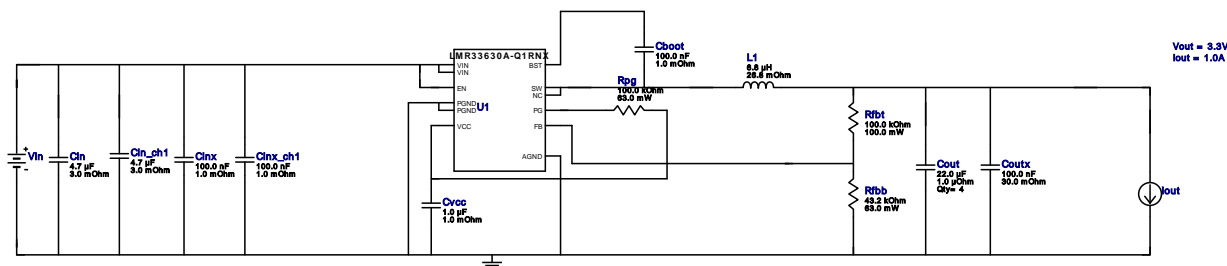


VinMin = 6.0V
 VinMax = 18.0V
 Vout = 3.3V
 Iout = 1.0A

Device = LMR33630AQRNXRQ1
 Topology = Buck
 Created = 2023-02-09 05:50:51.864
 BOM Cost = NA
 BOM Count = 16
 Total Pd = 0.3W

WEBENCH® Design Report

Design : 8462 LMR33630AQRNXRQ1
 LMR33630AQRNXRQ1 6V-18V to 3.30V @ 1A



Design Alerts

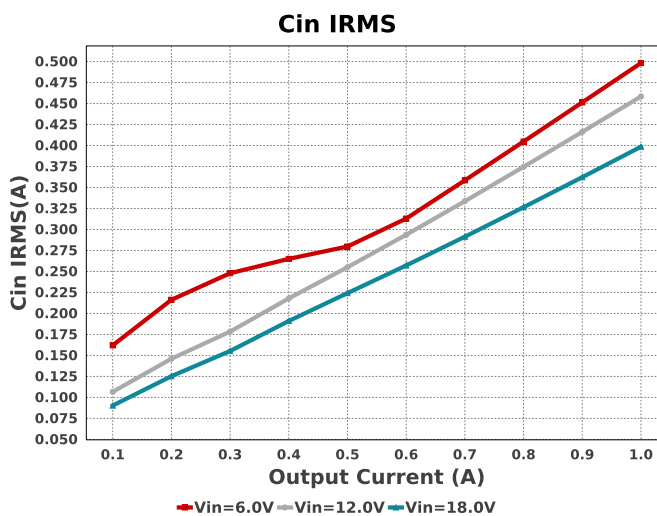
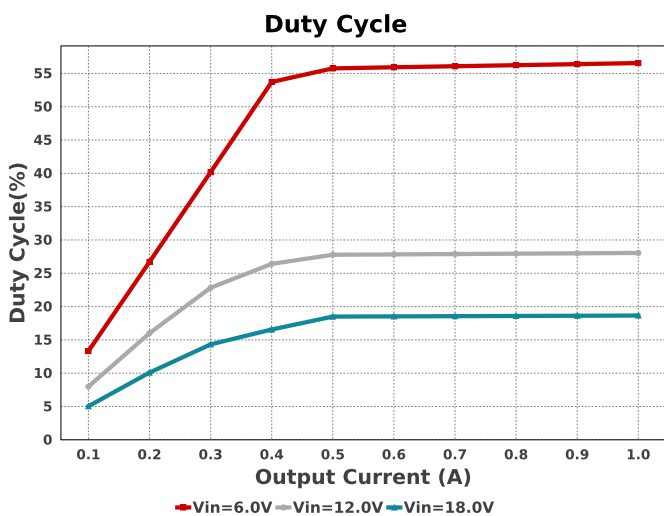
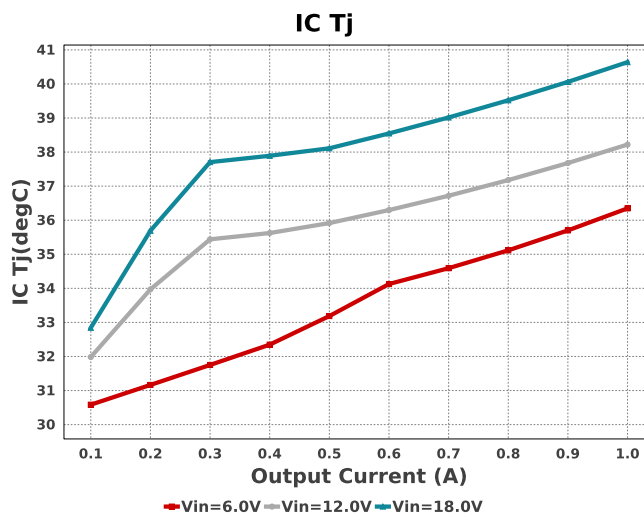
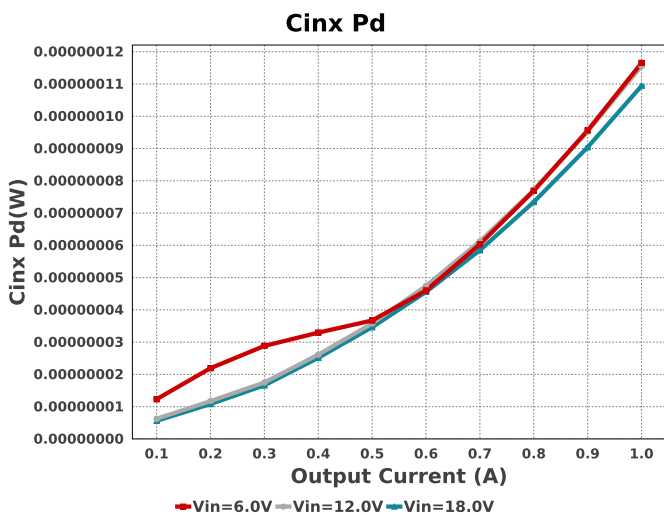
Component Selection Information

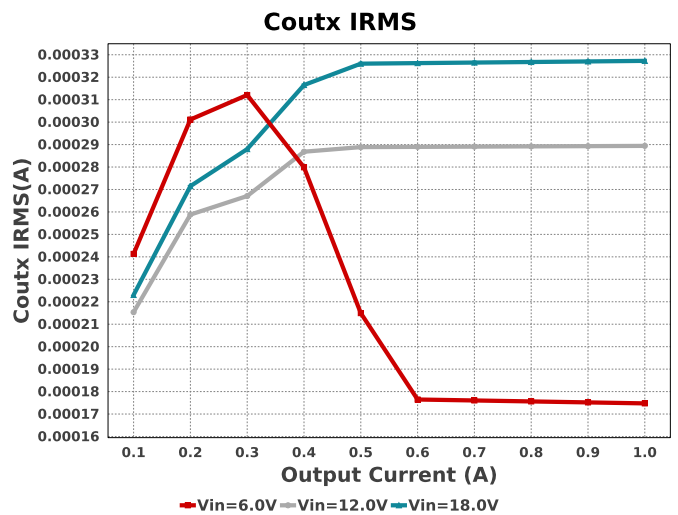
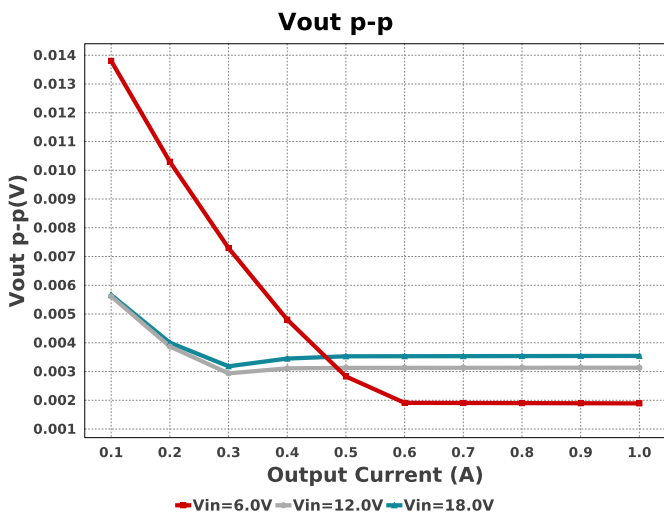
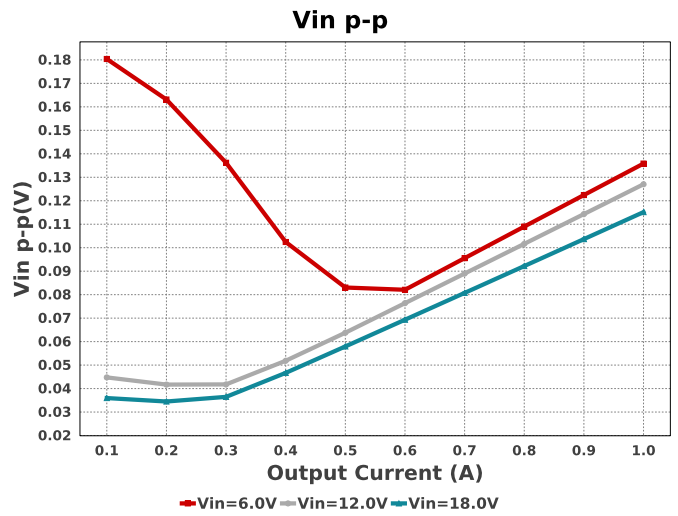
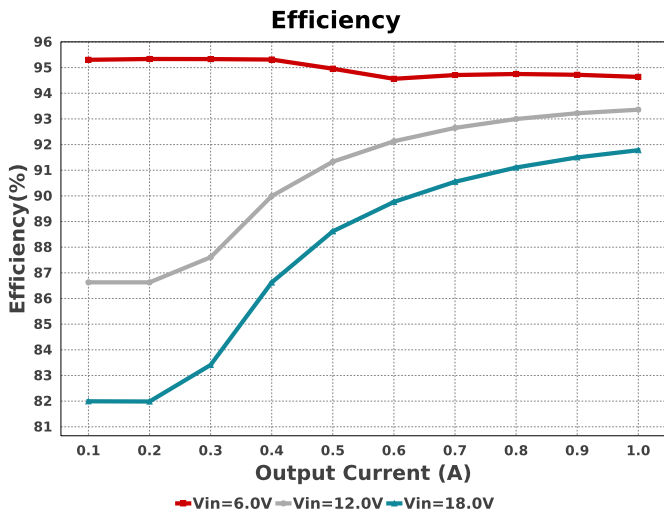
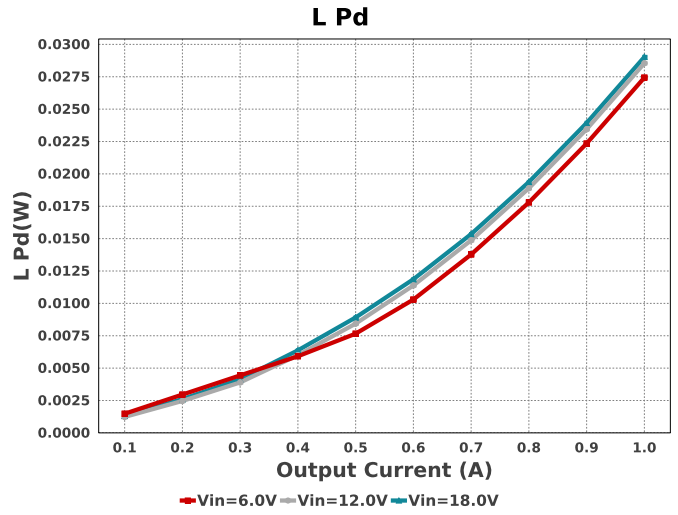
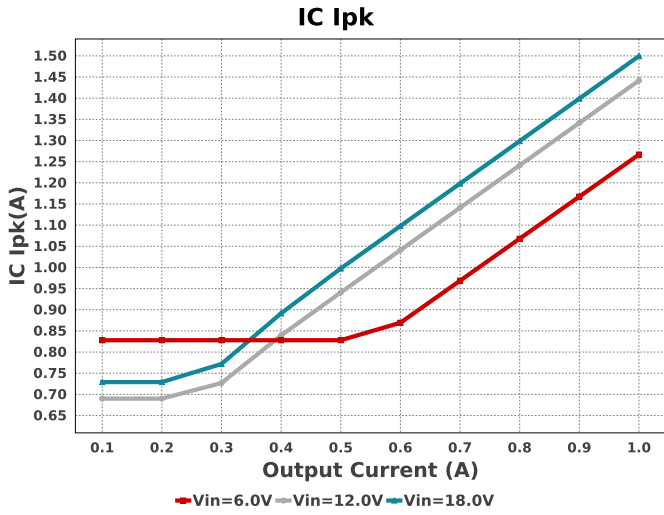
The LMR33630AQ1-WSON is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.

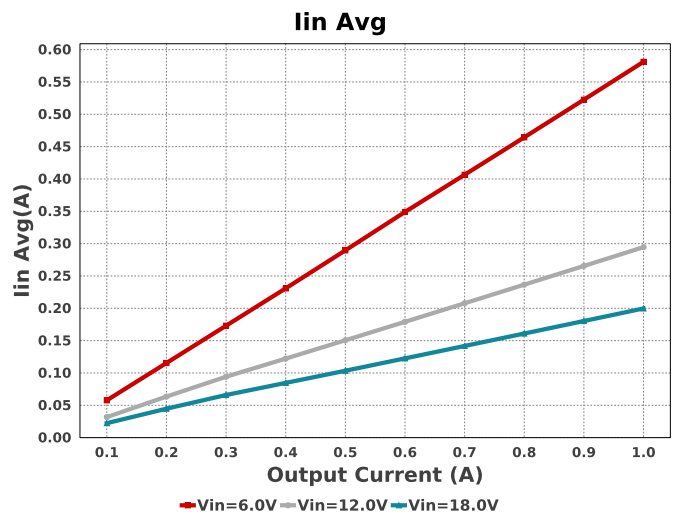
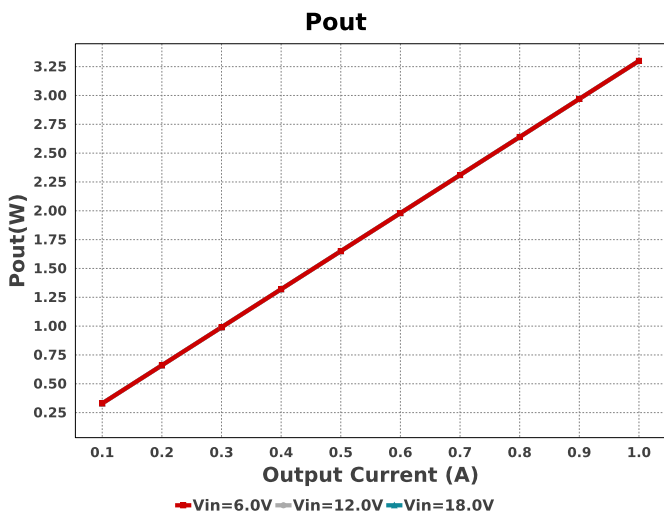
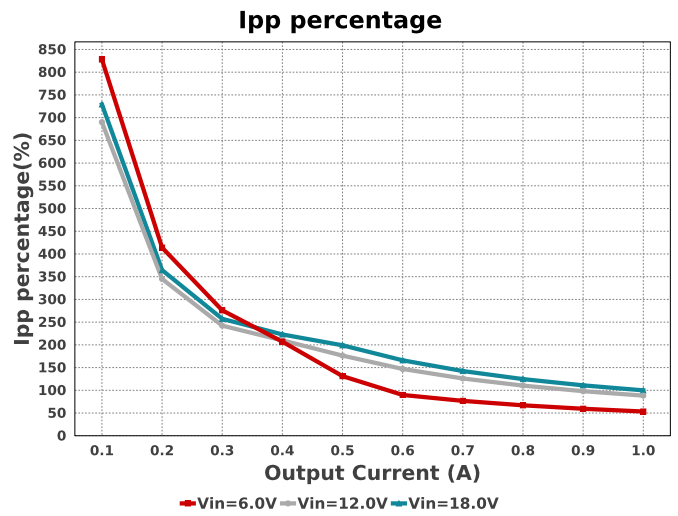
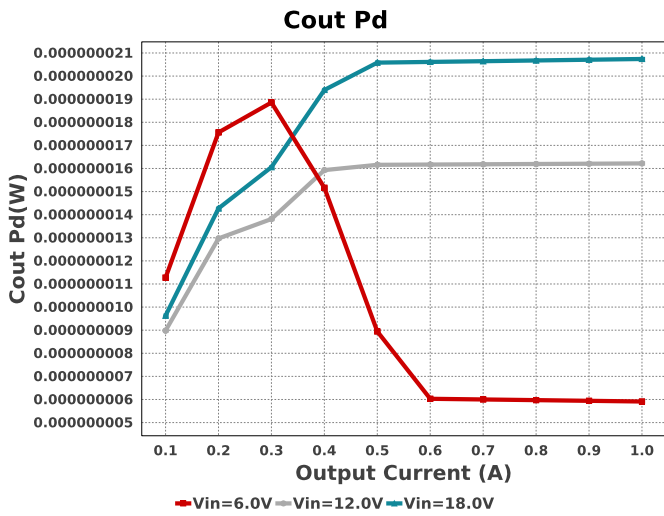
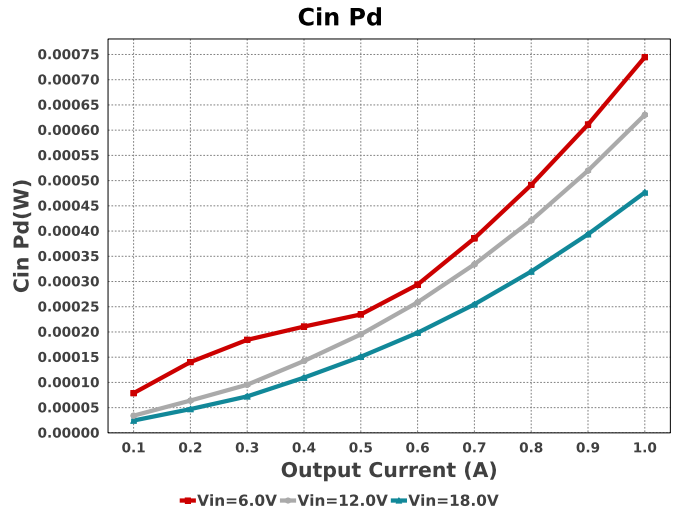
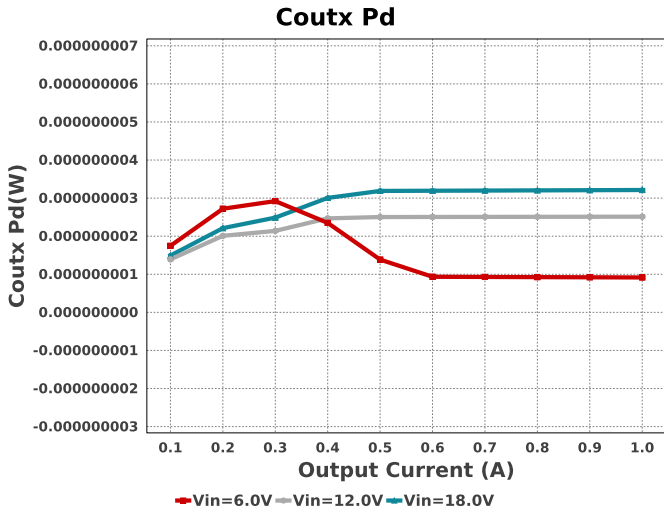
Electrical BOM

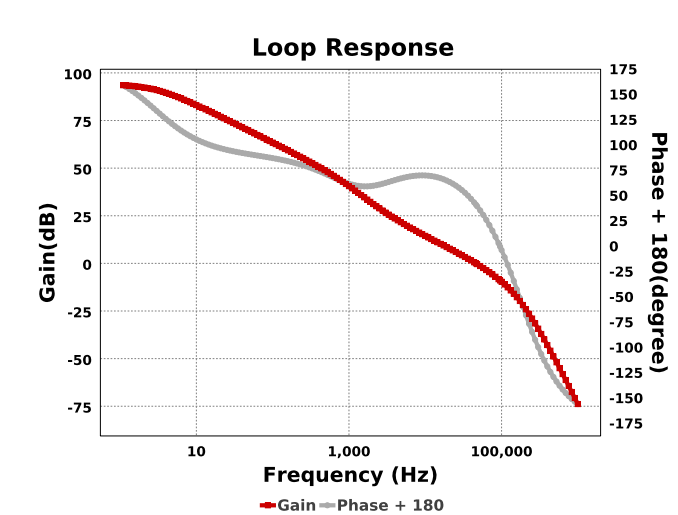
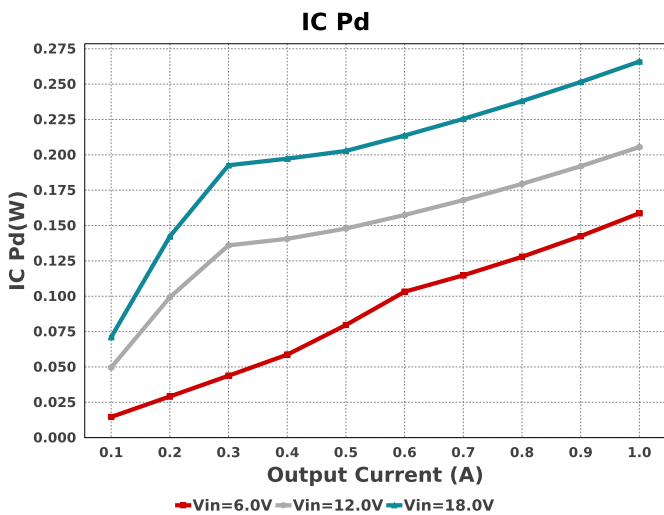
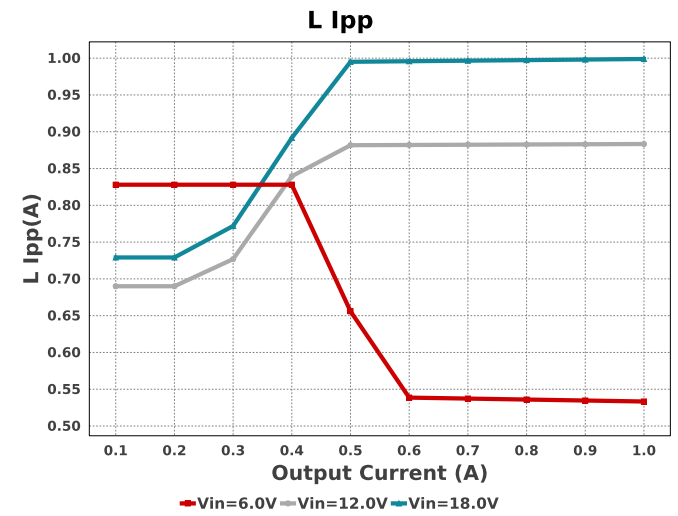
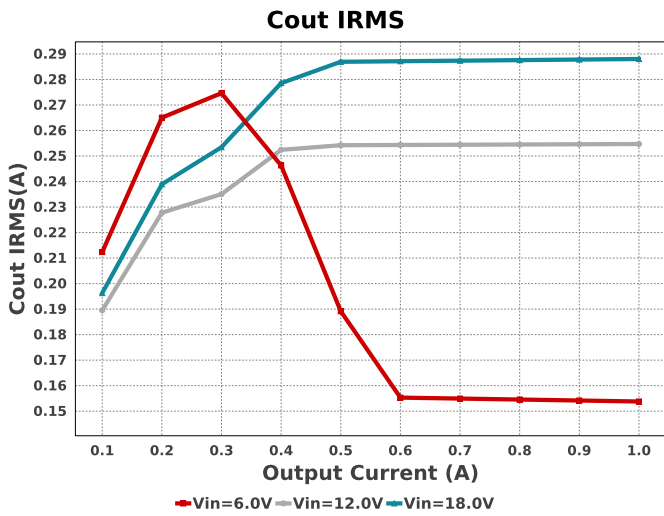
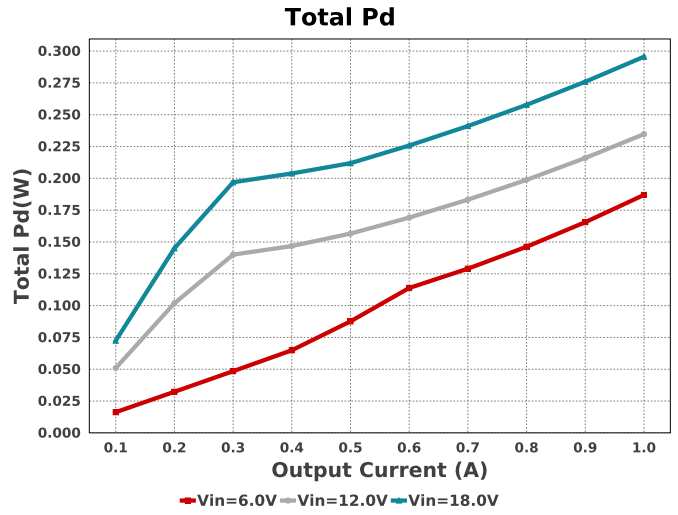
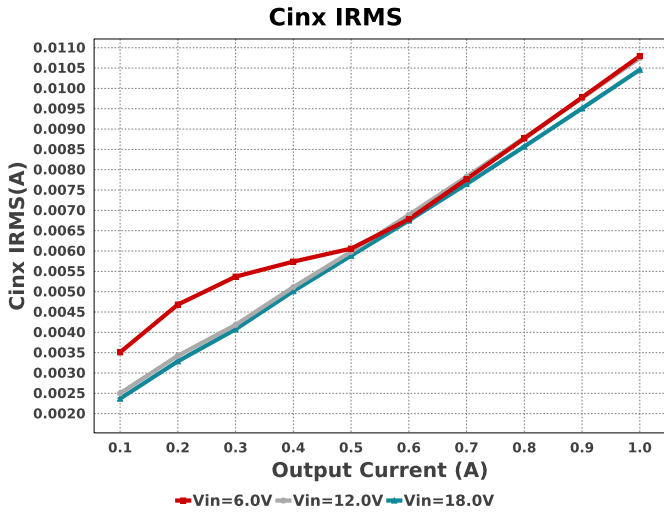
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	MuRata	GRM155R71C104KA88D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	\$0.10	1206 11 mm ²
Cin_ch1	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	\$0.10	1206 11 mm ²
Cinx	MuRata	GRM188R72A104KA35D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 100.0 V IRMS= 3.85 A	1	\$0.05	0603 5 mm ²
Cinx_ch1	MuRata	GRM188R72A104KA35D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 100.0 V IRMS= 3.85 A	1	\$0.05	0603 5 mm ²
Cout	CUSTOM	CUSTOM Series= X6S	Cap= 22.0 uF ESR= 1.0 uOhm VDC= 6.3 V IRMS= 6.0 A	4	NA	1210_270 0 mm ²
Coutx	MuRata	GRM188R71E104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 1.51 A	1	\$0.01	0603 5 mm ²
Cvcc	Kemet	C0603C105K8PACTU Series= X5R	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
L1	Coilcraft	XAL5050-682MEB	L= 6.8 µH 26.8 mOhm	1	\$0.92	XAL5050 54 mm ²

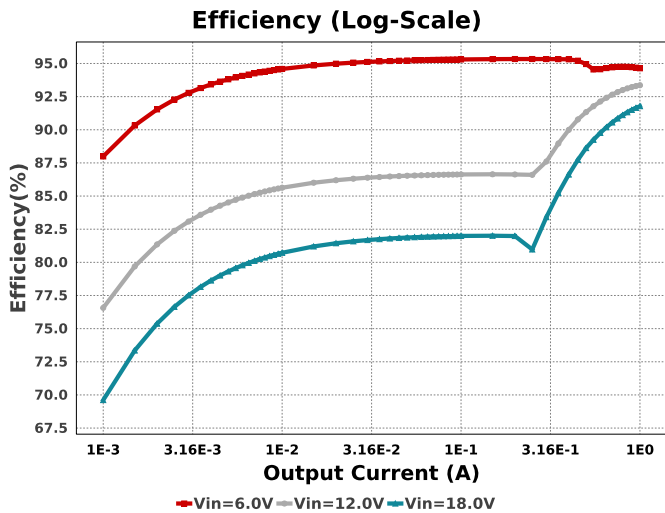
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rfbb	Vishay-Dale	CRCW040243K2FKED Series= CRCW..e3	Res= 43.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
Rfbt	Vishay-Dale	CRCW0603100KFKEA Series= CRCW..e3	Res= 100.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
Rpg	Vishay-Dale	CRCW0402100KFKEA Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
U1	Texas Instruments	LMR33630AQRNXRQ1	Switcher	1	\$0.93	RNX0012B 12 mm ²











Operating Values

#	Name	Value	Category	Description
1.	BOM Count	16		Total Design BOM count
2.	Total BOM	NA		Total BOM Cost
3.	Cin IRMS	398.525 mA	Capacitor	Input capacitor RMS ripple current
4.	Cin Pd	476.47 μ W	Capacitor	Input capacitor power dissipation
5.	Cinx IRMS	10.46 mA	Capacitor	Bulk capacitor RMS ripple current
6.	Cinx Pd	109.4 nW	Capacitor	Bulk capacitor power dissipation
7.	Cout IRMS	288.026 mA	Capacitor	Output capacitor RMS ripple current
8.	Cout Pd	20.74 nW	Capacitor	Output capacitor power dissipation
9.	Coutx IRMS	327.276 μ A	Capacitor	Output capacitor_x RMS ripple current
10.	Coutx Pd	3.213 nW	Capacitor	Output capacitor_x power loss
11.	IC Ipk	1.499 A	IC	Peak switch current in IC
12.	IC Pd	265.99 mW	IC	IC power dissipation
13.	IC Tj	40.639 degC	IC	IC junction temperature
14.	IC Tolerance	15.0 mV	IC	IC Feedback Tolerance
15.	ICThetaJA Effective	40.0 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
16.	Iin Avg	199.75 mA	IC	Average input current
17.	Ipp percentage	99.889 %	Inductor	Inductor ripple current percentage (with respect to average inductor current)
18.	L Ipp	998.886 mA	Inductor	Peak-to-peak inductor ripple current
19.	L Pd	29.028 mW	Inductor	Inductor power dissipation
20.	Cin Pd	476.47 μ W	Power	Input capacitor power dissipation
21.	Cinx Pd	109.4 nW	Power	Bulk capacitor power dissipation
22.	Cout Pd	20.74 nW	Power	Output capacitor power dissipation
23.	Coutx Pd	3.213 nW	Power	Output capacitor_x power loss
24.	IC Pd	265.99 mW	Power	IC power dissipation
25.	L Pd	29.028 mW	Power	Inductor power dissipation
26.	Total Pd	295.55 mW	Power	Total Power Dissipation
27.	Cross Freq	46.127 kHz	System	Bode plot crossover frequency
28.	Duty Cycle	18.656 %	System Information	Duty cycle
29.	Efficiency	91.78 %	System Information	Steady state efficiency
30.	FootPrint	179.0 mm ²	System Information	Total Foot Print Area of BOM components
31.	Frequency	400.0 kHz	System Information	Switching frequency
32.	Gain Marg	-8.972 dB	System Information	Bode Plot Gain Margin
33.	Iout	1.0 A	System Information	Iout operating point
34.	Low Freq Gain	93.533 dB	System Information	Gain at 1Hz
35.	Mode	CCM	System Information	Conduction Mode
36.	Phase Marg	41.45 deg	System Information	Bode Plot Phase Margin
37.	Pout	3.3 W	System Information	Total output power
38.	Vin	18.0 V	System Information	Vin operating point

#	Name	Value	Category	Description
39.	Vin p-p	115.161 mV	System Information	Peak-to-peak input voltage
40.	Vout	3.3 V	System Information	Operational Output Voltage
41.	Vout Actual	3.315 V	System Information	Vout Actual calculated based on selected voltage divider resistors
42.	Vout Tolerance	2.932 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
43.	Vout p-p	3.543 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	1.0	Maximum Output Current
VinMax	18.0	Maximum input voltage
VinMin	6.0	Minimum input voltage
Vout	3.3	Output Voltage
base_pn	LMR33630AQ1-WSON	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

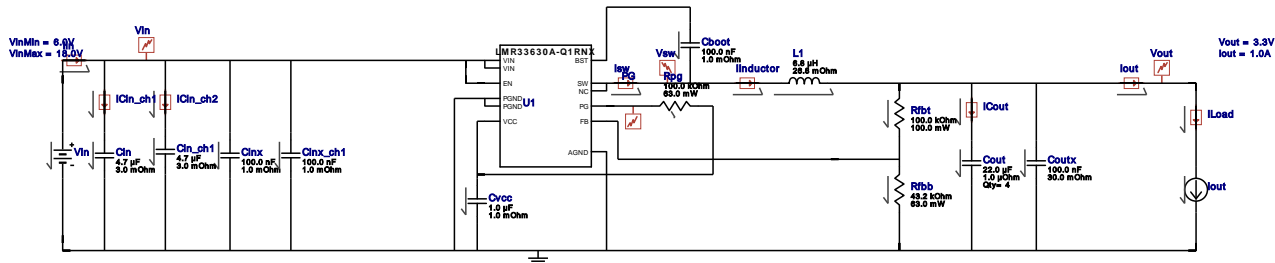
WEBENCH® Assembly

WEBENCH® Electrical Simulation Report

Design Id = 8462

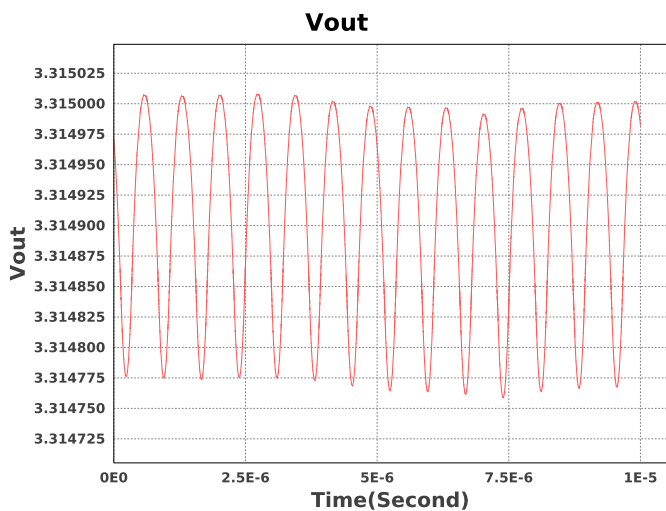
sim_id = 1

Simulation Type = Steady State



Simulation Parameters

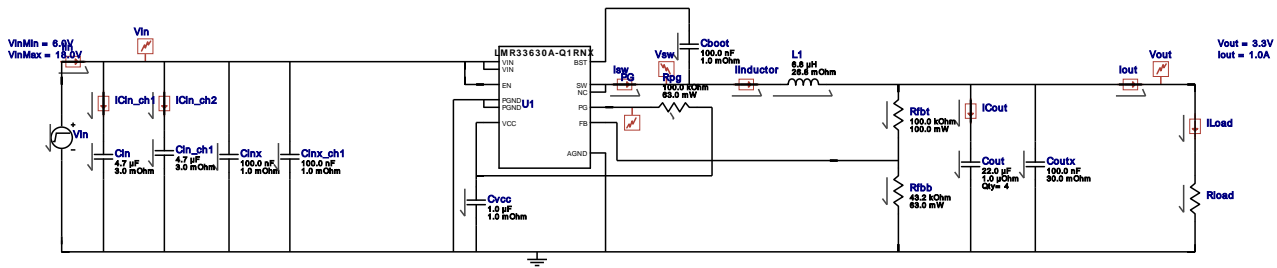
#	Name	Parameter Name	Description	Values
1.	Iout	I	Load Current	1.0 A



Design Id = 8462

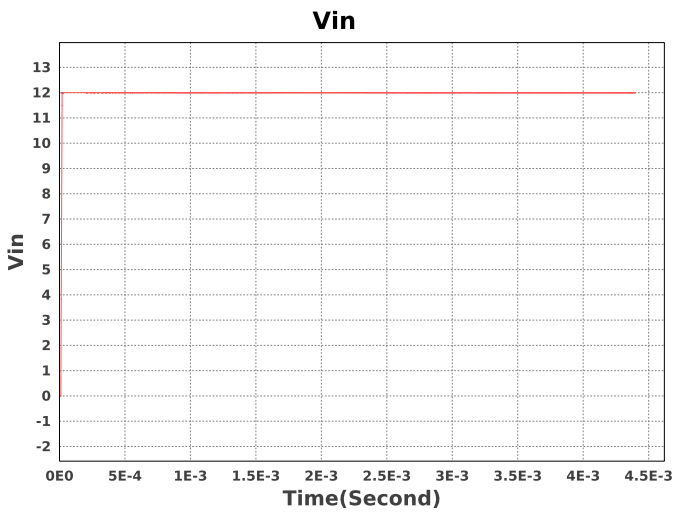
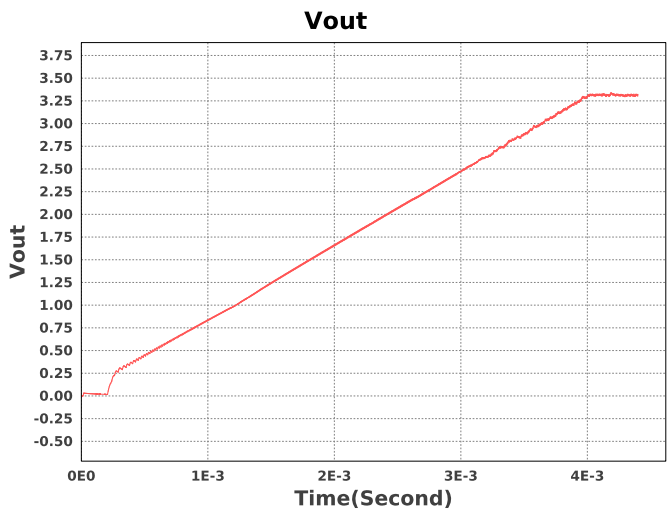
sim_id = 2

Simulation Type = Startup



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Rload	R	Load Resistance	3.3 Ohm



Design Assistance

- Master key : AE3011FD2EE8F4EB[v1]
- LMR33630AQ1-WSON Product Folder : <http://www.ti.com/product/LMR33630%2DQ1> : contains the data sheet and other resources.

Important Notice and Disclaimer

TI provides technical and reliability data (including datasheets), design resources (including reference designs), application or other design advice, web tools, safety information, and other resources AS IS and with all faults, and disclaims all warranties. These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you will fully indemnify TI and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

Providing these resources does not expand or otherwise alter TI's applicable Terms of Sale or other applicable terms available either on ti.com or provided in conjunction with TI products.