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, configured to detect the temperature of the memory chip and to output an analog signal corresponding to the temperature; and

an Analog/Digital (A/D) conversion module comprising multiple comparison units, wherein each of the comparison units comprises an input end, a reference end and an output end, the input end receives the analog signal output by the temperature detection unit, the output end outputs a digital signal, and reference voltages received by the reference ends of respective multiple comparison units increase non-uniformly,

wherein a reference voltage increase amplitude in a preset reference voltage range is lower than a reference voltage increase amplitude in another reference voltage range,

wherein the memory chip is enabled when the temperature detected by the temperature detection module reaches a set threshold.

~~2. The semiconductor device of claim 1, wherein a reference voltage increase amplitude in a preset reference voltage range is lower than a reference voltage increase amplitude in another reference voltage range.~~

~~3. The semiconductor device of claim 2, wherein the memory chip is enabled when the temperature detected by the temperature detection module reaches a set threshold.~~

~~4~~2. The semiconductor device of claim ~~3~~1, wherein the set threshold corresponds to a threshold voltage, and the threshold voltage is in the preset reference voltage range.

~~5~~3. The semiconductor device of claim ~~2~~1, wherein the A/D conversion module further comprises a resistor unit, the resistor unit is provided with multiple leading-out terminals, voltages of respective multiple leading-out terminals increase non-uniformly, and the voltages of the respective leading-out terminals are taken as the reference voltage received by the reference end of the respective comparison units.

~~6~~4. The semiconductor device of claim ~~5~~3, wherein the resistor unit is provided with a first end and a second end, 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 a grounding terminal, and the leading-out terminals are arranged between the first end and the second end.

~~7~~5. The semiconductor device of claim ~~6~~4, wherein the resistor unit comprises multiple sub-resistors connected in series, and the numbers of the sub-resistors between respective leading-out terminals of the resistor unit and the second end of the resistor unit are different from each other, such that the voltages of the respective leading-out terminals are different from each other.

~~8~~6. The semiconductor device of claim ~~7~~5, wherein the numbers of the sub-resistors between adjacent respective leading-out terminals in the resistor unit are the same or different from each other, such that the reference voltages received by the reference ends of the respective multiple comparison units increase non-uniformly.

~~9~~7. The semiconductor device of claim ~~8~~6, wherein the number of the sub-resistors between adjacent leading-out terminals in a resistor unit region corresponding to a preset reference voltage is smaller than the number of the sub-resistors between adjacent leading-out terminals in another region.

~~10~~8. The semiconductor device of claim ~~7~~5, wherein each of the sub-resistors has the same resistance value.

~~11~~9. The semiconductor device of claim ~~7~~5, wherein each of the sub-resistors is a

polyresistor, and the sub-resistors are electrically connected with each other through a first layer of metal wires.

~~12~~10. The semiconductor device of claim ~~11~~9, wherein the leading-out terminals of the resistor unit are formed through a second layer of metal wires.

~~13~~11. The semiconductor device of claim ~~5~~3, wherein the A/D conversion module further comprises an encoding unit, and the encoding unit receives and codes the digital signal of the comparison unit.

~~14~~12. The semiconductor device of claim ~~5~~3, wherein the A/D conversion module further comprises an output unit, and the output unit is connected with the comparison unit, and is configured to output the digital signal.

~~15~~13. The semiconductor device of claim 1, wherein the temperature detection unit comprises:

a fixed resistor provided with a first end and a second end, the first end being electrically connected with a power supply; and

a diode connected in series with the fixed resistor, a positive end of the diode being electrically connected with the second end of the fixed resistor, and a negative end of the diode being electrically connected with the grounding terminal.

~~16~~14. The semiconductor device of claim ~~15~~13, wherein the temperature detection unit further comprises an adjustable resistor, and the adjustable resistor is connected in parallel with the diode.

~~17~~15. The semiconductor device of claim 1, wherein the temperature detection unit is arranged in the memory chip.

~~18~~16. The semiconductor device of claim ~~17~~15, wherein the temperature detection unit and the memory chip share the same grounding terminal.

~~19~~17. The semiconductor device of claim ~~17~~15, wherein the temperature detection unit and the memory chip are powered by different power supplies.

~~20~~18. The semiconductor device of claim ~~19~~17, wherein the temperature detection unit is powered earlier than the memory chip.

~~21~~19. The semiconductor device of claim 1, further comprising a control chip, the memory chip and the temperature detection unit being electrically connected with the control chip.

~~22~~20. The semiconductor device of claim ~~21~~19, 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 reaches the set threshold.