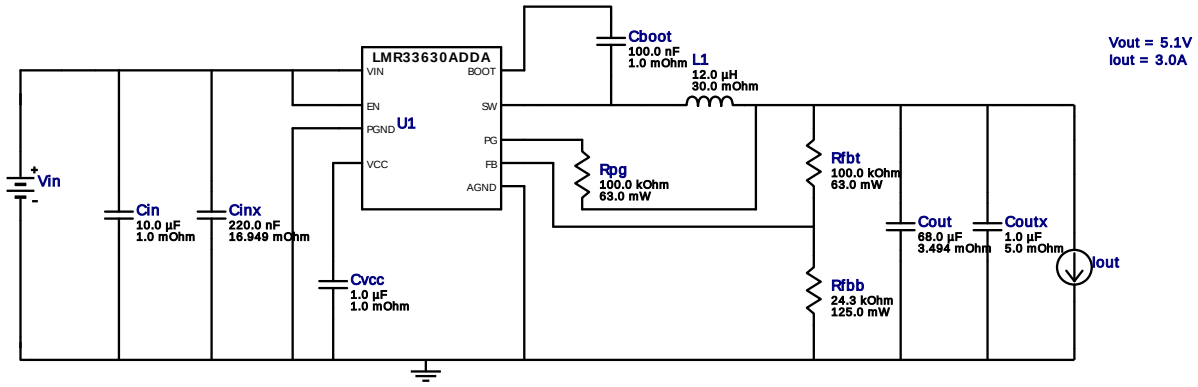
WEBENCH® Design Report

LMR33630ADDAR 6.5V-30V to 5.10V @ 3A

VinMin = 6.5V
VinMax = 30.0V
Vout = 5.1V
Iout = 3.0A

Device = LMR33630ADDAR
Topology = Buck
Created = 2019-04-18 22:58:42.796
BOM Cost = $3.01
BOM Count = 11
Total Pd = 1.88W



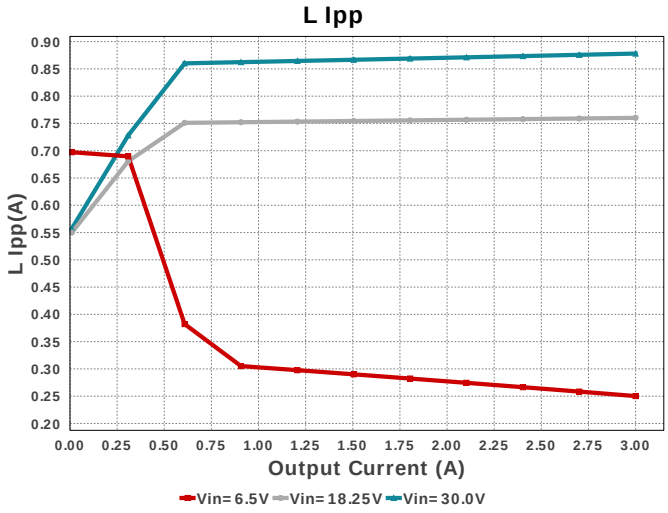
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

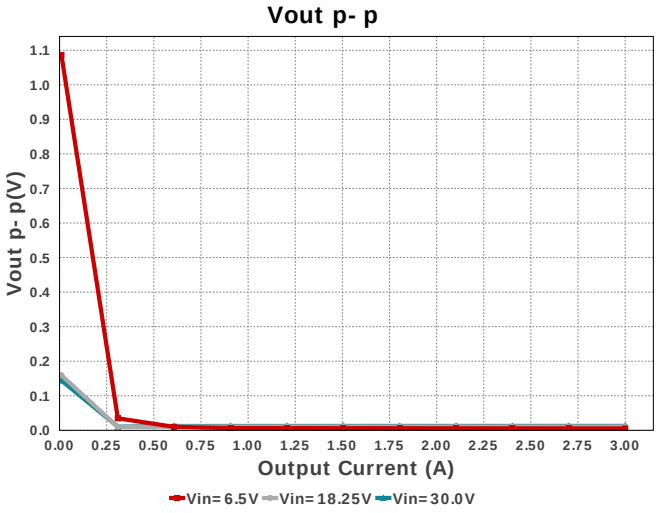
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating 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.

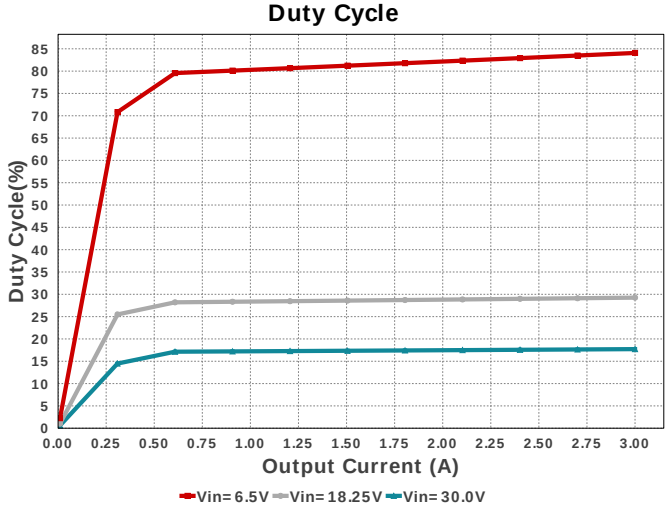
Electrical BOM

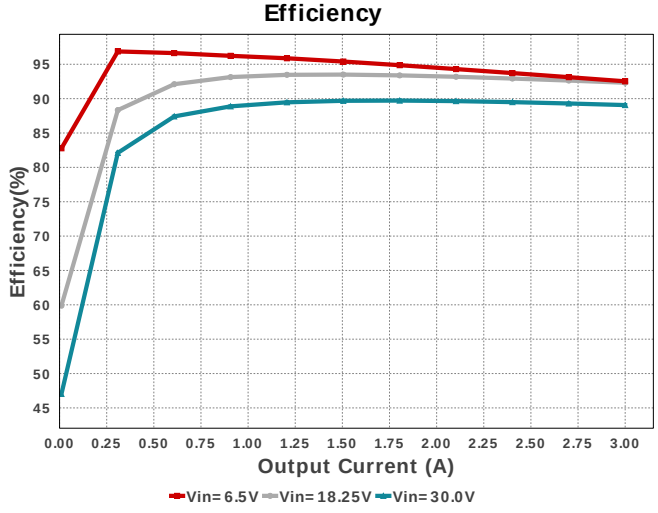
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Yageo	CC0805KRX7R9BB104 Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
2.	Cin	TDK	C3216X5R1H106K160AB Series= X5R	Cap= 10.0 uF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 4.9 A	1	$0.30	1206_180 11 mm²
3.	Cinx	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	TDK	C3216X5R1A686M160AC Series= X5R	Cap= 68.0 uF ESR= 3.494 mOhm VDC= 10.0 V IRMS= 3.8813 A	1	$0.55	1206_190 11 mm²
5.	Coutx	MuRata	GRM21BR71A105KA01L Series= X7R	Cap= 1.0 uF ESR= 5.0 mOhm VDC= 10.0 V IRMS= 3.92 A	1	$0.03	0805 7 mm²
6.	Cvcc	Kemet	C0603C105Z8VACTU Series= Y5V	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
7.	L1	Bourns	SDR1307-120ML	L= 12.0 µH DCR= 30.0 mOhm	1	$0.42	SDR1307 226 mm²

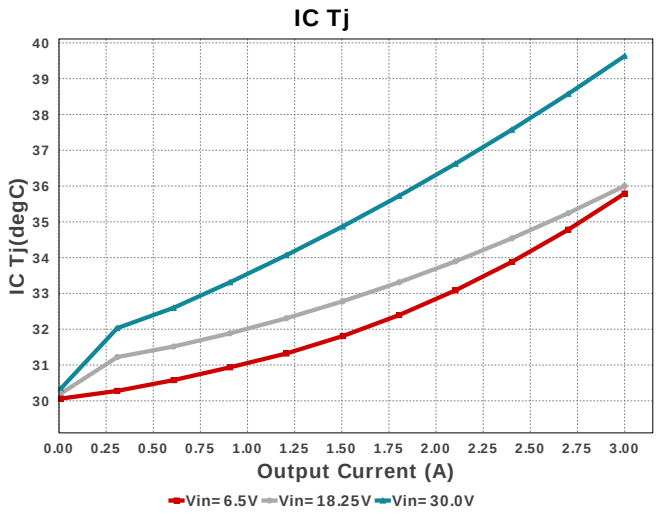
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Rfbb	Panasonic	ERJ-6ENF2432V Series= ERJ-6E	Res= 24300.0Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm^2
9.	Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100000.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
10.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100000.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
11.	U1	Texas Instruments	LMR33630ADDAR	Switcher	1	$1.62	 DDA0008J 55 mm^2

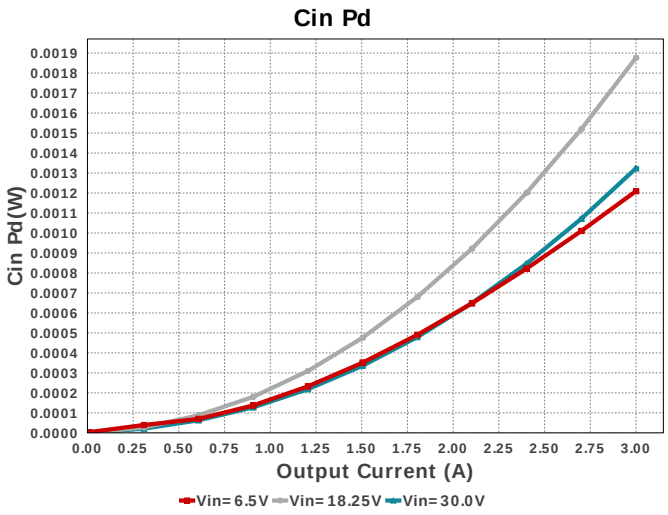


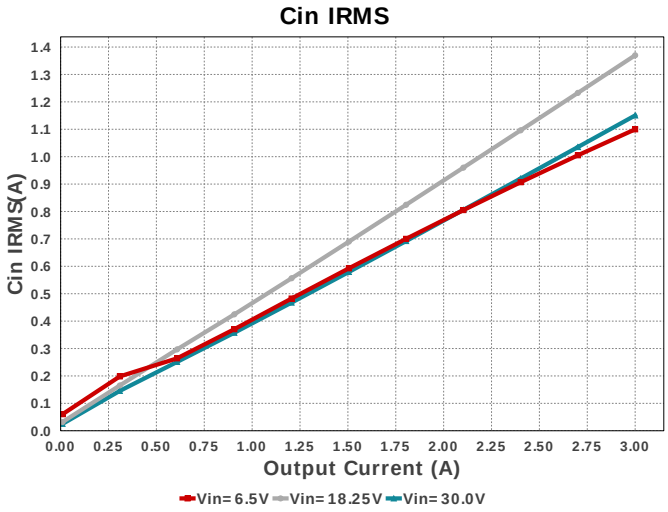


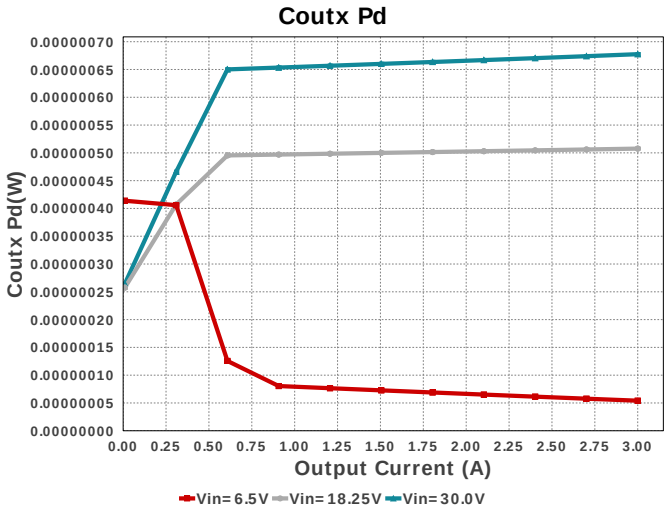


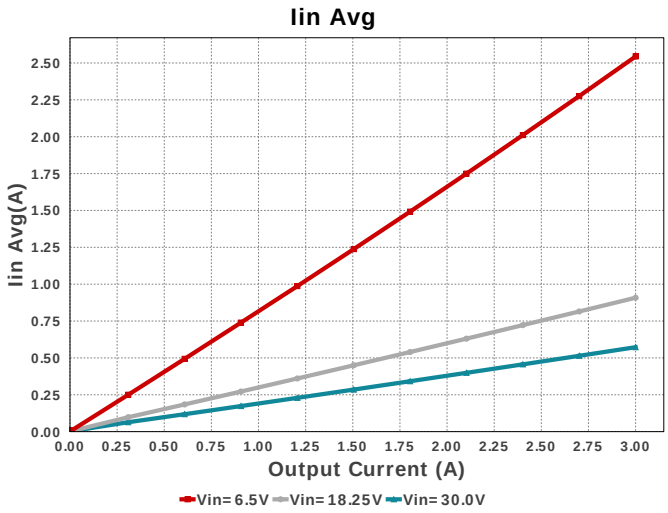


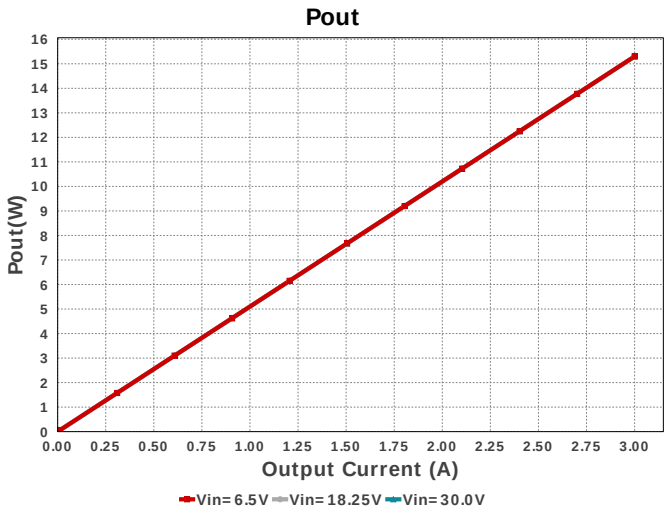


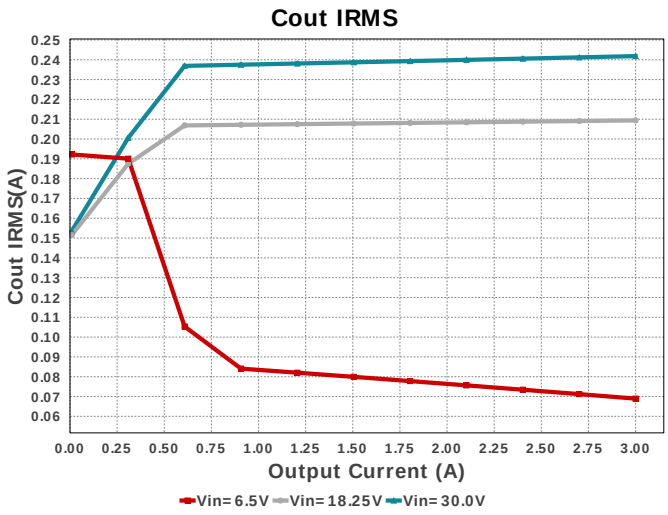


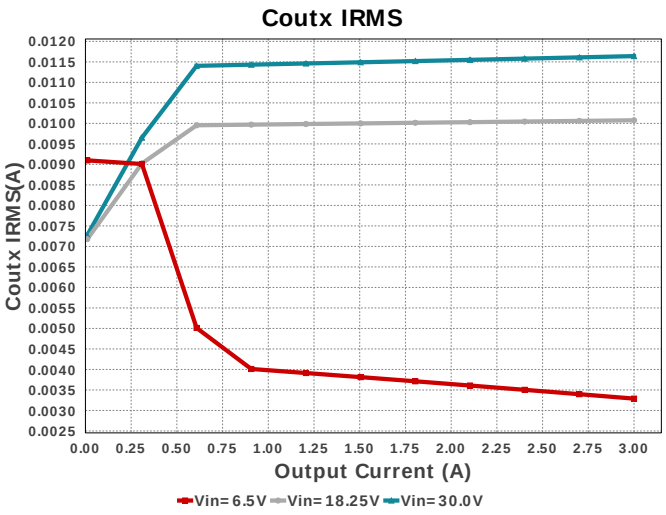


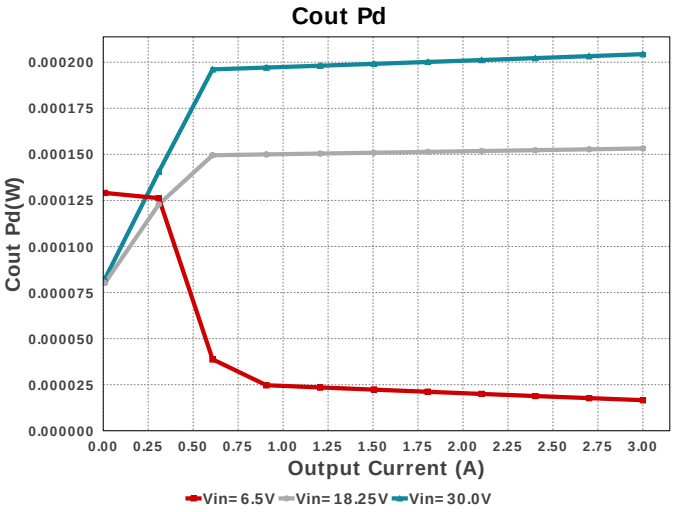


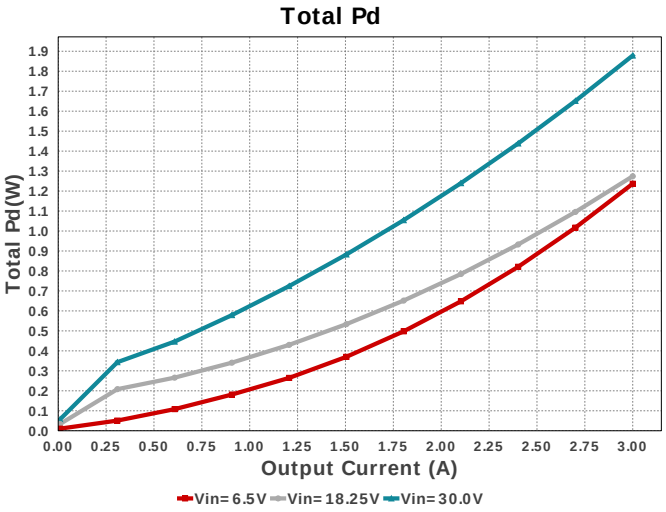


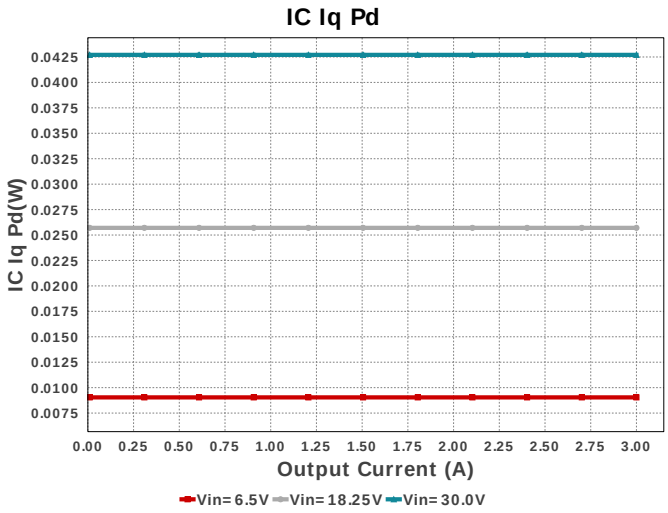


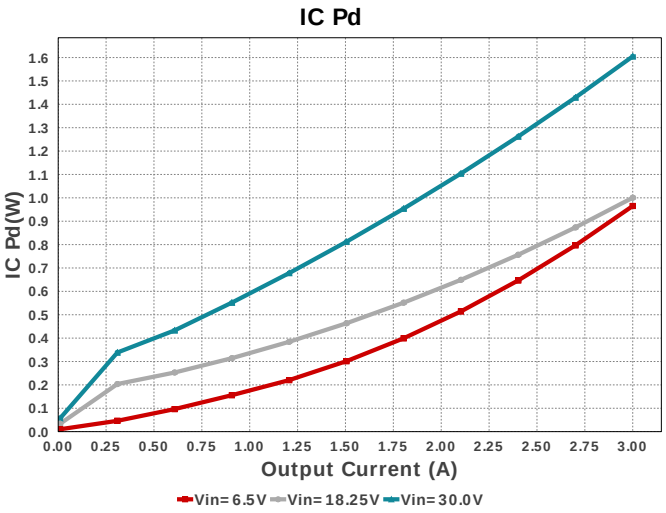


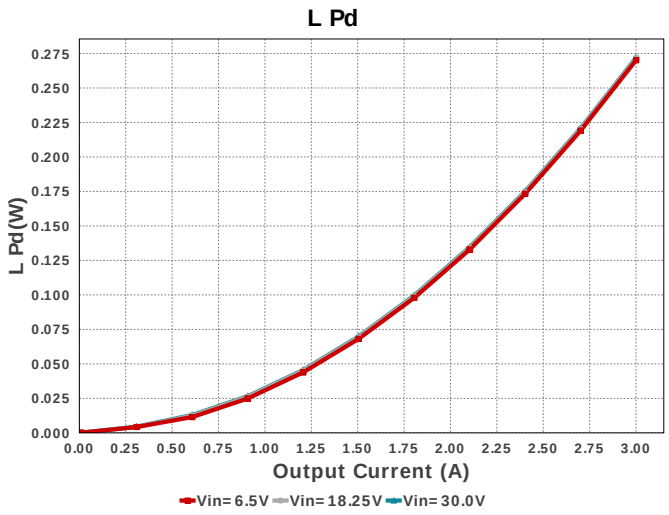


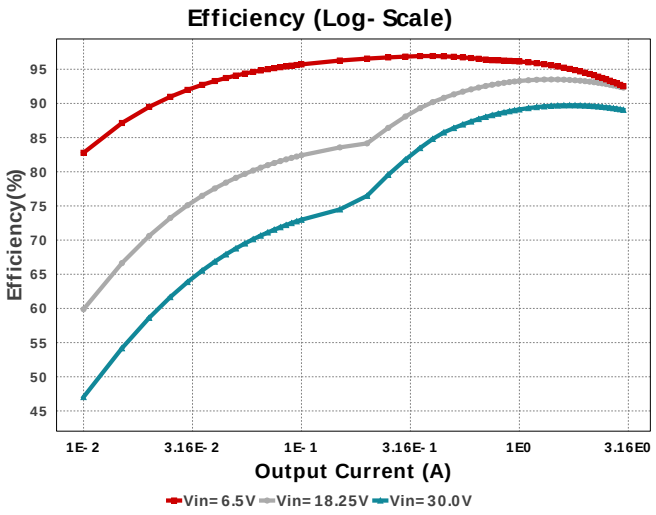












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.15 A	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	1.324 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	241.852 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	204.37 µW	Capacitor	Output capacitor power dissipation
5.	Coutx IRMS	11.641 mA	Capacitor	Output capacitor_x RMS ripple current
6.	Coutx Pd	677.54 nW	Capacitor	Output capacitor_x power loss
7.	IC Iq Pd	42.707 mW	IC	IC Iq Pd
8.	IC Pd	1.605 W	IC	IC power dissipation
9.	IC Tj	39.63 degC	IC	IC junction temperature
10.	ICThetaJA Effective	6.0 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
11.	Iin Avg	572.62 mA	IC	Average input current
12.	L Ipp	878.13 mA	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	271.93 mW	Inductor	Inductor power dissipation
14.	Cin Pd	1.324 mW	Power	Input capacitor power dissipation
15.	Cout Pd	204.37 µW	Power	Output capacitor power dissipation
16.	Coutx Pd	677.54 nW	Power	Output capacitor_x power loss
17.	IC Pd	1.605 W	Power	IC power dissipation
18.	L Pd	271.93 mW	Power	Inductor power dissipation
19.	Total Pd	1.879 W	Power	Total Power Dissipation
20.	BOM Count	11	System Information	Total Design BOM count
21.	Duty Cycle	17.719 %	System Information	Duty cycle
22.	Efficiency	89.064 %	System Information	Steady state efficiency
23.	FootPrint	341.0 mm^2	System Information	Total Foot Print Area of BOM components
24.	Frequency	411.941 kHz	System Information	Switching frequency
25.	Iout	3.0 A	System Information	Iout operating point
26.	Mode	CCM	System Information	Conduction Mode
27.	Pout	15.3 W	System Information	Total output power
28.	Total BOM	$3.01	System Information	Total BOM Cost
29.	Vin	30.0 V	System Information	Vin operating point
30.	Vout	5.1 V	System Information	Operational Output Voltage
31.	Vout Actual	5.115 V	System Information	Vout Actual calculated based on selected voltage divider resistors
32.	Vout Tolerance	3.15 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
33.	Vout p-p	12.778 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current

#	Name	Value	Description
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	6.5	Minimum input voltage
4.	Vout	5.1	Output Voltage
5.	acFrequency	60.0	AC Frequency
6.	base_pn	LMR33630A-SOIC	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	30.0	Ambient temperature

Design Assistance

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