

DESCRIPTION

Demonstration circuit 501 is high power, high voltage, and high efficiency DC/DC buck converter featuring the LTC3703.

This is a general-purpose high voltage DC to DC with an input voltage range of 20V to 72V. The board is optimized for positive 48V input operation with high voltage surges up to 72VDC allowed. The limiting factor is the LTC3703 GN16 package that will not meet UL/CSA/IEC60950 clearance and creepage distance requirements above the SELV 60VDC maximum due to pin spacing. If the user wishes to support higher continuous input voltages or compliance to 60950, the LTC3703 is offered in a G-28 pin package. See Data Sheet. However, for the purposes of evaluation, the board will work reliably up to 72V.

The maximum continuous current in free air is 4A. 6A is permissible with some forced air cooling. The output voltage is programmed with a voltage divider and configured for 12V.

The demonstration circuit comes with jumpers preset to power up in the continuous switching mode. Test points are provided to monitor or control Mode/SYNC, BGRTN and VCC.

Configuration jumpers allow Burst or Continuous Switch mode operation (JP1), to turn the power supply On and OFF (JP2) and Vcc or Boost Bias Supply select (JP3).

The board has been layed out to support up to 12A of DC current buy doubling the MOSFETs and input capacitors along with an inductor with lower DC resistance and higher current ratings. Some forced air cooling will be required.

Special consideration must be given to the inductor chosen. The short circuit current has a very wide tolerance with initial transient spikes that work against the use of a Ferrite based inductor. A powder based magnetic core material is highly recommended. Whatever inductor is chosen, the circuit should be checked for proper short circuit operation by verifying the inductor does not saturate.

The board can also support a boost converter configuration. See schematic.

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

Table 1. Performance Summary

PARAMETER	CONDITION/NOTES	VALUE
Maximum Input Voltage	Limited by MOSFET Voltage Ratings.	72V \pm 10 %
Minimum Input Voltage		20V \pm 10 %
Efficiency	Vin = 48V with 4 amp load	93%
	Vin = 24V with 4 amp load	95%
Switching Frequency	User adjustable.	260KHz Nominal
Output Voltage	0 to 6 Amps measured at VOUT and GND terminals.	12V \pm 2 %
Maximum Current Free Air	Limited by temperature rise of inductor.	4A
Maximum Current with Force Air cooling	Accuracy and limit set by Rds-on value of bottom MOSFET. See Datasheet.	6A -0A / +3A

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 501

Universal High Input Voltage 12V/6A POWER SUPPLY

QUICK START PROCEDURE

Demonstration circuit 501 is easy to set up to evaluate the performance of the LTC3703. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Connect a power source to the VIN and GND. The power supply must be capable of at least 120 watts of power at the input voltage you choose provided it is within the Vin range permitted.

2. Connect a load to the VOUT and GND terminals and set it to 0Amps
3. Turn on the input power supply and DC501 should power up.
4. Adjust load as required for evaluation.

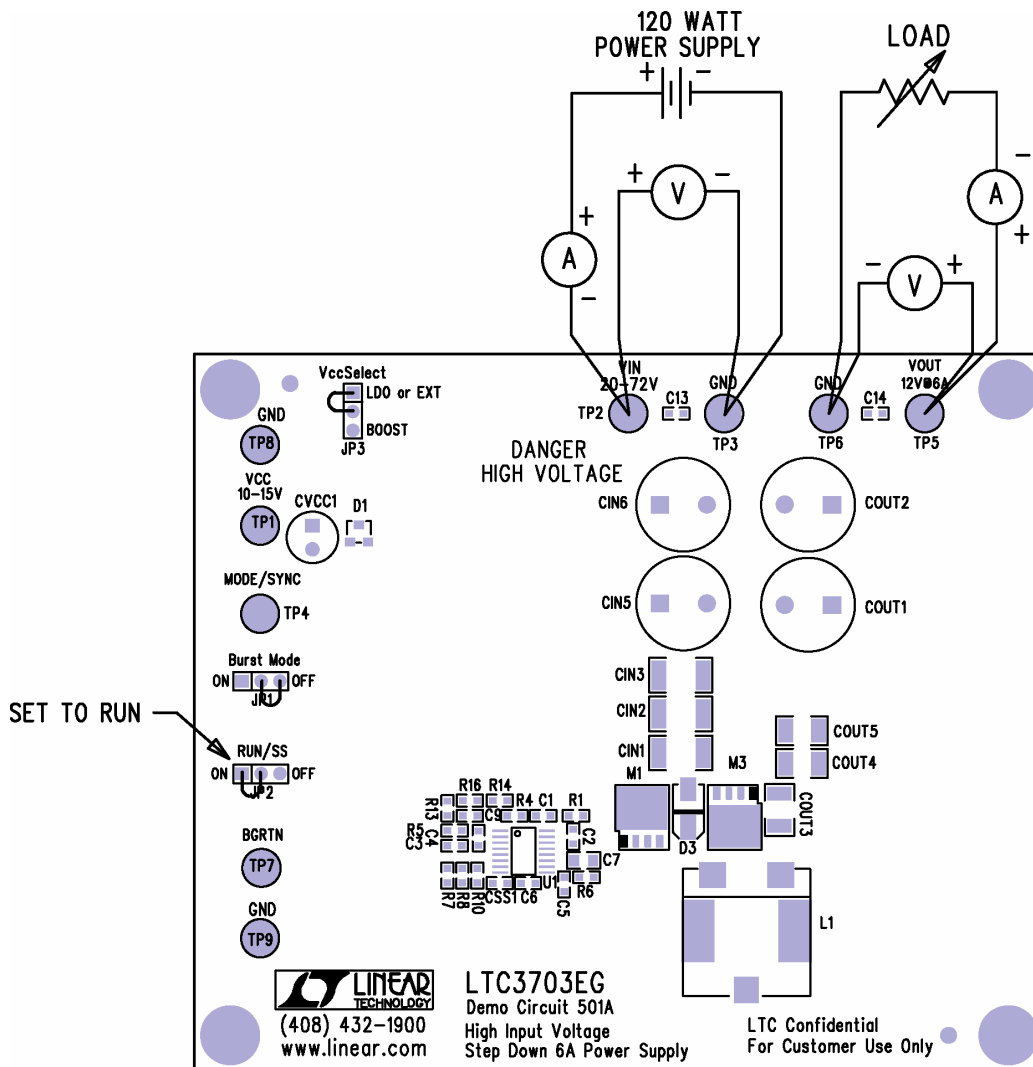
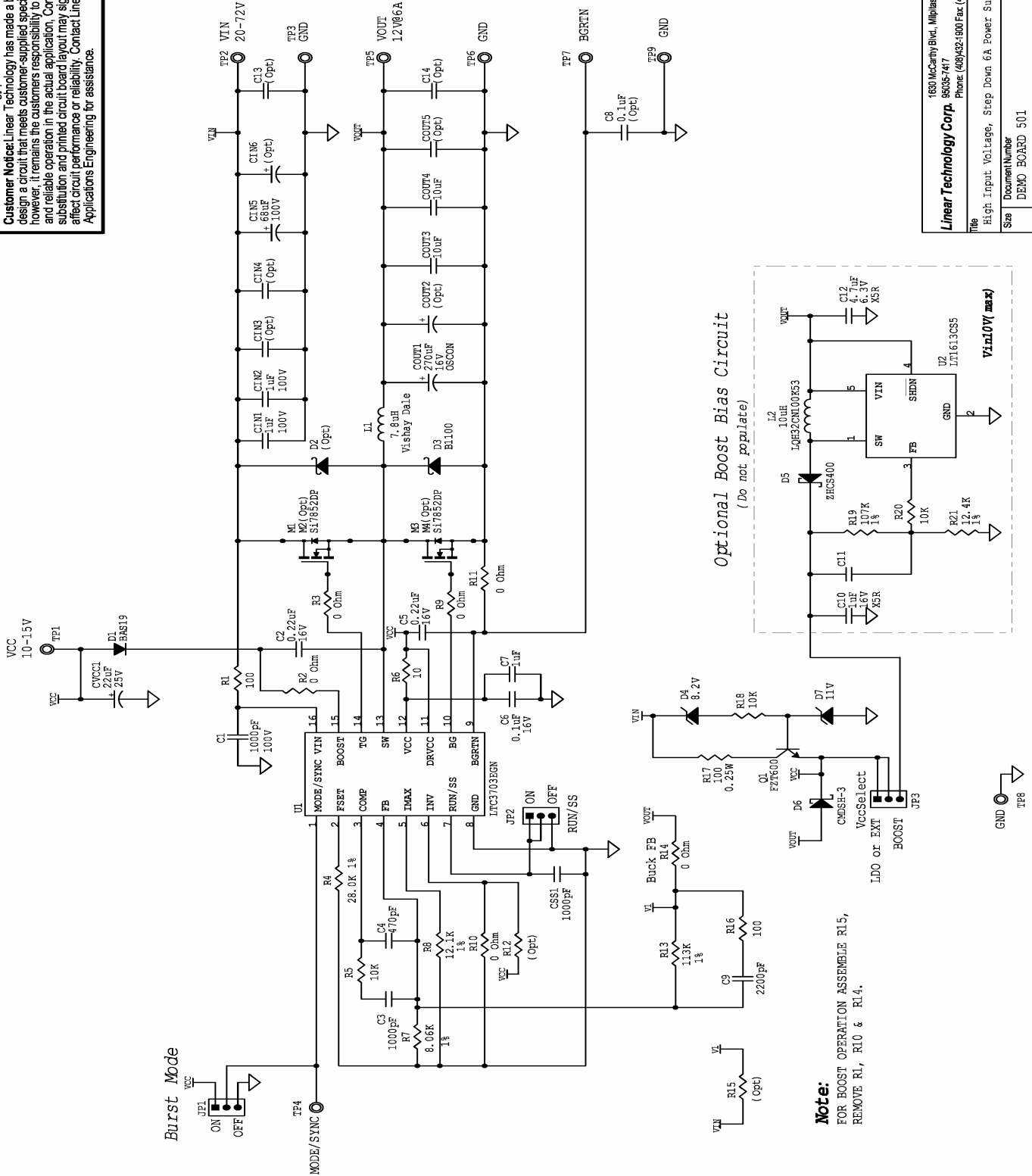


Figure 1. Proper Measurement Equipment Setup

QUICK START GUIDE FOR DEMONSTRATION CIRCUIT 501

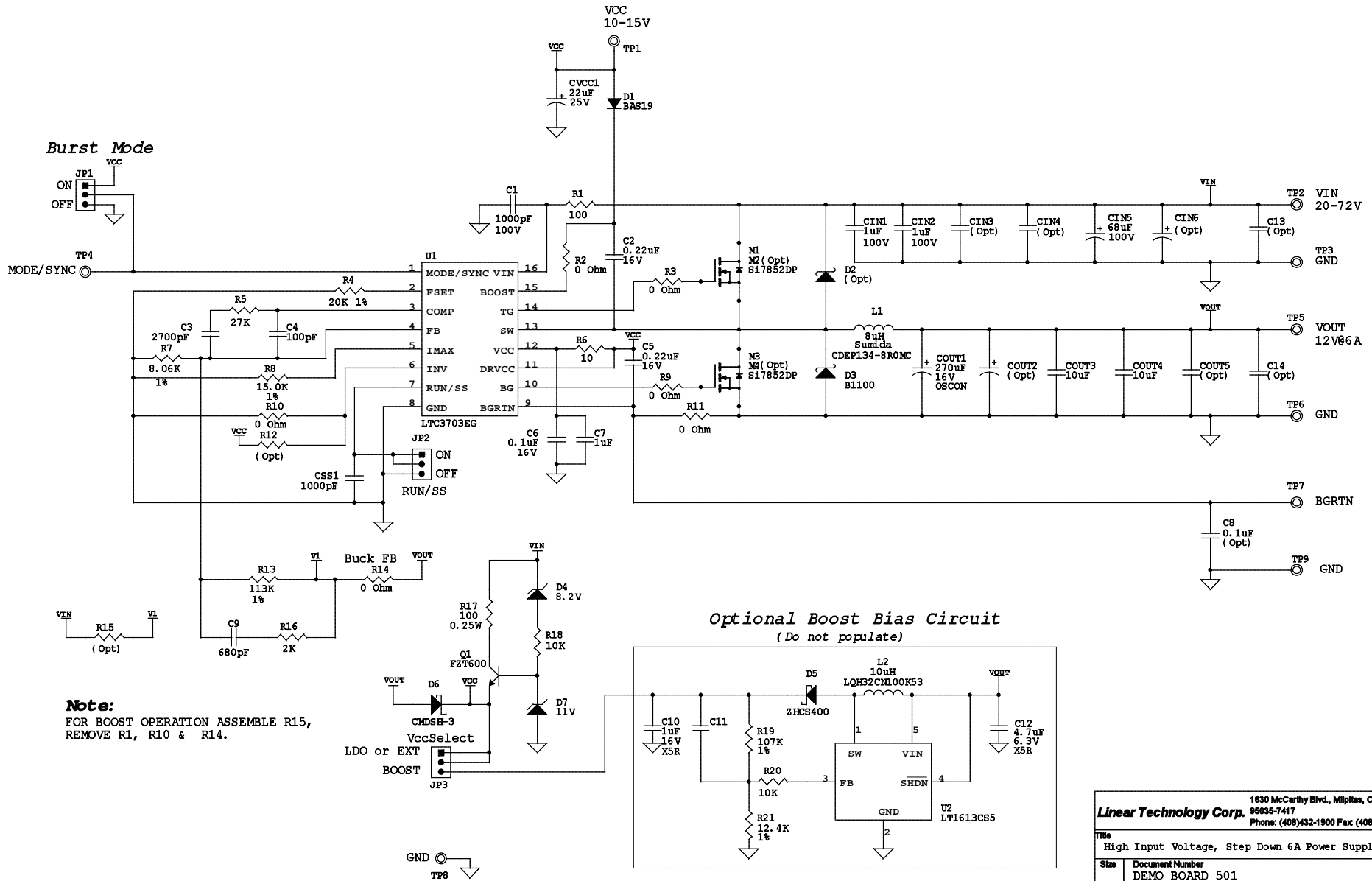
Universal High Input Voltage 12V/6A POWER SUPPLY

This circuit is proprietary to Linear Technology and supplied for use with Linear Technology parts.
Customer Notice: Linear Technology has made a best effort to design a circuit that meets customer-supplied specifications; however, it remains the customer's responsibility to verify proper and reliable operation in the actual application. Component substitution and printed circuit board layout may significantly affect circuit performance or reliability. Contact Linear Applications Engineering for assistance.



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4/4/2005

Item	Qty	Reference	Part Description	Manufacture / Part #
1	2	CIN2,CIN1	Cap., X7R 1uF 100V 20%	TDK C4532X7R2A105M
2	0	CIN3,CIN4 (Opt)	Cap., X7R 1uF 100V 20%	TDK C4532X7R2A105M
3	1	CIN5	Cap., Alum 68uF 100V 25%	SANYO 100MV68AX
4	0	CIN6 (Opt)	Cap., Alum 68uF 100V 25%	SANYO 100MV68AX
5	1	COUT1	Cap., Alum 270uF 16V 20%	OSCON 16SP270M
6	0	COUT2 (Opt)	Cap., Alum 270uF 16V 20%	OSCON 16SP270M
7	2	COUT4,COUT3	Cap., X7R 10uF 16V 20%	Taiyo Yuden EMK325BJ106KN
8	0	COUT5 (Opt)	Cap., X7R 10uF 16V 20%	Taiyo Yuden EMK325BJ106KN
9	3	CSS1,C1,C3	Cap., X7R 1000pF 100V 10%	AVX 06031C102KAT2A
10	1	CVCC1	Cap., Alum 22uF 25V 25%	SANYO 25MV22UAX
11	2	C5,C2	Cap., X5R 0.22uF 16V 20%	Taiyo Yuden EMK107BJ224MA
12	1	C4	Cap., NPO 470pF 25V 10%	AVX 06033A471KAT2A
13	1	C6	Cap., X7R 0.1uF 16V 20%	Taiyo Yuden EMK107BJ104M
14	1	C7	Cap., X5R 1uF 16V 20%	Taiyo Yuden EMK212BJ105MG
15	0	C8 (Opt)	Cap., X7R 0.1uF 16V 20%	Taiyo Yuden EMK107BJ104M
16	1	C9	Cap., X7R 2200pF 25V 20%	AVX 06033C222MAT2A
17	0	C10 (Opt)	Cap., X5R 1uF 16V 20%	Taiyo Yuden EMK212BJ105MG
18	0	C11 (Opt)	Cap., NPO 220pF 25V 5%	AVX 06033A221JAT1A
19	0	C12 (Opt)	Cap., X5R 4.7uF 6.3V 20%	Taiyo Yuden JMK212BJ475MG-T
20	0	C14,C13 (Opt)	Cap., 0603	
21	1	D1	Diode, Speed Switching	Diodes Inc. BAS19 -7
22	0	D2 (Opt)	Schottky Barrier Rectifier	Diodes Inc. B1100
23	1	D3	Schottky Barrier Rectifier	Diodes Inc. B1100 -13
24	1	D4	Zener Diode, 8.2V	Diodes Inc. MMBZ5237B-7
25	0	D5 (Opt)	Schottky Diode, 40V	ZETEX ZHCS400
26	1	D6	Schottky Diode, Super-Mini	Central Semi. Corp CMDSH-3 - LTC
27	1	D7	Zener Diode, 11V	On Semi. MMBZ5241B-7
28	3	JP1,JP2 ,JP3	Headers, 3 Pins 2mm Ctrs.	CommConn Con Inc. 2802S-03G2
29	3	XJ1,XJ2,XJ3	Shunt, 2 Pins 2mm Ctrs.	CommConn Con Inc. CCIJ2MM-138G
30	1	L1	Inductor, 7.8uH	Vishay Dale IHLP-5050EZ-01-7R8-M
			Inductor, 8uH	Sumida CDEP134-8R0MC
31	0	L2 (Opt)	Inductor, 10uH 300mA 0.42 Ohm	muRata LQH32CN100K53
32	2	M1,M3	Mosfet N-Chan., PowerPAK SO8	Vishay Siliconix Si7852DP
33	0	M4,M2	Mosfet N-Chan., PowerPAK SO8	Vishay Siliconix Si7852DP
34	1	Q1	XSTR,, DARLINGTON	Zetex FZT600TA
35	2	R1,R16	Res., Chip 100 0.06W 5%	AAC CR16-101JM
36	6	R2,R3,R9-R11,R14	Jumper, Chip 0 Ohm 1/16W 5%	AAC CJ06-000M

Item	Qty	Reference	Part Description	Manufacture / Part #
37	1	R4	Res., Chip 28.0K 0.1W 1%	AAC CR16-2802FM
38	2	R5 ,R18	Res., Chip 10K 0.1W 5%	AAC CR16-103JM
39	1	R6	Res., Chip 10 0.1W 5%	AAC CR16-100JM
40	1	R7	Res., Chip 8.06K 0.1W 1%	AAC CR16-8061FM
41	1	R8	Res., Chip 12.1K 0.1W 1%	AAC CR16-1212FM
42	0	R12,R15 (Opt)	Res., 0603	
43	1	R13	Res., Chip 113K 0.1W 1%	AAC CR16-1133FM
44	1	R17	Res., Chip 100 0.25W 5%	AAC CR18-101JM
45	0	R19 (Opt)	Res., Chip 107K 0.1W 1%	AAC CR16-1073FM
46	0	R20 (Opt)	Res., Chip 10K 0.1W 5%	AAC CR16-103JM
47	0	R21 (Opt)	Res., Chip 12.4K 0.1W 1%	AAC CR16-1242FM
48	9	TP1-TP9	Turret, Testpoint	Mill Max 2501-2 (sealed bags)
49	1	U1	I.C., Step-Down Reg.	Linear Tech. Corp. LTC3703EGN
50	0	U2 (Opt)	I.C., DC/DC Converter	Linear Tech. Corp. LT1613CS5
51	4		SCREW, #4-40, 1/4"	ANY (sealed bags)
52	4		STANDOFF, #4-40 1/4"	MICRO PLASTICS 14HTSP101 (sealed)
53	1		PRINTED CIRCUIT BOARD	DEMO CIRCUIT 501A
54	2		STENCIL(Top & Bottom)	STENCIL DC501A