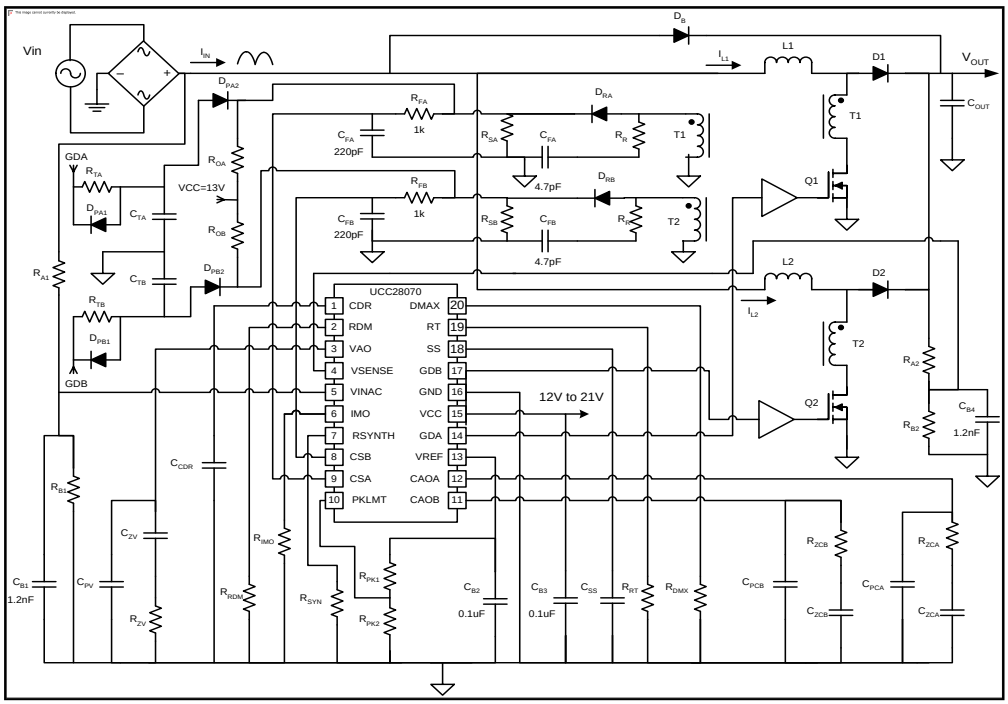
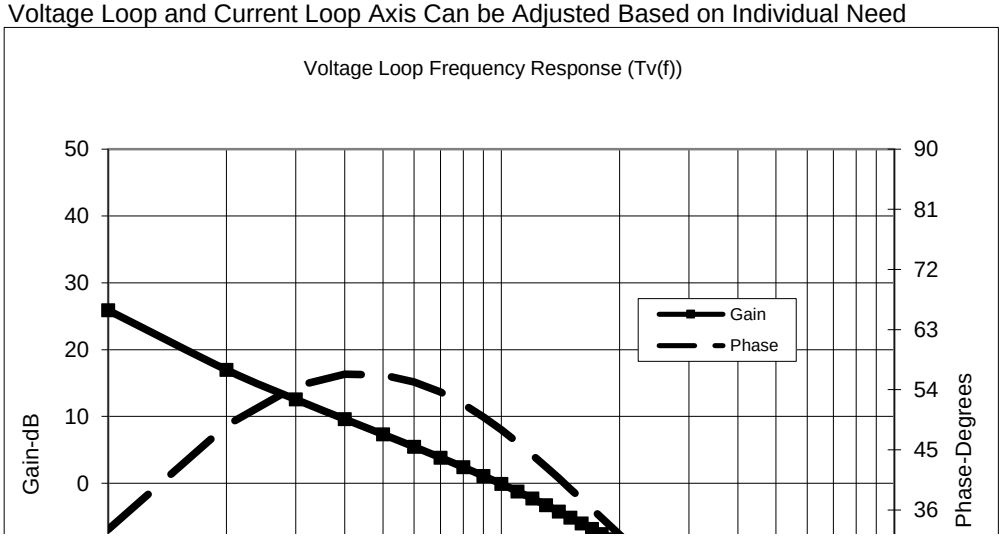
UCC28070 Controller Setup Tool	11/20/2018		
Preliminary			
Notes:			
This design tool is designed to work with the UCC28070 Application Note SLUA479			
This design tool is optimized for a Universal Input and can be used for designs were the input voltage is anywhere between 85V to 265V RMS.			
Please enter design parameters into the	**shaded**	**cells;**	
Calculated results will be in GRAY			
Design Parameters:	**Variable Names**		Units
Minimum RMS Input Voltage	V_{IN_MIN}	85	V
Maximum RMS Input Voltage	V_{IN_MAX}	120	V
Minimum Line Frequency	f_{LINE}	55	Hz
Maximum Line Frequency		65	Hz
Maximum Output Power	P_{OUT}	5000	W
Full Load Efficiency (Must be less than 0.99)	η	0.95	
Switching Frequency	f_S	1.00E+05	Hz
Output Voltage	V_{OUT}	390	V
Maximum Duty Cycle	D_{MAX}	0.94	
Soft Start Time	t_{SS}	0.50	s
Optional Frequency Dither Magnitude (Total Δfs)	f_{DM}	3.00E+04	Hz
Optional Frequency Dither Rate	f_{DR}	1.00E+04	Hz
VCC	VCC	12	V
Component Selection, Trip Points and Calculated Values from the UCC28070 Design Example			
Duty Cycle at the Peak the Peak of Low Line Input	D_{PLL}	0.69	
Inductor Ripple Current Cancellation at the Peak of Low Line	$K(D_{PLL})$	0.55	
Inductor Ripple Current	ΔI_{L1}	47.38	
Calculated Boost Inductors L_{1_MIN}, L_{2_MIN}	L_{1_MIN}, L_{2_MIN}	1.76E-05	H
Enter the Lowest Inductance Value of the Real Inductor	L_{1_MIN}, L_{2_MIN}	1.80E-05	H
Enter the Highest Inductance Value of the Real Inductor	L_{1_MAX}, L_{2_MAX}	2.00E-05	H
Average Inductance Value	L_{1_AVG}, L_{2_AVG}	1.90E-05	H
Inductor RMS Current	I_{L1_RMS}, I_{L2_RMS}	32.563	A
Output Capacitance Calculated Based on Holdup Time	C_{OUT}	2.73E-03	F
Output Capacitance Selected	C_{OUT}	3.28E-03	F
Output Ripple Voltage	V_{RIPPLE}	11.9	V
Low Frequency Output Capacitor RMS Current	I_{COUT_LF}	9.543	A
High Frequency Output Capacitor RMS Current	I_{COUT_HF}	25.660	A
Peak Diode and FET Current	I_{PEAK}	80.969	A
FET RMS Current (Q1 and Q2)	I_{DS}	26.603	A
Diode Average Current (D1 and D2)	I_D	6.410	A
Calculated Current Sense Transformer Turns Ratio	$N_{CT}=N_S/N_P$	810	
Enter Current Sense Transformer Turns Ratio	$N_{CT}=N_S/N_P$	200	

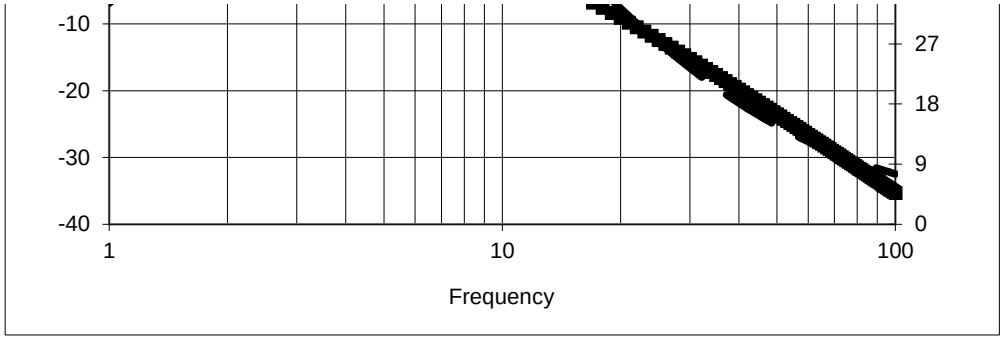
Minimum Magnetizing Inductance of the Current Sense Transform	L_M	3.16E-03	H
Select Current Sense Peak Voltage	V_S	3.00	V
Calculated Current Sense Resistor	$R_{SA} = R_{SB}$	6.7	ohm
Select Standard Current Sense Resistor	$R_{SA} = R_{SB}$	6.8	ohm
CalculatedReset Resistor	R_R	1.E+02	ohm
Select a Standard Value	R_R	1.00E+02	ohm
Calculated Maximum DR Reverse Voltage	V_R	40	V
Current Sense Offset Desired	V_{OFF}	0.20	V
Program Offset Bias Current to be added to R_S	$R_{OA}=R_{OB}$	4.01E+02	ohm
Select a Standard Value	$R_{OA}=R_{OB}$	4.00E+02	ohm
Program Current Sense PWM Ramp Resistor	$R_{TA}=R_{TB}$	8.50E+02	ohm
Select Standard Values	$R_{TA}=R_{TB}$	8.45E+02	ohm
Program Current Sense PWM Ramp Timing Capacitor	$C_{TA}=C_{TB}$	4.90E-07	F
Select Standard Values	$C_{TA}=C_{TB}$	4.70E-07	F
Select High Side Resistor on Peak Current Limit Divider	R_{PK1}	6.80E+03	ohm
Calculated Low Side Resistor on Peak Current Limit Divider	R_{PK2}	6.80E+03	ohm
Select Low Side Resistor on Peak Current Limit Divider	R_{PK2}	6.80E+03	ohm
Calculated Timing Resistor	R_{RT}	7.50E+04	ohm
Select Timing Resistor	R_{RT}	7.50E+04	ohm
Calculated Programmable Duty Cycle Limit Resistor	R_{DMX}	6.60E+04	ohm
Select Programmable Duty Cycle Limit Resistor	R_{DMX}	6.65E+04	ohm
Select High Side Resistor for VSENSE Voltage Divider	R_A	3.00E+06	ohm
Calculated Low Side Resistor on VSENSE voltage Divider	R_B	2.33E+04	ohm
Select Low Side Resistor on VSENSE voltage Divider	R_B	2.37E+04	ohm
Calculated Nominal Over Voltage Trip Point	V_{OVP}	406	V
Voltage Divider Gain	H	7.84E-03	
Voltage Amplifier Output Impedance at double f_{LINE}	Z_O	1.47E+04	ohm
Calculated Pole Capacitance for the Voltage Loop	C_{PV}	9.85E-08	F
Select a Standard Value	C_{PV}	1.00E-07	F
Calculated Voltage Loop Crossover Frequency	f_{VC}	13.2	Hz
Calculated Voltage Loop Zero Compensation Resistor	R_{ZV}	1.20E+05	ohm
Select a Standard Value	R_{ZV}	1.20E+05	ohm
Calculated Voltage Loop Zero Compensation Capacitor	C_{ZV}	1.00E-06	F
Select a Standard Value	C_{ZV}	1.00E-06	F
Calculated Current Synthesis Programmable Resistor	R_{SYN}	4.61E+04	ohm
Select a Standard Value	R_{SYN}	4.60E+04	ohm
Voltage Calculation for Selecting Multiplier Resistor	V_1	68.563	V
Voltage Calculation for Selecting Multiplier Resistor	V_2	2.030	V
Multiplier Resistor	R_{IMO}	1.56E+04	ohm
Select a Standard Value	R_{IMO}	1.56E+04	ohm
Current Loop Power Stage Gain at Loop Crossover	G_{PSC}	2.777	
Current Loop Zero Resistor	$R_{ZC1}=R_{ZC2}$	3.60E+03	ohm

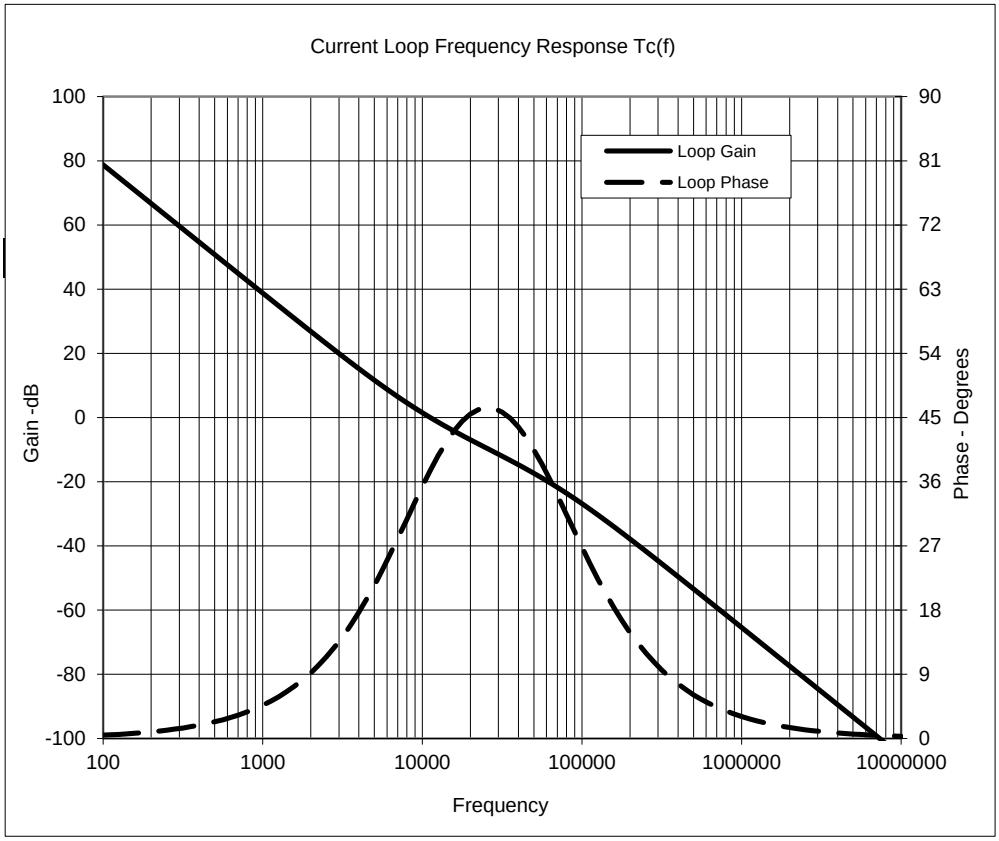
Select a Standard Value	$R_{ZC1}=R_{ZC2}$	3.60E+03	ohm
Current Loop Zero Capacitor	$C_{ZC1}=C_{ZC2}$	4.42E-09	F
Select a Standard Value	$C_{ZC1}=C_{ZC2}$	4.30E-09	F
Current Loop Pole Capacitor	$C_{PC1}=C_{PC2}$	8.84E-10	F
Select a Standard Value	$C_{PC1}=C_{PC2}$	8.20E-10	F
Calculated Soft Start Capacitor (Be sure C_{SS} > or = C_{ZV})	C_{SS}	2.22222E-06	F
Select a Standard Value (Be sure C_{SS} > or = C_{ZV})	C_{SS}	2.20E-06	F
Program Dither Magnitude Resistor	R_{RDM}	3.13E+04	ohm
Select a Standard Value	R_{RDM}	3.12E+04	ohm
Program Dither Rate Capacitor	C_{CDR}	2.08E-10	F
Select a Standard Value	C_{CDR}	2.20E-07	F



Voltage Loop and Current Loop Axis Can be Adjusted Based on Individual Need




-10
-20
-30
-40
27
18
9
0
1
10
100
Frequency


Current Loop Frequency Response Tc(f)
Loop Gain
Loop Phase
Gain -dB
Phase - Degrees
100
80
60
40
20
0
-20
-40
-60
-80
-100
90
81
72
63
54
45
36
27
18
9
0
100
1000
10000
100000
1000000
10000000
Frequency