

# RFMD®

## 3G Multi-band, Multimode Front End Portfolio

With the proliferation of data services, mobile device original equipment manufacturers (OEMs) are presented with new, unprecedented challenges and demands from both mobile operators and consumers. Mobile operators require customized handsets and mobile devices to meet various consumer roaming needs, and the issue of rapid customization has fallen to OEMs who must configure these complex 3G devices to function in multiple frequency bands and operating modes (GSM, EDGE, WCDMA, HSPA+, with LTE on the horizon). As the number of bands and band combinations grow, frequency flexibility and signal routing, at the platform level, has increased in importance as critical parameters for 3G mobile device development.

Additionally, aggressive consumer demand for feature-rich 3G multimode handsets and the data services they offer has emphasized reduced power consumption and form factor size as key parameters for these mobile devices. Radios in the handset have grown more complex and numerous, causing battery drain such that reduced talk time continues to be a major issue facing manufacturers. In parallel, consumers have dictated that the size and talk time of these new 3G devices are consistent with the 2G and 2.5G handsets with which they have become accustomed.

This sets up an unprecedented challenge for mobile device OEMs and their system platform providers. Having anticipated this challenge, RFMD designed a broad portfolio of high-performance multi-band, multimode front ends and components that offer frequency flexibility, ease of implementation, size reduction, and low current consumption.

RFMD delivers platforms and components that reduce the complexity of the 3G multimode RF systems with a keen eye toward the 4G standard's coming proliferation. We have designed the entire front end to work together seamlessly, enabling handset and mobile device OEMs to mix and match GSM/GPRS, EDGE, and WCDMA/HSPA+ elements to meet their customization needs while maintaining the performance requirements necessary to address the evolving demands of both consumers and mobile operators.



**RF7200**  
Band 1  
WCDMA/HSPA+  
Power Amplifier  
(PA) Module



**RF3161**  
Quad-band  
GSM/LSPM  
EDGE Power  
Amplifier



**RF7201/7202**  
Dual-band  
WCDMA/HSPA+  
PA Module



**RF1193**  
Single-pole  
Ten-Throw  
(SP10T)



**RF7203**  
Band 3  
WCDMA/HSPA+  
PA Module



**RF1194**  
Single-pole  
Nine-Throw  
(SP9T)



**RF3204**  
Quad-band,  
Linear EDGE  
Transmit Module  
(TxM)



**RF6650**  
Front End  
Power  
Management IC



## RF720x Family of WCDMA/HSPA+ Power Amplifier (PA) Modules

The RF720x family of high-efficiency, linear PA modules is specifically designed for the needs of today's complex multi-band, multimode 3G mobile devices. Whether single- or dual-band, each PA is delivered in a compact 50-ohm matched module optimized for their specific band of operation. By providing digital power modes, the RF720x family allows for lower current consumption as power levels decrease. Additionally, each PA in the family features an integrated output power coupler, thereby eliminating the need to place discrete couplers externally—saving board space and bill-of-materials (BOM) cost.

### RF7200 Band 1 WCDMA PA Module

- Ultra-small, ultra-thin 3 x 3 x 1 mm package size
- High-efficiency operation, 41% at  $P_{OUT} = +28.0$  dBm
- 3-mode power states with digital control interface

### RF7201/RF7202 Dual-band WCDMA PA Module

- Ultra-small, ultra-thin 4 x 5 x 1 mm package size
- RF7201: Band 1/8, RF7202: Band 2/5
- 3-mode power states with digital control interface

### RF7203 Band 3 WCDMA/HSPA+ PA Module

- Ultra-small, ultra-thin 3 x 3 x 1 mm package size
- High-efficiency operation, 41% at  $P_{OUT} = +28.0$  dBm
- HSPA+ compliant to 26.5 dBm
- Low quiescent current of 18 mA in LPM

## GSM/EDGE Front Ends

### RF3204 Quad-band, Linear EDGE Transmit Module (TxM)

Designed for use as the last portion of the multimode handset's transmit chain in GSM/Linear EDGE architectures that require WCDMA pass-through ports, the RF3204 is a high-efficiency TxM with integrated power control, pHEMT switch, and GSM/EDGE transmit harmonic filtering. A self-contained device, the RF3204 features 50-ohm input and output terminals, and requires no external matching circuits, contributing to an ultra-compact front end design.

- Symmetrical switch ports for platform flexibility
- Three high-linearity WCDMA receive/transmit (Rx/Tx) ports
- Integrated coupler and power detector
- Digital SPI control

### RF3161 Quad-band GSM/LSPM EDGE PA Module

- Compact, 6 x 6 x 1 mm package
- GMSK efficiency: GSM850 / GSM900 - 51% at  $P_{MAX}$ , DCS1800 / PCS1900 - 52% at  $P_{MAX}$
- Proven PowerStar® technology for high-volume manufacturing

## Switch Products

RFMD's switch products provide low insertion loss along with excellent linearity performance and are ideal for multimode (GSM, EDGE, and UMTS) handset and mobile device applications. These modules build upon RFMD's proven pHEMT switch technology, and integrate low pass filtering on the GSM transmit paths, thus avoiding the need for external harmonic attenuation.

### RF1193 Single-pole Ten-Throw (SP10T)

- Exceptional linearity performance
- Lowest BOM cost and small solution—no external DC blocking capacitors
- Platform capable: SP8T and SP9T operation with no loss of performance
- GPIO interface and compatible with +1.8 V logic
- Compact 3.0 x 3.8 x 0.85 mm, 26-pin QFN package

### RF1194 Single-pole Nine-Throw (SP9T)

- Integrated GSM receive SAW filters for ease of implementation
- Integrated 8 kV ESD protection on antenna port
- GPIO interface and compatible with 1.8 V logic (VCTL-high min = 1.3 V)
- Compact 4.5 x 4.5 x 1.3 mm, 28-pin QFN package

## RF6650 Front End Power Management IC

OEMs worldwide are seeking effective power management solutions to optimize handset energy consumption while maintaining a positive user experience. RFMD is uniquely positioned in the marketplace with an in-depth knowledge of both cellular RF component and power management design. With exceptional noise performance and high efficiency, RFMD's front end power management ICs offer a family of switch mode power supply- (SMPS-) based products suitable for multiple applications within mobile devices.

- 650 mA Buck SMPS with automatic bypass
- Small 1.5 x 1.5 mm, 3 x 3 bump array, WLCSPP
- High efficiency: up to 97%
- Fast output voltage transition: <25 uS
- 2 MHz PWM switching frequency and variable output voltage from 0 to  $V_{BATT}$

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