



Overview

GLOBALFOUNDRIES 40nm RFCMOS technology offers a cost-effective solution to address the most challenging wireless RFSoc applications. Built on the company's low power (LP) platform, the 40nm RFCMOS technology combines the benefits of a rich baseline logic technology and IP ecosystem with world-class RF features and PDKs, enabling a seamless transition to digital logic SoCs with higher levels of RF integration. With the emergence of newer technologies seeking higher frequencies and greater bandwidth, the GLOBALFOUNDRIES 40nm LP-RF technology is millimeter design-ready with specific device characterization and PDK enablement tuned for the demands of millimeter wave RF design.

RF-specific Features

Using a multi-Vt baseline logic process, the 40nm LP-RF technology adds RF-specific features such as:

- Deep n-well devices
- LDMOS
- Parasitic bipolar devices
- MOS varactor
- Precision resistors
- MIMcaps/MOMcaps
- Inductors
- Thick metals
- Transmission lines

These features enable you to achieve the performance and integration level required by the most demanding wireless applications. Device mismatch modeling, ESD kit enablement, statistical and corners modeling and DFM features ensure your design is robust and ready for high volume manufacturing.

Robust PDKs

PDK enablement is an integral part of RF design, and our 40nm RFCMOS technology contains specific EDA features that are critical to maximizing first-time-right success in RF. The PDK is built upon layout-optimized scalable devices with hardware-correlated RF SPICE models. The models are further enhanced by precise parasitic extraction models to account for layout-specific impairments which affect RF performance.

Also, we partner with the leading providers in EDA, IP, prototyping and design services who are recognized for helping to accelerate customer time-to-market with reduced manufacturing risk.

A Complete Foundry Platform for RF Design

Silicon Process	RF Models	Design Enablement	Technical Support
<ul style="list-style-type: none"> • f_T : 260 GHz • Low-power CMOS • Collaborative process development • Marketplace success & maturity – Mobility & Connectivity SoCs, GPS, Wi-Fi, millimeter wave, Bluetooth, DTV and more 	<ul style="list-style-type: none"> • Silicon-validated RF Models • Process and corner modeling • Device noise modeling – Monte-Carlo & Statistical • mmWave coverage for active and passive elements 	<ul style="list-style-type: none"> • Devices – FETs, Resistors, MOM/MIM caps, UTM, DNWell, LDMOS • Layout – ESD kit, DRC/LVS/PEX • Advanced RF simulation capability - EMX, HFSS, Momentum 	<ul style="list-style-type: none"> • Regional field technical support • Collaborative IP development through partnerships (ex. Catena, Chipidea) • GlobalShuttle MPW Program • MOSIS MPW program





Baseline Features

Feature	Technology Node: 40nm LP
Core Vdd (V)	1.1
I/O Voltage Options (V)	1.8 / 2.5 / 3.3
Multiple Vt Options	LVt, RVt, HVt
Metallization	Cu , low K
Resistor Options	Nwell, Diff Rs, Sal Poly, UnSal Poly, precision poly resistor
Capacitor Options	APMOM, MIM & MOS Caps
Varactor Options	MOS
LDMOS	5V
VPNP/VNPN	Yes
Thick top metal	3 μ m Cu
28K Al Cap layer	Yes
eFuse	Yes

RF Features

Device	Parameter	40nm Features
SG NFET, PFET	Peak f_T	260, 132GHz
DG NFET, PFET	Peak f_T	42, 22GHz
SG NFET	NF _{min} (dB) @ 5GHz & Vg=Vd=Vdd	0.24
N+/P+ Diffusion Resistor	Sheet Resistance, Tolerance	110 Ω / \square , +/-15%, 197 Ω / \square , +/-15%
N+/P+ Poly Resistor	Sheet Resistance, Tolerance	17 Ω / \square , +/-20%, 618 Ω / \square , +/-15%
Nwell (STI, active) Resistor	Sheet Resistance, Tolerance	1540 Ω / \square , +/-35%, 500 Ω / \square , +/-35%
Precision Resistor*	Sheet Resistance, Tolerance	380 Ω / \square , +/-11%
Inductor (3 μ m Cu + LB Termination)	Q _{peak} @0.22nH (RF) Q _{peak} @0.06nH (mmWave)	27 26
MOS Var (NCAP)	Capacitance Density (accumulation)	14.65fF/ μ m ² (SGNCAP)
	Tuning Range (Cacc/Cmin)	>6 (SGNCAP)
VNCap (M1-M6)	Density, Tolerance	4.25fF/ μ m ² , +/-15%
APMOM Cap (M1-M6)	Density, Tolerance	4.95fF/ μ m ² , +/-15%
MIM cap – Nitride*	Density, Tolerance	2.5fF/ μ m ² . +/-15%
Transmission line	Z0 characteristic impedance @60/80GHz	40 to 100 Ω
Millimeter wave passive structures	Microstrip line, co-planar waveguide, slow-wave co-planar waveguide, 45/90 degree bend, tee junction	

* optional device