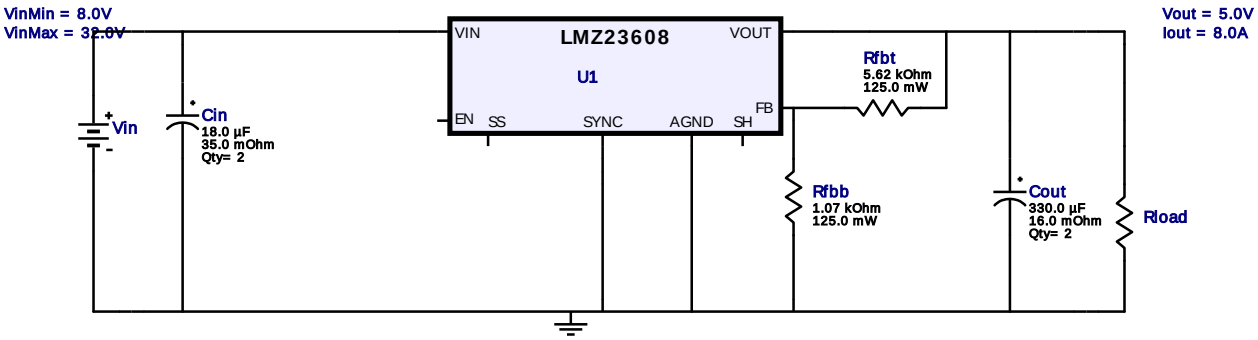
WEBENCH® Design Report

VinMin = 8.0V
VinMax = 32.0V
Vout = 5.0V
Iout = 8.0A

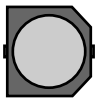
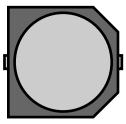
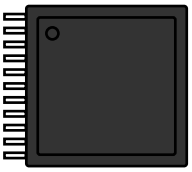
Device = LMZ23608TZ/NOPB
Topology = Buck
Created = 6/6/14 6:37:47 AM
BOM Cost = $15.66
Footprint = 887.0mm2
BOM Count = 7
Total Pd = 7.0W

Design : 3982099/72 LMZ23608TZ/NOPB
LMZ23608TZ/NOPB 8.0V-32.0V to 5.0V @ 8.0A



1. This design cannot function without airflow at maximum input voltage and full load current. An airflow of 225LFM is required to bring down the ThetaJA of the IC.

Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	Panasonic	50SVPF18M Series= 1273	Cap= 18.0 µF ESR= 35.0 mOhm VDC= 50.0 V IRMS= 2.7 A	2	$0.53	 CAPSMT_62_E7 106mm2
2.	Cout	Panasonic	16SVP330M Series= 261	Cap= 330.0 µF ESR= 16.0 mOhm VDC= 16.0 V IRMS= 4.72 A	2	$0.39	 SM_RADIAL_10AMM 160mm2
3.	Rfbb	Panasonic	ERJ-6ENF1071V Series= 225	Res= 1.07 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
4.	Rfbt	Panasonic	ERJ-6ENF5621V Series= 225	Res= 5.62 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
5.	U1	Texas Instruments	LMZ23608TZ/NOPB	Switcher	1	$13.80	 TZA011A 342mm2

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.965 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.664 A	Current	Output capacitor RMS ripple current
3.	IC Ipk	10.882 A	Current	Peak switch current in IC
4.	Iin Avg	1.469 A	Current	Average input current
5.	M1 Irms	3.243 A	Current	Q Iavg
6.	BOM Count	7	General	Total Design BOM count
7.	FootPrint	887.0 mm2	General	Total Foot Print Area of BOM components
8.	Frequency	350.0 kHz	General	Switching frequency
9.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
10.	M Vds Act	54.995 mV	General	Voltage drop across the MosFET
11.	Pout	40.0 W	General	Total output power
12.	Total BOM	$15.66	General	Total BOM Cost
13.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	6.761 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	16.438 %	Op_point	Duty cycle
16.	Efficiency	85.104 %	Op_point	Steady state efficiency
17.	IC Tj	122.778 degC	Op_point	IC junction temperature
18.	ICThetaJA	7.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	8.0 A	Op_point	Iout operating point
20.	Phase Marg	54.834 deg	Op_point	Bode Plot Phase Margin
21.	VIN_OP	32.0 V	Op_point	Vin operating point
22.	Vout p-p	46.217 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	153.842 mW	Power	Input capacitor power dissipation
24.	Cout Pd	22.149 mW	Power	Output capacitor power dissipation
25.	IC Drive Pd	0.0 W	Power	Driver power dissipation
26.	IC Iq Pd	32.0 mW	Power	IC Iq Pd
27.	Total Pd	7.001 W	Power	Total Power Dissipation
28.	Number of Drivers	1.0	Unknown	Number of drivers in current sharing mode.
29.	Required Airflow	225.0 LFM	Unknown	Required Air Flow to keep the IC cool at full load current. This design is not possible without this much air flow.

Design Inputs

#	Name	Value	Description
1.	Iout	8.0 A	Maximum Output Current
2.	Iout1	8.0 Amps	Output Current #1
3.	VinMax	32.0 V	Maximum input voltage
4.	VinMin	8.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	LMZ23608	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	75.0 degC	Ambient temperature

Design Assistance

1. The Modules are very easy to use and just need a basic design using a resistor divider at the feedback and input and output caps to work. To design for UVLO you could click on the drop down menu in the 'Change Inputs' menu and select the 'UVLO Enabled Design'. The internal softstart time is set at 1.6mSec. If a longer softstart time is desired, you could change the preset to the desired amount and click on 'Submit'. Webench will then add an external softstartcap to the schematic. For designs requiring more than 8A of load current, multiple LMZ23608 parts can be used by connecting their 'SH' pins together. The 'Master' LMZ23608is set by connecting the resistor divider from feedback to the output. The slaves have their feedback pins open.

2. **LMZ23608** Product Folder : http://www.ti.com/product/lmz23608 : contains the data sheet and other resources.