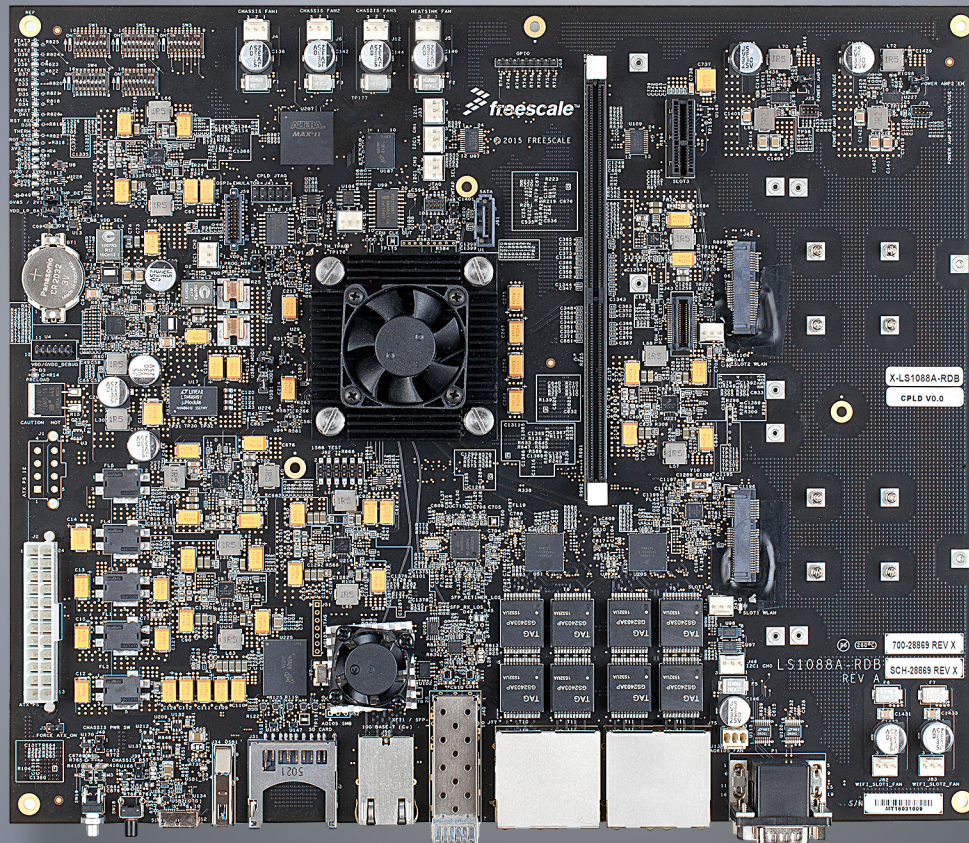


# Power Management Solutions for NXP Processors

## Tested and Verified

- ▣ [www.linear.com/nxp](http://www.linear.com/nxp)
- ▣ Schematics
- ▣ Bill-of-Materials
- ▣ Power Circuit Simulation & Design Tools

QorIQ LS1088A Reference Design (LS1088A-RDB)



▣, LT, LTC, LTM, LTSpice, LTpowerPlanner, LTpowerPlay, LTpowerCAD, µModule, PolyPhase, Linear Technology and the Linear logo are registered trademarks and VLDO is a trademark of Linear Technology Corporation. All other trademarks are the property of their respective owners.

## Introduction

Power management solutions presented here have been assembled and verified by NXP or third-party development board providers. For more information and technical documentation, visit [www.linear.com/nxp](http://www.linear.com/nxp).

## Contents

NXP Development Boards.....	3-7
PMICs for Modern Application Processors .....	8-9
Power Circuit Simulation & Design Tool .....	10-11

Development Boards in this Brochure Can Be Found at [www.linear.com/nxp](http://www.linear.com/nxp)

Processor	Board Supplier	Product Name	Part Number for Core Rail	Page
QorIQ LS1088A	NXP	LS1088A-RDB	LTC®3882	3
QorIQ LS1043A	NXP	LS1043A-RDB	LTM®4649	4
QorIQ T1023A	NXP	T1023RDB	LT®8612	5
i.MX 7	Arrow	i.MX7 96Board	LTC3589-2	6
i.MX 6	Novtech	NOVPEK i.MX6Q/D	LTC3676-1	7

Contact board supplier to purchase the board

NXP: [www.nxp.com](http://www.nxp.com)



Novtech: [www.novtech.com](http://www.novtech.com)



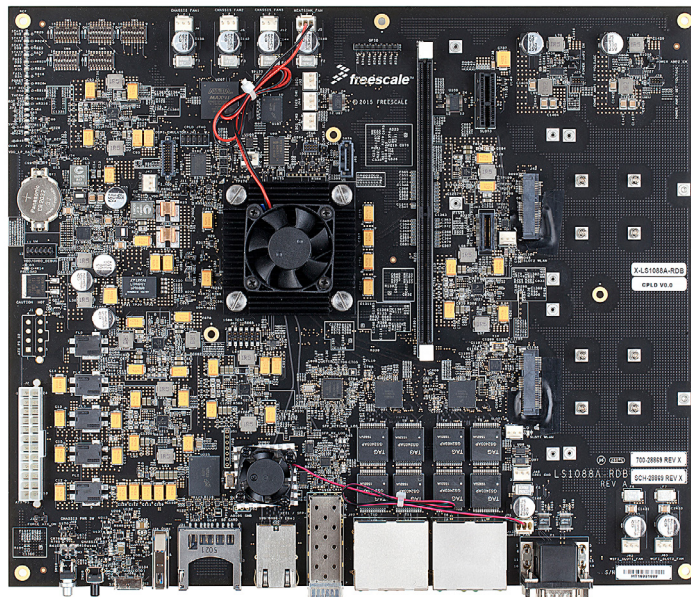
Arrow: [www.arrow.com](http://www.arrow.com)



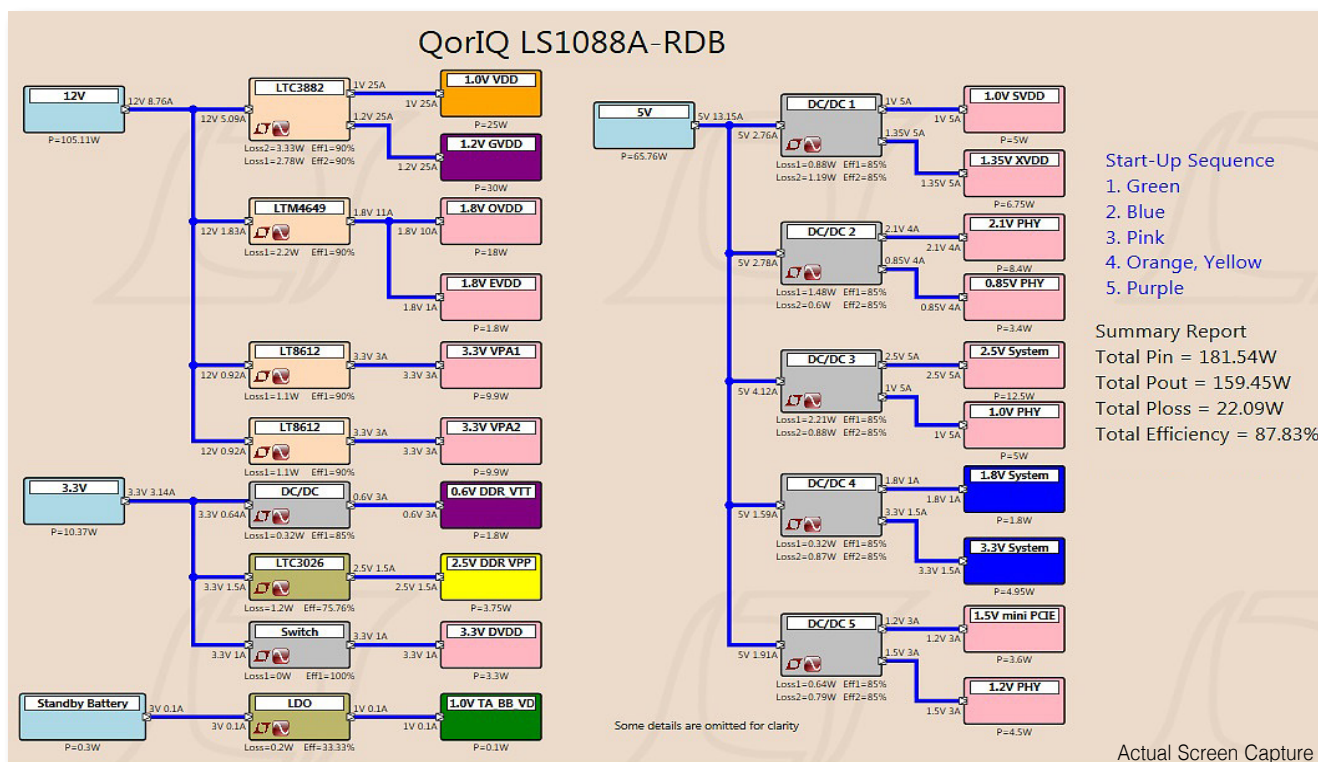
Contact Linear Technology for schematics and design support: [refdesign@linear.com](mailto:refdesign@linear.com)

## QorIQ LS1088A-RDB

The QorIQ LS1088A reference design board (LS1088A-RDB) is designed to exercise the capabilities of the LS1088A device. It has up to eight ARM® Cortex®-A53 cores with the advanced, high performance data-path and network peripheral interfaces required for wireless access points, networking infrastructure, intelligent edge access, including virtual customer premise equipment (vCPE) and high performance industrial applications.



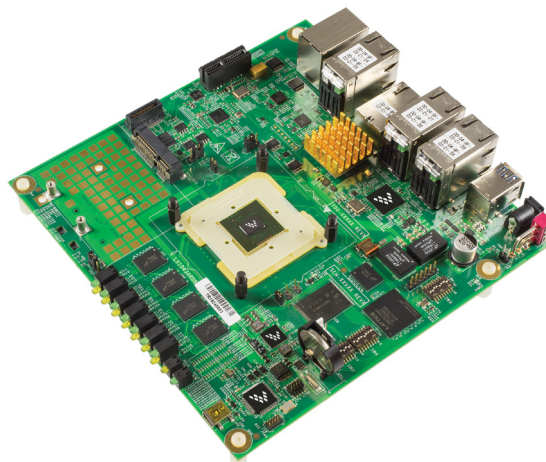
Rail/Function	Part Number	General Description
1.0V: VDD	<a href="#">LTC3882</a>	Dual Output PolyPhase® Step-Down DC/DC Voltage Mode Controller with Digital Power System Management. Using LTpowerPlay® for Design
1.2V: GVDD	<a href="#">LTM4649</a>	10A Step-Down DC/DC µModule® Regulator
1.8V: OVDD, EVDD	<a href="#">LT8612</a>	42V, 6A Synchronous Step-Down Regulator with 3µA Quiescent Current
3.3V: VPA	<a href="#">LTC3026</a>	1.5A Low Input Voltage VLDO™ Linear Regulator
2.5V: DDR VPP		



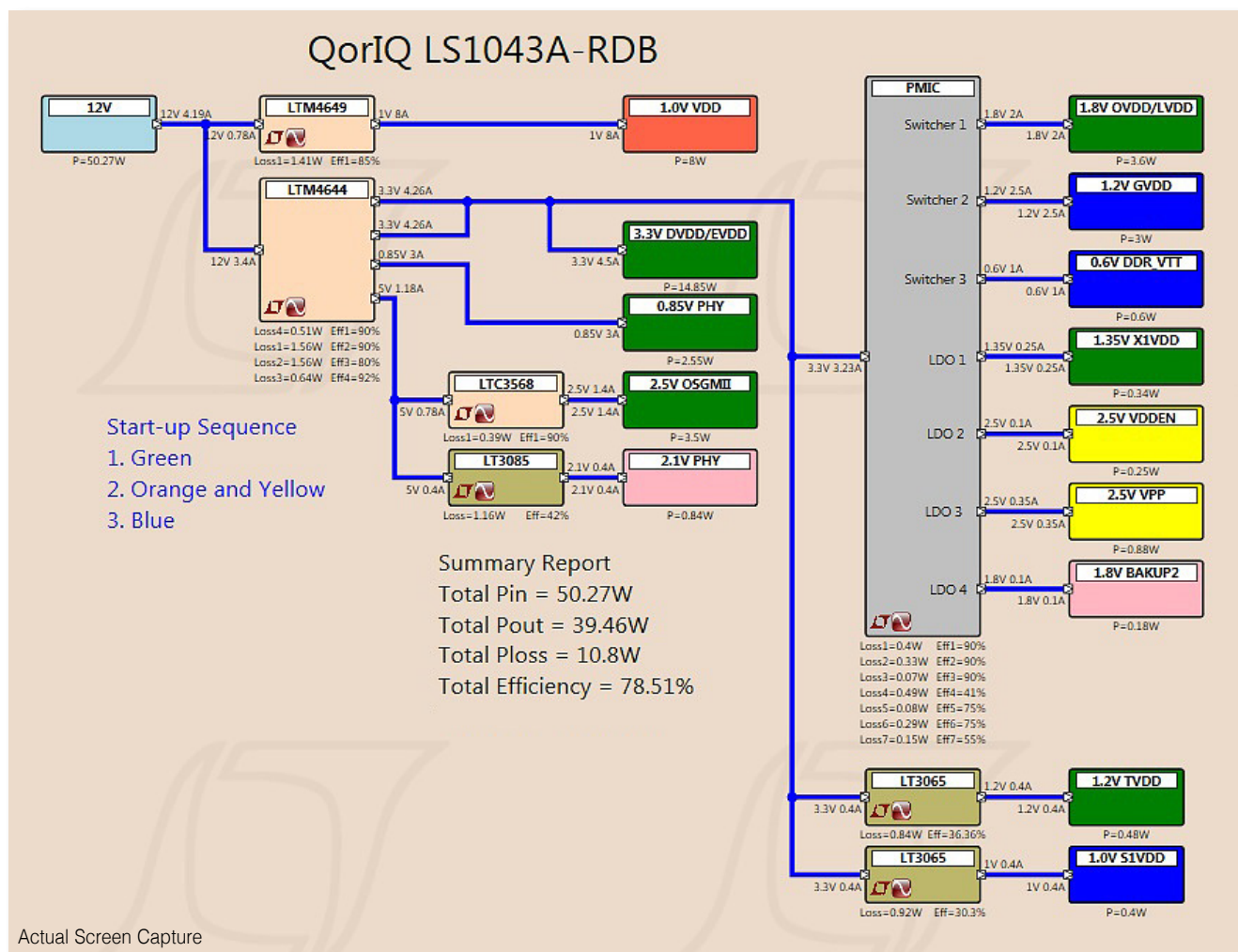
Power Tree designed in [LTpowerPlanner®](#)

## QorIQ LS1043A-RDB

The QorIQ LS1043A reference design board (LS1043A-RDB) is designed to exercise most capabilities of the LS1043A device, NXP's first quad-core, 64-bit ARM-based processor for embedded networking and industrial infrastructure.



Rail/Function	Part Number	General Description
1.0V: VDD	LTM4649	10A Step-Down DC/DC $\mu$ Module Regulator
3.3V: DVDD/EVDD, System Power 0.85V: PHY 5V: System Power	LTM4644	Quad DC/DC $\mu$ Module Regulator with Configurable 4A Output Array
2.5V: OSGMII	LTC3568	1.8A, 4MHz, Synchronous Step-Down DC/DC Converter
2.1V: PHY	LT3085	Adjustable 500mA Single Resistor Low Dropout Regulator
1.2V: TVDD 1.0V: S1VDD	LT3065	45V $V_{IN}$ , 500mA Low Noise, Linear Regulator with Programmable Current Limit and Power Good



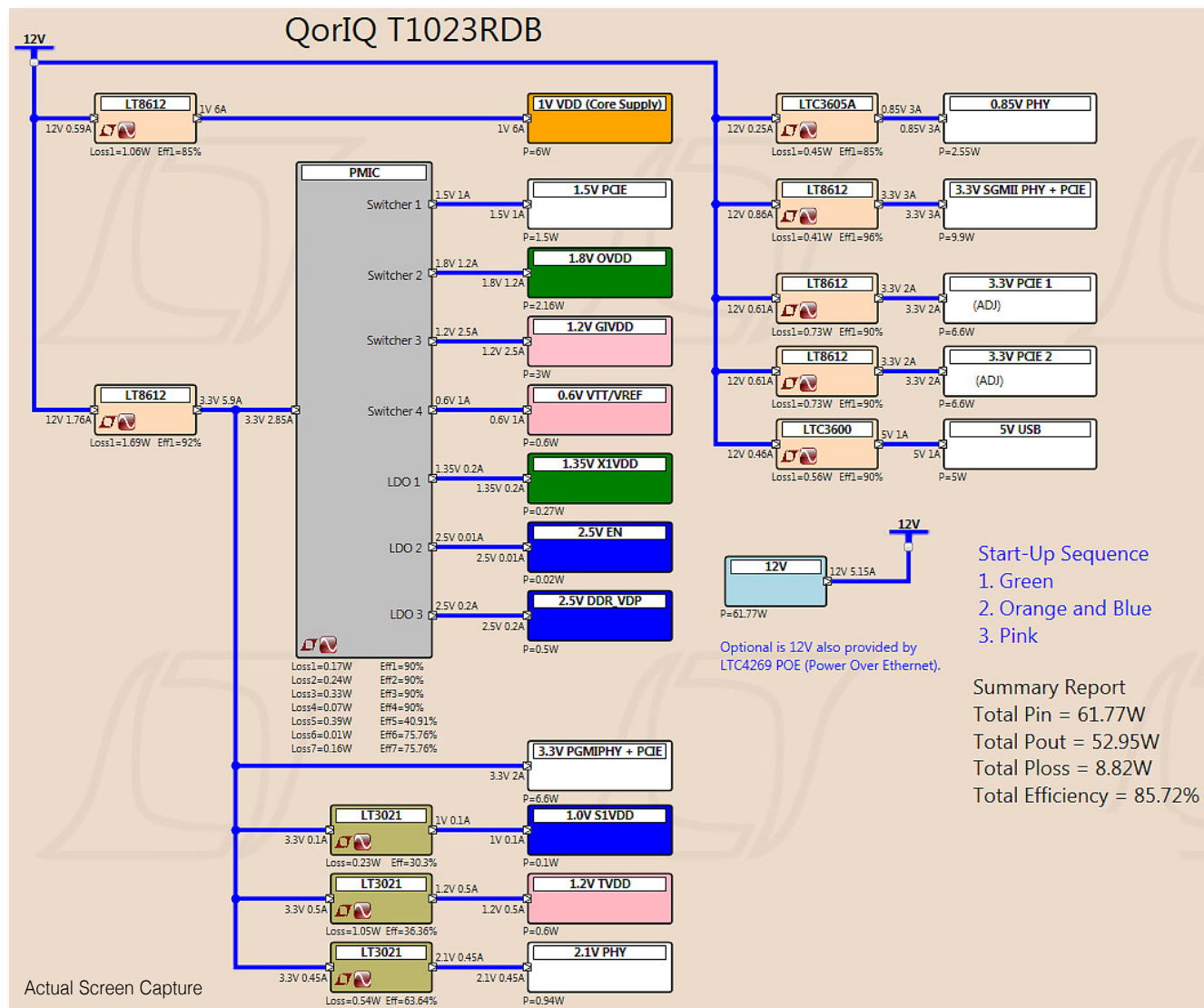
Power Tree designed in LTpowerPlanner

## QorIQ T1023RDB

The QorIQ T1023 Reference Design Board (T1023RDB) is a high performance evaluation, development and test platform supporting the QorIQ T1023 communications processor. The board will support the evaluation and development of the dual core T1023 and the single core T1013 communications processors built on Power Architecture® technology.



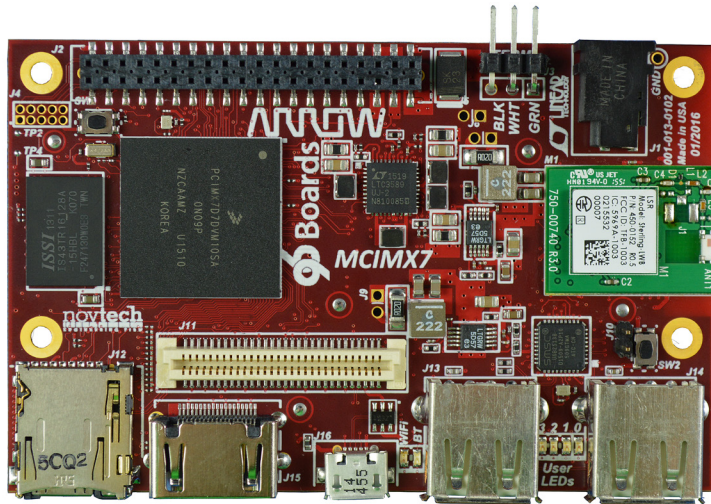
Rail/Function	Part Number	General Description
1.0V: VDD 3.3V: System Power, PHY, PCIE	LT8612	42V, 6A Synchronous Step-Down Regulator with 3μA Quiescent Current
1.0V: S1VDD 1.2V: TVDD 2.1V: PHY	LT3021	500mA, Low Voltage, Very Low Dropout Linear Regulator
0.85V: PHY	LTC3605A	20V, 5A Synchronous Step-Down Regulator
5V: USB	LTC3600	15V, 1.5A Synchronous Rail-to-Rail Single Resistor Step-Down Regulator



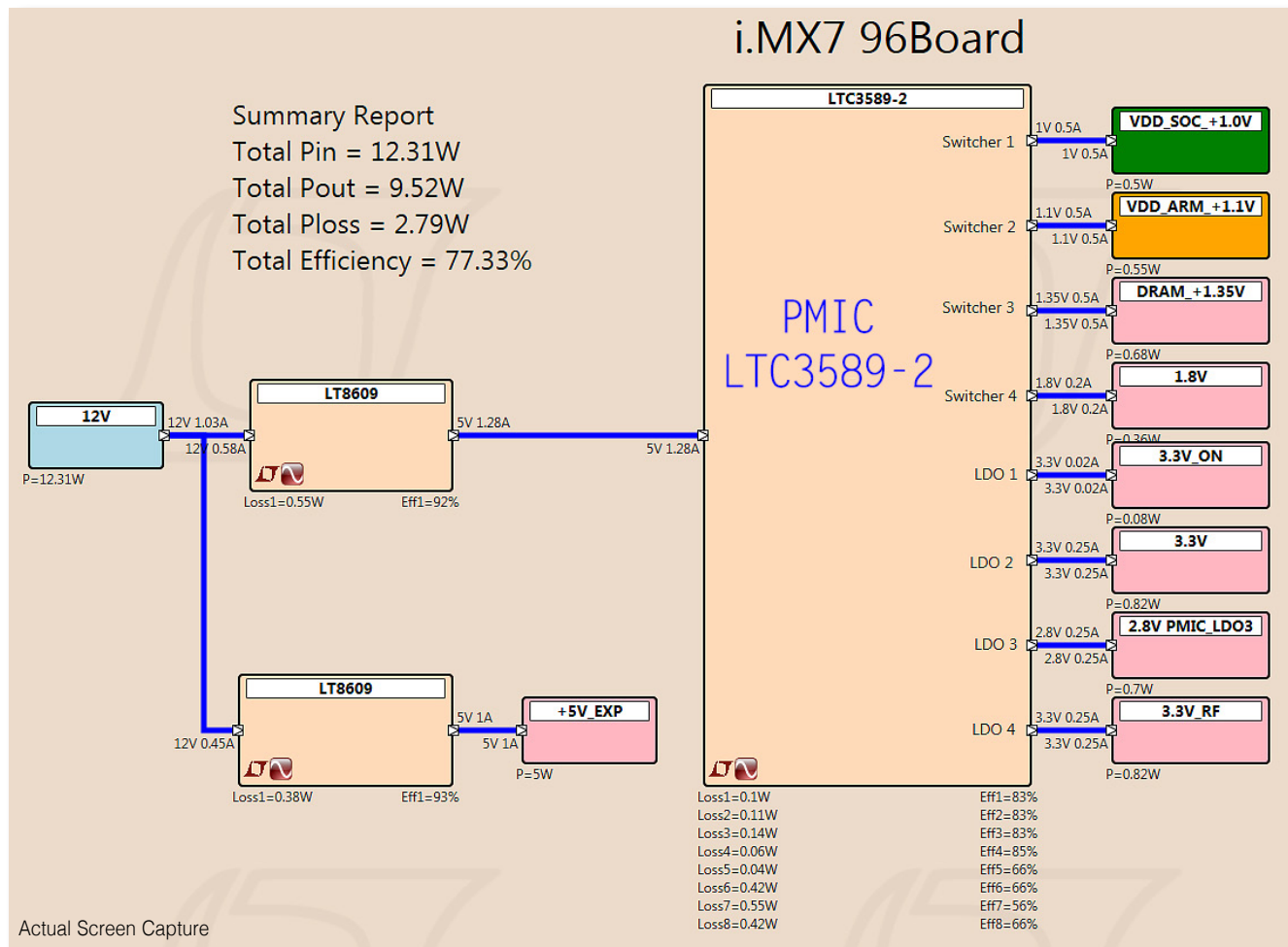
Power Tree designed in LTpowerPlanner

## i.MX7 96Board

The i.MX 7 series-based, open-source board provided by Arrow enables secure, power-efficient systems with drastically reduced time to market. The i.MX 7 series is a highly integrated multi-market applications processor designed to enable secure and portable applications within the Internet of Things. The i.MX 7 series utilizes both the ARM Cortex-A7 and Cortex-M4 cores for general purpose programmable processing.



Rail/Function	Part Number	General Description
1.0V: VDD_SoC 1.1V: VDD_ARM 1.35V: DRAM 1.8V 3.3V 2.8V	LTC3589-2	8-Output Regulator with Sequencing and I <sup>2</sup> C for ARM and ARM Based Processors
5V: System Power	LT8609	42V, 2A/3A Peak Synchronous Step-Down Regulator with 2.5μA Quiescent Current

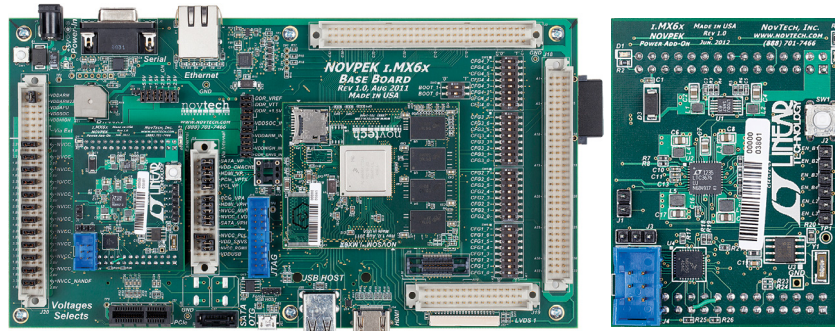


Power Tree designed in LTpowerPlanner

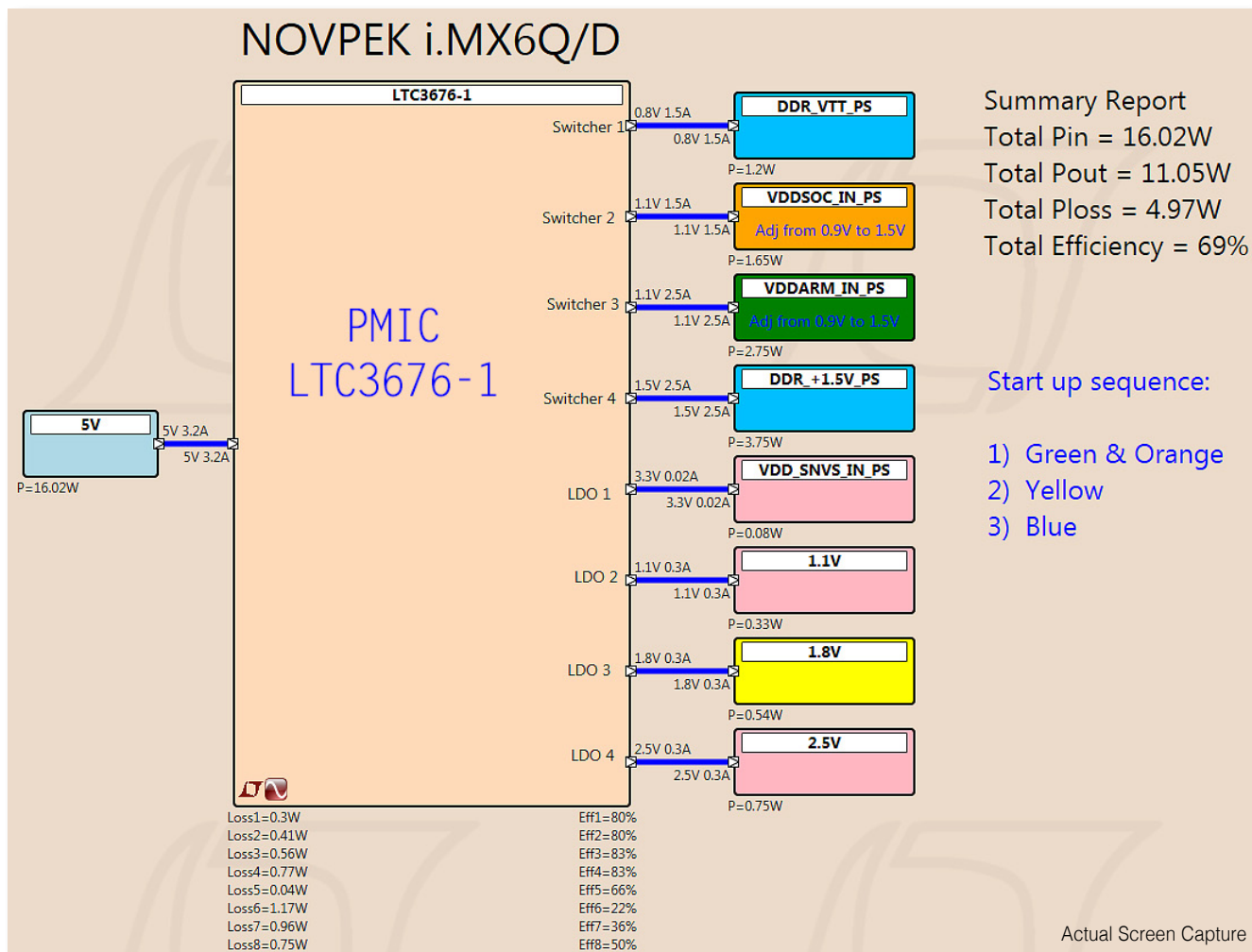
## NOVPEK i.MX 6Q/D

The NOVPEK i.MX 6 Platform Evaluation Kit provided by Novtech™ was developed to give OEMs a flexible platform to evaluate i.MX 6 processors by giving access to all the available I/Os on the device and a robust power supply system using the LTC3676-1 PMIC from Linear Technology.

The i.MX 6 series of applications processors is a scalable multicore platform that includes single-, dual- and quad-core families based on the ARM Cortex architecture, including Cortex-A9, combined Cortex-A9 + Cortex-M4 and Cortex-A7 based solutions.

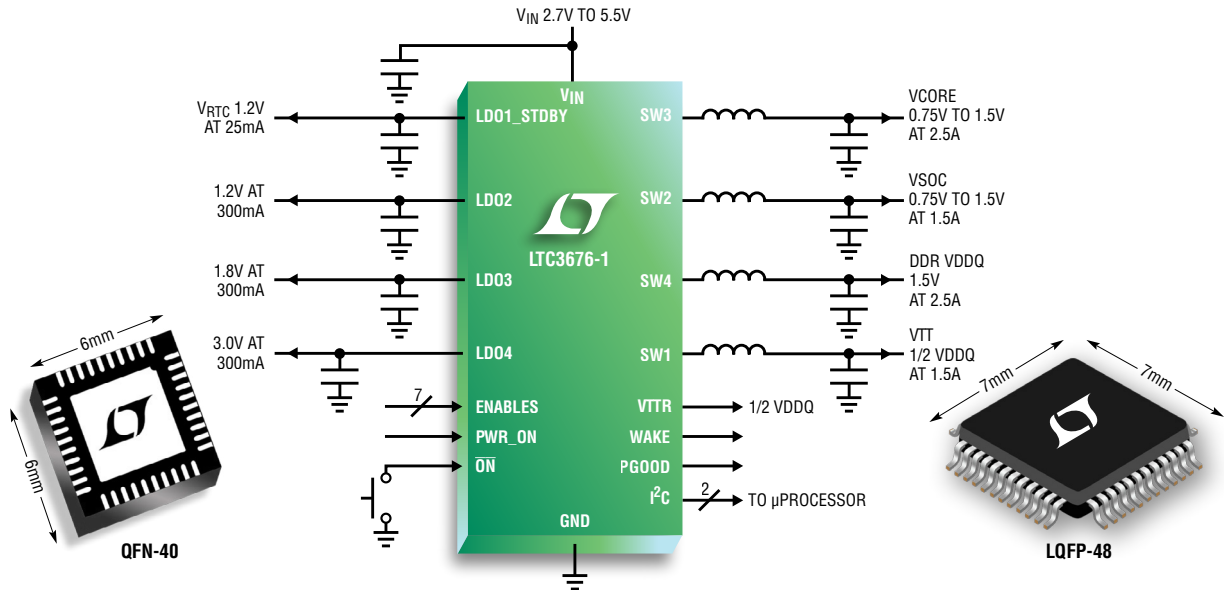


Rail/Function	Part Number	General Description
0.8V: DDR_VTT 1.1V: VDDSOC, VDDARM 1.5V: DDR 3.3V: VDD_SNVS 1.1V 1.8V 2.5V	LTC3676-1	8-Output Power Management Solution with I <sup>2</sup> C Interface for Application Processors



Power Tree designed in LTpowerPlanner

# New PMIC for Advanced Application Processors



4 High Current High Efficiency Bucks + 4 LDOs + DDR Solution with VTTR + I<sup>2</sup>C Control + Sequencing + Dynamic Voltage Scaling = Complete Power Management Solution for Advanced Application Processor-Based Systems

The LTC<sup>®</sup>3676 and LTC3676-1 are complete power management solutions for NXP i.MX 6 series, ARM Cortex and other advanced portable application processor systems. The LTC3676/LTC3676-1 feature eight independent resistor-programmable voltage rails, with dynamic voltage scaling and sequencing, in compact QFN and thermally enhanced QFP packages. These rails supply power to the processor core, SDRAM, I/O, system memory, PC cards, always-on real-time clock (RTC) and a variety of other functions.

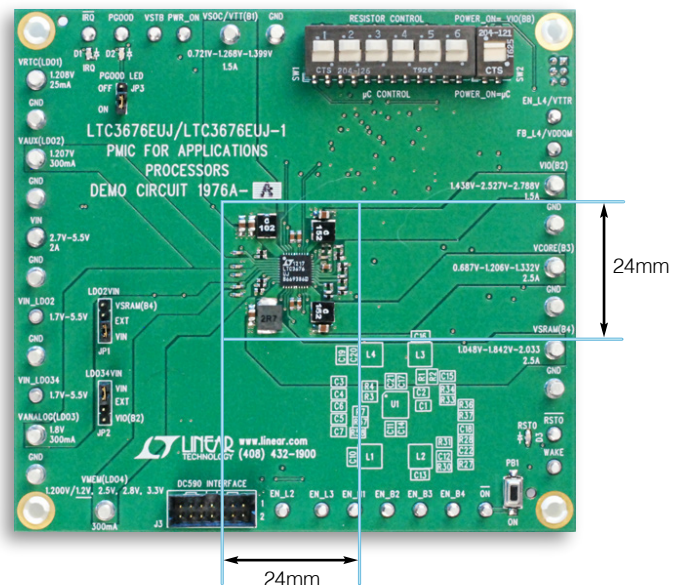
## Features

- Quad I<sup>2</sup>C Adjustable High Efficiency Step-Down DC/DC Converters: 2.5A, 2.5A, 1.5A, 1.5A
- Triple 300mA LDO Regulators (2 Adjustable)
- DDR Power Solution with VTT and VTTR Reference (LTC3676-1 Version)
- Pushbutton On/Off Control with System Reset
- Independent Enable Pin-Strap or I<sup>2</sup>C Sequencing
- Programmable Autonomous Power-Down Control
- Power Good and Reset Functions
- Dynamic Voltage Scaling
- Selectable 2.25MHz or 1.12MHz Switching Frequency
- Always Alive 25mA LDO Regulator
- 12 $\mu$ A Standby Current
- 40-Pin 6mm x 6mm x 0.75mm QFN Package
- 48-Pin 7mm x 7mm LQFP Package

## Applications

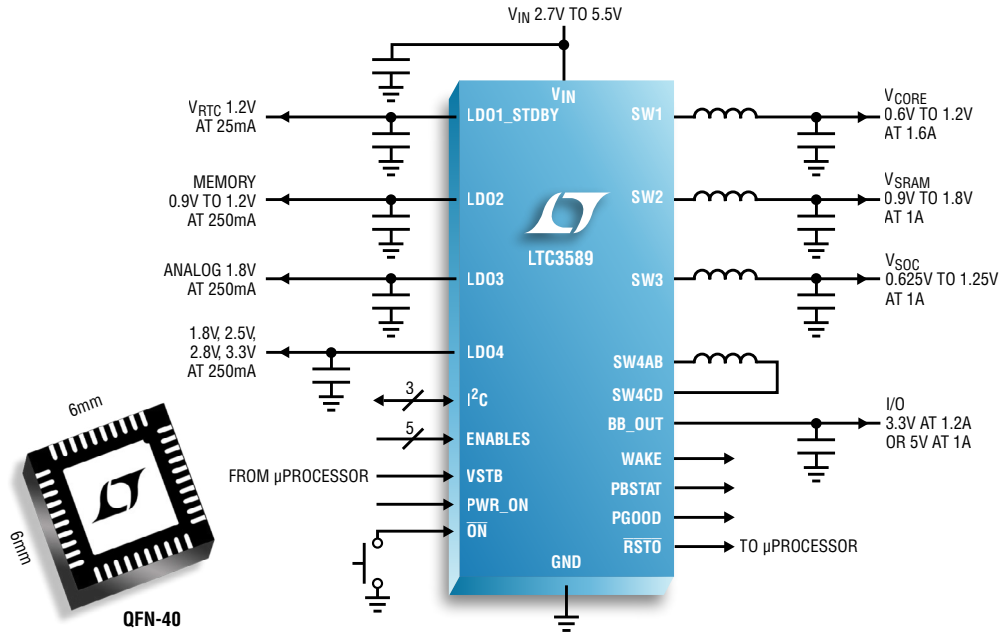
- Supports NXP i.MX 6, ARM-Based SoC FPGAs, ARM Cortex and other Application Processors
- Handheld Instruments and Scanners
- Portable Industrial and Medical Devices
- Automotive Infotainment
- High-End Consumer Devices
- Multirail Systems

## LTC3676 Demo Board



LT, LT, LTC, LTM, Linear Technology and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

# A PMIC for Modern Application Processors



3 Bucks + Buck-Boost + 4 LDOs + I<sup>2</sup>C Control + Sequencing + Dynamic Voltage Scaling = A Complete Power Management Solution for Advanced Application Processor-Based Systems

The LTC®3589 is a complete power management solution for portable processors such as i.MX, ARM, and other advanced portable microprocessor systems. The device features eight independent rails, with dynamic control and sequencing, in a compact QFN package. These rails supply power to the processor core, SDRAM, system memory, PC cards, always-on real-time clock (RTC) and a variety of other functions.

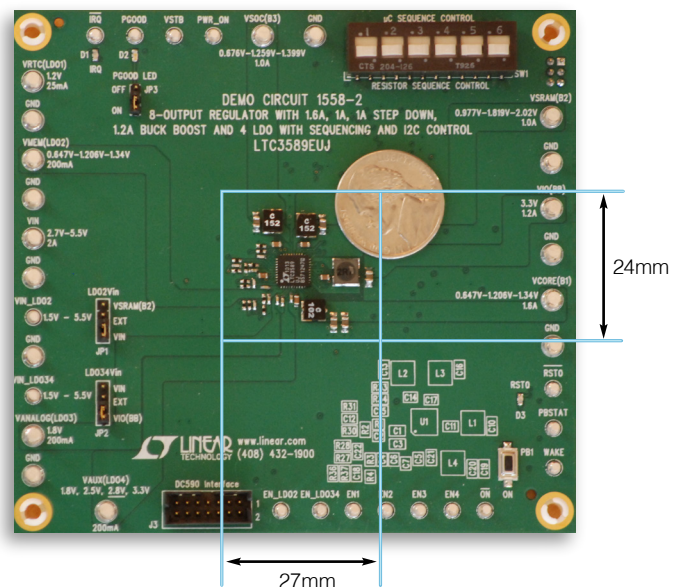
## Features

- Triple I<sup>2</sup>C Adjustable High Efficiency Step-Down DC/DC Converters: 1.6A, 1A, 1A
- High Efficiency 1.2A Buck-Boost DC/DC Converter
- Triple 250mA LDO Regulators
- Pushbutton On/Off Control with System Reset
- Flexible Pin-Strap Sequencing Operation
- I<sup>2</sup>C and Independent Enable Control Pins
- Power Good and Power-On Reset Outputs
- Dynamic Voltage Scaling and Slew Rate Control
- Selectable 2.25MHz or 1.12MHz Switching Frequency
- Always Alive 25mA LDO Regulator
- 8µA Standby Current
- 40-Pin 6mm × 6mm × 0.75mm QFN Package

## Applications

- Supports NXP i.MX, and Other Application Processors
- Handheld Instruments and Scanners
- Portable Industrial and Medical Devices
- Automotive Infotainment
- High-End Consumer Devices
- Multirail Systems

## LTC3589 Demo Board



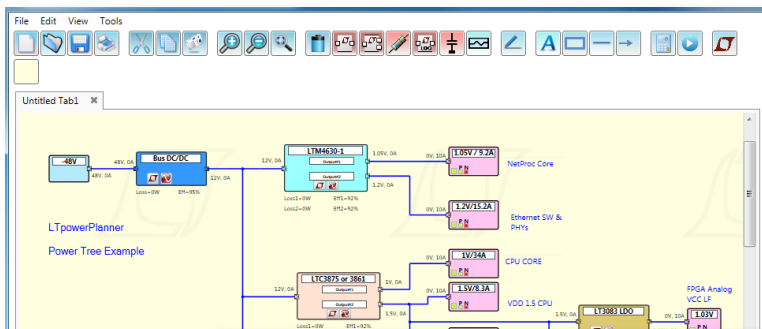
## Design Support

Linear Technology provides design support tools that help you select, design and simulate Linear Technology products. These tools shorten design time and optimize your power supply solution before you build your prototype board. For more information and design support, contact a local sales office [www.linear.com/contact](http://www.linear.com/contact)

## LTpowerCAD II

LTpowerCAD® is a free download and easy-to-use power supply design tool with a user-friendly graphical user interface (GUI) and powerful design features. It helps power supply designers select a solution for given supply specifications, design power stage components, estimate regulator efficiency and power loss, and optimize supply loop stability and load transient performance. It is a fast off-line tool that runs on Windows PCs, and includes a sync-release feature to ensure your program and its solution libraries are up-to-date. Once a circuit design is completed, it is easily exported to the LTspice® simulation platform. Inside the LTpowerCAD toolbox, there is also an [LTpowerPlanner](#) system architecture tool for system-level power management design and optimization.

LTpowerPlanner



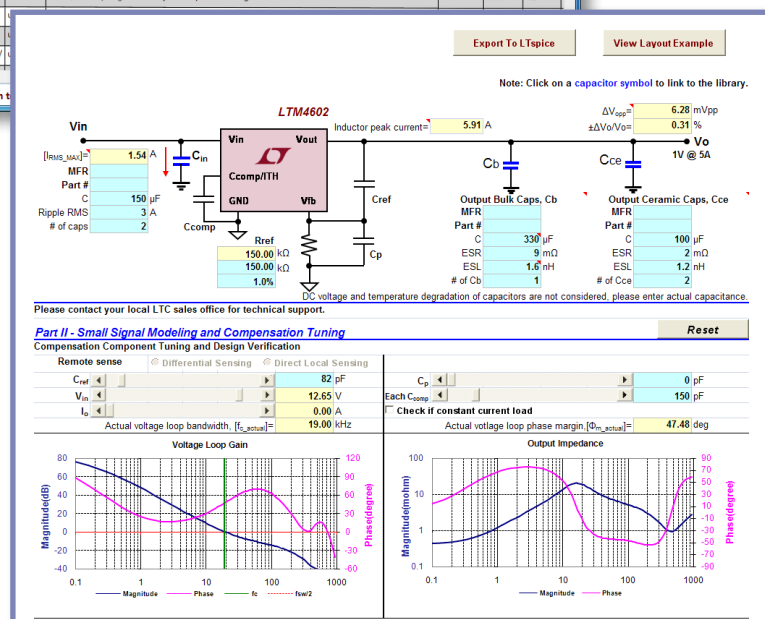
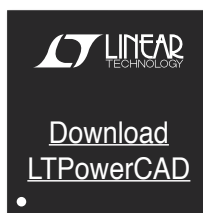
System  
Architecture  
and Plan

LTpowerCAD

The screenshot shows the LTpowerCAD Design Tool v2.4.2 interface. It includes a 'Converter Specification' section with fields for Converter Topology (Buck), Converter Type (uModule), Min. Input Voltage (10 V), Nom. Input Voltage (12 V), Max. Input Voltage (13 V), Num. of Output Rails (One), and Num. of Parallel Phases (1). There is also a 'Find Part #' field. To the right, there are 'Optional Features' like Burst Mode, Synchronous FET, Isolated, Run / Enable, Sync. to External Clock, Output Voltage Tracking, Remote Voltage Sensing, Margin Control, Power Good Monitor, Poly-phase / Load Share, and I2C/PMBus Interface. Below this is a table of available regulators:

Design Tool	Website	Part Name	Type	Desc.	Topology	Max Vin	Min Vin
LTC Web		LTM4625	uModule	14VIN, 5A Step-Down DC/DC uModule Regulator	Buck	20	4
LTC Web		LTM4649	uModule	16V Single 10A Step Down DC/DC uModule Regulator	Buck	16	4.5
LTC Web		LTM4603-1	uModule	6A Step Down uModule Regulator. Use LTM4618 for new designs.	Buck	20	4.5
LTC Web		LTM4603	uModule	6A Step uModule Regulator with PLL. Output Margining. Use LTM4618 for new designs.	Buck	20	4.5
LTC Web		LTM4603HV	uModule	6A, 28VIN Step Down uModule Regulator with PLL, Vo Margining. Use LTM4618 for new designs.	Buck	28	4.5
LTC Web		LTM4618	uModule	26VIN, 6A Step High Efficiency Down uModule Regulator	Buck	26.5	4.5
LTC Web		LTM4606	uModule				
LTC Web		LTM4602	uModule				
LTC Web		LTM4602HV	uModule				

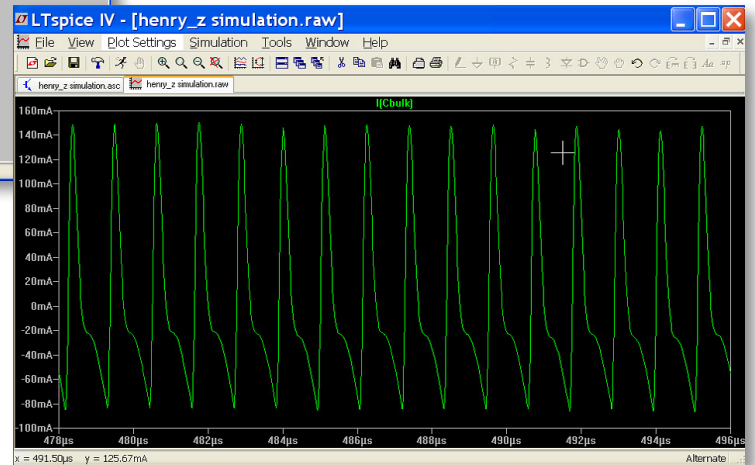
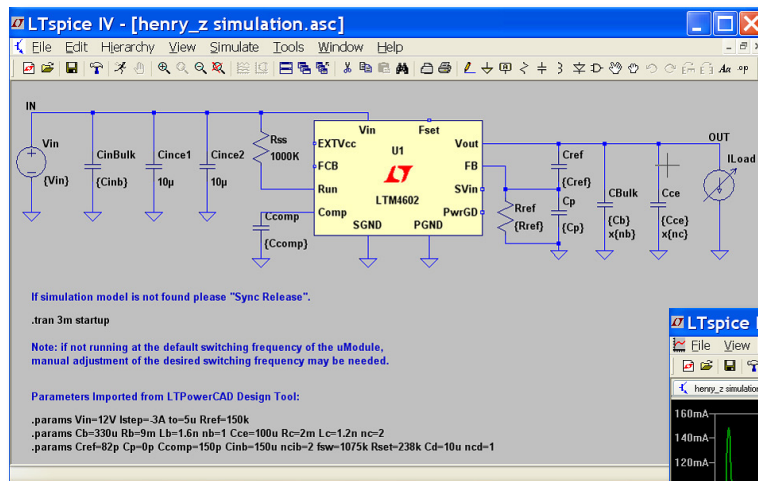
Search  
and  
Selection



Circuit  
Parameter  
Design

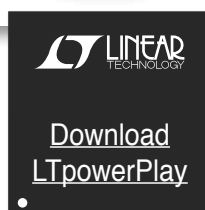
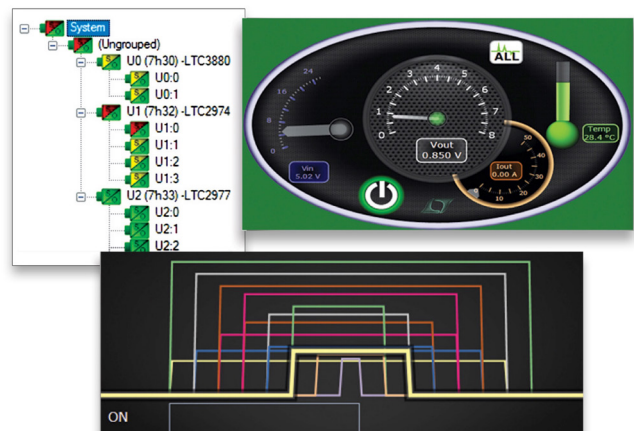
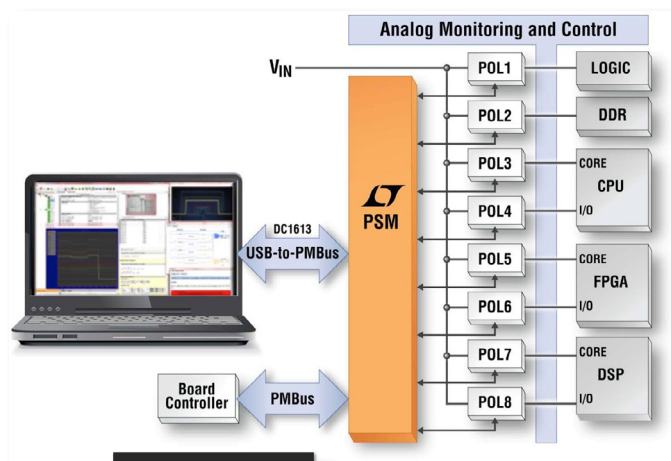
## LTspice

LTspice is a free, simple and powerful circuit simulation tool with a library containing all Linear Technology products, as well as commonly used discrete passive and transistor components.




## LTpowerPlay

LTpowerPlay® is a powerful and intuitive Windows-based development environment used to configure and interrogate power system management (PSM) devices. It can also be used in an off-line mode (with no hardware present) in order to build a multichip configuration file that can be saved and reloaded at a later time.



[www.linear.com/nxp](http://www.linear.com/nxp)

 **LINEAR**  
TECHNOLOGY

## Proven Power Solutions for NXP Processors

