



## **CMP User's meeting 2017**

### **ams Full Service Foundry division**

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# CMP USER'S MEETING 2017

2017-01-26, Paris

AMS OVERVIEW & UPDATES

0.18UM PROCESSES

0.30UM SUPER LOW NOISE HV PROCESS (A30)

FOUNDRY OPTOELECTRONIC PLATFORM

FOUNDRY ECOSYSTEM

## ams at a glance



### Our business

- Focus on high performance sensor solutions
- Sensor solutions, sensor ICs, interfaces, related software
- Small, low power, highest sensitivity, multi-sensor integration
- Full service foundry including packaging and testing options

### Our end markets

- Consumer & Communications (C&C) – 50% of sales H1 2016
- Automotive, Industrial, Medical (AIM) – 50% of sales H1 2016

### By the numbers

- 700+ ams engineers (830+ combined with Heptagon)
- 18+1 design centers, 2+1 manufacturing locations
- 35 years of design and manufacturing know-how
- 2,100+ ams employees worldwide (2,900+ combined with Heptagon)
- 8,000+ customers

# The ams world of sensors

## Smart Phones & Tablet



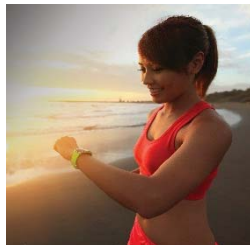
- Ambient light, color & proximity sensors
- Active Noise Cancellation
- Breath analysis
- Gesture recognition
- Environmental sensors
- Spectral sensors

## Automotive



- Air quality sensors
- Position sensors
- Sensors for advanced driver assistance

## Wearables



- Biosensors, heart rate monitoring
- Active Noise Cancellation
- Environmental sensors
- Ambient light, color sensing
- Power management

## Industrial



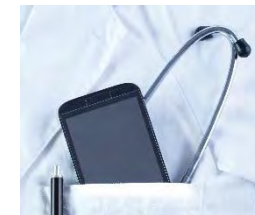
- CMOS sensors for machine vision and drones
- Flow sensors
- Industrial/building automation
- NFC/RFID Sensor Tags
- Position sensors

## Smart Home & Buildings



- Air quality sensors
- Flow sensors
- Gas sensors
- Humidity sensors
- Smart light sensors
- Temperature sensors

## Medical



- CMOS image sensors and miniature cameras for endoscopy
- Image Sensors for:
  - Computed tomography
  - Digital x-ray
  - Surgical robots



# Full service foundry

Your one-stop-shop for turn-key high performance analog IC solutions



## Specialty processes

- 0.18 $\mu$ m, 0.35 $\mu$ m, 0.8 $\mu$ m
- CMOS, HV, SiGe
- AUT & MED certified
- Extended temp range

## Foundry services

- MPW & MLR service
- Benchmark PDK: hitkit
- Highly accurate models
- Digital & analog base IP

## Turn-key solutions

- One-stop-shop
- Mixed-signal test
- Qualification services
- 2nd source capabilities

## More than silicon

- Customized solutions
- 3D IC using TSVs
- Extended IP portfolio
- Advanced packages



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## Status of 0.18 $\mu$ m processes

Technology	C18	H18
status	released	released
hitkit	v4.11 released	v4.11 released
design documents	released	released
MPW runs	available	available
SDT runs	available	available
production	mass prod	mass prod



## Status of 0.18 $\mu$ m processes

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## Status of 0.18 $\mu$ m processes

Technology	C18	H18	aC18	aH18
status	released	released	cond. released	May 2017
hitkit	v4.11 released	v4.11 released	v4.14 released	v4.14 on demand
design documents	released	released	released	prel. docs on demand
MPW runs	on demand	on demand	4 runs in 2017	4 runs in 2017
SDT runs	available	available	available	accepted
production	mass prod	mass prod	ramp up	N.A.

→ All information available on foundry support server!

→ Please contact [hitkit@ams.com](mailto:hitkit@ams.com)

# C18/H18 vs. aC18/aH18 process

Process migration

## Device:

- Not all devices are available at ams
- BE stack different (CU vs. AL, FT, AM)
- Different models / corners
- HV oxide not available
- New IOLIBs

## Action:

re-simulate / replace  
redesign  
re-simulate  
redesign  
redesign

→ Migration guidelines and support available for foundry customers

→ Please contact [hitkit@ams.com](mailto:hitkit@ams.com)



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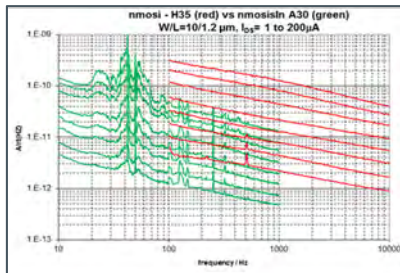
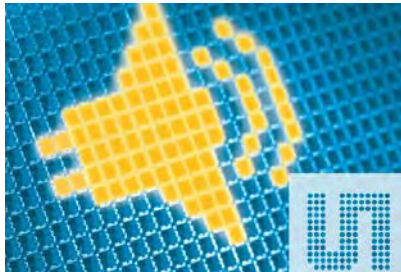
0.30UM SUPER LOW NOISE HV PROCESS (A30)

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# A30 – 0.30μm Analog Low Noise CMOS process

High performance CMOS process optimized for ultra low noise applications



## Technology highlights

- based on industry proven 0.35μm High-Voltage CMOS process
- realized as an optical shrink by a factor of 0.9 from H35
- 3 and 4 metal layers, optional thick top metal 4 available

## Extensive set of high quality devices:




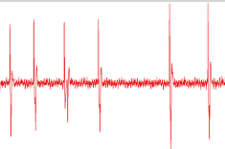




- Optimized super low noise device **NMOSISLN** (noise:  $0.46 \text{ pA}/\sqrt{\text{Hz}}$ )
- Isolated HV NMOSI20T device
- Floating 3.3V NMOS/PMOS (std.  $V_T$  and low  $V_T$ )
- Vertical bipolar devices VERTN1/VERTPH
- Several capacitors (poly, sandwich, MOS varactor)
- Several resistors (poly, high-res poly, precision poly, diffusion, well)

## Advantages & benefits:

- Superior noise performance
- Smaller die size / more dies per wafer
- High yield: Running in mass production (billions of devices shipped)

# Applications & Markets

A30 HPA Low Noise CMOS Process

Market	Application	Device Features & Requirements
Medical	Hearing Aid	Audio signal (amplifier), Noise cancelling  
Medical	Neural Recording	Low Noise Amplifier  
Consumer	Mobile ANC	Headsets, MEMS Micro Amplifier  
Automotive	ANC	Cabin Noise Cancelling  



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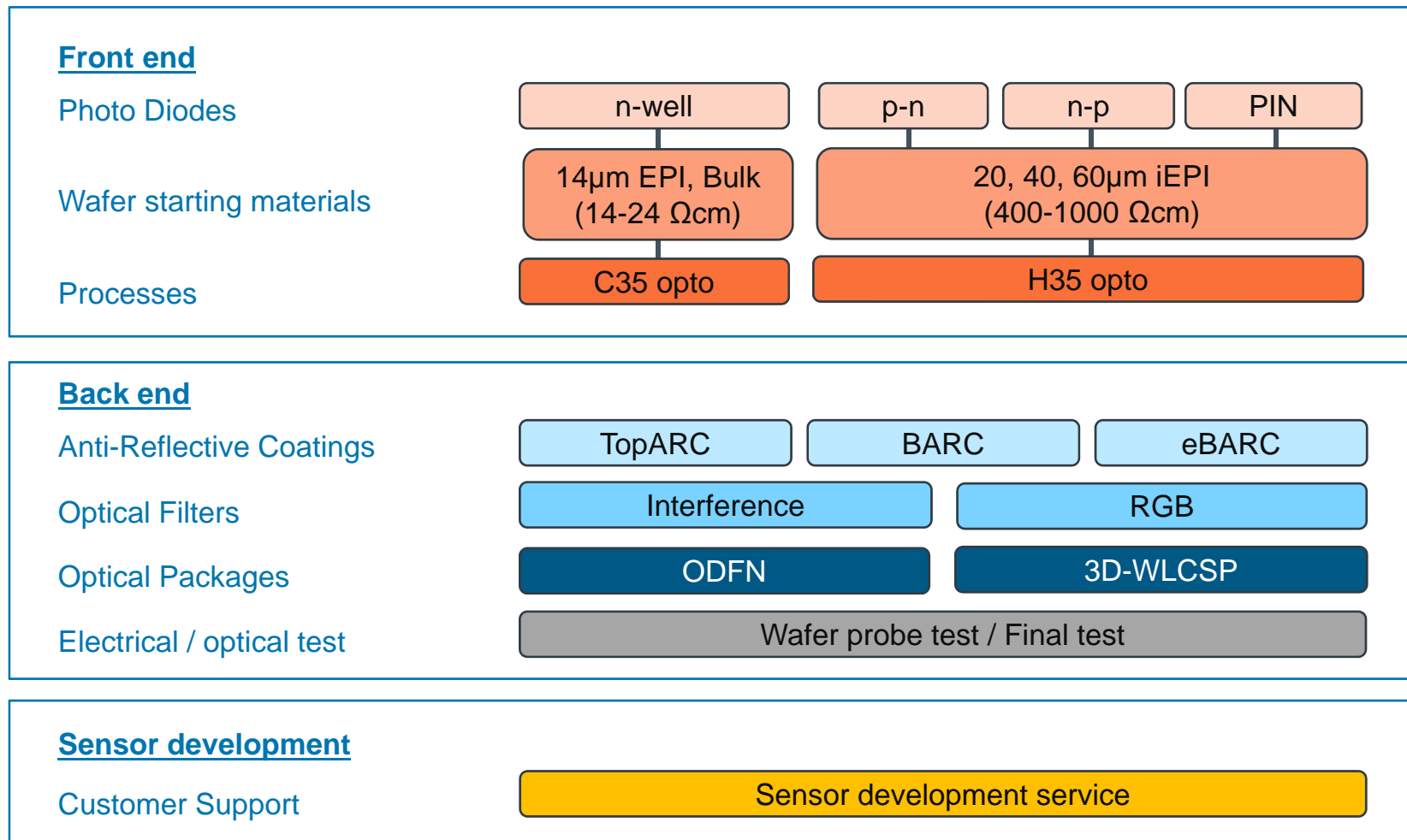
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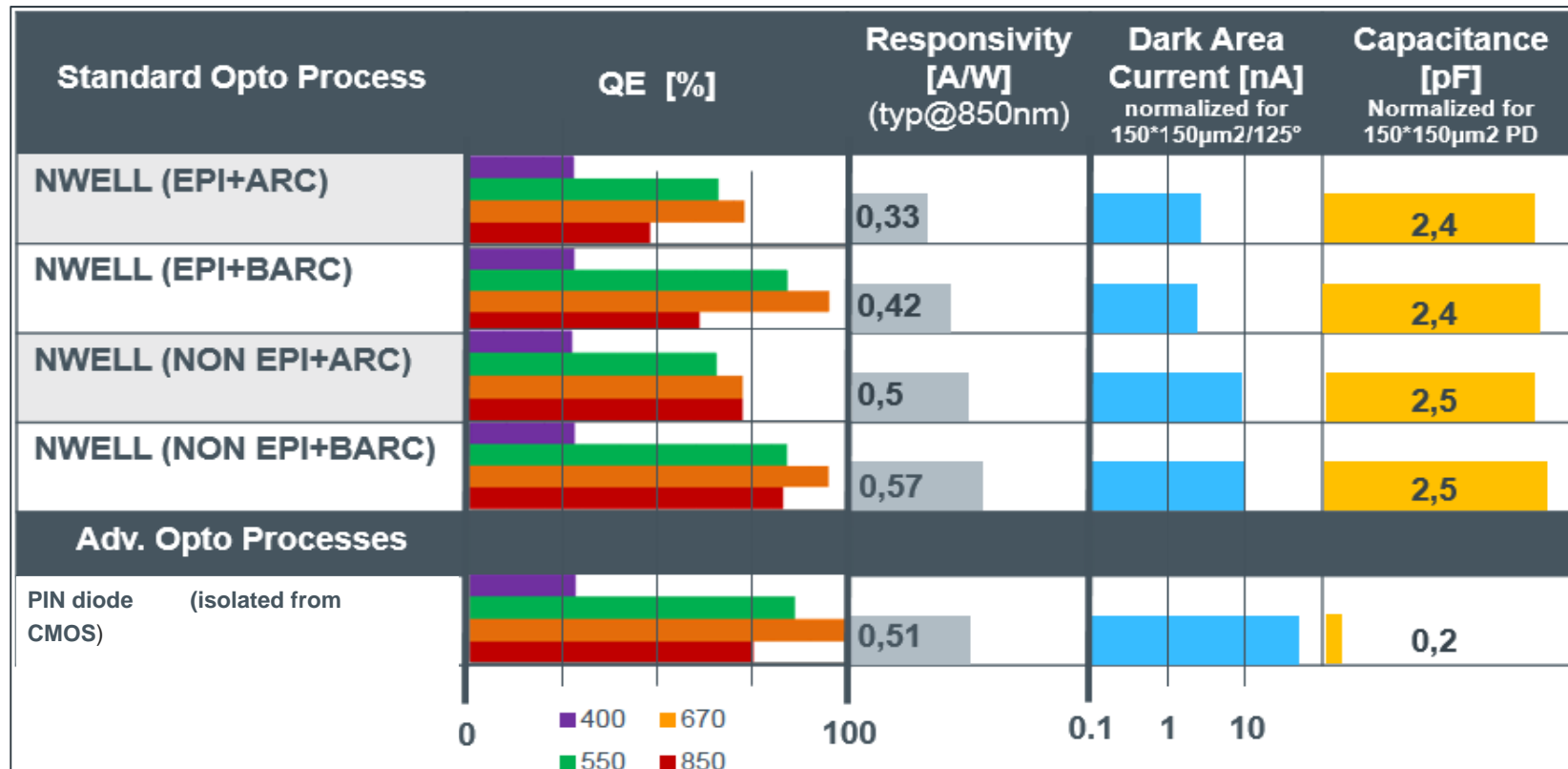
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# Foundry Optoelectronic Platform



# Photo Diodes / Examples



**N-well and PIN photo diodes with different performances in responsivity, dark current and capacities depending on wafer material, ARC or BARC.**





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# Shaping the world with sensor solutions

Advanced analog & mixed-signal semiconductor ecosystem

## PDK

- HD Digital libraries
- IO cells incl ESD protection structures
- Verification rule decks (DRC, LVS, ERC, PEX, ..)
- Various tools: SOAC, LTACC

## IPs & Advanced IPs

- ADCs & DACs
- Bandgaps
- RAMs & ROMS
- OTPs & EEPROM blocks

## Consulting Services & Support

- Design Support
- ESD support
- Place & Route

## Turnkey Solutions

- Test program & hardware development
- Wafer sort & final test
- Assembly services



## 3<sup>rd</sup> Party IP Blocks

- LDOs, Oscillators, PLLs
- ADCs & DACs
- Custom IP block development

## Design Resources

- Block level design
- Complete IC design

## Product Qualification

- HTOL & HAST
- APQP
- PPAP

## 3D-IC technologies

- Through Silicon Vias (TSV)
- Wafer to wafer bonding
- Die to wafer stacking

## EDA Tool Support

- Access to 3<sup>rd</sup> party PDKs
- EDA tool service



**Thank you**

Please visit our website [www.ams.com](http://www.ams.com)