

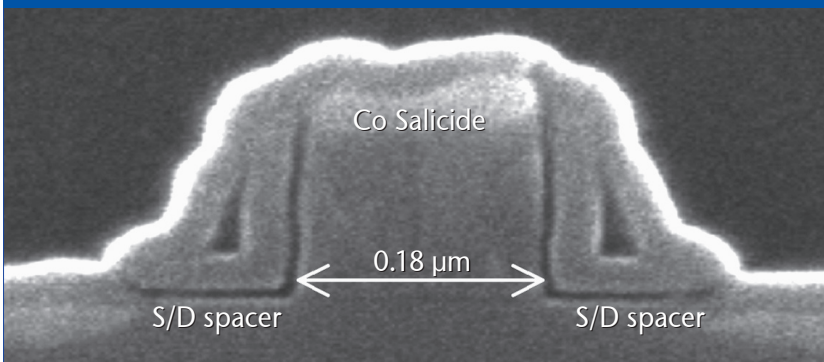
0.18 μm CMOS Process Family



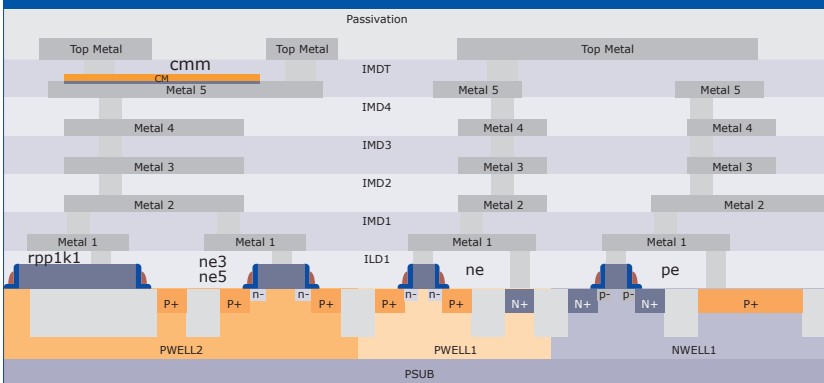
> XC018 RF CMOS

> Modular 0.18 μm CMOS process
available for RF and mixed-signal/analog applications

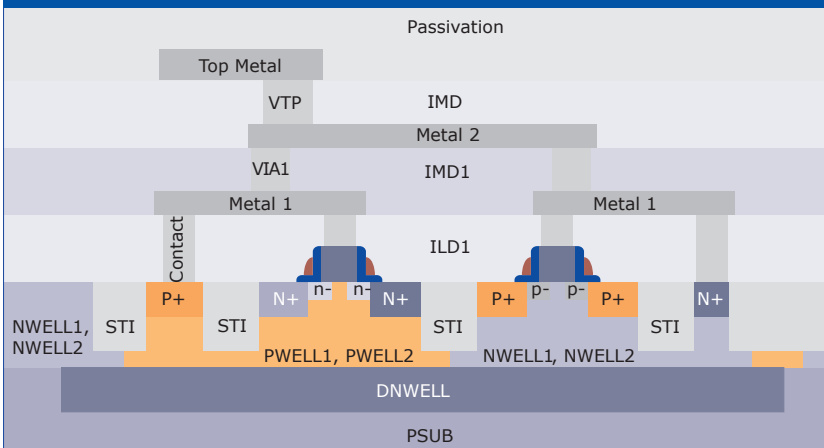
> Poly Gate Cross Section



> HRPOLY, MIM Devices & Metal Scheme



> Extended High-voltage Device



> Module Overview

CORE

MOSST
Standard 1.8V MOS module

MOSLP
Low power 1.8V MOS module

FEOL

MOS3ST
Standard 3.3V MOS module

MOS3LP
Low power 3.3V MOS module

MOS5ST
Standard 5V MOS module

MOS5LP
Low power 5V MOS module

ISOMOS
Triple well isolated MOS module

BEOL

MIM
Single MIM capacitor module

DMIM
Double MIM capacitor module

TMIM
Triple MIM capacitor module

4METALS
4 metal layers module

5METALS
5 metal layers module

6METALS
6 metal layers module

THKMET
Thick top metal module

PIMIDE
Polyimide module resilient barrier

0.18 μm CMOS Process Family

> XC018 RF CMOS

Features

- Logic layout & performance compatible with industry standard
- RF characterisation and models for all RF MOS transistors and passive components (LP module only)
- Standard & Low Power modules
- 1.8V core with 3.3V or 5V I/O module
- Isolation well for all 1.8V, 3.3V & 5V MOS devices
- Thick Top Metal for inductors & smart power application
- Fully documented and characterized:
 - MOS BSIM3v3.24 MOS, BJT Gummel Poon
 - RES, CAP & parasitics
 - MOS 1/f noise included in model
- Digital standard & low power library
- Standard cell library, up to 115k gates/mm²
- Pad / Core limited, RF CMOS IO libraries
- Calibre & Assura verification decks
- Cadence PDK

Design Rules

Parameter	Size [μm]
N-well width	0.86
Active Area width	0.22
Polysilicon Gate	0.18
Contact / Metal 1 width	0.22 / 0.23
Via / Metal width	0.26 / 0.28
Top Via / Metal	0.36 / 0.44

RF Varactor

Parameter	Tuning Range [%]	Q @ 1GHz
1.8V MOS Varactor	57	50
3.3V MOS Varactor	54	70
5V MOS Varactor	45	140
1.8V Diode Varactor	33	60
3.3V Diode Varactor	34	60
5V Diode Varactor	33	60

Transistors (Selection)

Parameter	VT [V] (MOSLP/MOSST)	IDS [$\mu\text{A}/\mu\text{m}$] (MOSLP/MOSST)	BVDSS [V]	Max VDS [V]
NMOS 1.8V	0.60 / 0.43	480 / 620	> 4	1.98
PMOS 1.8V	0.65 / 0.51	170 / 270	> 4	1.98
NMOS 3.3V	0.7 / 0.75	600 / 600	> 7	3.6
PMOS 3.3V	0.63 / 0.69	300 / 290	> 7	3.6
NMOS 5.0V	0.77 / -	530 / -	> 10	5.5
PMOS 5.0V	0.84 / -	240 / -	> 10	5.5

RF Transistors (MOSLP) (Selection)

Parameter	fT [GHz] (NMOS/PMOS)	fmax [GHz] (NMOS/PMOS)
1.8V MOS	50 / 20	75 / 40
3.3V MOS	27 / 15	57 / 30
5.0V MOS	18 / 9	48 / 24

Resistors

Parameter	RS [Ω/\square]
N+ Poly resistor (unsalicide)	330
P+ Poly resistor (unsalicide)	280
P+ Poly resistor high	1000
P+ diffusion resistor	135
N+ diffusion resistor	62
N-well resistor (STI)	970

Capacitors

Parameter	Area Cap [$\text{fF}/\mu\text{m}^2$]	Max VCC [V]
Metal-Insulator-Metal (MIM)	1.0	5.5
Double MIM	2.0	5.5
Triple MIM	3.0	5.5

Inductors

Parameter	Inductance [nH]	Q-Factor
Symmetric Inductors for 2.4 GHz	3.8	15.6
Symmetric Inductors for 5 GHz	2.0	12.9



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