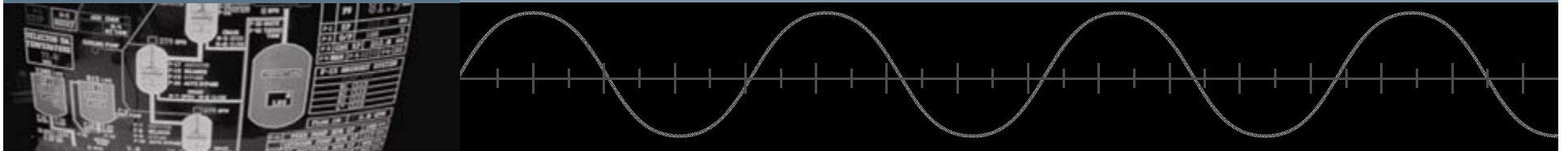


LTpowerCAD™ II

Introduction & Quick Start Guide

Rev. 2.0 07/2013



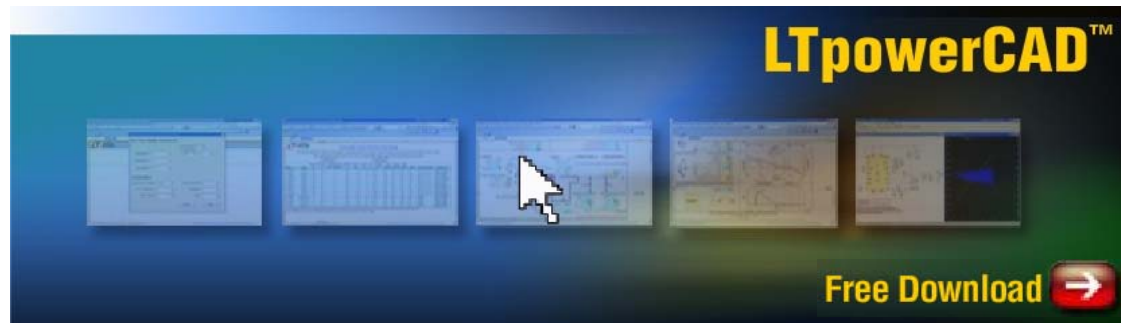
Design Tool Development Team
Power Products, Linear Technology Corp.
LTpowerCAD@Linear.com

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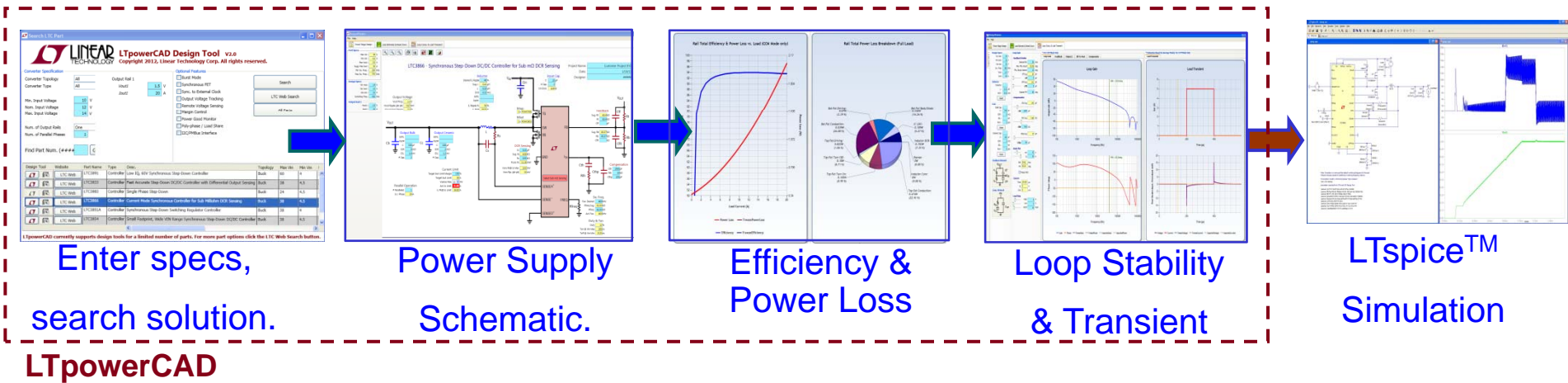


What is LTpowerCAD Design Tool

A Complete, Step-by-Step Power Supply Design Tool:



Step-by-Step Power Supply Design:



LTspice: A powerful circuit **simulation tool** with integrated models of most Linear Technology products.

LTpowerCAD Design Tool :

- A power supply **design tool** instead of simulation tool.
- **Searches for a solution** / LTC part for given power supply spec.
- Guides users to **select power stage components**.
- Provides detailed **power efficiency / loss** analysis.
- Provide quick **loop bode plot** stability and load transient analysis.
- Only supports **selected power products** (mostly buck & modules).
- Design file can be exported into LTspice simulation circuit.

- Go to <http://www.linear.com/LTpowerCAD>
- Download & install **LTpowerCAD II** on your Windows PC.
- See later pages for installation instruction.

Buck Converters :

Buck

Updated: 7/25/2013

	Green Cell Background - Excel tool available
	Red Cell Background - LTpowerCAD Non-Excel Tool available
	Bold - Polyphase single output compatible

Controller

3-output	2-output	1 output
	LTC3838	LTC3829
	LTC3838-1	LTC3833
	LTC3838-2	LTC3839
	LTC3850	LTC3851A
	LTC3855	LTC3854
	LTC3857	LTC3856
	LTC3857-1	LTC3866
	LTC3858	LTC3883
	LTC3858-1	LTC3883
	LTC3858-2	
	LTC3869	LTC3864
	LTC3869-2	LTC3891
	LTC3880	
	LTC3890	
	LTC3890-1	

Monolithic

3-output	2-output	1-output	
	LTC3615	LTC3600	LT3976
	LTC3615(CH1)	LTC3601	LT3990
	LTC3615(CH2)	LTC3602	LT3991
	LTC3633	LTC3603	LTC3403
	LTC3633A	LTC3604	LTC3404
	LTC3633A-1	LTC3605	LTC3405
	LTC3633A-2	LTC3605A	LTC3405A
	LTC3633A-3	LTC3415	LTC3405A-1.375
	LTC3407(CH1)	LTC3418	LTC3405A-1.5
	LTC3407(CH2)	LTC3608	LTC3405A-1.8
	LTC3407-2(CH1)	LTC3609	LTC3406/3406B
	LTC3407-2(CH2)	LTC3610	LTC3406-1.2
	LTC3407-	LTC3611	LTC3406-1.5
	LTC3407-	LTC3612	LTC3406-1.8
	LTC3407-4(CH1)	LTC3614	LTC3406A
	LTC3407-4(CH2)	LTC3616	LTC3406AB
	LTC3417(CH1)	LTC3613	LTC3406AB-2
	LTC3417(CH2)	LTC3646	LTC3406B-1.2
	LTC3417A(CH1)	LTC3646-1	LTC3406B-2
	LTC3417A(CH2)		LTC3409
	LTC3417A-		LTC3409A
	LTC3417A-		LTC3410
	LTC3419(CH1)		LTC3410-1.2
	LTC3419(CH2)		LTC3410-1.65
	LTC3547(CH1)		LTC3410-1.875
	LTC3547(CH2)		LTC3410B
			LTC3411
			LTC3411A
			LTC3412
			LTC3412A
			LTC3413
			LTC3414
			LTC3416
			LTC3549
			LTC3561
			LTC3568

µModule Regulator®

3-output	2-output	1-output
	LTM4620	LTM4618
	LTM4620A	LTM4627
	LTM4628	LTM4600
	LTM4614	LTM4600HV
	LTM4615	LTM4601
	LTM4616	LTM4601-1
	LTM4619	LTM4601HV
		LTM4604
		LTM4606
		LTM4608
		LTM4611
		LTM4612
		LTM4613
		LTM4637
		LTM4602
		LTM4602HV
		LTM4603
		LTM4603-1
		LTM4603HV
		LTM8021
		LTM8022
		LTM8023
		LTM8025
		LTM8027
		LTM8029
		LTM8031
		LTM8032
		LTM8033

Note:

This list was generated on 07/25/2013. **New parts** could be added to the library after that. Click **“Sync-Release”** to update LTpowerCAD library & functions.

Boost Converters :

Boost Updated: 6/6/2013

Polyphase (Bold)

Green Cell Background - Excel tool available
Red Cell Background - LTpowerCAD Non-Excel Tool available
Bold - Polyphase single output compatible

Controller			Monolithic			µModule Regulator®		
3-output	2-output	1-output	3-output	2-output	1-output	3-output	2-output	1-output
	LTC3788	LTC3787 LTC3862 LTC3786						

Buck-Boost Converters :

Buck-Boost Updated: 6/6/2013

Polyphase (Bold)

Green Cell Background - Excel tool available
Red Cell Background - LTpowerCAD Non-Excel Tool available
Bold - Polyphase single output compatible

Controller			Monolithic			µModule Regulator®		
3-output	2-output	1-output	3-output	2-output	1-output	3-output	2-output	1-output
								LTM4605 LTM4607 LTM4609

Note:

This list was generated on 06/06/2013. **New parts** could be added to the library after that. Click **“Sync-Release”** to update LTpowerCAD library & functions.

LTpowerCAD II
Software Installation

The following system and software is required for LTpowerCAD II v2.0™

- ✓ **PC with Microsoft Windows** XP SP2 or later OS
- ✓ **Microsoft Office Excel** 2000, 2003, 2007, 2010 or 2013
- ✓ **Microsoft .NET Framework** 3.5 SP1, 4.0 or Higher

<http://www.microsoft.com/net/download>

- ✓ **Microsoft SQL Server Compact** 3.5 Service Pack 2

<http://www.microsoft.com/en-us/download/details.aspx?id=5783>

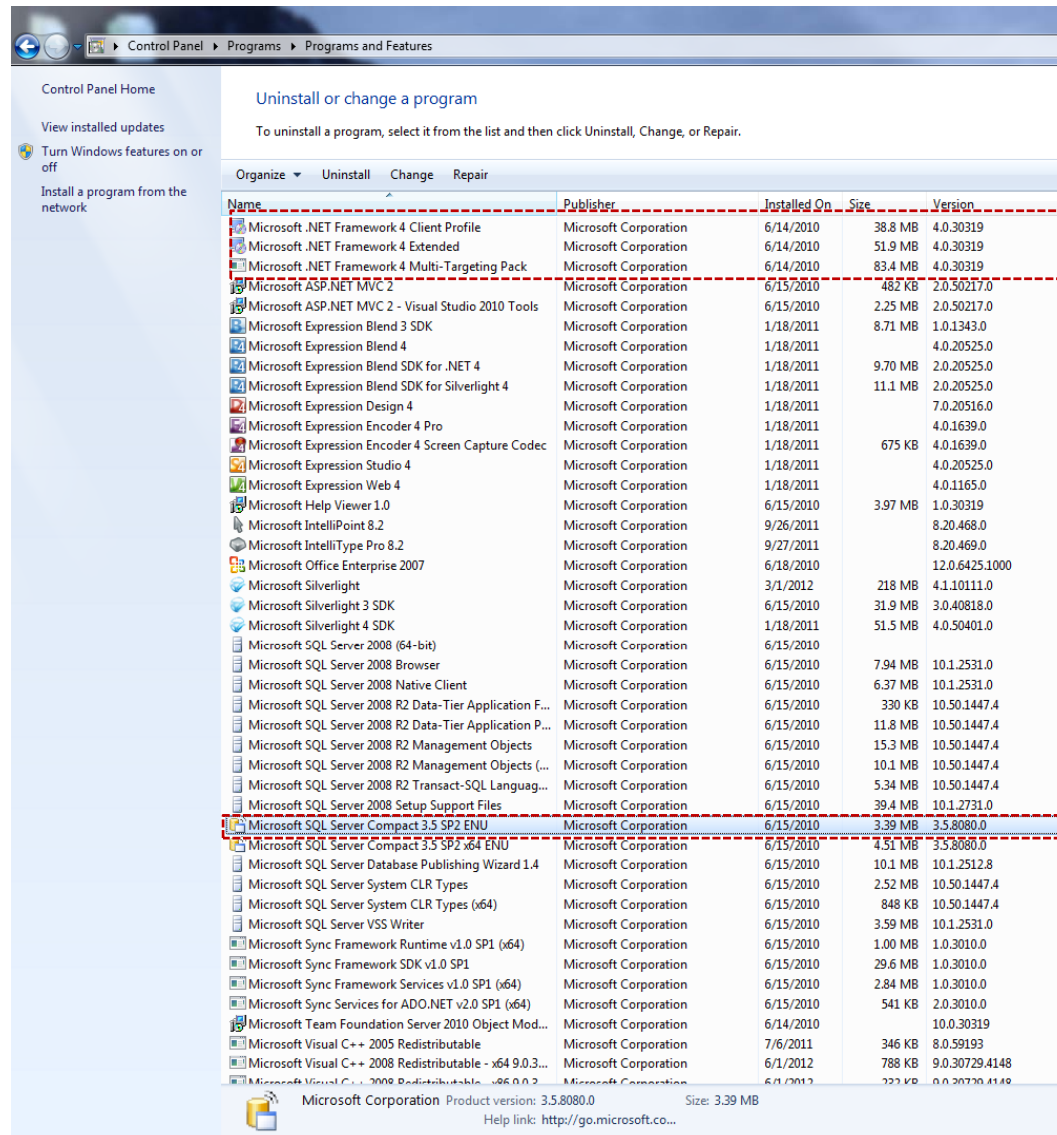
* Note : The LTpowerCAD installer is made to **automatically download and install these the Microsoft .NET and SQL Server** to your system if your system does not already have these installed. However, if for some reason they are not installed automatically, you need to install them manually from Microsoft download sites.

****Note:**

- Windows Vista or Windows 7, Windows 8 based PC has .NET Framework integrated.
- Some Windows XP based PC may need additional installation of the .NET Framework, which can be freely downloaded at www.microsoft.com.

- Many new computers may already have SQL Server Compact 3.5SP2 installed (check to make sure)

Optional: check if .NET and SQL Server are installed:



Microsoft .NET 3.5, 4 or higher is required

Required for accessing part information

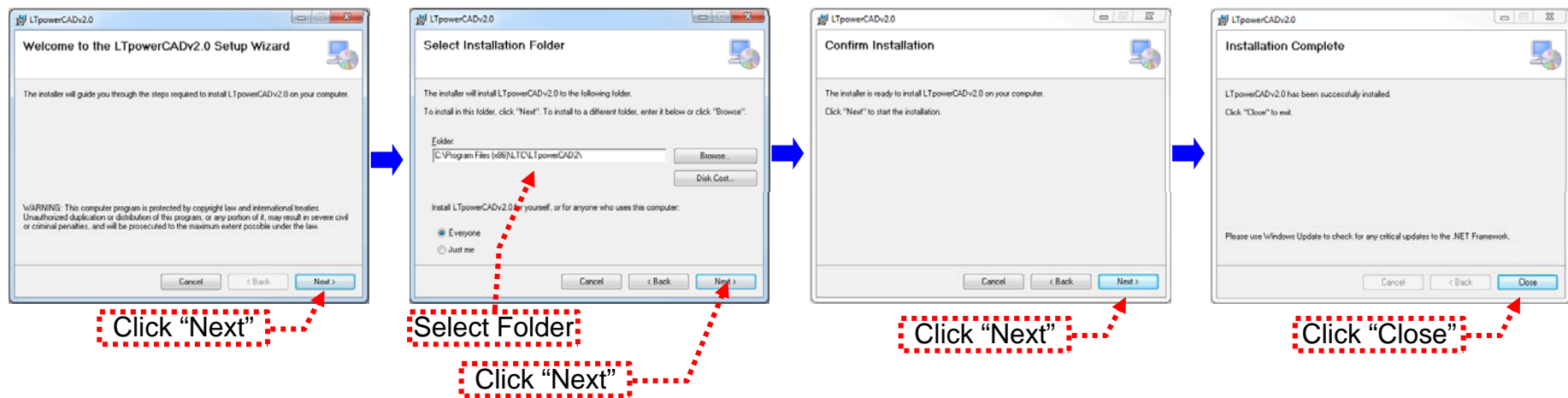
1. Double Click “**Setup.exe**” to Start LTpowerCAD II v2.0™ Design Tool Setup Wizard

Note : Do not install by double clicking the “MS.msi” file as this will prevent the installer from checking to install and installing any missing Microsoft requirements.

2. Click “**Next**”

3. Select Installation Folder and Click “**Next**”

4. Click “**Next**” to Confirm Installation and then “**Close**” to complete the Installation



5. Check the contents of the installation folder (see next slide)

Note : The installation will place shortcuts to the LTpowerCAD II v2.0



Getting Start with LTpowerCAD II

The screenshot shows the main interface of the LTpowerCAD II v2.0 software. On the left, a dark blue vertical bar contains several text labels. Yellow arrows point from these labels to specific buttons on the right side of the interface. The buttons are arranged vertically and include: 'Start New Design', 'Open Existing Design' (with two sub-buttons: one with a red 'L' icon and one with a green Excel icon), 'Help', 'LTC Sales Contacts', 'LTC Toolbox', and 'Sync Release'. At the bottom of the interface, there is a white section with the product name 'LTpowerCAD II Design Tool v2.0', a copyright notice, and the Linear Technology logo.

Search for a part based on supply spec. and requirements

Open an existing LTpowerCAD II design file

Open an existing Excel-Based design file

View help file

View LTC Sales Office contacts

Open LTC Toolbox

Update LTpowerCAD II program & program library

Start New Design

Open Existing Design

Help

LTC Sales Contacts

LTC Toolbox

Sync Release

LTpowerCAD II Design Tool v2.0
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LINEAR
TECHNOLOGY

Step 1. Enter power supply spec. and required functions.

If you know the LT part# to use, you can enter the 4-digit part# and click "go" instead of search.

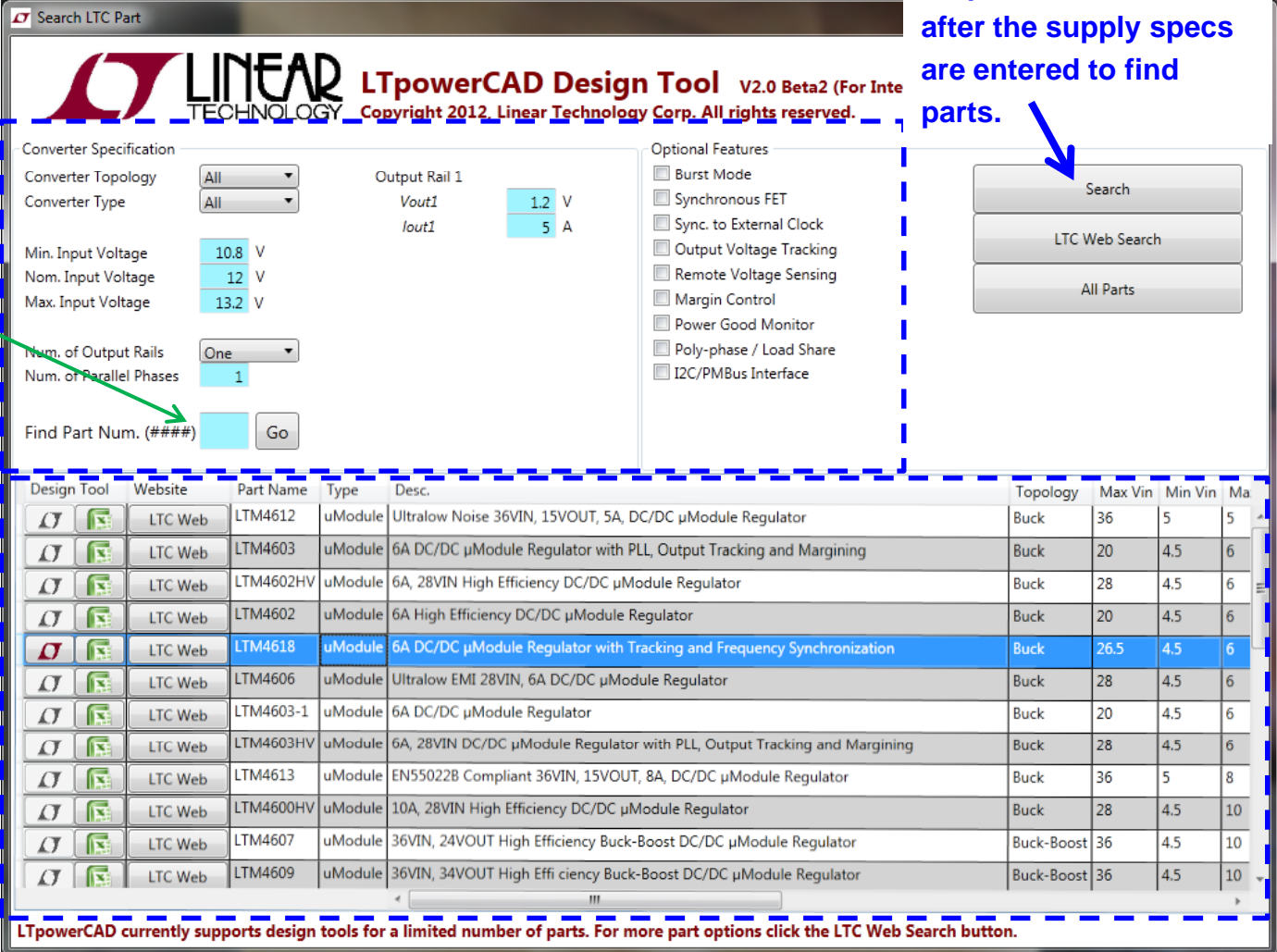
Step 3. Select a Part from Search Results Table:

Click LTC icon for LTpowerCAD II tool

Click Excel icon for Excel-Based tool

Note: if the icon is in grey color, it means the design tool is not available.

Step 2. Click "Search" after the supply specs are entered to find parts.



LINEAR TECHNOLOGY LTpowerCAD Design Tool V2.0 Beta2 (For Inte Copyright 2012, Linear Technology Corp. All rights reserved.

Converter Specification

Converter Topology: All
 Converter Type: All

Output Rail 1
 Vout1: 1.2 V
 Iout1: 5 A

Optional Features

- Burst Mode
- Synchronous FET
- Sync. to External Clock
- Output Voltage Tracking
- Remote Voltage Sensing
- Margin Control
- Power Good Monitor
- Poly-phase / Load Share
- I2C/PMBus Interface

Min. Input Voltage: 10.8 V
 Nom. Input Voltage: 12 V
 Max. Input Voltage: 13.2 V

Num. of Output Rails: One
 Num. of Parallel Phases: 1

Find Part Num. (####) Go

Design Tool	Website	Part Name	Type	Desc.	Topology	Max Vin	Min Vin	Ma
	LTC Web	LTM4612	uModule	Ultralow Noise 36VIN, 15VOUT, 5A, DC/DC μModule Regulator	Buck	36	5	5
	LTC Web	LTM4603	uModule	6A DC/DC μModule Regulator with PLL, Output Tracking and Margining	Buck	20	4.5	6
	LTC Web	LTM4602HV	uModule	6A, 28VIN High Efficiency DC/DC μModule Regulator	Buck	28	4.5	6
	LTC Web	LTM4602	uModule	6A High Efficiency DC/DC μModule Regulator	Buck	20	4.5	6
	LTC Web	LTM4618	uModule	6A DC/DC μModule Regulator with Tracking and Frequency Synchronization	Buck	26.5	4.5	6
	LTC Web	LTM4606	uModule	Ultralow EMI 28VIN, 6A DC/DC μModule Regulator	Buck	28	4.5	6
	LTC Web	LTM4603-1	uModule	6A DC/DC μModule Regulator	Buck	20	4.5	6
	LTC Web	LTM4603HV	uModule	6A, 28VIN DC/DC μModule Regulator with PLL, Output Tracking and Margining	Buck	28	4.5	6
	LTC Web	LTM4613	uModule	EN55022B Compliant 36VIN, 15VOUT, 8A, DC/DC μModule Regulator	Buck	36	5	8
	LTC Web	LTM4600HV	uModule	10A, 28VIN High Efficiency DC/DC μModule Regulator	Buck	28	4.5	10
	LTC Web	LTM4607	uModule	36VIN, 24VOUT High Efficiency Buck-Boost DC/DC μModule Regulator	Buck-Boost	36	4.5	10
	LTC Web	LTM4609	uModule	36VIN, 34VOUT High Efficiency Buck-Boost DC/DC μModule Regulator	Buck-Boost	36	4.5	10

LTpowerCAD currently supports design tools for a limited number of parts. For more part options click the LTC Web Search button.

Two possible design tool formats:

1. Non-Excel LTpowerCAD Design Tool:

If available, an active LTC button is shown:




2. Excel-Based Design Tool:

If available, an active Excel button is shown:



Note: if the icon is in grey color, it means the design tool is not available yet.

Search LTC Part



LTpowerCAD Design Tool V2.0 Beta2 (For Internal Review Only)
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Converter Specification

Converter Topology: All

Converter Type: All

Output Rail 1
Vout1: 1.2 V
Iout1: 5 A

Min. Input Voltage: 10.8 V
Nom. Input Voltage: 12 V
Max. Input Voltage: 13.2 V

Num. of Output Rails: One

Num. of Parallel Phases: 1

Find Part Num. (####): Go

Optional Features

- Burst Mode
- Synchronous FET
- Sync. to External Clock
- Output Voltage Tracking
- Remote Voltage Sensing
- Margin Control
- Power Good Monitor
- Poly-phase / Load Share
- I2C/PMBus Interface

Search

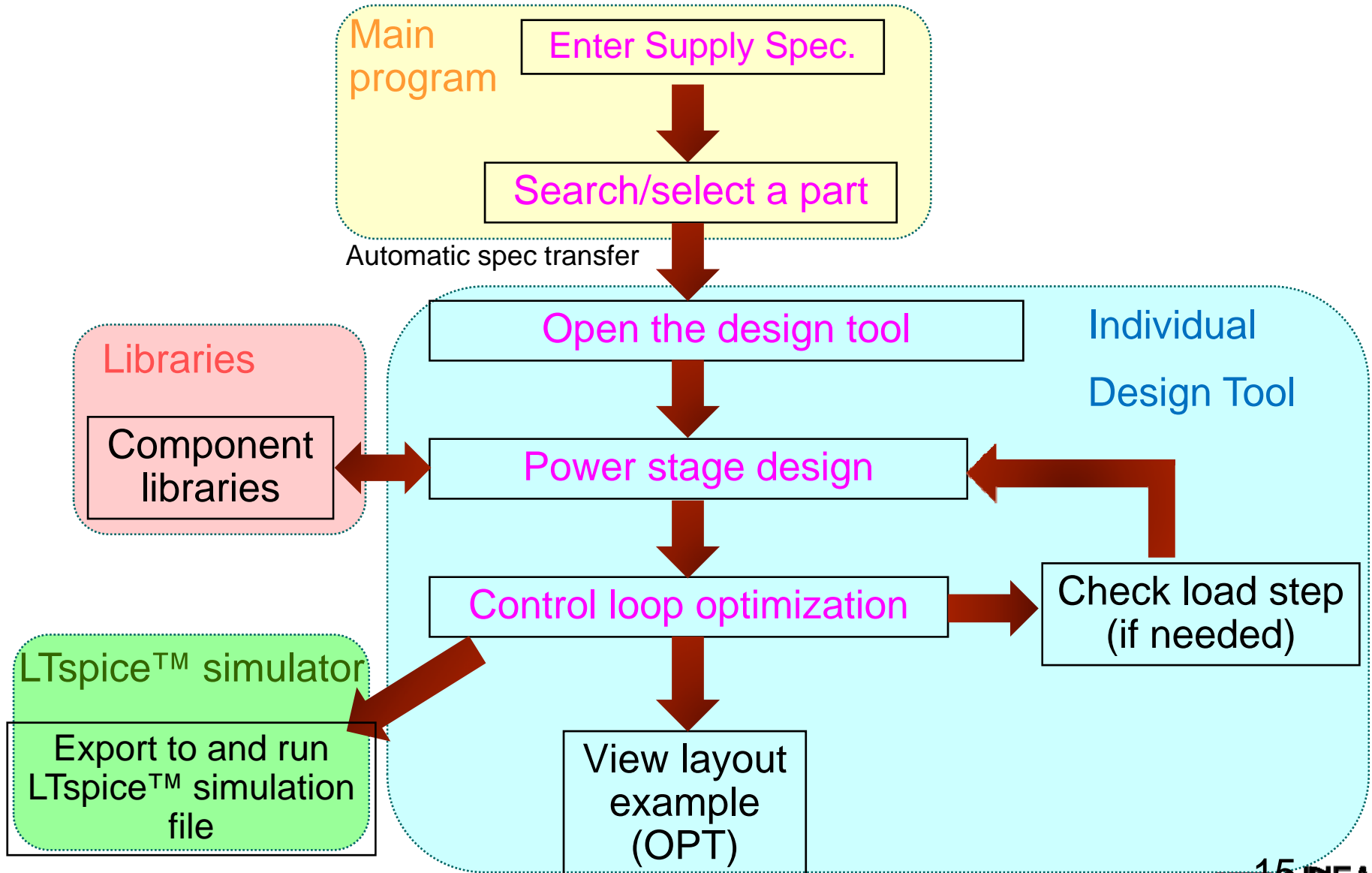
LTC Web Search

All Parts

Design Tool	Website	Part Name	Type	Desc.	Topology	Max Vin	Min Vin	Ma	
		LTC Web	LTM4612	uModule	Ultralow Noise 36VIN, 15VOUT, 5A, DC/DC μModule Regulator	Buck	36	5	5
		LTC Web	LTM4603	uModule	6A DC/DC μModule Regulator with PLL, Output Tracking and Margining	Buck	20	4.5	6
		LTC Web	LTM4602HV	uModule	6A, 28VIN High Efficiency DC/DC μModule Regulator	Buck	28	4.5	6
		LTC Web	LTM4602	uModule	6A High Efficiency DC/DC μModule Regulator	Buck	20	4.5	6
		LTC Web	LTM4618	uModule	6A DC/DC μModule Regulator with Tracking and Frequency Synchronization	Buck	26.5	4.5	6
		LTC Web	LTM4606	uModule	Ultralow EMI 28VIN, 6A DC/DC μModule Regulator	Buck	28	4.5	6
		LTC Web	LTM4603-1	uModule	6A DC/DC μModule Regulator	Buck	20	4.5	6
		LTC Web	LTM4603HV	uModule	6A, 28VIN DC/DC μModule Regulator with PLL, Output Tracking and Margining	Buck	28	4.5	6
		LTC Web	LTM4613	uModule	EN55022B Compliant 36VIN, 15VOUT, 8A, DC/DC μModule Regulator	Buck	36	5	8
		LTC Web	LTM4600HV	uModule	10A, 28VIN High Efficiency DC/DC μModule Regulator	Buck	28	4.5	10
		LTC Web	LTM4607	uModule	36VIN, 24VOUT High Efficiency Buck-Boost DC/DC μModule Regulator	Buck-Boost	36	4.5	10
		LTC Web	LTM4609	uModule	36VIN, 34VOUT High Efficiency Buck-Boost DC/DC μModule Regulator	Buck-Boost	36	4.5	10

LTpowerCAD currently supports design tools for a limited number of parts. For more part options click the LTC Web Search button.

using the LTpowerCAD™ Design Tool



Example of a non-Excel **LTpowerCAD** design Tool

Yellow Cells = Suggested values or calculated parameters

Blue Cells = User's chosen values

Red Cells = Warning - parameter outside of recommended range.

Design Requirements & Part Limits

Design Specs

Max Vin:	38 V
Min Vin:	4.5 V
Max Vout:	5.5 V
Sugg. Max Iout:	30 A
Min Sw. Freq.:	200 kHz
Max Sw. Freq.:	2000 kHz

Output Voltage

Vout1 Prog:	1.2 V
Vout1 Ripple (pk-pk):	19 mV
ΔVout1/Vout1 Ripple:	1.6 %

Output Rail 1

Vout1:	1.2 V
Iout1:	10 A

Output Rail 2

Vout2:	1.8 V
Iout2:	8 A

DCR Current Sensing

Act. Io2 Limit:	8.07 A
IL1 Pk@ Io1 Limit:	6.59 A
Vsm1 Pk@ Io1 Max:	741 mV
Vsm1 Vly@ Io1 Max:	59 mV
Vsm1 Rip. (pk-pk):	15.1 mV

DCR Current Sensing

Act. Io2 Limit:	4.09 A
IL2 Pk@ Io2 Limit:	7.42 A
Vsm2 Pk@ Io2 Max:	63.6 mV
Vsm2 Vly@ Io2 Max:	42.7 mV
Vsm2 Rip. (pk-pk):	21.1 mV

Output Voltage

Vout2 Prog.:	1.8 V
Vout2 Ripple (pk-pk):	26.56 mV
ΔVout2/Vout2 Ripple:	1.5 %

Select different current sensing schemes

- User can only change blue-cell values and check calculated circuit parameters in yellow and red cells.
- Red cells are for warnings. User needs to decide if following/correcting the warning or not.

View data for each rail

Enter power stage component details & Test Conditions (enter manually or select from built-in library)

The screenshot displays the LTpowerCAD II v2.0 software interface. On the left, the 'Design Specs' panel shows input parameters: Vin max: 15 V, Vin nom: 10 V, Vin min: 5 V, Sw. Freq: 370 kHz, Vout: 1.2 V, Iout: 10 A. Below this, the 'Inductor' section is set to L: 1.5 uH, DCR: 10.4 mΩ. The 'MOSFET' section shows 'Top MOSFET QT' as Fairchild FDM57578 and 'Bottom MOSFET QB' as Fairchild FDM58558. The 'Update Plots' button is highlighted with a blue arrow. A blue box highlights the 'Design Specs' and 'Inductor' sections.

The central chart, 'Rail Total Efficiency & Power Loss vs. Load (CCM Mode only)', plots Efficiency (%) on the left y-axis (50 to 100) and Power Loss (W) on the right y-axis (0.19 to 1.71) against Load Current (A) on the x-axis (0 to 10). A blue curve represents Efficiency, and a red curve represents Power Loss. A vertical dashed line is at 4.2 A. A blue arrow points to the 'Update Plots' button.

The right chart, 'Rail Total Power Loss Breakdown (Full Load)', is a pie chart showing the distribution of power loss at full load. The largest portion is Inductor DCR at 1.068W (65.48%). Other significant losses include Top Fet Conduction (0.078W, 4.78%), Bot Fet Body Diode (0.079W, 4.84%), and Top Fet Turn On (0.069W, 4.23%). A blue arrow points to the pie chart.

Below the charts, a table shows 'Rail Total Power Loss @ Full Load': Pin: 13.629 W, Pout: 12 W, PLoss: 1.629 W, η: 88.05%. A blue arrow points to the 'Update Plots' button.

Click "Update Plots" after component value changes.

Estimated Efficiency & Power Loss Curves with Data Point Cursors. Double-click to set axes Preferences

Estimated Power Loss Breakdown

Click "Select" to open MOSFET library.

Standard library

User created library

User can add new part into user library

Popular vendor weblinks

FAIRCHILD SEMICONDUCTOR **VISHAY** **Infineon** **RENESAS**

Vendor	Part Name	Vds (V)	Rdson (mΩ)	Qg (nC)	Qgd (nC)	Qgs (nC)	Rg (Ω)	Vdiode (V)	Vmiller (V)	Vth (V)	Package	Channel Type
Renesas	RJK0301	30	3	32	7	14.5	2	0.84	3	2.5	LFPK	N
Renesas	RJK0305	30	10	8	1.5	3.6	0.6	0.85	3	2.5	LFPK	N
Infineon	BSC019N02K	20	1.6	64	11	19	1.90	0.80	1.90	1.0	PG-TDSON	N
Infineon	BSC026N02K	20	2.1	40	7	11.4	1.50	0.85	1.90	1.0	PG-TDSON	N
Infineon	BSC046N02K	20	3.5	21	4	6.5	1.90	0.90	2.10	1.0	PG-TDSON	N
Infineon	BSC010NE2L	25	1.1	31	6.8	11	0.60	0.80	2.40	1.6	PG-TDSON	N
Infineon	BSC010NE2L	25	1.1	29	6.9	10	0.60	0.56	2.40	1.6	PG-TDSON	N
Infineon	BSC014NE2L	25	1.6	18.7	4.7	6.8	0.60	0.56	2.50	1.6	PG-TDSON	N
Infineon	BSC018NE2L	25	1.8	19	4.3	7	0.80	0.85	2.50	1.6	PG-TDSON	N
Infineon	BSC0911ND_	25	1.3	25	5.5	8.8	0.60	0.79	2.30	1.6	PG-TISON	N
Infineon	BSC0911ND	25	3.7	7.7	1.8	3	0.90	0.84	2.60	1.6	PG-TISON	N

Vendor	Part Name	Vds (V)	Rdson (mΩ)	Qg (nC)	Qgd (nC)	Qgs (nC)	Rg (Ω)	Vdiode (V)	Vmiller (V)	Vth (V)	Package	Channel Type
Fairchild	FDMS8558S	25	1.3	38	9.7	10	0.90	0.60	2.10	1.7	POWER 56	N
Fairchild	FDMS7578	25	6.3	8	1.7	3.7	1.20	0.83	2.90	2.0	POWER 56	N

Click "Select" to open inductor library.

Standard library

User created library

User can add new part into user library

Popular vendor weblink / web-search site.

Popular vendor weblink / web-search site.

Enter component details (enter manually or select from built-in library)

View data for each rail

View Loop Gain, Feedback gain, Output Impedance, Control to Output, Compensator plots

The screenshot displays the LTpowerCAD II software interface. On the left, the 'Design Specs' panel lists parameters such as Vin max (13.2 V), Vout (1.2 V), and Iout (15 A). Below this, the 'Inductor' and 'Capacitor library' sections allow for component selection. The 'Feedback Network' and 'Comp. Network' diagrams are also visible. The main area is divided into two plots: 'Loop Gain' and 'Load Transient'. The 'Loop Gain' plot shows Magnitude (dB) vs. Frequency (Hz) with a bandwidth (BW) of 34.67 kHz and a phase margin (PM) of 69.78 deg. The 'Load Transient' plot shows Iout (A) and Vout Undershoot (mV) vs. Time (μs). At the bottom, there are 'Import', 'Export', and 'Clear Imported' buttons.

Loop Gain, Feedback, Output Impedance, Ith to Vout, and Compensator plots

Import plot data from data file (ie Ridley AP300) or Export data to data file or Excel.

Load Transient Estimation plots

LTpowerCAD II v2.0

Power Stage Design | Loss Estimate & Break Down | Loop Comp. & Load Transient

Part Specs

- Max Vin: 38 V
- Min Vin: 4.5 V
- Max Vout: 5.5 V
- Sugg. Max Iout: 30 A
- Min Sw. Freq.: 200 kHz
- Max Sw. Freq.: 2000 kHz

Design Specs

- Vin max: 15 V
- Vin nom: 10 V
- Vin min: 5 V
- Switching Freq.: 370 kHz

Output Rail 1

- Vout1: 1.2 V
- Iout1: 10 A

Output Rail 2

- Vout2: 1.8 V
- Iout2: 8 A

Current Limit

- Target Iout1 Limit Margin: 150%
- Target Iout1 Limit: 15 A
- IL pk@ Target Iout1 Limit: 15.95 A
- IL vly@ Target Iout1 Limit: 14.05 A

Output Voltage

- Vout1 Prog: 1.2 V
- Vout1 Ripple (pk-pk): 19 mV
- ΔVout1/Vout1 Ripple: 1.6%

Output Bulk

- Part#: C
- Value: 330 μF
- ESR: 9 mΩ
- ESL: 2 nH
- # Cap: 1

Output Ceramic

- Part#: C
- Value: 10 μF
- ESR: 3 mΩ
- ESL: 0.8 nH
- # Cap: 1

DCR Current Sens

- Act. Io1 Limit: 5.64 A
- IL1 Pk@ Io1 Limit: 6.59 A
- Vsns1 Pk@ Io1 Max: 74.1 mV
- Vsns1 Vly@ Io1 Max: 59 mV
- Vsns1 Rip. (pk-pk): 15.1 mV

Feedback

- Sug. Rb1: 60.4 kΩ
- Rt1: 60.4 kΩ
- Cft1: pF

Duty & Ton

- Sug. Rb1: 60.4 kΩ
- Rb1: 60.4 kΩ
- Cft1: pF
- Vout1 Duty: 12%
- Ton1 @ Vin Max: 216 ns
- Ton1 @ Vin Min: 2054 ns

LTspice IV - LTC3838 circuit.raw

File | View | Plot Settings | Simulation | Tools | Window | Help

LTC3838 circuit.asc | LTC3838 circuit.raw

LTC3838 circuit.asc

LTC3838 circuit.raw

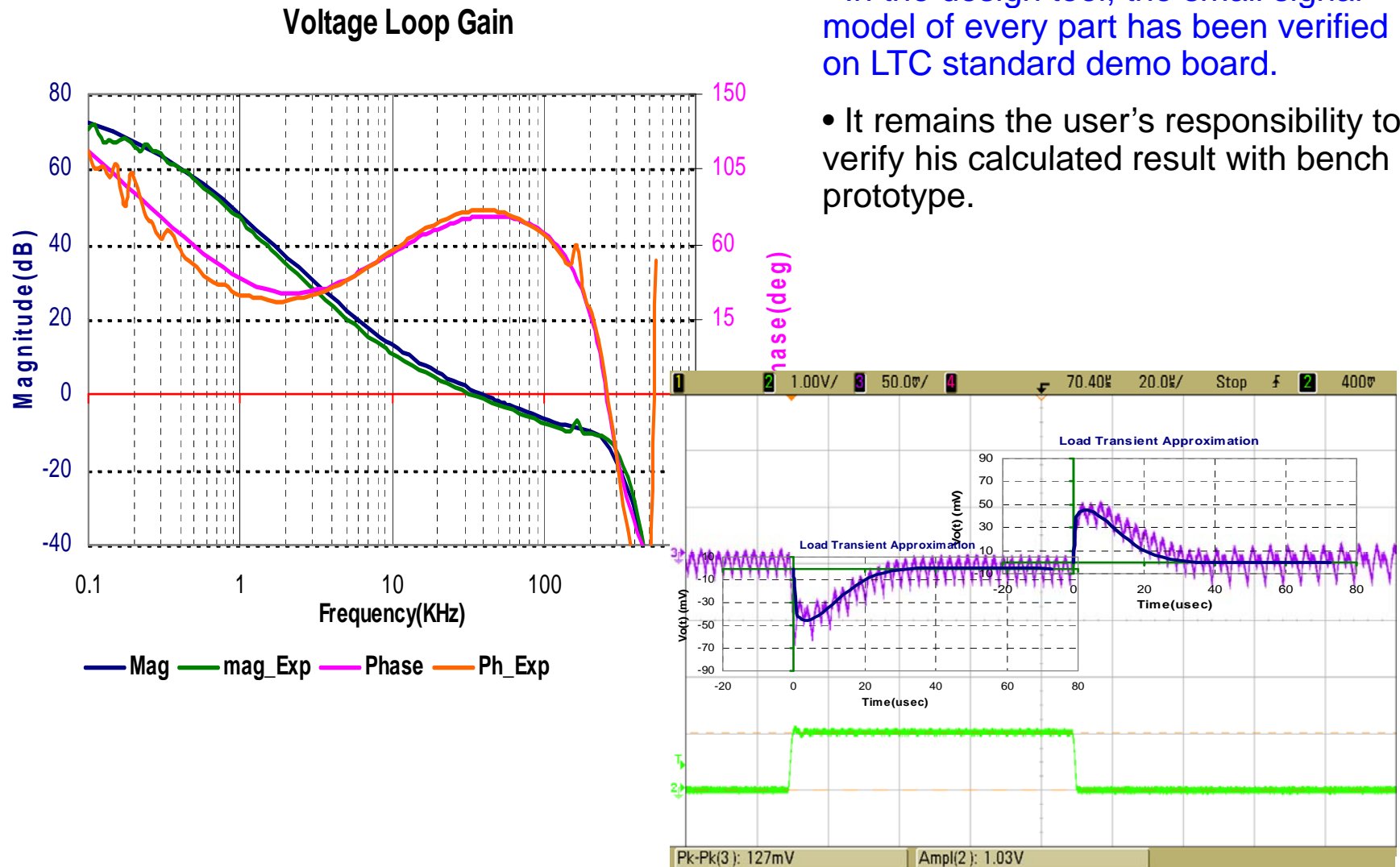
V(n007)

11V
9V
7V
5V
3V
1V
-1V

I(L2)

6.3A
1.4A
-3.6A

0μs 80μs 160μs 240μs 320μs 400μs 480μs 560μs 640μs 720μs

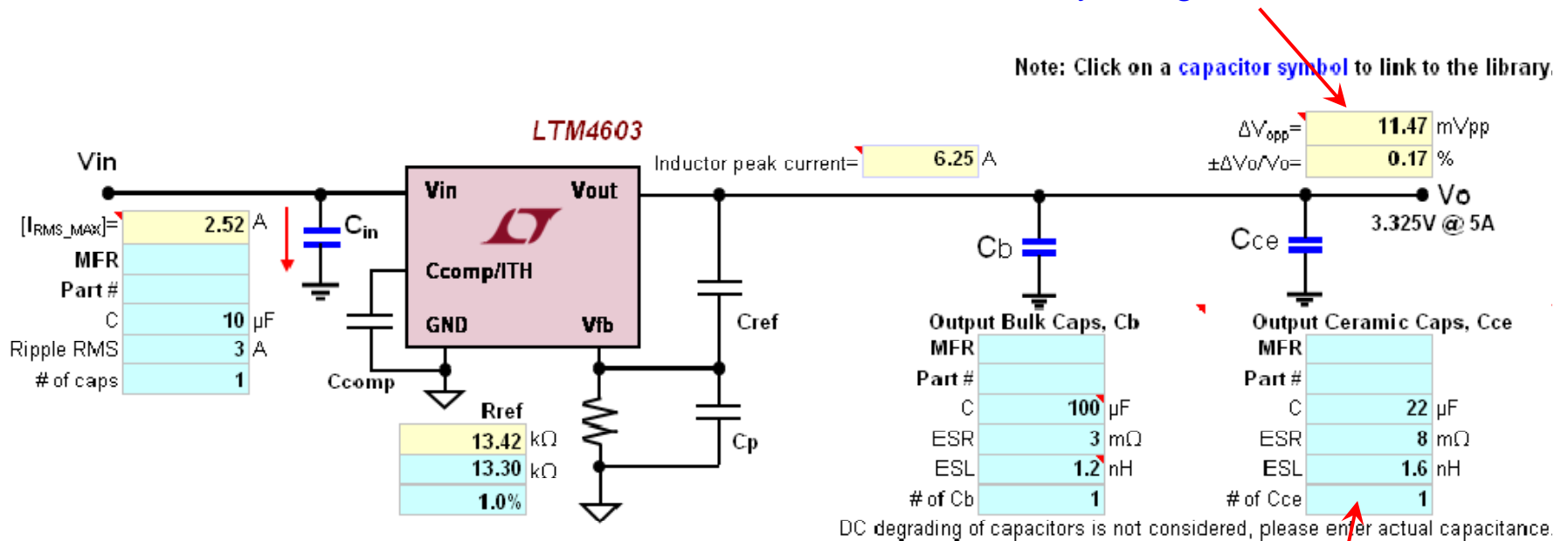


- In the design tool, the small signal model of every part has been verified on LTC standard demo board.
- It remains the user's responsibility to verify his calculated result with bench prototype.

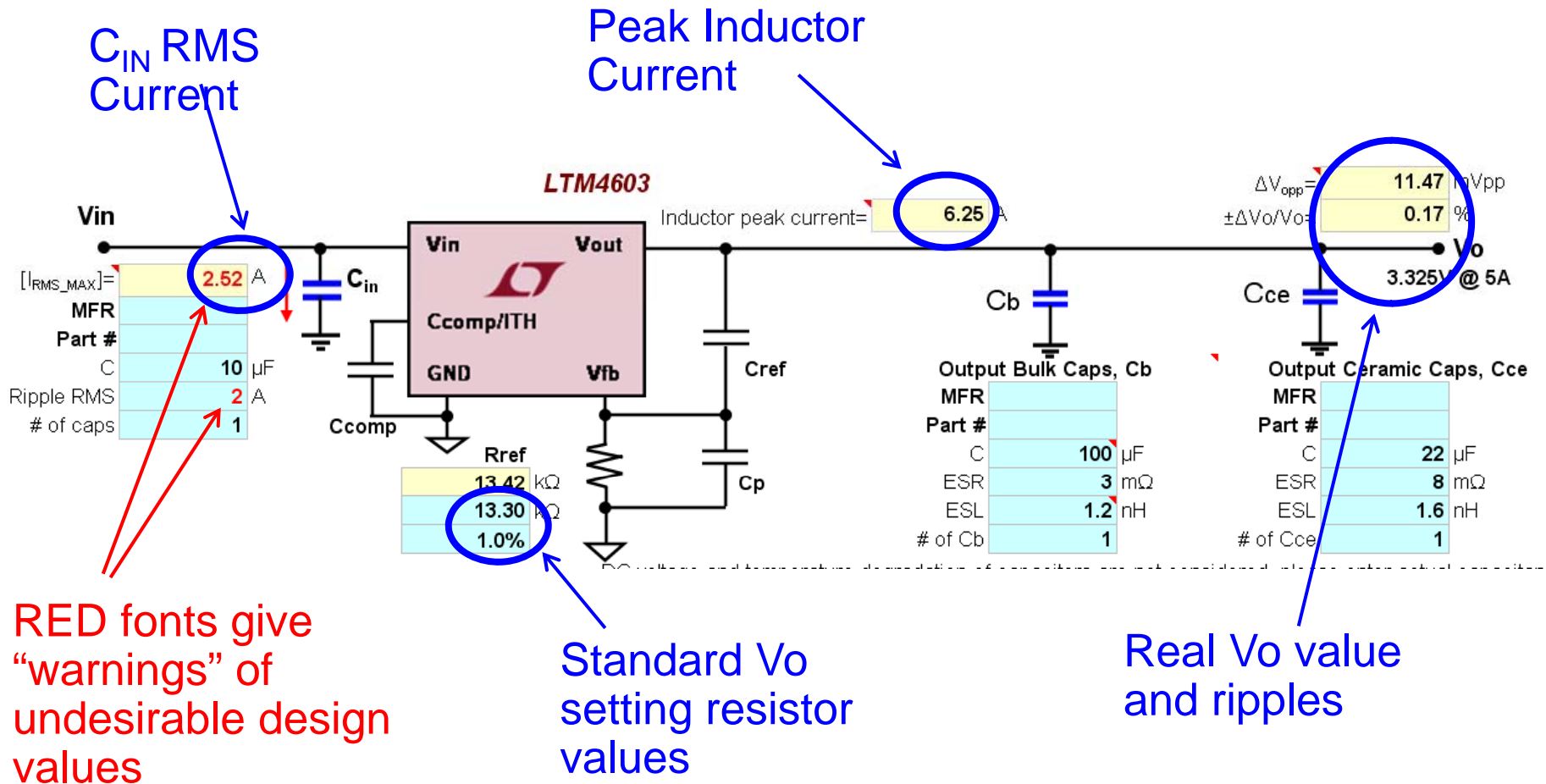
Example of a **Excel-Based** design Tool

In the design spreadsheet, power components design is guided with schematic interface:

Values in yellow cells are calculated / recommended by design tool.



Values in blue cells are selected / entered by user.



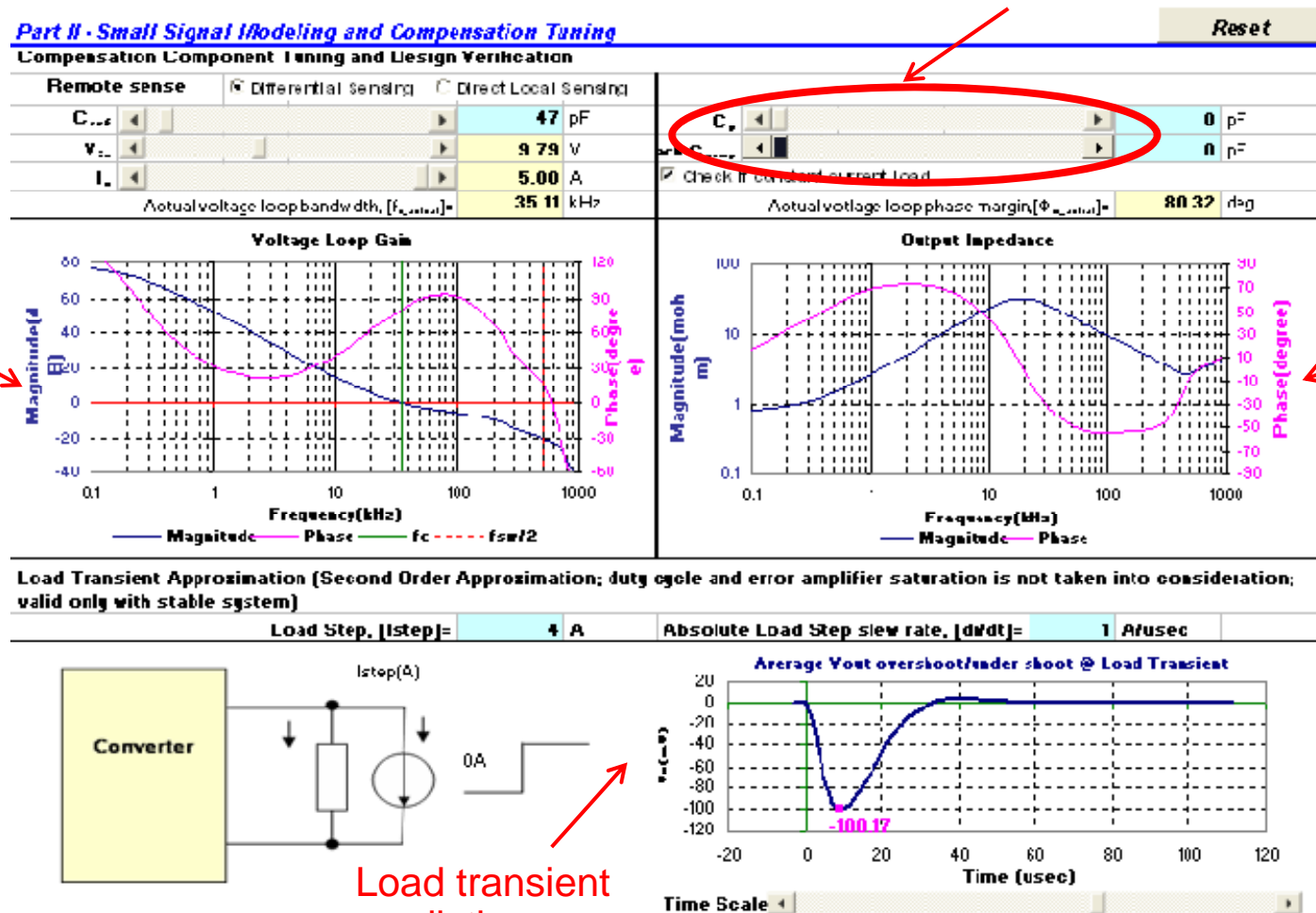
Step 2: Control Loop Optimization

In the design spreadsheet, control loop design can be fine tuned:

Sliding bar for compensation adjustment.

Loop gain prediction

Output Impedance



Export to & Run LTspice™ Simulation

In the design spreadsheet, click the “Export To LTspice” button:

Note: Click on a capacitor symbol to link to the library

Export To LTspice View Layout Example

Inductor peak current = 5.37 A

$\Delta V_{c_{pp}} = 12.56$ mVpp
 $\pm \Delta V_o/V_o = 0.19$ %
 3.325 V @ 4A

$I_{RMS_MAX} = 1.92$ A
 MFR
 Part #
 C 10 μ F
 Ripple RMS 3 A
 # of caps 1

LTM4603

Output Bulk Caps, Cl
 MFR
 Part #
 C 100 μ F
 ESR 3 m Ω
 ESL 1.2 nH
 # of Cb 1

Rref 13.42 k Ω
 13.30 k Ω
 1.0%

DC voltage and temperature degradation of capacitors are no

Linear Technology LTspice/SwitcherCAD III - LTM4603.asc

LTM4603.asc LTM4603.raw

V(out)

1.1V
1.0V
0.9V
0.8V
0.7V
0.6V
0.5V
0.4V
0.3V
0.2V
0.1V
0.0V
-0.1V
-0.2V
-0.3V
-0.4V
-0.5V

0.0ms 0.6ms 1.2ms 1.8ms 2.4ms 3.0ms

If the LTspice™ simulator is installed, it will be automatically opened:

Link to down load free LTSpice™ simulator:
<http://www.linear.com/designtools/software/ltspice.jsp>

Additional Feature (2):

Summary of design: BOM, size, cost and stress

In the design spreadsheet, click the “Summary” sheet:

Summary of Design

Bill of Material of Power Components									
Component	Part #	# of parts	Value	Package	Unit	L	W	H	Total Price
					inch	mm			
Cin (bulk)	0	1	100 μ F	1210		0.098	0.126	N/A	\$0.00
Cin (ceramic)			μ F	1206		0.063	0.126	N/A	\$0.00
Cout (bulk)	2R5TPE220MC	0	220 μ F	0805		0.049	0.079	N/A	\$0.00
Cout (ceramic)	0.00	1	72 μ F	1210		0.098	0.126	N/A	\$0.00
MicroModule	LTM4603	1		LGA (15 X 15 X2.8)		0.591	0.591	0.110	\$0.00
Power Component Summary:									
					Foot print clearance factor= 1.5				
Total footprint are W/O output Bulk Capacitors							0.560	inch ²	
Total footprint							0.560	inch ²	
Total BOM cost W/O input and output Bulk Capacitors							\$0.00		
Total BOM cost							\$0.00		
Design Analysis									
Parameters	Condition	Minimum	Typical	Maximum	Units				
Input Voltage		7.000	12.000	14.000	V				
Output Voltage		0.984	0.999	1.014	V				
Inductor peak-to-peak Ripple			0.909	0.921	A				
Frequency			1004.016		KHz				
Crossover freq.	Vin=8.09V		119.891		kHz				
Phase Margin	Vin=8.09V		39.159		Deg.				
It remains the customer's responsibility to verify proper and reliable operation in the actual application.									

Power components summary

Stress analyses

Any feedback comments on the program or issues encountered are welcome!

Please forward your comments to the addresses below.

LTpowerCAD@Linear.com

LTpowerCAD II v2.0™

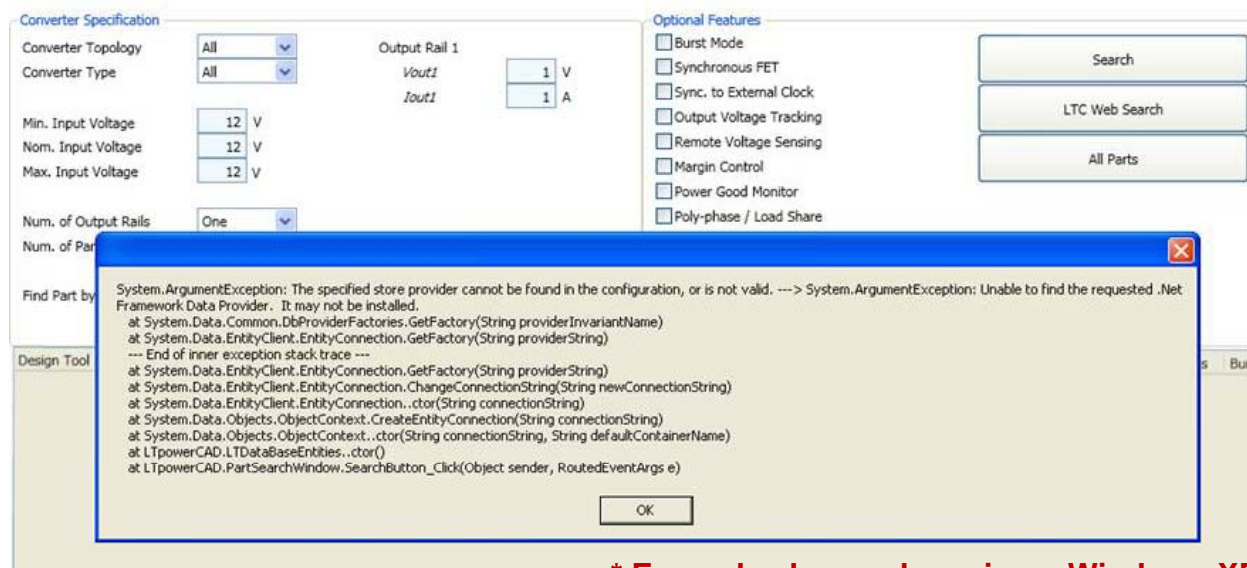
Installation

Troubleshooting

I. Microsoft SQL Server Compact 3.5 SP2 ENU requirement :

1) Possible issue: Microsoft SQL Server Compact 3.5 SP2 is requirement missing

LTpowerCAD II v2.0 requires Microsoft SQL Server Compact 3.5 SP2 to access the internal parts database. If this is not installed, the program may have issues accessing information for parts included in the program. An example screenshot is shown below where this type of error has occurred. *If this is confirmed to be installed on your system, make sure it was installed correctly which may require a repair of the installation or new installation of this requirement.*



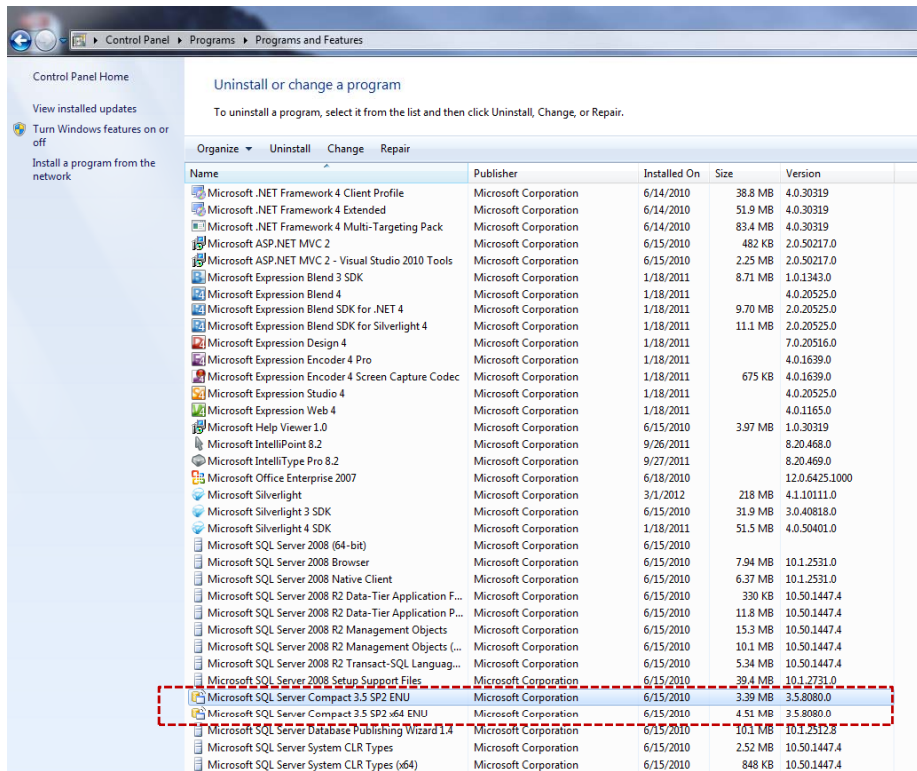
* Example shown above is on Windows XP

Important : Make sure you installed using “setup.exe” file (not the MS.msi file)

Possible issue solution:

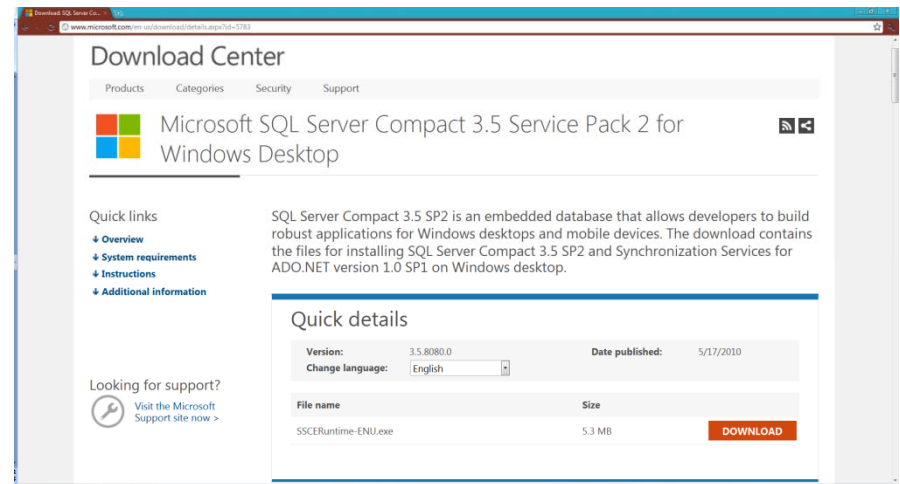
Check the programs you have currently installed on your system to see if Microsoft SQL Server Compact 3.5 SP2 requirement is missing or not. The LTpowerCAD II v2.0 installer automatically checks if you have this requirement, if not it will download and install it automatically. This can also be freely downloaded at Microsoft at <http://www.microsoft.com/en-us/download/details.aspx?id=5783> *If this is confirmed to be installed on your system, make sure it was installed correctly which may require a repair of the installation or new installation of this requirement.*

Step 1) Check the list of programs you have currently installed on your system by going to Start Menu → Control Panel → Uninstall a program



Important : Make sure you installed using “setup.exe” file (not the MS.msi file)

Step 2) If this is not installed, this can be downloaded from <http://www.microsoft.com/en-us/download/details.aspx?id=5783> . Please download and install this package, then try to un-install / re-install LTpowerCAD II v2.0.

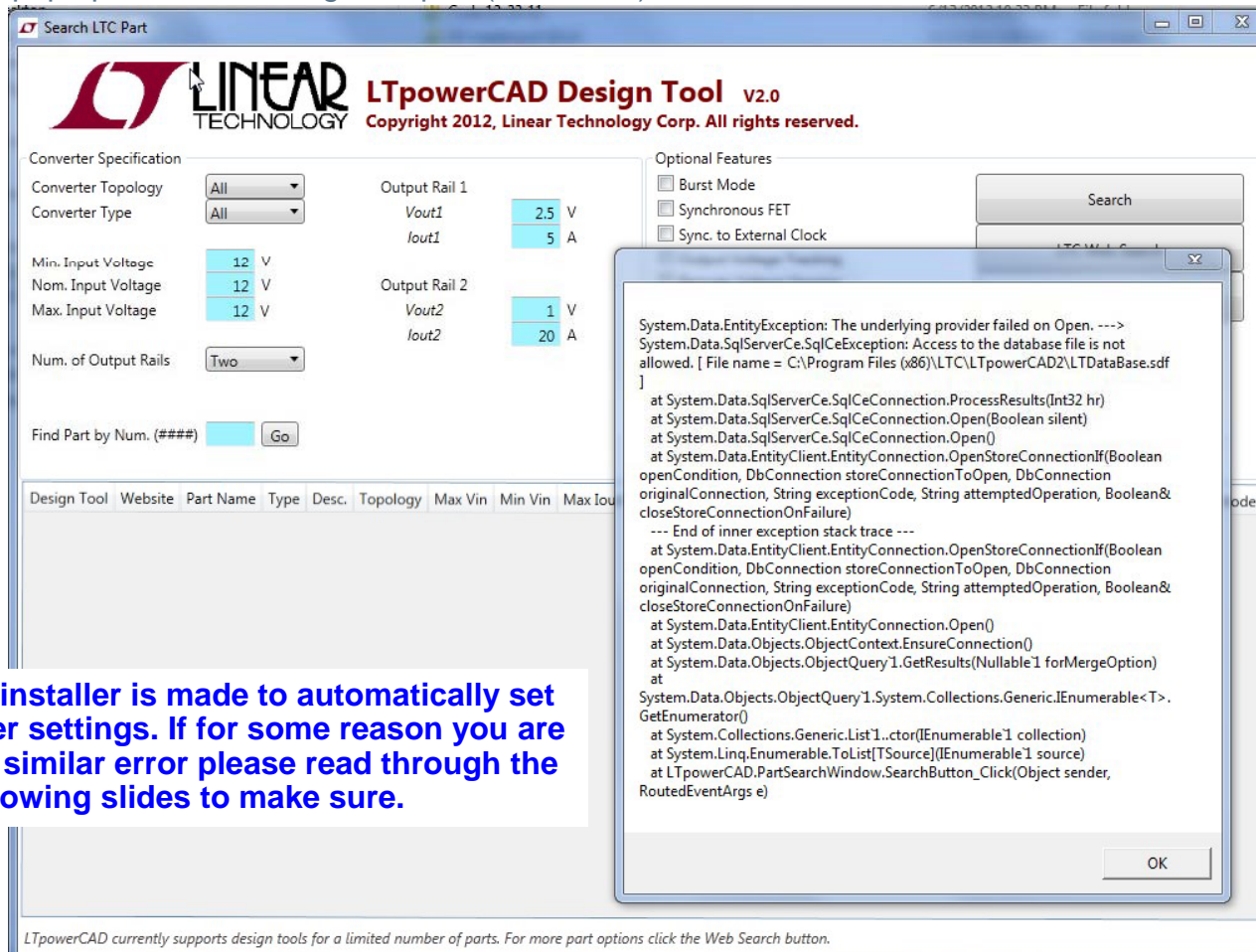


**** Note : The installer is made to automatically download and install these software requirements to your system if your system does not already have these installed.**

II. Microsoft Security Settings :

2) Possible issue: Microsoft Security Settings

Security default settings may prevent access of LTpowerCAD II v2.0 from its database causing an error message to pop up when searching for a part (see below).



**** Note :** The installer is made to automatically set up these folder settings. If for some reason you are still getting a similar error please read through the following slides to make sure.

Important : Make sure you installed using "setup.exe" file (not the MS.msi file)

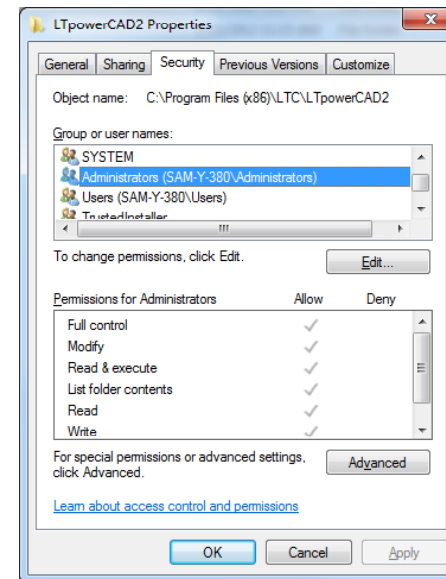
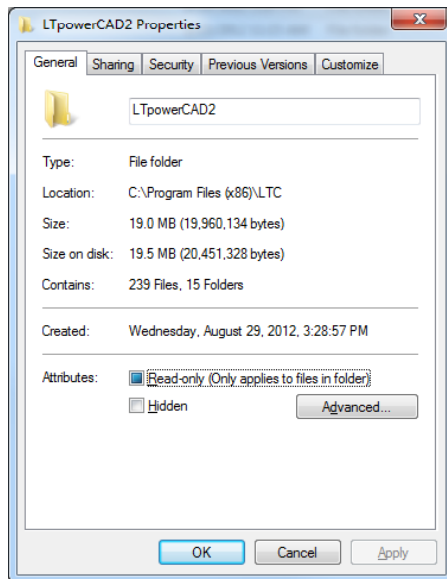
Possible issue solution:

Run the program with an Administrator account , or try to modify your system's Users account security settings for now (see below).

Step 1) Go to the LTC folder location: (ie C:\Program Files (x86)\LTC)

Step 2) Right click on the LTpowerCAD 2 program folder → **Properties**

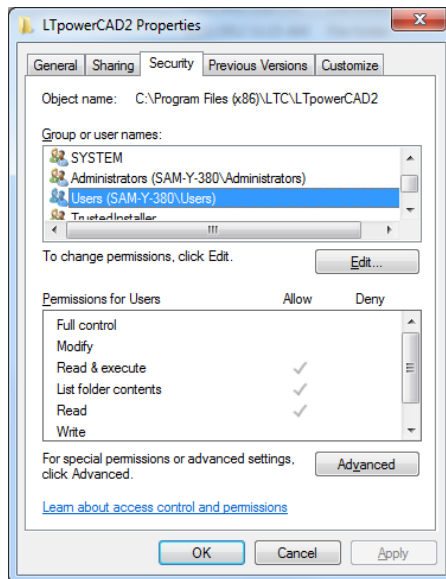
Step 3) Click on the **Security** tab. Click on your **Administrators** account and see that the permissions should show Allow for all options (except for Special permissions). The **SYSTEM** account should also have the same settings.



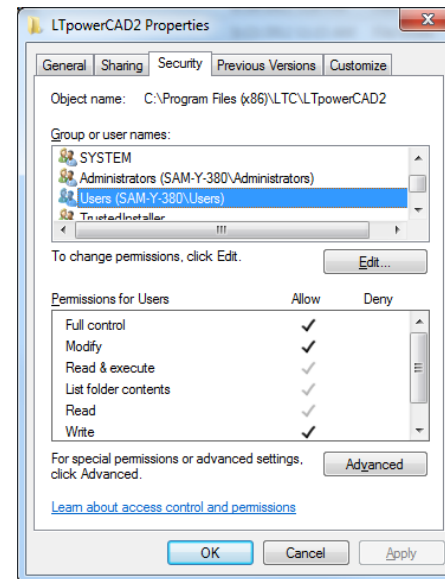
Important : Make sure you installed using “setup.exe” file (not the MS.msi file)

Possible issue solution (cont'd):

Step 4) Click on your **Users** account to see the user settings. Your user account may not have the permissions set (like shown below) that are needed. You can change these in the next step.



Step5) Click on the **Edit** button and click on your **Users** account again and click the check boxes on the **Allow** column for **Full control, Modify, Write**. Click **OK**. The settings should now be the same as you saw for the **Administrators** account.



Important : Make sure you installed using “setup.exe” file (not the MS.msi file)