DESCRIPTION

Demonstration circuit 561 is a high current step-down PolyPhase™ converter featuring the LTC®3731 three-phase synchronous buck controller. To minimize the supply footprint size and improve the thermal performance, the 5mm x 5mm QFN package LTC3731CUH controller is used. The switching frequency of the LTC3731 is in the 250kHz to 600kHz range. The input voltage is from 10V to 14V and output is 1.5V. An optional VID controller circuit is available on both DC561A-A and DC561A-B demo circuits for output voltage programming. DC561A-A can provide up to 180A output current with a 12-phase buck circuit, while DC561A-B is a 6-phase buck converter with up to 90A output current. Optional 0.1% external voltage reference and external OP-AMP compensation circuits are also available on DC561A-A and DC561A–B for accurate voltage regulation and best transient response. Additional MOSFETs can be populated for higher output current.

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

Table 1. Performance Summary (T_A = 25°C)

PARAMETER	CONDITION	VALUE
Minimum Input Voltage		10V
Maximum Input Voltage		14V
V_{OUT}	DC561A-A: I_{OUT} = 0A to 180A DC561A-B: I_{OUT} = 0A to 90A	1.5V±1%
Nominal Switching Frequency	Set by resistor divider on demo circuit	450kHz
Typical Efficiency	DC561A-A: V_{IN} = 12V, V_{OUT} = 1.5V, I_{OUT} = 180A DC561A-B: V_{IN} = 12V, V_{OUT} = 1.5V, I_{OUT} = 90A	83% 84%

QUICK START PROCEDURE

Demonstration circuit 561 is easy to set up to evaluate the performance of the LTC3731. Refer to Figure 2. For proper measurement equipment setup and follow the procedure below:

1. Preset the following jumpers on the demo circuit: JP1-Int Prog, JP2-Off, JP4-Off, JP9-Int. and JP10-On. With above jumper setup, the supply is running at about 450kHz phase frequency, and using the on board +5V bias supply.
2. Preset the voltage of the input power supply to be 12V. Preset the current limit of the input power supply to be greater than 30A for DC561A-A or 15A for DC561A-B. With power off, connect the input power supply to Vin and GND.
3. Connect the electronic load to Vout+ and Vout-. Preset the load current to be 0A.
4. Turn on the power at the input.
5. Check for the proper output voltages at no load and full load (180A for DC561A-A and 90A for DC561A-B). Vout = 1.485V to 1.515V. A cooling fan is needed if the load current is higher than 50% of the full rated load current.

6. Adjust the loads within the operating range and observe the output voltage regulation, efficiency and other parameters.
7. (Optional) To perform the load transient test, set jumpers JP4-On and JP2-On. Use coaxial cables to connect LOAD STEP and Vout+ coaxial outputs to oscilloscope inputs. Adjust R81 and R75 for desired load current step and rising slope. Adjust R73 for desired load current falling slope.

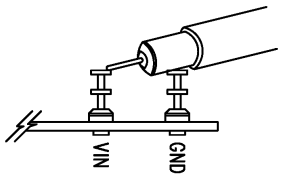


Figure 1. Scope Probe Placement for Measuring Input or Output Ripple

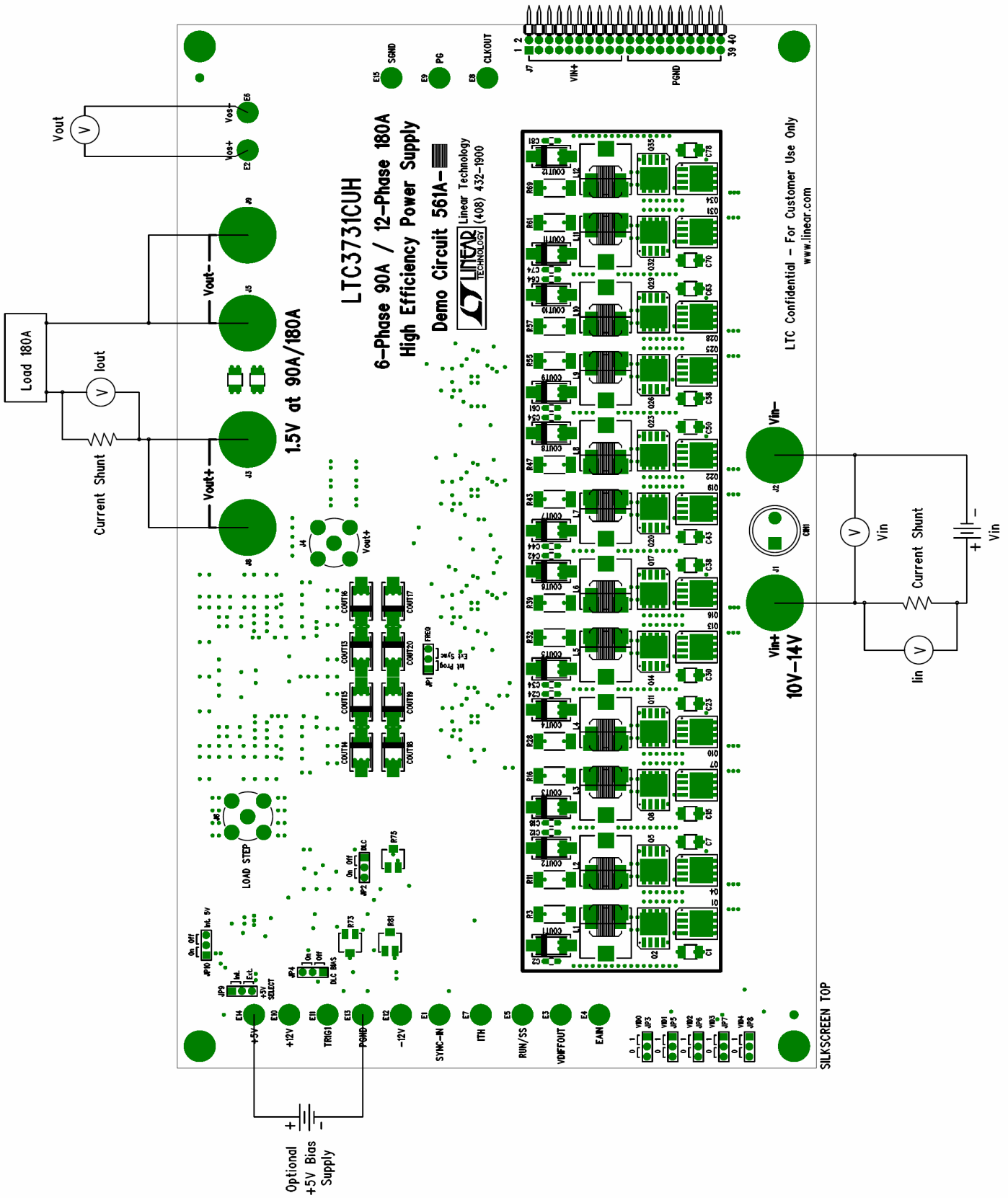
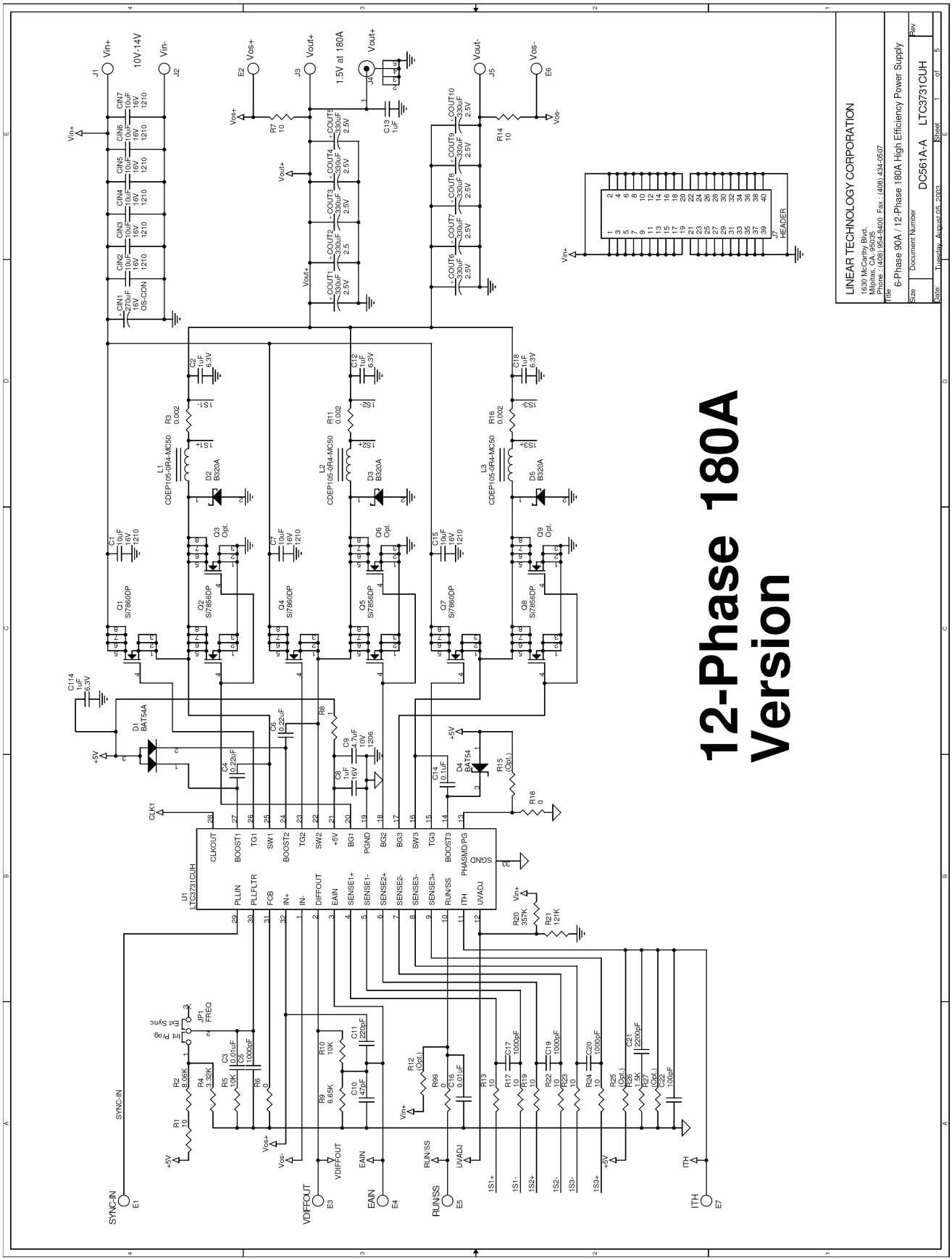


Figure 2. Proper Measurement Equipment Setup


12-Phase 180A
Version
LINEAR TECHNOLOGY CORPORATION
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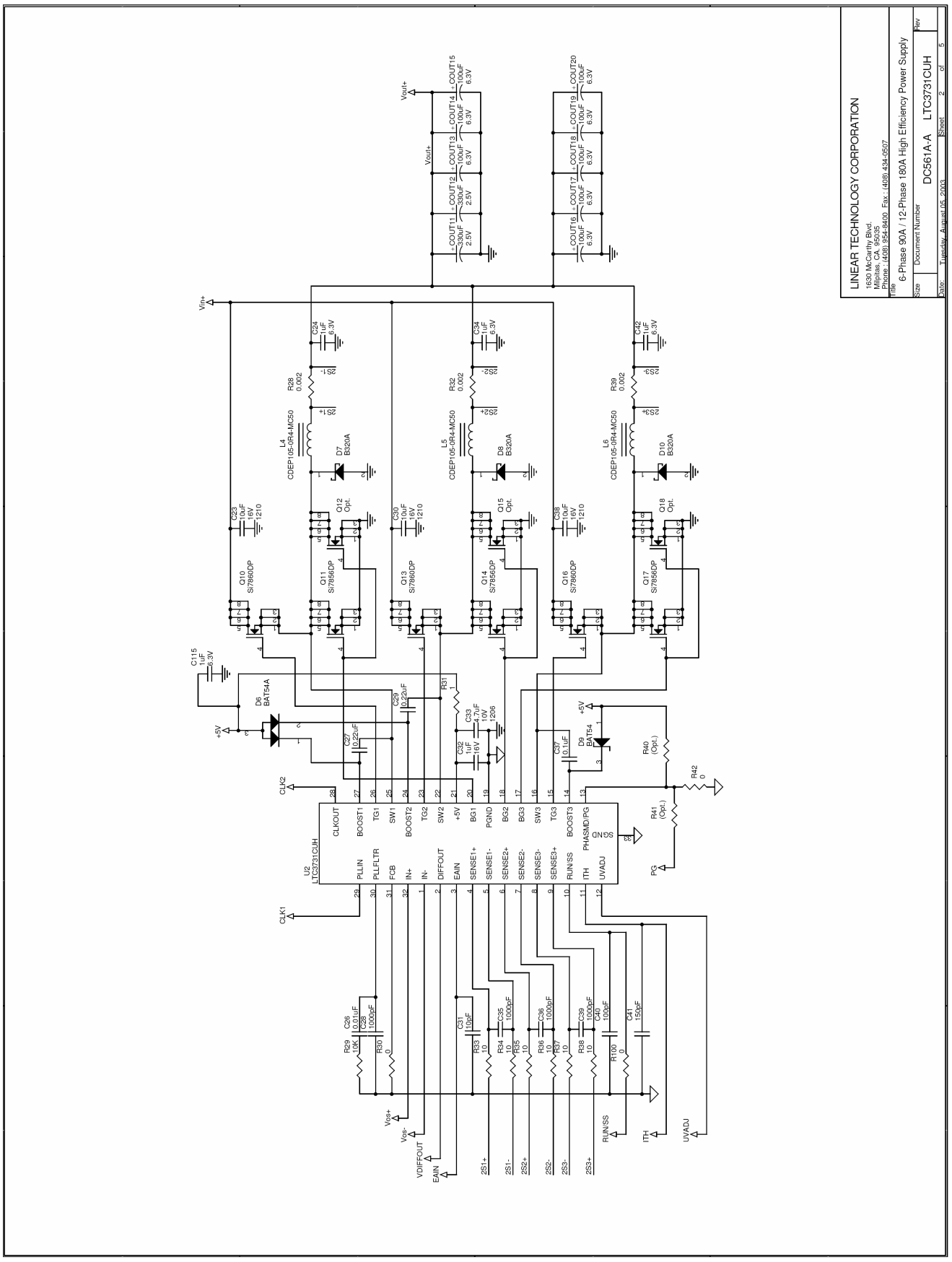
Title 6-Phase 90A / 12-Phase 180A High Efficiency Power Supply
Size Document Number DC561A-A LTC3731CUH Rev
Date: Tuesday, August 05, 2003 Sheet 1 of 5
U1 LTC3731CUH
J1 Vin+
J2 Vin-
10V-14V
J3 Vout+
1.5V at 180A
J4 Vout+
J5 Vout-
E2 Vos+
E6 Vos-
J7 HEADER
L1 CDEP105-0R44-MC50
L2 CDEP105-0R44-MC50
L3 CDEP105-0R44-MC50
D1 BAT54A
D2 B320A
D3 B320A
D4 BAT54
D5 B320A
Q1 Si7860DP
Q2 Si7860DP
Q3 Opt.
Q4 Si7860DP
Q5 Si7860DP
Q6 Opt.
Q7 Si7860DP
Q8 Si7860DP
Q9 Opt.
SYNC-IN
VDIFFOUT
EAIN
RUN/SS
UVADJ
ITH
1S1+
1S1-
1S2+
1S2-
1S3-
1S3+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6-Phase 90A / 12-Phase 180A High Efficiency Power Supply
Size
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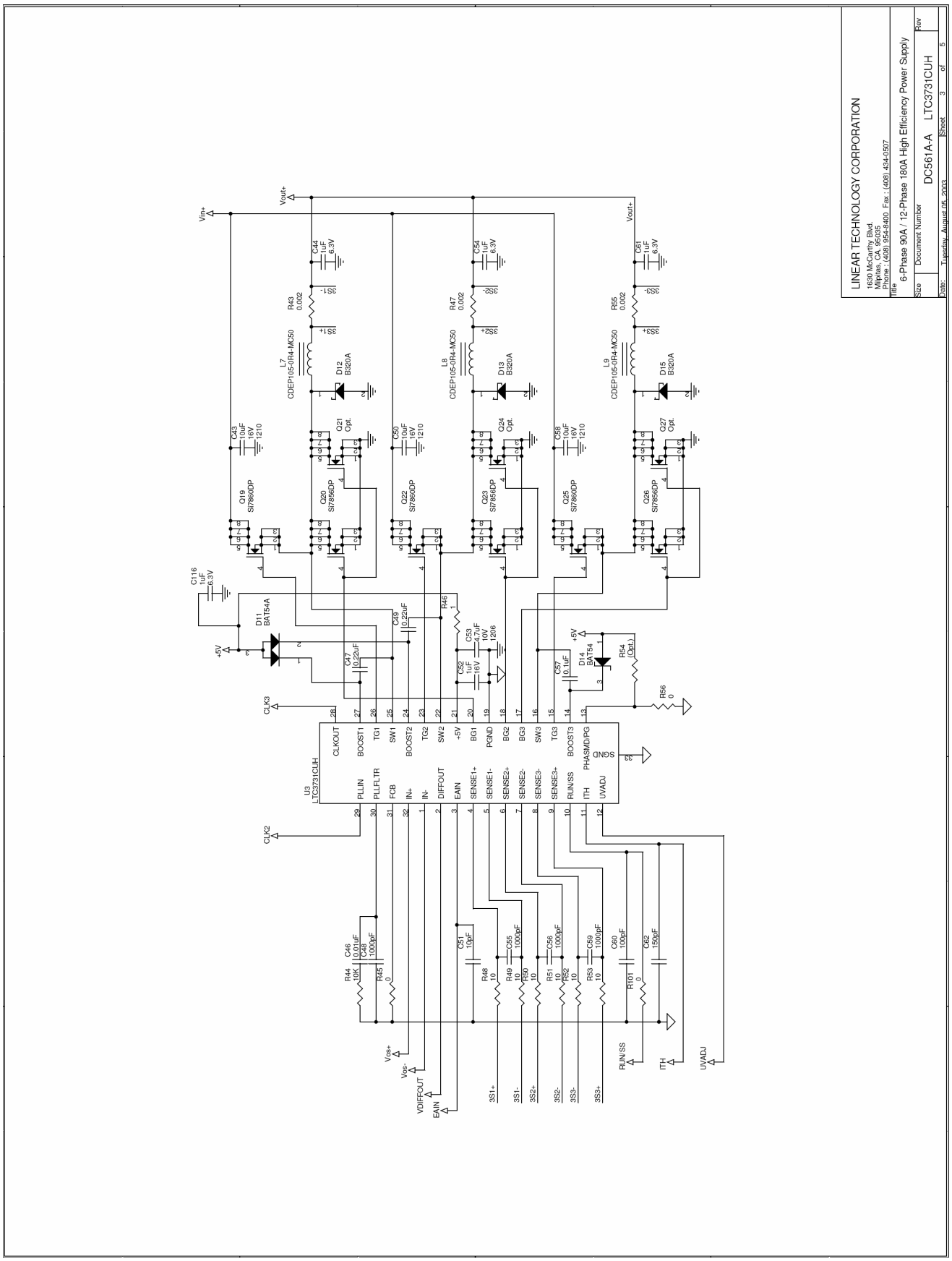
Sheet 2 of 5
Vout+
Vin+
U2
LTC3731CUH
CLKOUT
BOOST1
TG1
SW1
BOOST2
TG2
SW2
+5V
BG1
PGND
BG2
BG3
SW3
TG3
BOOST3
PHASMD/PG
SGND
PLLIN
PLLFLTR
FCB
IN+
IN-
DIFFOUT
EAIN
SENSE1+
SENSE1-
SENSE2+
SENSE2-
SENSE3-
SENSE3+
RUN/SS
ITH
UVADJ
CLK1
CLK2
PG
L4
CDEP105-0R4-MC50
L5
CDEP105-0R4-MC50
L6
CDEP105-0R4-MC50
D6
BAT54A
D7
B320A
D8
B320A
D10
B320A
D9
BAT54
Q10
Si7860DP
Q11
Si7856DP
Q12
Opt.
Q13
Si7860DP
Q14
Si7856DP
Q15
Opt.
Q16
Si7860DP
Q17
Si7856DP
Q18
Opt.
R28
0.002
R32
0.002
R39
0.002
R40
(Opt.)
R41
(Opt.)
R42
0
R29
10K
R30
0
R31
1
R33
10
R34
10
R35
10
R36
10
R37
10
R38
10
R100
0
C24
1uF
6.3V
C34
1uF
6.3V
C42
1uF
6.3V
C23
10uF
16V
1210
C30
10uF
16V
1210
C38
10uF
16V
1210
C115
1uF
6.3V
C26
0.01uF
C28
1000pF
C29
0.22uF
C27
0.22uF
C32
1uF
16V
C33
4.7uF
10V
1206
C37
0.1uF
C31
10pF
C35
1000pF
C36
1000pF
C39
1000pF
C40
100pF
C41
150pF
COUT11
330uF
2.5V
COUT12
330uF
2.5V
COUT13
100uF
6.3V
COUT14
100uF
6.3V
COUT15
100uF
6.3V
COUT16
100uF
6.3V
COUT17
100uF
6.3V
COUT18
100uF
6.3V
COUT19
100uF
6.3V
COUT20
100uF
6.3V
Vos+
Vos-
VDIFFOUT
EAIN
2S1+
2S1-
2S2+
2S2-
2S3-
2S3+
RUN/SS
ITH
UVADJ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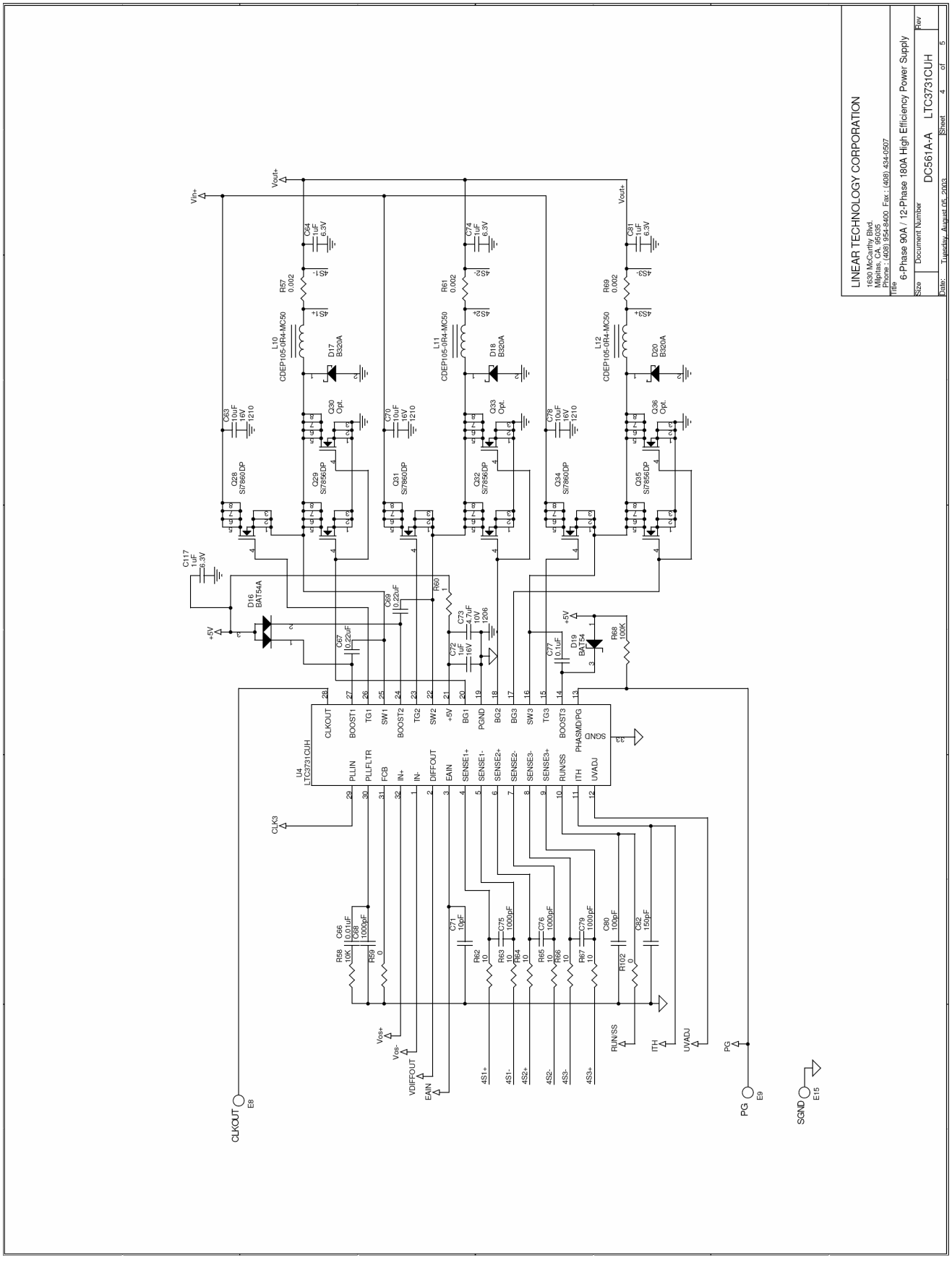
Title
6-Phase 90A / 12-Phase 180A High Efficiency Power Supply
Size
Document Number
DC561A-A LTC3731CUH
Rev
Date: Tuesday, August 05, 2003
Sheet 3 of 5
U3 LTC3731CUH
CLKOUT
BOOST1
TG1
SW1
BOOST2
TG2
SW2
+5V
BG1
PGND
BG2
BG3
SW3
TG3
BOOST3
PHASMD/PG
SGND
PLLIN
PLLFLTR
FCB
IN+
IN-
DIFFOUT
EAIN
SENSE1+
SENSE1-
SENSE2+
SENSE2-
SENSE3+
SENSE3-
RUN/SS
ITH
UVADJ
Vin+
Vout+
L7 CDEP105-0R4+MC50
L8 CDEP105-0R4+MC50
L9 CDEP105-0R4+MC50
D12 B320A
D13 B320A
D15 B320A
D11 BAT54A
D14 BAT54
Q19 Si7860DP
Q20 Si7856DP
Q21 Opt.
Q22 Si7860DP
Q23 Si7856DP
Q24 Opt.
Q25 Si7860DP
Q26 Si7856DP
Q27 Opt.
R43 0.002
R47 0.002
R55 0.002
C43 10uF 16V 1210
C50 10uF 16V 1210
C58 10uF 16V 1210
C44 1uF 6.3V
C54 1uF 6.3V
C61 1uF 6.3V
C116 1uF 6.3V
C27 0.22uF
C49 0.22uF
C52 1uF 16V
C53 4.7uF 10V 1206
C57 0.1uF
R46 1
R54 (OPT.)
R56 0
R44 10K
R45 0
C46 0.01uF
C48 1000pF
C51 10pF
R48 10
C55 1000pF
R49 10
R50 10
C56 1000pF
R51 10
R52 10
C59 1000pF
R53 10
C60 100pF
R101 0
C62 150pF
Vos+
Vos-
VDIFFOUT
EAIN
3S1+
3S1-
3S2+
3S2-
3S3-
3S3+
RUN/SS
ITH
UVADJ
CLK2
CLK3
+5V
SGND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6-Phase 90A / 12-Phase 180A High Efficiency Power Supply
Size
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DC561A-A LTC3731CUH
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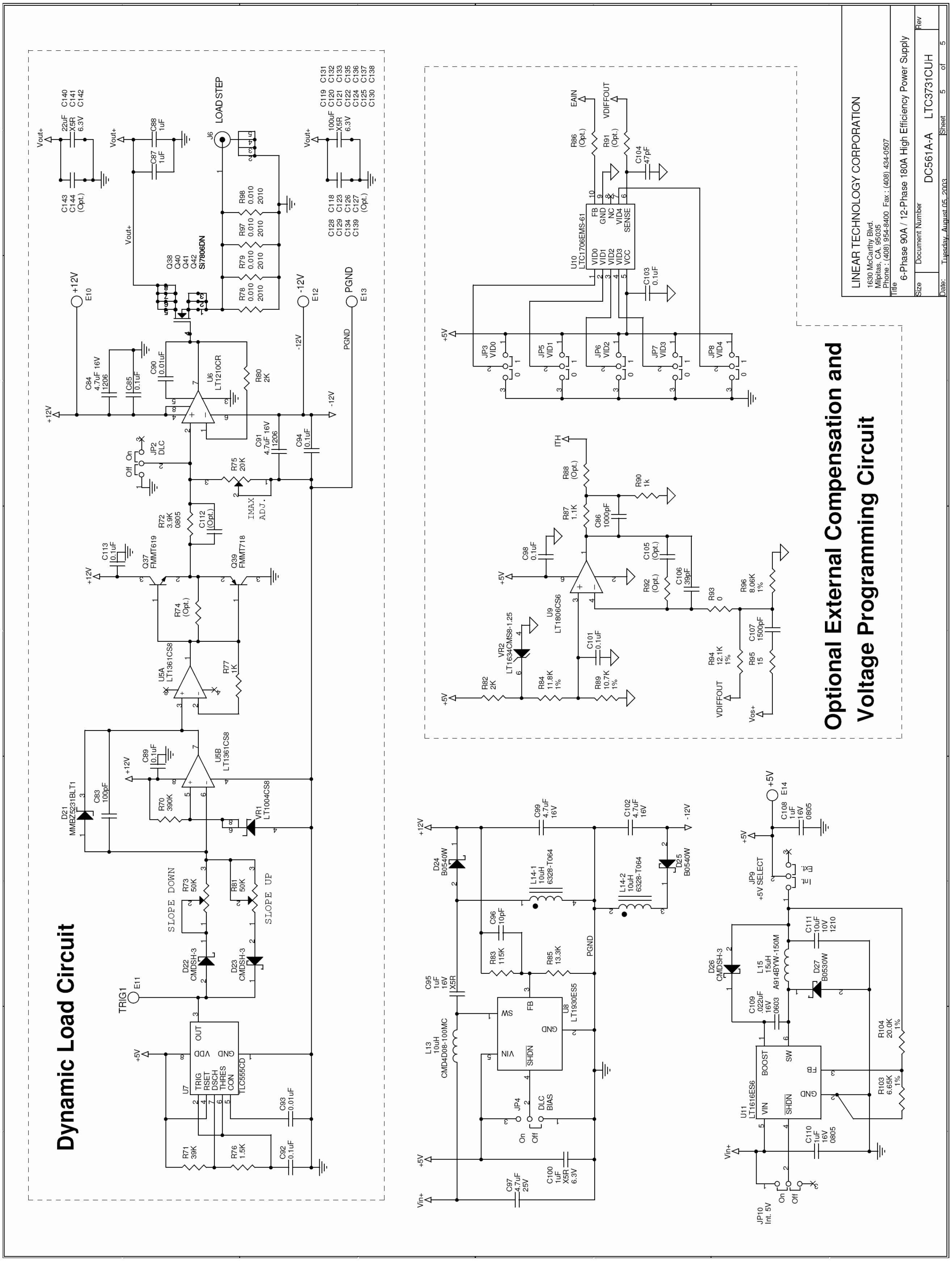
Date: Tuesday, August 05, 2003
Sheet 4 of 5
U4 LTC3731CUH
CLKOUT
BOOST1
TG1
SW1
BOOST2
TG2
SW2
+5V
BG1
PGND
BG2
BG3
SW3
TG3
BOOST3
PHASMD/PG
SGND
PLLIN
PLLFLTR
FCB
IN+
IN-
DIFFOUT
EAIN
SENSE1+
SENSE1-
SENSE2+
SENSE2-
SENSE3-
SENSE3+
RUNSS
ITH
UVADJ
L10 CDEP105-0R4-MC50
L11 CDEP105-0R4-MC50
L12 CDEP105-0R4-MC50
D17 B320A
D18 B320A
D20 B320A
D16 BAT54A
D19 BAT54
Q28 Si7960DP
Q29 Si7856DP
Q30 Opt.
Q31 Si7960DP
Q32 Si7856DP
Q33 Opt.
Q34 Si7960DP
Q35 Si7856DP
Q36 Opt.
R57 0.002
R61 0.002
R69 0.002
R58 10K
R59 0
R60 1
R62 10
R63 10
R64 10
R65 10
R66 10
R67 10
R68 100K
R102 0
C66 0.01uF
C68 1000pF
C67 0.22uF
C69 0.22uF
C71 10pF
C72 1uF
C73 4.7uF
C75 1000pF
C76 1000pF
C77 0.1uF
C79 1000pF
C80 100pF
C82 150pF
C117 1uF
C53 10uF
C70 10uF
C78 10uF
C54 1uF
C74 1uF
C81 1uF
Vin+
Vout+
+5V
CLK3
Vos+
Vos-
VDIFFOUT
EAIN
4S1+
4S1-
4S2+
4S2-
4S3-
4S3+
RUN/SS
ITH
UVADJ
PG
SGND
CLKOUT
E8
PG
E9
SGND
E15


Dynamic Load Circuit
Optional External Compensation and Voltage Programming Circuit
LOAD STEP
SLOPE DOWN
SLOPE UP
IMAX ADJ.
TRIG1
+12V
-12V
PGND
+5V
DLC BIAS
+5V SELECT
Int. 5V
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DC561A-A LTC3731CUH
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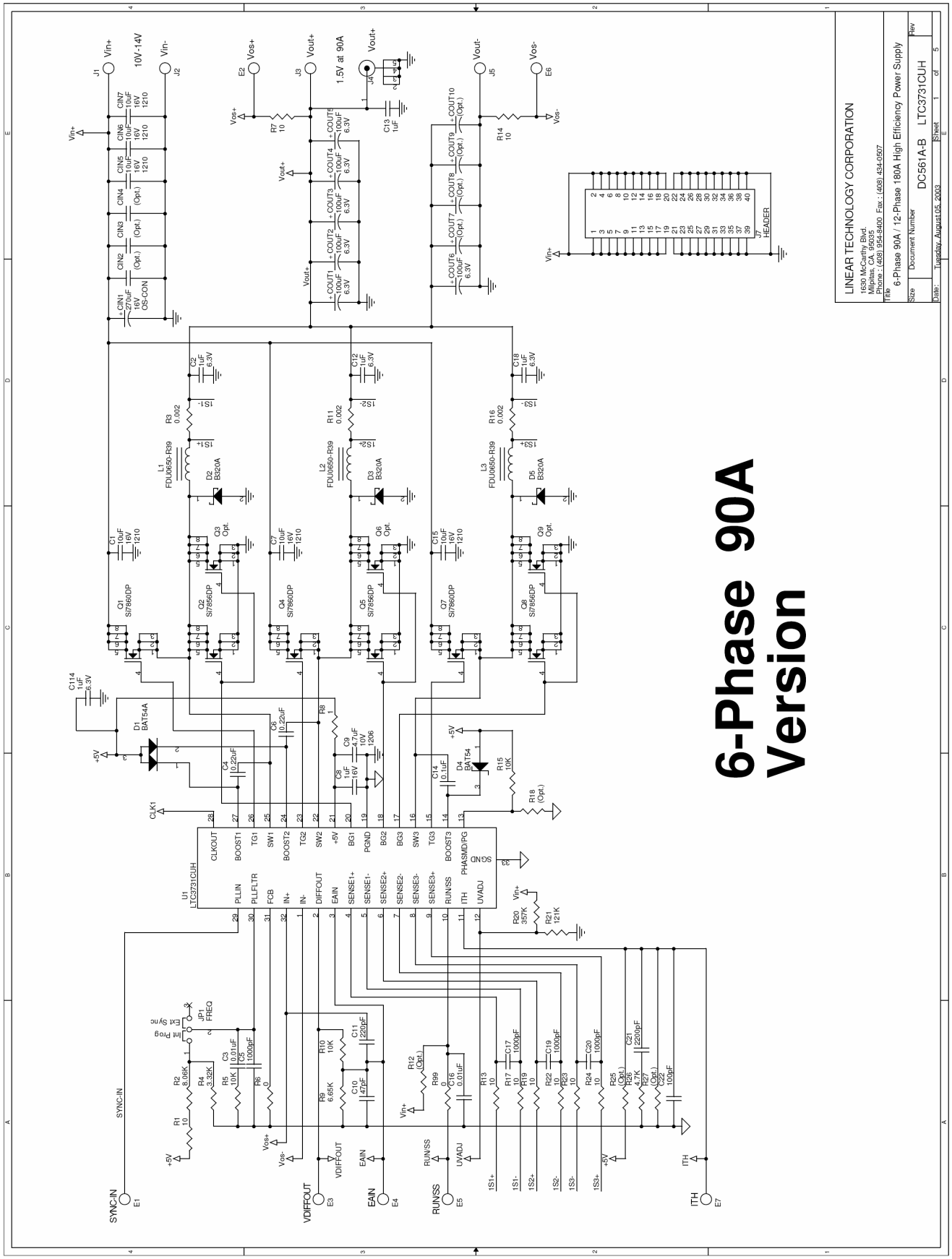
6-Phase 90A
Version
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Title
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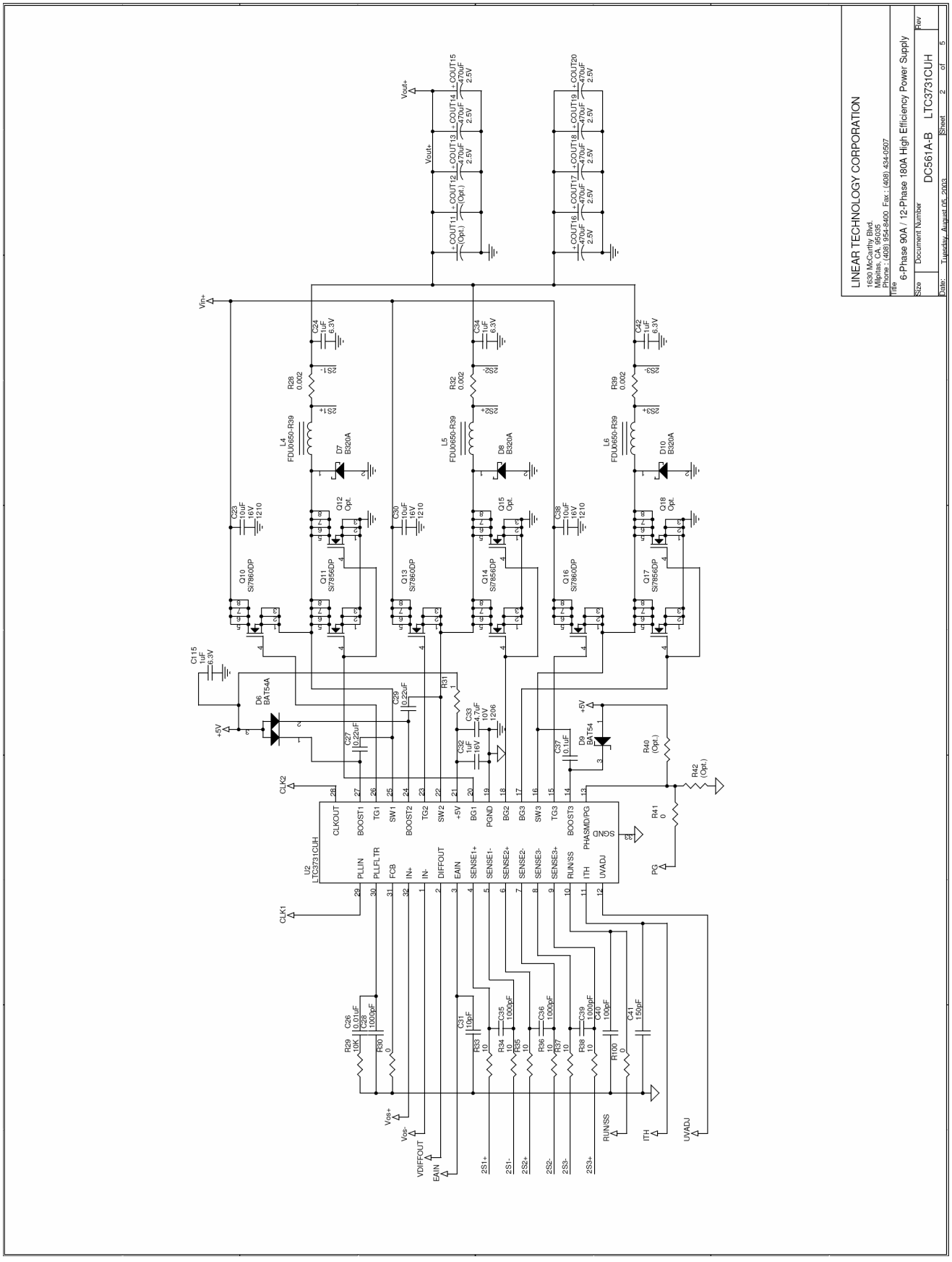
Size
Document Number
DC561A-B LTC3731CUH
Rev
Date: Tuesday, August 05, 2003
Sheet 1 of 5
U1 LTC3731CUH
Q1 Si7860DP
Q2 Si7856DP
Q3 Opt.
Q4 Si7860DP
Q5 Si7856DP
Q6 Opt.
Q7 Si7860DP
Q8 Si7856DP
Q9 Opt.
L1 FDU0650-R39
L2 FDU0650-R39
L3 FDU0650-R39
D2 B320A
D3 B320A
D5 B320A
D1 BAT54A
D4 BAT54
J1 Vin+
J2 Vin-
10V-14V
J3 Vout+
1.5V at 90A
J4 Vout+
J5 Vout-
E2 Vos+
E6 Vos-
J7 HEADER
SYNC-IN
VDIFFOUT
EAIN
RUN/SS
UVADJ
ITH
JP1 FREQ
Ext Sync
Int Prog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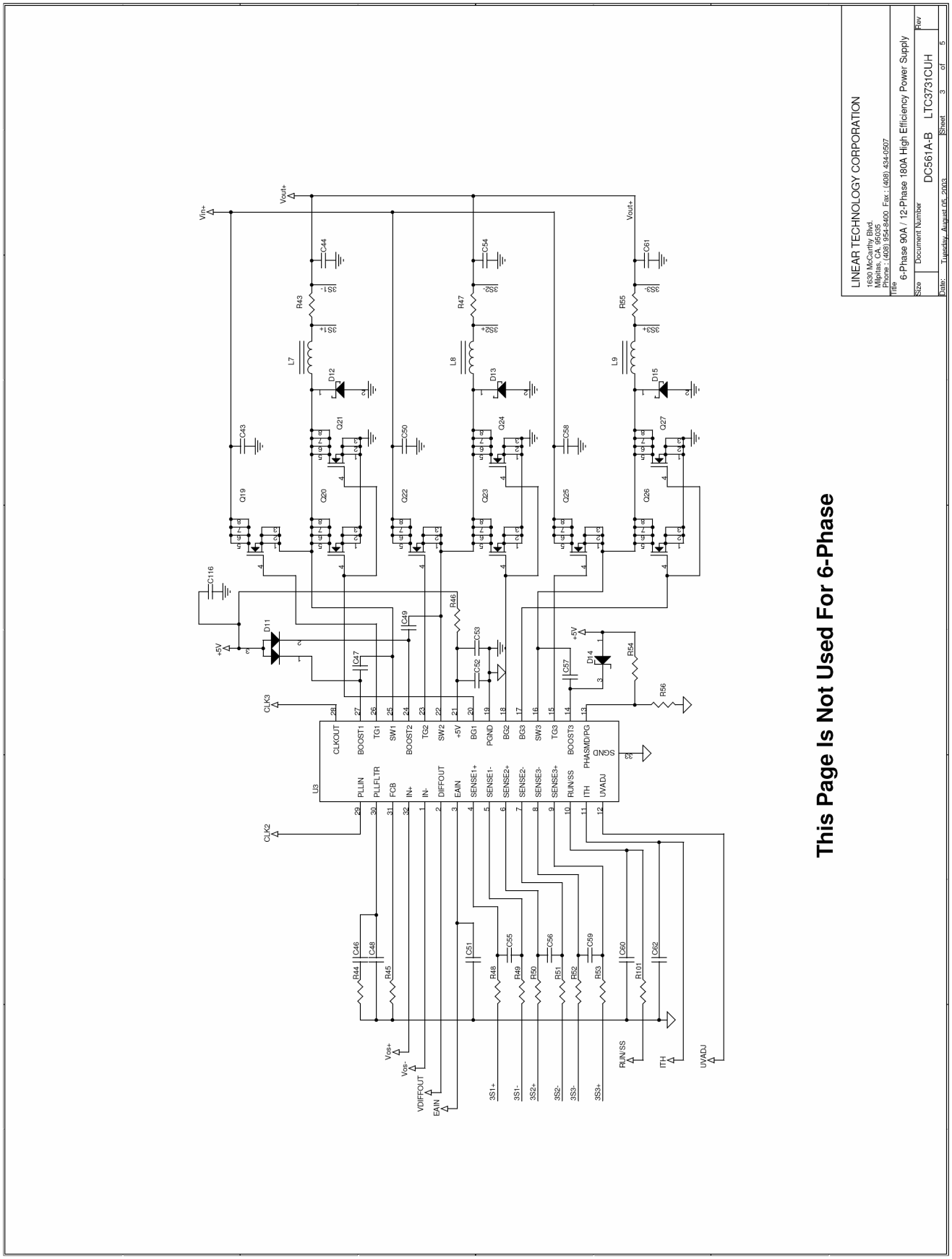
Size
Document Number
DC561A-B
LTC3731CUH
Rev
Date: Tuesday, August 05, 2003
Sheet 2 of 5
U2 LTC3731CUH
CLKOUT
BOOST1
TG1
SW1
BOOST2
TG2
SW2
+5V
BG1
PGND
BG2
BG3
SW3
TG3
BOOST3
PHASMD/PG
SGND
PLLIN
PLLFLTR
FCB
IN+
IN-
DIFFOUT
EAIN
SENSE1+
SENSE1-
SENSE2+
SENSE2-
SENSE3+
SENSE3-
RUN/SS
ITH
UVADJ
CLK1
CLK2
Vin+
Vout+
Vos+
Vos-
VDIFFOUT
EAIN
2S1+
2S1-
2S2+
2S2-
2S3+
2S3-
RUN/SS
ITH
UVADJ
PG
+5V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Title
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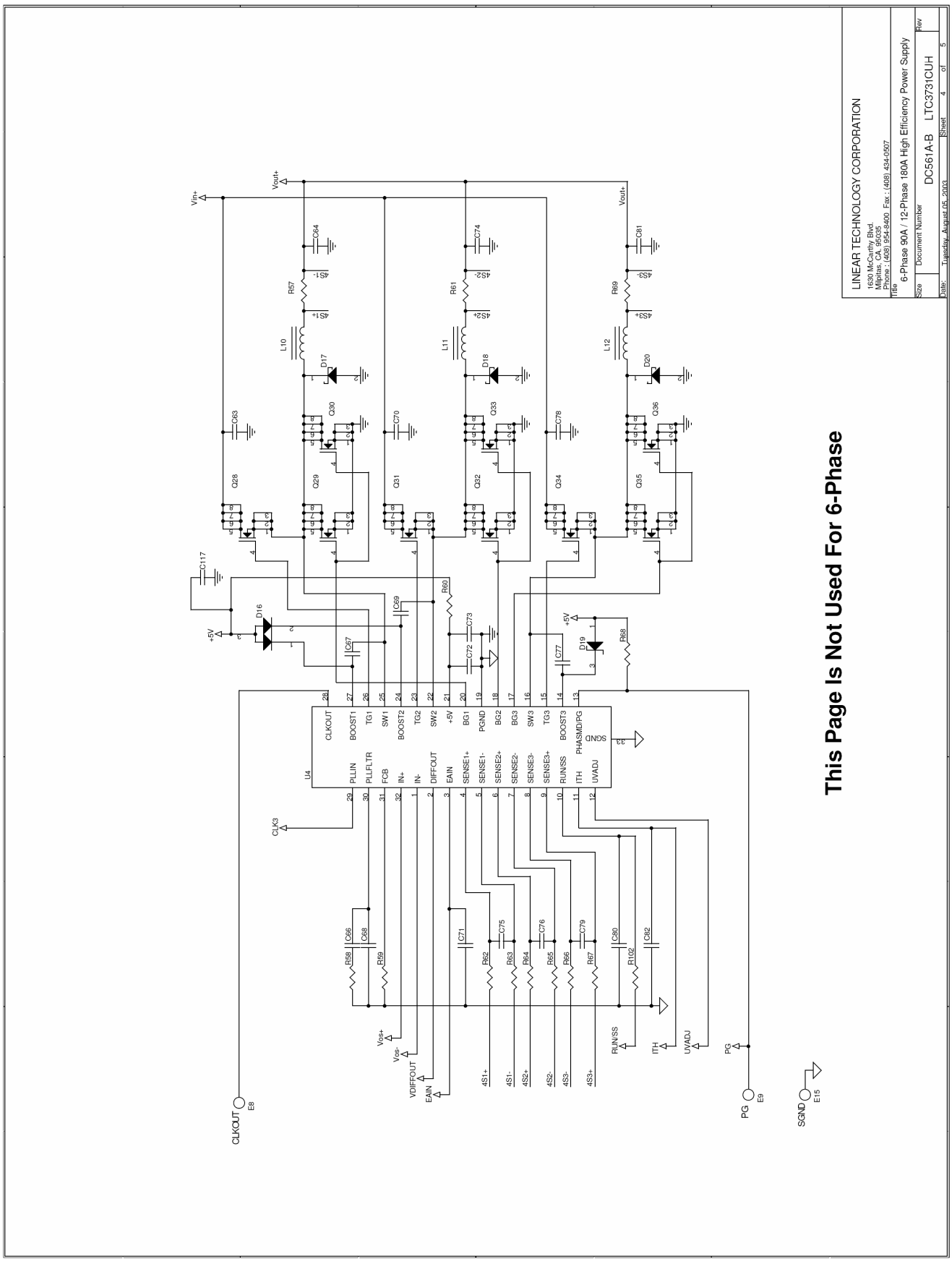
Size
Document Number
DC561A-B LTC3731CUH
Rev
Date: Tuesday, August 05, 2003
Sheet 3 of 5
This Page Is Not Used For 6-Phase
Vin+
Vout+
U3
CLKOUT
BOOST1
TG1
SW1
BOOST2
TG2
SW2
+5V
BG1
PGND
BG2
BG3
SW3
TG3
BOOST3
PHASMD/PG
SGND
PLLIN
PLL-FLTR
FCB
IN+
IN-
DIFFOUT
EAIN
SENSE1+
SENSE1-
SENSE2+
SENSE2-
SENSE3+
SENSE3-
RUN/SS
ITH
UVADJ
CLK3
CLK2
Vos+
Vos-
VDIFFOUT
EAIN
3S1+
3S1-
3S2+
3S2-
3S3-
3S3+
RUN/SS
ITH
UVADJ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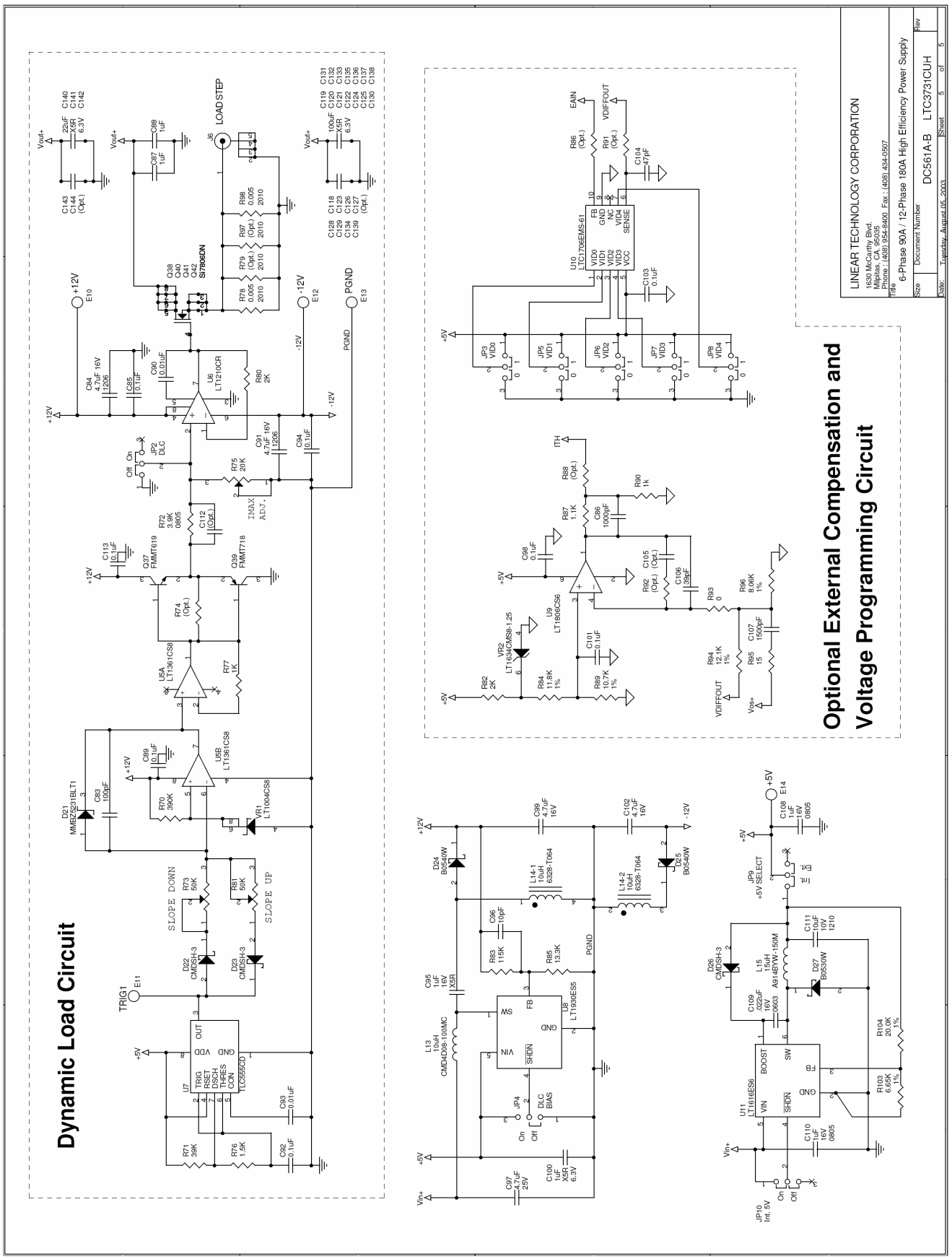
Title
6-Phase 90A / 12-Phase 180A High Efficiency Power Supply
Size
Document Number
DC561A-B
LTC3731CUH
Rev
Date: Tuesday, August 05, 2003
Sheet 4 of 5
U4
CLKOUT
PLLIN
PLLFLTR
FCB
IN+
IN-
DIFFOUT
EAIN
SENSE1+
SENSE1-
SENSE2+
SENSE2-
SENSE3-
SENSE3+
RUNSS
ITH
UVADJ
PHASMD/PG
SGND
BOOST3
TG3
SW3
BG3
BG2
PGND
BG1
+5V
SW2
TG2
BOOST2
SW1
TG1
BOOST1
L10
L11
L12
D17
D18
D20
D16
D19
R57
R61
R69
R60
R68
C64
C74
C81
C63
C70
C78
C117
C69
C67
C73
C72
C77
C66
C68
C71
C75
C76
C79
C80
C82
R58
R59
R62
R63
R64
R65
R66
R67
R102
Vout+
Vin+
CLK3
Vos+
Vos-
VDIFFOUT
EAIN
4S1+
4S1-
4S2+
4S2-
4S3-
4S3+
RUNSS
ITH
UVADJ
PG
SGND
CLKOUT
E8
PG
E9
E15


Dynamic Load Circuit
Optional External Compensation and Voltage Programming Circuit
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Phone : (408) 954-8400 Fax : (408) 434-0507
Title
6-Phase 90A / 12-Phase 180A High Efficiency Power Supply
Size
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DC561A-B
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Rev
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Sheet 5 of 5
SLOPE DOWN
SLOPE UP
LOADSTEP
TRIG1
+12V
-12V
PGND
Vout+
Vin+
+5V
VDIFFOUT
ITH
EAIN

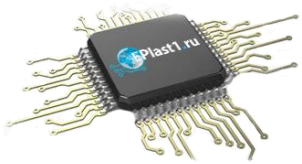
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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