



# **PowerSoC & PowerSiP markets are preparing. Are you?** Or Micro-power electronics world explained

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- PowerSiP & PowerSoC World
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- Trends to watch
- Conclusion





# Introduction

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Power electronics and power consumption are under the spotlight:

- At high power for **renewables, transport...**
- At low power for **tablets, phones, laptops** and all embedded electronics

**Drivers** towards micro power electronics integration are here, and the market will follow:

• Power efficiency



- Power output stability
- Time-to-market

# Computing power vs. Consumed power (1/2)





Source: DTU - Arnold Knott – ECPE Workshop 2015 Hypothesis on a 50W-100W range power supplies



# PowerSiP & PowerSoC world

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## PowerSiP & PowerSoC: Definitions 1/2



# PowerSiP & PowerSoC: Definitions 2/2



The key hurdle is still passives: Integration in package or on wafer

## Most advanced solution to date: PowerSiP

### Wafer integration

### **Haswell Platform**







# **Enabling PowerSiP**

with advanced packaging

# Competing Wafer/panel scale packaging landscape



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## Example: AT&S ECP





- Single Power Device embedded
- Up to 10A
- Substrate level integration:
- 40% to 70% footprint reduction
- Applications
  - Power Management Unit
  - Li Battery charger
  - µDC/DC buck converter

Applied in:

 GaNsystems 600V devices



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# Example: TDK SeSUB



- All integrated System-in-Package solution
- Up to 8A
- 40% to 70% footprint reduction
- Low power only (less than 5V)
- Applications
  - Power Management Unit
  - Li Battery charger
  - µDC/DC buck converter

Applied in:

 Blackberry Z10 smartphones (2013)



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## Example: ASE a-EASI





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- Half-Bridge + Driver Power Device •
- Up to 10A •
- Substrate level integration: •
- 40% to 70% footprint reduction •
- **Applications** ٠
  - Power Management Unit •
  - Small Power Converter/inverter •
  - DC/DC converters •

Applied in:

Infineon Half-Bridge ٠

# Micro Power Electronics device manufacturers



# Integrated power maker's product positionning



### Volume of production

## Advanced Packaging players





### Intel, Altera, Microchip

A semiconductor company:

- FPGA
- ASIC
- µprocessor
  5B acquisition in 2011

### Enpirion, Volterra, Micrel...

- A PSiP/PwrSoC converter maker:
  - DC/DC converter
- Power IC
- Patent and IP

- Semiconductor heavy players, having needs for power management in their integrated computing ICs.
- Spending what's needed to have both Information processing and power processing

MICROCHIP

# Applications of PowerSoC and PowerSiP



#### System Power

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## PSiP and PowerSoC market forecast



This is a preliminary figure. It is subject to evolution and adjustment. Your feedbacks are welcome!

#### \*Figures include only open-market

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# Trends to watch

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# The key role of Packaging in today's supply-chain



Advanced packaging players will be at the heart of Power Electronics SiP/SoC supply-chain (as they are today for other SiP-SoC)

# GaN IC -> higher power integratin levels

#### Power+IC on the same GaN Wafer



### Potential design of a GaN Power IC



Illustration example based on Powdec SJ GaN design









LED lighting

Home appliances

AC adaptor



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# Conclusion

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# Conclusion

- Strong market drivers
- Need for better performance and specifications
- Technologies becoming available
- Strategic acquisition of companies and their know-how/knowledge

PowerSoC and PowerSiP is very active. We are at the edge of an evolution, to become a revolution.

#### At very low power:

Intel is making most of it, with its integrated VR in Haswell processor combined with Enpirion's acquisition (through Altera). Other players also work toward this path integrating passives and low power devices.

#### At Low Power:

All Power management unit maker's are willing take profit of the technologies and supply-chain in place for other applications (MEMS, RF...). Power Electronics will become another application of several SiP packaging technologies.

#### At Medium Power:

Start-ups will come with concepts, IP and patents of integrated converters unleashing performances from GaN and VHF conversion. GaN IC with integrated drivers will help ! Passive components maker have now a reason to develop integrated passives. But this will come step by step: System makers need to be assured it will work!





# Feel free to ask any question... This is an on-going work, Feedbacks are welcome

Check <u>www.PointThePower.com</u> for updates on PowerSoC and PowerSiP, and power electronics in the future

# CONTACT INFORMATION

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## **Point the Gap**

Your tailor made market intelligence specialist **Experts in power electronics and semiconductor markets** 

alex@pointthegap.com



the Gap

# The idea: A tailor made market intelligence service



Keep track of your competitors and competing technology...

...and anticipate and act knowing the landscape



Validate your products and projects in the competitive landscape...

...and identify your **new market** opportunities



Gather your **team** to discuss **competitive landscape...** 

...and put them on a learning curve about market and technologies Gap

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## What we do? Market intelligence

## Market research: « How can I know my strategy is right? »







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## What we do? Market Intelligence

### Marketing survey: « What are the markets for my technology? »

**Direct interviews** with experts





**Evaluate your innovations** or technologies



**Build your strategy** on facts and feedbacks from the field Gap

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# What we do? Market reports

« The best market reports are the one,

*answering your key questions »* With thousands of potential leads to investigate, **let's decide together** *which subjects are crucial!* 

### 1. You pre-buy a report

We suggest a list of reports. You pre-buy the reports you need. As a pre-sales, the report is not available now, but is also cheaper.

# 3. You receive a market report answering your questions

You are charged when the report is delivered, and can enjoy specific information at competitive price.

### 2. We get to work

For 4 to 6 weeks, we follow our proven design process: phone interviews, data scouting and nights of analysis!





## Market reports: Basics of Power electronics

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### **Basics of Power Electronics**

A stress relief and communication optimization tool between tech & non-tech staff – December 2015





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# Market reports: GaN devices and applications

### **Gallium Nitride devices and applications**

All about device makers and targeted applications – August 2016



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# How we do it: Our expertise in action

## How we **do it**:



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# Our expertise: concerned fields





Point the Gap is...

...made of "communicating-business-technologists":







**Readable material** 

**Business-oriented** 

**Technology expertise** 

### ...initiated by Alex AVRON



Eng. Electronics and semiconductor 4 years experience as Market and Technology analyst in Power semiconductors at **Yole** 

*Competitive intelligence teacher in University*