DEMO CIRCUIT 958

# LT3506A and LT3506 Dual Monolithic 1.6A Step-Down Switching Regulator

## DESCRIPTION

Demonstration circuit 958 is a Dual Monolithic 1.6A Step-Down Switching Regulator featuring the LT3506A and LT3506. The top half of the board features the LT3506A circuit. The bottom half of the board features the LT3506 circuit. These two circuits are totally independent on the demo board. The main difference between the two circuits is the switching frequency. The switching frequency of the LT3506A circuit is 1.1MHz. The LT3506 switching frequency is 575KHz. Higher switching frequency allows smaller components in a given application. Lower switching frequency gives higher efficiency and allows a circuit to operate at a lower duty cycle.

The LT3506A circuit takes a 6.8V to 25V input and generates a 5V and a 3.3V output, both at 1.6A. The LT3506 circuit takes a 3.6V to 21V input and generates a 1.8V and a 1.2V output, both at 1.6A. The wide input voltage of the LT3506A and the LT3506, 3.6V to 25V, accepts a variety of power sources, from lead-acid batteries and 5V rails to unregulated wall adapters and distributed power supplies. The output voltage of both the LT3506A and LT3506 can be as low as 0.8V.

The LT3506 high switching frequency and current mode control allow the use of small, low profile surface mount components. The circuit is stable with ceramic capacitors. The low ESR of a ceramic capacitor and high switching frequency results in very low, predictable output ripple.

The LT3506 datasheet gives complete description of the part, operation and application information. The datasheet must be read in conjunction with this quick start guide for working on or modifying the demo circuit 958.

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



## PERFORMANCE SUMMARY

**Specifications are at TA = 25°C**

| SYMBOL | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| $V_{IN}$ | Input Supply Range | LT3506A Circuit (TOP) | 6.8 | | 25 | V |
| $V_{IN}$ | Input Supply Range | LT3506 Circuit (BOTTOM) | 3.6 | | 21 | V |
| $V_{OUT1}$ | Output Voltage Range | LT3506A Circuit (TOP) | 4.85 | 5 | 5.15 | V |
| $V_{OUT2}$ | Output Voltage Range | LT3506A Circuit (TOP) | 3.2 | 3.3 | 3.4 | V |
| $V_{OUT3}$ | Output Voltage Range | LT3506 Circuit (BOTTOM) | 1.746 | 1.8 | 1.854 | V |
| $V_{OUT4}$ | Output Voltage Range | LT3506 Circuit (BOTTOM) | 1.164 | 1.2 | 1.236 | V |
| $I_{OUT}$ | Output Current | Each Output | | | 1.6 | A |
| F | Switching Frequency | LT3506A Circuit (TOP), $I_{OUT}$ = 1.6A | | 1100 | | KHz |
| F | Switching Frequency | LT3506 Circuit (BOTTOM), $I_{OUT}$ = 1.6A | | 575 | | KHz |
| $V_{RIPPLE}$ | Output Ripple | Each Output, $V_{IN}$ = 12V, $I_{OUT}$ = 1.6A | | 15 | | mV |
| η | Efficiency | LT3506A Circuit (TOP), $V_{IN}$ = 6.8V, $I_{OUT1}$ = 0.9A, $I_{OUT2}$ = 0.9A | | 86.5 | | % |
| η | Efficiency | LT3506 Circuit (BOTTOM), $V_{IN}$ = 3.6V, $I_{OUT3}$ = 0.9A, $I_{OUT4}$ = 0.9A | | 78 | | % |

## QUICK START PROCEDURE

Demonstration circuit 958 is easy to set up to evaluate the performance of the LT3506A and LT3506. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

**NOTE.** When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the VIN or VOUT and GND terminals. See Figure 2 for proper scope probe technique.

1. With power off, connect a 6.8V–25V or a 3.6V-21V input power supply to the VIN and the GND terminals on the board corresponding to the top circuit or the bottom circuit. Each circuit is powered separately from its own VIN and GND.
2. Turn on the power at the input.

   **NOTE.** Make sure that the input voltage does not exceed 25V.
3. Check for the proper output voltages. VOUT1 = 5V, VOUT2 = 3.3V, VOUT3 = 1.8V, VOUT4 = 1.2V

   **NOTE.** If there is no output, temporarily disconnect the load to make sure that the load is not set too high.
4. The RUN/SS and the Power Good functions are optional and their terminals can be left floating (disconnected) if their functions are not being used. Connecting a RUN/SS terminal to GND will disable the corresponding output.
5. Once the proper output voltages are established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.

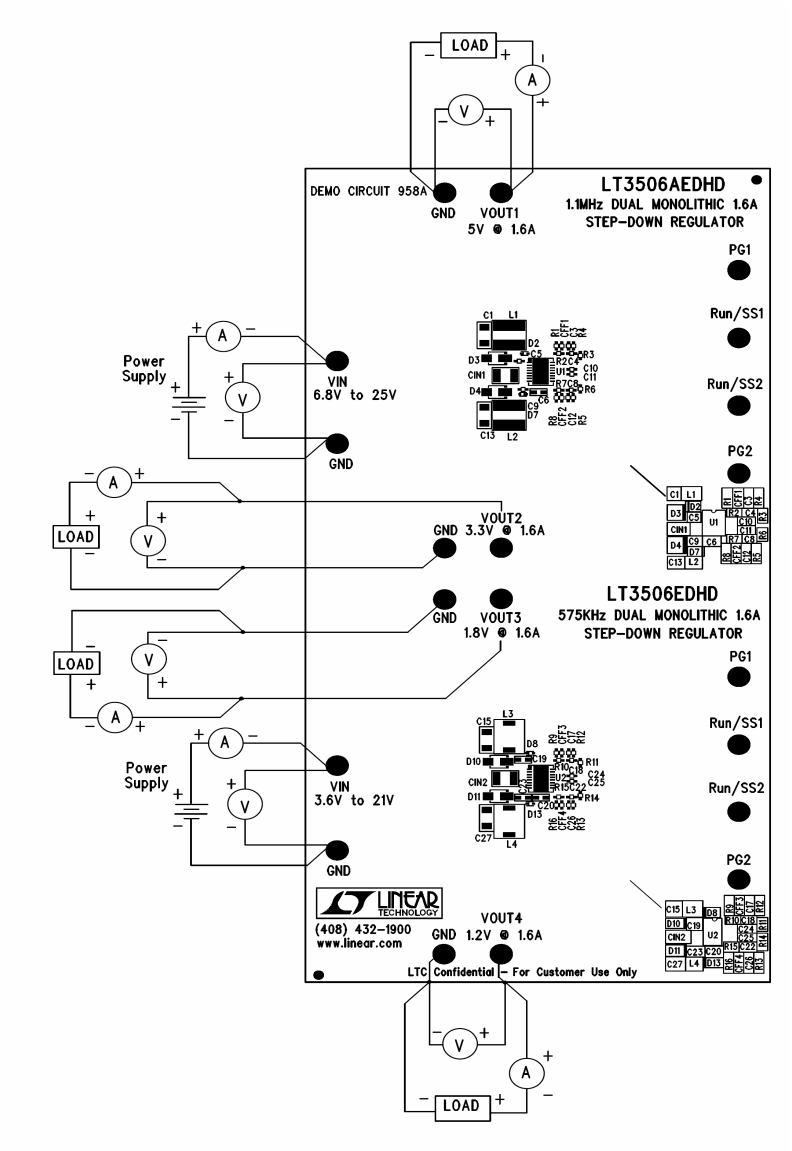



**Figure 1. Proper Measurement Equipment Setup**

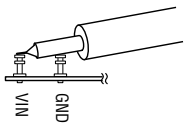
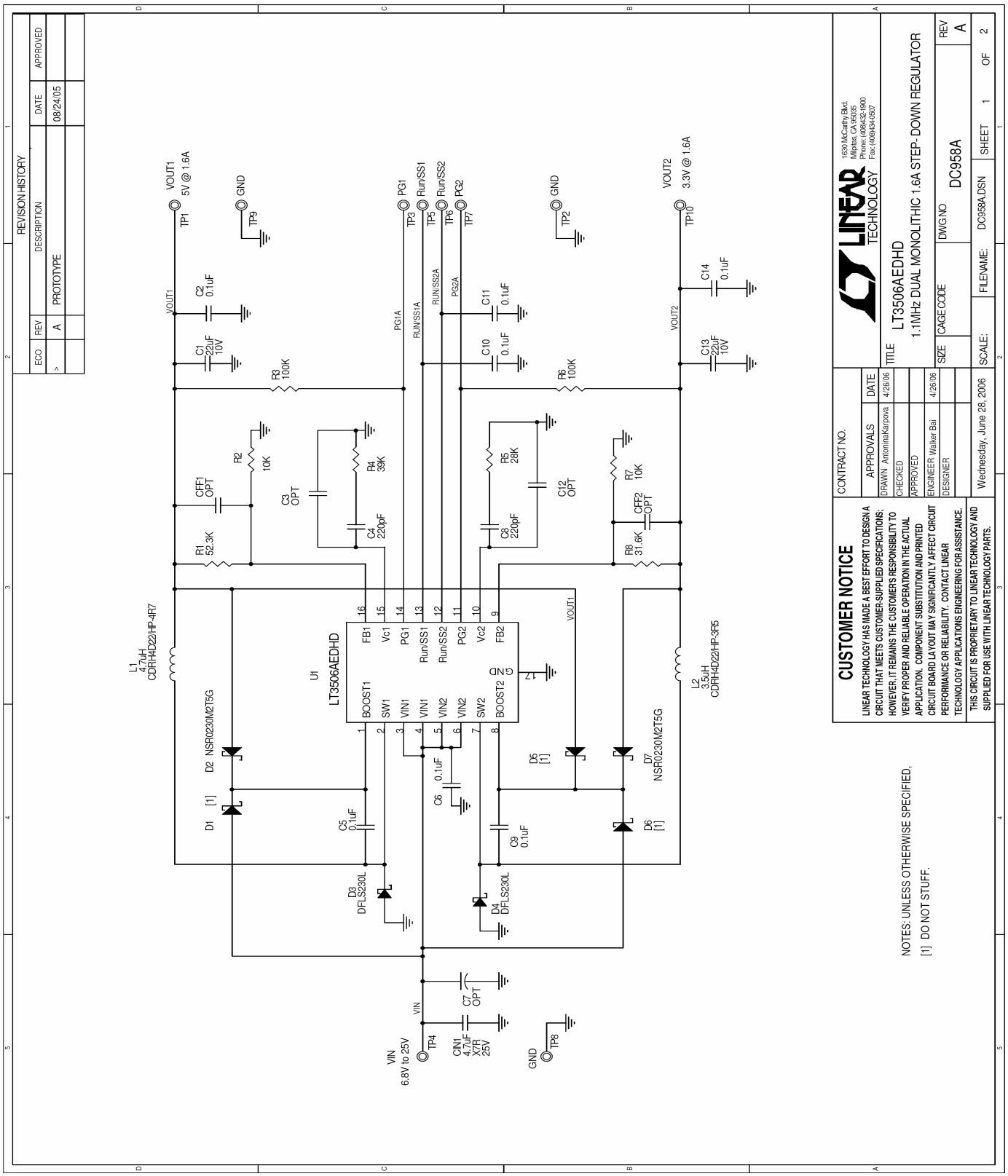
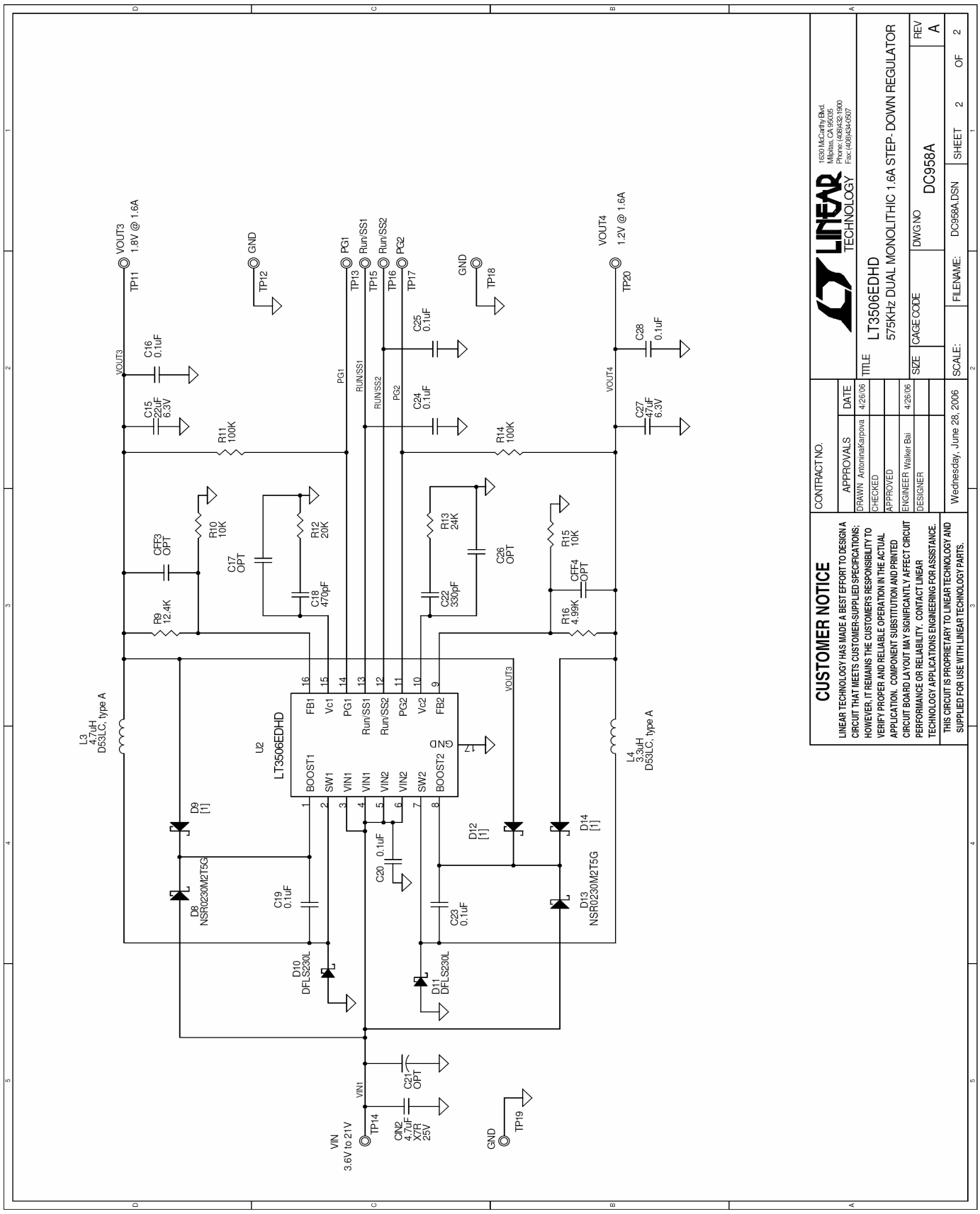



**Figure 2. Measuring Input or Output Ripple**


REVISION HISTORY
ECO
REV
DESCRIPTION
DATE
APPROVED
A
PROTOTYPE
08/24/05
VOUT1
5V @ 1.6A
VOUT2
3.3V @ 1.6A
VIN
6.8V to 25V
GND
PG1
Run/SS1
Run/SS2
PG2
U1
LT3506AEDHD
L1
4.7uH
CDRH4D22/HP-4R7
L2
3.5uH
CDRH4D22HP-3R5
D1 [1]
D2 NSR0230M2T5G
D3 DFLS230L
D4 DFLS230L
D5 [1]
D6 [1]
D7 NSR0230M2T5G
R1 52.3K
R2 10K
R3 100K
R4 39K
R5 28K
R6 100K
R7 10K
R8 31.6K
C1 22uF 10V
C2 0.1uF
C3 OPT
C4 220pF
C5 0.1uF
C6 0.1uF
C7 OPT
C8 220pF
C9 0.1uF
C10 0.1uF
C11 0.1uF
C12 OPT
C13 22uF 10V
C14 0.1uF
CFF1 OPT
CFF2 OPT
CIN1 4.7uF X7R 25V
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
CUSTOMER NOTICE
LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER-SUPPLIED SPECIFICATIONS; HOWEVER, IT REMAINS THE CUSTOMERS 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.
CONTRACT NO.
APPROVALS
DATE
DRAWN AntoninaKarpova 4/26/06
CHECKED
APPROVED
ENGINEER Walker Bai 4/26/06
DESIGNER
Wednesday, June 28, 2006
LINEAR TECHNOLOGY
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
Fax: (408)434-0507
TITLE
LT3506AEDHD
1.1MHz DUAL MONOLITHIC 1.6A STEP-DOWN REGULATOR
SIZE
CAGE CODE
DWG NO
DC958A
REV
A
SCALE:
FILENAME: DC958A.DSN
SHEET 1 OF 2
NOTES: UNLESS OTHERWISE SPECIFIED,
[1] DO NOT STUFF.


LT3506EDHD
575KHz DUAL MONOLITHIC 1.6A STEP- DOWN REGULATOR
DC958A
LINEAR TECHNOLOGY
1630 McCarthy Blvd.
Milpitas, CA 95035
Phone: (408)432-1900
Fax: (408)434-0507
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.
CONTRACT NO.
APPROVALS
DRAWN AntonmarKarpova 4/26/06
CHECKED
APPROVED
ENGINEER Walker Bai 4/26/06
DESIGNER
SIZE
CAGE CODE
DWG NO
REV A
SCALE:
FILENAME: DC958A.DSN
SHEET 2 OF 2
Wednesday, June 28, 2006
VOUT3 1.8V @ 1.6A
VOUT4 1.2V @ 1.6A
VIN 3.6V to 21V
GND
PG1
Run/SS1
Run/SS2
PG2
L3 4.7uH D53LC, type A
L4 3.3uH D53LC, type A
U2
D8 NSR0230M2T5G
D9 [1]
D10 DFLS230L
D11 DFLS230L
D12 [1]
D13 NSR0230M2T5G
D14 [1]

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Analog Devices Inc.:

DC958A