

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 888A-A

36V-72VIN, ISOLATED SYNCHRONOUS FORWARD

LTC3725/LTC3706

DESCRIPTION

Demonstration circuit 888A-A is a high power isolated synchronous forward converter featuring the LTC3725 and LTC3706. When powered from a 36-72V input, a single DC888A-A provides an isolated 3.3V at 50A in a quarter-brick footprint. If higher output current is required, multiple DC888A boards may be stacked together using on-board connectors for a complete PolyPhase current sharing solution. The converter operates at 250kHz and achieves efficiency up to 93% with synchronous output rectifiers. Secondary-side control eliminates complex optocou-

pler feedback, providing fast transient response with a minimum amount of output capacitance. Additional DC888A versions include DC888A-B (5V at 40A) and DC888A-C (12V at 20A). The simple architecture can be easily modified to meet different input and output voltage requirements.

**Design files for this circuit board are available.
Call the LTC factory.**

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Table 1. Performance Summary ($T_A = 25^\circ\text{C}$)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		36V
Maximum Input Voltage		72V
Output Voltage V_{OUT}	$V_{\text{IN}} = 36\text{V to } 72\text{V}, I_{\text{OUT}} = 0\text{A to } 50\text{A}$	3.3V
Maximum Output Current	200LFM	50A
Typical Output Ripple V_{OUT}	$V_{\text{IN}} = 48\text{V}, I_{\text{OUT}} = 50\text{A}, 250\text{kHz}$	< 30mV _{P-P}
Output Regulation	Over All Input Voltages and Output Currents	±1% (Reference)
Load Transient Response	Peak Deviation with 25A to 50A Load Step (10A/us)	±250mV
	Settling Time	•50us
Nominal Switching Frequency		250kHz
Efficiency	$V_{\text{IN}} = 36\text{V}, I_{\text{OUT}} = 30\text{A}$	93% Typical
Isolation	BASIC	1500VDC
Size	Component Area x Top x Bottom Component Height	2.3" x 1.45" x 0.4" x 0.075"

OPERATING PRINCIPLES – SINGLE PHASE

The LTC3706 secondary side controller is used on the secondary and the LTC3725 smart driver with self-starting capability is used on the primary. When an input voltage is applied, the LTC3725 (U1 in Figure 15), which is powered through R29 and Q28, begins a controlled soft-start of the output voltage by switching MOSFETs Q9 and Q11. As the output voltage begins to rise, the LTC3706 secondary controller is quickly powered up via D24, Q29, C67, and Q27. The

LTC3706 then assumes control of the output voltage by sending encoded PWM gate pulses to the LTC3725 primary driver via signal transformer, T2. The LTC3725 then operates as a simple driver receiving both input signals and bias power through T2. The transition from primary to secondary control occurs seamlessly at a fraction of the output voltage. From that point on, operation and design simplifies to that of a simple buck converter. The LTC3706 regu-

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lates by observing the output voltage directly resulting in superior output voltage regulation and transient

response.

OPERATING PRINCIPLES – POLYPHASE

The LTC3725 and LTC3706 allow the user to develop modular power supply “building blocks” that can be added as power/current requirements increase. Connecting two DC888A power supplies in a PolyPhase configuration has several advantages. By distributing power across multiple high power/current supplies, heat is also distributed, reducing individual component temperatures. Each parallel module develops equal output currents so that electrical and thermal stresses are shared, increasing reliability. Multi-phase operation and Shared input and output filtering result in fewer/smaller input/output capacitors and inductors for a given voltage/current ripple or transient response.

In PolyPhase systems, one power supply is configured as a “master” and one as a “slave”. The master communicates switching frequency via the PT+ pin to

FS/SYNC pin of the slave (Figures 19 and 20). The relative clock phase of each stage is determined by the slave. The master’s voltage error amplifier’s output (ITH pin) controls the output current of all the phases via the ITH pin voltage which is distributed to each slave’s unity-gain differential amplifier.

Several of the signals that are shared between the master and the slave are of a bidirectional nature. A fault on either phase can be communicated to the opposite phase via the primary side SS/FLT pin interconnection or the secondary side RUN/SS interconnection. Sharing Vcc on the secondary side ensures the master, which initially develops this bias voltage, and slave power up simultaneously. Each phase then contributes to the shared Vcc bus. Finally, the input voltage (Vin) and output voltage (Vout) busses are interconnected to allow for load sharing.

OPTIONAL POLYPHASE SETUP

Only minor modifications and minimal interconnections are needed to implement PolyPhase with the DC888. See component changes list (Figure 18) and schematics (Figures 21 and 22) for the required electrical changes to master and slave units. After the modifications are done, the boards are then stacked one on top of another (Figure 23). J1 and P1 headers interconnect small signals and E1, E2, E3, and E4 stand offs provide interconnection for the power signals.

The DC888 was designed primarily to demonstrate the chipset’s single phase operation and therefore be further optimized for PolyPhase applications. A small resistor can be placed between the R76/D27 junction and C70/U2-16 junction to reduce already small PWM jitter associated with separate master and slave ground planes. Another optimization can result from combining each individual phase’s input/output filter components into one shared input/output filter.

QUICK START PROCEDURE

Demonstration Circuit 888A-A is easy to set up to evaluate the performance of the LTC3725 and LTC3706. Refer to Figure 1 for proper equipment setup. Follow the procedure below:

NOTE: When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the scope probe. Measure the output (or input) voltage ripple by touching the probe tip and probe

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ground directly across the +Vout and –Vout (or +Vin and –Vin) terminals. See Figure 2 for proper probing technique.

1. The optional input LC filter stage (C2/L5) lowers ac input rms current. A power supply's complete input filter must have output impedance that is less than the converter input impedance to assure stability. This may require a damping impedance. (See Linear Technology Application Note AN19 for a discussion of input filter stability.) A source with a 50mOhm or higher ESR at the filter resonant frequency is one way of providing damping for the filter elements provided on the DC888A. For bench testing, adding an 82uF electrolytic capacitor such as a Sanyo 100MV82AX to the input terminals will provide suitable damping and ripple current capability. The values selected have a filter resonant frequency that is below the converter switching frequency, thus avoiding high circulating currents in the filter.
2. Set an input power supply to a voltage of 36V. Make sure that it is capable of 36V to 72V at a current supplying capability of at least 8A per number of phases being tested. Then, turn off the supply.
3. With power off, connect the supply to the input terminals +Vin and –Vin.
 - a. Input voltages lower than 36V can keep the converter from turning on due to the undervoltage lockout feature of the LTC3725.
 - b. If efficiency measurements are desired, an ammeter capable of measuring at least 8Adc per phase can be put in series with the input supply

in order to measure the DC888A-A's input current.

- c. A voltmeter with a capability of measuring • 72V can be placed across the input to get an accurate input voltage measurement.

4. Turn on the power at the input.

NOTE: Make sure that the input voltage • 72V.

5. Check for the proper output voltage of 3.3V.

6. Turn off the power at the input.

7. Once the proper output voltages are established, connect a variable load capable of sinking 50A per phase at 3.3V to the output terminals +Vout and –Vout. Set current to 0A.

- a. If efficiency measurements are desired, an ammeter or a resistor current shunt that is capable of handling at least 50Adc per phase can be put in series with the output load in order to measure the DC888A-A's output current.

- b. A voltmeter with a capability of measuring at least 3.3V can be placed across the output terminals in order to get an accurate output voltage measurement.

8. Turn on the power at the input.

NOTE: If there is no output, disconnect the load to verify that the load is not set too high.

9. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other desired parameters.

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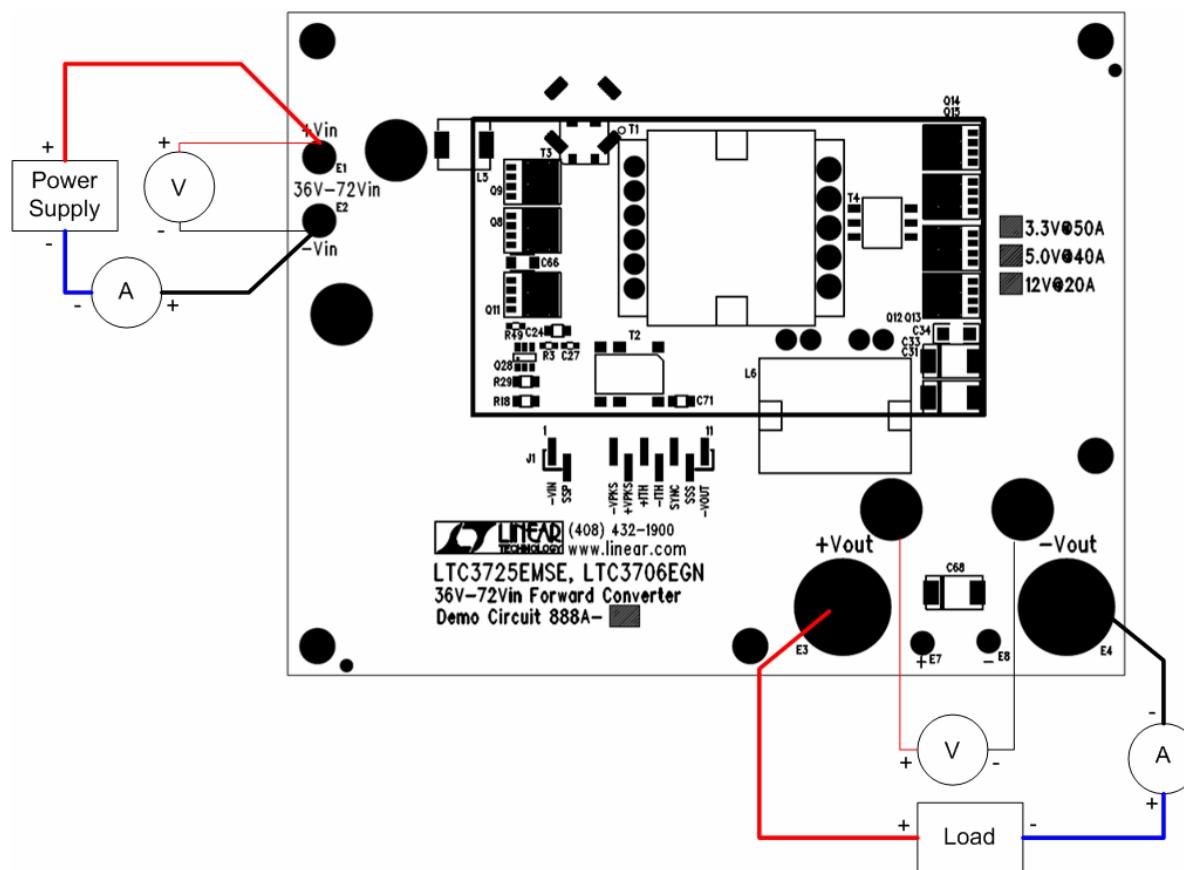


Figure 1. Proper Measurement Equipment Setup

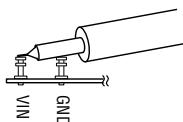


Figure 2. Measuring Input or Output Ripple

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MEASURED DATA

Figures 3 through 14 are measured data for a typical DC888A-A. Figures 15 through 23 consist of schematics, bill of materials, and a picture.

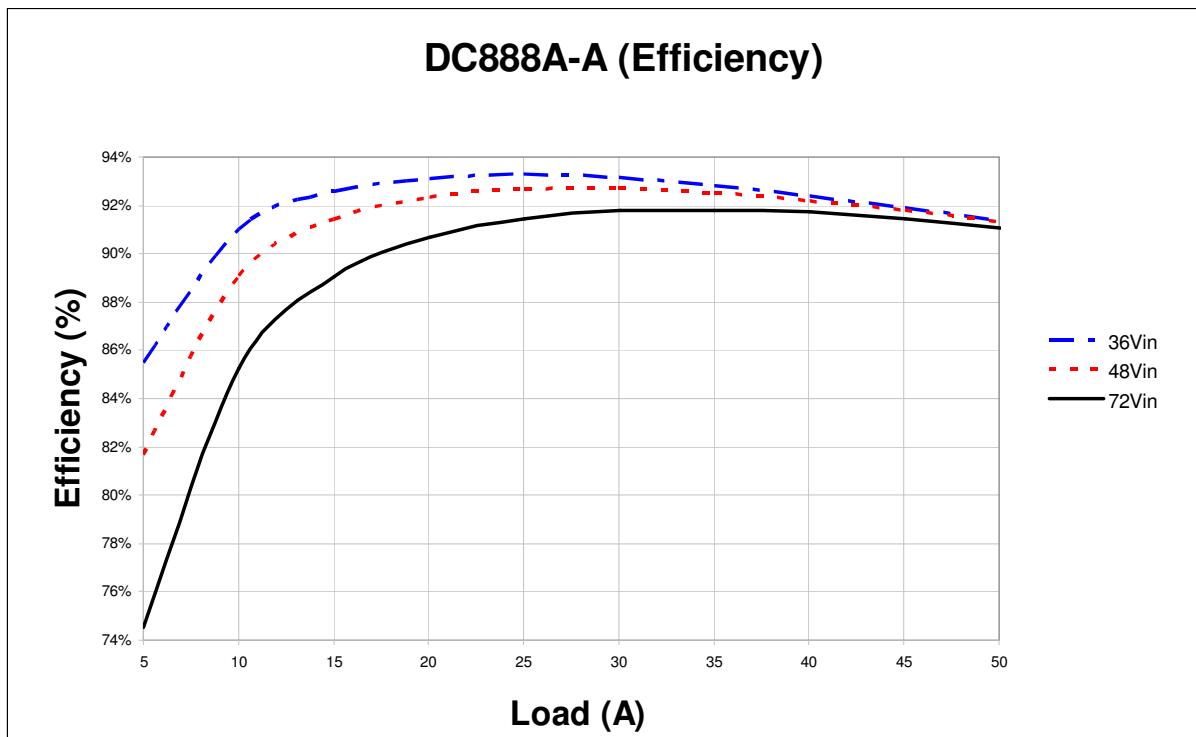


Figure 3. Efficiency

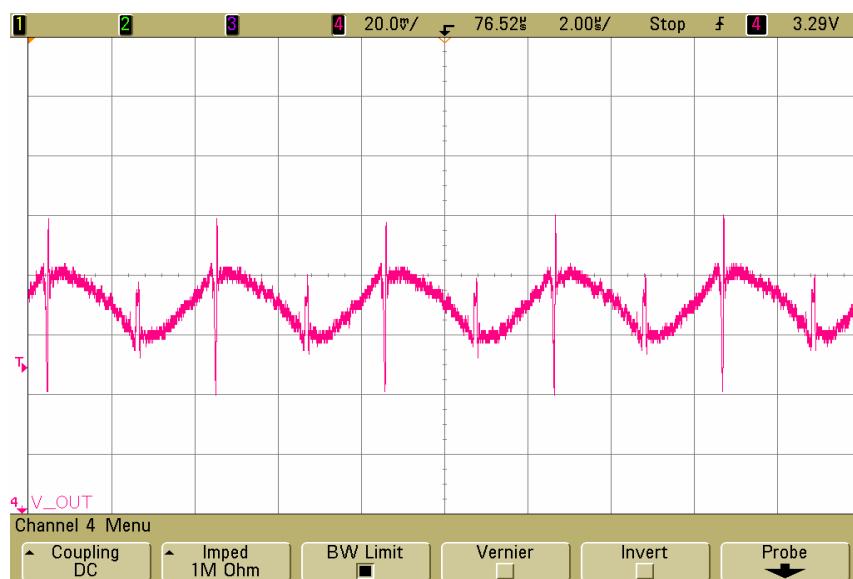


Figure 4. Output Voltage Ripple (48Vin, 50A, Single Phase)

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Figure 5. Load Transient Response (48Vin, 25A to 50A to 25A at 10A/us, Single Phase)

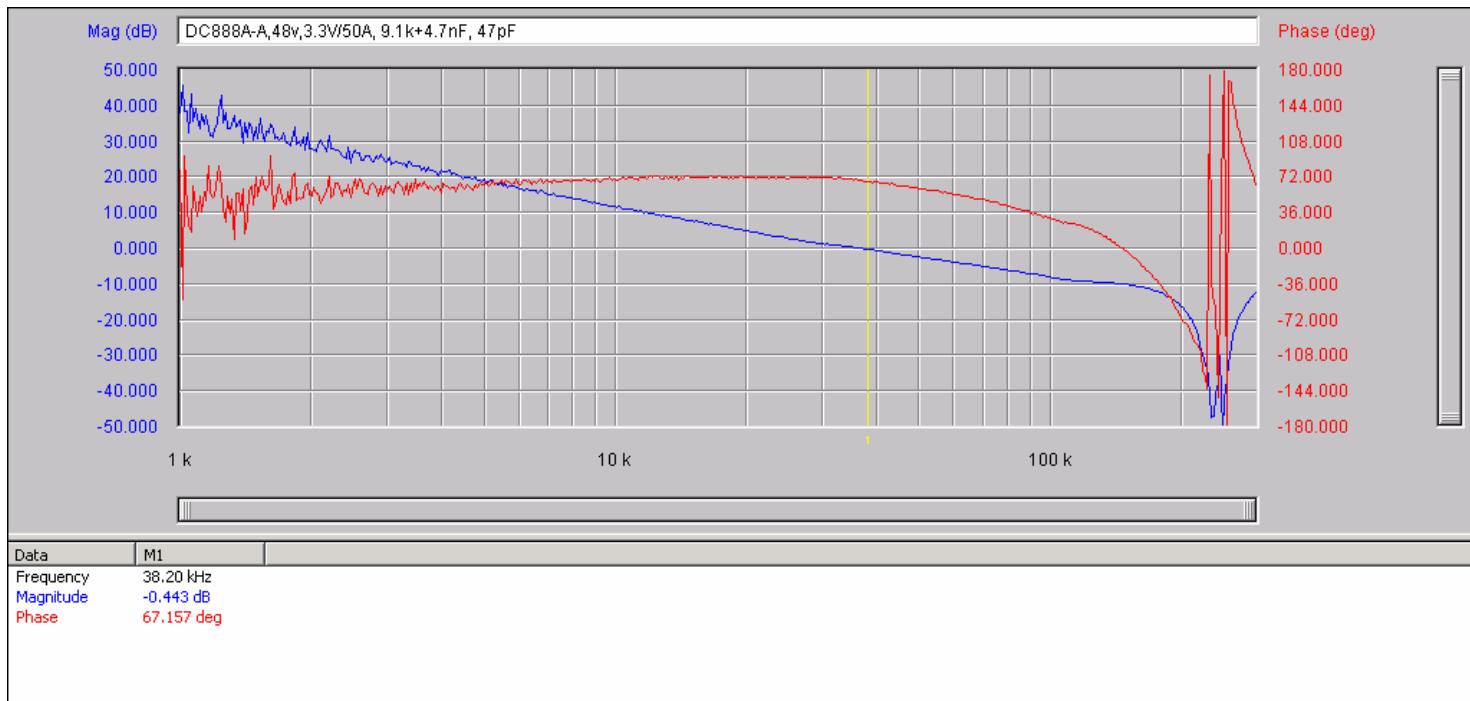


Figure 6. Loop Response (48Vin, 50A, Single Phase)

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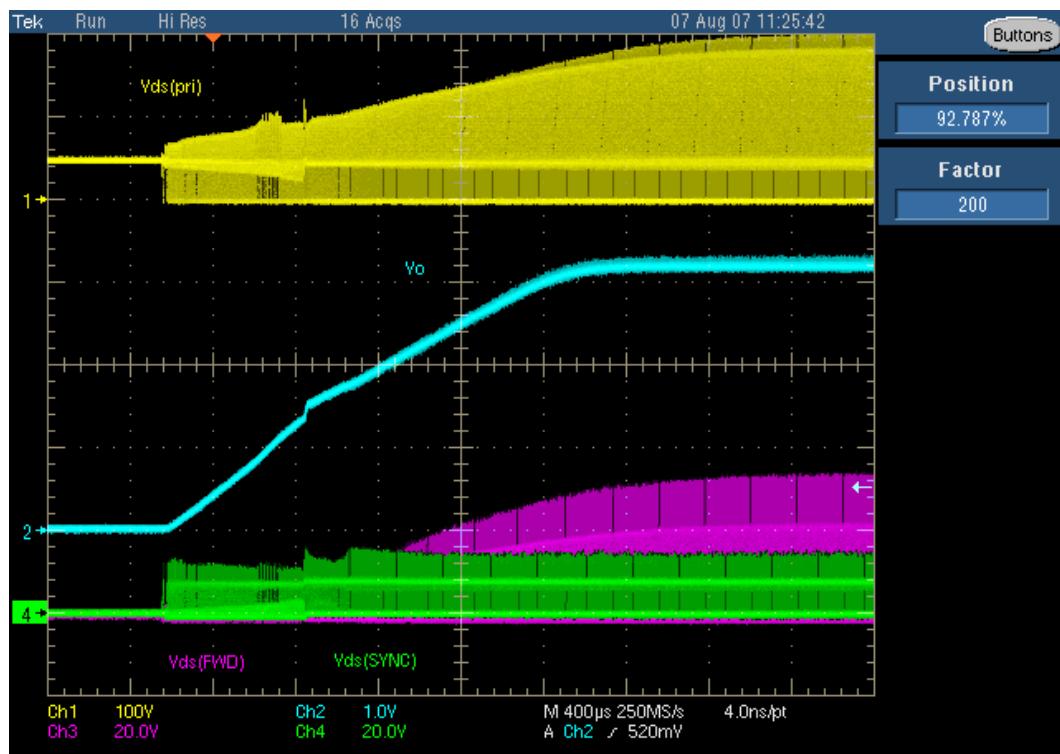


Figure 7. Turn-on (48Vin, 50A, Single Phase)

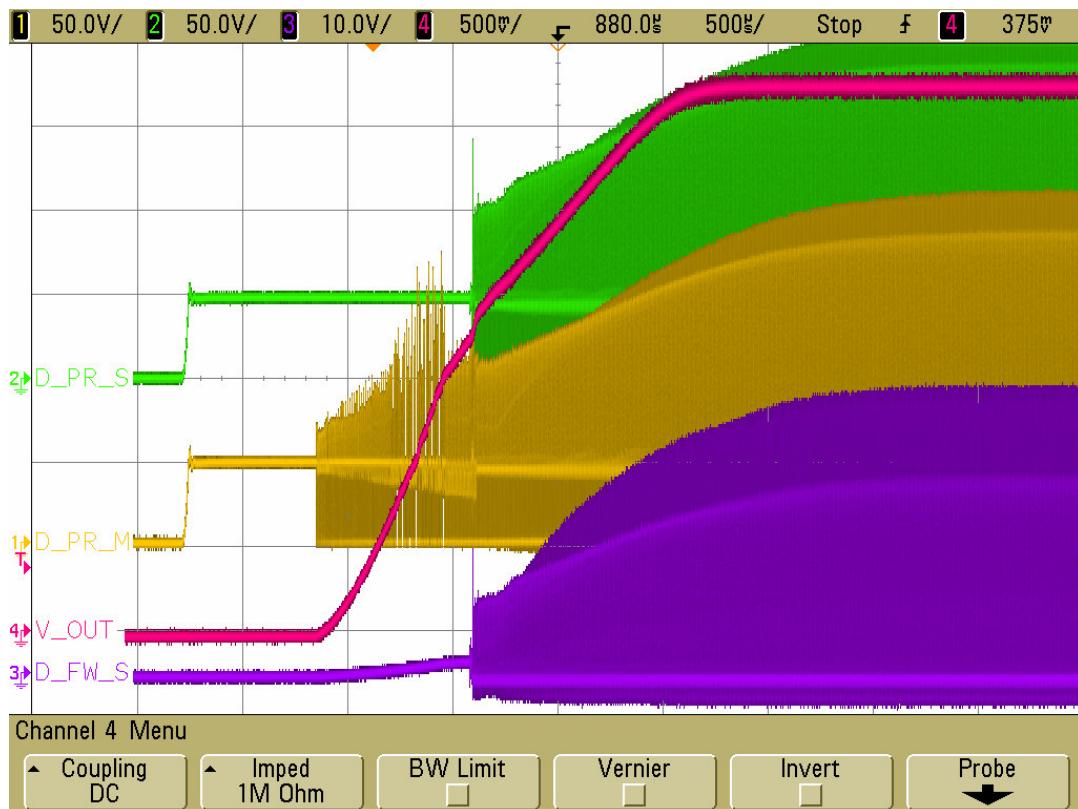


Figure 8. Turn-on (48Vin, 100A, PolyPhase)

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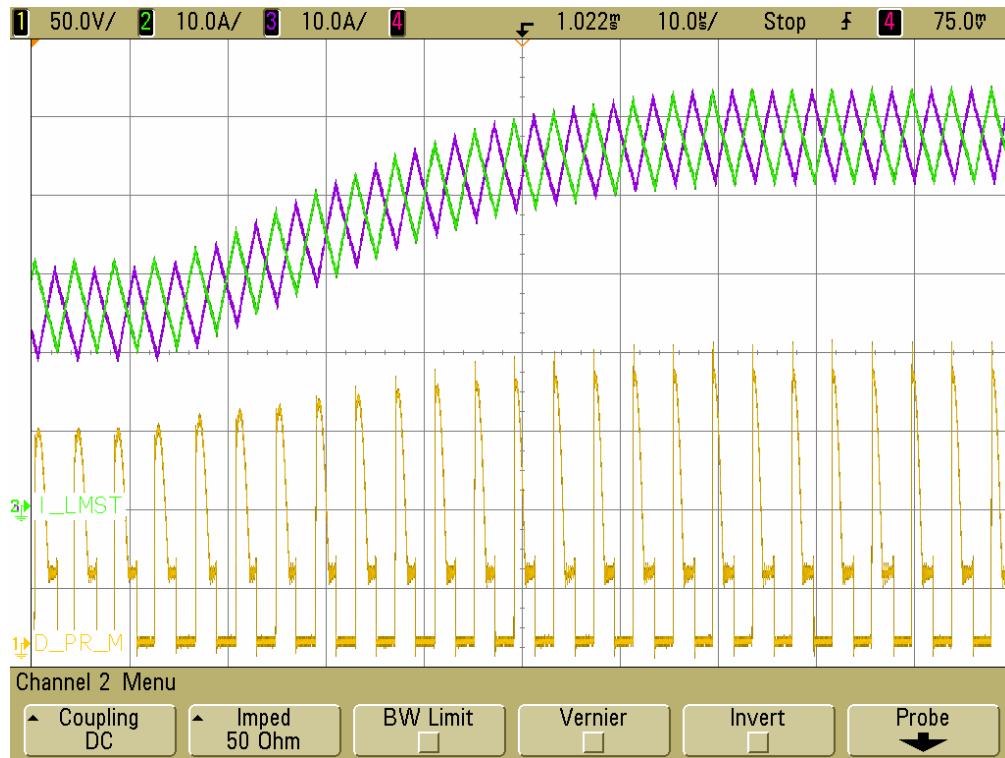


Figure 9. Transient Sharing of Inductor Current (48Vin, 50A to 100A, PolyPhase)

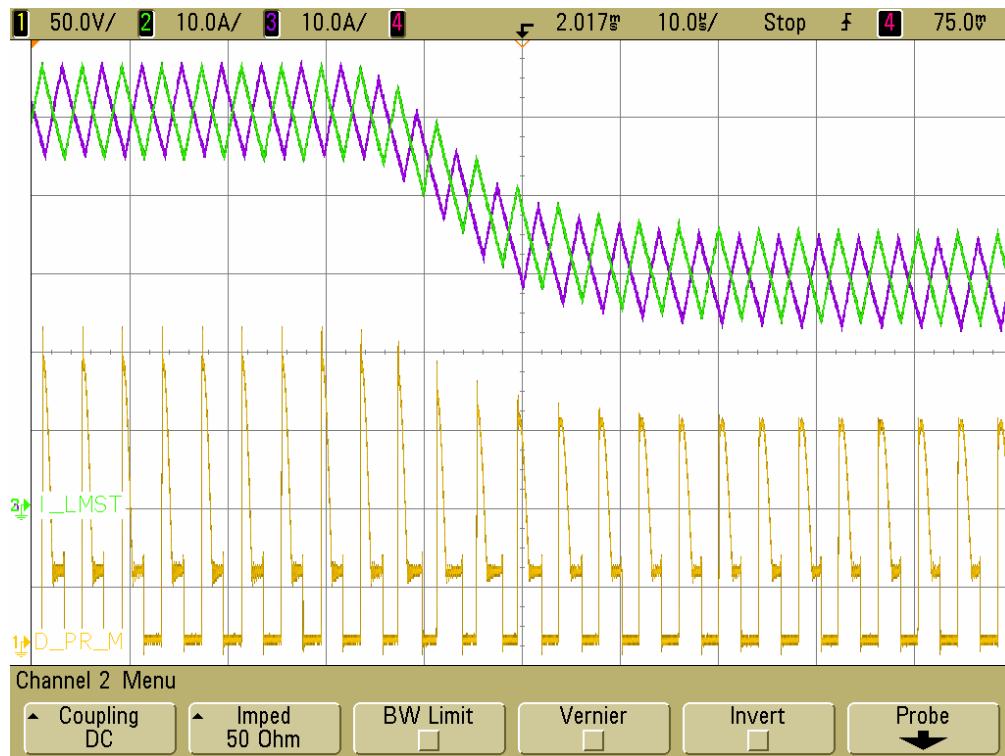


Figure 10. Transient Sharing of Inductor Current (48Vin, 100A to 50A, PolyPhase)

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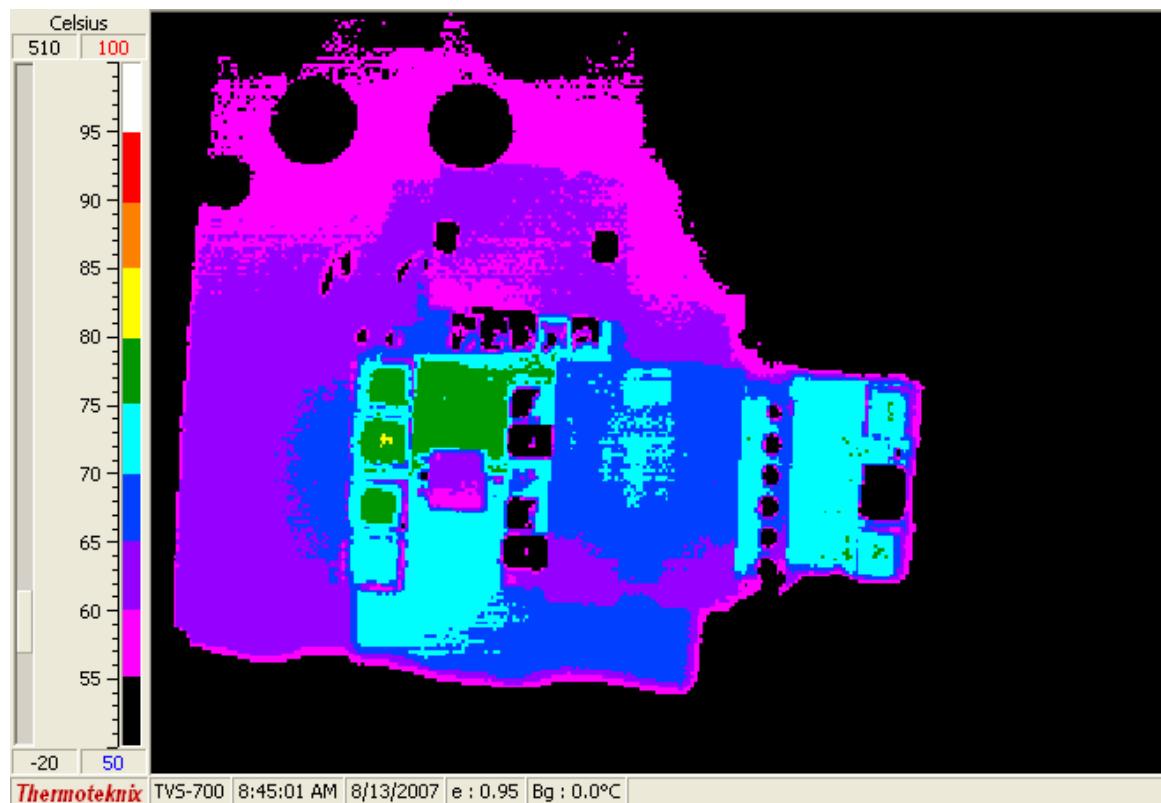


Figure 11. Temp Data (48Vin, 50A, 200LFM airflow – top)

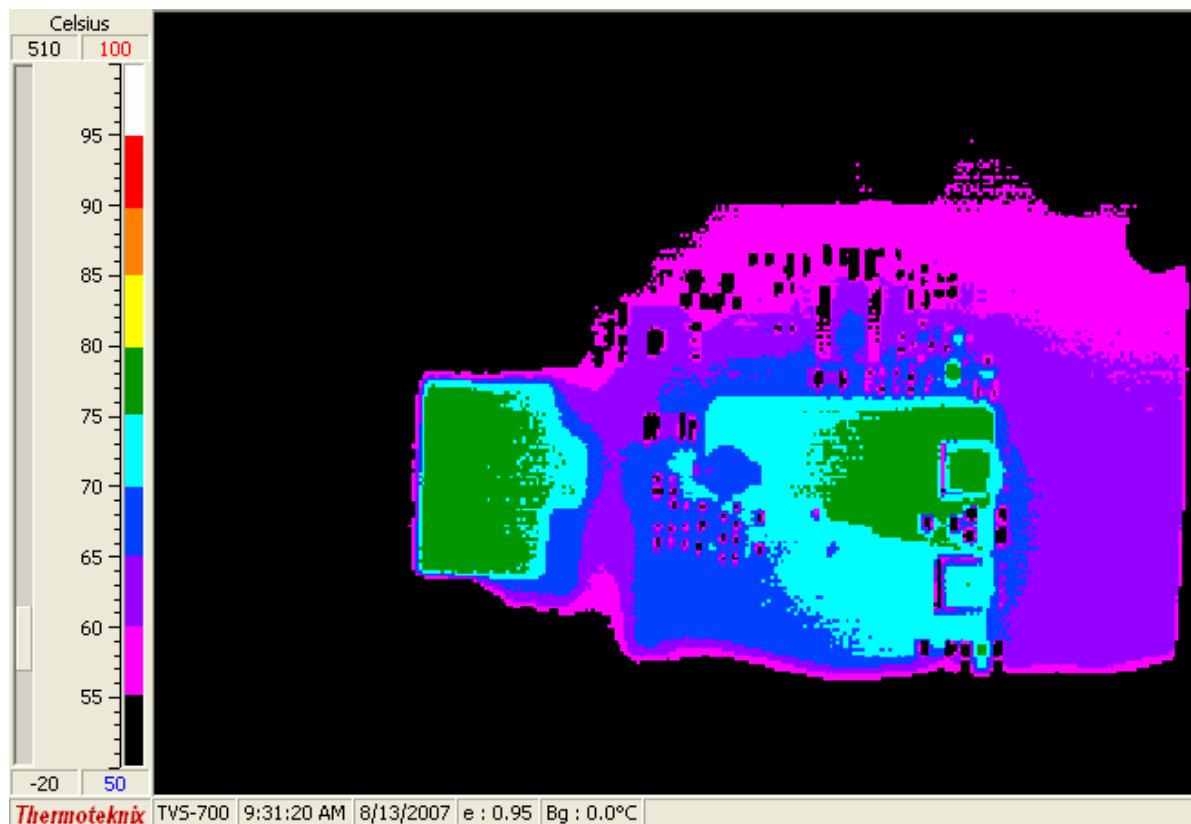


Figure 12. Temp Data (48Vin, 50A, 200LFM airflow – bottom)

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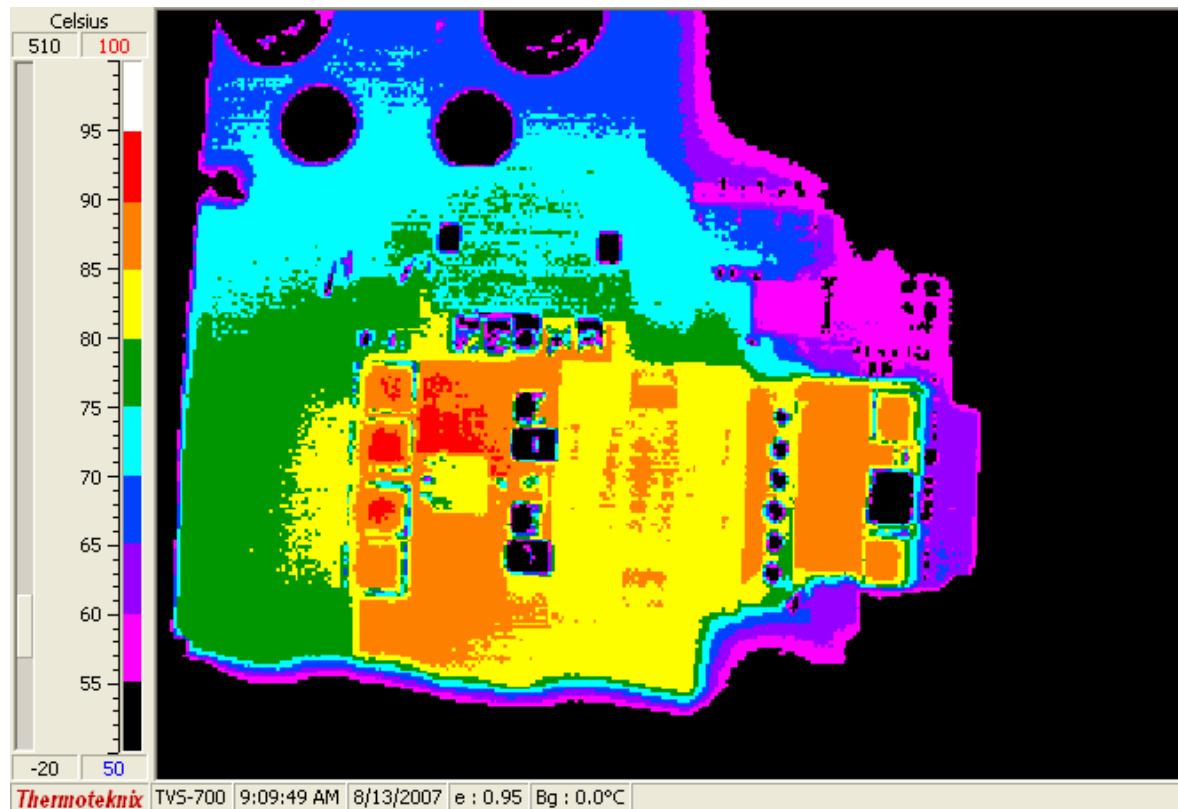


Figure 13. Temp Data (48Vin, 43A, OLFM airflow – top)

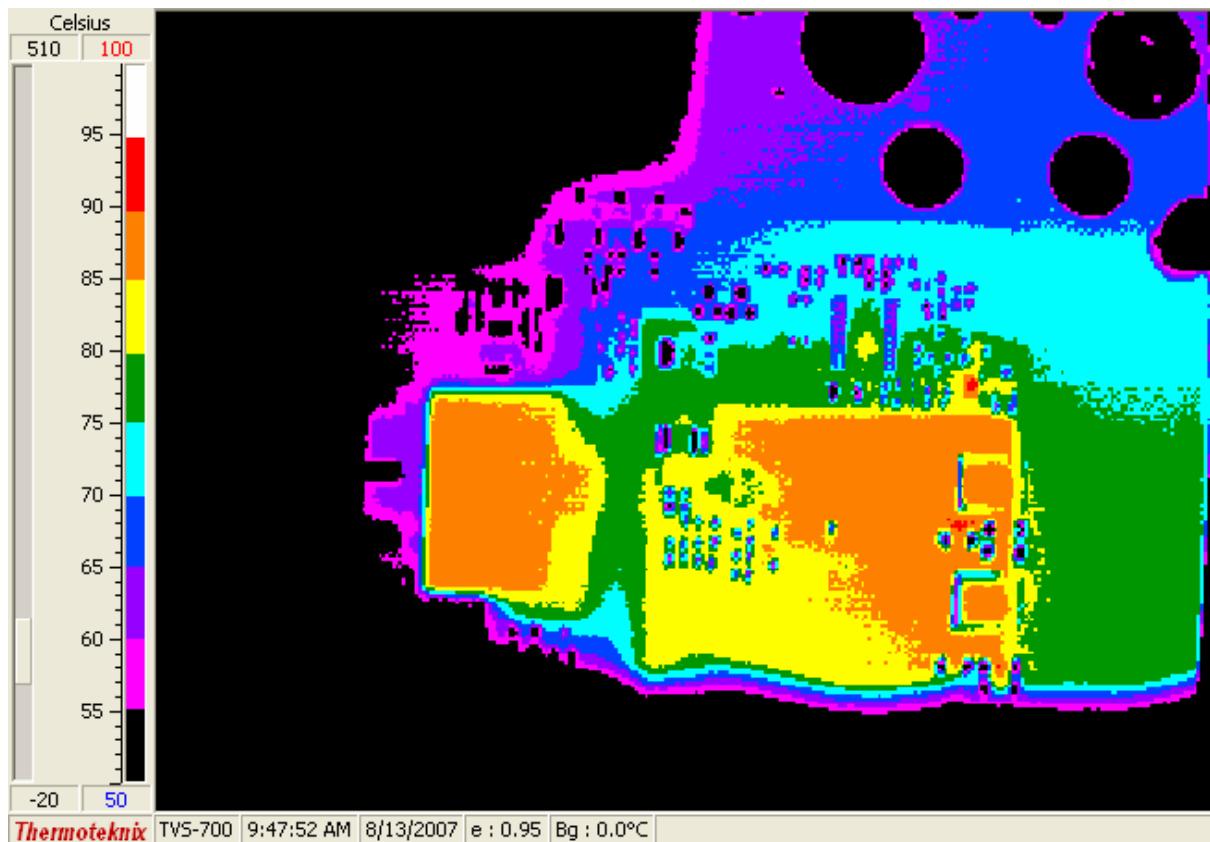


Figure 14. Temp Data (48Vin, 43A, OLFM airflow – bottom)

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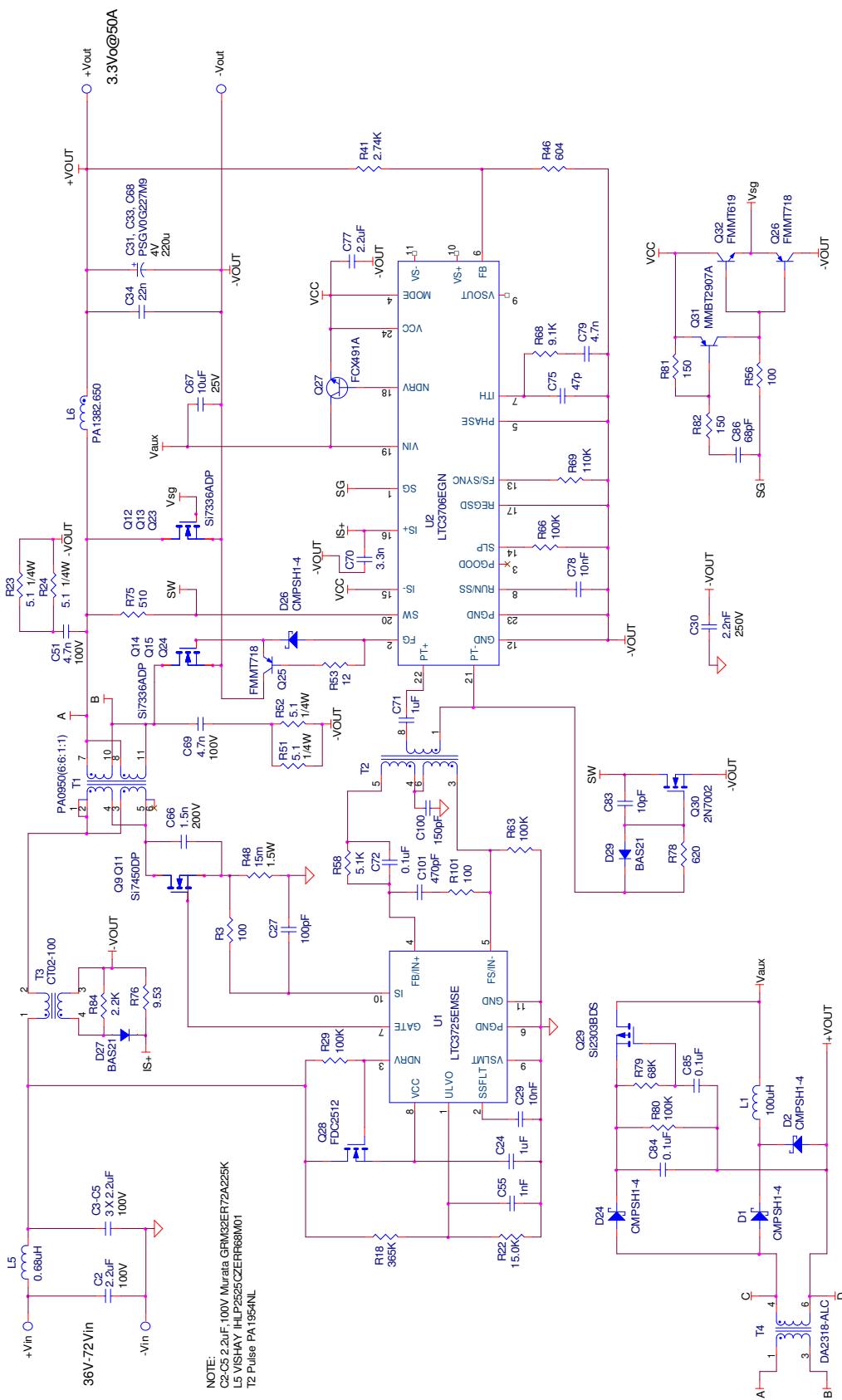


Figure 15. Single Phase Schematic

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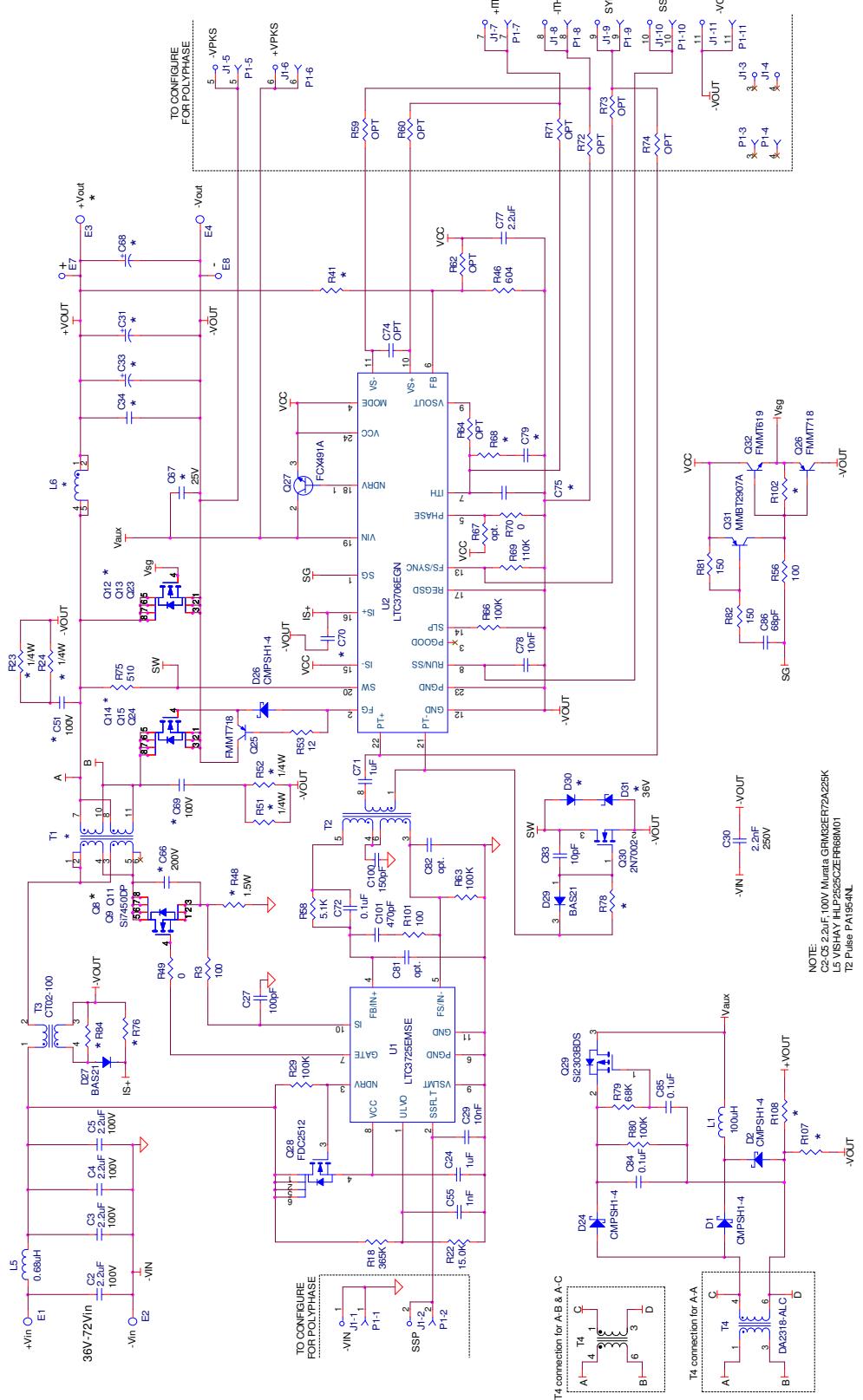


Figure 16. Full Single Phase Schematic

* VERSION TABLE

VERSION	Vout/Out	C31/C58	C33	C34	C66	C51/C69	C67	C70	C75	C79	D30	D31	R46	R68	R76	R78	R84	R94	R102	R107	R108	T1								
DC888A-A	3.3V@50mA	220uF, 4V	22uF	22uF	22uF	4.7nF	10uF	3.3nF	4.7nF	4.7nF	opt.	PA1382-650	5.1	2.74K	0.015	9.1K	9.53	2.2K	opt.	0	PA0950(6:1:1)									
DC888A-B	5.0V@40mA	220uF, 3.4V	220uF	220uF	220uF	1.5nF	2.2nF	3.3nF	100pF	100pF	opt.	PA1382-650	6.8	4.42K	0.015	9.1K	8.06	750	1.0K	opt.	0	PA0950(6:1:1)								
DC888A-C	12V@20mA	680uF, 16V	opt.	10uF	680uF	1.0nF	4.7uF	10nF	4.7uF	4.7uF	opt.	PA1494-242	10	11.8K	0.010	6.2K	7.50	390	330	240	0	opt.	PA0950(6:2:1)							

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Qty	Reference	Part Description	Manufacturer / Part #
REQUIRED CIRCUIT COMPONENTS¹			
3	C3,C4,C5	CAP., X7R, 2.2uF, 100V, 20%, 1210	Murata, GRM32ER72A225K
2	C24,C71	CAP., X7R, 1.0uF, 16V 10%, 0805	TAIYO YUDEN, EMK212BJ105KG
1	C27,	CAP., COG, 100pF, 50V, 10%, 0603	AVX, 06035A101KAT2A
2	C29,C78	CAP., X7R, 10nF, 50V, 10%, 0603	AVX, 06035C103KAT2A
1	C30	CAP., X7R, 2.2nF, 250V, 10%, 1812	Murata, GA343QR7GD222KW01L
3	C31,C33,C68	NeoCap., 220uF, 4V, 20%, V case	NEC Tokin, TE PSGV0G227M9-12R
1	C34	CAP., X5R, 22uF, 6.3V, 20%, 1206	TDK, C3216X5R0J226M
2	C51,C69	CAP., COG, 4.7nF, 100V, 5%, 1206	Murata, GRM3195C2A472JA01D
1	C66	CAP., COG, 1.5nF, 200V, 10%, 1206	AVX, 12062A152KAT2A
1	C67	CAP., X5R, 10uF, 25V, 10%, 1210	Taiyo Yuden, TMK325BJ106KN
1	C70	CAP., X7R, 3.3nF, 50V, 10%, 0603	AVX, 06035C332KAT2A
1	C75	CAP., COG, 47pF, 25V, 10%, 0603	AVX, 06033A470KAT2A
1	C79	CAP., X7R, 4.7nF, 50V, 10%, 0603	AVX, 06035C472KAT2A
1	C55	CAP., COG, 1nF, 25V, 10%, 0603	AVX, 06033A102KAT2A
1	C77	CAP., X7R, 2.2uF, 16V, 20%, 1206	AVX, 1206YD225MAT2A
1	C72	CAP., X7R, 0.1uF, 25V, 10%, 0805	AVX, 08053C104KAT2A
1	C83	CAP., COG, 10pF, 50V, 10%, 0603	AVX, 06035A100KAT2A
2	C84,C85	CAP., X7R, 0.1uF, 50V, 10%, 0603	TDK, C1608X7R1H104K
1	C86	CAP., COG, 68pF, 25V, 10%, 0603	AVX, 06033A680KAT2A
1	C100	CAP., COG, 150pF, 25V, 10%, 0603	AVX, 06033A151KAT2A
1	C101	CAP., COG, 470pF, 25V, 10%, 0603	AVX, 06033A471KAT2A
4	D1,D2,D24,D26	Diode Schottky, CMPSH1-4, 40V, SOT23	CENTRAL SEMI., CMPSH1-4-LTC
2	D27,D29	Diode, BAS21 SOT23	Diodes Inc., BAS21
1	L1	INDUCTOR, 100uH, DO1606T	Coilcraft, DO1606T-104MLC
1	L6	INDUCTOR, PLANAR, 0.65uH	PULSE, PA1382.650
2	Q11,Q9	FET, N-CH., Si7450DP, Powerpak SO-8	VISHAY, Si7450DP
6	Q12,Q13,Q14,Q15,Q23,Q24	FET, N-CH., Si7336ADP, Powerpak SO-8	VISHAY, Si7336ADP-T1-e3
2	Q25,Q26	TRANSISTOR, NPN, FMMT718, SOT23	ZETEX, FMMT718
1	Q27	TRANSISTOR, NPN, FCX491A, SOT89	ZETEX, FCX491A
1	Q28	FET, N-CH, FDC2512, SUPERSOT-6	Fairchild, FDC2512_NL
1	Q29	FET, P-CH, 30-V(D-S) SOT-23	VISHAY, Si2303BDS-T1-E3
1	Q30	N-MOSFET, 2N7002 SOT23	Diodes Inc., 2N7002-7-F
1	Q31	TRANSISTOR, PNP, SOT-23	DIODES., MMBT2907A-7-F
1	Q32	TRANSISTOR, NPN, SOT-23	ZETEX, FMMT619
3	R3,R56,R101	RES., CHIP, 100, 1/16W, 5%, 0603	VISHAY, CRCW0603100RJNEA
1	R18	RES., CHIP, 365K, 1/8W, 1%, 0805	VISHAY, CRCW0805365KFKEA
1	R22	RES., CHIP, 15.0K, 1/16W, 1%, 0603	VISHAY, CRCW060315K0FKEA
4	R23,R24,R51,R52	RES., CHIP, 5.1, 1/4W, 5%, 1206	VISHAY, CRCW12065R10JNEA
1	R41	RES., CHIP, 2.74K, 1/16W, 1%, 0603	VISHAY, CRCW06032K74FKEA
1	R48	RES., CHIP, 0.015, 1.5W, 2%, 2512	IRC, LRC-LRF2512-01-R015-G
1	R68	RES., CHIP, 9.1K, 1/16W, 5%, 0603	VISHAY, CRCW06039K10JNEA
1	R76	RES., CHIP, 9.53, 1/16W, 1%, 0805	VISHAY, CRCW08059R53FNEA
1	R78	RES., CHIP, 620, 1/16W, 5%, 0603	VISHAY, CRCW0603620RJNEA

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Figure 17. Bill of Materials (Single Phase)

1	R84	RES., CHIP, 2.2K, 1/16W, 5%, 0805	VISHAY, CRCW08052K20JNEA
1	R29	RES., CHIP, 100K, 1/8W, 5%, 0805	VISHAY, CRCW0805100KJNEA
1	R46	RES., CHIP, 604, 1/16W, 1%, 0603	VISHAY, CRCW0603604RFKEA
1	R53	RES., CHIP, 12, 1/16W, 5%, 0603	VISHAY, CRCW060312R0JNEA
1	R58	RES., CHIP, 5.1K, 1/16W, 5%, 0603	VISHAY, CRCW06035K10JNEA
3	R63,R66,R80	RES., CHIP, 100K, 1/16W, 5%, 0603	VISHAY, CRCW0603100KJNEA
1	R69	RES., CHIP, 110K, 1/16W, 5%, 0603	VISHAY, CRCW0603110KJNEA
1	R75	RES., CHIP, 510, 1/16W, 5%, 0603	VISHAY, CRCW0603510RJNEA
1	R79	RES., CHIP, 68K, 1/8W, 5%, 0603	VISHAY, CRCW060368K0JNEA
2	R81,R82	RES., CHIP, 150, 1/16W, 5%, 0603	VISHAY, CRCW0603150RJNEA
1	T1	TRANSFORMER, PLANAR, 6:6:1:1	PULSE, PA0950
1	T2	TRANSFORMER, PA1954NL	PULSE, PA1954NL
1	T3	TRANSFORMER, CT02-100	ICE Components., CT02-100
1	T4	TRANSFORMER, 1.5 : 1	Coilcraft, DA2318-ALC
1	U1	I.C. LTC3725EMSE, MS10E	LINEAR TECH., LTC3725EMSE#PBF
1	U2	I.C. LTC3706EGN, SSOP-24GN	LINEAR TECH., LTC3706EGN#PBF

ADDITIONAL DEMO BOARD CIRCUIT COMPONENTS²

1	C2	CAP., X7R, 2.2uF, 100V, 20%, 1210	Murata, GRM32ER72A225K
0	C74(opt)	CAP., 0603	
0	C81,C82(opt.)	CAP., 0603	
0	D30 (opt)	Diode, SOT23	
0	D31 (opt)	Diode, SOT23	
1	L5	INDUCTOR, 0.68uH,	VISHAY, IHLP-2525CZERR68M01 e3
0	Q8(opt)	FET, N-CH., SO-8	
2	R49,R70	RES., CHIP, 0, 1/16W, 0603	VISHAY, CRCW06030000Z0EA
0	R59,R60.R62,R64,R67,R71-R74(opt)	RES., 0603	
0	R102,R107(opt)	RES., 0603	
1	R108	RES., CHIP, 0, 1/16W, 0603	VISHAY, CRCW06030000Z0EA
2	E1,E2	TESTPOINT, TURRET, .094"	MILL-MAX, 2501-2-00-80-00-00-07-0
2	E8,E7	TESTPOINT, TURRET, .061"	MILL-MAX, 2308-2-00-80-00-00-07-0
2	E3,E4	STUD	PEM, KFH-032-6
4	E3,E4(2 EACH)	NUT, BRASS, #10-32	ANY
2	E3,E4	WASHER, STAR #10 BRASS NICKEL	ANY
2	E3,E4	Ring, Lug Ring # 10	KEYSTONE 8205
1	J1	HEADER, SMD, single row, 2mm	Comm Com, 2SMD1-140/335/180-11G2
1	P1	SOCKET, SMD, single row, 2mm	COMM COM, 1309-11G2

Notes:

- Required Circuit Components are those parts that are required to implement the circuit function
- Additional Demo Board Circuit Components are those parts that provide added functionality for the demo board but are or may not be required in the actual circuit.

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Figure 17. Bill of Materials (Single Phase) (cont'd)

	Ref Des	Single Phase	PolyPhase
MASTER	C29	10nF	4.7nF
	C70	3.3nF	15nF
	C78	10nF	4.7nF
	R71	OPT	0Ω
	R72	OPT	0Ω
	R74	OPT	0Ω
SLAVE	C29	10nF	4.7nF
	C70	3.3nF	15nF
	C78	10nF	4.7nF
	C79	4.7nF	open
	R41	2.74kΩ	open
	R46	604Ω	open
	R59	OPT	0Ω
	R60	OPT	0Ω
	R62	OPT	0Ω
	R63	100kΩ	open
	R64	OPT	0Ω
	R67	OPT	0Ω
	R68	9.1kΩ	open
	R69	110kΩ	open
	R70	0Ω	open
	R73	OPT	0Ω

Figure 18. Single Phase to PolyPhase Electrical Component Changes

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MASTER

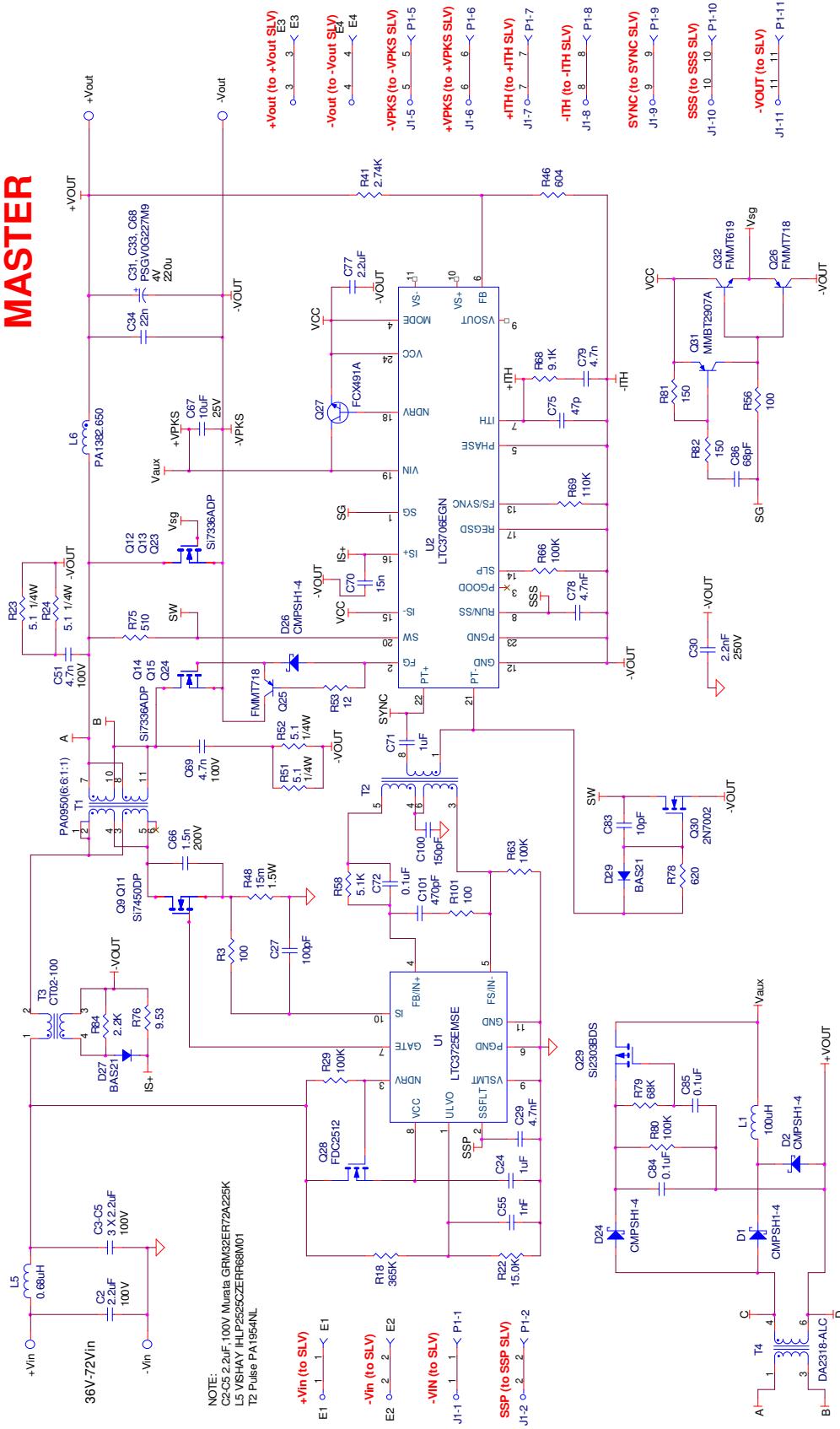


Figure 19. PolyPhase Master Schematic

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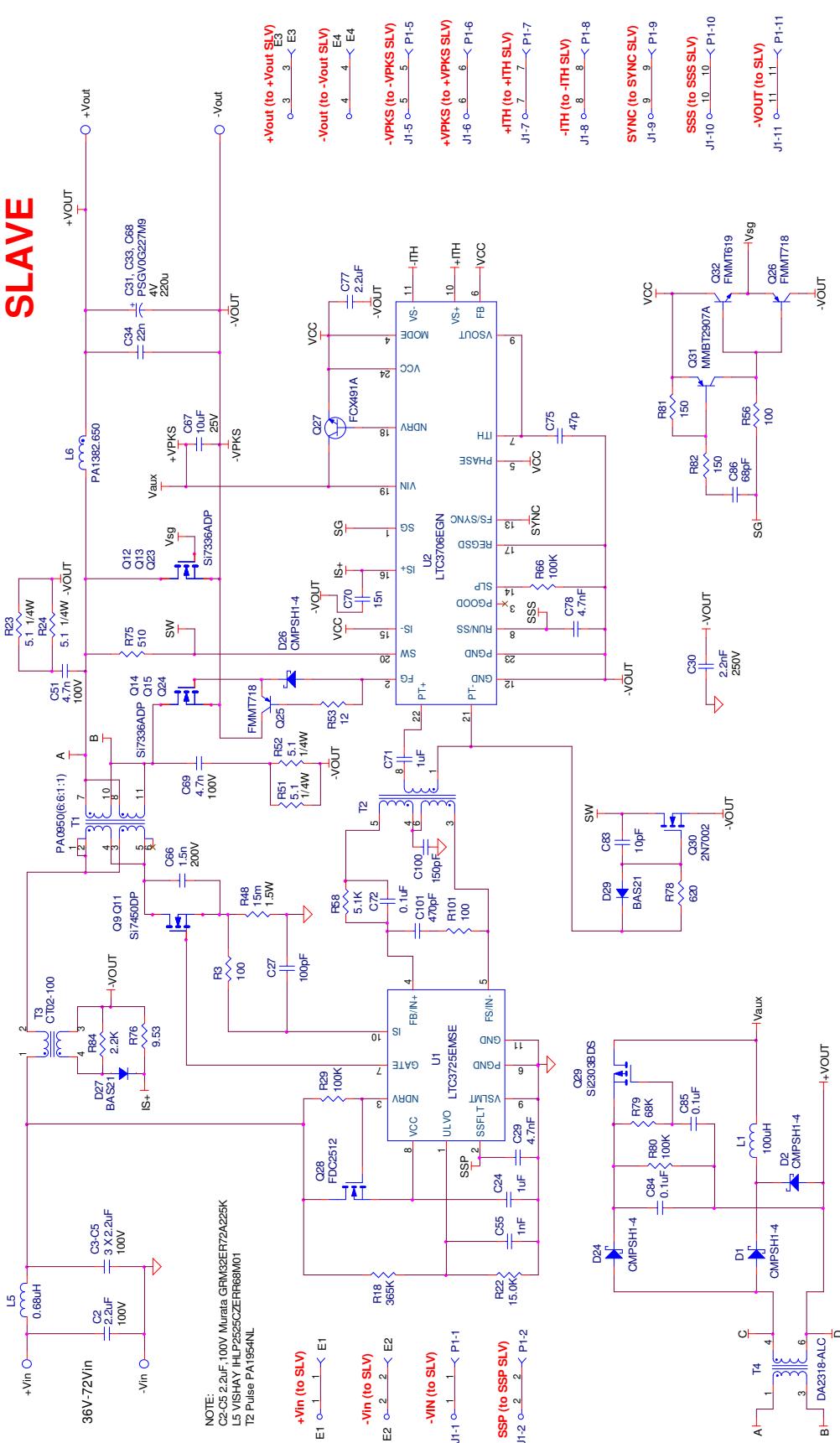


Figure 20. PolyPhase Slave Schematic

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36V-72VIN, ISOLATED SYNCHRONOUS FORWARD

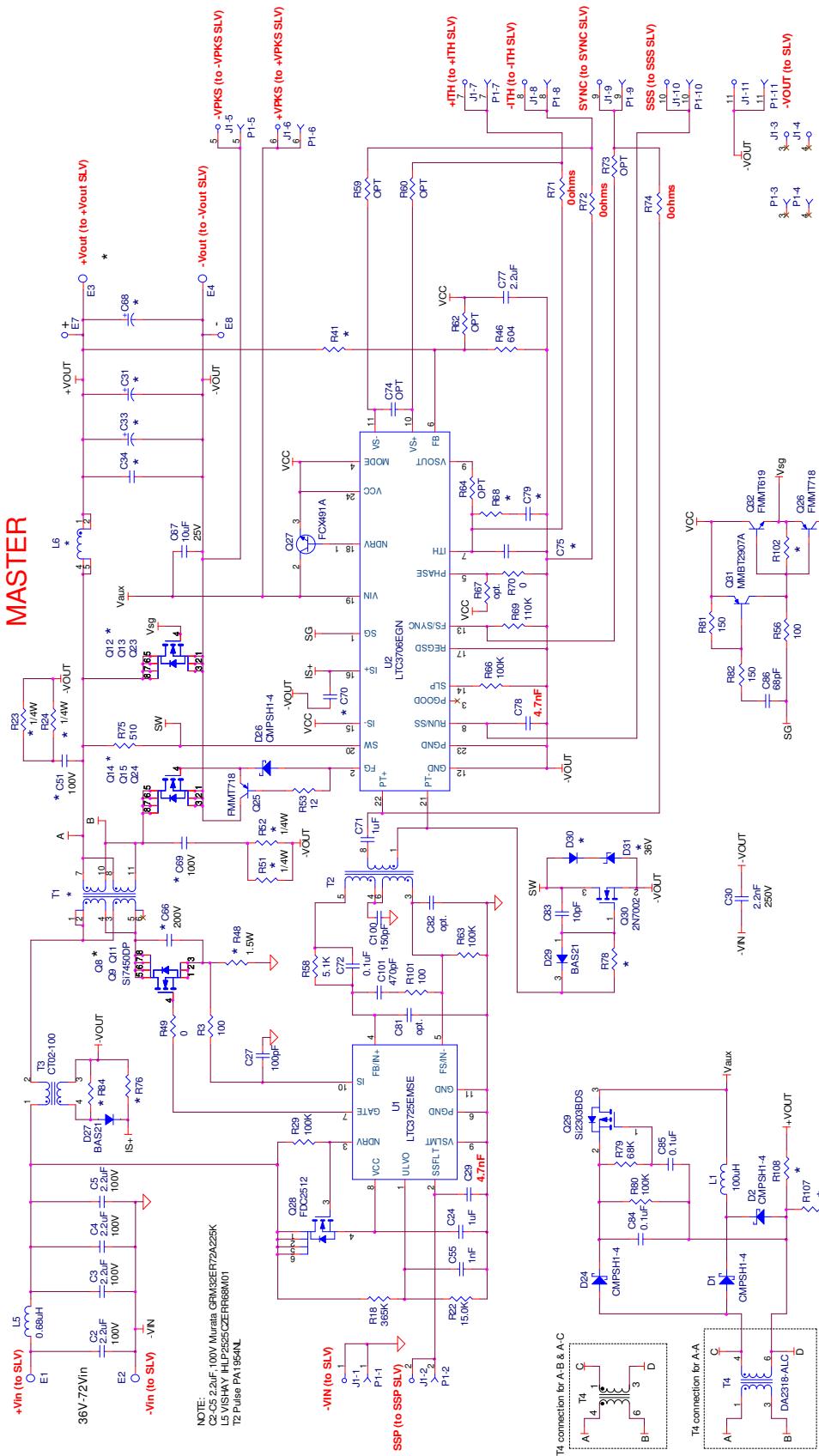


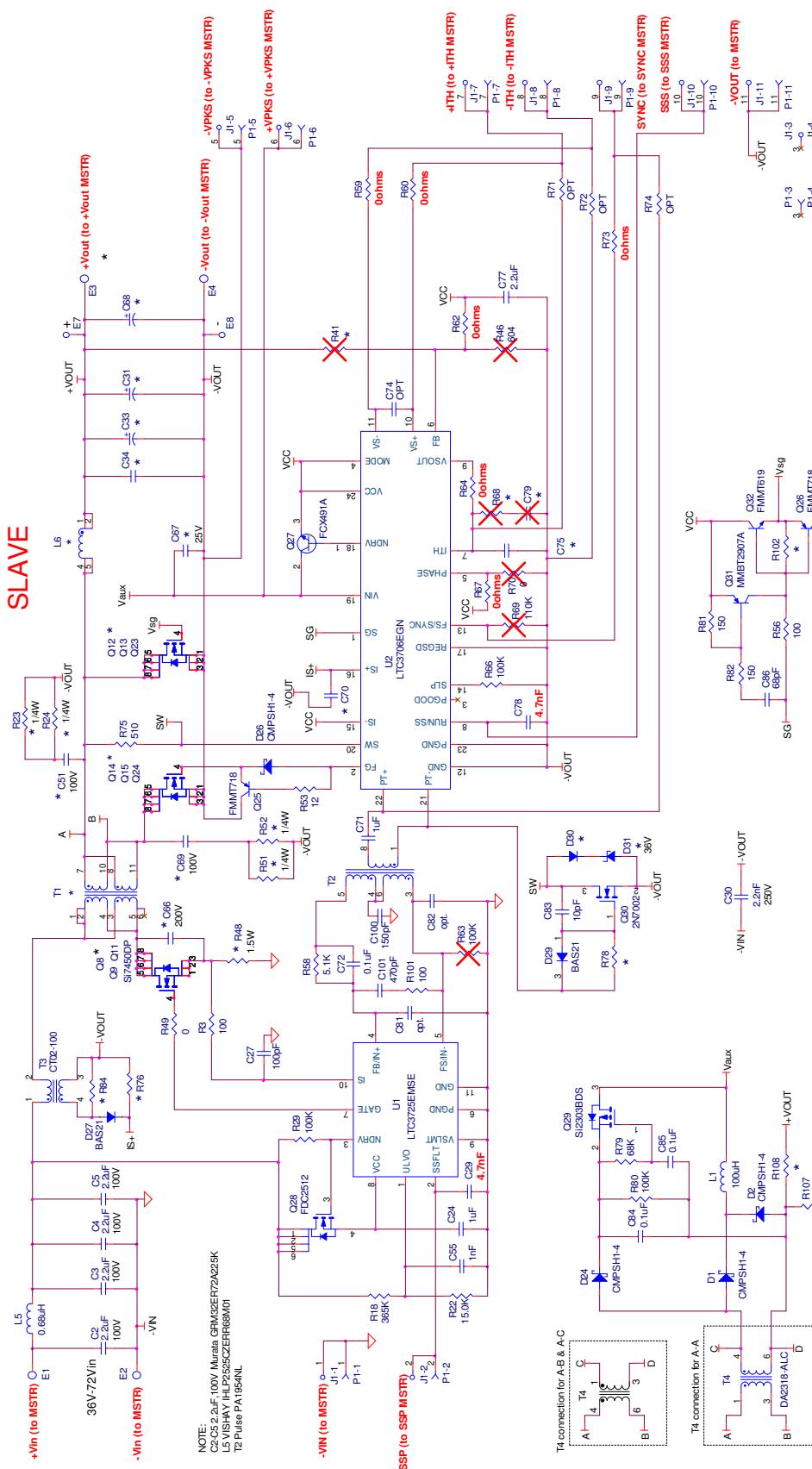
Figure 21. Full PolyPhase Master Schematic

* VERSION TABLE

VERSION	Vout/Out	C31-C38	C33	C34	C36	C51-C59	C70	C75	C79	D30	D31	L6	Q8	Q12-Q15	Q23-Q24	R23-R24	R51-R52	R41	R48	R68	R76	R78	R84	R102	R107	R108	T1	
D2888A-A	3.3V@50mA	220uF, AV	C33	C34	C36	C51-C59	C70	C75	C79	D30	D31	L6	Q8	Q12-Q15	Q23-Q24	S17386ADP	S17386ADP	5.1	2.74K	0.015	9.1K	9.53	620	2.2K	opt.	0	PA09506(6.1:1)	
D2888A-B	5.0V@40mA	220uF, 6.3V	C33	C34	C36	C51-C59	C70	C75	C79	D30	D31	L6	Q8	Q12-Q15	Q23-Q24	S17386ADP	S17386ADP	6.8	4.42K	0.015	9.1K	8.06	750	1.0K	opt.	0	PA09546(4.1:1)	
D2888A-C	12V@20mA	680uF, 16V, opt	C33	C34	C36	C51-C59	C70	C75	C79	D30	D31	L6	Q8	Q12-Q15	Q23-Q24	S17450DP	S17450DP	10	11.5K	0.010	6.2K	7.50	390	330	240	0	opt.	PA09505(6.2:1)

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 888A-A

36V-72VIN, ISOLATED SYNCHRONOUS FORWARD



* VERSION TABLE

VERSION	Vout/Iout	C31-C58	C59-C76	C77-C94	C95-C112	C113-C130	C131-C148	C149-C166	C167-C184	C185-C202	C203-C220	C221-C238	C239-C256	C257-C274	C275-C292	C293-C310	C311-C328	C329-C346	C347-C364	C365-C382	C383-C400	C401-C418	C419-C436	C437-C454	C455-C472	C473-C490	C491-C508	C509-C526	C527-C544	C545-C562	C563-C580	C581-C608	C609-C626	C627-C644	C645-C662	C663-C680	C681-C708	C709-C726	C727-C744	C745-C762	C763-C780	C781-C808	C809-C826	C827-C844	C845-C862	C863-C880	C881-C908	C909-C926	C927-C944	C945-C962	C963-C980	C981-C1008	C1009-C1026	C1027-C1044	C1045-C1062	C1063-C1080	C1081-C1108	C1109-C1126	C1127-C1144	C1145-C1162	C1163-C1180	C1181-C1208	C1209-C1226	C1227-C1244	C1245-C1262	C1263-C1280	C1281-C1308	C1309-C1326	C1327-C1344	C1345-C1362	C1363-C1380	C1381-C1408	C1409-C1426	C1427-C1444	C1445-C1462	C1463-C1480	C1481-C1508	C1509-C1526	C1527-C1544	C1545-C1562	C1563-C1580	C1581-C1608	C1609-C1626	C1627-C1644	C1645-C1662	C1663-C1680	C1681-C1708	C1709-C1726	C1727-C1744	C1745-C1762	C1763-C1780	C1781-C1808	C1809-C1826	C1827-C1844	C1845-C1862	C1863-C1880	C1881-C1908	C1909-C1926	C1927-C1944	C1945-C1962	C1963-C1980	C1981-C2008	C2009-C2026	C2027-C2044	C2045-C2062	C2063-C2080	C2081-C2108	C2109-C2126	C2127-C2144	C2145-C2162	C2163-C2180	C2181-C2208	C2209-C2226	C2227-C2244	C2245-C2262	C2263-C2280	C2281-C2308	C2309-C2326	C2327-C2344	C2345-C2362	C2363-C2380	C2381-C2408	C2409-C2426	C2427-C2444	C2445-C2462	C2463-C2480	C2481-C2508	C2509-C2526	C2527-C2544	C2545-C2562	C2563-C2580	C2581-C2608	C2609-C2626	C2627-C2644	C2645-C2662	C2663-C2680	C2681-C2708	C2709-C2726	C2727-C2744	C2745-C2762	C2763-C2780	C2781-C2808	C2809-C2826	C2827-C2844	C2845-C2862	C2863-C2880	C2881-C2908	C2909-C2926	C2927-C2944	C2945-C2962	C2963-C2980	C2981-C3008	C3009-C3026	C3027-C3044	C3045-C3062	C3063-C3080	C3081-C3108	C3109-C3126	C3127-C3144	C3145-C3162	C3163-C3180	C3181-C3208	C3209-C3226	C3227-C3244	C3245-C3262	C3263-C3280	C3281-C3308	C3309-C3326	C3327-C3344	C3345-C3362	C3363-C3380	C3381-C3408	C3409-C3426	C3427-C3444	C3445-C3462	C3463-C3480	C3481-C3508	C3509-C3526	C3527-C3544	C3545-C3562	C3563-C3580	C3581-C3608	C3609-C3626	C3627-C3644	C3645-C3662	C3663-C3680	C3681-C3708	C3709-C3726	C3727-C3744	C3745-C3762	C3763-C3780	C3781-C3808	C3809-C3826	C3827-C3844	C3845-C3862	C3863-C3880	C3881-C3908	C3909-C3926	C3927-C3944	C3945-C3962	C3963-C3980	C3981-C4008	C4009-C4026	C4027-C4044	C4045-C4062	C4063-C4080	C4081-C4108	C4109-C4126	C4127-C4144	C4145-C4162	C4163-C4180	C4181-C4208	C4209-C4226	C4227-C4244	C4245-C4262	C4263-C4280	C4281-C4308	C4309-C4326	C4327-C4344	C4345-C4362	C4363-C4380	C4381-C4408	C4409-C4426	C4427-C4444	C4445-C4462	C4463-C4480	C4481-C4508	C4509-C4526	C4527-C4544	C4545-C4562	C4563-C4580	C4581-C4608	C4609-C4626	C4627-C4644	C4645-C4662	C4663-C4680	C4681-C4708	C4709-C4726	C4727-C4744	C4745-C4762	C4763-C4780	C4781-C4808	C4809-C4826	C4827-C4844	C4845-C4862	C4863-C4880	C4881-C4908	C4909-C4926	C4927-C4944	C4945-C4962	C4963-C4980	C4981-C5008	C5009-C5026	C5027-C5044	C5045-C5062	C5063-C5080	C5081-C5108	C5109-C5126	C5127-C5144	C5145-C5162	C5163-C5180	C5181-C5208	C5209-C5226	C5227-C5244	C5245-C5262	C5263-C5280	C5281-C5308	C5309-C5326	C5327-C5344	C5345-C5362	C5363-C5380	C5381-C5408	C5409-C5426	C5427-C5444	C5445-C5462	C5463-C5480	C5481-C5508	C5509-C5526	C5527-C5544	C5545-C5562	C5563-C5580	C5581-C5608	C5609-C5626	C5627-C5644	C5645-C5662	C5663-C5680	C5681-C5708	C5709-C5726	C5727-C5744	C5745-C5762	C5763-C5780	C5781-C5808	C5809-C5826	C5827-C5844	C5845-C5862	C5863-C5880	C5881-C5908	C5909-C5926	C5927-C5944	C5945-C5962	C5963-C5980	C5981-C6008	C6009-C6026	C6027-C6044	C6045-C6062	C6063-C6080	C6081-C6108	C6109-C6126	C6127-C6144	C6145-C6162	C6163-C6180	C6181-C6208	C6209-C6226	C6227-C6244	C6245-C6262	C6263-C6280	C6281-C6308	C6309-C6326	C6327-C6344	C6345-C6362	C6363-C6380	C6381-C6408	C6409-C6426	C6427-C6444	C6445-C6462	C6463-C6480	C6481-C6508	C6509-C6526	C6527-C6544	C6545-C6562	C6563-C6580	C6581-C6608	C6609-C6626	C6627-C6644	C6645-C6662	C6663-C6680	C6681-C6708	C6709-C6726	C6727-C6744	C6745-C6762	C6763-C6780	C6781-C6808	C6809-C6826	C6827-C6844	C6845-C6862	C6863-C6880	C6881-C6908	C6909-C6926	C6927-C6944	C6945-C6962	C6963-C6980	C6981-C7008	C7009-C7026	C7027-C7044	C7045-C7062	C7063-C7080	C7081-C7108	C7109-C7126	C7127-C7144	C7145-C7162	C7163-C7180	C7181-C7208	C7209-C7226	C7227-C7244	C7245-C7262	C7263-C7280	C7281-C7308	C7309-C7326	C7327-C7344	C7345-C7362	C7363-C7380	C7381-C7408	C7409-C7426	C7427-C7444	C7445-C7462	C7463-C7480	C7481-C7508	C7509-C7526	C7527-C7544	C7545-C7562	C7563-C7580	C7581-C7608	C7609-C7626	C7627-C7644	C7645-C7662	C7663-C7680	C7681-C7708	C7709-C7726	C7727-C7744	C7745-C7762	C7763-C7780	C7781-C7808	C7809-C7826	C7827-C7844	C7845-C7862	C7863-C7880	C7881-C7908	C7909-C7926	C7927-C7944	C7945-C7962	C7963-C7980	C7981-C8008	C8009-C8026	C8027-C8044	C8045-C8062	C8063-C8080	C8081-C8108	C8109-C8126	C8127-C8144	C8145-C8162	C8163-C8180	C8181-C8208	C8209-C8226	C8227-C8244	C8245-C8262	C8263-C8280	C8281-C8308	C8309-C8326	C8327-C8344	C8345-C8362	C8363-C8380	C8381-C8408	C8409-C8426	C8427-C8444	C8445-C8462	C8463-C8480	C8481-C8508	C8509-C8526	C8527-C8544	C8545-C8562	C8563-C8580	C8581-C8608	C8609-C8626	C8627-C8644	C8645-C8662	C8663-C8680	C8681-C8708	C8709-C8726	C8727-C8744	C8745-C8762	C8763-C8780	C8781-C8808	C8809-C8826	C8827-C8844	C8845-C8862	C8863-C8880	C8881-C8908	C8909-C8926	C8927-C8944	C8945-C8962	C8963-C8980	C8981-C9008	C9009-C9026	C9027-C9044	C9045-C9062	C9063-C9080	C9081-C9108	C9109-C9126	C9127-C9144	C9145-C9162	C9163-C9180	C9181-C9208	C9209-C9226	C9227-C9244	C9245-C9262	C9263-C9280	C9281-C9308	C9309-C9326	C9327-C9344	C9345-C9362	C9363-C9380	C9381-C9408	C9409-C9426	C9427-C9444	C9445-C9462	C9463-C9480	C9481-C9508	C9509-C9526	C9527-C9544	C9545-C9562	C9563-C9580	C9581-C9608	C9609-C9626	C9627-C9644	C9645-C9662	C9663-C9680	C9681-C9708	C9709-C9726	C9727-C9744	C9745-C9762	C9763-C9780	C9781-C9808	C9809-C9826	C9827-C9844	C9845-C9862	C9863-C9880	C9881-C9908	C9909-C9926	C9927-C9944	C9945-C9962	C9963-C9980	C9981-C10008

Figure 22. Full PolyPhase Slave Schematic

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 888A-A

36V-72VIN, ISOLATED SYNCHRONOUS FORWARD

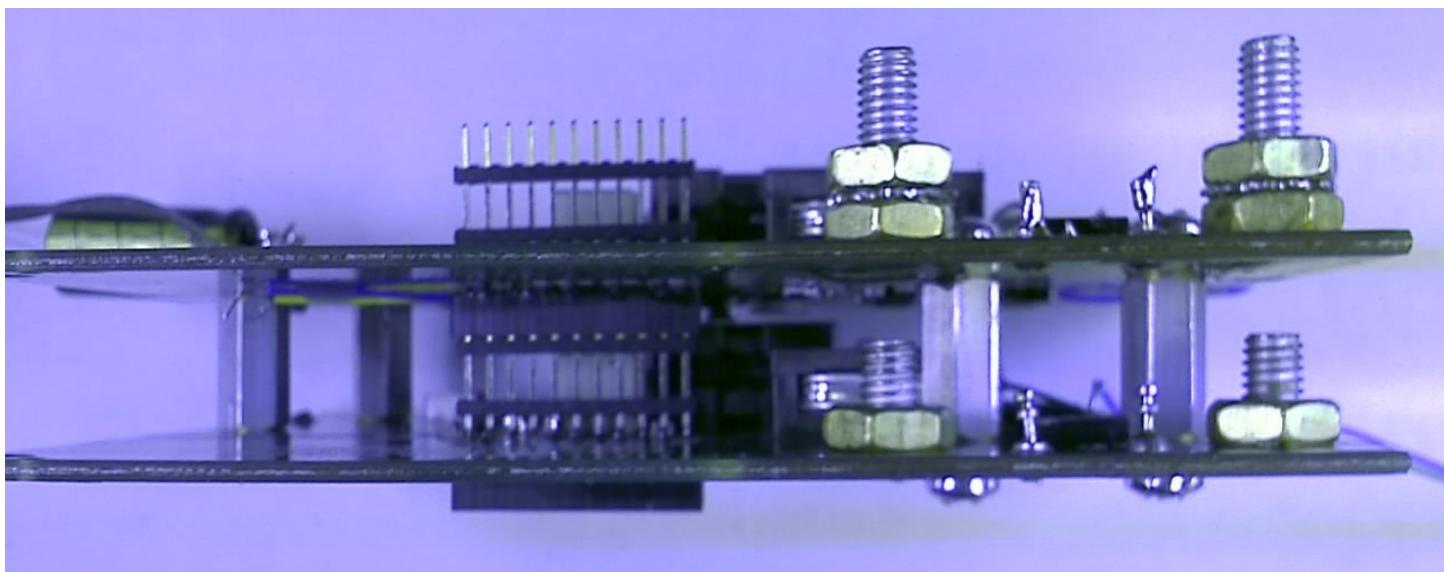


Figure 23. Picture of two DC888A's configured for PolyPhase