

# Integrated 5G mmWave mobile FEMs/TRXs using 22FDX RF and 22FDX RF+

Optimize performance, power and area in a single chip



## 2 of top 3

5G mmWave FEM design companies are designing with 22FDX RF.\*



## 1st & only

22FDX RF and 22FDX RF+ are the industry's only solutions enabling world-class power and performance benefits in a single-chip 5G mmWave SoC.



## Relentless innovation

22FDX RF+ enhancements take PA and switch performance to new levels.



Crazy-fast downloads, buffer-free live streaming of ultra HD video, more immersive games and other user experiences not previously possible are on the horizon. All this made possible by more powerful, ever sleeker 5G mobile devices that still fit in the palm of a hand or on a wrist.

22FDX™ RF and 22FDX RF+ solutions from GlobalFoundries® (GF®) enable you to integrate critical front-end module (FEM) elements, including low noise amplifiers (LNAs), power amplifiers (PAs) and switches with the transceiver (TRX). The result is a single-chip mmWave radio solution that delivers the superior RF power efficiency and performance levels revolutionary 5G devices demand.

### 22FDX RF and 22FDX RF+ at a glance

Platform	Solution	Key features
22FDX	22FDX RF	<ul style="list-style-type: none"> <li>• 22 nm FD-SOI with RF &amp; LDMOS</li> <li>• Ultra-low power (0.4 V logic)</li> <li>• Superior <math>f_{max}</math> (&gt; 350 GHz), using planar device structure</li> <li>• Device stacking</li> </ul>
22FDX+	22FDX RF+	<ul style="list-style-type: none"> <li>• Builds on 22FDX RF features, offering 30% better switch insertion loss and <math>R_{on} \cdot C_{off}</math> performance, and up to 3 dBm better <math>P_{sat}</math> at the same PAE†</li> </ul>



**Save space:**

22FDX RF and RF+ offer up to a 40% logic scaling advantage<sup>†</sup> and are the industry’s only solutions that enable fully integrated 5G mmWave SoCs with best-in-class performance and power benefits, so you can leverage the saved space to add other advanced features.



**Extend battery life:**

22FDX RF and RF+ PAs deliver performance, power and thermal efficiency advantages so consumers can enjoy up to 10% longer battery life.<sup>‡</sup>



**Boost range:**

22FDX RF provides superior noise figure,  $R_{on} * C_{off}$  and switch insertion loss (IL) performance that help boost signal quality and extend signal reach up to 6% for reliable connections and better sounding calls.<sup>§</sup> 22FDX RF+ extends GF 5G leadership by offering 30% better  $R_{on} * C_{off}$  and IL performance.<sup>†</sup>



**Keep it cool:**

22FDX RF and RF+ PAs generate less heat<sup>†</sup> and can be fully integrated so that you can design smaller devices without the overheating worries. An optimized 22FDX RF+ PA device is designed to deliver even more power-handing capability while operating at a higher breakdown voltage.<sup>†</sup>

**LEARN MORE**

GF knows RF. Learn how our extensive mobile solutions portfolio can help you extend your 5G leadership at [globalfoundries.com/contact-us](https://globalfoundries.com/contact-us)

**Contact Us**



**5G cellular radio solutions from GF**

22FDX RF	22FDX RF+	45RFSOI
Superior performance with highest level of integration & up to 20 dBm $P_{sat}$ (with power combiners) for premium 5G mmWave smartphones	Superior performance with digital & RF enhancements that deliver 30% better IL and $R_{on} * C_{off}$ <sup>†</sup> for premium 5G mmWave smartphones	Superior performance with high $P_{sat}$ (up to 23 dBm) for premium 5G mmWave smartphones
7SW RF SOI	8SW RF SOI	
Great performance for entry & mid-tier 4G LTE and 5G sub-6 GHz smartphones, smart watches & other connected mobile devices	Outstanding performance for premium & high-tier 5G sub-6 GHz smartphones	

\* Current estimate based on design win pipeline.

† Compared to 22FDX RF.

‡ Compared to 28 nm bulk CMOS. Benefits will vary with chip/system design.

§ Assumes 28 GHz band, TX and RX antenna gain of 20 dB, line of sight communication. Benefits will vary with chip/system design.

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