Advanced RF SiPs for Cell Phones:
Reverse Costing Overview

Physical analyses and cost estimation of radio-frequency Systems-in-Packages from Skyworks Solutions, Murata, TDK-Epcos, Qorvo and Broadcom/Avago

**The impending fifth generation (5G) communication technology is bringing a new order to the market. Major companies are battling to provide devices that could be integrated into the resulting smartphones. And even though not all technologies suit 5G requirements, every player could win something in the battle. Packaging could be a major domain where performance, integration and cost efficiency will be optimized to provide the most suitable device. All high-quality competitors are looking for a better way to make high-density front-end communication devices. With this historic advance, it is the perfect time to examine every module supplier and, compare their integration technologies and costs.**

To accompany Yole Développement’s Advanced RF SIP for Cell Phones 2017 Market and Technology Report, System Plus Consulting has conducted a comparative technology review. It provides insights into structure, technology and costing for RF SIP packaging of front-end modules (FEMs) in smartphones. The report includes the study of eight FEMs found in three high-end flagship smartphones, the Huawei P10, the Samsung Galaxy S8 and the Apple iPhone 8 Plus. In these phones, five major suppliers, Skyworks Solutions, Murata, TDK-Epcos, Qorvo and Broadcom, share the market.

After a teardown of these three high-end smartphones, we extract the main RF modules and analyze them in detail. We study their sizes and technologies, describe the technical and economic choices made by the original equipment manufacturers (OEMs) that produce the phones and an overview of the packaging market. We have analyzed the major players, who remain Broadcom/Avago, Qorvo, Skyworks Solutions, Murata and Epcos/TDK.

The report includes a description of each component and important data, including type of substrate, proportion of silicon in the module and line spacing. We also include comparisons for all front-end modules analyzed and a manufacturing cost estimation of the SiPs. Wifi and Bluetooth modules are not covered in this report.
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