DC/DC converters reduce board space by up to 50 percent

Texas Instruments Incorporated introduced the industry's smallest monolithic point-of-load (POL) DC/DC converters for harsh environments, including radiation tolerant, geological, heavy industrial, and oil and gas applications. The 6.3-V, 6-A TPS50601 and the 6.3-V, 3-A TPS50301 are synchronous step- down converters optimized for small form factor designs.

The devices' current mode control, high switching frequency, and integration of the high- and low-side MOSFETs slash board space by 50 percent compared to other solutions, reducing the size of equipment needed for tight spaces, such as down-hole drilling.

Key features and benefits of the TPS50601 and the TPS50301:

- Peak efficiency: Best-in-class peak efficiency of up to 95 percent results in lower heat dissipation, compared to competitive devices.
- Design flexibility: 100-kHz to 1-MHz switching frequency and optimized compensation scheme enable designers to make trade-offs between size and efficiency.
- Reduced board space: High efficiency, optimal layout and dynamic bias reduce the size and number of output capacitors, and improve transient response. This enables more than 12-watts-per-square-inch power, compared to the nearest competitor at 10 watts per square inch.
- High reliability: The TPS50301 is qualified up to +210 degrees-C for high temperature applications, while the TPS50601 is qualified up to +125 degrees-C for harsh environments with QMLV/RHA qualifications pending.

- Higher-current operation: Designers can use two devices in parallel to double the output current.

Packaging, availability and pricing

The TPS50601 and the TPS50301 are sampling now in a 20-pin thermally enhanced dual in-line ceramic flatpack. Please contact spacesample@list.ti.com for suggested retail price of the TPS50601, and htsamples@list.ti.com for suggested retail price of the TPS50301.

Tools and support

The TPS50601 is supported by single- and dual-configured EVMs. The dual TPS50601SPEVM-D provides high efficiency and high reliability due to reduced stress on the components. The single TPS50601SPEVM-S implements split-input power rails with separate voltage inputs for power stage and control circuitry. Suggested retail price is US$499 for the single EVM and US$599 for the dual EVM.

The harsh environment engineering model (EM), TPS50601HKHMPR, is a TPS50601 prototype for initial evaluation for harsh environment customers. The model provides the same functionality and footprint as the TPS50601, but at a reduced cost and for evaluation only.

A small form factor reference design of approximately 1 inch by 1 inch is available. It features optimal layout, high efficiency, design calculations, transient response, and information on the device design and test results.

The TPS50601 and the TPS50301are supported by TI's WEBENCH® online design tool to simplify and speed the design process. SPICE models are also available to simulate and debug the circuit.

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[1] http://www.ti.com