn the power on or off.
- When power on: push the switch PSW, then it will generate a “beep” sound for 1/8 sec.
  - a) Under press PSW, displays all the segments LCD – «Totally ON» mode. After release PSW, it continue on for 1 sec.
  - b) After a., as described above, then shows the last-time measured temperature for 2 sec.
  - c) After b., shows the self-test temperature  $37.00 \pm 0.01^{\circ}\text{C}$  for 2 sec. The  $^{\circ}\text{C}$  mark is ON.
  - d) After c., displays the highest measured temperature, then the  $^{\circ}\text{C}$  mark will flash at 1Hz.
  - e) If the temperature is  $< 32.00^{\circ}\text{C}$ , the display shows Lo  $^{\circ}\text{C}$ .
  - f) If the temperature is  $> 43.00^{\circ}\text{C}$ , the display shows Hi  $^{\circ}\text{C}$ .
  - g) The display always shows the higher temperature during the temperature measurement.
  - h) If the measured temperature does not change for more than 8 sec, the measurement is over and the  $^{\circ}\text{C}$  mark flash stops.
  - i) When measurement is over,
    - a) if the temperature  $< 37.50^{\circ}\text{C}$  the buzzer alarms for 4 sec, as follows:

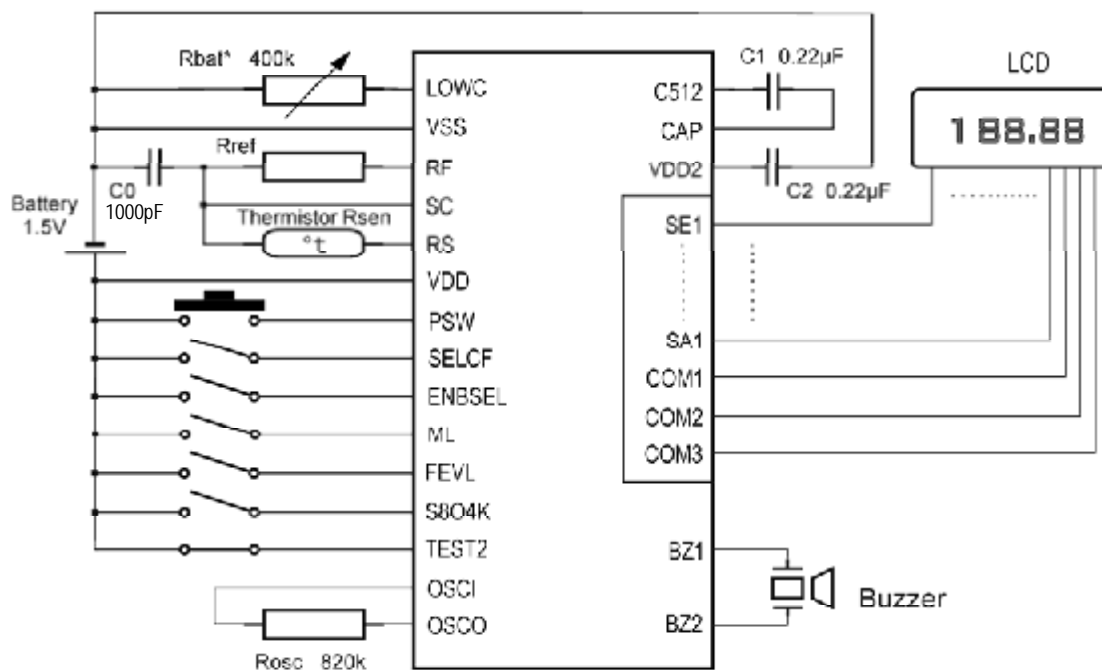


if the temperature  $> 37.50^{\circ}\text{C}$ , the buzzer alarms as follows:



- a) It will automatically turn the power off when measurement is over for 8 min 40 sec.
  - b) When measurement is over, but if the temperature rises within 8 min 40 sec, and starts to count 8 min 40 sec again.
  - c) When beep sound is on for 4 sec, the temperature is not measured.
- The frequency of the buzzer is 4kHz or 8kHz by pin option.
  - Fever alarm is pin option.
  - The low battery and “M” flag cannot display when the temperature shows Hi or Lo.
  - When battery voltage is low, the battery mark “B” flashes at a speed of 1Hz and the measurement may not be accurate. The low voltage detect  $1.35 \pm 0.05\text{V}$ .
  - During the process of mass production, in order to adjust the reference resistance  $R_{ref}$ , let pin TEST2 be floating, the measured temperature will be the actual temperature of the measured environment. It can be up or down, not always the higher one.
  - Under power OFF, if PSW button is pressed and withheld over 5 sec, 705CF shall change measurement unit selection mode. LCD will display the original temperature measurement unit. If pin SELCF not connected or set  $V_{SS}$ , init measurement unit is  $^{\circ}\text{C}$ . If pin SELCF set  $V_{DD}$ , init measurement unit is  $^{\circ}\text{F}$ . If continue hold PSW button over 2 sec, measurement unit will be change and IC generate a “beep” sound 1/16 sec. Release PSW before 2 sec, there is return «Totally ON» mode. After change unit for 2 seconds, IC automatically power OFF. If pin ENBSEL not connected, then the initial measurement unit not be changed.

## Application Circuits



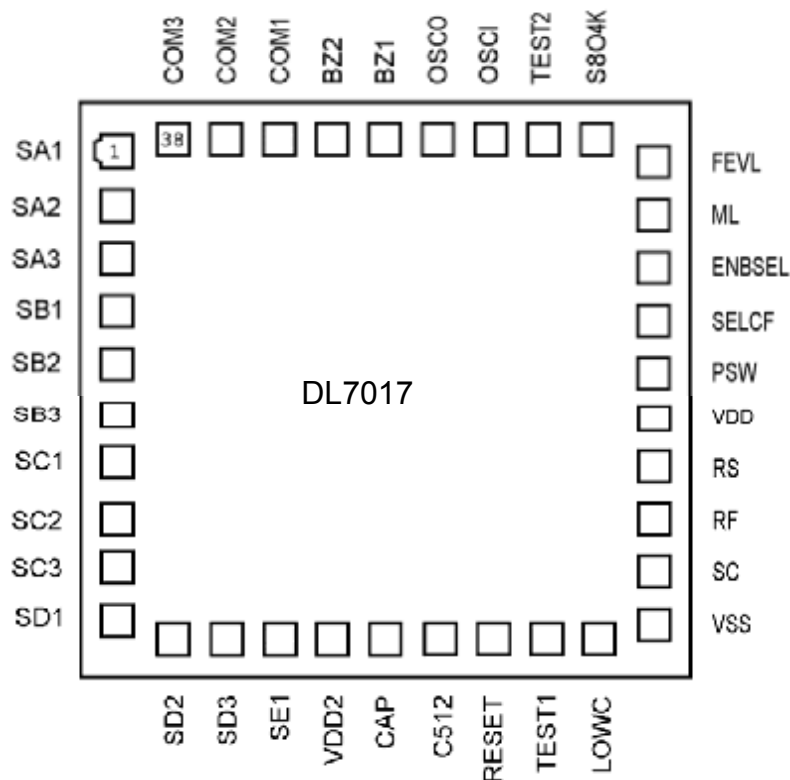
Notes:

DL7017

- Pins VDD2, CAP and C512 are externally connected to capacitors 0.22µf for stabilizing 3.0V.
- Pins BZ1 and BZ2 are connected to an external Buzzer for generating sounds.
- Pin LOWC is connected to an external trimming resistor Rbat = 400K for adjusting the detector level 1.35±0.05V of a low voltage detector. Open the pin when not in use.
- Pins OSCI, OSCO are connected to an external resistor Rosc = 820K±5%, and form an RC oscillator with a built-in capacitor for system clock 32kHz.
- Sensor Rsen is thermistor type SEMITEC 503ET-3H "Ishizuka Electronics Corp."
- Reference resistor Rref is value equal to 503ET-3H sensor in 37.00°C.
- C0 is temperature measuring capacitance 220pf±5%.
- Bonding Options for 26 ~ 31 pins

	腳位		打線	不打	功能
SELCF ENBSEL	26 SELCF	27 ENBSEL			
	不	不		26, 27	LCD總是展示 ° C, 不可能改變
	打線	不	26	27	LCD總是展示 ° F, 不可能改變
	不	打線	27	26	默認 ° C, 可按PSW鍵 轉 ° F
	打線	打線	26, 27		默認 ° F, 可按PSW鍵 轉 ° C
ML	28		28		當 開機, 會顯示上次測量的溫度2秒。
ML	28			28	當 開機, 不會顯示上次測量的溫度。
FEVL	29		29		當溫度高過 37.5 ° C, 產品發出 1Hz聲響 (即 0.5s響0.5不響) 4次。
FEVL	29			29	總是正常響鬧聲音
S804KL	30		30		響鬧聲音 8K Hz
S804KL	30			30	響鬧聲音 4K Hz
TEST 2	31		30		LCD將顯示被測量的最高的溫度
TEST 2	31			30	LCD將顯示當前溫度(當溫度變化, 數值將相應地改變)

## Pad Assignment



Chip size: no more than 1.450x1.350 mm<sup>2</sup>

The IC substrate should be connected to VSS in the PCB layout artwork.

## Pad Description

Pad	Name	Function	Pad	Name	Function
1~3	SA1~SA3	LCD segment drive	23	RS	Connect sensor resistor, PMOS open drain
4~6	SB1~SB3	LCD segment drive	24	VDD	Positive power supply +1.5V
7~19	SC1~SC3	LCD segment drive	25	PSW	Pull low input pin, power ON/OFF and change measurement unit
10~12	SD1~SD3	LCD segment drive	26	SELCF	Select measurement unit pin
13	SE1	LCD segment drive	27	ENBSEL	Enable change measurement unit pin
14	VDD2	Double power supply voltage +3.0V	28	ML	Connect to VDD for memory function, otherwise floating.
15	CAP	For generate double voltage	29	FEVL	Floating with fever function, otherwise connect to VDD.
16	C512	For generate double voltage, inverter output	30	S804KL	Floating buzzer is 4kHz, connect to VDD if buzzer is 8kHz.
17	RESET	Reset IC pin	31	TEST2	Pull low test pin, for production test, floating LCD displays the real time value, when connected to VDD, LCD displays the highest value.
18	TEST1	Test pin for IC	32	OSCI	System 32 kHz RC oscillator input
19	LOWC	For the supply voltage detector, open the pin when not in use	33	OSCO	System 32 kHz RC oscillator output
20	VSS	Negative power supply 0V	34	BZ1	Buzzer output 1
21	SC	Pin for connect measuring capacitance, NMOS open drain	35	BZ2	Buzzer output 2
22	RF	Connect reference resistor, PMOS open drain	36~38	COM1~COM3	LCD backplane drive, 3-level voltage out