CLAIMS

1. A semiconductor device, comprising a memory chip and a temperature detection module, the temperature detection module being configured to detect a temperature of the memory chip, the temperature detection module comprising:

a temperature detection unit, wherein the temperature detection unit comprises a temperature sensitive unit and an adjustable resistor unit, an electrical conductivity of the temperature sensitive unit changes with the change of temperature, the temperature sensitive unit is a diode, and the adjustable resistor unit is connected in parallel with the diode,

wherein the temperature detection unit is configured to be calibrated by adjusting a resistance value of the adjustable resistor unit;

wherein the adjustable resistor unit comprises multiple sub-resistors and multiple switches, the sub-resistors are connected in series, each of the switches is connected in parallel with at least one of the sub-resistors, and the resistance value of the adjustable resistor unit is changed by changing switching-on and switching-off of the multiple switches;

wherein the temperature detection unit further comprises a fixed resistor, the fixed resistor is connected in series with diode, the fixed resistor is provided with a first end and a second end, the first end of the fixed resistor is electrically connected with a power supply, and the second end of the fixed resistor is electrically connected with the diode;

wherein a positive end of the diode is electrically connected with the second end of the fixed resistor, and a negative end of the diode is electrically connected with a grounding terminal; and

wherein the adjustable resistor unit comprises a first end and a second end, the sub-resistors are disposed between the first end of the adjustable resistor unit and the second end of the adjustable resistor unit, the first end of the adjustable resistor unit is electrically connected with the grounding terminal, and the second end of the adjustable resistor unit is directly connected with the second end of the fixed resistor.

2. The semiconductor device of claim 1, wherein resistance values of the sub-resistors are the same.

3. The semiconductor device of claim 1, wherein each of the sub-resistors is a polysilicon resistor or a N-type diffused resistor or a P-type diffused resistor.

4. The semiconductor device of claim 1, wherein the sub-resistors are electrically connected with each other through a first layer of metal wires, and the sub-resistors are electrically connected with the switches through a second layer of metal wires.

5. The semiconductor device of claim 1, wherein the temperature detection module further comprises an Analog/Digital (A/D) conversion module having an input end and an output end, the input end is electrically connected with the second end of the fixed resistor, the output end outputs digital signals, and the A/D conversion module is configured to convert analog signals of the second end of the fixed resistor into digital signals.

6. The semiconductor device of claim 5, wherein the A/D conversion module comprises:

a resistor unit provided with a first end and a second end, wherein the first end of the resistor unit is electrically connected with a power supply, the second end of the resistor unit is electrically connected with the grounding terminal, the resistor unit is provided with multiple leading-out terminals, and the voltages of respective leading-out terminals are different from each other; and

multiple comparison units, wherein signals of the input end of the A/D conversion module serve as input signals of the comparison units, signals of the respective multiple leading-out terminals of the resistor unit serve as reference signals of the respective multiple comparison units, and the comparison units output digital signals.

7. The semiconductor device of claim 6, wherein the A/D conversion module further comprises an encoding unit, and the encoding unit receives and encodes the digital signals of

the comparison units.

8. The semiconductor device of claim 6, wherein the A/D conversion module further comprises an output unit, and the output unit is connected with the comparison units to output the digital signals.

9. The semiconductor device of claim 5, wherein the resistor unit comprises multiple sub-resistors connected in series, and the numbers of the sub-resistors between the respective leading-out terminals of the resistor unit and the second end of the resistor unit are different from each other, so that the voltages of the respective leading-out terminals are different from each other.

10. The semiconductor device of claim 9, wherein resistance values of the respective sub-resistors are the same or different from each other.

11. The semiconductor device of claim 9, wherein the numbers of the sub-resistors between the respective leading-out terminals of the resistor unit and the second end of the resistor unit are progressively increased by a preset value.

12. The semiconductor device of claim 9, wherein each of the sub-resistors is at least one of a polysilicon resistor, a N-type diffused resistor or a P-type diffused resistor.

13. The semiconductor device of claim 11, wherein the sub-resistors are electrically connected with each other through a first layer of metal wires, and the resistor unit forms the leading-out terminals through a second layer of metal wires.

14. The semiconductor device of claim 1, wherein the temperature detection unit and the memory chip are powered by different power supplies.

15. The semiconductor device of claim 13, wherein the temperature detection unit is powered earlier than the memory chip.

16. The semiconductor device of claim 1, wherein the semiconductor device further comprises a control chip, and the memory chip and the temperature detection module are electrically connected with the control chip.

17. The semiconductor device of claim 16, wherein the control chip is configured to heat the memory chip before the memory chip is enabled and to judge whether the temperature detected by the temperature detection unit reaches a set threshold, and to control the memory chip to be enabled if the temperature detected by the temperature detection unit reaches the set threshold.