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SUNSTAR **(Preliminary)**

# SS0911-1

# CLOCK ALARM CALENDAR WITH THERMO-HYGROMETER

## FEATURES

- 1.5V battery operation with very low power consumption
- Real Time Clock with Alarm
- Day and Month display calendar
- Temperature reading and Humidity reading display
- C/F display format selectable
- 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 ( 20% - 90% 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

## DESCRIPTIONS

The SS0911-1 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 is -50°C ~ 70°C and 20% ~ 90% covering most of indoor and outdoor conditions.



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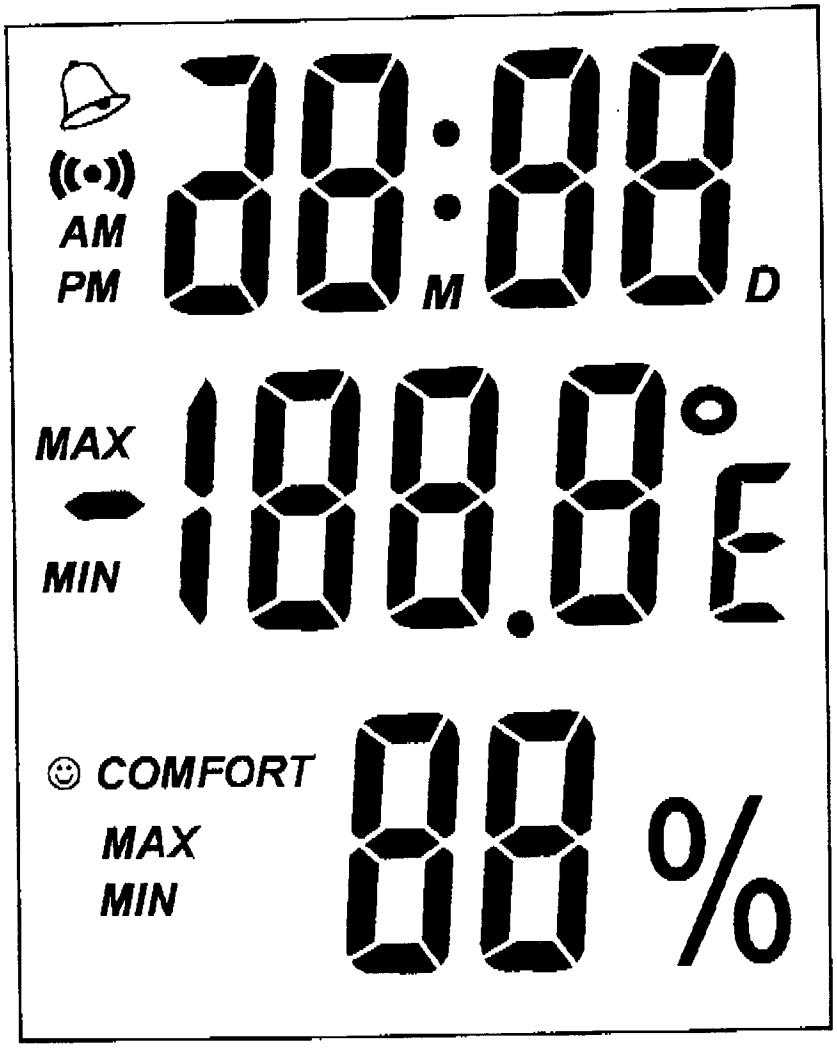
## LCD LAYOUT




## LCD CHARACTERISTICS REQUIREMENT

| Parameters | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Operating Voltage | Vop | | 3.0 | | V |
| Duty | | | 1/4 | | |
| Bias | | | 1/2 | | |



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## KEY OPERATIONS

| Keys | Descriptions |
|---|---|
| MODE | Select CLOCK/ALARM/DATE display on the top digits |
| °C↔°F /SET | Toggle the temperature display between °C and °F or<br>Hold for 1-2 seconds will enter into corresponding setting mode |
| MAX-MIN/MEMCLR | Select NORMAL/MAX/MIN temperature and relative humidity displays or<br>Hold for 2 seconds will Clear the temperature and relative humidity memory |
| BK LIGHT | Turn on the back light |

## 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 |
| 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. symbol ((•)) indicate the ALARM mode and the 🔔 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. |



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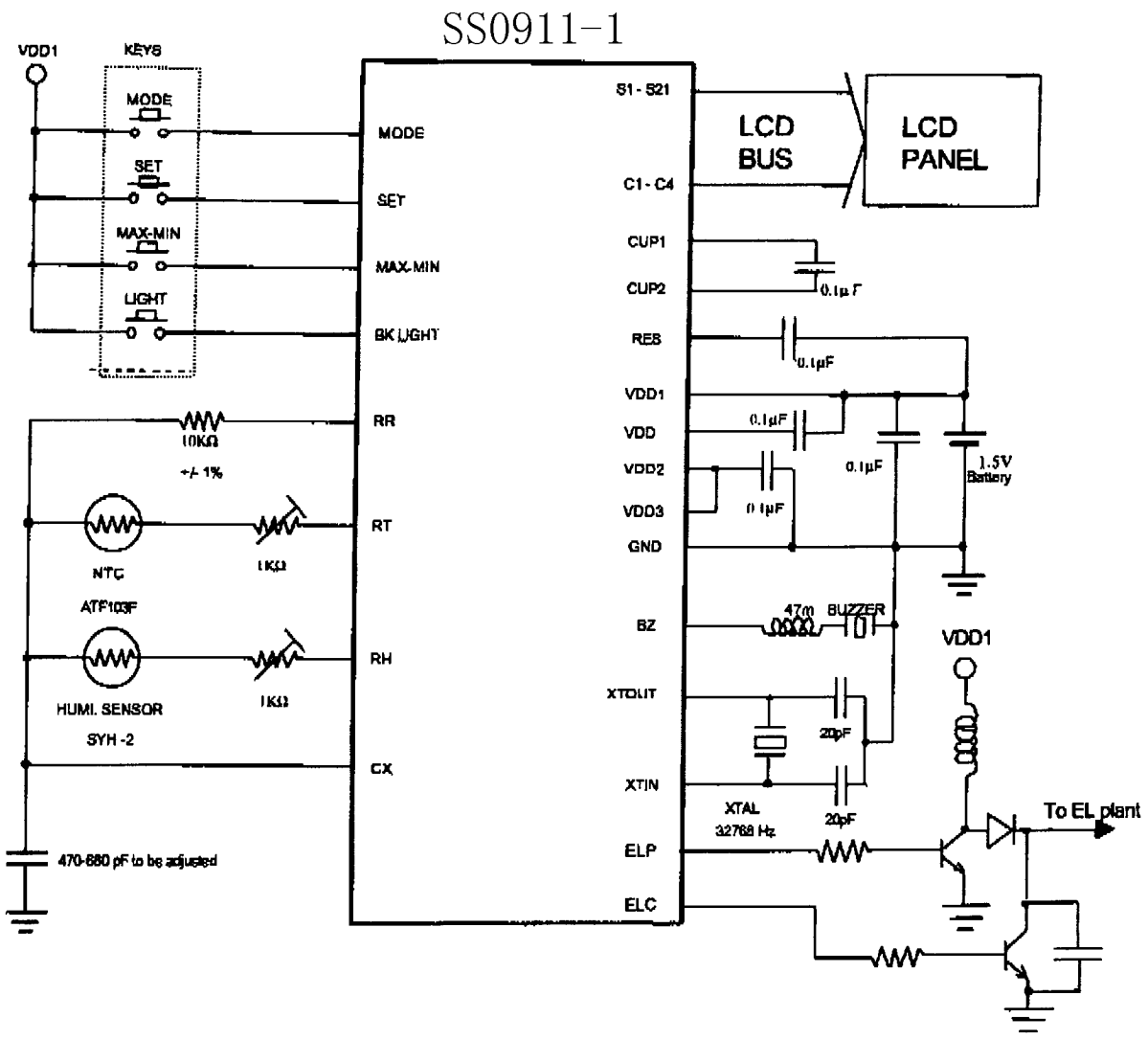
## APPLICATION CIRCUIT



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## 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 = 3V

| Parameters | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Operating Voltage | VDD | 1.2 | 1.5 | 1.8 | V |
| Operating Current | Id | | | | μA |
| Standby Current | Ist | | | | 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 |



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## 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 | $RH_{in}$ | | 20 | | 90 | % |
| Resolution | $RH_{dd}$ | | | 1 | | % |
| Accuracy | $\%_{err}$ | 10°C -30°C | -1 | | +1 | % |
| | | Otherwise | -2 | | +2 | % |
| Sample Frequency | $F_s$ | | | 10 | | secs |



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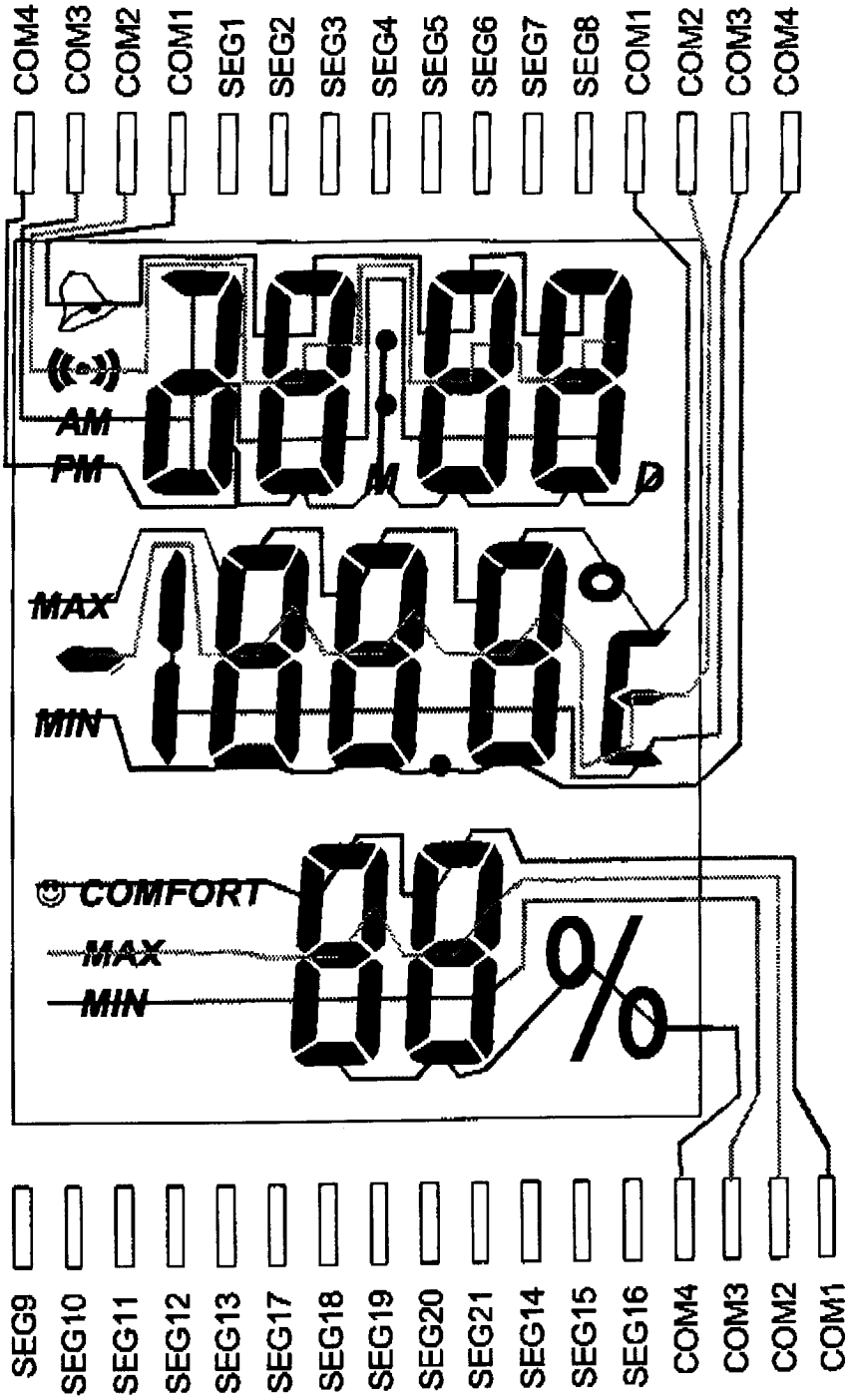
## LCD Wiring



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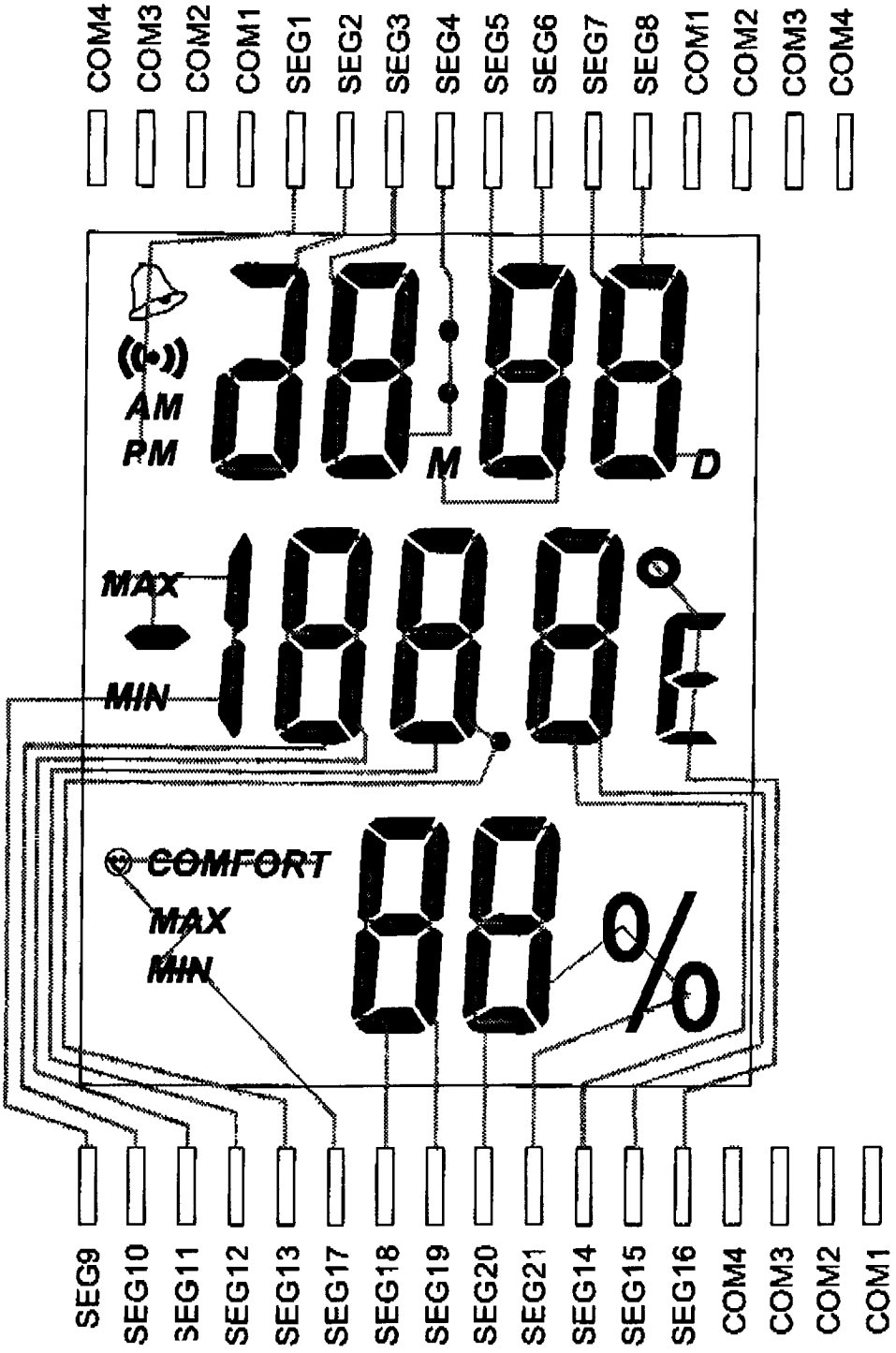




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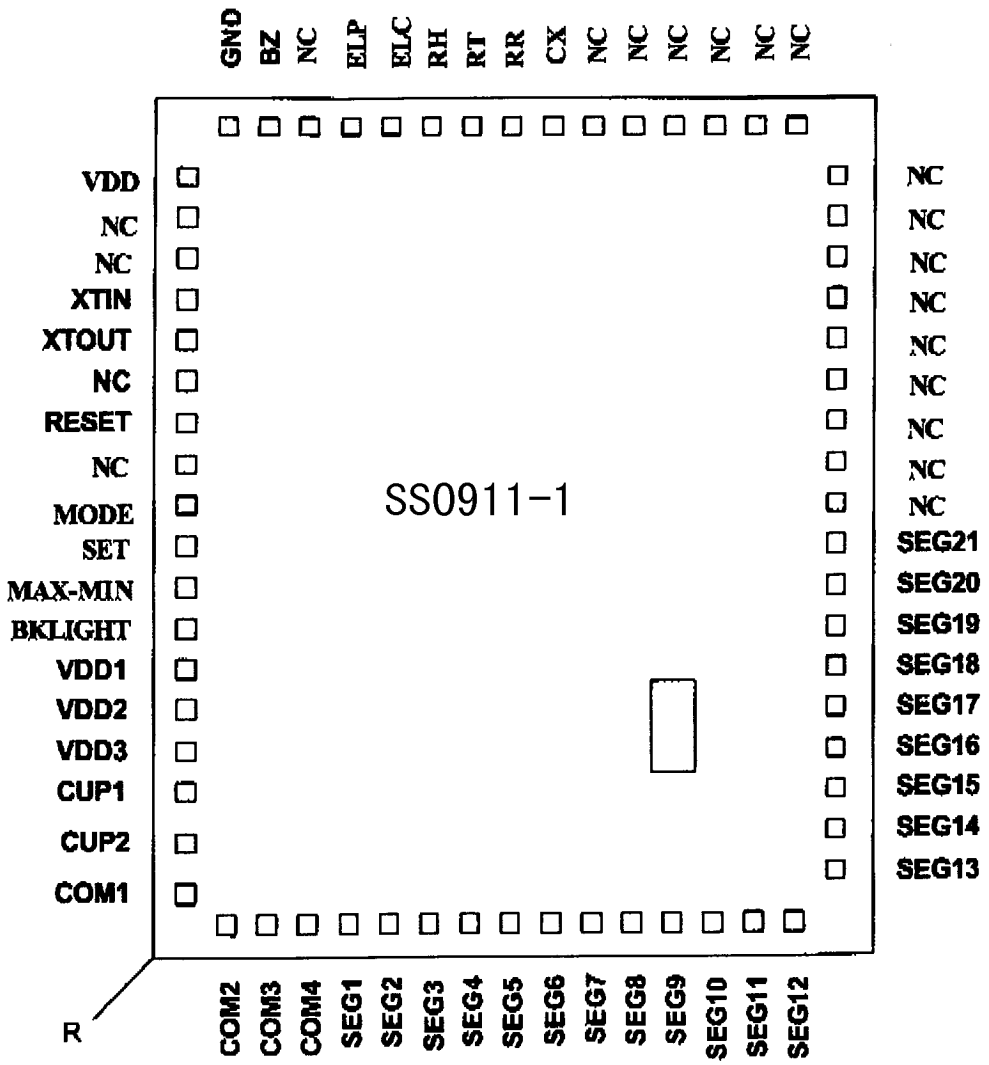
## CHIP INFORMATION

Chip size: 2040 x 2335 ($\mu m^2$) or 84.65 x 96.45 ($mil^2$)
Pad size: 90 x 90 ($\mu m^2$)
Pad pitch min.: 115μm

## PIN/PAD DIAGRAM



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## PIN/PAD ASSIGNMENT

Unit: μm

| Pad No. | Pad Name | Coordinate X | Coordinate Y | Pad No. | Pad Name | Coordinate X | Coordinate Y |
|---|---|---|---|---|---|---|---|
| 1 | VDD | 70.0 | 2175.0 | 34 | SEG13 | 1970.0 | 160.0 |
| 2 | NC | 70.0 | 2045.0 | 35 | SEG14 | 1970.0 | 290.0 |
| 3 | NC | 70.0 | 1915.0 | 36 | SEG15 | 1970.0 | 420.0 |
| 4 | XTIN | 70.0 | 1800.0 | 37 | SEG16 | 1970.0 | 535.0 |
| 5 | XTOUT | 70.0 | 1685.0 | 38 | SEG17 | 1970.0 | 650.0 |
| 6 | NC | 70.0 | 1570.0 | 39 | SEG18 | 1970.0 | 765.0 |
| 7 | RESET | 70.0 | 1455.0 | 40 | SEG19 | 1970.0 | 880.0 |
| 8 | NC | 70.0 | 1340.0 | 41 | SEG20 | 1970.0 | 995.0 |
| 9 | MODE | 70.0 | 1225.0 | 42 | SEG21 | 1970.0 | 1110.0 |
| 10 | SET | 70.0 | 1110.0 | 43 | NC | 1970.0 | 1225.0 |
| 11 | MAX-MIN | 70.0 | 985.0 | 44 | NC | 1970.0 | 1340.0 |
| 12 | BKLIGHT | 70.0 | 880.0 | 45 | NC | 1970.0 | 1455.0 |
| 13 | VDD1 | 70.0 | 765.0 | 46 | NC | 1970.0 | 1570.0 |
| 14 | VDD2 | 70.0 | 650.0 | 47 | NC | 1970.0 | 1685.0 |
| 15 | VDD3 | 70.0 | 535.0 | 48 | NC | 1970.0 | 1800.0 |
| 16 | CUP1 | 70.0 | 420.0 | 49 | NC | 1970.0 | 1915.0 |
| 17 | CUP2 | 70.0 | 290.0 | 50 | NC | 1970.0 | 2045.0 |
| 18 | COM1 | 70.0 | 160.0 | 51 | NC | 1970.0 | 2175.0 |
| 19 | COM2 | 200.0 | 70.0 | 52 | NC | 1840.0 | 2265.0 |
| 20 | COM3 | 330.0 | 70.0 | 53 | NC | 1710.0 | 2265.0 |
| 21 | COM4 | 445.0 | 70.0 | 54 | NC | 1595.0 | 2265.0 |
| 22 | SEG1 | 560.0 | 70.0 | 55 | NC | 1480.0 | 2265.0 |
| 23 | SEG2 | 675.0 | 70.0 | 56 | NC | 1365.0 | 2265.0 |
| 24 | SEG3 | 790.0 | 70.0 | 57 | NC | 1250.0 | 2265.0 |
| 25 | SEG4 | 905.0 | 70.0 | 58 | CX | 1135.0 | 2265.0 |
| 26 | SEG5 | 1020.0 | 70.0 | 59 | RR | 1020.0 | 2265.0 |
| 27 | SEG6 | 1135.0 | 70.0 | 60 | RT | 905.0 | 2265.0 |
| 28 | SEG7 | 1250.0 | 70.0 | 61 | RH | 790.0 | 2265.0 |
| 29 | SEG8 | 1365.0 | 70.0 | 62 | ELC | 675.0 | 2265.0 |
| 30 | SEG9 | 1480.0 | 70.0 | 63 | ELP | 560.0 | 2265.0 |
| 31 | SEG10 | 1595.0 | 70.0 | 64 | NC | 445.0 | 2265.0 |
| 32 | SEG11 | 1710.0 | 70.0 | 65 | BZ | 330.0 | 2265.0 |
| 33 | SEG12 | 1840.0 | 70.0 | 66 | GND | 200.0 | 2265.0 |

N.B:The Substrate must be connected to GND



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