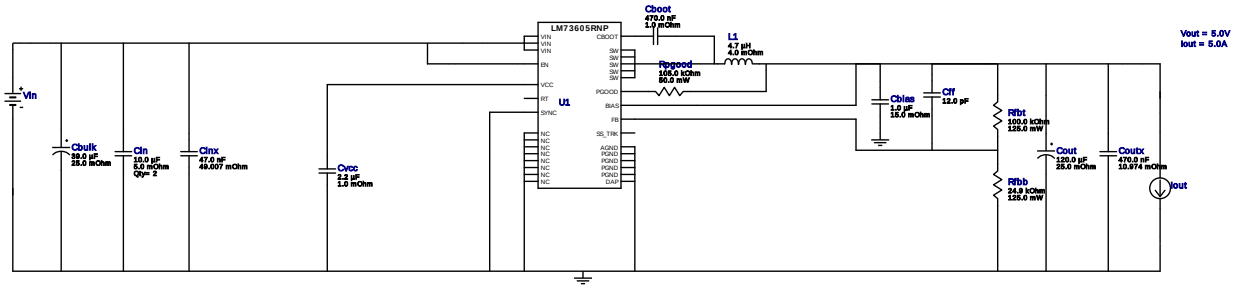
VinMin = 8.0V
VinMax = 30.0V
Vout = 5.0V
Iout = 5.0A

Device = LM73605RNPR
Topology = Buck
Created = 2018-10-30 13:58:51.269
BOM Cost = $5.39
BOM Count = 15
Total Pd = 2.15W

WEBENCH® Design Report

Design : LM73605RNPR
LM73605RNPR 8V-30V to 5.00V @ 5A



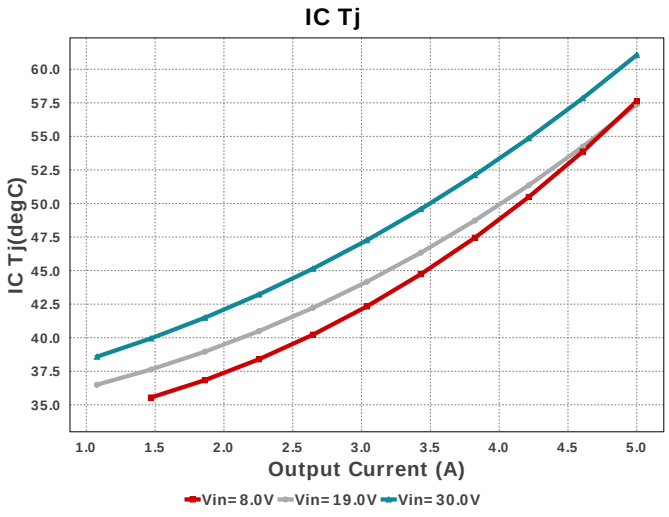
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

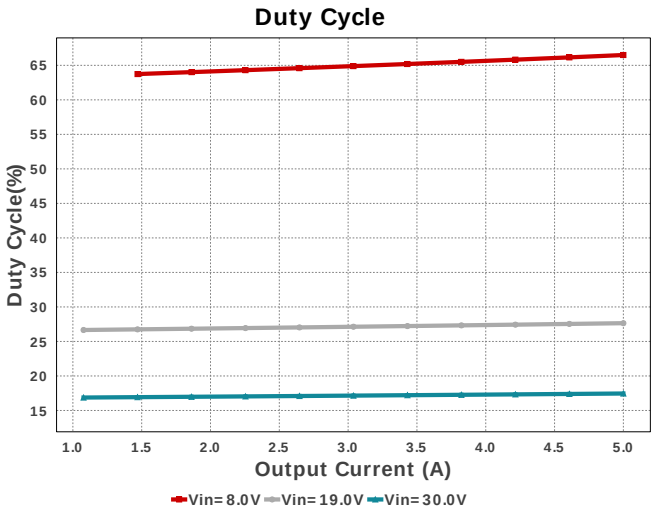
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating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

Electrical BOM

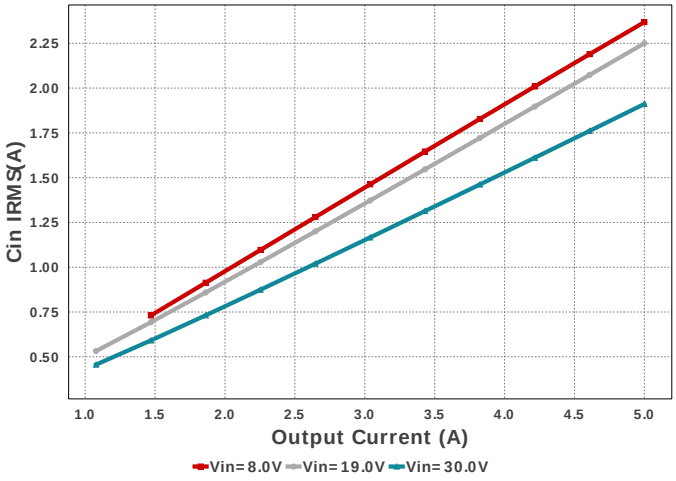
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Kemet	C0805C105K4RACTU Series= X7R	Cap= 1.0 uF ESR= 15.0 mOhm VDC= 16.0 V IRMS= 8.19 A	1	$0.02	0805 7 mm^2
2.	Cboot	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0402 3 mm^2
3.	Cbulk	Panasonic	50SVPF39M Series= SVPF	Cap= 39.0 uF ESR= 25.0 mOhm VDC= 50.0 V IRMS= 3.8 A	1	$0.78	CAPSMT_62_E12 106 mm^2
4.	Cff	MuRata	GRM0335C1E120JA01D Series= C0G/NP0	Cap= 12.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
5.	Cin	Samsung Electro-Mechanics	CL32B106KBJNNWE Series= X7R	Cap= 10.0 uF ESR= 5.0 mOhm VDC= 50.0 V IRMS= 0.0 A	2	$0.22	1210_270 15 mm^2
6.	Cinx	TDK	C1608X5R1H473K080AA Series= X5R	Cap= 47.0 nF ESR= 49.007 mOhm VDC= 50.0 V IRMS= 767.53 mA	1	$0.01	0603 5 mm^2
7.	Cout	Chemi-Con	APXE100ARA121MF61G Series= PXE	Cap= 120.0 uF ESR= 25.0 mOhm VDC= 10.0 V IRMS= 2.53 A	1	$0.46	CAPSMT_62_F61 74 mm^2
8.	Coutx	TDK	C1608X5R1H474K080AB Series= X5R	Cap= 470.0 nF ESR= 10.974 mOhm VDC= 50.0 V IRMS= 1.57483 A	1	$0.04	0603 5 mm^2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cvcc	Taiyo Yuden	EMK212BJ225KG-T Series= X5R	Cap= 2.2 uF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
10.	L1	Coilcraft	MLC1565-472MLB	L= 4.7 µH DCR= 4.0 mOhm	1	$1.05	MLC1565 243 mm²
11.	Rfbb	Vishay-Dale	CRCW080524K9FKEA Series= CRCW..e3	Res= 24.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
12.	Rfbt	Panasonic	ERJ-6ENF1003V Series= ERJ-6E	Res= 100.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
13.	Rpgood	Yageo	RC0201FR-07105KL Series= ?	Res= 105.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
14.	U1	Texas Instruments	LM73605RNPR	Switcher	1	$2.50	RNP0030A 48 mm²

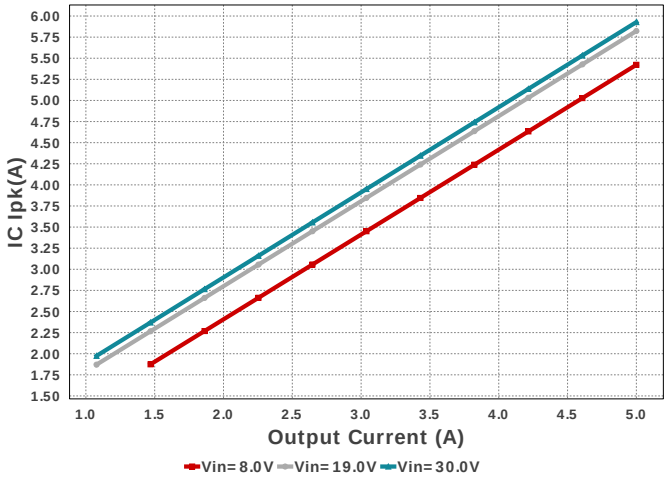




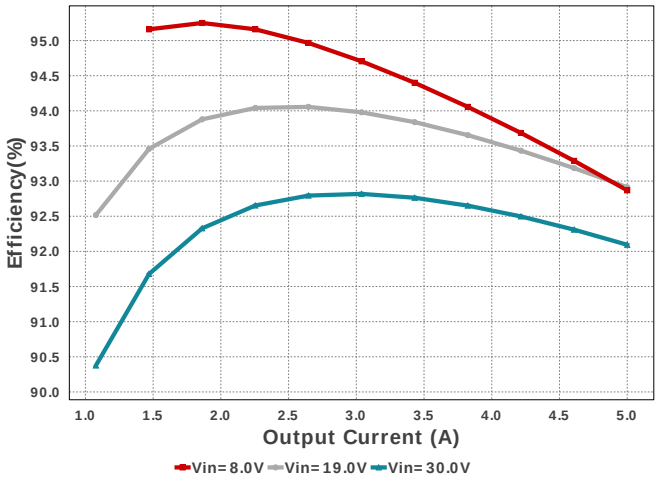
Cin IRMS



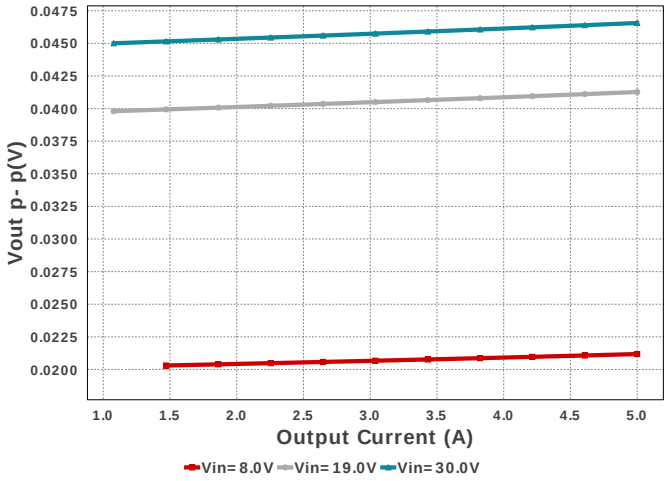
IC Ipk



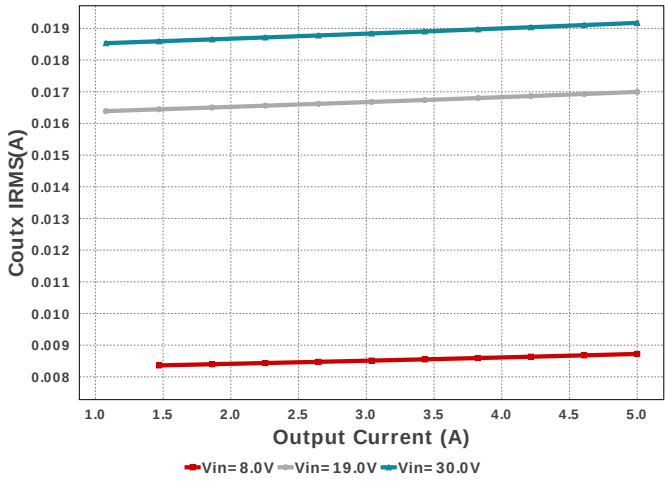
Efficiency



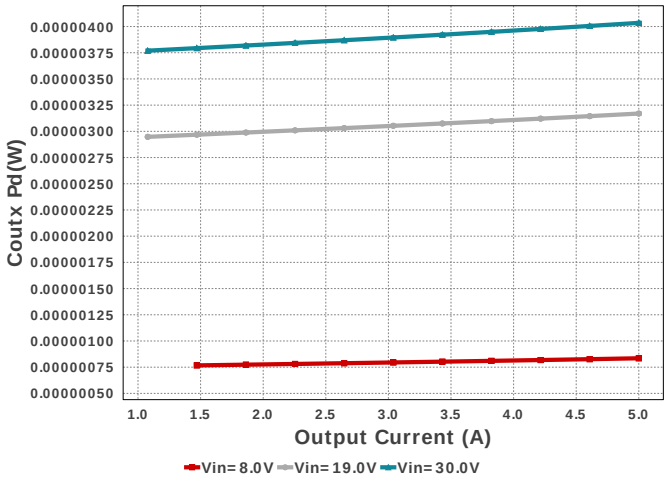
Vout p- p

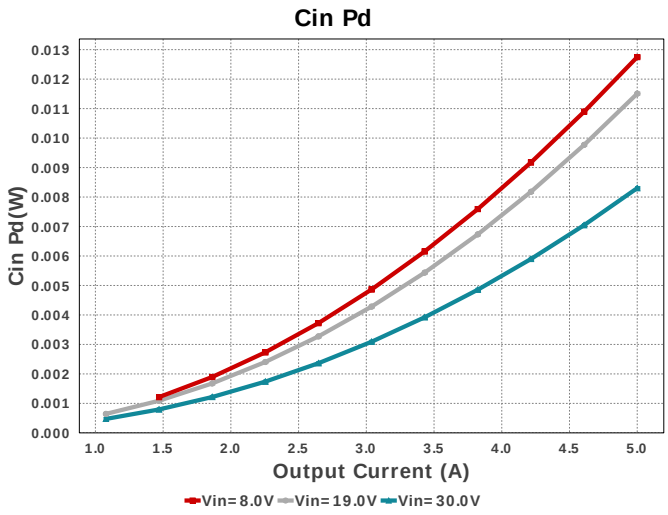


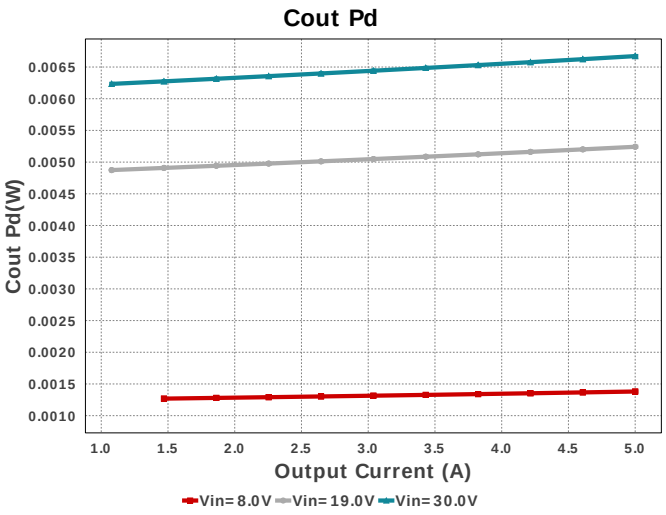
Coutx IRMS

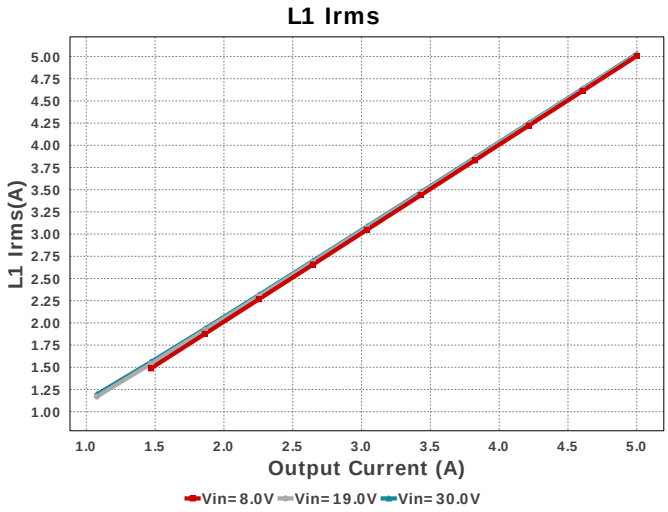


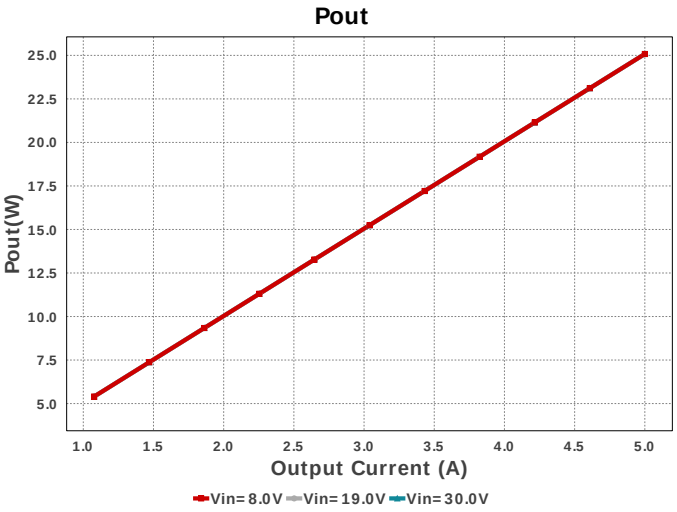
Coutx Pd

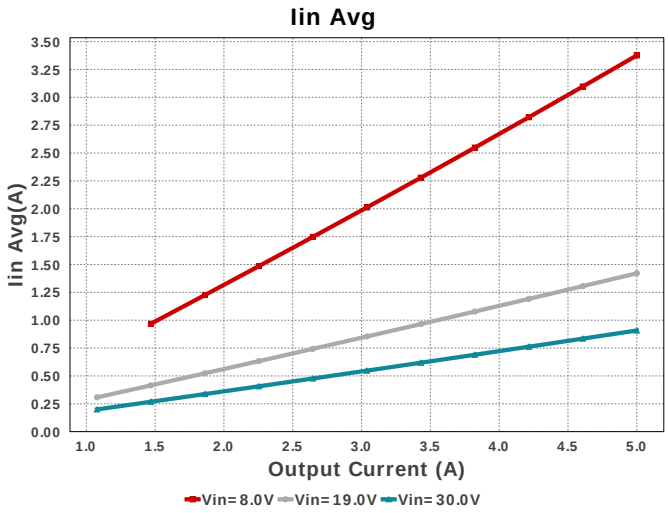


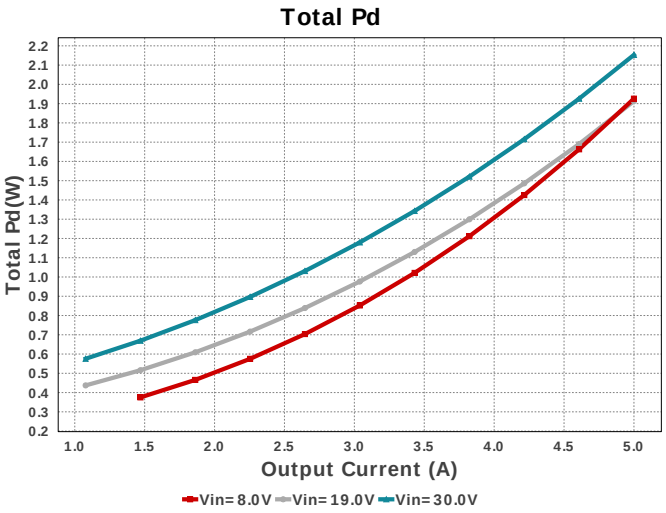


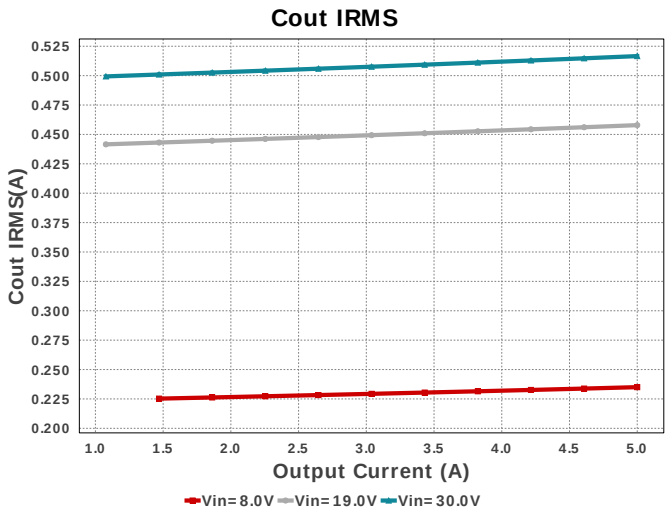


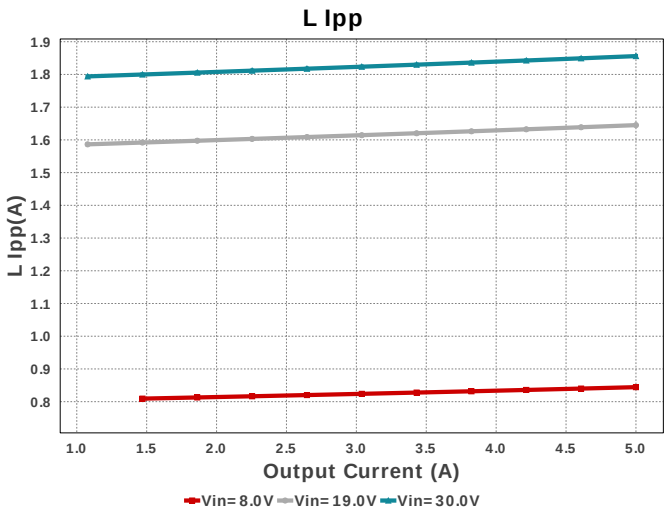


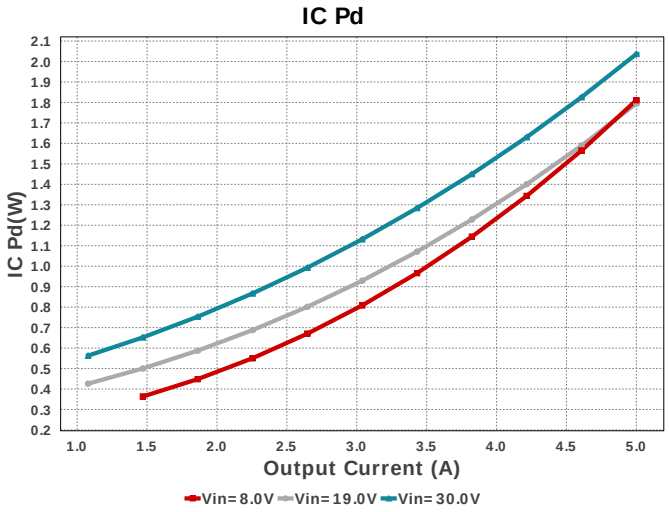


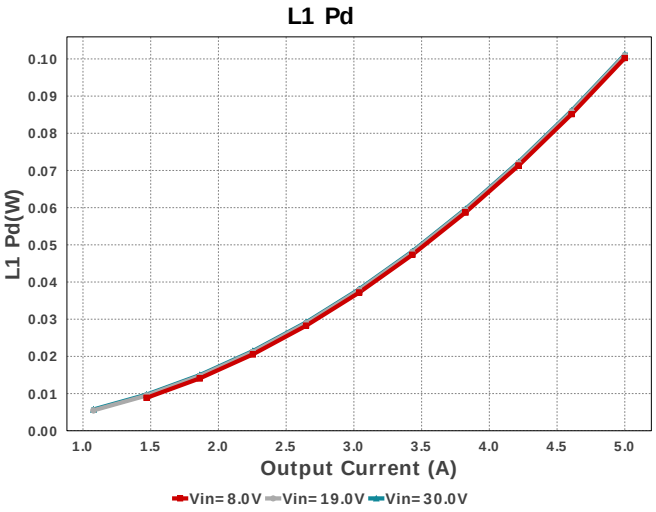


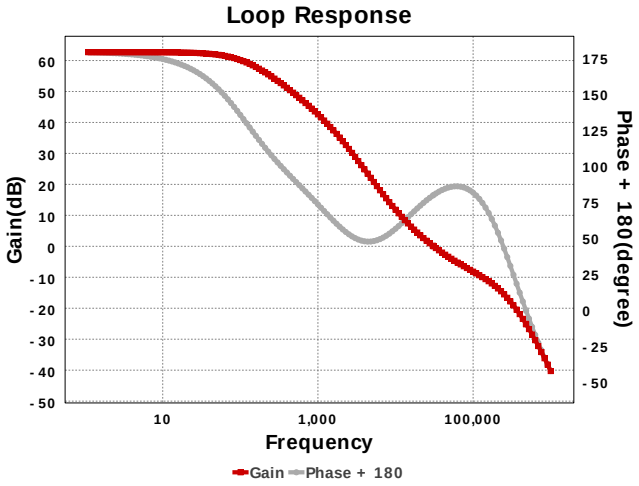












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.911 A	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	8.301 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	516.621 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	6.672 mW	Capacitor	Output capacitor power dissipation
5.	Coutx IRMS	19.175 mA	Capacitor	Output capacitor_x RMS ripple current
6.	Coutx Pd	4.035 µW	Capacitor	Output capacitor_x power loss
7.	IC Ipk	5.928 A	IC	Peak switch current in IC
8.	IC Pd	2.037 W	IC	IC power dissipation
9.	IC Tj	61.061 degC	IC	IC junction temperature
10.	ICThetaJA	15.25 degC/W	IC	IC junction-to-ambient thermal resistance
11.	Iin Avg	907.78 mA	IC	Average input current

#	Name	Value	Category	Description
12.	L Ipp	1.856 A	Inductor	Peak-to-peak inductor ripple current
13.	L1 Irms	5.029 A	Inductor	Inductor ripple current
14.	L1 Pd	101.15 mW	Inductor	Power Dissipation in the Inductor
15.	Cin Pd	8.301 mW	Power	Input capacitor power dissipation
16.	Cout Pd	6.672 mW	Power	Output capacitor power dissipation
17.	Coutx Pd	4.035 µW	Power	Output capacitor_x power loss
18.	IC Pd	2.037 W	Power	IC power dissipation
19.	L1 Pd	101.15 mW	Power	Power Dissipation in the Inductor
20.	Total Pd	2.153 W	Power	Total Power Dissipation
21.	BOM Count	15	System Information	Total Design BOM count
22.	Cross Freq	30.951 kHz	System Information	Bode plot crossover frequency
23.	Duty Cycle	17.458 %	System Information	Duty cycle
24.	Efficiency	92.094 %	System Information	Steady state efficiency
25.	FootPrint	544.0 mm^2	System Information	Total Foot Print Area of BOM components
26.	Frequency	500.0 kHz	System Information	Switching frequency
27.	Gain Marg	-25.193 dB	System Information	Bode Plot Gain Margin
28.	Iout	5.0 A	System Information	Iout operating point
29.	Low Freq Gain	62.687 dB	System Information	Gain at 1Hz
30.	Mode	PWM	System Information	Conduction Mode
31.	Phase Marg	80.352 deg	System Information	Bode Plot Phase Margin
32.	Pout	25.08 W	System Information	Total output power
33.	Total BOM	$5.39	System Information	Total BOM Cost
34.	Vin	30.0 V	System Information	Vin operating point
35.	Vout	5.0 V	System Information	Operational Output Voltage
36.	Vout Actual	5.016 V	System Information	Vout Actual calculated based on selected voltage divider resistors
37.	Vout Tolerance	3.548 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
38.	Vout p-p	46.562 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	8.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM73605	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM73605** Product Folder : http://www.ti.com/product/LM73605 : contains the data sheet and other resources.

