# 50A to 300A, Scalable *µ*Module Regulator Needs 60% Less Capacitance to Power Sub-28nm GPUs, FPGAs, ASICs & Processors

MILPITAS, CA – September 8, 2016 – Linear Technology Corporation introduces the LTM4650-1A and LTM4650-1B, dual 25A or single 50A µModule® (power module) regulators scalable to deliver 300A to high power, low voltage sub-28nm GPUs, FPGAs, ASICs and microprocessors. The low core voltage of these digital devices requires very accurate voltage regulation at both steady state (DC) and fast load current transients. The LTM4650-1A guarantees ±0.8% total DC voltage accuracy over reference, line, load and temperature (–40°C to 125°C), whereas the LTM4650-1B guarantees ±1.5%. Both devices can be optimized for ±3% or better total error band, including load step transients with a minimum number of ceramic capacitors to meet the core voltage window requirement of sub-28nm digital ICs.

Compared to competing power POL module regulators, the LTM4650-1A requires 60% less capacitance because of three main features ($12V_{IN}$, $1V_{OUT}$, 0A to 25A load step, 25A/µs):

(1) Guaranteed ±0.8% total DC voltage accuracy allows more margin (less capacitance) for the AC variation due to a load transient response to satisfy a given processor core voltage tolerance window.

(2) The device can be externally adjusted (compensated) for optimum loop response to deliver load transients with fewer output capacitors. This enables use of important capacitors.

(3) The device operates with phase interleaving, which reduces input and output current ripple, reducing the requirement for load capacitance.

The LTM4650-1 includes a dual output DC/DC regulator, inductors and MOSFETs in a 16mm x 16mm x 5.01mm BGA package. The LTM4650-1 regulates an output voltage ranging from 0.6V to 1.8V from an input voltage within 4.5V to 15V. Delivering 50A, 92% efficiency is recorded at $5V_{IN}$, $1.8V_{OUT}$ and 86% at $12V_{IN}$, $1.0V_{OUT}$. The LTM4650-1 delivers the full 50A current up to 70°C ambient, from $12V_{IN}$ to $1.0V_{OUT}$ with 200LFM airflow. The LTM4650-1 can be operated in parallel to increase output current, up to six in parallel for 300A of output current.

The LTM4650-1 is pin-compatible with the lower current LTM4630-1 (dual 18A or single 36A); so users can choose the correct part depending on load current without changing PCB layout.

The LTM4650-1 is rated for operation from –40ºC to 125ºC. 1,000-piece pricing starts at $46.75 each. For more information, visit www.linear.com/product/LTM4650-1.

**Photo Caption:** µModule® Regulator with Precision DC & Transient Voltage Accuracy for Advanced Digital Devices

## Summary of Features: LTM4650-1

- ±0.8% Maximum Total DC Output Error Over Line, Load & Temperature (LTM4650-1A)
- ±3% Total Output Error with Minimum Output Capacitance, Including Transients
- Dual 25A or Single 50A Output
- 4.5V to 15V Input, 0.6V to 1.8V Output Voltage Range
- Differential Remote Sense Amplifier
- Current Mode Control/Fast Transient Response
- Current Sharing Up to 300A
- 16mm × 16mm × 5.01mm BGA Package

Pricing shown is for budgetary use only and may differ due to local duties, taxes, fees and exchange rates.

## About Linear Technology

Linear Technology Corporation, a member of the S&P 500, has been designing, manufacturing and marketing a broad line of high performance analog integrated circuits for major companies worldwide for over three decades. The Company's products provide an essential bridge between our analog world and the digital electronics in communications, networking, industrial, automotive, computer, medical, instrumentation, consumer, and military and aerospace systems. Linear Technology produces power management, data conversion, signal conditioning, RF and interface ICs, $\mu$Module® subsystems, and wireless sensor network products. For more information, visit www.linear.com



**Press Contacts:**

**North America / Worldwide**

John Hamburger, Director Marketing Communications
jhamburger@linear.com
Tel: 408-432-1900 ext 2419

Doug Dickinson, Media Relations Manager
ddickinson@linear.com
Tel: 408-432-1900 ext 2233

**UK & Nordic**

Alan Timmins
a.timmins@ntlworld.com
Tel: +44-1-252-629937