

DESCRIPTION

Demo Board DC259A provides an isolated 3.3V or 5Vout at 10A from a 36 to 72VDC source. The DC259A's small size (2.4in x 2.3in x 0.5in) and industry standard pin-out allows rapid evaluation in new or existing designs. Gerber files are available upon request. Synchronous output rectifiers result in high-efficiency (89% typical) operation, eliminating the need for a heat sink in many applications *. Standard PCB and transformer technology reduces manufacturing cost. Input under-voltage lockout, remote on/off, output voltage trim, over-voltage protection and current limit are included.

QUICK START GUIDE

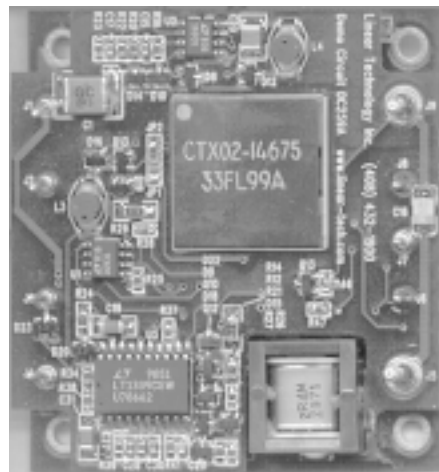
DC259A comes configured for 5V operation. For 3.3V operation, separate the control and power board by gently rocking and pulling the boards apart. Locate JP1 and JP2 which are located on the top side of the control board (the side facing the bottom of the unit)

near the left edge of the large rectangular hole in the board. See Figure 1. JP1 and JP2 share a common resistor pad. Carefully remove the 0 ohm jumper from the center/JP2 position and install into the center/JP1 position (if the 0 ohm jumper is damaged, replace with a small section of wire). Next locate and remove JP3 (0 ohm jumper) which is located on the bottom, left side of the control board near the output

Connect wire jumpers from J6 (+Sense) to J5 (+Vout) and from J8 (-Sense) to J9 (-Vout). See Figure 2. There is no minimum load requirement. Connect a DVM and 0-10A variable test load (electronic load box or power resistors) with series current meter between J5 (+Vout) and J9 (-Vout). Connect a 36 to 72VDC / 2A power supply and DVM between J4 (+Vin) and J1 (-Vin). See SETUP for details. The shut-down circuitry is referenced to the primary. The unit can be shut down by connecting J3 (ON) to J1 (-Vin).

*Based on 190 lfm airflow, 50C ambient (110C PCB) temperature. See Thermal Measurements section.

BOARD PHOTO



SETUP

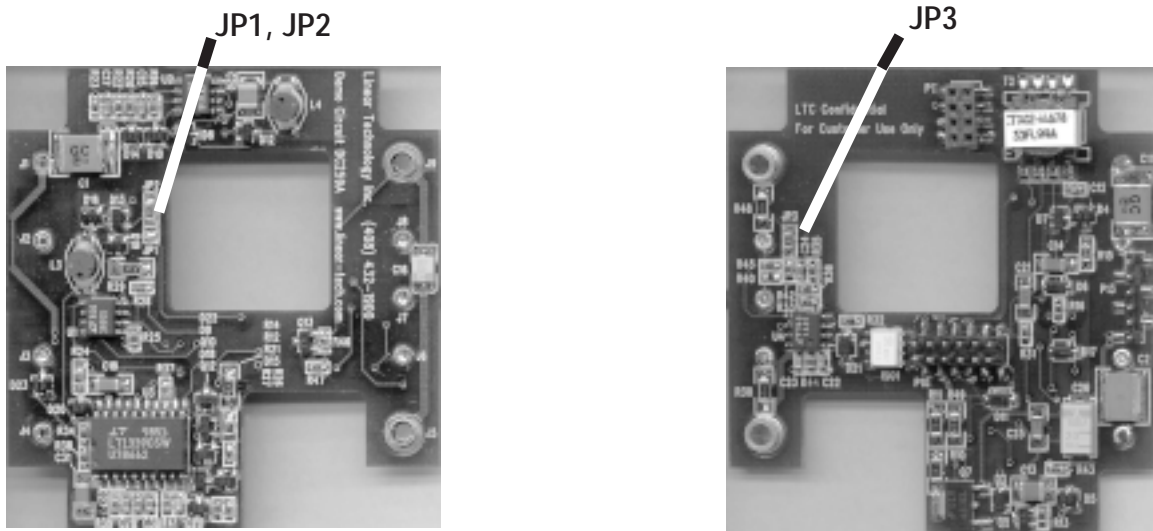


Figure 1. Location of JP1, JP2 and JP3 which select between 5 and 3.3V operation.

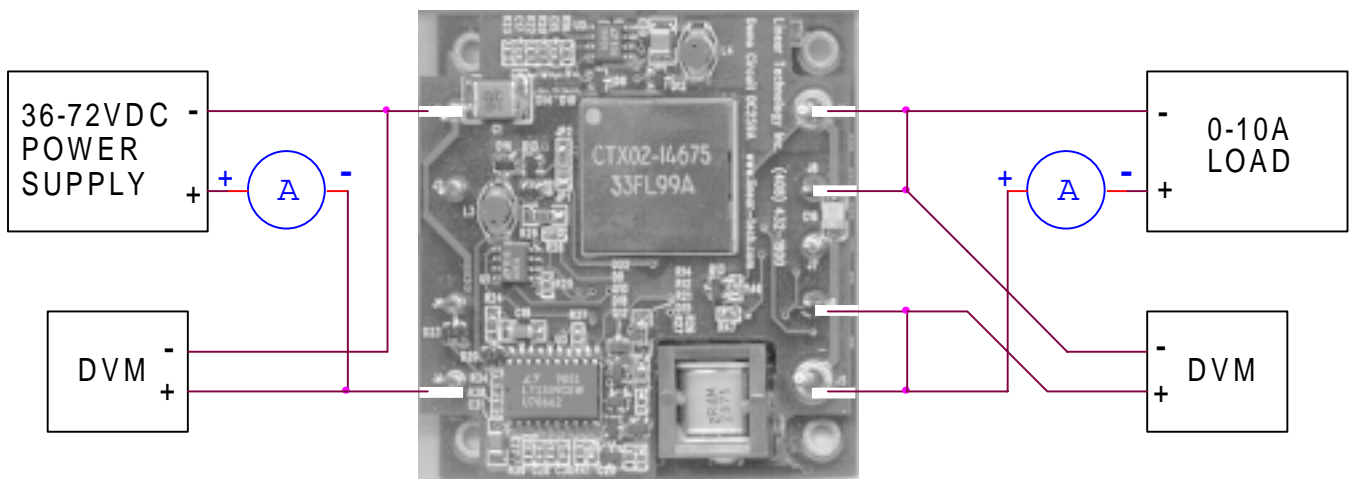
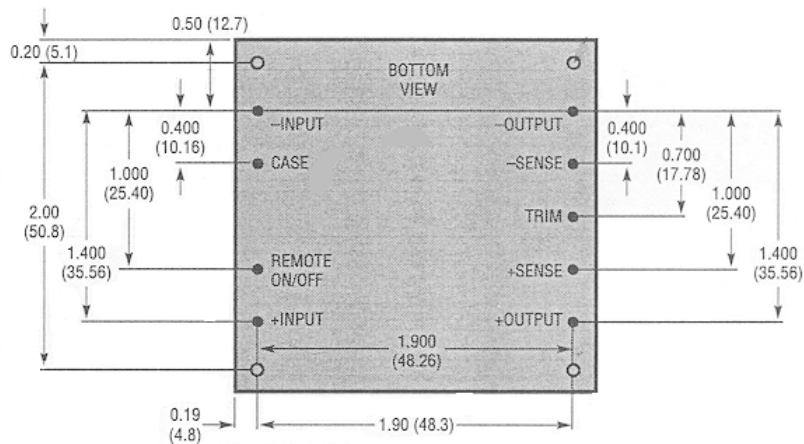


Figure 2. Test Setup.

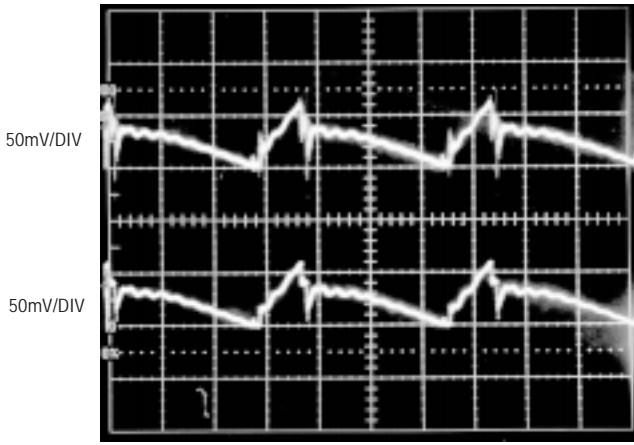


Pin Assignments.

PERFORMANCE SUMMARY

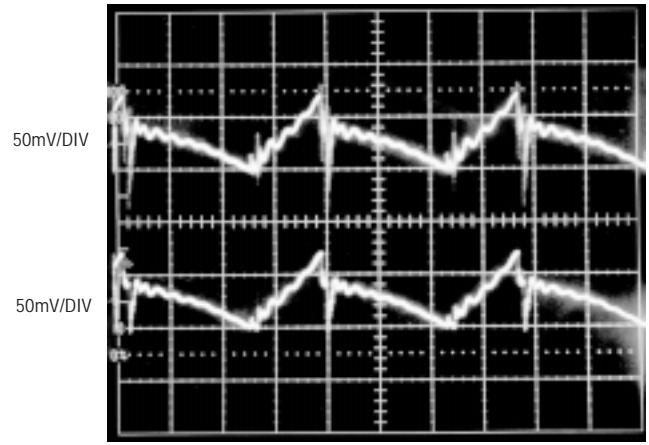
Input Voltage		36 to 72VDC (100Vmax)
Input Current (min)	72V _{in} , on/off=low	15mA
Input Current	72V _{in} , 5V/0A _{out}	50mA typ
Input Current (max)	36V _{in} , 5V/10A _{out}	1.6A
	36V _{in} , 5V/12A _{out}	2A
	36V _{in} , output shorted. Input current = 2A _{pk} , 4ms switching bursts.	<10mA _{avg}
Input Current (start)	36V _{in} , 5V/10A _{out} , start-up	2.2A _{pk}
	36V _{in} , 3.3V/10A _{out} , start-up	2A _{pk}
Input Ripple	48V _{in} , 5V/10A _{out} , source C = 39 μ F	0.6A _{p-p}
Conductor Emissions	EN55022, CISPR-A, FCC part 15 (Consult Factory for Emissions Data)	Class A
Output Voltage	Jumper selectable	5V or 3.3V
Trim Range	User selectable (R40)	
Start-up Time	36V _{in} , 5V/10A _{out} , output voltage up	90ms
Overshoot	Turn-on 72V _{in} , 5V/0A _{out}	0%
	Turn-on 72V _{in} , 3.3V/0A _{out}	10%
Undershoot	Turn-off	none
Output Ripple	48V _{in} , 5V/10A _{out} , measured across C16, 20MHz BW	70mV _{p-p} typ
	48V _{in} , 5V/10A _{out} , measured across C16, 350MHz BW	120mV _{p-p} typ
	48V _{in} , 3.3V/10A _{out} , measured across C16, 20MHz BW	60mV _{p-p} typ
	48V _{in} , 3.3V/10A _{out} , measured across C16, 350MHz BW	110mV _{p-p} typ
Min Load		0A
Transient Response	48V _{in} , 5V _{out} /5 to 10A step	+/-50mV, t = 1ms
	48V _{in} , 3.3V _{out} /5 to 10A step	+/-30mV, t = 1ms
Efficiency	48V _{in} , 5V/10A _{out}	89%
	48V _{in} , 3.3V/10A _{out}	86%
Operating Temperature	PCB temperature (see Thermal Performance Section)	0 to 110C
Isolation Voltage	Input to output	1500VDC
	Input/output to case	1000VDC
Switching Frequency	Fixed, nominal	130KHz
Agency Approval	Designed to meet	EN60950, UL1950

TYPICAL PERFORMANCE CHARACTERISTICS



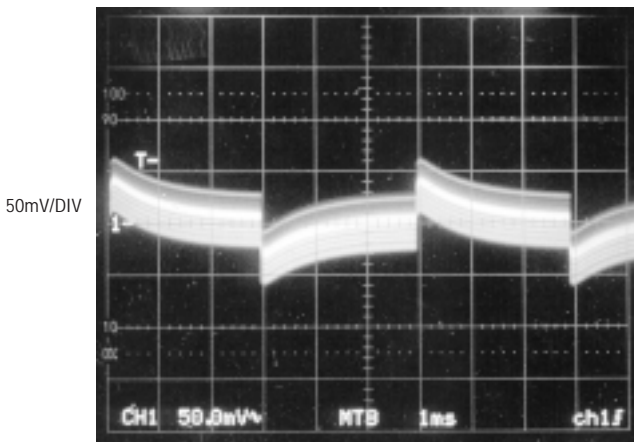
2us/DIV

Figure 3. 3.3V/10A Output Ripple with 48Vin.
(Top trace = 350MHz BW, bottom trace = 20MHz BW)



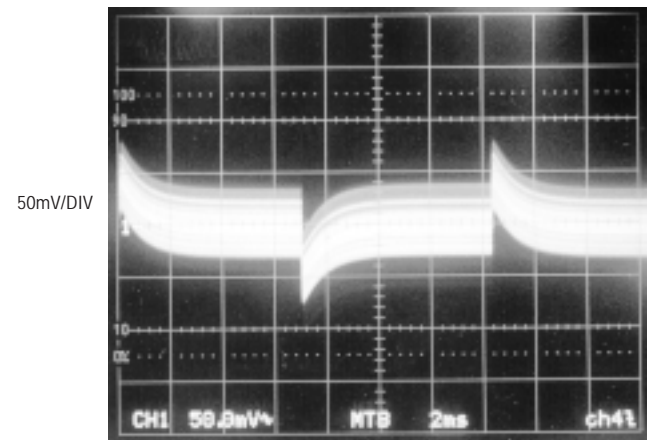
2us/DIV

Figure 4. 5V/10A Output Ripple with 48Vin.
(Top trace = 350MHz BW, bottom trace = 20MHz BW)



1ms/DIV

Figure 5. 3.3V Output Response, 5A to 10A current step (48Vin).

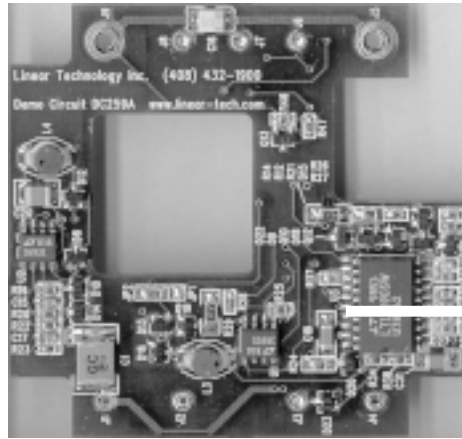


2ms/DIV

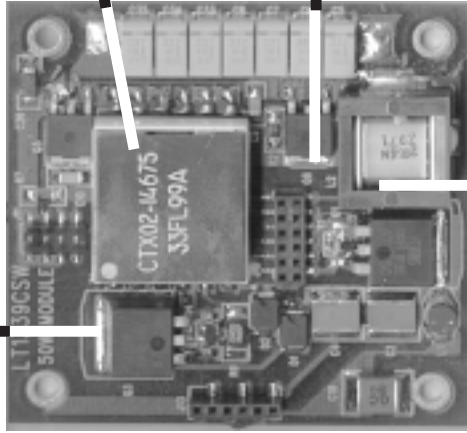
Figure 6. 5V Output Response, 5A to 10A current step (48Vin).

THERMAL MEASUREMENTS

Q3	5V/8A	5V/10A	5V/10A 190lfm	5V/10A w/HS
36Vin	60	81	47	55
48Vin	60	76	46	60
72Vin	66	83	50	62



U1 pin 15 (pgnd)	5V/8A	5V/10A	5V/10A 190lfm	5V/10A w/HS
36Vin	43	59	32	46
48Vin	46	54	35	50
72Vin	51	60	34	48



L2 between foil & core	5V/8A	5V/10A	5V/10A 190lfm	5V/10A w/HS
36Vin	46	70	45	51
48Vin	56	70	50	55
72Vin	58	73	52	60

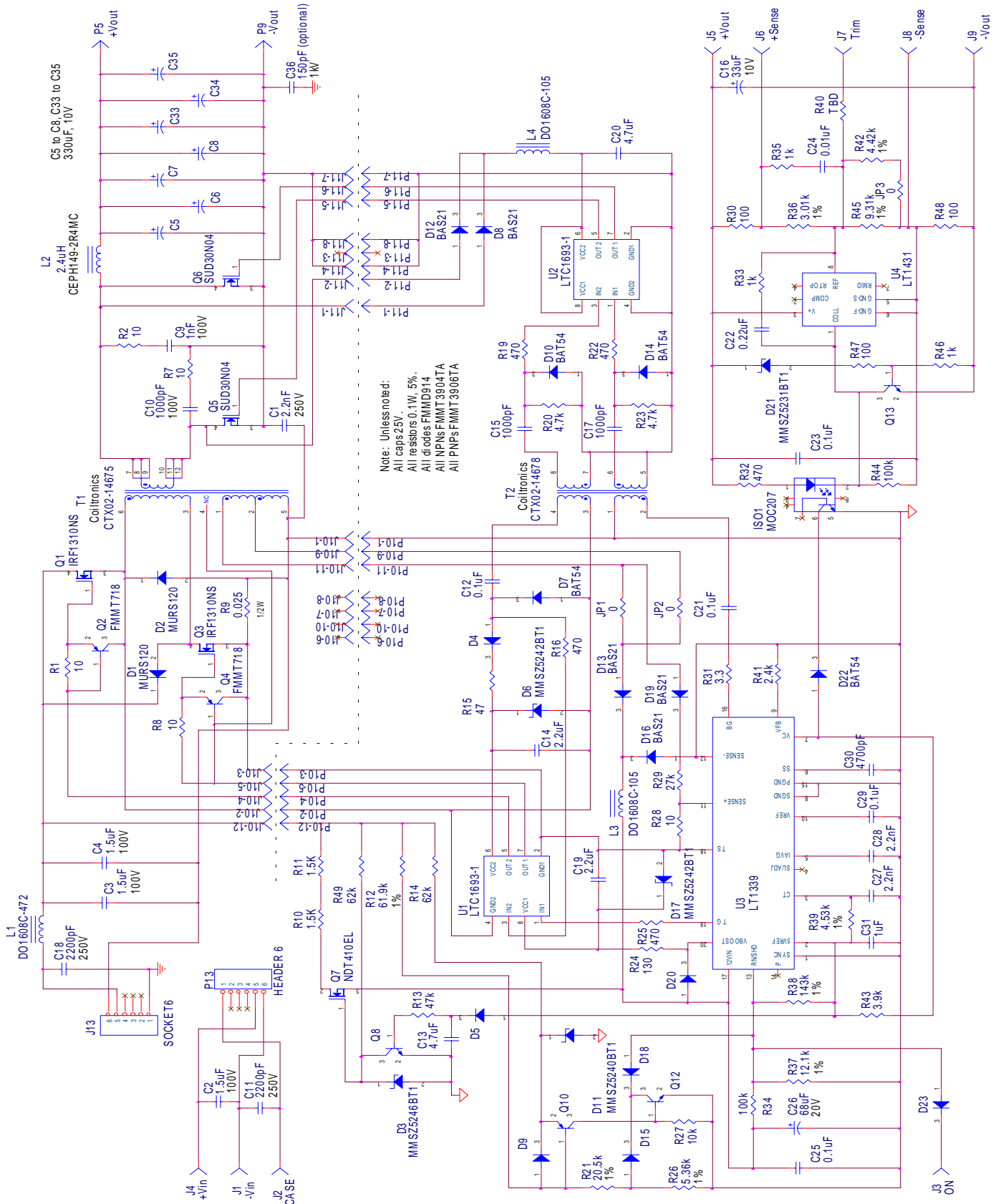
T1 between wire & core	5V/8A	5V/10A	5V/10A 190lfm	5V/10A w/HS
36Vin	54	78	50	61
48Vin	58	75	50	63
72Vin	60	78	50	62

O6	5V/8A	5V/10A	5V/10A 190lfm	5V/10A w/HS
36Vin	59	81	50	55
48Vin	60	83	56	60
72Vin	63	83	58	63

HS side of board behind O6	5V/8A	5V/10A	5V/10A 190lfm	5V/10A w/HS
36Vin	44	74	46	45
48Vin	54	70	46	46
72Vin	58	73	46	46

Temperature Rise above 22C ambient
 Board Mounted Horizontally, 4 OZ Cu (2 OZ internal)
 (lfm = linear feet per minute, HS = Thermalloy P6515B Heat Sink)

SCHEMATIC DIAGRAM



PARTS LIST

REFERENCE DESIGNATOR	QUANTITY	PART NUMBER	DESCRIPTIONN	VENDOR	TELEPHONE
C36	1/OPT	GRM43X7R151KXKVAL	CAP CER X7R 150pF 1KV 20% 1808 OPTION	MuRata	814-237-1431
C9,C10	2	12061C102MAT1A	CAP CER X7R 1000pF 100V 20% 1206	Avx	843-946-0362
C15,C17	2	06035C102MAT1A	CAP CER X7R 1000pF 50V 20% 0603	Avx	843-946-0362
C27,C28	2	06035C222MAT1A	CAP CER X7R 2200pF 50V 20% 0603	Avx	843-946-0362
C1,C11,C18	3	GHM3035X7R222K-GC	CAP CER X7R 2200pF 250V 10%	MuRata	814-237-1431
C30	1	06035C472MAT1A	CAP CER X7R 4700pF 50V 20% 0603	Avx	843-946-0362
C24	1	06035C103MAT1A	CAP CER X7R 0.01uF 50V 20% 0603	Avx	843-946-0362
C21,C25	2	12065C104MAT1A	CAP CER X7R 0.1uF 50V 20% 1206	Avx	843-946-0362
C12,C23,C29	3	0603YC104MAT1A	CAP CER X7R 0.1uF 16V 20% 0603	Avx	843-946-0362
C22	1	0603ZC224MAT1A	CAP CER X7R 0.22uF 10V 20% 0603	Avx	843-946-0362
C31	1	TMK316BJ105ML	CAP CER X7R 1uF 16V 20% 1206	Taiyo Yuden	800-348-2496
C2,C3,C4	3	VJ1825Y155MXB	CAP CER X7R 1.5uF 100V 20% 1825	Vitramon	203-268-6261
C14,C19	2	EMK316BJ225ML	CAP CER X5R 2.2uF 16V 20% 1206	Taiyo Yuden	800-348-2496
C13,C20	2	EMK325BJ475MN	CAP CER X5R 4.7uF 16V 20% 1210	Taiyo Yuden	800-348-2496
C16	1	TAJB336M010R0375	CAP TANT. 33uF 10V 20% 3528	Avx	207-282-5111
C26	1	TPSE686M020R0125	CAP TANT 68uF 20V 20% 7343H	Avx	207-282-5111
C5 to C8, C33 to C35	7	T510X3371010AS	CAP TANT 330uF 10V 20% 7343H	Kemet	864-963-6300
D1,D2	2	MURS120T3	DIODE ULTRAFast 200V 1A SMB	On Semiconductor	800-282-9855
D4,D5,D9,D15, D18,D20,D23	7	FMMD914	DIODE SWITCHING 70V 0.2A 4ns SOT-23	Zetex	516-543-7100
D3	1	MMSZ5246B-7	DIODE ZENER 16V 0.5W 5% SOD-123	Vishay	408-241-4588
D6,D17	2	MMSZ5242B-7	DIODE ZENER 12V 0.5W 5% SOD-123	Vishay	408-241-4588
D11	1	MMSZ5240B-7	DIODE ZENER 10V 0.5W SOD-123	Vishay	408-241-4588
D21	1	MMSZ5231B-7	DIODE ZENER 5.1V 0.5W SOD-123	Vishay	408-241-4588
D7,D10,D14,D22	4	BAT54TA	DIODE SCHOTTKY 30V 200mA SOT-23	Zetex	516-543-7100
D8,D13,D12, D16,D19	5	BAS21TA	DIODE SWITCHING 200V 0.2A 50ns SOT-23	Zetex	516-543-7100
ISO1	1	MOC207	OPTOCOUPLER 100-200 2500VRMS SO8	QT Optoelectronics	408-720-1440
L1	1	DO1608C-472	INDUCTOR 4.7uH 20% 0.090ohms 1.5A	Coilcraft	847-639-6400
L2	1	CEPH149-2R4MC	INDUCTOR 2.4uH	Sumida	847-956-0667
L3,L4	2	Coilcraft DO1608C-105	INDUCTOR 1.0mH 20% 13.8ohms 0.1A	Coilcraft	847-639-6400
Q1,Q3	2	IRF1310NS	MOSFET N-CHNL 100V 0.036ohms D2-PAK	IR	310-322-3331
Q5,Q6	2	SUD30N04-10	MOSFET N-CHNL 40V 0.01ohms D-PAK	Siliconix	800-554-5565
Q7	1	NDT410EL	MOSFET N-CHNL 100V 0.25ohms SOT-223	Fairchild	408-822-2126
Q2,Q4	2	FMMT718TA	TRAN PNP 20V 1.5A HIGH CURR SOT-23	Zetex	516-543-7100
Q8,Q12,Q13	3	FMMT3904TA	TRAN NPN 40V 0.2A GEN PURPOSE SOT-23	Zetex	516-543-7100
Q10	1	FMMT3906TA	TRAN PNP 40V 0.2A GEN PURPOSE SOT-23	Zetex	516-543-7100
R9	1	WSL 2110 0.025 1%	RES CHIP 2110 0.025 1% 1/2W 2110	Dale	605-665-9301
R10,R11	2	CR18-152JM	RES CHIP 1206 1.5k 5% 1/8W	Tad	714-255-9123

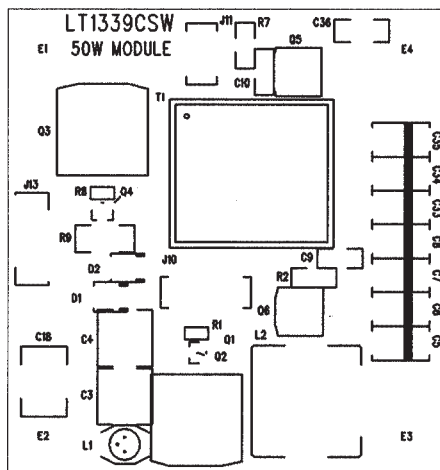
PARTS LIST

R36	1	CR16-3011FM	RES CHIP 0603 3.01k 1%	Tad	800-508-1521
R42	1	CR16-4421FM	RES CHIP 0603 4.42k 1%	Tad	800-508-1521
R39	1	CR16-4531FM	RES CHIP 0603 4.53k 1%	Tad	800-508-1521
R26	1	CR16-5361FM	RES CHIP 0603 5.36k 1%	Tad	800-508-1521
R45	1	CR16-9311FM	RES CHIP 0603 9.31k 1%	Tad	800-508-1521
R37	1	CR16-1212FM	RES CHIP 0603 12.1k 1%	Tad	800-508-1521
R21	1	CR16-2052FM	RES CHIP 0603 20.5k 1%	Tad	800-508-1521
R12	1	CR10-5622FM	RES CHIP 0805 56.2k 1%	Tad	800-508-1521
R38	1	CR16-1433FM	RES CHIP 0603 143k 1%	Tad	800-508-1521
R31	1	CR16-3R3JM	RES CHIP 0603 3.3 5%	Tad	800-508-1521
R1,R8,R28	3	CR16-100JM	RES CHIP 0603 10 5%	Tad	800-508-1521
R2,R7	2	CR18-100JM	RES CHIP 1206 10 5%	Tad	800-508-1521
R15	1	CR10-470JM	RES CHIP 0805 47 5%	Tad	800-508-1521
R47	1	CR16-101JM	RES CHIP 0603 100 5%	Tad	800-508-1521
R48,R30	2	CR18-101JM	RES CHIP 1206 100 5%	Tad	800-508-1521
R24	1	CR10-131JM	RES CHIP 0805 130 5%	Tad	800-508-1521
R16,R19,R22, R25,R32	5	CR16-471JM	RES CHIP 0603 470 5%	Tad	800-508-1521
R33,R35,R46	3	CR16-102JM	RES CHIP 0603 1k 5%	Tad	800-508-1521
R41	1	CR16-242JM	RES CHIP 0603 2.4k 5%	Tad	800-508-1521
R43	1	CR16-392JM	RES CHIP 0603 3.9k 5%	Tad	800-508-1521
R20,R23	2	CR16-472JM	RES CHIP 0603 4.7k 5%	Tad	800-508-1521
R27	1	CR16-103JM	RES CHIP 0603 10k 5%	Tad	800-508-1521
R29	1	CR18-273JM	RES CHIP 1206 27k 5%	Tad	800-508-1521
R13	1	CR16-473JM	RES CHIP 0603 47k 5%	Tad	800-508-1521
R14,R49	2	CR18-623JM	RES CHIP 1206 62k 5%	Tad	800-508-1521
R34,R44	2	CR16-104JM	RES CHIP 0603 100k 5%	Tad	800-508-1521
R40	0	RES TBD	RES CHIP 0603	Tad	800-508-1521
JP1,JP2,JP3	3	CR10-000M	RES CHIP 0805 0ohm 5%	Tad	800-508-1521
T1	1	CTX02-14675	TRANSFORMER CTX02-14675	Coiltronics	561-241-7876
T2	1	CTX02-14678	TRANSFORMER CTX02-14678	Coiltronics	561-241-7876
J5,J9	2	1640B	RECEPTACLE 0.078-0.081	Keystone	718-956-8900
J1,J2,J3,J4, J6,J7,J8	7	1425-2	PIN 0.04 PC PIN	Keystone	718-956-8900
P5,P9	2	1213-680-6	PIN 0.08 X 0.68 high pin	Zierick	800-882-8020
J10	1	SMM-106-02-F-D	SOCKET 12PINS DOUBLE ROW SMT	Samtec	800-726-8329
J11	1	SMM-104-02-F-D	SOCKET 8PINS DOUBLE ROW SMT	Samtec	800-726-8329
J13	1	SMM-106-02-F-S	SOCKET 6 PINS SURFACE MOUNT	Samtec	800-726-8329
P10	1	HTSM2205-12-G2	HEADER 12PINS SURFACE MOUNT	Comm-Con	626-301-4200
P11	1	HTSM2205-08-G2	HEADER 8PINS SURFACE MOUNT	Comm-Con	626-301-4200
P13	1	HTSM2805-06-G2	HEADER 6 PINS SURFACE MOUNT	Comm-Con	626-301-4200
	4	1636-440-A-0	STANDOFF 3/16 ROUND 4-40 X 7/16	RAF	203-888-2133

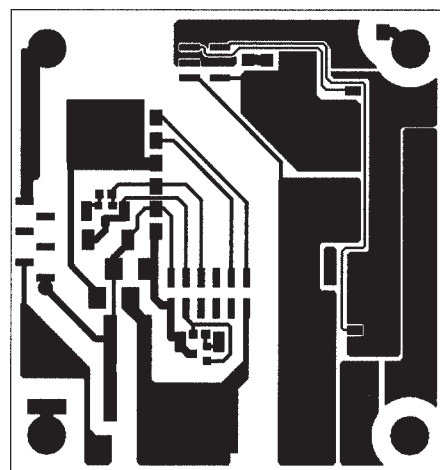
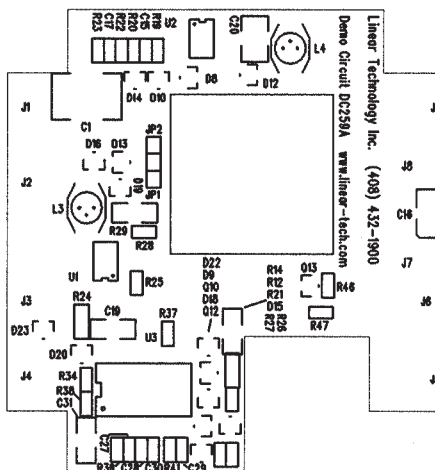
PARTS LIST

	1	P6515B	HEATSINK P6515B	Thermalloy	972-243-4321
U1,U2	2	LT1693-1B	IC LTC1693-1 8-LEAD SO8	Linear	408-432-1900
U3	1	LT1339CSW	IC LT1339CSW 20-LEAD SOL-20	Linear	408-432-1900
U4	1	LT1431CS8	IC LT1431CS8 8-LEAD SO8	Linear	408-432-1900
	1	DEMO BOARD DC259A	PRINTED CIRCUIT BOARD	Linear	408-432-1900
	2		STENCIL	Linear	408-432-1900

PCB LAYOUT AND FILM

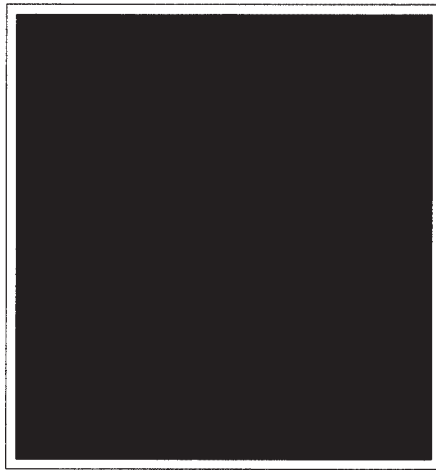


Silkscreen Top

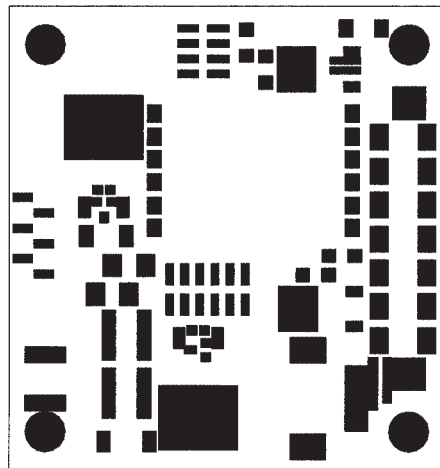
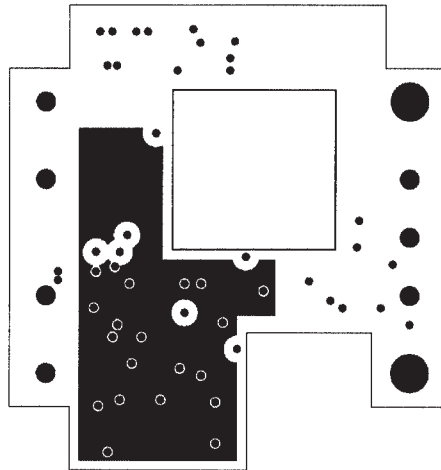


Component Side

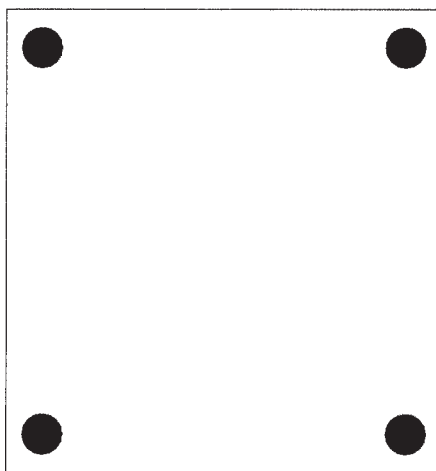
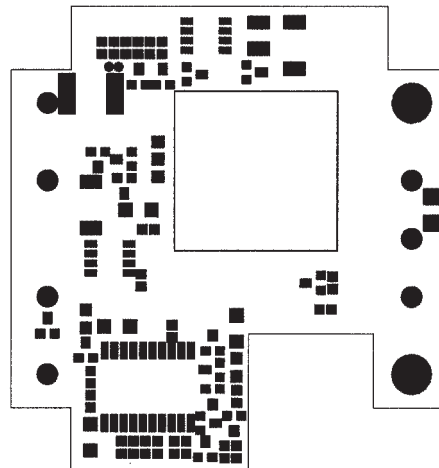
PCB LAYOUT AND FILM



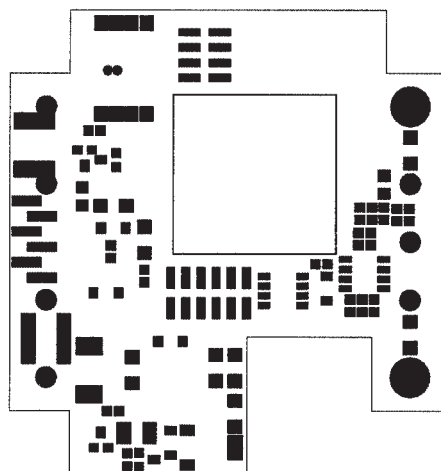
Inner Layer3



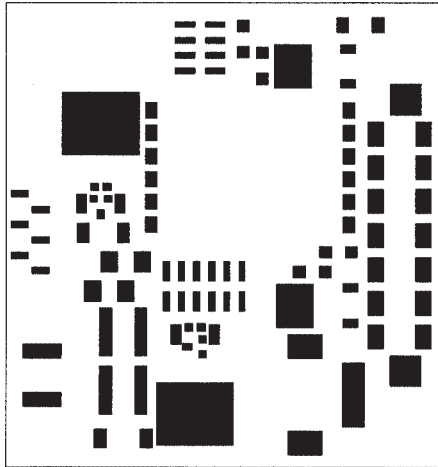
Soldermask Top



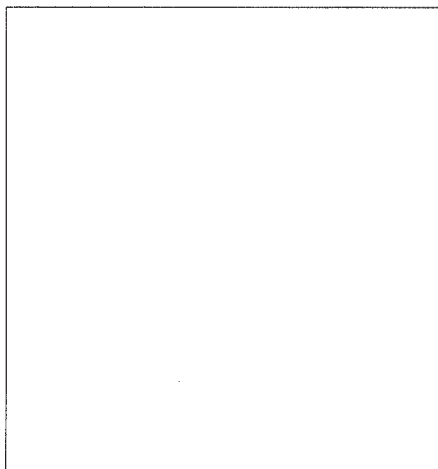
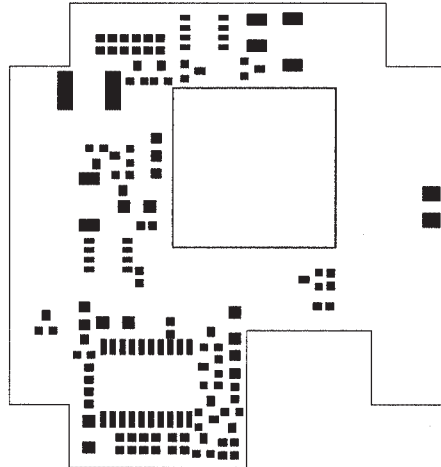
Soldermask Bottom



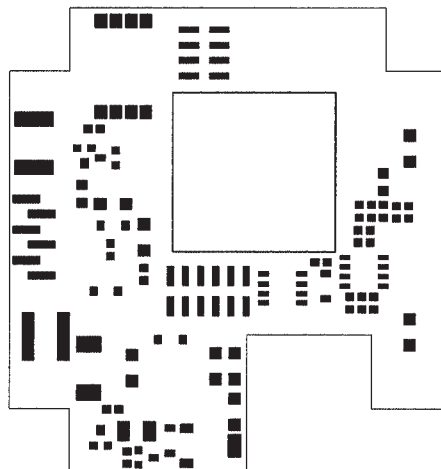
PCB LAYOUT AND FILM



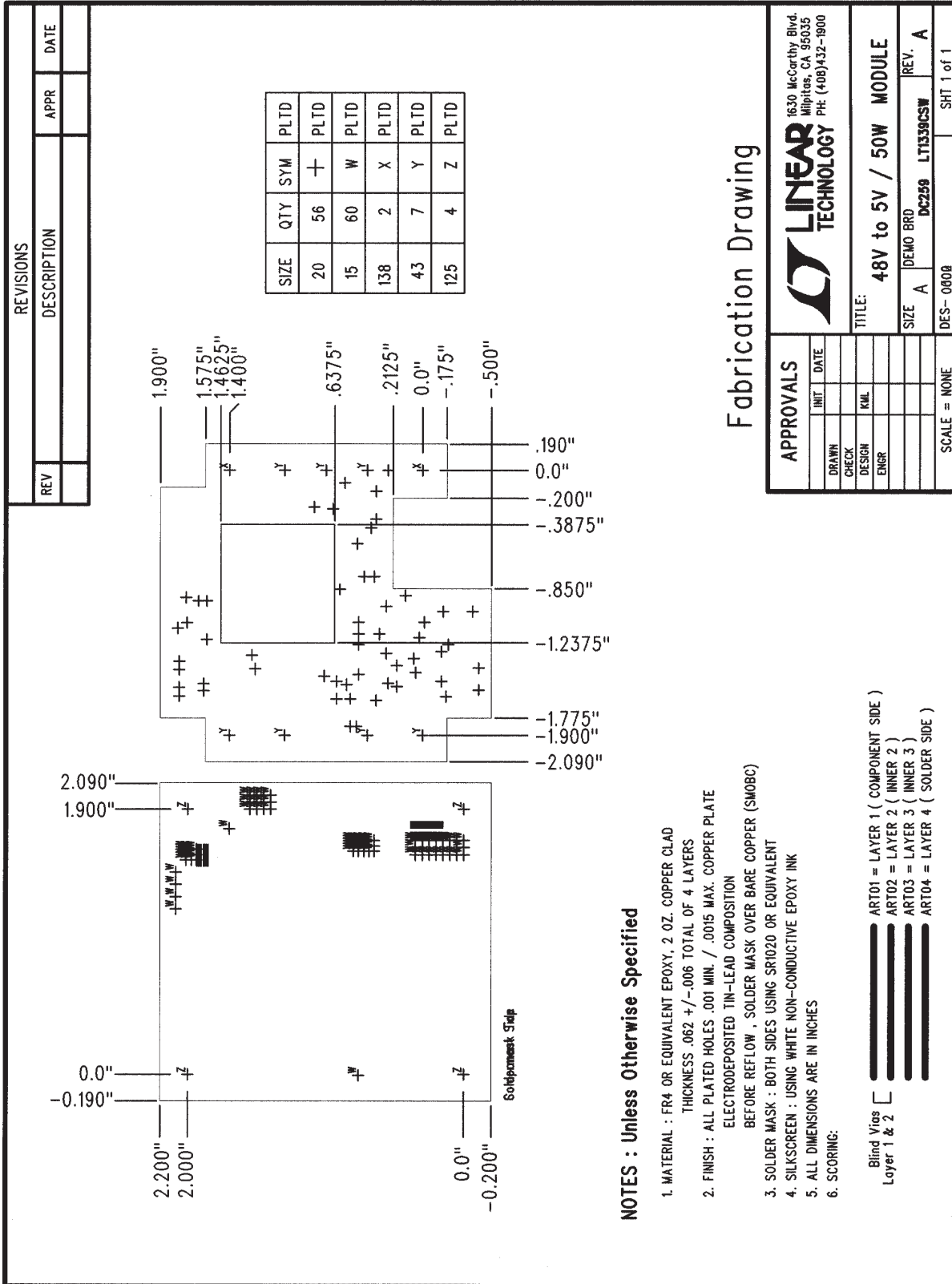
Pastemask Top



Pastemask Bottom



PCB FAB DRAWING



NOTES : Unless Otherwise Specified

1. MATERIAL : FR4 OR EQUIVALENT EPOXY, 2 OZ. COPPER CLAD THICKNESS .062 +/- .006 TOTAL OF 4 LAYERS
2. FINISH : ALL PLATED HOLES .001 MIN. / .0015 MAX. COPPER PLATE ELECTRODEPOSITED TIN-LEAD COMPOSITION BEFORE REFLOW , SOLDER MASK OVER BARE COPPER (SMOBC)
3. SOLDER MASK : BOTH SIDES USING SR1020 OR EQUIVALENT
4. SILKSCREEN : USING WHITE NON-CONDUCTIVE EPOXY INK
5. ALL DIMENSIONS ARE IN INCHES
6. SCORING:

- Blind Vias ART01 = LAYER 1 (COMPONENT SIDE)
 Layer 1 & 2 ART02 = LAYER 2 (INNER 2)
 ART03 = LAYER 3 (INNER 3)
 ART04 = LAYER 4 (SOLDER SIDE)