International Rectifier

THE POWER MANAGEMENT LEADER

One Cycle Control µPFC Circuit Featuring the IR1150S IC

Operating Conditions:

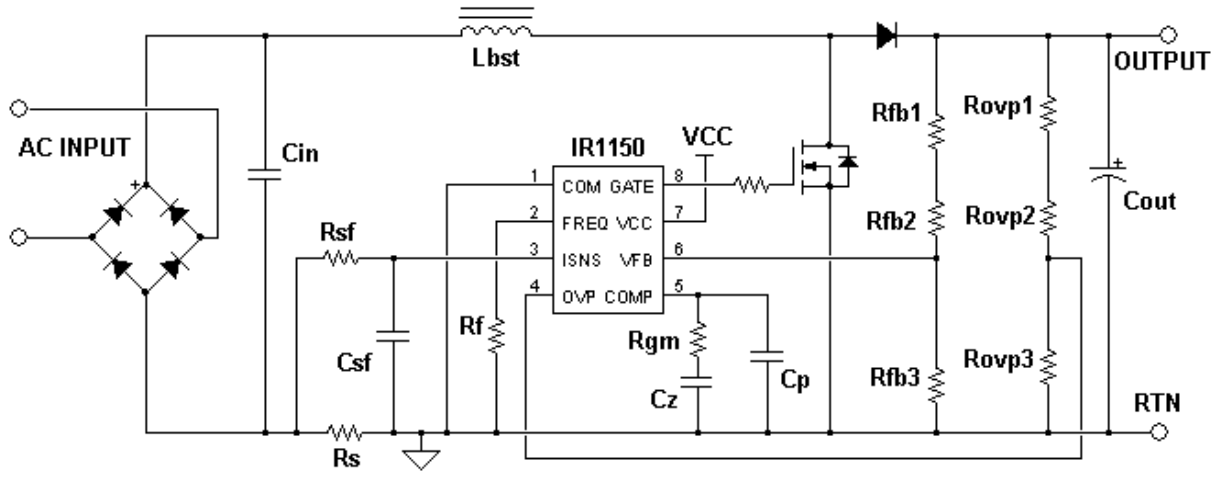
Input				Output	
Min Input Voltage:	**85** V	Switching Frequency:	**80** kHz	Output Power:	**500** W
Max Input Voltage:	**264** V	Hold-up Time:	**20** ms	Output Voltage:	**385** V
Input AC Frequency:	**50** Hz	Choke Ripple Current:	**20** %	Output Voltage (min):	**300** V
Start-up Time:	**50** ms			Output Cap Tolerance:	**10** %
Target Efficiency:	**92** %			OVP Threshold:	**425** V

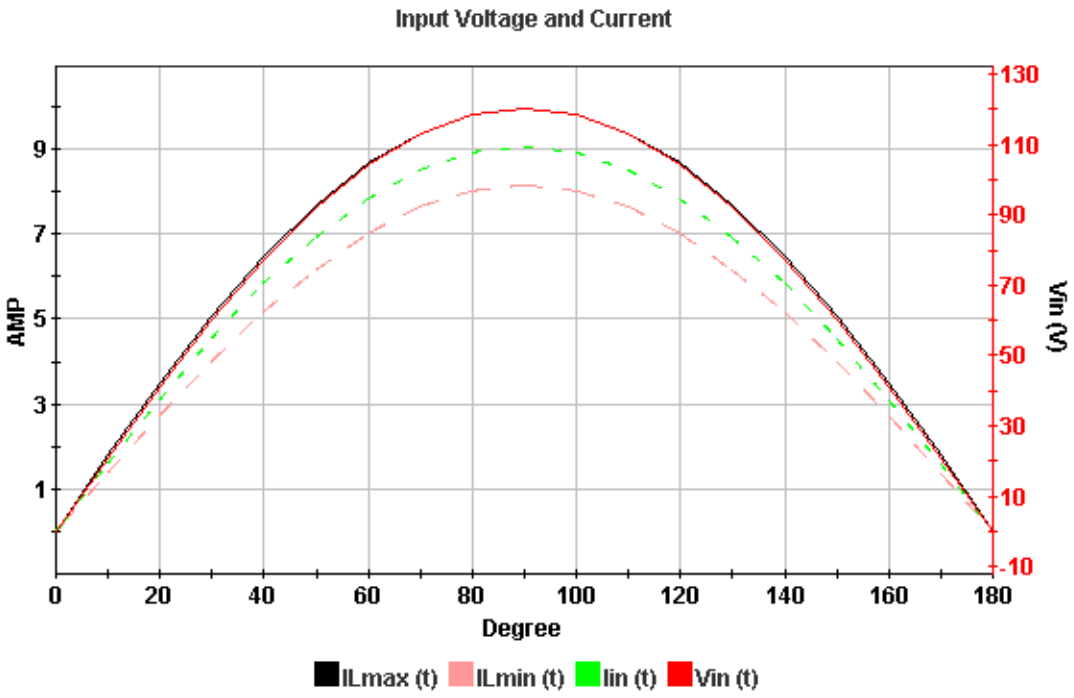
Calculation Result:

Output Conditions		
Max Input Power	543	W
Input RMS Current	6.39	A
Input Peak Current	9.04	A
Input Average Current	5.76	A
Input Pk Voltage (min)	120	V
Duty Cycle - low line	0.69	
Ripple Current	1.81	A
Peak Inductor Current	9.95	A
V Current Sense	0.76	V
Peak Current Limit	13.82	A
Input Pk Ovld Current	10.44	A
Power Distribution		
Power Dissipation Rfb	71.6	mW
Power Diss Rovp	71.4	mW
Power Rs	2.96	W

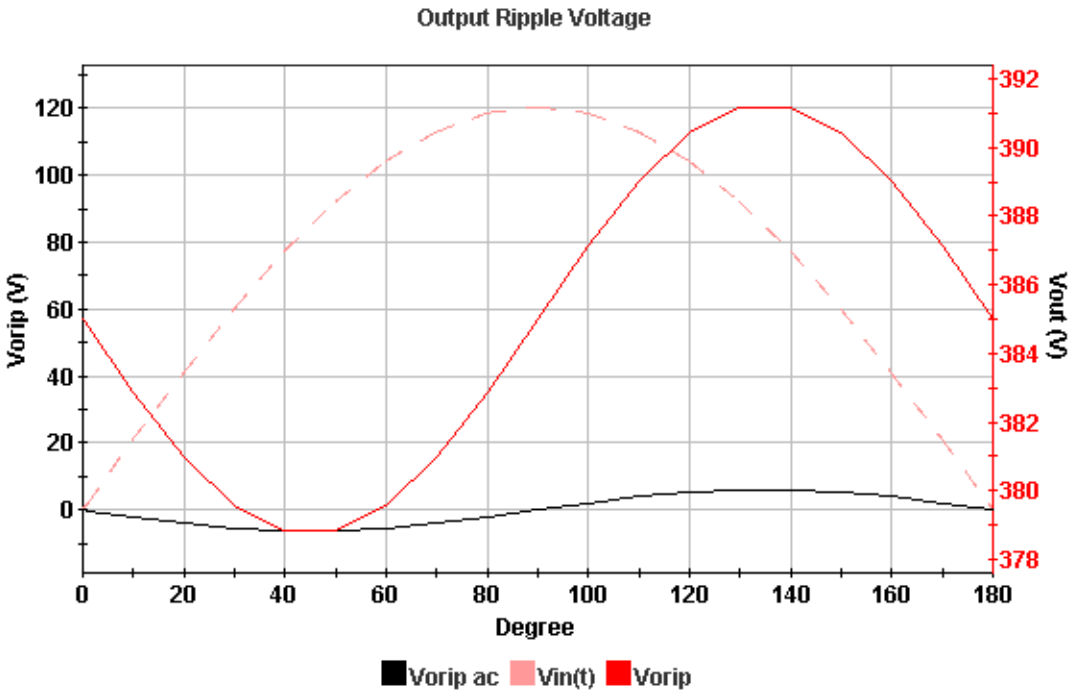
Component Values

Component	Ref Des	Std Value	Calc Value
High Freq Input Cap	Cin	680 nF	0.50 uF
Boost Choke Value	Lbst	620 uH	571 uH
Output Capacitor	Cout	470 µF	382 uF
Output Voltage Rset	Rfb3	18.7 kOhm	18.5 kOhm
Output OVP Rset	Rovp3	18.2 kOhm	17.9 kOhm
Current Sense Res	Rs		0.072 Ohm
Zero Capacitor	Cz	330 nF	331 nF
Gain Resistor	Rgm	3.01 kOhm	2.96 kOhm
Pole Capacitor	Cp	3.9 nF	4.03 nF
Current Sense Filter Capacitor	Csf	1 nF	1.00 nF
Current Sense Filter Resistor	Rsf	100 Ohm	100 Ohm
Timing Resistor	Rf	102 kOhm	101.1 kOhm
Rfb1, Rfb2, Rovp1 and Rovp2 are 499 kOhms each			

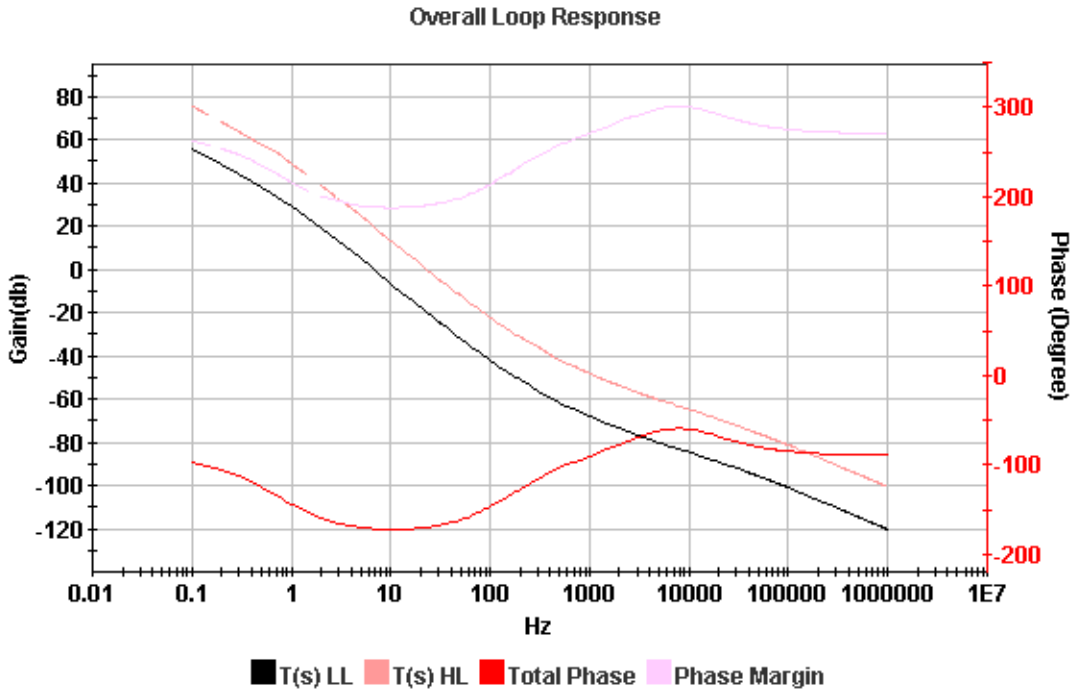




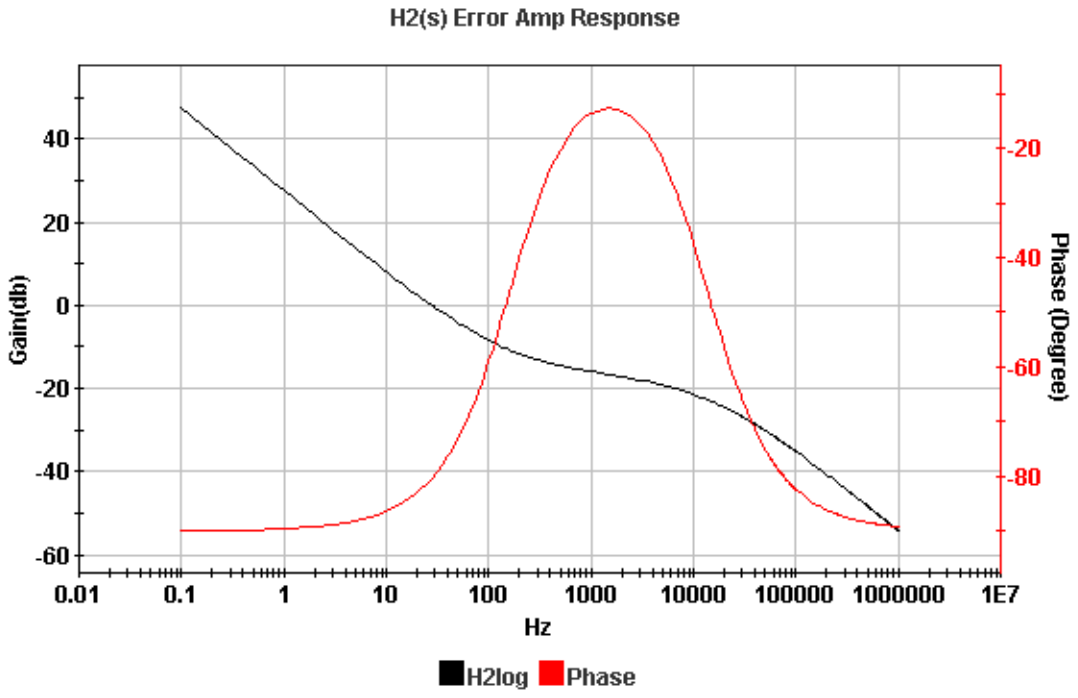
Graph 1: Input voltage and current relationship for this IR1150 power factor correction circuit.



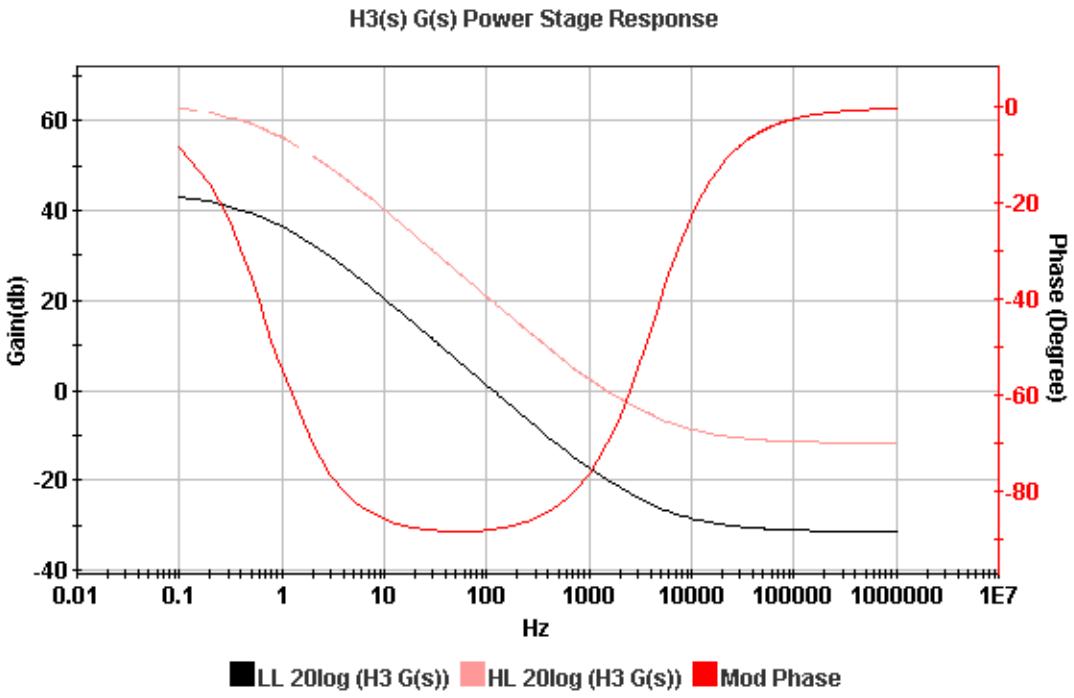
Graph 2: Output voltage ripple amplitude relative to the AC input voltage for this design.



Graph 3: This is the overall feedback loop response of the power factor correction circuit showing phase and gain.



Graph 4: This is the error amplifier response of the power factor correction circuit showing phase and gain.



Graph 5: This is the power stage response of the power factor correction circuit showing phase and gain.

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