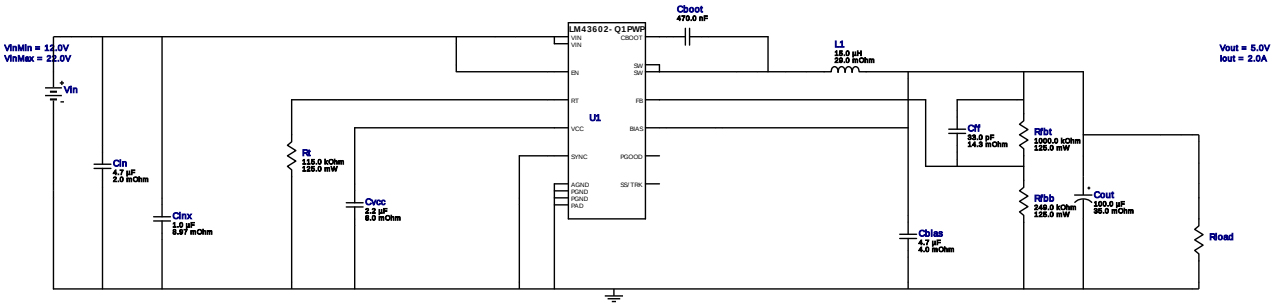
VinMin = 12.0V
VinMax = 22.0V
Vout = 5.0V
Iout = 2.0A

Device = LM43602QPWPRQ1
Topology = Buck
Created = 8/5/15 10:12:34 PM
BOM Cost = $3.32
Footprint = 289.0 mm^2
BOM Count = 12
Total Pd = 0.82W

WEBENCH® Design Report

Design : 3989908/19 LM43602QPWPRQ1
LM43602QPWPRQ1 12.0V-22.0V to 5.00V @ 2.0A



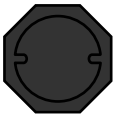
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

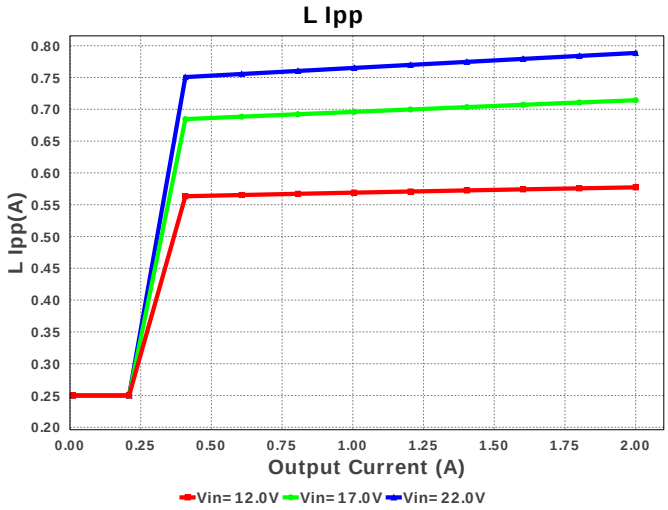
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating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

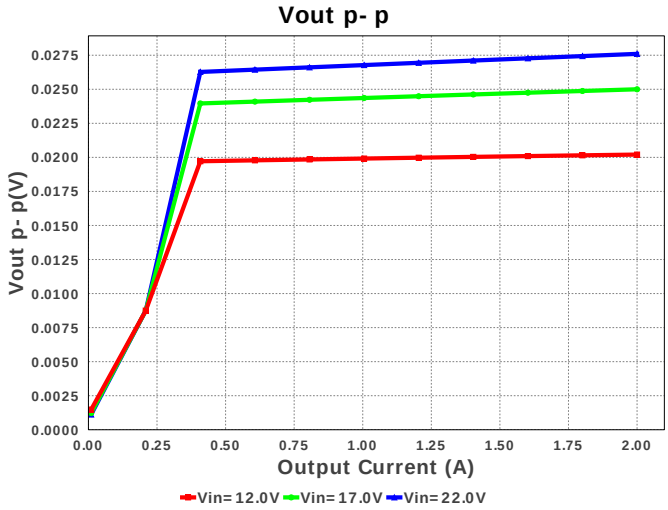
3. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.View WEBENCH(R) Disclaimer.

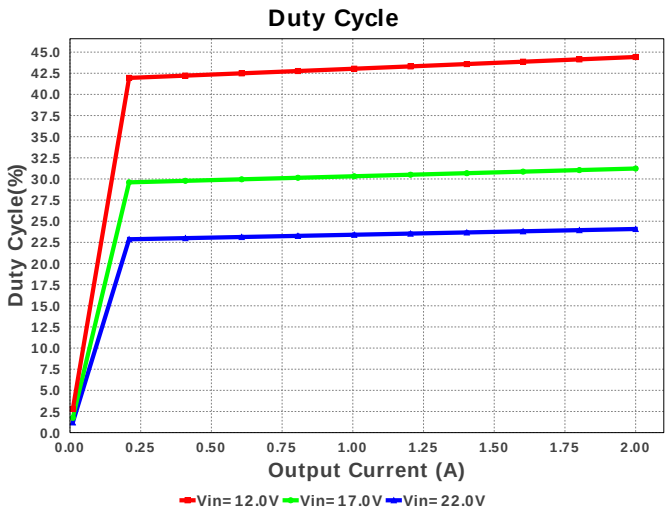
Electrical BOM

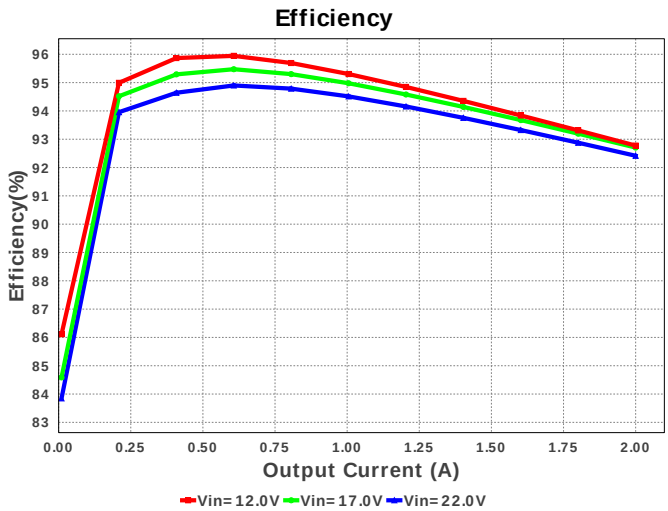
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Kemet	C0805C475K8PACTU Series= X5R	Cap= 4.7 uF ESR= 4.0 mOhm VDC= 10.0 V IRMS= 9.89 A	1	$0.03	0805 7 mm^2
2.	Cboot	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Cff	Kemet	C0805C330J5GACTU Series= C0G/NP0	Cap= 33.0 pF ESR= 14.3 mOhm VDC= 50.0 V IRMS= 656.0 mA	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	8TPE100MAZB Series= TPE	Cap= 100.0 uF ESR= 35.0 mOhm VDC= 8.0 V IRMS= 1.4 A	1	$0.48	3528-21 17 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

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	L1	Bourns	SRU1048-150Y	L= 15.0 µH DCR= 29.0 mOhm	1	$0.33	 SRU1048 144 mm²
9.	Rfbb	Panasonic	ERJ-6ENF2493V Series= ERJ-6E	Res= 249.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
10.	Rfbt	Panasonic	ERJ-6ENF1004V Series= ERJ-6E	Res= 1000.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
11.	Rt	Panasonic	ERJ-6ENF1153V Series= ERJ-6E	Res= 115.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
12.	U1	Texas Instruments	LM43602QPWPRQ1	Switcher	1	$2.07	 PWP0016F 59 mm²

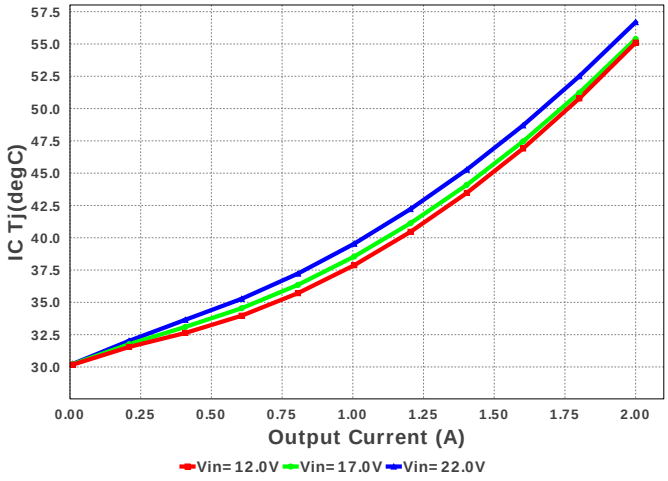




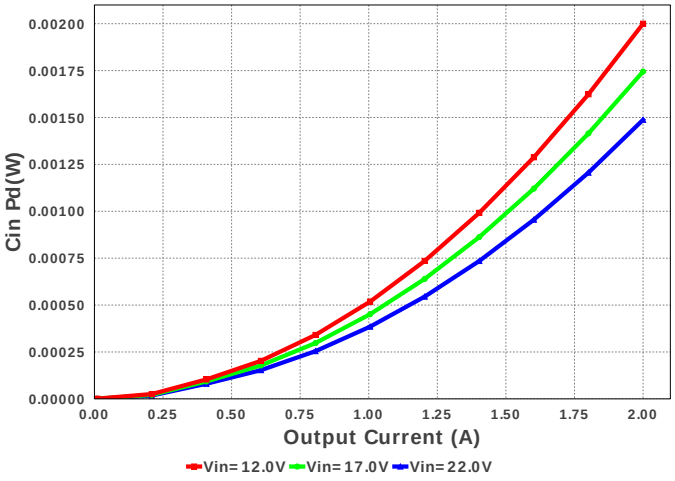




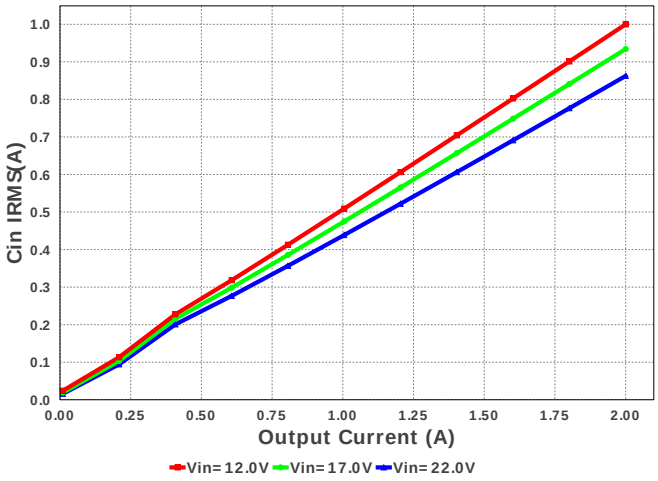
IC Tj



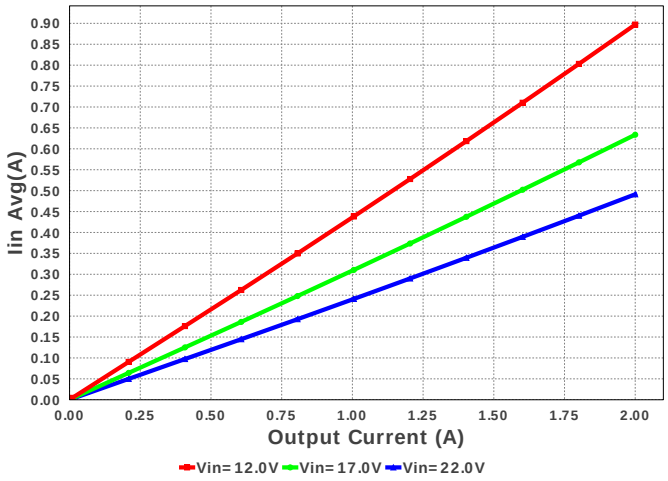
Cin Pd



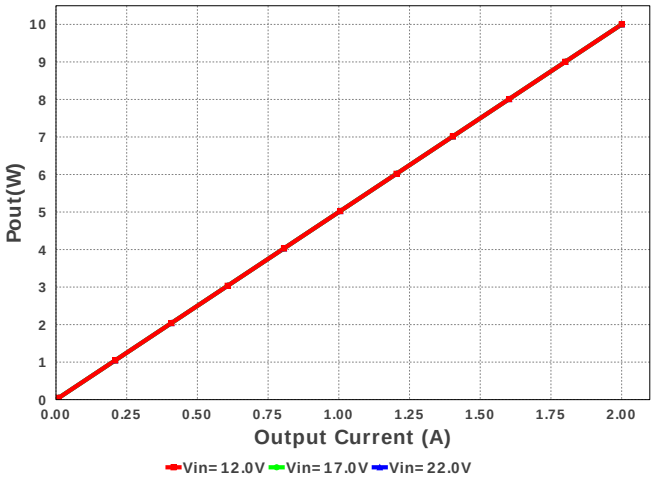
Cin IRMS



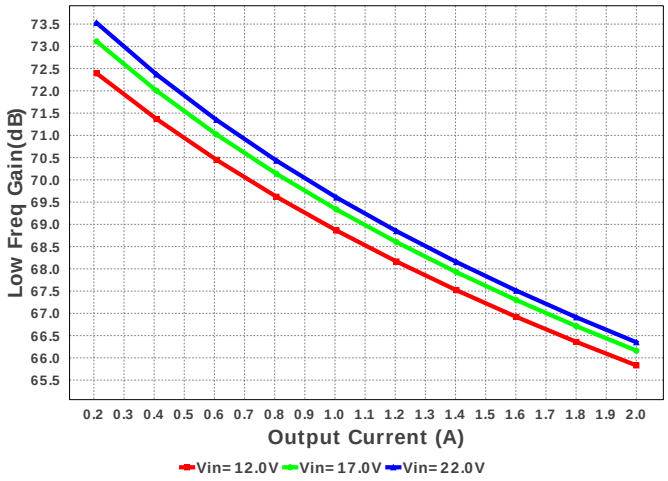
Iin Avg



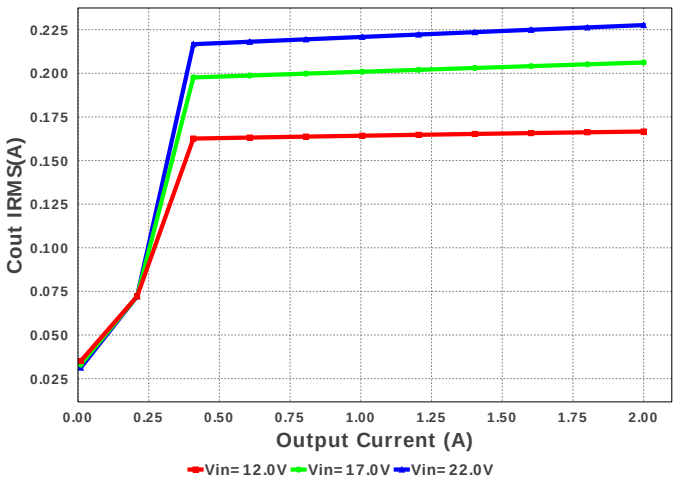
Pout



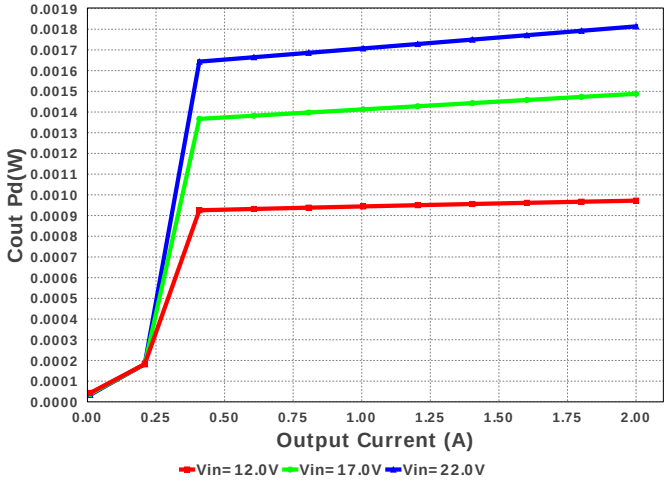
Low Freq Gain



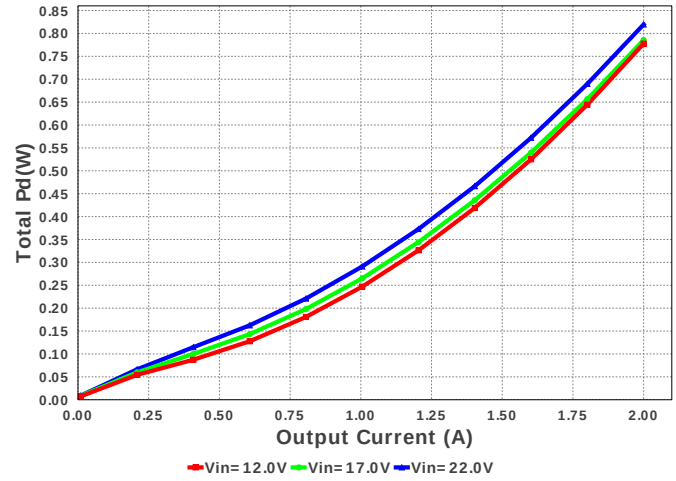
Cout IRMS



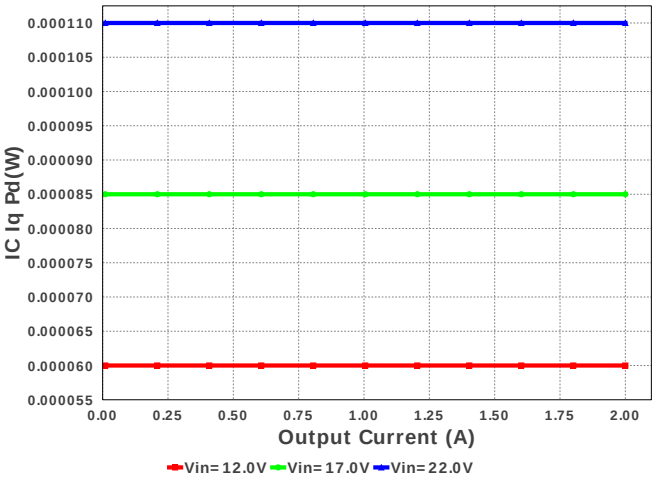
Cout Pd



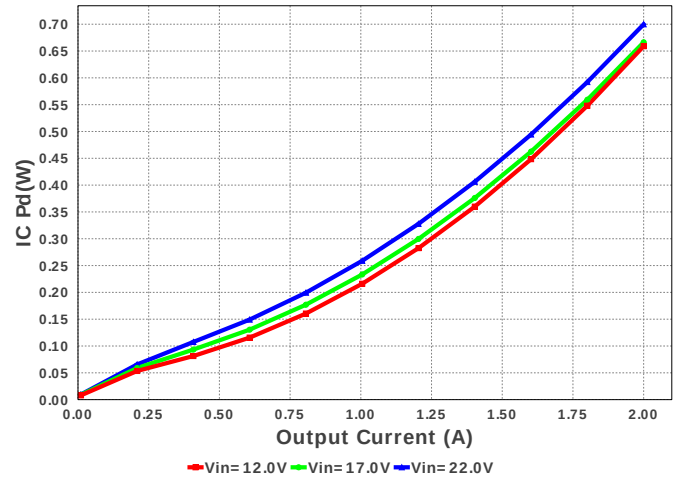
Total Pd



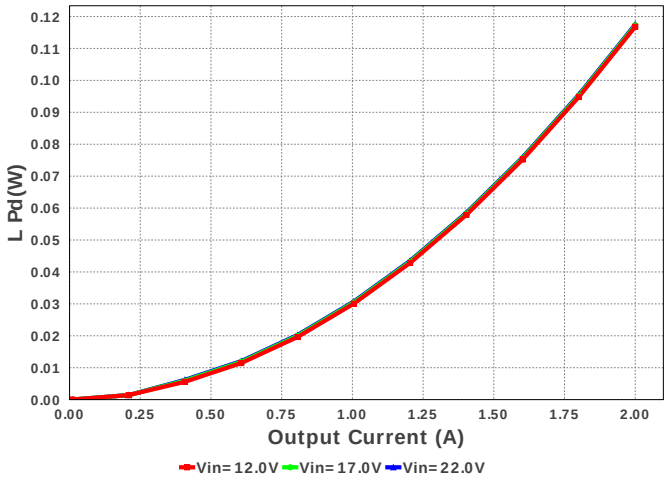
IC Iq Pd

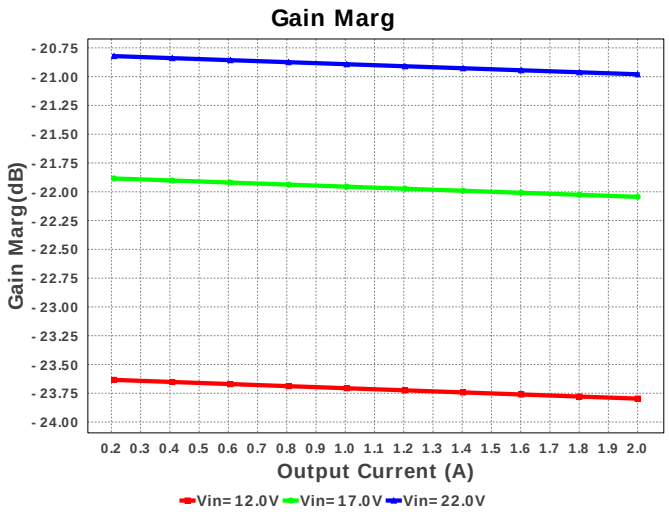


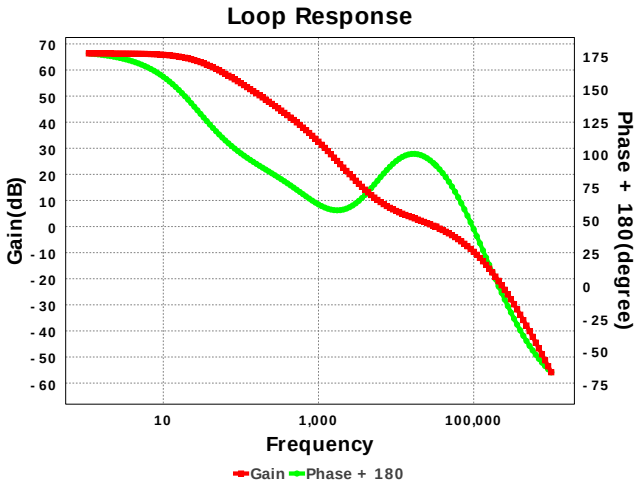
IC Pd

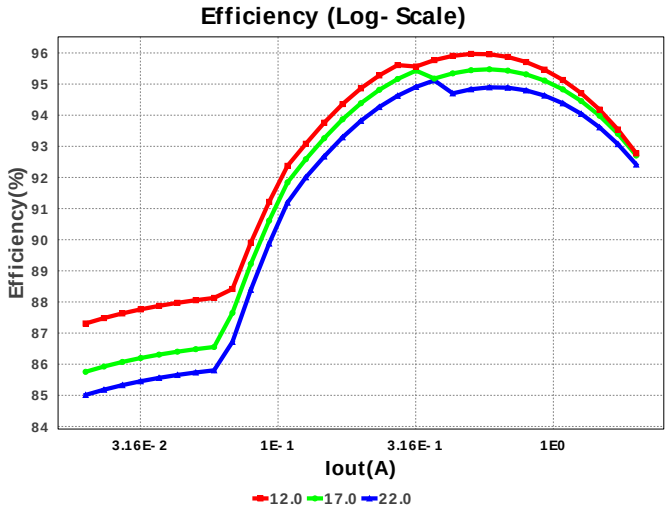


L Pd









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	862.358 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	226.177 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	491.28 mA	Current	Average input current
4.	L Ipp	783.5 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	289.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	350.0 kHz	General	Switching frequency
8.	Pout	10.0 W	General	Total output power
9.	Total BOM	$3.32	General	Total BOM Cost
10.	Low Freq Gain	66.363 dB	Op_Point	Gain at 10Hz
11.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
12.	Cross Freq	31.974 kHz	Op_point	Bode plot crossover frequency
13.	Duty Cycle	24.084 %	Op_point	Duty cycle
14.	Efficiency	92.406 %	Op_point	Steady state efficiency
15.	Gain Marg	-21.066 dB	Op_point	Bode Plot Gain Margin
16.	IC Tj	56.737 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	92.926 deg	Op_point	Bode Plot Phase Margin
20.	VIN_OP	22.0 V	Op_point	Vin operating point
21.	Vout p-p	27.422 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	1.487 mW	Power	Input capacitor power dissipation
23.	Cout Pd	1.79 mW	Power	Output capacitor power dissipation
24.	IC Iq Pd	110.0 µW	Power	IC Iq Pd
25.	IC Pd	701.071 mW	Power	IC power dissipation
26.	L Pd	117.484 mW	Power	Inductor power dissipation
27.	Total Pd	820.772 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	12.0	Minimum input voltage
5.	Vout	5.0	Output Voltage
6.	Vout1	5.0	Output Voltage #1
7.	base_pn	LM43602-Q1	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0	Ambient temperature

Design Assistance

1. The LM43602-Q1 is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.

2. LM43602-Q1 Product Folder : http://www.ti.com/product/LM43602%2DQ1 : contains the data sheet and other resources.