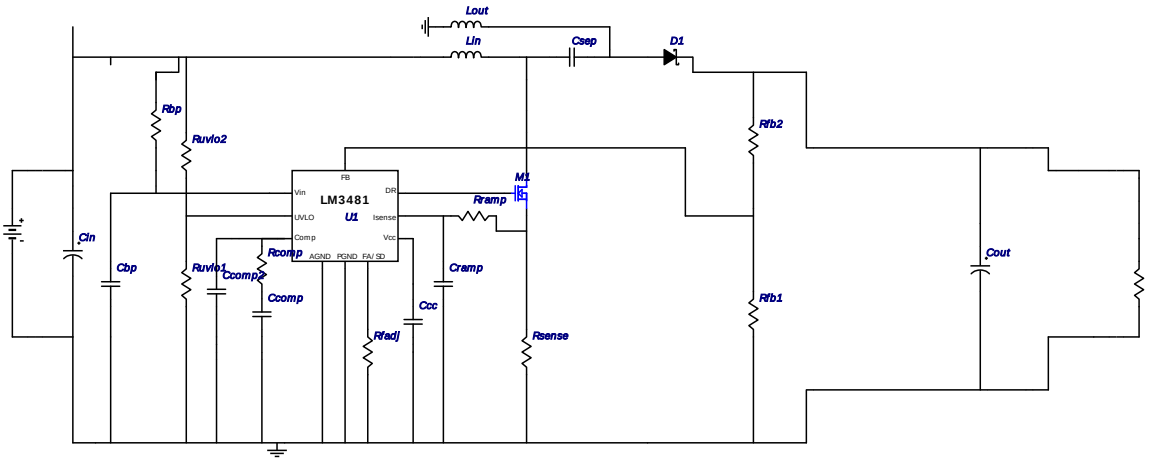
WEBENCH® Design Report

VinMin = 4.5V
VinMax = 25.0V
Vout = 5.4V
Iout = 1.0A

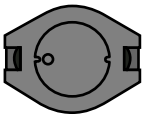
Device = LM3481MM
Topology = SEPIC
Created = 7/23/12 11:51:26 PM
BOM Cost = $3.85
Total Pd = 1.57 W
Footprint = 645.0 mm2
BOM Count = 22

Design : 1043996/35 LM3481MM
LM3481MM 4.5V-25.0V to 5.4V @ 1.0A



Electrical BOM

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
1.	Cbp	Kemet	C0603C104K5RACTU Series= X7R	1	$0.01	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	0603 10mm2
2.	Ccc	MuRata	GRM155R61A224KE19D Series= X5R	1	$0.01	Cap= 220.0 nF VDC= 10.0 V IRMS= 0.0 A	0402 8mm2
3.	Ccomp	MuRata	GRM155R61A563KA01D Series= X5R	1	$0.01	Cap= 56.0 nF VDC= 10.0 V IRMS= 0.0 A	0402 8mm2
4.	Ccomp2	MuRata	GRM1885C1H751JA01D Series= C0G/NP0	1	$0.02	Cap= 750.0 pF VDC= 50.0 V IRMS= 0.0 A	0603 10mm2
5.	Cin	Nippon Chemi-Con	EMVY350ADA680MF80G Series= MVY	1	$0.13	Cap= 68.0 µF ESR= 340.0 mOhm VDC= 35.0 V IRMS= 280.0 mA	CAPSMT_62_F80 74mm2
6.	Cout	Nippon Chemi-Con	APXE100ARA121MF61G Series= PXE	1	$0.48	Cap= 120.0 µF ESR= 25.0 mOhm VDC= 10.0 V IRMS= 2.53 A	CAPSMT_62_F61 74mm2
7.	Cramp	Yageo America	CC0805KRX7R9BB821 Series= X7R	1	$0.01	Cap= 820.0 pF VDC= 50.0 V IRMS= 0.0 A	0805 13mm2
8.	Csep	TDK	C4532X7R1H475M Series= X7R	1	$0.35	Cap= 4.7 µF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 2.9 A	1812 39mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
9.	D1	Diodes Inc.	B260A-13-F	1	$0.11	VF@Io= 700.0 mV VRRM= 60.0 V	 SMA 37mm2
10.	Lin	Wurth Elektronik eiSos	744071150	1	$1.10	L= 15.0 µH DCR= 46.0 mOhm	 IND_WE-TPC 23mm2
11.	Lout	Bourns	SDR1005-470KL	1	$0.28	L= 47.0 µH DCR= 190.0 mOhm	 SDR1005 176mm2
12.	M1	Vishay-Siliconix	SI4446DY	1	$0.26	VdsMax= 40.0 V IdsMax= 3.9 Amps	 SOIC-8 55mm2
13.	Rbp	Vishay-Dale	CRCW040220R0FKED Series= CRCW..e3	1	$0.01	Res= 20.0 Ohm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
14.	Rcomp	Vishay-Dale	CRCW04022K61FKED Series= CRCW..e3	1	$0.01	Res= 2.61 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
15.	Rfadj	Vishay-Dale	CRCW040247K5FKED Series= CRCW..e3	1	$0.01	Res= 47.5 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
16.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	1	$0.01	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
17.	Rfb2	Vishay-Dale	CRCW040232K4FKED Series= CRCW..e3	1	$0.01	Res= 32.4 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
18.	Rramp	Vishay-Dale	CRCW0805100RFKEA Series= CRCW..e3	1	$0.01	Res= 100.0 Ohm Power= 125.0 mW Tolerance= 1.0%	 0805 13mm2
19.	Rsense	Stackpole Electronics Inc	CSR1206FK25L0 Series= ?	1	$0.10	Res= 25.0 mOhm Power= 500.0 mW Tolerance= 1.0%	 1206 19mm2
20.	Ruvlo1	Vishay-Dale	CRCW040268K1FKED Series= CRCW..e3	1	$0.01	Res= 68.1 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
21.	Ruvlo2	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	1	$0.01	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
22.	U1	Texas Instruments	LM3481MM	1	$0.90	Switcher	 MUA08A 34mm2

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	3.486 m A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.218 A	Current	Output capacitor RMS ripple current
3.	Csep IRMS	1.223 A	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	1.571 A	Current	D1 Irms
5.	IC Ipk	8.24 m A	Current	Peak switch current in IC
6.	Iin Avg	1.549 A	Current	Average input current
7.	Lin Ipk	1.693 A	Current	Lin peak current
8.	Lin Ipp	415.571 m A	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	1.499 A	Current	Lin ripple current
10.	Lout Ipk	1.064 A	Current	Lout peak current
11.	Lout Ipp	133.415 m A	Current	Peak-to-peak output inductor ripple current
12.	Lout Irms	1.003 A	Current	Lout ripple current
13.	M1 Irms	1.947 A	Current	M1 MOSFET Irms
14.	BOM Count	22.0	General	Total Design BOM count
15.	FootPrint	645.0 mm2	General	Total Foot Print Area of BOM components
16.	Frequency	405.0 k Hz	General	Switching frequency
17.	IC Tolerance	19.0 m V	General	IC Feedback Tolerance
18.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
19.	Total BOM	$3.85	General	Total BOM Cost
20.	D1 Tj	47.625 degC	Op_Point	D1 junction temperature
21.	SEPIC Resonance Freq	12.565 k Hz	Op_Point	SEPIC Resonance Frequency
22.	V SEPIC damping factor	128.314 m	Op_Point	V SEPIC damping factor
23.	Vin p-p	4.037 m V	Op_Point	Peak-to-peak input voltage
24.	Vsep p-p	314.979 m V	Op_Point	Peak-to-peak sepic voltage
25.	Cross Freq	6.151 k Hz	Op_point	Bode plot crossover frequency
26.	Duty Cycle	60.5 %	Op_point	Duty cycle
27.	Efficiency	77.49 %	Op_point	Steady state efficiency
28.	Gain Marg	10.152 db	Op_point	Bode Plot Gain Margin
29.	IC Tj	71.2 degC	Op_point	IC junction temperature
30.	IOUT_OP	1.0 A	Op_point	Iout operating point
31.	M1 TjOP	63.421 degC	Op_point	M1 MOSFET junction temperature
32.	Phase Marg	57.901 deg	Op_point	Bode Plot Phase Margin
33.	Phase Shift	59.258 deg	Op_point	Bode Plot Phase Shift
34.	VIN_OP	4.5 V	Op_point	Vin operating point
35.	Vout p-p	70.611 m V	Op_point	Peak-to-peak output ripple voltage
36.	Cin Pd	4.131 µ W	Power	Input capacitor power dissipation
37.	Cout Pd	37.074 m W	Power	Output capacitor power dissipation
38.	Csep Pd	4.484 m W	Power	SEPIC capacitor power dissipation
39.	D1 Pd	704.99 m W	Power	Diode power dissipation
40.	D1 PdCond	700.0 m W	Power	Diode conduction losses
41.	D1 PdSw	4.99 m W	Power	Diode switching losses
42.	IC Pd	206.0 m W	Power	IC power dissipation
43.	Lin Pd	104.851 m W	Power	Lin power dissipation
44.	Lout Pd	191.455 m W	Power	Lout power dissipation
45.	M1 Pd	371.439 m W	Power	M1 MOSFET total power dissipation
46.	M1 PdCond	237.761 m W	Power	M1 MOSFET conduction losses
47.	M1 PdSw	133.679 m W	Power	M1 MOSFET switching losses
48.	Rsense Pd	94.797 m W	Power	LED Current Rsns Power Dissipation
49.	Total Pd	1.569 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.0 A	Maximum Output Current
2.	Iout1	1.0 Amps	Output Current #1
3.	VinMax	25.0 V	Maximum input voltage
4.	VinMin	4.5 V	Minimum input voltage
5.	Vout	5.4 V	Output Voltage
6.	Vout1	5.4 Volt	Output Voltage #1
7.	base_pn	LM3481	National Based Product Number
8.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **LM3481** Product Folder : http://www.ti.com/product/LM3481 : contains the data sheet and other resources.