2016 Comparison of Application Processor (AP) Packaging: TSMC’s inFO vs. Amkor’s PoP vs. Samsung’s PoP vs. Shinko’s MCeP

Comparison of main players AP: Apple A10 with inFO vs. Qualcomm Snapdragon 820 with MCeP packaging technology vs. HiSilicon Kirin 955 & Samsung Exynos 8 with standard Package-on-Package

Five major players are sharing the smartphone application processors (AP) market. Among them, Qualcomm, Apple, Samsung and HiSilicon propose the most powerful AP. They use almost the same technology node for the die, and the innovation is now at the packaging level. During this year, we observed different technologies inside the four main smartphone flagships: classic Package-on-Package (PoP) developed by Amkor for the Kirin 955 and for the Exynos 8, Molded Core Embedded Package (MCeP) technology developed by Shinko for the Snapdragon 820 and integrated Fan-Out packaging (inFO) developed by TSMC for the A10.

Located under the DRAM chip on the main board, the AP are packaged using PoP technology. The Apple A10 can be found in the iPhone 7 series. The HiSilicon Kirin 955 can be found in the Huawei P9 and the Samsung Exynos 8 as the Qualcomm Snapdragon 820 can be found in the Samsung Galaxy S7 series depending on the world version (US and Asia for the Snapdragon and International for the Exynos).

In this report, we highlight the differences and the innovations of the packages chosen by the end-user OEMs. Whereas some AP providers like for HiSilicon or Samsung choose to consider conventional PoP with embedded land-side capacitor (LSC), others like Apple or Qualcomm use innovative technologies like Fan-Out PoP and silicon based Deep Trench LSC or embedded die packaging with advanced PCB substrate. The detailed comparison between the four players will give the pros and the cons of the packaging technologies.

This report also compares the costs of the different approaches and includes a detailed technical comparison between the packaging structure of the Qualcomm Snapdragon 820, the Samsung Exynos 8, the HiSilicon Kirin 955 and the Apple A10.
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