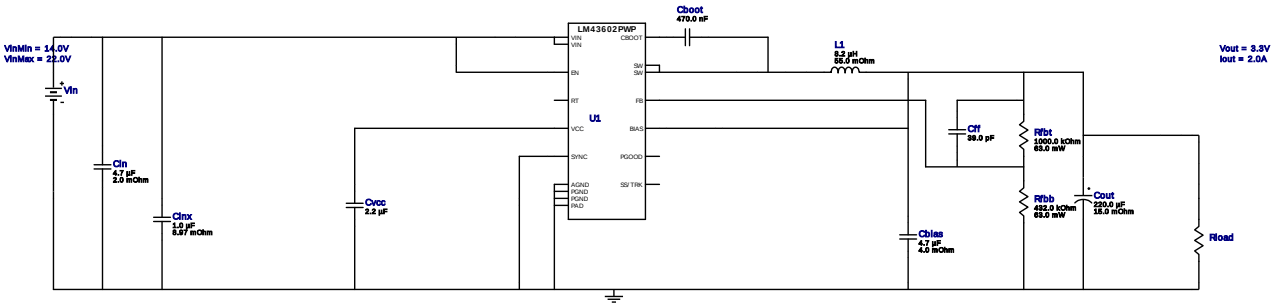
WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 3.3V
Iout = 2.0A

Device = LM43602PWPR
Topology = Buck
Created = 6/19/15 1:25:37 AM
BOM Cost = $2.46
Footprint = 224.0 mm^2
BOM Count = 11
Total Pd = 0.98W

Design : 4216432/1 LM43602PWPR
LM43602PWPR 14.0V-22.0V to 3.30V @ 2.0A



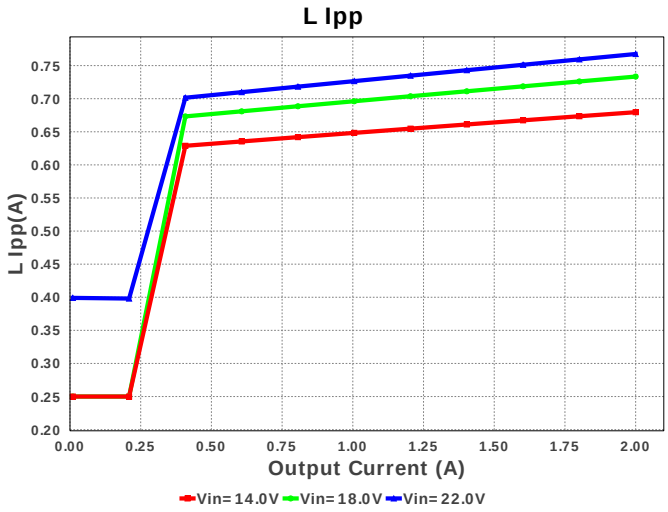
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

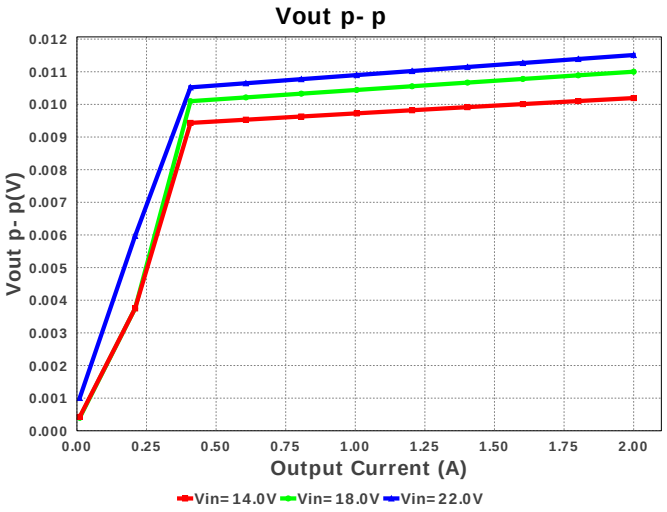
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating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

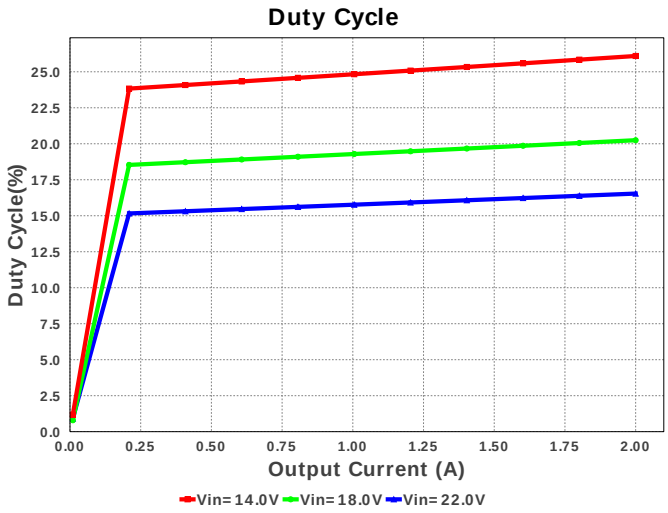
Electrical BOM

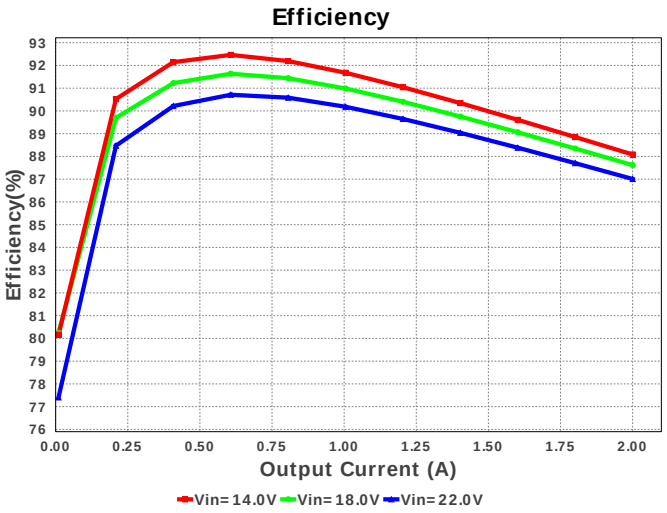
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Taiyo Yuden	JMK212BJ475KG-T Series= X5R	Cap= 4.7 uF ESR= 4.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.02	0805 7 mm^2
2.	Cboot	MuRata	GRM155C80J474KE19D Series= 379	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Cff	Kemet	C0201C390J3GACTU Series= C0G/NP0	Cap= 39.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm^2
4.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	1	$0.29	1210 15 mm^2
5.	Cinx	TDK	C3216X5R1H105K Series= X5R	Cap= 1.0 uF ESR= 8.97 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.04	1206 11 mm^2
6.	Cout	Panasonic	6SVPE220MW Series= 259	Cap= 220.0 uF ESR= 15.0 mOhm VDC= 6.3 V IRMS= 3.15 A	1	$0.14	CAPSMT_62_E61 53 mm^2
7.	Cvcc	Kemet	C0603C225K9PACTU Series= X5R	Cap= 2.2 uF VDC= 6.3 V IRMS= 0.0 A	1	$0.02	0603 5 mm^2
8.	L1	Bourns	SRN6045-8R2Y	L= 8.2 µH DCR= 55.0 mOhm	1	$0.16	SRN6045 64 mm^2
9.	Rfbb	Vishay-Dale	CRCW0402432KFKED Series= CRCW..e3	Res= 432.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

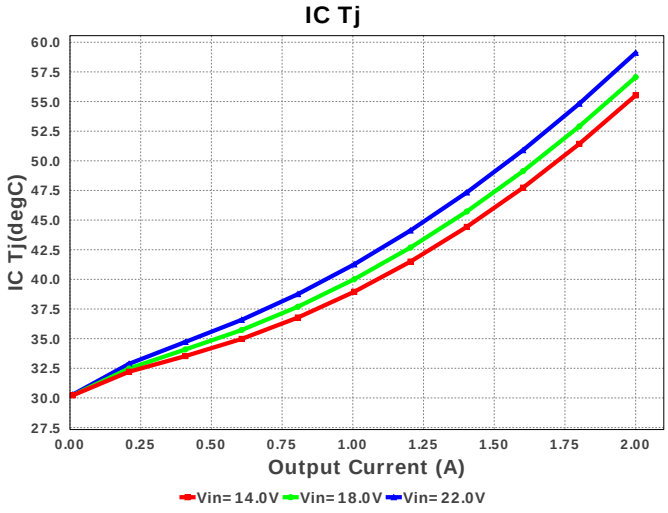
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfbt	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	U1	Texas Instruments	LM43602PWPR	Switcher	1	$1.75	 PWP0016F 59 mm^2

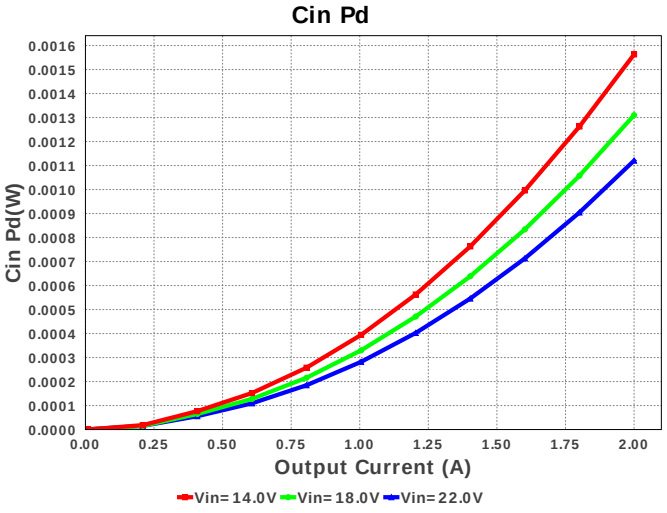




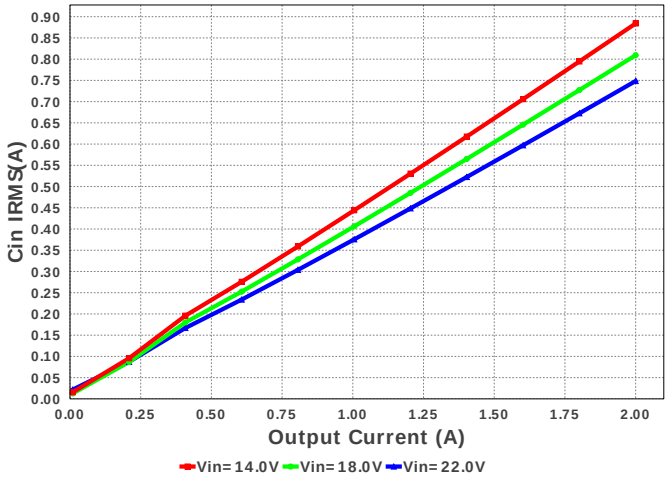




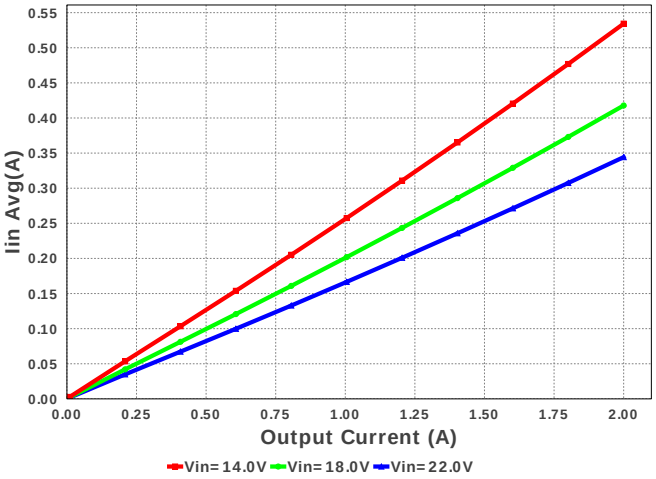




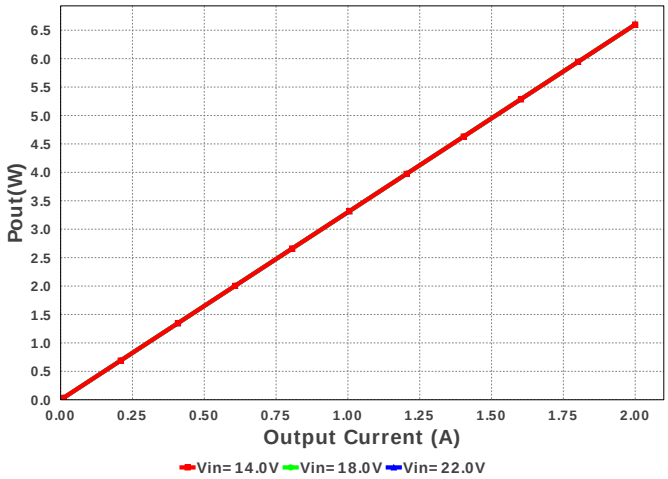
Cin IRMS



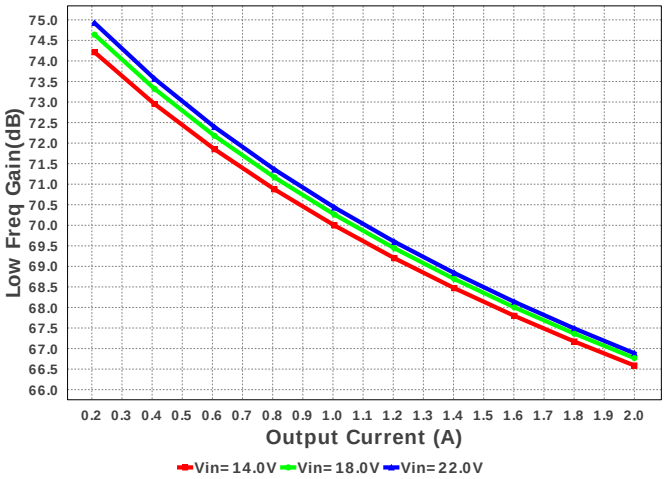
Iin Avg



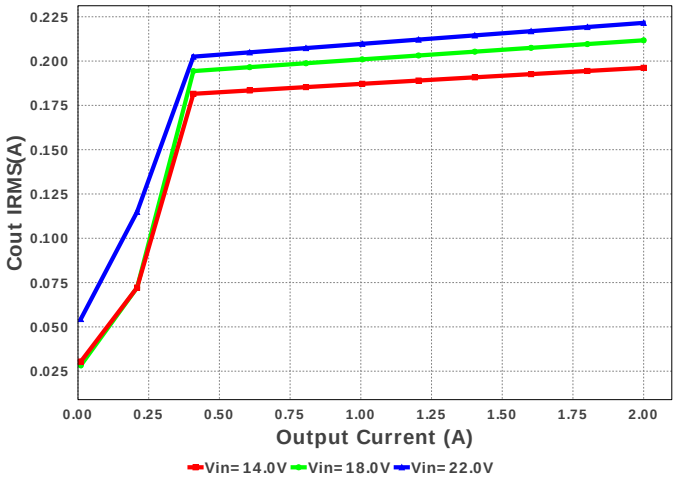
Pout



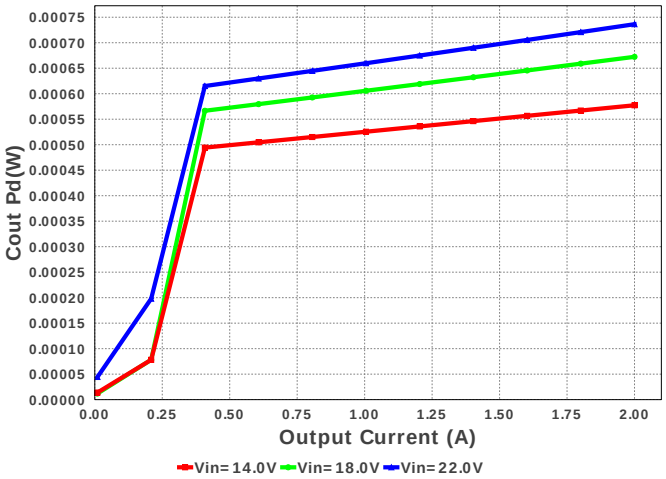
Low Freq Gain



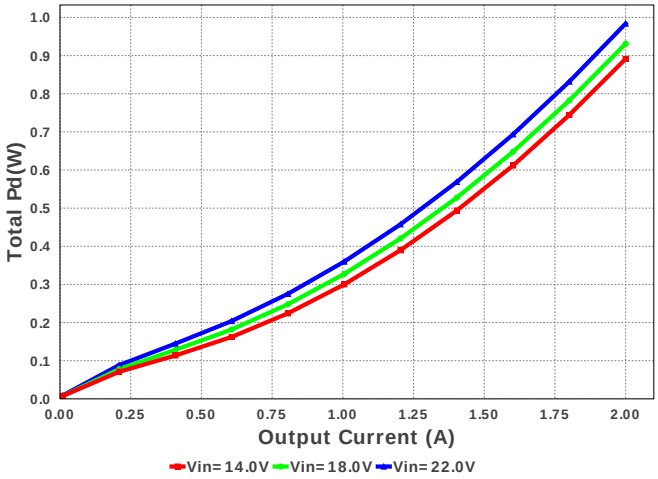
Cout IRMS



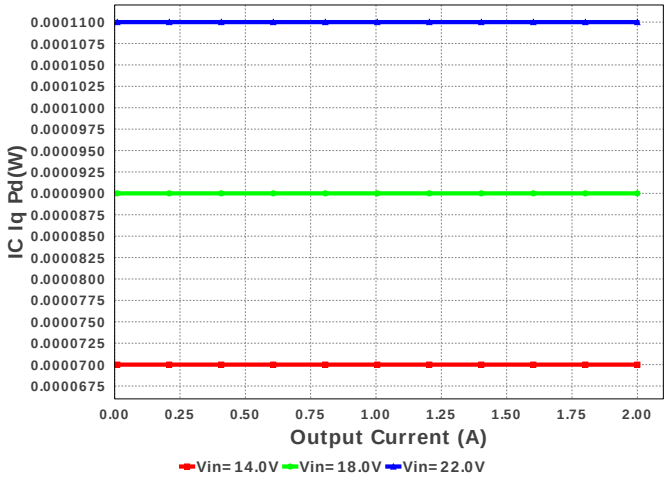
Cout Pd



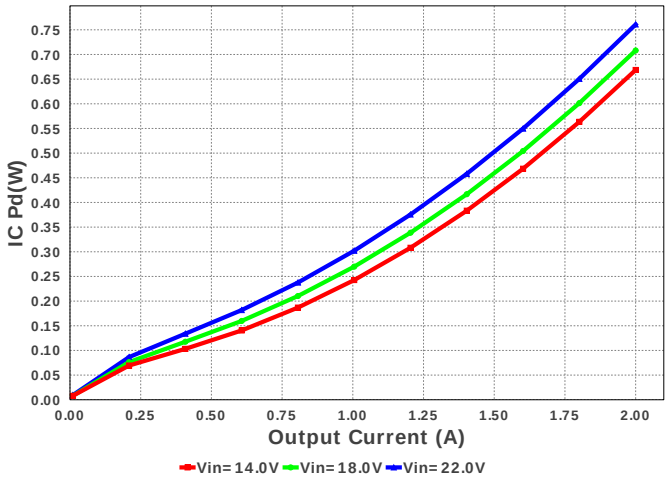
Total Pd



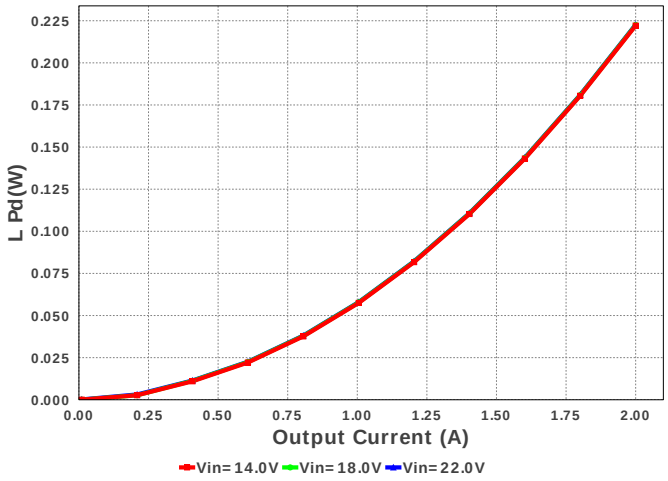
IC Iq Pd



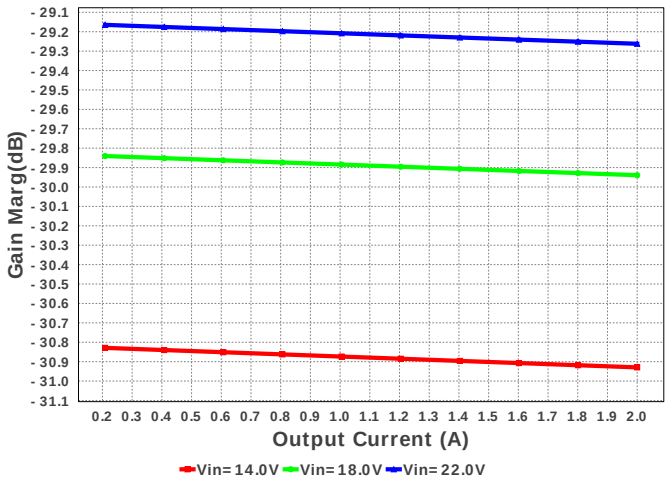
IC Pd



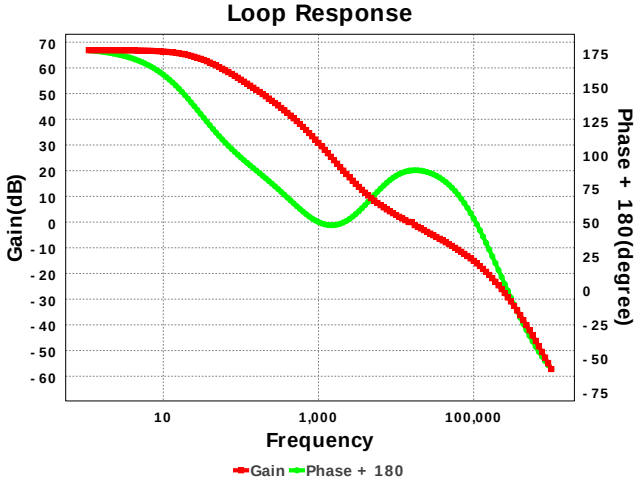
L Pd

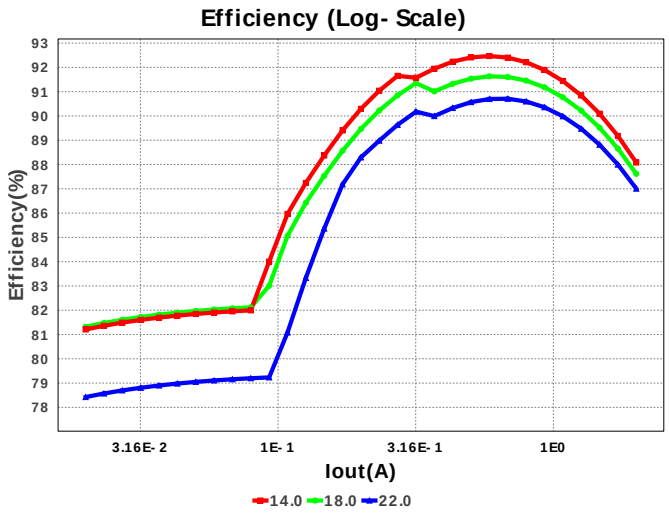


Gain Marg



Loop Response





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	748.501 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	221.558 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	344.22 mA	Current	Average input current
4.	L Ipp	767.5 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	11	General	Total Design BOM count
6.	FootPrint	224.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	500.0 kHz	General	Switching frequency
8.	Pout	6.6 W	General	Total output power
9.	Total BOM	$2.46	General	Total BOM Cost
10.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
11.	Cross Freq	14.66 kHz	Op_point	Bode plot crossover frequency
12.	Duty Cycle	16.539 %	Op_point	Duty cycle
13.	Efficiency	87.008 %	Op_point	Steady state efficiency
14.	Gain Marg	-29.262 dB	Op_point	Bode Plot Gain Margin
15.	IC Tj	59.112 degC	Op_point	IC junction temperature
16.	ICThetaJA	38.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	2.0 A	Op_point	Iout operating point
18.	Phase Marg	88.726 deg	Op_point	Bode Plot Phase Margin
19.	VIN_OP	22.0 V	Op_point	Vin operating point
20.	Vout p-p	11.512 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	1.121 mW	Power	Input capacitor power dissipation
22.	Cout Pd	736.317 µW	Power	Output capacitor power dissipation
23.	IC Iq Pd	110.0 µW	Power	IC Iq Pd
24.	IC Pd	760.917 mW	Power	IC power dissipation
25.	L Pd	222.7 mW	Power	Inductor power dissipation
26.	Total Pd	983.863 mW	Power	Total Power Dissipation
27.	Low Freq Gain	66.885 dB	Unknown	Gain at 10Hz

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	Iout1	2.0	Output Current #1
3.	VinMax	22.0	Maximum input voltage
4.	VinMin	14.0	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	Vout1	3.3	Output Voltage #1
7.	base_pn	LM43602	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM43602** Product Folder : http://www.ti.com/product/LM43602 : contains the data sheet and other resources.