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IMVP-6/6+/6.5 Single-Phase DC/DC Controller

MILPITAS, CA – July 20, 2010 – Linear Technology Corporation introduces the [LTC3816](#), a single-phase synchronous step-down DC/DC controller implementing the Intel® IMVP-6®, IMVP-6+®, and IMVP-6.5® protocols. Intel Mobile Voltage Positioning (IMVP) is a smart voltage regulation technology that effectively reduces the amount of output capacitance required for a given output error budget. On-chip support is provided for all the IMVP-6/6+/6.5 requirements, including a 7-bit VID code, start-up to a preset boot voltage (V_{BOOT}), differential remote output voltage sensing, programmable active voltage positioning (AVP), output current reporting (I_{MON} , IMVP-6.5) and power optimization during deeper sleep state to increase the battery run time.

The LTC3816 incorporates a parallel input, 7-bit digital-to-analog converter (DAC), which dynamically adjusts its output to the Intel CPU core supply voltage from 0V to 1.500V in 12.5mV steps with $\pm 0.75\%$ V_{OUT} accuracy over temperature. It operates from an input voltage ranging from 4.5V to 36V, has powerful onboard N-channel MOSFET gate drivers and can control output currents up to 25A. Its leading edge modulation architecture enables a very low output voltage to be regulated from a high input voltage and still operate at high frequency (phase-lockable up to 550kHz). A unity-gain differential amplifier provides remote voltage sensing at the CPU, eliminating errors due to parasitic IR drops across PCB metal traces.

Current sensing can be implemented with either a temperature-compensated lossless inductor DCR network, or with a discrete sense resistor. If DCR sensing is used, an NTC

thermistor network will compensate for the gain and time constant variations caused by the inductor DCR temperature coefficient.

The LTC3816 can operate in pulse-skipping or forced continuous mode. Pulse skipping provides the highest light load efficiency, while forced continuous operation has faster transient response at light load. AVP minimizes the peak-to-peak output voltage transient during a step load.

The LTC3816 is available in thermally enhanced 38-lead SSOP or 38-lead 5mm x 7mm QFN packages and operates over a -40°C to 125°C operating junction temperature range. 1000-piece price starts at \$3.25 each. Both versions are available from stock. For more information, visit www.linear.com/3816.


Photo Caption: Single-Phase IMVP-6/6.5 DC/DC Controller

Summary of Features: LTC3816

- Intel IMVP-6, IMVP-6+ & IMVP-6.5 Compliant
- 7-Bit VID DAC Control of V_{OUT} : 0V to 1.500V in 12.5mV Steps
- $\pm 0.75\%$ V_{OUT} Accuracy Over Temperature
- Wide V_{IN} Range from 4.5V to 36V
- Line Feedforward Compensation
- Preset V_{BOOT} Output Voltage at Start-Up
- Programmable Active Voltage Positioning
- Power Optimization at Light Load
- CLKEN#, VRTT# and PWRGD Open Drain Outputs
- Powerful Onboard N-Channel MOSFET Gate Drivers
- Internal 5V LDO with Auxiliary 5V Supply Operation (EXTV_{CC})
- R_{SENSE} or Temperature Compensated DCR Current Sensing
- Selectable Pulse Skipping or Forced Continuous Operation
- True Differential Amplifier for Remote Output Voltage Sensing
- Programmable Slow Slew Rate Deeper Sleep State Exit
- Programmable Soft Start Time
- Phase-Lockable Fixed Frequency Operation from 150kHz to 550kHz
- Very Low Minimum On-Time (Less than 35nsec)

About Linear Technology

Linear Technology Corporation, a manufacturer of high performance linear integrated circuits, was founded in 1981, became a public company in 1986 and joined the S&P 500 index of major public companies in 2000. Linear Technology products include high performance amplifiers, comparators, voltage references, monolithic filters, linear regulators, DC-DC converters, battery chargers, data converters, communications interface circuits, RF signal conditioning circuits, uModule[®] products, and many other analog functions. Applications for Linear Technology's high performance circuits include telecommunications, cellular telephones, networking products such as optical switches, notebook and desktop computers, computer peripherals, video/multimedia, industrial instrumentation, security monitoring devices, high-end consumer products such as digital cameras and MP3 players, complex medical devices, automotive electronics, factory automation, process control, and military and space systems.

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