SS0402 THERMOMETER

攝氏及華氏體溫計

FEATURES 功能敘述：

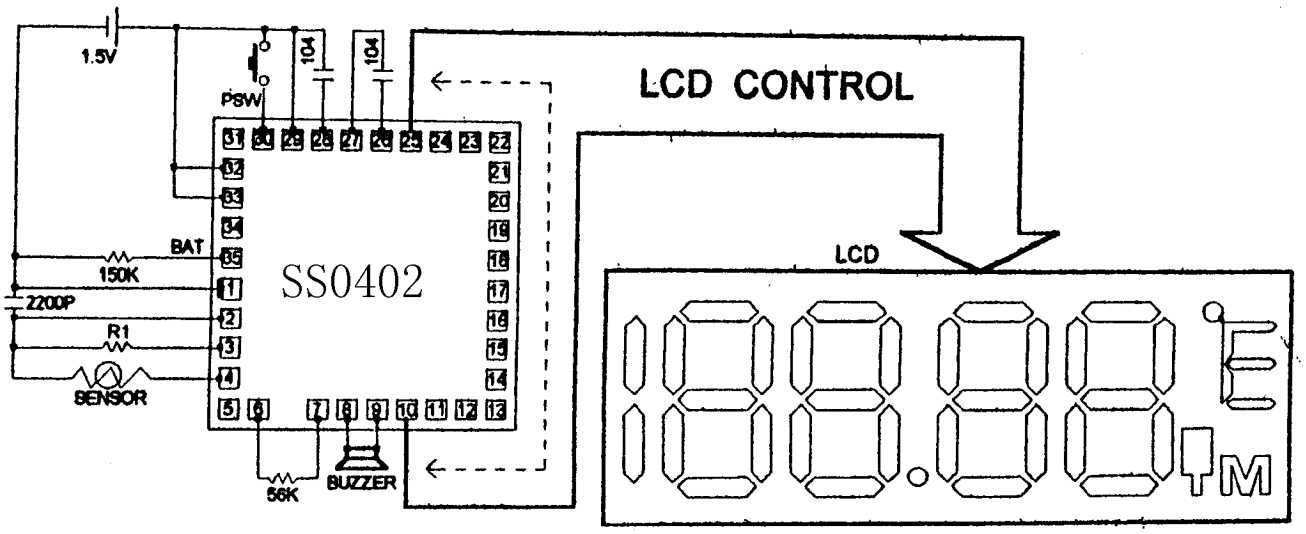
TEMPERATURE RANGE 溫度範圍 32.00℃(89.60℉)～43.00℃(109.40℉)

- RESOLUTION 0.01℃(0.01℉)，ACCURACY ±0.1℃(±0.2℉)
- LOW BATTERY DETECTOR 低電壓檢測
- BUZZER ALARM 警示聲及 AUTO POWER-OFF
- TC327203C 為 ℃ DISPLAY，TC327203F 為 ℉ DISPLAY
- SENSOR 溫度感測使用 503ET
- CHIP SIZE = 1970 X 2200 um*um

ELECTRICAL CHARACTERISTICS 電氣規格：

CHARACTERISTICS	SYMBOL	MIN.	TYPE	MAX.	UNIT	REMARK
工作電壓 Operating Voltage	Vdd	1.30	1.50	1.65	V	
工作電流 Operating Current	Idd	—	45	—	uA	Average current
靜態電流 Stand-by Current	Ist	—	0	—	uA	LCD not Display
推動電流 BZ Driving Current	Idv	1.5	—	—	mA	Vout=1/2Vdd
推動電流 BZ Sinking Current	Isk	—	—	-2.0	mA	Vout=1/2Vdd
振盪頻率 Oscillate Frequence	Fosc	—	128	—	KHz	RC Oscillator
工作溫度 Operating Temperature	Topr	-20	—	75	℃	
儲存溫度 Storage Temperature	Tstg	-20	—	125	℃	

APPLICATION DIAGRAM 參考電路圖：



- IC chip substrate don't connect to VDD or VSS.
- All SPEC and applications shown above subject to change without prior notice.

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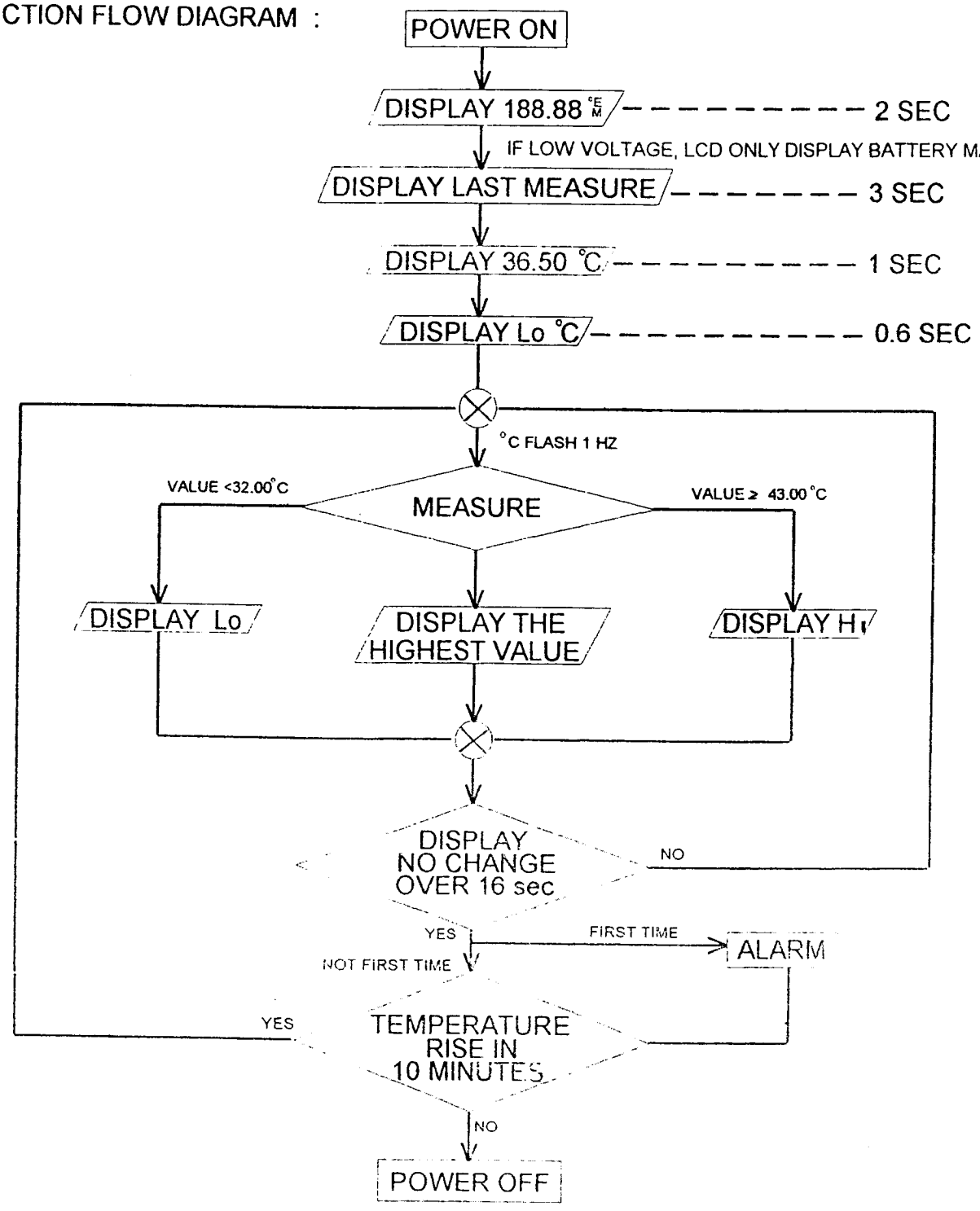
SS0402 PRODUCT SPECIFICATION

FUNCTION FLOW DIAGRAM :



SS0402 THERMOMETER PRODUCT SPECIFICATION (1.5V)

<1> POWER SW: PUSH SWITCH CAN TURN ON OR TURN OFF THE THERMOMETER.

<2> AT POWER ON :

A. LCD DISPLAY 88.88 2 SECOND AT FIRST.

B. FOLLOWING A; DISPLAY THE HOLDING TEMPERATURE OF THE LAST MEASURED ABOUT 3 SECOND, AND CHARACTER "M" ALSO DISPLAY.

C. FOLLOWING B; AFTER DISPLAY 36.50 ℃ 1 SECOND, AND DISPLAY " Lo" ABOUT 0.6 SECOND AGAIN.

D. FOLLOWING C; WHEN MEASURING ,THE MARK ℃ IS FLASH BY 1HZ.

E. THE DISPLAY TEMPERATURE ALWAYS KEEP HIGHER DURING MEASURING.

F. IF THE TEMPERATURE < 32.00 ℃, THE LCD DISPLAY " Lo ℃".

G. IF THE TEMPERATURE ≧ 43.00 ℃, THE LCD DISPLAY " Hi ℃".

H. IF THE MEASURRED TEMPERATURE IS NO CHANGE MORE THAN 16 SECOND, THE MEASUREMENT IS OVER AND ℃ MARK FLASH STOP.THE BUZZER ALARM "Bi-Bi-Bi——Bi-Bi-Bi——" ABOUT 4 SEC, AS BELOW:

Bi————Bi————Bi————————

0.125S 0.125S 0.125S 0.125S 0.125S 0.375S

I. IT WILL AUTO POWER OFF WHEN MEASUREMENT IS OVER THAN 10 MINUTES.

J. WHEN MEASUREMENT IS OVER, IF TEMPERATURE RISES WITHIN 10 MINUTES, THE ℃ MARK WILL REFLASH AND MEASURED AGAIN (REPEAT STEP 2-D), BUT THE TEMPERATURE IS HOLDING, THE BUZZER NO ALARM.

K. OPERATING AVERAGE CURRENT ≦ 45 uA .

<3> PUSH SWITCH CAUSE A BUZZER ALARM "Bi" ABOUT 0.125 SECOND.

<4> THE STAND-BY CURRENT ≦ 0.5 uA AT POWER OFF STATUS.

<5> THE FREQUENCY OF BUZZER IS 5.3KHZ.

<6> AFTER (2-A), IF THE BATTERY VOLTAGE IS LOW, THE LCD ONLY DISPLAY BATTERY MARK " " ,MEANS THE MEASUREMENT MAYBE NOT ACCURATE.THE LOW VOLTAGE DETECT: 1.35V ± 0.05V

<7> TEST2 PIN CONNECT VDD, DISPLAY IS REAL TIME TEMPERATURE NOT THE HIGHEST TEMPERATURE IN ORDER TO ADJUST REFERENCE RESISTER.

<8> LOW BATTERY RESISTOR IS ABOUT 97KΩ (R3=110KΩ PARALLEL TO Radj=820KΩ). IF BATTERY MARK WAS SHOWN WHEN VDD IS MORE THAN 1.4V , THE PARALLEL RESISTOR Radj MUST BE CANCEL.

<9> FOR MATCHING 503ET AND 833ET SENSOR, THE VALUE OF R1 IS ACCORDING TO DIFFERENTIAL SENSOR TYPE (SEE PAGE 11).

<10> FOR SENSOR TYPE IS ONLY USED 503ET AND 833ET.

<11> THE ACCURACY SPECIFICATION IS FOLLOWING BELOW:

Temperature	Specification
T<34.00℃	± 0.2℃
34.00℃≦T<40.00℃	± 0.1℃
40.00℃≦T	± 0.2℃

PIN DESCRIPTION

PIN	NAME	DESCRIPTION
1	VSS	POWER PIN.
2	SC	REFERENCE AND SENSOR FREQUENCY INPUT PIN. THE REFERENCE AND SENSOR FREQUENCY GENERATOR CONSTSTS OF PIN 2,3,4.
3	RF	PMOS OPEN DRAIN, CONNECT TO THE REFERENCE RESISTOR.
4	RS	PMOS OPEN DRAIN, CONNECT TO THE SENSOR RESISTOR.
5	TEST1	TEST PIN ,FOR IC TEST ONLY.
6	OSCI	SYSTEM FREQUENCY INPUT PIN.
7	OSCO	SYSTEM FREQUENCY OUTPUT PIN.
8	BZ1	OUTPUT PIN, THE BUFFER OF BUZZER.
9	BZ2	OUTPUT PIN, THE BUFFER OF BUZZER.
10	COM1	OUTPUT PIN, CONNECT TO LCD PIN 1.
11	COM2	OUTPUT PIN, CONNECT TO LCD PIN 2.
12	COM3	OUTPUT PIN, CONNECT TO LCD PIN 3.
13	SA1	OUTPUT PIN, CONNECT TO LCD PIN 4.
14	SA2	OUTPUT PIN, CONNECT TO LCD PIN 5.
15	SA3	OUTPUT PIN, CONNECT TO LCD PIN 6.
16	SB1	OUTPUT PIN, CONNECT TO LCD PIN 7.
17	SB2	OUTPUT PIN, CONNECT TO LCD PIN 8.
18	SB3	OUTPUT PIN, CONNECT TO LCD PIN 9.
19	SC1	OUTPUT PIN, CONNECT TO LCD PIN 10.
20	SC2	OUTPUT PIN, CONNECT TO LCD PIN 11.
21	SC3	OUTPUT PIN, CONNECT TO LCD PIN 12.

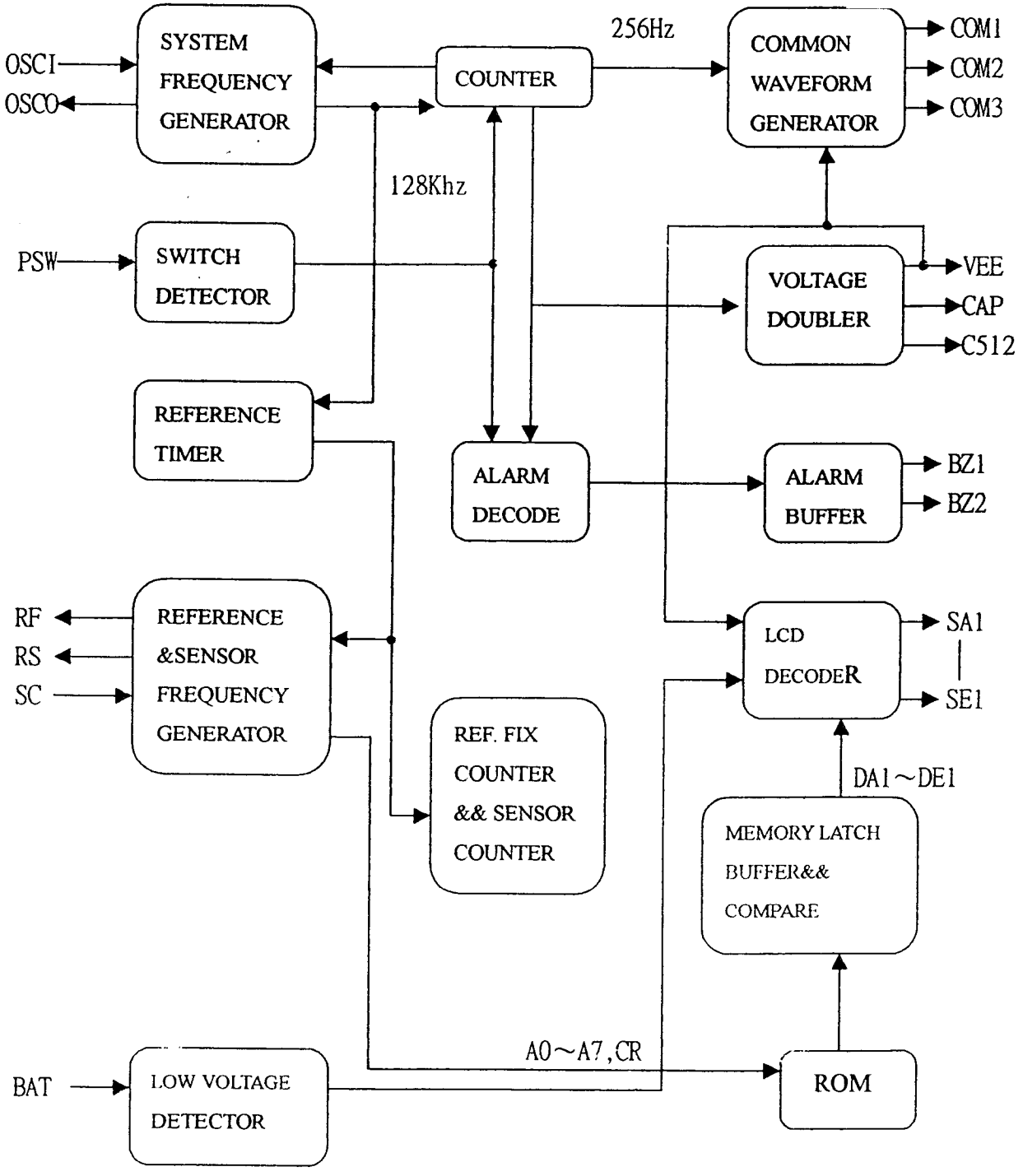
22	SD1	OUTPUT PIN, CONNECT TO LCD PIN 13.
23	SD2	OUTPUT PIN, CONNECT TO LCD PIN 14.
24	SD3	OUTPUT PIN, CONNECT TO LCD PIN 15.
25	SE1	OUTPUT PIN, CONNECT TO LCD PIN 16.
26	C512	THE PIN 26,27 IS DOUBLER VOLTAGE 3V CAPACITOR CONNECT.
27	CAP	
28	VEE	VOLTAGE 3V
29	VDD	
30	PSW	PULL LOW INPUT PIN. PUSH SWITCH TO POWER ON/OFF.
31	TEST2	PULL LOW TEST PIN. WHEN THIS PIN CONNECT TO VDD ON PRODUCTION, THE LCD WILL DISPLAY REALTIME VALUE (NOT THE HIGHEST VALUE).
32	VOP	IN ORDER TO SELECT VDD USE 1.5V OR 3V, WHEN SELECT 1.5V THIS PIN CONNECT TO VDD, OTHERWISE CONNECT TO VSS.
33	HALF	CONNECT TO 1.5V.
34	P3V	OUTPUT PIN. FOR 3V APPLICATION USE ONLY.
35	BAT	FOR THE LOW VOLTAGE DETECTING.

****

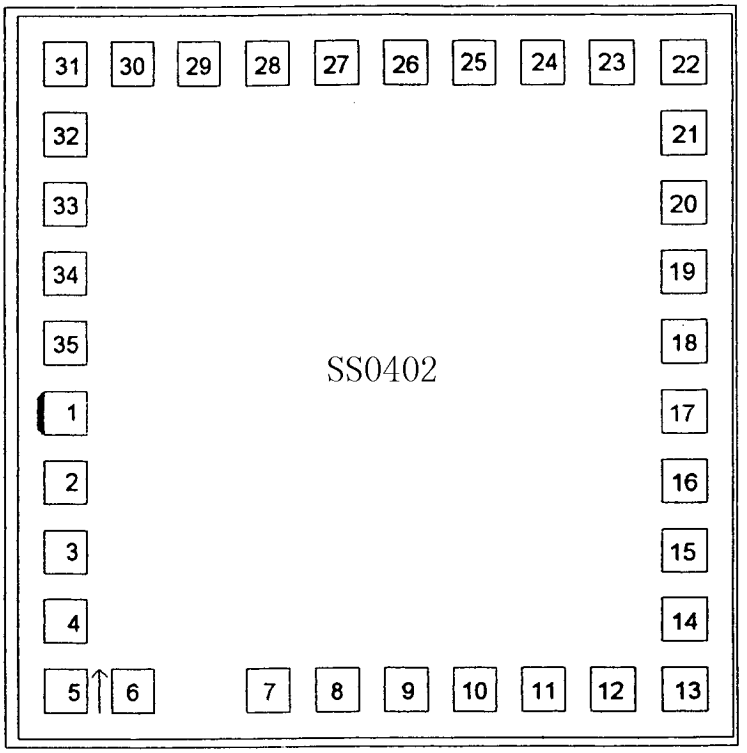
OPERATING PARAMETER:(VDD=1.5V)

1. OPERATING VOLTAGE	:	1.3V - 1.65V
2. OPERATING AVERAGE CURRENT	:	≦ 45 uA.
3. INPUT VOLTAGE	:	VIL ≦ VSS+0.3V
		VIH ≧ VDD-0.3V
4. OUTPUT VOLTAGE	:	VOL ≦ VSS+0.1V
		VOH ≧ VDD-0.1V
5. BUZZER DRIVING CURRENT	:	≧ 1.5mA (Vout=1/2 VDD)
BUZZER SINKING CURRENT	:	≦ -2.0mA (Vout=1/2 VDD)

BLOCK DIAGRAM :



PAD'S DIAGRAM

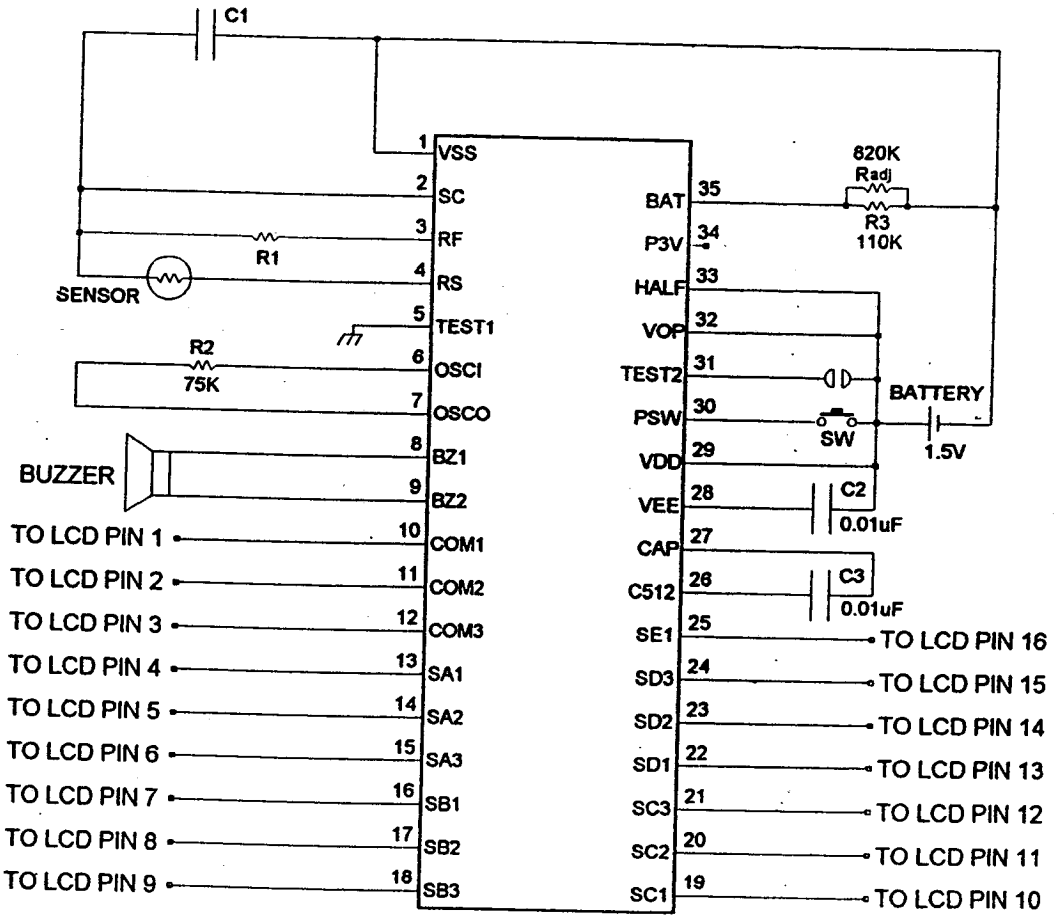


CHIP SIZE : X=1780 um
Y=1620 um

PAD NAME	PAD No.	COORDINATE (X,Y)	PAD NAME	PAD No.	COORDINATE (X,Y)
VSS	1	(-764.80, - 30.52)	SC1	19	(764.80, 218.36)
SC	2	(-764.80, -234.68)	SC2	20	(764.80, 363.96)
RF	3	(-764.80, -370.68)	SC3	21	(764.80, 509.56)
RS	4	(-764.80, -506.68)	SD1	22	(764.80, 659.80)
TEST1	5	(-764.80, -659.80)	SD2	23	(585.28, 659.80)
OSCI	6	(-608.80, -659.80)	SD3	24	(421.28, 659.80)
OSCO	7	(-247.44, -659.80)	SE1	25	(257.28, 659.80)
BZ1	8	(- 79.44, -659.80)	C512	26	(93.28, 659.80)
BZ2	9	(84.56, -659.80)	CAP	27	(- 70.72, 659.80)
COM1	10	(248.56, -659.80)	VEE	28	(-248.80, 659.80)
COM2	11	(412.56, -659.80)	VDD	29	(-416.80, 659.80)
COM3	12	(576.56, -659.80)	PSW	30	(-592.80, 659.80)
SA1	13	(764.80, -659.80)	TEST2	31	(-764.80, 659.80)
SA2	14	(764.80, -509.64)	VOP	32	(-764.80, 501.48)
SA3	15	(764.80, -364.04)	HALF	33	(-764.80, 365.48)
SB1	16	(764.80, -218.44)	P3V	34	(-764.80, 233.48)
SB2	17	(764.80, - 72.84)	BAT	35	(-764.80, 101.48)
SB3	18	(764.80, 72.76)			

NOTICE: On PCB, IC Substrate should not connect directly with vss or vdd

SS0402 THERMOMETER APPLICATION (1.5V)



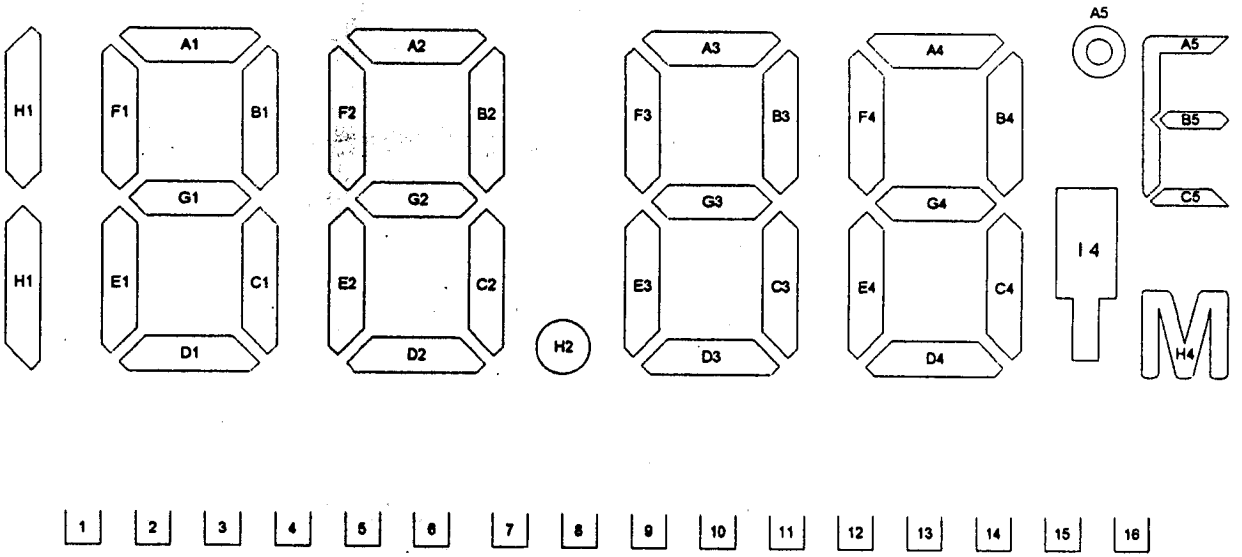
REMARK 1: R1 SELECTED ACCORDING TO SENSOR TYPE .

2: R3//Radj =97Kohm

3. SC CAPACITOR SELECT ACCORDING TO SENSOR TYPE:

IF USE ET503 SENSOR TYPE, C1 SELECT 2200pF

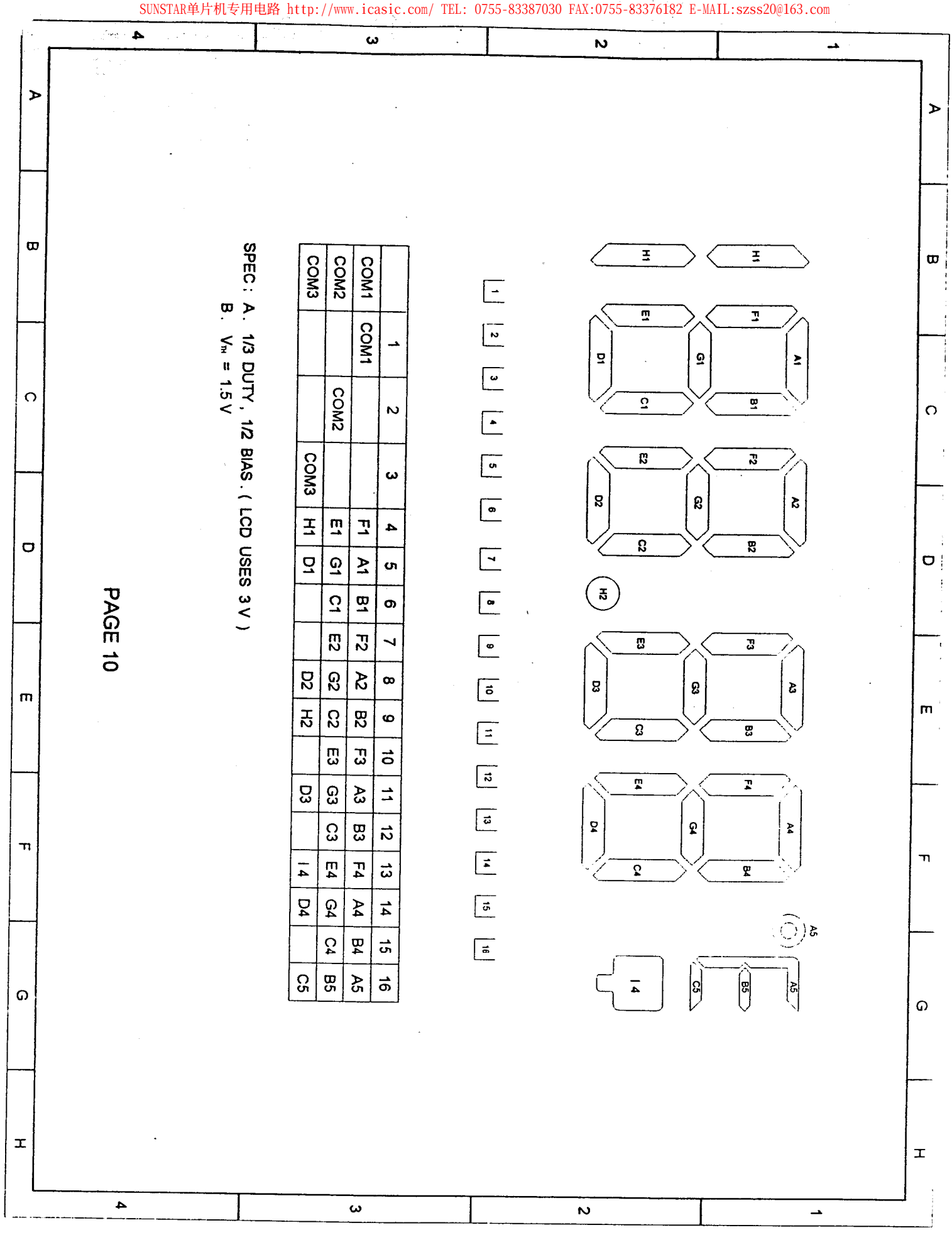
IF USE ET833 SENSOR TYPE, C1 SELECT 1000pF



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COM1	COM1			F1	A1	B1	F2	A2	B2	F3	A3	B3	F4	A4	B4	A5
COM2		COM2		E1	G1	C1	E2	G2	C2	E3	G3	C3	E4	G4	C4	B5
COM3			COM3	H1	D1			D2	H2		D3		I 4	D4	H4	C5

SPEC : A. 1/3 DUTY , 1/2 Bl LCD USES 3 V)

B. V_{TH} = 1.5 V



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COM1	COM1			F1	A1	B1	F2	A2	B2	F3	A3	B3	F4	A4	B4	A5
COM2		COM2		E1	G1	C1	E2	G2	C2	E3	G3	C3	E4	G4	C4	B5
COM3			COM3	H1	D1			D2	H2		D3		I 4	D4		C5

SPEC: A. 1/3 DUTY, 1/2 BIAS. (LCD USES 3 V)

B. V_{IH} = 1.5 V

PAGE 10

IC TEST DATA:

A.SENSOR 503ET ZERO-POWER RESISTANCE AND MATCHING RF RESISTANCE TEST:

TYPE	SENSOR SPEC.(37℃) RESISTANCE	RF APPLICATION RESISTANCE
A	29.137	29.191
B	29.242	29.292
C	29.348	29.403
D	29.454	29.502
E	29.561	29.618
F	29.668	29.720
G	29.775	29.817
H	29.883	29.926

TYPE	SENSOR SPEC.(37℃) RESISTANCE	RF APPLICATION RESISTANCE
I	29.991	30.035
J	30.100	30.152
K	30.209	30.256
L	30.318	30.370
M	30.428	30.474
N	30.538	30.594
O	30.649	30.702
P	30.759	30.814

UNIT:KΩ

B.SENSOR 833ET ZERO-POWER RESISTANCE AND MATCHING RF RESISTANCE TEST:

TYPE	SENSOR SPEC.(37℃) RESISTANCE	RF APPLICATION RESISTANCE
A	48.567	48.593
B	48.737	48.775
C	48.913	48.944
D	49.090	49.132
E	49.268	49.300
F	49.446	49.483
G	49.625	49.656
H	49.805	49.839

TYPE	SENSOR SPEC.(37℃) RESISTANCE	RF APPLICATION RESISTANCE
I	49.985	50.022
J	50.166	50.203
K	50.348	50.383
L	50.530	50.568
M	50.713	50.750
N	50.897	50.933
O	51.081	51.118
P	51.265	51.298

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