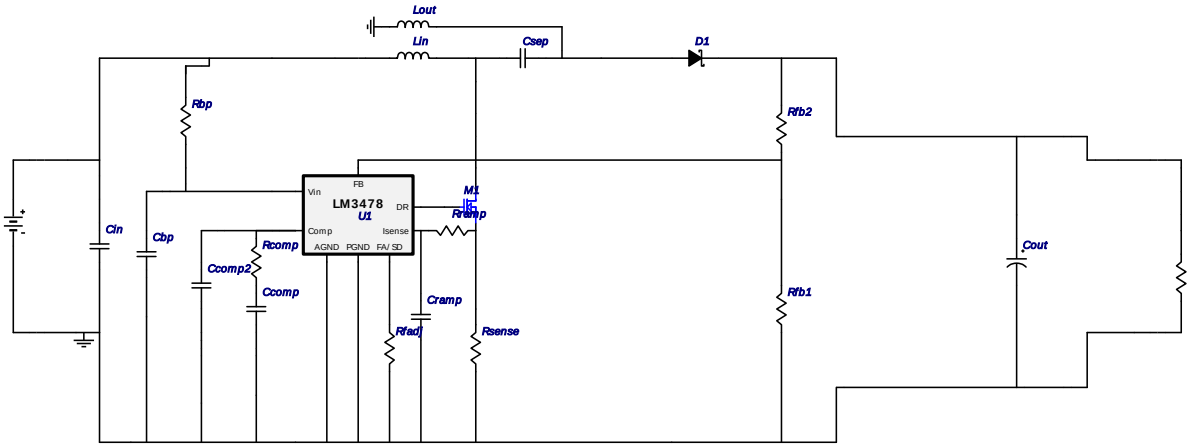
WEBENCH® Design Report

VinMin = 3.0V
VinMax = 5.5V
Vout = 50.0V
Iout = 0.3A

Device = LM3478MM/NOPB
Topology = SEPIC
Created = 1/15/13 6:24:11 AM
BOM Cost = $4.68
Total Pd = 0.71 W
Footprint = 1,174.0 mm2
BOM Count = 21

Design : 3605849/15 LM3478MM/NOPB
LM3478MM/NOPB 3.0V-5.5V to 50.0V @ 0.3A



Electrical BOM

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
1.	Cbp	MuRata	GRM155R71A104KA01D Series= X7R	1	$0.01	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	0402 8mm2
2.	Ccomp	MuRata	GRM216R71E182KA01D Series= X7R	1	$0.01	Cap= 1.8 nF VDC= 25.0 V IRMS= 0.0 A	0805 13mm2
3.	Ccomp2	Yageo America	CC0805JRNP09BN101 Series= C0G/NP0	1	$0.01	Cap= 100.0 pF VDC= 50.0 V IRMS= 0.0 A	0805 13mm2
4.	Cin	TDK	C1608X5R1A106M Series= C0G/NP0	1	$0.09	Cap= 10.0 µF ESR= 7.8 mOhm VDC= 10.0 V IRMS= 1.85 A	0603 10mm2
5.	Cout	Panasonic	EEV-FK1K680Q Series= FK	3	$0.51	Cap= 68.0 µF ESR= 320.0 mOhm VDC= 80.0 V IRMS= 500.0 mA	SM_RADIAL_H13 264mm2
6.	Cramp	Yageo America	CC0805KRX7R9BB561 Series= X7R	1	$0.01	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	0805 13mm2
7.	Csep	MuRata	GRM188R61A335KE15D Series= X5R	1	$0.03	Cap= 3.3 µF ESR= 5.0 mOhm VDC= 10.0 V IRMS= 1.7 A	0603 10mm2
8.	D1	Micro Commercial Components	SK310A-TP	1	$0.10	VF@Io= 850.0 mV VRRM= 100.0 V	SMA 37mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
9.	Lin	Coilcraft	XAL5030-332MEB	1	$0.56	L= 3.3 µH DCR= 20.0 mOhm	 XAL5030 54mm2
10.	Lout	Bourns	SDR0403-560KL	1	$0.17	L= 56.0 µH DCR= 940.0 mOhm	 SDR0403 39mm2
11.	M1	Renesas	HAT2244WP	1	$1.15	VdsMax= 80.0 V IdsMax= 30.0 Amps	 WPAK 58mm2
12.	Rbp	Vishay-Dale	CRCW040220R0FKED Series= CRCW..e3	1	$0.01	Res= 20.0 Ohm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
13.	Rcomp	Vishay-Dale	CRCW040282K5FKED Series= CRCW..e3	1	$0.01	Res= 82.5 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
14.	Rfadj	Vishay-Dale	CRCW040225K5FKED Series= CRCW..e3	1	$0.01	Res= 25.5 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
15.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	1	$0.01	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
16.	Rfb2	Susumu Co Ltd	RR1220P-394-D Series= 264	1	$0.01	Res= 390.0 kOhm Power= 100.0 mW Tolerance= 0.5%	 0805 13mm2
17.	Rramp	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	1	$0.01	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
18.	Rsense	Panasonic	ERJ-M1WSF3M0U Series= 1119	1	$0.15	Res= 3.0 mOhm Power= 1.0 W Tolerance= 1.0%	 2512 43mm2
19.	U1	Texas Instruments	LM3478MM/NOPB	1	$0.80	Switcher	 MUA08A 34mm2

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	249.903 m A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	465.111 m A	Current	Output capacitor RMS ripple current
3.	Csep IRMS	424.109 m A	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	443.696 m A	Current	D1 Irms
5.	IC Ipk	38.4 m A	Current	Peak switch current in IC
6.	Iin Avg	2.857 A	Current	Average input current
7.	Lin Ipk	2.385 A	Current	Lin peak current
8.	Lin Ipp	2.511 A	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	1.355 A	Current	Lin ripple current
10.	Lout Ipk	203.379 m A	Current	Lout peak current
11.	Lout Ipp	149.627 m A	Current	Peak-to-peak output inductor ripple current
12.	Lout Irms	136.941 m A	Current	Lout ripple current
13.	M1 Irms	1.421 A	Current	M1 MOSFET Irms
14.	BOM Count	21.0	General	Total Design BOM count
15.	FootPrint	1.174 k mm2	General	Total Foot Print Area of BOM components
16.	Frequency	590.0 k Hz	General	Switching frequency
17.	IC Tolerance	24.3 m V	General	IC Feedback Tolerance
18.	Mode	DCM	General	Conduction Mode
19.	Total BOM	$4.68	General	Total BOM Cost
20.	D1 Tj	59.75 degC	Op_Point	D1 junction temperature
21.	SEPIC Resonance Freq	12.399 k Hz	Op_Point	SEPIC Resonance Frequency
22.	V SEPIC damping factor	113.614 m	Op_Point	V SEPIC damping factor
23.	Vin p-p	19.478 m V	Op_Point	Peak-to-peak input voltage
24.	Vsep p-p	72.312 m V	Op_Point	Peak-to-peak sepic voltage
25.	Cross Freq	4.347 k Hz	Op_point	Bode plot crossover frequency
26.	Duty Cycle	90.0 %	Op_point	Duty cycle
27.	Efficiency	95.451 %	Op_point	Steady state efficiency
28.	Gain Marg	42.701 db	Op_point	Bode Plot Gain Margin

#	Name	Value	Category	Description
29.	IC Tj	72.24 degC	Op_point	IC junction temperature
30.	IOUT_OP	300.0 m A	Op_point	Iout operating point
31.	M1 TjOP	0.0 degC	Op_point	M1 MOSFET junction temperature
32.	Phase Marg	87.043 deg	Op_point	Bode Plot Phase Margin
33.	Phase Shift	12.478 deg	Op_point	Bode Plot Phase Shift
34.	VIN_OP	5.5 V	Op_point	Vin operating point
35.	Vout p-p	264.745 m V	Op_point	Peak-to-peak output ripple voltage
36.	Cin Pd	487.123 µ W	Power	Input capacitor power dissipation
37.	Cout Pd	23.075 m W	Power	Output capacitor power dissipation
38.	Csep Pd	899.343 µ W	Power	SEPIC capacitor power dissipation
39.	D1 Pd	297.497 m W	Power	Diode power dissipation
40.	D1 PdCond	255.0 m W	Power	Diode conduction losses
41.	D1 PdSw	42.497 m W	Power	Diode switching losses
42.	IC Pd	211.2 m W	Power	IC power dissipation
43.	Lin Pd	140.909 m W	Power	Lin power dissipation
44.	Lout Pd	17.907 m W	Power	Lout power dissipation
45.	M1 Pd	0.0 W	Power	M1 MOSFET total power dissipation
46.	M1 PdCond	0.0 W	Power	M1 MOSFET conduction losses
47.	M1 PdSw	0.0 W	Power	M1 MOSFET switching losses
48.	Rsense Pd	6.054 m W	Power	LED Current Rsns Power Dissipation
49.	Total Pd	714.919 m W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	300.0 mA	Maximum Output Current
2.	Iout1	300.0 mAmps	Output Current #1
3.	VinMax	5.5 V	Maximum input voltage
4.	VinMin	3.0 V	Minimum input voltage
5.	Vout	50.0 V	Output Voltage
6.	Vout1	50.0 Volt	Output Voltage #1
7.	base_pn	LM3478	National Based Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **LM3478** Product Folder : http://www.ti.com/product/lm3478 : contains the data sheet and other resources.