

Global RFFE Market: Analysis By Type (PA module, FEM module, Discrete Filter, Antenna Tuner, mmW module, Discrete LNA, Discrete switch, RFIC and mmW Discrete), By Application (Consumer Electronics, Automotive, Wireless Connection, Military and Others), By Region Size & Forecast with Impact Analysis of COVID-19 and Forecast up to 2029

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Abstracts

The radio frequency (RF) front end refers to the section of a communication system or electronic device that handles signals in the radio frequency range. It is an essential component in radio receivers and other radio frequency systems, responsible for initial signal processing and preparing the signal for further stages of processing and demodulation. RFFE Includes RF Filter, RF Amplifier, Local Oscillator, Mixer, and Antenna. In 2023, the global RFFE market was valued at US\$24.90 billion, and is probable to reach US\$44.94 billion by 2029.

An increase in data traffic, increasing adoption of Bluetooth-enabled devices, and rapid deployment of industrial IoT systems are some of the significant factors that are expected to transform the radio frequency front end industry outlook in the long run. Continuous innovations and advancements in mobile handset technology owing to continuing transition from 2G, 3G to 4G/LTE, LTE-Advanced, LTE-Advanced Pro, and 5G lead to the rising need for maximizing power efficiency and spectrum range of mobile devices. RFFE design and manufacturing is a key investment area for China because it is an area of investment needed to support domestic mobile handset OEMs that do not have access to RFFE supply from Western suppliers resulting from US export controls and the China manufacturing infrastructure for RFFE is relatively unaffected by US export controls. The RFFE market awaits the next big growth driver -

6G - which may not fully evolve today. The global RFFE market value is projected to grow at a CAGR of 10.34%, during the forecast period of 2024-2029.

Market Segmentation Analysis:

By Type: According to the report, the global RFFE market is segmented into nine types: PA Module, FEM Module, Discrete Filter, Antenna Tuner, mmW Module, Discrete LNA, Discrete Switch, RFIC and mmW Discrete. PA Module segment acquired majority of share in the market in 2023, as an increase in applications of power amplifiers in GSM, radar HDTV, LTE point-to-point microwave AND 5G signal amplification, etc. will propel the segment growth. Whereas, discrete switch segment would grow with the fastest rate, because it provides the flexibility and customization required in such advanced RF systems. Additionally, the trend toward smaller and more integrated electronic devices, such as smartphones, wearables, and IoT devices, drives the need for compact and space-efficient RF components.

By Application: According to the report, the global RFFE market is segmented into five applications: Consumer Electronics, Automotive, Wireless Connection, Military and Other application. Consumer Electronics segment acquired majority of share in the market in 2023 and would have the fastest growing CAGR in the future, as the widespread use of IoT technologies and technical innovations like the integration of AI features (control/voice recognition) in set-top boxes and TVs. Receivers/transmitters, filters, power amplifiers, duplexers, antenna switches, and demodulators are the key parts used in RF front communications in consumer electronics products

By Region: The report provides insight into the RFFE market based on the supply, namely Asia Pacific, Europe, North America and Rest of the World. Asia Pacific RFFE market enjoyed the highest market share in 2023 and would grow at the fastest CAGR, due to increasing demand for radio frequency components in consumer electronics applications. Growing adoption of power amplifiers and duplexers for use in a wide range of devices such as mobile phones, tablets, and laptops & notebooks among others. The flourishing Integrated Circuit (IC) industry, expanding the SOI ecosystem in the Asia-Pacific, and increasing the use of SOI in IoT applications act as growth opportunities for the RF Front End Module (RFFE). According to Forbes, the number of IoT devices will surpass 3.5 billion by 2023, with Asia leading the highest market share. China is the largest maker of electric vehicles and leads with the highest level of EV uptake over the projection period. China's massive capital investment project designed to nurture the domestic semiconductor industry has rolled out its second funding phase. The project is scheduled for the next five years with a budget of US\$28.9 billion. By

addressing RF front-end modules, Huawei creates an opportunity to ponder areas that need attention for developing the necessary technologies, designs, and IPs, possibly expected to begin designing a whole integrated module system in China.

North America RFFE market is the second largest market in RFFE industry. This market augmented in the historical years due to growing demand for wireless communication, including smartphones, IoT devices, and other wireless technologies. Collaborations and product launch between key players in the RF front end industry, as well as partnerships with telecommunications and technology companies, can drive innovation and market expansion. For instance, in December 2022, Qualcomm launched the FastConnect 7800. It is set to be the world's first Wi-Fi 7 public solution. The US RFFE market has augmented in the years due to the partnership and acquisitions for the expanding of the business.

Global RFFE Market Dynamics:

Growth Drivers: 5G Deployment plays a pivotal role in driving growth in the global RFFE market as The Radio Frequency Front-End (RFFE) market is a crucial component in the telecommunications industry, and the deployment of 5G networks has significantly contributed to the growth of RFFE market. This includes components like power amplifiers, low noise amplifiers, and filters. 5G networks leverage advanced technologies like beamforming and Massive Multiple Input Multiple Output (MIMO) to enhance signal quality, coverage, and network efficiency. These technologies require a larger number of antenna elements and more advanced RFFE components to support the complex signal processing involved. This drives the demand for RF components in the market. Further, the market is expected to increase due to increasing adoption of wireless communication, growing use of RF front end components in automotive applications, augmenting high-end telecommunication devices, etc.

Challenges: The market's expansion is projected to be hampered by high security concerns, as with the increased connectivity and integration of 5G networks into critical infrastructure, security concerns become more pronounced. Ensuring the security of RFFE components and preventing vulnerabilities in the communication infrastructure is an ongoing challenge that requires continuous efforts. The other challenges that RFFE market faces include supply chain disruptions, etc.

Trends: One of the most distinct and pervasive trends observed in the global RFFE market is growing wireless IoT connectivity. Like RF solutions are needed for cellular connectivity, several unlicensed, short-range wireless standards also have unique RF

needs. These short-range wireless standards include Wi-Fi, Bluetooth, Zigbee, Z-Wave, Thread, and more. When several IoT connectivity standards co-exist in an IoT node, an RF front-end module may be required. More trends in the market are believed to augment the growth of RFFE market during the forecasted period include, 6G networking, miniaturization and advancements in packaging, market expansion in emerging economies, etc.

Impact Analysis of COVID-19 and Way Forward:

The impact of COVID-19 on the radio frequency front end market had slowed its growth. Several problems hampered market growth in the first half of 2020, and the global market experienced a sudden drop in market size. However, global market demand increased in the latter half of 2020. The COVID-19 outbreak has gradually impacted the supply chain of the radio frequency components market. For a short time, industries such as consumer electronics, automotive, machinery, and others saw declining demand for their products as a result of the global slowdown and customers' declining purchasing power.

Competitive Landscape and Recent Developments:

Global RFFE market is concentrated. Market players have implemented sustainable growth techniques in the market. To strengthen their position in the market, some of the leading competitors are pursuing various growth methods such as mergers, acquisitions, collaborations, and agreements. Key players of global RFFE market are:

Microchip Technology Inc.
Infineon Technology
NXP Semiconductor N.V.
Qualcomm Incorporated
Analog Devices, Inc.
Broadcom Inc.
Skyworks Solutions, Inc.
Teradyne Inc.
Soitec
Murata Manufacturing Co., Ltd.
Renesas Electronics Corporation
Vanchip Tianjin Technology Co Ltd.

The key players are constantly investing in strategic initiatives, such as new launches,

introducing their products to emerging markets and more, to maintain a competitive edge in this market. For instance, in June 2022, Qualcomm Technologies Inc., announced the launch of Wi-Fi 7 front-end modules that offered enhanced wireless performance in automotive and internet-connected devices. The introduction of the RFFE modules aligned with the company's objective to extend its handset range with modem-to-antenna solutions for automotive and IoT. Also, In February 2022, Murata Manufacturing announced the expansion of its millimeter-wave RF front-end portfolio for 5G wireless infrastructure applications.

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