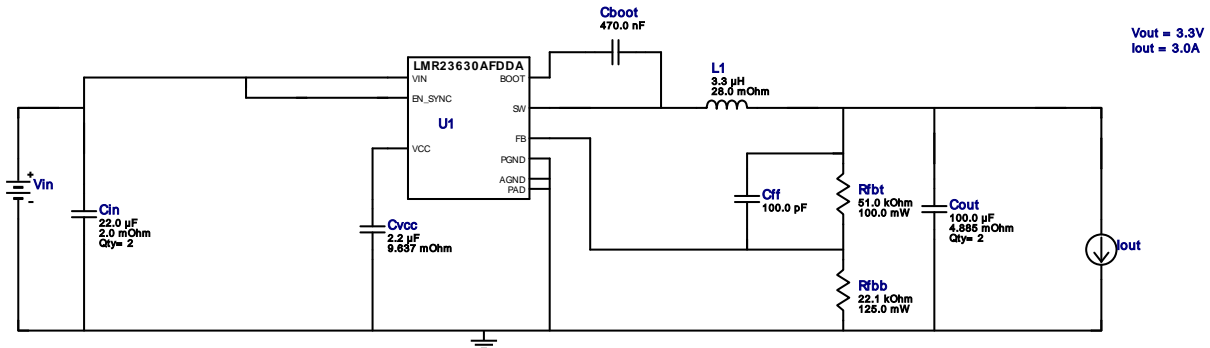


WEBENCH® Design Report

Design : 4875907/22 LMR23630AFDDAR
LMR23630AFDDAR 4.5V-5.5V to 3.30V @ 3.0A




1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating at a much lower voltage than the maximum input voltage. Sizing the inductor based on the maximum input voltage may yield an inductance much larger than typically needed, causing a larger footprint for the overall design. At the same time, components such as the input capacitor must be rated based on the maximum input voltage. WEBENCH now supports the use of this additional input voltage specification.

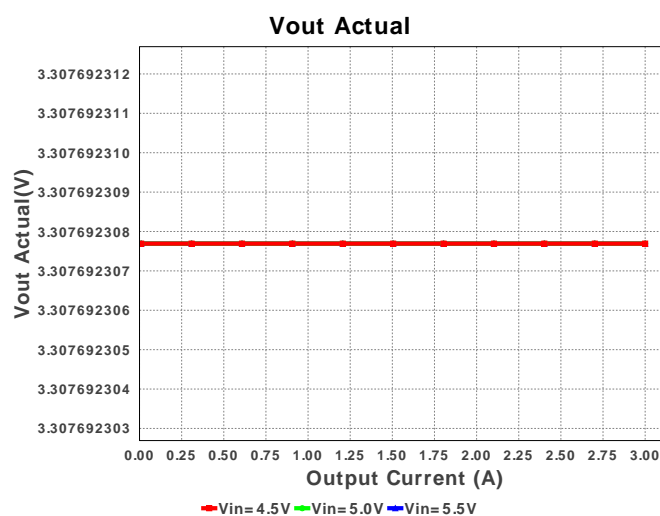
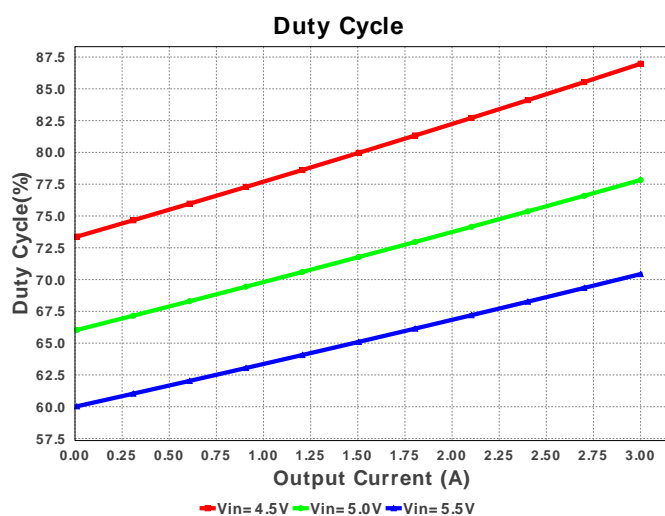
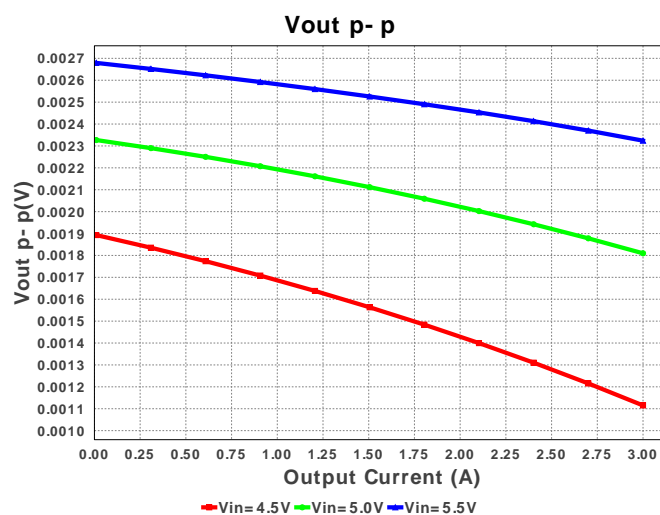
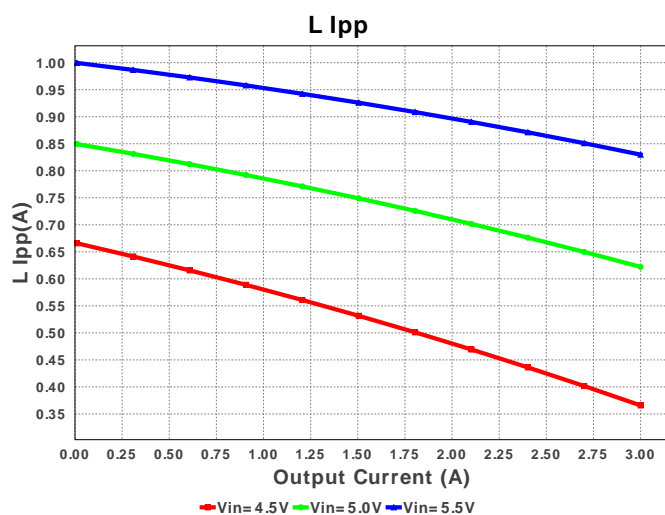
My Comments

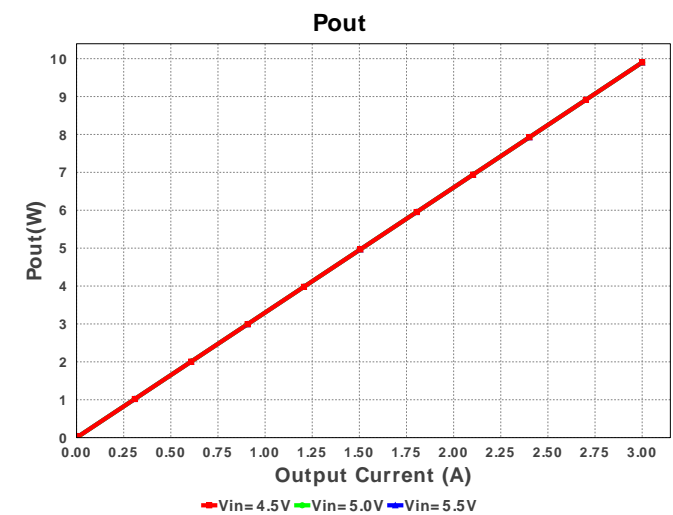
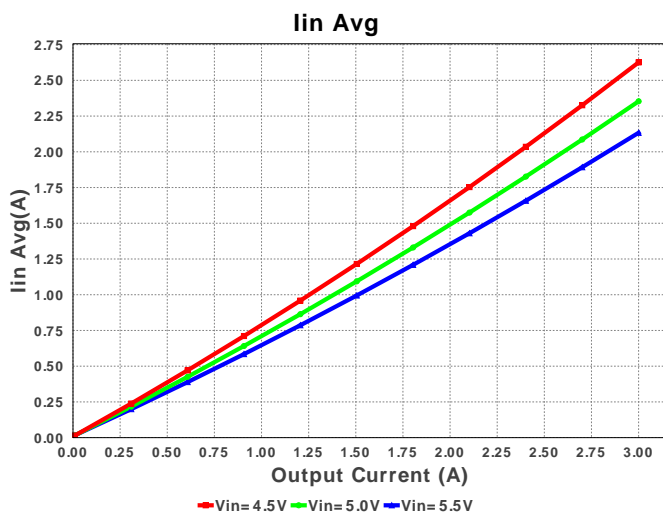
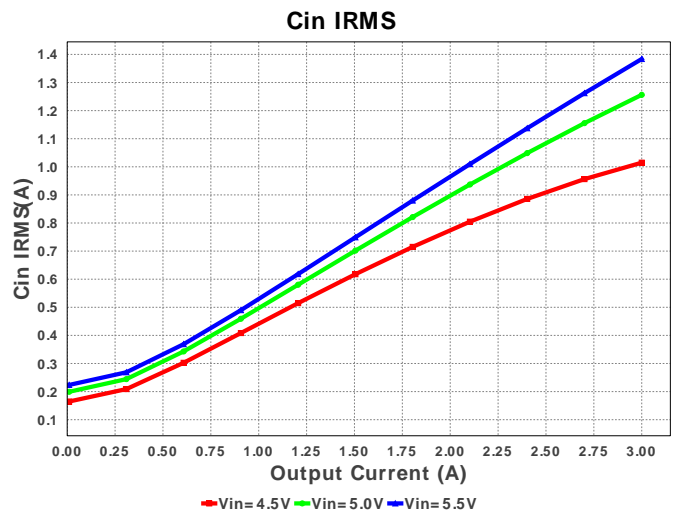
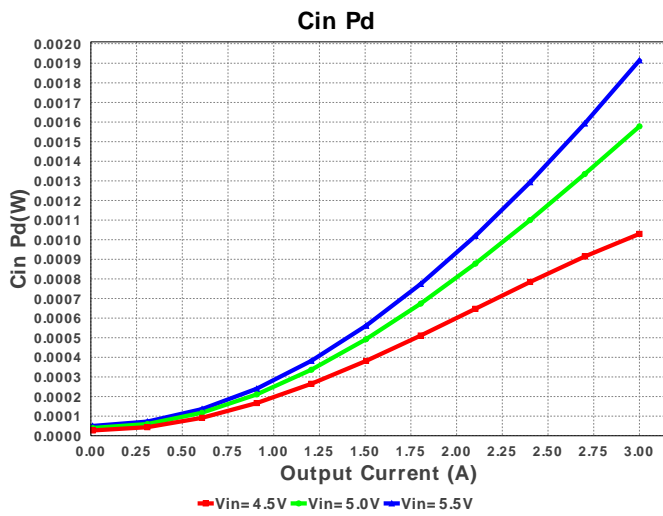
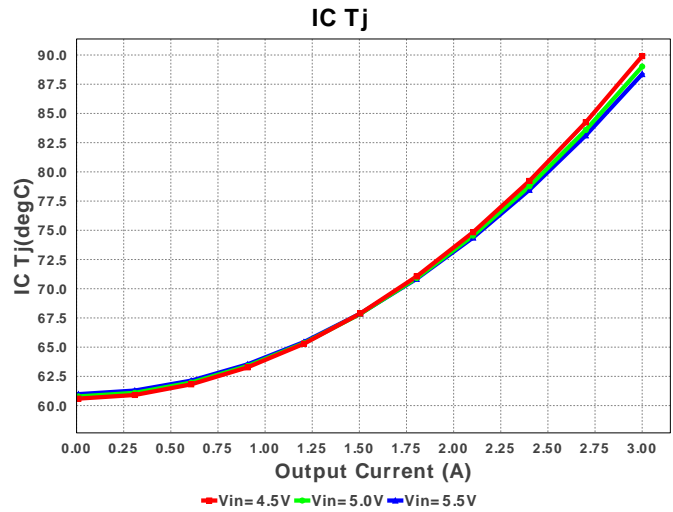
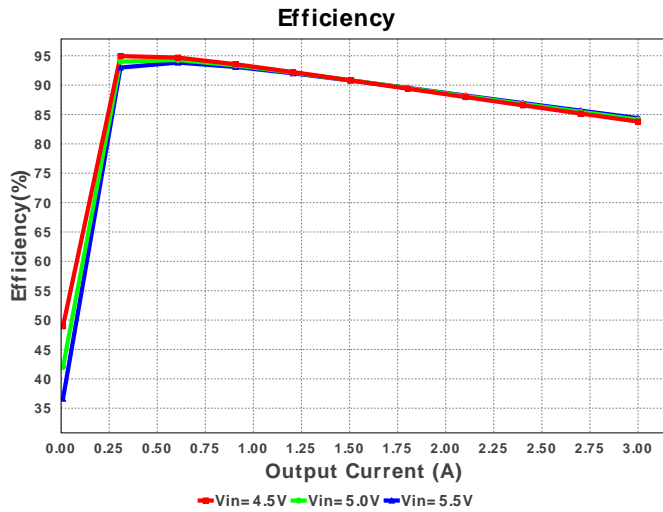
No comments

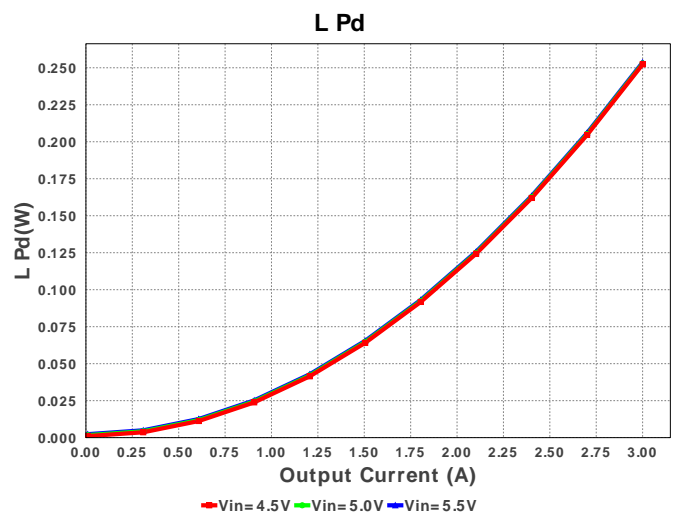
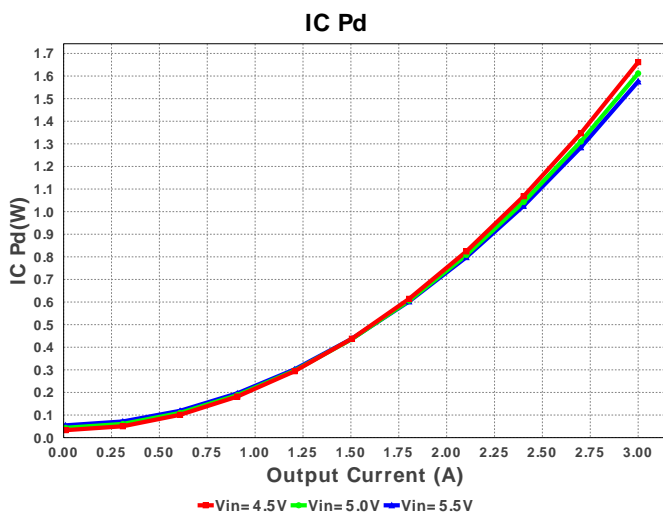
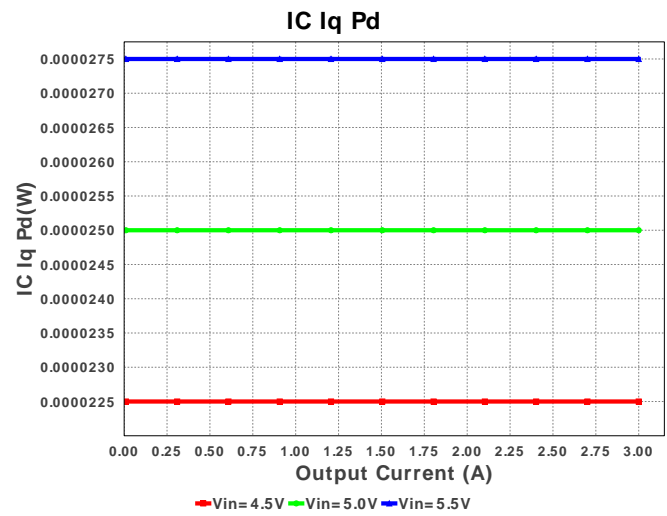
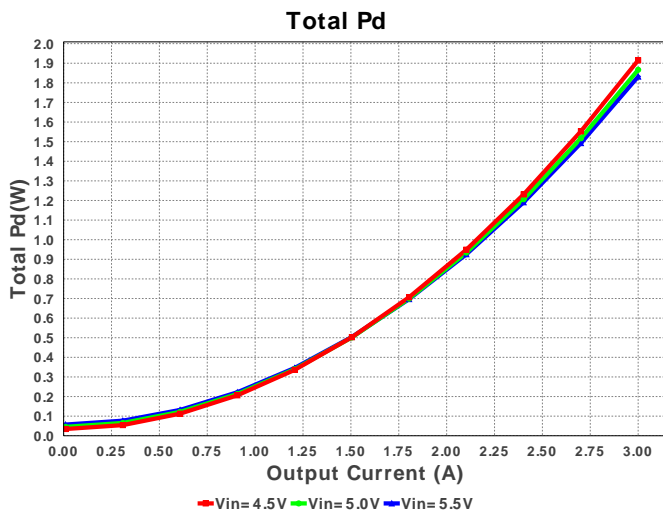
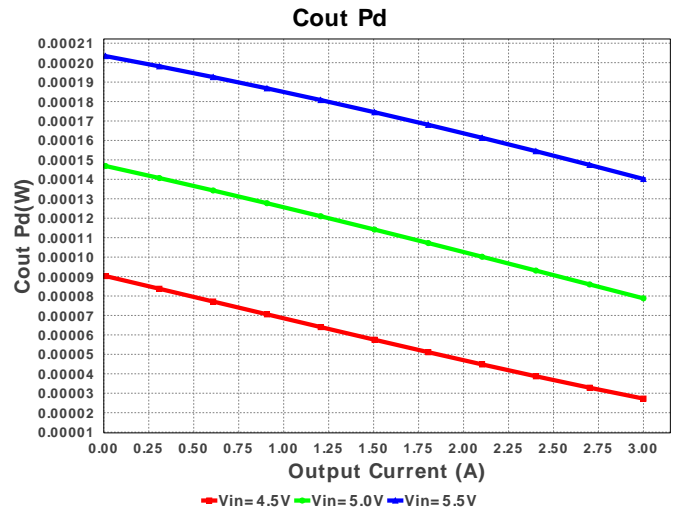
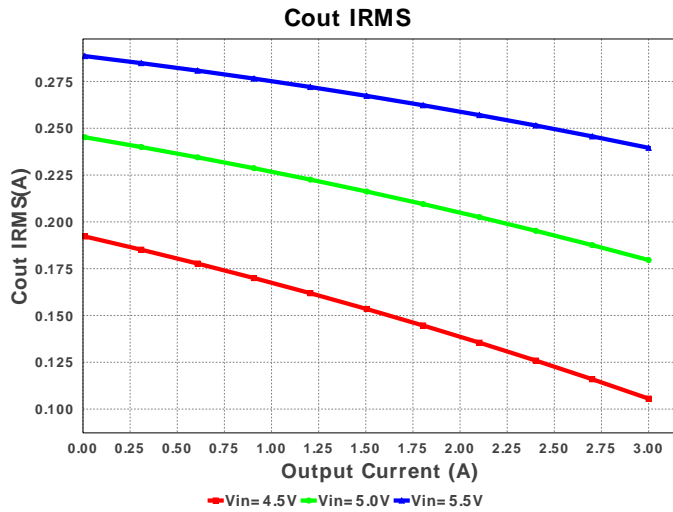
Electrical BOM

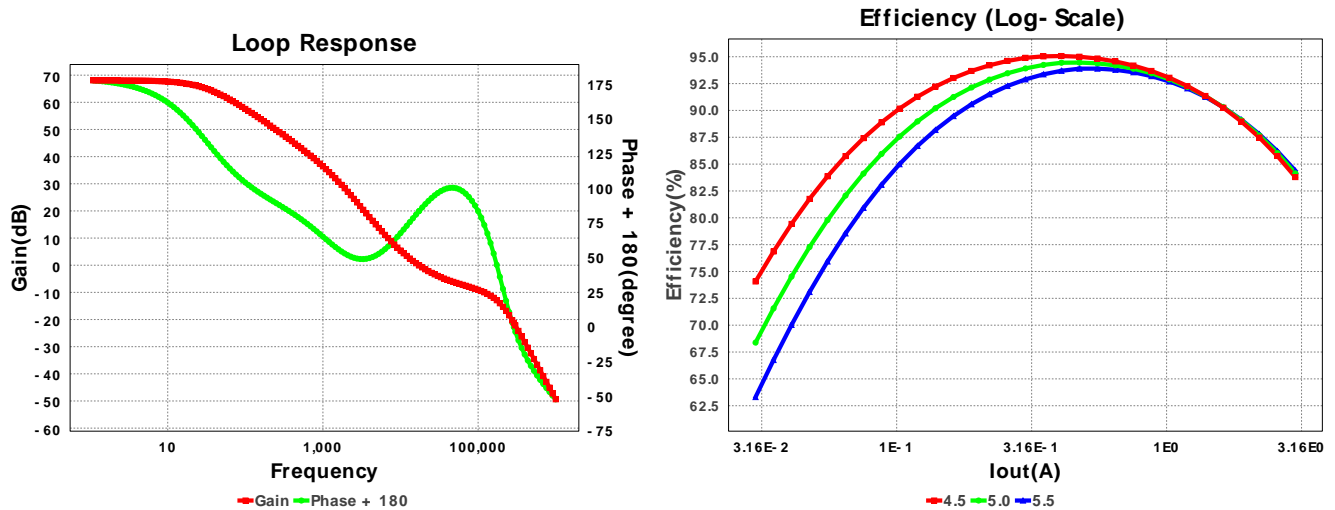
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C474K8PACTU Series= X5R	Cap= 470.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.02	 0603 5 mm ²
2.	Cff	Kemet	C0603C101J3GACTU Series= C0G/NP0	Cap= 100.0 pF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
3.	Cin	MuRata	GRM32ER61C226KE20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	2	\$0.12	 1210 15 mm ²
4.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	2	\$0.14	 1206_190 11 mm ²
5.	Cvcc	MuRata	GRM188R60J225KE19D Series= X5R	Cap= 2.2 uF ESR= 9.637 mOhm VDC= 6.3 V IRMS= 1.32271 A	1	\$0.02	 0603 5 mm ²
6.	L1	Vishay-Dale	IHLP2525CZER3R3M01	L= 3.3 uH DCR= 28.0 mOhm	1	\$0.95	 IHLP-2525CZ 75 mm ²
7.	Rfbb	Panasonic	ERJ-6ENF2212V Series= ERJ-6E	Res= 22.1 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
8.	Rfbs	Yageo America	RC0603FR-0751KL Series= ?	Res= 51.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	U1	Texas Instruments	LMR23630AFDDAR	Switcher	1	\$1.40	 DDA0008E_N 57 mm ²









Operating Values

#	Name	Value	Category	Description
1.	BOM Count	11		Total Design BOM count
2.	Total BOM	\$2.94		Total BOM Cost
3.	Cin IRMS	1.384 A	Current	Input capacitor RMS ripple current
4.	Cout IRMS	239.561 mA	Current	Output capacitor RMS ripple current
5.	Iin Avg	2.133 A	Current	Average input current
6.	L Ipp	829.864 mA	Current	Peak-to-peak inductor ripple current
7.	FootPrint	209.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	400.0 kHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	9.9 W	General	Total output power
11.	ICThetaJA Effective	18.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
12.	Low Freq Gain	68.059 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	3.308 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
15.	Cross Freq	17.266 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	70.432 %	Op_point	Duty cycle
17.	Efficiency	84.386 %	Op_point	Steady state efficiency
18.	Gain Marg	-21.244 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	88.368 degC	Op_point	IC junction temperature
20.	IOUT_OP	3.0 A	Op_point	Iout operating point
21.	Phase Marg	83.637 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	5.5 V	Op_point	Vin operating point
23.	Vout p-p	2.324 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	1.915 mW	Power	Input capacitor power dissipation
25.	Cout Pd	140.174 μ W	Power	Output capacitor power dissipation
26.	IC Iq Pd	27.5 μ W	Power	IC Iq Pd
27.	IC Pd	1.576 W	Power	IC power dissipation
28.	L Pd	253.607 mW	Power	Inductor power dissipation
29.	Total Pd	1.832 W	Power	Total Power Dissipation
30.	Vout Tolerance	3.438 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current
2.	VinMax	5.5	Maximum input voltage
3.	VinMin	4.5	Minimum input voltage
4.	VinTyp	5.0	Typical input voltage
5.	Vout	3.3	Output Voltage
6.	base_pn	LMR23630AF	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	60.0	Ambient temperature

Design Assistance

1. **LMR23630AF** Product Folder : <http://www.ti.com/product/LMR23630> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).