The upcoming 5G communication technology is creating a new order in the communication market. All the major RF front-end players are battling to provide devices that could be integrated in smartphones. Not all technologies suit the 5G requirement, but every player could win something. There will be opportunities for low cost competitors in the SAW filter market for low band communications like GSM, 2G or 3G, as high quality competitors shift focus to the 4G and 5G market with BAW filters. This comes along with better integration of all the front-end communication devices, now in just one module. This is therefore the perfect time to examine every player, and particularly to compare integration technologies of the original equipment manufacturers (OEMs) who make smartphones and the RF front-end module suppliers.

This comparative technology study provides technology data for RF front-end modules in smartphones. The report includes at least 16 front-end modules and several components found in five flagship smartphones: the Apple iPhone 7 Plus, Samsung Galaxy S7 Edge, Huawei P9, LG G5 and Xiaomi Mi5.

After teardowns of a large variety of smartphones, we have extracted and physically analyzed the main RF modules. We have studied their sizes and technologies, and present a large panel of OEM technical and economical choices and an overview of the market. The major players remain Broadcom/Avago and Qorvo but there are several other players, including Skyworks, Murata, Epcos/TDK, and we have analyzed their products.

The report includes a description of each component and statistical analyses for most front-end modules. It also tries to explain the OEMs’ choices and supplier tendencies. Wi-Fi and Bluetooth module analyses are not covered in this report.
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## RELATED REPORT

**RF Front End Modules and Components for Cellphones, Technology and Market report by Yole Développement**

A dynamic market with high responsivity to technical innovation, the RF front end industry is set to grow at 14% CAGR to reach $22.7B in 2022.

### KEY FEATURES OF THE REPORT

- Market landscape and forecast for 2016-2022 including revenues, players, and volumes
- Back to Basics: A detailed description of each RF device function, their challenges and key characteristics
- 4G and 5G characteristics and the future outlook, including QAM, CA, MIMO and OFDM coding
- Roadmap for technology evolution and future developments
- RF front-end industry strategy

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Stéphane has a deep knowledge of materials characterizations and electronics systems. He holds an engineering degree in electronics and numerical technology, and a PhD in materials for micro-electronics.

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**SYSTEM PLUS CONSULTING RELATED REPORTS**

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2.5 The person receiving the Products on behalf of the Buyer shall immediately verify the quality of the Products and their conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Buyer from time to time, in the same way, and at least within thirty (30) days from delivery. If the Buyer does not claim within this period, the Seller shall be considered as having delivered the Products in accordance with the order.

2.6 No return of Products shall be accepted without prior information to the Seller, even in case of delayed delivery. Any Product returned to the Seller without prior information to the Seller as required under article 2.5 shall remain the Seller’s property.

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3.2 Some products may be offered by the Seller, which are made to order, for a specific period of time.

3.3 Payments due by the Buyer shall be sent by check payable to Yole Développement, credit card or by electronic transfer to the following account:

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Account number: 0170 200 1565 87
Swift code: CCFRFRPP
IBAN: FR76 3005 6001 7001 7020 0156 587

3.4 The Seller reserves the right to request a down payment from the Buyer, in accordance with the conditions contained in article 3. 

3.5 In the event of termination of the contract, or of misconduct, during the contract, the Seller will have the right to invoice the Buyer for all non-conformity to the order. Any claim for apparent defects or for non-conformity shall be sent in writing to the Buyer from time to time, in the same way, and at least within thirty (30) days from delivery. If the Buyer does not claim within this period, the Seller shall be considered as having delivered the Products in accordance with the order.

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3.7 The Seller reserves the right to charge the Buyer for all costs that have been incurred as at the date of notification by the Buyer of such termination or decision.

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4. Liabilities

4.1. The Seller shall not be liable for (i) direct and (ii) harmless personal loss, caused by the Products or arising from a material breach of this Agreement.

4.2. No liability shall be incurred by the Buyer for (i) damages, (ii) loss, (iii) personal injury, (iv) loss of profit, business interruption and loss of information or programs or information arising out of the use of or inability to use the Seller’s website or the Products, or provided on the website, or in the Products; or (v) any claim attributable to errors, omissions or inaccuracies in the Product or interpretations thereof.

4.3. Any Product and/or information derived from sources beyond the control of the Buyer as is reasonable. The Seller does not warrant the accuracy, completeness adequacy or reliability of such information, which cannot be guaranteed to be free from errors.

4.4. To the extent that the Seller shall not be liable for damages that the Seller, upon prior notice from the Buyer to time be modified by or substituted with similar Products meeting the needs of the Buyer. This modification shall not lead to the liability of the Seller, provided that the Seller ensures the substituted Product is similar to the Product initially ordered.

4.5. The Seller shall not be liable for any damages that the Seller is asked to state for the making of the Products are given for information only and are not guaranteed. If such deadlines are met, it shall not lead to any damages or cancellation of the orders, except for non acceptable delays exceeding [4] months from the stated deadline, without information from the Seller. In such case, the Buyer shall be entitled to ask for a reimbursement of its first down payment and for further damages.

4.6. The Buyer may not make any alterations, express or implied, including, without limitation, those of sale ability and fitness for a particular purpose, with respect to the Products. Although the Seller shall take reasonable care in each product to avoid infection of viruses, Trojans, worms or other harmful codes containing contaminating or destructive properties before making the Products available, the Seller cannot guarantee that any Product will be free from infection.

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5.1 The Seller shall not be liable for any delay in performance directly or indirectly caused by or resulting from acts of nature, fire, flood, accident, riot, war, government intervention, embargoes, strikes, labor difficulties, equipment failure, late deliveries by suppliers or other difficulties which are beyond the control of the Seller.

6. Production of this Firms

6.1 All the Firms attached to the Products are and remain the property of the Seller and are protected under French and international copyright law and conventions.

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- Use in time-sharing, service bureau, bulletin board or similar public display;
- Production of any Product other than upon order by the Buyer and for the purpose for which the Product is intended;
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7. Termination

7.1. If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Buyer shall indemnify the Seller for the entire costs that have been incurred as at the date of notification of the Buyer by such delay or cancellation. This may also apply for any other direct or indirect consequential loss that may be borne by the Seller, following this decision.

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8. Joint Ventures

8.1 All the provisions of these Terms and Conditions are for the benefit of the Seller itself, but also for its licensors, employees and agents. Each of them is entitled to assert and enforce these provisions against the Buyer. Any notices under these Terms and Conditions shall be given in writing exclusively upon the other Party. The Seller may, from time to time, update these Terms and Conditions and the Buyer, is deemed to have accepted the latest version of these terms and conditions, provided they have been communicated to him in due time.

9. Governing law and jurisdiction

9.1 Any dispute arising out or linked to these Terms and Conditions or to any contract (orders) shall be entered into in application of these Terms and Conditions shall be settled by the French Commercial Courts of Lyon, which shall have exclusive jurisdiction over such issues.

9.2 French law shall govern the relation between the Buyer and the Seller, in accordance with these Terms and Conditions.