

REVISION HISTORY				
ECO	REV	DESCRIPTION	APPROVED	DATE
-	3	PRODUCTION FAB	JD	7-29-13

OUTPUT VOLTAGE SELECTION

OUT2	OUT1	OUT0	VOUT
0	0	0	1.8V
0	0	1	2.5V
0	1	0	2.8V
0	1	1	3.0V
1	0	0	3.3V
1	0	1	3.6V
1	1	0	4.5V
1	1	1	5.0V

LDO VOLTAGE SELECTION

LDO2	LDO1	LDO 0	LDO_OUT
0	0	0	1.2V
0	0	1	1.5V
0	1	0	1.8V
0	1	1	2.0V
1	0	0	2.5V
1	0	1	3.0V
1	1	0	3.3V
1	1	1	= LDO_IN

ILM SELECTION INSTALL

IPK2	IPK1	IPK0	ILIM
R3	R5	R7	5mA
R3	R5	R6	10mA
R3	R4	R7	15mA
R3	R4	R6	25mA
R2	R5	R7	50mA
R2	R5	R6	100mA
R2	R4	R7	150mA
R2	R4	R6	250mA

UVLO SELECTION

UV3	UV2	UV1	UV0	UVLO RISING	UVLO FALLING
0	0	0	0	4V	3V
0	0	0	1	5V	4V
0	0	1	0	6V	5V
0	0	1	1	7V	6V
0	1	0	0	8V	7V
0	1	0	1	8V	5V
0	1	1	0	10V	9V
0	1	1	1	10V	5V
1	0	0	0	12V	11V
1	0	0	1	12V	5V
1	0	1	0	14V	13V
1	0	1	1	14V	5V
1	1	0	0	16V	15V
1	1	0	1	16V	5V
1	1	1	0	18V	17V
1	1	1	1	18V	5V

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 TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE.

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

APPROVALS

PCB DES.	NC
APP ENG.	JD

SCALE = NONE



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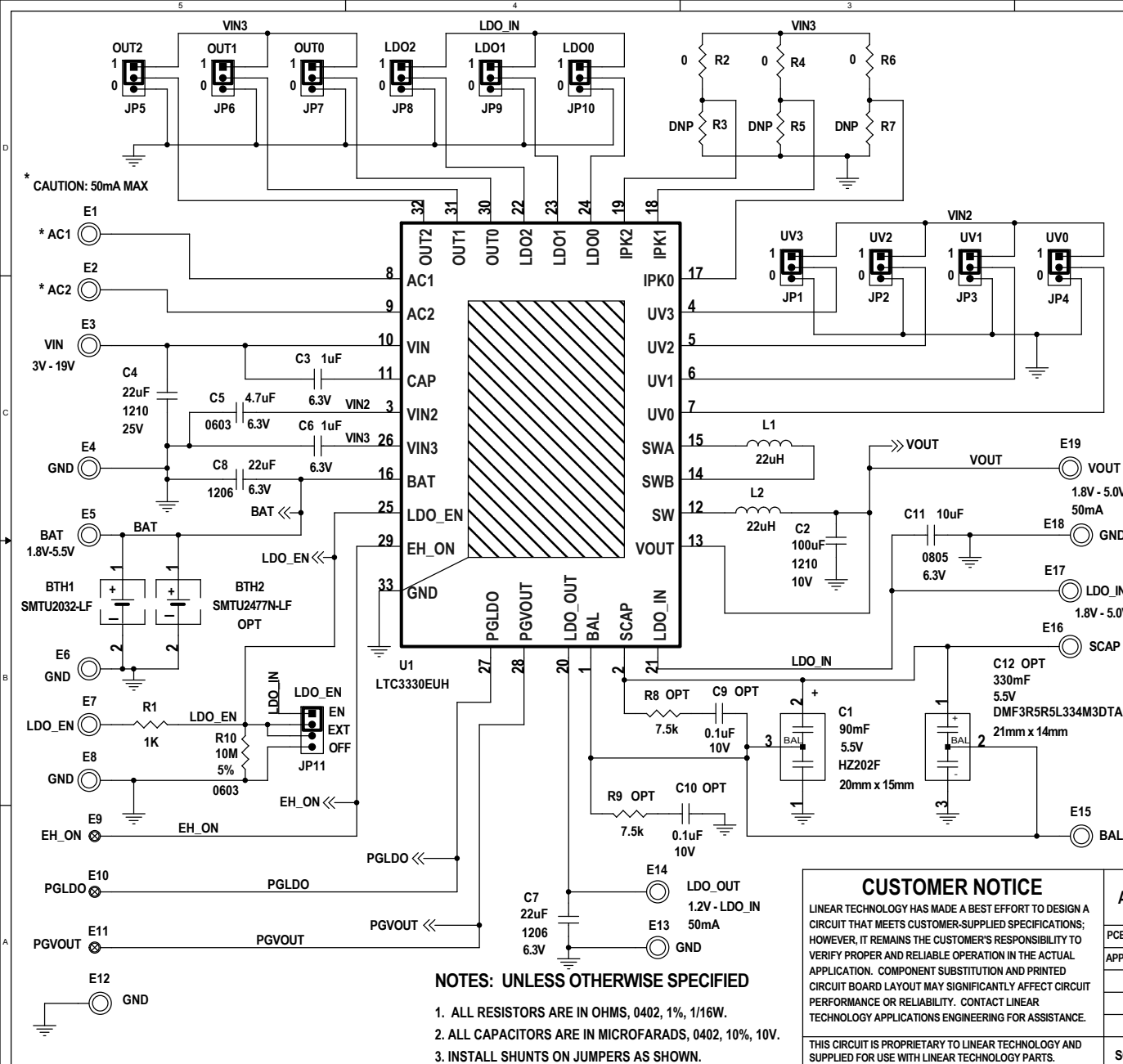
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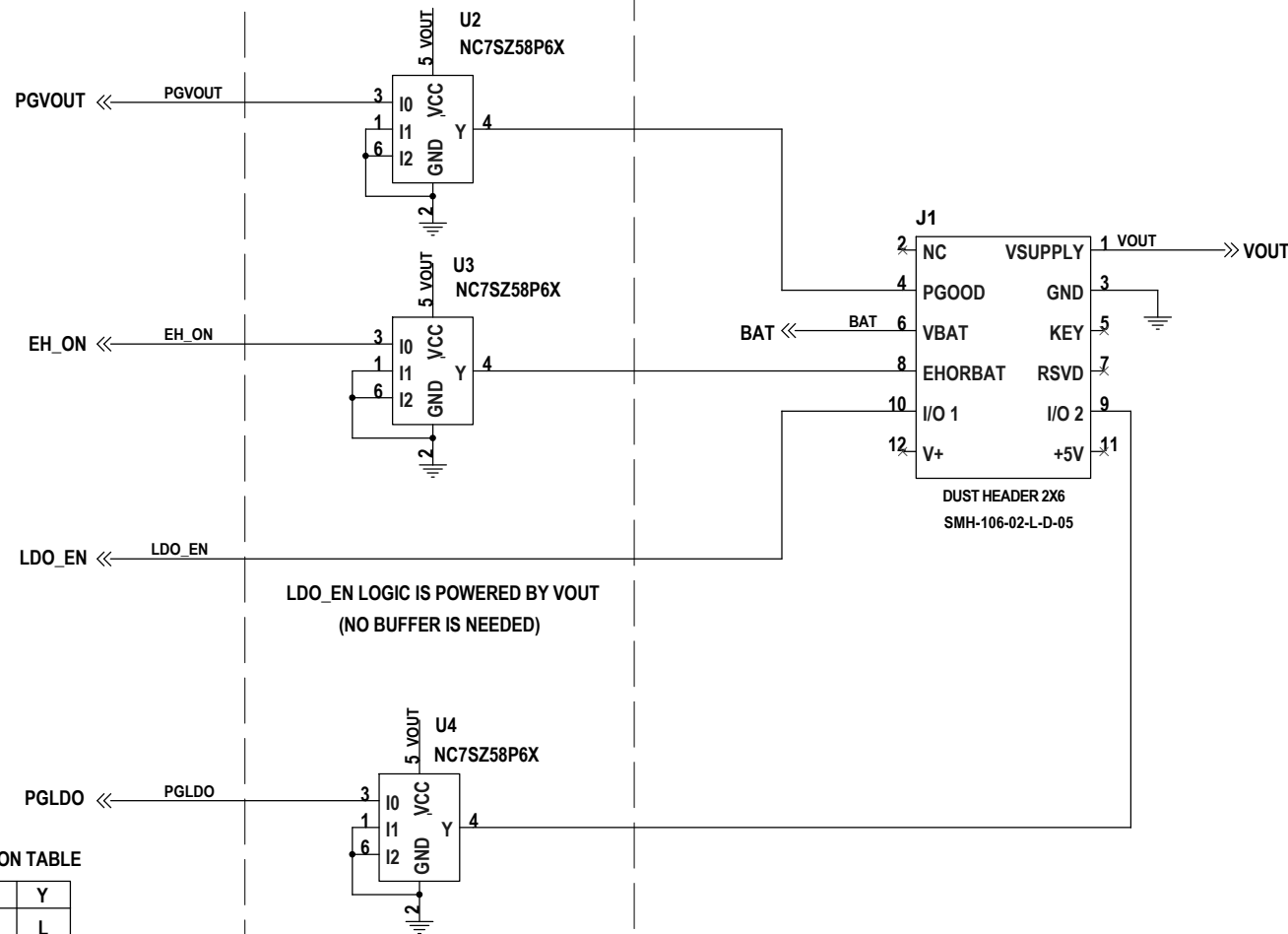
**NANOPOWER BUCK - BOOST DC / DC
WITH ENERGY HARVESTING BATTERY LIFE EXTENDER**

SIZE	IC NO.	LTC3330EUH DEMO CIRCUIT 2048A	REV. 3
N/A			

DATE: 7-29-13

SHEET 1 OF 2





U2, U3, U4 FUNCTION TABLE

I2	I1	I0	Y
L	L	L	L
L	L	H	H

$$Y = (I_0) \cdot (I_2) + (I_1) \cdot (I_2)$$

OVERVOLTAGE TOLERANT BUFFERS
TRANSLATE THE HIGH PULL-UP
VOLTAGES FROM THE LTC3330 TO THE
VOUT VOLTAGE DRIVING THE
PROCESSOR I/O BUS, WHICH IS VOUT.

CUSTOMER NOTICE

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THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

APPROVALS

PCB DES. NC

APP ENG. JD

SCALE = NONE



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TITLE: SCHEMATIC

NANOPOWER BUCK - BOOST DC / DC
WITH ENERGY HARVESTING BATTERY LIFE EXTENDER

SIZE

N/A

IC NO.

LTC3330EUH
DEMO CIRCUIT 2048A

REV.

3

DATE: 7 - 29 - 13

SHEET 2 OF 2

Linear Technology Corporation

LTC3330EUH

ENGR: J.DREW (011-087)

BILL OF MATERIALS

DEMO BD. #2048A-3 BOM

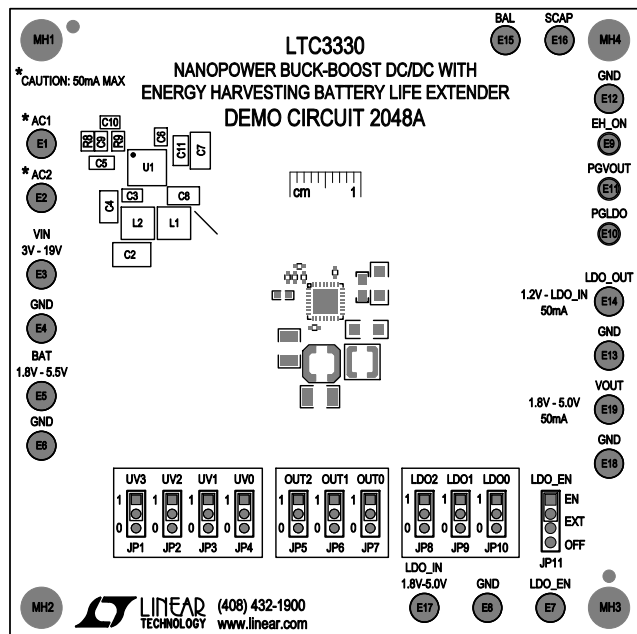
QTY-300

8/7/2013

Item	Qty	Reference	Part Description	Manufacturer / Part #	Kit Qty
				NUMBER OF BOARDS =	300
1	1	BAT1	CR2032 COIN LI-ION BATTERY	DURACELL, CR2032	300
2	1	BTH1	SMT, CR2032 BATTERY HOLDER	MPD INC, BU2032SM-HD-GCT-ND	300
3	0	BTH2	SMT, CR2477 BATTERY HOLDER	RENATA, SMTU2477-1	0
4	1	C1	SUPERCAP, 90mF, 5.5V, 20mm x 15mm	CAP-XX, HZ202F	300
5	1	C2	CAP, CHIP, X5R, 100uF, 20%, 10V, 1210	TAIYO YUDEN, LMK325ABJ107MM	300
6	2	C7,C8	CAP, CHIP, X5R, 22uF, 20%, 6.3V, 1206	TAIYO YUDEN, JMK316BJ226ML-T	600
7	2	C3,C6	CAP, CHIP, X5R, 1uF, 10%, 6.3V, 0402	TDK, C1005X5R0J105KT	600
8	1	C11	CAP, CHIP, X5R, 10uF, 10%, 6.3V, 0805	AVX, 08056D106KAT2A	
9	1	C4	CAP, CHIP, X5R, 22uF, 10%, 25V, 1210	AVX, 12103D226KAT1A	300
10	1	C5	CAP, CHIP, X5R, 4.7uF, 10%, 6.3V, 0603	TDK, C1608X5R0J475KT	300
11	0	C9,C10 (OPT)	CAP, CHIP, X5R, 0.1uF, 10%, 10V, 0402	TDK, C1005X5R1A104K	0
12	0	C12 (OPT)	SUPERCAP/ULTRACAPACITOR, 330mF 5.5V 60mOHM DOUBLE CELL	MURATA,DMF3R5R5L334M3DTA0	
13	15	E1-E8,E12-E19	TURRET, 0.09 DIA	MILL-MAX, 2501-2	4500
14	3	E9-E11	TURRET, 0.061 DIA	MILL-MAX, 2308-2	900
15	1	J1	HEADER, 12 PIN, DUST HEADER 2X6	SAMTEC, SMH-106-02-L-D-05	300
16	10	JP1-JP10	HEADER, 3 PINS, 2mm	SAMTEC, TMM-103-02-L-S	3000
17	1	JP11	HEADER, 4 PINS, 2mm	SAMTEC, TMM-104-02-L-S	300
18	11	JP1-JP11	SHUNT 2MM	SAMTEC, 2SN-BK-G	3300
19	1	L1	INDUCTOR, 22UH , 0.800A, 0.36Ω, 3.9mm x 3.9mm	COILCRAFT, LPS4018-223MLC	300
20	1	L2	INDUCTOR, 22UH , 0.75A, 0.19Ω, 4.8mm x 4.8mm	COILCRAFT, LPS5030-223MLC	300
21	1	R1	RES,CHIP,1K,1/16W,1%,0402	VISHAY, CRCW04021K00FKED	300
22	3	R2,R4,R6	RES,CHIP, 0, 0603	VISHAY, CRCW060300000FKED	900
23	0	R3,R5,R7 (DNP)	RES,CHIP, 0603	VISHAY, CRCW060300000FKED	0
24	0	R8,R9 (OPT)	RES,CHIP, 7.5K, 1/16W,1%, 0402	VISHAY, CRCW04027K50FKED	0
25	1	R10	RES,CHIP,10M,1/10W, 5%, 0603	VISHAY, CRCW060310M0JNEA	300
26	1	U1	NANOPOWER BUCK-BOOST DC/DC WITH EH BATTERY LIFE EXTENDER	LINEAR TECH, LTC3330EUH	300
27	3	U2, U3, U4	IC, UHS UNIV. CONFIG. TWO-INPUT GATES, SC70-6	FAIRCHILD, NC7SZ58P6X	900
28	4		STAND-OFF, NYLON 0.625" tall (SNAP ON)	KEYSTONE, 8834 (SNAP ON)	1200
29	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 2048A-3	300
30	2		STENCILS - TOP & BOTTOM	DC2048A-3	2

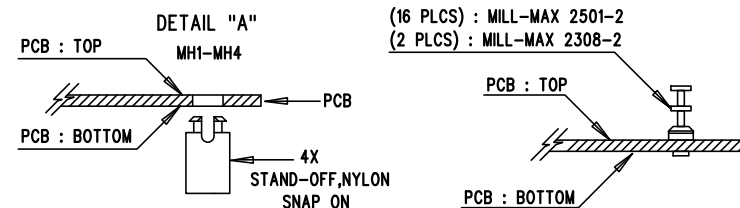
Item	Qty	Reference - Des	Part Description	Manufacturer, Part #
REQUIRED CIRCUIT COMPONENTS:				
1	1	BAT1	CR2032 COIN LI-ION BATTERY	DURACELL, CR2032
2	1	BTH1	SMT, CR2032 BATTERY HOLDER	MPD INC, BU2032SM-HD-GCT-ND
3	1	C1	SUPERCAP, 90mF, 5.5V, 20mm x 15mm	CAP-XX, HZ202F
4	1	C2	CAP, CHIP, X5R, 100uF, 20%, 10V, 1210	TAIYO YUDEN, LMK325ABJ107MM
5	2	C7,C8	CAP, CHIP, X5R, 22uF, 20%, 6.3V, 1206	TAIYO YUDEN, JMK316BJ226ML-T
6	2	C3,C6	CAP, CHIP, X5R, 1uF, 10%, 6.3V, 0402	TDK, C1005X5R0J105KT
7	1	C11	CAP, CHIP, X5R, 10uF, 10%, 6.3V, 0805	AVX, 08056D106KAT2A
8	1	C4	CAP, CHIP, X5R, 22uF, 10%, 25V, 1210	AVX, 12103D226KAT1A
9	1	C5	CAP, CHIP, X5R, 4.7uF, 10%, 6.3V, 0603	TDK, C1608X5R0J475KT
10	1	L1	INDUCTOR, 22UH , 0.800A, 0.36Ω, 3.9mm x 3.9mm	COILCRAFT, LPS4018-223MLC
11	1	L2	INDUCTOR, 22UH , 0.75A, 0.19Ω, 4.8mm x 4.8mm	COILCRAFT, LPS5030-223MLC
12	3	R2,R4,R6	RES,CHIP,0,0603	VISHAY, CRCW06030000FKED
13	1	R10	RES,CHIP,10M,1/10W, 5%, 0603	VISHAY, CRCW060310M0JNEA
14	1	U1	NANOPOWER BUCK-BOOST DC/DC WITH EH BATTERY LIFE EXTENDER	LINEAR TECH, LTC3330EUH
ADDITIONAL DEMO BOARD CIRCUIT COMPONENTS:				
1	0	C9,C10	CAP, CHIP, X5R, 0.1uF, 10%, 10V, 0402 (OPT)	TDK, C1005X5R1A104K
2	0	C12	SUPERCAP/ULTRACAPACITOR, 330mF 5.5V 60mOHM DOUBLE CELL	MURATA,DMF3R5R5L334M3DTA0
3	0	BTH2	SMT, CR2477 BATTERY HOLDER	RENATA, SMTU2477-1
4	1	R1	RES,CHIP,1K,1/16W,1%,0402	VISHAY, CRCW04021K00FKED
5	0	R3,R5,R7	RES,CHIP, 0 , 0603 (DNP)	VISHAY, CRCW06030000FKED
6	0	R8,R9	RES,CHIP,7.5K,1/16W,1%,0402	VISHAY, CRCW04027K50FKED
7	3	U2, U3, U4	IC, UHS UNIV. CONFIG. TWO-INPUT GATES, SC70-6	FAIRCHILD, NC7SZ58P6X
1	15	E1-E8,E12-E19	TURRET, 0.09 DIA	MILL-MAX, 2501-2
2	3	E9-E11	TURRET, 0.061 DIA	MILL-MAX, 2308-2
3	1	J1	HEADER, 12 PIN, DUST HEADER 2X6	SAMTEC, SMH-106-02-L-D-05
4	10	JP1-JP10	HEADER, 3 PINS, 2mm	SAMTEC, TMM-103-02-L-S
5	1	JP11	HEADER, 4 PINS, 2mm	SAMTEC, TMM-104-02-L-S
6	11	JP1-JP11	SHUNT 2MM	SAMTEC, 2SN-BK-G

REVISION HISTORY				
ECO	REV	DESCRIPTION	APPR	DATE
-	3	PRODUCTION FAB	JD	7-29-13



NOTES: UNLESS OTHERWISE SPECIFIED

1. WORKMANSHIP SHALL BE IN ACCORDANCE WITH IPC-A-610.
2. ASSEMBLY PROCESS SHALL INCLUDE: REFLOW SOLDER TOP SIDE SMD. MAXIMUM SOLDER TEMPERATURE IS 240 DEGREES CELSIUS.
3. PARTS TO OMIT WILL BE SPECIFIED ON THE BILL OF MATERIALS. LOCATIONS OF OMITTED PARTS SHALL BE FREE OF SOLDER. MASK THE SOLDER STENCIL WHERE SMT PARTS ARE OMITTED.
4. INSTALL SHUNTS AS SHOWN ON ASSY DRAWING.
5. DEPANELIZE BOARDS AFTER ASSEMBLY AND ROUTE-OUT THE BREAKOUT TABS ON FOUR SIDES OF THE BOARD EDGE.
7. INSTALL TURRETS AND 4 STAND-OFFS AT FOUR CORNERS AS SHOWN BELOW:



UVLO SELECTION

UV3	UV2	UV1	UV0	UVLO RISING	UVLO FALLING
0	0	0	0	4V	3V
0	0	0	1	5V	4V
0	0	1	0	6V	5V
0	0	1	1	7V	6V
0	1	0	0	8V	7V
0	1	0	1	8V	5V
0	1	1	0	10V	9V
0	1	1	1	10V	5V
1	0	0	0	12V	11V
1	0	0	1	12V	5V
1	0	1	0	14V	13V
1	0	1	1	14V	5V
1	1	0	0	16V	15V
1	1	0	1	16V	5V
1	1	1	0	18V	17V
1	1	1	1	18V	5V

OUTPUT VOLTAGE SELECTION

OUT2	OUT1	OUT0	VOUT
0	0	0	1.8V
0	0	1	2.5V
0	1	0	2.8V
0	1	1	3.0V
1	0	0	3.3V
1	0	1	3.6V
1	1	0	4.5V
1	1	1	5.0V

LDO VOLTAGE SELECTION

LDO2	LDO1	LDO0	LDO_OUT
0	0	0	1.2V
0	0	1	1.5V
0	1	0	1.8V
0	1	1	2.0V
1	0	0	2.5V
1	0	1	3.0V
1	1	0	3.3V
1	1	1	=LDO_IN

ILIM SELECTION INSTALL

IPK2	IPK1	IPK0	ILIM
R3	R5	R7	5mA
R3	R5	R6	10mA
R3	R4	R7	15mA
R3	R4	R6	25mA
R2	R5	R7	50mA
R2	R5	R6	100mA
R2	R4	R7	150mA
R2	R4	R6	250mA

APPROVALS

PCB DES.	NC
APP ENG.	JD



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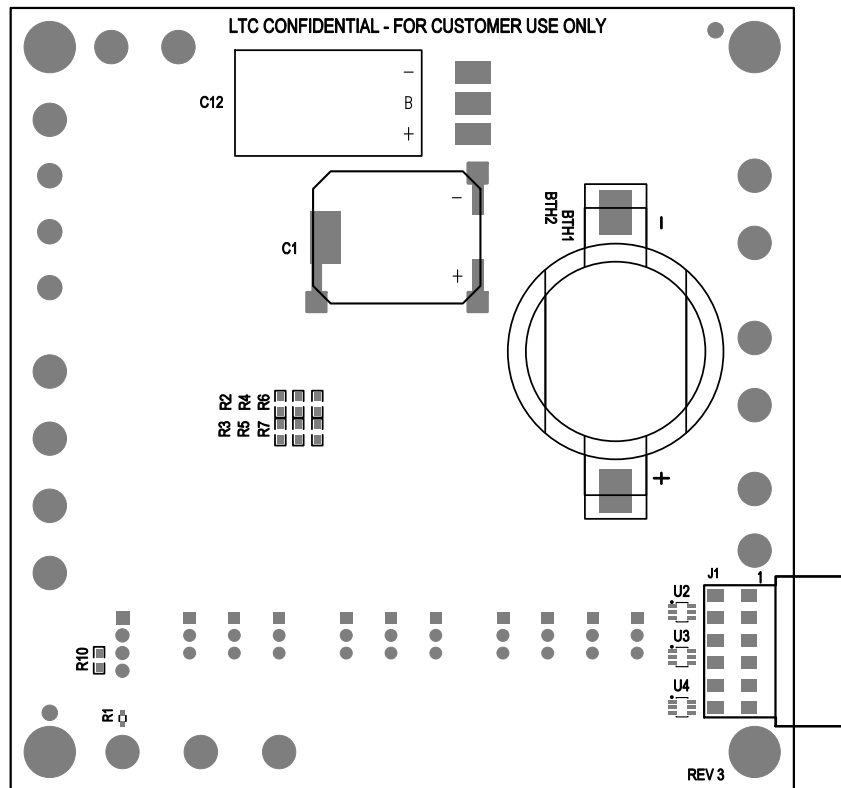
TITLE: TOP ASSEMBLY DRAWING:
 NANOPOWER BUCK-BOOST DC/DC WITH
 ENERGY HARVESTING BATTERY LIFE EXTENDER

SIZE	IC NO.	REV.
N/A	LTC3330EUH DEMO CIRCUIT 2048A	3

SCALE = NONE


FILENAME: DC2048A-3.PCB

SHT 1 of 2



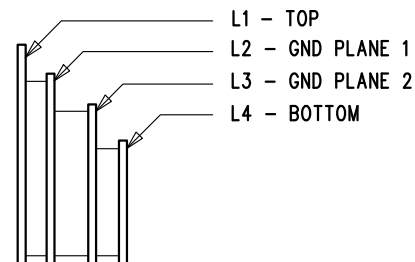
NOTES: UNLESS OTHERWISE SPECIFIED

1. C1 AND C12 ARE NOT TO BE SOLDERED USING RE-FLOW AND FLOW PROFILES.
2. FOR C12 SOLDERING IRON TEMP NEEDS TO BE 350 DEG C +/-10 DEG C.
SOLDERING IRON TIME = 3.0+1/-0 SECONDS.
3. ASSEMBLE C1 AND C12 AFTER BOARDS ARE CLEANED. DO NOT WASH C1 AND C12.
4. DO NOT INSTALL BAT1. PLACE BAT1 IN MANUFACTURERS PACKAGE IN DEMO BOARD BAG.

APPROVALS		 <div> 1630 MCCARTHY BLVD MILPITAS, CA 95035 PH: (408)432-1900 www.Linear.com LTC CONFIDENTIAL- FOR CUSTOMER USE ONLY </div>	
PCB DES.	NC		
APP ENG.	JD	TITLE: BOTTOM ASSEMBLY DRAWING: NANOPOWER BUCK-BOOST DC/DC WITH ENERGY HARVESTING BATTERY LIFE EXTENDER	
		SIZE	IC NO. LTC3330EUH
		N/A	DEMO CIRCUIT 2048A
			REV. 3
SCALE = NONE		FILENAME: DC2048A-3.PCB	
		SHT 2 of 2	

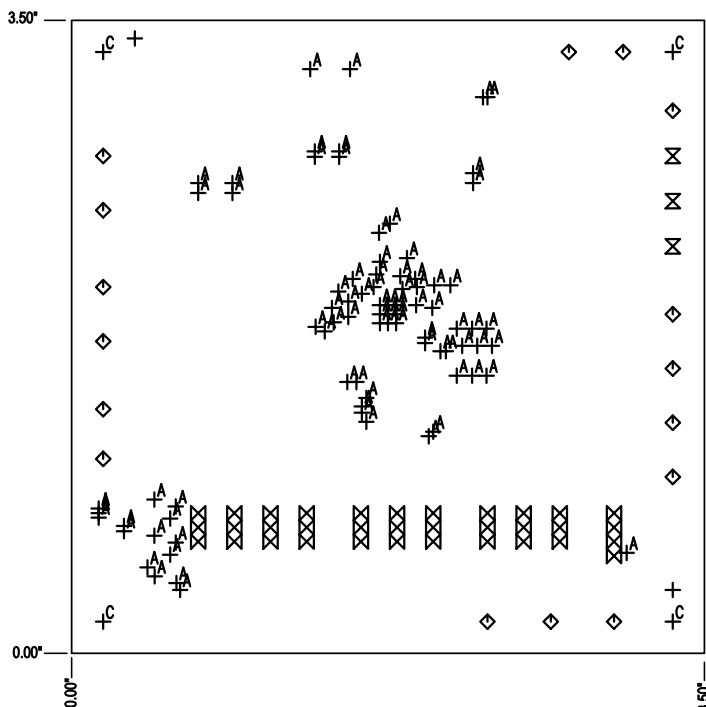
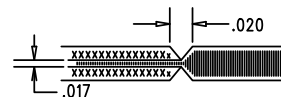
REVISION HISTORY				
ECO	REV	DESCRIPTION	APPR	DATE
-	3	PRODUCTION FAB	JD	7-29-13

LAYER STRUCTURE

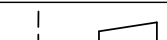



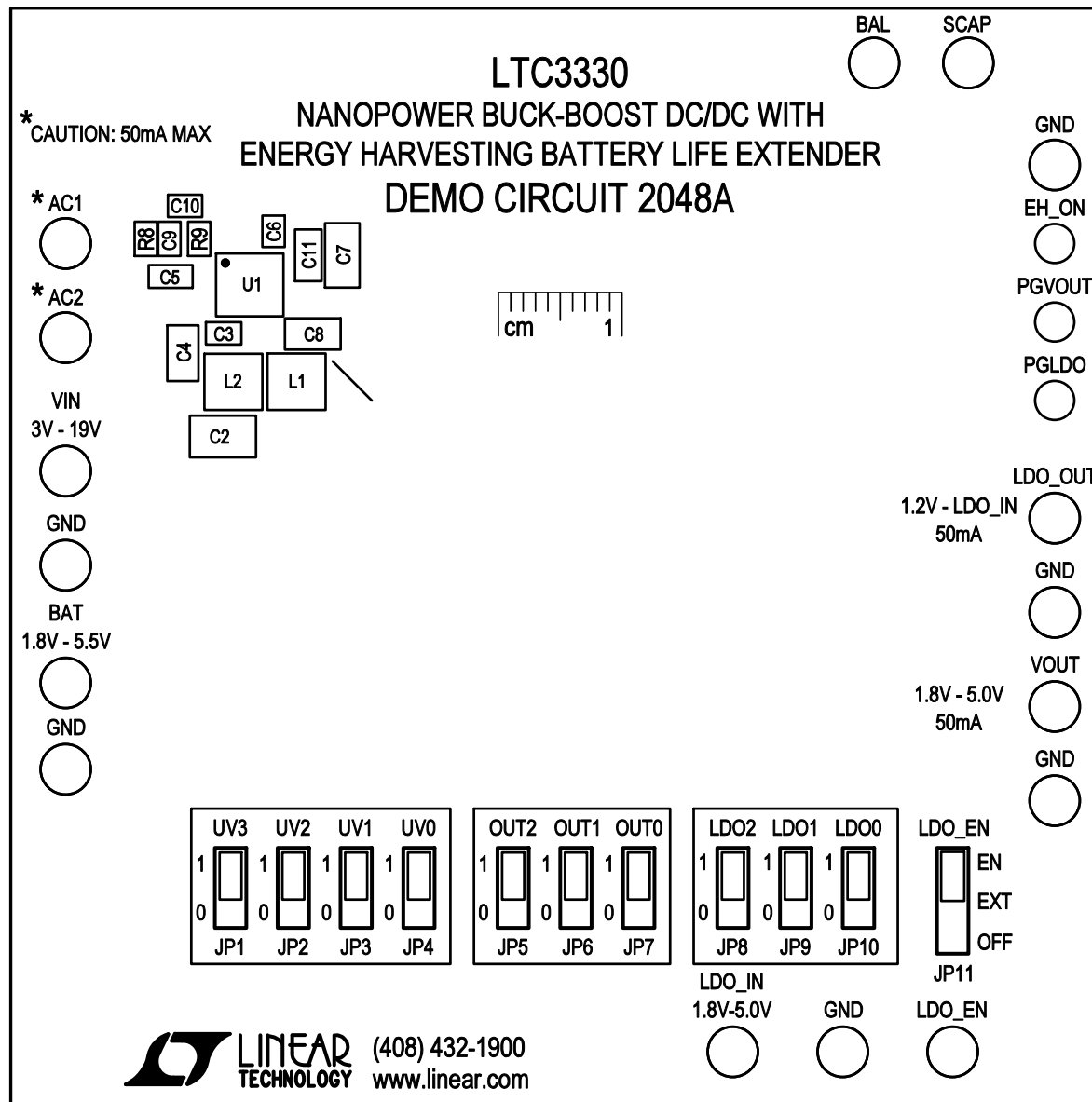
NOTES: UNLESS OTHERWISE SPECIFIED

- FAB PER IPC-A-600.
- MATERIAL: -LEAD FREE ASSEMBLY COMPLIANT, ISOLA FR-370HR OR EQUIVALENT.
-FINISHED THICKNESS TO BE 0.062" +/- .005"
-TOTAL OF 4 LAYERS WITH 1 OZ. CU ON THE OUTER LAYERS
AND 1 OZ. CU ON THE INNER LAYERS.
-FLAMMABILITY RATING: 94 V-0 MINIMUM.
- SIZE: CUT TO DIMENSIONS AND TOLERANCES SHOWN.
0.00 ARE PRIMARY DATUMS.
- DRILLING: -DRILL HOLES PER SCHEDULE. PLATE THROUGH
HOLES WITH COPPER, 0.001" THICK MIN.
-ALL HOLE SIZES ARE SPECIFIED AFTER PLATING.
-HOLE LOCATION TOLERANCES ARE +/-0.003"
IN RELATION TO CENTER
- FINISH: -SMOBC USING LPI BOTH SIDES, COLOR GREEN.
-GOLD IMMERSION BOTH SIDES.
(LEAD FREE SOLDER CAN BE USED FOR PROTOTYPE)
-FOR SILKSCREEN: BOTH SIDES USE WHITE NON-CONDUCTIVE INK.
- DO NOT ALTER ARTWORK e.g. TO ADD LOGO OR DATE CODE.
PAD SIZE CAN BE MODIFIED TO MEET END FINISH.
- PCBS ARE TO BE RoHS COMPLIANT.
- DO NOT ALTER SOLDER MASK MAINTAIN .0018" OVERSIZE
ON SMT PADS. A .005" WEBBING IS REQUIRED BETWEEN SMD PADS.
- SCORING FOR PANELIZED PCB: "PRODUCTION FAB ONLY"



SIZE	QTY	SYM	PLATED	TOL
0.07	2	+	NO	+/-0.003
0.094	16	◇	YES	+/-0.003
0.063	3	⊗	YES	+/-0.003
0.035	34	△	YES	+/-0.003
0.01	83	⊖	YES	+/-0.003
0.19	4	⊕	YES	+/-0.003

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON ANGLE ±1 0.XX" = ±0.01" 0.XXX" = ±0.005" INTERPRET DIM AND TOL PER ASME Y14.5M-1994 THIRD ANGLE PROJECTION  DO NOT SCALE DRAWING	APPROVALS		 LINEAR TECHNOLOGY	1630 MCCARTHY BLVD MILPITAS, CA 95035 PH: (408)432-1900 www.linear.com LTC CONFIDENTIAL- FOR CUSTOMER USE ONLY	
	PCB DES.	NC		TITLE: FABRICATION DRAWING: NANOPOWER BUCK-BOOST DC/DC WITH ENERGY HARVESTING BATTERY LIFE EXTENDER	
	APP ENG.	JD			
		SIZE	IC NO.	LTC3330EUH	REV.
		N/A		DEMO CIRCUIT 2048A	3
		FILENAME: DC2048A-3.PCB		SHT 1 of 1	



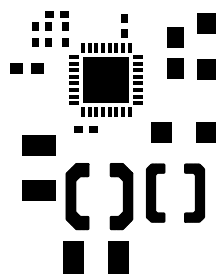
SILKSCREEN TOP

LINEAR TECH CORP.

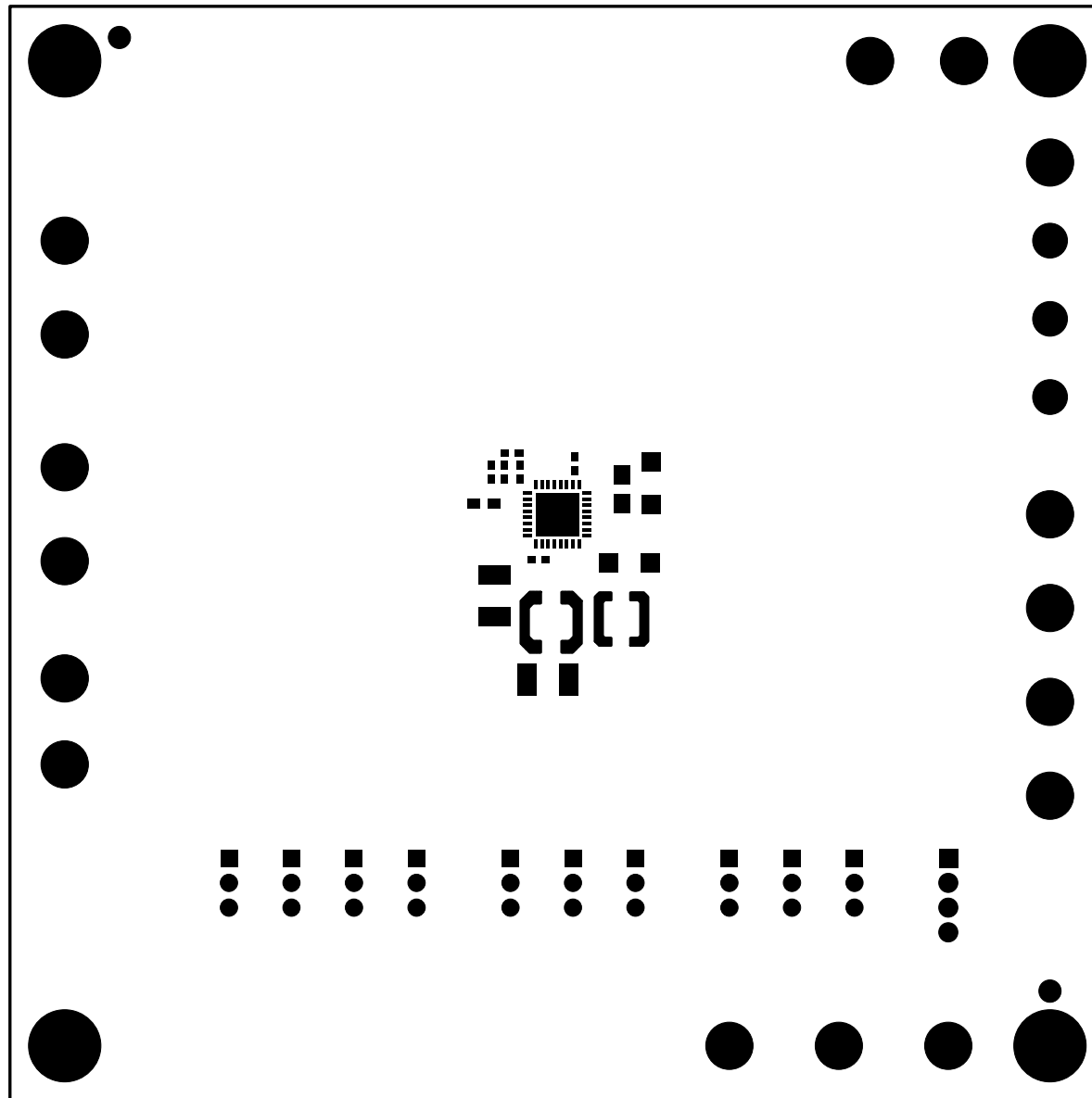
DEMO CIRCUIT 2048A-3 * LTC3330

NANOPOWER BUCK - BOOST DC / DC WITH
 ENERGY HARVESTING BATTERY LIFE EXTENDER

DATE: 7 - 29 - 13



PASTEMASK TOP
LINEAR TECH CORP.
DEMO CIRCUIT 2048A-3 * LTC3330
NANOPOWER BUCK - BOOST DC / DC WITH
ENERGY HARVESTING BATTERY LIFE EXTENDER
DATE: 7 - 29 - 13



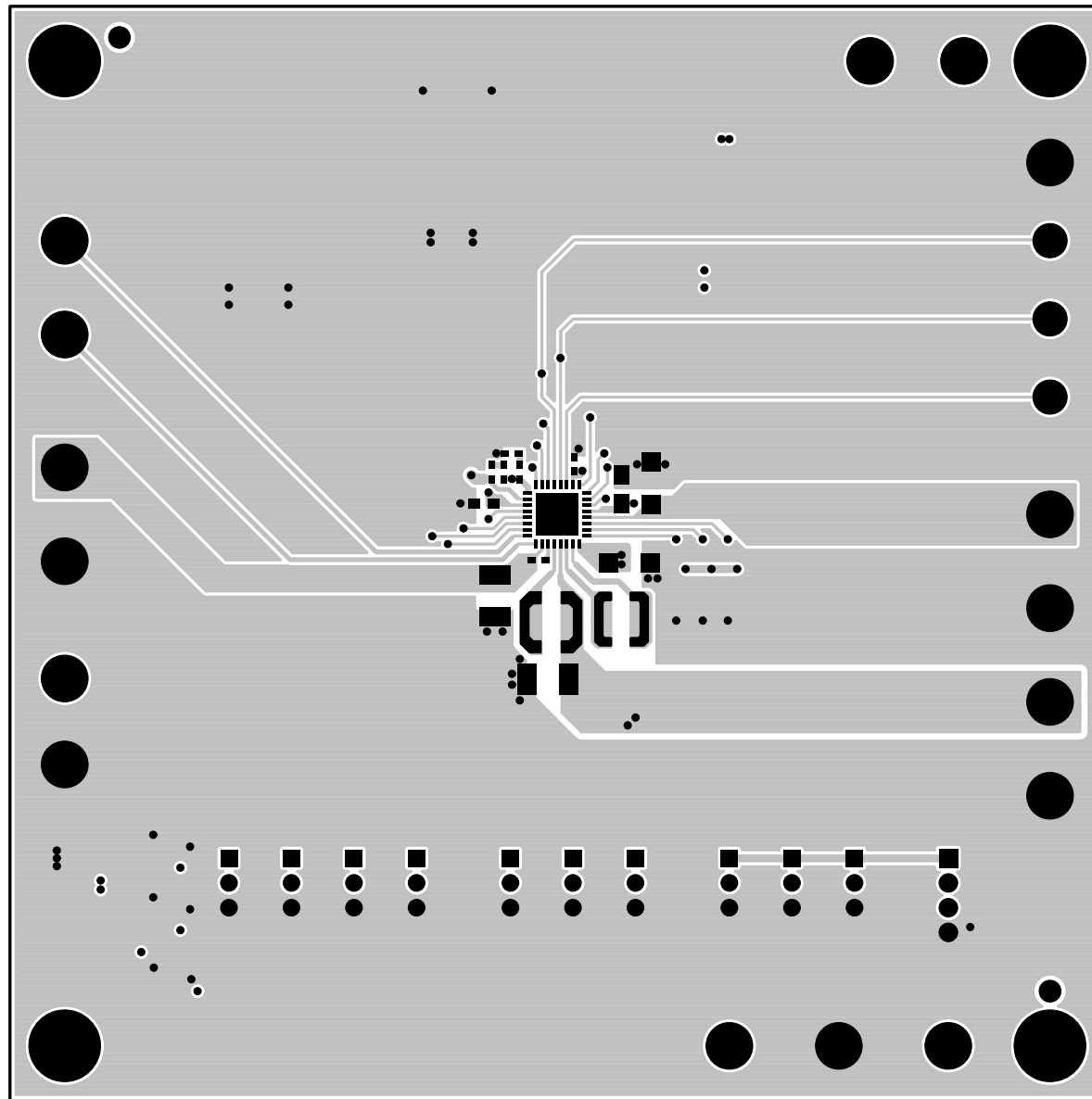
SOLDERMASK TOP

LINEAR TECH CORP.

DEMO CIRCUIT 2048A-3 * LTC3330

NANOPOWER BUCK - BOOST DC / DC WITH
ENERGY HARVESTING BATTERY LIFE EXTENDER

DATE: 7 - 29 - 13



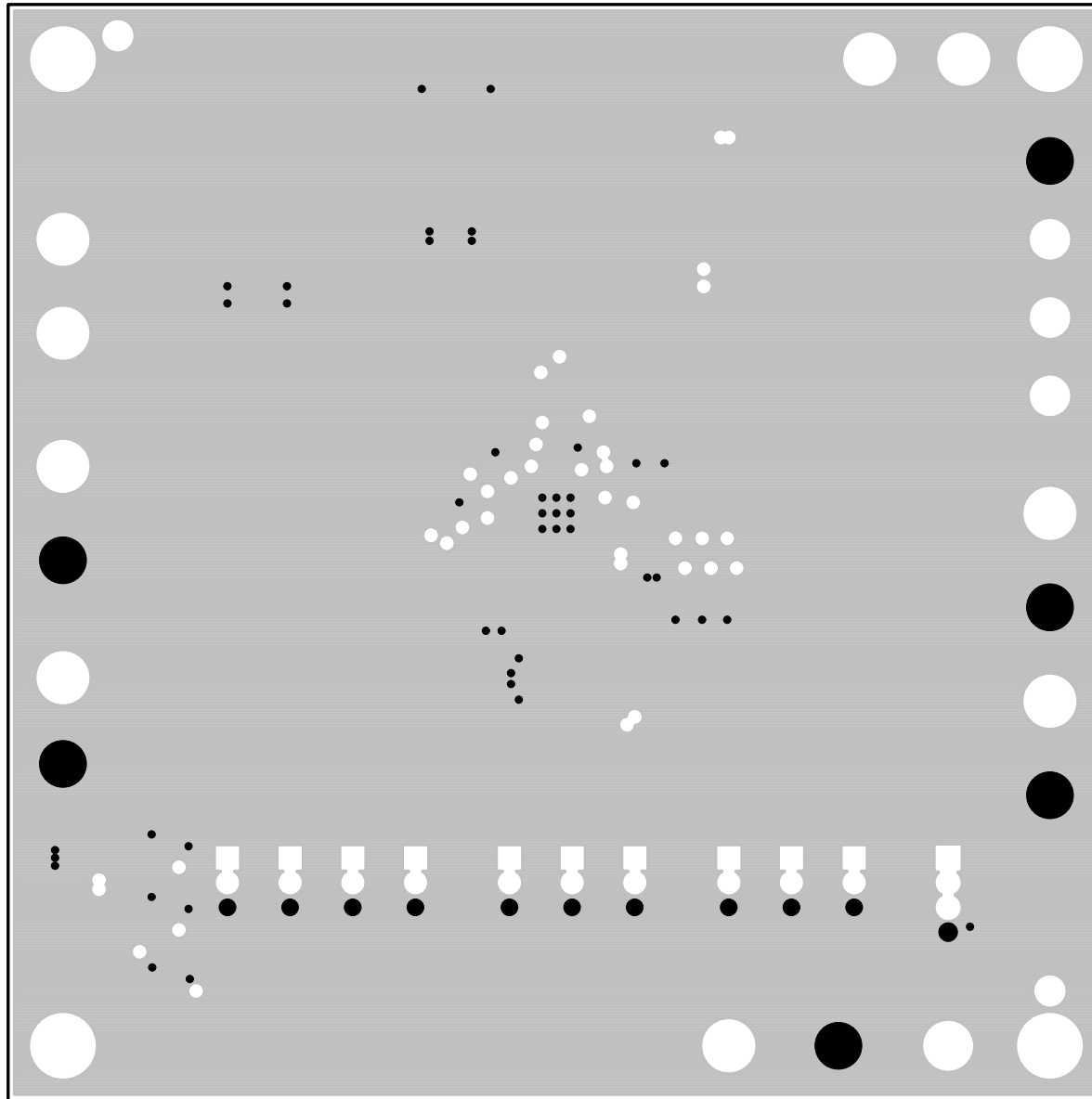
TOP LAYER

LINEAR TECH CORP.

DEMO CIRCUIT 2048A-3 * LTC3330

NANOPOWER BUCK - BOOST DC / DC WITH
ENERGY HARVESTING BATTERY LIFE EXTENDER

DATE: 7 - 29 - 13



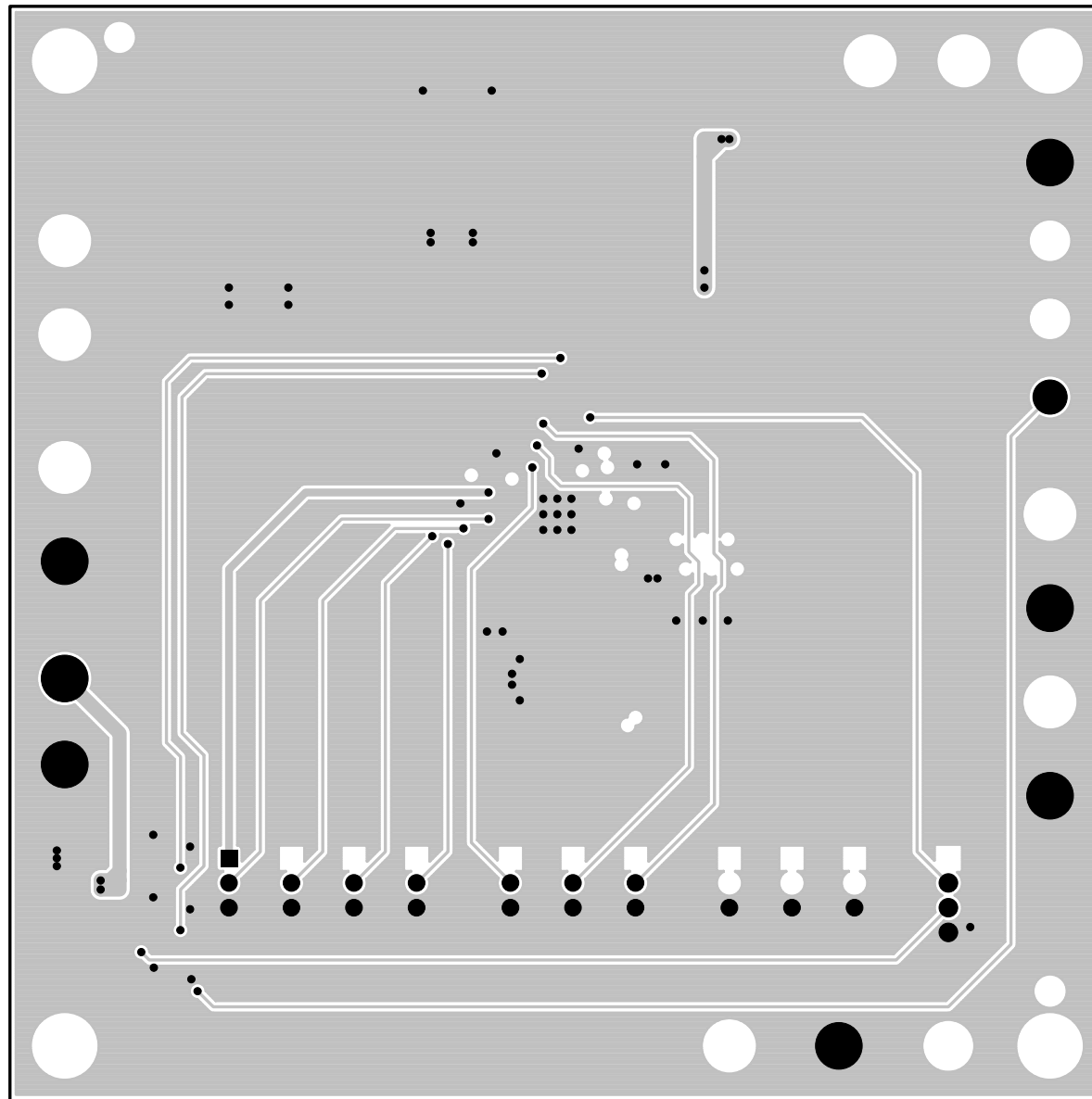
LAYER 2 GND PLANE

LINEAR TECH CORP.

DEMO CIRCUIT 2048A-3 * LTC3330

NANOPOWER BUCK - BOOST DC / DC WITH
ENERGY HARVESTING BATTERY LIFE EXTENDER

DATE: 7 - 29 - 13



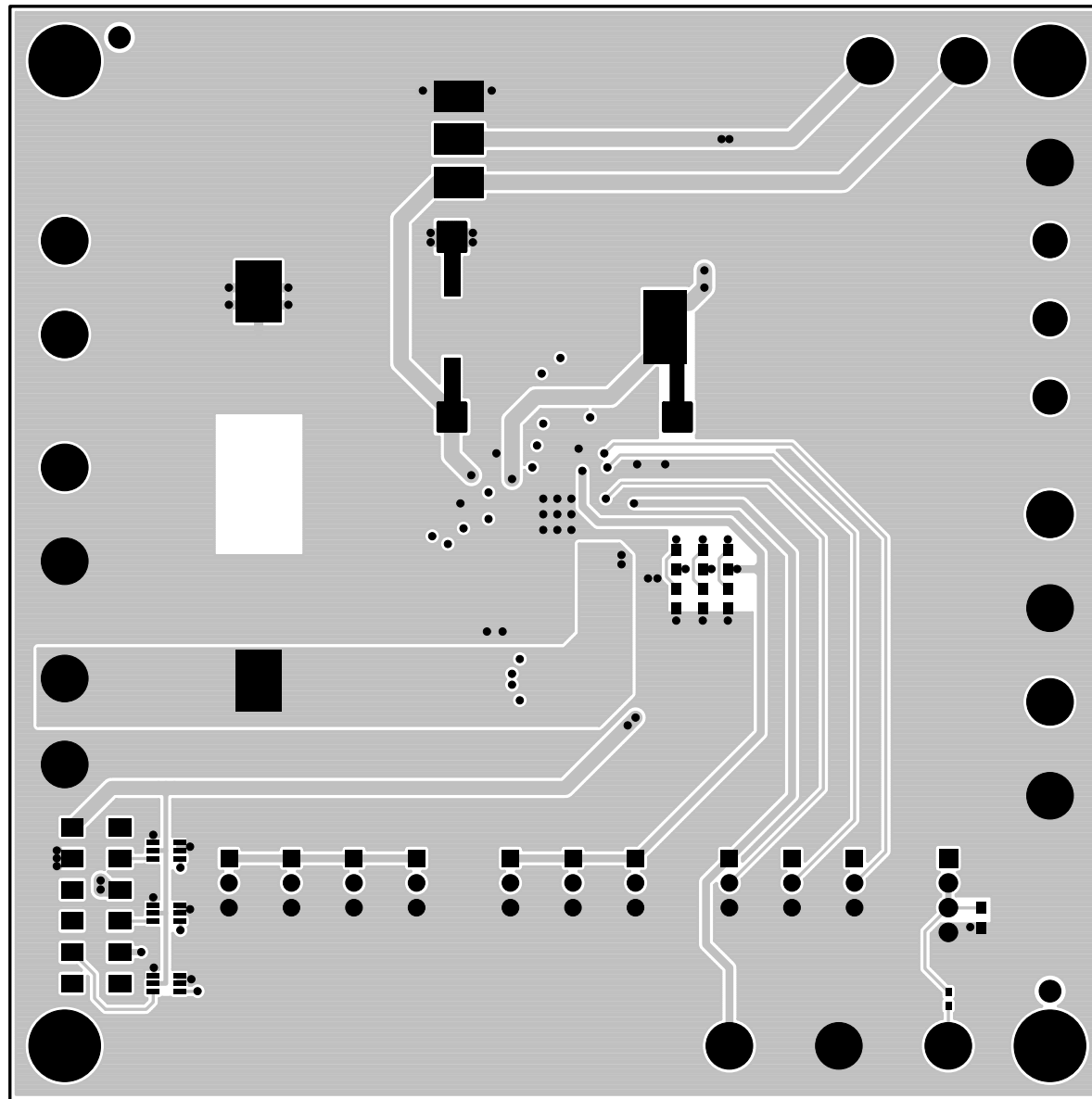
LAYER 3 GND PLANE

LINEAR TECH CORP.

DEMO CIRCUIT 2048A-3 * LTC3330

NANOPOWER BUCK - BOOST DC / DC WITH
ENERGY HARVESTING BATTERY LIFE EXTENDER

DATE: 7 - 29 - 13



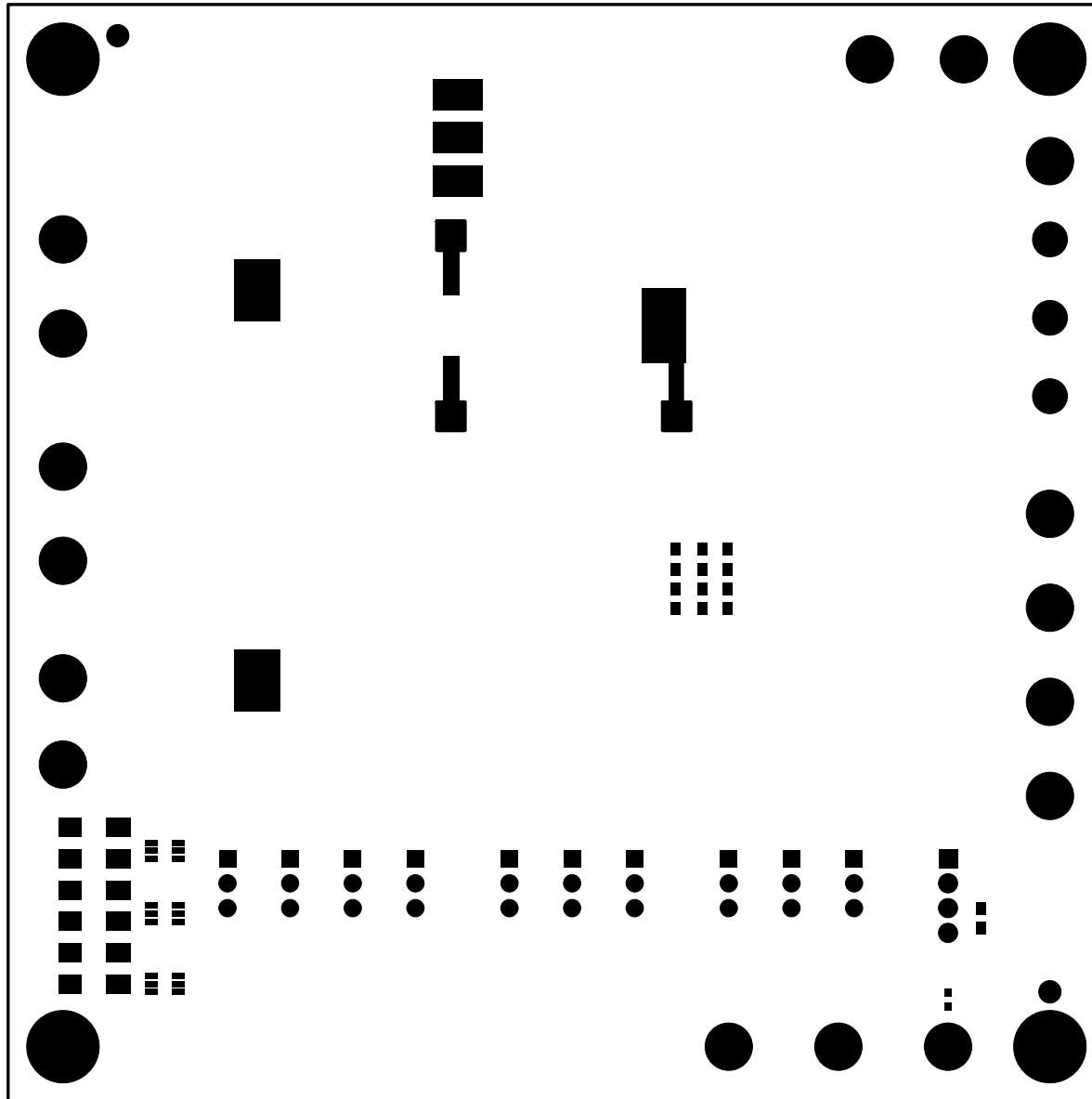
BOTTOM SIDE

LINEAR TECH CORP.

DEMO CIRCUIT 2048A-3 * LTC3330

NANOPOWER BUCK - BOOST DC / DC WITH
ENERGY HARVESTING BATTERY LIFE EXTENDER

DATE: 7 - 29 - 13



SOLDERMASK BOTTOM

LINEAR TECH CORP.

DEMO CIRCUIT 2048A-3 * LTC3330

NANOPOWER BUCK - BOOST DC / DC WITH
ENERGY HARVESTING BATTERY LIFE EXTENDER

DATE: 7 - 29 - 13

