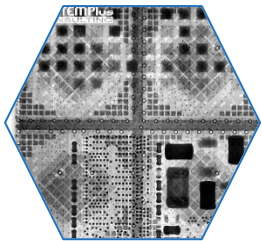
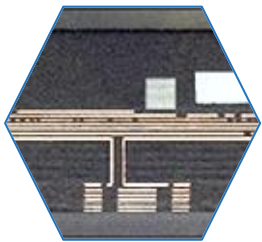
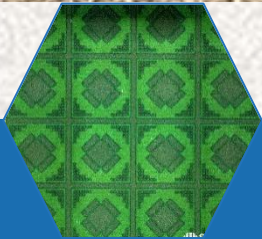




Qualcomm QTM527 mmWave Antenna Module

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



Title: Qualcomm QTM527 mmWave Antenna Module

Pages: 127

Date: September 2021

Format: PDF & Excel file

Price: EUR 3,990

Reference: SPR21635

This full reverse costing study has been conducted to provide technology data, manufacturing cost and selling price of the QTM527 5G millimeter wavelength (mmWave) antenna module supplied by Qualcomm. More details are available on Qualcomm's website.

The extended range Qualcomm QTM527 mmWave antenna module was developed for the antenna router in 5G customer premise equipment (CPE). The CPE equipped with the QTM527 can have up to 64 dual polarization antenna elements. Each QTM527 is a 16 patch Antenna on Package (AoP) component. The 64 antennas are obtained by the integration of four components on the same PCB.

The flagship component supports up to 800MHz of bandwidth in the n257 28GHz, n258 26GHz, n260 39GHz and n261 28GHz bands. The lower frequencies are managed by other components and antennas.

The transceiver die is powered by a power management integrated circuit (PMIC) die to optimize the power consumption of the CPE and probably the envelope tracking. The transceiver and the PMIC are assembled with passives on the substrate of the AoP. The 3GHz signal input is performed by two coaxial connectors, one providing a horizontal signal, and one a vertical signal.

To provide extensive range radiation, beamforming, beam steering and 2x2 Multiple Input Multiple Output (MIMO) implementation, the QTM527 antenna

module is almost four times bigger than the QTM535. In addition, 16 antennas are integrated in each AoP, implementing up to 64 horizontally and vertically polarized antennae elements. Analysis of the AoP reveals several innovations taken from the smartphone AoP, like complex printed circuit board (PCB) structures with embedded filters and antenna systems, similar transceivers and PMIC implementations.

This report includes a full investigation of the system, featuring a detailed study of the AoPs, including die analyses, processes and board cross-sections with an X-Ray Computed Tomography (CT) scan for the AoP. It contains a complete cost analysis and a selling price estimation of the system. Finally, it features a technical and cost comparison with the QTM525 from Qualcomm.

COMPLETE TEARDOWN WITH

- System analysis
- Detailed photos
- Precise measurements
- Materials analysis
- Manufacturing process flow
- Supply chain evaluation
- Manufacturing cost analysis
- Estimated sales price
- Technical and cost comparison with the Qualcomm QTM525

TABLE OF CONTENTS

Overview / Introduction

- Executive Summary
- Reverse Costing Methodology

Company Profile

- Qualcomm
- QTM527 Characteristics
- Supply Chain
- Market Analysis

Physical Analysis

- Summary of the Physical Analysis
- Package Analysis
 - ✓ Module Views
 - ✓ Module opening
 - ✓ Module X-Ray
 - ✓ Module Cross-Section
- Qualcomm Transceiver Die
 - ✓ Die View & Dimensions
 - ✓ Die Delayering & Cross-Section

- Qualcomm PMIC Die
 - ✓ Die View & Dimensions
 - ✓ Die Delayering & Cross-Section

Manufacturing Process

- Global Overview
- Qualcomm Transceiver Die
- Qualcomm PMIC Die
- Packaging

Cost Analysis

- Yield Hypothesis
- Qualcomm Transceiver Die
- Qualcomm PMIC Die
- Packaging Cost
- Component Cost

Selling price

Cost Comparison

Feedbacks

System Plus Consulting Services

AUTHORS



Sylvain Hallereau has been Project Manager at System Plus Consulting since 2000. He is in charge of costing analyses for Integrated Circuits, Power semiconductors and LEDs. He has significant experience in the modeling of manufacturing costs for electronics components, Sylvain holds a Master degree in Microelectronics from the University of Nantes, France.



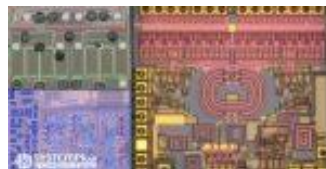
Léo Vatant is a Microelectronic Laboratory Technician. He has a Master degree in material science majoring Ceramics from the University of Limoges. He previously worked on different subject among which solar cells or tellurite glasses for optical fibre application.

RELATED ANALYSES



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.
September 2021 - EUR 3,990*



RF Front-End Module Comparison 2021 – Vol. 2 – Focus on 5G Chipset

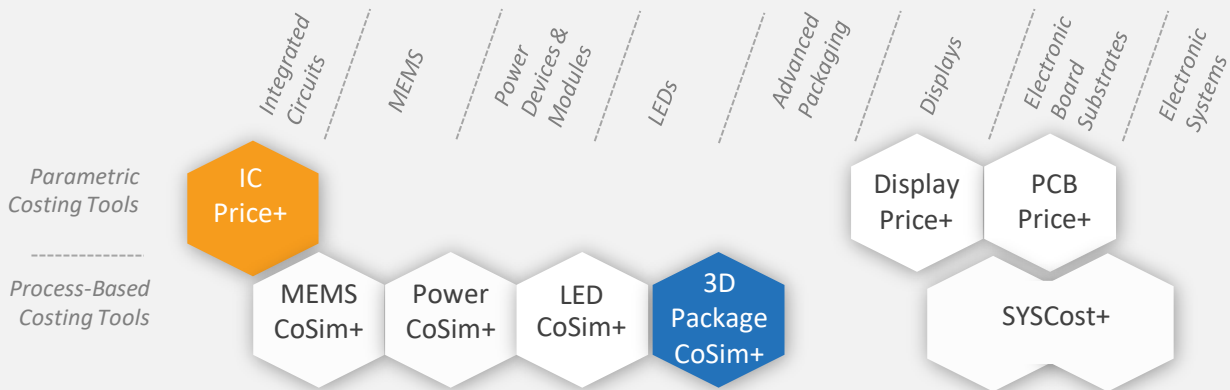
Technical and cost overview of the evolution of radio frequency front-end module technologies integrated in 5G mmWave and Sub-6 GHz Phones.
April 2021 - EUR 6,490*



5G Packaging Trends for Smartphones 2021

5G packaging brings innovative technology and 2.6-billion-dollar opportunities for SiP business.
March 2021 - EUR 6,490*

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.



CONTACTS

Headquarters

22, bd Benoni Goullin
Nantes Biotech
44200 Nantes
France
+33 2 40 18 09 16
sales@systemplus.fr

Europe Sales Office

Lizzie LEVENEZ
Frankfurt am Main
Germany
+49 151 23 54 41 82
llevenez@systemplus.fr

America Sales Office

Steven LAFERRIERE
Western USA & Canada
+1 310-600-8267
laferriere@yole.fr

Chris YOUUMAN

Eastern USA & Canada
+1 919-607-9839
chris.youman@yole.fr

Asia Sales Office

Takashi ONOZAWA
Japan & Rest of Asia
+81 80 4371 4887
onozawa@yole.fr

Mavis WANG

Greater China
TW +886 979 336 809
CN +8613661566824
wang@yole.fr

Peter OK

Korea
+82 10 4089 0233
peter.ok@yole.fr

System Plus Consulting is specialized in the cost analysis of electronics from semiconductor devices to electronic systems.

A complete range of services and costing tools to provide in-depth production cost studies and to estimate the objective selling price of a product is available.

Our services:

- **STRUCTURE & PROCESS ANALYSES**
- **TEARDOWNS**
- **CUSTOM ANALYSES**
- **COSTING SERVICES**
- **COSTING TOOLS**
- **TRAININGS**

www.systemplus.fr
sales@systemplus.fr

TERMS AND CONDITIONS OF SALES

1. INTRODUCTION

The present terms and conditions apply to the offers, sales and deliveries of services managed by System Plus Consulting except in the case of a particular written agreement.

Buyer must note that placing an order means an agreement without any restriction with these terms and conditions.

2. PRICES

Prices of the purchased services are those which are in force on the date the order is placed. Prices are in Euros and worked out without taxes. Consequently, the taxes and possible added costs agreed when the order is placed will be charged on these initial prices.

System Plus Consulting may change its prices whenever the company thinks it necessary. However, the company commits itself in invoicing at the prices in force on the date the order is placed.

3. REBATES and DISCOUNTS

The quoted prices already include the rebates and discounts that System Plus Consulting could have granted according to the number of orders placed by the Buyer, or other specific conditions. No discount is granted in case of early payment.

4. TERMS OF PAYMENT

System Plus Consulting delivered services are to be paid within 30 days end of month by bank transfer except in the case of a particular written agreement.

If the payment does not reach System Plus Consulting on the deadline, the Buyer has to pay System Plus Consulting a penalty for late payment the amount of which is three times the legal interest rate. The legal interest rate is the current one on the delivery date. This penalty is worked out on the unpaid invoice amount, starting from the invoice deadline. This penalty is sent without previous notice.

When payment terms are over 30 days end of month, the Buyer has to pay a deposit which amount is 10% of the total invoice amount when placing his order.

5. OWNERSHIP

System Plus Consulting remains sole owner of the delivered services until total payment of the invoice.

6. DELIVERIES

The delivery schedule on the purchase order is given for information only and cannot be strictly guaranteed. Consequently any reasonable delay in the delivery of services will not allow the buyer to claim for damages or to cancel the order.

7. ENTRUSTED GOODS SHIPMENT

The transport costs and risks are fully born by the Buyer. Should the customer wish to ensure the goods against lost or damage on the base of their real value, he must imperatively point it out to System Plus Consulting when the shipment takes place. Without any specific requirement, insurance terms for the return of goods will be the carrier current ones (reimbursement based on good weight instead of the real value).

8. FORCE MAJEURE

System Plus Consulting responsibility will not be involved in non execution or late delivery of one of its duties described in the current terms and conditions if these are the result of a force majeure case. Therefore, the force majeure includes all external event unpredictable and irresistible as defined by the article 1148 of the French Code Civil?

9. CONFIDENTIALITY

As a rule, all information handed by customers to system Plus Consulting are considered as strictly confidential. A non-disclosure agreement can be signed on demand.

10. RESPONSABILITY LIMITATION

The Buyer is responsible for the use and interpretations he makes of the reports delivered by System Plus Consulting. Consequently, System Plus Consulting responsibility can in no case be called into question for any direct or indirect damage, financial or otherwise, that may result from the use of the results of our analysis or results obtained using one of our costing tools.

11. APPLICABLE LAW

Any dispute that may arise about the interpretation or execution of the current terms and conditions shall be resolved applying the French law.

If the dispute cannot be settled out-of-court, the competent Court will be the Tribunal de Commerce de Nantes.