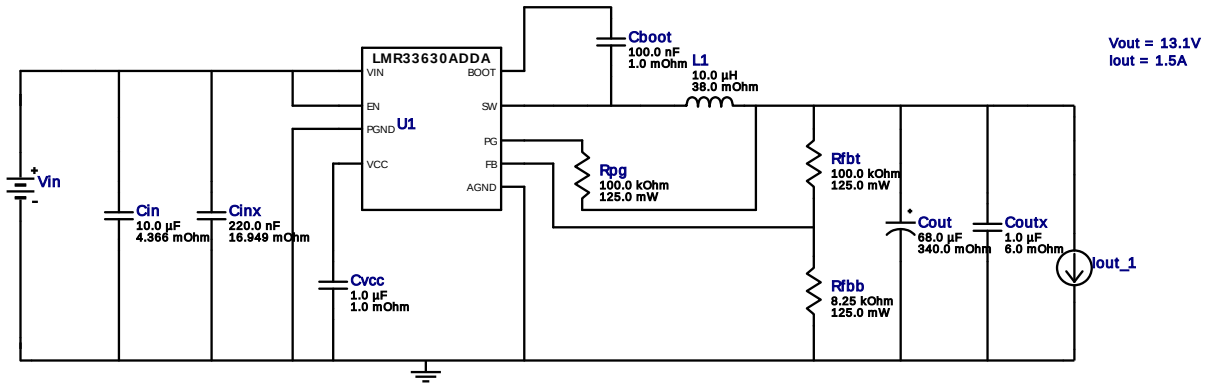
WEBENCH® Design Report

VinMin = 15.0V
VinMax = 15.0V
Vout = 13.1V
Iout = 1.5A

Device = LMR33630ADDAR
Topology = Buck
Created = 2018-03-22 08:48:22.114
BOM Cost = $2.13
BOM Count = 11
Total Pd = 0.54W

Design : 5286684/26 LMR33630ADDAR
LMR33630ADDAR 15.0V-15.0V to 13.10V @ 1.5A



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.

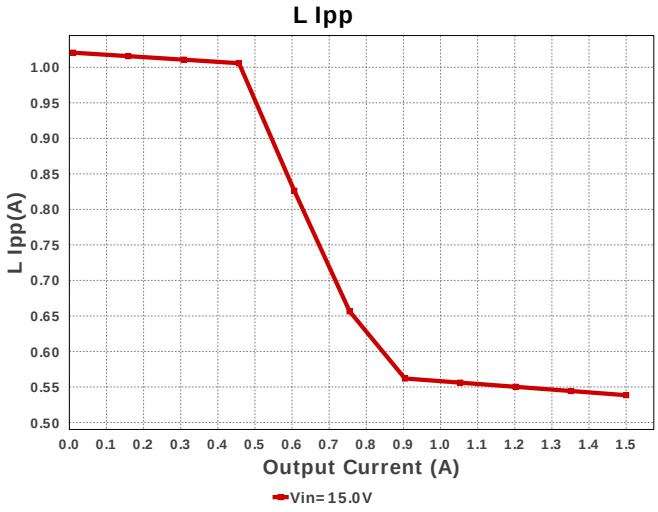
My Comments

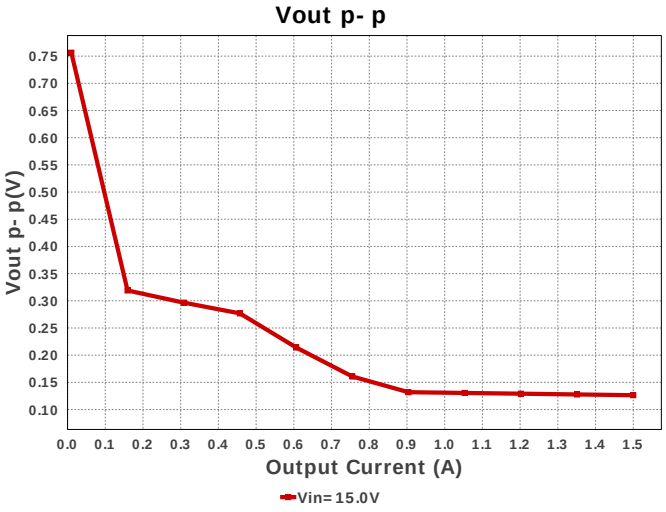
No comments

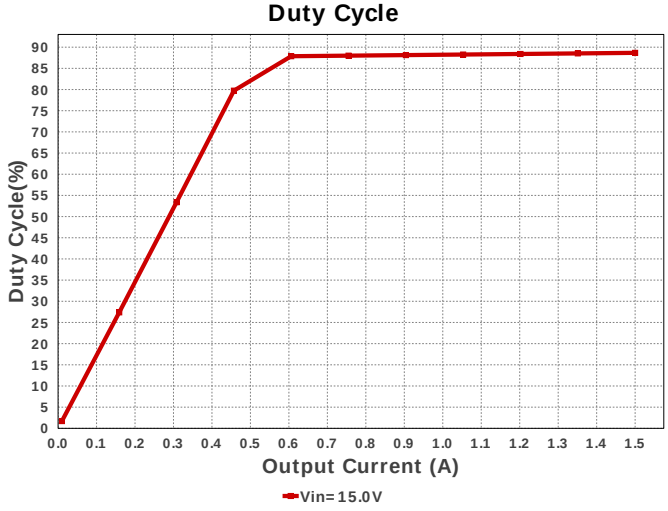
Electrical BOM

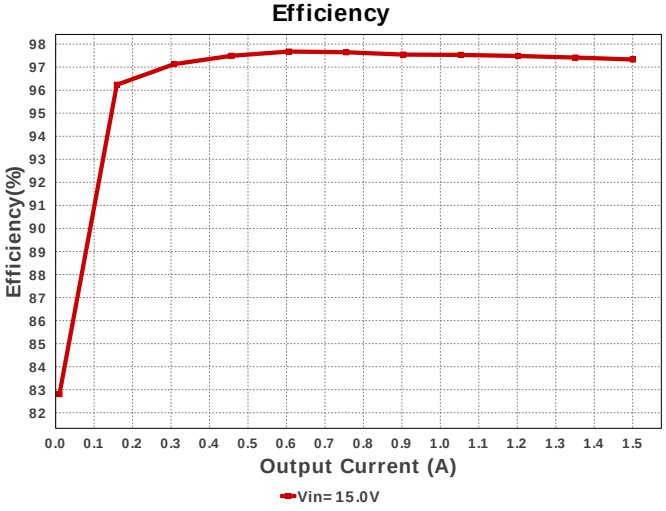
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Yageo America	CC0805KRX7R8BB104 Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71E106KA12L Series= X7R	Cap= 10.0 uF ESR= 4.366 mOhm VDC= 25.0 V IRMS= 2.8022 A	1	$0.06	1206_190 11 mm²
3.	Cinx	TDK	C2012X5R1H224K125AA Series= X5R	Cap= 220.0 nF ESR= 16.949 mOhm VDC= 50.0 V IRMS= 1.5961 A	1	$0.03	0805 7 mm²
4.	Cout	Nichicon	UUD1V680MCL1GS Series= uD	Cap= 68.0 uF ESR= 340.0 mOhm VDC= 35.0 V IRMS= 280.0 mA	1	$0.12	SM_RADIAL_6.3BMM 80 mm²
5.	Coutx	MuRata	GRM219R71E105KA88D Series= X7R	Cap= 1.0 uF ESR= 6.0 mOhm VDC= 25.0 V IRMS= 3.87 A	1	$0.02	0805 7 mm²
6.	Cvcc	Taiyo Yuden	LMK212B7105KG-T Series= X7R	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²

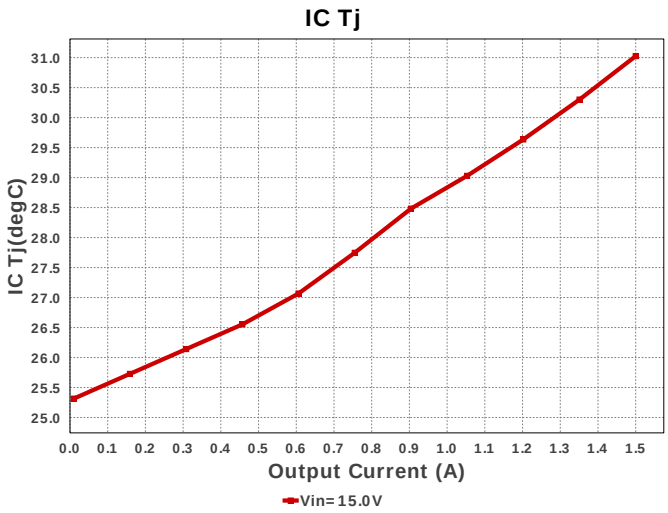
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	L1	TDK	VLP8040T-100M	L= 10.0 µH DCR= 38.0 mOhm	1	$0.22	 VLP8040 113 mm²
8.	Rfbb	Panasonic	ERJ-6ENF8251V Series= ERJ-6E	Res= 8.25 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
9.	Rfbt	Panasonic	ERJ-6ENF1003V Series= ERJ-6E	Res= 100.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
10.	Rpg	Panasonic	ERJ-6ENF1003V Series= ERJ-6E	Res= 100.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
11.	U1	Texas Instruments	LMR33630ADDAR	Switcher	1	$1.62	 DDA0008J 55 mm²

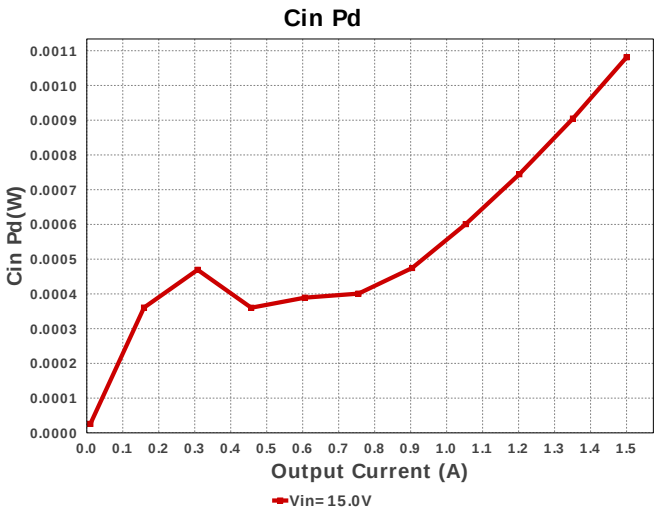


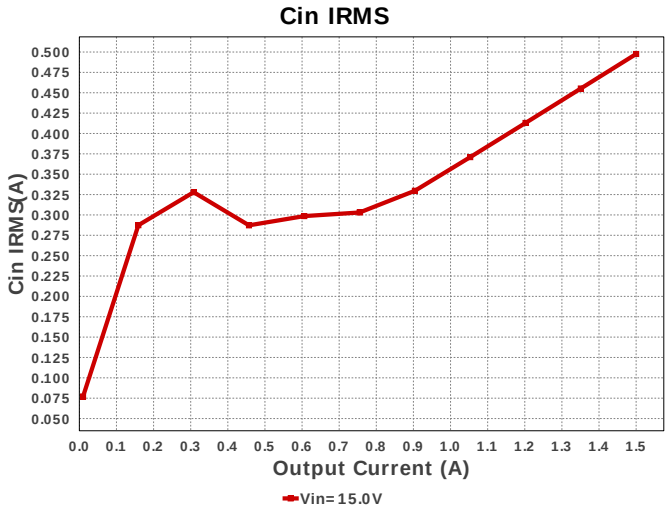


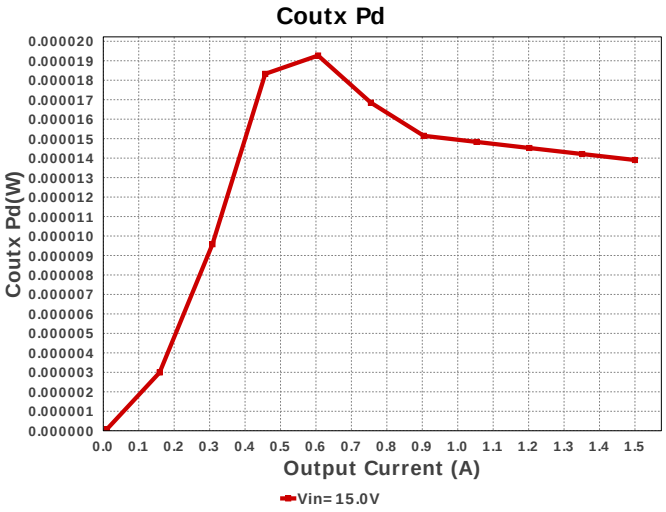


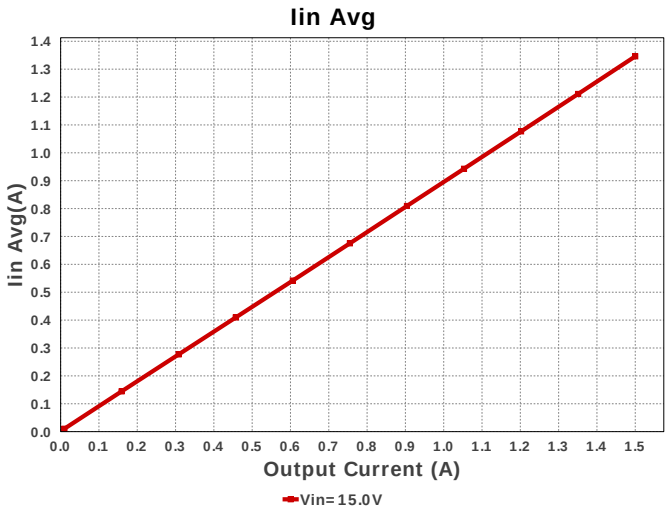


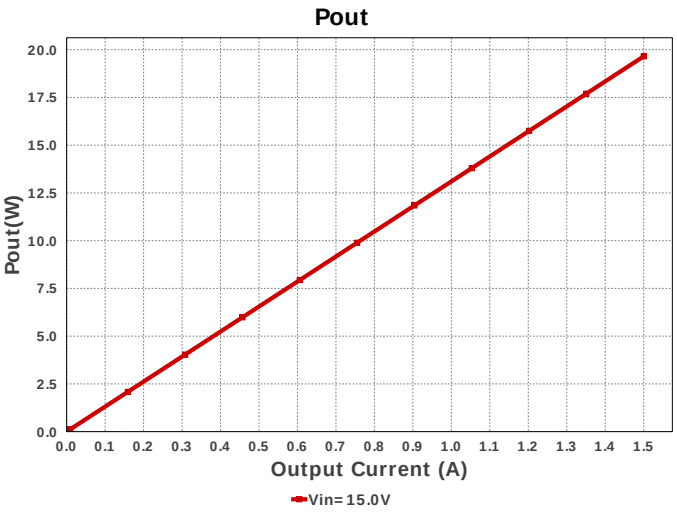


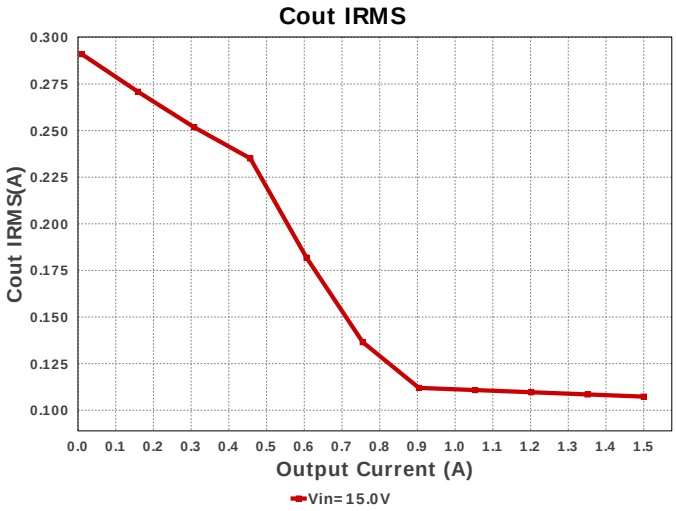


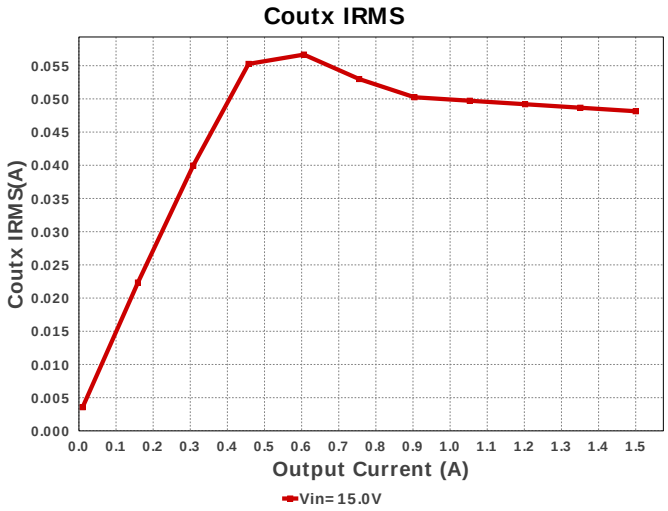


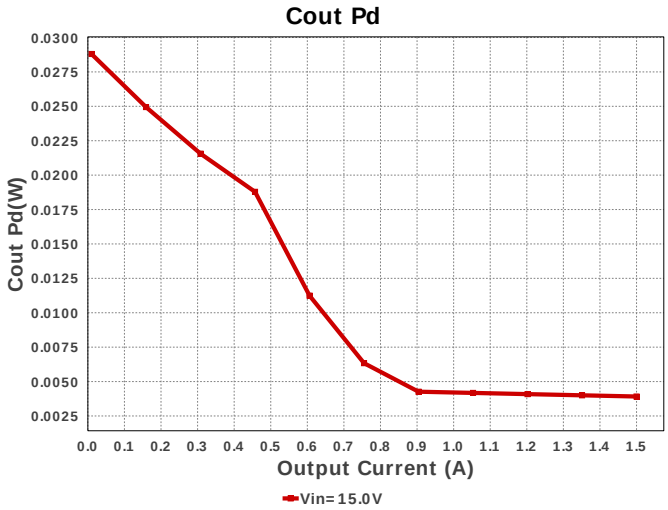


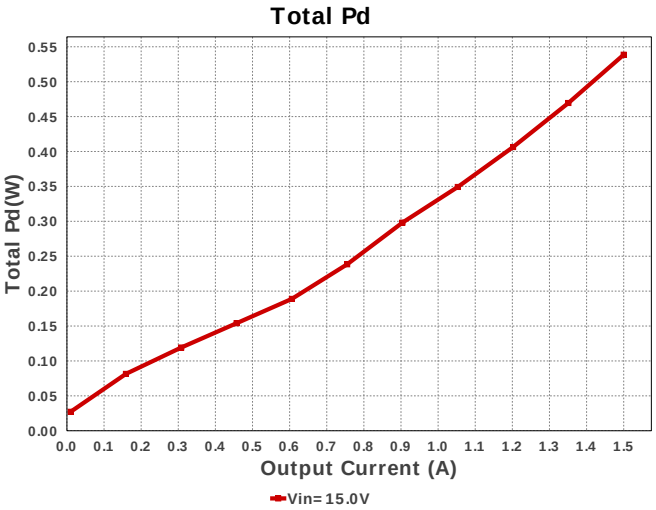


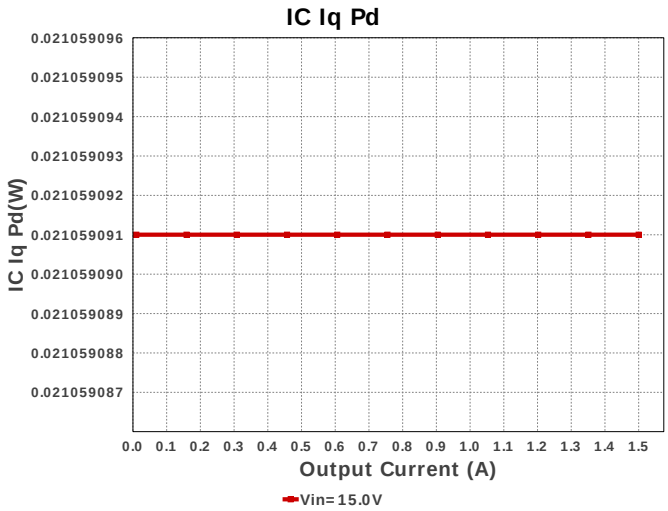


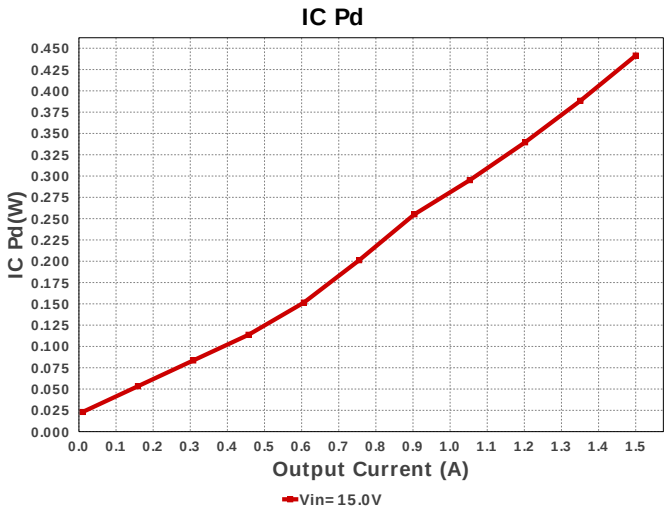


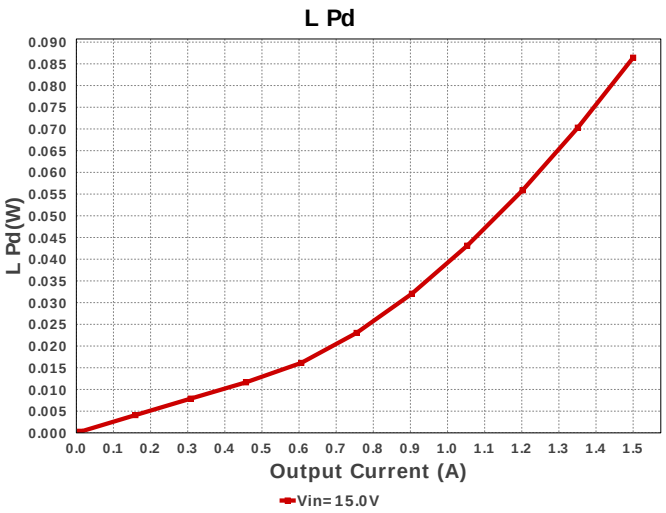


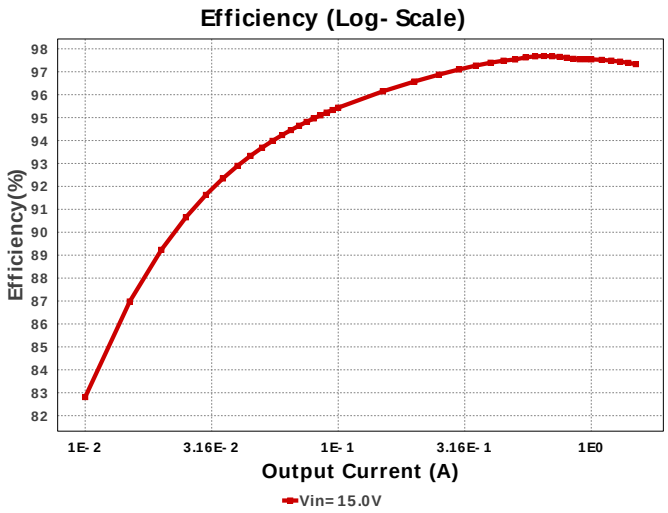












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	497.597 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	107.292 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	48.137 mA	Current	Output capacitor_x RMS ripple current
4.	Iin Avg	1.346 A	Current	Average input current
5.	L Ipp	538.42 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	11	General	Total Design BOM count
7.	FootPrint	307.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	277.853 kHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	19.65 W	General	Total output power
11.	Total BOM	$2.13	General	Total BOM Cost
12.	Duty Cycle	88.662 %	Op Point	Duty cycle
13.	Efficiency	97.332 %	Op Point	Steady state efficiency
14.	IC Tj	31.025 degC	Op Point	IC junction temperature
15.	ICThetaJA Effective	13.65 degC/W	Op Point	Effective IC Junction-to-Ambient Thermal Resistance
16.	IOUT_OP	1.5 A	Op Point	Iout operating point
17.	VIN_OP	15.0 V	Op Point	Vin operating point
18.	Vout Actual	13.121 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
19.	Vout OP	13.1 V	Op Point	Operational Output Voltage
20.	Vout Tolerance	3.394 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
21.	Vout p-p	126.368 mV	Op Point	Peak-to-peak output ripple voltage
22.	Cin Pd	1.081 mW	Power	Input capacitor power dissipation
23.	Cout Pd	3.914 mW	Power	Output capacitor power dissipation
24.	Coutx Pd	13.903 µW	Power	Output capacitor_x power loss
25.	IC Iq Pd	21.059 mW	Power	IC Iq Pd
26.	IC Pd	441.412 mW	Power	IC power dissipation
27.	L Pd	86.418 mW	Power	Inductor power dissipation
28.	Total Pd	538.629 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.5	Maximum Output Current
2.	VinMax	15.0	Maximum input voltage
3.	VinMin	15.0	Minimum input voltage
4.	VinTyp	15.0	Typical input voltage
5.	Vout	13.1	Output Voltage
6.	base_pn	LMR33630A-SOIC	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	25.0	Ambient temperature

Design Assistance

1. **LMR33630A-SOIC** Product Folder : http://www.ti.com/product/LMR33630 : contains the data sheet and other resources.