A smartphone contains several components that generate heat and other components sensitive to heat; to maintain acceptable temperature levels in these small handheld devices, manufacturers propose different solutions which require high performance and design constraints.

To complement Yole Développement’s Market Opportunities for Thermal Management Components in Smartphones report, System Plus Consulting has conducted a comparative technology review to provide insights into the assembling structure and thermal management technology of 10 flagship smartphones from leading suppliers: Apple, Samsung, Huawei, LG and Xiaomi.

In this report, we highlight the differences and the innovations in the thermal management solutions chosen by the end-user OEMs.

Whereas some OEMs use standard solutions such as heat spreaders of metal frames, others choose to consider more complex structures such as heat pipes.

Moreover, as the processor is one of the most important heat sources, we have seen how the PCB design has changed to improve thermal dissipation and how the packaging of the processor itself has evolved to solve thermal problems caused by miniaturization and efficiency increase. Located close to the battery and the DRAM chip on the main board, the application processors are packaged using different Package-on-Package (PoP) technologies. Some AP providers, like HiSilicon or Samsung, use conventional PoP with embedded land-side capacitors; others, like Apple or Qualcomm, use innovative technologies like fan-out PoP or embedded die packaging with advanced PCB substrate.

This report includes multiple comparisons based on physical analyses of the latest flagship smartphones. It offers the unique possibility of seeing thermal management technology evolution, tracked by manufacturer.
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