

SS0514

CLOCK ALARM CALENDAR WITH INDOOR/OUTDOOR THERMOMETER

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
- Built in low battery detection
- Temperature - Measurement range ($-50^{\circ}\text{C} \sim 70^{\circ}\text{C}$, $-58^{\circ}\text{F} \sim 158^{\circ}\text{F}$)
 - Accuracy $\pm 1^{\circ}\text{C}$ ($0^{\circ}\text{C} - 50^{\circ}\text{C}$), $\pm 2^{\circ}\text{C}$ (otherwise)
 - 0.1°C 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
 - ☐ 1 /10 seconds sampling frequency

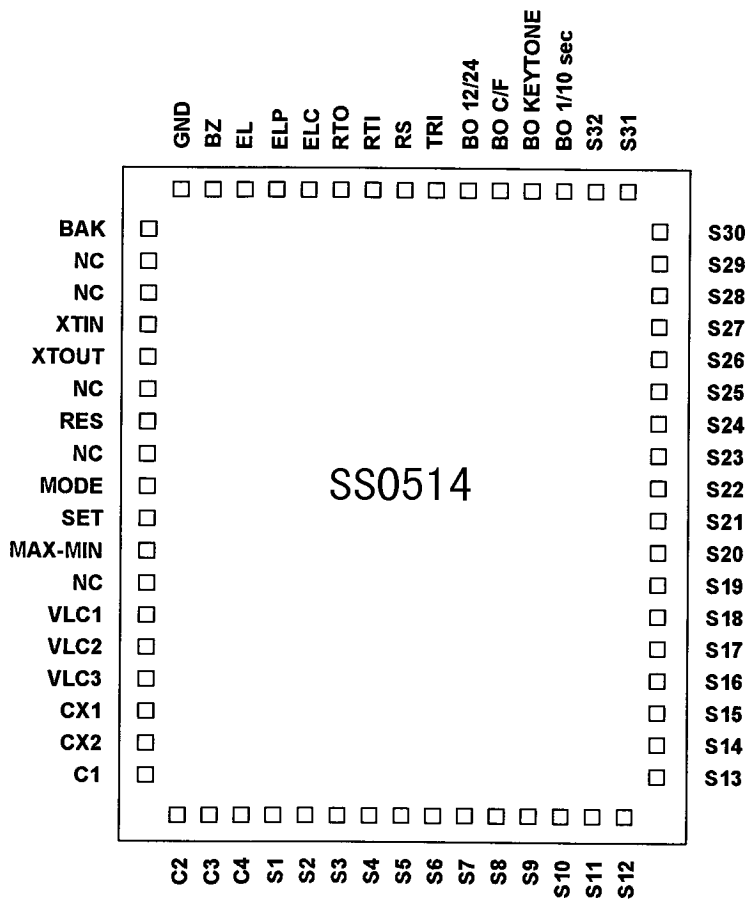
DESCRIPTIONS

The SS0514 is specially designed IC for the indoor/outdoor dual thermometer application. It provides a real time clock alarm and monthly calendar which allows the good planning of life. The thermometers allows the user to measure both indoor and outdoor temperature. Its measuring range $-50^{\circ}\text{C} \sim 70^{\circ}\text{C}$ 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 (μm²)
Pad size 90 x 90 (μm²)
Pad pitch min. 140μm

PIN/PAD DIAGRAM



PIN/PAD ASSIGNMENT

Unit : μm

Pad No.	Pad Name	Coordinate		Pad No.	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	NC	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	C4	445.0	70.0	54	BO 1/10 SEC	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	RTI	905.0	2265.0
28	S7	1250.0	70.0	61	RTO	790.0	2265.0
29	S8	1365.0	70.0	62	ELC	675.0	2265.0
30	S9	1480.0	70.0	63	ELP	560.0	2265.0
31	S10	1595.0	70.0	64	EL	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	$V_{DD}+0.3$	V
Maximum Output Voltage	V_{out}	-0.3	$V_{DD}+0.3$	V
Maximum Operating Temperature	T_{opg}	0	70	°C
Maximum Storage Temperature	T_{stg}	-25	125	°C

ELECTRICAL CHARACTERISTICS

at $T_a = 25^{\circ}\text{C}$, $V_{DD} = 1.5\text{V}$

Parameters	Symbol	Min	Typ.	Max	Unit
Operating Voltage	VDD	1.2	1.5	1.8	V
Operating Current	I_d		5	6	μA
Standby Current	I_{st}		2	4	μA
LCD Supply Voltage	V_{lcd}		3		V
LCD Frame Frequency	F_{lcd}		32		Hz
Operating Frequency	F_{opg}		32.768		kHz

THERMISTOR CHARACTERISTICS REQUIREMENTS

Parameters	Symbol	Min	Typ.	Max	Unit
Resistance at $T_a = 25^{\circ}\text{C}$	R_{25}		10		$\text{k}\Omega$
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

THERMOMETER CHARACTERISTICS

Parameters	Symbol	Condition	Min	Typ.	Max	Unit
Measurement Range	T_{in}		-50		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			1 OR 10		secs

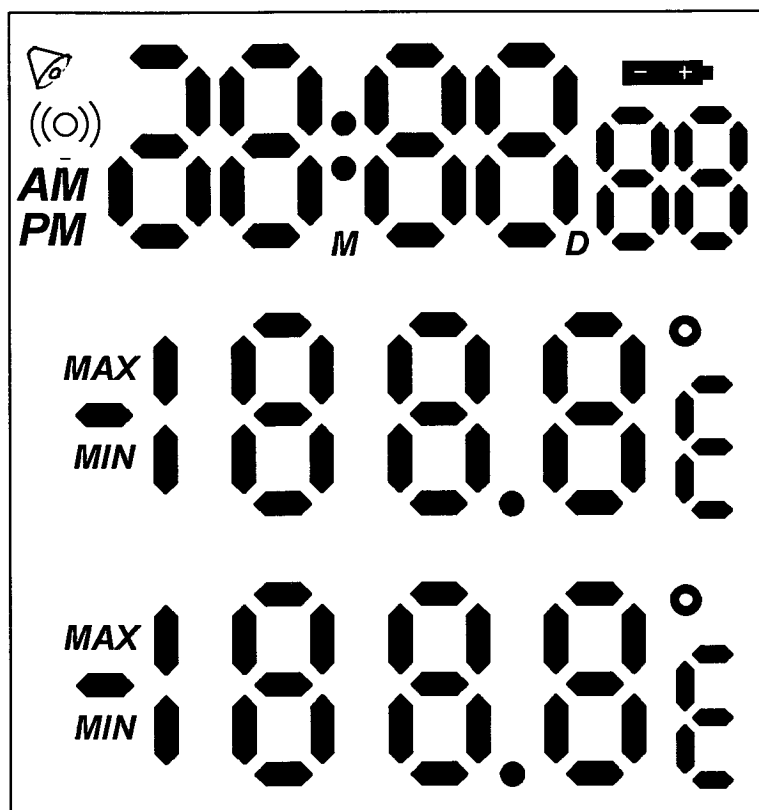
KEY OPERATIONS

Keys	Descriptions
MODE	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 , long pressed for memory clear
EL	Turn the EL light for 5 secs

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
	Bonded Low	Keytone and hourly chimes enabled
	Bonded High	Keytone and hourly chimes disabled
1/10 secs	Bonded Low	Temperature readings updated every 1 second
	Bonded High	Temperature readings updated every 10 seconds

LCD LAYOUT



LCD CHARACTERISTICS REQUIREMENT

Parameters	Symbol	Min	Typ.	Max	Unit
Operating Voltage	Vop		4.5		V
Duty			1/4		
Bias			1/3		

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. Low battery icon indicates the low battery situation.

Modes	Descriptions
CLOCK	Real Time Clock; Display in 12/24 hrs format according to bonding option 12/24
DATE	Date, Day and Month will 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.

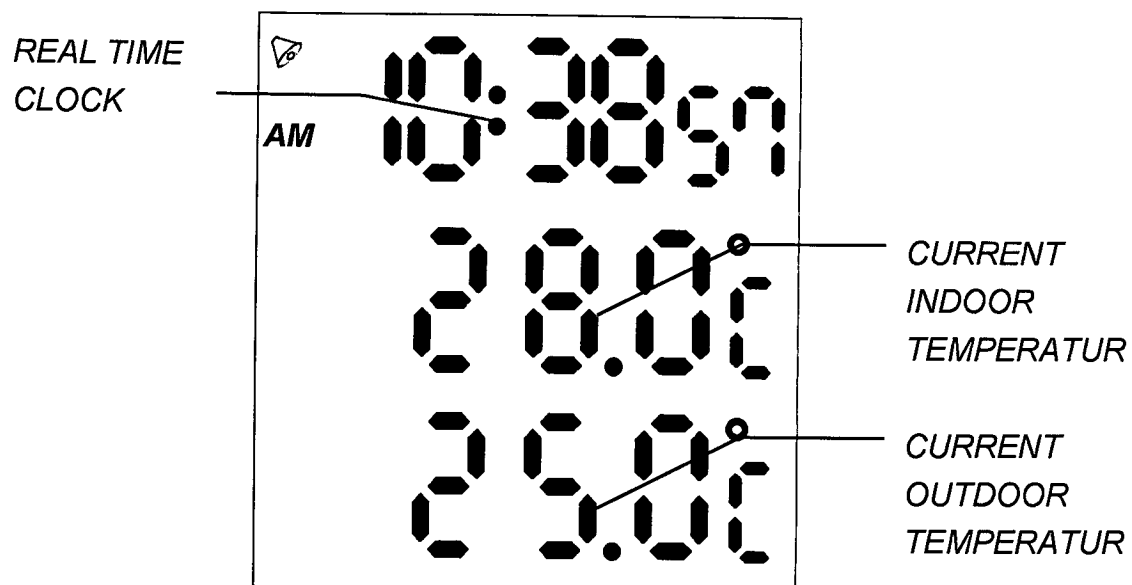
- The **MIDDLE** and **BOTTOM** set digits

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

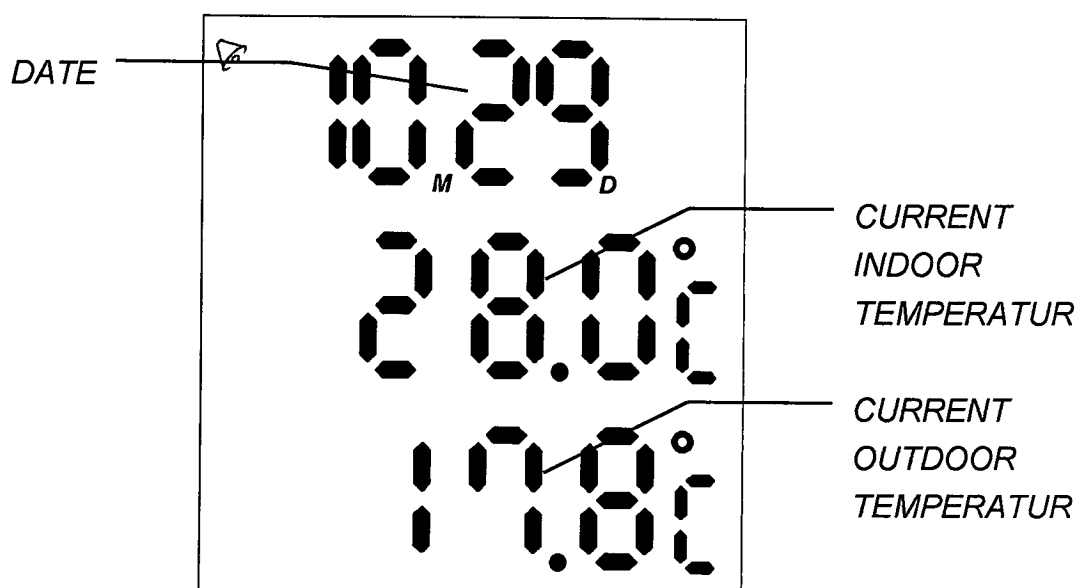
Modes	Descriptions
CURRENT	Show the current temperature and relative humidity readings.
MAX	Show the Maximum temperature readings recorded from last MEMCLR action. MAX icon will be displayed for indication.
MIN	Show the Minimum temperature readings recorded from last MEMCLR action. MIN icon will be displayed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

There are some examples in different display modes

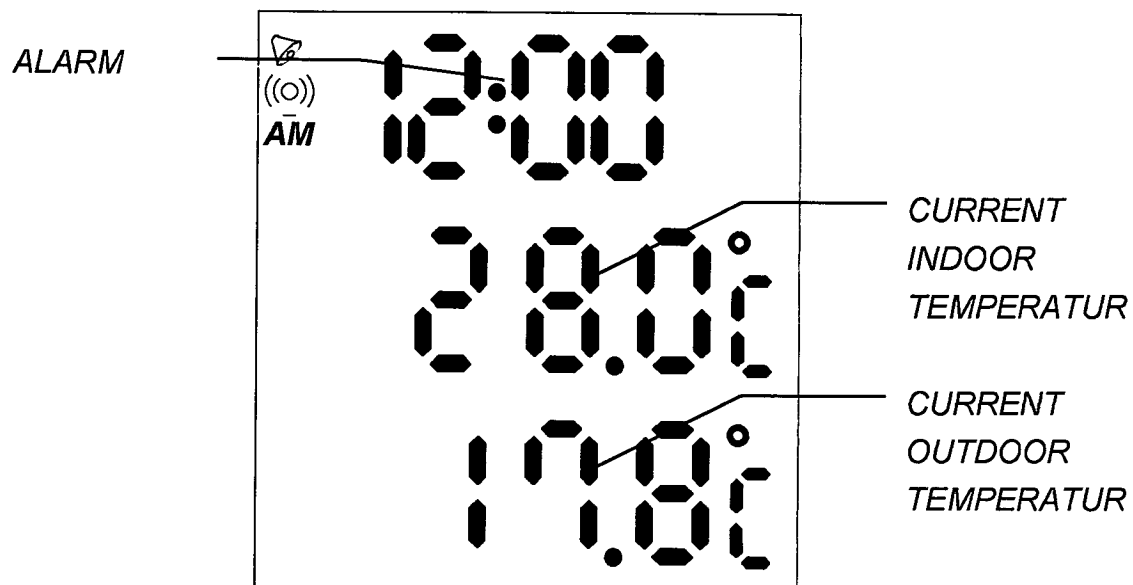
- REAL TIME CLOCK MODE



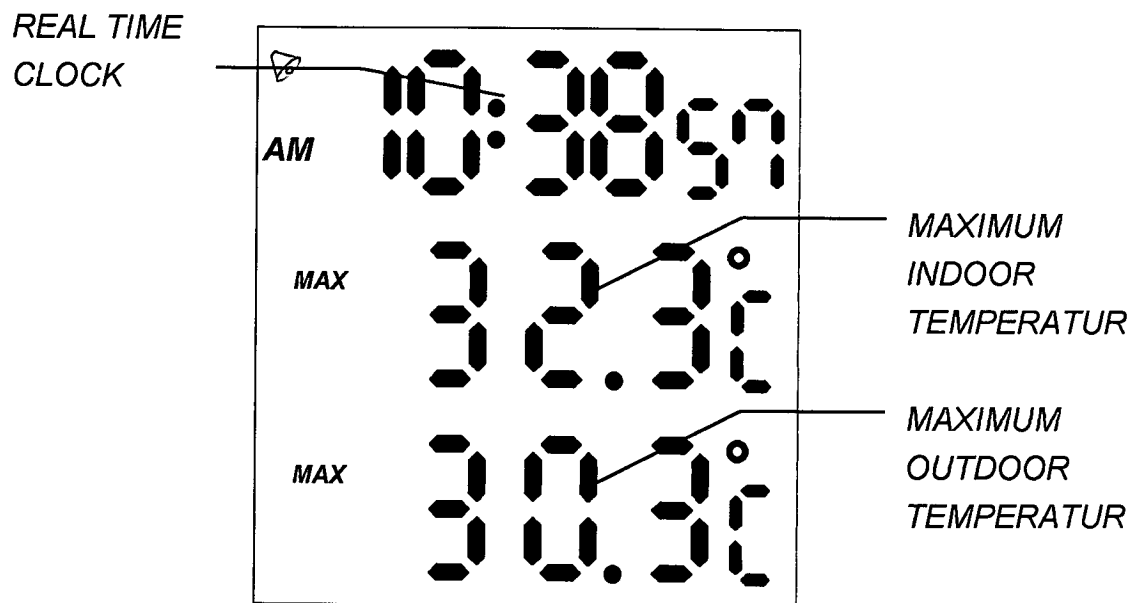
- DATE MODE



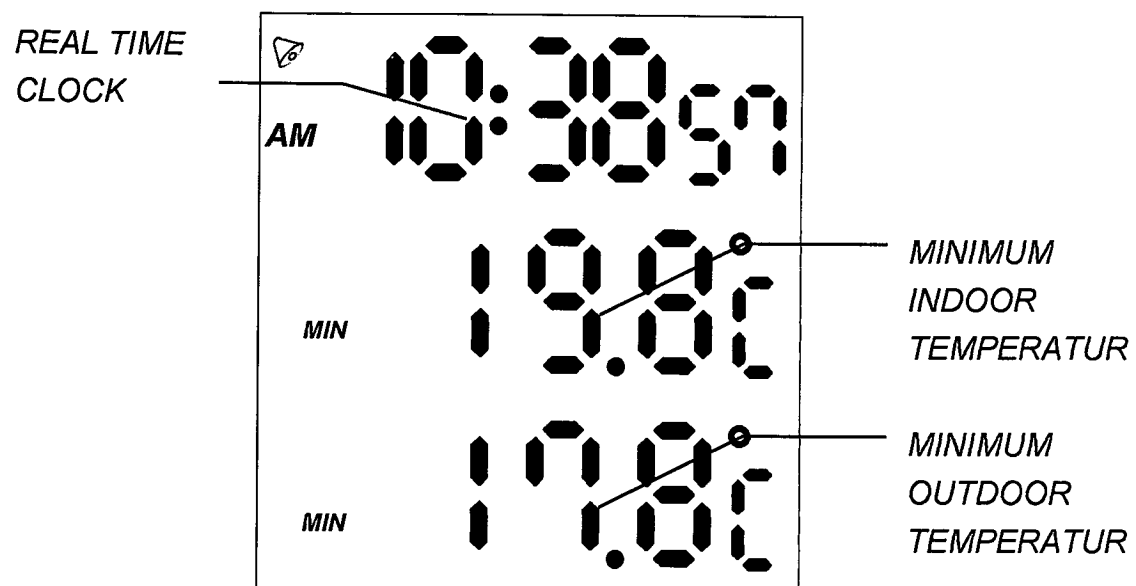
- ALARM MODE



- MAX MODE



- MIN MODE



The diagram shows the SS0514 microcontroller at the center, with various pins connected to external components:

- Power and Ground:** VDD and GND connections are shown at the top and bottom.
- Keys:** A group of keys (MODE, SET, MAX-MIN, EL) is connected to the 12/24, C/F, KEYTONE, and 1/10 SEC pins.
- Bonding Options:** A set of pins labeled BONDING OPTIONS is shown at the top.
- LCD Panel:** The LCD BUS is connected to the LCD PANEL.
- Capacitors:** Several 0.1μF capacitors are connected to the CX1, CX2, RES, VLC2, VLC3, and VLC1 pins.
- Resistors:** A 10KΩ resistor is connected to the RS pin. A 1KΩ resistor is connected to the RTI and RTO pins.
- NTC Thermistors:** Two NTC ATF103F thermistors are connected to the RTI and RTO pins.
- Buzzer:** The BZ and BZB pins are connected to a buzzer circuit, which includes a 20mH inductor, a 1KΩ resistor, and an 8050C transistor.
- Crystal Oscillator:** The XTOUT and XTIN pins are connected to a 32768Hz crystal oscillator circuit, which includes a 20pF capacitor and a VDD connection.

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