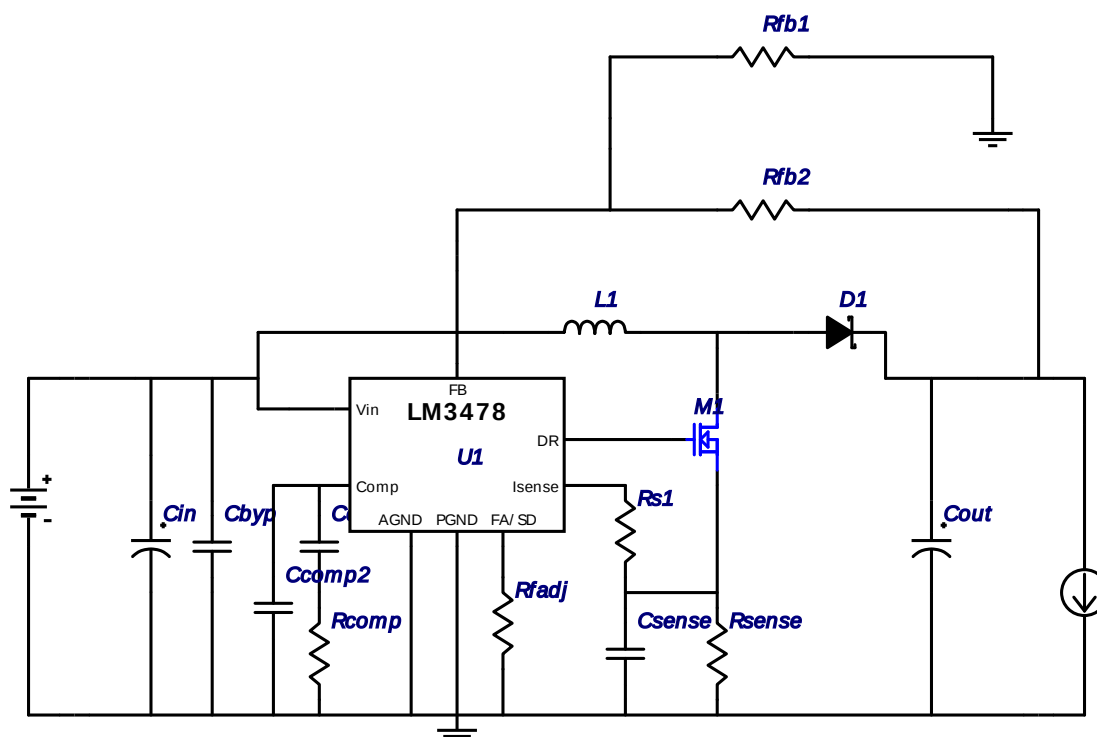


WEBENCH® Design Report

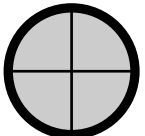
Design : 555443/5 LM3478MM
Design 5 - LM3478MM

VinMin = 12.0V
VinMax = 36.0V
Vout = 51.0V
Iout = 0.05A

Device = LM3478MM
Topology = Boost
Created = 9/30/11 9:53:54 AM
BOM Cost = \$2.22
Total Pd = 0.29 W
Footprint = 588.0 mm2
BOM Count = 16



Electrical BOM

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
1.	Cbyp	Kemet	C0805C104K5RACTU Series= X7R	1	\$0.01	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	 0805 13mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB681 Series= X7R	1	\$0.01	Cap= 680.0 pF ESR= 0.0 Ohm VDC= 50.0 V IRMS= 0.0 A	 0805 13mm2
3.	Ccomp2	Yageo America	CC0805JRNPO9BN121 Series= C0G/NP0	1	\$0.01	Cap= 120.0 pF ESR= 0.0 Ohm VDC= 50.0 V IRMS= 0.0 A	 0805 13mm2
4.	Cin	Panasonic	EEE-FK1H220P Series= FK	1	\$0.12	Cap= 22.0 µF ESR= 880.0 mOhm VDC= 50.0 V IRMS= 165.0 mA	 SM_RADIAL_D 84mm2
5.	Cout	Panasonic	EEUED2D680 Series= 286	1	\$0.37	Cap= 68.0 µF ESR= 263.307 mOhm VDC= 200.0 V IRMS= 950.0 mA	 CAPPR5-12.5X25 210mm2
6.	Csense	MuRata	GRM216R71H103KA01D Series= X7R	1	\$0.01	Cap= 10.0 nF ESR= 0.0 Ohm VDC= 50.0 V IRMS= 0.0 A	 0805 13mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
7.	D1	Diodes Inc.	B1100-13-F	1	\$0.09	VF@Io= 790.0 mV VRRM= 100.0 V	 SMA 37mm2
8.	L1	Panasonic	ELL-6UH271M	1	\$0.28	L= 270.0 µH DCR= 1.2 Ohm	 ELL6UH 67mm2
9.	M1	Infineon Technologies	BSC340N08NS3 G	1	\$0.31	VdsMax= 80.0 V IdsMax= 23.0 Amps	 PG-TDSON-8 55mm2
10.	Rcomp	Vishay-Dale	CRCW0402137KFKED Series= CRCW..e3	1	\$0.01	Res= 137.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
11.	Rfadj	Vishay-Dale	CRCW040240K2FKED Series= CRCW..e3	1	\$0.01	Res= 40.2 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
12.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	1	\$0.01	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
13.	Rfb2	Vishay-Dale	CRCW0402392KFKED Series= CRCW..e3	1	\$0.01	Res= 392.0 kOhm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
14.	Rs1	Vishay-Dale	CRCW0402100RFKED Series= CRCW..e3	1	\$0.01	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	 0402 8mm2
15.	Rsense	Panasonic	ERJ-3RSFR18V Series= 227	1	\$0.03	Res= 180.0 mOhm Power= 100.0 mW Tolerance= 1.0%	 0603 10mm2
16.	U1	National Semiconductor	LM3478MM	1	\$0.93	Switcher	 MUA08A 34mm2

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	17.418 m A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	88.546 m A	Current	Output capacitor RMS ripple current
3.	Iin Avg	236.48 m A	Current	Average input current
4.	L Ipp	60.336 m A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	216.639 m A	Current	Inductor ripple current
6.	M Irms	277.909 m A	Current	MOSFET RMS ripple current
7.	SW Ipk	246.106 m A	Current	Peak switch current
8.	BOM Count	16.0	General	Total Design BOM count
9.	FootPrint	588.0 mm2	General	Total Foot Print Area of BOM components
10.	Frequency	569.236 k Hz	General	Switching frequency
11.	IC Tolerance	24.3 m V	General	IC Feedback Tolerance
12.	M Rdson	38.08 m Ohm	General	Drain-Source On-resistance
13.	M Vds Act	10.583 m V	General	M Vds
14.	Mode	CCM	General	Conduction Mode
15.	Pout	2.55 W	General	Total output power
16.	Total BOM	\$2.22	General	Total BOM Cost
17.	D1 Tj	36.241 degC	Op_Point	D1 junction temperature
18.	Cross Freq	1.201 k Hz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	78.85 %	Op_point	Duty cycle
20.	Efficiency	89.859 %	Op_point	Steady state efficiency
21.	IC Tj	47.386 degC	Op_point	IC junction temperature
22.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	50.0 m A	Op_point	Iout operating point
24.	M ThetaJA	50.0 degC/W	Op_point	MOSFET junction-to-ambient thermal resistance
25.	M TjOp	33.851 degC	Op_point	MOSFET junction temperature
26.	Phase Marg	78.631 deg	Op_point	Bode Plot Phase Margin
27.	VIN_OP	12.0 V	Op_point	Vin operating point
28.	Vout p-p	15.887 m V	Op_point	Peak-to-peak output ripple voltage
29.	Cin Pd	266.967 µ W	Power	Input capacitor power dissipation
30.	Cout Pd	2.064 m W	Power	Output capacitor power dissipation
31.	Diode Pd	39.5 m W	Power	Diode power dissipation
32.	IC Pd	86.928 m W	Power	IC power dissipation
33.	L Pd	67.583 m W	Power	Inductor power dissipation
34.	M Pd	77.023 m W	Power	MOSFET power dissipation

#	Name	Value	Category	Description
35.	M1 PdCond	3.089 m W	Power	M1 MOSFET conduction losses
36.	M1 PdSw	73.934 m W	Power	M1 MOSFET switching losses
37.	Rfb Pd	6.47 m W	Power	Rfb Power Dissipation
38.	Total Pd	287.777 m W	Power	Total Power Dissipation
39.	Vout OP	51.0 V	Unknown	Operational Output Voltage

Design Inputs

#	Name	Value	Description
1.	Iout	50.0 mA	Maximum Output Current
2.	Iout1	50.0 mAmps	Output Current #1
3.	VinMax	36.0 V	Maximum input voltage
4.	VinMin	12.0 V	Minimum input voltage
5.	Vout	51.0 V	Output Voltage
6.	Vout1	51.0 Volt	Output Voltage #1
7.	base_pn	LM3478	National Based Product Number
8.	Ta	30.0 degC	Ambient temperature
9.	UserFsw	397.279 kHz	Customer Selected Frequency

Design Assistance

1. **LM3478** Product Folder : <http://www.national.com/pf/LM/LM3478.html> : contains the data sheet and other resources.

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