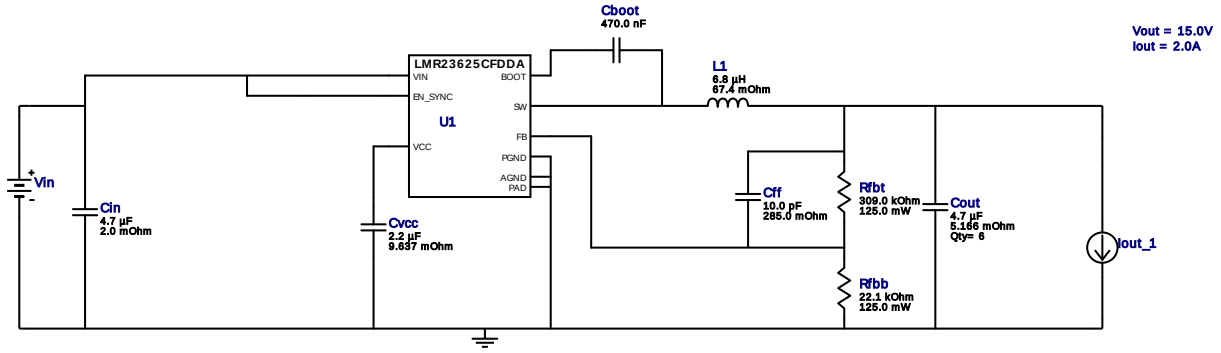
WEBENCH® Design Report

VinMin = 22.0V
VinMax = 30.0V
Vout = 15.0V
Iout = 2.0A

Device = LMR23625CFDDAR
Topology = Buck
Created = 7/17/16 8:15:15 AM
BOM Cost = $2.48
BOM Count = 14
Total Pd = 3.61W

Design : 4352199/34 LMR23625CFDDAR
LMR23625CFDDAR 22.0V-30.0V to 15.00V @ 2.0A



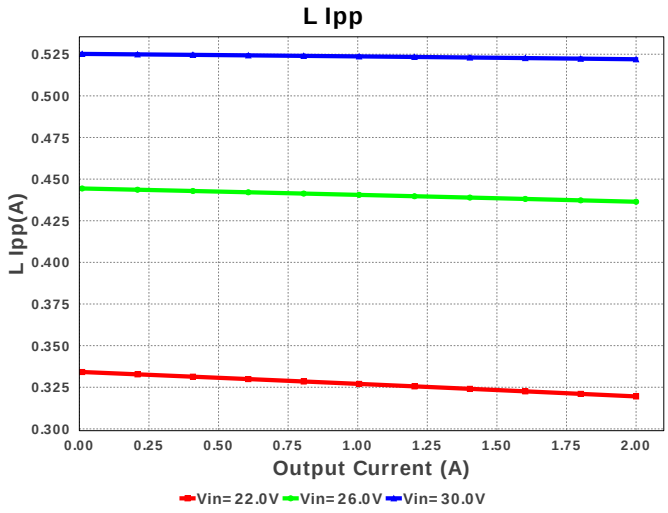
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

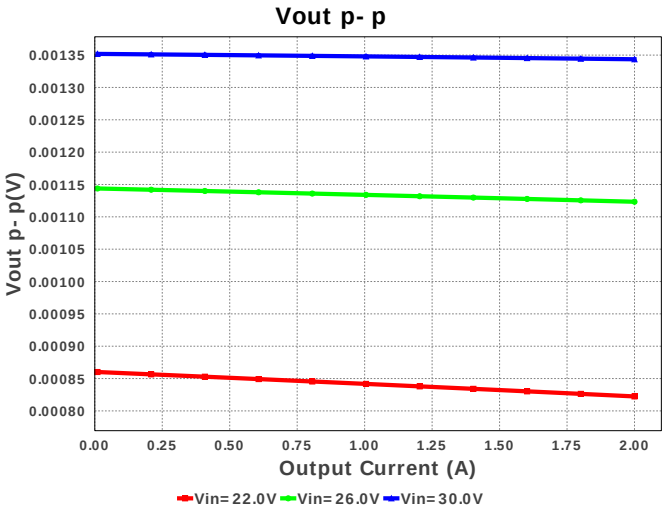
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating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

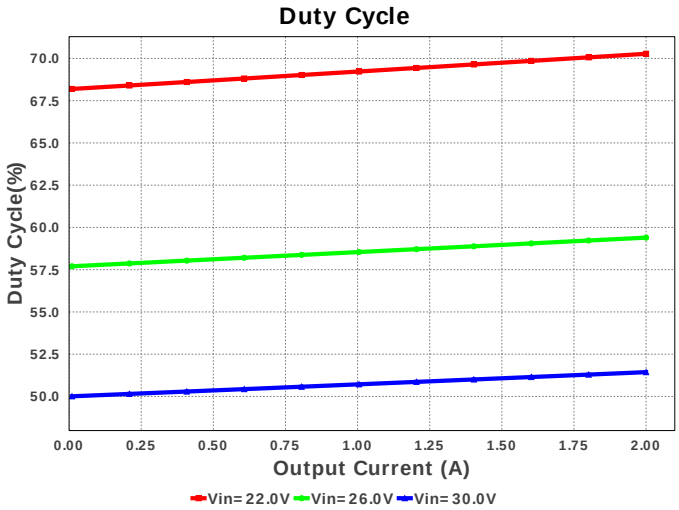
Electrical BOM

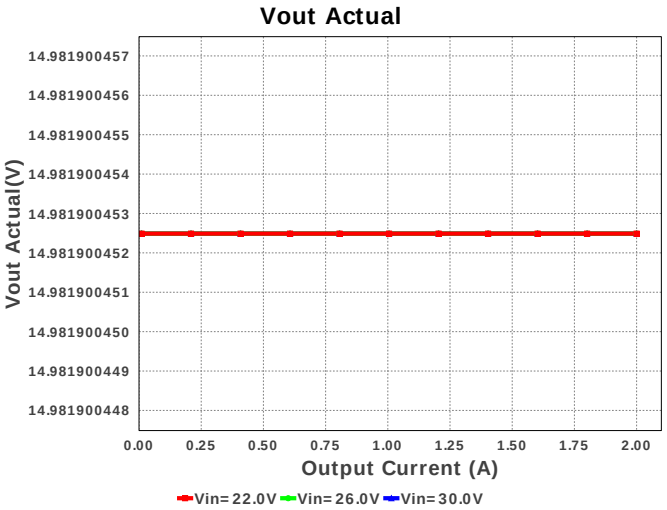
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM21BR71H474KA88L Series= X7R	Cap= 470.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.05	0805 7 mm²
2.	Cff	Kemet	C0805C100J5GACTU Series= C0G/NP0	Cap= 10.0 pF ESR= 285.0 mOhm VDC= 50.0 V IRMS= 221.0 mA	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	1	$0.19	1210 15 mm²
4.	Cout	MuRata	GRM21BC81E475KA12L Series= X6S	Cap= 4.7 uF ESR= 5.166 mOhm VDC= 25.0 V IRMS= 2.03531 A	6	$0.02	0805 7 mm²
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 mm²
6.	L1	Coilcraft	XAL4030-682MEB	L= 6.8 µH DCR= 67.4 mOhm	1	$0.72	XAL4030 25 mm²
7.	Rfbb	Panasonic	ERJ-6ENF2212V Series= ERJ-6E	Res= 22.1 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
8.	Rfbt	Panasonic	ERJ-6ENF3093V Series= ERJ-6E	Res= 309.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²

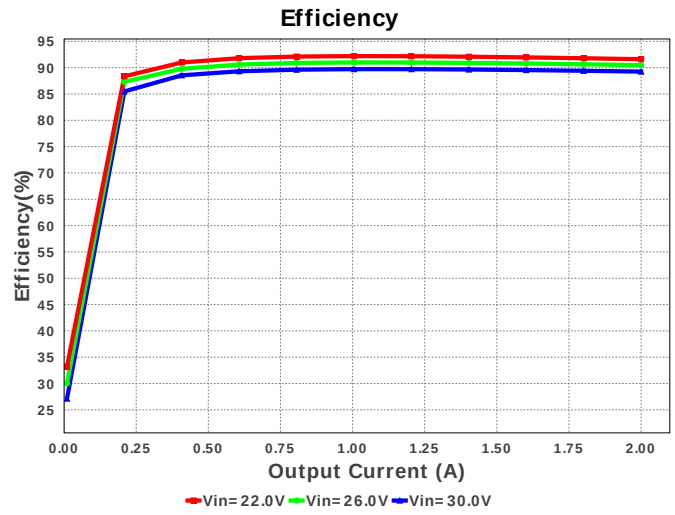
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	U1	Texas Instruments	LMR23625CFDDAR	Switcher	1	$1.35	 DDA0008E_N 57 mm^2

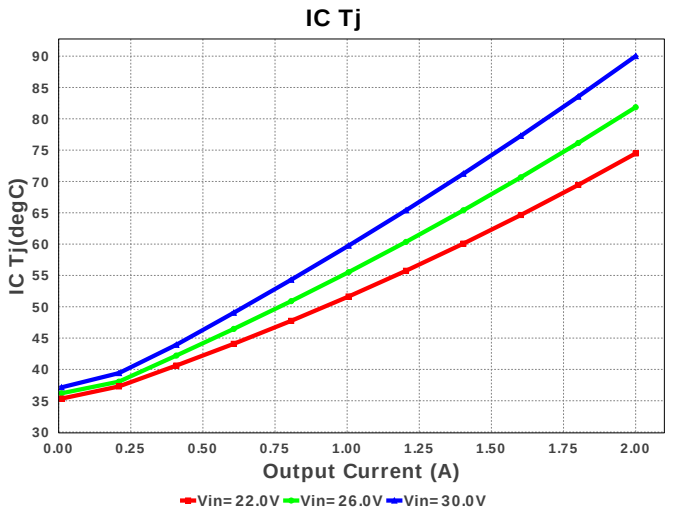


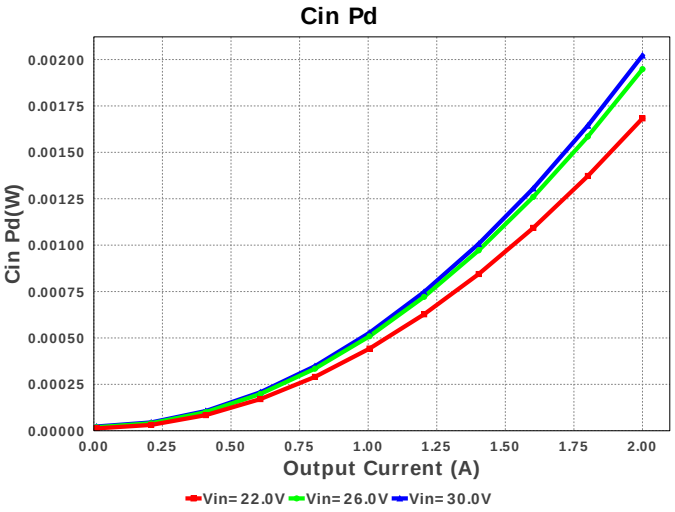


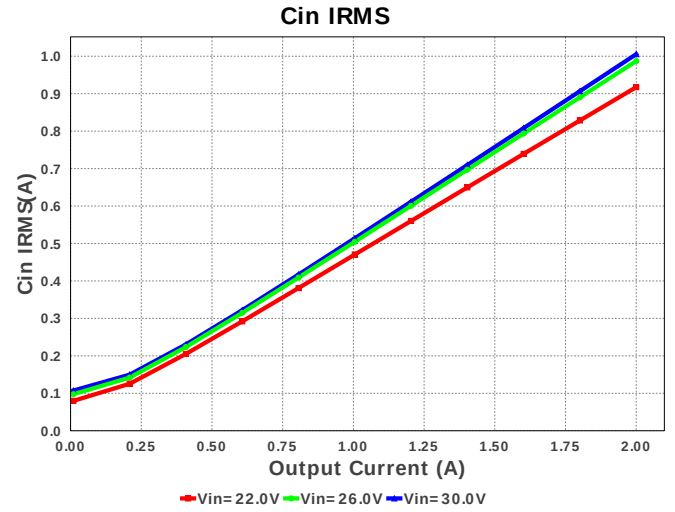


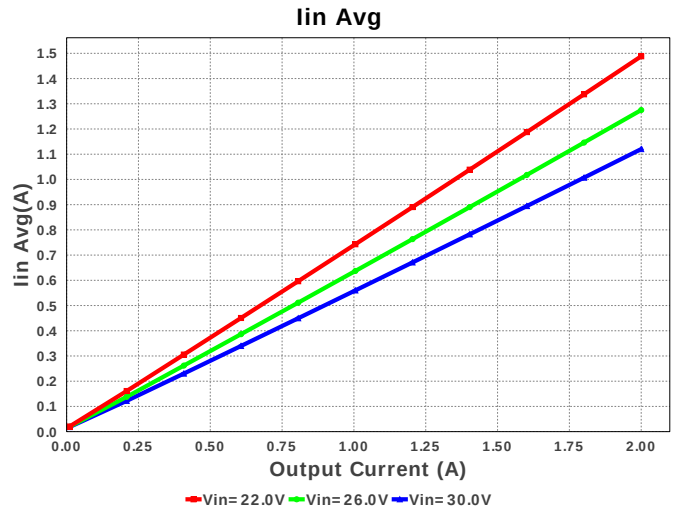


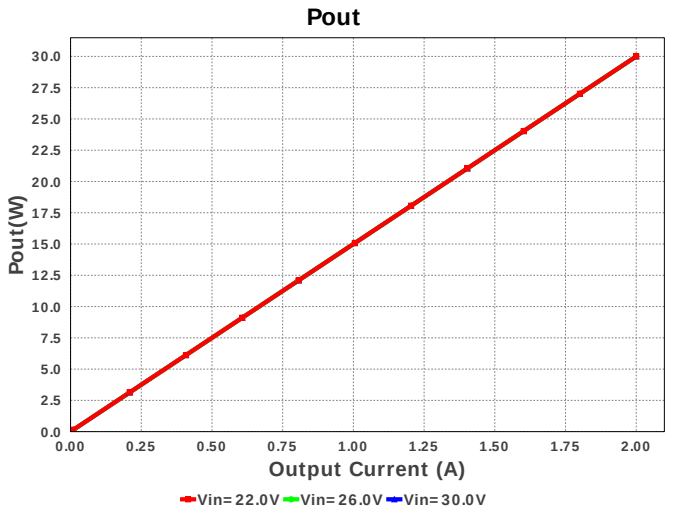


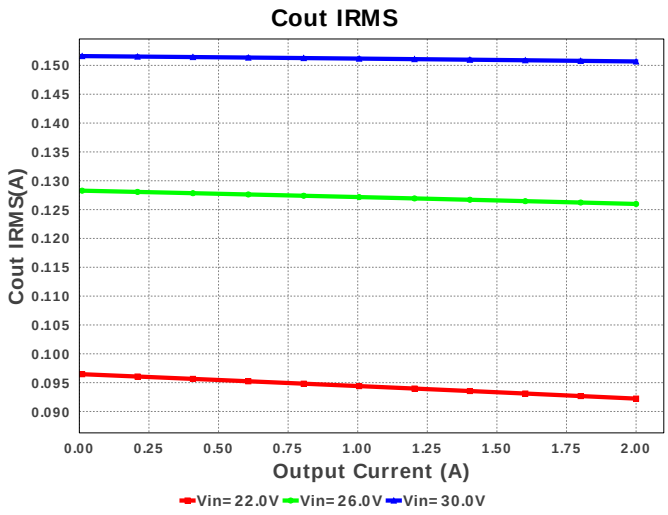


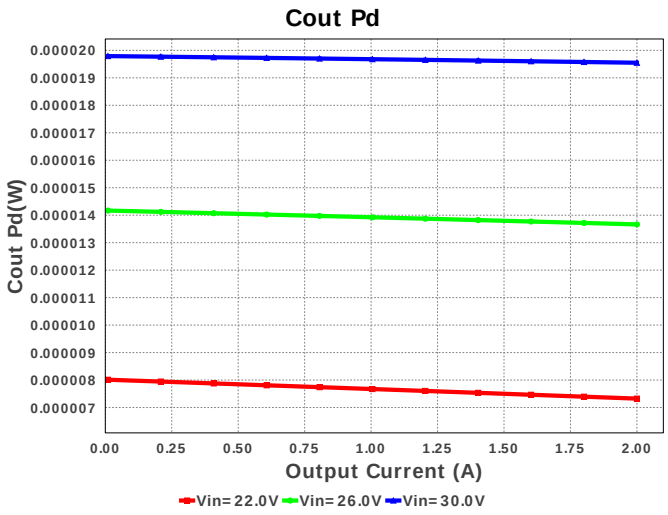


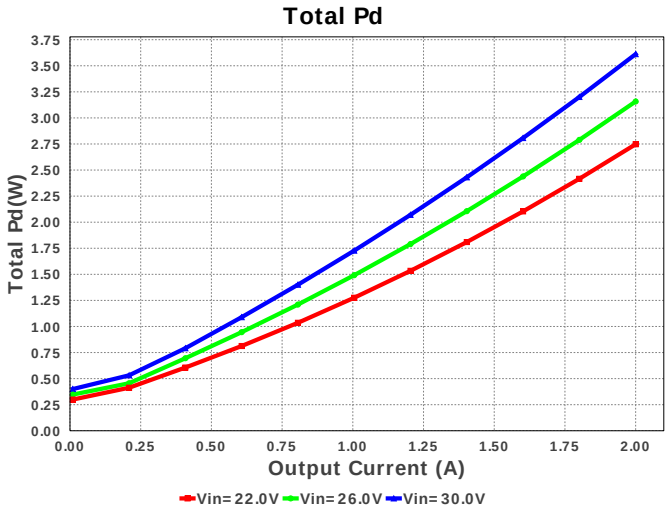


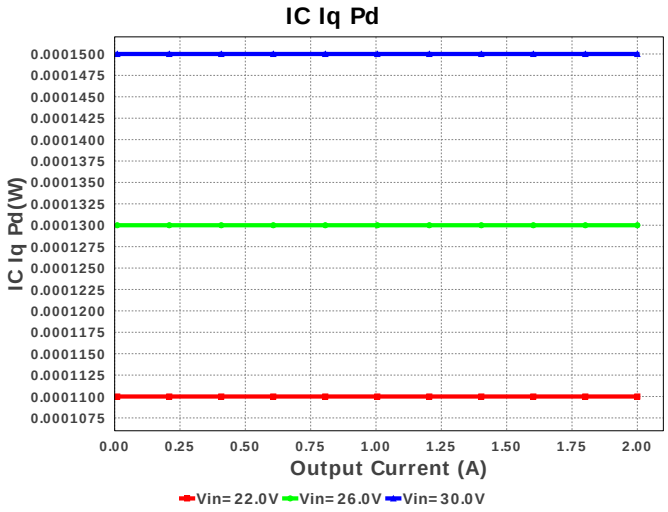


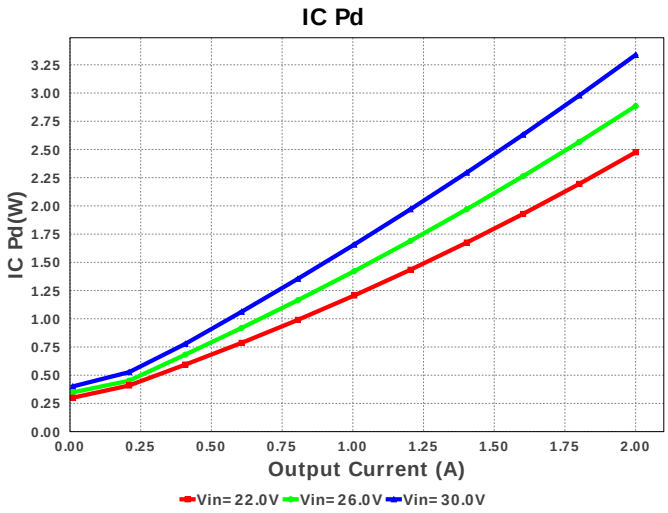


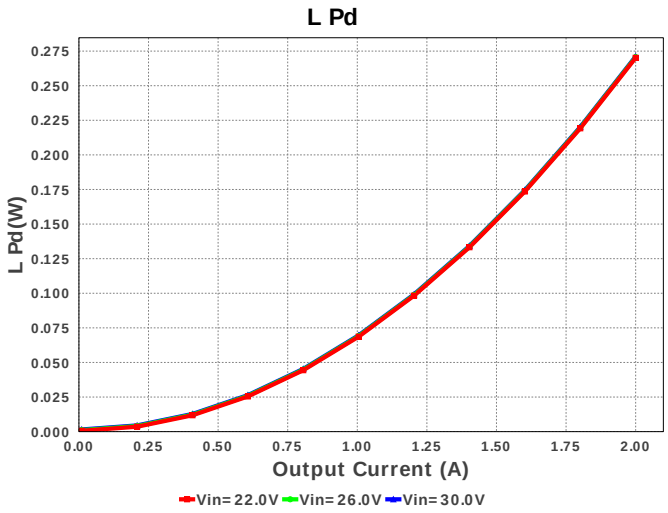


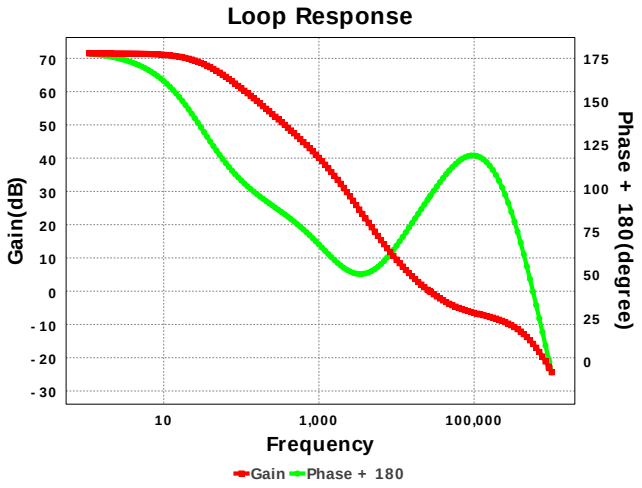


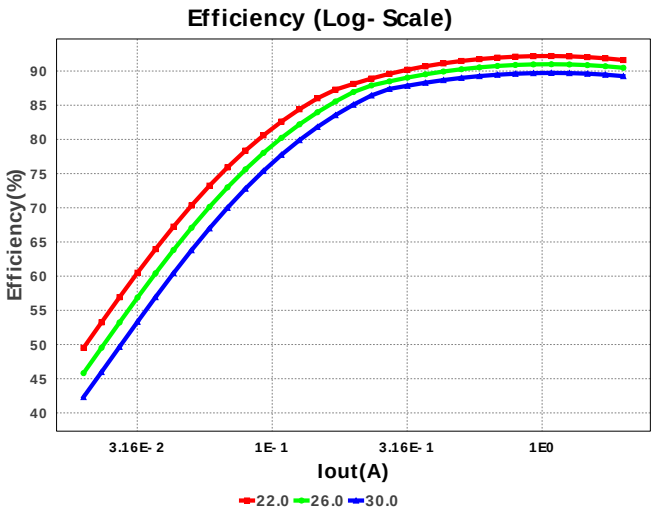












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.005 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	150.682 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.12 A	Current	Average input current
4.	L Ipp	521.98 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	14	General	Total Design BOM count
6.	FootPrint	169.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	2.1 MHz	General	Switching frequency
8.	Pout	30.0 W	General	Total output power
9.	Total BOM	$2.48	General	Total BOM Cost
10.	ICThetaJA Effective	18.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
11.	Low Freq Gain	71.481 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	14.982 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	15.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	26.631 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	51.437 %	Op_point	Duty cycle
16.	Efficiency	89.254 %	Op_point	Steady state efficiency
17.	Gain Marg	-23.087 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	90.009 degC	Op_point	IC junction temperature
19.	IOUT_OP	2.0 A	Op_point	Iout operating point
20.	Phase Marg	95.219 deg	Op_point	Bode Plot Phase Margin
21.	VIN_OP	30.0 V	Op_point	Vin operating point
22.	Vout p-p	1.344 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	2.022 mW	Power	Input capacitor power dissipation
24.	Cout Pd	19.549 µW	Power	Output capacitor power dissipation
25.	IC Iq Pd	150.0 µW	Power	IC Iq Pd
26.	IC Pd	3.338 W	Power	IC power dissipation
27.	L Pd	271.13 mW	Power	Inductor power dissipation
28.	Total Pd	3.612 W	Power	Total Power Dissipation
29.	Vout Tolerance	3.923 %		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	30.0	Maximum input voltage
3.	VinMin	22.0	Minimum input voltage
4.	Vout	15.0	Output Voltage
5.	base_pn	LMR23625CF	Base Product 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.