Broadcom AFEM-8100 System-in-Package in the Apple iPhone 11 Series

Cost effective third generation of mid/high band Front-End Module with advanced and innovative packaging.

Staying true to its choices for each previous iPhone series iteration Apple has again selected an innovative Radio Frequency (RF) Front-End Module (FEM) for its flagship. Each year Broadcom, its faithful supplier, has advanced its filters and innovative packaging technology in order to compete with the other market players and maintain its contract. This year, for the first time, Broadcom chose double side Ball Grid Array (BGA) packaging coupled to new Electro-Magnetic Interference (EMI) shielding to enable a very high-density System-in-Package (SiP) with frequency band sharing.

In 2019, Broadcom remains the only supplier of the same module for several versions of the latest Apple iPhone series: 11, 11 Pro and 11 Pro Max. Like its predecessor, the AFEM-8092, the AFEM-8100 is a Mid- and High-Band (MB and HB) Long Term Evolution (LTE) FEM. It features several dies, including Power Amplifier (PA), Silicon-on-Insulator (SOI) Switch and Film Bulk Acoustic Resonator (FBAR) Filters. The filters are still using Avago’s Microcap bonded wafer Chip-Scale Packaging (CSP) technology with Through-Silicon Vias (TSVs) enabling electrical contacts and scandium doped aluminum nitride (AlScN) as a piezoelectric material. For this special version, Broadcom has innovated in several directions. Thanks to the double side BGA technology, the packaging is denser and the critical master switches and Low-Noise Amplifier dies have been completely isolated from the filtering part. In the EMI Shielding, a new integration method has allowed a huge reduction in the packaging cost. Finally, with the latest GaAs PA technology using Flip-Chip configuration, the PA area has shrunk by 30%. Thanks to all these innovations, Broadcom is able to supply a cost-effective new component with fewer input/output (I/O) connections.

The report contains a complete analysis of the FEM SiP, including a detailed analysis of the PA, the LNA, the filtering dies, and the internal/external EMI shielding. The report also features a cost analysis and a price estimation of the component. Finally, it also integrates a comparison with the AFEM-8072, MB/HB LTE FEM in the Apple iPhone X and the AFEM-8092, MB/HB LTE FEM in the Apple iPhone Xs.

COMPLETE TEARDOWN WITH
- Detailed photos
- Precise measurements
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RELATED REPORTS

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First mid/high-band front-end module from Qorvo in an Apple phone with advanced packaging.
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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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6.1 All the IPR 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 any timesharing, service bureau, bulletin board or similar arrangement or public display;
• posting any Product to any other online service (including bulletin boards or the Internet);
• Licensing, leasing, selling, offering for sale or assigning the Product.

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6.4 The Buyer shall be solely responsible for any delay in respect to article 2.1 above, and the Seller reserves the right to cancel or suspend the sharing of the data or information for non-compliance. The Seller may totally or partially refuse to supply the Product if it considers that the copyright and related rights attached to the Products require for the analyst extra time to compute or compare the data in order to enable the Seller to deliver a high quality Product.

6.5 The Buyer shall define within its company a contact point for the needs of the contract. This person will be the recipient of each new report. This person shall also be responsible for indicating to the Seller if the Buyer wants to extend the rights of use of the Product within the limits of the primary user. The Buyer shall have the right to decide who within the Buyer, shall be entitled to receive the protected link that will allow the Buyer to access the Products. It is acknowledged that the Products contain defects, the Seller undertakes to replace the defective products as far as the supplies allow and without indemnities or compensation of any kind for labour costs, delays, loss caused or any other reason. The replacement is guaranteed for a maximum period of two months starting from the delivery date. Any replacement is excluded for any event set out in article 5 below.

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7.1 If the Buyer cancels the order in whole or in part or postpones the date of mailing, the Seller may suspend or terminate these Terms of Conditions and the order at any time, 30 days from the date of the order without any notification by the Buyer of such delay or cancellation. This may also apply for any other reason that the Seller may have, and at its own discretion.

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