

A Linear 1 W Power Amplifier for 2400 MHz

by R. Heidemann, DC 3 QS

The following single-stage transistor linear amplifier possesses a gain of approximately 7 dB and an output power of 1 W in the 13 cm band (approx. 2400 MHz). It is thus suitable for use, for instance, together with the 13 cm transmit converter described in (1). This hybrid-power mixer equipped with a varactor diode type BXY 28 can generate between 200 and 250 mW. This means that the described power amplifier can provide a linear output power in the order of 1 W.

CIRCUIT DESCRIPTION

A transistor type F1E6 manufactured by CTC is used. In the case of this transistor, the emitter is internally connected to the cooling bolt. This ensures that there are no problems with respect to the high-frequency grounding of the emitter. The circuit diagram of this amplifier is given in Figure 1. It shows no tendency to oscillation. The matching of the transistor input and output impedance to 50 Ω is

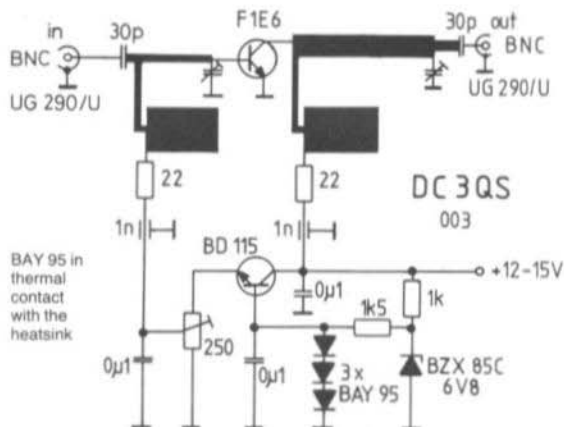


Fig. 1:
This amplifier provides a gain of approx. 7 dB at 2400 MHz and an output power of 1 W

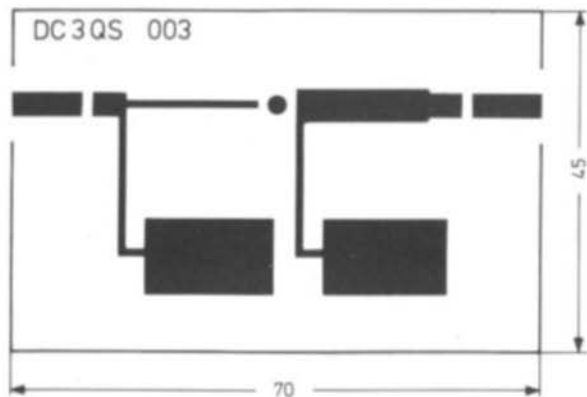


Fig. 2:
The PC-board consists of a double-coated glassfibre epoxy material

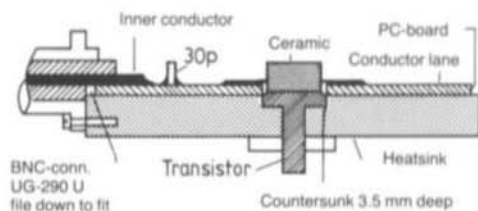


Fig. 3:
Mounting of the transistor and the two BNC connectors in a manner to avoid impedance jumps

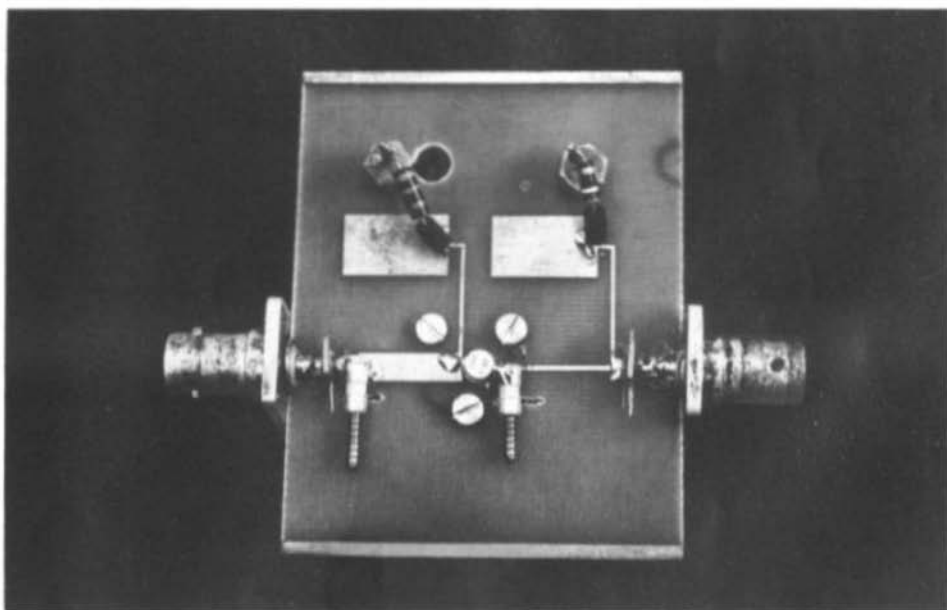


Fig. 4:
Photograph of the author's prototype using a piece of board that was available

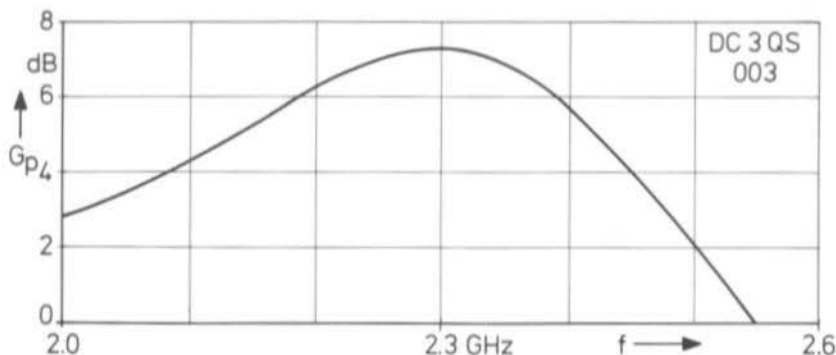


Fig. 5: The described amplifier can be used without tuning from 2.2 to 2.4 GHz

made using the standard method described in (2). The circuit for adjusting and stabilizing the DC-operating point is similar to the method described in (3).

CONSTRUCTION

Double-coated, epoxy glassfibre material is also suitable for applications in the 13 cm band. PC-board DC 3 QS 003 has dimensions of 70 mm x 45 mm, and is shown in **Figure 2**. Of course, it would have been possible to use the more expensive, non-readily available PTFE PC-board material, but this is not necessary for this application.

The cross-sectional drawing given in **Figure 3** shows how the transistor, and BNC-connectors for the input and output are mounted in such a manner that no impedance jumps occur.

Further details regarding construction are shown in the photograph given in **Figure 4**. One will notice the chip capacitors at input and output, whose values of approximately 30 pF are not critical, as well as the two miniature tubular trimmers (Phillips, of approx. 3 pF), whose ground connections are placed through the slots in the board. The two ferrite beads on the connection wires of the 22 Ω resistors can also be seen.

Finally, **Figure 5** gives the low-signal frequency response of the described amplifier. The following measuring equipment was used for the measurements:

- Power meter HP 432 A
- Sweep generator HP 8690 A
- Network analyzer HP 8410 A
- Power signal generator AIL 124

REFERENCES

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- (3) G. Sattler, DJ 4 LB: Two-Stage ATV Linear Amplifier for 435 MHz
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