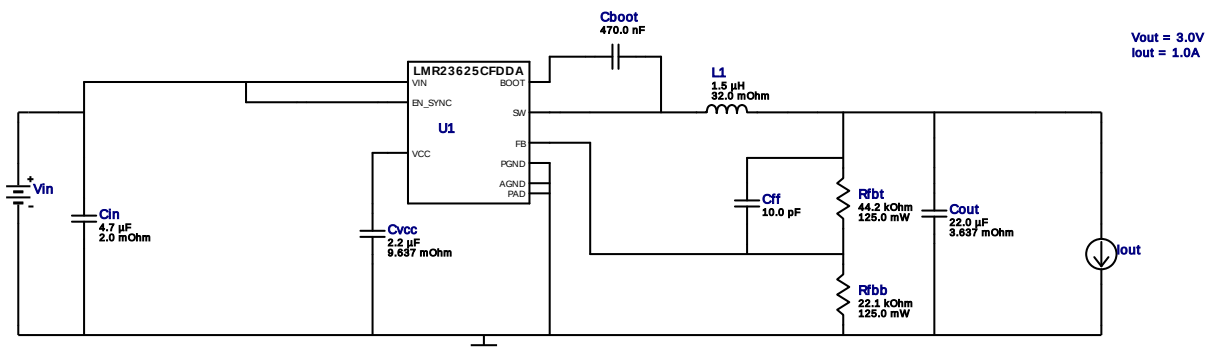


WEBENCH® Design Report

Design : 4728729/19 LMR23625CFDDAR
LMR23625CFDDAR 10.0V-19.0V to 3.00V @ 1.0A



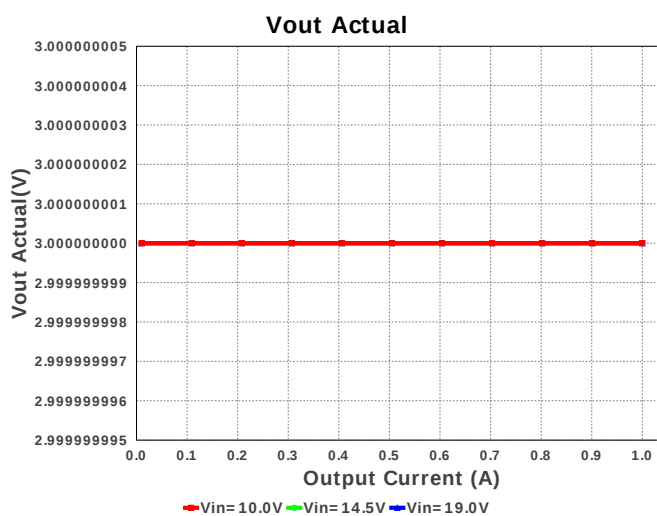
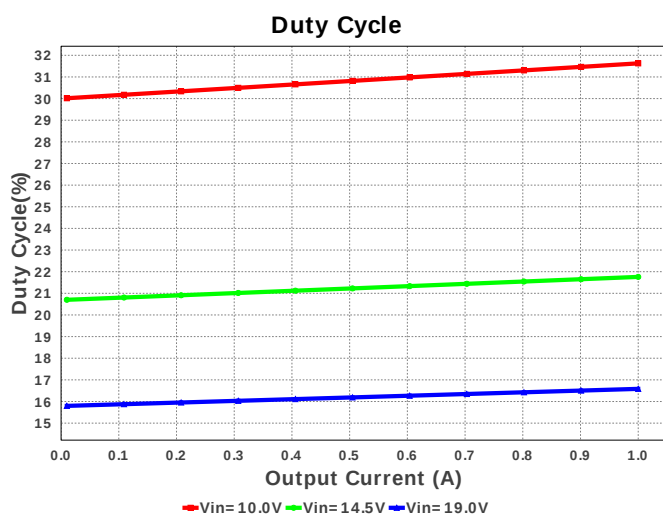
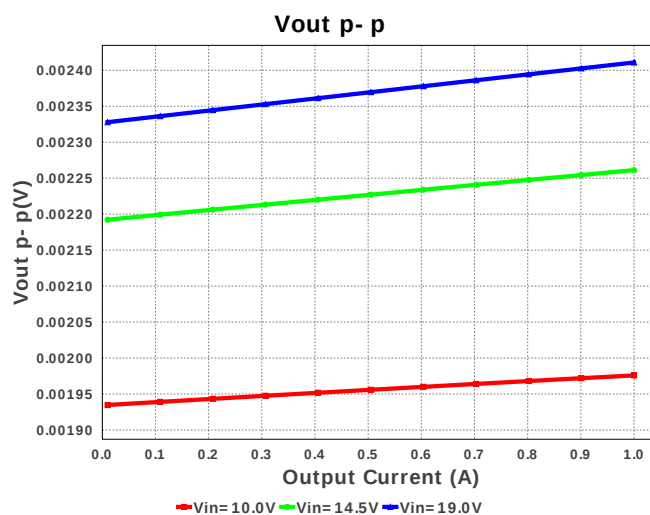
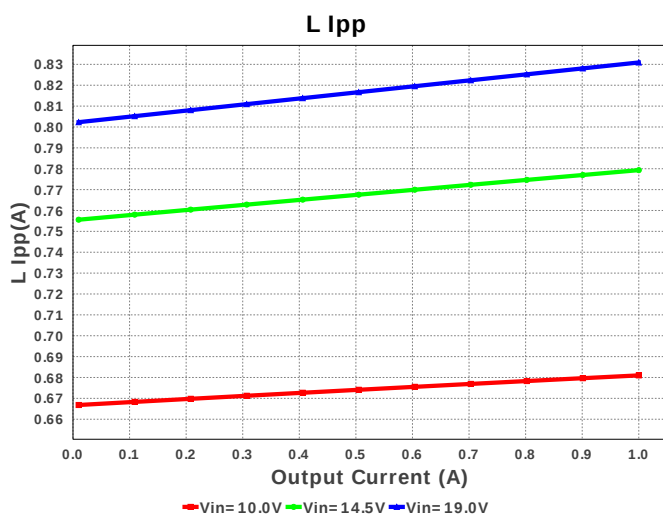
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

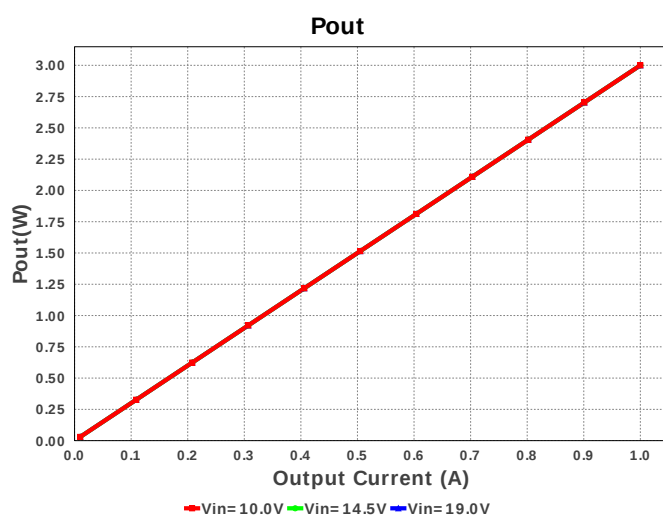
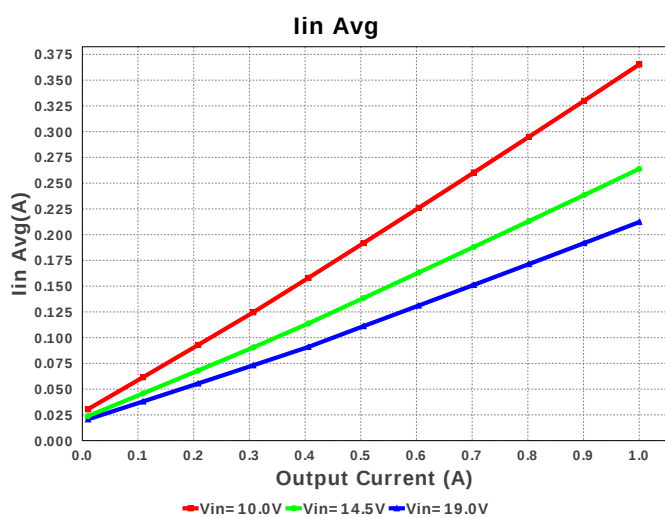
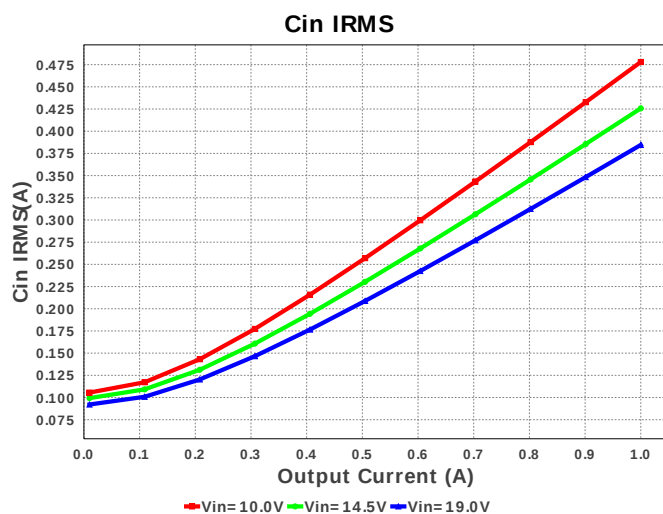
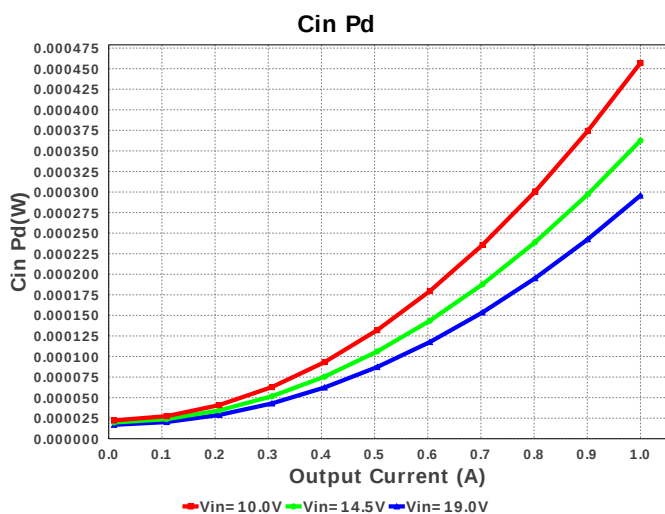
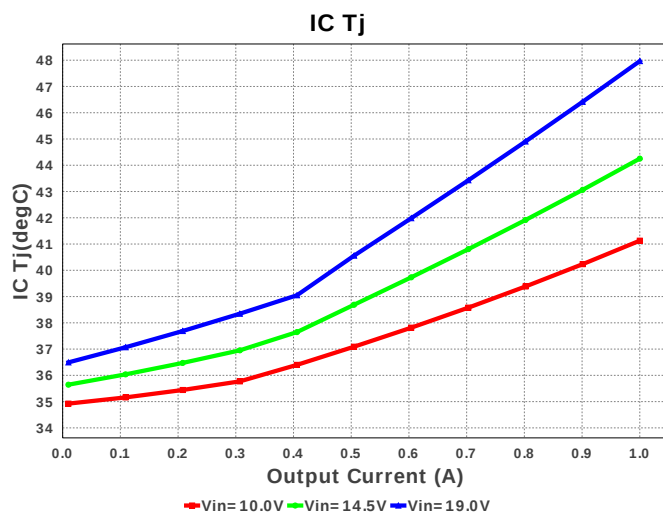
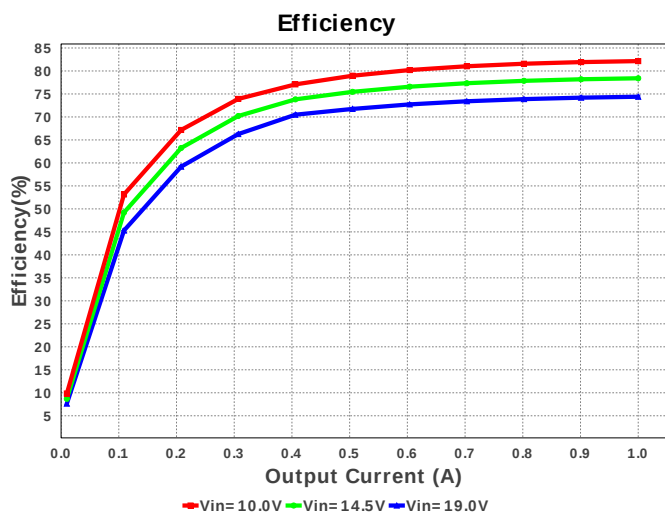
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating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

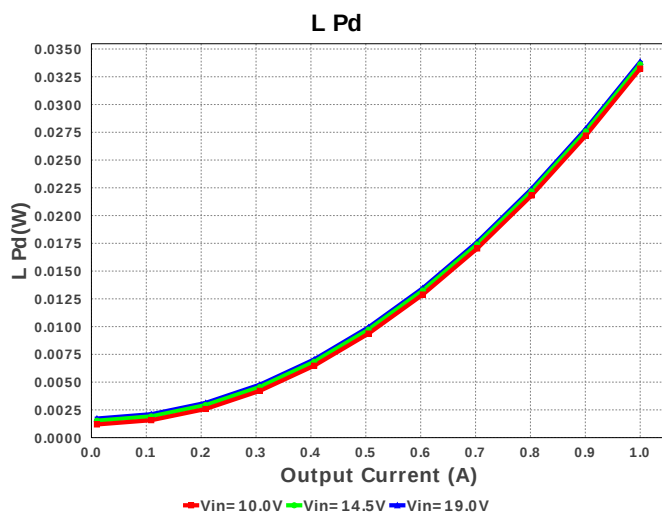
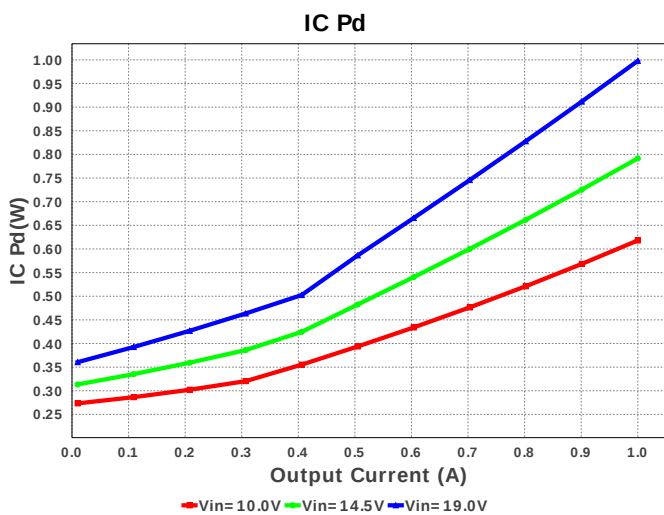
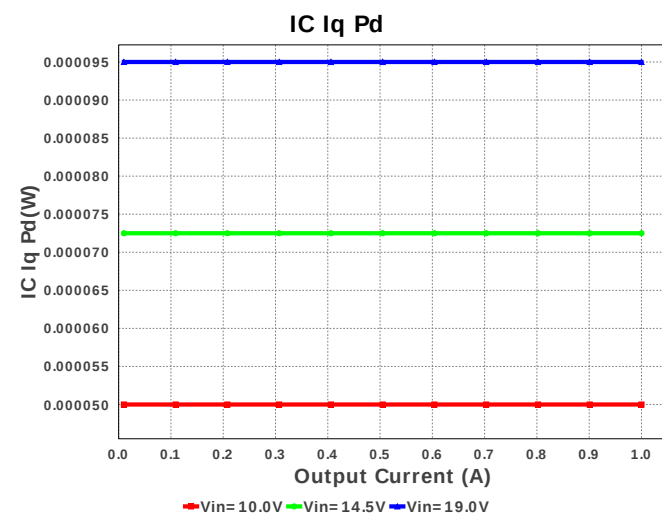
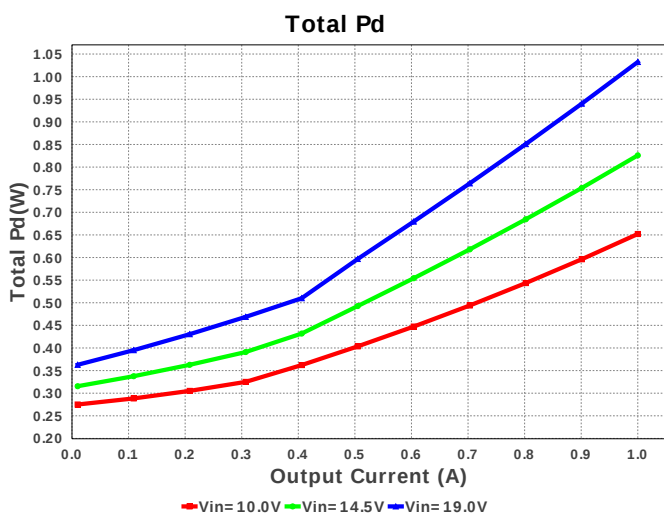
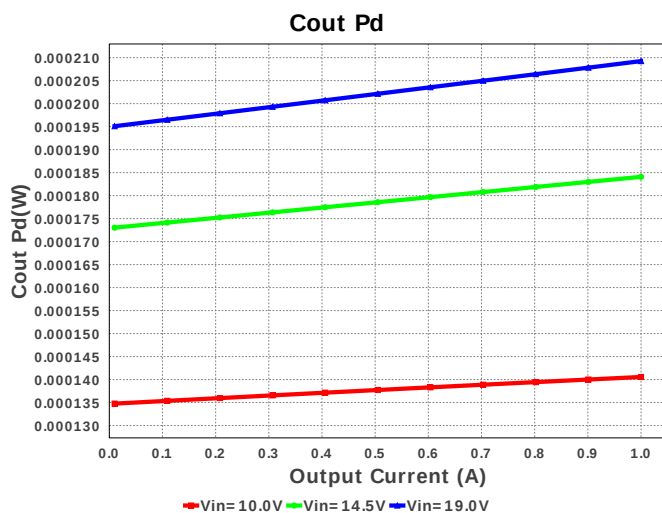
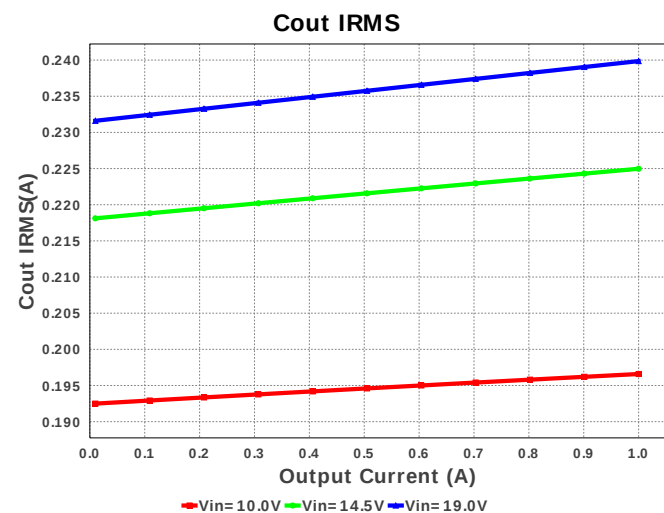
Electrical BOM

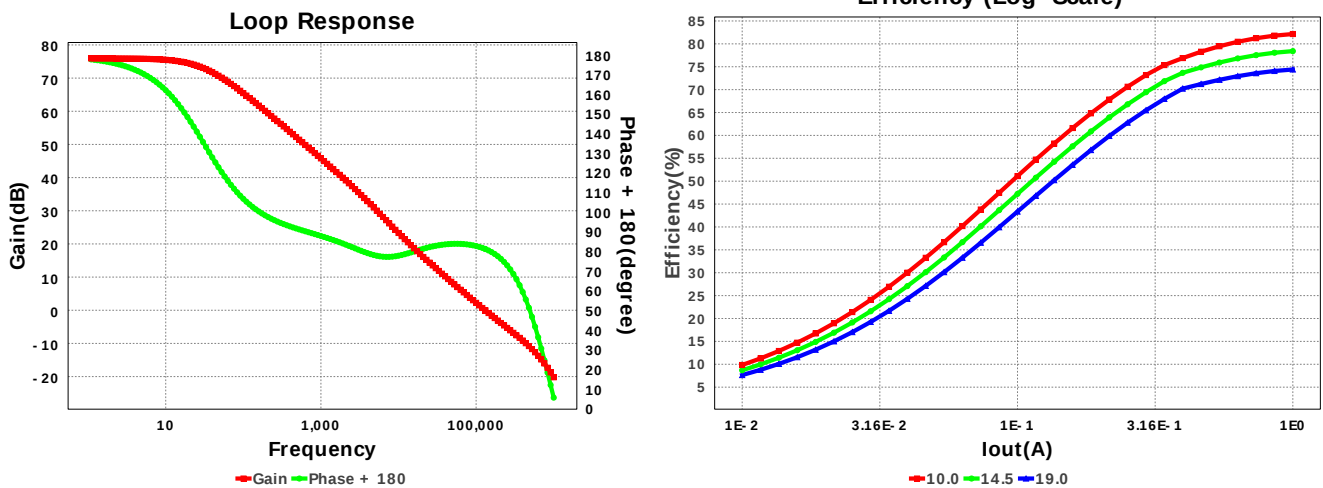
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	GMK212BJ474KG-T Series= X5R	Cap= 470.0 nF VDC= 35.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Cff	Kemet	C0805C100M4GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Cin	MuRata	GRM32ER71H475KA88L 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
4.	Cout	MuRata	GRM31CR61A226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	1	\$0.07	1206_190 11 mm ²
5.	Cvcc	MuRata	GRM188R60J225KE19D Series= X5R	Cap= 2.2 uF ESR= 9.637 mOhm VDC= 6.3 V IRMS= 1.32271 A	1	\$0.02	0603 5 mm ²
6.	L1	Vishay-Dale	IHLP1212BZER1R5M11	L= 1.5 uH DCR= 32.0 mOhm	1	\$0.56	IHLP-1212BZ 19 mm ²
7.	Rfbb	Panasonic	ERJ-6ENF2212V Series= ERJ-6E	Res= 22.1 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
8.	Rfbs	Panasonic	ERJ-6ENF4422V Series= ERJ-6E	Res= 44.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	U1	Texas Instruments	LMR23625CFDDAR	Switcher	1	\$1.35	 DDA0008E_N 57 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	384.549 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	239.86 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	212.24 mA	Current	Average input current
4.	L Ipp	830.9 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	9	General	Total Design BOM count
6.	FootPrint	134.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	2.1 MHz	General	Switching frequency
8.	Pout	3.0 W	General	Total output power
9.	Total BOM	\$2.25	General	Total BOM Cost
10.	ICThetaJA Effective	18.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
11.	Low Freq Gain	75.929 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	3.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	3.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	130.58 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	16.584 %	Op_point	Duty cycle
16.	Efficiency	74.398 %	Op_point	Steady state efficiency
17.	Gain Marg	-21.54 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	47.966 degC	Op_point	IC junction temperature
19.	IOUT_OP	1.0 A	Op_point	Iout operating point
20.	Phase Marg	81.551 deg	Op_point	Bode Plot Phase Margin
21.	VIN_OP	19.0 V	Op_point	Vin operating point
22.	Vout p-p	2.411 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	295.756 μW	Power	Input capacitor power dissipation
24.	Cout Pd	209.247 μW	Power	Output capacitor power dissipation
25.	IC Iq Pd	95.0 μW	Power	IC Iq Pd
26.	IC Pd	997.886 mW	Power	IC power dissipation
27.	L Pd	33.841 mW	Power	Inductor power dissipation
28.	Total Pd	1.032 W	Power	Total Power Dissipation
29.	Vout Tolerance	3.374 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	19.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	3.0	Output Voltage
5.	base_pn	LMR23625CF	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LMR23625CF Product Folder : <http://www.ti.com/product/LMR23625> : 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](#).