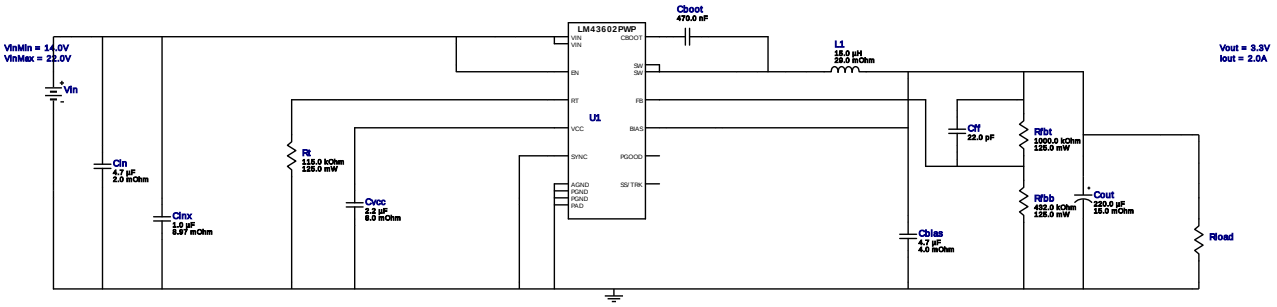
WEBENCH® Design Report

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

Device = LM43602PWPR
Topology = Buck
Created = 8/5/15 12:01:57 AM
BOM Cost = $2.65
Footprint = 325.0 mm^2
BOM Count = 12
Total Pd = 0.78W

Design : 4434382/1 LM43602PWPR
LM43602PWPR 14.0V-22.0V to 3.30V @ 2.0A



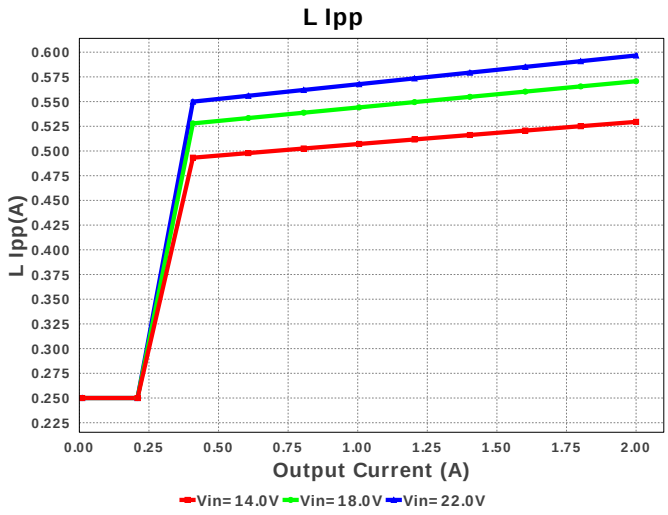
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

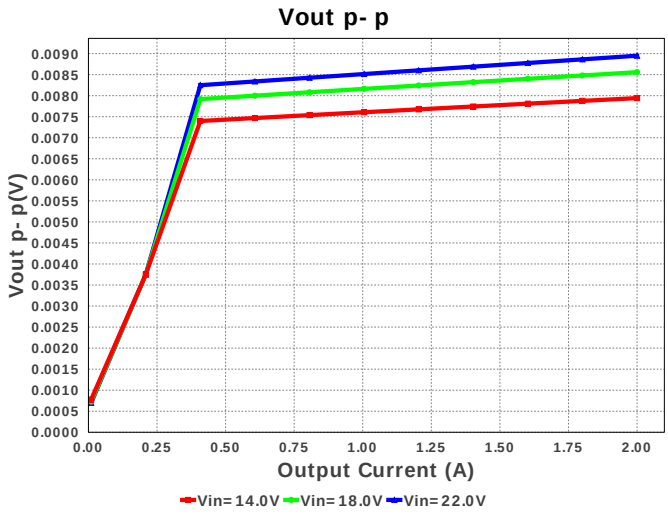
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating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

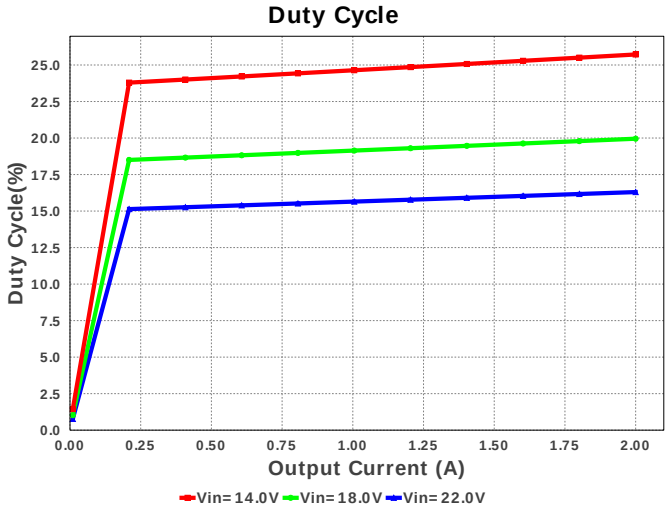
Electrical BOM

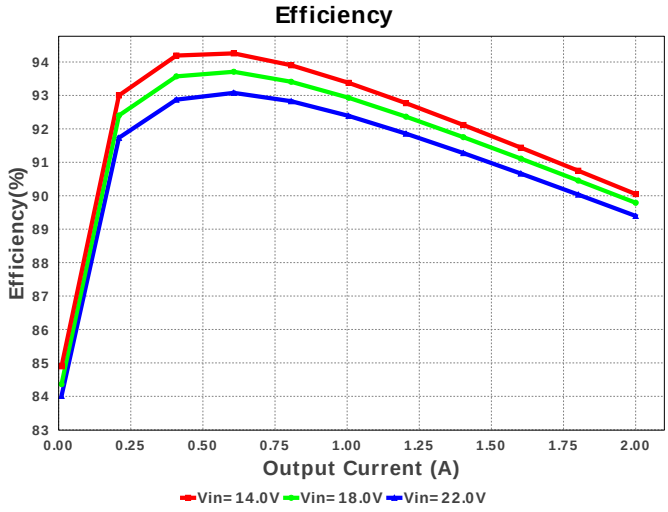
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Taiyo Yuden	JMK212BJ475KG-T Series= X5R	Cap= 4.7 uF ESR= 4.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.02	0805 7 mm^2
2.	Cboot	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Cff	Kemet	C0805C220K3GACTU Series= C0G/NP0	Cap= 22.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 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= SVPE	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	C0805C225K8RACTU Series= X7R	Cap= 2.2 uF ESR= 8.0 mOhm VDC= 10.0 V IRMS= 15.55 A	1	$0.03	0805 7 mm^2
8.	L1	Bourns	SRU1048-150Y	L= 15.0 µH DCR= 29.0 mOhm	1	$0.33	SRU1048 144 mm^2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rfbb	Panasonic	ERJ-6ENF4323V Series= ERJ-6E	Res= 432.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm^2
10.	Rfbt	Panasonic	ERJ-6ENF1004V Series= ERJ-6E	Res= 1000.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm^2
11.	Rt	Panasonic	ERJ-6ENF1153V Series= ERJ-6E	Res= 115.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm^2
12.	U1	Texas Instruments	LM43602PWPR	Switcher	1	$1.75	PWP0016F 59 mm^2

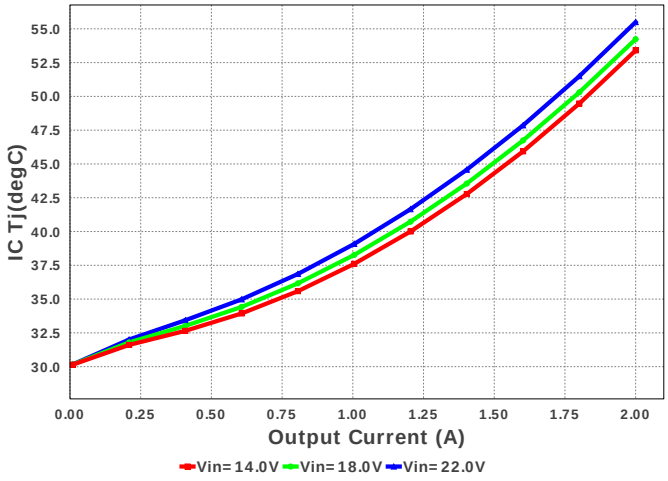




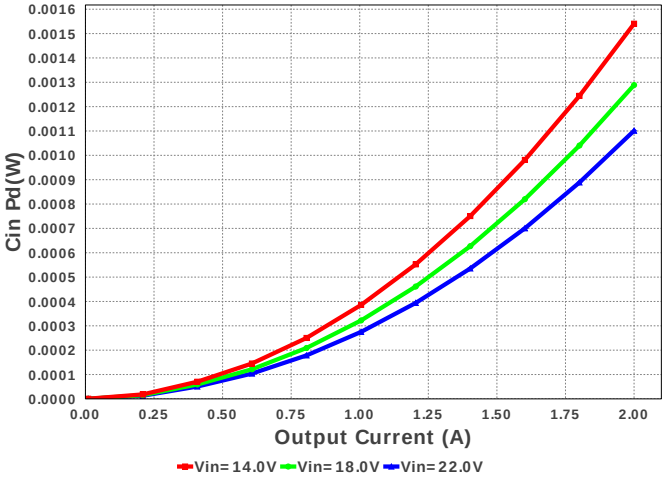




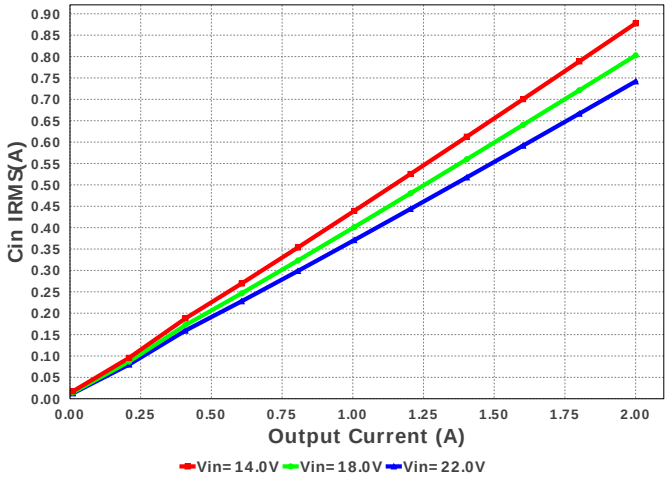
IC Tj



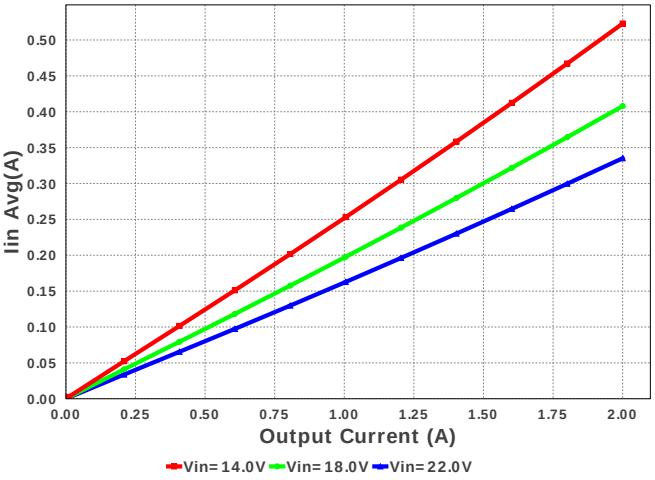
Cin Pd



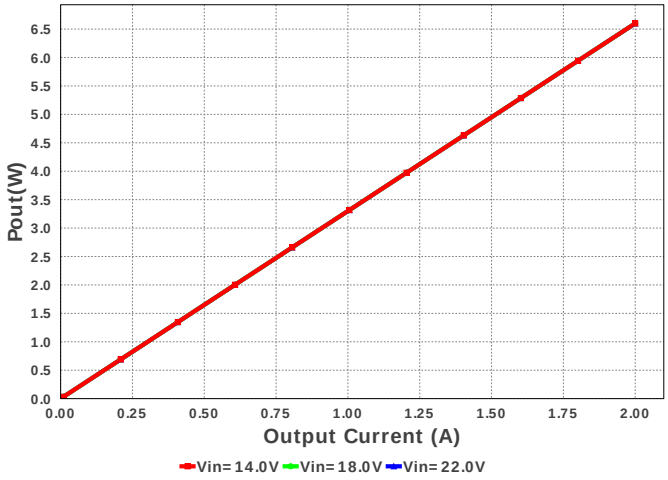
Cin IRMS



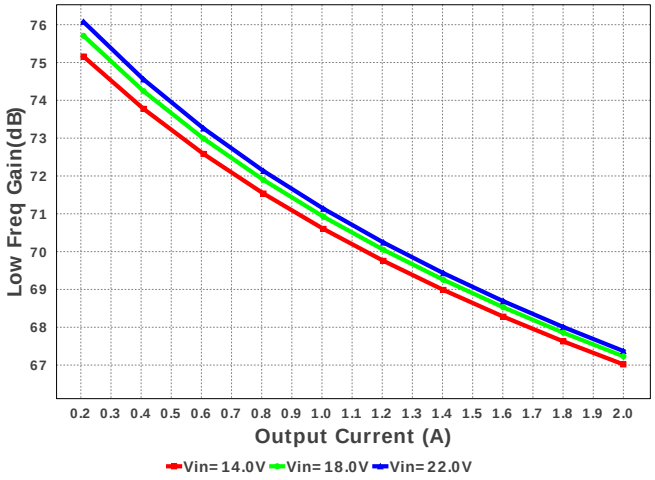
Iin Avg

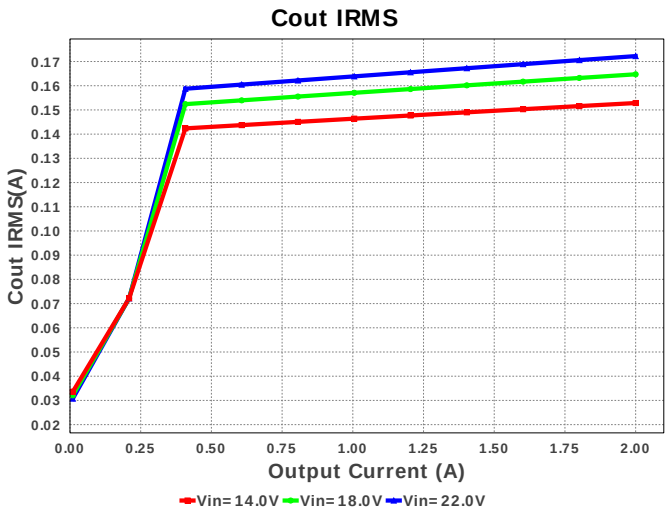


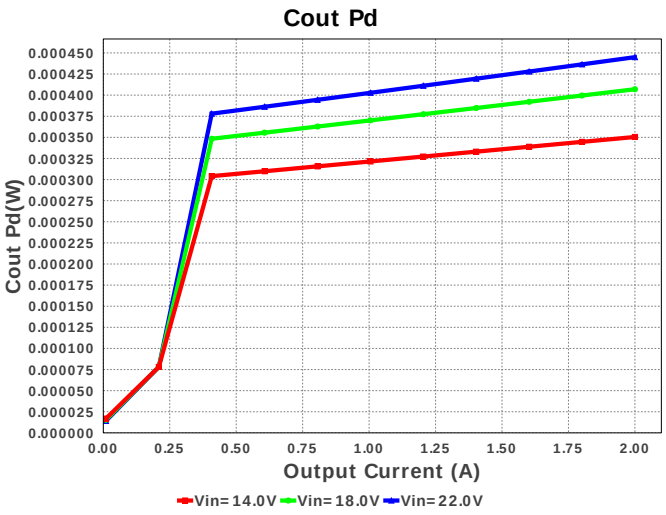
Pout

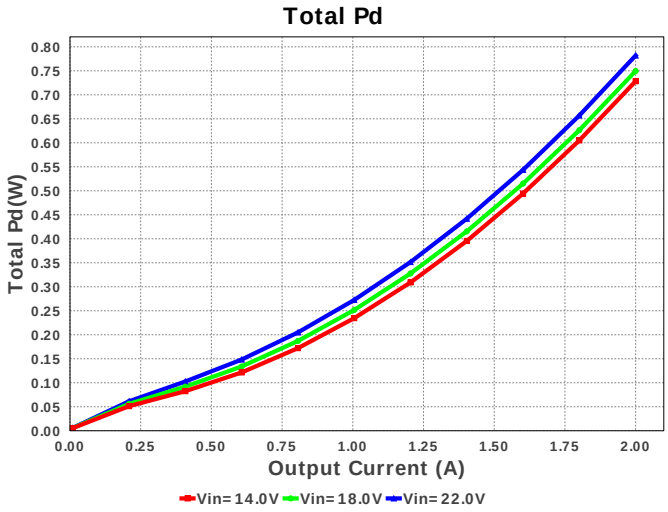


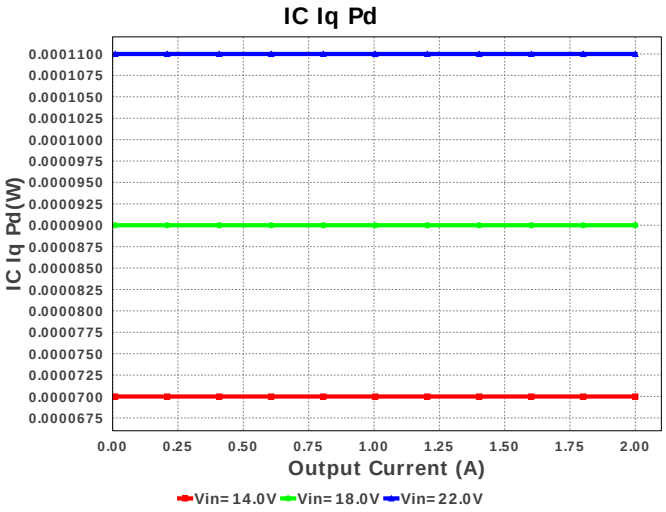
Low Freq Gain

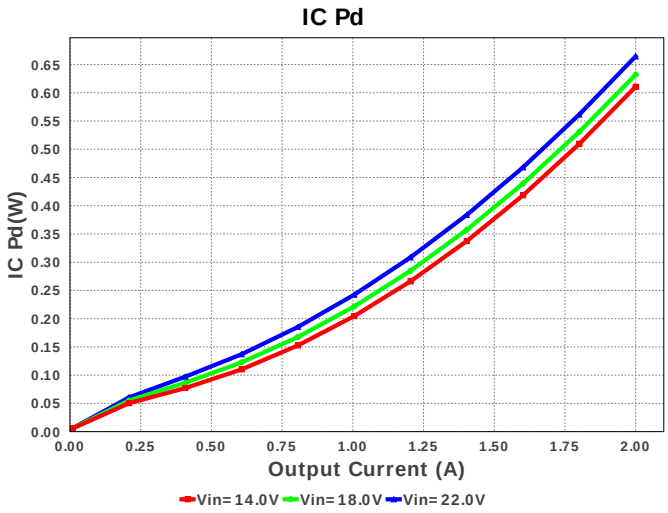


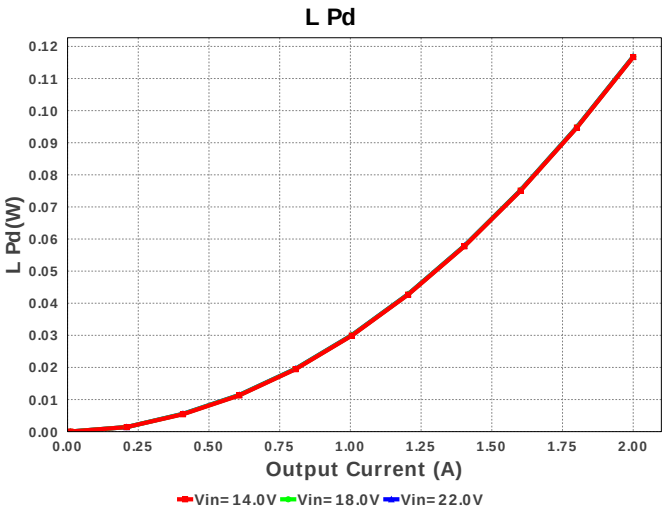


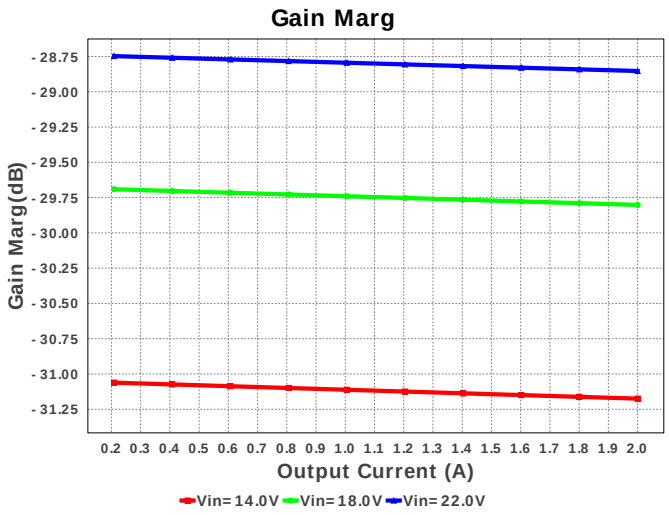


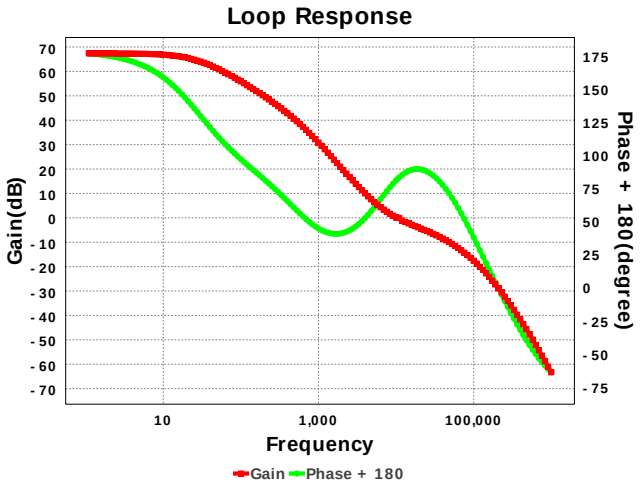


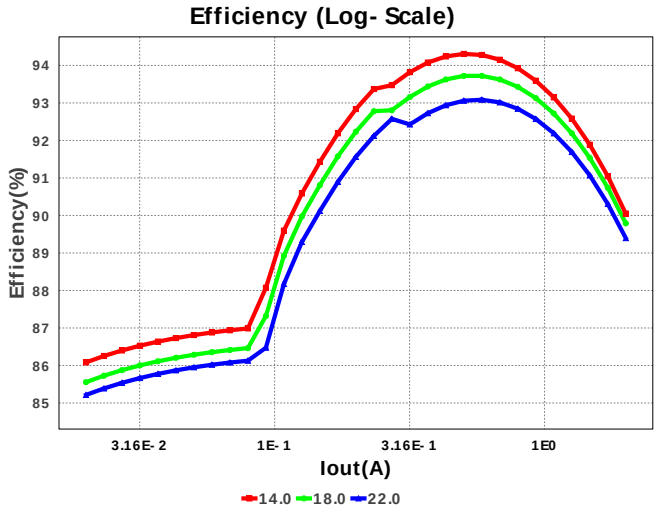












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	741.948 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	171.128 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	335.23 mA	Current	Average input current
4.	L Ipp	592.81 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	325.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	350.0 kHz	General	Switching frequency
8.	Pout	6.6 W	General	Total output power
9.	Total BOM	$2.65	General	Total BOM Cost
10.	Low Freq Gain	67.382 dB	Op_Point	Gain at 10Hz
11.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
12.	Cross Freq	10.251 kHz	Op_point	Bode plot crossover frequency
13.	Duty Cycle	16.3 %	Op_point	Duty cycle
14.	Efficiency	89.381 %	Op_point	Steady state efficiency
15.	Gain Marg	-28.931 dB	Op_point	Bode Plot Gain Margin
16.	IC Tj	55.543 degC	Op_point	IC junction temperature
17.	ICThetaJA	38.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
18.	IOUT_OP	2.0 A	Op_point	Iout operating point
19.	Phase Marg	82.36 deg	Op_point	Bode Plot Phase Margin
20.	VIN_OP	22.0 V	Op_point	Vin operating point
21.	Vout p-p	8.892 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	1.101 mW	Power	Input capacitor power dissipation
23.	Cout Pd	439.274 µW	Power	Output capacitor power dissipation
24.	IC Iq Pd	110.0 µW	Power	IC Iq Pd
25.	IC Pd	665.719 mW	Power	IC power dissipation
26.	L Pd	116.849 mW	Power	Inductor power dissipation
27.	Total Pd	783.158 mW	Power	Total Power Dissipation

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	Texas Instruments Base Part 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.