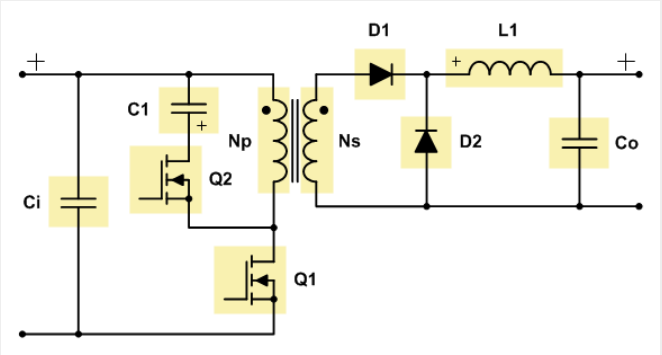
Design Values

Minimum Input Voltage:	36	V
Maximum Input Voltage:	72	V
Output Voltage:	5	V
Output Current:	35	A
Switching Frequency:	200	kHz
Diode Voltage Drop:	0.1	V
Inductor Current Ripple:	30	%
Maximum Duty Cycle:	60	%
Magnetization Current:	15	%



Recommended Values

Turns Ratio:	4.24	: 1
Transformer Inductance:	87.13	µH
Inductance:	1.70	µH

Choose Values

Turns Ratio:	4	: 1
Transformer Inductance:	100	µH
Inductance:	2.2	µH

Calculated Values at Input Voltage: 48.24 V

Period:	5.00 µs	Input Power:	178.50 W
DutyCycle:	42.29 %	Output Power:	175.00 W
On-Time:	2.11 µs	Rectifier Diode Losses:	1.48 W
Off-Time:	2.89 µs	Freewheeling Diode Losses:	2.02 W
Zero-Time:	0.00 µs		

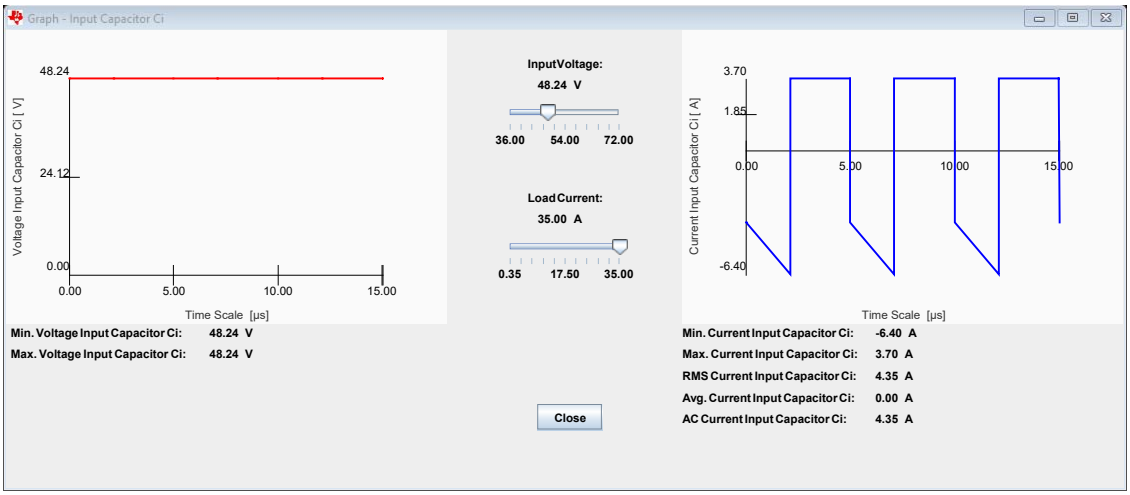
Load Current: 35.00 A

L_{sec}:	6.25 µH
Mag. Current:	1.02 A
	11.66 %
Input Current:	3.70 A
Current Ripple:	6.69 A
	19.11 %

Info

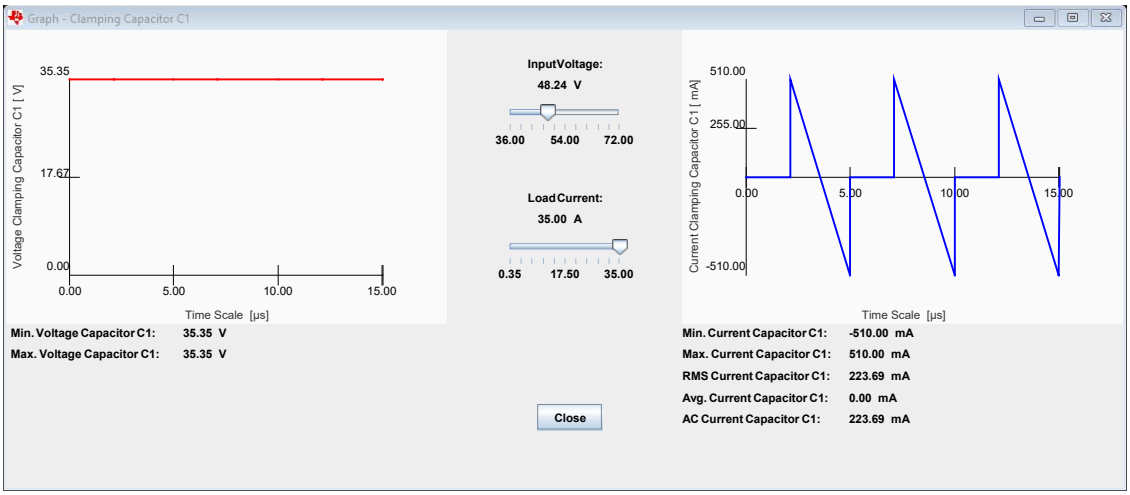
Check TIDesigns™ Reference Design Library

Texas Instruments


Graph - Input Capacitor Ci
48.24
24.12
0.00
Voltage Input Capacitor Ci [V]
0.00
5.00
10.00
15.00
Time Scale [µs]
Min. Voltage Input Capacitor Ci: 48.24 V
Max. Voltage Input Capacitor Ci: 48.24 V
InputVoltage:
48.24 V
36.00 54.00 72.00
Load Current:
35.00 A
0.35 17.50 35.00
Close
3.70
1.85
0.00
-6.40
Current Input Capacitor Ci [A]
0.00
5.00
10.00
15.00
Time Scale [µs]
Min. Current Input Capacitor Ci: -6.40 A
Max. Current Input Capacitor Ci: 3.70 A
RMS Current Input Capacitor Ci: 4.35 A
Avg. Current Input Capacitor Ci: 0.00 A
AC Current Input Capacitor Ci: 4.35 A

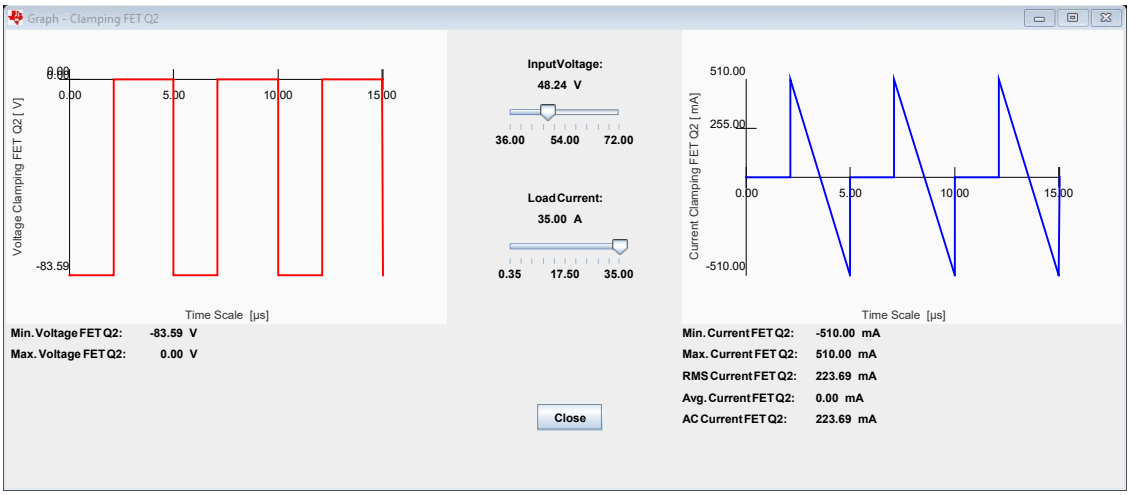

Graph - Main FET Q1
83.59
41.79
0.00
Voltage Main FET Q1 [V]
0.00
5.00
10.00
15.00
Time Scale [µs]
Min. Voltage FET Q1: 0.00 V
Max. Voltage FET Q1: 83.59 V
Input Voltage:
48.24 V
36.00 54.00 72.00
Load Current:
35.00 A
0.35 17.50 35.00
Close
10.10
5.05
0.00
Current Main FET Q1 [A]
0.00
5.00
10.00
15.00
Time Scale [µs]
Min. Current FET Q1: 7.40 A
Max. Current FET Q1: 10.10 A
RMS Current FET Q1: 5.71 A
Avg. Current FET Q1: 3.70 A
AC Current FET Q1: 4.35 A


Graph - Transformer Primary Side Np
48.24
24.12
0.00
5.00
10.00
15.00
-35.35
Voltage Transformer Np [V]
Time Scale [µs]
Min. Voltage Transformer Np: -35.35 V
Max. Voltage Transformer Np: 48.24 V
InputVoltage:
48.24 V
36.00 54.00 72.00
Load Current:
35.00 A
0.35 17.50 35.00
Close
10.10
5.05
-0.51
0.00
5.00
10.00
15.00
Current Transformer Np [A]
Time Scale [µs]
Min. Current Transformer Np: -0.51 A
Max. Current Transformer Np: 10.10 A
RMS Current Transformer Np: 5.71 A
Avg. Current Transformer Np: 3.70 A
AC Current Transformer Np: 4.35 A



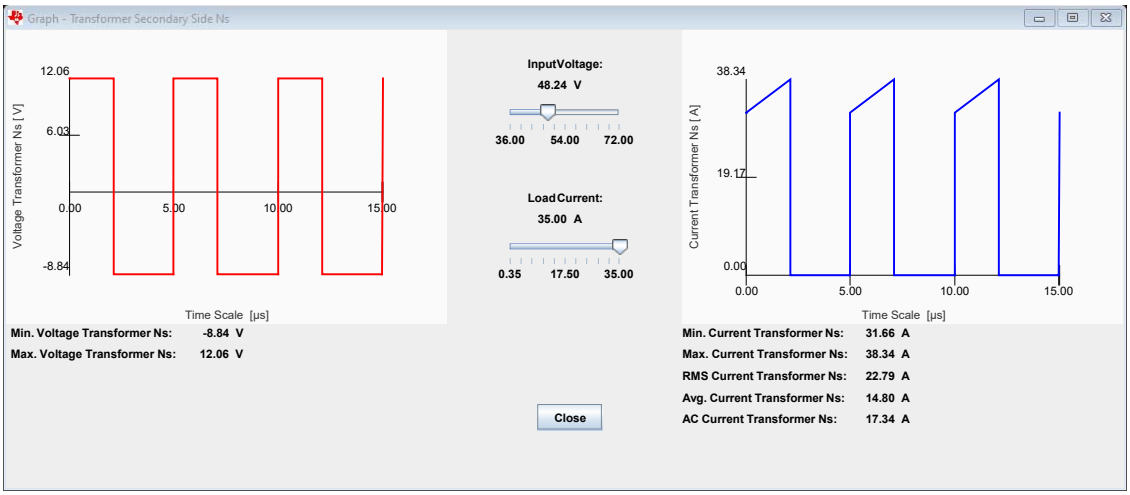
Min. Voltage Capacitor C1: 35.35 V
Max. Voltage Capacitor C1: 35.35 V

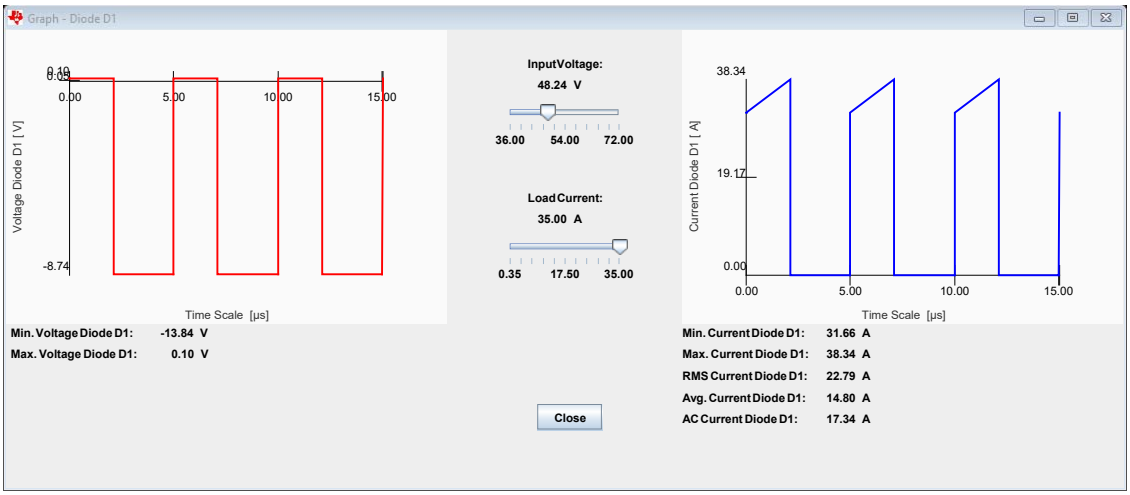
Min. Current Capacitor C1: -510.00 mA
Max. Current Capacitor C1: 510.00 mA
RMS Current Capacitor C1: 223.69 mA
Avg. Current Capacitor C1: 0.00 mA
AC Current Capacitor C1: 223.69 mA

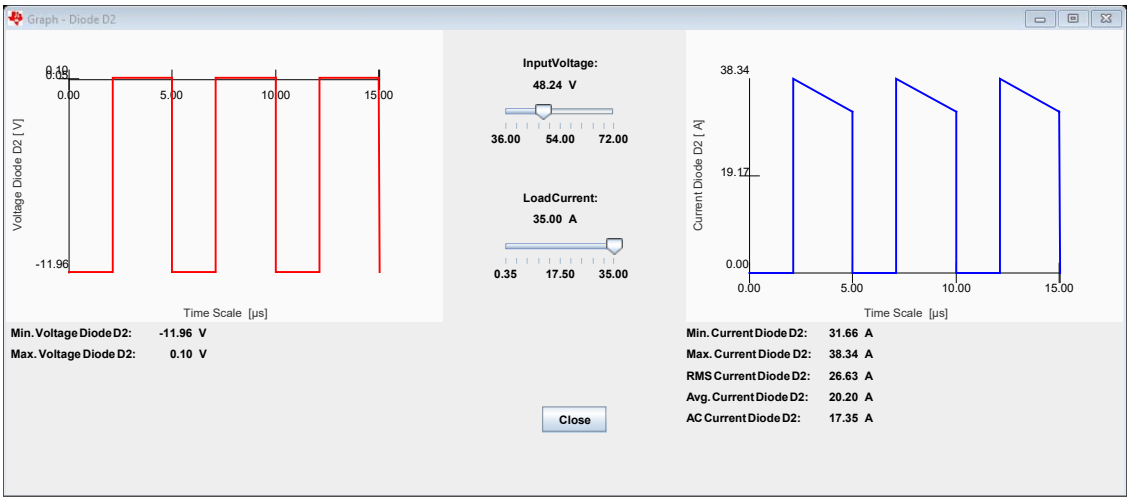


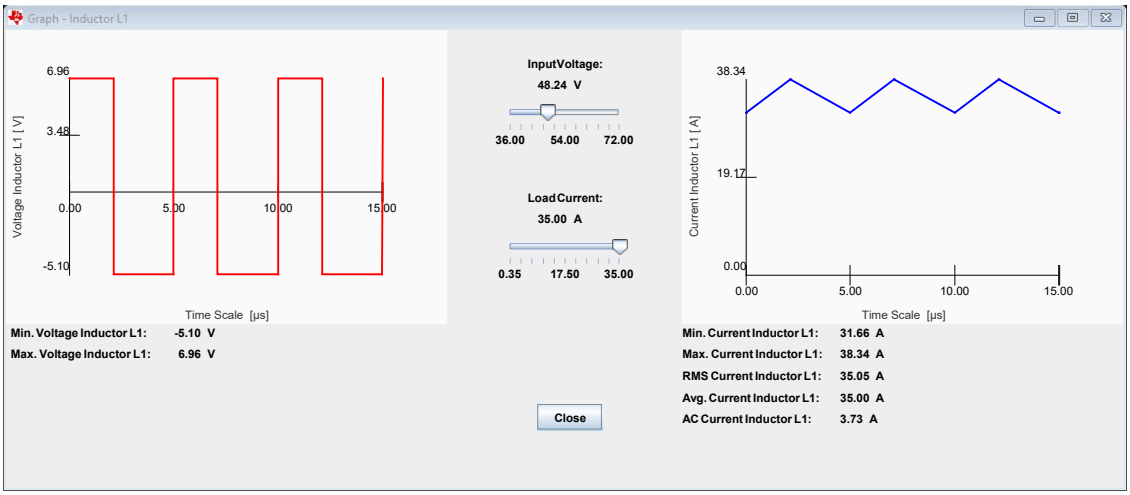
Min. Voltage FET Q2: -83.59 V
Max. Voltage FET Q2: 0.00 V

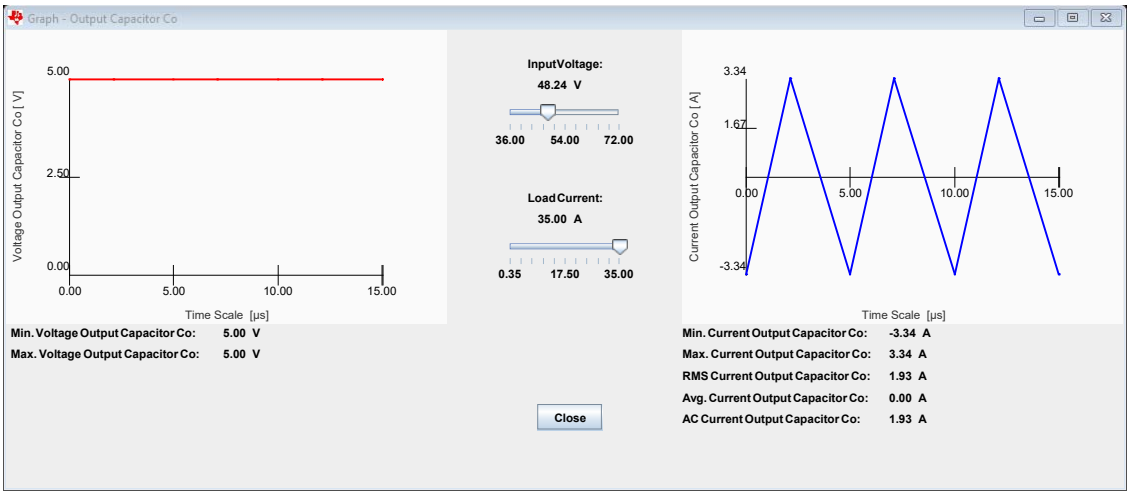
Min. Current FET Q2: -510.00 mA
Max. Current FET Q2: 510.00 mA
RMS Current FET Q2: 223.69 mA
Avg. Current FET Q2: 0.00 mA
AC Current FET Q2: 223.69 mA


Graph - Transformer Secondary Side Ns
12.06
6.03
0.00
-8.84
5.00
10.00
15.00
Voltage Transformer Ns [V]
Time Scale [µs]
Min. Voltage Transformer Ns: -8.84 V
Max. Voltage Transformer Ns: 12.06 V
InputVoltage:
48.24 V
36.00 54.00 72.00
Load Current:
35.00 A
0.35 17.50 35.00
Close
38.34
19.17
0.00
0.00
5.00
10.00
15.00
Current Transformer Ns [A]
Time Scale [µs]
Min. Current Transformer Ns: 31.66 A
Max. Current Transformer Ns: 38.34 A
RMS Current Transformer Ns: 22.79 A
Avg. Current Transformer Ns: 14.80 A
AC Current Transformer Ns: 17.34 A


Graph - Diode D1
0.10
0.00
5.00
10.00
15.00
Voltage Diode D1 [V]
-8.74
Time Scale [µs]
Min. Voltage Diode D1: -13.84 V
Max. Voltage Diode D1: 0.10 V
InputVoltage:
48.24 V
36.00 54.00 72.00
Load Current:
35.00 A
0.35 17.50 35.00
Close
38.34
19.17
0.00
Current Diode D1 [A]
0.00
5.00
10.00
15.00
Time Scale [µs]
Min. Current Diode D1: 31.66 A
Max. Current Diode D1: 38.34 A
RMS Current Diode D1: 22.79 A
Avg. Current Diode D1: 14.80 A
AC Current Diode D1: 17.34 A


Graph - Diode D2
0.10
0.00
5.00
10.00
15.00
Voltage Diode D2 [V]
-11.96
Time Scale [µs]
InputVoltage:
48.24 V
36.00
54.00
72.00
LoadCurrent:
35.00 A
0.35
17.50
35.00
38.34
19.17
0.00
Current Diode D2 [A]
Time Scale [µs]
Min. Voltage Diode D2: -11.96 V
Max. Voltage Diode D2: 0.10 V
Close
Min. Current Diode D2: 31.66 A
Max. Current Diode D2: 38.34 A
RMS Current Diode D2: 26.63 A
Avg. Current Diode D2: 20.20 A
AC Current Diode D2: 17.35 A


Graph - Inductor L1
6.96
3.48
-5.10
0.00
5.00
10.00
15.00
Voltage Inductor L1 [V]
Time Scale [µs]
Min. Voltage Inductor L1: -5.10 V
Max. Voltage Inductor L1: 6.96 V
Input Voltage:
48.24 V
36.00 54.00 72.00
Load Current:
35.00 A
0.35 17.50 35.00
Close
38.34
19.17
0.00
0.00
5.00
10.00
15.00
Current Inductor L1 [A]
Time Scale [µs]
Min. Current Inductor L1: 31.66 A
Max. Current Inductor L1: 38.34 A
RMS Current Inductor L1: 35.05 A
Avg. Current Inductor L1: 35.00 A
AC Current Inductor L1: 3.73 A


Graph - Output Capacitor Co
5.00
2.50
0.00
Voltage Output Capacitor Co [V]
0.00
5.00
10.00
15.00
Time Scale [µs]
Min. Voltage Output Capacitor Co: 5.00 V
Max. Voltage Output Capacitor Co: 5.00 V
InputVoltage:
48.24 V
36.00 54.00 72.00
Load Current:
35.00 A
0.35 17.50 35.00
Close
3.34
1.67
0.00
-3.34
Current Output Capacitor Co [A]
0.00
5.00
10.00
15.00
Time Scale [µs]
Min. Current Output Capacitor Co: -3.34 A
Max. Current Output Capacitor Co: 3.34 A
RMS Current Output Capacitor Co: 1.93 A
Avg. Current Output Capacitor Co: 0.00 A
AC Current Output Capacitor Co: 1.93 A