

Overview

The GLOBALFOUNDRIES family of silicon germanium (SiGe) BiCMOS power amplifier technologies, SiGe PA, is optimized to keep pace with evolving mobile standards that are driving performance requirements continually higher.

The SiGe PA family includes four purpose-built offerings, enabling you to choose the technology that delivers the optimal balance of performance, integration functionality, and cost for your RF solution:

- SiGe 5PAe and 5PAx offerings are value / performance-optimized for standalone Wi-Fi and cellular power-amplifier (PA) applications.
- SiGe 1KW5PAe and 1K5PAx offerings, built on high-resistivity substrates, are optimized for performance and integration. Designers can minimize form factor by implementing multiple functions, such as power amplifiers (PAs), RF switches, and low noise amplifiers (LNAs), on a single chip.

The latest additions to the GLOBALFOUNDRIES SiGe PA family, 5PAx and 1K5PAx, deliver faster data throughput and use less power than their earlier counterparts—5PAe and 1KW5PAe, respectively—through performance benefits that include:

- Higher PA gain and linearity
- Lower $R_{on} \cdot C_{off}$, for switches with less insertion loss
- Lower LNA noise figure

Because they are built on a silicon base, the GLOBALFOUNDRIES SiGe PA technologies offer integration advantages over gallium-arsenide alternatives, for smaller modules at equivalent performance. All four offerings feature production-proven through silicon vias (TSVs) so that you can leverage low-cost, quad-flat no-leads (QFN) package solutions.

Comprehensive Enablement

Billions of GLOBALFOUNDRIES SiGe PA chips have already been deployed, and are being used in some of today's premier mobile devices. Marketplace adoption continues to grow, with leading mobile suppliers taking advantage of the SiGe PA portfolio to develop differentiated Wi-Fi and cellular solutions for the next-generation of smartphones and other RF-enabled devices, Wi-Fi access points, and base transceiver station small cells.

GLOBALFOUNDRIES leverages its extensive technology insight and expertise to offer design enablement you can count on. Our best-in-class physical design kits include RF-specific tool support and ultra-accurate model-to-hardware correlation designed to help you achieve predictable results and accelerate time-to-market.

Frequently scheduled, cost-effective MPW runs through MOSIS enable fast prototyping so that you can see results in hardware early. Expert program management and technical support are also available, every step of the way, from concept to design to production.

Features and Specifications

GLOBALFOUNDRIES continues to refine the SiGe PA portfolio with future-ready device, feature, and technology roadmap enhancements.

Feature	5PAe	1KW5PAe	5PAx	1K5PAx
CMOS supply	3.3 V, 5.0 V			
Substrate:				
50 ohm-cm P-substrate	✓		✓	
High-resistivity P-substrate		✓		✓

Features and Specifications (Continued)

Feature	5PAe	1KW5PAe	5PAx	1K5PAx
TSV	Second generation 100µm TSV			
eFuse	✓	✓	✓	✓
Multi-emitter power cells:				
High-performance NPN	$f_{max} = 100\text{GHz}$		$f_{max} = 110\text{GHz}$	
High-breakdown NPN	$BV_{ceo} = 8.3\text{V}$		To be qualified	
High-efficiency LNA NPN		✓	✓	✓
High-efficiency PA NPN		✓	✓	✓
FETs:				
Thin oxide NFET, PFET (3.3V)	✓	✓	✓	✓
Thick oxide NFET, PFET (5.0V)	✓	✓	✓	✓
Thin and thick oxide-isolated NFET (3.3V and 5.0V)	✓	✓	✓	✓
Tight pitch switch FET		✓	✓	✓
Waffle FET	✓	✓		
Resistors:				
PC P+ poly resistor (220 ohm/sq.)	✓	✓	✓	✓
PE poly resistor (3 Kohm/sq.)	✓	✓	✓	✓
Silicided poly resistor (2.8 ohm/sq.)	✓	✓	✓	✓
L1 TaN resistor (60 ohm/sq.)	✓	✓		
Diffusion	✓	✓	✓	✓
Capacitors:				
Thick oxide MOS (1.2 fF/µm ²)	✓	✓	✓	✓
Single nitride MIM (1.35 fF/µm ²)	✓	✓	✓	✓
Dual MIM (2.7 fF/µm ²)	✓	✓	✓	✓
High-density single nitride MIM (2.7 fF/µm ²)	✓	✓		
High-density dual nitride MIM (5.4 fF/µm ²)	✓	✓		
High-voltage MIM (0.6 fF/µm ²)	✓	✓		
Q1 MIM	✓	✓		
Varactors and diodes:				
CB varactor	✓	✓		
NMOS varactor (thin and thick oxide)	✓	✓	✓	✓
Hyper-abrupt varactor	✓	✓		
PIN diode	✓	✓		
Schottky barrier diode	✓	✓	✓	✓
Inductors:				
Analog metal (4µm thick Al)	✓		✓ (Enhanced)	✓ (Enhanced)
Dual metal (4µm thick Al / 3µm thick Cu)	✓	✓	✓ (Enhanced)	✓ (Enhanced)
Interconnect (wire bond, Cu pillar, and lead-free C4 available)	✓	✓	✓	✓