Digital consumer applications in Philips Semiconductors

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Managing Director Consumer Systems of Semiconductors div.
PS capabilities in Digital domain

PS at a glance

Market trends

Technology capabilities
Philips Semiconductors

At a glance

- Major division of Philips Electronics, world’s 8th largest electronics company
- World’s 8th largest semiconductor supplier in 1998, top European semiconductor company
- Sales - Integrated circuits: $3290 million
  - Discrete semiconductors: $900 million
- 27,000 employees
- 16 manufacturing and assembly sites in 11 countries
- Four System Labs and twelve design centers
- Over 100 sales offices in 44 countries, over 100 sales rep and distributor locations
- Producing 12 million ICs and 4.9 billion discrete devices every day
- Over 45 years of semiconductor experience
### Key products in application domains

<table>
<thead>
<tr>
<th>Multimedia</th>
<th>Controllers &amp; Processors</th>
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<tbody>
<tr>
<td>- Digital video / audio</td>
<td>- TriMedia embedded DSP multimedia processor</td>
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<tr>
<td>- Decoders</td>
<td>- R3000 &amp; R4000 MIPS controllers</td>
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<tr>
<td>- Scalers</td>
<td>- XA 16-bit controllers</td>
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<tr>
<td>- CD-x chipsets</td>
<td>- 80C51-based 8-bit controllers</td>
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<td></td>
<td>- REAL and EPICS DSP</td>
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<tr>
<td>Audio / Video</td>
<td>- Logic</td>
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<td>- Single chip TV</td>
<td>- 3 and 5 volt logic families, PLDs</td>
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<td>- DTV chipsets</td>
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<td>- STB chipsets</td>
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<tr>
<td>- Video chipsets</td>
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<tr>
<td>- Audio chipsets</td>
<td></td>
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<tr>
<td>Mobile Communications</td>
<td>- Discrete Semiconductors</td>
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<tr>
<td>- GSM circuits</td>
<td>- Small signal transistors and diodes</td>
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<tr>
<td>- PHS / PDC chipsets</td>
<td>- Power transistors and diodes</td>
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<tr>
<td>- DECT chipsets</td>
<td>- RF transistors and modules</td>
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<tr>
<td>- GPS chipsets</td>
<td>- Sensors</td>
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<td>- RF devices</td>
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**Let's make things better.**
Our top 3 positions (worldwide)

- Consumer Systems
- Discrete Semiconductors
- (Car)radio, front end and DSP
- Audio power for wide range of applications
- Power management (DC/DC converters, battery mgt, green SMPS)
- Decoders and motorcontrol in CD-audio, CD-ROM, Video CD, CD-R
- CMOS Logic
- Microcontrollers
- Wireless communication ICs
PS capabilities in Digital domain

PS at a glance

Market trends

Technology capabilities
Worldwide Consumer Electronics Semiconductor Market (Billions of Dollars)

Source: DataQuest Nov 98
Semiconductor content of electronic equipment 1960 - 2000

Source: Dataquest / ST / PS
Synergies/convergence around digital TV

- Analog TV
- Digital TV
- Set Top Box
- Hybrid TV
- Integrated DTV
- Internet TV
- Personalized TV
- Home studio
- Games Console
- Networking
- Disc recording
- Imaging

Let's make things better.
PS capabilities in Digital domain

PS at a glance
Market trends
Technology capabilities
PS current position in Analog to Digital migration

Sales

Digital 44%

Analog 56%

Digital 71%

Analog 29%

R&D effort
PS capabilities in Digital domain

Technology capabilities

- Processes:
  - deep submicron CMOS
    - aligned with STM Crolles and TSMC

- Design methodologies:
  - CoReUse / MoReUse
  - Digital Video platform
SSMC
(Systems on Silicon Manufacturing Company)

- Joint venture with TSMC & EDB
- Management in Singapore as of January 1st
- Contractor appointed
- Design complete
- Equipment move in early 2000
- 1st silicon Q3 2000
- Production Q4 2000

- Capacity: 360k 8” wafers / y
- Capability: CMOS13 and higher
The design support organization
Silicon System Platform

• Generic architecture for signal processing and control

• Applicable within a certain application domain:
  • Digital video (DTV, set-top boxes, DVD, etc.)
  • Cellular telephony (GSM, CDMA, UMTS, etc.)

• Scalable over the various applications within the domain:
  • From high-end to low-end
  • Flexible or cost-optimized

• Hardware and software

Let's make things better.
Digital Video Platform

- TMx Mediaprocessor
  - 32/64 b core
- Memory
- Memory controller
- Specific blocks
- High speed bus
- Bridge
- Control bus
- Peripherals blocks
- Platform
- SW blocks
- Compression
- Picture improvement
- Graphics
- Fast I/Os
Application domain: Digital TV
Specific applications: DTV, DVB, DVD-video, Set-top box
CPU: MIPS
DSP: TriMedia
OS: pSOS
Buses: I²C, USB, i-Link (IEEE 1394)
Advantages of the DVP

DVP
- **TtM:** much faster for follow-up products
- **resource usage:** more optimal resource use
- **market risk:** technology used in many markets
- **changing customer requirements:** framework allows faster derivatives
- **design risk:** allows use of tested blocks

Point Solution(s)
- **TtM:** may be faster for 1st product
- **resource usage:** may duplicate effort
- **market risk:** success depends on single market
- **changing customer requirements:** derivatives may take longer
- **design risk:** product may use mostly new blocks
Embedded MIPS core family

- **PR5xxx**
  - 64-bits, floating point
  - dual/single issue
  - dual caches
  - High-end set-top boxes, EDP, information appliances, game machines

- **PR39xx**
  - 32-bits, 5-stage
  - single issue, MIPS16
  - dual caches
  - Medium-end set-top boxes, multimedia players, handheld/palm-size computers, personal communicators

- **PR19xx**
  - 32-bits, 3-stage
  - single issue, MIPS16
  - unified caches
  - Low-end 16-bit controllers, DSC, navigation
HDTV, NTSC Picture Enhancement, Web Enabled TV ... One Platform

- ATSC
- HDTV+
- GUI
- Spyglass Web Browser
- Original (input) NTSC Image (480i 3:2 Pulldown)
- Enhanced NTSC (480P 60fps with interpolated missing frames)

Let's make things better.
Today Philips Semiconductors CS is a global leader in analog consumer products.

Analog is our core competence today and remains important for the future.

Major growth opportunities are in the digital area.

Philips Semiconductors aim to achieve the same leadership position in digital consumer electronics.

We are investing in a long term, extended roadmap Silicon System Platform