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PII: S0038-1101(16)30200-3
DOI: http://dx.doi.org/10.1016/j.sse.2016.10.033
Reference: SSE 7130

To appear in: *Solid-State Electronics*

Please cite this article as: Stork, J.M.C., Hosey, G.P., SOI Technology for Power Management in Automotive and Industrial Applications, *Solid-State Electronics* (2016), doi: http://dx.doi.org/10.1016/j.sse.2016.10.033

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***Abstract* – Semiconductor on Insulator (SOI) technology offers an assortment of opportunities for chip manufacturers in the Power Management market. Recent advances in the automotive and industrial markets, along with emerging features, the increasing use of sensors, and the ever-expanding "Internet of Things" (IoT) are providing for continued growth in these markets while also driving more complex solutions. The potential benefits of SOI include the ability to place both high-voltage and low-voltage devices on a single chip, saving space and cost, simplifying designs and models, and improving performance, thereby cutting development costs and improving time to market. SOI also offers novel new approaches to long-standing technologies.**

***Keywords*—Semiconductor on Insulator, SOI, Power Management, Automotive Electronics, Industrial Electronics**

I. Introduction

Today's modern cars contain an enormous amount of electrical wiring and electronic circuits used for a variety of applications, and the trend is for even greater integration and complexity. Likewise, the industrial segment continues to grow and expand with the "Internet of Things". With each new advance and each new opportunity come new challenges. In power management, these challenges include the ability to fabricate high-voltage power electronics and the low-voltage MOS dev ices required to control them without the additional space and cost of multi-chip and co-packaged solutions. Semiconductor-on-Insulator technology offers the advantage of integrating both high-voltage devices and low-voltage circuitry on the same chip [1]. The monolithic integration of vertical power devices together with control circuits increases the functionality and minimizes the size of the chips [2]. SOI also offers improved performance as a result of lower parasitic leakage and capacitance, leading to improved model accuracy and fewer development iterations, resulting in reduced development costs and quicker time to market, as well as improved reliability. In addition, SOI provides new ways to improve older technologies and opens paths to novel process integrations.

II. Automotive and Industrial Applications

The automotive segment has enjoyed one of the fastest growth rates of any large segment in the worldwide chip market, averaging 8% annual growth between 2002 and 2012. The average automobile currently has around $350 in semiconductor content with even higher dollar content found in hybrid and luxury vehicles [3]. The vast majority of this content is in microcontroller units, analog, and power. (Figure 1 shows a breakdown of the semiconductor content in various automobile families by family and by semiconductor type.)

Key trends in automotive semiconductors include:

- Fuel Economy & Emissions Reduction
- Active Safety & Autonomous Driving (autonomous cruise control, collision warning/avoidance)
- Vehicle Electrification (Hybrids, plug-ins, electric cars)
- Connectivity (Bluetooth, in-car WiFi)
- Light Emitting Diode (LED) Lighting

ON Semiconductor offers a vast array of solutions in these areas, including

- Power Management, Igniters, Application-Specific Integrated Circuits (ASICs), Application-Specific Standard Products (ASSPs)
- Image Sensors, Communications, Sensor Interface
- Insulated Gate Bipolar Transistors (IGBTs), High Efficiency FETs, Power Integrated Modules (PIMs), Gate Drivers, Intelligent Power Modules (IPMs)
- Wireless Charging Circuits, In-Vehicle Networking