

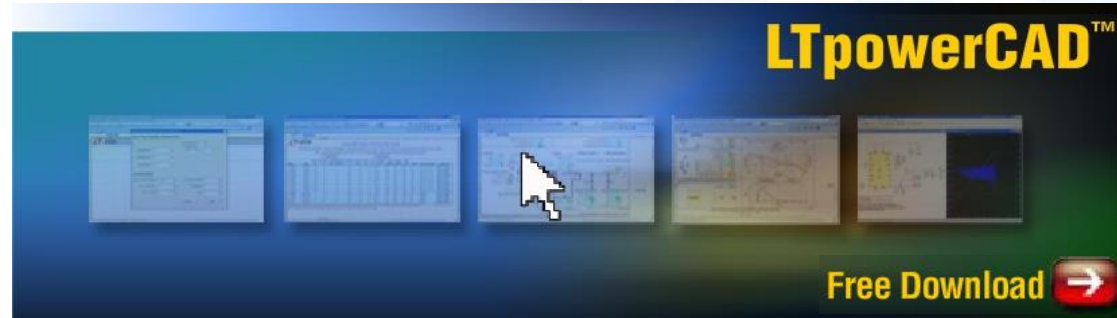
LTpowerCAD

Quick Start Guide

Design Tool Development Team
Power Products, Analog Devices Corp.
LTpowerCAD@analog.com

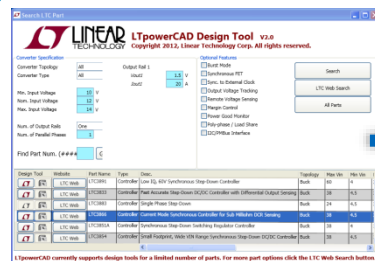


A Complete, Step-by-Step Power Converter Design Tool

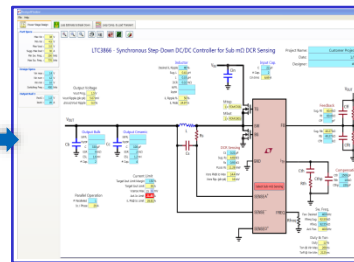


LTpowerCAD

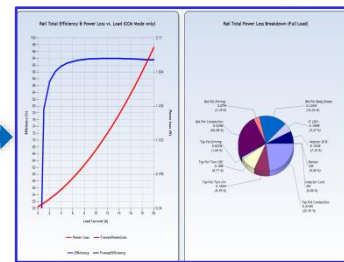
Design a Power Converter In Five Simple Steps



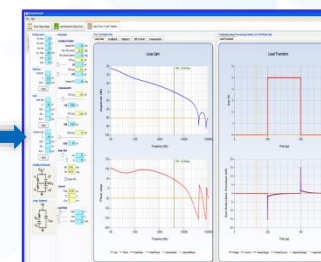
**Enter Supply Specs.
Search for Solutions**



**Power Supply
Schematic.**



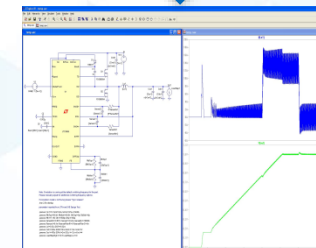
**Efficiency & Power
Loss**



Loop Stability & Transient

**Design Summary &
BOM**

LTspice™



Download

Go to <https://www.analog.com/en/design-center/ltpowercad.html>

Download & install LTpowerCAD II program (Free) for your Windows PC

Questions?

LTpowerCAD@analog.com

System Minimum Requirements

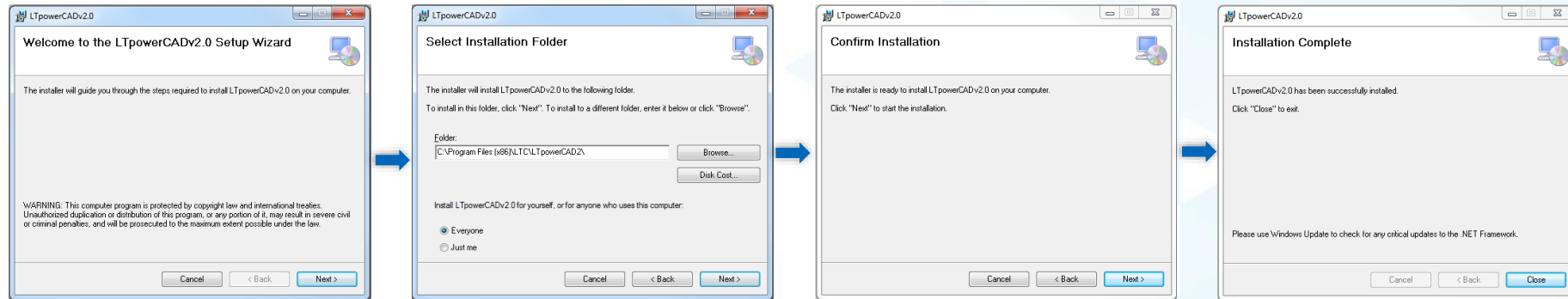
- ✓ PC with Microsoft Windows 7 or later OS
- ✓ Microsoft .NET Framework 4.7.2 or Higher
- ✓ Microsoft Office Excel (for Legacy Excel design tools use only)
- ✓ LTspice SPICE simulation software (for Export to LTspice feature use)

Installation

Double Click “**Setup.exe**” to Start LTpowerCAD II v2.7.2 Design Tool Setup Wizard

Click “**Next**” “**Next**” “**Next**”

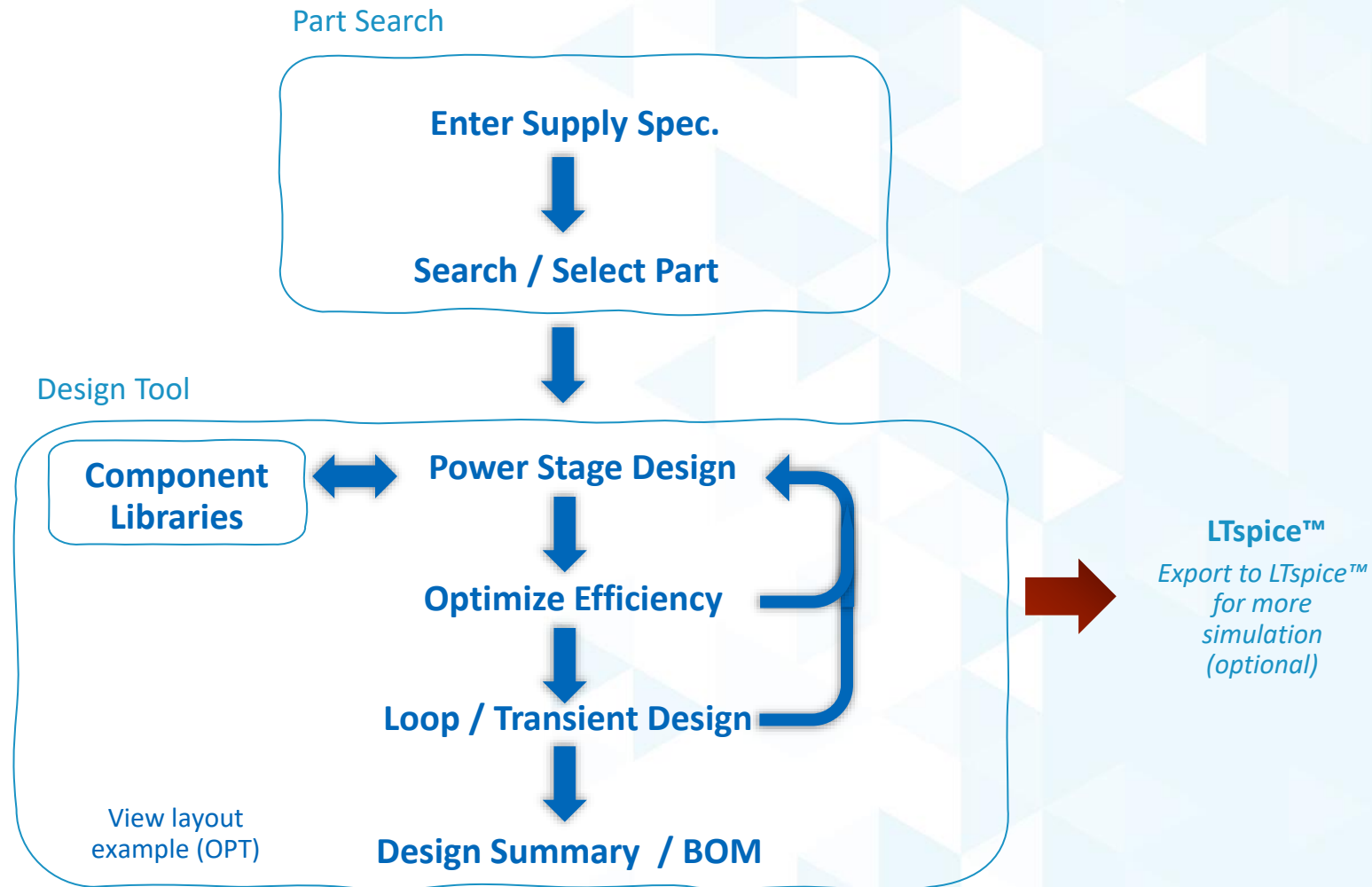
Click “**Close**” to complete the Installation



* The installation will place a shortcut to LTpowerCAD II on the desktop

Designing with LTpowerCAD

Supply Design Procedure



Main Window



Start a Power Converter Design



Start an LTpowerPlanner™
System Block Diagram



Launch LTspice™ Simulation Tool



Open Chain Signal Power Configurator



Extra Tools, Programs



Sales / Support Contacts



LTpowerCAD Program Updates

Part Search

Enter Supply Specification

Converter Specification

Vin min. 10.8 V
Vin nom. 12 V
Vin max. 13.2 V

Output 1
Vout1 1 V
Iout1 20 A

Outputs One
Max. Paralleled 1

Enter Fsw for Best Results
Frequency Fsw kHz
Max. Height mm

Search for Best Parts

Search Parts

Select any Desired Features

Converter Topology Buck
Converter Type All

Other Product Types

Search Solutions

Launch Design Tool

LTpowerCAD Design Tool v2.7.2
Copyright © 2021, Analog Devices Inc. All rights reserved.

Optional Features

- ☒ Synchronous
- ☐ Burst
- ☐ Run / Enable
- ☐ Ext. Clock
- ☐ Output Tracking
- ☐ Remote Sensing
- ☐ Margining
- ☐ Power Good
- ☐ Parallel
- ☐ Low EMI / Silent
- ☐ I2C/PMBus
- ☐ Isolated
- ☐ Int. & Ext. Comp.
- ☐ Automotive
- ☐ MP Temp. Grade

Datasheet Schematic

Pin Configuration

Search Options

Search Parts
All Parts

☒ Keep Search Page Open

Reset Filters

Find Part (###) Find

PWM Converters LDOs Protection Controllers Switch-Cap Converters

Search For Parts Search For Solutions

Design Tool	Website	Part #	Topology	Type	Description	Year Released	Total Eff. @ 500kHz or min. (%)	Total Eff. @ 2MHz or max. (%)	Part # Outputs	Part # Phases	Part Min. Vin (V)	Part Max. Vin (V)
	Web	LTM4647	Buck	uModule	30A DC/DC Step-Down uModule Regulator	2016	90.81	83.78	1	1	4.7	15
	Web	LTM4637	Buck	uModule	20Vin, 20A Step Down DC/DC uModule Step-Down Regulator	2013	85.47	82.17	1	1	4.5	20
	Web	LTM4636-1	Buck	uModule	40A uModule Regulator with Overvoltage/ Overtemperature Protection	2016	90.63	83.58	1	1	4.7	15
	Web	LTM4636	Buck	uModule	40A uModule Regulator with Enhanced Efficiency and Thermal Protection	2016	90.63	83.58	1	1	4.7	15
	Web	LTC7150S	Buck	Monolithic	20Vin, 20A Synchronous Step-Down Regulator	2017	92.82	87.72	1	1	3.1	20
	Web	LTC7130	Buck	Monolithic	20Vin, 20A Monolithic Buck Converter with Ultra-Low DCR Sense	2016	91.48	88.94	1	1	4.5	20
	Web	LT3740	Buck	Controller	Wide Operating Range, Valley Mode, No RSENSE Synchronous Buck Converter	2006			1	1	2.2	22

LTpowerCAD May Not Support All ADI/LT Power Parts. For More Parts Click The Web Search Button.

Results : 43

* If the tool launch icon is gray tool is not yet available * If no operating conditions are entered then default solution (demo board configuration) will be launched

**ANALOG
DEVICES**

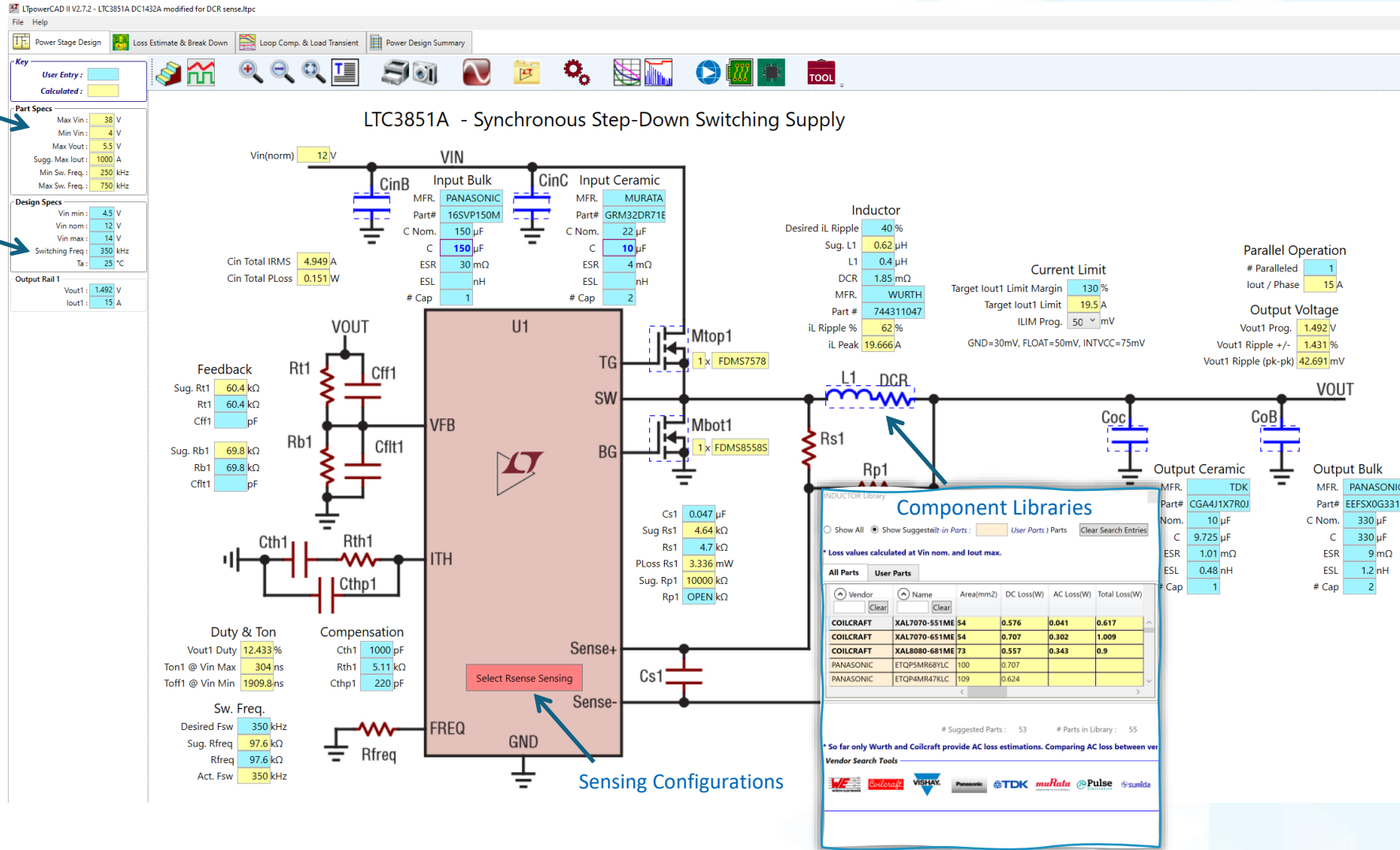
AHEAD OF WHAT'S POSSIBLE™

Your User Solutions

Power Stage Design Tab

Part
Operating
Limits

Operating
Conditions

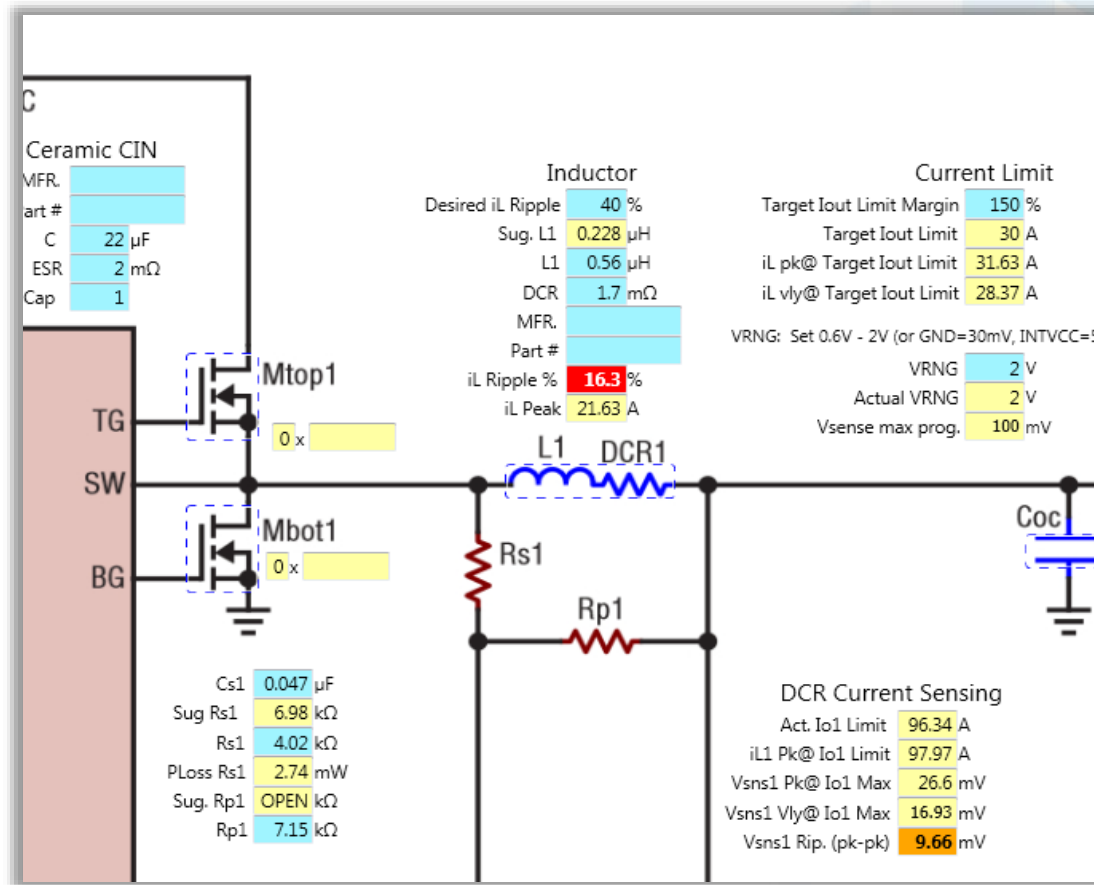


- Suggested values & calc. parameters
- User entered actual component values & desired requirements

Design Steps

- Select a switching frequency (f_{sw})**
higher f_{sw} , smaller L/C size but higher loss
- Select Inductor, Current sensing**
Inductor affects its current ripple
Select sufficient DC & Saturation rated
Check current sensing setup and limit
- Select input and output capacitors**
Considering ripple, RMS current rating, ESR, transient, etc.

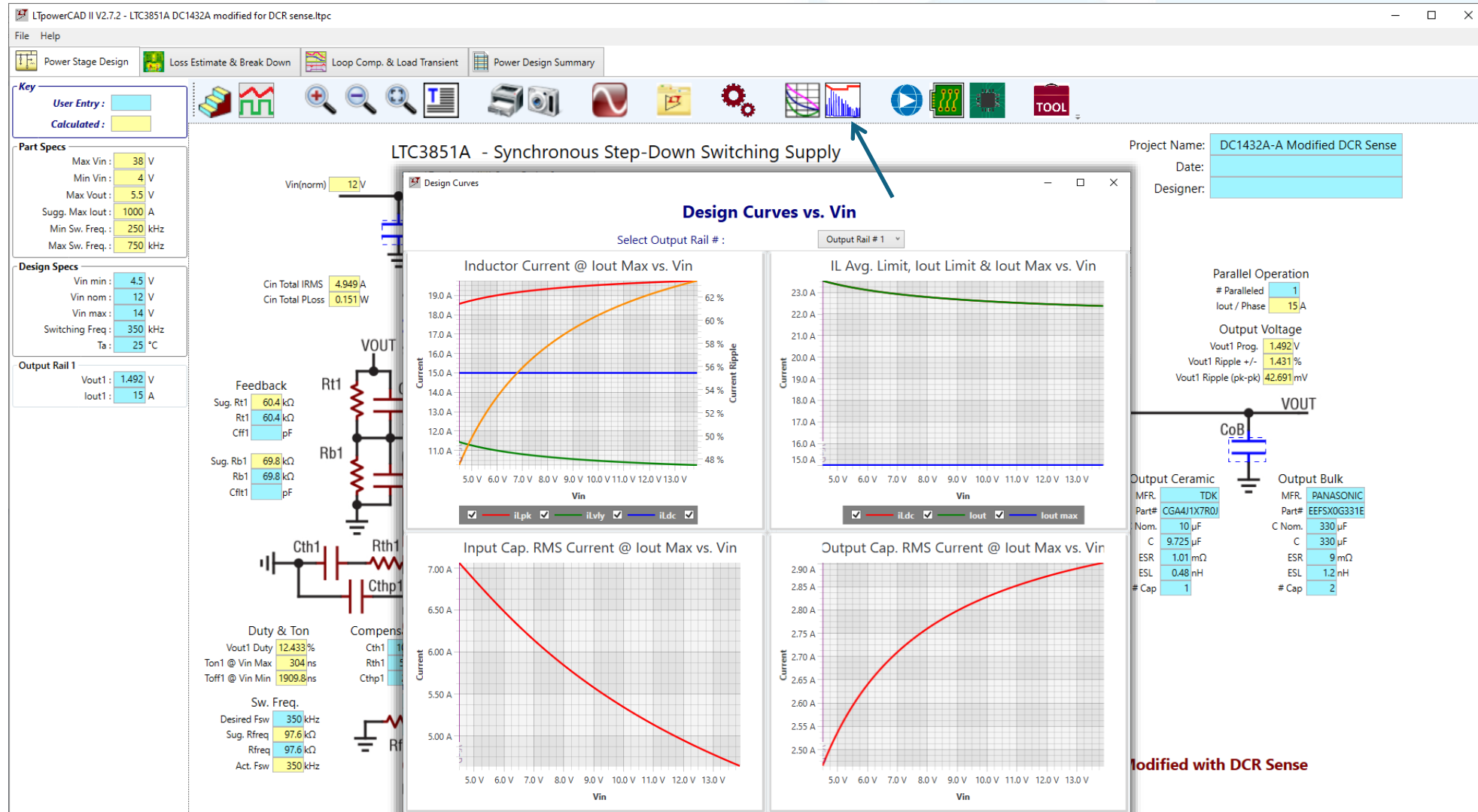
Schematic Warnings



Warnings Guide for Proper Supply Design

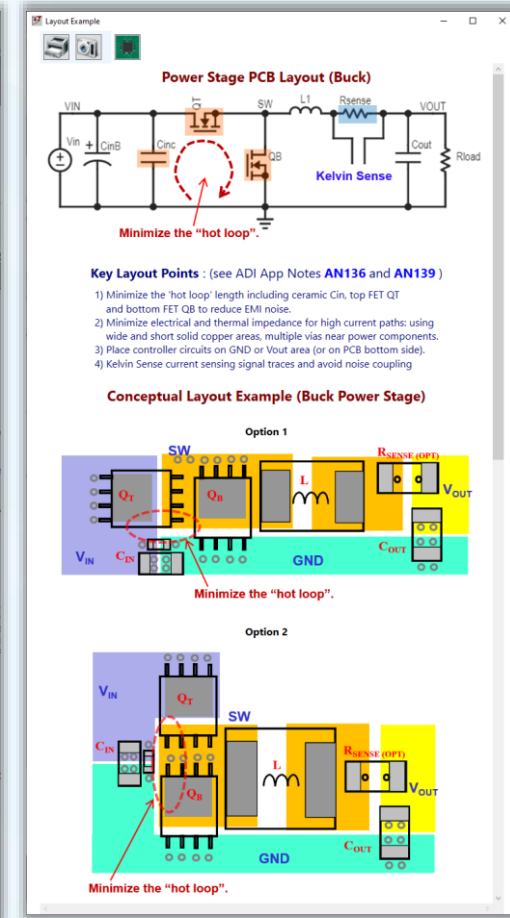
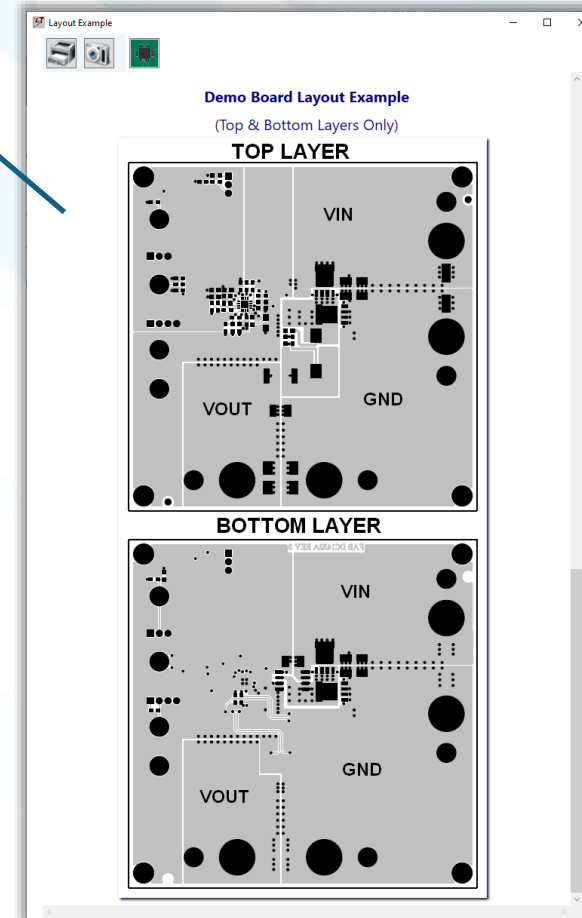
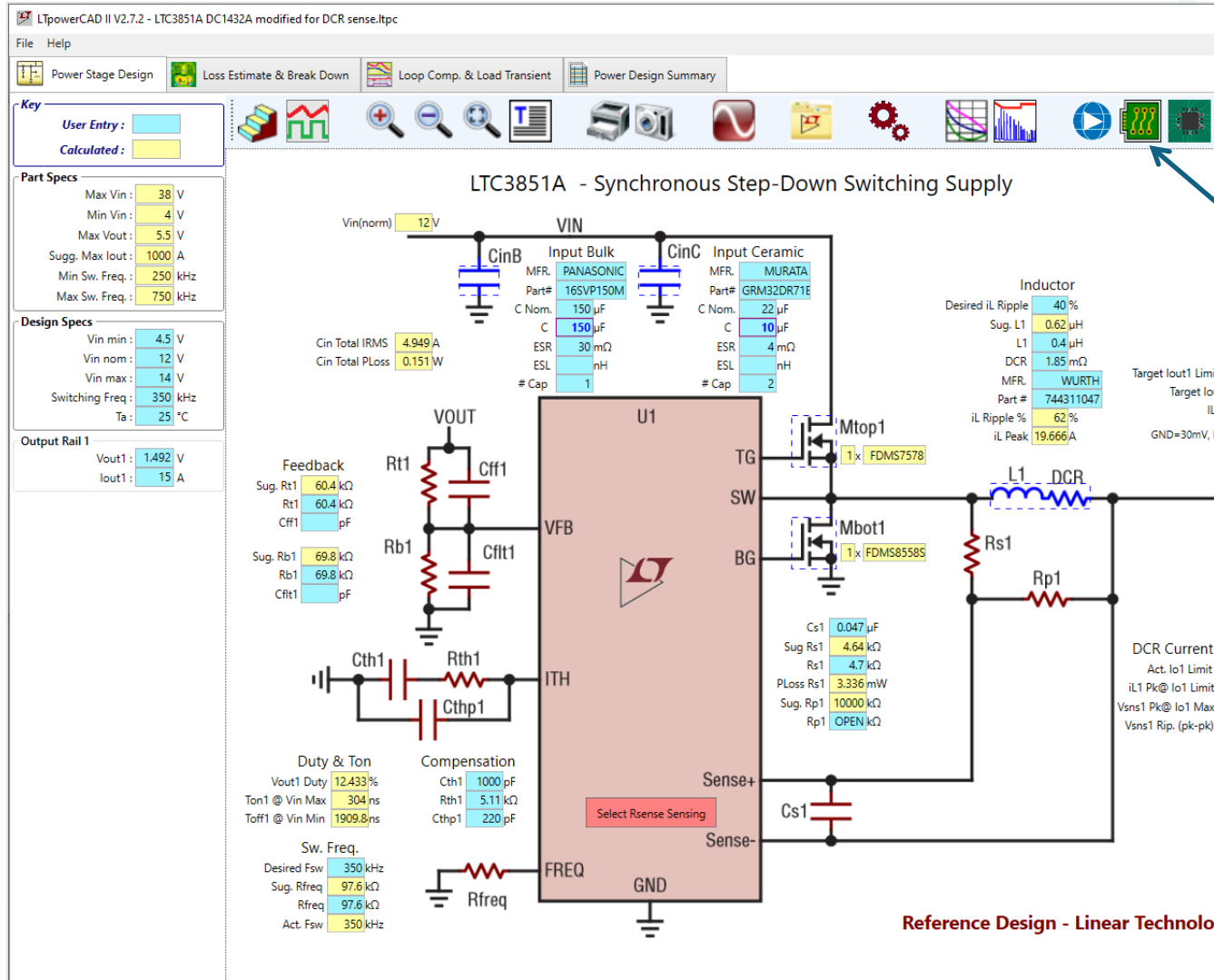
- Strong warning (recommendations / limits exceeded)**
- Soft Warning (parameter slightly outside recommended)**

Design Curves vs Vin



* For reviewing design's currents over the operating range (especially if Vin range is wide) to ensure chosen components have sufficient current ratings

Layout Example



* Demo Board Top and Bottom Layer (Copper & Placement), Layout general guidelines

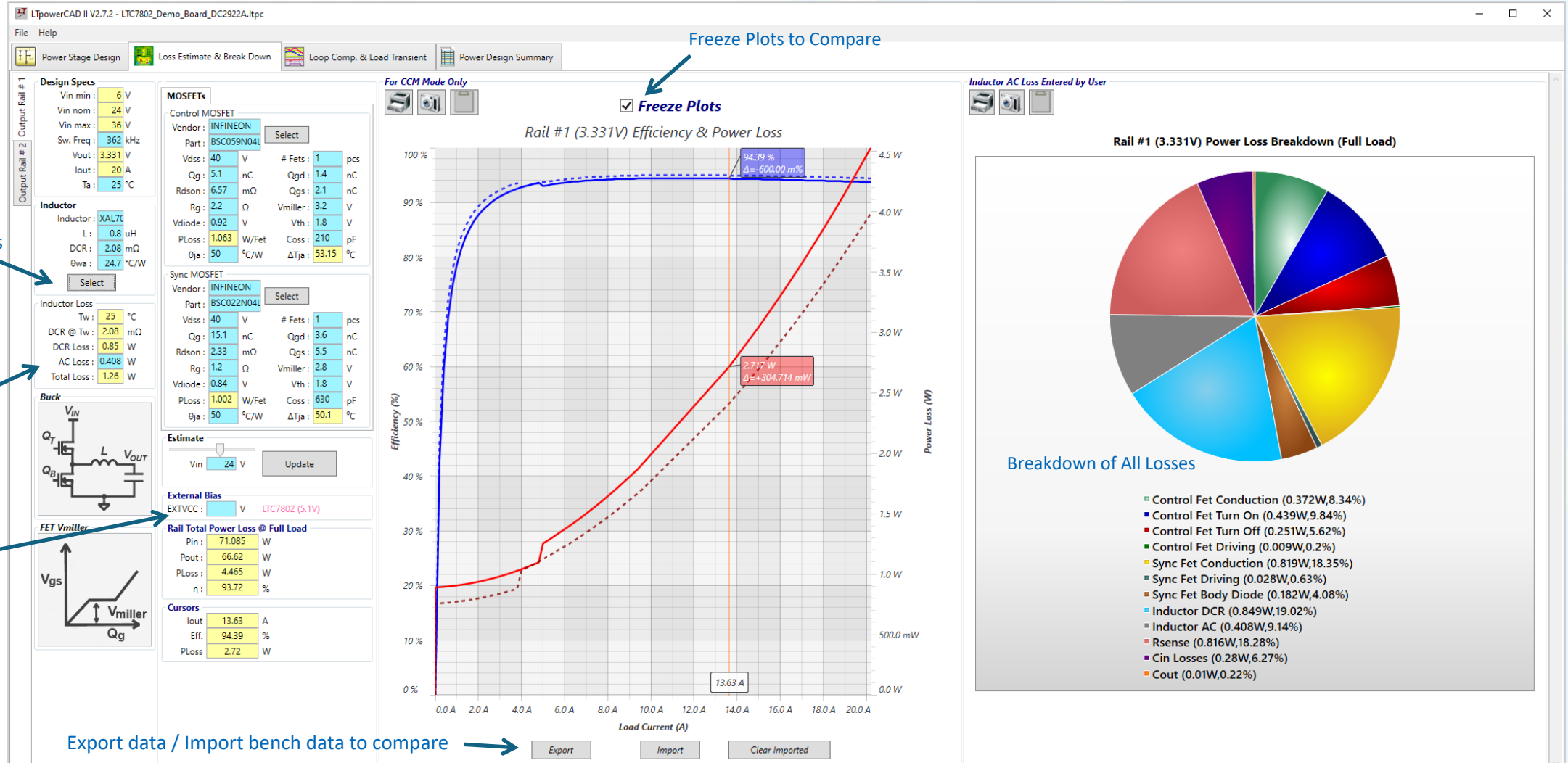
Loss Estimate & Breakdown Tab

Outputs on
Separate Tabs →

Specify or Select
Inductor & MOSFETs →

AC Loss
User entered or
from Inductor
Library (API) →

External Bias →



Power MOSFET Library

Suggested MOSFETs for conditions (by lowest power loss) AECQ

Power MOSFET Library

☐ Show All ☒ Show Suggested Control FET Key: Built-in Parts: User Parts: ☐ Show Only AEC-Q Parts Clear Search Entries

Vin 24 (V) Iout 20 (A) # Parallel FETs 1 pcs. (for MOSFET Loss Calculation) Update Search

Filter Search

All Parts User Parts

Vendor	Name	Control FET Loss (W)	Area (mm ²)	Loss/Area (W/cm ²)	V _{ds} (V)	V _{gs} (V)	R _{ds1} (mΩ)	Q _g
VISHAY	SIR426DP	1.167	32.9	3.55	40	4.5	10.19	9.3
INFINEON	BSZ034N04LS	1.184	11.6	10.24	40	4.5	3.32	13
INFINEON	BSC032N04LS	1.242	34	3.66	40	4.5	3.21	13
RENEASAS	RJK0451DPB	1.341	29.9	4.49	40	4.5	6.84	14
INFINEON	BSZ028N04LS	1.427	11.6	12.34	40	4.5	2.65	16
VISHAY	SJA72ADP	1.428	3397.2	0.04	40	4.5	3.86	14.8
INFINEON	BSZ097N04LS	1.45	11.6	12.54	40	4.5	11.04	8.6
VISHAY	SiR422DP	1.459	32.9	4.44	40	4.5	6.38	16.1
INFINEON	BSC026N04LS	1.491	34	4.39	40	4.5	2.55	16
INFINEON	BSC093N04LS-G	1.503	34	4.42	40	4.5	10.65	8.6
ONSEMI	FDMC8321L	1.506	11.6	13.03	40	4.5	2.61	21
AOS	AON6144	1.51	31.5	4.8	40	4.5	2.62	22
TOSHIBA	TPH7R204PL	1.528	32.8	4.66	40	4.5	6.74	12
TOSHIBA	TPN7R504PL	1.545	13	11.92	40	4.5	7.03	12

Suggested Parts: 198 # Parts in Library: 200

Vendor Links

ON Semiconductor VISHAY infineon nexperia ALPHA & OMEGA TOSHIBA Leading Innovation >>>

Links to Vendor Parametric Search

Power MOSFET Library

☐ Show All ☒ Show Suggested Sync. FET Key: Built-in Parts: User Parts: ☐ Show Only AEC-Q Parts Clear Search Entries

* Enter Parameters Into Green Cells To Add a New Component *

Vin 24 (V) Iout 20 (A) # Parallel FETs 1 pcs. (for MOSFET Loss Calculation) Update Search

All Parts User Parts

Vendor	PartName	V _{ds} (V)	V _{gs} (V)	R _{ds1} (mΩ)	Q _g (nC)	V _{gs2} (V)	R _{ds2} (mΩ)
USER	NEW PART	25	4.5	1	40	10	0.9

Add Part # Suggested Parts: 0 # Parts in Library: 200

Vendor Links

ON Semiconductor VISHAY infineon nexperia ALPHA & OMEGA TOSHIBA Leading Innovation >>>

Add your own Parts

Power Inductor Library

Suggested Inductors (by lowest power loss, AC Loss provided by Vendor API)

INDUCTOR Library

☐ Show All
 ☐ Show Suggested
 ☒ Show Suggested w/ AC Loss Info
 Key: Built-in Parts: User Parts:
 ☐ Show Only AEC-Q Parts

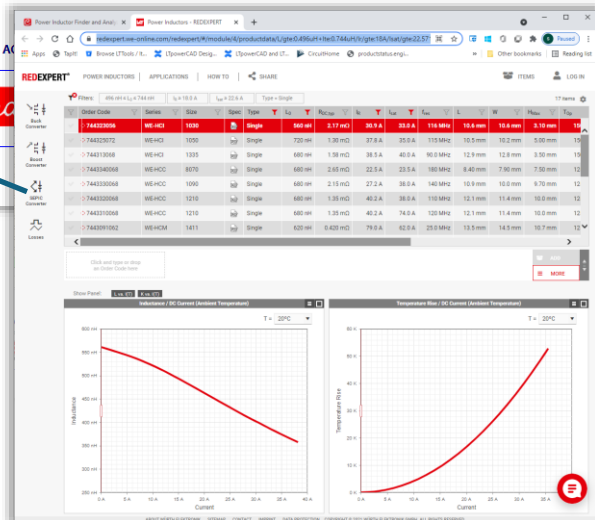
* Loss values calculated at Vin nom. and Iout max.

Vendor	Name	Area(mm ²)	DC Loss(W)	AC Loss(W)	Total Loss(W)	L(μH)	L Tol(%)	DCR(mΩ)	DCR Tol(%)	I Sat(A)	L Dec(%)
COILCRAFT	XAL6030-561ME	41.7	0.688	0.22	0.908	0.56	20	3.01	10	29	22
COILCRAFT	XAL6020-601ME	44.3	1.472	0.197	1.669	0.6	20	6.45	10	25	18.5
COILCRAFT	XAL7070-551ME	54	0.325	0.19	0.515	0.55	20	1.42	10	43	29
COILCRAFT	XAL7070-651ME	54	0.399	0.081	0.48	0.65	20	1.75	10	40	26.5
COILCRAFT	XAL7030-601ME	64	0.685	0.257	0.942	0.6	20	3	10	36	23
COILCRAFT	XAL8080-681ME	73	0.314	0.104	0.418	0.68	20	1.38	10	38	37
COILCRAFT	XAL1030-561ME	123.9	0.572	0.212	0.784	0.56	20	2.5	10	44	32
COILCRAFT	MLC1555-551MI	182.2	0.307	0.21	0.517	0.55	20	1.34	10	35.7	22.3
COILCRAFT	XAL1350-631NE	187.4	0.342	0.169	0.511	0.63	30	1.5	10	74	38
COILCRAFT	SER2012-601ML	358.7	0.329	0.228	0.557	0.6	20	1.44	20	97	35
COILCRAFT	SER2012-681ML	358.7	0.328	0.114	0.442	0.68	20	1.44	20	85	35
COILCRAFT	SER2011-501	392.6	0.276	0.23	0.506	0.5	20	1.2	20	100	40
USER	NEW PART					1	20	1	20	40	30

* So far only Wurth and Coilcraft provide AC



Passes conditions to vendor for extra analysis / comparisons



User Library

INDUCTOR Library

☐ Show All
 ☐ Show Suggested
 ☒ Show Suggested Key: Built-in Parts: User Parts:
 ☐ Show Only AEC-Q Parts

* Loss values calculated at Vin nom. and Iout max. Enter Parameters Into Green Cells To Add a New Component *

Vendor	Name	L(μH)	L Tol(%)	DCR(mΩ)	DCR Tol(%)	I Sat(A)	L Dec(%)	I Heat(°C)
USER	NEW PART	1	20	1	20	40	20	30

Add Part

Suggested Parts: 0

Parts in Library: 14

* So far only Wurth and Coilcraft provide AC loss estimations. Comparing AC loss between vendors may not be accurate due to different estimation methods

Vendor Search Tools



Loop Compensation & Load Transient Tab

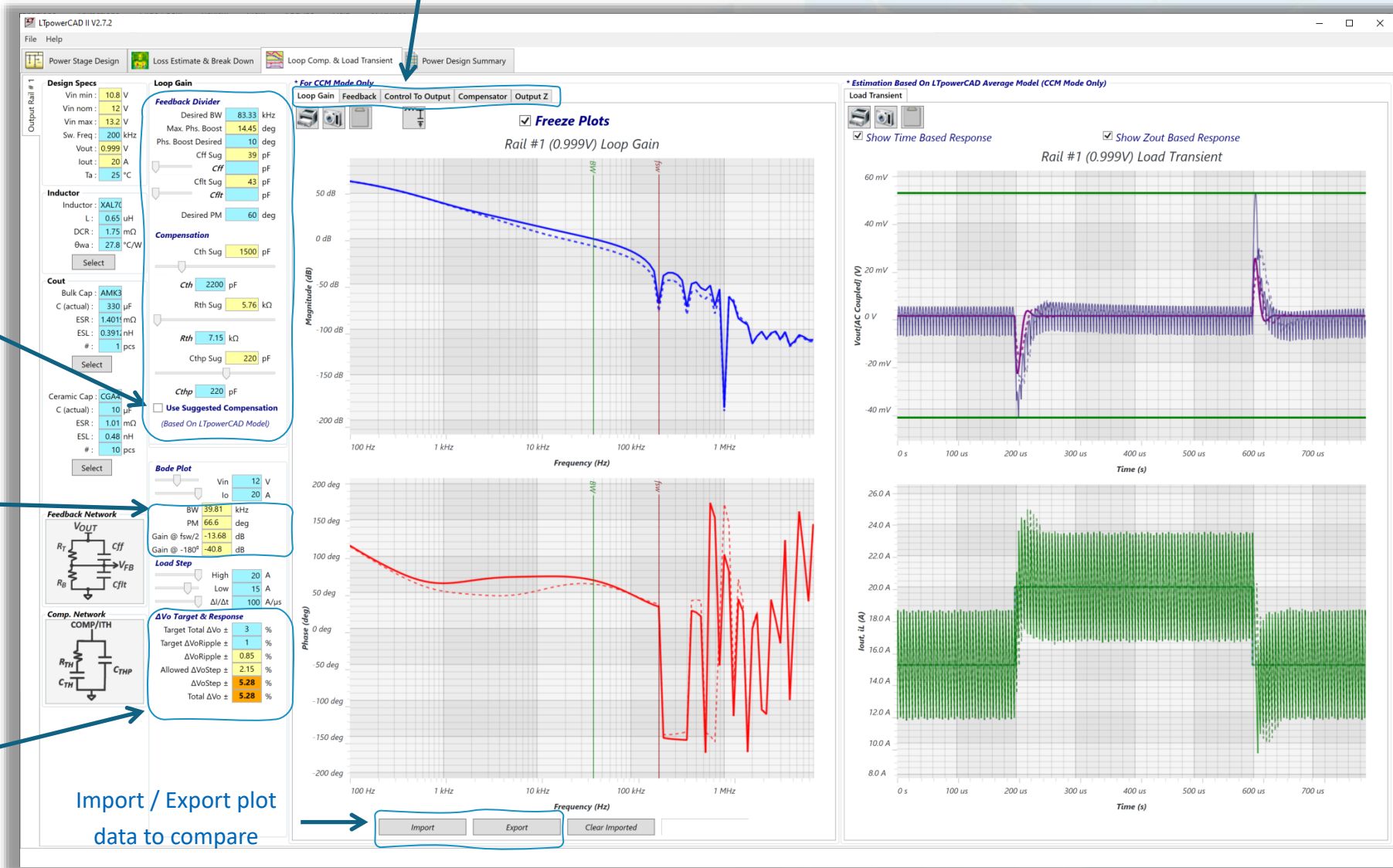
Loop gain, Output Impedance & inner loop plots

Adjust
Compensation
manually or
automatically

Check BW
and stability

Target
transient
performance

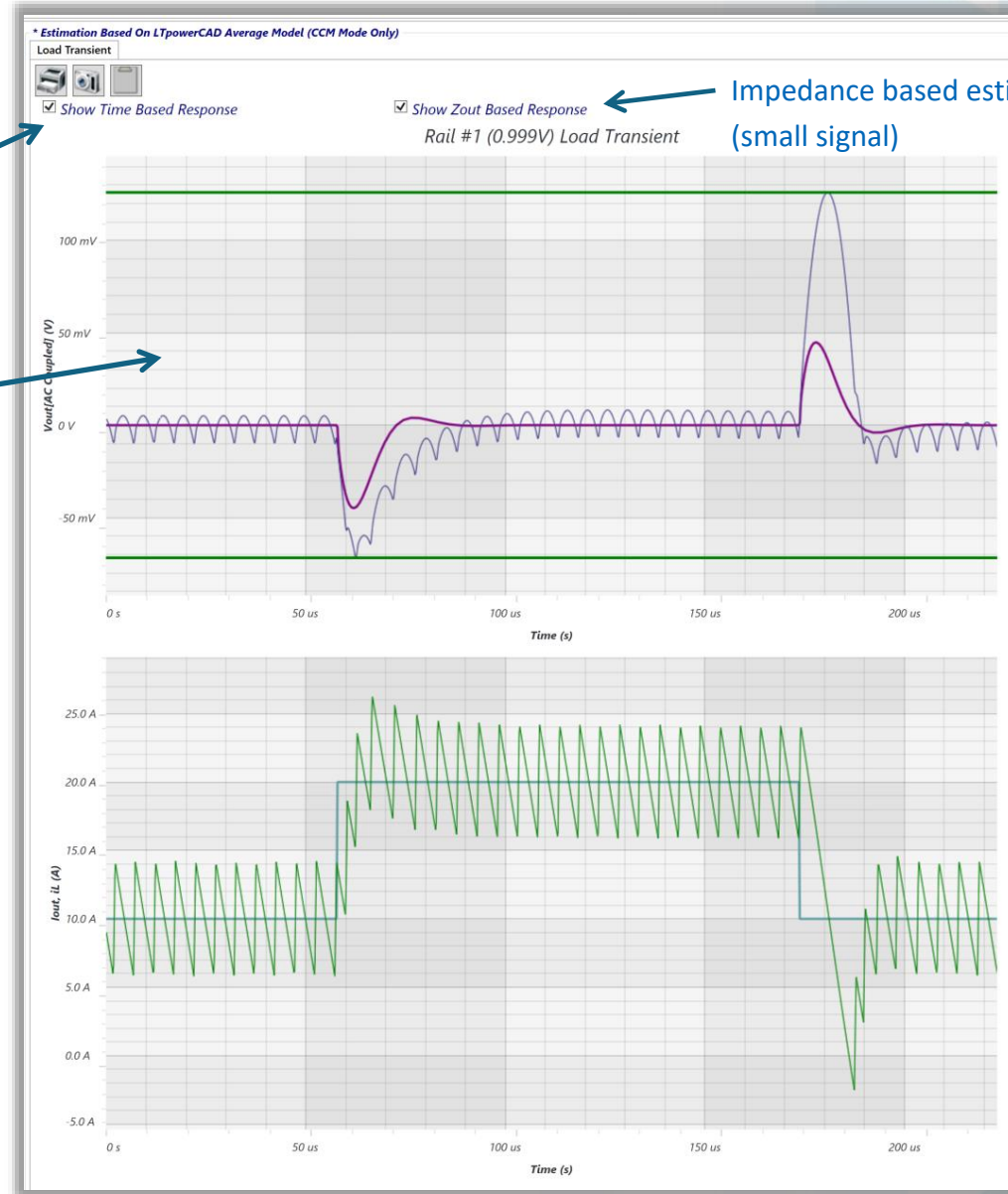
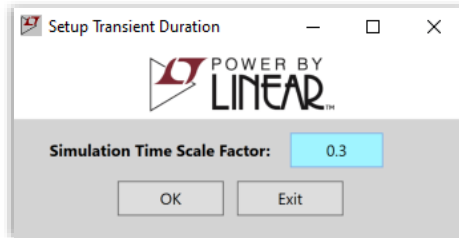
Import / Export plot
data to compare



Load Transient

Time-based estimation
(cycle-by-cycle)

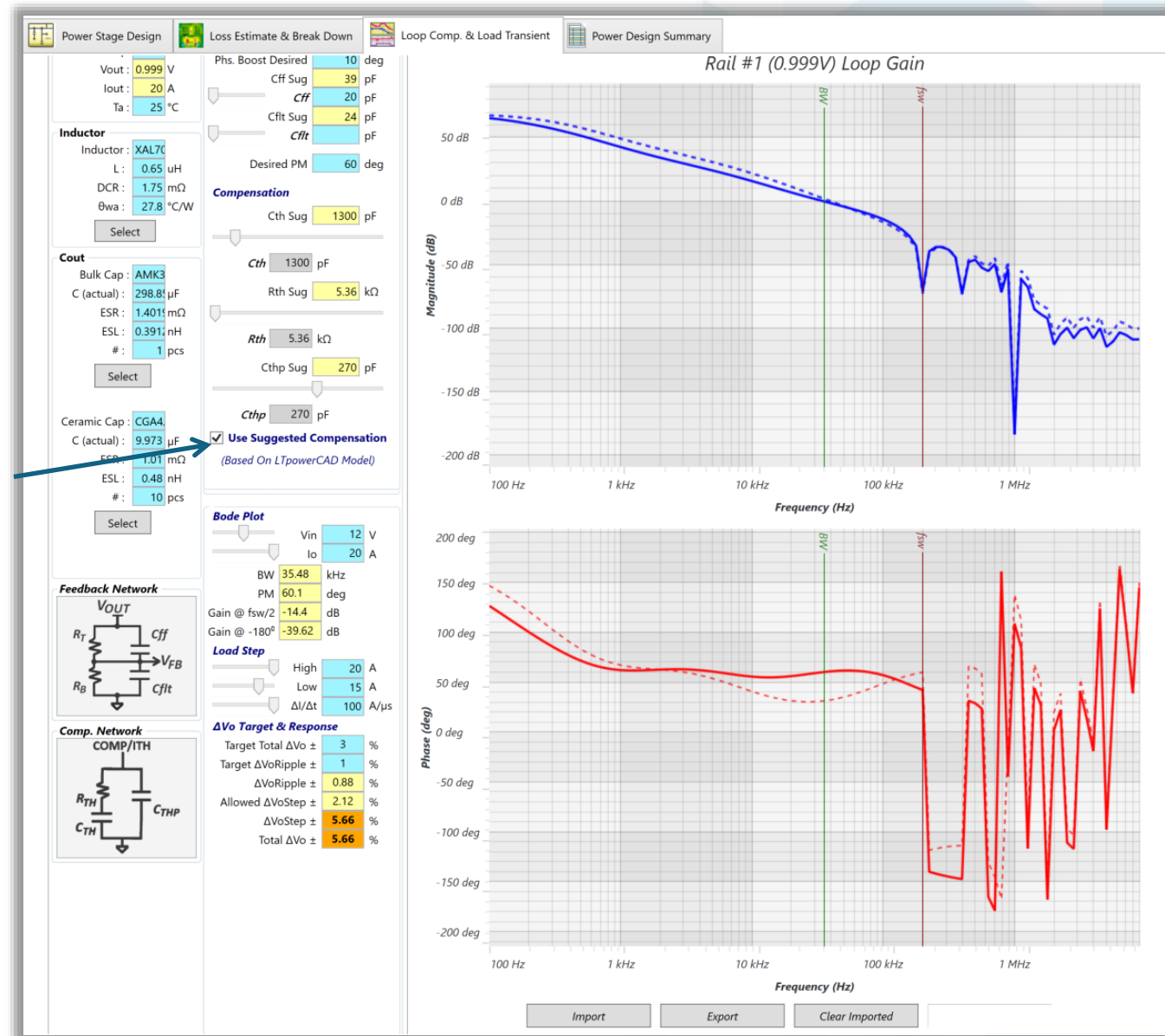
Right click plot to change
load step duration



Impedance based estimation
(small signal)

Automatic Compensation

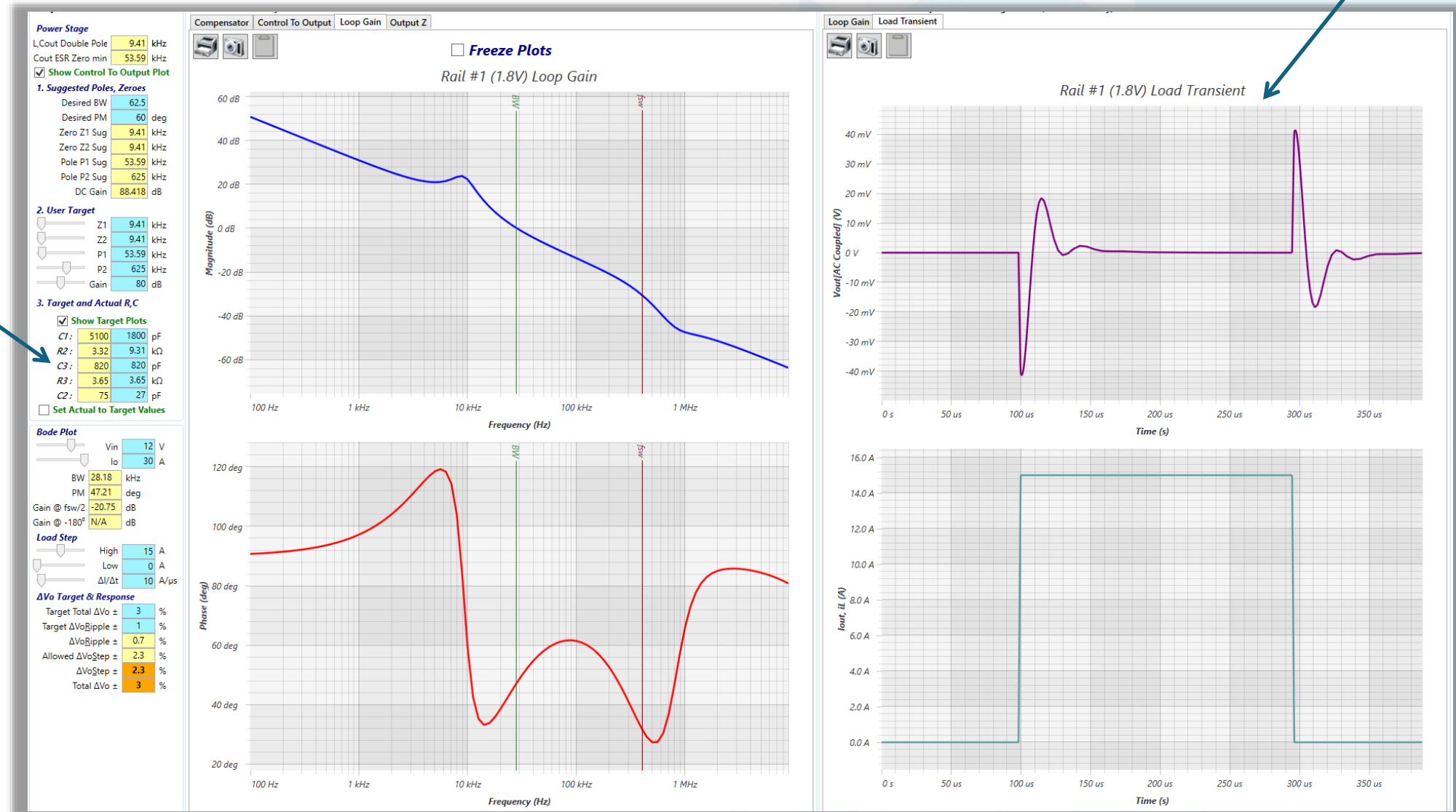
Meet entered target
BW & Phase Margin



Voltage Mode

Only Impedance based estimation available

Adjust / Set
Compensation
Poles / Zeroes



Capacitor Library

Actual capacitance at DC Bias
(derated)

Total cap. Area for desired capacitance

CAPACITOR Library

☐ Show All ☒ Show Suggested

Key: Built-in Parts: User Parts:

☐ Show Only AEC-Q Parts

All Parts **User Parts**

Vendor	Name	Cnom(μF)	C @ 50% Vmax(μF)	C @ Vmax (μF)	C @ Vbias nom. (μF)	#Pcs. to Equal Cnom	Area Each (mm2)	Tot. Area to Equal Cnom (mm2)	ESR(mΩ)	ESL(nH)	In
TDK	CGA4J1X7R0J106M125AC	10	8.892	6.624	9.7	1.03	2.5	2.6	1.01	0.48	6.51
TDK	C2012X7R0J106K125AB	10	8.892	6.624	9.7	1.03	2.5	2.6	1.01	0.48	6.51
KEMET	C000805C106K7PAC	10	9.5	8	9.7	1.03	2.5	2.6	1.091201052	1.23	8.8838
KEMET	C000805C106K9PAC	10	8.759687	5.079365079	9.7	1.03	2.5	2.6	1.091201052	1.23	8.8838
KEMET	C0603C106K7PAC	10	8.72	5	9.2	1.09	1.28	1.4	1.109647762	0.83	10.786
KEMET	C0603C106K9PAC	10	6.349206	3.174603175	9.1	1.1	1.28	1.4	1.109647762	0.83	10.786
TDK	CGA4J1X8L0J106K125AC	10	9.043	6.656	9.8	1.02	2.5	2.6	2.53	0.48	4.1
TDK	C2012X8L0J106K125AC	10	9.043	6.656	9.8	1.02	2.5	2.6	2.53	0.48	4.1
TAIYO YUDEN	JMK212AB7106KG-T	10	8	4.7	9.5	1.05	2.5	2.6	2.815785884	0.5953304	3.09
TAIYO YUDEN	JMK212AB7106MG-T	10	8	4.7	9.5	1.05	2.5	2.6	2.815785884	0.5953304	3.09
MURATA	GRM31CR60J106KA01	10	9.69	8.54	9.9	1.01	5.12	5.2	2.9	0.462	4.6
MURATA	GRM31CR70J106KA01	10	9.59	8.42	9.9	1.01	5.12	5.2	2.9	0.462	4.6
AVX	06036D106MAT2A	10	5.5	3	8.9	1.12	1.28	1.4	3	0.39	3.5
TAIYO YUDEN	JMK316AB7106KLHT	10	9.7	7	9.9	1.01	5.12	5.2	3.120260021	0.6774848	2.86
TAIYO YUDEN	JMK316AB7106MLHT	10	9.7	7	9.9	1.01	5.12	5.2	3.120260021	0.6774848	2.86
TAIYO YUDEN	JMF316AB7106KLHT	10	9.7	7	9.9	1.01	5.12	5.2	3.120260021	0.6774848	2.86
TAIYO YUDEN	JMF316AB7106MLHT	10	9.7	7	9.9	1.01	5.12	5.2	3.120260021	0.6774848	2.86
TAIYO YUDEN	JMK212ABJ106KG8T	10	7.9	4.7	9.5	1.05	2.5	2.6	3.128771009	0.5460856	2.25
TAIYO YUDEN	JMK212ABJ106MG8T	10	7.9	4.7	9.5	1.05	2.5	2.6	3.128771009	0.5460856	2.25
TAIYO YUDEN	JMK212ABJ106KGHT	10	7.9	4.7	9.5	1.05	2.5	2.6	3.128771009	0.5460856	2.25
TAIYO YUDEN	JMK212ABJ106MGHT	10	7.9	4.7	9.5	1.05	2.5	2.6	3.128771009	0.5460856	2.25
TDK	CGA3E1X7T0G106M080AC	10	8.245	5.218	8.9	1.12	1.28	1.4	3.22	0.42	2.9

Suggested Parts : 91 # Parts in Library : 93

Vendor Links

Panasonic **muRata** **KEMET** **NIPPON CHEMI-CON** **TAIYO YUDEN** **TDK** **AVX** **SUNCON**

User Library

CAPACITOR Library

☐ Show All ☒ Show Suggested

Key: Built-in Parts: User Parts: Show Only AEC-Q Parts

* Enter Parameters Into Green Cells To Add a New Component *

All Parts **User Parts**

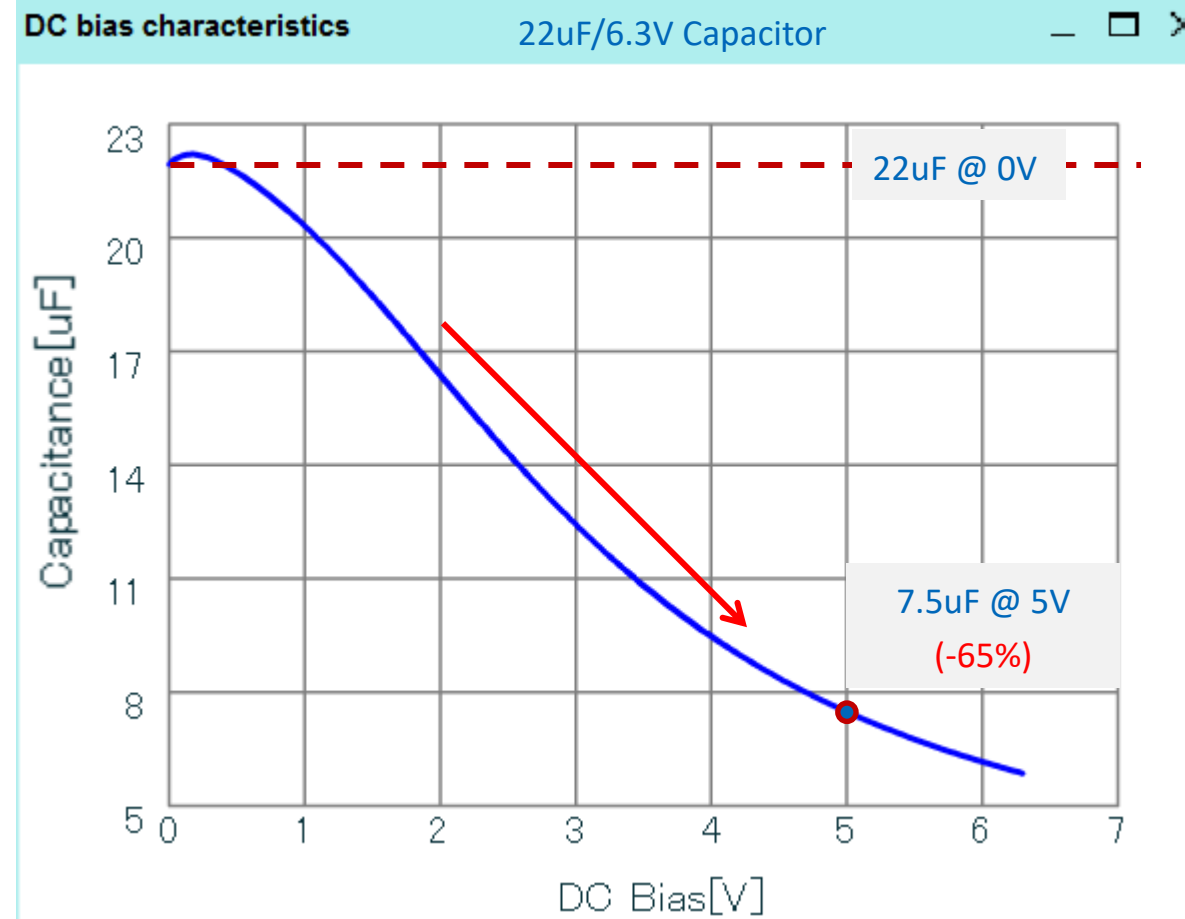
Vendor	Name	Cnom(μF)	C @ 50% Vmax(μF)	C @ Vmax (μF)	ESR(mΩ)	ESL(nH)
USER	NEW PART	100	80	60	5	0.5

Suggested Parts : 0 # Parts in Library : 93

Vendor Links

Panasonic **muRata** **KEMET** **NIPPON CHEMI-CON** **TAIYO YUDEN** **TDK** **AVX** **SUNCON**

Capacitor Derating



MLCC typically has significant capacitance reduction @ DC bias voltage
LTpowerCAD estimates the actual capacitance

Component Estimation Settings

LTpowerCAD II V2.7.2

File Help

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

Key
User Entry:
Calculated:

Part Specs
Max Vin: 38 V
Min Vin: 4.5 V
Max Vout: 5.5 V
Sugg. Max Iout: 1000 A
Min Sw. Freq.: 200 kHz
Max Sw. Freq.: 2000 kHz

Design Specs
Vin min: 10.8 V
Vin nom: 12 V
Vin max: 13.2 V
Switching Freq.: 200 kHz
Ta: 25 °C

Output Rail 1
Vout1: 0.999 V
Iout1: 20 A

C3833 - Fast Accurate Step-Down DC/DC Controller with Differential Output Sensing

Project Name: 12VIN to 1V/20A Supply
Date: 09/10/2021
Designer: Yue Zheng

Vin(norm) 12V VIN

CinB Bulk CIN MFR: NIPPON CHEI Part # APSG160ELL1 C Nom 150 µF C 150 µF ESR 20 mΩ # Cap 1

CinC Ceramic CIN MFR: KEMET Part # C1210C226K4 C Nom 22 µF C 11.55 µF ESR 1 mΩ # Cap 2

VOUT

Feedback
Rt1 60.4 kΩ
Cff1 20 pF
Rb1 60.4 kΩ
Cff1 20 pF
Rt1 60.4 kΩ
Cff1 20 pF
Rb1 60.4 kΩ
Cff1 20 pF

U1

TG SW BG

Vosns+ Vosns-

ITH

Cth1 Rth1 Cthp1

Duty & Ton
Duty 8.325 %
Max 378 ns
Min 4537.5 ns

Sw. Freq.
Fsw 200 kHz
tfreq 205 kHz
rfreq OPEN kHz
Fsw 200 kHz

Compensation
Cth1 620 pF
Rth1 5.36 kΩ
Cthp1 270 pF

Sense+ Sense-
Change to Rsense Sensing

Rt Rfreq

GND

Component Estimation Settings

POWER BY LINEAR

MLCCs MOSFETs Inductors Resistors

Estimate Actual Capacitance at DC Bias: ☒

OK Exit

ases 1
ase 20 A

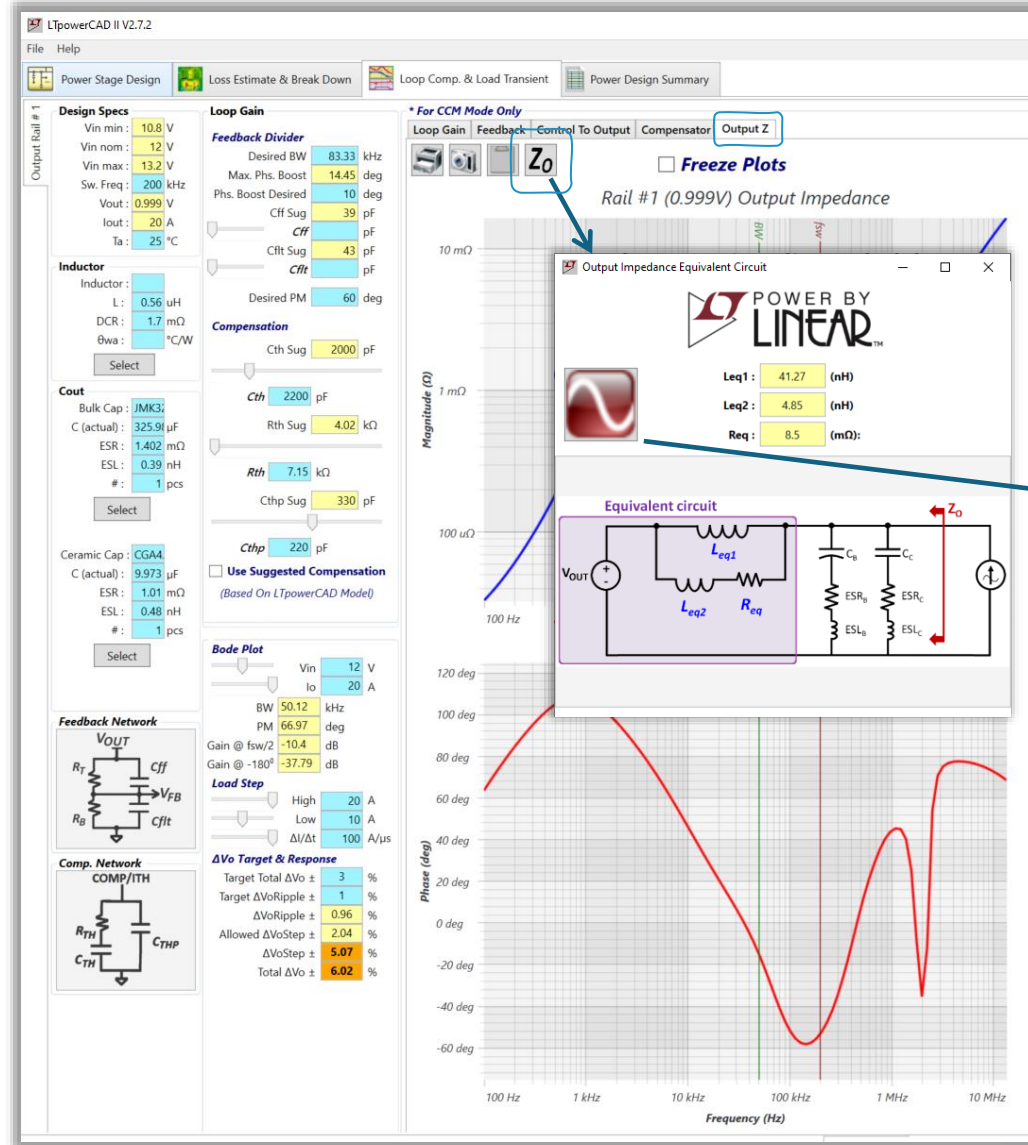
Voltage
0.999 V
14.136 mV
0.707 %

VOUT

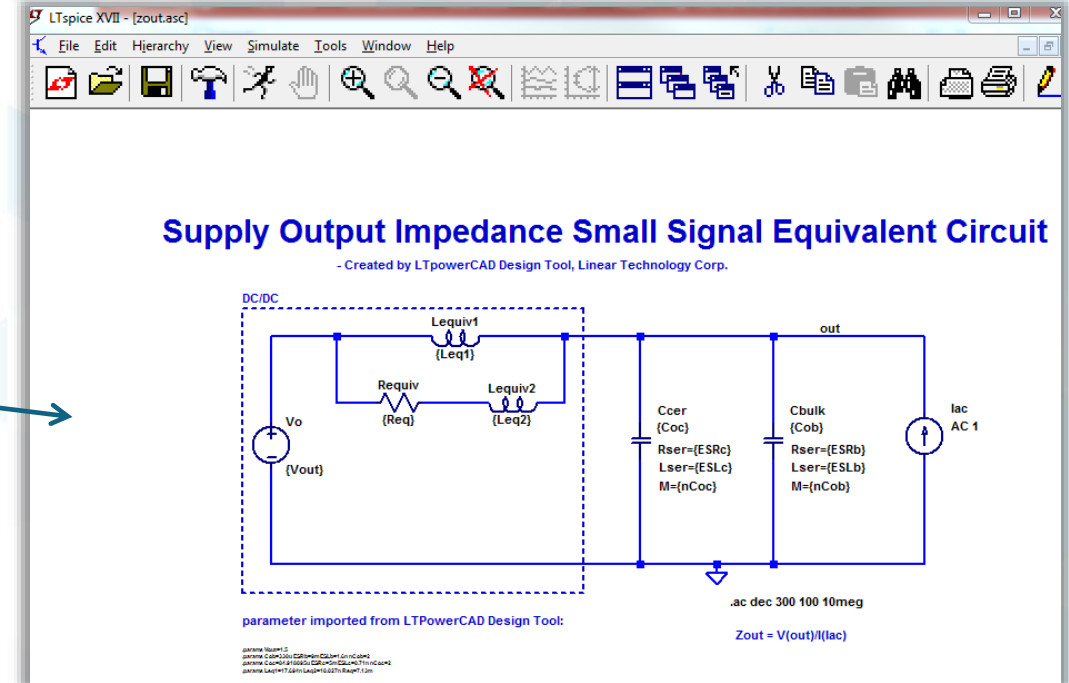
Bulk Cout
MFR: TAIYO YUDEN
Part# AMK325AC63
Nom 330 µF
C 298.85 µF
ESR 1.402 mΩ
ESL 0.39 nH
f Cap 1

- Pick full component part# from the capacitor library.
- Enable capacitance derating with DC bias. (for MLCC).
- If a component is missing from the standard library, user can enter it manually based on vendor's datasheet.

Output Impedance Model

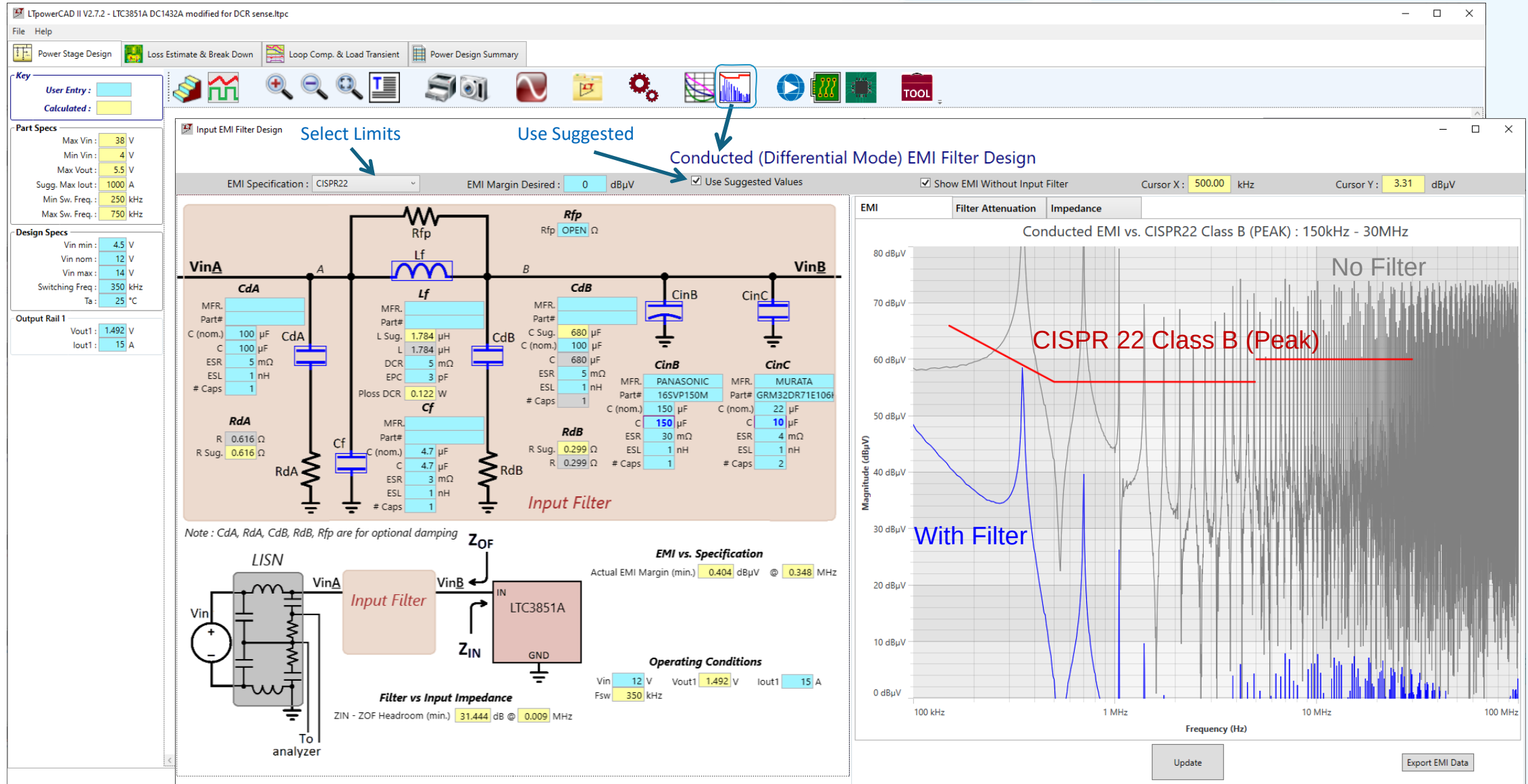


Export Closed Model to Ltspice – Analyze & modify with external filter or parasitics



* Useful for PDN analysis or circuit modification beyond LTpowerCAD estimations

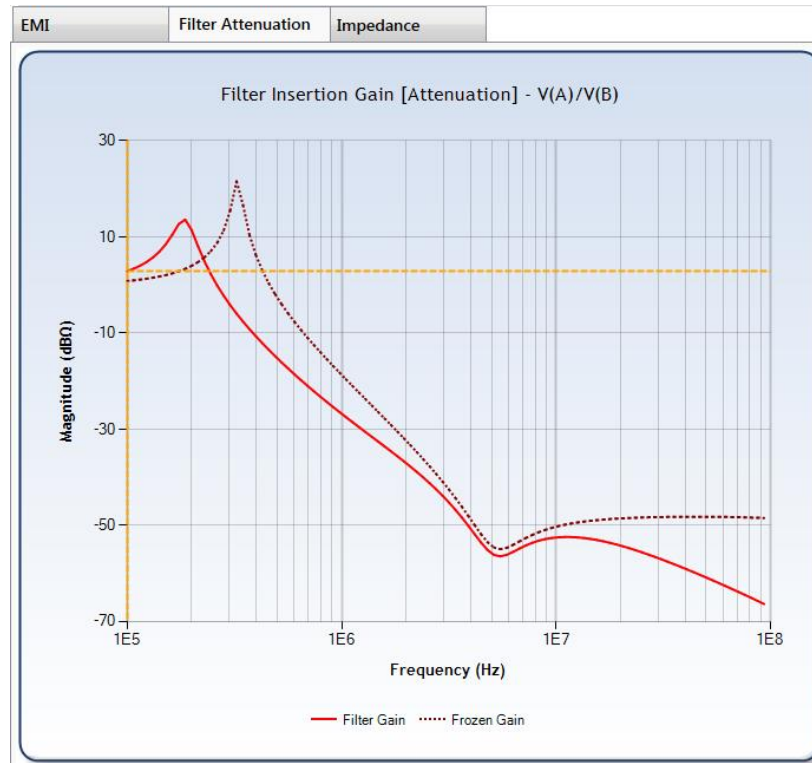
Conducted (DM) EMI Filter Design



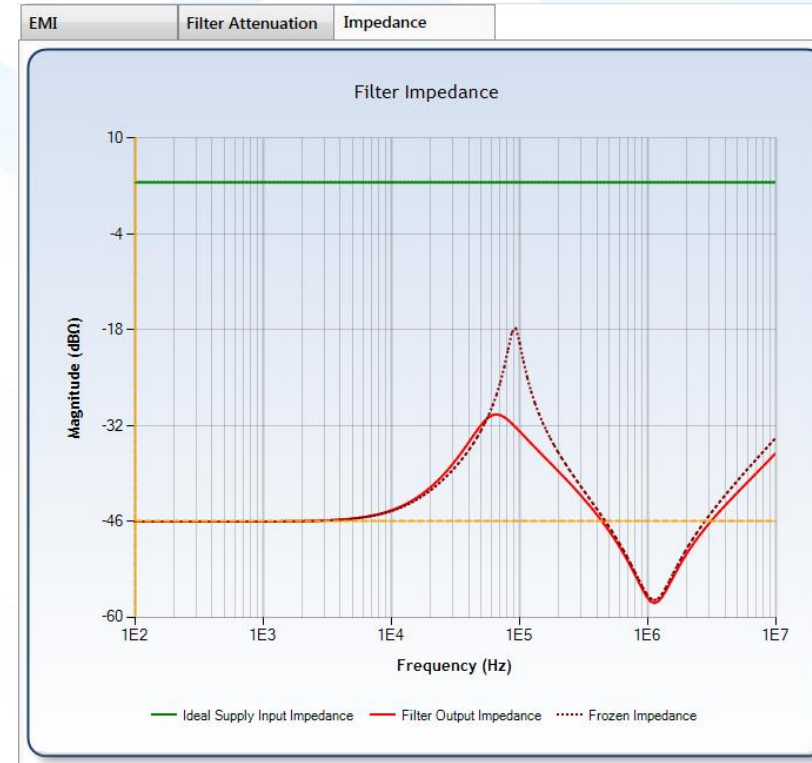
First few orders of harmonics determine the filter size.

EMI Filter Plots

Filter Insertion Gain

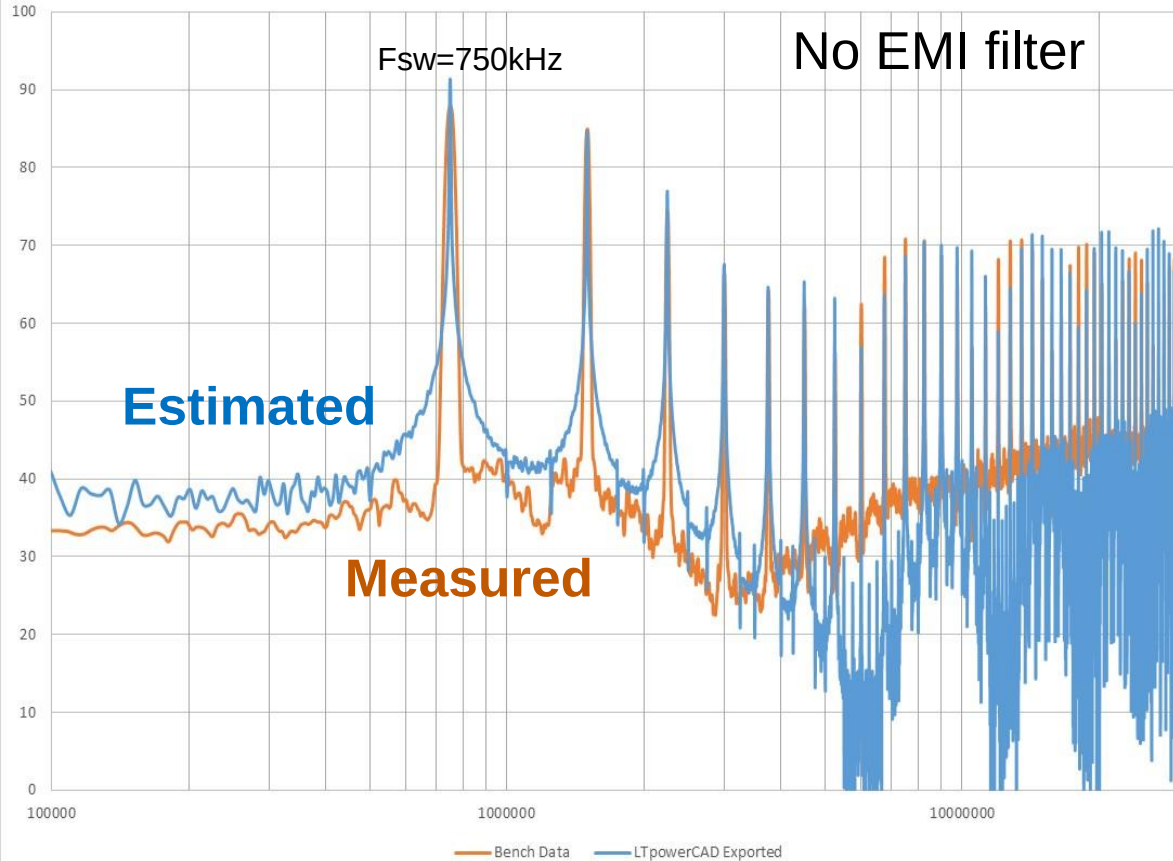


Filter Impedance vs (Ideal) Input Impedance (stability check)

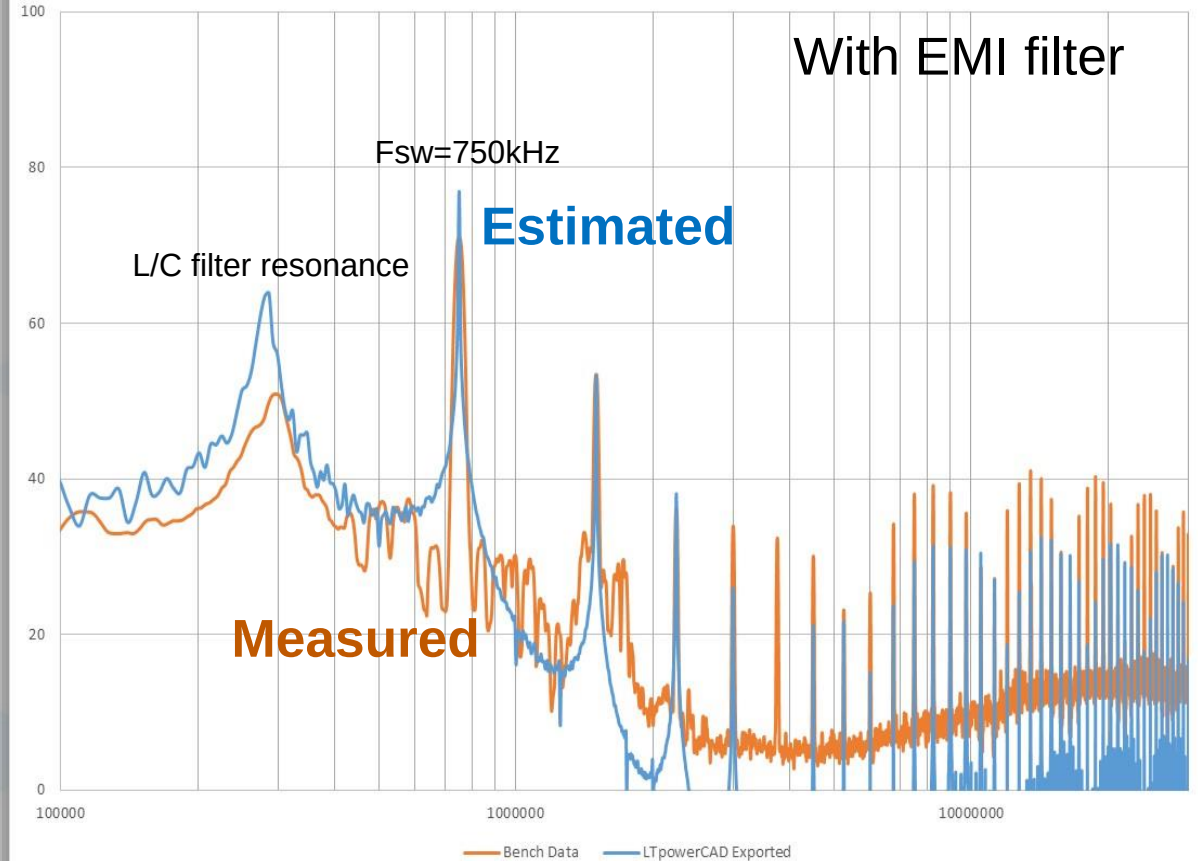


DM EMI Noise – Estimated vs. Measured

LTpowerCAD EMI Estimation vs. Bench [100k - 30MHz]
No EMI Filter

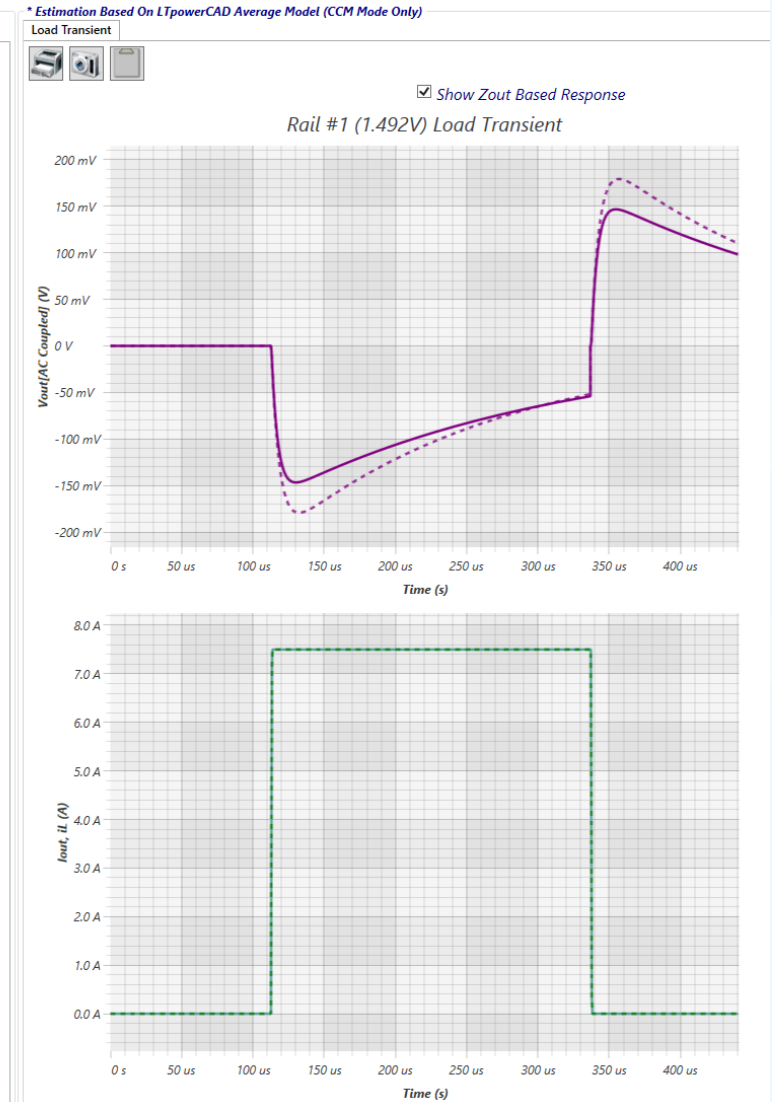
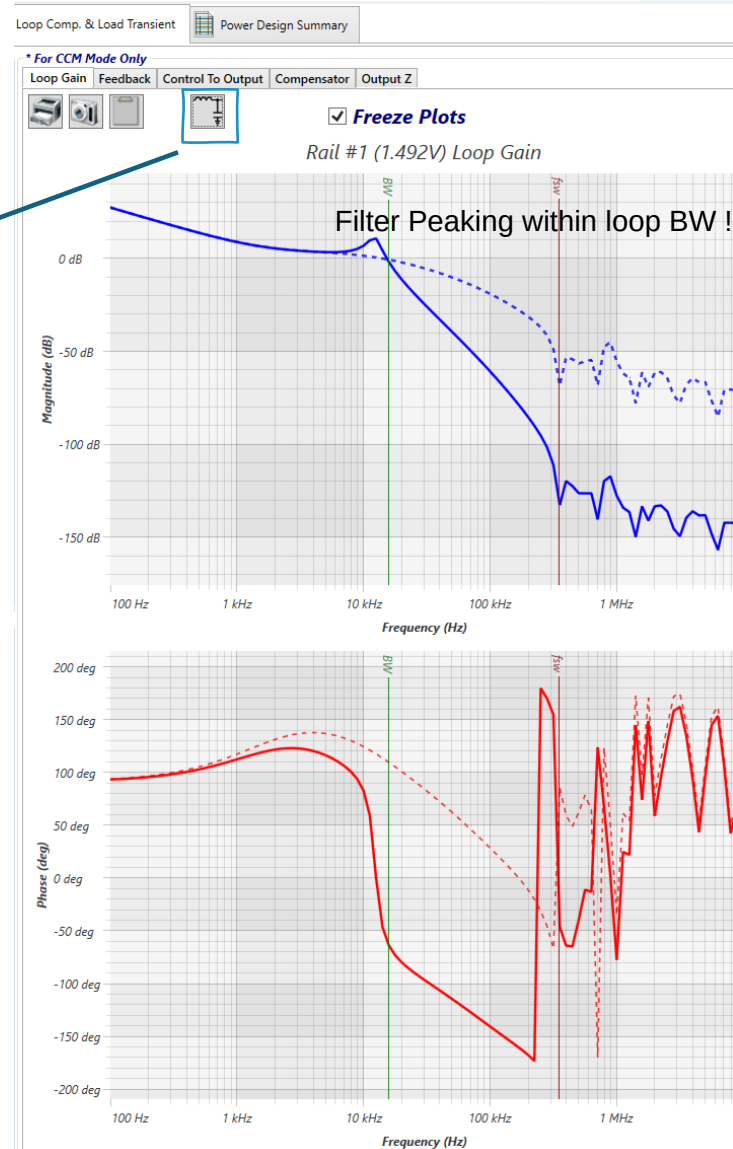
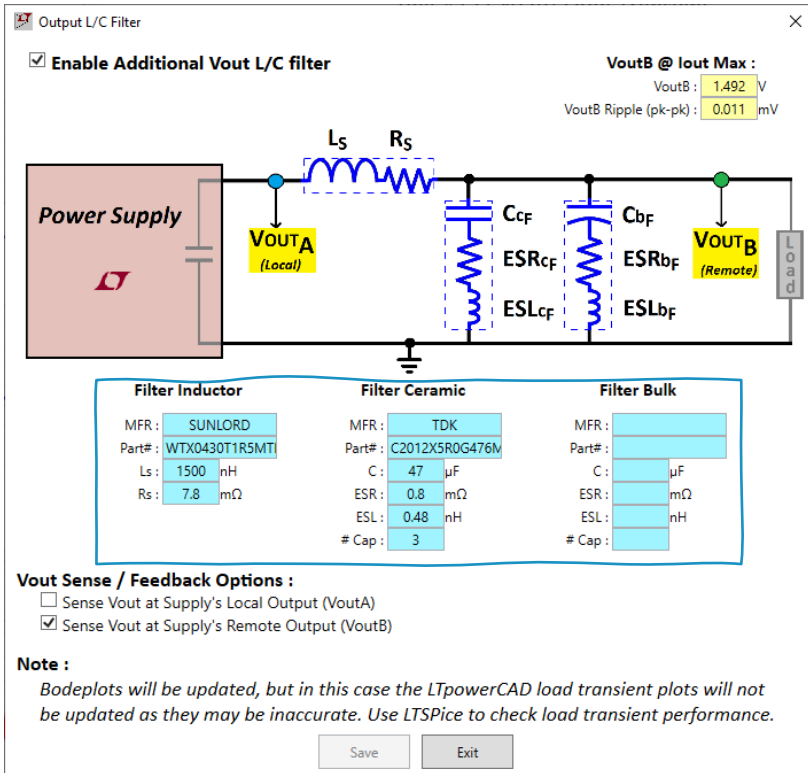


LTpowerCAD EMI Estimation vs. Bench [100k - 30MHz]
With EMI Filter



* LTC3851 single phase buck demo board (12Vin, 1.5Vout, 15A, 750kHz)

Output Filter



Power Stage Design Summary Tab

Estimate & Break Down

Loop Comp. & Load Transient

Power Design Summary

Print Summary Report

LTC3833 Supply Design Summary

POWER BY LINEAR

Project Info:

12VIN to 1V/20A Supply, 09/10/2021, Yue Zheng

Design Specifications

Steady State :

Rail #	Vin Min.	Vin Nom.	Vin Max.	Fsw	Vo	ΔVo	ΔVo%	Io Max	ΔILp-p	ΔIL%	iLpk	Duty	Ton min.	Toff min.
1	10.8 V	12 V	13.2 V	200 kHz	0.999 V	14.14 mV	0.7 %	20 A	7.04 A	35 %	23.52 A	8.33 %	378 ns	4538 ns

Efficiency and Loop :

Rail #	Vo	Iomax	Eff.@Iomax	PLoss@Iomax	Loop BW	Loop PM	Step Low	Step High	Step Slew	ΔVo@Step	ΔVo@Step %
1	0.999 V	20 A	90.93 %	1.992 W	39.81 kHz	66.83 deg	15 A	20 A	100 A/μs	56.608728119	+/-5.7 %

Recommendations and Warnings :

Message

Rail #1 Inductor Peak Current at Actual Current Limit at Vin nom. Exceeds Inductor's Saturation Current Rating (40A).

Power Components

Power Components Bill Of Materials :

Export BOM

Ref. Des.	Value	Quantity	Description	Mfr. Name	Mfr. Part #	Pkg. (Imperial)	L(mm)	W(mm)	H(mm)	User Note
U1		1	IC	LINEAR TECH	LTC3833		4	3	0.8	
Lo1	0.65μH	1	IND	COILCRAFT	XAL7070-651MEB		7.5	7.2	7	
Cinb1	150μF	1	CAP	NIPPON CHEM	APSG160ELL151MF05S		6.3	6.3	5	
Cinc1 Cinc2	22μF	2	CAP	KEMET	C1210C226K4PAC	1210	3.2	2.5	2.1	
Cob1	330μF	1	CAP	TAIYO YUDEN	AMK325AC6337MM-PE	1210	3.2	2.5	2.8	
Coc1 Coc2 Coc3 Coc4 Coc5 Coc6 Co	10μF	10	CAP	TDK	CGA4J1X7R0J106M125AC	0805	2	1.25	1.25	
Mtop1	25V	1	FET	INFINEON	BSC026NE2LS5	PG-TDSON-8	6.35	5.35	1.1	
Mbot1	30V	1	FET	TOSHIBA	TPWR6003PL		5.2	6.3	0.83	

Power Components Footprint :

# Components	18
Max. Height	7 mm
Component Clearance (d)	1 mm
* Power Components Area (Excludes ICs)	397.8 mm^2 0.617 in^2
* Power Components Area (Includes ICs)	422.6 mm^2 0.655 in^2

Component Clearance (d)

Part # 1

Part # 2

d

d/2

d/2

Length

Width

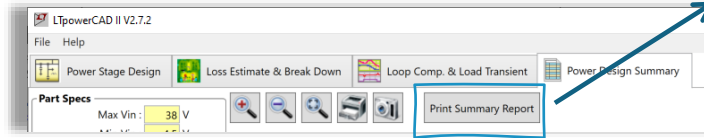
Design Performance
Overview

Design Warnings

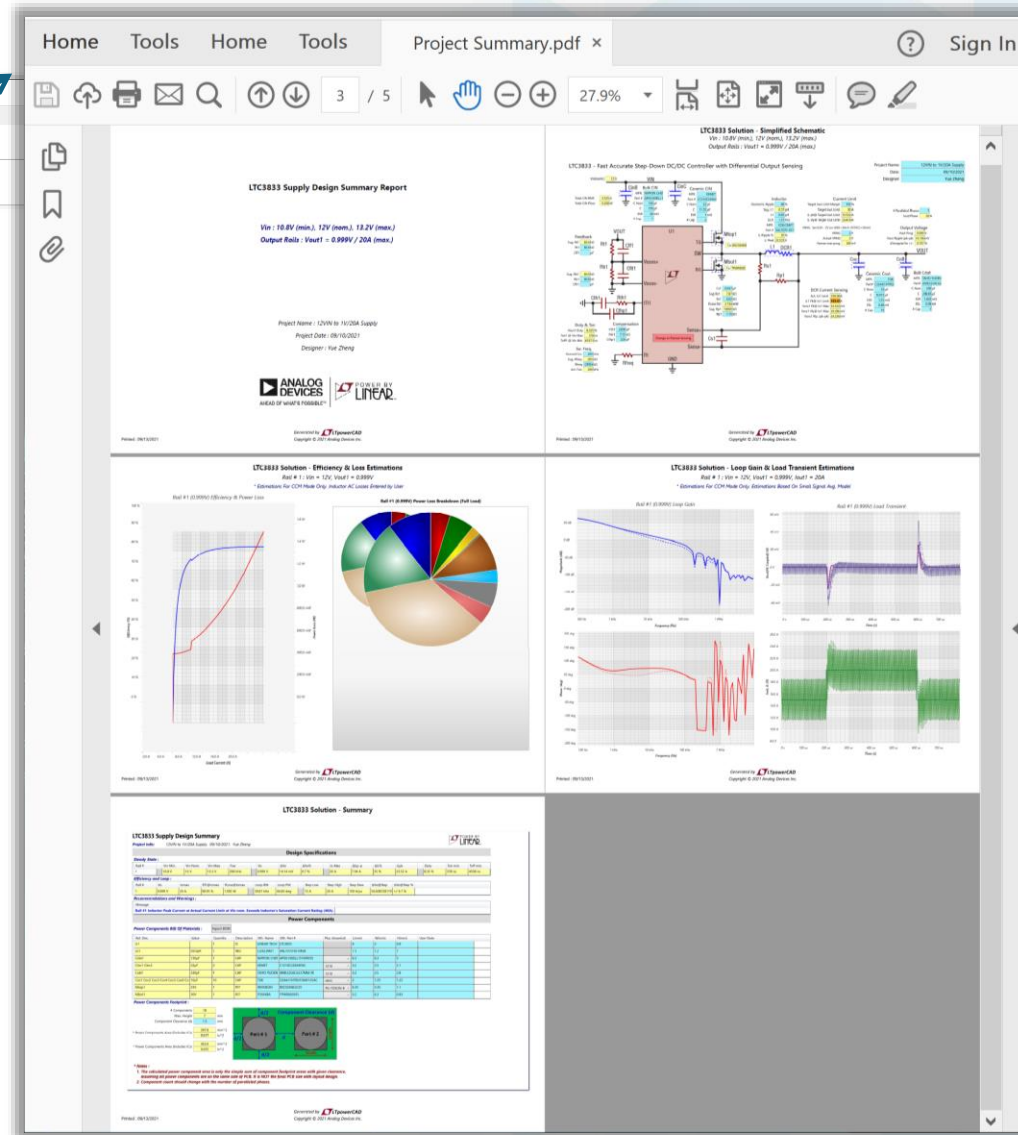
Power Stage
Components BOM

Solution Area Estimation
(1st order, single sided PCB)

Print Summary Report



Print report showing Design Summary
Schematic, Performances, BOM, Size



Design Shortcut – Solution Library

Key
User Entry :
Calculated :

Part Specs
Max Vin : 38 V
Min Vin : 4 V
Max Vout : 5.5 V
Sugg. Max Iout : 1000 A
Min Sw. Freq. : 250 kHz
Max Sw. Freq. : 750 kHz

Design Specs
Vin min : 4.5 V
Vin nom : 12 V
Vin max : 14 V
Switching Freq : 350 kHz
Ta : 25 °C

Output Rail 1
Vout1 : 1.492 V
Iout1 : 15 A

Solutions Library

Built-In Solutions

Part Name	Solution Name	Vin Min. (V)	Vin Nom. (V)	Vin Max. (V)	Output Voltages (V)	Output Currents (A)	Solution Description	File Name
LTC3851A-1	DC1432 A-B	4.5	12	14	Vout1 = 1.5V	Iout1 = 15A	1.5V/15A with Rsense	LTC3851A-1 DC1432 A-B.itpc
LTC3851A-1	DC1432A-B Modified DCR	4.5	12	14	Vout1 = 1.5V	Iout1 = 15A	1.5V/15A Design with DCR Sense	LTC3851A-1 DC1432A-B Modified DCR.itpc
LTC3851A	DC1171A-A	4.5	12	14	Vout1 = 1.5V	Iout1 = 15A	1.5V/15A with Rsense	LTC3851A DC1171A-A.itpc
LTC3851A	DC1171A-B Modified	4.5	12	14	Vout1 = 1.5V	Iout1 = 15A	1.5V/15A DCR sense	LTC3851A DC1171A-B Modified.itpc
LTC3851A	DC1432A-A Rsense	4.5	12	14	Vout1 = 1.5V	Iout1 = 15A	1.5V/15A with Rsense	LTC3851A DC1432A-A Rsense.itpc
LTC3851A	Ref Design 12Vin to 1V 20A	10.8	12	13.2	Vout1 = 1V	Iout1 = 20A	1V/20A with DCR Sense	LTC3851A Ref Design 12Vin to 1V 20A.itpc
LTC3851A	Ref Design 12Vin to 3.3V 20A	10.8	12	13.2	Vout1 = 3.3V	Iout1 = 20A	3.3V/20A DCR Sense	LTC3851A Ref Design 12Vin to 3.3V 20A.itpc
LTC3851A	Ref Design 12Vin to 5V 20A	10.8	12	13.2	Vout1 = 5V	Iout1 = 20A	5V/20A DCR Sense	LTC3851A Ref Design 12Vin to 5V 20A.itpc
LTC3851A	Ref Design 5-26Vin to 3.3V 6A	5	12	26	Vout1 = 3.3V	Iout1 = 6A	Small size, DCR sense	LTC3851A Ref Design 5-26Vin to 3.3V 6A.itpc
LTC3851A	DC1432A modified for DCR sense	4.5	12	14	Vout1 = 1.5V	Iout1 = 15A	1.5V/15A DCR Sense	LTC3851A DC1432A modified for DCR sense.itpc

User's Solutions

Part Name	Solution Name	Vin [min] (V)	Vin [nom] (V)	Vin [max] (V)	Rail Voltage(s) (V)	Output Currents(s) (A)	Description	File Name
LTC3851A	Test Solution Name 1	4.5	12	14	Vout1 = 1.5V	Iout1 = 15A	Test Solution Description 1	LTC3851A_Test_Solution_Name_1.itpc

Add This Project As A New Solution

New Solution Name :

New Solution Description :

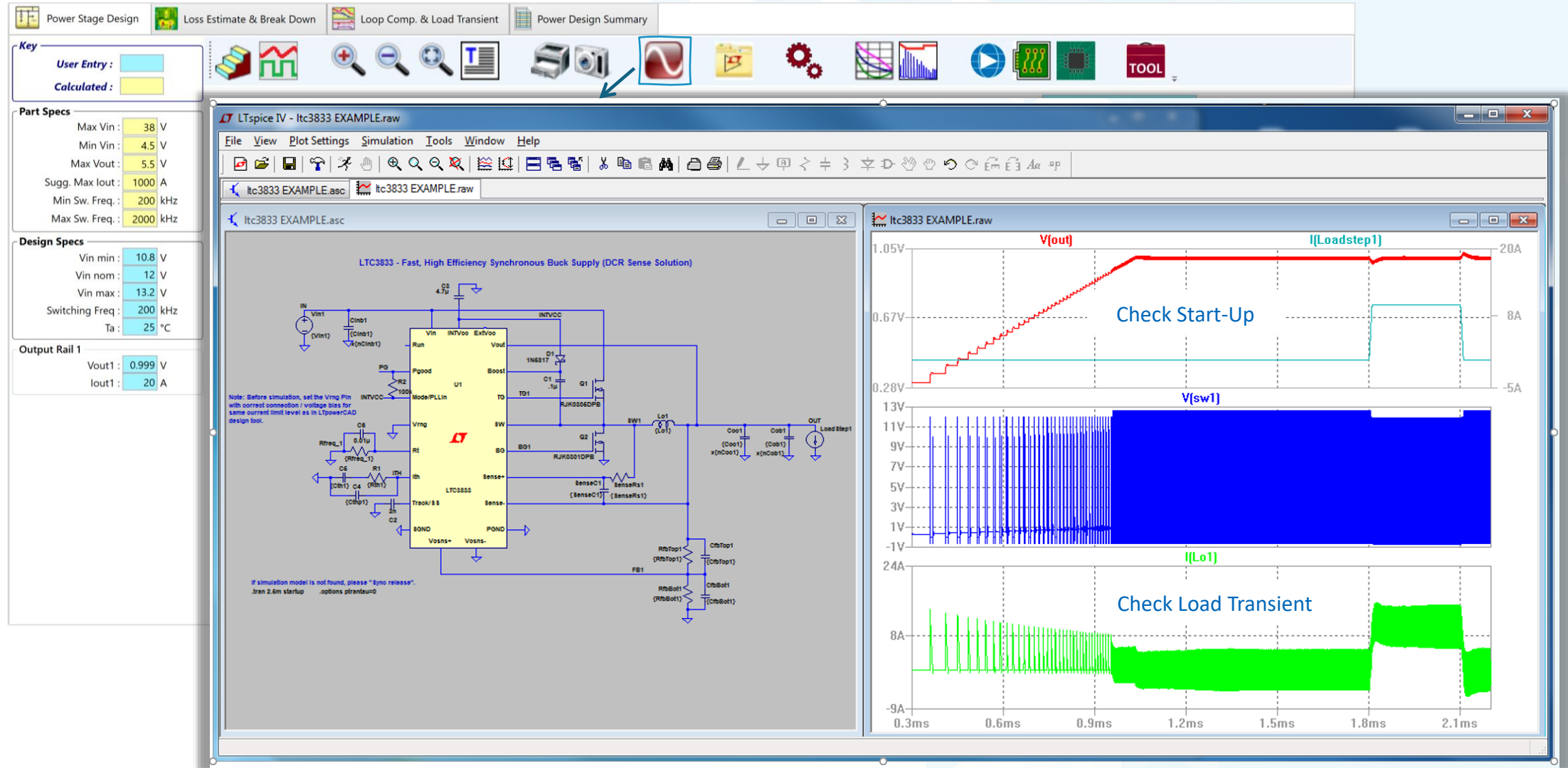
☐ Bench Verified Designer Name :

☐ ADI Internal Only

Save New Solution Import Solution Overwrite Selected Solution Cancel / Exit

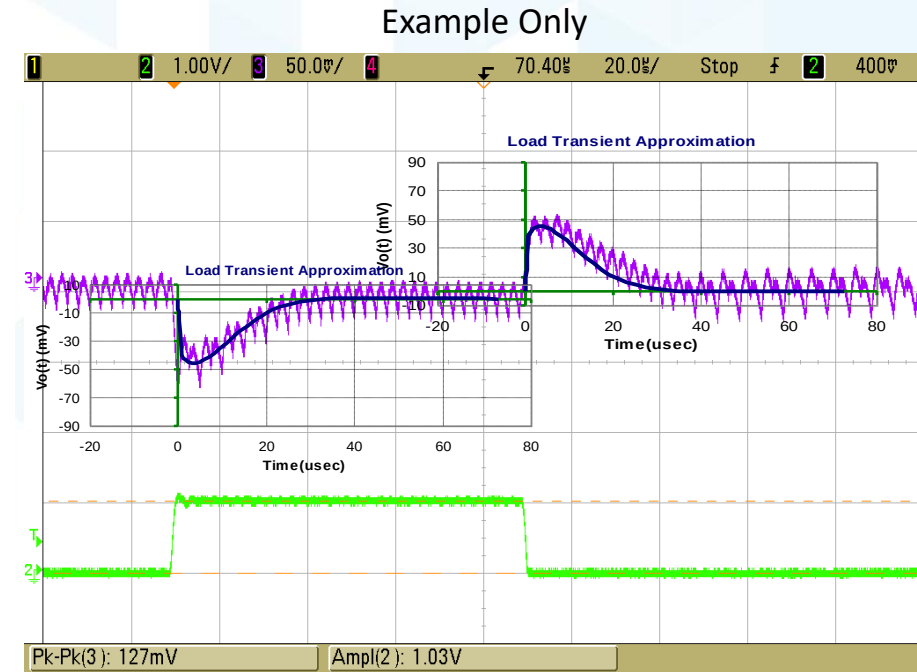
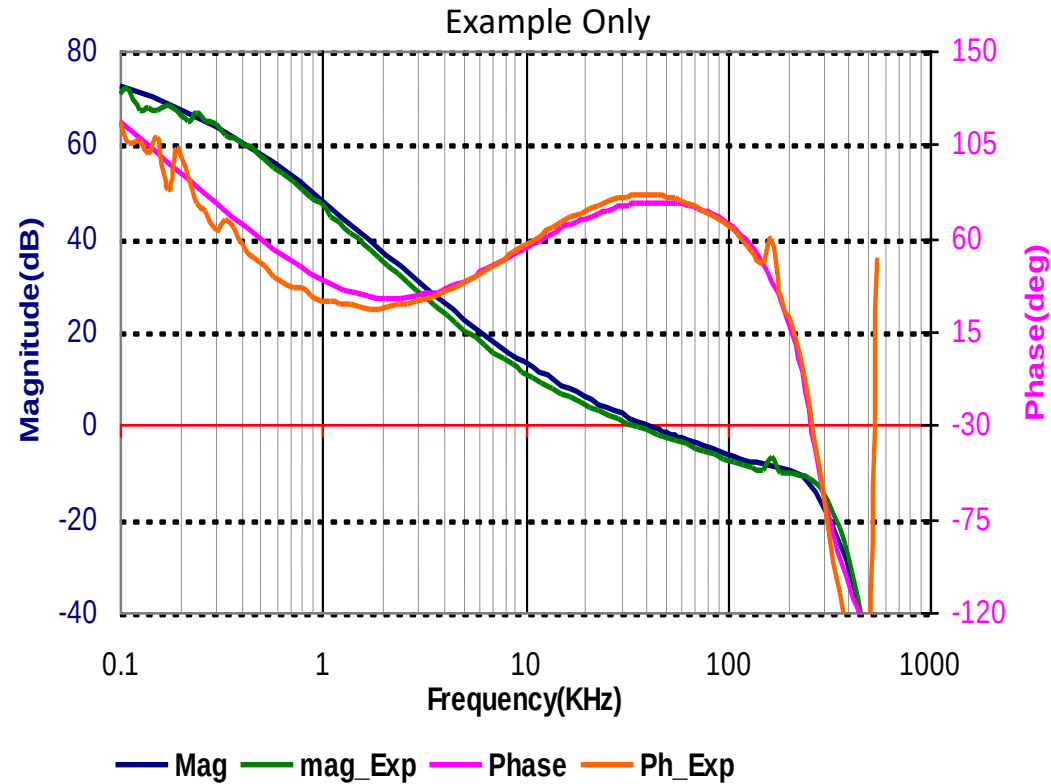
* Leverage existing designs / modify for a quick solution

Export to LTspice for Simulation



Design Tools are all Bench Verified

The small signal model of every part in LTpowerCAD has been verified against LTC standard demo board bench results



* It remains the user's responsibility to verify their estimated performance against their own bench prototype's performance

Appendix



Aug. 2021

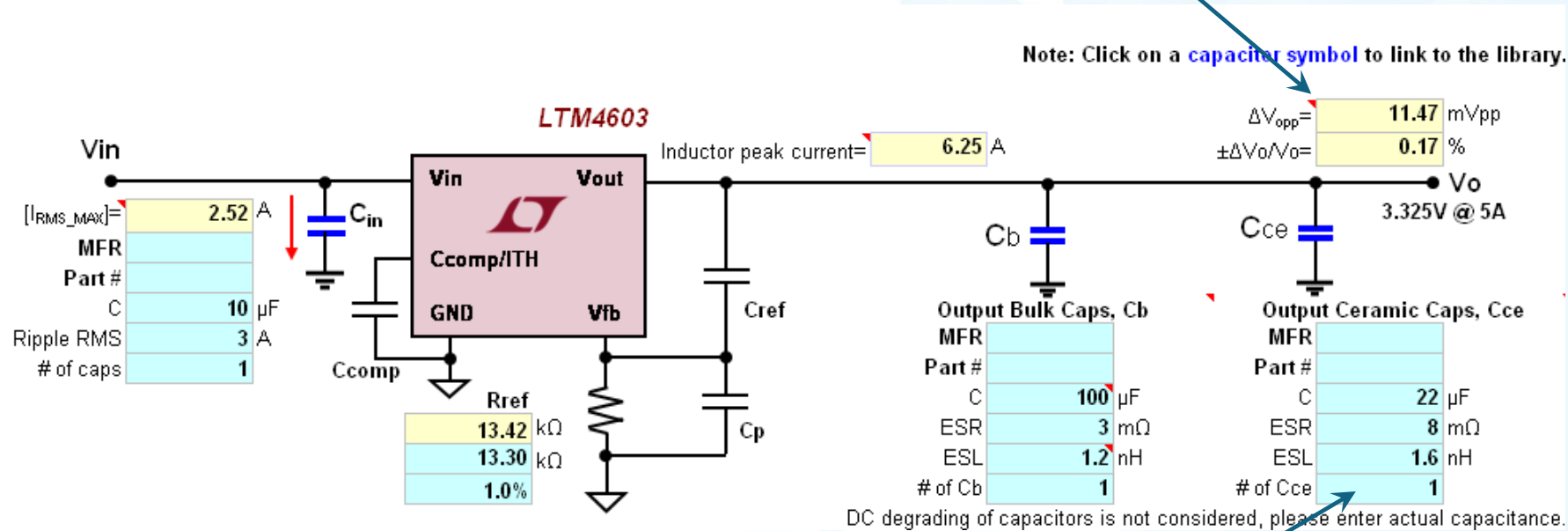
Legacy **Excel-Based** Design Tools



Power Components Selection

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

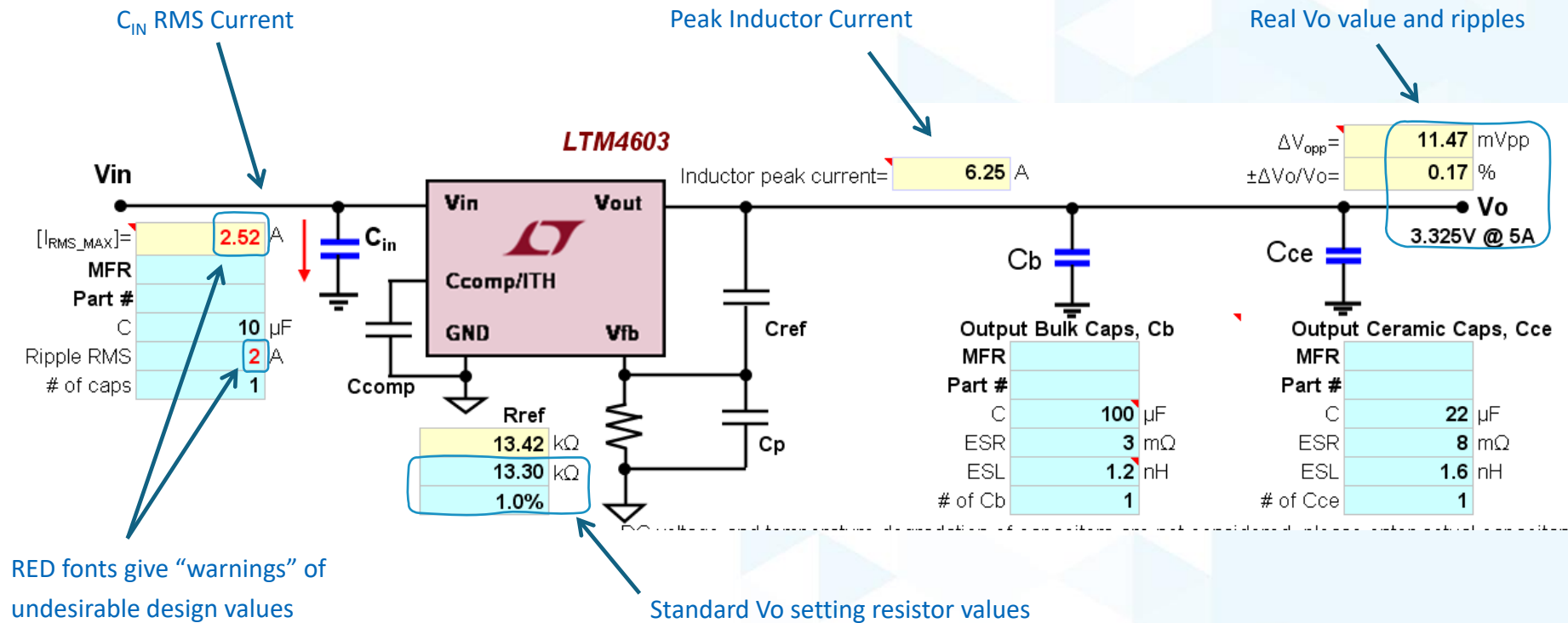
Values in yellow cells are calculated / recommended by design tool.



DC degrading of capacitors is not considered, please enter actual capacitance.

Values in blue cells are selected/ entered by user.

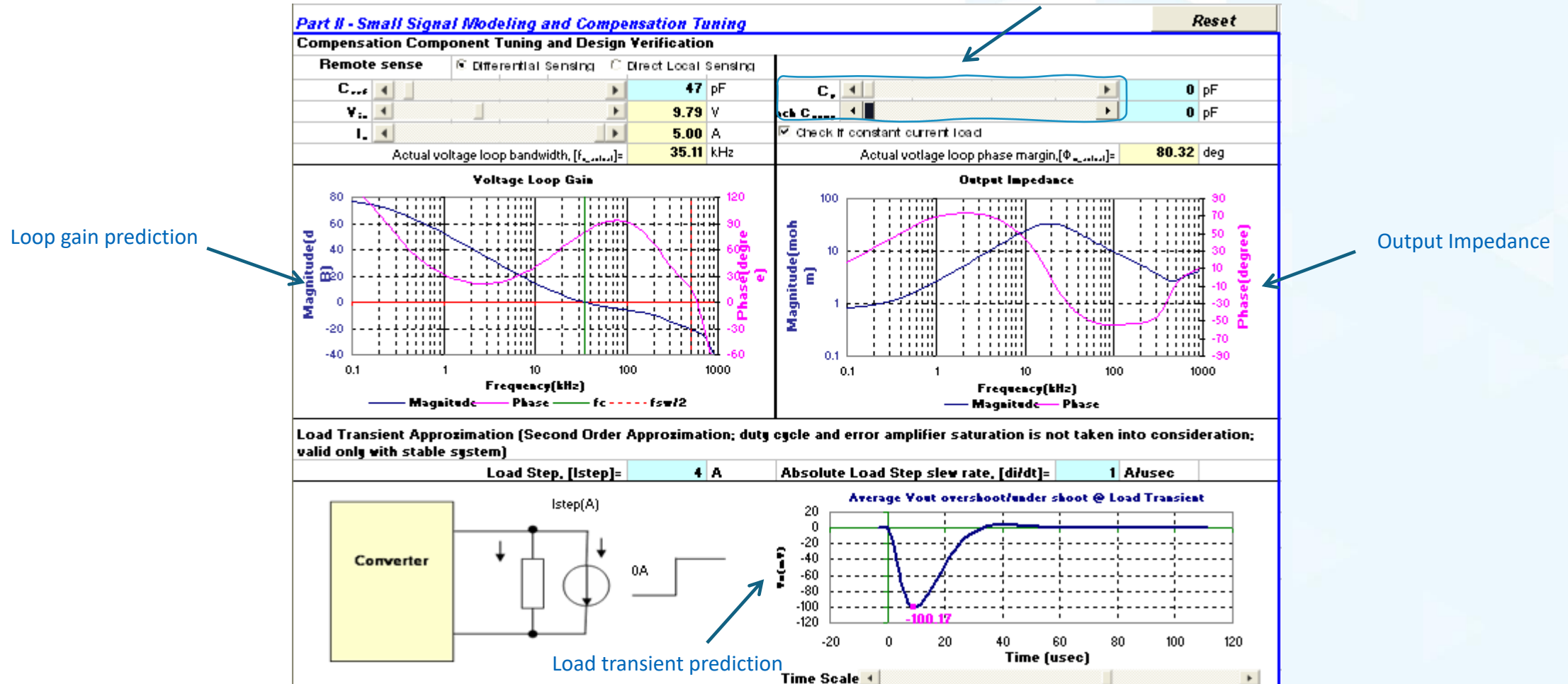
Power Stage Performances



Control Loop Optimization

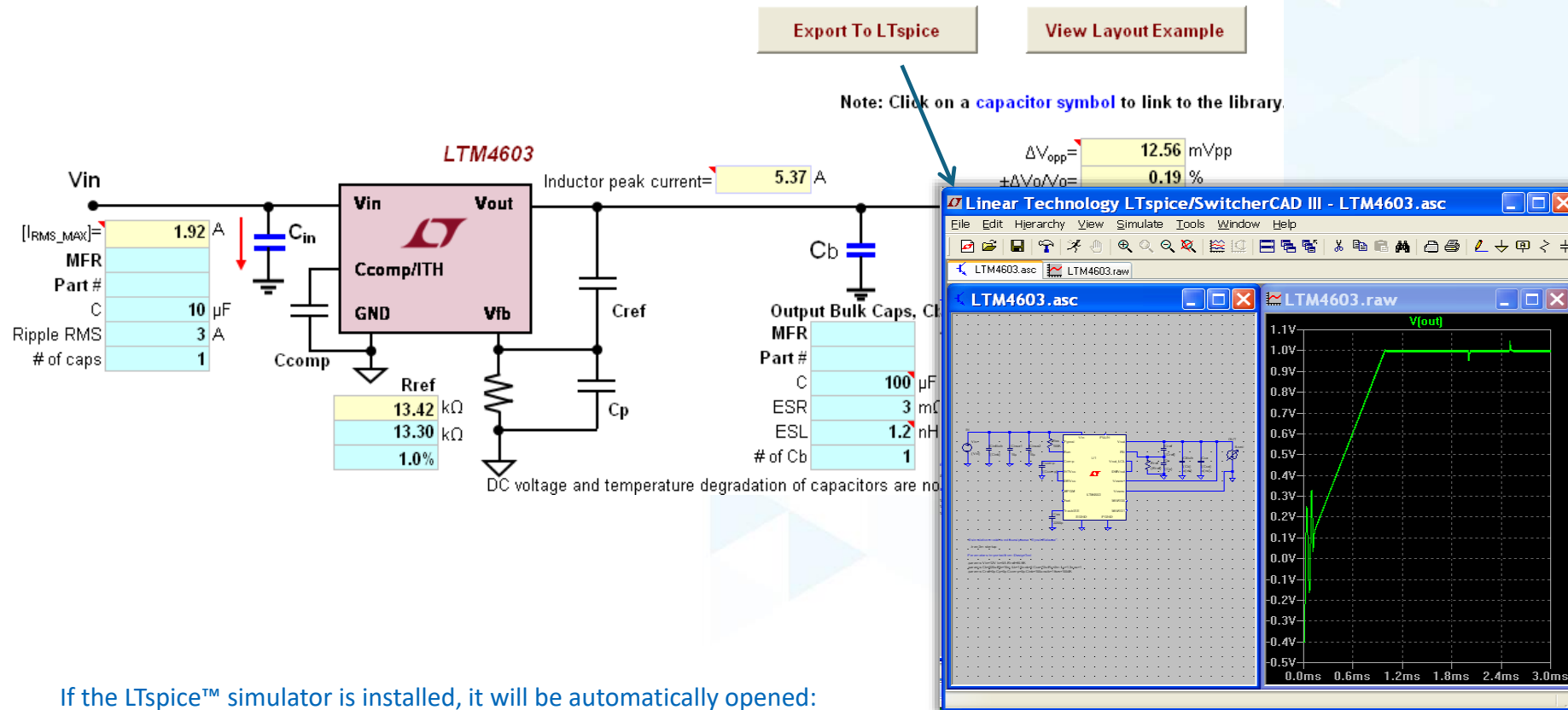
In the design spreadsheet, control loop design can be fine tuned:

Sliding bar for compensation adjustment.



Export for LTspice™ Simulation

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



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

Link to download free LTSpice™ simulator:

<https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html>

Design Tool Development Team
Power Products, Analog Devices Corp.

LTpowerCAD@analog.com



Aug. 2021