

TEMIC

THE COMPLETE ASIC SUPPLIER

TEMIC: The complete ASIC supplier

- Sub microwatt to multi GHz RF devices
- Digital 622MHz cross connect matrix to fully integrated mixed analog & digital audio path for mobile phones
- Application synergy
- Evolution of special functions and blocks
- Reduced time to market
- Optimized costs

TEMIC offers the way to system level integration

Expertize centers

- **Dialog**
Mixed analog & digital
- **EZIS**
Analog & RF
- **Matra MHS**
Digital

Broadline ASIC capability

Digital MHS

CMOS/BiCMOS

- low power
- high speed
- up to 500k gates

ULC

Arrays

Cell based

Custom/Foundry

Silicon revenues

Mixed Signal Dialog

CMOS/BiCMOS

- medium frequency
- special techniques
- analog/digital

Cell based

Full Custom

Silicon revenues

Analog EZIS

Bipolar/BiCMOS

- up to UHF
- advanced R&D
- special processes

Analog arrays

Full custom

The progressive integration

TEMIC ASSP_s

Standard components

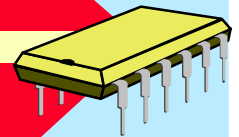
Specialized circuits

Integrated subsystems

TEMIC ASIC

Media & tools

Other products



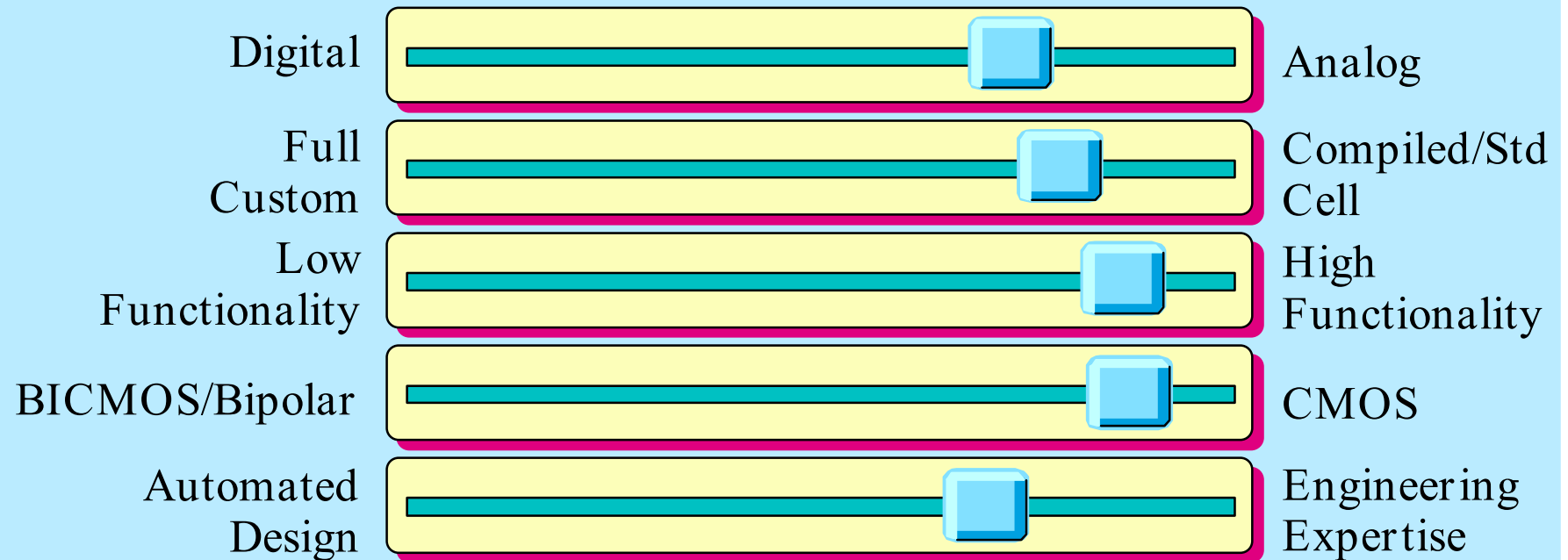
TEMIC ASIC advantages

- Complete ASIC offering for all system requirements
- International company - dedicated world-wide centers of expertise
- Local sales offices with specialized system and design knowledge
- The right technology for all types of ASICs:
 - Processes
 - Assembly
 - Design

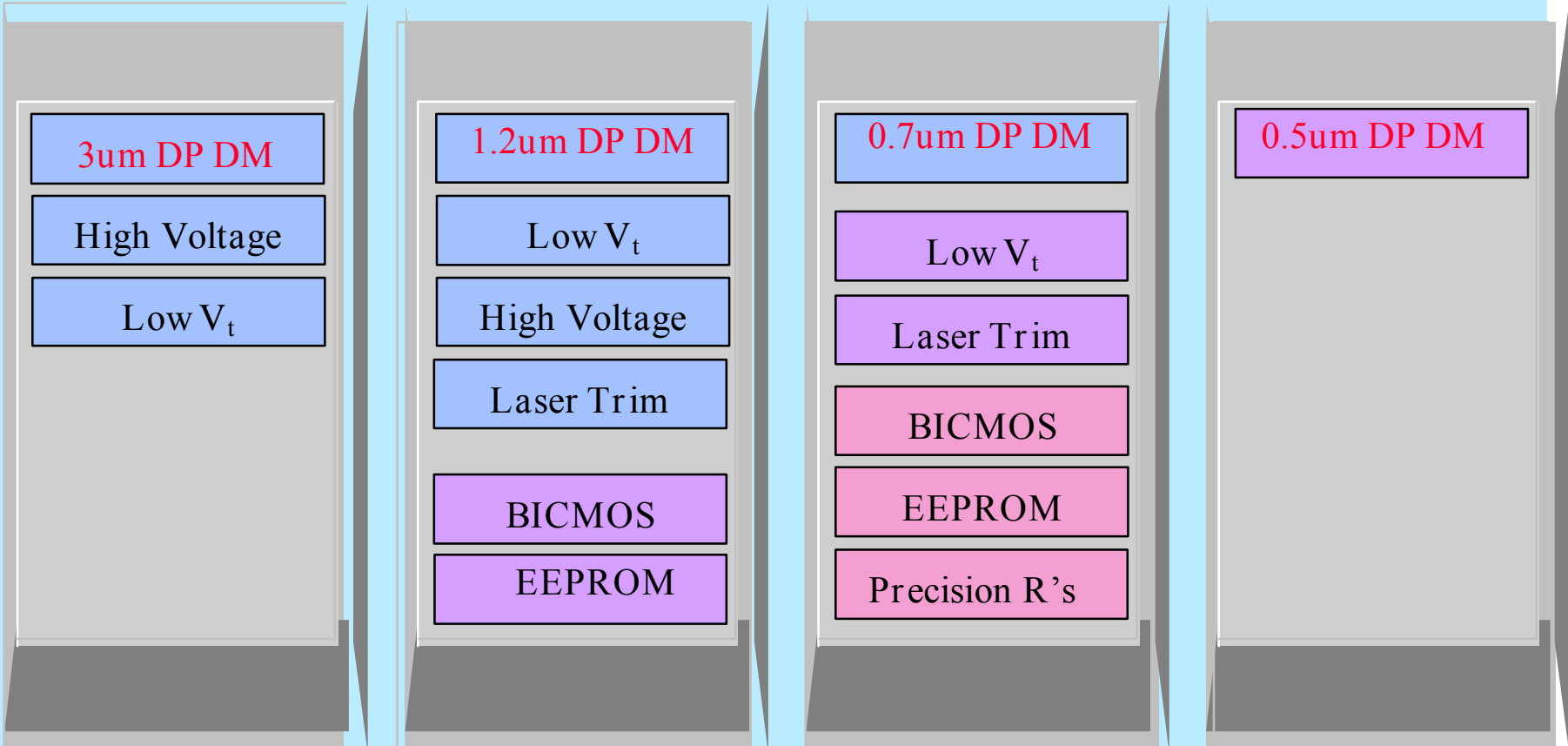
Mixed Signal Products and Services

- Mixed Signal ASIC design and supply
- CMOS foundry service
- Multi-Project Wafer (low cost) prototyping
- Specialist products
- Training & Consultancy

Mixed Signal Technology Positioning

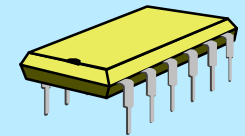
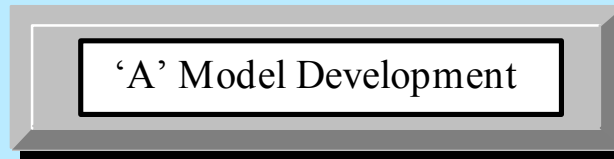
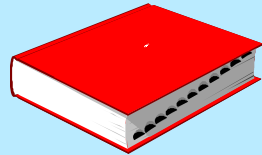


Key Analog Processes

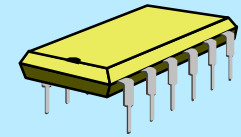
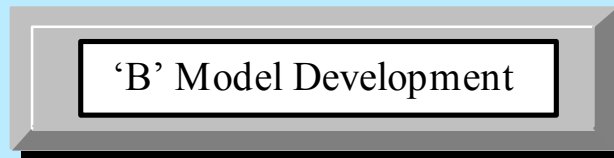


Availability: Now 1996 1997

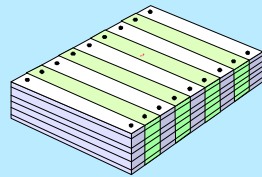
Mixed Signal Design Flow



10 Prototypes



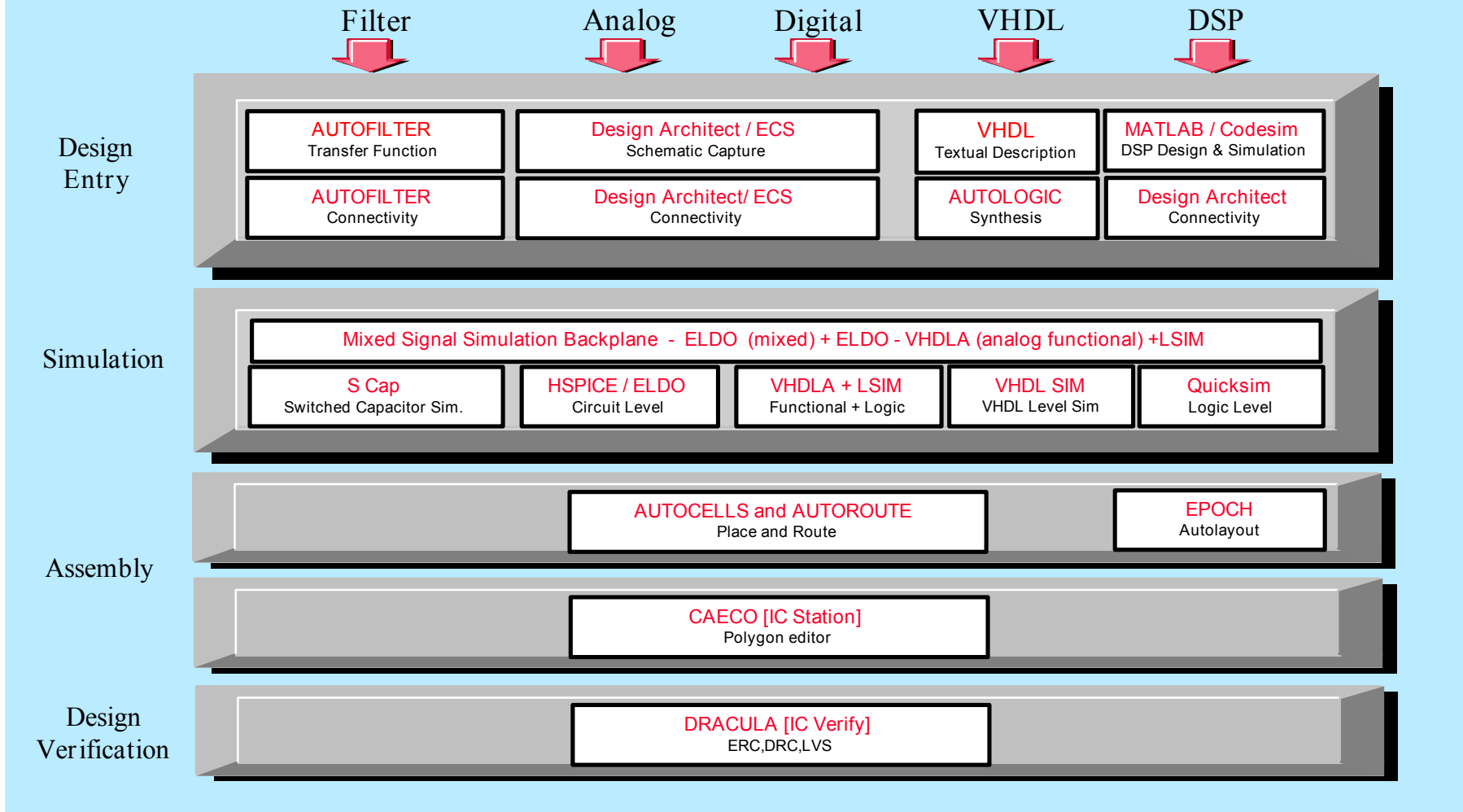
10 Prototypes



Test Program



Mixed Signal Design System



CMOS Analog Cell Performance

Data Converters

ADC/DAC up to 18 bits resolution
ADC/DAC conversion rates up to 20 MHz
General purpose 8 bit converters with
low power consumption (approx. 1mA)

Filters

Switched capacitor filters down to 0.05 Hz
Switched capacitor filter up to 375 kHz
Programmable filters up to 14th order
Poles accurate to within 0.05 %

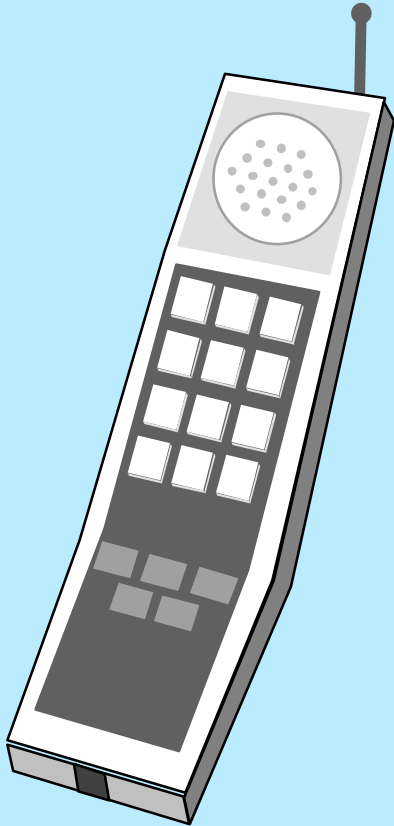
Amplifiers

Frequency response (GBW) up to 200 MHz
Good noise performance (< 20 nV /rt Hz at 20Hz)
Low power consumption ($< 2\mu$ A)
Low offset voltage without trimming ($V_{os} < 1$ mV)
Low voltage operation down to 2 V

Special Cells

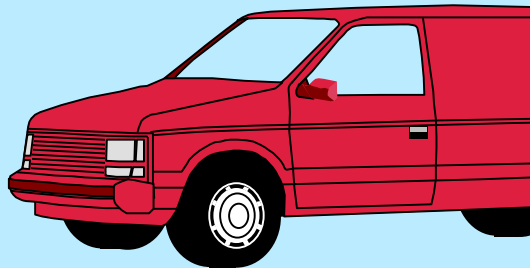
High speed comparator (10 nsec)
Precision bandgap with $TC = 20$ ppm/ $^{\circ}C$
Low power bandgap reference ($\pm 5\%$ accuracy)
High swing output opamp (within 50 mV of rails)
DTMF with total distortion $< 1\%$

Mixed Signal Experience - Communications



- Speech scrambling and encryption
- Handset power management
- DTMF decoders/dialler
- Voice-over modem
- Long haul digital data communication
- Serial interface controller
- Cellular/mobile phone audio processing

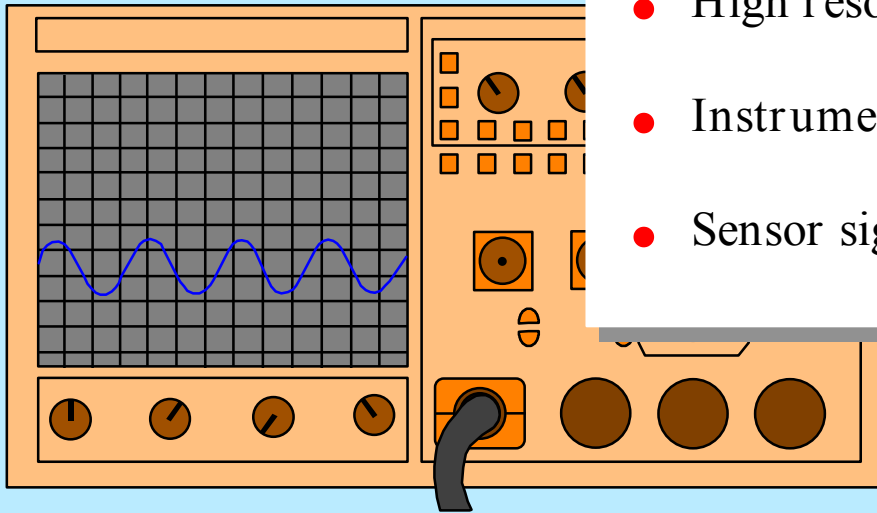
Mixed Signal Experience - Automotive



- Airbag electronics
- Dynamic suspension / power steering
- Security alarms / safety
- Heater motor regulation (air conditioning)
- Gearbox controls
- 3 function timer
- Throttle valve sensor

Mixed Signal Experience - Industrial

- Energy management / metering
- Power control
- High resolution intelligent sensor systems
- Instrumentation
- Sensor signal conditioning



Mixed Signal Experience - Consumer/Computer



- Mass storage
- Ultrasonic/passive PIR detector
- Sound generators and synthesizers
- Heart rate monitor
- Medical analyzer
- Satellite and cable TV / PIP / OSD

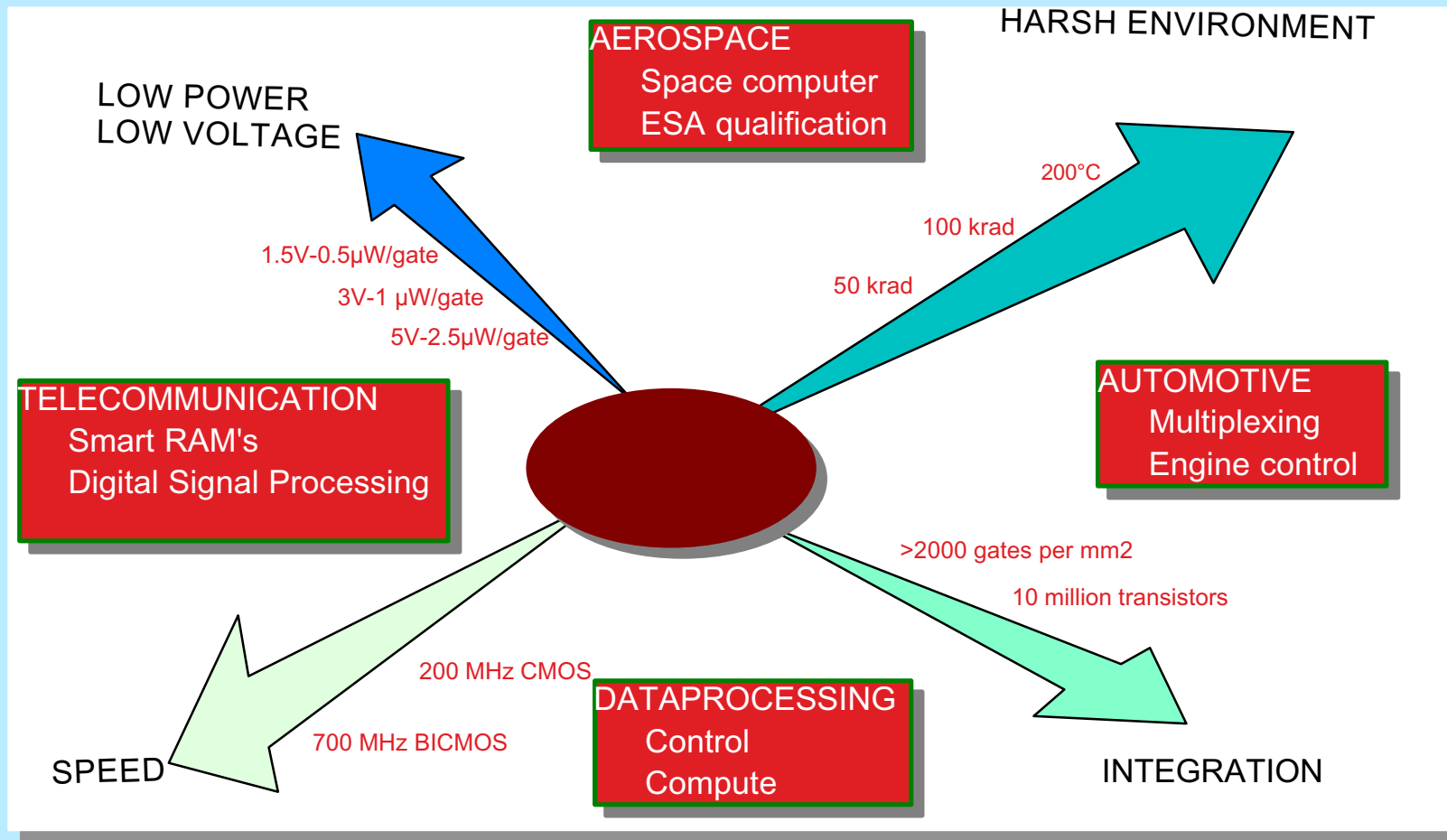
Analog Arrays

- Suitable for low volume production
- Quick time to market
- Bipolar technology
- Can integrate diodes, resistors, transistors, capacitors
- Cell library and design manual available

Analog Arrays Families

- Series A (4 arrays)
 - 24 V and 30 V options
 - f_t npn 500 MHz; pnp 5 MHz
 - arrays include up to 1000 analog components
- Series D (2 arrays)
 - 24 V and 30 V options
 - f_t npn 500 MHz; pnp 5 MHz
 - arrays include up to 500 analog components & up to 360 I²L gates
- B2000S UHF array
 - 2500 analog components (5000 with combination)
 - f_t npn 15 GHz
 - double metallization

Digital ASIC TREND



Digital ASIC solutions (1/2)

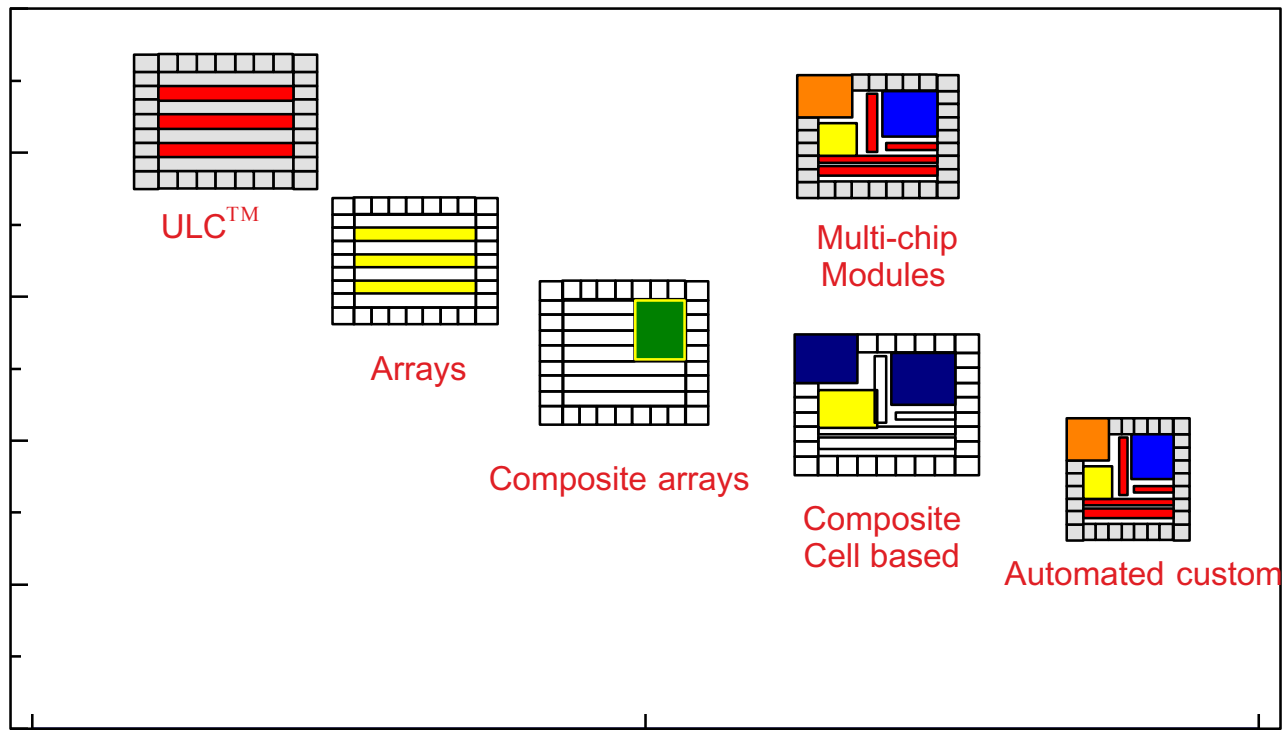
- SCMOS 0.85 μ m Arrays from 0.4k to 86k gates
- BiCMOS 0.85 μ m Arrays from 0.8k to 102k gates (speed, output current, ECL interface,...)
- SCMOS 0.6 μ m, 3 Metal layers Arrays from 1k to 500K cells, from 24 to 480 I/Os
 - ❑ 2000 Dual Port RAM bits per mm²
 - ❑ 2000 usable gates per mm²
- Composite arrays with specific hard blocks : RAM, ROM, specialized processors, signal processing, analog interfaces, standard functions.

Digital ASIC solutions (2/2)

- Conversion of field programmable circuits (ULC) : PLD, FPGA, ...
- Cell Based compiler on SCMOS 0.85 μ m and 0.6 μ m, using COMPASS.
- Automated custom for circuit optimization:
 - ❑ turnkey design
 - ❑ on request dedicated function development
- Foundry on standard processes: CMOS 0.85 μ m, BiCMOS 0.85 μ m, CMOS Analog 0.85 μ m, CMOS 0.6 μ m.
- High-performance, silicon-based Multi-Chip Modules

Full palette of TEMIC solutions

Flexibility & unit cost



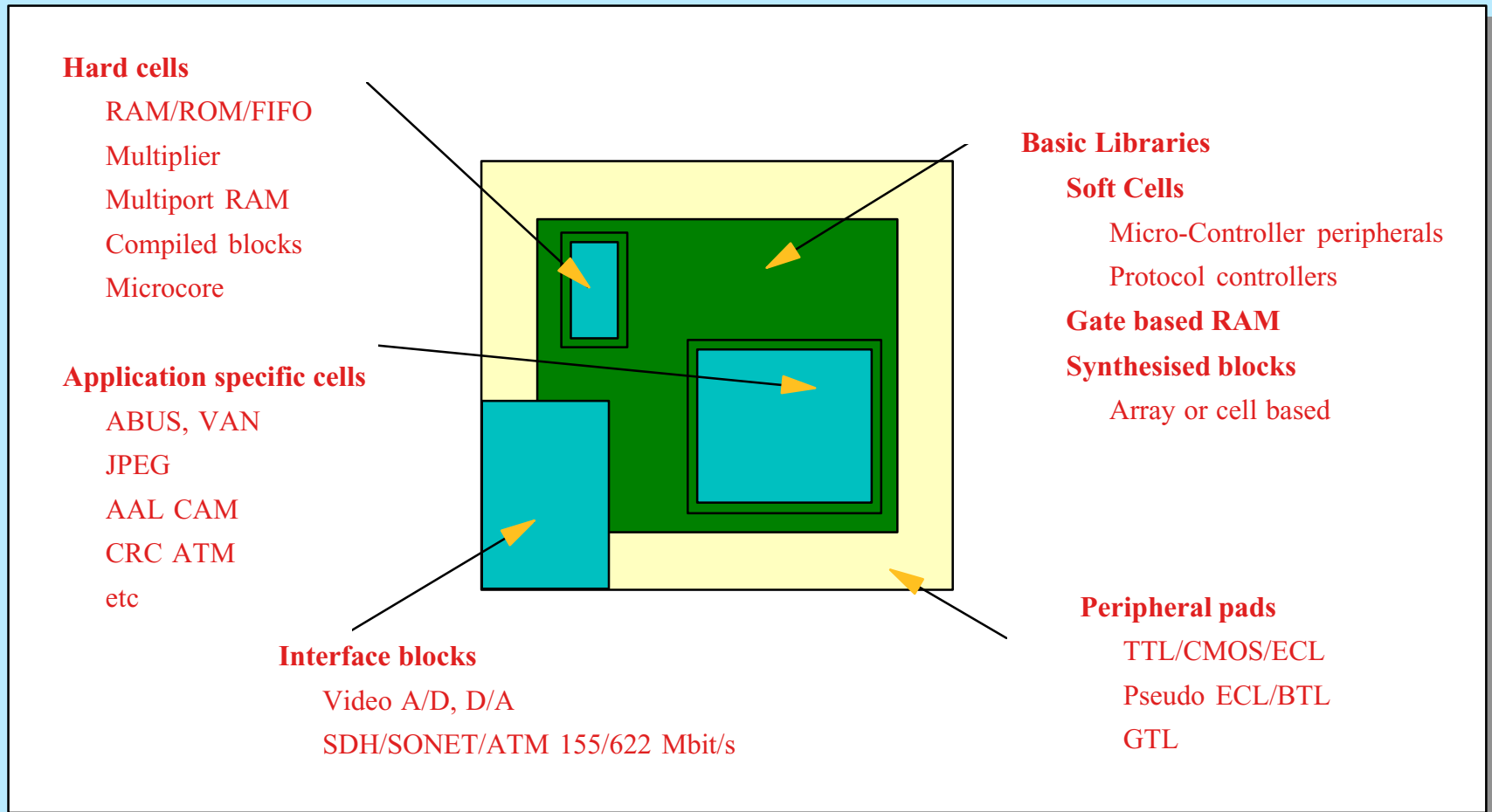
Density & Development cost

we have technologies that can grow with your changing need

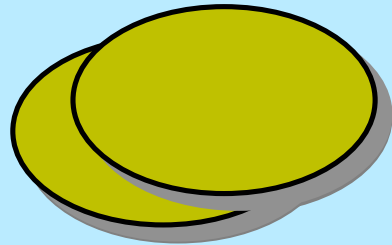
Digital ASIC CAD tools

- Supporting industry standards : CADENCE, MENTOR, COMPASS, SYNOPSYS.
- Tools for preplacement, pre/post-simulation, high level models (VHDL/VITAL), clock synthesis, power estimation, packaging editor, ...
- System-oriented, local Integration Centres for close users support.

Digital ASIC Composite principle



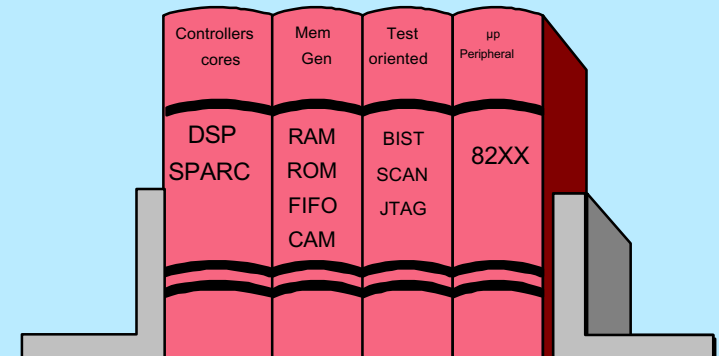
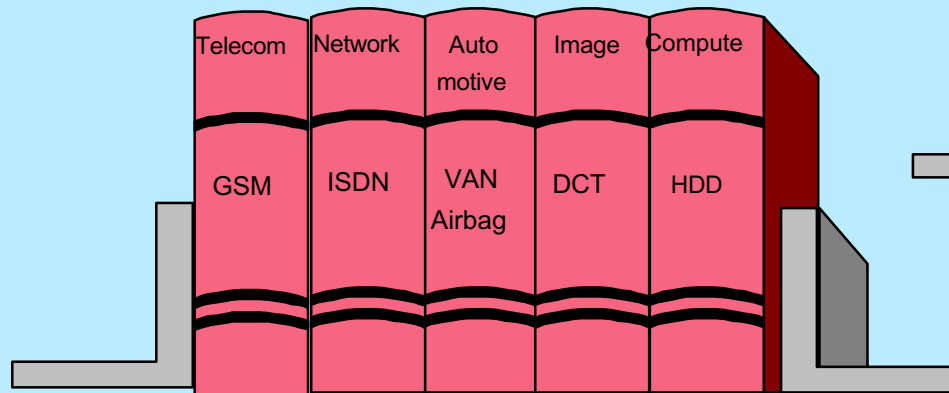
Digital ASIC high level libraries



Validated on silicon

General purpose libraries

Application Specific libraries



System integration criteria

Technical

- Performance
- Flexibility
- Power consumption

Financial

- Development cost
- Production cost
- Risk management

Marketing

- Time to market
- Packaging
- Protection of innovation

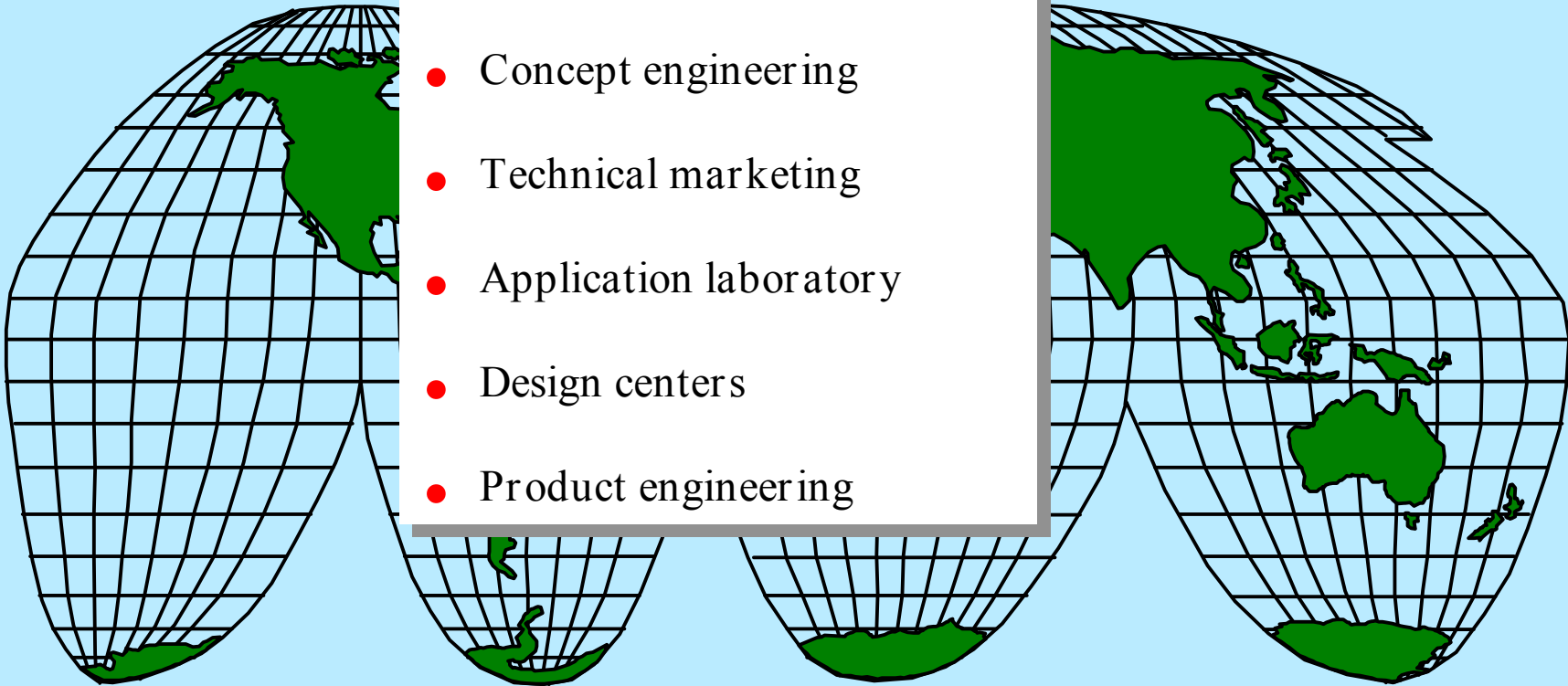
TEMIC, The optimal ASIC solution

Digital ASIC Integration Scenario

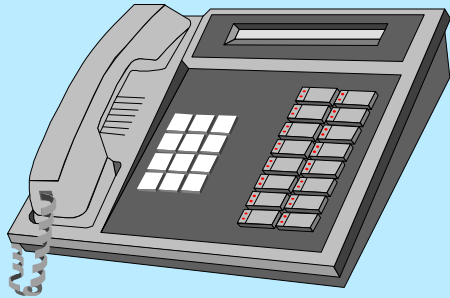
- 1. Quick and flexible development
- 2. Cost and performance optimization
- 3. Technology migration path:
higher integration level
geometric die shrink

TEMIC, The optimal ASIC solution

TEMIC Digital ASIC support

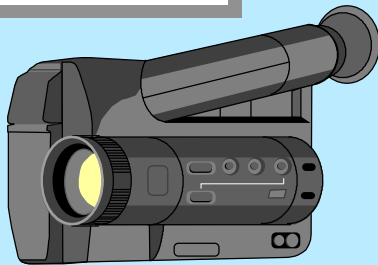
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- Field application engineering
 - Concept engineering
 - Technical marketing
 - Application laboratory
 - Design centers
 - Product engineering

TEMIC ASIC experience



Communications

- Analog Cellular
- Digital Cellular
- Radio Paging
- Echo Cancellation
- Modems
- Telephone Handset
- RF Control



Industrial

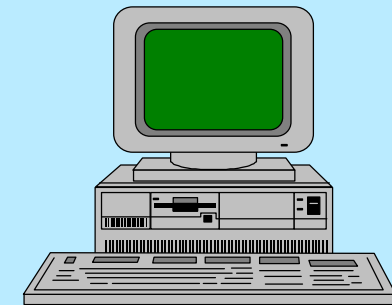
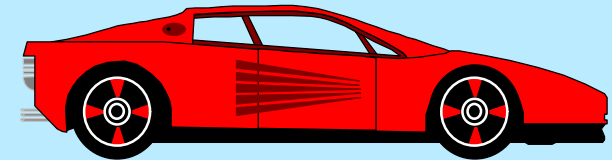
- Switched Mode Power Supply
- Bar Code Reader
- Weigh Scale
- Light Controller
- PIR Detectors
- Remote Metering

Consumer and EDP

- Sound Generator
- Music Synthesiser
- Television Picture in Picture
- Video DAC
- Satellite Sound Expander
- Freezer Temperature Control
- SMART card driver
- Customised LCD decoder/driver
- Disk Drive Control

Automotive

- Car Alarm
- Signal Conditioning
- Airbag Acceleration Sensor
- Active Suspension Control
- Automatic Transmission Control
- Throttle Valve Sensor



TEMIC: The complete ASIC supplier

- Breadth of technology
- Mastering quality
- Comprehensive experience