SS0209

CLOCK ALARM CALENDAR WITH THERMO-HYGROMETER

FEATURES

- 1.5V or 3V battery operation with very low power consumption
- Real Time Clock with Alarm
- Day and Month display calendar
- Temperature reading and Humidity reading display
- Temperature - Measurement range (-50°C ~ 70°C , -58°F ~ 158°F)
  - Accuracy ±1°C (0 °C - 50 °C), ±2°C (otherwise)
  - 0.1°C resolution over the measuring range
- Humidity - Measurement range (25% - 100% R.H.)
  - Accuracy ±5% (10 °C - 30 °C), ±7% (otherwise)
  - 1% resolution over the measuring range
- Built in 32.768kHz crystal oscillation circuit
- De-bounce circuit on switch inputs
- Protection against static discharge
- Bonding Option :
  - ☐ 12/24 hours display format selectable
  - ☐ C/F display format selectable
  - ☐ keytone and hourly chimes selectable

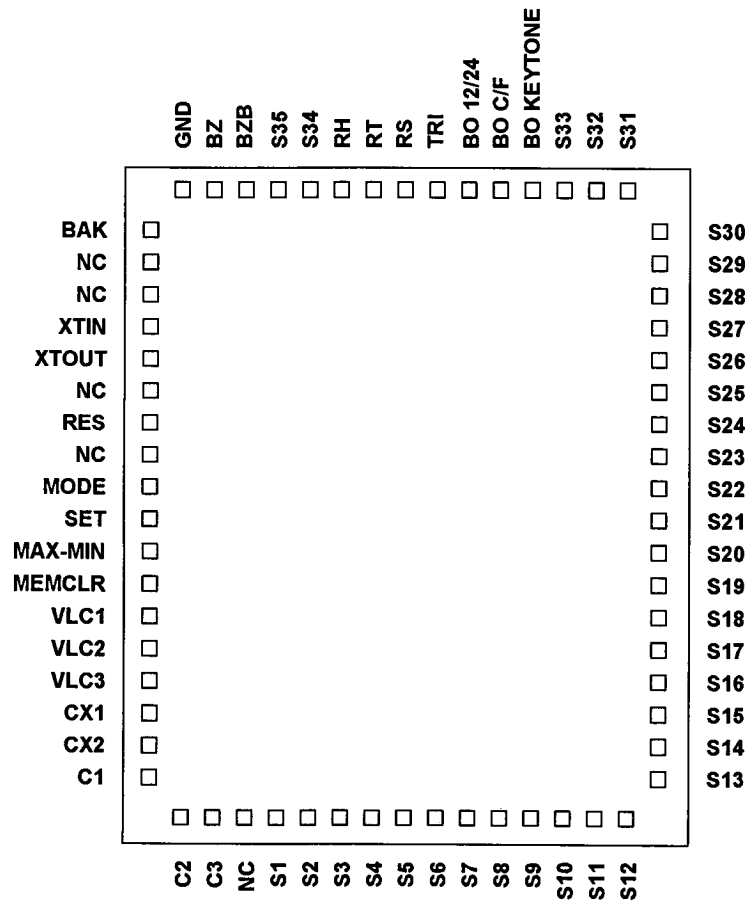
DESCRIPTIONS

The SS0209 is specially designed IC for the desktop calendar thermo-hygrometer application. It provides a real time clock alarm and monthly calendar which allows the good planning of life. The thermo-hygrometer allows the user to measure the temperature and relative humidity. Its measuring range -50°C ~ 70°C and 30% ~ 90% covering most of indoor and outdoor conditions. Several bonding options are available for the user the choose for wider product versatile.

CHIP INFORMATION

Chip size	2040 x 2335 (μm^2)
Pad size	90 x 90 (μm^2)
Pad pitch	min. 115μm

PIN/PAD DIAGRAM



PIN/PAD ASSIGNMENT

Unit : μm

Pad No.	Pad Name	Coordinate			Pad Name	Coordinate	
		X	Y			X	Y
1	BAK	70.0	2175.0	34	S13	1970.0	160.0
2	NC	70.0	2045.0	35	S14	1970.0	290.0
3	NC	70.0	1915.0	36	S15	1970.0	420.0
4	XTIN	70.0	1800.0	37	S16	1970.0	535.0
5	XTOUT	70.0	1685.0	38	S17	1970.0	650.0
6	NC	70.0	1570.0	39	S18	1970.0	765.0
7	RES	70.0	1455.0	40	S19	1970.0	880.0
8	NC	70.0	1340.0	41	S20	1970.0	995.0
9	MODE	70.0	1225.0	42	S21	1970.0	1110.0
10	SET	70.0	1110.0	43	S22	1970.0	1225.0
11	MAX-MIN	70.0	985.0	44	S23	1970.0	1340.0
12	MEMCLR	70.0	880.0	45	S24	1970.0	1455.0
13	VLC1	70.0	765.0	46	S25	1970.0	1570.0
14	VLC2	70.0	535.0	47	S26	1970.0	1685.0
15	VLC3	70.0	420.0	48	S27	1970.0	1800.0
16	CX1	70.0	290.0	49	S28	1970.0	1915.0
17	CX2	70.0	160.0	50	S29	1970.0	2045.0
18	C1	70.0	70.0	51	S30	1970.0	2175.0
19	C2	200.0	70.0	52	S31	1840.0	2265.0
20	C3	330.0	70.0	53	S32	1710.0	2265.0
21	NC	445.0	70.0	54	S33	1595.0	2265.0
22	S1	560.0	70.0	55	BO KEYTONE	1480.0	2265.0
23	S2	675.0	70.0	56	BO C/F	1365.0	2265.0
24	S3	790.0	70.0	57	BO 12/24	1250.0	2265.0
25	S4	905.0	70.0	58	TRI	1135.0	2265.0
26	S5	1020.0	70.0	59	RS	1020.0	2265.0
27	S6	1135.0	70.0	60	RT	905.0	2265.0
28	S7	1250.0	70.0	61	RH	790.0	2265.0
29	S8	1365.0	70.0	62	S34	675.0	2265.0
30	S9	1480.0	70.0	63	S35	560.0	2265.0
31	S10	1595.0	70.0	64	BZB	445.0	2265.0
32	S11	1710.0	70.0	65	BZ	330.0	2265.0
33	S12	1840.0	70.0	66	GND	200.0	2265.0

N.B : The Substrate must be connected to GND

ABSOLUTE RATINGS

Parameters	Symbol	Min	Max	Unit
Maximum Supply Voltage	V_{DD}	-0.3	+5.5	V
Maximum Input Voltage	V_{in}	-0.3	VDD+0.3	V
Maximum Output Voltage	V_{out}	-0.3	VDD+0.3	V
Maximum Operating Temperature	T_{opg}	0	70	°C
Maximum Storage Temperature	T_{stg}	-25	125	°C

ELECTRICAL CHARACTERISTICS

at Ta = 25°C, VDD = 1.5V

Parameters	Symbol	Min	Typ.	Max	Unit
Operating Voltage	VDD	1.2	1.5	1.8	V
Operating Current	Id		5	6	μA
Standby Current	Ist		2	4	μA
LCD Supply Voltage	Vlcd		3		V
LCD Frame Frequency	Flcd		32		Hz
Operating Frequency	Fopg		32.768		kHz

THERMISTER CHARACTERISTICS REQUIREMENTS

Parameters	Symbol	Min	Typ.	Max	Unit
Resistance at Ta= 25°C	R_{25}		10		kΩ
B Constant	B		3,435		
R_{25} Tolerance	%err R		1	5	%
B Constant Tolerance	%err B		1	2	%
Operating Temperature Range	T_{ther}	-50		70	°C

HUMIDITY SENSOR CHARACTERISTICS REQUIREMENTS

Parameters	Symbol	Min	Typ.	Max	Unit
Resistance at R.H.=60%, Ta=25°C	$R_{60\%}$		33		kΩ
Accuracy	%err R	-5		+5	%
Operating temperature range		0		50	°C
Operating relative humidity range		30		90	%

THERMOMETER CHARACTERISTICS

Parameters	Symbol	Condition	Min	Typ.	Max	Unit
Measurement Range	T_{in}	Ta = 25°C	-30		70	°C
Resolution	T_{dd}			0.1		°C
Accuracy	$\%_{err}$	0°C -50°C	-1		+1	°C
		-30°C - 0 °C, 50-70°C	-2		+2	°C
Sample Frequency	F_s			10		secs

HYGROMETER CHARACTERISTICS

Parameters	Symbol	Condition	Min	Typ.	Max	Unit
Measurement Range	RH_{in}		0		100	%
Resolution	RH_{dd}			1		%
Accuracy	$\%_{err}$	10°C -30°C	-1		+1	%
		otherwise	-2		+2	%
Sample Frequency	F_s			10		secs

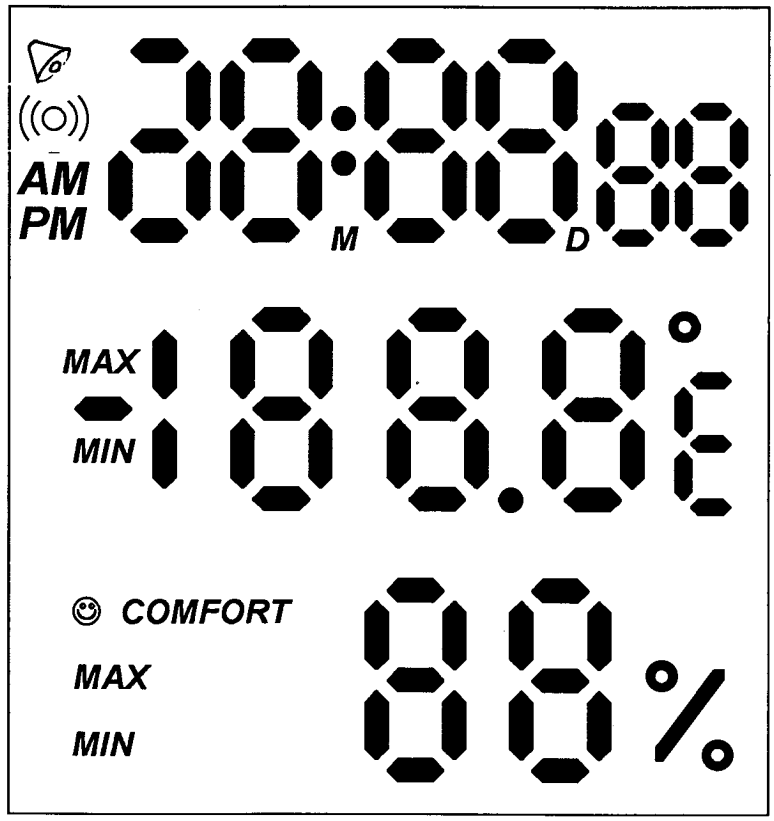
KEY OPERATIONS

Keys	Descriptions
MODE1	Select CLOCK/ALARM/DATE display on the top digits
SET	Long pressed will enter into corresponding setting mode
MAX-MIN	Select NORMAL/MAX/MIN temperature and relative humidity displays
MEMCLR	Clear the temperature and relative humidity memory

BONDING OPTIONS

Bonding Options	Option	Functions
12/24	Bonded Low	Clock and Alarm displayed in 12 hrs format
	Bonded High	Clock and Alarm displayed in 24 hrs format
C / F	Bonded Low	Celsius temperature reading display
	Bonded High	Fahrenheit temperature reading display
KEYTONE	Bonded Low	Keytone and hourly chimes enabled
	Bonded High	Keytone and hourly chimes disabled

LCD LAYOUT



LCD CHARACTERISTICS REQUIREMENT

Parameters	Symbol	Min	Typ.	Max	Unit
Operating Voltage	Vop		3.0		V
Duty			1/3		
Bias			1/2		

DISPLAY MODES

The LCD screen can be classified into 3 parts : The TOP set digits, the MIDDLE set digits and the BOTTOM set digits

- The **TOP** set digits

The TOP set digits is used to display the Clock / Date / Alarm. MODE key is used to select these modes

Modes	Descriptions
CLOCK	Real Time Clock; Display in 12/24 hrs format according to bonding option 12/24
DATE	Date, Day and Month with be shown with ***M*** and ***D*** icons indication
ALARM	Alarm Time, Display in 12/24 hrs format as same as in CLOCK mode. ***AL*** symbol indicate the ALARM mode and the bell indicate the alarm in ON status.

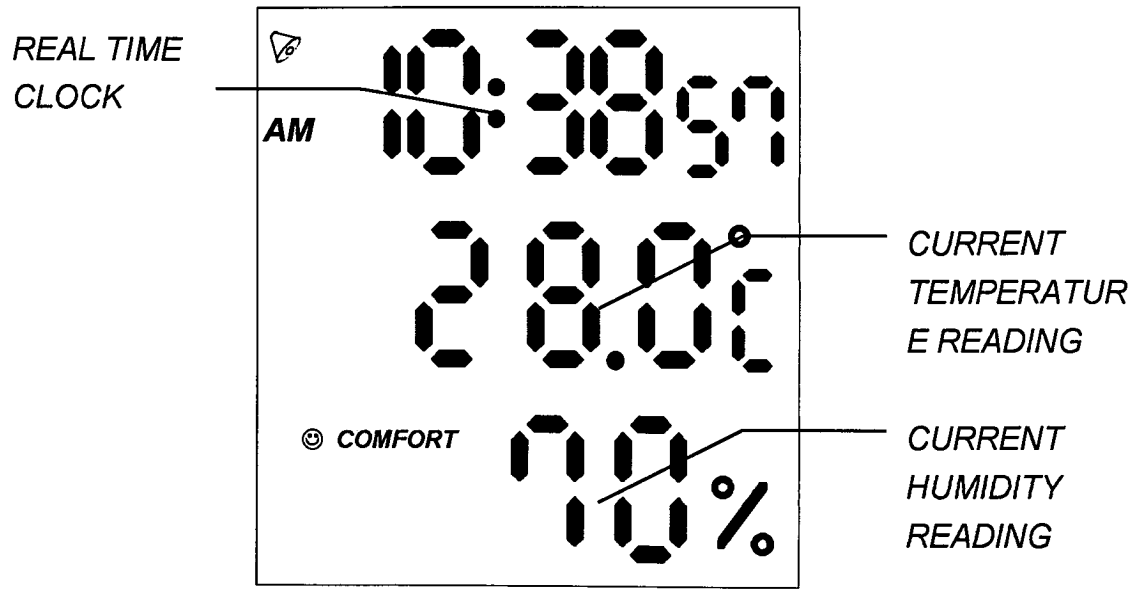
- The **MIDDLE** and **BOTTOM** set digits

The MIDDLE and BOTTOM set digits is used to display CURRENT / MAX / MIN temperature and relative humidity readings. MAX-MIN key is used to select among these modes.

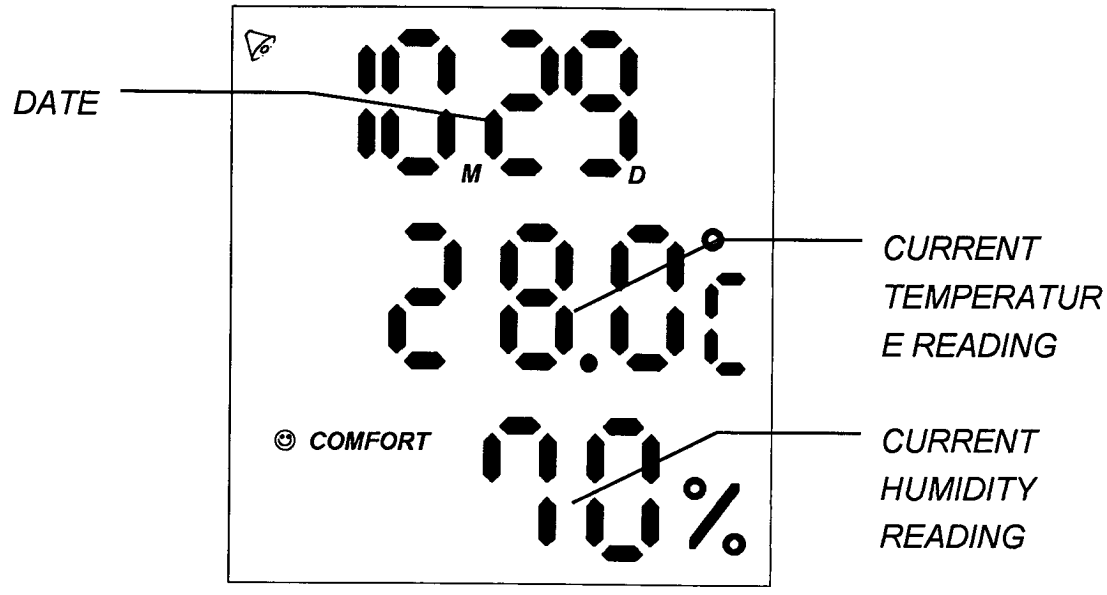
Modes	Descriptions
CURRENT	Show the current temperature and relative humidity readings.
MAX	Show the Maximum temperature and relative humidity readings recorded from last MEMCLR action. ***MAX*** icon will be displayed for indication.
MIN	Show the Minimum temperature and relative humidity readings recorded from last MEMCLR action. ***MIN*** icon will be displayed for indication.

There are some examples in different display modes :

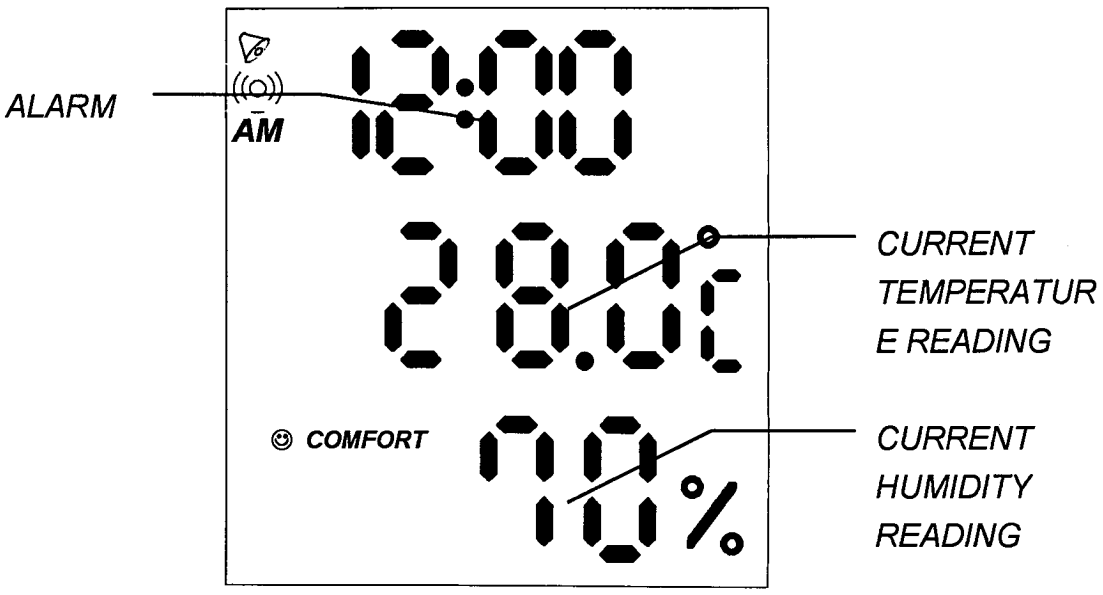
- REAL TIME CLOCK MODE



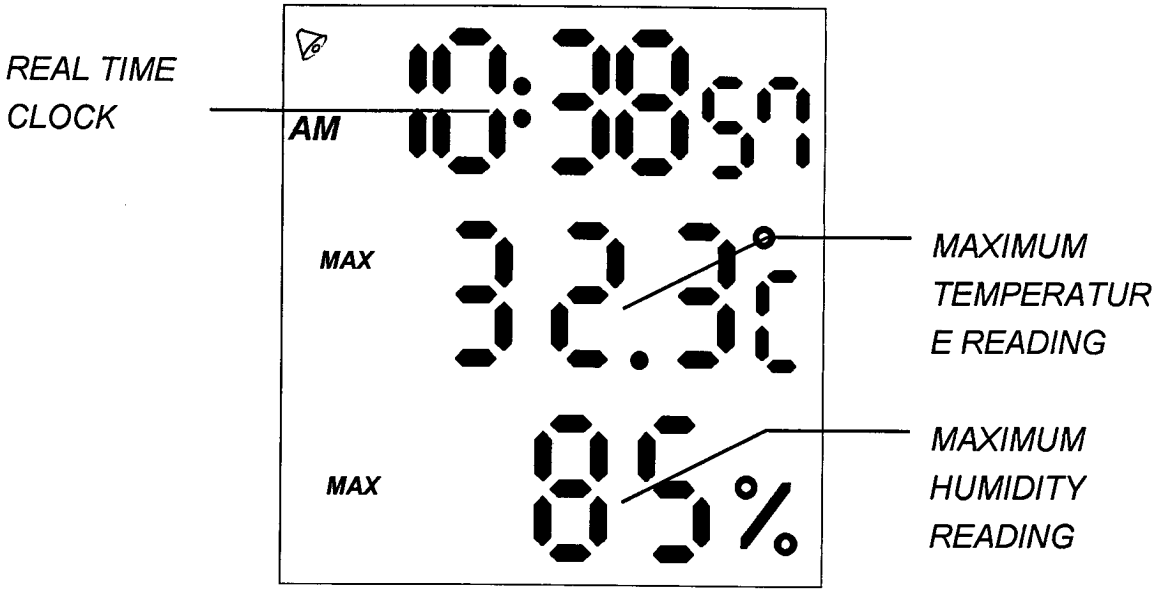
- DATE MODE



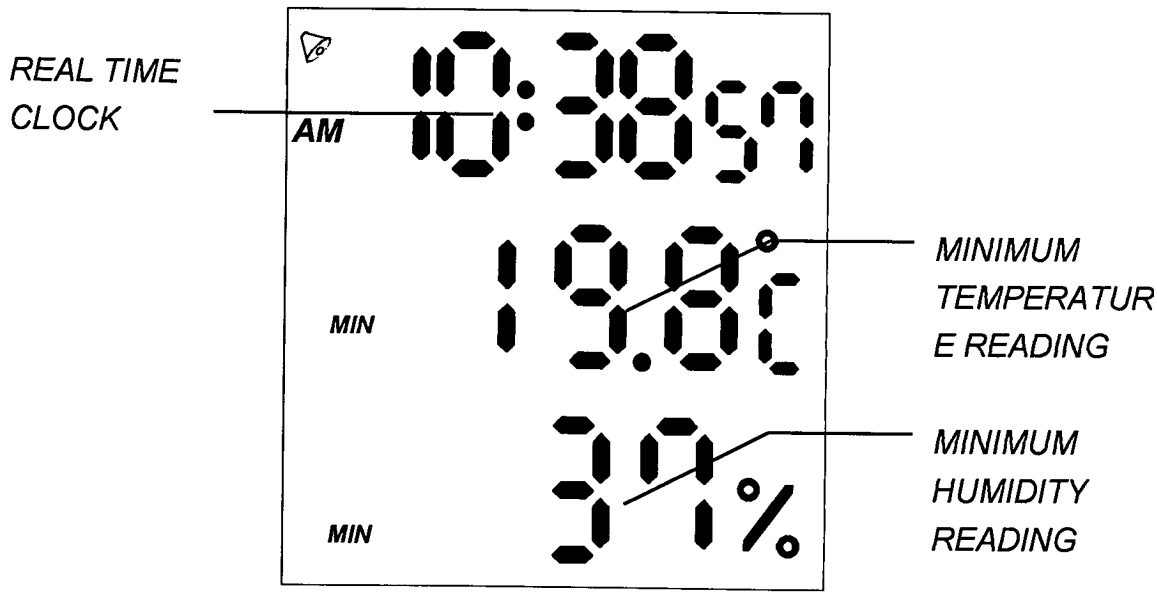
- ALARM MODE



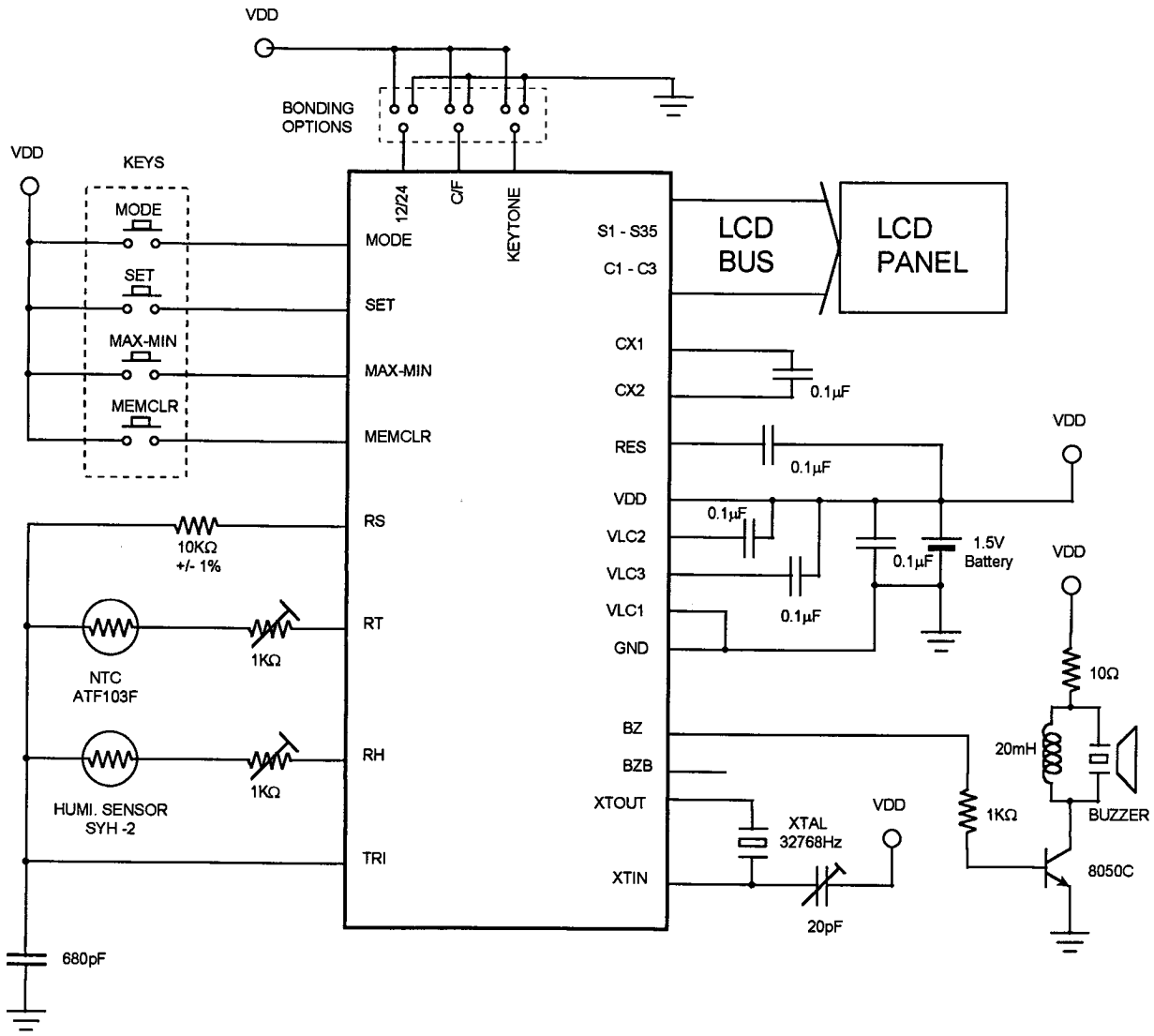
- MAX MODE



- MIN MODE


REAL TIME
CLOCK
AM
10:38 SA
MIN
19.8°C
MINIMUM
TEMPERATUR
E READING
MIN
39%
MINIMUM
HUMIDITY
READING

APPLICATION CIRCUIT



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