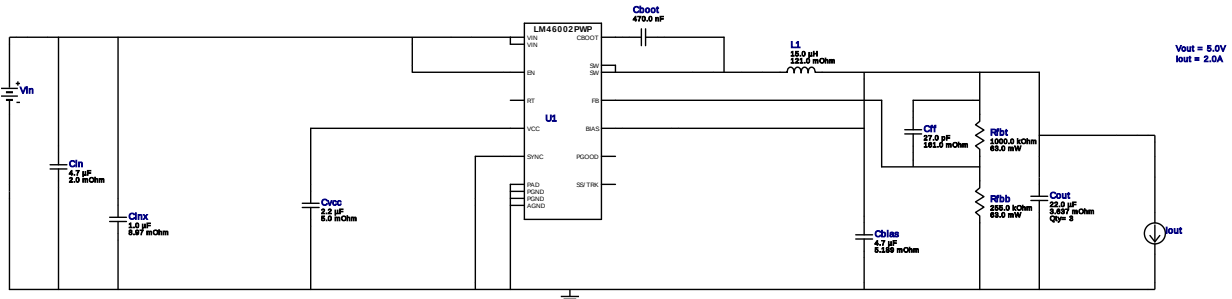


WEBENCH® Design Report

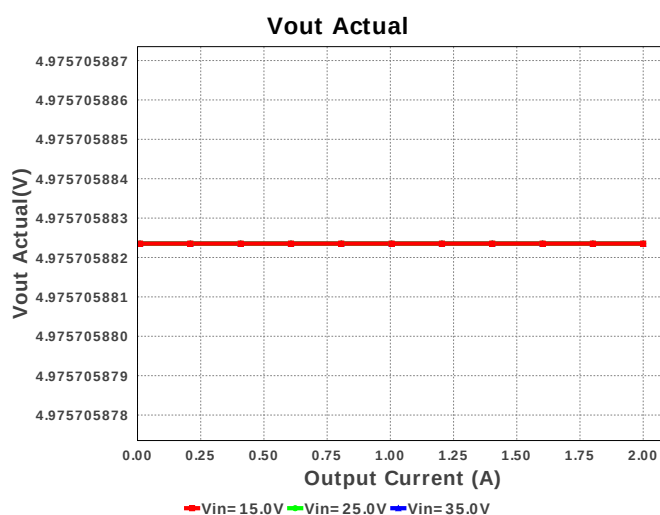
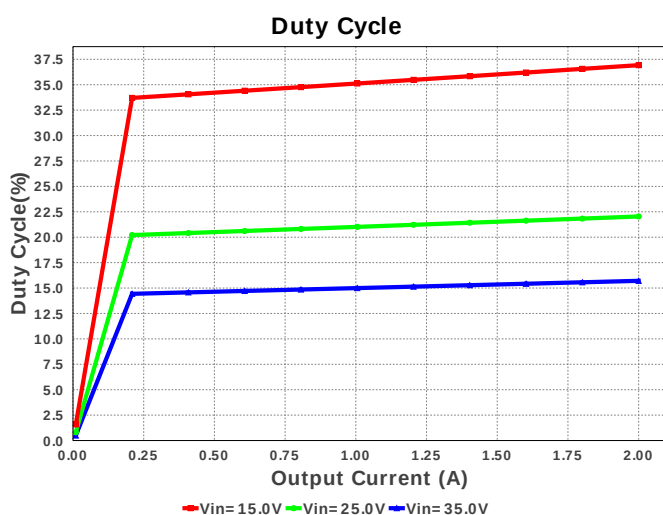
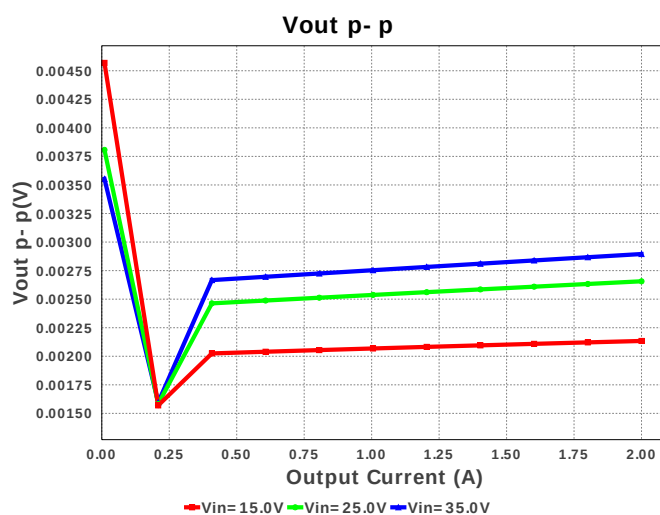
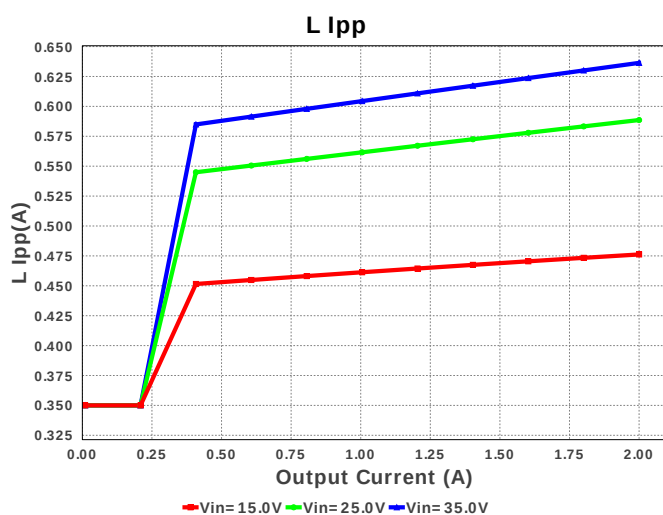
Design : 1542746/892 LM46002PWPR
LM46002PWPR 15.0V-35.0V to 5.00V @ 2.0A


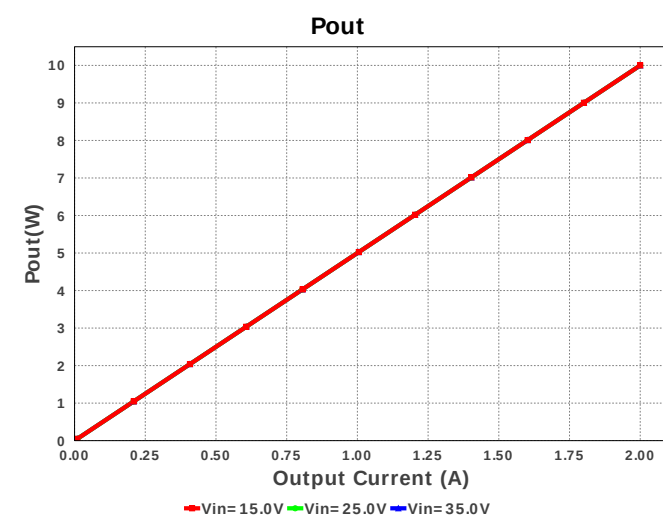
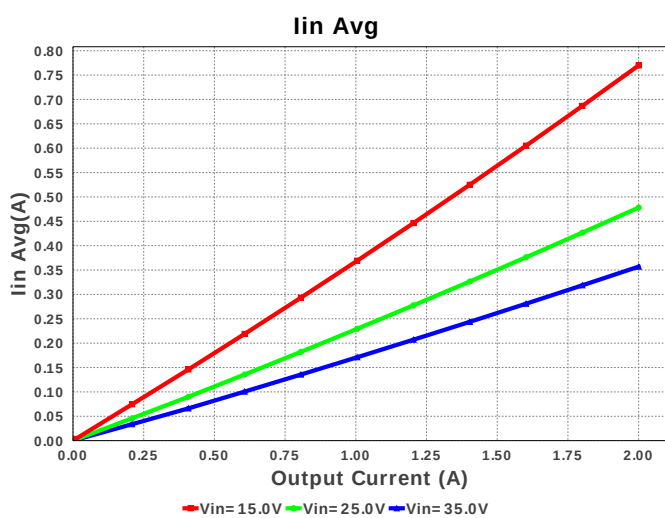
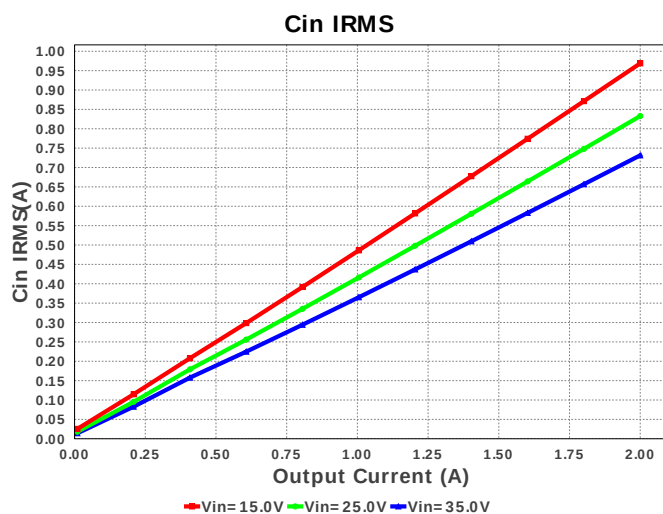
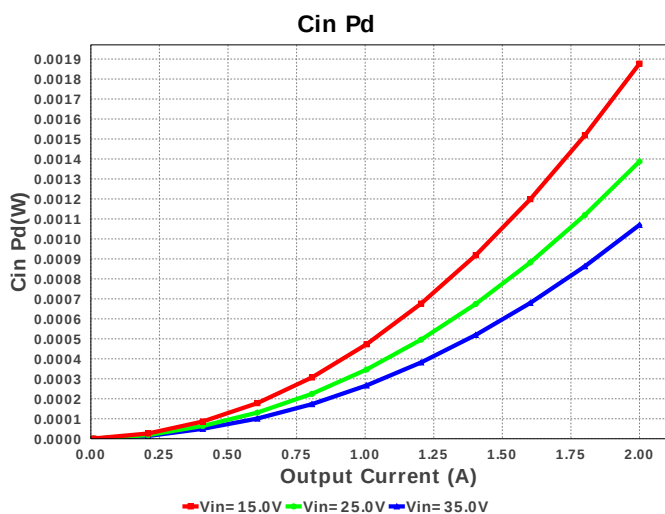
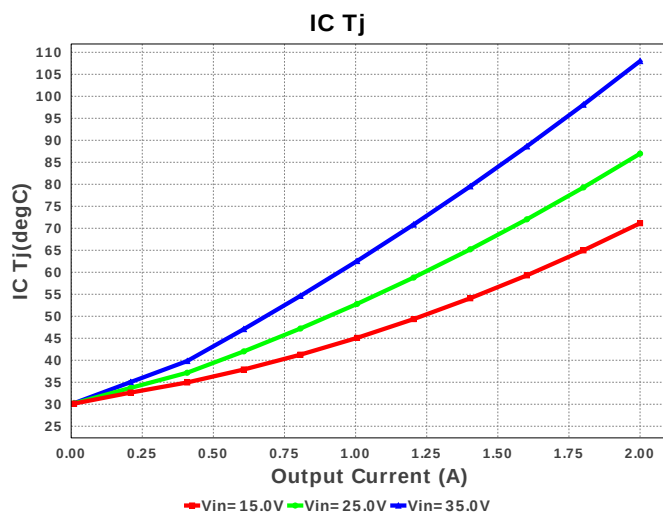
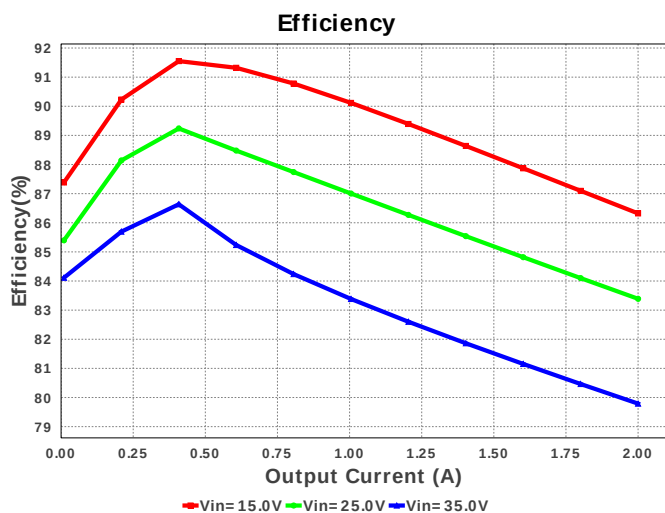
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.
2. If there is no VinTyp specified, WEBENCH will 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.

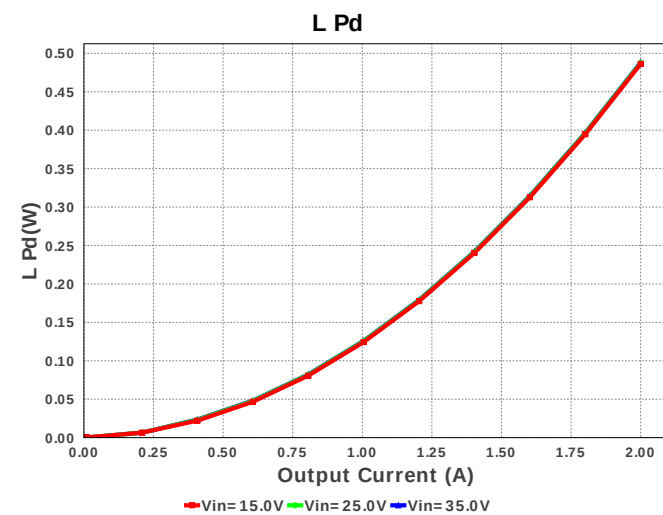
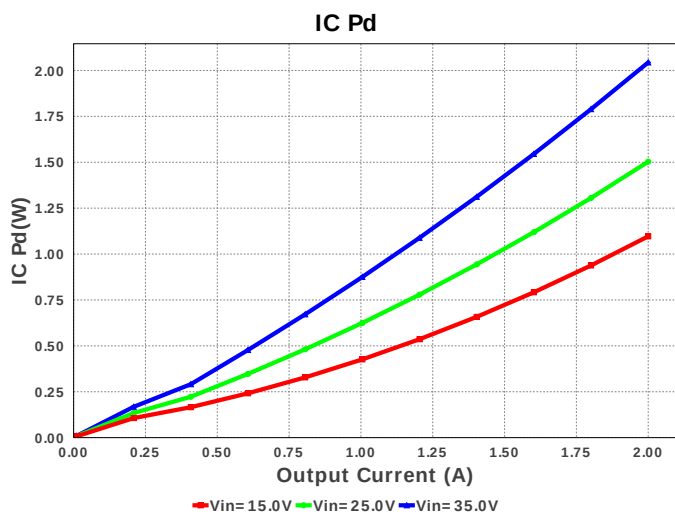
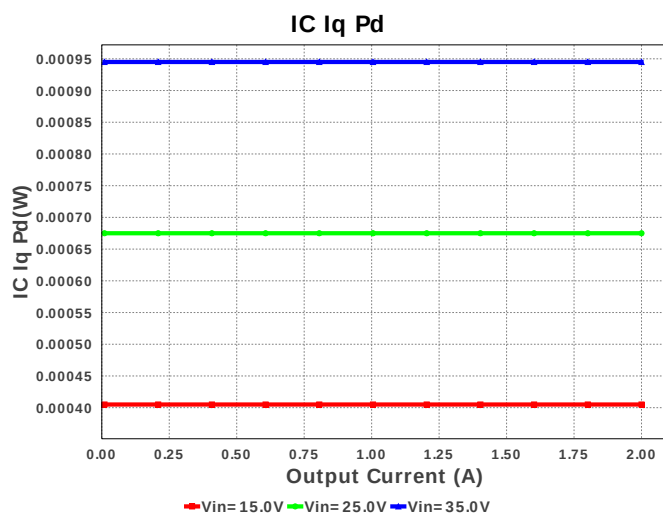
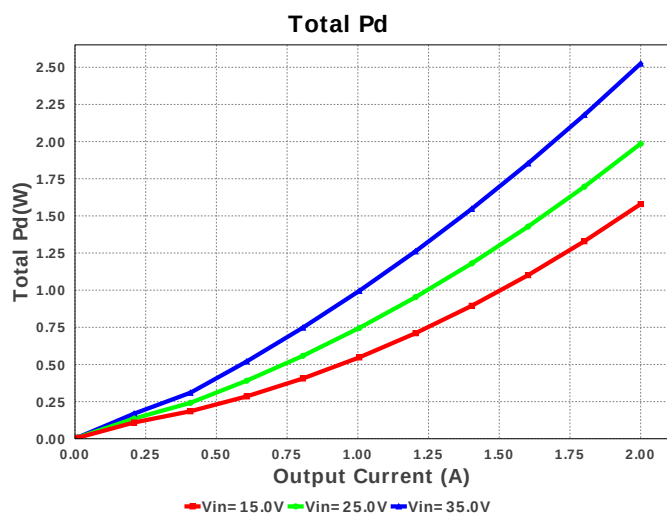
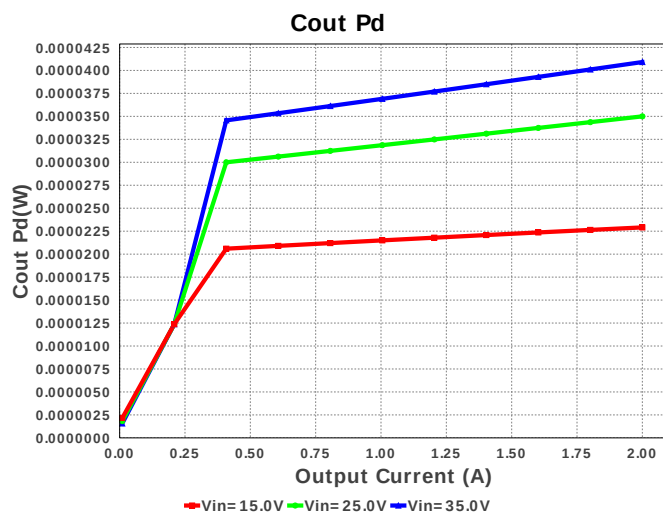
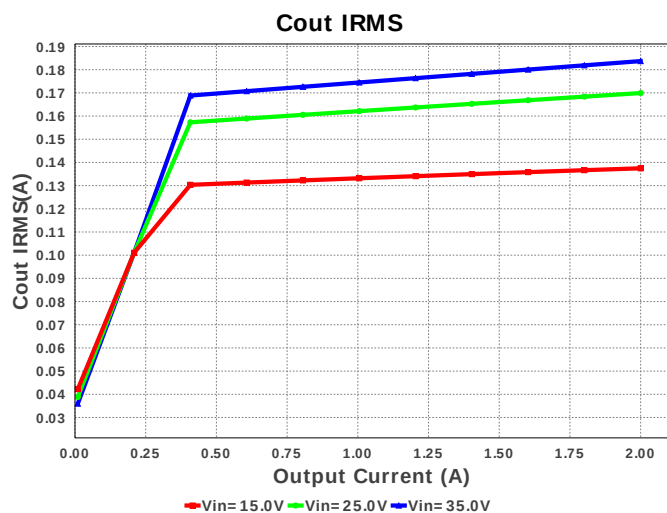
Electrical BOM

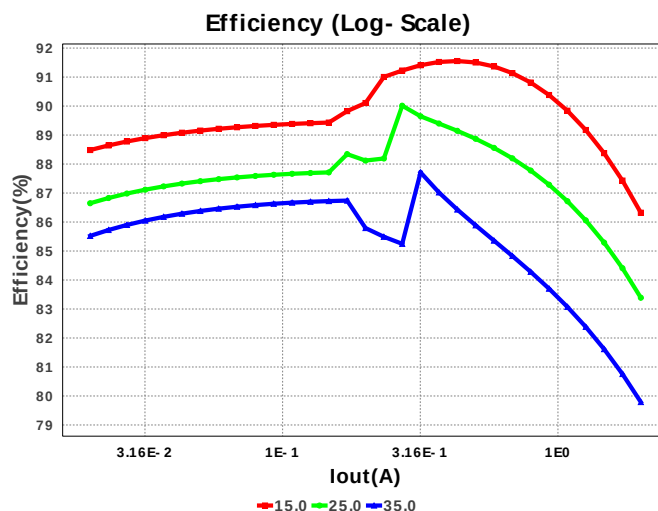
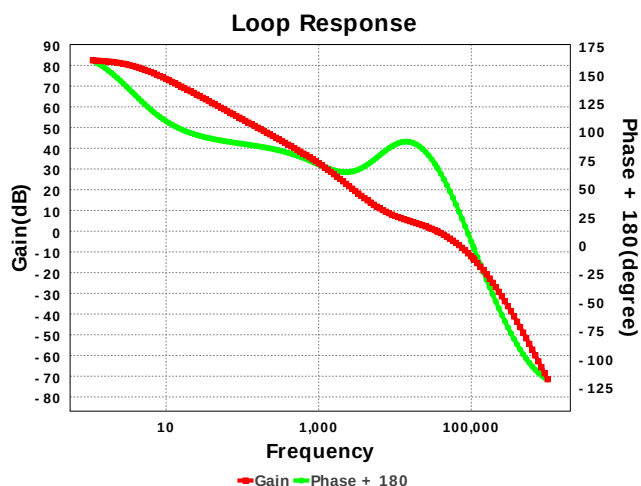
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	 0805 7 mm ²
2.	Cboot	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
3.	Cff	Kemet	C0805C270J5GACTU Series= C0G/NP0	Cap= 27.0 pF ESR= 161.0 mOhm VDC= 50.0 V IRMS= 524.0 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	\$0.19	 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	\$0.02	 1206 11 mm ²
6.	Cout	MuRata	GRM31CR61A226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	3	\$0.07	 1206_190 11 mm ²
7.	Cvcc	MuRata	GRM155R60J225ME15D Series= X5R	Cap= 2.2 uF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 3.67 A	1	\$0.02	 0402 3 mm ²
8.	L1	Bourns	SRP6540-150M	L= 15.0 uH DCR= 121.0 mOhm	1	\$0.60	 SRP6540 83 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rfbb	Vishay-Dale	CRCW0402255KFKED Series= CRCW..e3	Res= 255.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
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	LM46002PWPR	Switcher	1	\$1.85	 PWP0016F 59 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	731.418 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	183.704 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	356.98 mA	Current	Average input current
4.	L Ipp	636.37 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	13	General	Total Design BOM count
6.	FootPrint	225.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	500.0 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	10.0 W	General	Total output power
10.	Total BOM	\$2.95	General	Total BOM Cost
11.	Low Freq Gain	82.395 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	4.976 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	35.503 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	15.71 %	Op_point	Duty cycle
16.	Efficiency	79.79 %	Op_point	Steady state efficiency
17.	Gain Marg	-13.11 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	108.002 degC	Op_point	IC junction temperature
19.	ICThetaJA	38.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	Phase Marg	69.262 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	35.0 V	Op_point	Vin operating point
23.	Vout p-p	2.895 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	1.07 mW	Power	Input capacitor power dissipation
25.	Cout Pd	40.913 μW	Power	Output capacitor power dissipation
26.	IC Iq Pd	945.0 μW	Power	IC Iq Pd
27.	IC Pd	2.044 W	Power	IC power dissipation
28.	L Pd	488.083 mW	Power	Inductor power dissipation
29.	Total Pd	2.525 W	Power	Total Power Dissipation
30.	Vout Tolerance	2.615 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	35.0	Maximum input voltage
3.	VinMin	15.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM46002	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM46002** Product Folder : <http://www.ti.com/product/LM46002> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).