

# Unique Source for Space Microelectronics

- 130 nm/250 nm SiGe BiCMOS
- 8" (200 mm) Wafer Processing Pilot Line
- Advanced Design Kits – Digital and Mixed-Signal for ASIC and MMIC design
- Radiation Tolerant / Radiation Hard IPs
- Technology for Harsh Environments
- Multi Project Wafer Service – IC Prototyping
- Low Volume Production
- Design Support

## About IHP

IHP is a non-profit organization supported by the authorities of the state of Brandenburg and the German Federal government that performs R&D in the field of silicon-based systems, highest-frequency ICs and technologies for wireless and broadband communications especially suited for applications in the highest GHz band thanks to integrated HBT devices with high cut-off frequencies of up to 500 GHz

Manufacturing and Value Added Services for commercial IC production are provided via IHP Solutions GmbH, a fully-owned subsidiary of IHP under private law.

IHP strengths are:

- IP design, back-end and integration
- Process or device characterization
- Silicon evaluation



## IHP GmbH

Leibniz Institute for High Performance Microelectronics  
Leibniz-Institut für innovative Mikroelektronik

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## Project Management / Quality Assurance Space Products

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Leibniz Institute  
for high  
performance  
microelectronics

# Radiation Hard Design Kit

## Technologies for Space ASIC/MMIC Designs



SGB25RH, SG13RH – SiGe:C BiCMOS

## Overview

IHP offers research partners and customers access to its powerful SiGe:C BiCMOS technologies and special integrated RF modules.

These technologies are especially suited for applications in the higher GHz bands (e.g. for wireless, broadband, radar).



## Libraries and IPs

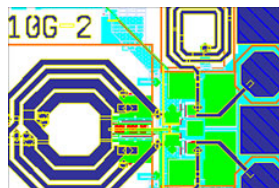
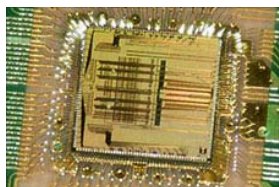
### Device Library

- Extended Operating Temperature Range : -55° C to +125° C
- MOS special layouts (ELT, SLT, JIC)
- MIM Capacitors, MOS Varactors, Inductor Models

### Radiation Tolerant Libraries

Radiation Levels :

- Bipolar (HBT) Devices TID > 800krad
- CMOS TID levels 100krad(Si) – 300krad(Si)
- CMOS SEU Threshold > 35MeV.cm<sup>2</sup>/mg -
- CMOS Special Cells SEU Threshold > 65MeV.cm<sup>2</sup>/mg
- SEL Free > 65MeV.cm<sup>2</sup>/mg



## Supported EDA Tools for RH PDKs

	cadence™	KEYSIGHT TECHNOLOGIES	SONNET
Schematic Capture	✓	✓	
Spice Simulation	✓	✓	
Field Simulation	✓	✓	✓
Layout	✓	✓	
Design Rule Check	✓	✓	
LVS Check	✓	✓	
Parasitic Extraction	✓	✓	✓

\* Third-Party Vendor

## SiGe BiCMOS Process Capability

SGB25RH 250nm SiGe BiCMOS	SG13RH 130nm SiGe BiCMOS
SiGe HBTs npn Peak $f_T/f_{MAX}$ 75/95GHz	SiGe HBTs npn Peak $f_T/f_{MAX}$ 220/340GHz
Mixed-Signal MMIC/ASIC up to Ku-Band	Mixed-Signal MMIC/ASIC up to Ka-Band
+2.5V CMOS Core Voltage	+1.2V CMOS Core Voltage
+2.5V / +3.3V Digital IO Pads	+2.5V / +3.3V Digital IO Pads

## Modeling

	Type	scalable	mismatch	statistical	noise	RF
NPN	VBIC HICUM	✓	✓	✓	✓	✓
MOSFET	PSP	✓	✓	✓	✓	✓
Varactor	PSP MOSVAR	✓	✓	✓	✓	✓
MIM Caps	SPICE	✓	✓	✓		✓
Resistors	SPICE	✓	✓	✓	✓	✓
Inductors	S-Param					✓

## Services

### CMOS Digital Back-End

- Synthesis, Place & Route, Parasitic Extraction
- Research & Development of RHBD techniques
- Device Modeling
- TID Device Characterization
- SEU Testing with External Partners



### EPPL registered

### Listed on European Preferred Parts List

- SGB25RH validated & listed
- SG13RH is under evaluation process
- Extended life time - endurance tested
- Component Standardisation Section at ESA
- European Space Components Coordination
- Supporting innovative technologies while maintaining quality assurance requirements

## Modules

### Special Modules offered for R&D

- Radiation Hardened LDMOS
- Embedded RF-MEMS

