

0.18 µm Process Family:

> XT018

0.18 Micron HV SOI CMOS Technology



DESCRIPTION

The XT018 series is X-FAB's 0.18-micron Modular High-voltage SOI CMOS Technology. It combines the benefit of SOI wafers with Deep Trench Isolation (DTI) and those of a state-of-the-art six metal layers 0.18-micron process. High voltage support up to 200V combined with range of Non-Volatile-Memory options. The XT018 platform is specifically designed

for a next generation automotive, industrial and medical applications operating in the temperature range of -40 to 175 °C.

Full PDK support for major EDA vendors, extensive device characterization and modeling, comprehensive analog, digital, and memory IPs

KEY FEATURES OVERVIEW

- 0.18-micron single poly, 8-inch p-type SOI wafer process
- Deep Trench Isolation
- Modular concept
- Up to six metal layers and thick metal options
- Up to 175°C operating temperature
- Efficient 1.8V & 5V Dual Gate and 5V Single Gate Core modules
- Integrated digital, analog, HV, NVM and SOI in a single process with low mask count
- High-reliability automotive NVM solution using SONOS technology in development
- 10V - 200V HV DMOS transistors
- Excellent specific Ron HV N-channel device performance
- Very fast forward HV diodes
- Zener type diodes with tight breakdown distribution
- Parasitic Vertical PNP BJTs
- Optional high gain BJTs
- High capacitance single, double, triple MIM and Sandwich MIM Capacitors
- Metal fringe capacitors
- Copper redistribution layer
- High density up to 125K gates per mm²
- Typical and worst-case models
- MOS 1/f noise characterized & included in model
- Comprehensive PDK support for Cadence, Mentor, Synopsys and Tanner
- Silicon Frontline R3D support for metal optimization

APPLICATIONS

- Reliable and robust applications up to 200V with 0.18 micron capabilities
- Automotive HV & Analog SoC
- Medical Ultrasound Imaging
- Power over Ethernet (PoE)
- Analog & HV switch arrays

QUALITY ASSURANCE

X-FAB spends a lot of effort to improve the product quality and reliability and to provide competent support to the customers. This is maintained by the direct and flexible customer interface, the reliable manufacturing process and complex test and evaluation conceptions, all of them guided by

strict quality improvement procedures developed by X-FAB. This comprehensive, proprietary quality improvement system has been certified to fulfill the requirements of the ISO 9001, ISO TS 16949 and other standards.

DELIVERABLES

- PCM tested wafers
- Optional engineering services: Multi Project Wafer (MPW) and Multi Layer Mask Service (MLM)
- Optional design services: feasibility studies, Place & Route, synthesis, custom block development

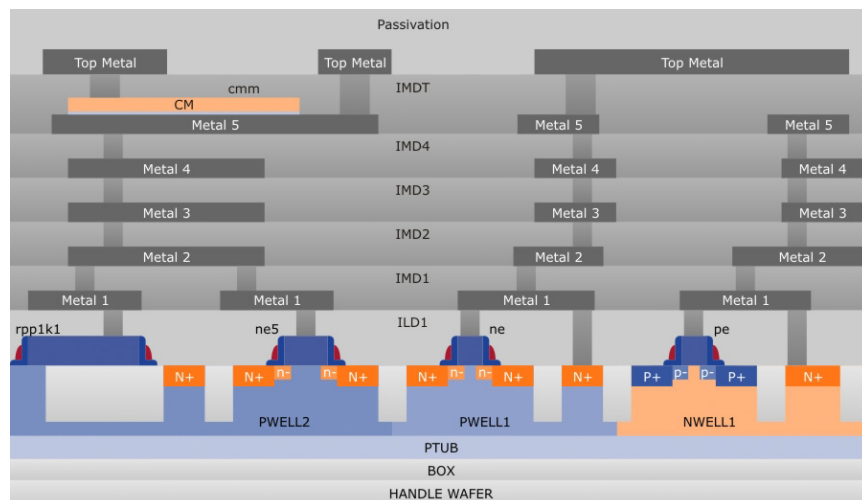
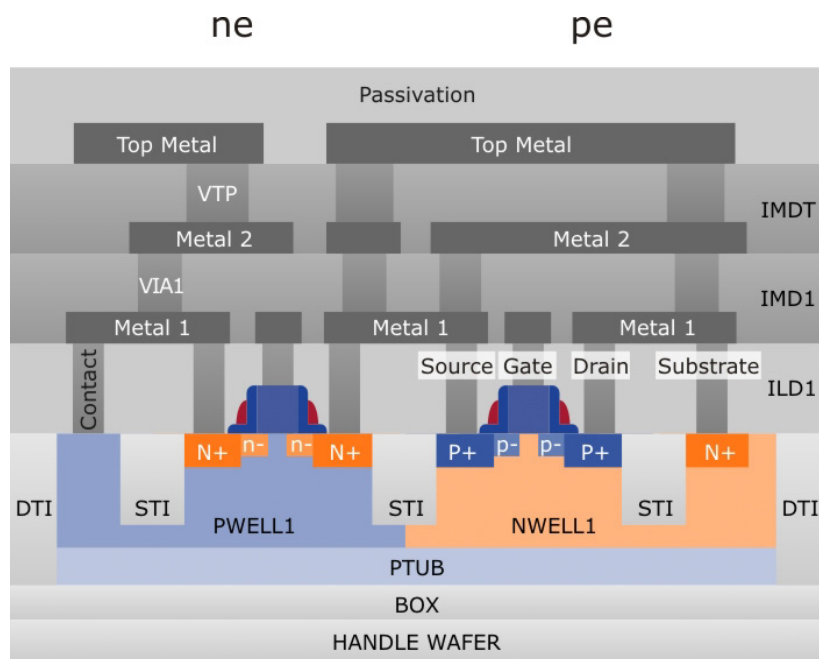
DIGITAL LIBRARIES

- Foundry-specific optimized libraries
- Standard core library for high speed digital blocks
- Low power library for energy efficient and small size digital blocks
- Liberty™ synthesis models
- IEEE 1364 Verilog simulation models
- IEEE 1076.4 VHDL-VITAL simulation models

PRIMITIVE DEVICES

- NMOS/PMOS transistors
- 10V drain extension NMOS/PMOS
- 40V, 60V HV N/P DMOS
- 100V, 140V, 200V Super Junctions N/P DMOS
- Bipolar transistors
- Capacitors
- Resistors
- Diodes
- IGBT

XT018 DEVICES SCHEMATIC CROSS SECTION



XT018 PROCESS FLOW

Core Module	Additional Modules	
Wafer Start	Handle wafer contact	HWC
	N-buried implant	NBUR
Epitaxy		
Active area		
SUB	Deep trench Isolations	DTI
	HV Pwell	HVP
	SJNP implant	1XN
	HV Nwell	HVN
	SJPN implant	1XP
	NBUF implant	NBUF
	N-drain extension implant	NHVA
	P-drain extension implant	PHVA
	NPN bipolar implant	BJTC
	PNP bipolar implant	BJTA
5.0V Nwell		
5.0V Pwell	PZENER implant	DIODEB
	NZENER implant	DIODEC
	nDMOS Pwell	NHVA, DIODEA
1.8V Nwell		LP5MOS, DNC, DPC (MOS5)
1.8V Pwell	Depletion implant	DEPL
	1.8V low Vt well	LVT (LP5MOS only)
1.8V gate oxide		LP5MOS only
5.0V gate oxide		
Poly silicon gate		
1.8V NMOS LDD		LP5MOS, HRPOLY
1.8V PMOS LDD		LP5MOS only
5.0V NMOS LDD		
5.0V PMOS LDD		
Source/Drain implants	MR poly implant	MRPOLY
Salicidation		
Contact		
Metal 1		
Via 1		
Metal 2	High Cap /Double MIM implant	DMIM, DMIMH
	High Cap /Triple MIM implant	TMIM, TMIMH
	Via 2	MET3
	Metal 3	
	High Cap /Double MIM implant	DMIM, DMIMH
	High Cap /Triple MIM implant	TMIM, TMIMH
	Via 3	MET4
	Metal 4	
	High Cap /Triple MIM implant	TMIM, TMIMH
	Via 4	MET5
	Metal 5	
	High Cap /MIM implant	MIM, MIMH
	Top Via	METMID
	Top metal	
	Thick Via	METTHK
	Thick Metal	
	Planarized Passivation	FLATPV
PAD		
	Polyimide	PIMIDE
	Bottom dielectric	BOTDIE
	Thick copper metal	THKCOP

mask steps

XT018 CORE MODULE

Module Name	Descriptions	Masks No.
LP5MOS	1.8/5.0V CORE module	19
MOSS	5.0V CORE module	14

XT018 ADDITIONAL MODULES (FEOL)

Module Name	Descriptions	Masks No.
HWC	Handle wafer contact module	1
NBUR	N-buried module	1
DTI	Deep trench isolation module	1
HVP	Deep P-well module	1
HVN	Deep N-well module	1
1XN	1X super-junction NDMOS module	1
1XP	1X super-junction PDMOS module	1
DNC	DNC module	1
DPC	DPC module	1
PSUB	Sub block module	1
HRPOLY	High resistance polysilicon module	1
MRPOLY	Medium resistance polysilicon module	1
LVT (LP5MOS)	1.8V low Vt module	2
BJTA	Bipolar module	1
BJTC	Bipolar module	1
DEPL	HV depletion module	1
NBUF	N buffer module	1
NHVA	High Voltage NMOS module	2
PHVA	High Voltage PMOS module	1
DIODEA	Diode a module	1
DIODEB	Diode b module	1
DIODEC	Diode c module	1
OTP5	One-Time Programmable Memory module	0
CEEPROM	Core EEPROM memory module	0

XT018 ADDITIONAL MODULES (BEOL)

Module Name	Descriptions	Masks No.
MIM	Single MIM capacitor module	1
DMIM	Double MIM capacitor module	1
TMIM	Triple MIM capacitor module	1
MIMH	Single high capacitance MIM capacitor module	1
DMIMH	Double high capacitance MIM capacitor module	1
TMIMH	Triple high capacitance MIM capacitor module	1
MET3	3-metal module	2
MET4	4-metal module	2
MET5	5-metal module	2
METMID	Top metal module	2
METTHK	Thick metal module	2
THKCOP	Thick copper module	1
BOTDIE	Bottom dielectric	1
FLATPV	Flat passivation	0
PIMIDE	Polyimide module	1

XT018 ADDITIONAL MASK COUNT FOR MODULE COMBINATION

Module Name	When combines with modules	Combined additional mask count
HRPOLY	LP5MOS	0
DNC	LP5MOS	0
DPC	LP5MOS	0
DIODEA	NHVA	2

XT018 METAL OPTIONS

Number of Metals	Available Metal Layer Combinations	Module Name
3	MET1 - MET2 - METTP	LP5MOS/MOS5+METMID
4	MET1 - MET2 - MET3 - METTP MET1 - MET2 - MET3 - METTPL MET1 - MET2 - METTP - METTPL	LP5MOS/MOS5+MET3+METMID LP5MOS/MOS5+MET3+METTHK LP5MOS/MOS5+METMID+METTHK
5	MET1 - MET2 - MET3 - MET4 - METTP MET1 - MET2 - MET3 - MET4 - METTPL MET1 - MET2 - MET3 - METTP - METTPL MET1 - MET2 - MET3 - METTP - METCOP MET1 - MET2 - MET3 - METTPL - METCOP	LP5MOS/MOS5+MET3+MET4+METMID LP5MOS/MOS5+MET3+MET4+METTHK LP5MOS/MOS5+MET3+METMID+METTHK LP5MOS/MOS5+MET3+METMID+THKCOP LP5MOS/MOS5+MET3+METTHK+THKCOP
6	MET1 - MET2 - MET3 - MET4 - MET5 - METTP MET1 - MET2 - MET3 - MET4 - MET5 - METTPL MET1 - MET2 - MET3 - MET4 - METTP - METTPL MET1 - MET2 - MET3 - METTP - METTPL - METCOP	LP5MOS/MOS5+MET3.+MET4+MET5+METMID LP5MOS/MOS5+MET3+MET4+MET5+METTHK LP5MOS/MOS5+MET3+MET4+METMID+METTHK LP5MOS/MOS5+MET3+METMID+METTHK+THKCOP

XT018 RESTRICTIONS FOR MODULE COMBINATIONS

Module name	Use of the module also requires use of the following module(s)	Use of the module is not available with the use of the following module(s)
LP5MOS	METMID, MET3+METTHK	MOSS
MOSS	METMID, MET3+METTHK	LP5MOS
HVN	DTI+PSUB	
HVP	PSUB	
1XN	DTI+PSUB+DPC+HVN+HVP+HWC+NBUR	NHVA, PHVA, BJTA, BJTC
1XP	DTI+PSUB+DNC+HVN+HVP+HWC+NBUR	NHVA, PHVA, BJTA, BJTC
NBUR	HWC+DTI+HVN+PSUB	
BJTA	DTI+PSUB	1XN, 1XP, NBUF, NBUR, HWC
BJTC	DTI+PSUB	1XN, 1XP, NBUF, NBUR, HWC
NBUF	DTI+PSUB+DPC+HVN+HVP+HWC+NBUR+1XN	NHVA, PHVA, BJTA, BJTC
NBUR	HWC, DTI, HVN, PSUB	NHVA, PHVA, BJTA, BJTC
NHVA	DTI, PSUB	1XN, 1XP, NBUF, NBUR, HWC
PHVA	DTI, PSUB	1XN, 1XP, NBUF, NBUR, HWC
DIODEA	PSUB	
DIODEB	PSUB	
DIODEC	DTI+PSUB	
MIM	METMID	DMIM, TMIM, MIMH, DMIMH, TMIMH
DMIM	MET3+METMID, MET4	MIM, TMIM, MIMH, DMIMH, TMIMH
TMIM	MET4+METMID, MET5	MIM, DMIM, MIMH, DMIMH, TMIMH
MIMH	METMID, METTHK	MIM, DMIM, TMIM, DMIMH, TMIMH
DMIMH	MET3+METMID, MET4	MIM, DMIM, TMIM, MIMH, TMIMH
TMIMH	MET4+METMID, MET5	MIM, DMIM, TMIM, MIMH, DMIMH
MET4	MET3	THKCOP
MET5	MET4	METMID+METTHK, THKCOP
METTHK	MET3, METMID	FLATPV
THKCOP	MET3+BOTDIE	MET4, MET5, PIMIDE
FALTPV	METMID	METTHK
HWC	DTI	NHVA, PHVA, BJTA, BJTC
PIMIDE		THKCOP

XT018 BASIC DESIGN RULES

Mask	width [μm]	Spacing [μm]
N-well	0.86	1.40
Active area	0.22	0.28
Polysilicon gate	0.18	0.25
Polysilicon resistor	0.44	0.44
Contact	0.22	0.25
Metal1	0.23	0.23
Via 1/2/3/4	0.26	0.26
Metal 2/3/4/5	0.28	0.28
Top Via / Metal	0.36 / 0.44	0.35 / 0.46
Thick Metal	3.0	2.5

Active Devices

XT018 MOS TRANSISTORS

Device	Name	Available with module	VT [V]	IDS [$\mu\text{A}/\mu\text{m}$]	BVDS [V]	Max. VDS [V]	Max VGS [V]
1.8V native Vt NMOS	nn	LP5MOS	0.12	320	-	1.98	1.98
1.8V NMOS	ne	LP5MOS	0.60	515	> 3.6	1.98	1.98
1.8V PMOS	pe, pe_5	LP5MOS	0.67	195	> 3.6	1.98	1.98
5.0V native Vt NMOS	nn5	LP5MOS, MOSS	0.14	550	-	5.5	5.5
5.0V NMOS	ne5	LP5MOS, MOSS	0.78	520	> 8	5.5	5.5
5.0V PMOS	pe5, pe5_5	LP5MOS, MOSS	0.82	280	> 7.5	5.5	5.5
DTI iso. 1.8V PMOS	peti	LP5MOS+DTI+HVN	0.65	195	> 3.6	1.98	1.98
DTI iso. 5.0V PMOS	pe5ti	DTI+HVN	0.82	280	> 7.5	5.5	5.5

XT018 LVT & DEPLETION MOS TRANSISTORS

Device	Name	Available with module	VT [V]	IDS [$\mu\text{A}/\mu\text{m}$]	BVDS [V]	Max. VDS [V]	Max VGS [V]
1.8V low Vt NMOS	nel	LVT	0.32	675	> 3.6	1.98	1.98
1.8V low Vt PMOS	pel, pel_5	LVT	0.324	335	> 3.6	1.98	1.98
5.0V depletion NMOS	nd5	DEPL	0.9	777	> 8	5.5	5.5

XT018 MV MOS TRANSISTORS

Device	Name	Available with module	VT [V]	IDS [$\mu\text{A}/\mu\text{m}$]	RON*A [$\text{m}\Omega\cdot\text{mm}^2$]	BVDS [V]	Max. VDS [V]	Max VGS [V]
10V drain ext. NMOS	nmva	DTI	0.82	415	7.66	> 12	10	5.5
10V drain ext. PMOS	pmva	DTI	0.85	224	18.62	> 12	10	5.5

Active Devices (Continued)

XT018 HV MOS TRANSISTORS								
Device	Name	Available with module	VT [V]	IDS [$\mu\text{A}/\mu\text{m}$]	RON*A [$\text{m}\Omega\cdot\text{mm}^2$]	BVDS [V]	Max. VDS [V]	Max VGS [V]
Low Ron 40V NMOS	nhvta	DTI+PSUB+NHVA	1.08	200	26	> 45	40	5.5
40V NMOS	nhvtb	DTI+PSUB+NHVA	1.07	190	52.3	> 50	40	5.5
60V NMOS	nhvu	DTI+PSUB+NHVA	1.11	174	114	> 65	60	5.5
Low Ron 40V PMOS	phvta	DTI+PSUB+PHVA	1	131	98.7	> 45	40	5.5
40V PMOS	phvtb	DTI+PSUB+PHVA	1.01	121	151	> 55	40	5.5
60V PMOS	phvu	DTI+PSUB+PHVA	1.02	108	251	> 65	60	5.5
40V depletion NMOS	ndhvt	DTI+PSUB+NHVA+DEPL	1	26	47.6	> 50	40	5.5
Low Ron 40V depl NMOS	ndhvta	DTI+PSUB+NHVA+DEPL	0.9	30	23	> 45	40	5.5

XT018 HV MOS TRANSISTORS								
Device	Name	Available with module	VT [V]	IDS [$\mu\text{A}/\mu\text{m}$]	RON*A [$\text{m}\Omega\cdot\text{mm}^2$]	BVDS [V]	Max. VDS [V]	Max. VGS [V]
100V SJNP HV NMOS	nhsj1_7	DTI+PSUB+1XN+ HVN+ HVP+HWC+NBUR+DPC	1.1	109	315	> 110	100	5.5
100V SJPN HV PMOS	phsj1_7	DTI+PSUB+1XP+ HVN+ HVP+HWC+NBUR+DNC	1.2	61	980	> 110	100	5.5
140V SJNP HV NMOS	nhsj1_10	DTI+PSUB+1XN+ HVN+ HVP+HWC+NBUR+DPC	1.1	95	570	> 155	140	5.5
140V SJPN HV PMOS	phsj1_10	DTI+PSUB+1XP+ HVN+ HVP+HWC+NBUR+DNC	1.2	57	1765	> 155	140	5.5
200V SJNP HV NMOS	nhsj1_16c	DTI+PSUB+1XN+ HVN+ HVP+HWC+NBUR+DPC	1.1	85	1295	> 220	200	5.5
200V SJPN HV PMOS	phsj1_16c	DTI+PSUB+1XP+ HVN+ HVP+HWC+NBUR+DNC	1.2	47	4005	> 220	200	5.5

XT018 BIPOLAR TRANSISTORS						
Device	Name	Available	BETA	VA [V]	VBE [mV]	max. VCE [V]
1.8V vPNP	qpva/b/c	LP5MOS+PSUB	2.7 / 2.8 / 2.8 *	>500 / >200 / >100 *	708 / 669 / 636 *	1.98
1.8V vPNP	qpve/f/g	LP5MOS	2.6 / 2.7 / 2.9 *	>100	708 / 669 / 636 *	1.98
5.0V vPNP	qpva5/b5/c5	PSUB	1.9 / 2.1 / 2.2 *	>500 / >200 / >100 *	709 / 670 / 636 *	5.5
5.0V vPNP	qpve5/f5/g5	LP5MOS, MOS5	1.95 / 2.15 / 2.25 *	>100	709 / 670 / 636 *	5.5
5V NPN	qnv5	DTI+PSUB+BJTC	75	32	> 8	5.5
5V PNP	qp5	DTI+PSUB+BJTA	69	57	> 8	5.5

* Values for $2\times 2\ \mu\text{m}^2$ / $5\times 5\ \mu\text{m}^2$ / $10\times 10\ \mu\text{m}^2$

Passive Devices

XT018 ESD DEVICES

Device	Name	Available with module	BETA	VBE [V]	BVCEO [V]	VEB [V]	Max. VCE [V]
1.8V LV NMOS triggered SCR	rnw_scr	LP5MOS	-	-	-	-	-
5V LV NMOS triggered SCR	rnw5_scr	LP5MOS, MOS5	-	-	-	-	-

These devices are only allowed to be used for ESD protection. Please refer to ESD documentation on XTIC.

XT018 DIFFUSION RESISTORS

Device	Name	Available with module	RS [Ω/\square]	Temp. Coeff. [$10^{-3}/K$]	Max VTB [V]
1.8V N+ diffusion*	rdn	LP5MOS	62	1.4	1.98
1.8V P+ diffusion*	rdp	LP5MOS	135	1.3	1.98
1.8V N-well	rnw	LP5MOS	1020	3.0	5.5
DTI N-well	rxw2ti	DTI+PSUB	460	3.6	5.5
5.0V N+ diffusion*	rdn5	LP5MOS, MOS5	62	1.4	5.5
5.0V P+ diffusion*	rdp5	LP5MOS, MOS5	135	1.3	5.5
5.0V N-well	rnw5	LP5MOS, MOS5	1250	3.0	5.5

* non-salicated

XT018 POLY RESISTORS

Device	Name	Available with module	RS [Ω/\square]	Temp. Coeff. [$10^{-3}/K$]	Max VTB [V]
N+ poly high ohmic	rnp1h, rnp1h_3	HRPOLY	6700	-5.7	200
P- poly	rpp1k1, rpp1k1_3	MRPOLY	1000	-0.9	60
P- poly	rpp1k1a, rpp1k1a_3	MRPOLY	1000	-0.9	200
N+ poly (non-salicated)	rnp1, rnp1_3	LP5MOS, MOS5	330	-1.5	60
P+ poly (non-salicated)	rpp1, rpp1_3	LP5MOS, MOS5	290	-0.11	60
P+ poly	rpp1s, rpp1s_3	LP5MOS, MOS5	7.5	2.9	60

Devices name ending with _3: are 3 terminals devices and variants of the corresponding basic device with an underlying well, but not crossing a well boundary. The models realize an improved description of bulk voltage dependency.

XT018 METAL RESISTORS

Device	Name	Available with module	RS [Ω/\square]	Thickness [μm]	Max J/W [$mA/\mu m$]	Temp. Coeff. [$10^{-3}/K$]	Max VTB [V]
Metal 1	rm1	LP5MOS, MOS5	0.095	0.555	1.0	3.2	200
Metal 2	rm2	LP5MOS, MOS5	0.085	0.555	1.0	3.2	200
Metal 3	rm3	MET3	0.085	0.555	1.0	3.2	200
Metal 4	rm4	MET4	0.085	0.555	1.0	3.2	200
Metal 5	rm5	MET5	0.085	0.555	1.0	3.2	200
Top metal	rmtpl	METMID	0.043	0.975	1.6	3.2	200
Thick metal	rmtpl	METTHK	0.0095	3.00	6	3.5	200
Thick copper redistribution	rmrcl	THKCOP	0.0017	10.00	25	3.6	-

Passive Devices (Continued)

XT018 MIM CAPACITORS						
Device	Name	Available with module	Area Cap [fF/μm ²]	Voltage Coeff. [10 ⁻⁶ /V]	BV [V]	Max VTB [V]
Single MIM	cmm3t, cmm4t, cmm5t, cmm6t	MIM+METMID MIM+MET3+METMID MIM+MET4+METMID MIM+MET5+METMID	1.00	15	> 20	200
Double MIM	cdmm4, cdmm4t	DMIM+MET4 DMIM+MET3+METMID	2.00	3	> 20	200
Triple MIM	ctmm5, ctmm5t	TMIM+MET5 TMIM+MET4+METMID	3.00	15	> 20	200
Single high cap. MIM	cmmh3t, cmmh4t, cmmh5t, cmmh6t	MIMH+METMID MIMH+MET3+METMID MIMH+MET4+METMID MIMH+MET5+METMID	2.20	-120	> 10	200
Double high cap. MIM	cdmmh4t, cdmmh4	DMIMH+MET3+METMID DMIMH+MET4	4.40	-20	> 10	200
Triple high cap. MIM	ctmmh5t, ctmmh5	TMIMH+MET4+METMID TMIMH+MET5	6.60	-120	> 10	200
Single high cap. MIM	cmmh4l, cmmh5l, cmmh6l	MIMH+MET3+METTHK MIMH+MET4+METTHK MIMH+MET5+METTHK	2.2	-120	> 10	200

XT018 FRINGE CAPACITORS					
Device	Name	Available with module	Cap. [fF]	BV [V]	Max VTB [V]
Poly1/M1/M2 fringe	csf2p	LP5MOS, MOS5	22.9	> 15	100
Poly1/M1/M2/M3 fringe	csf3p	MET3	33.8	> 15	100
M1/M2/M3 fringe	csf3	MET3	29.9	> 35	200
60V M1/M2/M3 fringe	csf3a	MET3	21.7	> 70	200
M1/M2/M3/M4 fringe	csf4	MET4	40.9	> 35	200
60V M1/M2/M3/M4 fringe	csf4a	MET4	29.9	> 70	200
M1/M2/M3/M4/M5 fringe	csf5	MET5	52.8	> 35	200
60V M1/M2/M3/M4/M5 fringe	csf5a	MET5	38.0	> 70	200
M1/M2/M3/MT fringe	csft4	MET3+METMID	33.8	> 35	200
60V M1/M2/M3/MT fringe	csft4a	MET3+METMID	26.1	> 70	200
M1/M2/M3/M4/MT fringe	csft5	MET4+METMID	44.9	> 35	200
60V M1/M2/M3/M4/MT fringe	csft5a	MET4+METMID	34.3	> 70	200
M1/M2/M3/M4/M5/MT fringe	csft6	MET5+METMID	56.9	> 35	200
60V M1/M2/M3/M4/M5/MT fringe	csft6a	MET5+METMID	42.4	> 70	200

Passive Devices (Continued)

XT018 SANDWICH CAPACITORS

Device	Name	Available with module	Area Cap [fF]	Perimeter Cap. [fF/ μm]	Max VTB [V]
Poly1/M1/M2/M3	csandwt3	MET3	0.13	0.037	100
Poly1/M1/M2/M3/M4	csandwt4	MET4	0.16	0.052	100
Poly1/M1/M2/M3/M4/M5	csandwt5	MET5	0.20	0.074	100

XT018 MOS VARACTOR

Device	Name	Available with module	Tuning range [%]	Capacitance V+ @100kHz [fF/ μm^2]	Capacitance V- @100kHz [fF/ μm^2]	Max VGB [V]
1.8V N-type Varactor	mosvc	LP5MOS	70	8	2.4	1.98
5V N-type Varactor	mosvc5	LP5MOS, MOS5	64	2.5	9	5.5
1.8V DTI P-type Varactor	mosvcti	LP5MOS+DTI	75	2	8	1.98
5V DTI P-type Varactor	mosvc5ti	DTI	69	0.8	2.6	5.5

XT018 DTI DIODES

Device	Name	Available with module	BV [V]	Diode leakage [fA/ μm^2]	Max VCC
Handle wafer diode 2 DTI	dhw2a	DTI+PSUB+HVN+HWC+NBUR	> 110	0.9	100
Handle wafer diode 2 DTI	dhw2	DTI+PSUB+HVN+HWC+NBUR	> 155	2	140
Handle wafer diode 3 DTI	dhw3	DTI+PSUB+HVN+HWC+NBUR	> 220	3.1	200

XT018 PROTECTION DIODES

Device	Name	Available with module	BV [V]	Max VCC
6V P-type protection	dpp6	HVN+DNC+DTI	5.7	7
7V N-type protection	dnp7	DPC+DTI	7.6	9.6
7V P-type protection	dpp7	HVN+DNC+DTI	7.6	9.4
8V N-type protection	dnpa	PSUB+DIODEA, PSUB+NHVA	7.85	9
8V N-type protection	dnpati	DTI+PSUB+NHVA, DTI+PSUB+DIODA	7.85	9

Passive Devices (Continued)

XT018 RECTIFIER DIODES

Device	Name	Available with module	Vforward [V]	BV [V]	Max VCC [V]
5V rectifier p+ /n	dfwdpa	DTI+PSUB+HVN+DNC	0.77	> 7.1	5.5
6V rectifier n+ /p	dfwdn5	DTI+PSUB	0.706	> 8	6
40V rectifier	dfwdnt	DTI+PSUB+NHVA	0.667	> 50	40
60V rectifier	dfwdnu	DTI+PSUB+NHVA	0.665	> 65	60

XT018 FORWARD DIODES

Device	Name	Available with module	Vforward [V]	BV [V]	Reverse recovery time [ns]	Max VCC [V]
100VSJNP diode	dfwnsj1_7	DTI+PSUB+1XN+H-VN+HVP+HWC+NBUR	0.78	> 110	20	100
140 SJNP diode	dfwnsj1_10	DTI+PSUB+1XN+H-VN+HVP+HWC+NBUR	0.78	> 155	20	140
200V SJNP diode	dfwnsj1_16c	DTI+PSUB+1XN+H-VN+HVP+HWC+NBUR	0.78	> 220	20	200

XT018 ZENER DIODES

Device	Name	Available with module	Ileak [nA/μm ²]	BV [V]	Max VTB [V]
5.3V Zener	dza	PSUB+DIODEB	6	5.32	200
5.3V Zener	dzati	DTI+PSUB+DIODEB	8.5	5.32	200
5.3V Zener	dzbti	DTI+PSUB+DIODEC	0.7	5.34	200

XT018 SCHOTTKY DIODES

Device	Name	Available with module	VForward [V]	IForward [μA]	BV [V]	Max VCC
Schottky diode	ds5	HVN+DTI	0.35	550	> 7.3	5.5

XT018 DIFFUSION DIODES

Device	Name	Available with module	Area junc. cap. [fF/μm ²]	Sidewall Cap. [fF/μm]	BV [V]	Max VCC
1.8V N diffusion / P-well1	dn	LP5MOS	1.27	0.35	> 6	1.98
1.8V P diffusion / N-well1	dp	LP5MOS	0.98	0.21	> 6	1.98
1.8V N-well1 / P-well1	dnw	LP5MOS	0.21	0.48	> 9	5.5
5.0V N diffusion / P-well2	dn5	LP5MOS, MOSS	1.02	0.21	> 8	5.5
5.0V P diffusion / N-well2	dp5	LP5MOS, MOSS	1.29	0.22	> 7.5	5.5
5.0V N-well2 / P-well2	dnw5	LP5MOS, MOSS	0.21	0.47	> 9	5.5

IGBTs

XT018 IGBT							
Device	Name	Available with module	VT [V]	RON*A [mΩ.mm²]	BV [V]	Temp Coeff [mV/K]	Max VCE [V]
200V SJNP NIGBT	nisj1_16	NBUF	1.13	525	220	-2	200

Non-Volatile-Memory

XT018 NVM			
Parameter	EASYFUSE	TrimOTP Compiler	CEEPROM
Available with module	LP5MOS, MOS5	OTP5	CEEPROM
Memory Size	2 to 64 bits	8 to 16k bits	4k bits
Power supply	1.8V (5.0V Vprog.)	5.0V	5.0V
Operating temperature	-40 to +175°C	-40 to +175°C	-40 to +175°C
Endurance			100k cycles @25°C 10k cycles @125°C
Data retention	Min. 10 years @ 85°C	Min. 10 years @ 125°C	Min. 10 years @ 125°C

Standard Cells Libraries

XT018 LOGIC LIBRARY			
Device	Library feature	Voltage range	Application benefits
D_CELLS	standard	1.2V / 1.8V	standard speed & power, availability of low power cells, P&R compatible with D_CELLS_LL
D_CELLS_5V	standard, 5V	2.5 / 3.3V / 4.0V / 5.0V	5.0V supply voltage, 0.5μm channel length, standard speed & power, availability of low power cells
D_CELLS_HD	high density	1.2V / 1.8V	min area, P&R optimized
D_CELLS_HDMV	multivoltage, high density	1.2V ... 5.0V	standard speed & power, multivoltage, high density
D_CELLS_LL	low leakage, low power	1.2V / 1.8V	low leakage, 0.21μm channel length, low power consumption, P&R compatible with D_CELLS
D_CELLS_M5V	standard, multivoltage, 5V	1.8V ... 5.0V	5.0V supply voltage, standard speed & power, multi-voltage
D_CELLS_MV	standard, multivoltage	1.2V ... 5.0V	standard speed & power, multivoltage

I/O Libraries

XT018 I/O CELLS LIBRARY						
Device	Library Feature	V _{CORE} *	V _{IO} *	ESD Level	Application benefits	
IO_CELLS_5V	Standard, 1.8V/5.0V multi supply voltage	1.8V	5.0V	4kV HBM	Pad limited	
IO_CELLS_F5V	Standard, 1.8V/5.0V multi supply voltage	1.8V	5.0V	2kV HBM	Core limited	
IO_CELLS_C1V8	Standard, V _{CORE} =V _{IO} single supply voltage	1.8V	1.8V	4kV HBM	Pad limited	
IO_CELLS_FC1V8	Standard, V _{CORE} =V _{IO} single supply voltage	1.8V	1.8V	2kV HBM	Core limited	
IO_CELLS_C5V	Standard, V _{CORE} =V _{IO} single supply voltage	5.0V	5.0V	4kV HBM	Pad limited	
IO_CELLS_FC5V	Standard, V _{CORE} =V _{IO} single supply voltage	5.0V	5.0V	2kV HBM	Core limited	

* Please refer to the library databook for details about available PVT ranges

ANALOG LIBRARIES

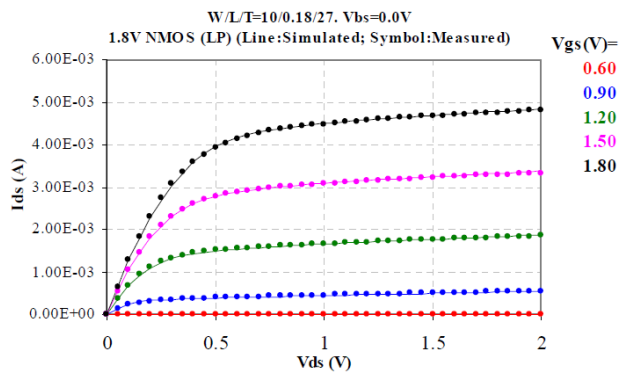
XT018 5V A_CELLS ANALOG LIBRARY

Library	Cell Name	Operating conditions	Required module
Bias Cells	abiac01_5v	VDD: 3.5V to 5.5V; T: -40...175°C	LP5MOS/MOSS, MRPOLY, DTI, MET3
Bias Cells	acsoc01_5v acsoc02_5v	VDD: 4.0V to 5.5V; T: -40...175°C	LP5MOS/MOSS, MRPOLY, DTI, MET3
Bandgap	abgpc01_5v abgpc02_5v abgpc06_5v	VDD: 4.0V to 5.5V; T: -40...125°C	LP5MOS/MOSS, PSUB, DTI, MET3
Operational Amplifier	aopac01_5v aopac02_5v	VDD: 4.0V to 5.5V; T: -40...125°C	LP5MOS/MOSS, DTI, MET3
Comparators	acmpc01_5v acmpc02_5v acmpc03_5v	VDD: 3.5V to 5.5V; T: -40...125°C	LP5MOS/MOSS, DTI, MET3
RC Oscillators	arcoc01_5V arcoc02_5V arcoc03_5V arcoc04_5V	VDD: 3.5V to 5.5V; T: -40...175°C	LP5MOS/MOSS, DTI, MET3
ADC	aadcc01_5v	VDDA: 3.5V to 5.5V; T: -40...125°C	LP5MOS, MET3, METMID, DTI, MIM
DAC	adacc01_5v	VDDA: 3.5V to 5.5V; T: -40...125°C	LP5MOS, DTI, MET3
Power-On-Reset	aporc01_5v	VDD: 3.5V to 5.5V; T: -40...125°C	LP5MOS/MOSS, DTI, MET3
Over-Temperature Detector	atmpc01_5v	VDD: 3.0V to 5.5V; T: -40...175°C	LP5MOS/MOSS, PSUB, MRPOLY, DTI, MET3

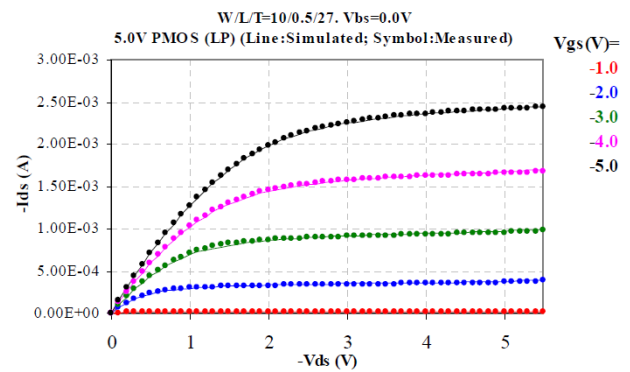
XT018 1.8V A_CELLS ANALOG LIBRARY

Library	Cell Name	Operating conditions	Required module
Bandgap	abgpc01_1v8 abgpc02_1v8 abgpc04_1v8	T: -40...150°C	LP5MOS, PSUB, DTI, MET3
Current Sources	acsoc02_1v8 acsoc04_1v8 acsoc05_1v8 acsoc06_1v8 acsoc07_1v8 acsoc08_1v8 acsoc09_1v8	T: -40...150°C	LP5MOS, DTI, MET3
Comparators	acmpc01_1v8 acmpc02_1v8 acmpc03_1v8 acmpc04_1v8 acmpc05_1v8 acmpc06_1v8 acmpc07_1v8	T: -40...150°C	LP5MOS, DTI, MET3
Operational Amplifiers	aopac01_1v8 aopac03_1v8 aopac05_1v8 aopac07_1v8 aopac08_1v8 aopac09_1v8	T: -40...150°C	LP5MOS, DTI, MET3
Power-On/Off-Resets	aporc02_1v8 aporc03_1v8	VDD < 1.98V; T: -40...150°C	LP5MOS, HRPOLY, DTI, MET3 LP5MOS, DTI, MET3
RC Oscillators	arcoc01_1v8 arcoc02_1v8 arcoc03_1v8 arcoc04_1v8 arcoc05_1v8 arcoc06_1v8 arcoc09_1v8	VDD: 1.5V to 1.98V; T: -40...150°C	LP5MOS, DTI, MET3
Voltage References	avrfc01_1v8	VDD: 1.4V to 1.98V; T: -40...150°C	LP5MOS, DTI, MET3

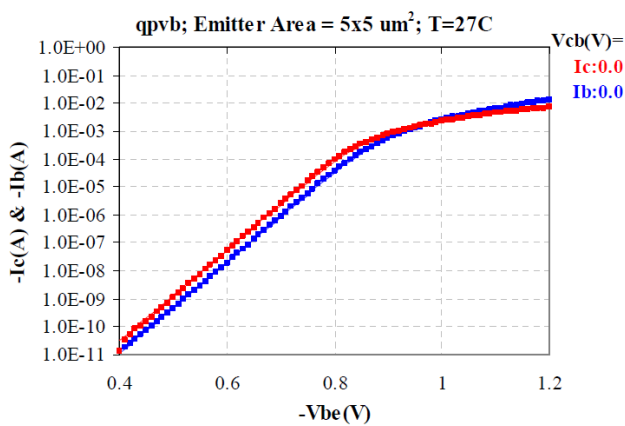
EXAMPLES FOR MEASURED AND MODELED PARAMETER CHARACTERISTICS



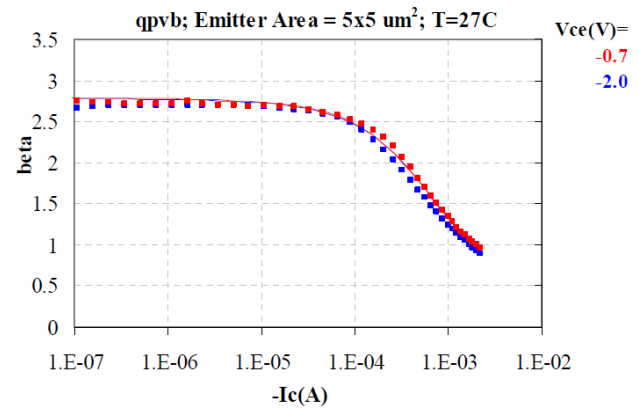
Device ne : Output characteristic for a typical wafer.
W/L = 10/0.18, VGS = 0.6, 0.9, 1.2, 1.5, 1.8V, VSB = 0V,
Symbol = measured, line = BSIM3v3 model



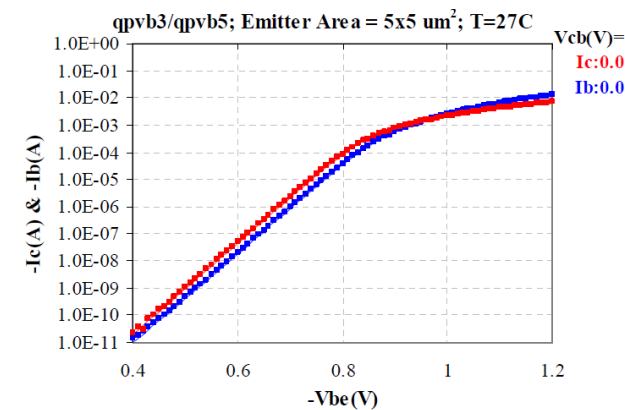
Device pe5 : Output characteristic for a typical wafer.
W/L = 10/0.50, -VGS = 1.0, 2.0, 3.0, 4.0, 5.0V, VSB = 0V,
Symbol = measured, line = BSIM3v3 model



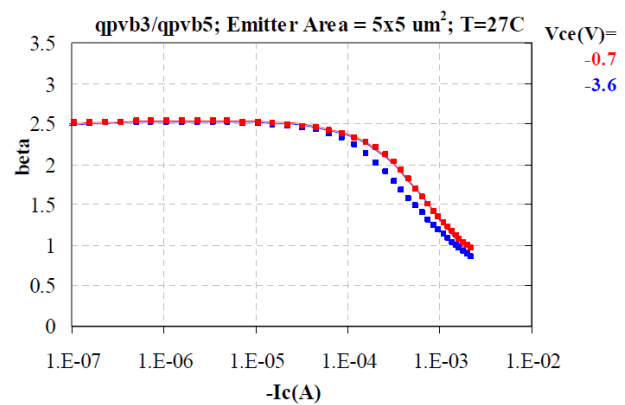
Device qpvb: Gummel plot of 1.8V vertical PNP bipolar transistor for a typical wafer.
Symbol = measured, line = SPICE model



Device qpvb: Current gain of 1.8V vertical PNP bipolar transistor for a typical wafer.
Symbol = measured, line = SPICE model

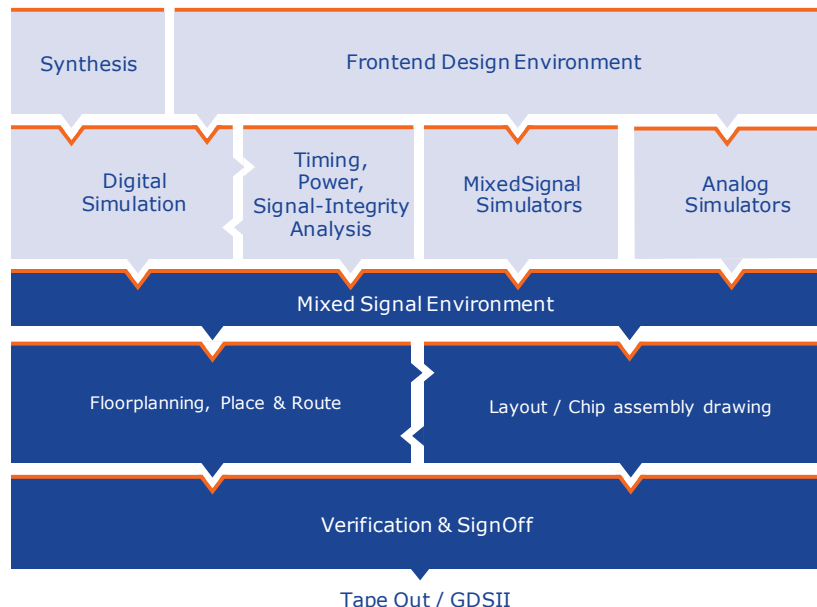


Device qpvb5: Gummel plot of 5V vertical PNP bipolar transistor for a typical wafer.
Symbol = measured, line = SPICE model



Device qpvb5 : Current gain of 5V vertical PNP bipolar transistor for a typical wafer.
Symbol = measured, line = SPICE model

XT018 SUPPORTED EDA TOOLS



Note: Diagram shows overview of reference flow at X-FAB. Detailed information of supported EDA tools for major vendors like Cadence, Mentor and Synopsys can be found on X-FAB's online technical information center X-TIC.

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which contain full front-end and back-end information for the development of digital, analog and mixed signal circuits. Tutorials and application notes are included as well. The Master Kit Plus additionally provides a set of general purpose analog functions mentioned in section "Analog Library Cells" and is subject to a particular license.

CONTACT

Marketing & Sales Headquarters
X-FAB Semiconductor Foundries AG
Haarbergstr. 67, 99097 Erfurt, Germany
Tel.: 49-361-427 6160
Fax: 49-361-427 6161
Email: info@xfab.com
Web: <http://www.xfab.com>

Technology & Design Support
hotline@xfab.com
Silicon Foundry Services
sifo@xfab.com

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