

How does the radiator on the phone work?

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Smart phones are now like pocket computers with considerable power, with CPUs and GPUs more powerful than older desktops. It is also because of 'too much power' in such a small area so keeping the hardware cool is also a challenge for the manufacturer.

Phone manufacturers have to find a reasonable solution for their phones to run normally when high capacity is required, and water cooling system is probably a solution. However, this system is different from the PC, because there is practically no water flow through the system.

Water-cooling capabilities have recently been mentioned on the Galaxy Note 9 and Pocophone but these are not the first phones to use this cooling system. Earlier, Samsung also introduced a similar solution on Galaxy S7.

How does the water-cooled system work on the phone?

On the Galaxy S7, Samsung uses copper heat pipes to bring heat out of the CPU, especially when the chip has to work hard. There is a bit of liquid in this tube, but not so much that it is obvious when cutting the tube. (Many people checked when opening the phone).

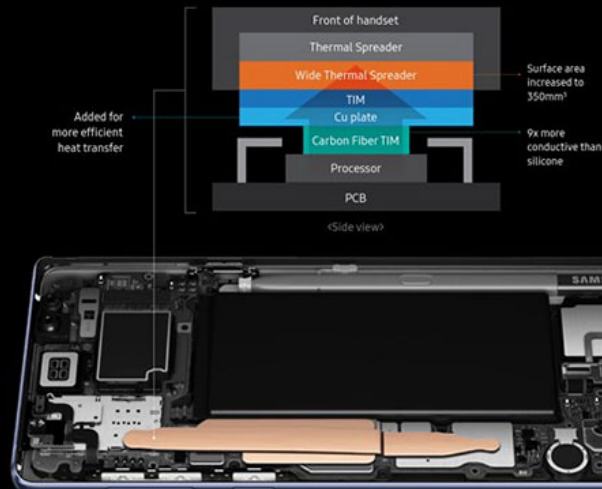
Instead, this cooling system works by condensation. When the processor is too hot, the liquid will evaporate, keeping the CPU cool. This vapor is transmitted to the end of the heat pipe, condensing into liquid. This process, used together with TIM carbon fiber (Thermal Interface Material) will be very effective to cool the phone hardware.

Current phones all use the same solution, but Samsung has made a clear statement about how it works with the 'carbon water cooling system' on Note 9.

Samsung knows that the Note 9 needs a cooling system over S7 (or any previous phone). To do so, they used a larger heat pipe and added a copper layer between the two layers of heat to transfer more heat.

Performance Innovation: Galaxy Note9's Water Carbon Cooling System Explained

Compared to the
Galaxy Note8:
3X greater heat absorption
3.5X thermal conductivity



SAMSUNG

Cooling system on Note 9

The whole cooling system is arranged into layers. Just above the processor is a carbon fiber layer (with very good heat transfer capacity) below a piece of copper. There is a layer of unknown heat transfer material (perhaps a form of silicon) and then a copper heat pipe. Right above the tube is the heat transfer bar to keep the heat concentrated in one place.

Other phones are similar in structure - or simpler but basically the same. Water only works to turn into steam, so it is perhaps more accurate to call it a cooling system.

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