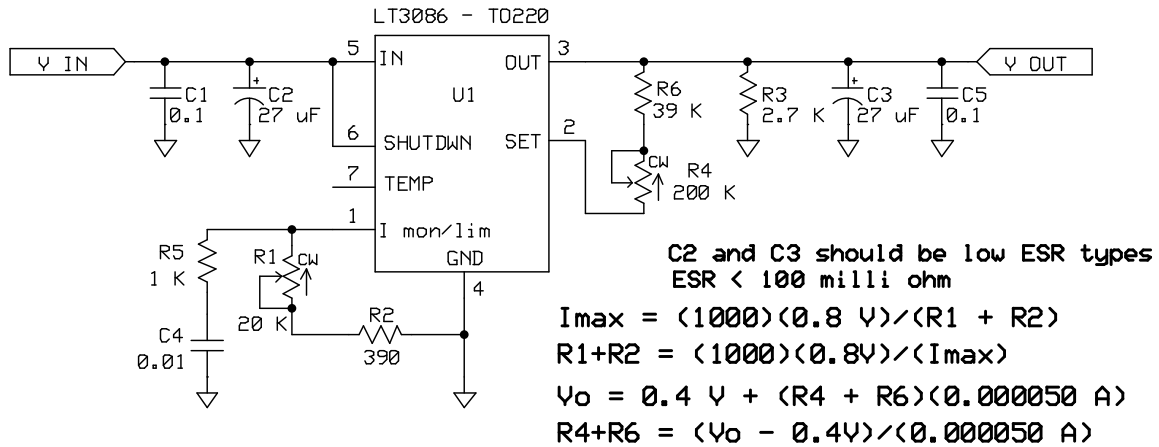


# A Current Limiting Accessory for QRP Power Supplies

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The Linear Technologies LT3086 is a low-dropout linear voltage regulator with adjustable output voltage and adjustable current limiting. It needs only about 350 mV of headroom when operating at its rated 2.2 amps. Cost of single pieces from Mouser Electronics is about \$8.

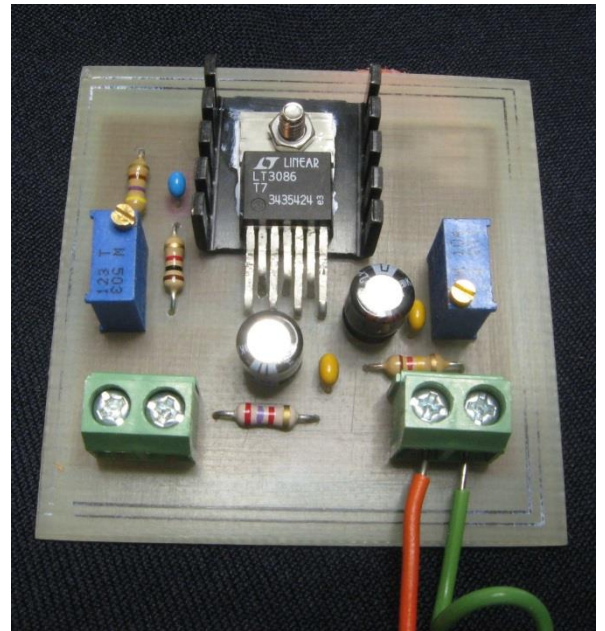
<http://cds.linear.com/docs/en/datasheet/3086fb.pdf>

Connected to a battery or high-current power supply, it can be used to limit load current to safe values (from mA to amps) when initially testing or troubleshooting equipment. Can also be useful operating equipment that must not see supply voltages that might be experienced with fully charged storage batteries or multi-cell battery packs.

The device is internally thermal limited at ~160°C, and has an internal current limit ~2.4 ampere. Both limits can be externally set to lower values.

The voltage at pin 1 is directly proportional to the load current and can be used to drive a current monitor without the need of inserting an ammeter in the supply or load connections.

A voltage proportional to the die temperature is available at pin 7.



Above right: A completed current limiter built on a home-etched PC board. The etching patterns are reproduced on the next page.

Right: actual size top and bottom copper patterns for 2-sided, through-plated, commercial PCB that fits in a Marlin P Jones #16281 BX die cast box.

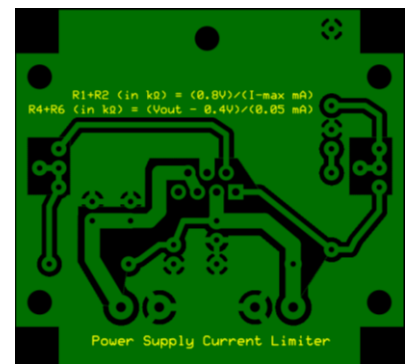
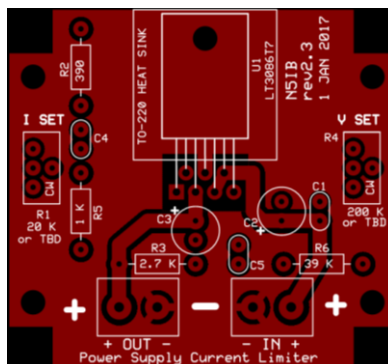
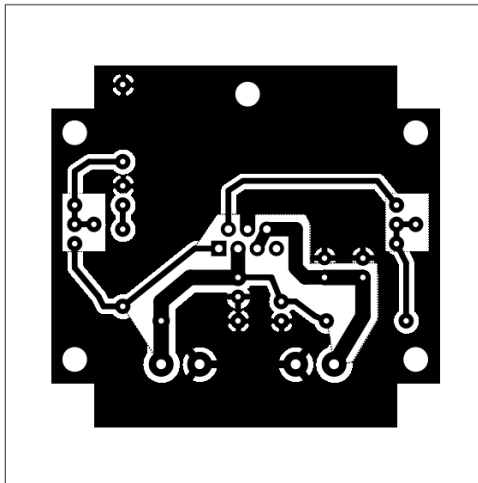


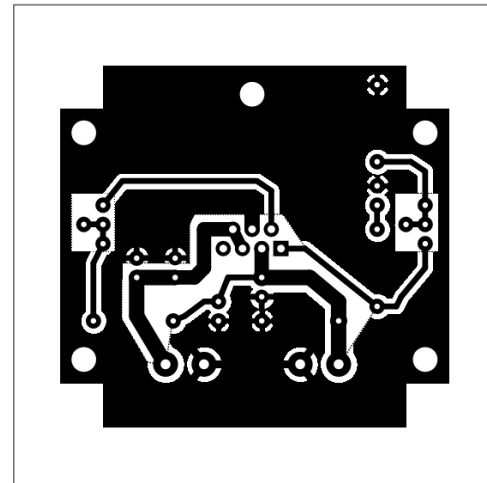
Table 1. Bill of Materials

C1, C5	0.1 $\mu$ F 50 V, ceramic capacitor, 0.1" (2.5 mm) lead spacing	Digi-Key 399-9870-1-ND
C2, C3	27 $\mu$ F 50 V, aluminum capacitor, 0.1" (2.5 mm) lead spacing	Digi-Key 493-11456-1-ND
*C2, C3	33 $\mu$ F 25 V, aluminum, 0.1" (2.5 mm) lead spacing *alternative selection, if low ESR part is desired	Digi-Key 493-6661-1-ND
C4	0.01 $\mu$ F 50 V, ceramic capacitor, 0.1" (2.5 mm) lead spacing	Digi-Key 399-9858-1-ND
R1	20 k $\Omega$ multi-turn trimmer potentiometer	Digi-Key 490-2881-ND
R2	390 $\Omega$ 5% 1/4W carbon film resistor	Digi-Key CF14JT390RCT-ND
R3	2.7 k $\Omega$ 5% 1/4W carbon film resistor	Digi-Key CF14JT2K70CT-ND
R4	200 k $\Omega$ multi-turn trimmer potentiometer	Digi-Key 490-2882-ND
R5	1.0 k $\Omega$ 5% 1/4W carbon film resistor	Digi-Key CF14JT1K00CT-ND
R6	39 k $\Omega$ 5% 1/4W carbon film resistor	Digi-Key CF14JT39K0CT-ND
U1	Linear Technology Corp. LT3086T7 regulator, TO-220 pack	Digi-Key LT3086IT7#PBF-ND
Enclosure	Die-cast aluminum box & lid, 60 mm x 55 mm x 30 mm	Marlin P Jones 16281 BX
Connectors	2 ea, 2-conductor screw terminals, 0.2" (5 mm) pitch	Marlin P Jones 18318 TS
PC Board	DIY etching, or available from author	<i>n5ib@juno.com</i>
Hardware	1 ea #4-40 x 1/4" flat head machine screw 1 ea #4 lock washer 4 ea, #4-40 x 1/2" flat head machine screw 5 ea #4-40 hex nut 4 ea #4 x 1/4" unthreaded standoff	

Bottom side copper etching pattern  
Inverted,  
i.e., viewed down through top of board  
Outer rectangle dimension : 2.5" x 2.5"

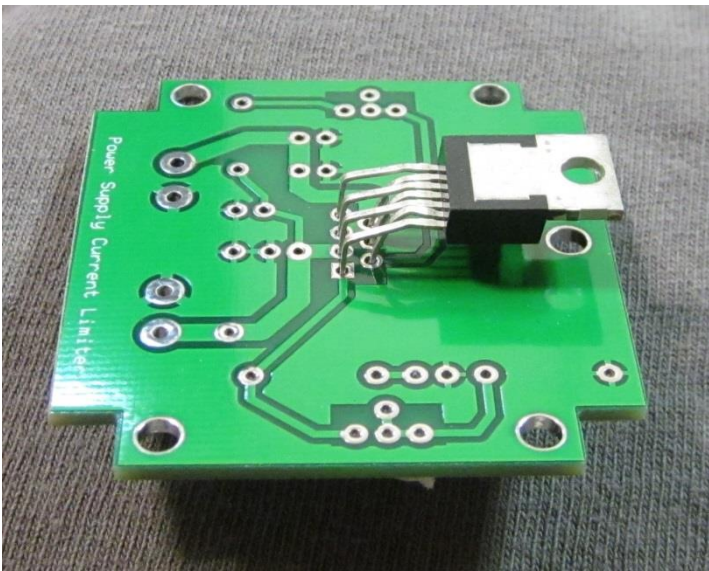


Bottom side copper etching pattern  
Non-inverted,  
i.e., viewed from bottom of board  
Outer rectangle dimension : 2.5" x 2.5"



When printing these layout patterns for transfer to a copper clad board, be sure the printed dimensions are correct. Measure the outside rectangles on the printed page. They should be exactly 2.5 inches high and wide.

Notice that there are some very fine dotted lines showing. These are an artifact of the layout program's imaging. They should be carefully erased if they get transferred to the copper substrate.



The regulator can be mounted on the top of the circuit board, with (bottom right) or without (top right) a heat sink, depending on the application. If you use the commercially done circuit board and the Marlin P Jones BX-35B-1 die cast box (stock number 16281 BX), you can mount the regulator directly on the bottom of the box (middle left), and form the leads so they come up from the bottom of the PCB (top left). Use a flathead machine screw to secure the TO-220 case to the box, so the box bottom is still flat on the outside. The solder joints to the pins are probably plenty enough to support the PCB so no other mounting screws would be needed.

Best process is to mount the chip to the bottom. Build the board - minus the regulator - then wiggle the pins into the PCB holes and solder (bottom left). It's tough to get the nut on the screw when the PCB is in the way.

Lots of aluminum thermal mass for a heatsink.

