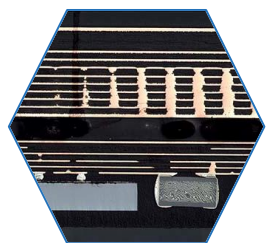
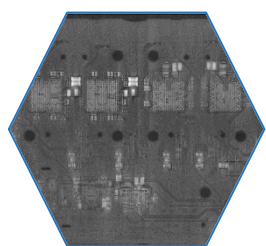


Samsung SFG-D0100 5G n261 mmWave CPE Chipset for Verizon

A complete study of the first generation of the 5G millimeter-wave chipset for Samsung's Customer Premise Equipment routers used by Verizon.



Title: Samsung SFG-D0100 5G n261 mmWave CPE Chipset for Verizon

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U.S. citizens were among the first people to gain access to 5G millimeter wavelength (mmWave) communication systems, thanks to Samsung and Verizon's agreement back in 2018. This sees Samsung supply 5G technology-based Fixed Wireless Access (FWA) system to the largest mobile network operator. With a projected Compound Annual Growth Rate (CAGR) of 72 % in shipped units between 2020 and 2025, the 5G market is expected to be profitable in the next few years. In this context, Verizon has gambled on mmWave 5G communication using the n261 frequency band. In its first generation of end point system, the company decided to use 5G mmWave Customer Premise Equipment (CPE) from Samsung.

The Samsung SFG-D0100 is a CPE system used for FWA through 5G mmWave communication technology. After a detailed analysis of the board including 12-layers printed circuit board (PCB), routing and antenna system analysis, the report is focused on complete analysis of the main components forming the chipset and involving several companies. The analysis starts with the digital component processing the data, the mm1002U from Samsung and the power management integrated circuit (IC), the TPS65400 from Texas Instruments. Then the analysis goes to the next level of frequency with the intermediate frequency IC, the ARES custom IC and its frequency synthesizer companion, the STW81200 from STMicroelectronics. The last stage for mmWave frequencies includes the transceiver (RxTx), the PHOBOS custom IC.

In this chipset, several technologies were involved to provide power, efficiency, and cost effectiveness. The radio frequency (RF) IC works on 65 nm RFCMOS technology. The well-known 28 nm high-k metal gate (HKMG) implements ten cores in a big.LITTLE architecture in a digital IC. The power and clock supply uses Bipolar-CMOS-DMOS and SiGe BiCMOS technologies. All of this enables 2x2 Multiple Input Multiple Output (MIMO) 5G communication using two antenna system polarized at 45° and 135° for beam steering allowing up to eight carriers per CPE system.

This report includes a full investigation of the system, featuring a Computed Tomography (CT) scan of the RxTx Board. A detailed study of the Systems-in-Packages (SiPs), including die analyses, processes, and board cross-sections. It contains a complete cost analysis and a selling price estimation of the system.

COMPLETE TEARDOWN WITH

- Analysis and description of the RF functions implemented in the system
- Detailed photos
- Precise measurements
- Materials analysis
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- Comparison with Qualcomm's 5G mmWave CPE chipset and Apple's 5G mmWave Handset Chipset

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AUTHORS

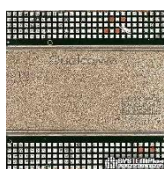


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RELATED ANALYSES



Qualcomm QTM527 mmWave Antenna Module

Deep analysis of the world's first fully integrated high-power 5G mmWave antenna module for Customer Premise Equipment fixed wireless access.
September 2021



Apple iPhone 12 series mmWave 5G Chipset and Antenna

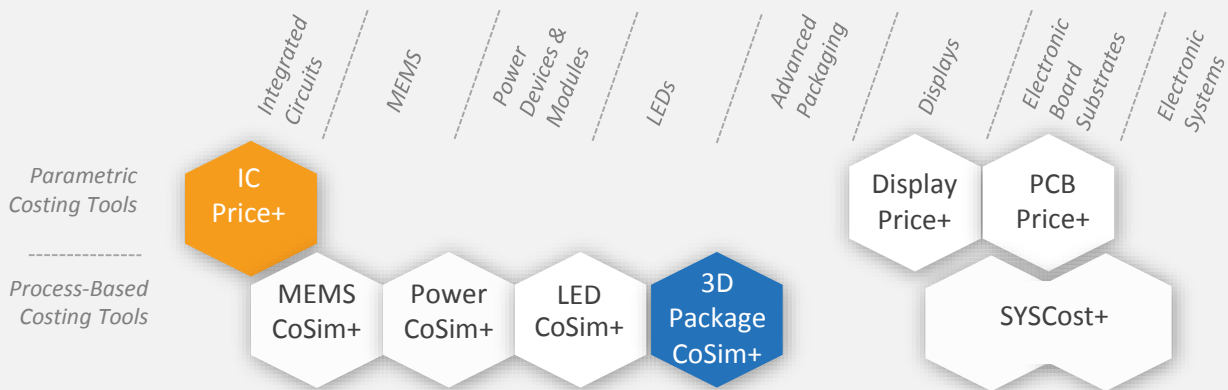
A study of the complete first generation of the 5G millimeter-wave chipset for Apple's phones including custom antenna, front-end module and antenna-on-package.
February 2021



5G's Impact on RF Front-End for Telecom Infrastructure 2021

The RF component market for telecom infrastructure will peak at \$4.2B in 2023 thanks to active implementation of 5G.
March 2021

COSTING TOOLS



Our analysis is performed with our costing tools 3D Packaging CoSim+ and IC Price+.

System Plus Consulting offers powerful costing tools to evaluate the production cost and selling price from single chip to complex structures.

3D Packaging CoSim+

Cost simulation tool to evaluate the cost of any Packaging process: Wafer-level packaging, TSV, 3D integration...

IC Price+

The tool performs the necessary cost simulation of any Integrated Circuit: ASICs, microcontrollers, DSP, memories, smartpower...

ABOUT SYSTEM PLUS CONSULTING

WHAT IS A REVERSE COSTING®?

Reverse Costing® is the process of disassembling a device (or a system) in order to identify its technology and calculate its manufacturing cost, using in-house models and tools.



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