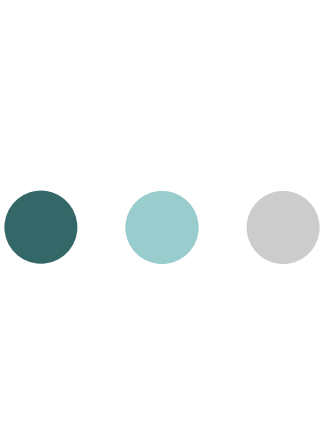

VIA Telematics miles ahead…

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In-vehicle computing: The worst enemies.

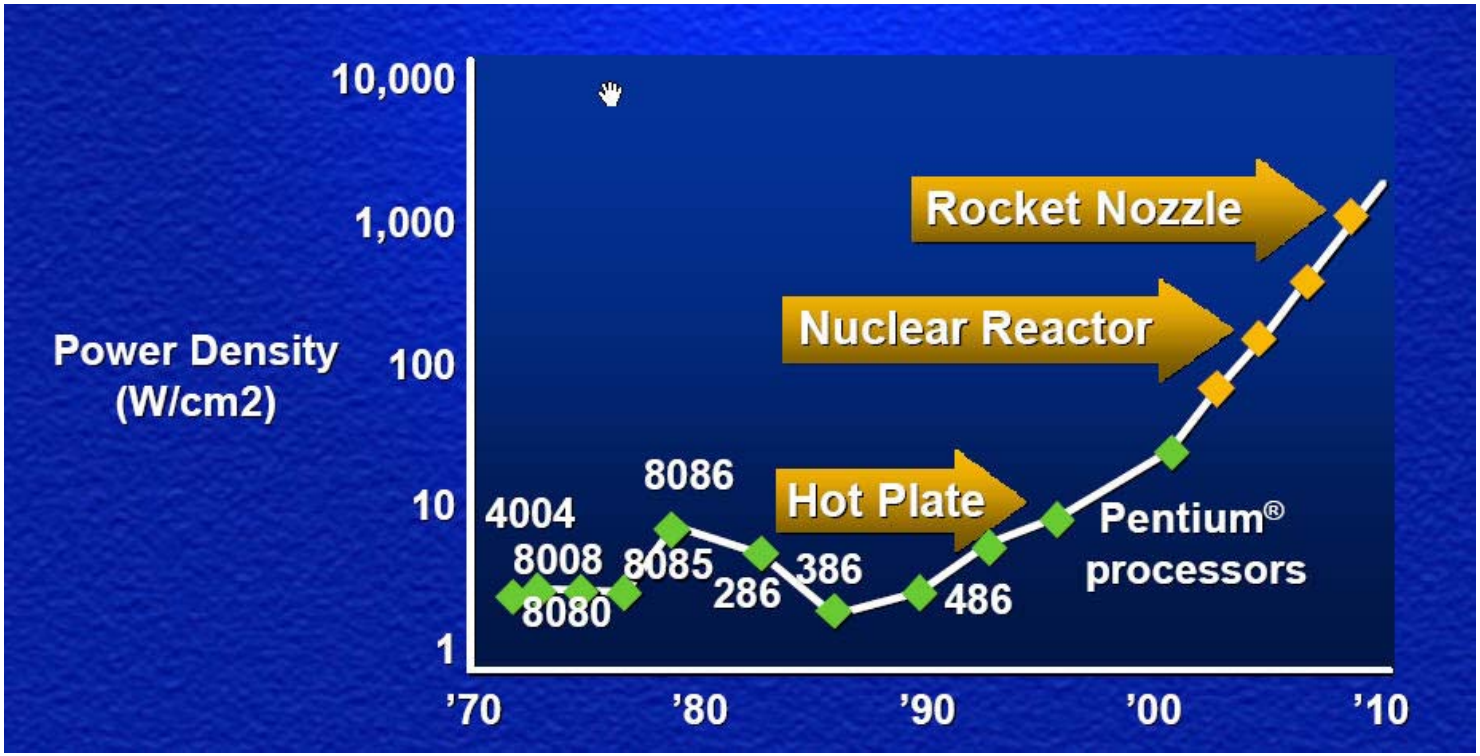
- For decades computes have gotten faster, hotter and bigger.
- The MHz race is _still_ going on, pushing power consumption to hundreds of watts.
- Heat dissipation is becoming a real challenge. A Pentium4 dissipates a disturbing 100watts per 100 square mm.
- Size of traditional motherboards is not shrinking due to processor cooling requirements.

Heat: What to do?

- At the 2002 IEDM conference is San Francisco, Andy Grove quoted Prof Bokor's power density research on current and future processors:

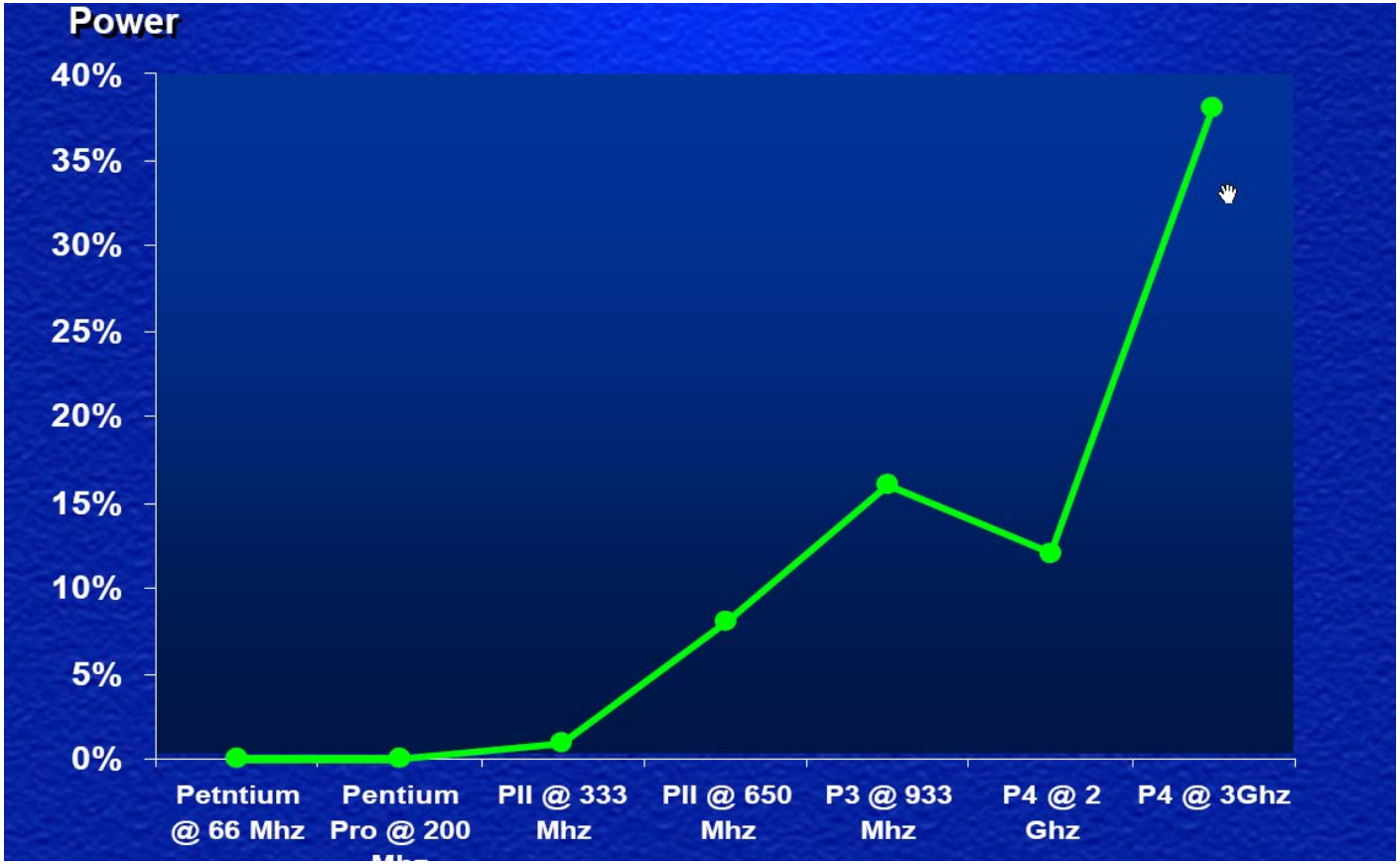
- "Power density – Will get even worse"

Power Density Trends, IEDM 2002



Andy Gove, IEDM 2002

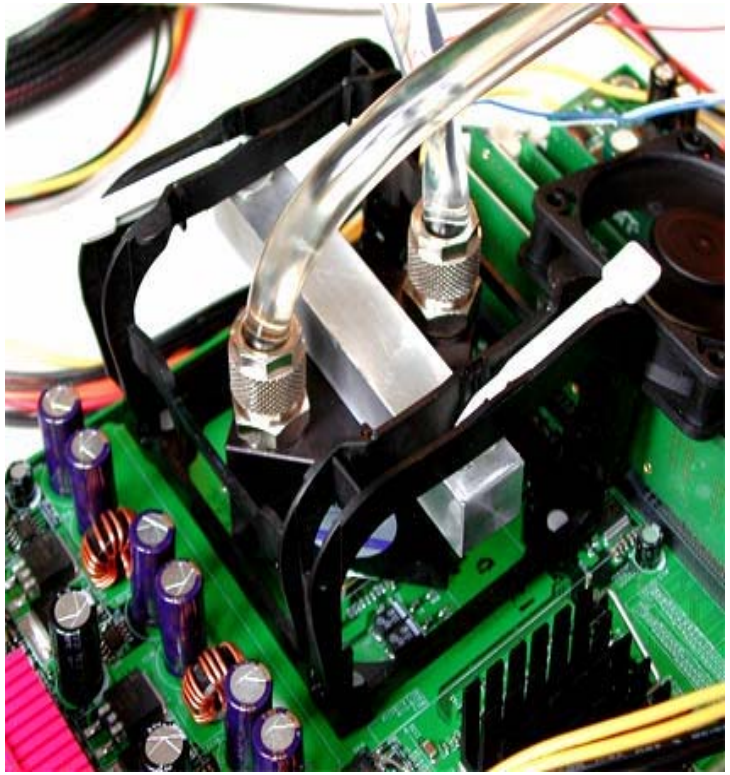
DC Power Leakage, IEDM 2002



Andy Gove, IEDM 2002

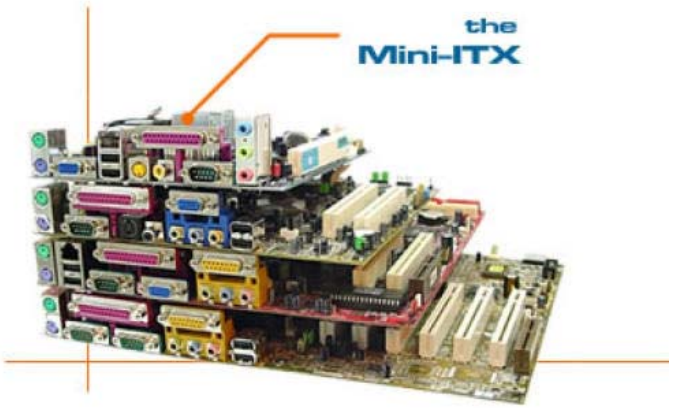
Heat Extraction: A real challenge…

- The latest Pentium 4 systems require colossal heat sinks, some water cooled.
- In-vehicle applications require passive heat sinks (no moving parts)



Size: The next frontier…

- In-vehicle applications require small footprint, low power, no moving parts components.
- Mini-ITX, Nano-ITX form factors are the ideal platform small embedded systems.



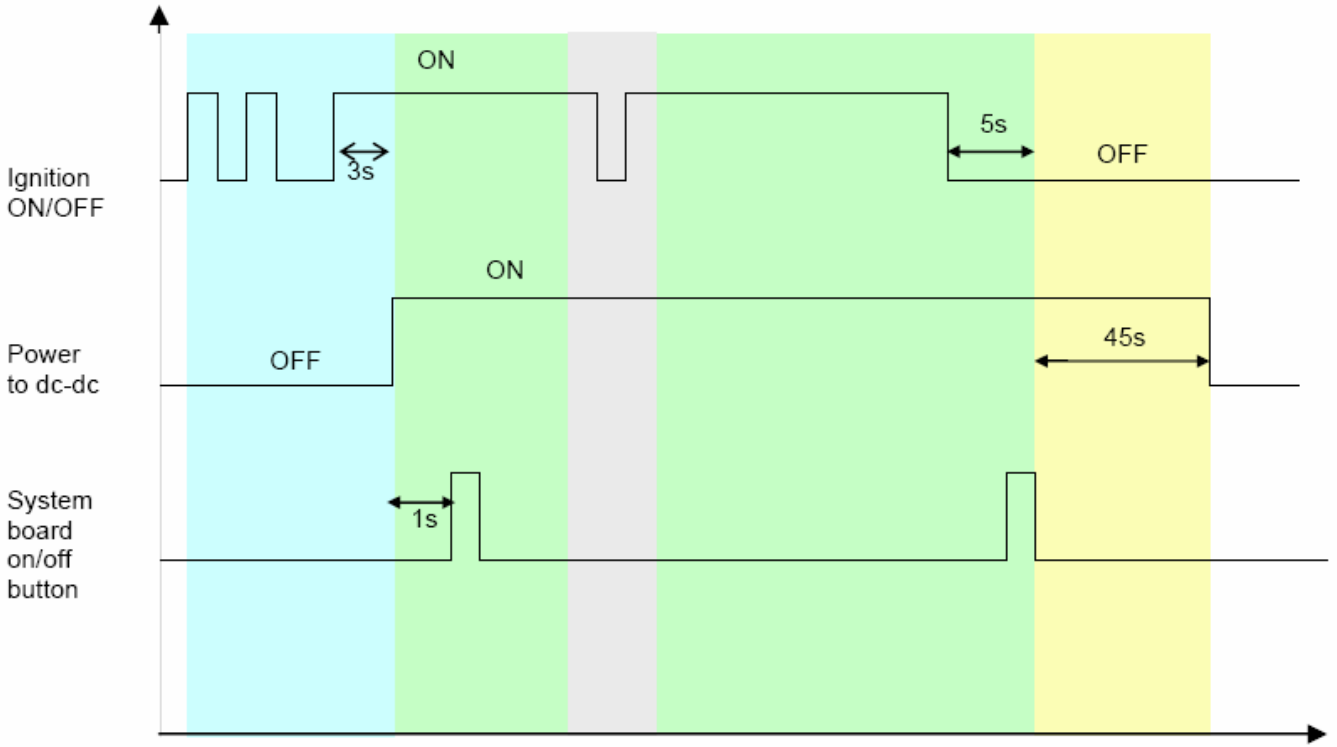
12V computing using off-the-shelf mini-ITX boards

The M-100 is powered using a low power 12V DC_DC converter

Inside the M-100: 12V power

A mini-ITX board next to a 300watt power supply

Power sequencing



Power Sequencing Chart for automotive applications

Turn on sequence

- **Turn-On sequence explained**

  -Waits 3 s for battery to reach ~12V
  -Provides On/OFF ignition debounce
  -Turns on the power to the DC-DC converter, waits for another 1s
  -Sends power ON signal for 400ms

Running sequence

- Running Sequence **explained**

  -nothing happens, computer is ON
  -provides ignition ON/OFF debounce
  -waits for an ‘key=off’ signal

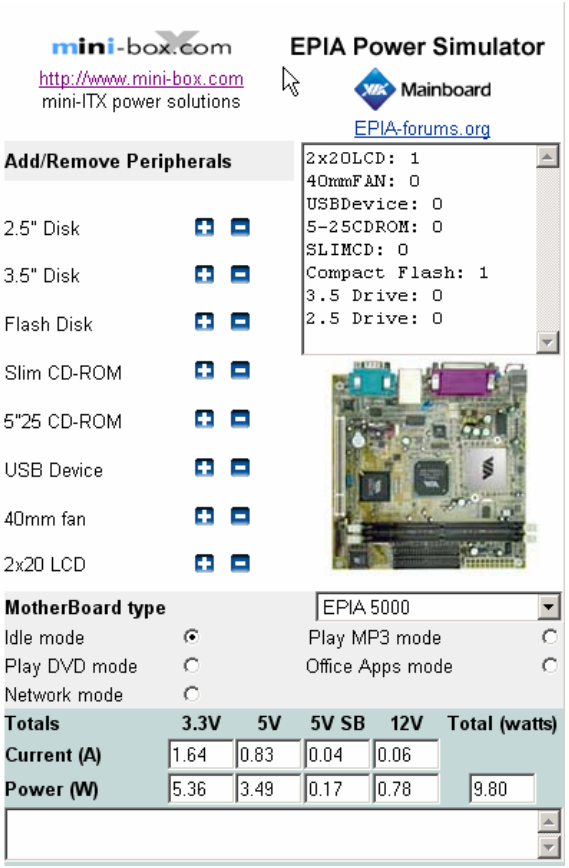
Shutting down

- **Shutting down sequence explained**
  -If ignition=off, then send a 400ms “Off signal” to the motherboard.
  -waits for 45s (OS shutdown sequence) and then cuts Off the power to the DC-DC converter.
  -Based on customer preference, OFF_DELAY and HARD_OFF delay can be changed to any value. For example, the OFF_DELAY can be set to 2 hours and HARD_OFF delay could be set to 24 hours or “0” (forever). Watch for battery drain!

Inside the M-100

The EPIA power simulator

- EPIA power simulator live DEMO, P4 versus EPIA
- Build and test a system in real-time.



The Choice: VIA mini-ITX

- Intel P4 or AMD. Too fast, too hot, too big + moving parts. Requires heave-duty power management.
- National Geode processor. Too slow for multimedia and CPU intensive applications. Price/MHz not appealing.
- VIA-EDEN processor: Cool, nimble and *small*. **Speed=‘just right’**

Embedded system design cycle

- Board level hardware design and prototyping: ~12months
- Typical costs for in-house board design and prototype: $500,000
- Cost of prototyping on the VIA Eden platform: About $100.

The Blessing

- VIA is blurring the line in between the embedded and consumer world:

- Consumers love it
- System designers benefit consumer-scale economics. (low cost processors and boards)

Conclusion

- The VIA EDEN platform is the only platform that allows system integrators to **rapidly design, prototype and produce** systems for a wide variety of Embedded Automotive Applications.