



Revolutionary Tech for Thin Devices

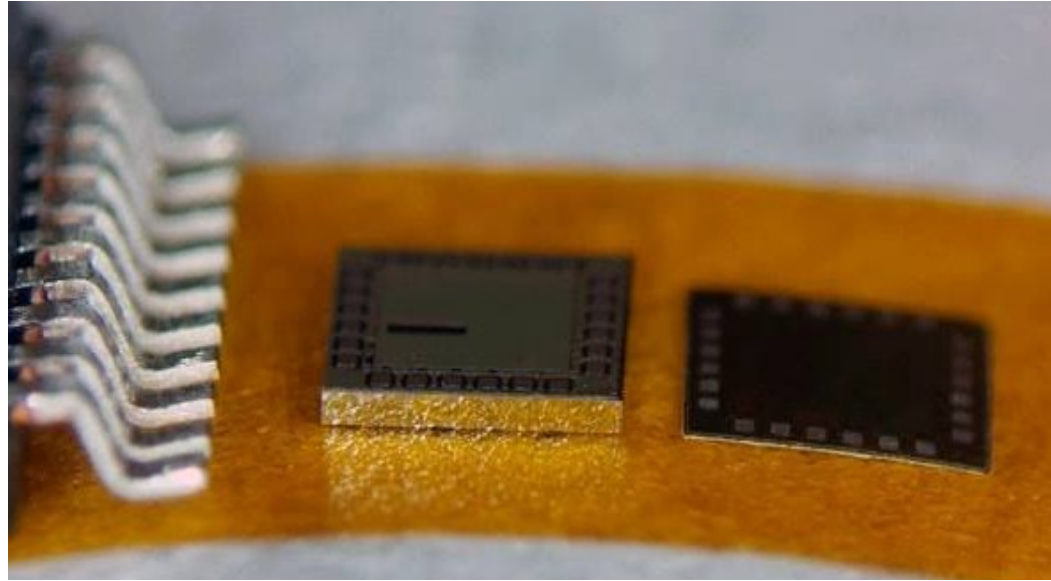
Ultra-thin Chips

Jan 2020

Proprietary Information

Doug Hackler
President & CEO
American Semiconductor

This is how die thickness scaling looks in real life:



SOIC

Bare Die

FleX SoP CSP IC

American Semiconductor produces
the thinnest ICs in the world

American Semiconductor is the industry leader in thin chip technology. We provide state of the art on-shore ultra-thin electronics manufacturing.



- 2-time Boeing SOTY
- Over 21 SBIR wins
- Founded Nov. 2001

Member:



9,000 sq ft FHE Manufacturing Facility



Flexible Hybrid Lab

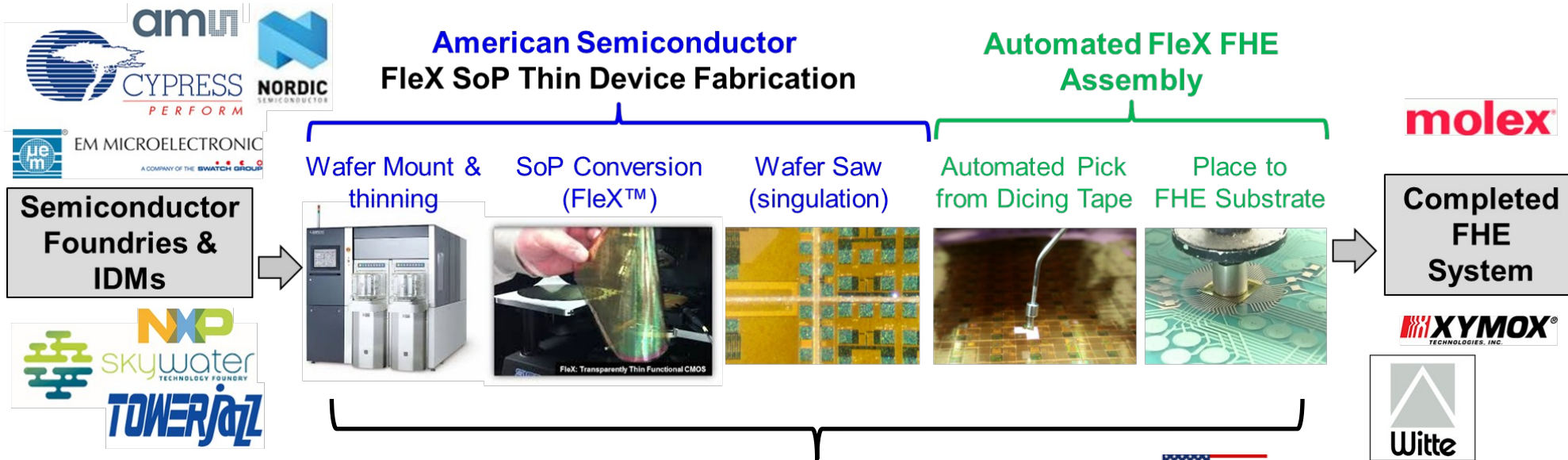



Class 100 Cleanroom

**OEM
Fabs (FEOL)**

**OSAT
(Out Sourced Assembly and Test)**

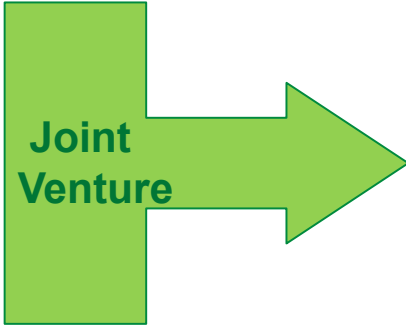
Integrators



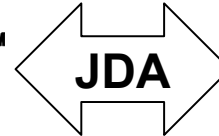
American Semiconductor, Boise 
300mm Wafer Level CSP and Assembly
 (200mm processing available on request)



DUPONT[™]



HD MicroSystems[™]
An Enterprise of Hitachi Chemical and DuPont Electronics



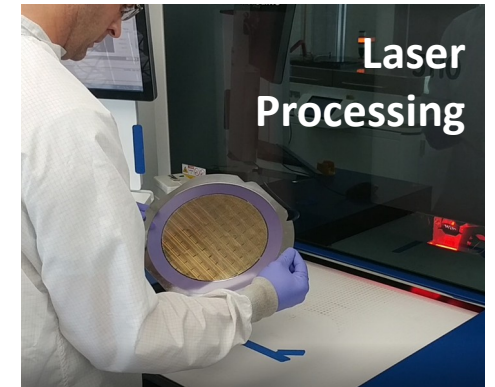
HITACHI

- HD MicroSystems is the world market share leader for semiconductor polyimide materials
- American Semiconductor is a technology leader in ultra-thin IC advanced packaging and assembly
- In February 2019, HD MicroSystems and American Semiconductor announced a joint development agreement to establish production capacity and commercialize Semiconductor-on-Polymer wafer level chip scale packaging based on full polyimide encapsulation of ultra-thin semiconductor ICs.

The world's first volume production facility for Flex™ Semiconductor-on-Polymer™ (SoP) Chip Scale Packaging (CSP)



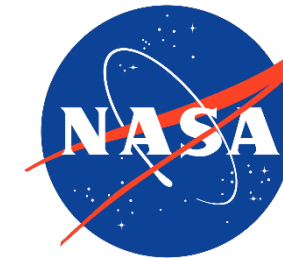
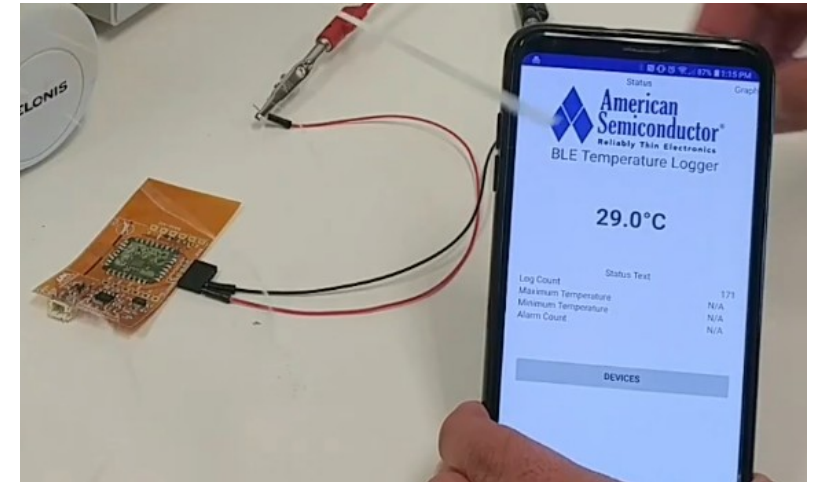
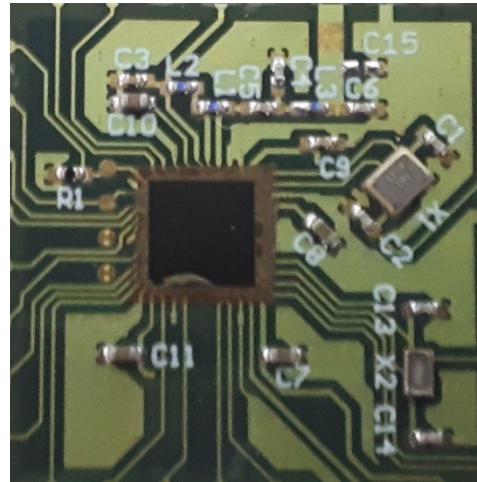
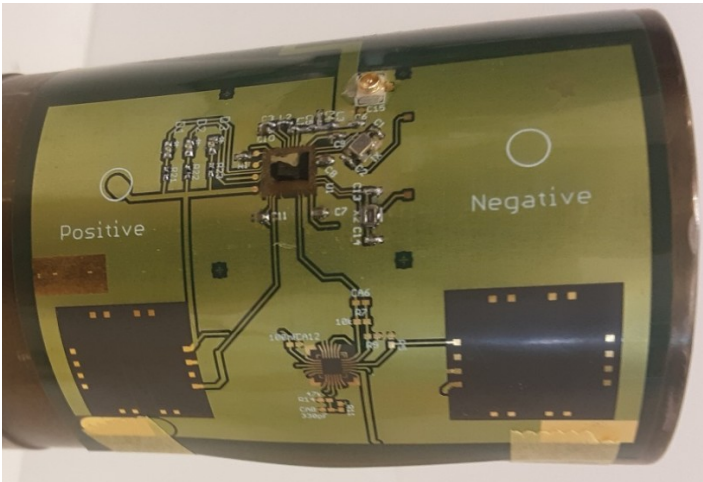
- ✓ 200mm and 300mm WLCSP Processing
- ✓ Flex assembly
- ✓ FHE electronics design
- ✓ 9,000 s.f.
- ✓ On-shore in Boise, Idaho, USA



OSAT for CSP, Assembly & Test



- Multiple active programs in 2019 to produce FleX-BLE systems
- ASI engineering team is doing it all: FleX-IC manufacturing, IC test, system design, flexible circuit board design and layout, firmware and application development

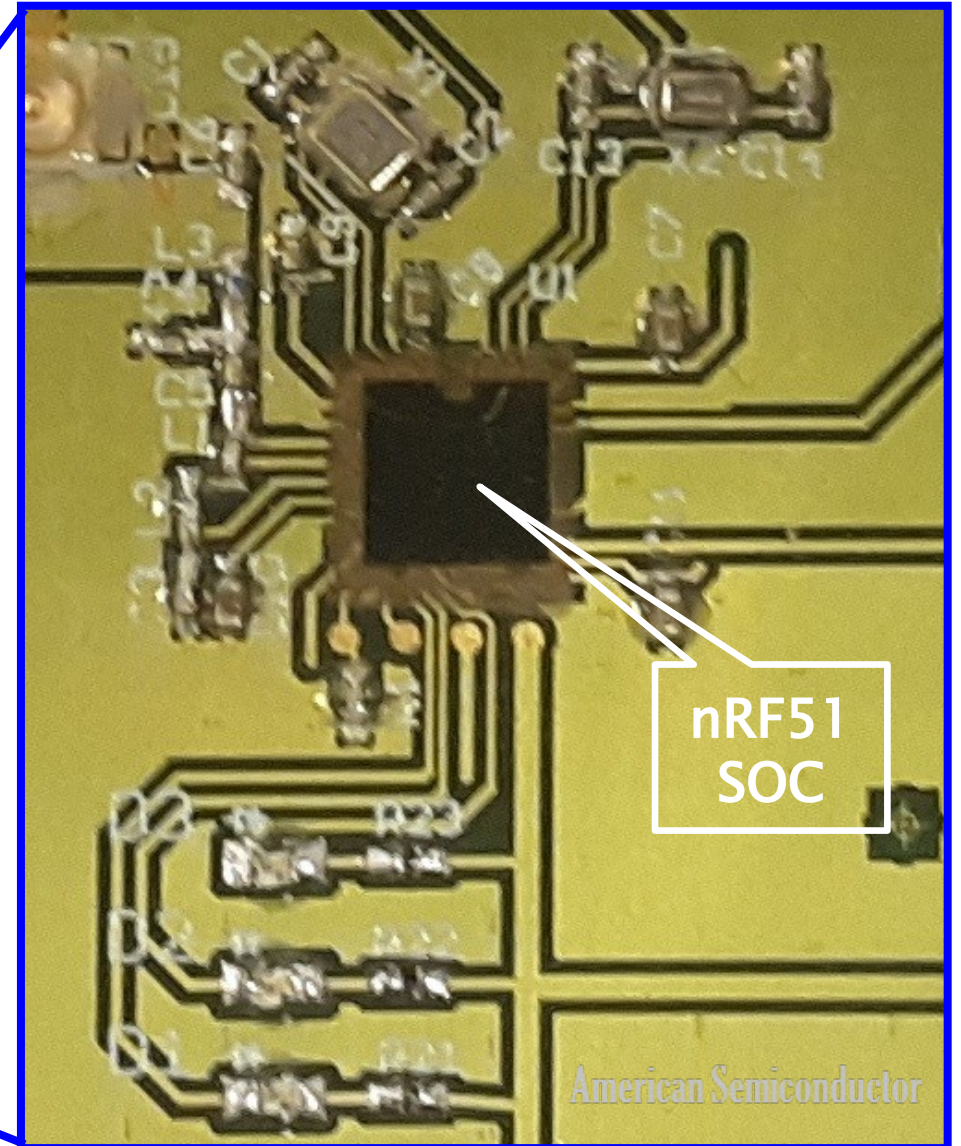
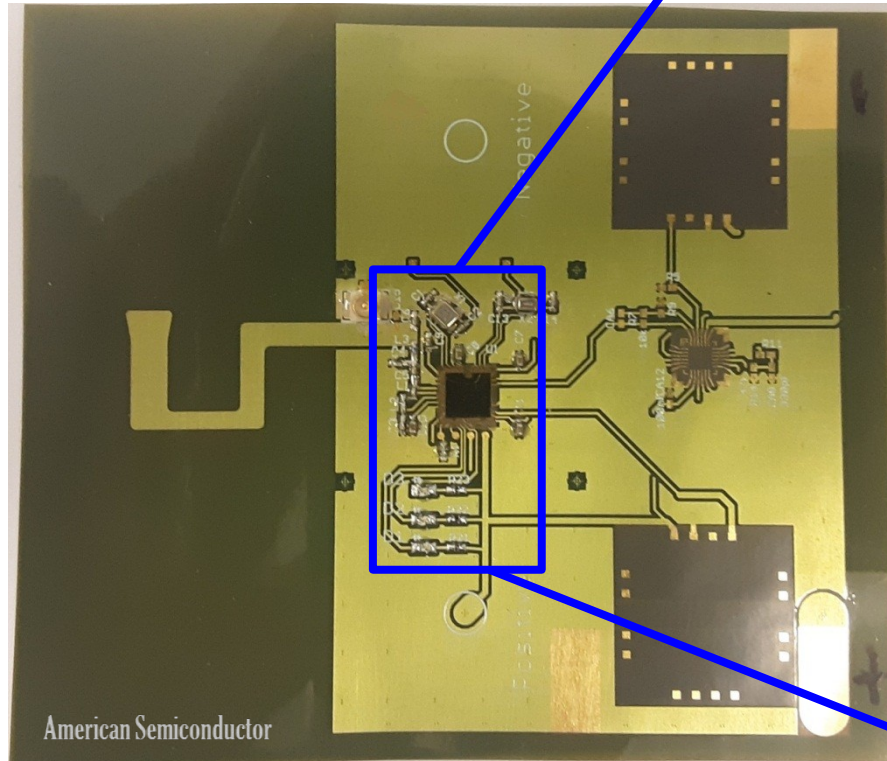


Courtesy NASA
Marshall Space
Flight Center
Huntsville, AL

Bluetooth[®] Development Kit

- Chips on flex
- Flip chip SoP SOC
- Quad OPAMP
- XO
- Caps
- Resistors

Product release
scheduled for
Q1, 2020



Product	Description	Datasheet Link
AS_ADC100x	FleX-ADC Analog-to-Digital Converter: 8-channels, 8-bits ASI (TowerJazz Semiconductor Foundry)	Datasheet
AS_ADC2001	FleX-ADC Analog-to-Digital Converter with 3 Configurable Op Amps ASI (TowerJazz Semiconductor Foundry)	Datasheet
AS_CY820x	FleX-SoC (System-on-a-Chip) with Capacitive Sense Cypress Semiconductor PSOC® CY8C20XX6A/S	Datasheet
AS_EM4325P	FleX-RFID 900MHz RFID Communication Temperature Monitoring IC EM Microelectronics EM4325	Datasheet
AS_NHS3100P	FleX-NFC Temp Logging IC with ARM® Cortex-M0+ NXP Semiconductor NTAG SmartSensor with Temperature Sensor	Datasheet
AS_AM39513	FleX-NFC Sensor Tag IC AMS (Austria Microsystems) AS39513 NFC Sensor Tag IC	In Development
AS_OPA4002	FleX-OpAmp Quad High Performance Op Amps ASI (TowerJazz Semiconductor Foundry)	Datasheet
AS_OPA4003	FleX-OpAmp Quad Output Transconductance Op Amps ASI (TowerJazz Semiconductor Foundry)	Datasheet
AS_CY8C424	FleX-BLE Bluetooth Low Energy with ARM® Cortex-M0 Cypress Semiconductor PSOC® 4 Bluetooth LE	In Development
AS_NRF51822	FleX-BLE Bluetooth Low Energy with ARM® Cortex-M0 Nordic Semiconductor nRF51822	Datasheet

Customer Segments & Value Proposition



Automotive
Interiors
Exteriors
Conforming
Programmable
Sensing

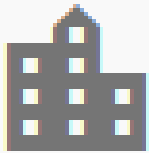


Consumer Products
Wearables
Accessories
Durability
Accessibility
Usability



Healthcare
Bandages
Blood Bags
Clinical Trials
Cold Chain
Personal Health Monitors
Pharmaceuticals
Medical Devices
Vaccines

Durability
Accessibility
Usability



**Logistics &
Warehousing**
Item Tracking
Temperature Tracking
Other sensors



IoT
Communication
Sensing
Tracking

Markets and Applications for FleX-ICs and FHE



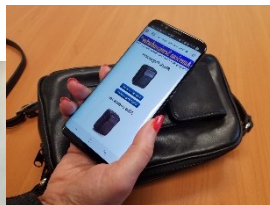
Consumer Wearables Accessories

Wearable Products

- FleX – SOC, NFC, RFID, BLE
- FleX – ADC, OPAMP
- Authentication/Anti-counterfeit
- Consumer data collection
- User customization
- Functional clothing – Heat, Cool, Monitor



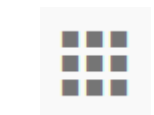
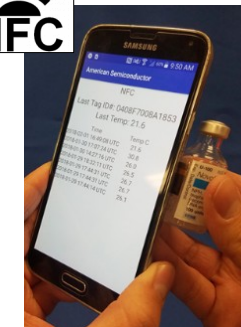
Image courtesy: **DUPONT**



Healthcare
Bandages
Blood Bags
Clinical Trials
Cold Chain
Personal Health Monitors
Pharmaceuticals
Medical Devices
Vaccines

Patient and Pharmaceutical Data

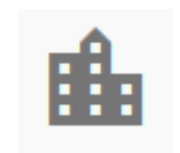
- FleX – SOC, NFC, RFID, BLE
- FleX – ADC, OPAMP
- Wearable monitors and drug delivery
- Remote monitoring
- Embedded Electronics
- Diagnostics
- Environmental
- Medical Equipment
- Consumables
- Smart BioPatch (EKG, Glucose, etc.)



IoT Communication
Sensing
Tracking

IoT

- Smart City
- Smart Home
- Distributed sensing systems
- Mobile commerce
- Asset tracking
- Smart farming



Logistics & Warehousing
Item Tracking
Temperature Tracking
Other sensors

Smart Labels

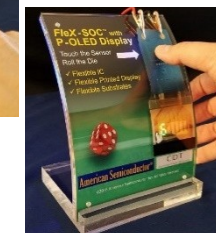
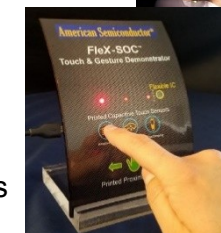
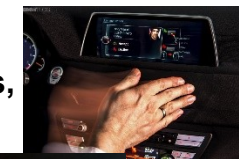
- FleX – NFC, RFID, BLE
- Wirelessly report sensor data without opening shipping cartons
- Passive tags require no battery
- Active logging tags with flexible battery technology



Automotive
Aerospace
White goods
Interiors
Exteriors
Components

Cockpits, Entertainment, Displays, Control Panels, Sensors

- FleX - SOC
- IME (In-Mold Electronics)
- Display Integration
- Smart tires, belts, hoses, fabrics, panels
- Wired and Wireless Sensors





Thank You

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