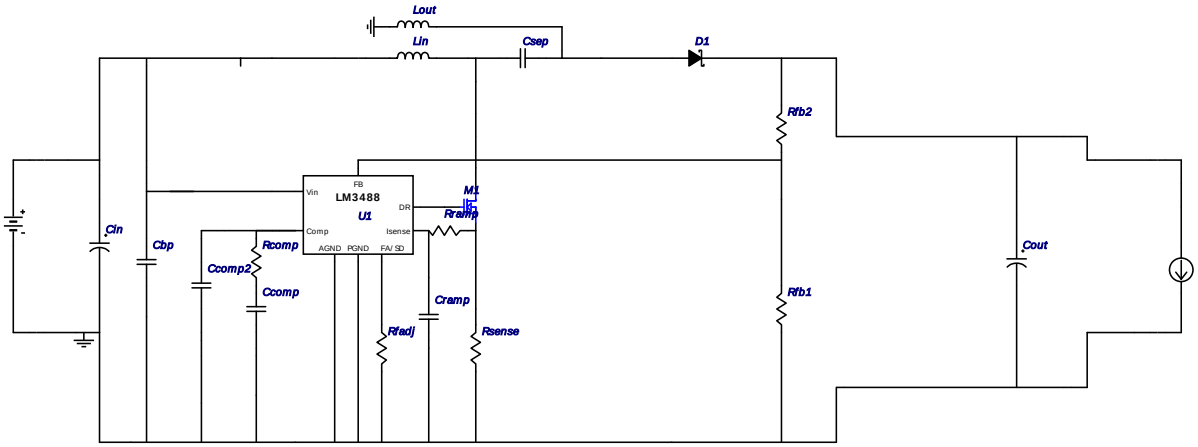
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 40.0V
Vout = 13.8V
Iout = 3.0A

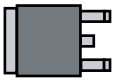
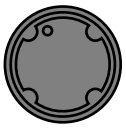
Device = LM3488MM
Topology = SEPIC
Created = 11/5/11 10:43:18 AM
BOM Cost = $0.00
Total Pd = 6.61 W
Footprint = 288.0 mm2
BOM Count = 13

Design : 1191190/16 LM3488MM
Design 16 - 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	MuRata	GRM155R60J683KA01D Series= X5R	1	$0.01	Cap= 68.0 nF ESR= 0.0 Ohm VDC= 6.3 V IRMS= 0.0 A	0402 8mm2
3.	Ccomp2	MuRata	GRM1885C1H242JA01D Series= C0G/NP0	1	$0.02	Cap= 2.4 nF ESR= 0.0 Ohm VDC= 50.0 V IRMS= 0.0 A	0603 10mm2
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	Vishay-Sprague	594D686X0025R2T Series= 594D	3	$3.94	Cap= 68.0 µF ESR= 95.0 mOhm VDC= 25.0 V IRMS= 1.6 A	CC_CASER 74mm2
6.	Cramp	MuRata	GRM1885C1E112JA01D Series= C0G/NP0	1	$0.02	Cap= 1.1 nF ESR= 0.0 Ohm VDC= 25.0 V IRMS= 0.0 A	0603 10mm2
7.	Csep	TDK	C5750X7R2A475M Series= X7R	1	$0.70	Cap= 4.7 µF ESR= 1.5 mOhm VDC= 100.0 V IRMS= 5.5 A	2220 60mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
8.	D1	Vishay-Semiconductor	12CWQ10FNPBF	1	$0.69	VF@Io= 950.0 mV VRRM= 100.0 V	 DPAK 102mm2
9.	Lin	Coilcraft	XAL1010-153MEB	1	$1.05	L= 15.0 µH DCR= 20.0 mOhm	 XAL1010 160mm2
10.	Lout	Coilcraft	RFS1317-473KL	1	$0.50	L= 47.0 µH DCR= 50.0 mOhm	 RFS1317 234mm2
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	CRCW04021K69FKED Series= CRCW..e3	1	$0.01	Res= 1.69 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
13.	Rfadj	Vishay-Dale	CRCW040268K1FKED Series= CRCW..e3	1	$0.01	Res= 68.1 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	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	1	$0.11	Res= 10.0 mOhm Power= 500.0 mW 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	32.114 m A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	3.778 A	Current	Output capacitor RMS ripple current
3.	Csep IRMS	3.802 A	Current	SEPIC capacitor RMS ripple current
4.	D1 Irms	4.843 A	Current	D1 Irms
5.	IC Ipk	4.504 m A	Current	Peak switch current in IC
6.	Iin Avg	4.801 A	Current	Average input current
7.	Lin Ipk	5.552 A	Current	Lin peak current
8.	Lin Ipp	1.393 A	Current	Peak-to-peak input inductor ripple current
9.	Lin Irms	4.9 A	Current	Lin ripple current
10.	Lout Ipk	3.12 A	Current	Lout peak current
11.	Lout Ipp	446.503 m A	Current	Peak-to-peak output inductor ripple current
12.	Lout Irms	2.915 A	Current	Lout ripple current
13.	M1 Irms	6.132 A	Current	M1 MOSFET Irms
14.	BOM Count	13.0	General	Total Design BOM count
15.	FootPrint	288.0 mm2	General	Total Foot Print Area of BOM components
16.	Frequency	280.0 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	61.522 degC	Op_Point	D1 junction temperature
21.	SEPIC Resonance Freq	9.828 k Hz	Op_Point	SEPIC Resonance Frequency
22.	V SEPIC damping factor	121.032 m	Op_Point	V SEPIC damping factor

#	Name	Value	Category	Description
23.	Vin p-p	12.826 m V	Op_Point	Peak-to-peak input voltage
24.	Vsep p-p	1.469 V	Op_Point	Peak-to-peak sepic voltage
25.	Cross Freq	4.103 k Hz	Op_point	Bode plot crossover frequency
26.	Duty Cycle	61.5 %	Op_point	Duty cycle
27.	Efficiency	86.232 %	Op_point	Steady state efficiency
28.	Gain Marg	10.653 db	Op_point	Bode Plot Gain Margin
29.	IC Tj	39.008 degC	Op_point	IC junction temperature
30.	IOUT_OP	3.0 A	Op_point	Iout operating point
31.	M1 TjOP	30.3 degC	Op_point	M1 MOSFET junction temperature
32.	Phase Marg	55.368 deg	Op_point	Bode Plot Phase Margin
33.	Phase Shift	51.897 deg	Op_point	Bode Plot Phase Shift
34.	VIN_OP	40.0 V	Op_point	Vin operating point
35.	Vout p-p	273.667 m V	Op_point	Peak-to-peak output ripple voltage
36.	Cin Pd	120.321 µ W	Power	Input capacitor power dissipation
37.	Cout Pd	451.927 m W	Power	Output capacitor power dissipation
38.	Csep Pd	21.687 m W	Power	SEPIC capacitor power dissipation
39.	D1 Pd	2.866 W	Power	Diode power dissipation
40.	D1 PdCond	2.85 W	Power	Diode conduction losses
41.	D1 PdSw	15.631 m W	Power	Diode switching losses
42.	IC Pd	45.04 m W	Power	IC power dissipation
43.	Lin Pd	492.463 m W	Power	Lin power dissipation
44.	Lout Pd	426.108 m W	Power	Lout power dissipation
45.	M1 Pd	1.692 W	Power	M1 MOSFET total power dissipation
46.	M1 PdCond	1.314 W	Power	M1 MOSFET conduction losses
47.	M1 PdSw	377.449 m W	Power	M1 MOSFET switching losses
48.	Rsense Pd	376.008 m W	Power	LED Current Rsns Power Dissipation
49.	Total Pd	6.61 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	3.0 A	Maximum Output Current
2.	Iout1	3.0 Amps	Output Current #1
3.	VinMax	40.0 V	Maximum input voltage
4.	VinMin	10.0 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.