Pliable Smart Sensor System

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**FleX™ Silicon-On-Polymer**

**FleX** is a substrate conversion process that delivers low cost, high performance CMOS in a flexible format.

**FleX** enables a new generation of durable, pliable ICs that greatly improves the ability to integrate CMOS functionality in flexible electronics.

**FleX** technology combined with Flexfet Advanced CMOS provides an Ultra Low Power solution that further benefits portable and battery powered applications.
American Semiconductor Inc.

- Corporate Headquarters – Boise, ID
  - Engineering – Design, Process, Modeling
  - Operations/Fab Management
  - Test & Characterization Cleanroom
  - Sales, Marketing, Administration

- Manufacturing – San Jose, CA; Austin, TX
  - Fab/Process Engineering

- Manufacturing – Specialty Process Modules

Privately Held
Founded November, 2001

Product Lines
- Design Services – Turnkey Design Solutions
- FleX™ - Silicon on Polymer

ITAR Compliant; Trusted Certification in Progress

This work is sponsored by the Air Force Research Laboratory
FleX™ Properties & Benefits

**Flexibility.**
For integration into flexible systems or conformal on mounting of non-flat surfaces.

**Durability.**
No silicon substrate improves tolerance to both mechanical and thermal shock.

**Size.**
Ultra thin form factor is useful in multi-chip packages and 3DIC.

**Performance.**
Transistors run 50%-100% faster on FleX wafers than on full thickness wafers.

Demonstrating Flexible CMOS

- Start with any SOI wafer from any vendor
- Add polymer layer
- Attach to carrier substrate
- Remove original substrate
- Remove carrier substrate

SOI Substrate
Circuitry
Polymer

Circuitry
Polymer
Carrier Substrate

Circuitry
Polymer
Carrier Substrate

FleX: Transparently Thin Functional CMOS

FleX Silicon-On-Polymer Roadmap

Qualified Foundry Process

Proof-of-Concept
Electrical Testing
Functional CMOS

Flexfet Process

Proof-of-Concept
Electrical Testing
Functional CMOS
Process Qual
Production

Custom Process

Functional Devices
Initial Production
Volume Production

Today
FleX™: Functional When Deformed

- A Flexfet test chip die is singulated and mounted to a #2 pencil
- The deformed die is placed into the wafer probe station
- FleX die functioned in a deformed state

101-Stage Tunable Inverter Ring Oscillator Operating at 1.8V

- Full Thickness Wafer -19% to +20%
- Tuning Range Unaffected
- FleX CMOS SOP -19% to +22%

Orders of magnitude faster, at lower voltage!
Pliable Smart Sensor System

Pliable Smart Sensor System Applications

Fly-by-feel

Conformal Load Bearing Antenna

Pliable Smart Sensor System

FleX IC
Pliable Smart Sensor System Applications

Smart Labels

- Shipper and Recipient Readable Information
- Printed Battery
- Shipper and Recipient Coded Information
- Shipper Coded Information displayed by low power, high contrast display. Shipment can be autonomously rerouted in-transit based on warning or alarm condition.
- Package ID Readable & Coded Information
- Display Can display readable and/or coded information to reflect normal or alert state
- Environmental Detector
- Flexible Microcontroller with embedded memory
- Additional Shipper Information

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SHIP TO:
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Science & Technology Directorate
Washington, DC 20528

SURFACE SHIPMENT
TRACKING# 1234 5678 2468 1357

Low Power, High Contrast Display

ABCD-1234

American Semiconductor Inc.
THANK YOU!

For more information

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