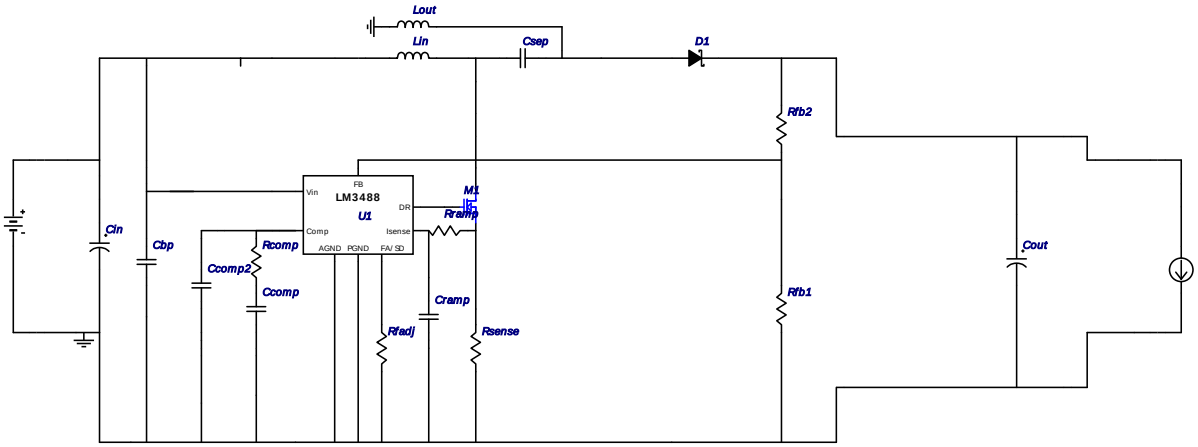
WEBENCH® Design Report

VinMin = 13.0V
VinMax = 40.0V
Vout = 13.8V
Iout = 5.0A

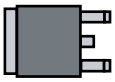
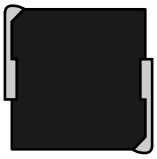
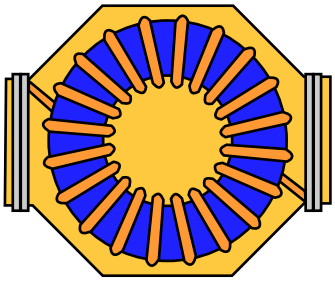
Device = LM3488MM
Topology = SEPIC
Created = 11/5/11 10:55:53 AM
BOM Cost = $0.00
Total Pd = 10.73 W
Footprint = 289.0 mm2
BOM Count = 13

Design : 1191190/18 LM3488MM
Design 18 - LM3488MM



Electrical BOM

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
1.	Cbp	Taiyo Yuden	HMK212B7104KG-T Series= X7R	1	$0.02	Cap= 100.0 nF ESR= 0.0 Ohm VDC= 100.0 V IRMS= 0.0 A	0805 13mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB104 Series= X7R	1	$0.01	Cap= 100.0 nF ESR= 0.0 Ohm VDC= 50.0 V IRMS= 0.0 A	0805 13mm2
3.	Ccomp2	MuRata	GRM1555C1E621JA01D Series= C0G/NP0	1	$0.01	Cap= 620.0 pF ESR= 0.0 Ohm VDC= 25.0 V IRMS= 0.0 A	0402 8mm2
4.	Cin	Panasonic	EEE-FK1J680UP Series= FK	3	$0.24	Cap= 68.0 µF ESR= 350.0 mOhm VDC= 63.0 V IRMS= 400.0 mA	SM_RADIAL_G 172mm2
5.	Cout	Nippon Chemi-Con	APXH200ARA820MJ80G Series= PXH	3	$0.89	Cap= 82.0 µF ESR= 45.0 mOhm VDC= 20.0 V IRMS= 2.4 A	CAPSMT_62_J80 156mm2
6.	Cramp	MuRata	GRM1555C1H911JA01D Series= C0G/NP0	1	$0.01	Cap= 910.0 pF ESR= 0.0 Ohm VDC= 50.0 V IRMS= 0.0 A	0402 8mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
7.	Csep	MuRata	GRM32ER72A225KA35L Series= X7R	2	$0.50	Cap= 2.2 µF ESR= 7.0 mOhm VDC= 100.0 V IRMS= 4.4 A	 1210 23mm2
8.	D1	Vishay-Semiconductor	12CWQ10FNPBF	1	$0.69	VF@Io= 950.0 mV VRRM= 100.0 V	 DPAK 102mm2
9.	Lin	Bourns	SRP1250-100M	1	$0.70	L= 10.0 µH DCR= 25.5 mOhm	 SRP1250 253mm2
10.	Lout	Bourns	PM2110-220K-RC	1	$1.09	L= 22.0 µH DCR= 10.0 mOhm	 PM2110 890mm2
11.	M1	Infineon Technologies	BSC340N08NS3 G	1	$0.31	VdsMax= 80.0 V IdsMax= 23.0 Amps	 PG-TDSON-8 55mm2
12.	Rcomp	Vishay-Dale	CRCW04021K96FKED Series= CRCW..e3	1	$0.01	Res= 1.96 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
13.	Rfadj	Vishay-Dale	CRCW040253K6FKED Series= CRCW..e3	1	$0.01	Res= 53.6 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
14.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	1	$0.01	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
15.	Rfb2	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	1	$0.01	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
16.	Rramp	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	1	$0.01	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
17.	Rsense	Susumu Co Ltd	PRL1632-R007-F-T1 Series= 237	1	$0.21	Res= 7.0 mOhm Power= 1.0 W Tolerance= 1.0%	 1206 19mm2
18.	U1	Texas Instruments	LM3488MM	1	$0.99	Switcher	 MUA08A 34mm2

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	46.736 m A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	5.567 A	Current	Output capacitor RMS ripple current
3.	Csep IRMS	5.59 A	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	7.53 A	Current	D1 Irms
5.	IC Ipk	4.878 m A	Current	Peak switch current in IC
6.	Iin Avg	6.133 A	Current	Average input current
7.	Lin Ipk	7.263 A	Current	Lin peak current
8.	Lin Ipp	2.045 A	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	6.304 A	Current	Lin ripple current
10.	Lout Ipk	5.367 A	Current	Lout peak current
11.	Lout Ipp	929.473 m A	Current	Peak-to-peak output inductor ripple current
12.	Lout Irms	4.936 A	Current	Lout ripple current

#	Name	Value	Category	Description
13.	M1 Irms	8.342 A	Current	M1 MOSFET Irms
14.	BOM Count	13.0	General	Total Design BOM count
15.	FootPrint	289.0 mm2	General	Total Foot Print Area of BOM components
16.	Frequency	335.0 k Hz	General	Switching frequency
17.	IC Tolerance	15.3 m V	General	IC Feedback Tolerance
18.	Mode	CCM	General	Conduction Mode
19.	Total BOM	$0.0	General	Total BOM Cost
20.	D1 Tj	82.509 degC	Op_Point	D1 junction temperature
21.	SEPIC Resonance Freq	17.294 k Hz	Op_Point	SEPIC Resonance Frequency
22.	V SEPIC damping factor	109.123 m	Op_Point	V SEPIC damping factor
23.	Vin p-p	18.833 m V	Op_Point	Peak-to-peak input voltage
24.	Vsep p-p	2.013 V	Op_Point	Peak-to-peak sepic voltage
25.	Cross Freq	6.517 k Hz	Op_point	Bode plot crossover frequency
26.	Duty Cycle	55.0 %	Op_point	Duty cycle
27.	Efficiency	86.539 %	Op_point	Steady state efficiency
28.	Gain Marg	10.071 db	Op_point	Bode Plot Gain Margin
29.	IC Tj	42.683 degC	Op_point	IC junction temperature
30.	IOUT_OP	5.0 A	Op_point	Iout operating point
31.	M1 TjOP	30.3 degC	Op_point	M1 MOSFET junction temperature
32.	Phase Marg	65.792 deg	Op_point	Bode Plot Phase Margin
33.	Phase Shift	66.904 deg	Op_point	Bode Plot Phase Shift
34.	VIN_OP	40.0 V	Op_point	Vin operating point
35.	Vout p-p	191.058 m V	Op_point	Peak-to-peak output ripple voltage
36.	Cin Pd	254.826 µ W	Power	Input capacitor power dissipation
37.	Cout Pd	464.941 m W	Power	Output capacitor power dissipation
38.	Csep Pd	109.35 m W	Power	SEPIC capacitor power dissipation
39.	D1 Pd	4.774 W	Power	Diode power dissipation
40.	D1 PdCond	4.75 W	Power	Diode conduction losses
41.	D1 PdSw	23.519 m W	Power	Diode switching losses
42.	IC Pd	63.414 m W	Power	IC power dissipation
43.	Lin Pd	1.047 W	Power	Lin power dissipation
44.	Lout Pd	250.173 m W	Power	Lout power dissipation
45.	M1 Pd	3.141 W	Power	M1 MOSFET total power dissipation
46.	M1 PdCond	2.438 W	Power	M1 MOSFET conduction losses
47.	M1 PdSw	702.859 m W	Power	M1 MOSFET switching losses
48.	Rsense Pd	487.109 m W	Power	LED Current Rsns Power Dissipation
49.	Total Pd	10.733 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	5.0 A	Maximum Output Current
2.	Iout1	5.0 Amps	Output Current #1
3.	VinMax	40.0 V	Maximum input voltage
4.	VinMin	13.0 V	Minimum input voltage
5.	Vout	13.8 V	Output Voltage
6.	Vout1	13.8 Volt	Output Voltage #1
7.	base_pn	LM3488	National Based Product Number
8.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **LM3488** Product Folder : http://www.national.com/pf/LM/LM3488.html : contains the data sheet and other resources.