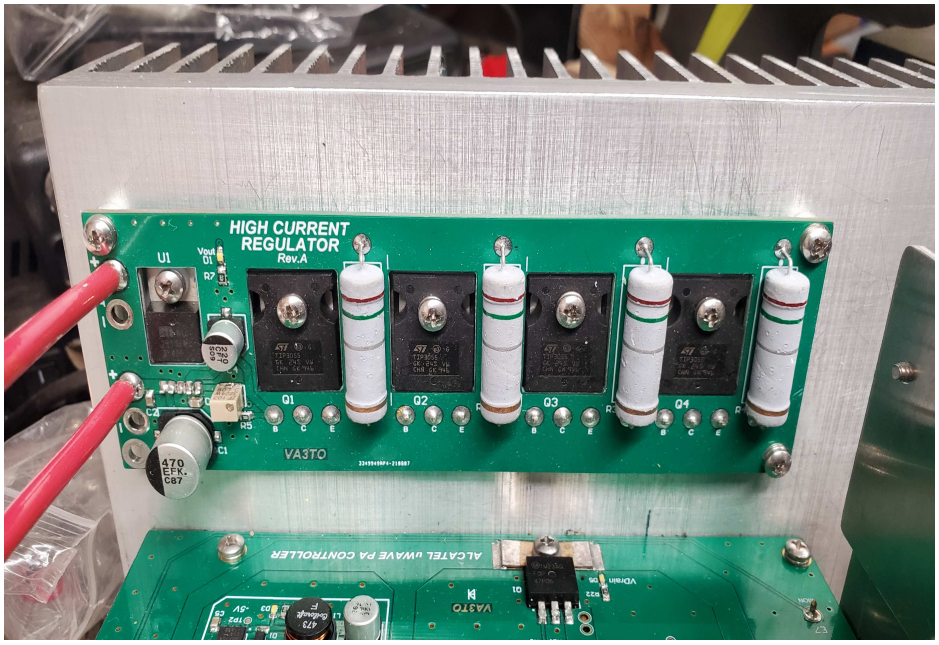
High Current Regulator Board

Hugh Duff VA3TO Oct. 2021

This board was designed to provide over 15 Amps @ 10 ~ 10.5V for GaAsFET microwave amplifiers. Builders previously had the option to use the one time ubiquitous LT1083 regulator for up to 7.5A but that part has long gone obsolete and the offerings on the auctions sites often end up being sub-par counterfeits.



SPECIFICATIONS

- Provides 4 to 5 Amps per pass transistor for 15 to 20A total. Board can be used with 1 to 4 pass transistors so the unused area can be cut off to make the board smaller if less current is required.

- Input Voltage: 12.0 ~ 15.0VDC

- Board dimensions: 1.75" x 5.25".

- Mounts using 4x 4-40 standoffs and screws + 5x 4-40 screws for the regulator and pass transistors.

ASSEMBLY

- The board must be mounted to a suitable heatsink as the pass transistors get quite hot under heavier loading. Use the unbuilt board as a template with the regulator and pass transistors sitting within their respective cutouts as a drilling guide to mark the hole centres. Drill and tap the heatsink for the 4 mounting holes and 5 component mounting holes using a #43 drill and a 4-40 tap.

- Solder the SMT parts to the board first.

- Bend the regulator and pass transistors leads up at 90° as these parts mount from under the board. Use 1/4” standoffs to mount the board with the regulator and pass transistors fitted and fastened to the heatsink, then solder and trim all of the leads. Mica or sil-pad insulators must be used for the pass transistors as the flanges cannot be grounded.

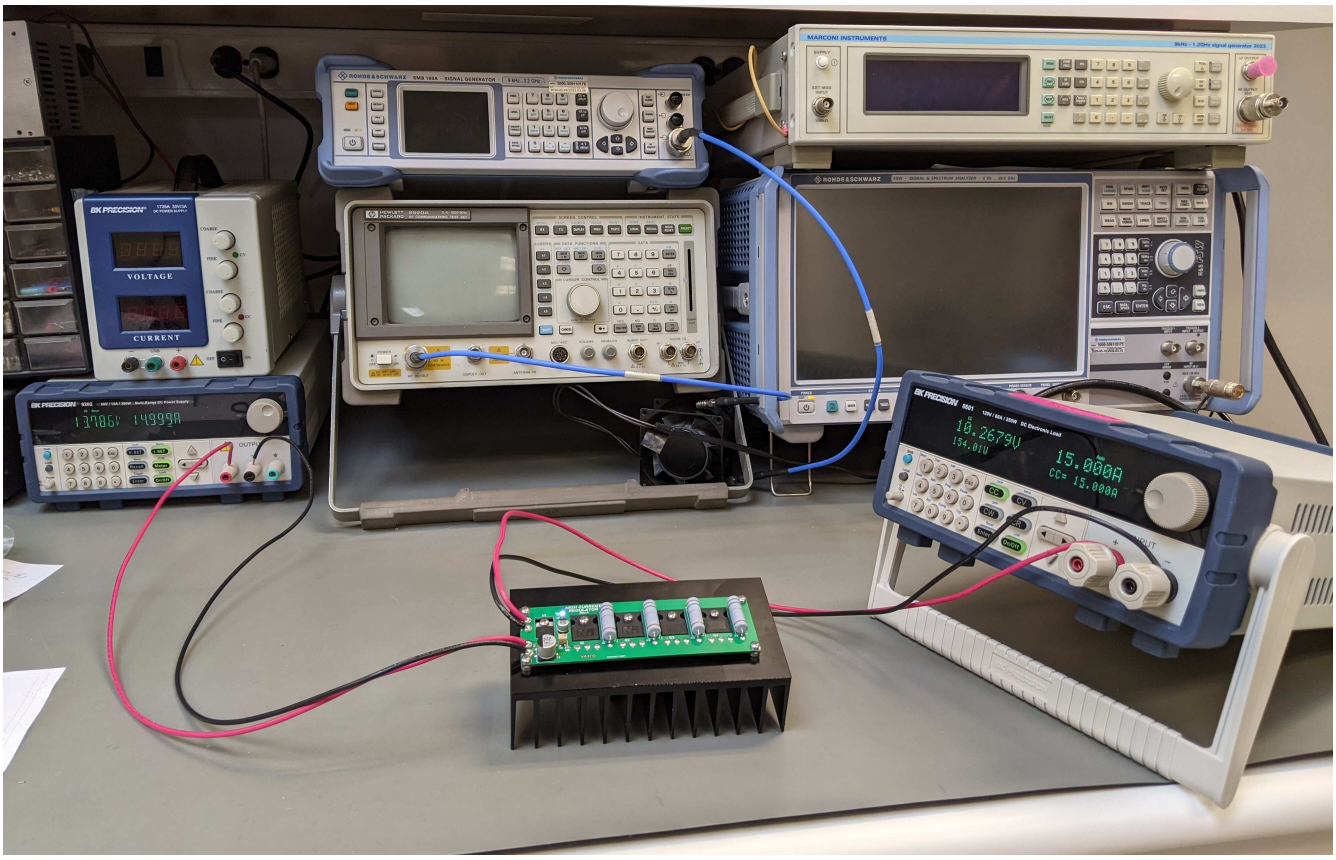
- Use heavy gauge wire to supply the board and feed the amplifier to reduce any voltage drop. AWG10 should be used if the board is built for 15 to 20A loading.

- Supply the board with 12 to 15V then adjust R6 to the required unloaded voltage.

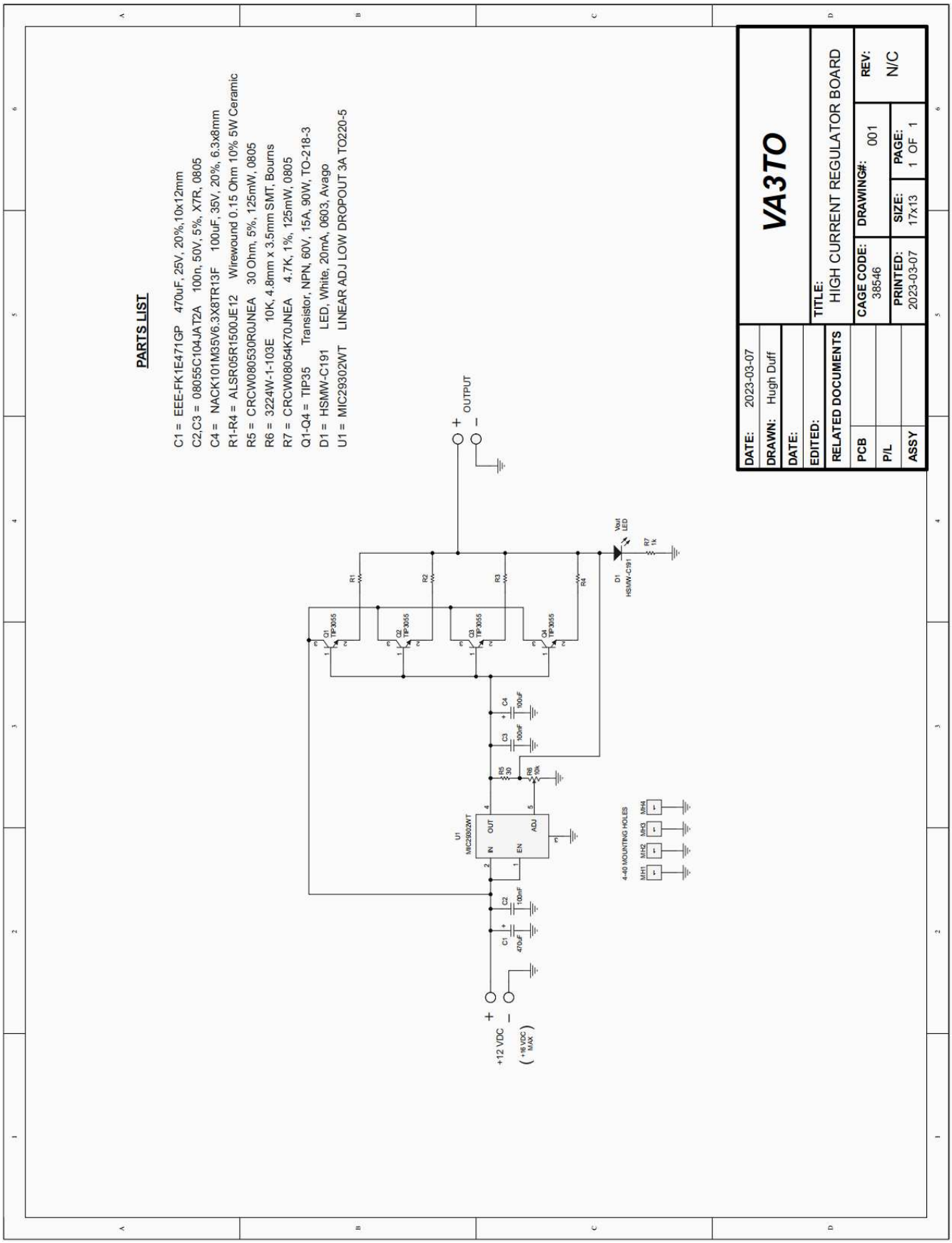
- Connect the regulator board to the amplifier and re-adjust R6 to the required output voltage while it is under load. There may be some differential between the loaded and unloaded output voltage so adjust accordingly.

TESTING

The fully built board with 4 pass transistors has been load tested to 15 Amps (maximum capacity of the available load tester) with little sag on the output voltage.



SCHEMATIC


PARTS LIST
C1 = EEE-FK1E471GP 470uF, 25V, 20%,10x12mm
C2,C3 = 08055C104JAT2A 100n, 50V, 5%, X7R, 0805
C4 = NACK101M35V6.3X8TR13F 100uF, 35V, 20%, 6.3x8mm
R1-R4 = ALSR05R1500JE12 Wirewound 0.15 Ohm 10% 5W Ceramic
R5 = CRCW080530R0JNEA 30 Ohm, 5%, 125mW, 0805
R6 = 3224W-1-103E 10K, 4.8mm x 3.5mm SMT, Bourns
R7 = CRCW08054K70JNEA 4.7K, 1%, 125mW, 0805
Q1-Q4 = TIP35 Transistor, NPN, 60V, 15A, 90W, TO-218-3
D1 = HSMW-C191 LED, White, 20mA, 0603, Avago
U1 = MIC29302WT LINEAR ADJ LOW DROPOUT 3A TO220-5
OUTPUT
+12 VDC
(+16 VDC MAX)
U1 MIC29302WT
IN OUT EN ADJ
C1 470uF
C2 100nF
C3 100nF
C4 100uF
R5 30
R6 10k
Q1 TIP3055
Q2 TIP3055
Q3 TIP3055
Q4 TIP3055
R1
R2
R3
R4
D1 HSMW-C191
Vout LED
R7 1k
4-40 MOUNTING HOLES
MH1 MH2 MH3 MH4
DATE: 2023-03-07
DRAWN: Hugh Duff
DATE:
EDITED:
RELATED DOCUMENTS
PCB
P/L
ASSY
VA3TO
TITLE: HIGH CURRENT REGULATOR BOARD
CAGE CODE: 38546
DRAWING#: 001
REV: N/C
PRINTED: 2023-03-07
SIZE: 17x13
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