µModule Power Products

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Product Marketing Engineer

AHEAD OF WHAT'S POSSIBLE™

Agenda	Page No	Duration
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Design Support	12	
Reference Designs	15	
µModule Regulator Product Portfolio		
Section 1		
▪ High Power PMBus I2C µModule Regulator ▪ 54V Bus Input µModule Regulator with PSM ▪ Single Output µModule regulators ▪ Dual, Triple & Quad Output µModule regulators	16 21 25 29	10 Minutes
Section 2		
▪ Ultrathin µModule regulators ▪ Silent Switcher µModule regulators ▪ Buck µModule regulators ▪ Buck-Boost µModule regulators	35 41 47 50	10 Minutes
Section 3		
Isolated µModule regulators LED Drivers Battery Charger	52 54 56	5 Minutes

Quality & Reliability

Power µModule Product Reliability

- 22,175,000 Power Cycles
- 5,071,000 High Temp Operating Life (device hours)
- Board Mount Temp Cycles
  2,118,000 (-40°C to 125°C)
  High Temp Bake (device hours)
  43,605,000 at 150°C
- 25,046,000 Temp Cycle -65°C to 150°C
- 16,439,000 Thermal Shock -65°C to 150°C
- FIT Rate: < 0.4
- And many more pages of data posted online
- 2nd Source Assembly & Manufacturing
- Multi-sourced Substrate and Component Suppliers
- Die Bank

Reliability Data Report
Report Number: R583
Report generated on: Tue Mar 03 13:04:49 PST 2020

OPERATING LIFE TEST

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS (+125°C)[1]	No. of FAILURES [2,3]
BGA 06X06	154	1748	1748	154	0
BGA 16X16	462	1452	1604	462	0
Totals	616	-	-	616	0

HIGHLY ACCELERATED STRESS TEST AT +130 DEG C / 85% RH

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS (+85°C)[4]	No. of FAILURES
BGA 06X06	459	0000	1813	1549	0
BGA 15x22	435	1739	1802	1464	0
BGA 16X16	1495	1452	1840	4400	0
Totals	2,389	-	-	7,413	0

HIGHLY ACCELERATED STRESS TEST AT +130 DEG C / 85% RH

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS (+85°C)[5]	No. of FAILURES
BGA 06X06	459	0000	1813	1549	0
BGA 15x22	435	1739	1802	1464	0
BGA 16X16	1495	1452	1840	4400	0
Totals	2,389	-	-	7,413	0

TEMP CYCLE FROM -55 TO 125 DEG C

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE	K DEVICE	No. of FAILURES
BGA 06X06	319	0000			
BGA 15x22	307	1739			
BGA 16X16	1215	1452			
Totals	1,841	-			

THERMAL SHOCK FROM -55 TO 125 DEG C

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEW
BGA 06X06	216	0000	
BGA 15x22	288	1739	
BGA 16X16	1076	1452	
Totals	1,580	-	

(1) Assumes Activation Energy = 1.0 Electron Volts
(2) Failure Rate Equivalent to +55 °C, 60% Confidence Level =2.98 FIT
(3) Mean Time Between Failure in Years = 38359
(4) Assumes 20X Acceleration from 85 °C to +130 °C
(5) Assumes 20X Acceleration from 85 °C to +130 °C
Note 1: 1 FIT = 1 Failure in One Billion Hours.
Note 2: HAST, Temp Cycle & Thermal Shock are subjected to J-STD-0

THERMAL SHOCK FROM -65 TO 150 DEG C

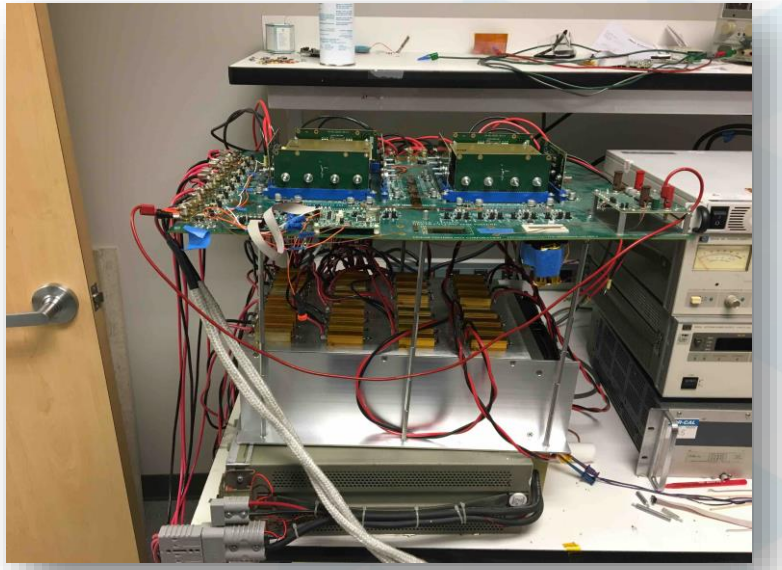
PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE CYCLES	No. of FAILURES
BGA 16X16	45	1651	1651	45	0
Totals	45	-	-	45	0

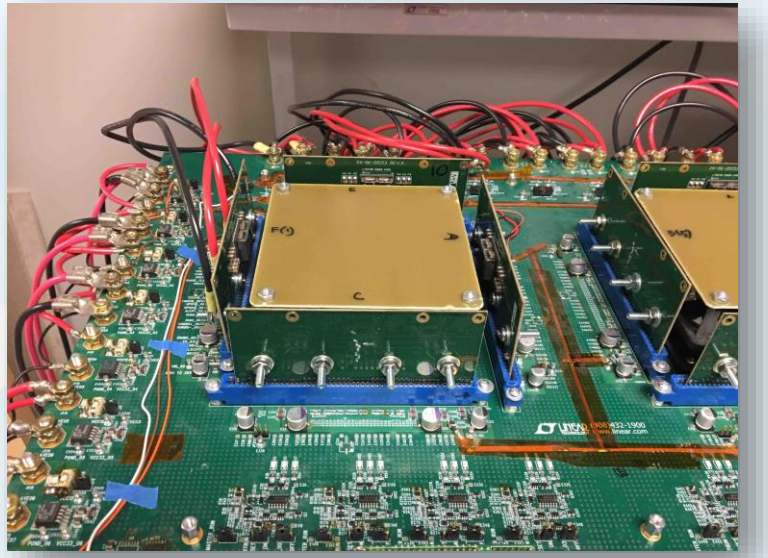
HIGH TEMPERATURE BAKE AT 150 DEG C

PACKAGE TYPE	SAMPLE SIZE	OLDEST DATE CODE	NEWEST DATE CODE	K DEVICE HRS	No. of FAILURES
BGA 06X06	204	0000	1751	261	0
BGA 15x22	231	1739	1802	462	0
BGA 16X16	706	1452	1840	1630	0
Totals	1,141	-	-	2,353	0

Power Cycle Testing for Long Term Reliability

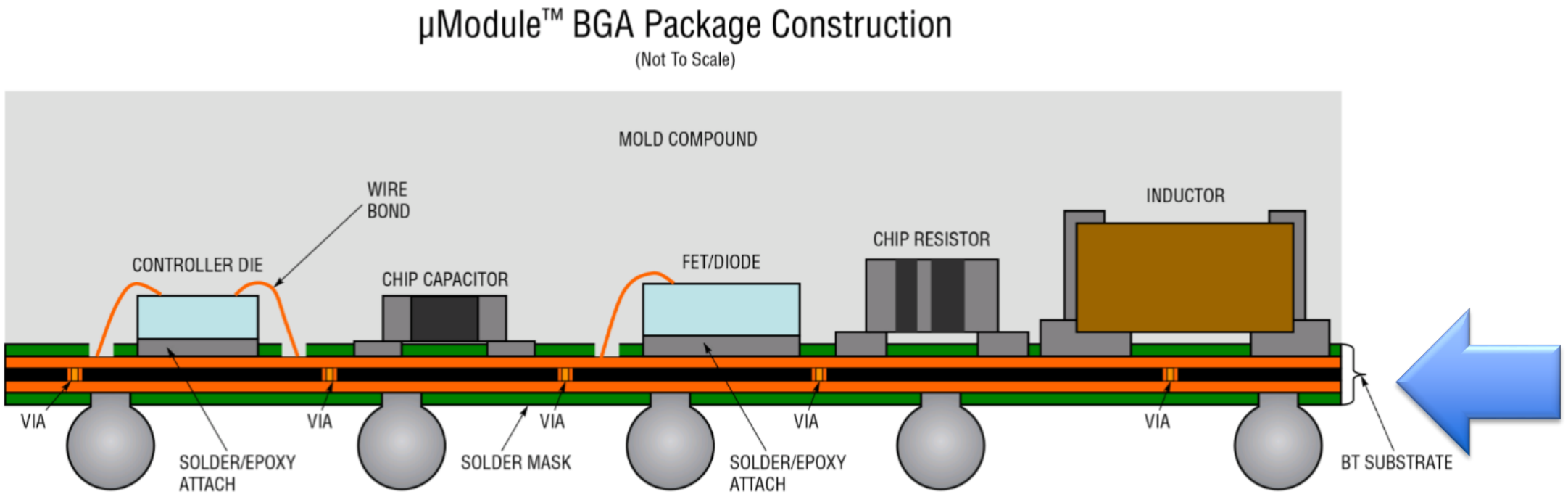
- 3 Lots to 50,000 cycles each
- 50℃ to Max. Junction each cycle
- All parameters tested 10k, 25k and 50k cycles
- Expose component weakness
- Validates design robustness





Packaging Advancement

µModule Architecture Advantage: Multi-Layer Substrate

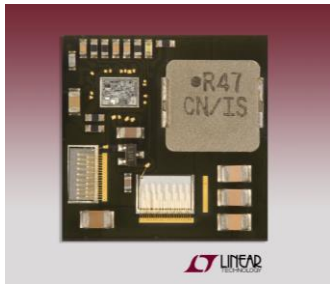


With substrate we offer pin-to-pin compatible:

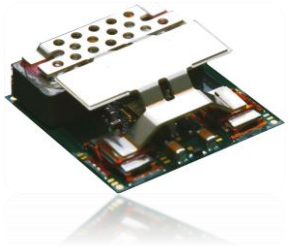
Ex. Dual output: 8A, 13A, 18A, 25A

Packaging Advancement Trend

10A-12A
Began in 2007

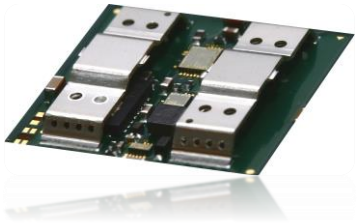


26A-50A
2013-2016

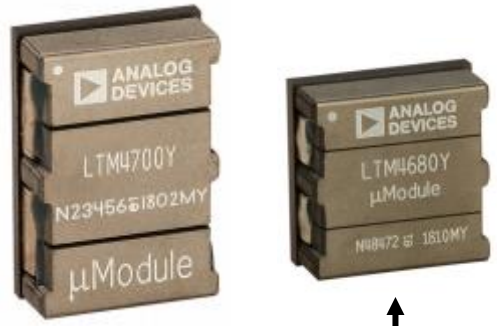


Integrated Heat Sink:
For faster and more efficient heat removal from Inside to top of package

40A+; 88%-89% Efficiency
2016



80A-100A+
2018



Inductor as Heat Sink:
For faster and more efficient heat removal from top of package

New <10A

LTM4657
(20V,8A)

LTM4663
TEC Controller

LTM4691
(3.6V, Dual 2A)

LTM8074
(40V,1.2A)

Better Cooling- Proprietary Packaging Technologies

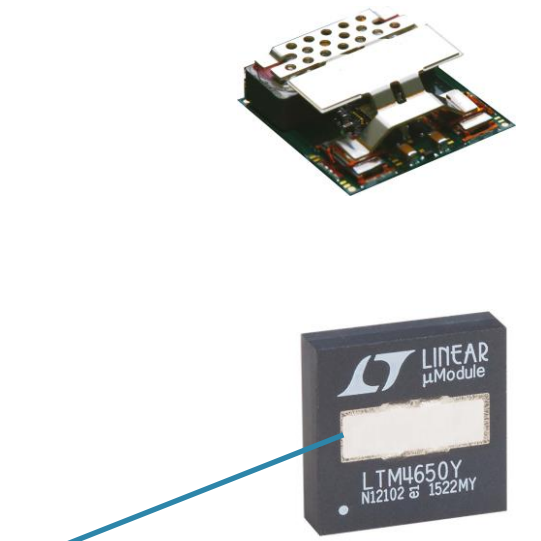
µModule Solution Advantage:

- With airflow, heat is removed quickly and efficiently from top of µModule regulator
- (heat also travels from bottom of package and disperses into customers' PCB)

1) CoP: Component on Package

Inductor as Heat Sink:
For faster and more efficient heat removal from top of package

2) Integrated Heat Sink



Integrated Heat Sink:
For faster and more efficient heat removal from Inside to top of package

New 100A

1 x LTM4700 with Digital PMBus I2C

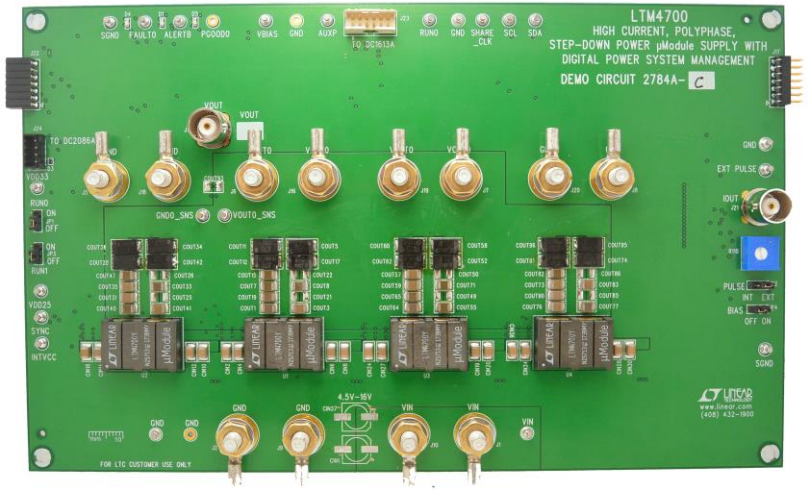
12 x LTM4601

(12 years ago)

Design Support

Excellent Full Support

- **Worldwide Field Applications support**
- **Design Tools**
- **Demo Boards**
- **GUI Support**
- **Symbols and Footprint**
- **Material Declaration**
- **Thermal Models**
- **3D Step Files**



400A 4x LTM4700 Demo Board

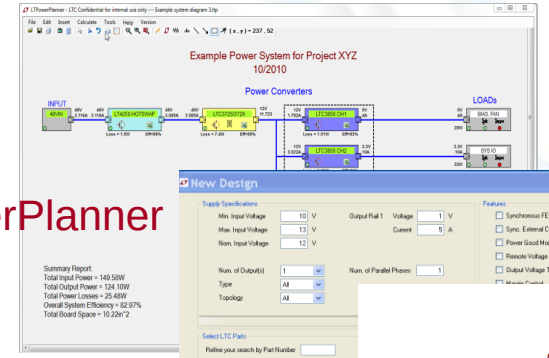
System Arch./Plan

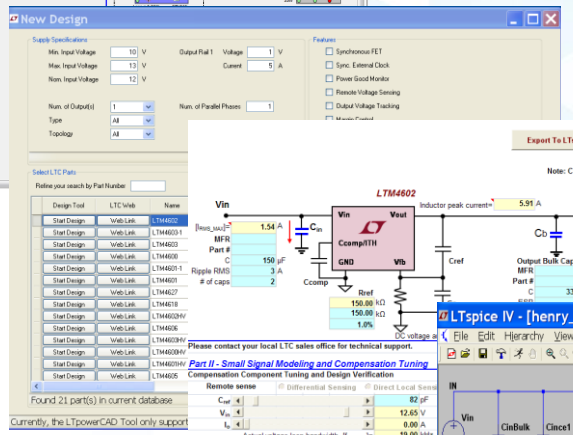
Search/Part Selection

Circuit Design and verification

Simulation

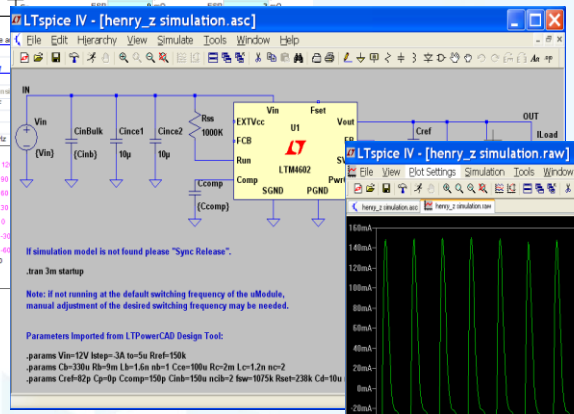
LTpowerPlanner



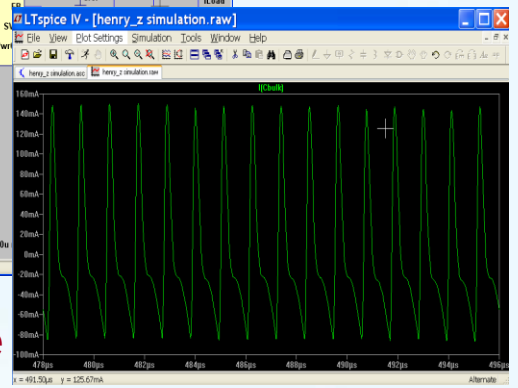


LTpowerCAD

LTspice

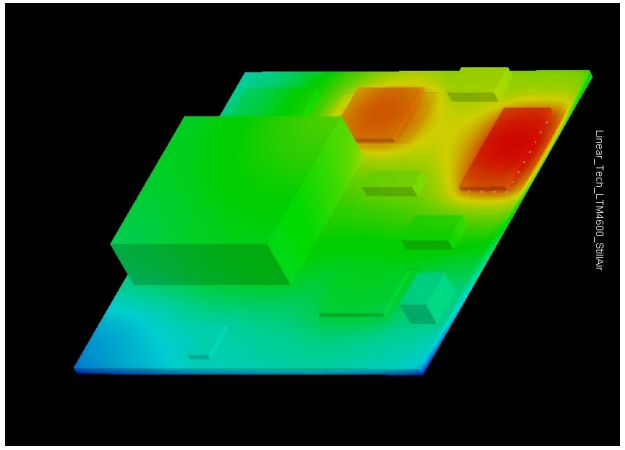
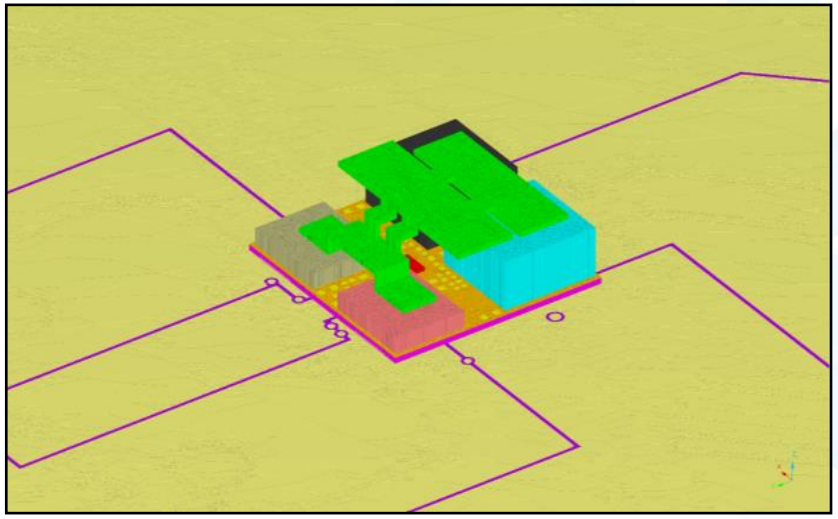
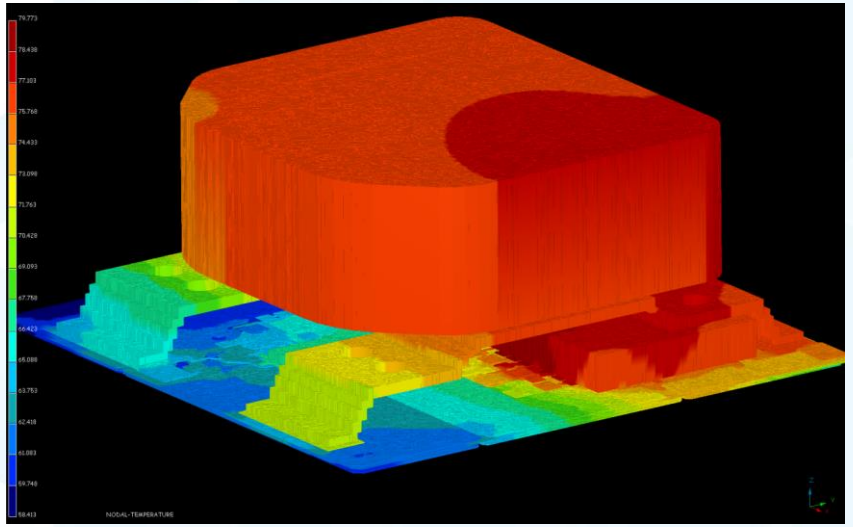
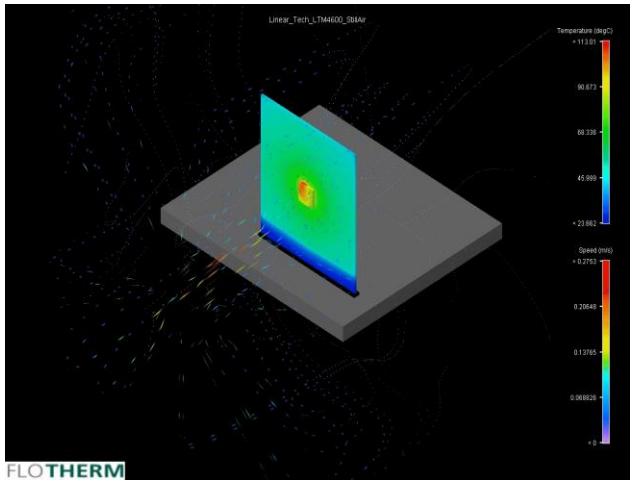
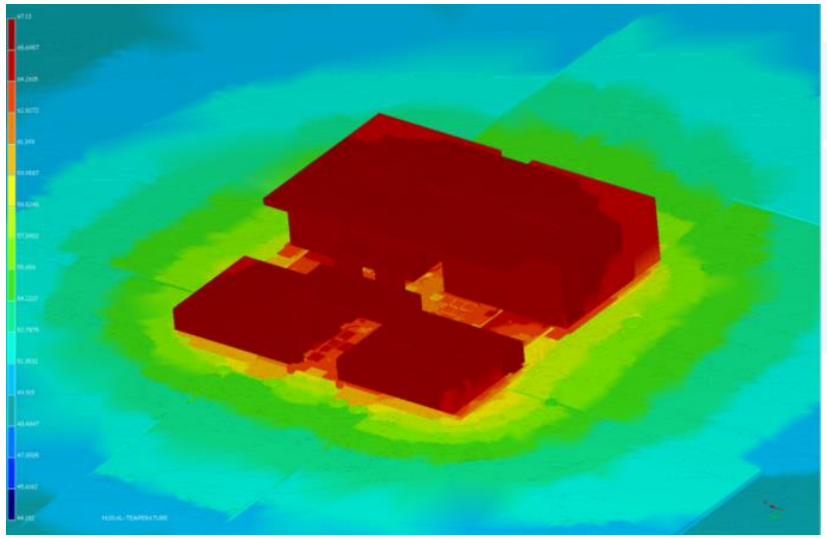
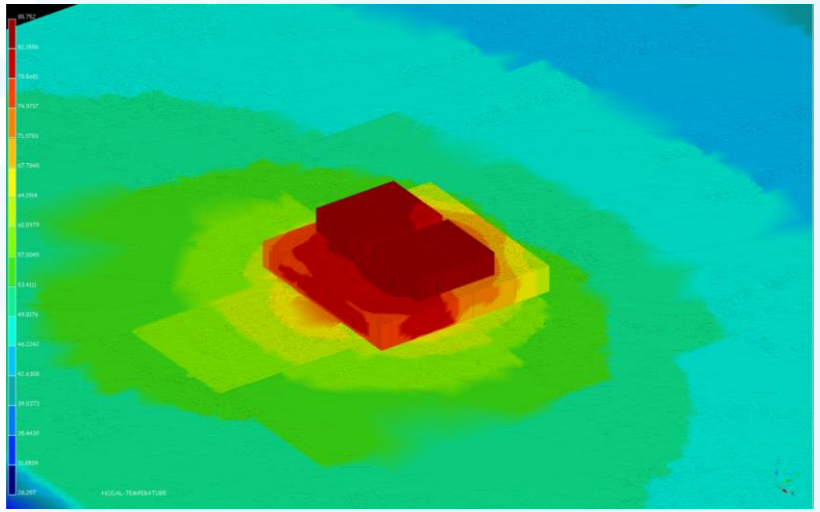


LTspice



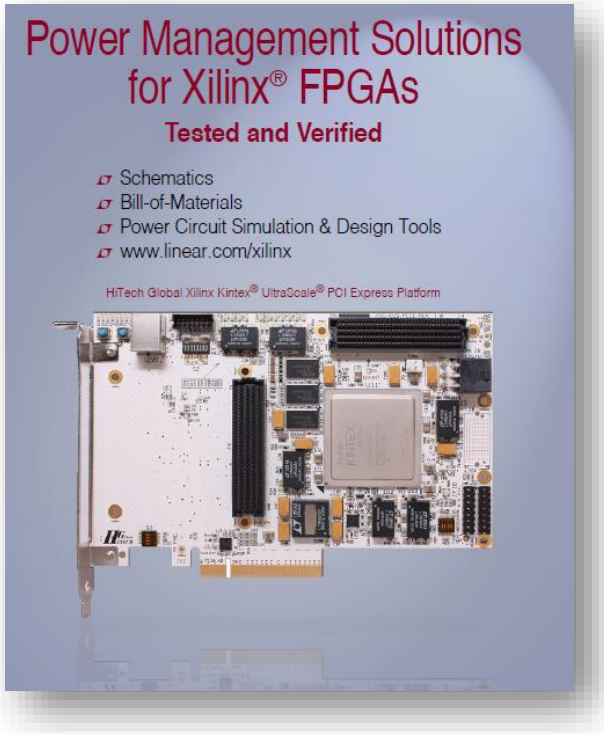
Thermal Modeling and Analysis is Available

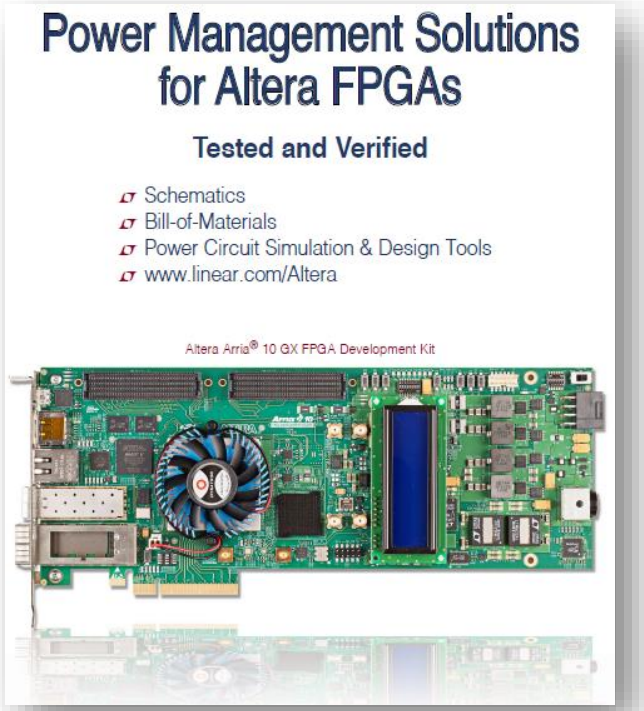
ANALOG DEVICES
AHEAD OF WHAT'S POSSIBLE™

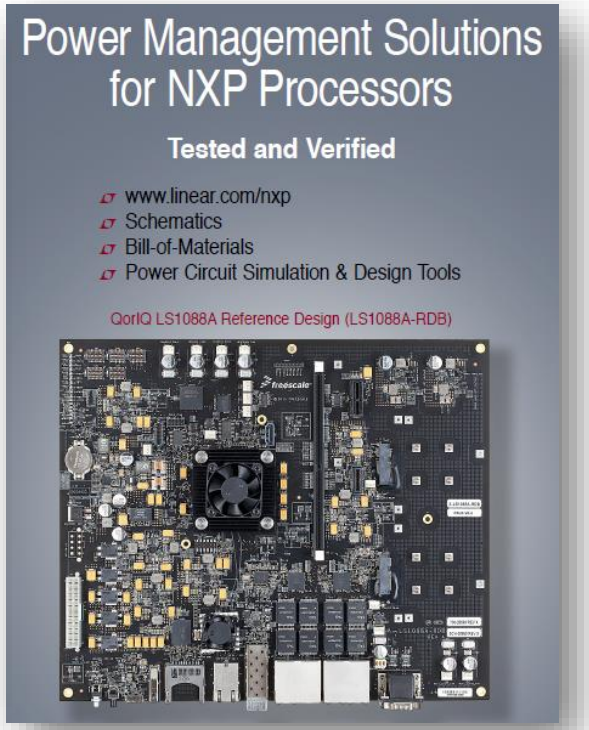
Standard	Integrated Heat Sink	Component on Top (CoP)
		
		

Power for FPGA, Processors & Rest of System: Reference Designs

The examples of actual application board "Tested and Verified" by the board suppliers





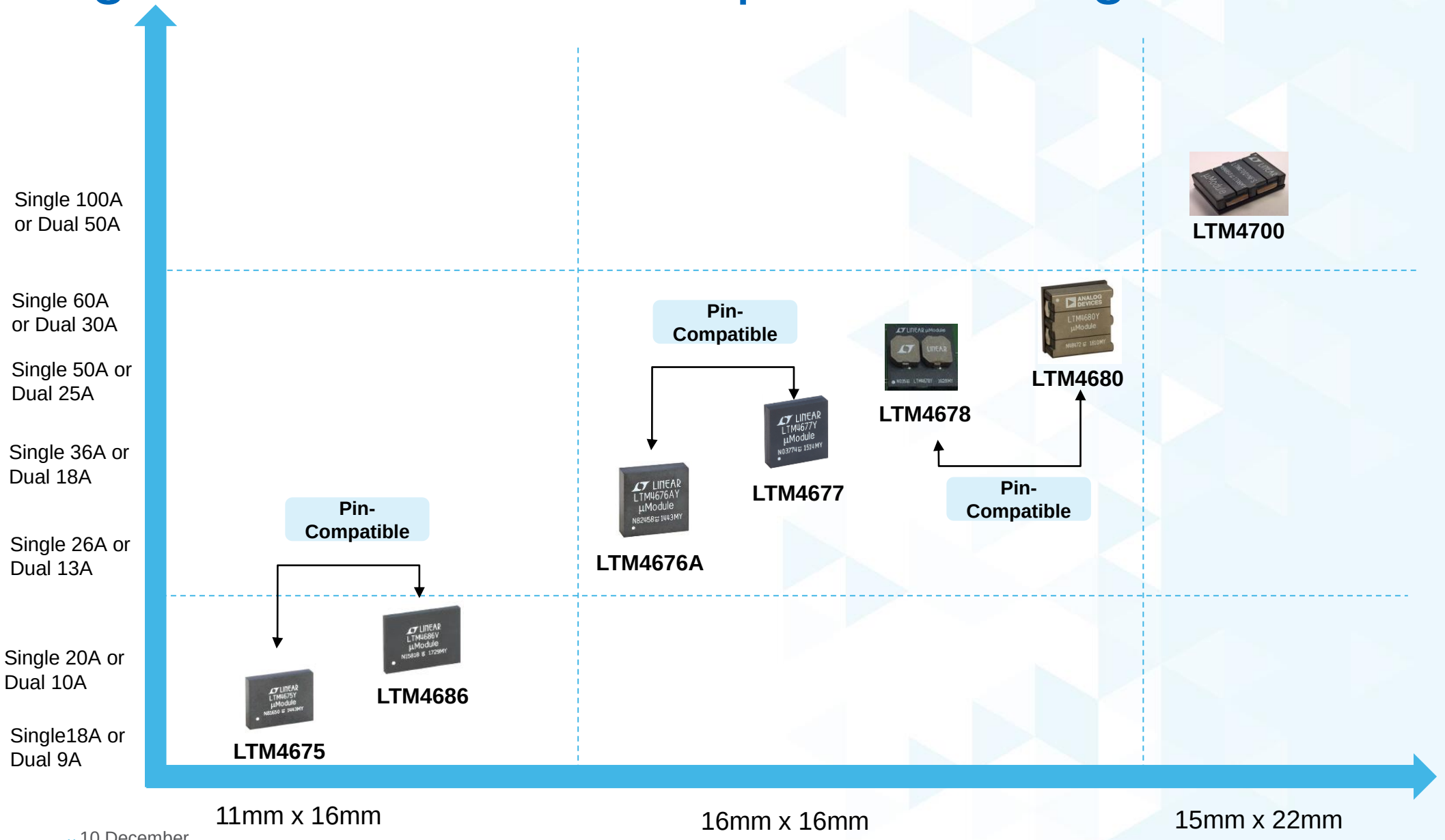


FPGA and Processors Compatible Reference Designs

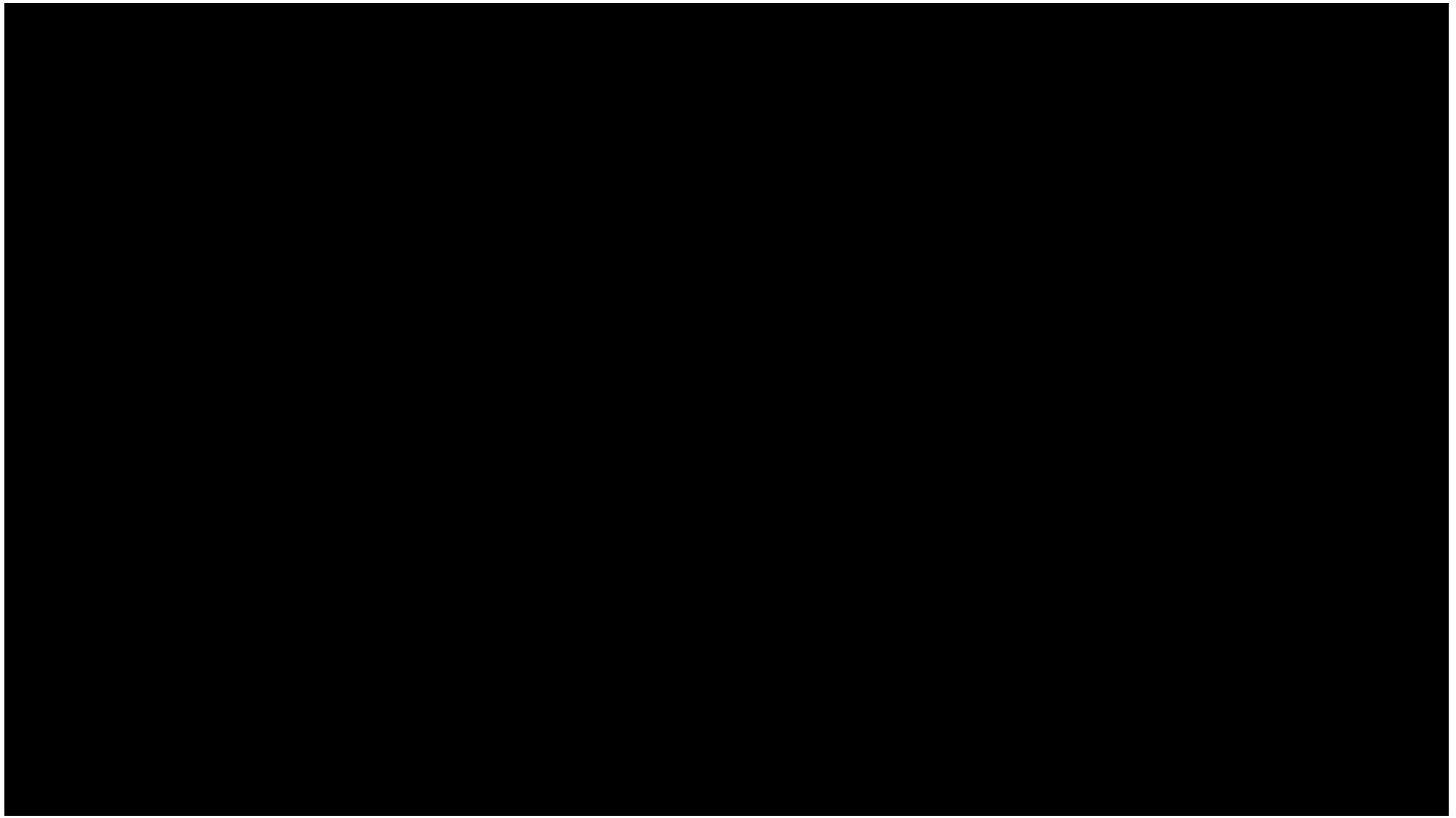
Section I

High Power PMBus I2C µModule Regulators

High Power PMBus I2C µModule Regulators



LTM4700, LTM4680 and LTM4678



LTM4700 Single 100A / Dual 50A µModule with Power System Management

FEATURES

- Dual 50A Digitally Adjustable Outputs with Digital Interface for Control, Compensation and Monitoring
- Wide Input Voltage : 4.5V to 16V
- Output Voltage Range: 0.5V to 1.8V
- ±0.5% Maximum DC Output Error Over Temperature
- ±2.5% Current Readback Accuracy
- Integrated Input Current Sense Amplifier
- 400kHz PMBus-Compliant I^2C Serial Interface
- Supports Telemetry Polling Rates Up to 125Hz
- Integrated 16-Bit ΔΣ ADC
- Constant Frequency Current Mode Control
- Parallel and Current Share Multiple Modules
- 15mm × 22mm × 7.82mm BGA Package

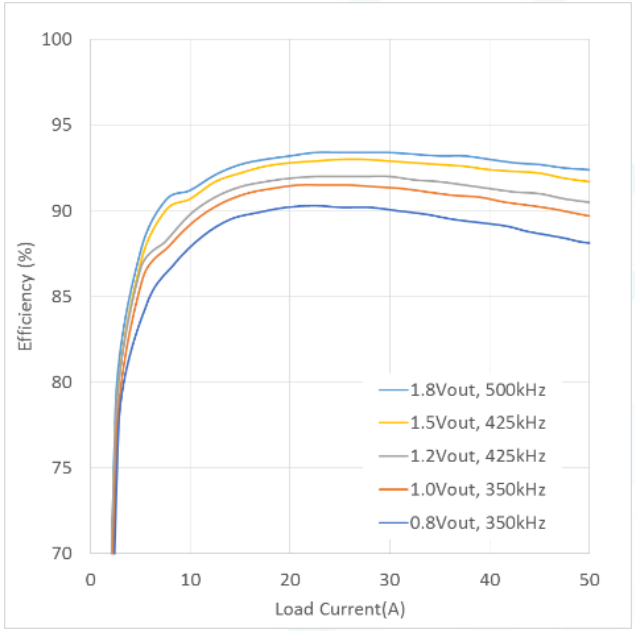
Readable Data:

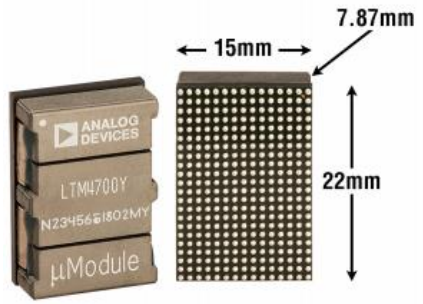
- Input and Output Voltages, Currents, and Temperatures
- Running Peak Values, Uptime, Faults and Warnings
- Internal EEPROM and Fault Logging with ECC

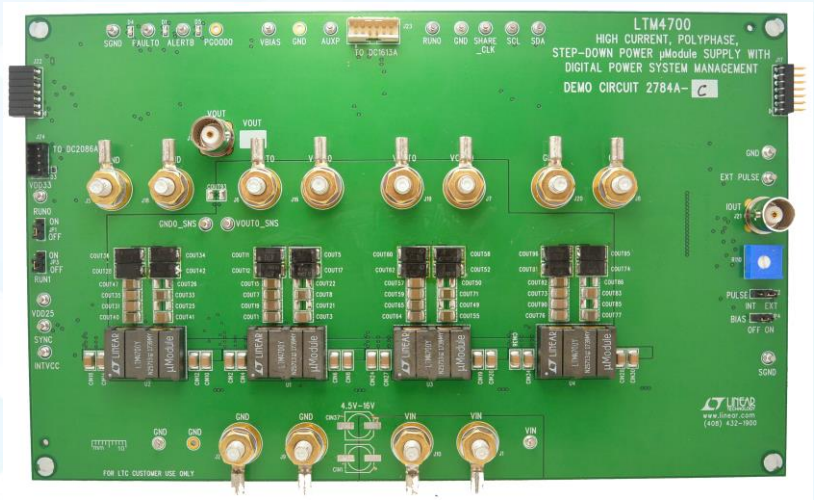
Writable Data and Configurable Parameters:

- Output Voltage, Voltage Sequencing and Margining
- Digital Soft-Start/Stop Ramp
- Optimize Analog Loop Compensation
- OV/UV/OT, UVLO, Frequency and Phasing

90% Efficiency at 12Vin to 1Vout







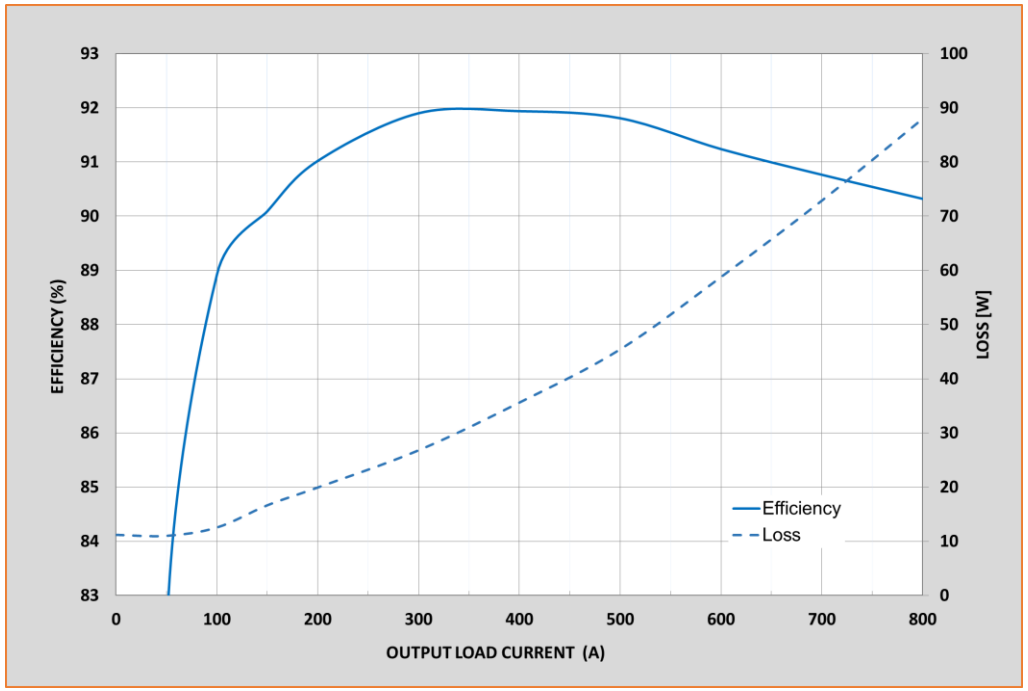
LTM4700: 400A Demo Board

800A= 8 x LTM4700

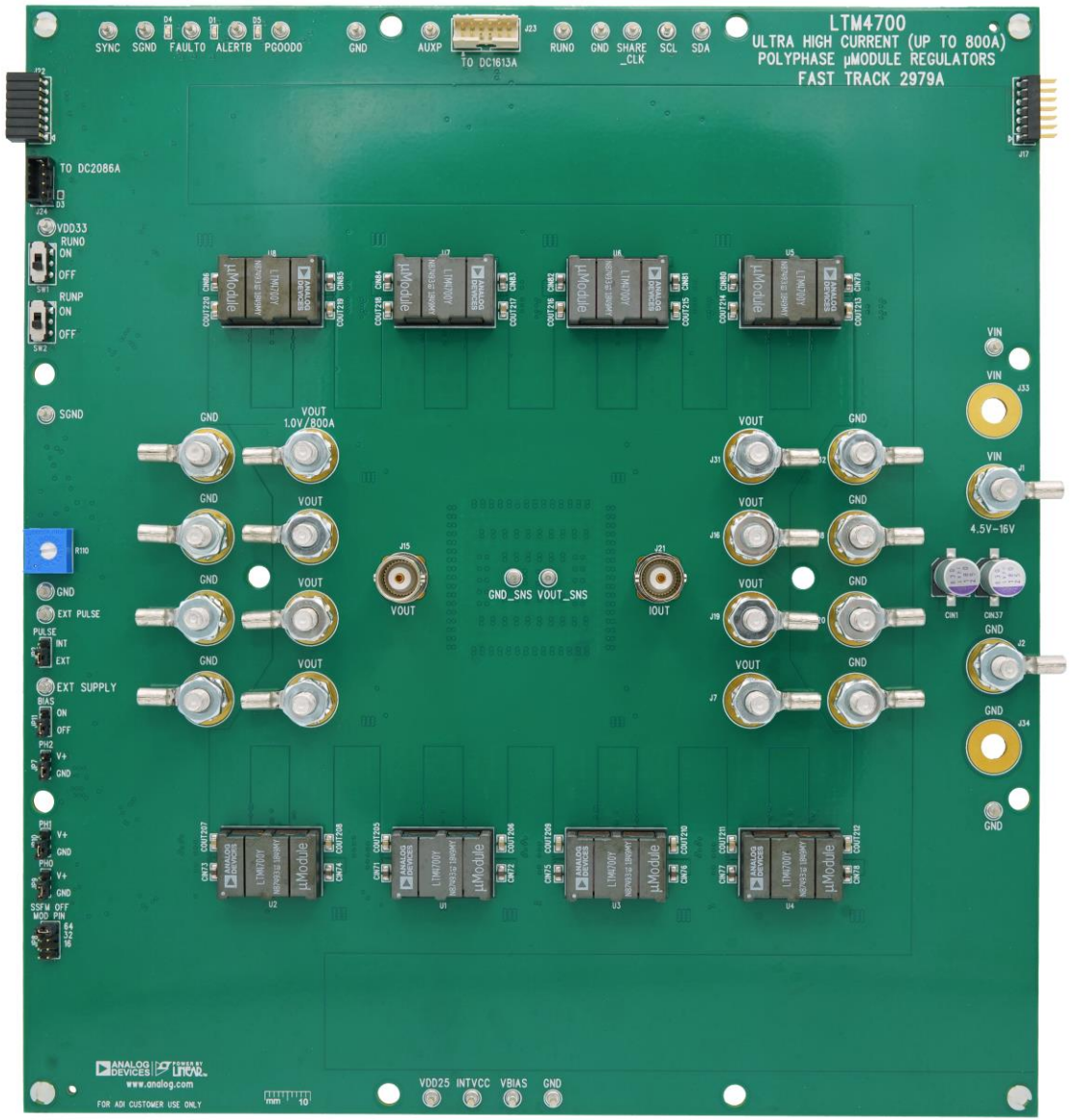
Test condition: V_{in} =12V, V_o=1.0V, f_{sw}=350kHz

Efficiency: 90.32%@800A

Power Loss: 87.95W@800A

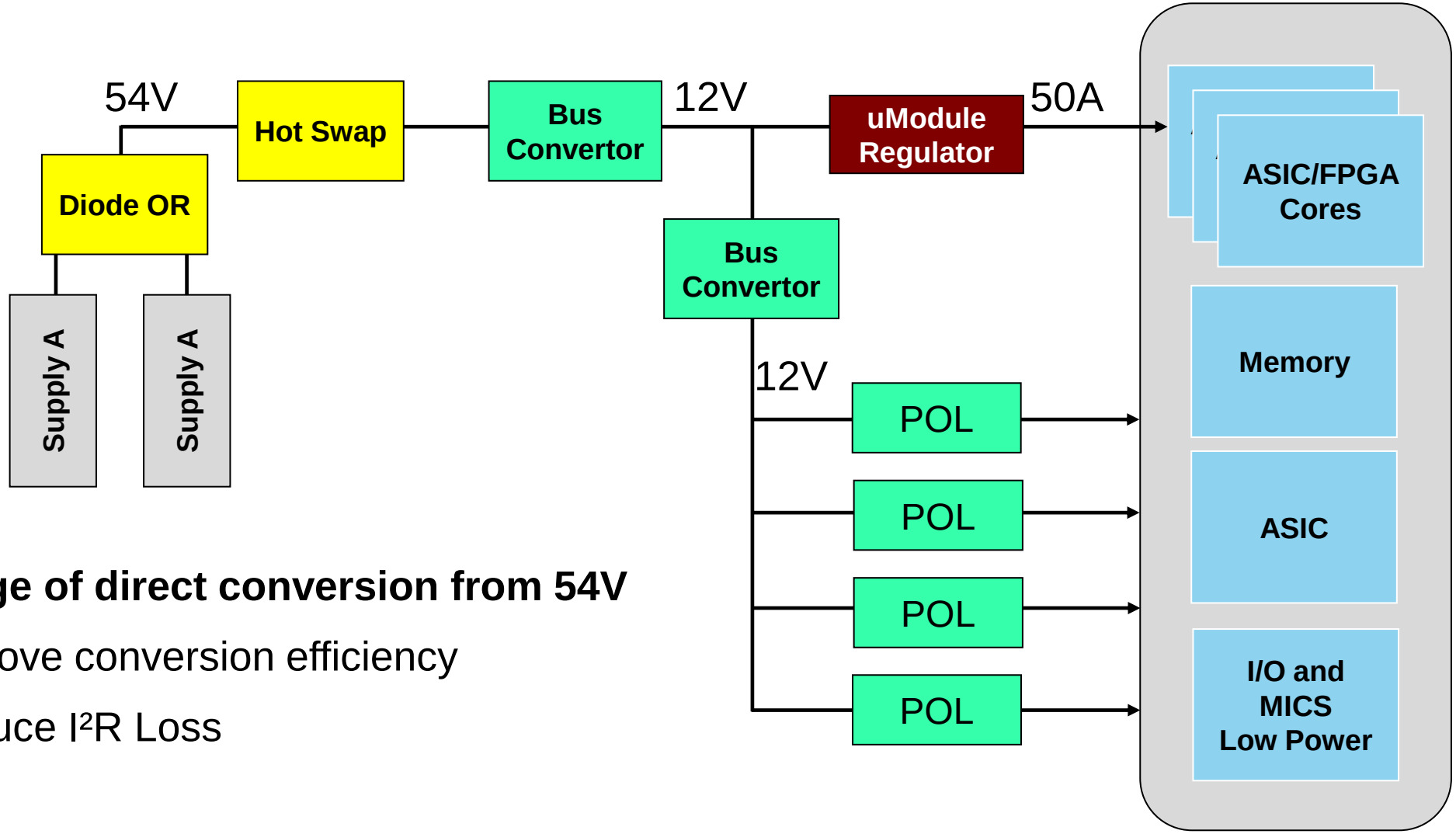


Efficiency and Power Loss vs Current



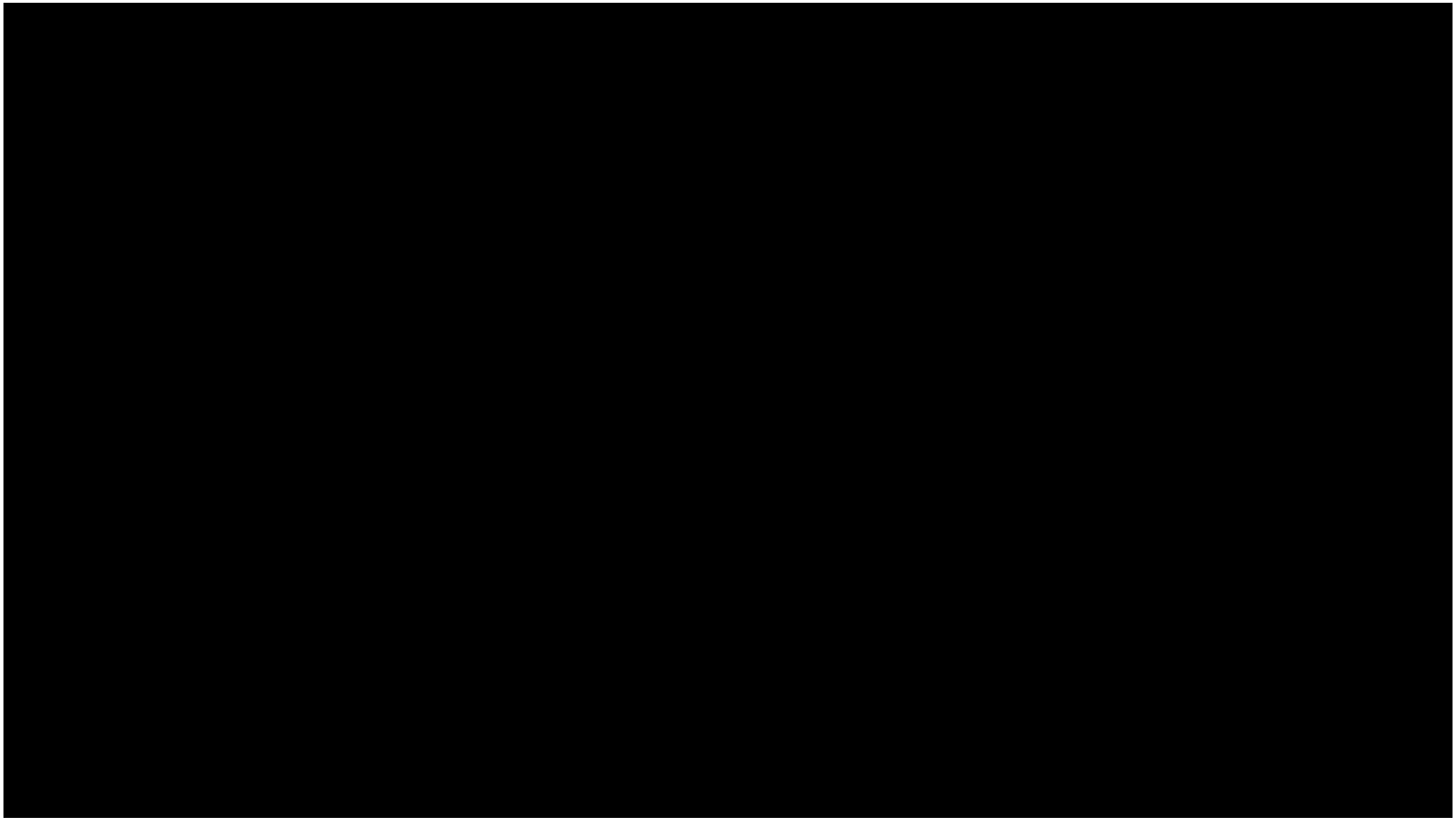
54V Bus Input µModule Regulator with PSM

Next Generation Telecom 54V Bus Power Architecture



- **Advantage of direct conversion from 54V**
  - Improve conversion efficiency
  - Reduce I^2R Loss

LTM4664 TechClip



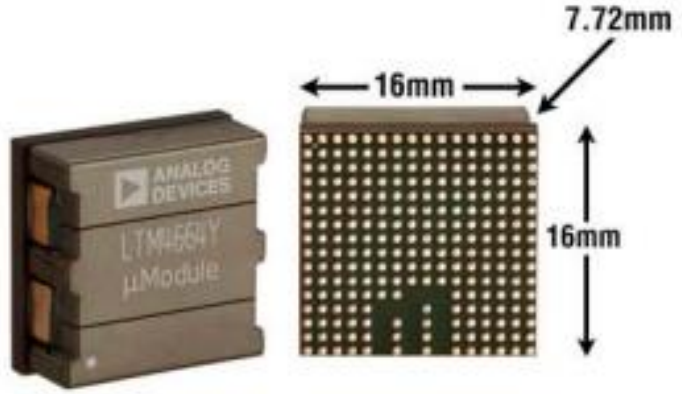
LTM4664 54V To Core Voltage
Single 50A/Dual 25A µModule with I2C PMBus

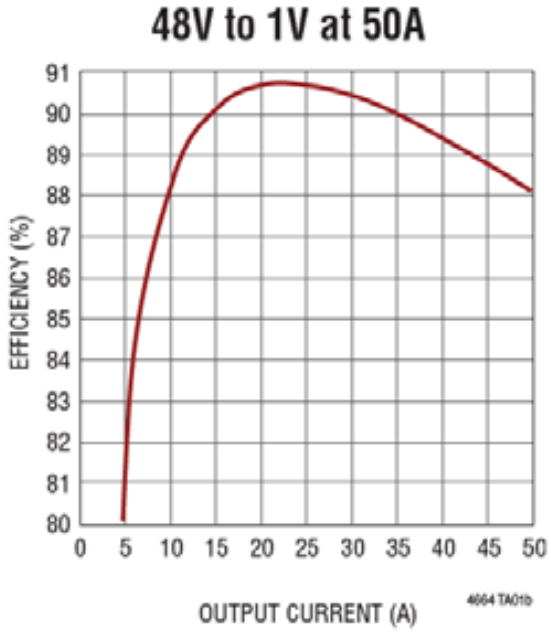
FEATURES

- **Complete 48V Input to Low Voltage Dual 25A Supply that Can Scale to 300A**
- Dual Analog Loops with Digital Interface for Compensation, Control and Monitoring
- Input Voltage Range: 30V to 58V
- Output Voltage Range: 0.5V to 1.5V
- ±3% Output Current Readback Accuracy (–20° to 125°C)
- 88% Efficiency for 48V to 1V at 50A
- ±0.5% Output Voltage Accuracy Over Temperature
- 400kHz PMBus-Compliant I^2C Serial Interface
- 16mm × 16mm × 7.72mm BGA Package

APPLICATIONS

- 48V Systems
- Computer and Networking Equipment
- Electronic Test Equipment
- Storage Systems

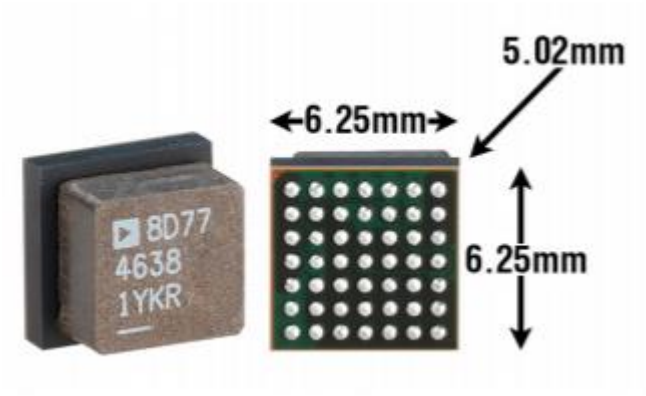




Single Output µModule Regulators

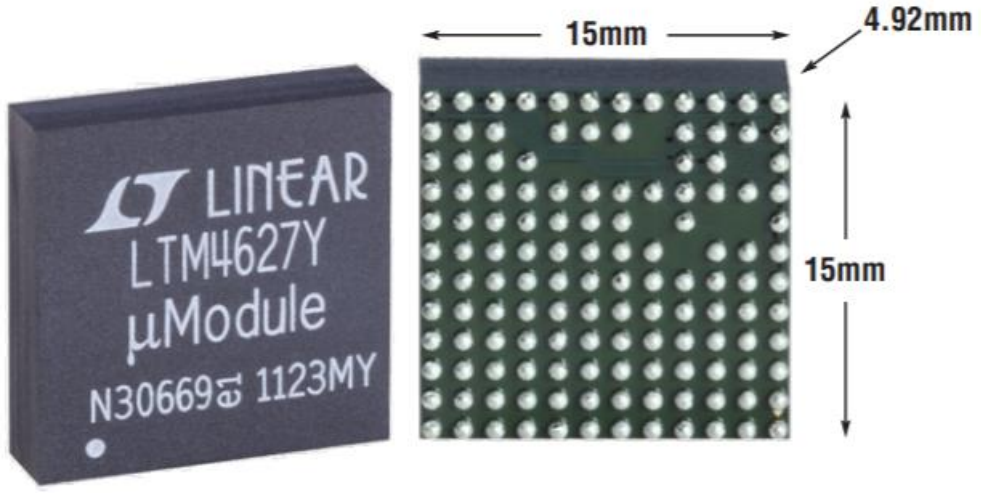
Tiny: 15A

LTM4638

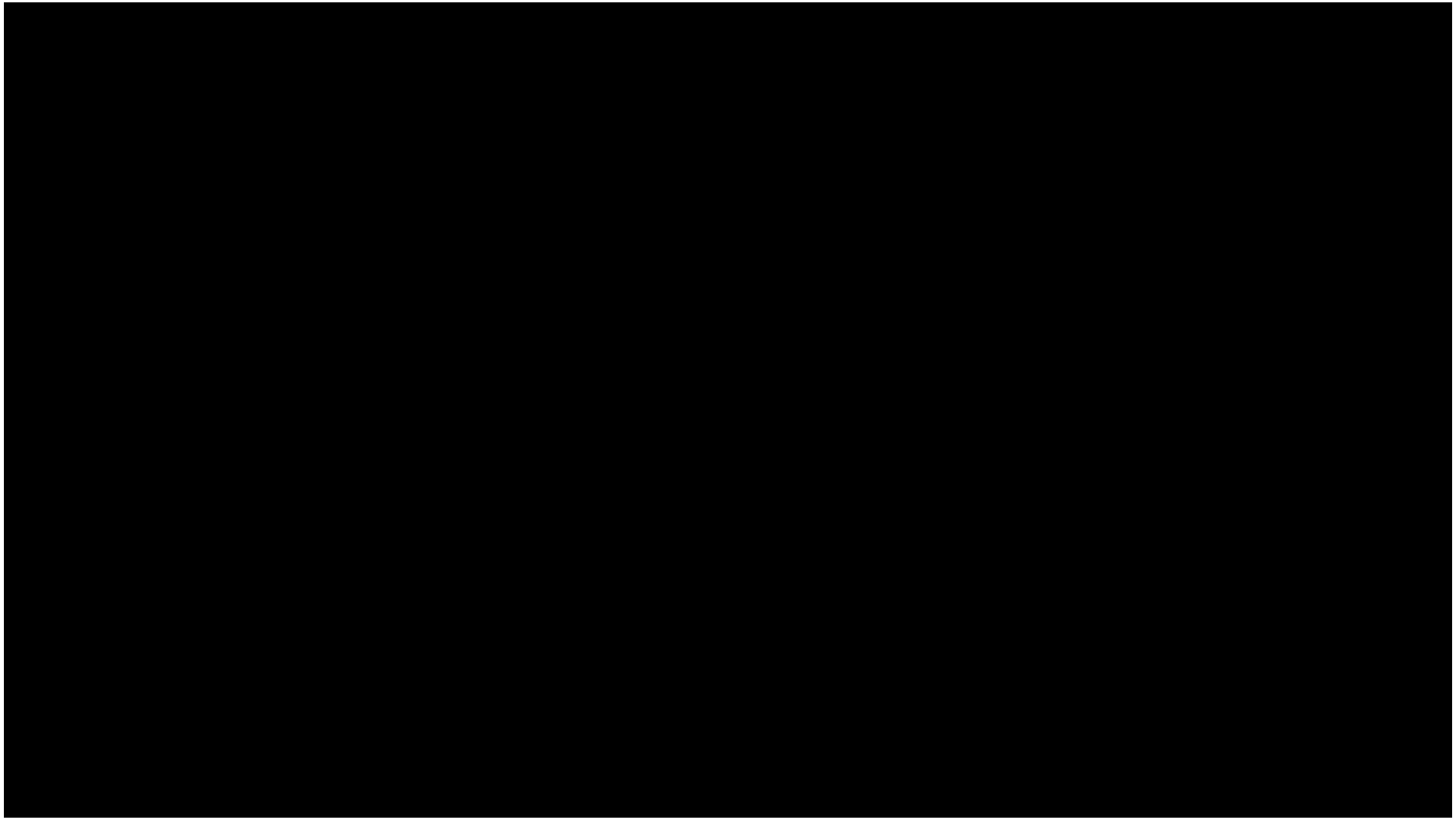


LTM4627

Released in 2013



LTM4626, LTM4638 TechClip

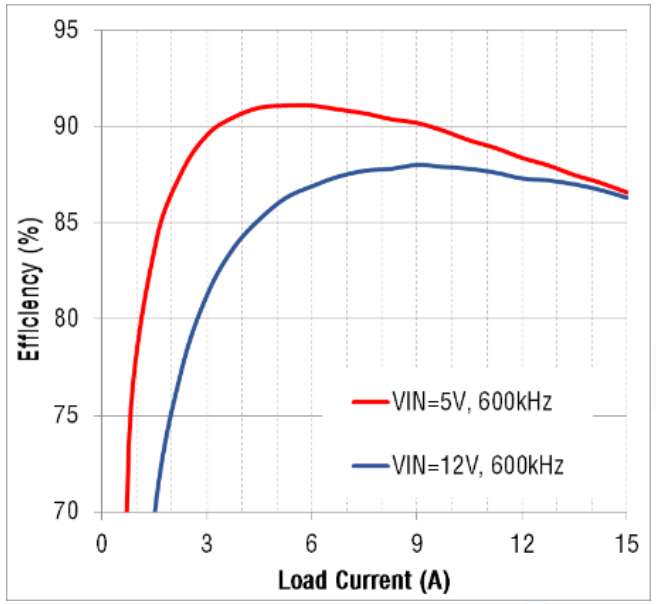


LTM4638/LTM4626/LTM4657: Tiny 15A/12A/8A µModule Regulator

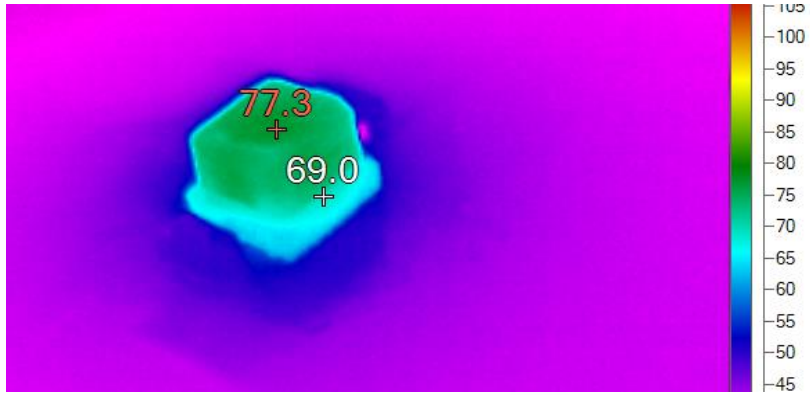
- Complete solution in <1cm^2 (Single-Sided PCB) or 0.5cm^2 (Dual-Sided PCB)
- Wide input voltage range: 3.1V to 20V
- 0.6V to 5.5V output voltage, 15A (LTM4638)
- 0.6V to 5.5V output voltage, 12A (LTM4626)
- 0.5V to 5.5V output voltage, 8A (LTM4657)
- ±1.5% maximum total V_{OUT} error over line, load and temperature
- Differential remote V_{OUT} sensing
- Multiphase current sharing with multiple devices

6.25 x 6.25 x 3.87mm BGA (LTM4626, LTM4657)

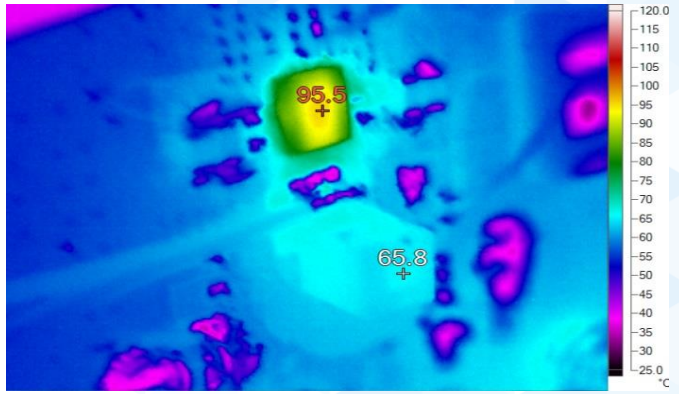
6.25 x 6.25 x 5.02mm BGA (LTM4638)



VIN=12V, VOUT=1V/15A, Fs=600kHz



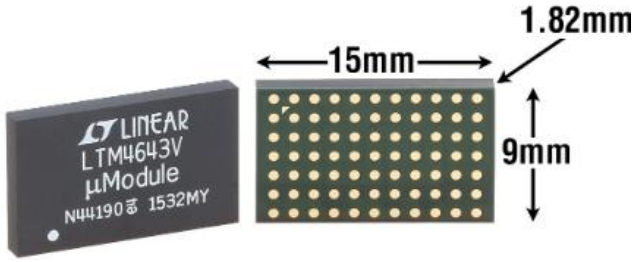
LTM4638



Discrete Solution (same IC)

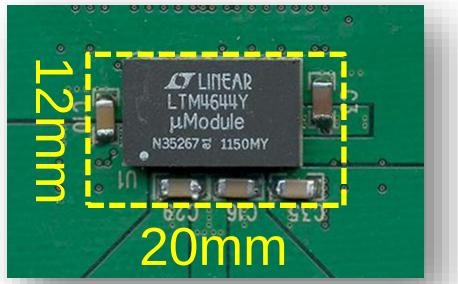
Triple/Quad Output µModule Regulators

Quad 3A Ultrathin and Quad 4A



Ultrathin Quad 3A

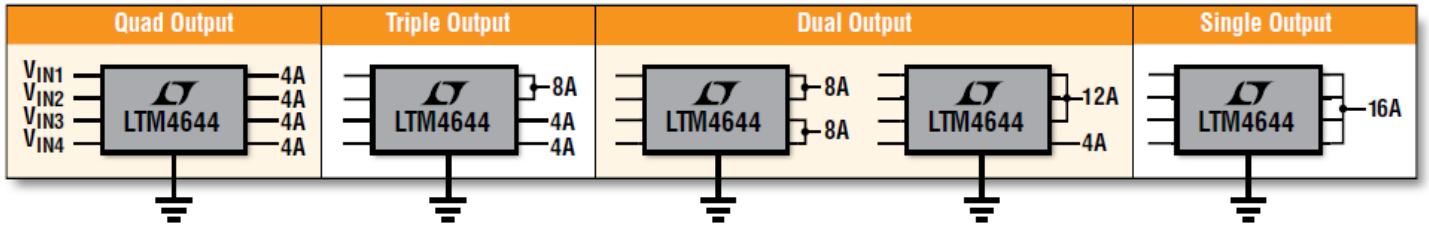
LTM4643



Quad 4A

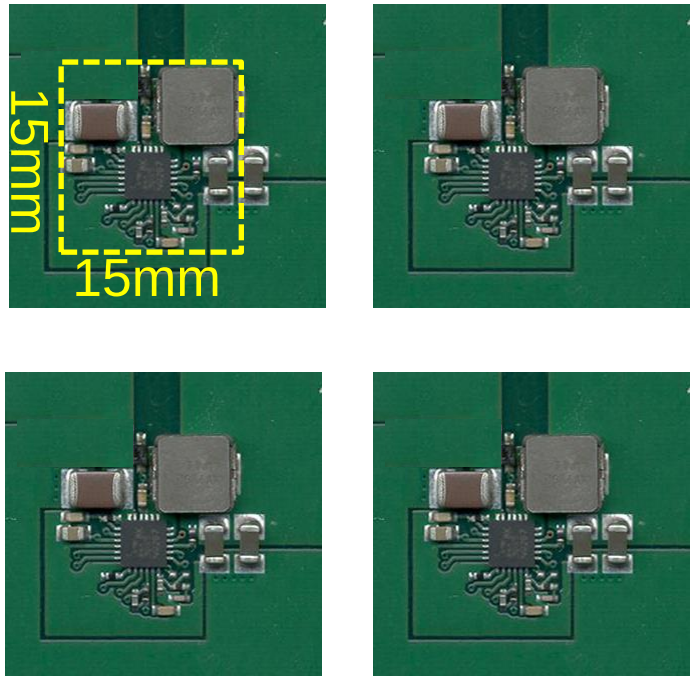
LTM4644

LTM4644's Outputs Are Configurable from Four 4A Outputs to a Single 16A

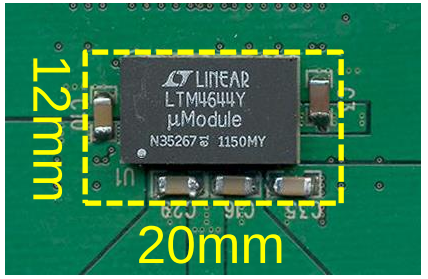


Size and Simplicity

Four 4A Monolithic Regulators



LTM4644
Quad 4A µModule Regulator

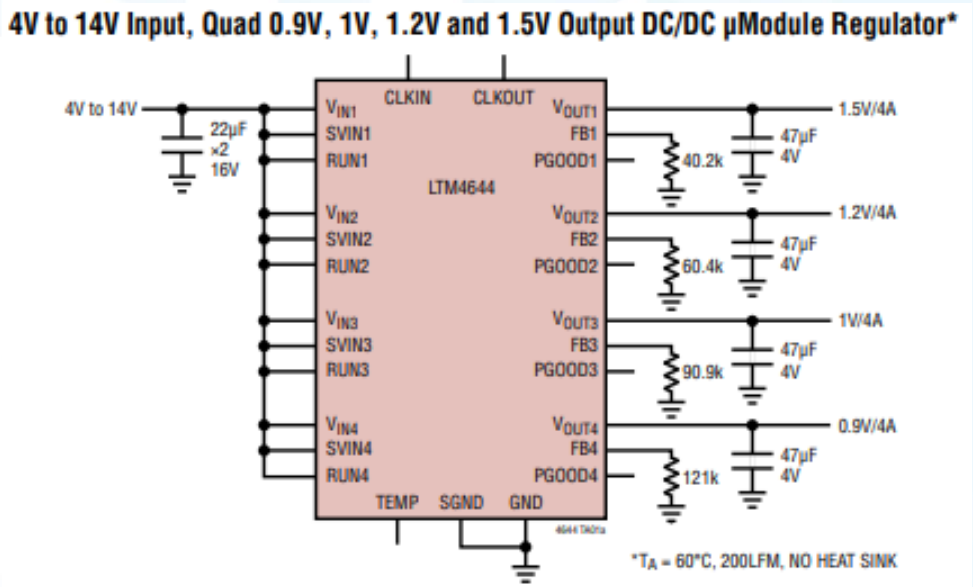


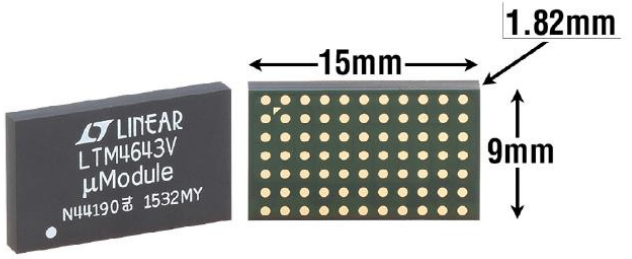
- 900 mm^2 vs. 240mm^2 = 73% reduction

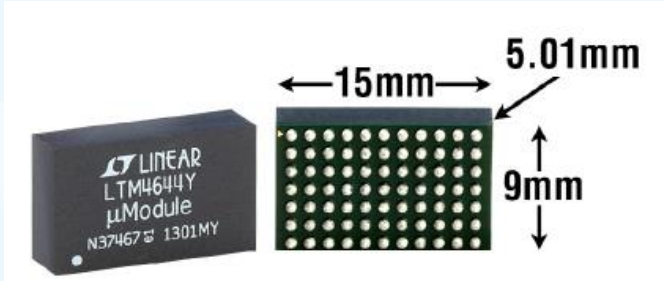
LTM4644/LTM4643: Quad Output µModule Regulators with Configurable 4A/3A Array

FEATURES

- Quad Output Step-Down µModule® Regulator with 4A per Output
- Wide Input Voltage Range: 4V to 14V
  - 2.375V to 14V with External Bias
- 0.6V to 5.5V Output Voltage
- 4A DC, 5A Peak Output Current Each Channel
- Up to 5.5W Power Dissipation (T_A = 60°C, 200 LFM, No Heat Sink)
- ±1.5% Total Output Voltage Regulation
- Current Mode Control, Fast Transient Response
- Parallelable for Higher Output Current
- Output Voltage Tracking
- Internal Temperature Sensing Diode Output
- External Frequency Synchronization
- Overvoltage, Current and Temperature Protection
- 9mm × 15mm × 5.01mm BGA Package





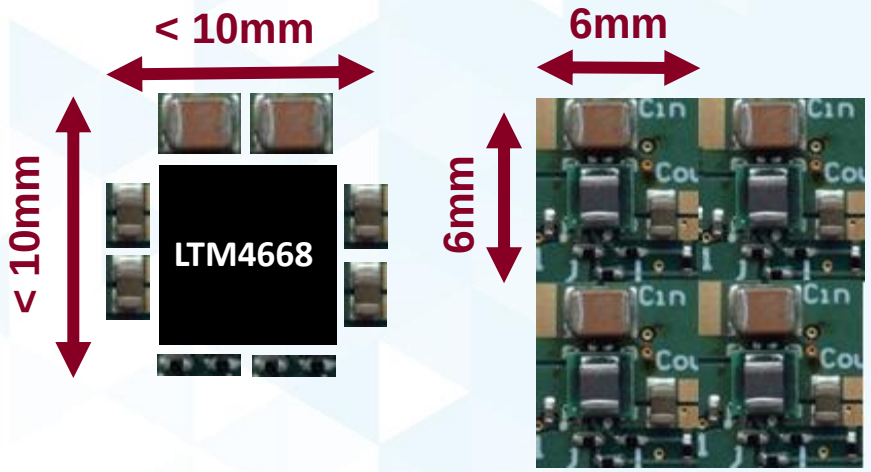


LTM4668: Quad Output µModule Regulator with Configurable 1.2A Output Array

FEATURES

- Quad Output Step-Down µModule Regulator with 1.2A per Output Channel
- Wide Input Voltage Range: 2.7V to 17V
- 0.6V to 1.8V Output Voltage
- 1.2A DC, Parallelable, Output Current Each Channel
- ±1.5% Total Output Voltage Regulation
- 100% Duty Cycle Operation
- Current Mode Control, Fast Transient Response
- External Frequency Synchronization
- Selectable Burst Mode® Operation
- Power Good Indicator
- Over Voltage, Current and Temperature Protection
- 6.25mm x 6.25mm x 2.1mm BGA Package
- Pin Compatible with LTM4668A (0.6V to 5.5V Output, 2.25MHz).

LTM4668 **4 discrete regulator solution**



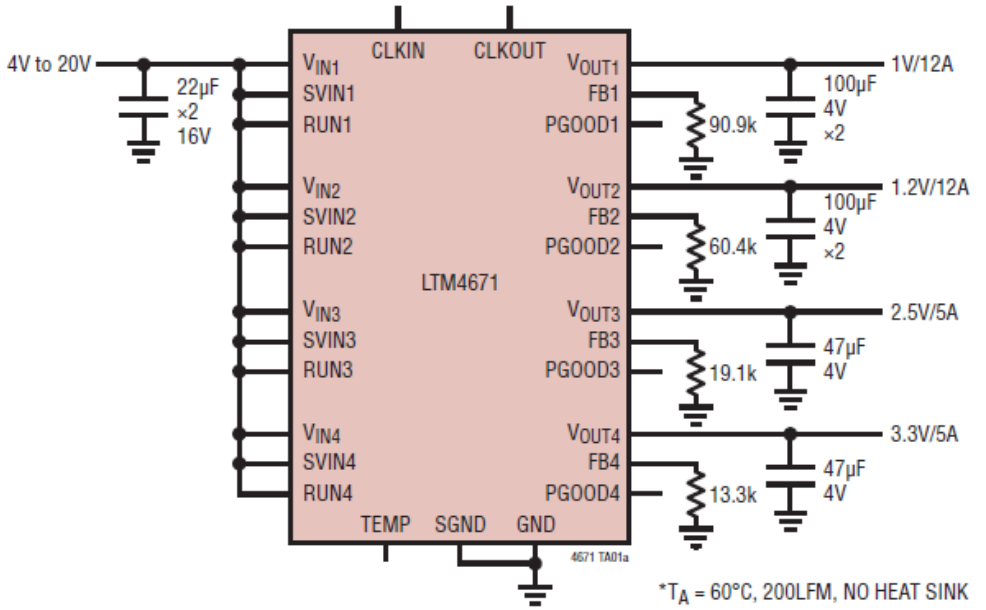
Configurable Output Array

LTM4671: Quad Output 12A/12A/5A/5A µModule Regulator

FEATURES

- **Quad Output Step-Down µModule® Regulator with Dual 12A and Dual 5A Output**
- **Wide Input Voltage Range: 3.1V to 20V**
- **Dual 12A DC Output from 0.6V to 1.8V**
- **Dual 5A DC Output from 0.6V to 5.5V**
- **Up to 7W Power Dissipation (T_A = 60°C, 200LFM, No Heat Sink)**
- ±1.5% Total Output Voltage Regulation
- Dual Differential Sensing Amplifier
- Current Mode Control, Fast Transient Response
- Parallelable for Higher Output Current
- Selectable Burst Mode® Operation
- Output Voltage Tracking
- Internal Temperature Sensing Diode Output
- External Frequency Synchronization
- Overvoltage, Current and Temperature Protection
- 9.5mm × 16mm × 4.82mm BGA Package

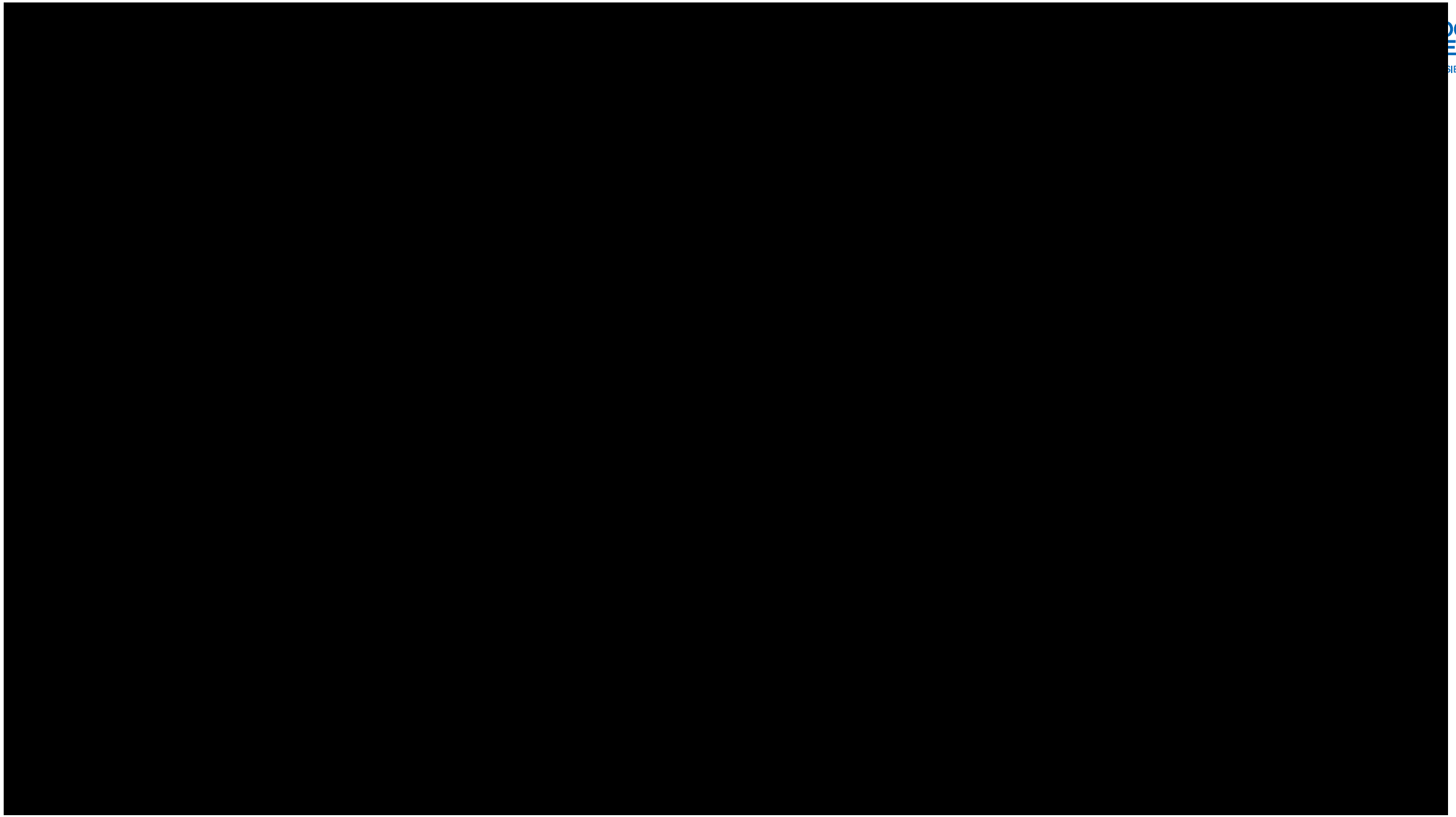
4V to 20V Input, 12A, 12A, 5A, 5A DC/DC Step-Up µModule Regulator



Configurable Output Array*

Section II

Ultrathin µModule Regulators



Ultrathin µModule Regulators

(Thickness: 1.18mm,1.82mm, 1.91mm)

LTM4691 Dual 2A
(4 x 3 x 1.18mm)

11 x 16 x 1.82mm

LTM4686
Dual 10A or Single 20A with PSM

16 x 16 x 1.91mm

LTM4631
Dual 10A or Single 20A

15 x 9 x 1.82mm

LTM4643
Quad 3A

6.25 x 6.25 x 1.82mm

LTM4622
Dual 2.5A or Single 5A

LTM4623
Single 3A

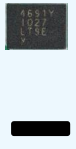
LTM4632
Triple output for DDR/QDR

6.25 x 6.25 x 2.01mm

LTM4668/
LTM4668A
Quad 1.2A

4 x 4 x 1.82mm

LTM8074
40Vin, 1.2A



4 x 3 x 1.18mm

LTM4691
Dual 2A

New

LTM4691 Tiny Dual 2A µModule Regulator

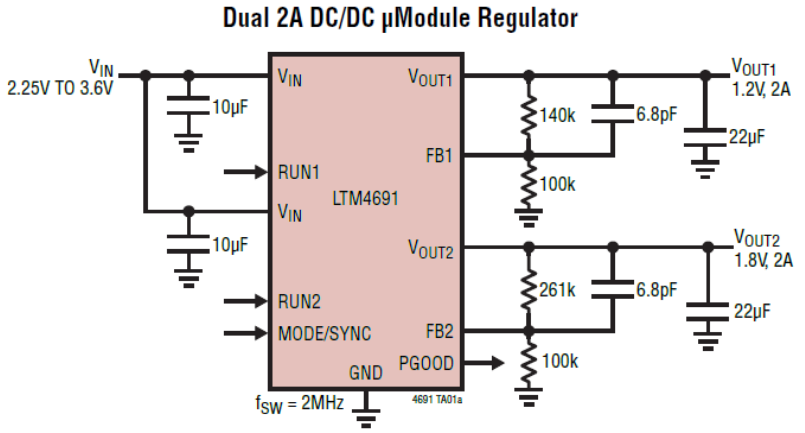
FEATURES

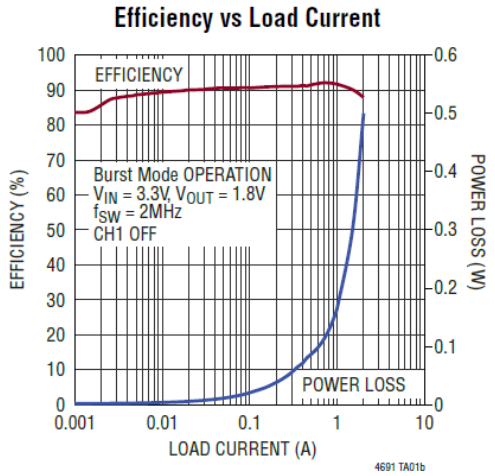
- **Tiny Surface Mount, Low Profile 3mm × 4mm × 1.18mm LGA Package**
- Input Voltage Range: 2.25V to 3.6V
- Dual 2A DC Output Current
- ±1.5% Total Output Voltage Regulation
- Current Mode Control, Fast Transient Response
- External Frequency Synchronization
- Selectable Pulse-Skipping Mode/Burst Mode® Operation/Forced Continuous Mode
- Power Good Indicator
- Internal Soft-Start
- Internal Compensation
- Overvoltage, Overcurrent and Overtemperature Protection

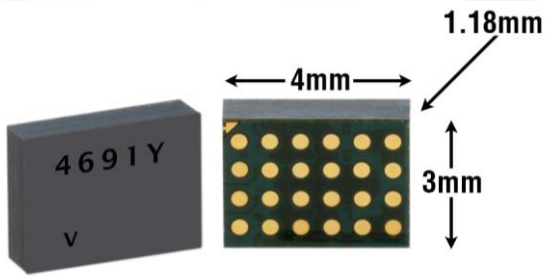
APPLICATIONS

- Telecom, Networking and Industrial Equipment
- Point-of-Load Regulation
- FPGA, ASIC Core Supplies

TYPICAL APPLICATION







LTM4663: Ultrathin 1.5A µModule Thermoelectric Cooler (TEC) Regulator

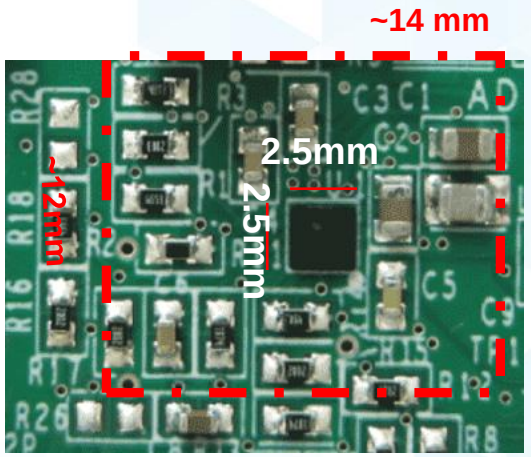
FEATURES

- **Built-in Two Zero-Drift, Rail-to-Rail Chopper Amplifiers**
- 2.7V to 5.5V Input Voltage Range
- 1.5A Driving Capability
- **1% Accuracy 2.5V Internal Reference Output**
- TEC Voltage and Current Monitoring
- Independent Programmable Heating and Cooling Current Limit
- Programmable Maximum TEC Voltage
- Default 2MHz Switching Frequency
- Synchronization from 1.85MHz to 3.25MHz
- Capable of NTC, PTC and RTD Thermal Sensors
- **3.5mm × 4mm × 1.3mm LGA Package**

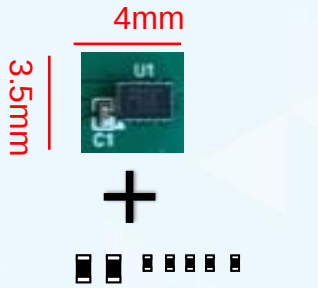
APPLICATIONS

- TEC Temperature Control
- Optical Networking System, Optical Module
- LiDAR System

Discrete Solution



LTM4663



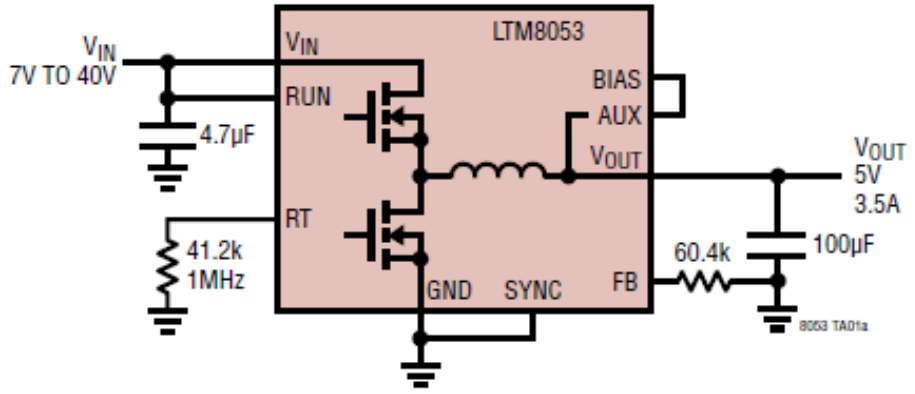
0402 Cap 0201 Res

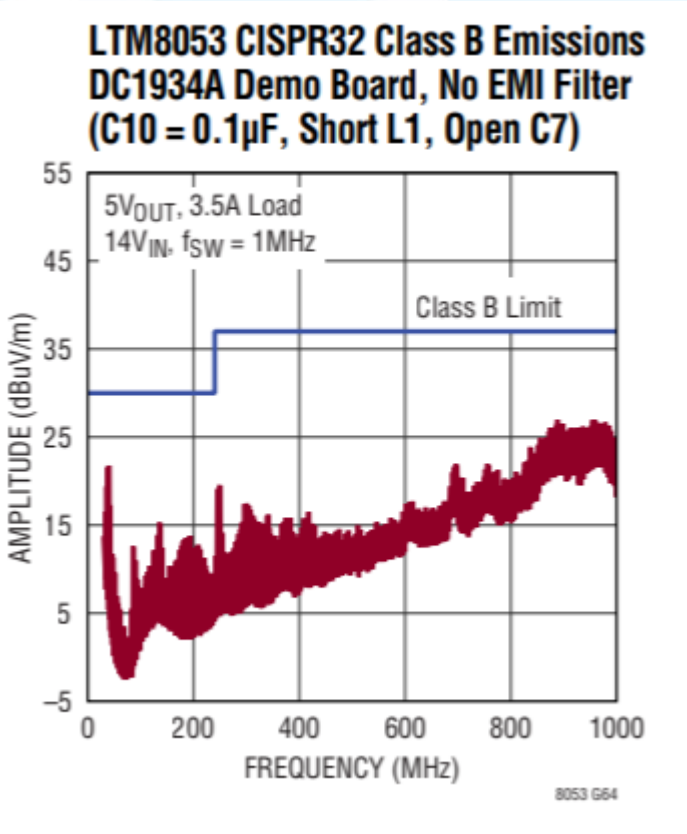
Silent Switcher µModule Regulators

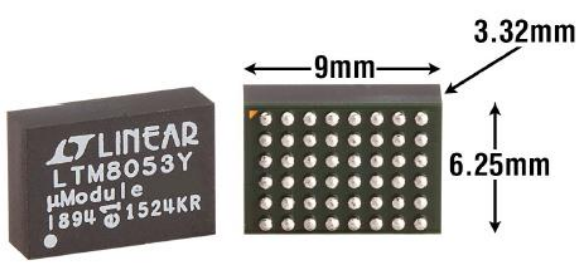
LTM8053 – The First Silent Switcher µModule Product

FEATURES

- **Complete Step-Down Switch Mode Power Supply**
- **Low Noise Silent Switcher® Architecture**
- **Wide Input Voltage Range: 3.4V to 40V**
- **Wide Output Voltage Range: 0.97V to 15V**
- **3.5A Continuous Output Current at $12V_{IN}$, $5V_{OUT}$, $T_A = 85°C$**
- **6A Peak Output Current**
- **Parallelable for Increased Output Current**
- Selectable Switching Frequency: 200kHz to 3MHz
- Tiny, Low Profile 6.25mm × 9mm × 3.32mm RoHS Compliant BGA Package



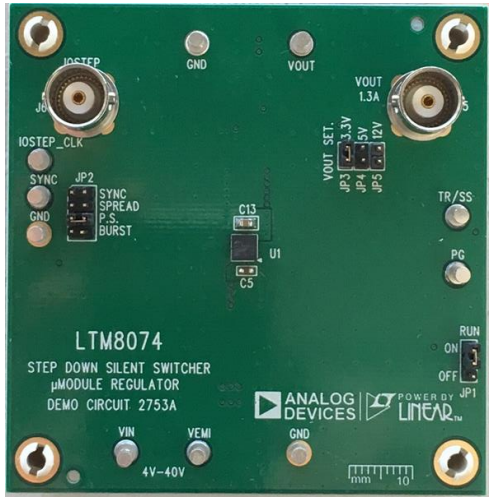




40Vin Single Output Silent Switcher µModule Regulators

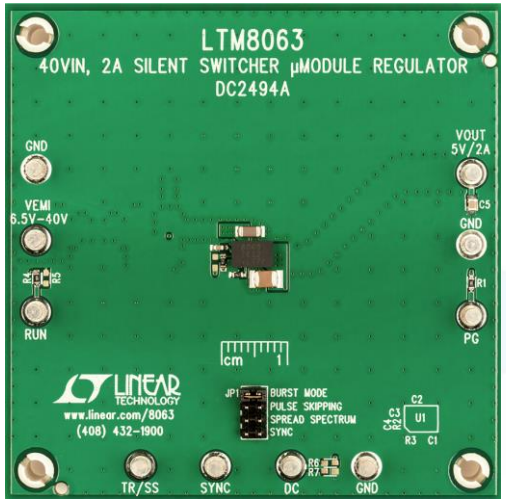
LTM8074 (1.2A)

4mm x 4mm



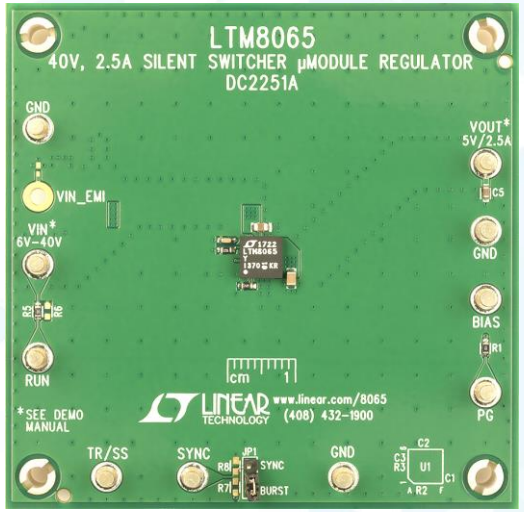
LTM8063 (2A)

4mm x 6.25mm



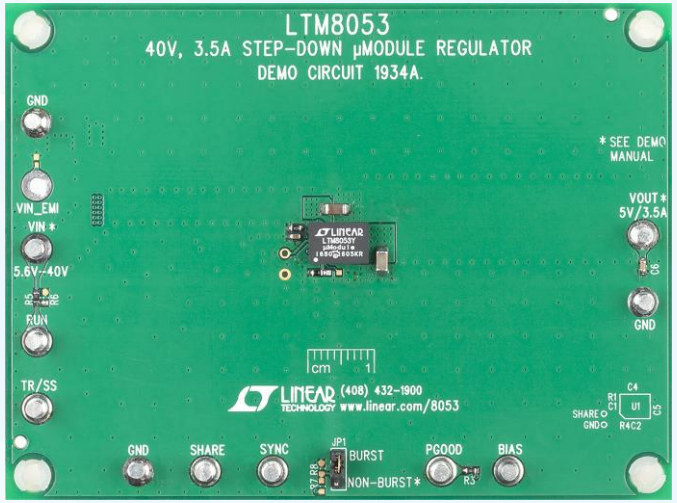
LTM8065 (2.5A)

6.25mm x 6.25mm



LTM8053 (3.5A)

6.25mm x 9mm



40Vin Dual Output Silent Switcher µModule Regulators

	LTM8078	LTM8024
# of Output	2	
Silent Switcher	Yes	
CISPR22 Class B Compliant	Yes	
Vin Range	3V to 40V	
Vout Range	0.8V to 10V	0.8V to 8V
Iout	1.4A	3.5A
Switching Frequency	300kHz to 3MHz	200kHz to 3MHz
Package Size (mm)	6.25 x 6.25 x 2.22	9 x 11.25 x 3.32
Package Type	BGA	BGA

60Vin Single Output Step-Down µModule Power Regulators

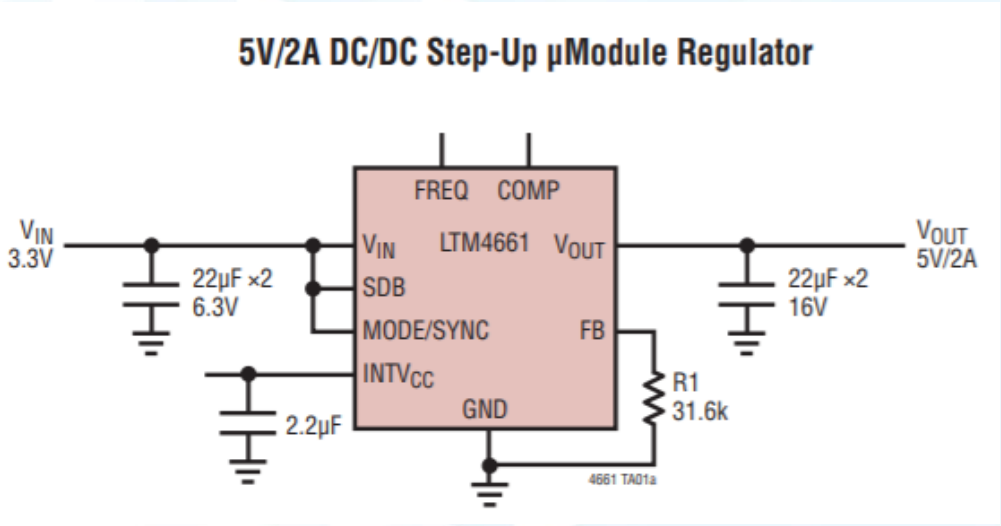
	LTM8073	LTM8071	LTM4653	LTM4651
Silent Switcher	Yes	Yes	No	No
CISPR22 Class B Compliant	CISPR22 Class B		EN55022 Class B	
Vin Range	3.4V to 60V	3.6V to 60V	3.1V to 58V	3.6V to 58V
Vout Range	0.8V to 15V	0.97V to 15V	0.5V to 0.94*Vin	-0.5V to -26.5V
Iout	3A	5A	4A	4A
Switching Frequency	200kHz to 3MHz	200kHz to 2.2MHz	400kHz to 3MHz	259kHz to 3MHz
Package Size (mm)	6.25 x 9 x 3.32	9 x 11.25 x 3.32	9 x 15 x 5.01	9 x 15 x 5.01
Package Type	BGA			

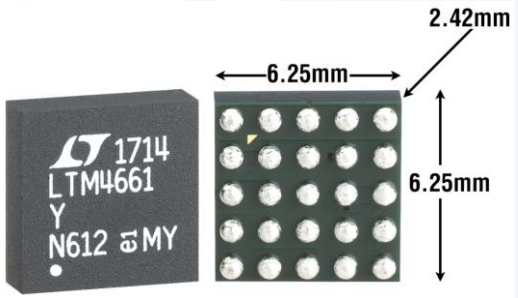
Boost µModule Regulators

LTM4661: 15V, 4A Step-Up µModule Regulator

FEATURES

- **Complete Solution in <1cm^2 (Single-Sided PCB) or 0.5cm^2 (Dual-Sided PCB)**
- **Input Voltage Range: 1.8V to 5.5V, Down to 0.7V After Start-Up**
- **Output Voltage Range: 2.5V to 15V**
- **4A Switch Current**
- **Dual Phase Operation**
- **±3% Maximum Total DC Output Voltage Regulation Over Load, Line and Temperature**
- **Output Disconnect in Shut Down**
- Inrush Current Limit
- External Frequency Synchronization
- Selectable Burst Mode® Operation
- Output Overvoltage and Overtemperature Protection
- 6.25mm × 6.25mm × 2.42mm BGA package

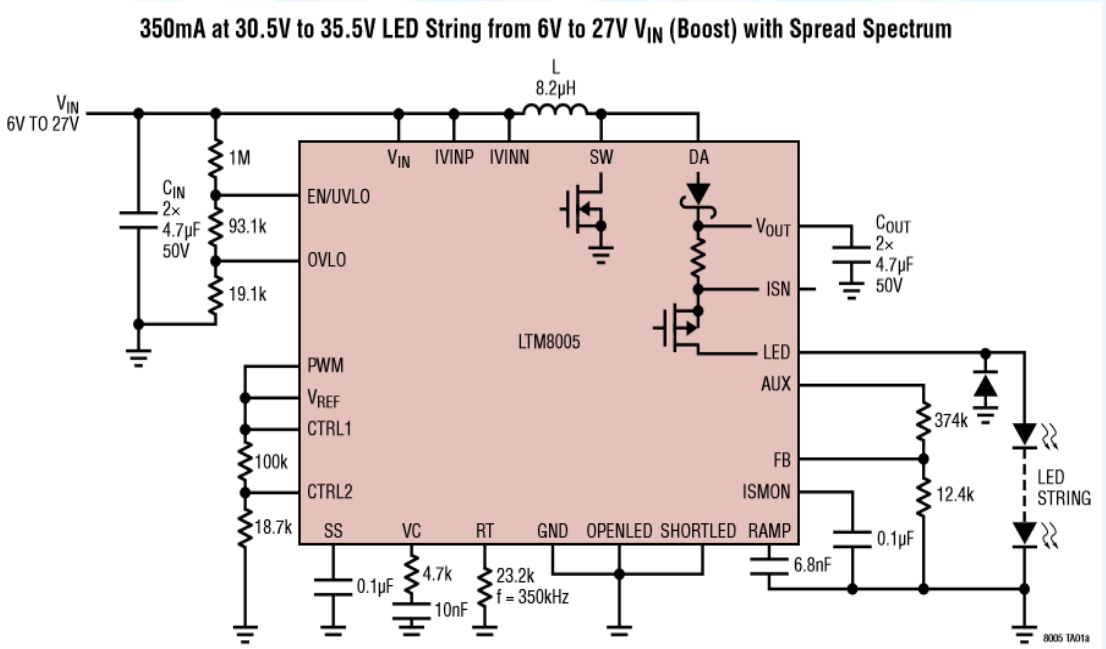


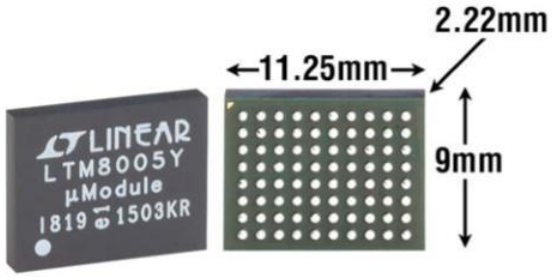


LTM8005: 38V Boost µModule Regulator for LED Drive with 10A Switch

FEATURES

- **Wide Input Voltage Range: 5V to 38V**
- **Supports Boost or SEPIC Power Topologies**
- **Adjustable LED Current Up to 1.6A**
- **40V 10A Internal Power Switch**
- **Wide Temperature Range: –40°C to 150°C**
- **Input and Output Current Reporting**
- **Internal Switch for PWM and Output Disconnect**
- **Internal Spread Spectrum Frequency Modulation**
- **3000:1 True Color PWM™ Dimming**
- Open LED Protection with OPENLED Flag
- Short-Circuit Protection and SHORTLED Flag
- Soft-Start with Programmable Fault Restart Timer
- 9mm × 11.25mm × 2.22mm BGA

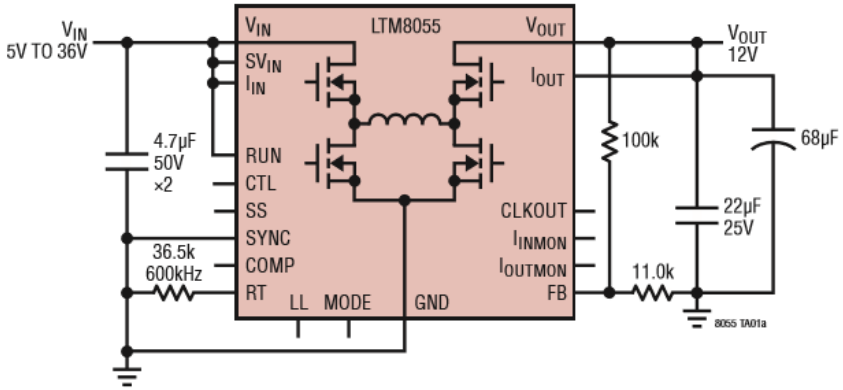


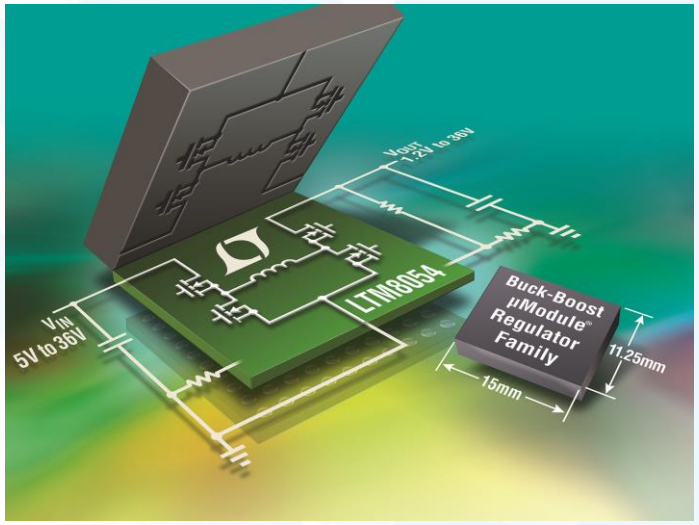


Buck-Boost µModule Regulators

Buck-Boost µModule Regulators

LTM8055 12Vout from 5Vin to 36Vin Buck-Boost Regulator





Part Number	Number of Output	Topology	Input Voltage (V)		Output Voltage (V)		Output Current (A)	Clock Sync Range (MHz)	Parallelable Outputs (Total I_{OUT})*	Inductor	Package Dimensions (mm)	Package
			Min	Max	Min	Max						
LTM8045	1	SEPIC	2.8	18	±2.5	±15	Up to 0.7 †	0.2 to 2.0	-	Internal	6.25 x 11.25 x 4.92	BGA
LTM8054		4-Switch Buck-Boost	5	36	1.2	36	5.4†	0.2 to 0.7	x2 (10.8A)	Internal	11.25 x 15 x 3.42	BGA
LTM8056			5	58	1.2	48	5.4†	0.2 to 0.7	x2 (10.8A)	Internal	15 x 15 x 4.92	BGA
LTM8055			5	36	1.2	36	8.5†	0.2 to 0.7	x2 (17A)	Internal	15 x 15 x 4.92	BGA
LTM4607			4.5	36	0.8	24	10†	0.2 to 0.4	x4 (20A) ††	External	15 x 15 x 2.82	LGA
LTM4609			4.5	36	0.8	34	10†	0.2 to 0.4	x4 (16A) ††	External	15 x 15 x 2.82 15 x 15 x 3.42	LGA BGA
LTM4605			4.5	20	0.8	16	12†	0.2 to 0.4	x4 (20A) ††	External	15 x 15 x 2.82	LGA
LTM8049	2	SEPIC	2.6	20	±2.4	±24	Up to 1†	0.2 to 2.5	x 2 (2A)	Internal	9 x 15 x 2.42	BGA

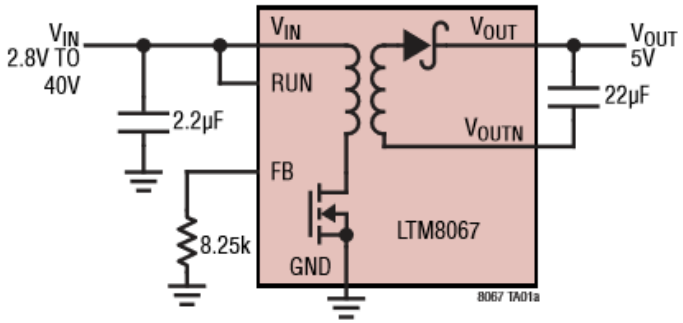
†Step-Dwon Mode. Output current vary depending on operation mode.

††Step up mode

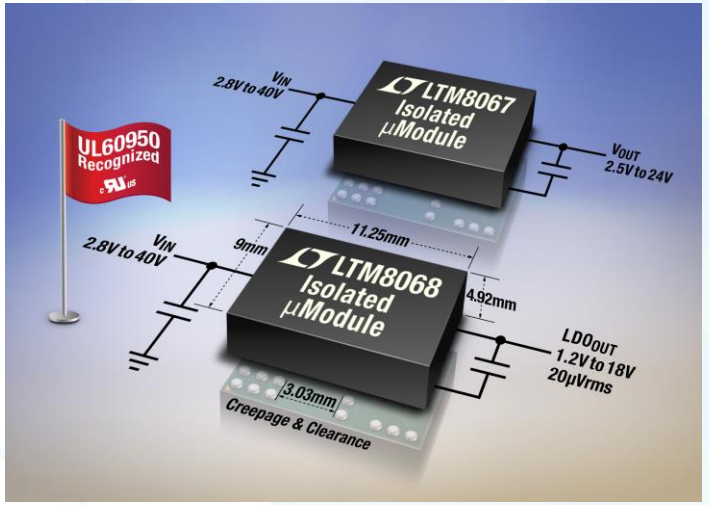
*Number of devices in parallel tested and verified by Linear Technology

Isolated µModule Regulators

Isolated µModule Regulators



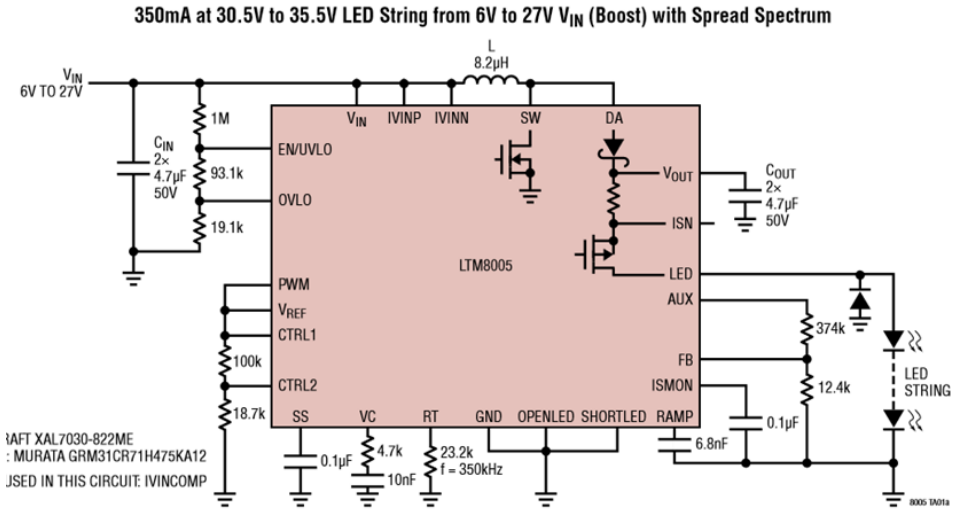
LTM8067: 2kVAC isolated µModule Regulator

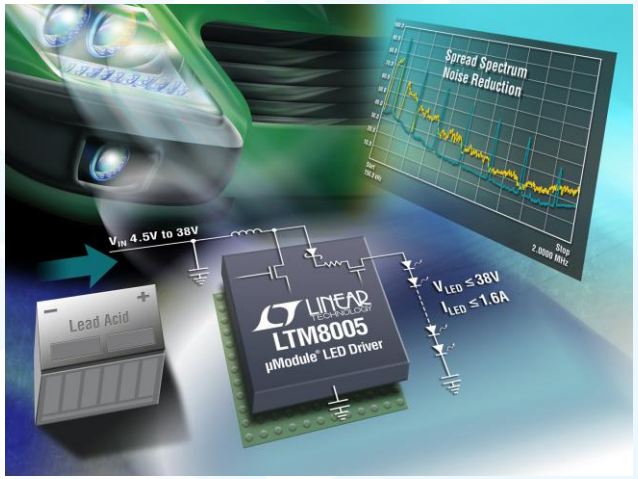


Part Number	Isolation	Output Channels	Input Voltage (V)		Output Voltage (V)		Output Ripple	Output Power	UL Recognized	BGA Package Dimensions (mm)
			Min	Max	Min	Max				
LTM8047	725VDC	1	3.1	32	2.5	12	20mVrms	1.5W	-	9 x 11.25 x 4.92
LTM8048		2	3.1	32	1.2	12	20µVrms (Vout2)	1.5W Combined	-	9 x 11.25 x 4.92
LTM8057	2kVAC (3kVDC)	1	3.1	31	2.5	12	20mVrms	1.5W	UL60950	9 x 11.25 x 4.92
LTM8058		2	3.1	31	1.2	12	20µVrms (Vout2)	1.5W Combined	UL60950	9 x 11.25 x 4.92
LTM8067		1	2.8	40	2.5	24	30mVrms	2.25W	UL60950	9 x 11.25 x 4.92
LTM8068		2	2.8	40	1.2	18	20µVrms (Vout2)	2.25W Combined	UL60950	9 x 11.25 x 4.92
LTM8046		1	3.1	31	1.8	12	20mVrms	2.5W	UL60950	9 x 15 x 4.92

LED Drivers

LED Drivers





LTM8005
350mA at 30.5V to 35.5V LED String
from 6V to 27V Vin (Boost) with Spread Spectrum

Part Number	Input Voltage (V)		Output Voltage (V)		LED Drive Current (A)	Dimming	Clock Sync Range (MHz)	Open LED Protection	LGA Package Dimensions (mm)
	Min	Max	Min	Max					
LTM8042	3	30	2	32	1	Analog and PWM	0.3 to 2.5	Yes	9 x 15 x 2.82
LTM8042-1	3	30	2	32	0.35	Analog and PWM	0.3 to 2.5	Yes	9 x 15 x 2.82
LTM8040	4	36	2.5	13	1	Analog and PWM	–	Yes	9 x 15 x 4.32
LTM8005	5	38	2	40	1.6	Analog and PWM	0.1 to 1	Yes	9 x 11.25 x 2.22

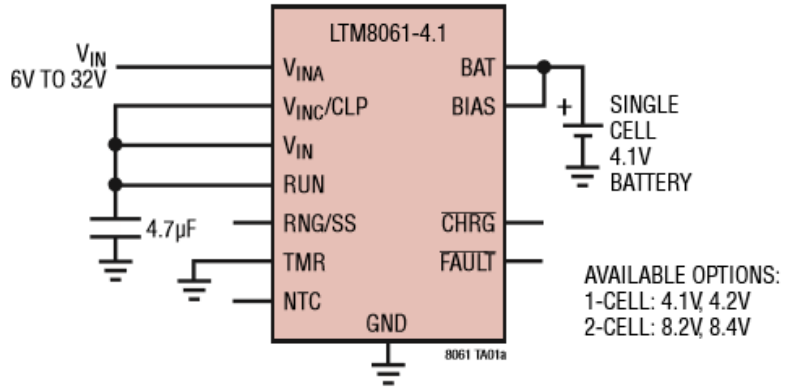
Battery Charger

LTM8061: 32V, 2A µModule Li-Ion/ Polymer Battery Charger

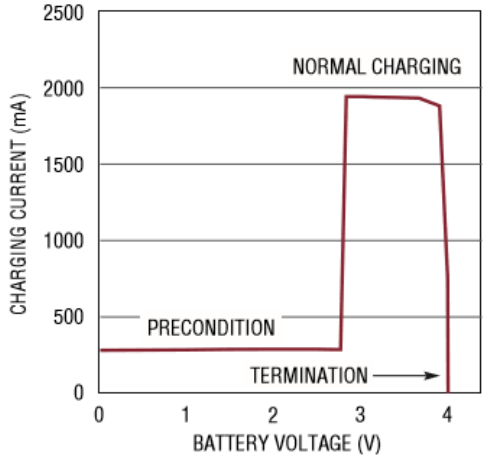
FEATURES

- **Wide Input Voltage Range: 4.95V to 32V (40V Absolute Maximum)**
- **Float Voltage Options: 1-Cell: 4.1V, 4.2V 2-Cell: 8.2V, 8.4V**
- **Programmable Charge Current: Up to 2A**
- **User-Selectable Charge Termination: C/10 or Onboard Termination Timer**
- **Dynamic Charge Rate Programming/Soft-Start Pin**
- **Programmable Input Current Limit**
- **Optional Reverse Input Protection**
- **NTC Resistor Temperature Monitor**
- 0.5% Float Voltage Accuracy
- Bad-Battery Detection with Auto-Reset
- Tiny, Low Profile (9mm × 15mm × 4.32mm) Surface Mount LGA Package

Standalone Single Cell 2A Li-Ion Battery Charger with C/10 Termination from 6V to 32V Input



Battery Charging Profile



Thank you!