Technical Article
How to Create a Power Supply for Intel's Braswell Processor

TEXAS INSTRUMENTS

George Lakkas

The Braswell processor, branded as the Intel® family of Pentium® N3000/3050/3150/3700 CPUs, is the latest Intel System-on-Chip for entry-level client and industrial computers. At 4W to 6W of thermal design power (TDP), this processor will be at the heart of single-board computers and computer-on-module (COM) Express Modules managing factory automation and computerized numerical control systems worldwide.

When looking for a power solution there are many factors to consider such as compliance to Intel's power specification, efficiency, power density, ease of use and layout, total bill of material (BOM) cost, load regulation, system monitoring and protection, and design tool support.

The TPS51623 VR12.1 CPU core controller from TI is part of a low-cost, easy to use and lay out discrete voltage regulator solution that is fully compliant and qualified for Intel Braswell platform power supplies. The TPS51623 is a 2-phase driverless PWM controller and works alongside TI's power stages such as the CSD97374, CSD97395Q4M or CSD95379Q3M to deliver a power dense, thermally efficient solution (see Figure 1).
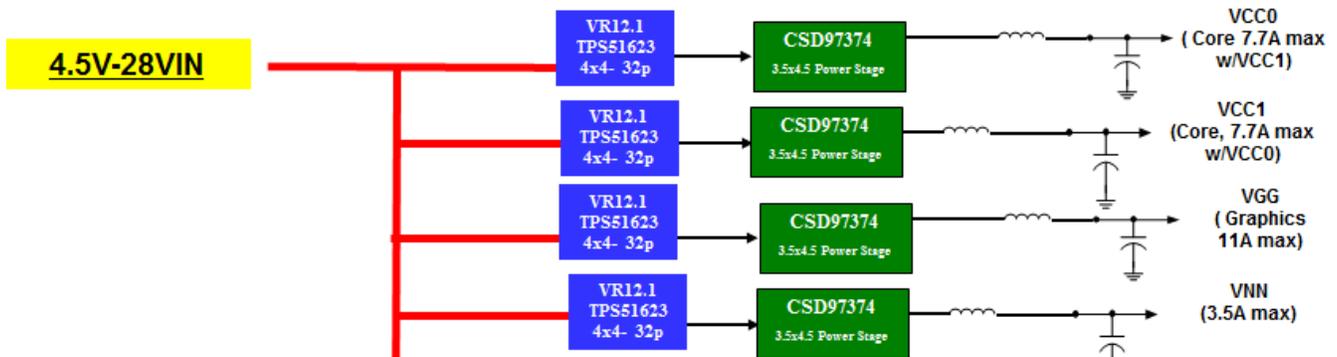

Figure 1. TPS51623 Vcore Controller Powers Intel's Braswell Processor.

The discrete voltage regulator solution allows the board designer to "sprinkle" the various system voltage regulators on available areas of the COM Express Module for a flexible layout.

When designing a power supply solution for an Intel processor, support tools are critical to help reduce the design and development time as well as to ensure the design conforms to given design and hardware metrics.

TI's TI Design reference design is compliant to the Intel VR12.1-SVID specification and helps to reduce development time and get products to market faster (see Figure 2). The design has been tested for power state efficiency and transition, loadline, current monitor accuracy, ripple, load transient response and dynamic voltage identification (VID) changes (see Figure 3).

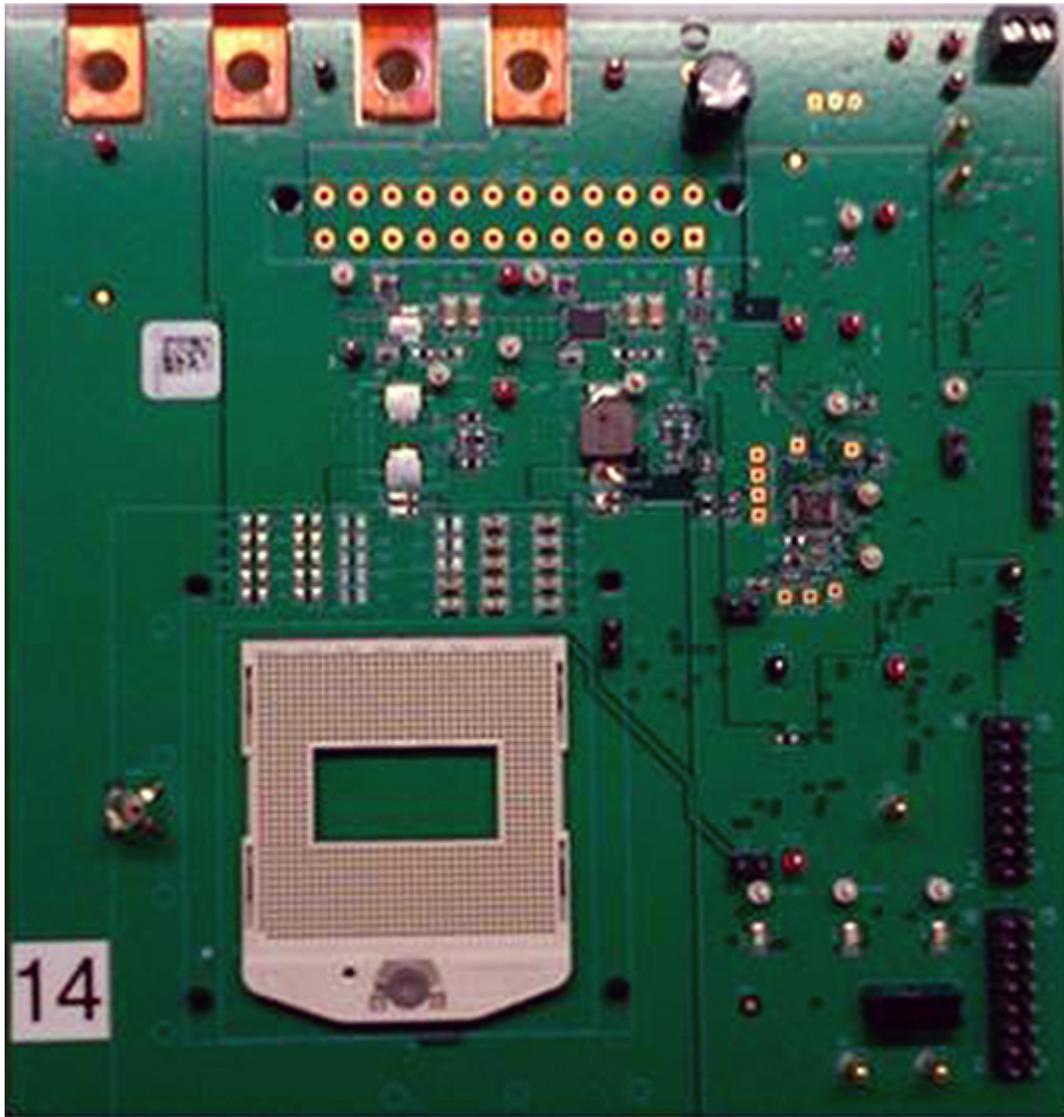**Figure 2.** TPS51623 **Intel Braswell (Pentium N3700) Reference Design.**
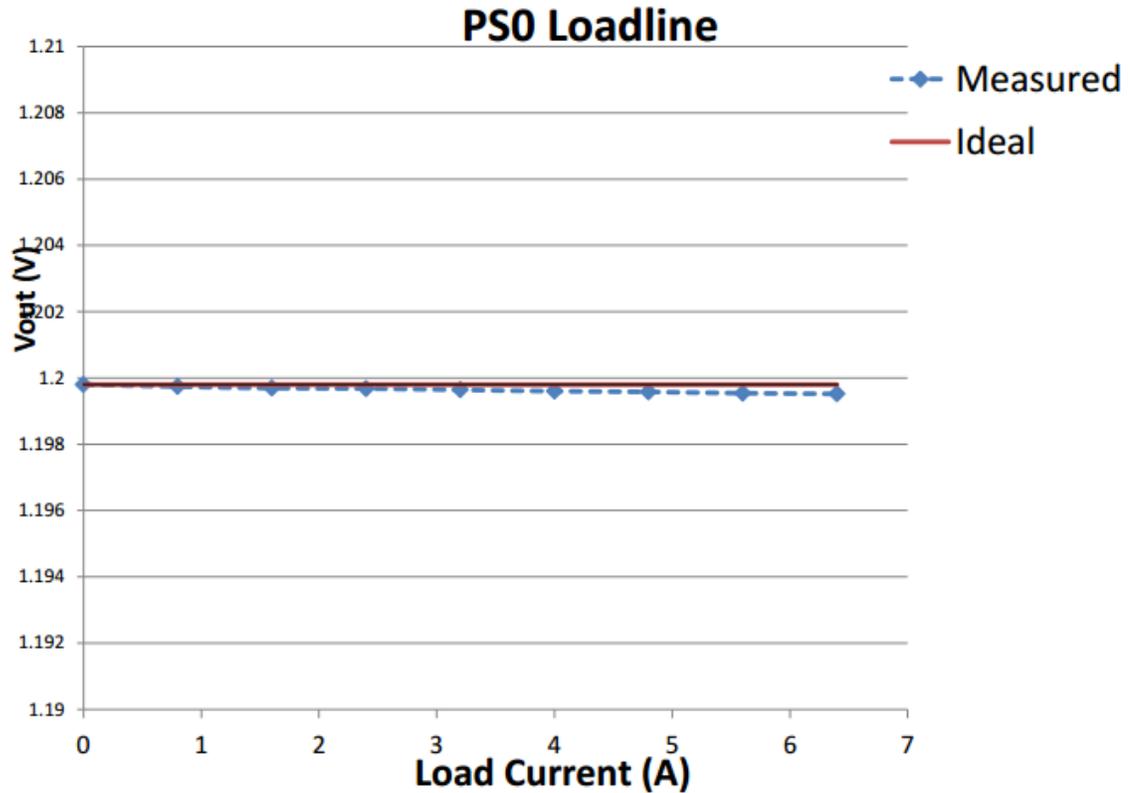
Loadline

Figure 3. TPS51623 **Reference Design CPU Loadline (Load Regulation) Data.**

TI offers a complete set of materials including schematic, BOM, Gerber files, test report and CAD symbols, as well as a BOM cost and PCB area Excel calculator tool for download. The Excel tool enables the designer to include passive components in the design and calculate the total PCB area (including routing area around each component) and BOM cost.

Additional Resources

- Access the complete set of materials for the TPS51623 VR12.1 CPU core controller.
- Download the high power density 9V to 15V input, Intel Pentium N3700 VCC0+VCC1 power supply reference design for industrial PCs.
- Send an email IMVP@list.ti.com to receive the BOM cost and PCB area Excel calculator tool.
- View the complete portfolio of TI's Intel CPU Vcore regulators.

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