



1.0 Design Specifications

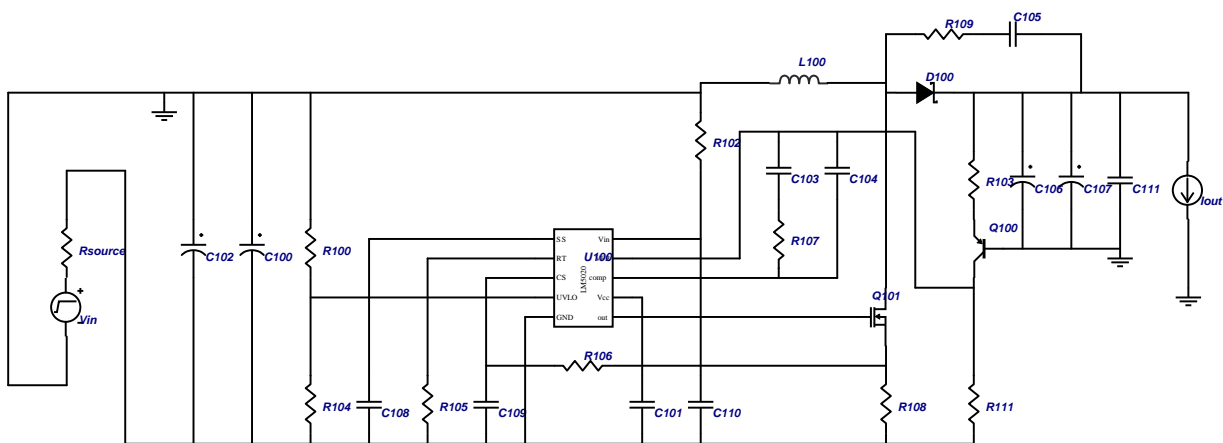
Inputs	Outputs #1
VinMin=-48	Vout1=13.5
VinMax=-48	Iout1=1.5

2.0 Design Description

The LM5020 is employed here to design a Buck-Boost type power supply where the absolute value of the negative input voltage rail can be above or below the positive output voltage rail. The LM5020 is a versatile pwm controller requiring an external FET switch, Q101, which is sized to fit the output current requirement. The input voltage, Vin, during the on-time of the switch charges the L100 inductor through the FET from ground to the negative rail. During the off-time of the FET switch the inductor reverses polarity to forward bias the diode D100 to charge the output capacitors to the required output

voltage and provide current to the load. The output voltage is set by the loop using a current sourcing circuit, Q100 & R103, to develop a feedback voltage across R111. The loop transient response is governed by the resistor capacitor circuit across the feedback pin, VFB, and the compensation pin, COMP, of the controller IC. Output capacitors, C1,106,C107 are set to limit ripple and noise voltage while the input capacitance limits the noise ripple effects found on the input rail. The softstart ramp is optimized through C108 and the switching frequency is set via R105. The current in the loop is sensed across resistor R108 to afford current mode operation and cycle to cycle current limiting.

3.0 Schematic



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FIGURE 1. Example Schematic Showing Connection for all Components.

4.0 Bill Of Materials

Part	Manufacturer	Part#	Attributes
C100	Sanyo	63MV220AX	220u F, 0.26 Ohms
C101	TDK	C2012X7R1C105	1u F
C102	Sanyo	63MV220AX	220u F, 0.26 Ohms
C103	Vishay	VJ0805Y473KXXAT	47n F
C104	Vishay	VJ0805A221KXXAT	220p F
C105	Vishay	VJ0805A101KXXAT	100p F
C106	Sanyo	25MV220WX	220u F, 0.17 Ohms
C107	Sanyo	25MV220WX	220u F, 0.17 Ohms

Part	Manufacturer	Part#	Attributes
C108	Vishay	VJ0805Y103KXXAT	0.01u F
C109	Vishay	VJ0805A102KXXAT	1000p F
C110	Vishay	VJ0805A101KXXAT	0.1u F
C111	Vishay	VJ0805A101KXXAT	0.1u F
D100	ONSEMI	MBRS3100T3	0.79 V
L100	Coilcraft	DO5010P-223HC	22u H, 0.047 Ohms
Q100	Vishay	MMBTA56/E8	
Q101	Vishay	Si7810DN	
R100	Vishay	CRCW08053323FRT6	332k Ohms
R102	Vishay	CRCW080510R0FRT6	10 Ohms
R103	Vishay	CRCW08055112FRT6	51.1k Ohms
R104	Vishay	CRCW08051002FRT6	10k Ohms
R105	Vishay	CRCW08052612FRT6	26.1k Ohms
R106	Vishay	CRCW08053010FRT6	301 Ohms
R107	Vishay	CRCW08051243FRT6	124k Ohms
R108	Vishay	WSL1206-18 0.068 1%	0.068 Ohms
R109	Vishay	CRCW08051000FRT6	100 Ohms
R111	Vishay	CRCW08054991FRT6	4.99k Ohms
U100			

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