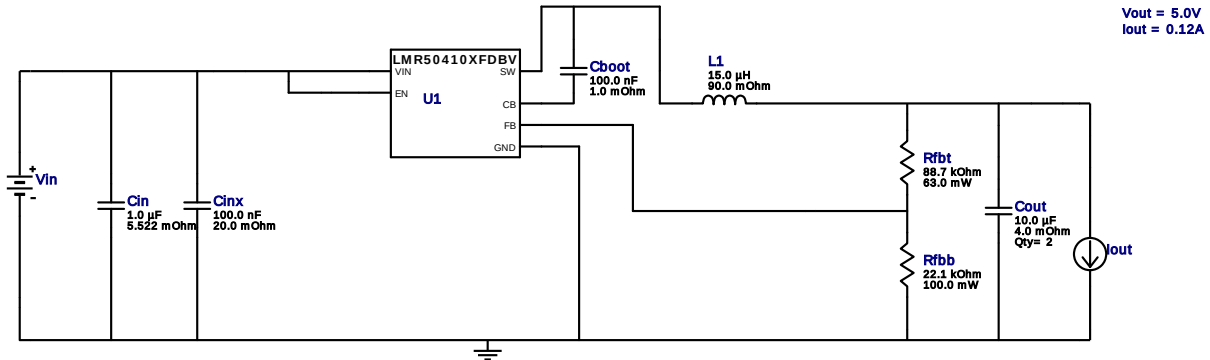


WEBENCH® Design Report

Design : 8503 LMR50410XFDBVR
LMR50410XFDBVR 6V-36V to 5.00V @ 1A

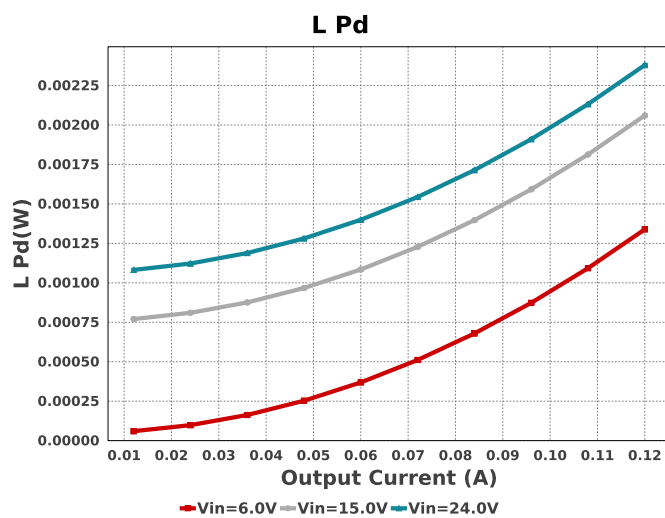
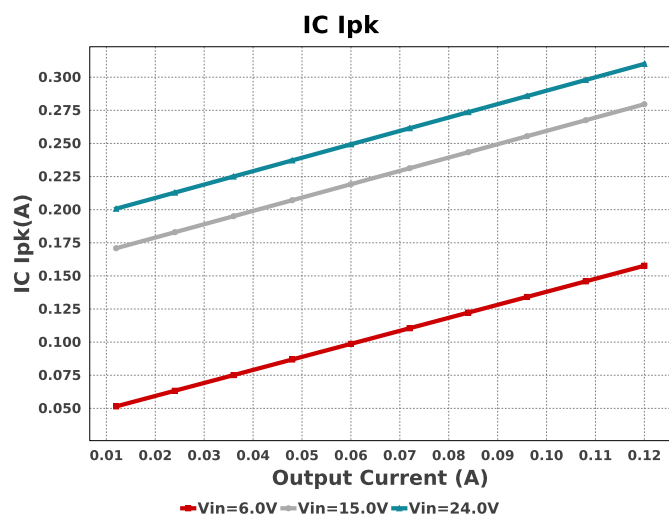
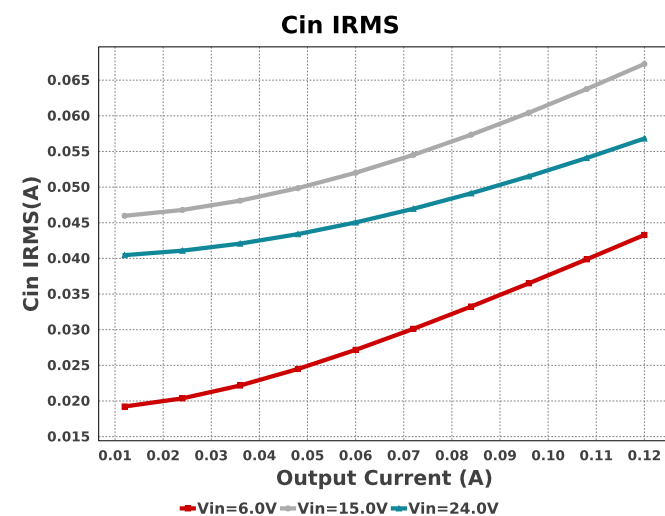
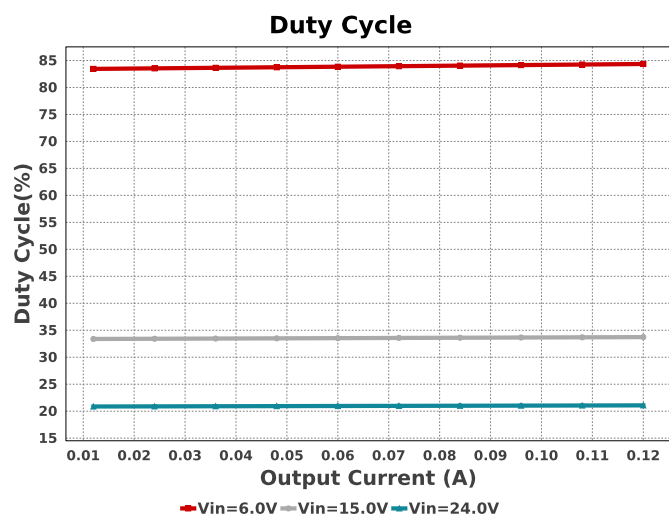
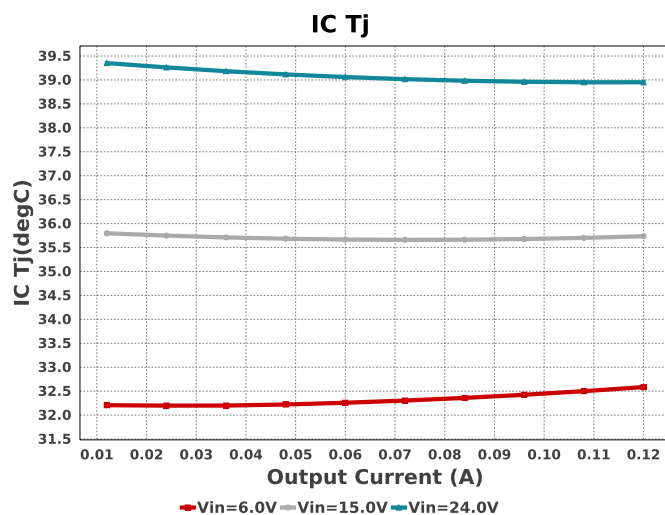
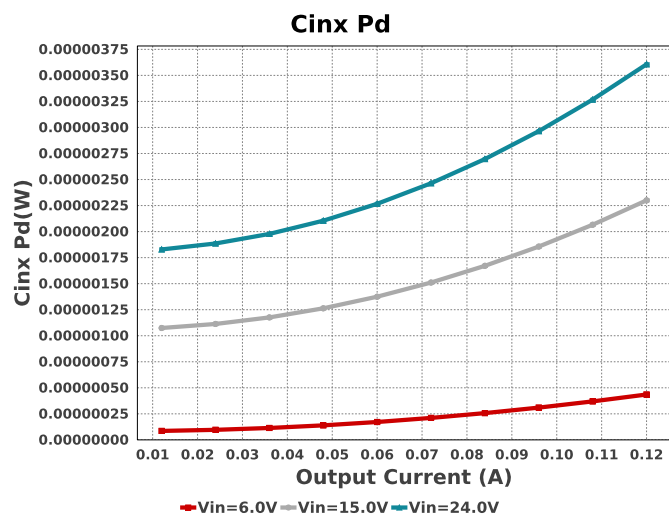
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VinMax = 24.0V
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Iout = 0.12A

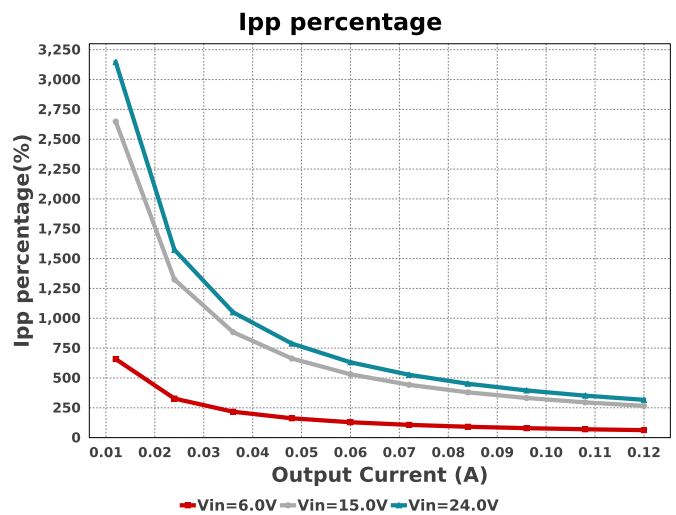
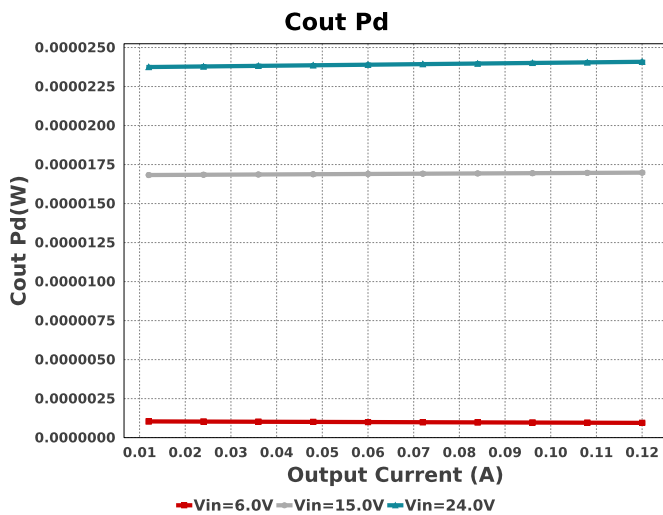
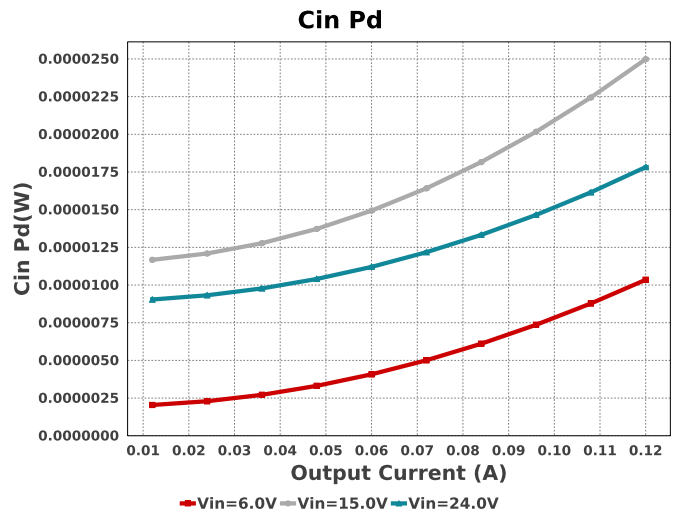
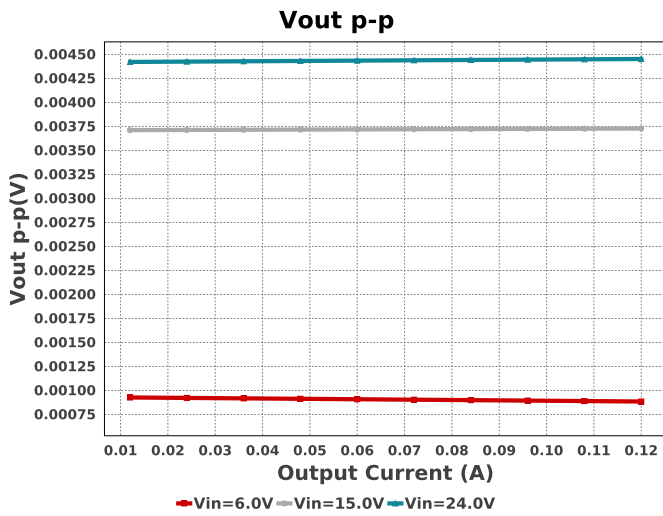
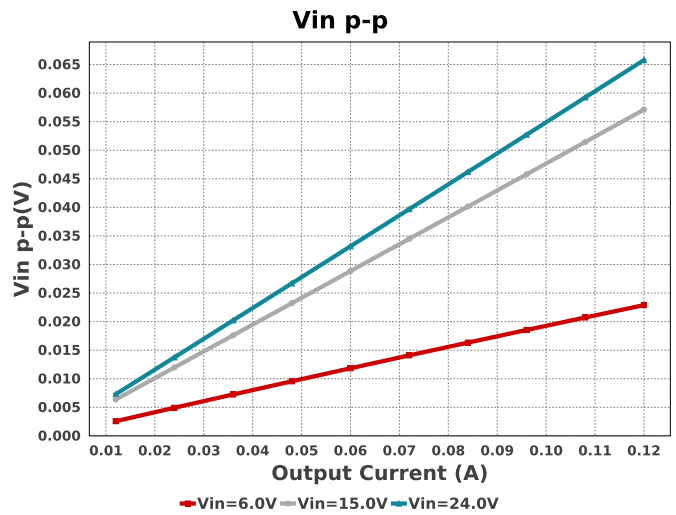
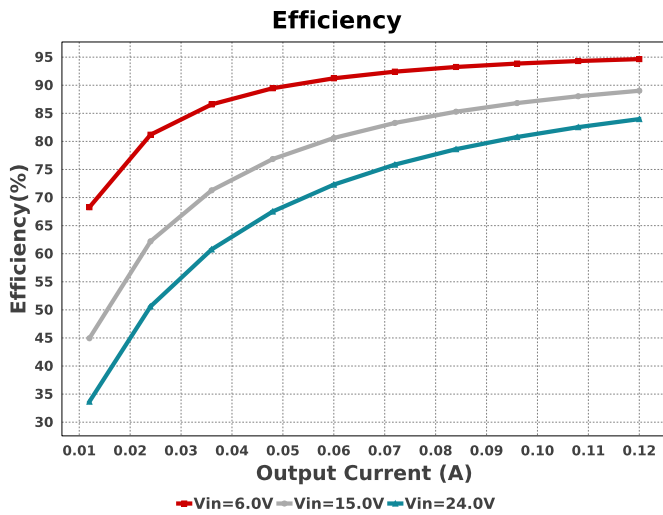
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Topology = Buck
Created = 2023-02-23 00:48:30.080
BOM Cost = \$0.75
BOM Count = 9
Total Pd = 0.11W

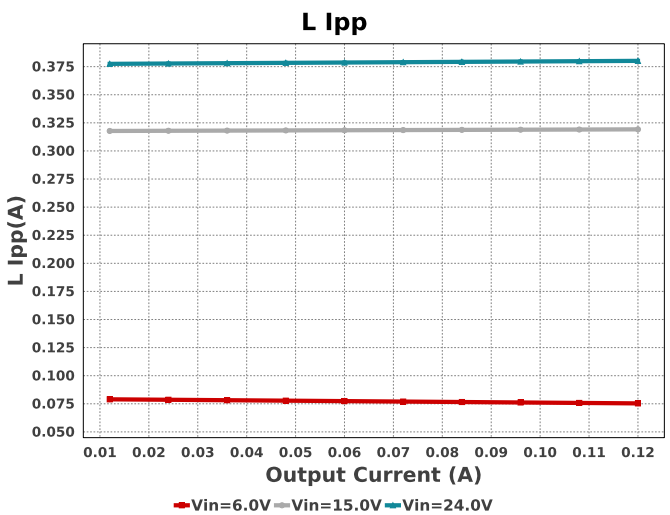
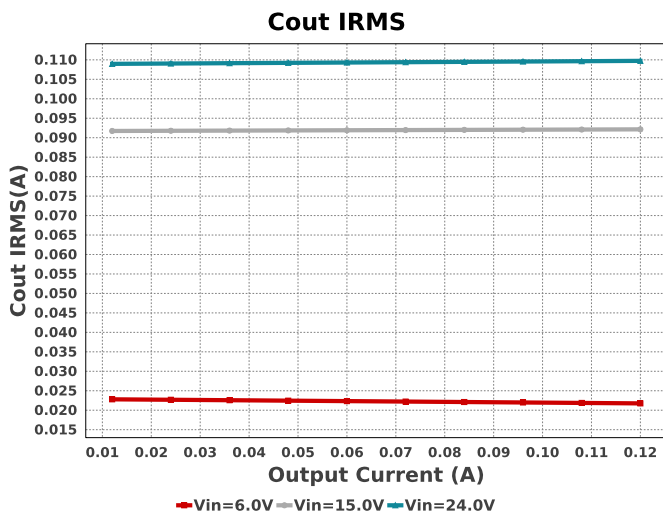
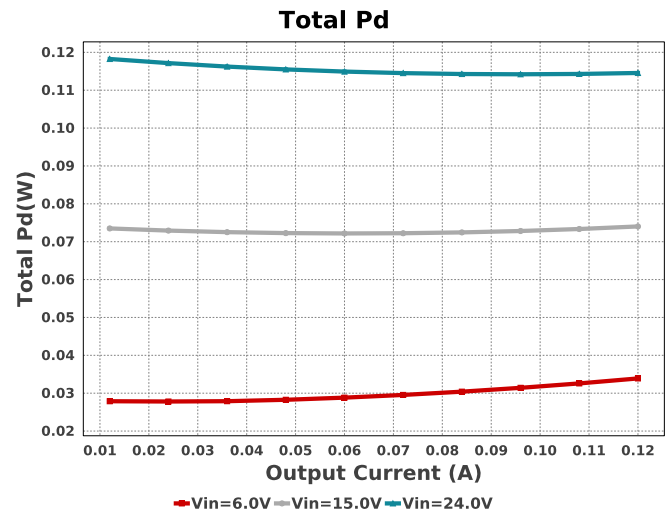
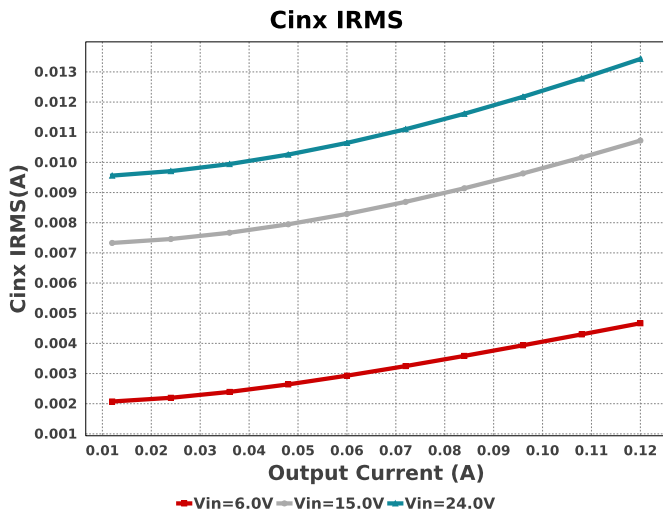
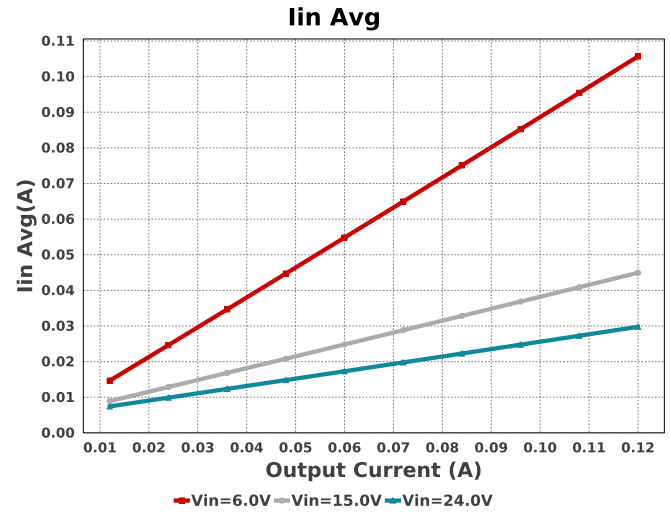
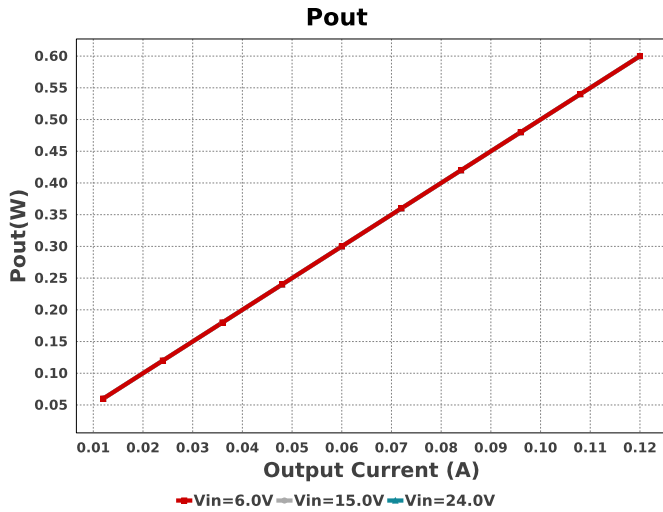


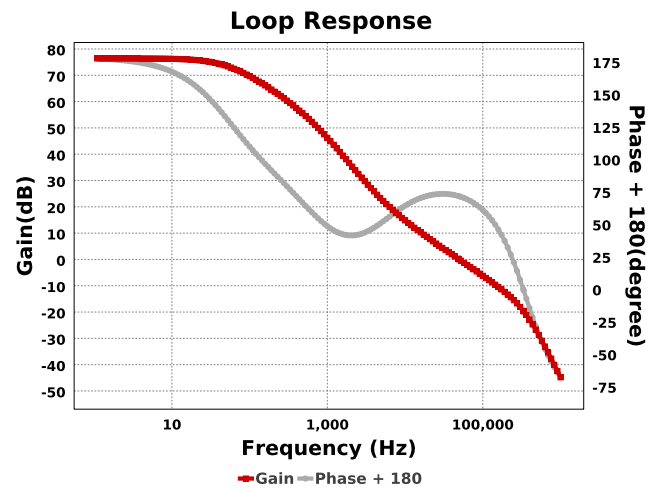
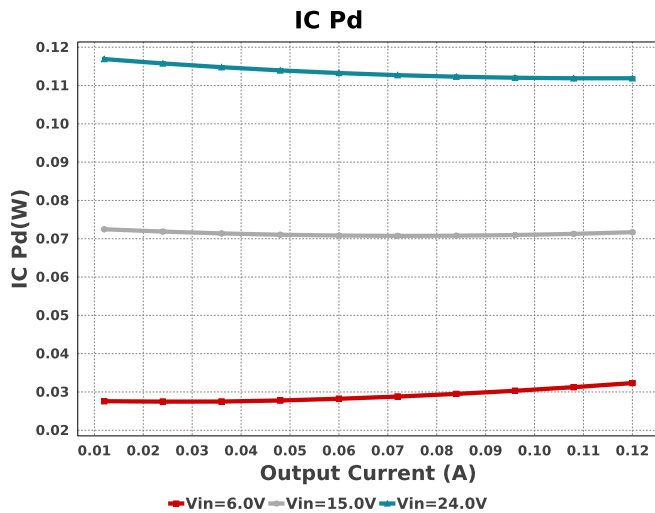
Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	MuRata	GRM155R71C104KA88D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
Cin	TDK	C1608X7R1V105K080AC Series= X7R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 35.0 V IRMS= 2.2162 A	1	\$0.05	0603 5 mm ²
Cinx	MuRata	GRM188R71H104KA93D Series= X7R	Cap= 100.0 nF ESR= 20.0 mOhm VDC= 50.0 V IRMS= 3.8 A	1	\$0.02	0603 5 mm ²
Cout	MuRata	GRM31CR71E106KA12L Series= X7R	Cap= 10.0 uF ESR= 4.0 mOhm VDC= 25.0 V IRMS= 6.0 A	2	\$0.06	1206_180 11 mm ²
L1	NIC Components	NPI75C150MTRF	L= 15.0 uH 90.0 mOhm	1	\$0.11	IND_NPI75C 94 mm ²
Rfbb	Yageo	RC0603FR-0722K1L Series= ?	Res= 22.1 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
Rfbb	Vishay-Dale	CRCW040288K7FKED Series= CRCW..e3	Res= 88.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
U1	Texas Instruments	LMR50410XFDBVR	Switcher	1	\$0.42	DBV0006A 15 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	56.815 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	17.825 μ W	Capacitor	Input capacitor power dissipation
3.	Cinx IRMS	13.428 mA	Capacitor	Bulk capacitor RMS ripple current
4.	Cinx Pd	3.606 μ W	Capacitor	Bulk capacitor power dissipation
5.	Cout IRMS	109.738 mA	Capacitor	Output capacitor RMS ripple current
6.	Cout Pd	24.085 μ W	Capacitor	Output capacitor power dissipation
7.	IC Ipk	310.071 mA	IC	Peak switch current in IC
8.	IC Pd	111.9 mW	IC	IC power dissipation
9.	IC Tj	38.952 degC	IC	IC junction temperature
10.	IC Tolerance	15.0 mV	IC	IC Feedback Tolerance
11.	ICThetaJA Effective	80.0 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
12.	Iin Avg	29.773 mA	IC	Average input current
13.	Ipp percentage	316.785 %	Inductor	Inductor ripple current percentage (with respect to average inductor current)
14.	L Ipp	380.14 mA	Inductor	Peak-to-peak inductor ripple current
15.	L Pd	2.38 mW	Inductor	Inductor power dissipation
16.	Cin Pd	17.825 μ W	Power	Input capacitor power dissipation
17.	Cinx Pd	3.606 μ W	Power	Bulk capacitor power dissipation
18.	Cout Pd	24.085 μ W	Power	Output capacitor power dissipation
19.	IC Pd	111.9 mW	Power	IC power dissipation
20.	L Pd	2.38 mW	Power	Inductor power dissipation
21.	Total Pd	114.55 mW	Power	Total Power Dissipation
22.	BOM Count	9	System	Total Design BOM count
23.	Cross Freq	49.606 kHz	System	Bode plot crossover frequency
24.	Duty Cycle	21.08 %	System	Duty cycle
25.	Efficiency	83.969 %	System	Steady state efficiency
26.	FootPrint	151.0 mm ²	System	Total Foot Print Area of BOM components
27.	Frequency	700.0 kHz	System	Switching frequency
28.	Gain Marg	-19.768 dB	System	Bode Plot Gain Margin
29.	Iout	120.0 mA	System	Iout operating point
30.	Low Freq Gain	76.406 dB	System	Gain at 1Hz
31.	Mode	FCCM	System	Conduction Mode
32.	Phase Marg	72.614 deg	System	Bode Plot Phase Margin
33.	Pout	600.0 mW	System	Total output power
34.	Total BOM	\$0.75	System	Total BOM Cost
35.	Vin	24.0 V	System	Vin operating point
36.	Vin p-p	65.782 mV	System	Peak-to-peak input voltage

#	Name	Value	Category	Description
37.	Vout	5.0 V	System Information	Operational Output Voltage
38.	Vout Actual	5.014 V	System Information	Vout Actual calculated based on selected voltage divider resistors
39.	Vout Tolerance	3.142 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
40.	Vout p-p	4.453 mV	System Information	Peak-to-peak output ripple voltage

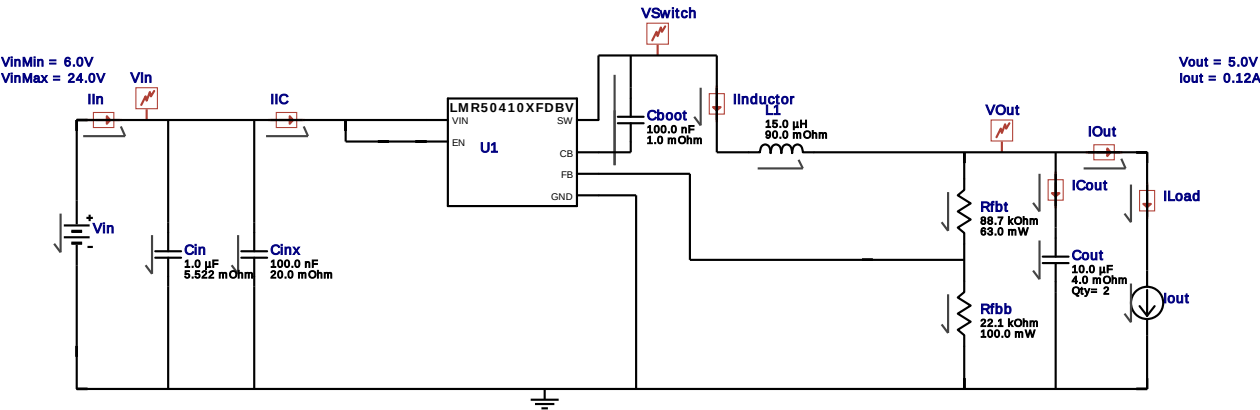
Design Inputs

Name	Value	Description
Iout	120.0 m	Maximum Output Current
VinMax	24.0	Maximum input voltage
VinMin	6.0	Minimum input voltage
Vout	5.0	Output Voltage
base_pn	LMR50410XF	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

WEBENCH® Assembly

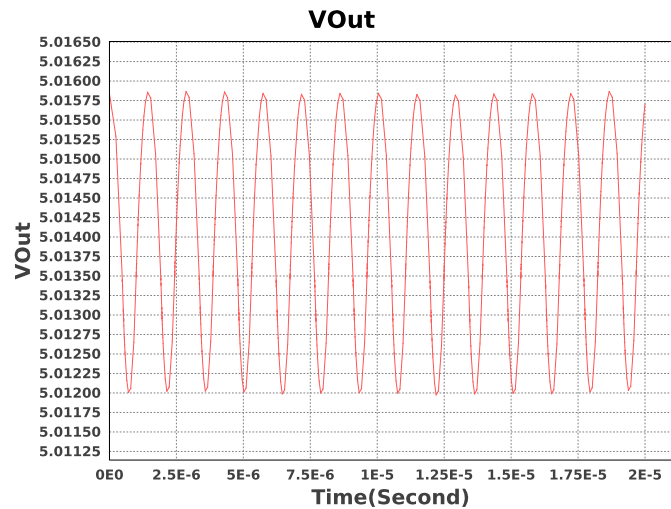
WEBENCH® Electrical Simulation Report

Design Id = 8503
sim_id = 2
Simulation Type = Steady State



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	L1	IC	Initial Current	0.12 A
2.	Iout	I	Output Current	0.12 A



Design Assistance

- Master key : AE3011FD2EE8F4EB[v1]
- LMR50410XF Product Folder : <http://www.ti.com/product/LMR50410> : contains the data sheet and other resources.

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