CLINICAL THERMOMETER

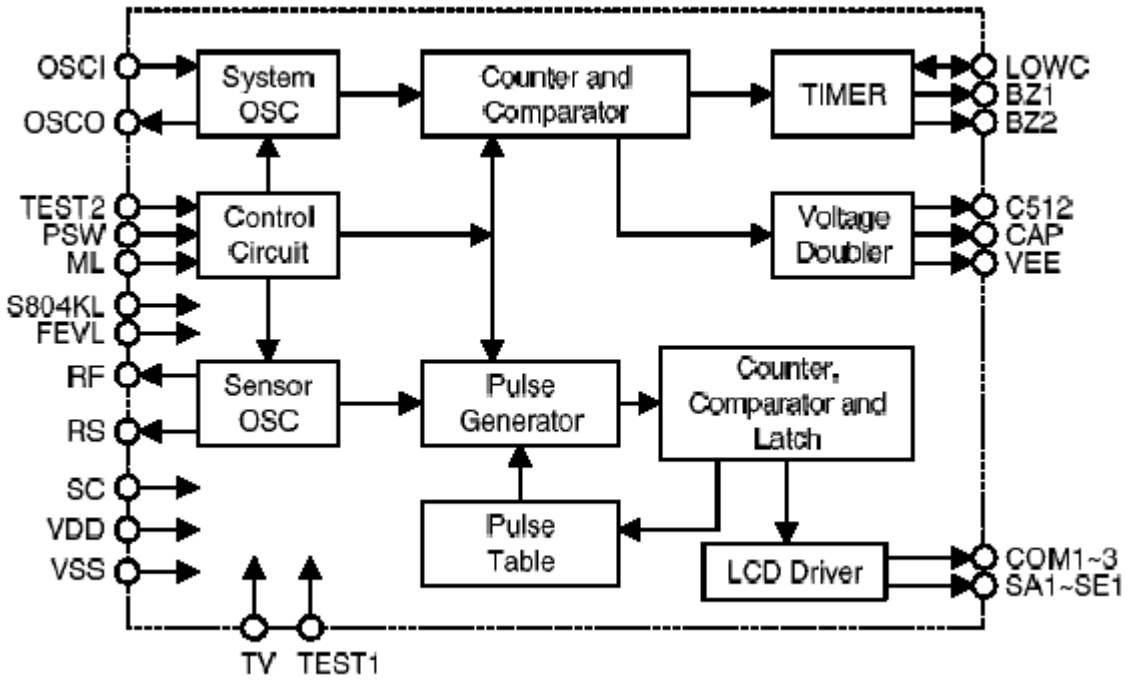
General Description

The IZ8005 is a CMOS digital clinical thermometer IC for measuring body temperature from 32.00°C~43.00°C. It also provides alarm, self-test, auto power off and last time measured temperature functions. The other electronic components are LCD display, thermister, 1.5V battery, ON/OFF switch, buzzer, resistors and capacitors.

Features

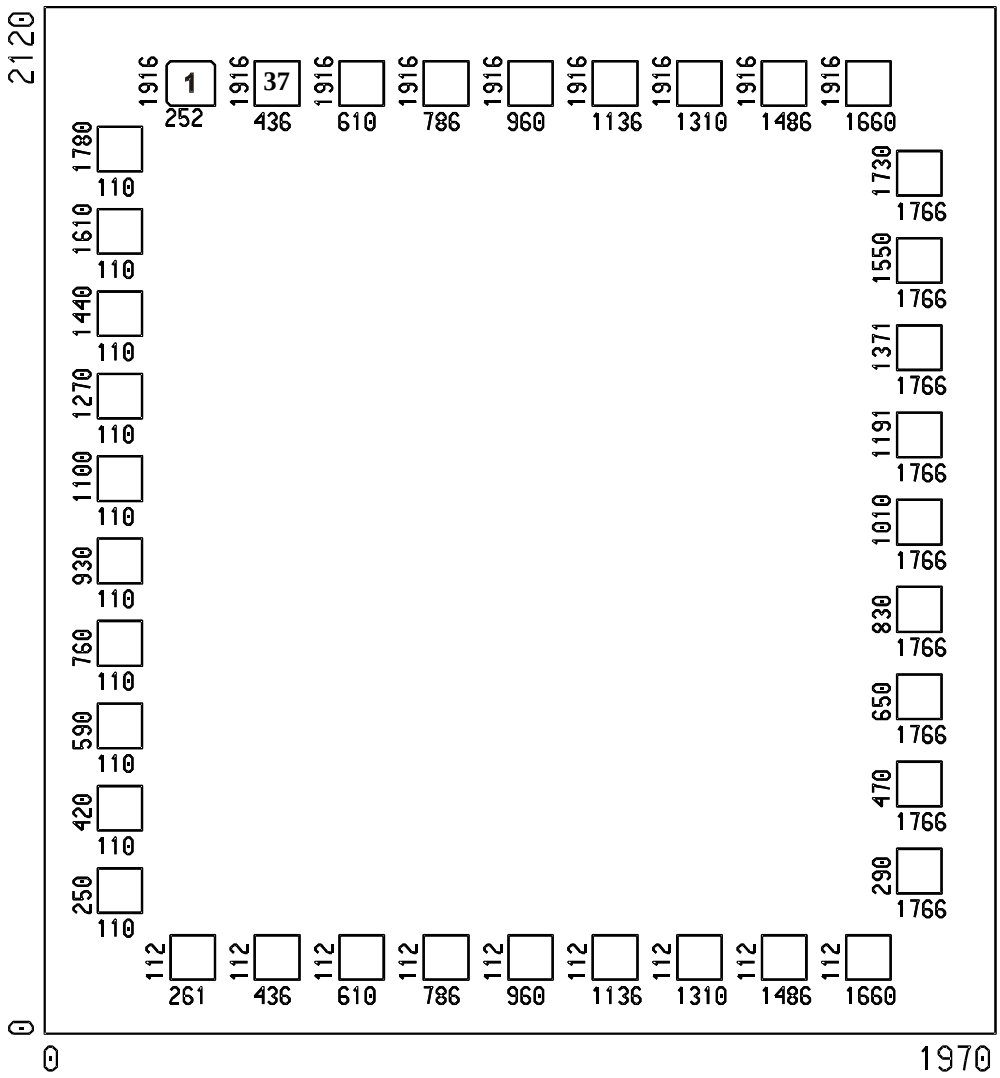
- Single-chip CMOS construction
- Single 1.5V battery operation
- Measurement range: +32.00°C ~ +43.00°C
  Measurement accuracy: ±0.1°C
  Resolution: 0.01°C
- Auto self-test
- Alarm warning for fever
- Highest temperature hold
- Auto power off after 8 min 40 sec
- One-key input switch for ON/OFF
- Displays last time measured temperature

Block Diagram



INTEGRAL

Pad Assignment



Chip size: 1.97 x 2.12 mm^2

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

INTEGRAL

Pad Description

Pad	Pad Name	I/O	Function
1~3	SA1~SA3	O	LCD segment drive
4~6	SB1~SB3	O	LCD segment drive
7~19	SC1~SC3	O	LCD segment drive
10~12	SD1~SD3	O	LCD segment drive
13	SE1	O	LCD segment drive
14	VEE	O	Generate negative voltage (–1.5V)
15	CAP	O	For negative voltage, NMOS output
16	C512	O	For negative voltage, inverter output
17	TV	B	Test pin for IC
18	TEST1	I	Test pin for IC
19	LOWC	B	For the supply voltage detector. Open the pin when not in use.
20	VSS	I	Power supply GND
21	SC	B	Common point, NMOS open drain
22	RF	O	Connect reference resistor, PMOS open drain
23	RS	O	Connect sensor resistor, PMOS open drain
24	VDD	I	Positive power supply
25	PSW	I	Pull low input pin, push switch to turn the power on or off
26	TEST2	I	Pull low test pin, for production test, floating LCD displays the real time value, when connected to VDD, LCD displays the highest value.
27	INIT	I	Test pin for IC
28	ML	I	Connect to VDD for memory function, otherwise floating.
29	FEVL	I	Floating with fever function, otherwise connect to VDD.
30	S804KL	I	Floating buzzer is 4kHz, connect to VDD if buzzer is 8kHz.
31	OSCI	I	For system oscillator in
32	OSCO	O	For system oscillator out
33	BZ1	O	Buzzer output 1
34	BZ2	O	Buzzer output 2
35~37	COM1~COM3	O	LCD backplane drive, 3-level voltage out

Absolute Maximum Ratings

Supply voltage.....0V to 2.0V Input voltage..... VSS–0.5V to VDD+0.5V

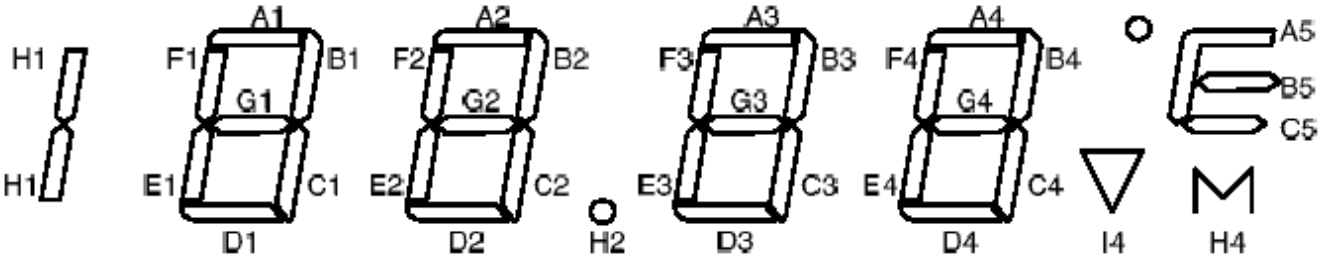
Operation Temperature.....–20°C to +75°C Storage Temperature.....–55°Cto +125°C

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{DD}	Operating Voltage	—	1.3	1.5	1.65	V
I_{DD}	Operating Current	V_{DD} = 1.5V, No load	—	60	100	mkA
I_{STB}	Standby Current	V_{DD} = 1.5V	—	0.3	1.0	mkA
F_{OSC}	Oscillating Frequency	V_{DD} = 1.5V, R_{OSC} = 820kOhm	25.6	32	38.4	kHz
R°C	Temperature Measurement Accuracy at Range 35°C~39°C	—	– 0.1	—	0.1	°C

LCD Electrode Pattern



	SA1	SA2	SA3	SB1	SB2	SB3	SC1	SC2	SC3	SD1	SD2	SD3	SE1
COM1	F1	A1	B1	F2	A2	B2	F3	A3	B3	F4	A4	B4	A5
COM2	E1	G1	C1	E2	G2	C2	E3	G3	C3	E4	G4	C4	B5
COM3	H1	D1	—	—	D2	H2	—	D3	—	I4	D4	H4	C5

Note: 1/3 duty, 1/2 bias (LCD uses 3V)

Functional Description

- Power sw: push switch to turn the power on or off.
- When power on: push the switch, then it will generate a “beep” sound for 0.125 sec.

a. First displays all the segments on for 2 sec.
b. After a., as described above, then shows the last-time measured temperature for 2.8 sec.
c. After b., shows the self-test temperature (37.00±0.01°C) for 1 sec. The °C mark will flash at a speed of 1Hz.
d. After c., displays the highest measured temperature, then the °C mark will flash at a speed of 1Hz.
e. If the temperature is < 32.00°C, the display shows Lo °C.
f. If the temperature is . 43.00°C, the display shows Hi °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 °C mark flash stops.
i. When measurement is over, if the temperature > 37.50°C the buzzer alarms “beep-beep-beep---beep-beep-beep---” for 4 sec, as follows:

BI ——— BI ——— BI ——— ———
(0.175S) (0.175S) (0.175S) (0.175S) (0.175S) (0.175S) (0.375S)

if the temperature . 37.50°C, the buzzer alarms “beep-beep-beep-beep-” for 4 sec, as follows:

BI ——
(0.5S) (0.5S)

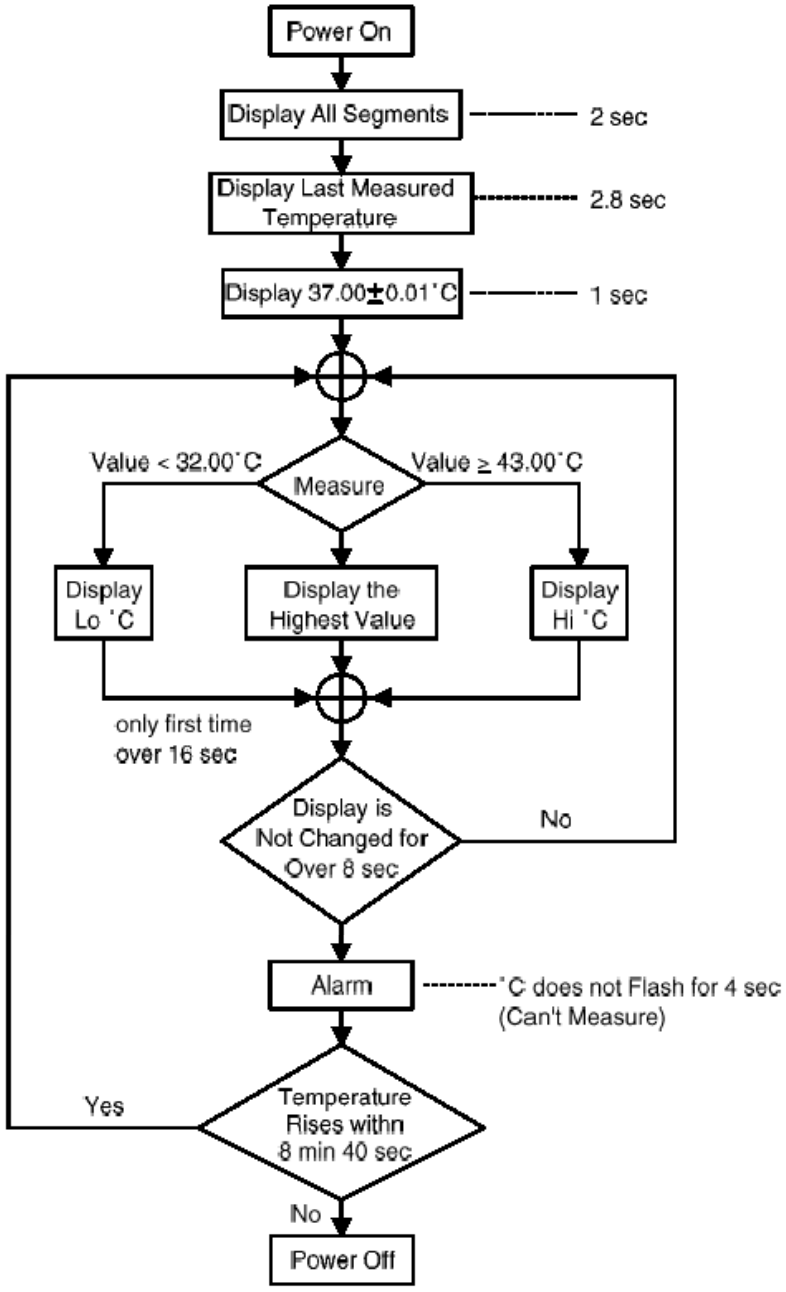
j. It will automatically turn the power off when measurement is over for 8 min 40 sec.
k. When measurement is over, but if the temperature rises within 8 min 40 sec, the °C mark will flash

again (repeat from step 2-d), and starts to count 8 min 40 sec again.

l. When beep sound is on for 4 sec, the temperature is not measured.

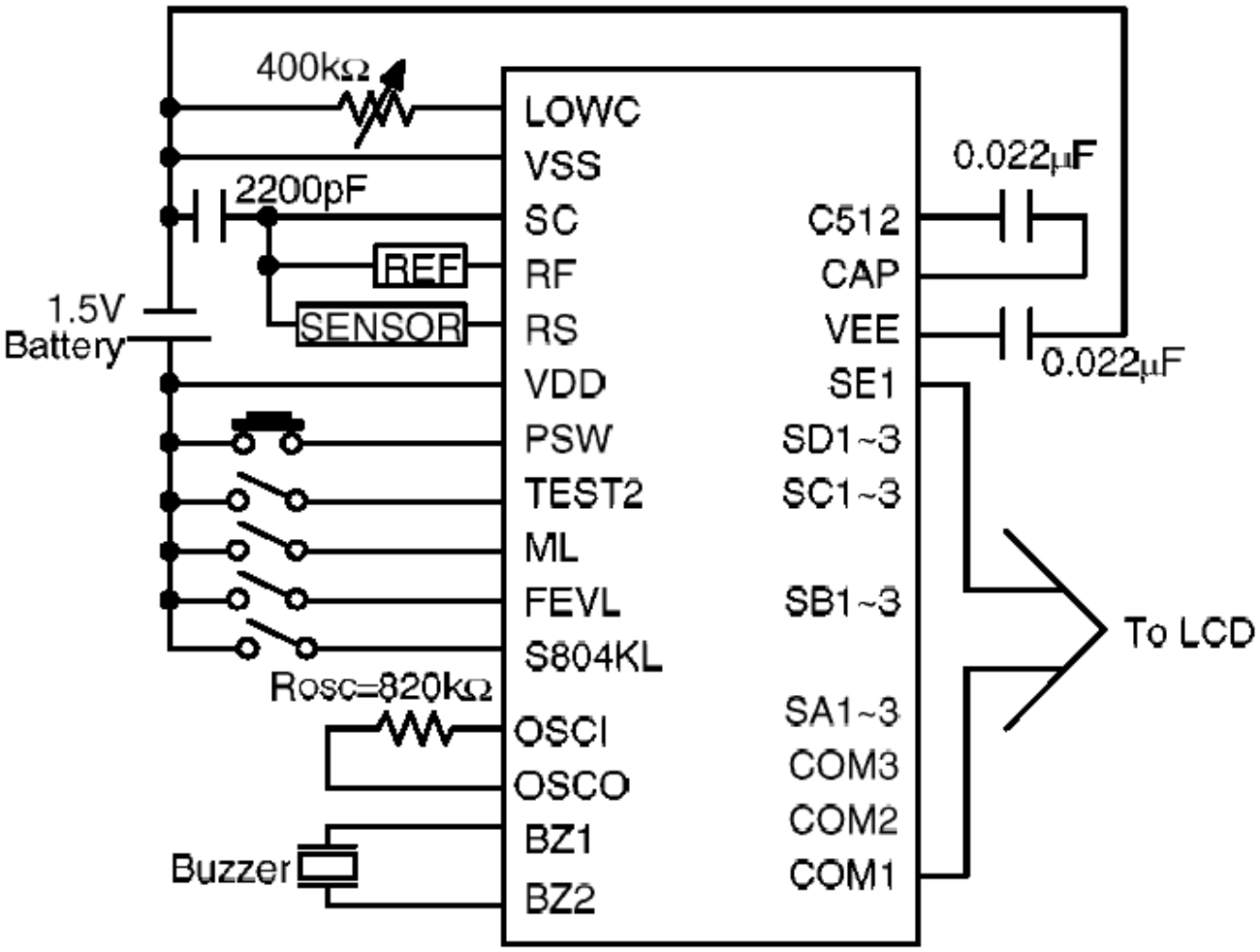
- When “Power OFF” type standby current is 0.3 mkA.
- The frequency of the buzzer is 4kHz or 8kHz by pin option.
- Fever alarm is pin option.
- Measurement to 0.01 degree at °C.
- Sensor use 503ET.
- Reference resistor is the value (sensor in 37.00°C)
- The low battery and “M” flag cannot display when the temperature shows Hi or Lo.
- When battery voltage is low, the battery mark “N” flashes at a speed of 1Hz and the measurement may not be accurate. The low voltage detect: 1.35V ± 0.05V.
- During the process of mass production, in order to adjust the reference resistance (RF), let test 2 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.

Flow Chart



INTEGRAL

Application Circuits



IZ8005

Notes:

- Substrate connect to VDD.
- VEE, CAP and C512 are externally connected to capacitors for stabilizing VEE (=1.5V).
- BZ1 and BZ2 are connected to an external Buzzer for generating sounds.
- LOWC is connected to an external resistor for adjusting the detector level of a low voltage detector. Open the pin when not in use.
- OSCI, OSCO are connected to an external resistor, and form an RC oscillator with a built-in capacitor for SYSTEM clock (=32kHz)
- RS, RF, SC constitute an alternating RC oscillator, which allows one oscillator, namely RS or RF, active at a time.
- REF (reference resistor) is a resistor value equal to 503ET sensor in 37.00°C.
- SENSOR is a 503ET thermistor.