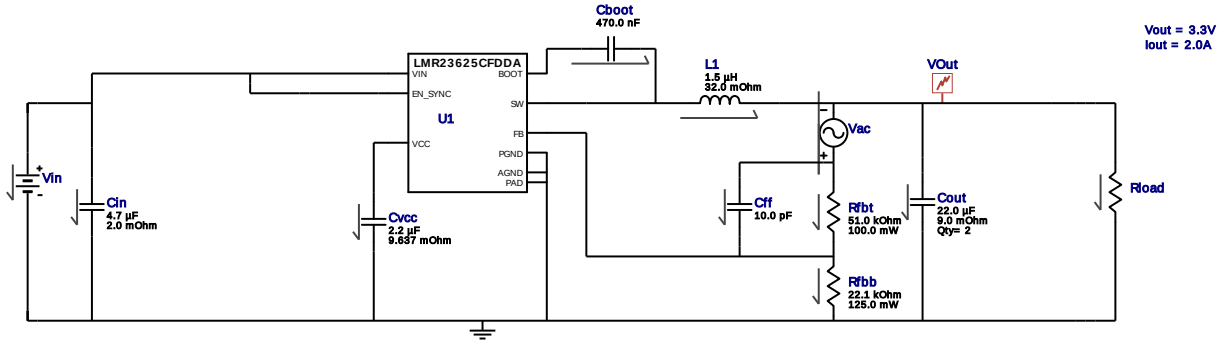
WEBENCH® Electrical Simulation Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 3.3V
Iout = 2.0A

Device = LMR23625CFDDAR
Topology = Buck
Created = 7/12/16 5:37:36 PM
User ID = 4354344
Design Id = 34
eSim Id = 1
Simulation Type = Bode Plot



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.

My Comments

No comments

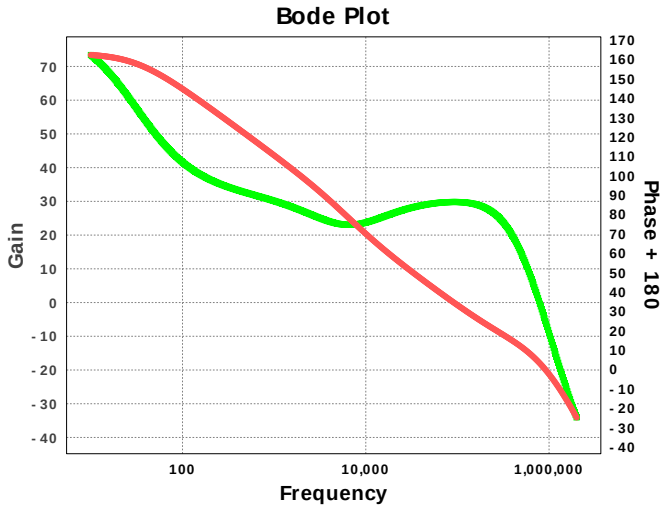
Electrical BOM

#	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 mm²
2.	Cff	Kemet	C0805C100M4GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 µF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	1	$0.19	1210 15 mm²
4.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 µF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	$0.04	0805 7 mm²
5.	Cvcc	MuRata	GRM188R60J225KE19D Series= X5R	Cap= 2.2 µF ESR= 9.637 mOhm VDC= 6.3 V IRMS= 1.323 A	1	$0.02	0603 5 mm²
6.	L1	Vishay-Dale	IHLP1212BZER1R5M11	L= 1.5 µH DCR= 32.0 mOhm	1	$0.56	IHLP-1212BZ 19 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	Yageo America	RC0603FR-0751KL Series= ?	Res= 51.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²

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

Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cout	IC	Initial Condition	no values
2.	Cinj	C	Injection Capacitor	10000000
3.	Linj	L	Injection L	10000000 F
4.	Vinj	AC	AC source	1 V
5.	Rload	R	Load Resistance	1.65 Ohm



Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	VinMax	22.0 V	Maximum input voltage
3.	VinMin	14.0 V	Minimum input voltage
4.	Vout	3.3 V	Output Voltage
5.	base_pn	LMR23625CF	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0 degC	Ambient temperature

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	748.404 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	274.105 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	410.55 mA	Current	Average input current
4.	L Ipp	949.53 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	10	General	Total Design BOM count
6.	FootPrint	135.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	2.1 MHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	6.6 W	General	Total output power
10.	Total BOM	$2.26	General	Total BOM Cost
11.	ICThetaJA Effective	18.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
12.	Low Freq Gain	72.371 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	3.308 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
15.	Cross Freq	91.357 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	16.377 %	Op_point	Duty cycle
17.	Efficiency	73.072 %	Op_point	Steady state efficiency
18.	Gain Marg	-24.632 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	71.402 degC	Op_point	IC junction temperature
20.	IOUT_OP	2.0 A	Op_point	Iout operating point

#	Name	Value	Category	Description
21.	Phase Marg	87.478 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	22.0 V	Op_point	Vin operating point
23.	Vout p-p	2.124 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	1.12 mW	Power	Input capacitor power dissipation
25.	Cout Pd	338.1 µW	Power	Output capacitor power dissipation
26.	IC Iq Pd	110.0 µW	Power	IC Iq Pd
27.	IC Pd	2.3 W	Power	IC power dissipation
28.	L Pd	130.404 mW	Power	Inductor power dissipation
29.	Total Pd	2.432 W	Power	Total Power Dissipation
30.	Vout Tolerance	3.438 %	Unknown	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Assistance

1. LMR23625CF Product Folder : http://www.ti.com/product/LMR23625 : contains the data sheet and other resources.