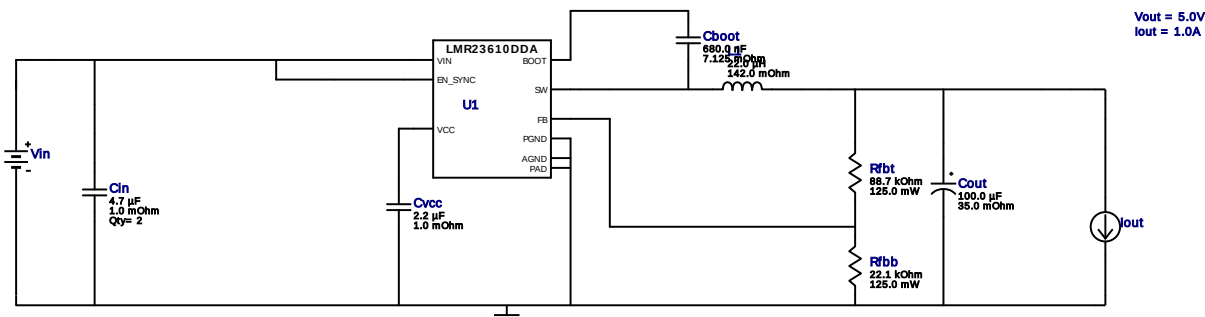


WEBENCH® Design Report

Design : LMR23610ADDAR
LMR23610ADDAR 22V-26V to 5.00V @ 1A

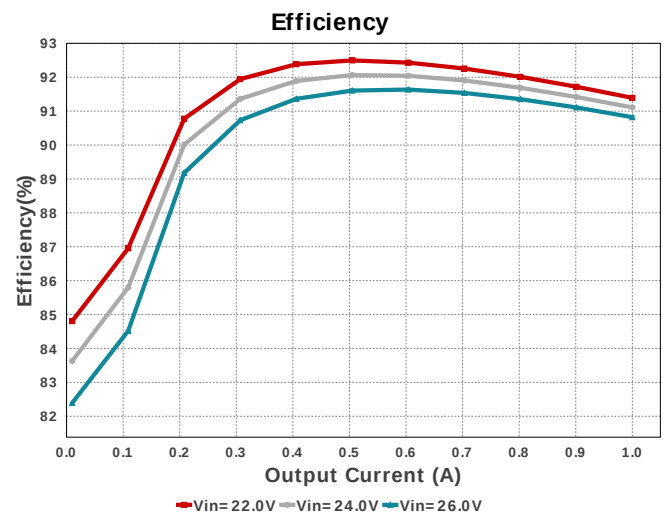
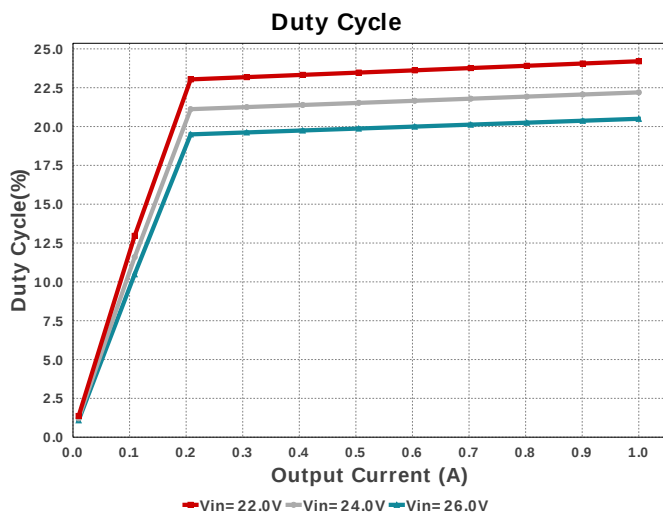
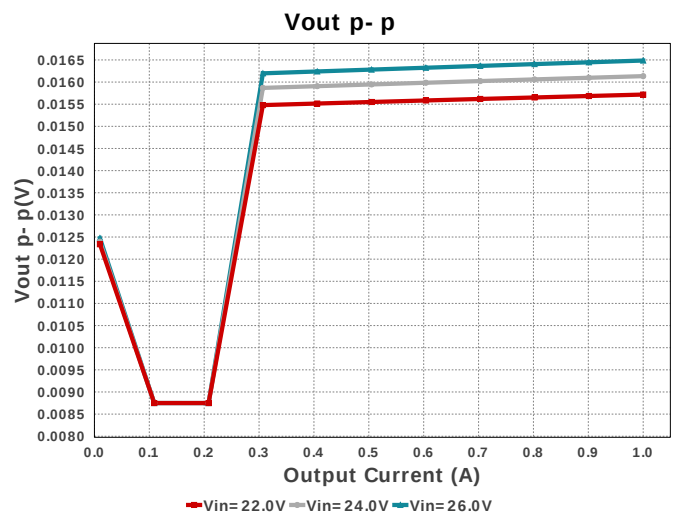
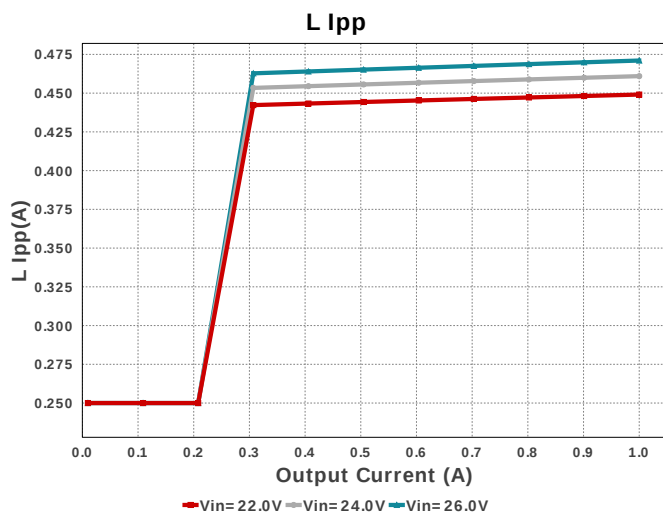


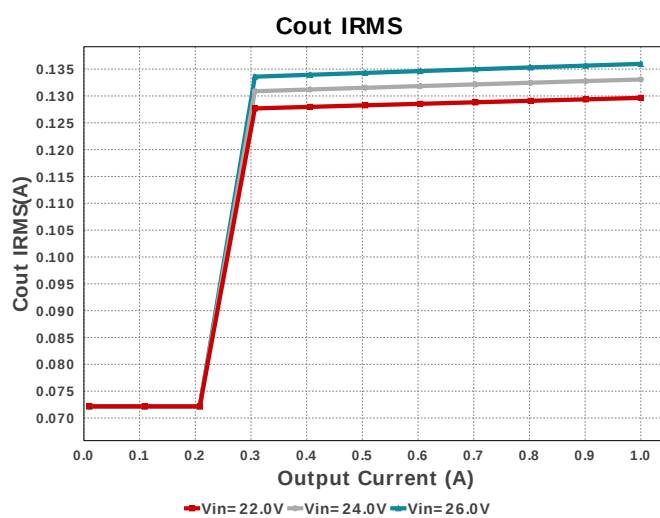
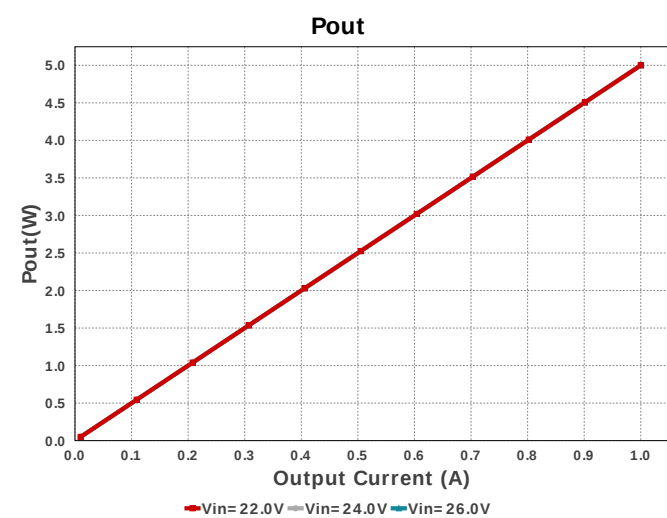
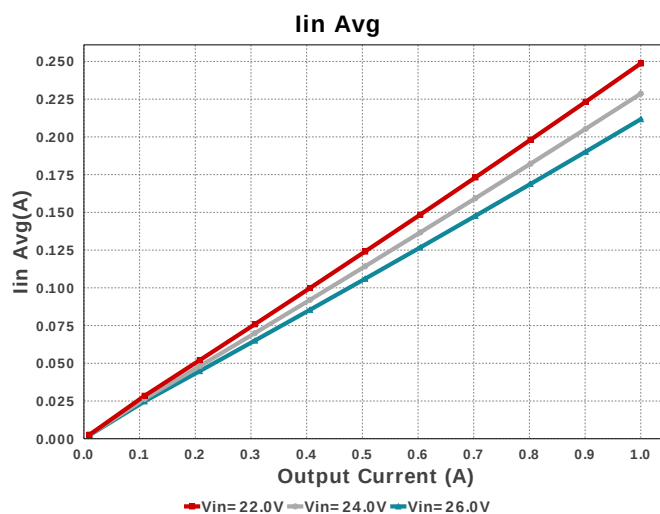
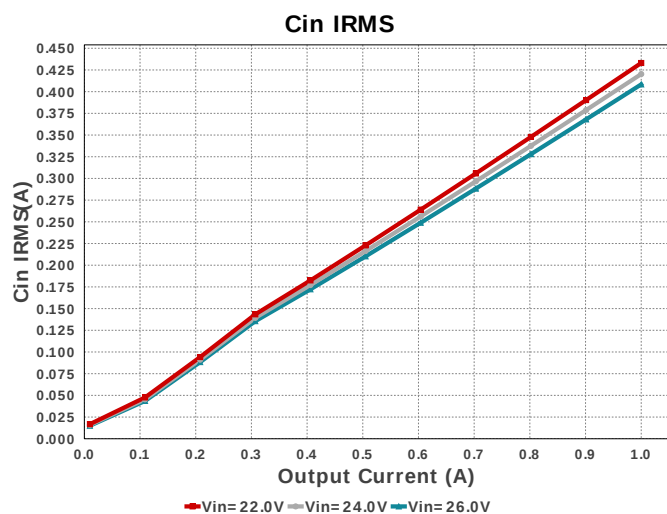
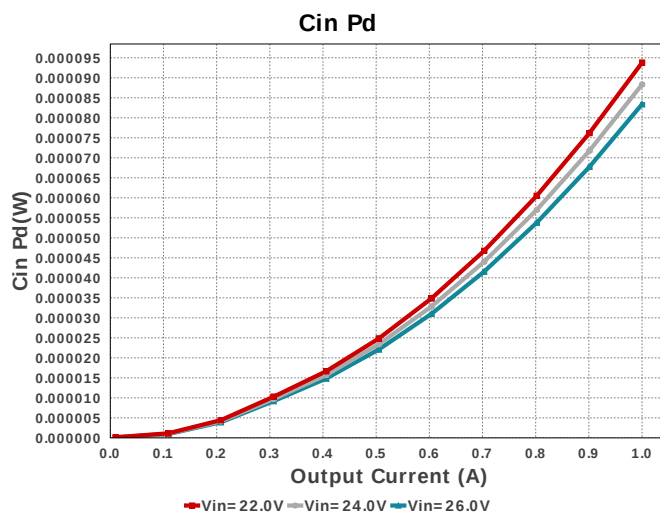
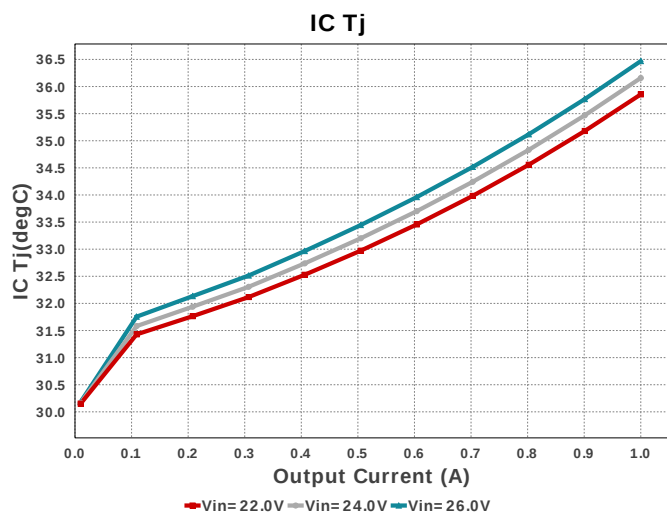
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.
2. If there is no VinTyp specified, WEBENCH will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

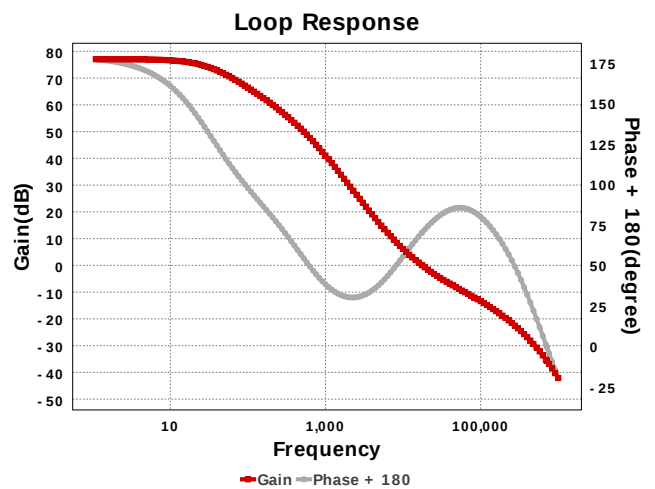
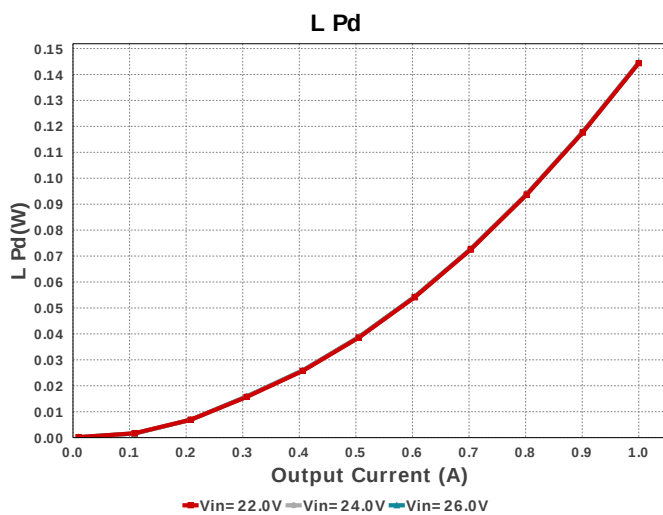
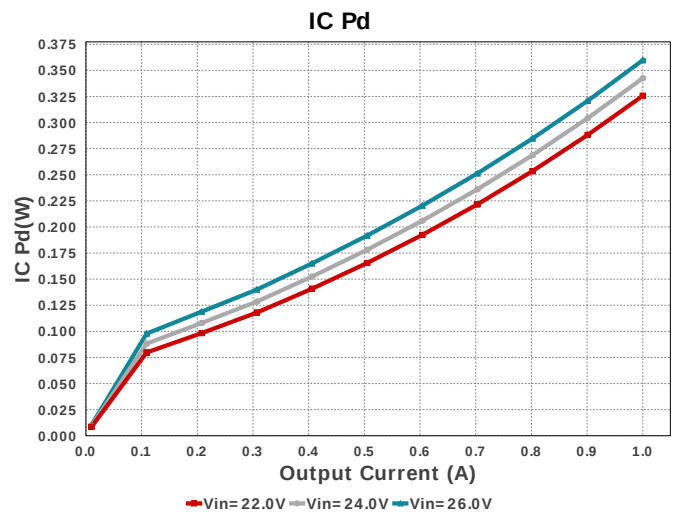
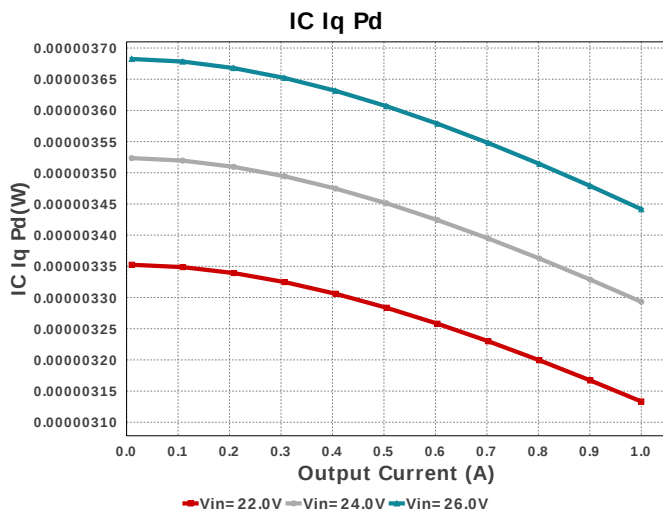
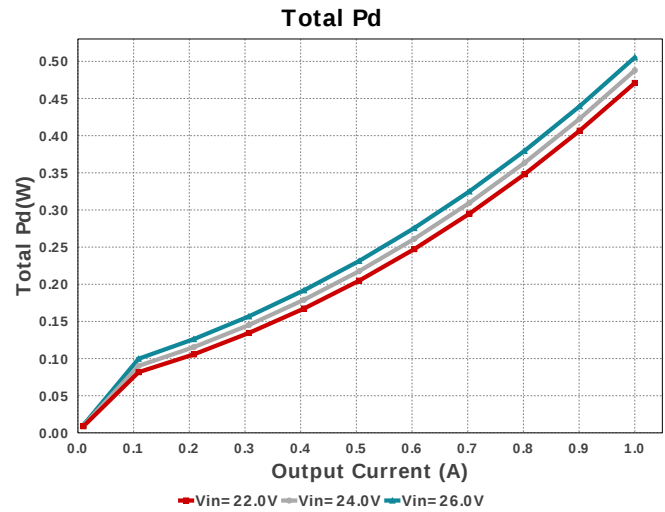
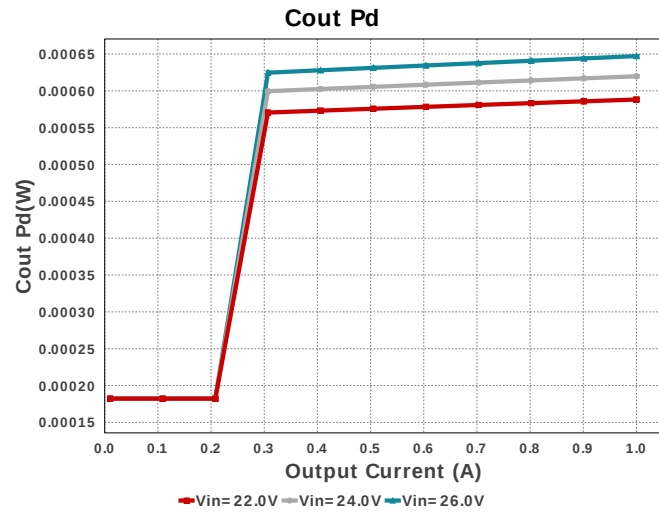
Electrical BOM

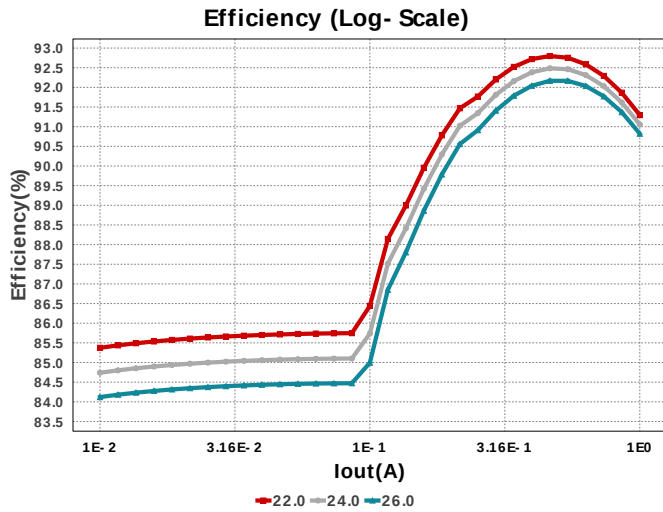
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	TDK	C1608X6S1H684K080AC Series= X6S	Cap= 680.0 nF ESR= 7.125 mOhm VDC= 50.0 V IRMS= 1.9522 A	1	\$0.06	0603 5 mm ²
2.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 6.0 A	2	\$0.55	1210 15 mm ²
3.	Cout	Panasonic	8TPE100MAZB Series= TPE	Cap= 100.0 uF ESR= 35.0 mOhm VDC= 8.0 V IRMS= 1.4 A	1	\$0.50	3528-21 17 mm ²
4.	Cvcc	Kemet	C0603C225K8PACTU Series= X5R	Cap= 2.2 uF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.05	0603 5 mm ²
5.	L1	Bourns	SRN6045-220M	L= 22.0 µH DCR= 142.0 mOhm	1	\$0.20	SRN6045 64 mm ²
6.	Rfbb	Panasonic	ERJ-6ENF2212V Series= ERJ-6E	Res= 22100.0Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
7.	Rfbb	Panasonic	ERJ-6ENF8872V Series= ERJ-6E	Res= 88700.0Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	U1	Texas Instruments	LMR23610ADDAR	Switcher	1	\$1.30	 DDA0008E_N 55 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	408.362 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	83.38 μ W	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	135.977 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	647.15 μ W	Capacitor	Output capacitor power dissipation
5.	IC Iq Pd	3.442 μ W	IC	IC Iq Pd
6.	IC Pd	359.74 mW	IC	IC power dissipation
7.	IC Tj	36.469 degC	IC	IC junction temperature
8.	ICThetaJA Effective	18.0 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
9.	Iin Avg	211.73 mA	IC	Average input current
10.	L Ipp	471.04 mA	Inductor	Peak-to-peak inductor ripple current
11.	L Pd	144.63 mW	Inductor	Inductor power dissipation
12.	Cin Pd	83.38 μ W	Power	Input capacitor power dissipation
13.	Cout Pd	647.15 μ W	Power	Output capacitor power dissipation
14.	IC Pd	359.74 mW	Power	IC power dissipation
15.	L Pd	144.63 mW	Power	Inductor power dissipation
16.	Total Pd	505.302 mW	Power	Total Power Dissipation
17.	BOM Count	9	System	Total Design BOM count
18.	Cross Freq	17.667 kHz	System	Bode plot crossover frequency
19.	Duty Cycle	20.499 %	System	Duty cycle
20.	Efficiency	90.821 %	System	Steady state efficiency
21.	FootPrint	189.0 mm ²	System	Total Foot Print Area of BOM components
22.	Frequency	400.0 kHz	System	Switching frequency
23.	Gain Marg	-35.737 dB	System	Bode Plot Gain Margin
24.	Iout	1.0 A	System	Iout operating point
25.	Low Freq Gain	77.053 dB	System	Gain at 1Hz
26.	Mode	CCM	System	Conduction Mode
27.	Phase Marg	71.045 deg	System	Bode Plot Phase Margin
28.	Pout	5.0 W	System	Total output power
29.	Total BOM	\$3.23	System	Total BOM Cost
30.	Vin	26.0 V	System	Vin operating point
31.	Vout	5.0 V	System	Operational Output Voltage
32.	Vout Actual	5.014 V	System	Vout Actual calculated based on selected voltage divider resistors
33.	Vout Tolerance	3.65 %	System	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
34.	Vout p-p	16.486 mV	System	Peak-to-peak output ripple voltage

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	26.0	Maximum input voltage
3.	VinMin	22.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	acFrequency	0.0	AC Frequency
6.	base_pn	LMR23610A	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR23610A** Product Folder : <http://www.ti.com/product/LMR23610> : contains the data sheet and other resources.

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