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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.	J.DREW

SCALE = NONE



1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900 www.linear.com
Fax: (408)434-0507
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TITLE: SCHEMATIC

20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR

SIZE N/A	IC NO. LTC3388EMSE-1 / LTC3388EMSE-3 DEMO CIRCUIT 1658A-A/B	REV. 2
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DATE: 8-23-10

SHEET 1 OF 1

LTC3388EMSE-1 LTC3388EMSE-3

20V High Efficiency Nano-power Step-Down Regulator

DESCRIPTION

Demonstration Circuit 1658A is a 20V High Efficiency Nanopower Step-Down Regulator featuring the LTC3388-1/LTC3388-3. The LTC3388 is an ultralow quiescent current power supply designed to regulate the output voltage by means of a nanopower high efficiency synchronous buck regulator. The input current is only 720nA typical at no load while maintaining output voltage regulation, capable of supplying 50mA of load current. The LTC3388-1/LTC3388-3 also incorporates an accurate undervoltage lockout feature to disable the converter and maintain a low quiescent current state when the input voltage falls below 2.3V. In regulation, the LTC3388-1/LTC3388-3 enter a sleep state in which both input and output quiescent currents are minimal. The buck converter turns on and off as needed to maintain regulation. An additional standby mode disables the buck switching while the

output is in regulation for short duration loads requiring low ripple.

Four output voltages are pin selectable with up to 50mA of continuous output current. A power good comparator produces a logic high referenced to VOUT on the PGOOD pin when the converter reaches the programmed VOUT, signaling that the output is in regulation.

The LTC3388EMSE-1/LTC3388EMSE-3 are available in a 10-lead (3mm × 3mm) MSE surface mount package with exposed pad.

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TABLE 1
PERFORMANCE SUMMARY LTC3388EMSE-1 Specifications are at $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNITS
VIN	Input Voltage Range		2.7	20.0	V
VOUT 1.2V	Output Voltage Range	D0 = 0, D1=0	1.14	to 1.26	V
VOUT 1.5V	Output Voltage Range	D0 = 1, D1=0	1.44	to 1.56	V
VOUT 1.8V	Output Voltage Range	D0 = 0, D1=1	1.737	to 1.863	V
VOUT 2.5V	Output Voltage Range	D0 = 1, D1=1	2.40	to 2.60	V

PERFORMANCE SUMMARY LTC3388EMSE-3 Specifications are at $T_A = 25^\circ\text{C}$

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNITS
VIN	Input Voltage Range		2.7	20.0	V
VOUT 2.8V	Output Voltage Range	D0 = 0, D1=0	2.688	to 2.912	V
VOUT 3.0V	Output Voltage Range	D0 = 1, D1=0	2.895	to 3.105	V
VOUT 3.3V	Output Voltage Range	D0 = 0, D1=1	3.201	to 3.399	V
VOUT 5.0V	Output Voltage Range	D0 = 1, D1=1	4.82	to 5.18	V

OPERATING PRINCIPLE

Refer to the block diagram within the LTC3388-1/-3 data sheet for its operating principle.

The LTC3388 is an ultralow quiescent current power supply designed to regulate the output voltage by means of a nanopower high efficiency synchronous buck regulator. See Figure 1 for the LTC3388-1 50mA efficiency versus input voltage curves for the four output voltage settings. Figure 2 is the efficiency curves for the LTC3388-3. The input current is only 720nA typical at no load while maintaining output voltage regulation capable of supplying 50mA of load current.

The LTC3388-1/LTC3388-3 also incorporates an accurate undervoltage lockout feature to disable the converter and maintain a low quiescent current (approximately 400nA), state when the input voltage falls below 2.3V. When the voltage on V_{IN} rises above the UVLO rising threshold, the buck converter is enabled and charge is transferred from the input capacitor to the output capacitor.

The buck regulator uses a hysteretic voltage algorithm to control the output through internal feedback from the V_{OUT} sense pin. The buck converter charges the output capacitor through an inductor to a value slightly higher than the regulation point. It does this by ramping the inductor current up to 150mA through an internal PMOS switch and then ramping down to 0mA through an internal NMOS switch. When the buck converter brings the output voltage into regulation, the LTC3388-1/LTC3388-3 enter a sleep state in which both input and output quiescent currents are minimal. The buck converter turns on and off as needed to maintain regulation.

Two logic pins, EN and STBY, determine the operating mode of the LTC3388-1/LTC3388-3. When EN is high and STBY is low the synchronous buck converter is enabled and will regulate the output if the input is above the programmed output voltage and above the UVLO threshold. If EN is low, the buck converter circuitry is powered to save quiescent current. The internal rail generation circuits are kept alive and the voltages at V_{IN2} and CAP are maintained.

While enabled, the LTC3388-1/LTC3388-3 can be placed in standby mode by bringing STBY high. In standby mode the buck converter is disabled, eliminating the quiescent current used to run the buck circuitry. The PGOOD and sleep comparators are kept alive to maintain the state of the PGOOD pin. The sleep comparator has a lower quiescent current than the PGOOD comparator and when the LTC3388-1/LTC3388-3 is in sleep mode, the PGOOD comparator is shut down and PGOOD is held high. If STBY is driven high with EN low, it will be ignored and will remain in shutdown.

Four output voltages are available by tying the output select pins, D0 and D1, to GND of V_{IN2} . Table 1 shows the four D0/D1 codes and their corresponding output voltages with up to 50mA of continuous output current. The internal feedback network draws a small amount of current from VOUT.

A power good comparator produces a logic high referenced to VOUT on the PGOOD pin when the converter reaches the programmed VOUT, signaling that the output is in regulation. The PGOOD pin will remain Hi-Z until VOUT falls below 92% of the desired regulation voltage. If PGOOD is high and V_{IN} falls below the UVLO falling threshold, PGOOD will remain high until VOUT falls to 92% of the desired regulation point.

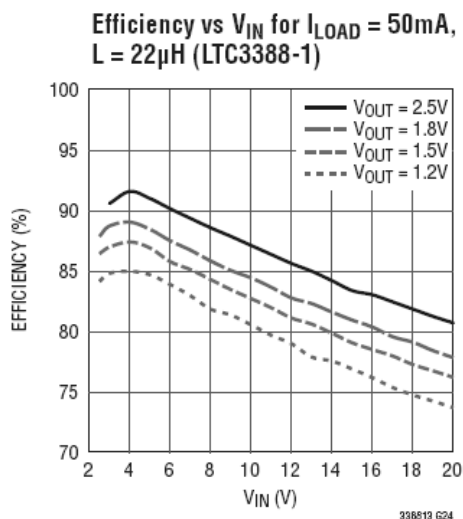


Figure 1

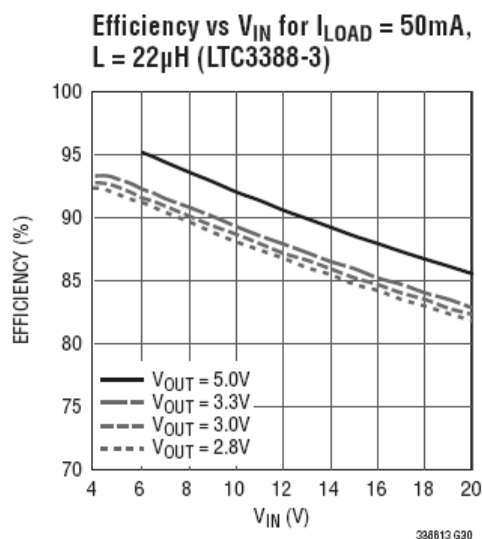


Figure 2

QUICK START PROCEDURE

Using short twisted pair leads for any power connections, with all loads and power supplies off, refer to Figure 1 for the proper measurement and equipment setup.

Follow the procedure below:

1. Initial Jumper, PS and LOAD 1 settings:

JP1 = 0

JP2 = 0

JP3 = EN

JP4 = ON

JP5 = 1

PS1 = OFF

LOAD1 = OFF

2. Turn on PS1 and slowly increase voltage to 2.0V while monitoring the input current. If the current remains less than 5mA, increase PS1 to 6.0V.
3. Set LOAD1 to 50mA. Verify voltage on VOUT is within the VOUT 1.2V/2.8V range in Table 1.

- Verify that the output ripple voltage is between 40mV and 90mV. Verify that PGOOD is high (VOUT).
- Set JP1 to 1. Set LOAD1 to 50mA. Verify voltage on VOUT is within the VOUT 1.5V/3.0V range in Table 1. Verify that the output ripple voltage is between 40mV and 90mV.
 - Set JP1 to 0 and JP2 to 1. Set LOAD1 to 50mA. Verify voltage on VOUT is within the VOUT 1.8V/3.3V range in Table 1. Verify that the output ripple voltage is between 50mV and 90mV.
 - Set JP1 to 1. Set LOAD1 to 50mA. Verify voltage on VOUT is within the VOUT 2.5V/5.0V range in Table 1. Verify that the output ripple voltage is between 50mV and 110mV.
 - Turn off LOAD1. Set JP4 to STBY. Monitor PGOOD as VOUT decays. PGOOD will go low when VOUT is approximately 2.25V/4.5V.
 - Set JP4 to ON. Set LOAD1 to 50mA. Verify voltage on VOUT is within the VOUT 2.5V/5.0V range in Table 1 and that PGOOD is high.
 - Turn off PS1 and LOAD1.

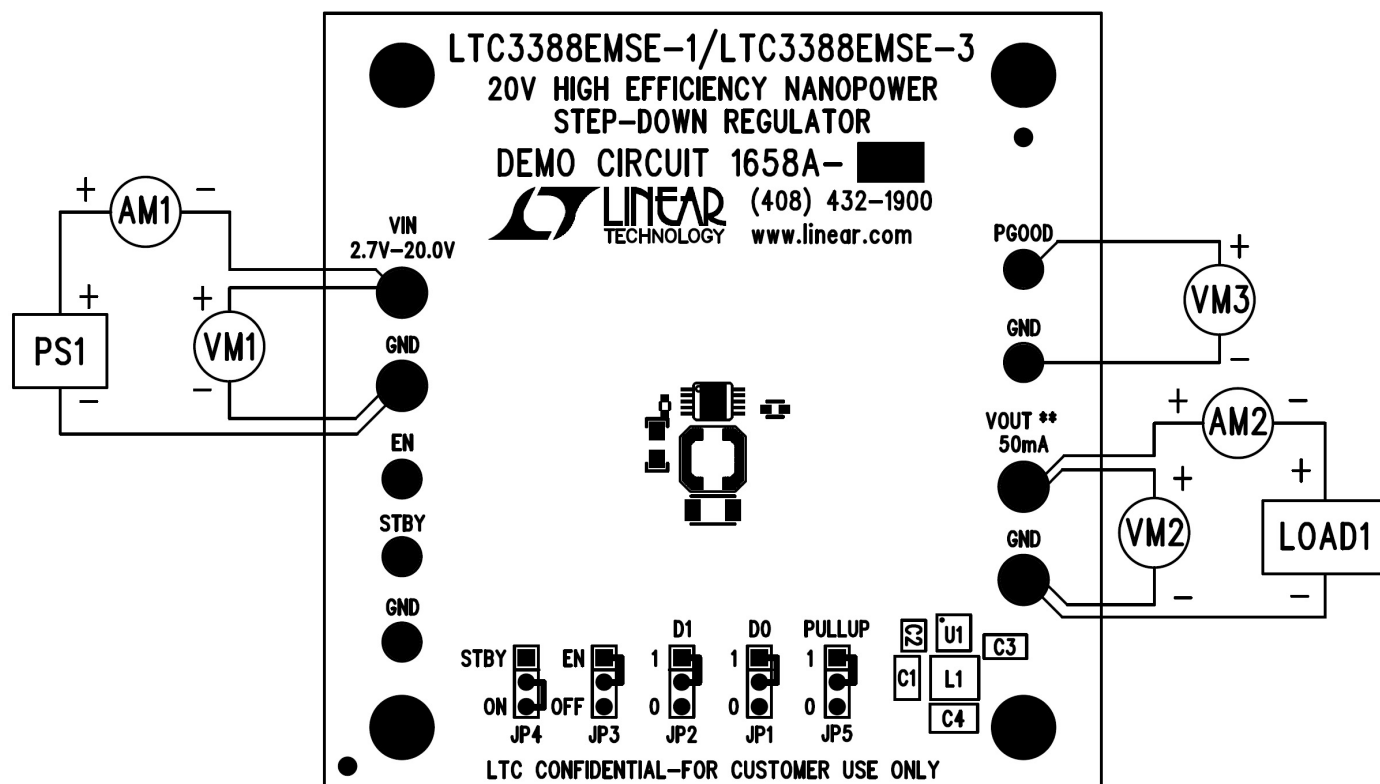


Figure 1. Proper Measurement Equipment Setup

REVISION HISTORY			
ECO	REV	DESCRIPTION	APPROVED DATE
-	2	PRODUCTION FAB	J.DREW 8-23-10

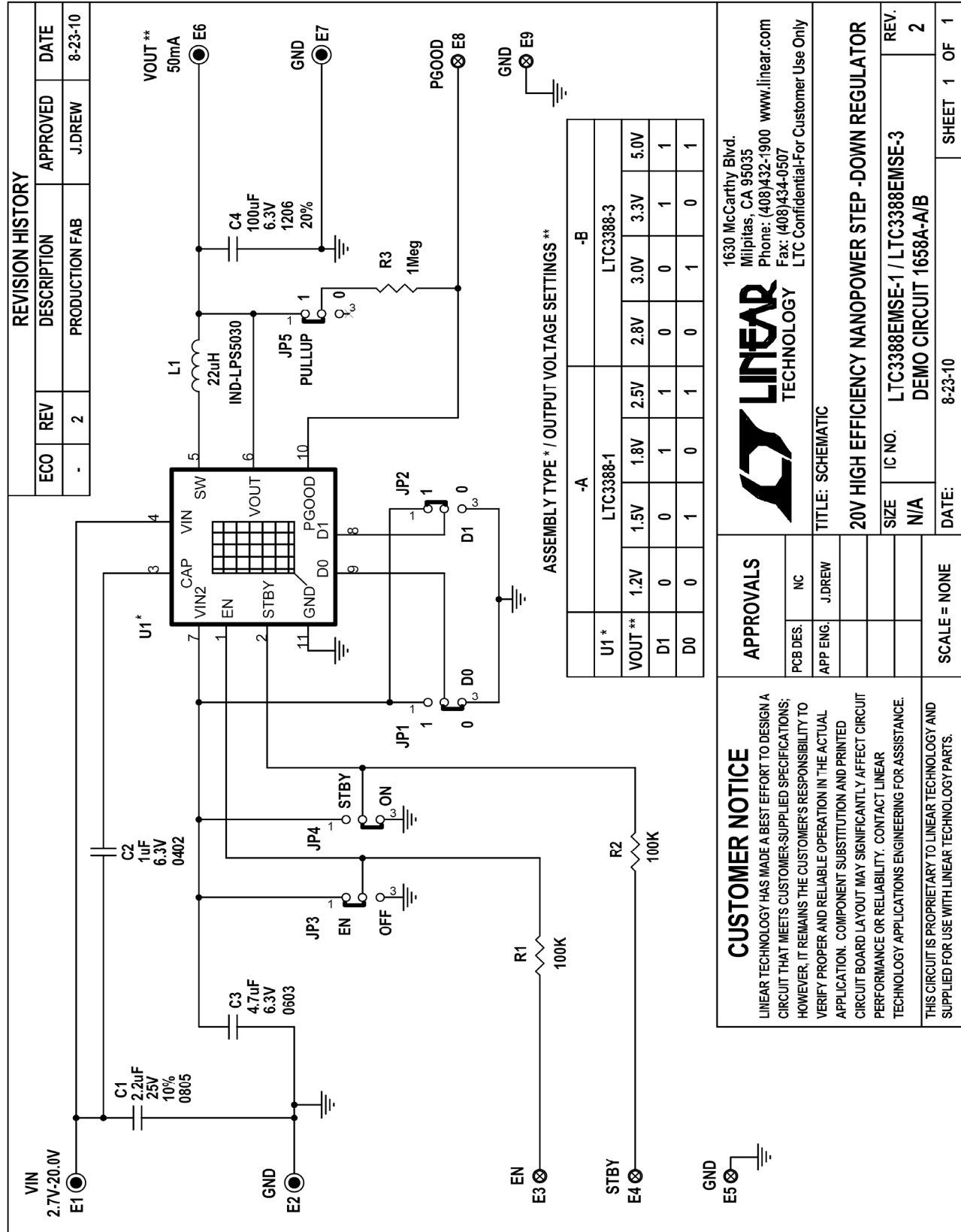


Figure 2: Schematic diagram

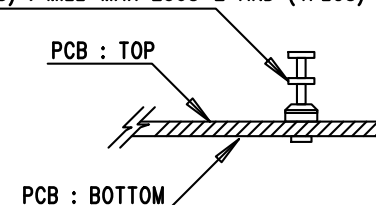
Item	Qty	Reference - Des	Part Description	Manufacturer, Part #
REQUIRED CIRCUIT COMPONENTS:				
1	1	C1	CAP, CHIP, X5R, 2.2uF, 10%, 25V, 0805	MURATA, GRM21BR71E225KA73L
2	1	C2	CAP, CHIP, X5R, 1uF, 10%, 6.3V, 0402	TDK, C1005X5R0J105KT
3	1	C3	CAP, CHIP, X5R, 4.7uF, 10%, 6.3V, 0603	TDK, C1608X5R0J475KT
4	1	C4	CAP, CHIP, X5R, 100uF, 20%, 6.3V, 1206	Taiyo Yuden, JMK316BJ107ML-T
5	1	L1	INDUCTOR, 22uH, 0.70A, 170mΩ, 5mm x 5mm	COILCRAFT, LPS5030-223MLC
6	2	R1,R2	RES,CHIP,100K,1/16W,1%,0402	VISHAY, CRCW0402100KFKED
7	1	R3	RES,CHIP,1MEG,1/16W,1%,0402	VISHAY, CRCW04021M00FKED
8	1	U1 (DC1658A-A)	20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR	LINEAR TECH., LTC3388EMSE-1
	1	U1 (DC1658A-B)	20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR	LINEAR TECH., LTC3388EMSE-3
HARDWARE FOR DEMO BOARD ONLY:				
1	4	E1,E2,E6,E7	TURRET, 0.09 DIA	MILL-MAX, 2501-2
2	5	E3-E5,E8,E9	TURRET, 0.061 DIA	MILL-MAX, 2308-2
3	5	JP1-JP5	HEADER, 3 PINS, 2mm	SAMTEC, TMM-103-02-L-S
4	5	JP1-JP5	SHUNT 2MM	SAMTEC, 2SN-BK-G

Bill of Materials

REVISION HISTORY				
ECO	REV	DESCRIPTION	APPR	DATE
-	2	PRODUCTION FAB	J.DREW	8-23-10

NOTES: UNLESS OTHERWISE SPECIFIED

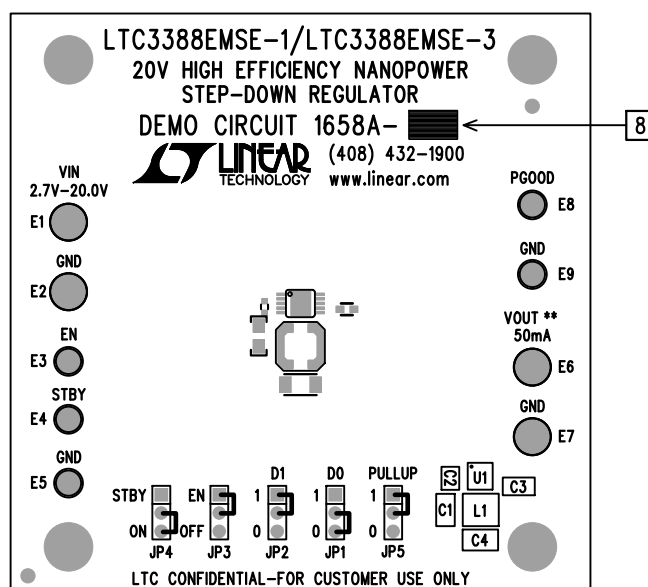
1. WORKMANSHIP SHALL BE IN ACCORDANCE WITH IPC-A-610.
2. ASSEMBLY PROCESS SHALL INCLUDE: REFLOW SOLDER TOP SIDE SMD.
3. PARTS TO OMIT WILL BE SPECIFIED ON THE BILL OF MATERIALS
LOCATIONS OF OMITTED PARTS SHALL BE FREE OF SOLDER.
MASK THE SOLDER STENCIL WHERE SMT PARTS ARE OMITTED.
4. INSTALL SHUNTS AS SHOWN ON ASSY DRAWING.
5. DEPANELIZE BOARDS AFTER ASSEMBLY AND ROUTE-OUT THE BREAKOUT TABS ON FOUR SIDES OF THE BOARD EDGE.
6. MAXIMUM SOLDER TEMPERATURE IS 240 DEGREES CELCIUS.
7. INSTALL TURRETS AS SHOWN BELOW:
(5 PLCS) : MILL-MAX 2308-2 AND (4PLCS) : MILL-MAX 2501-2



8. MARK EACH ASSEMBLY TYPE WITH BLACK PERMANENT MARKER AS SHOWN IN TABLE BELOW:

ASSEMBLY TYPE*/OUTPUT VOLTAGE SETTINGS**

	-A				-B			
U1*	LTC3388-1				LTC3388-3			
VOUT**	1.2V	1.5V	1.8V	2.5V	2.8V	3.0V	3.3V	5.0V
D1	0	0	1	1	0	0	1	1
D0	0	1	0	1	0	1	0	1



Silkscreen Top
LINEAR TECHNOLOGY
DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3
20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR
DATE: 8-23-10

APPROVALS

	INIT	DATE
PCB DES. NC		8-23-10
APP ENG. J.DREW		8-23-10



1630 MCCARTHY BLVD
MILPITAS, CA 95035
PH: (408)432-1900
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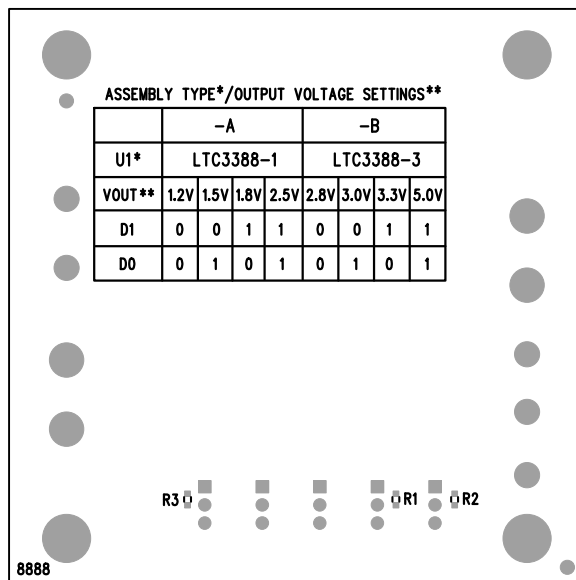
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20V HIGH EFFICIENCY NANOPOWER
STEP-DOWN REGULATOR

SIZE N/A IC NO. LTC3388EMSE-1/-3 REV. 2
DEMO CIRCUIT 1658A-A/B


SCALE = NONE

FILENAME: DC1658A-2.PCB

SHT 1 of 2



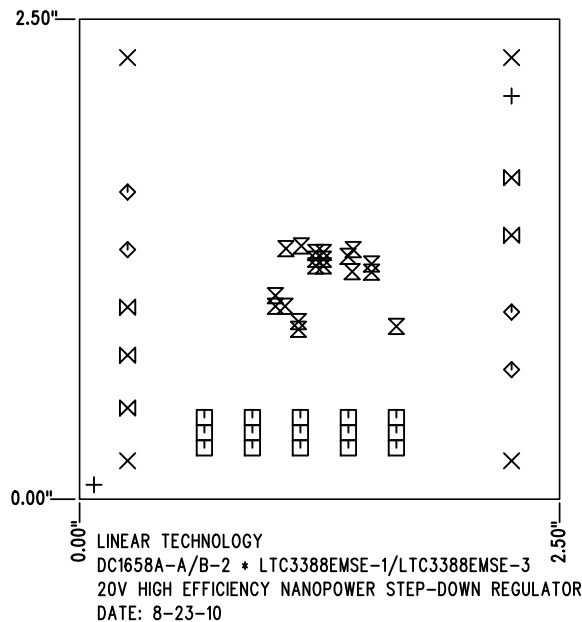
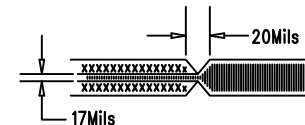
DATE: 8-23-10
 20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR
 DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3
 LINEAR TECHNOLOGY
 Silkscreen Bottom

APPROVALS			 LINEAR TECHNOLOGY		1630 MCCARTHY BLVD MILPITAS, CA 95035 PH: (408)432-1900 www.Linear.com LTC CONFIDENTIAL- FOR CUSTOMER USE ONLY	
	INIT	DATE				
PCB DES.	NC	8-23-10	TITLE: BOTTOM ASSEMBLY DRAWING 20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR			
APP ENG.	J.DREW	8-23-10				
			SIZE N/A IC NO. LTC3388EMSE-1/-3 DEMO CIRCUIT 1658A-A/B			
SCALE = NONE			FILENAME: DC1658A-2.PCB		REV. 2 SHT 2 of 2	

REVISION HISTORY				
ECO	REV	DESCRIPTION	APPR	DATE
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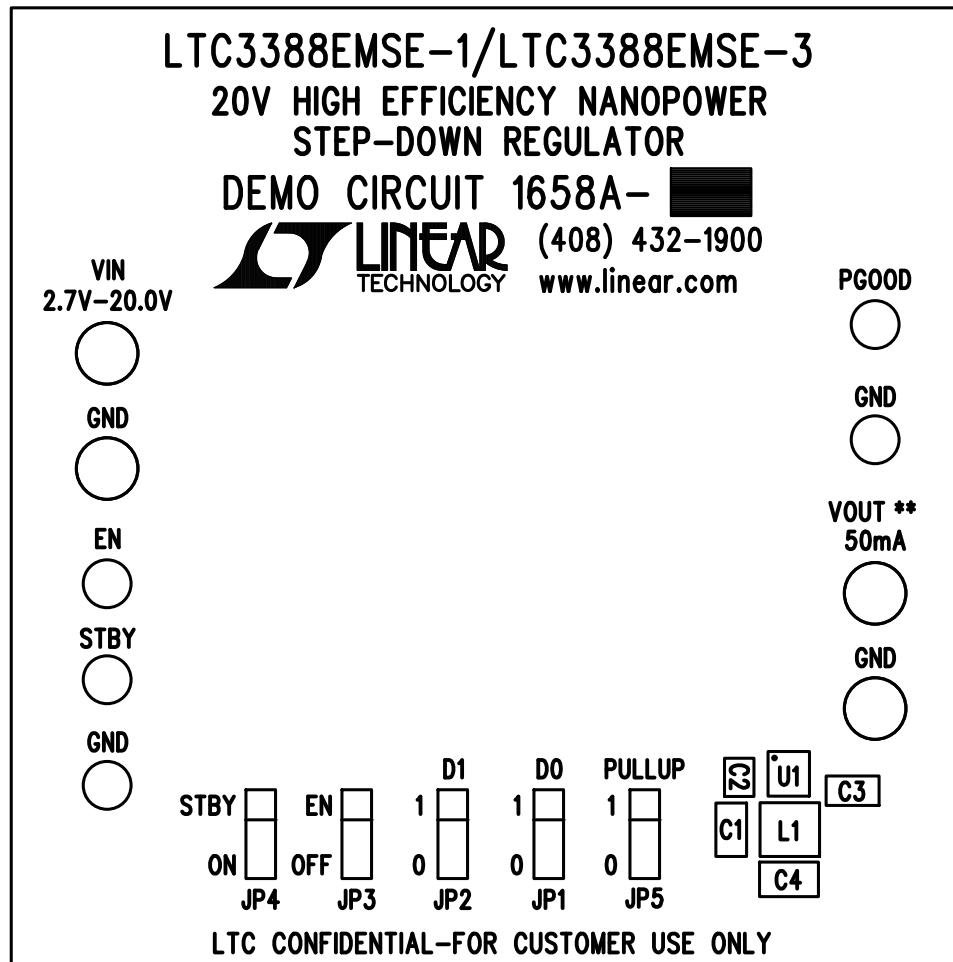
NOTES: UNLESS OTHERWISE SPECIFIED:

- ARTWORK P/N DEMO CIRCUIT 1658A-2
- FAB PER IPC-A-600. 4-Layers.
- MATERIAL: EPOXY FIBERGLASS, NEMA GRADE FR-4
.062 +/- .005 INCH THICKNESS WITH 2 OZ.
COPPER FINISH ON TWO OUTER LAYERS AND
1 OZ. COPPER ON FOUR INTERNAL LAYERS.
FLAMMABILITY RATING: 94 V-2 MINIMUM .
- SIZE: CUT TO DIMENSIONS AND TOLERANCES SHOWN.
0.00 ARE PRIMARY DATUMS.
- BOARD: SELECTIVE PLATED BOARD. SOLDER
MASK OVER BARE COPPER, COLOR, GREEN LPI.
GOLD IMMERSION (ENIG) BOTH SIDES.
SILKSCREEN : USING WHITE NON-CONDUCTIVE INK.
PLATE THRU ALL HOLES WITH COPPER
MIN. PLATING THICKNESS: 1 OZ. EXCEPT
WHERE PLATING NOT REQUIRED
- DRILL: ALL HOLES SHALL BE DRILLED +/- .003 INCH
WITH RESPECT TO CTR. OF DRILLED PAD.
ALL HOLES FINISHED SIZE AFTER PLATING.
- DO NOT ALTER ARTWORK e.g. TO ADD LOGO OR DATE CODE OR
ELECTRICAL TEST STAMP, BUT YOU MAY MODIFY PAD SIZE TO
MEET END FINISH.
- SCORING FOR PANELIZED PCB: "PRODUCTION RUN ONLY"
- DO NOT ALTER SOLDER MASK MAINTAIN .0018" OVERSIZE
ON SMT PADS. A .005" WEBBING IS REQUIRED BETWEEN SMD PADS.
- PCB'S ARE TO BE ROHS COMPLIANT.
- BOARDS WILL BE SERIALIZED USING BOTTOM SILKSCREEN DIGITS 8888.

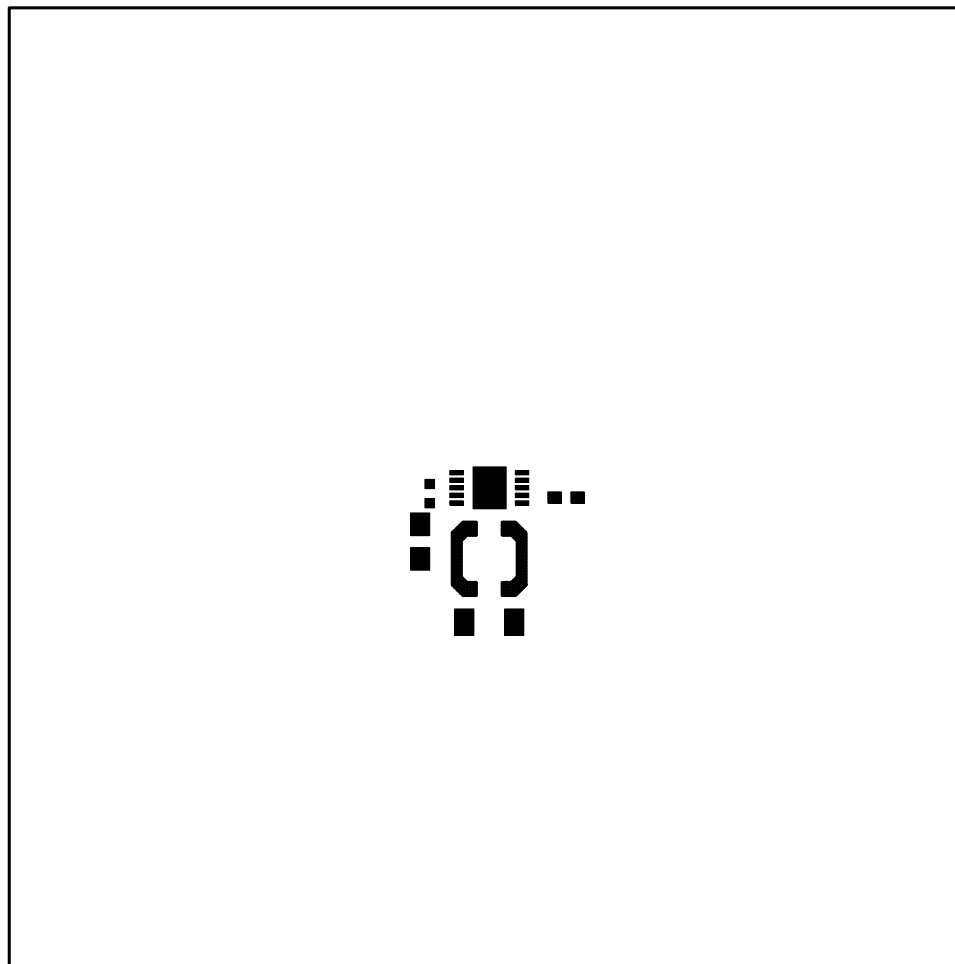


SIZE	QTY	SYM	PLATED	TOL
72	2	+	NO	+/- .003 in
190	4	X	YES	+/- .003 in
31	15	□	YES	+/- .003 in
94	4	◇	YES	+/- .003 in
15	19	⊗	YES	+/- .003 in
63	5	⊗	YES	+/- .003 in

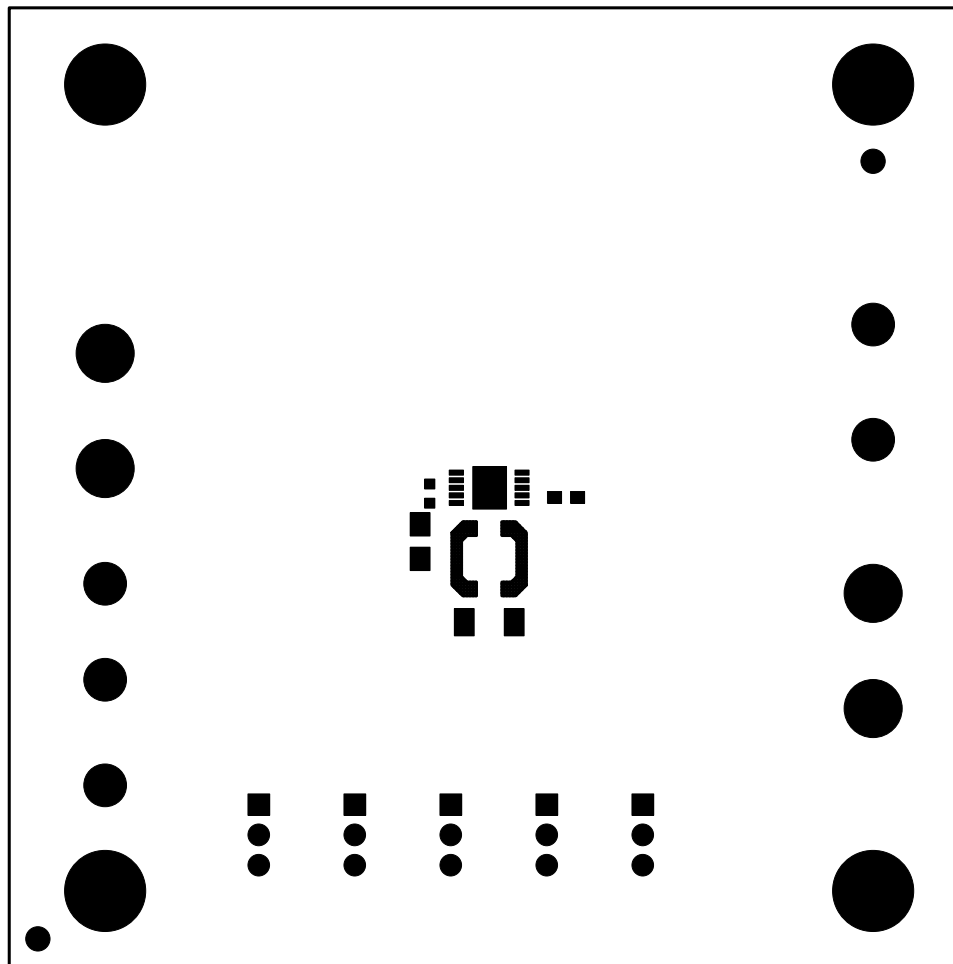
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON ANGLE ±1 0.XXX" = ±0.005" INTERPRET DIM AND TOL PER ASME Y14.5M-1994 THIRD ANGLE PROJECTION 	APPROVALS		 1630 MCCARTHY BLVD MILPITAS, CA 95035 PH: (408)432-1900 www.Linear.com LTC CONFIDENTIAL- FOR CUSTOMER USE ONLY
	PCB DES.	NC	DATE
	APP ENG.	J.DREW	8-23-10
	SCALE: NONE	FILENAME: DC1658A-2.PCB	SH T 1 of 1
DO NOT SCALE DRAWING	TITLE: FABRICATION DRAWING: 20V HIGH EFFICIENCY NANOPower STEP-DOWN REGULATOR		REV. 2
	SIZE	IC NO.	
	N/A	LTC3388EMSE-1/LTC3388EMSE-3 DEMO CIRCUIT 1658A-A/B	



Silkscreen Top
 LINEAR TECHNOLOGY
 DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3
 20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR
 DATE: 8-23-10



PasteMask Top
LINEAR TECHNOLOGY
DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3
20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR
DATE: 8-23-10



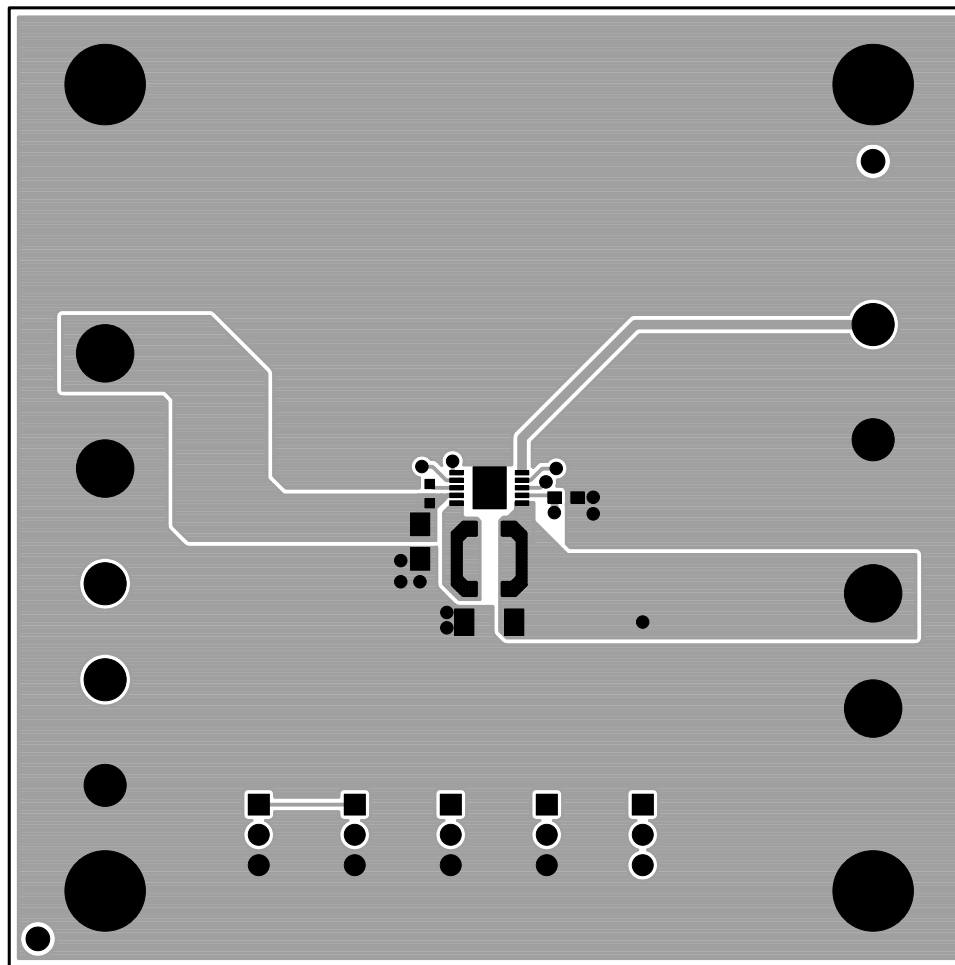
SolderMask Top

LINEAR TECHNOLOGY

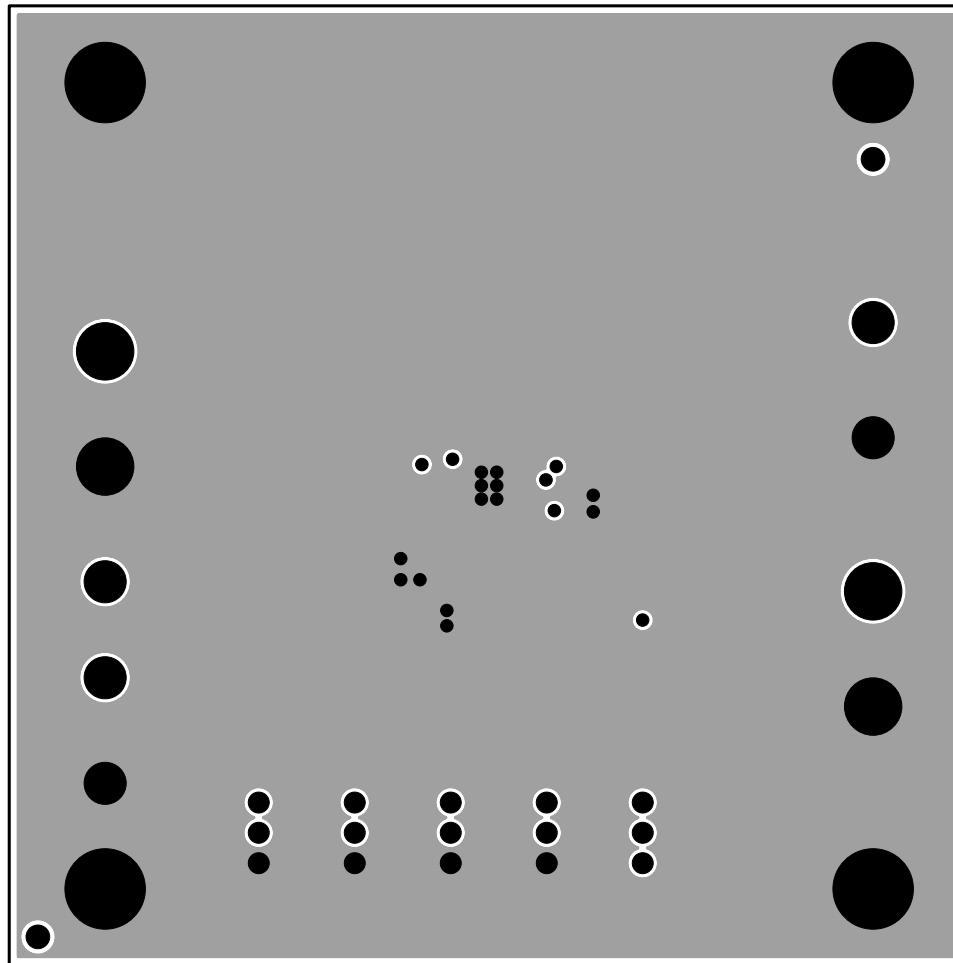
DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3

20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR

DATE: 8-23-10



Primary Side
LINEAR TECHNOLOGY
DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3
20V HIGH EFFICIENCY NANOPower STEP-DOWN REGULATOR
DATE: 8-23-10



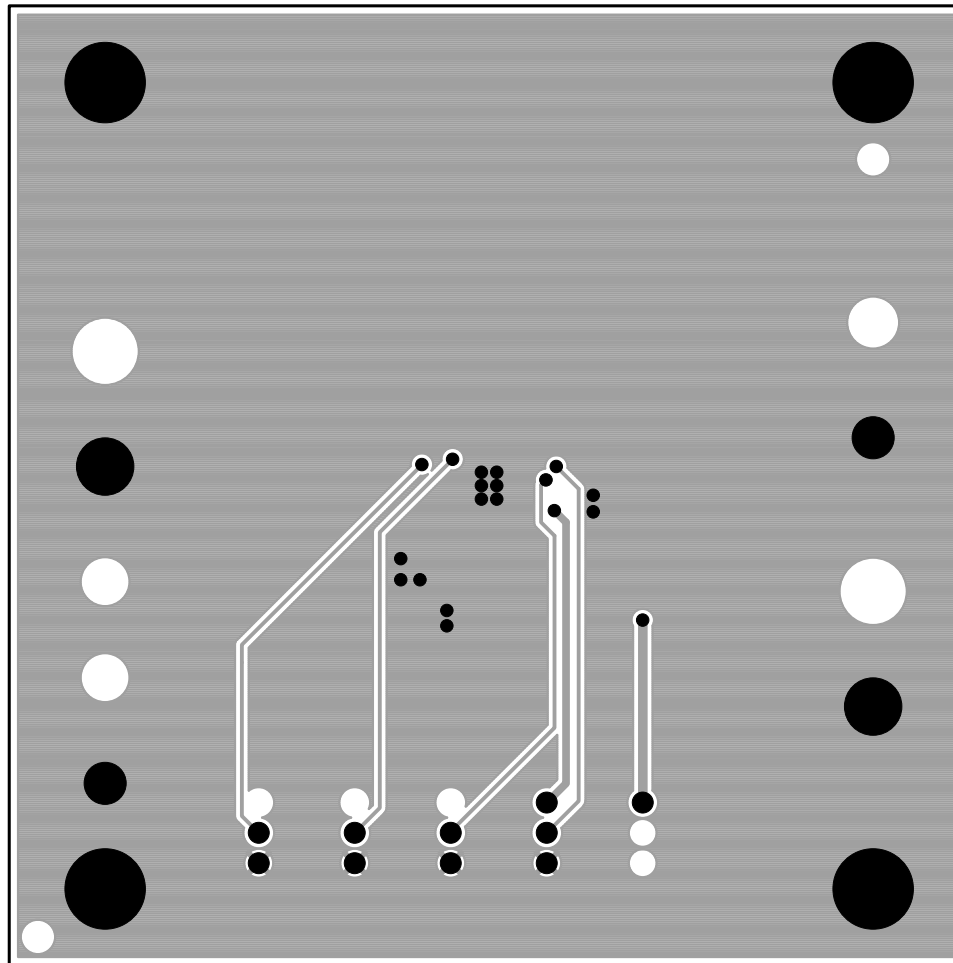
Layer2

LINEAR TECHNOLOGY

DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3

20V HIGH EFFICIENCY NANOPower STEP-DOWN REGULATOR

DATE: 8-23-10



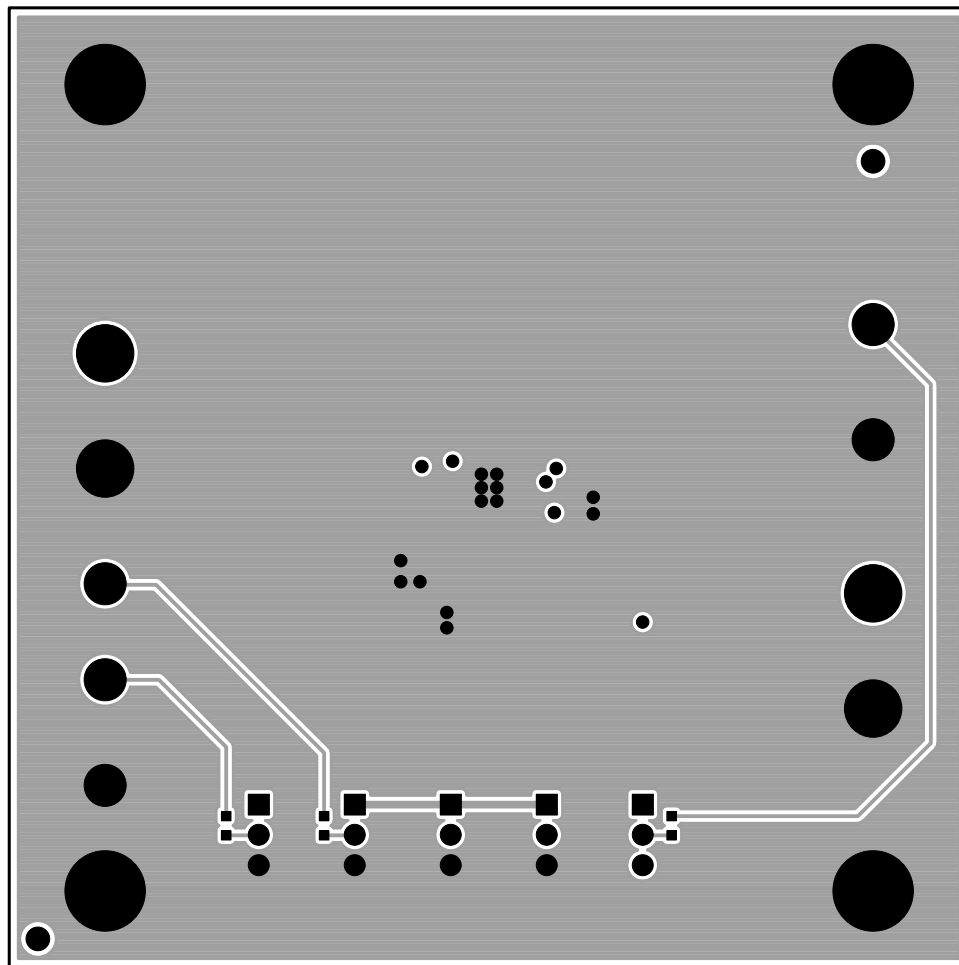
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LINEAR TECHNOLOGY

DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3

20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR

DATE: 8-23-10



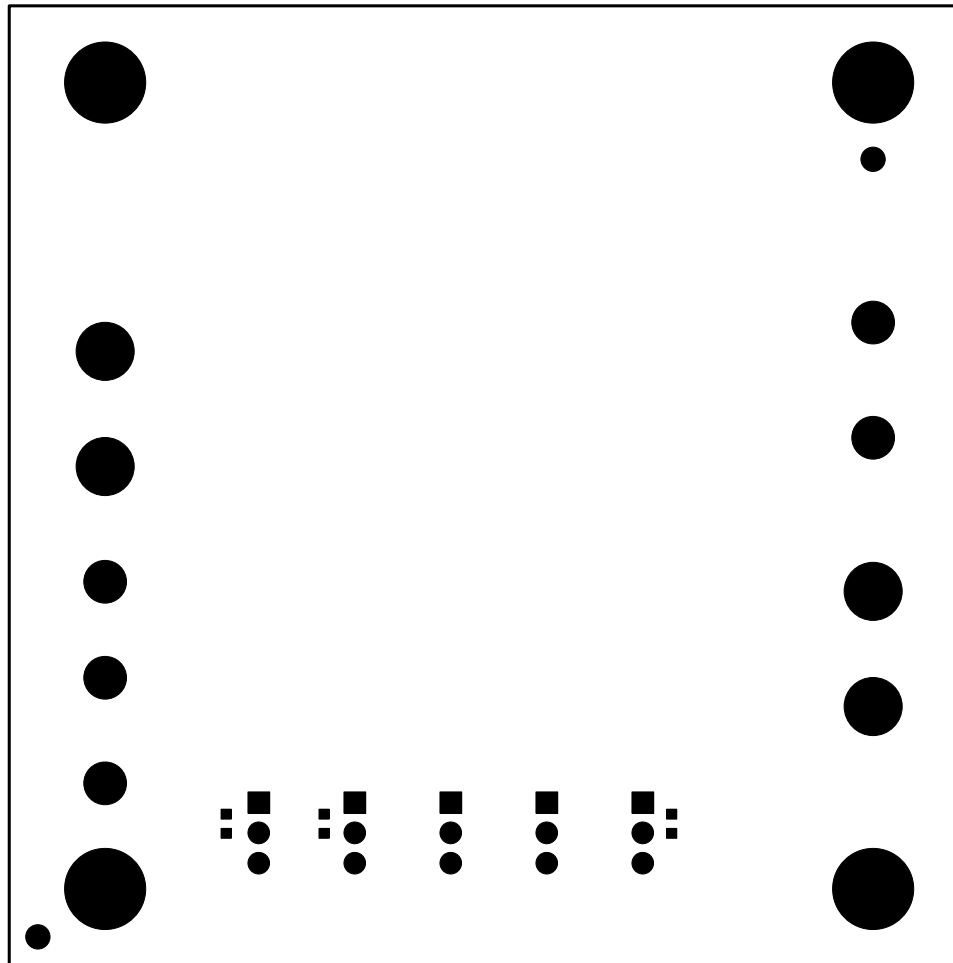
Bottom Side

LINEAR TECHNOLOGY

DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3

20V HIGH EFFICIENCY NANOPower STEP-DOWN REGULATOR

DATE: 8-23-10



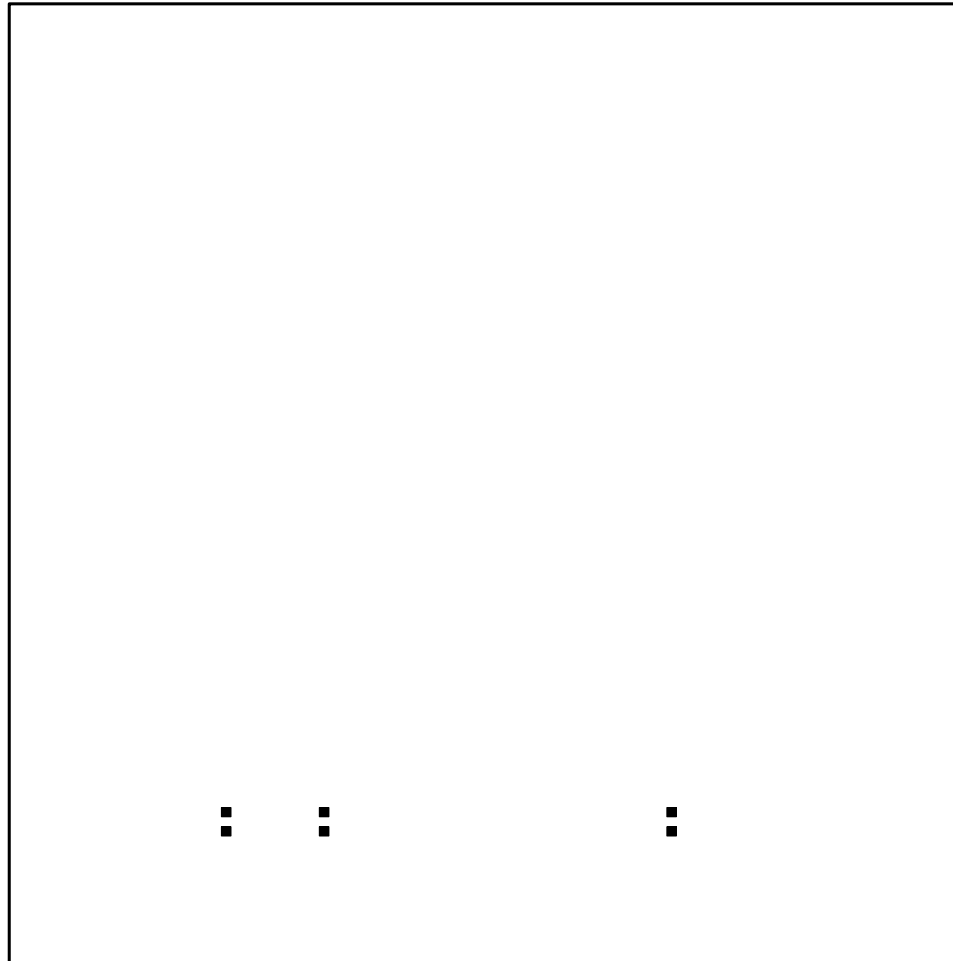
SolderMask Bottom

LINEAR TECHNOLOGY

DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3

20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR

DATE: 8-23-10



PasteMask Bottom

LINEAR TECHNOLOGY

DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3

20V HIGH EFFICIENCY NANOPower STEP-DOWN REGULATOR

DATE: 8-23-10

ASSEMBLY TYPE*\OUTPUT VOLTAGE SETTINGS**							
-B				-A			
LTC3388-3				LTC3388-1			
V0.2	V3.3	V0.8	V8.5	V2.5	V8.1	V2.1	V3.1
1	1	0	0	1	1	0	0
1	0	1	0	1	0	1	0

11R1 11R2

11R3

8888

Silkscreen Bottom
 LINEAR TECHNOLOGY
 DC1658A-A/B-2 * LTC3388EMSE-1/LTC3388EMSE-3
 20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR
 DATE: 8-23-10

<i>Item</i>	<i>Qty</i>	<i>Reference</i>	<i>Part Description</i>	<i>Manufacturer / Part #</i>	<i>Kit Qty</i>
				NUMBER OF BOARDS =	300
1	1	C1	CAP, CHIP, X5R, 2.2uF, 10%, 25V, 0805	MURATA, GRM21BR71E225KA73L	300
2	1	C2	CAP, CHIP, X5R, 1uF, 10%, 6.3V, 0402	TDK, C1005X5R0J105KT	300
3	1	C3	CAP, CHIP, X5R, 4.7uF, 10%, 6.3V, 0603	TDK, C1608X5R0J475KT	300
4	1	C4	CAP, CHIP, X5R, 100uF, 20%, 6.3V, 1206	Taiyo Yuden, JMK316BJ107ML-T	300
5	4	E1,E2,E6,E7	TURRET, 0.09 DIA	MILL-MAX, 2501-2	1200
6	5	E3-E5,E8,E9	TURRET, 0.061 DIA	MILL-MAX, 2308-2	1500
7	5	JP1-JP5	HEADER, 3 PINS, 2mm	SAMTEC, TMM-103-02-L-S	1500
8	5	JP1-JP5	SHUNT 2MM	SAMTEC, 2SN-BK-G	1500
9	1	L1	INDUCTOR, 22UH , 0.70A, 170mΩ, 5mm x 5mm	COILCRAFT, LPS5030-223MLC	300
10	2	R1,R2	RES,CHIP,100K,1/16W,1%,0402	VISHAY, CRCW0402100KFKED	600
	1	R3	RES,CHIP,1MEG,1/16W,1%,0402	VISHAY, CRCW04021M00FKED	
11	4		STAND-OFF, NYLON 0.375" tall (SNAP ON)	KEYSTONE, 8832 (SNAP ON)	1200
12	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT 1658A	300
13	1		STENCIL - TOP	STENCIL #1658A-TOP	300
14	1		STENCIL - BOTTOM	STENCIL #1658A-BOTTOM	300

Linear Technology Corporation
LTC3388EMSE-1

BILL OF MATERIALS
DC1658A-A
QTY- 150
10/18/2010 2:05 PM

<i>Item</i>	<i>Qty</i>	<i>Reference</i>	<i>Part Description</i>	<i>Manufacturer / Part #</i>	<i>Kit Qty</i>
				NUMBER OF BOARDS =	150
1	1	DC1658A	DC1658A General BOM		150
2	1	U1	20V HIGH EFFICIENCY NANOPower STEP-DOWN REGULATOR	LINEAR TECH.,LTC3388EMSE-1	150

Linear Technology Corporation
LTC3388EMSE-3

BILL OF MATERIALS
DC1658A-B
QTY- 150
10/18/2010 2:05 PM

<i>Item</i>	<i>Qty</i>	<i>Reference</i>	<i>Part Description</i>	<i>Manufacturer / Part #</i>	<i>Kit Qty</i>
				NUMBER OF BOARDS =	150
1	1	DC1658A	DC1658A General BOM		150
2	1	U1	20V HIGH EFFICIENCY NANOPower STEP-DOWN REGULATOR	LINEAR TECH.,LTC3388EMSE-3	150

<i>Item</i>	<i>Qty</i>	<i>Reference - Des</i>	<i>Part Description</i>	<i>Manufacturer, Part #</i>
REQUIRED CIRCUIT COMPONENTS:				
1	1	C1	CAP, CHIP, X5R, 2.2uF, 10%, 25V, 0805	MURATA, GRM21BR71E225KA73L
2	1	C2	CAP, CHIP, X5R, 1uF, 10%, 6.3V, 0402	TDK, C1005X5R0J105KT
3	1	C3	CAP, CHIP, X5R, 4.7uF, 10%, 6.3V, 0603	TDK, C1608X5R0J475KT
4	1	C4	CAP, CHIP, X5R, 100uF, 20%, 6.3V, 1206	Taiyo Yuden, JMK316BJ107ML-T
5	1	L1	INDUCTOR, 22UH, 0.70A, 170mΩ, 5mm x 5mm	COILCRAFT, LPS5030-223MLC
6	2	R1,R2	RES,CHIP,100K,1/16W,1%,0402	VISHAY, CRCW0402100KFKED
7	1	R3	RES,CHIP,1MEG,1/16W,1%,0402	VISHAY, CRCW04021M00FKED
8	1	U1 (DC1658A-A)	20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR	LINEAR TECH., LTC3388EMSE-1
	1	U1 (DC1658A-B)	20V HIGH EFFICIENCY NANOPOWER STEP-DOWN REGULATOR	LINEAR TECH., LTC3388EMSE-3
HARDWARE FOR DEMO BOARD ONLY:				
1	4	E1,E2,E6,E7	TURRET, 0.09 DIA	MILL-MAX, 2501-2
2	5	E3-E5,E8,E9	TURRET, 0.061 DIA	MILL-MAX, 2308-2
3	5	JP1-JP5	HEADER, 3 PINS, 2mm	SAMTEC, TMM-103-02-L-S
4	5	JP1-JP5	SHUNT 2MM	SAMTEC, 2SN-BK-G

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REGULATOR
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VOUT= 1.2V-2.5V@50mA

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