G3WDG006 Power Amplifier

The G3WDG006 power amplifier is a single stage design using the Mitsubishi MGF1801 GaAs FET. The circuit diagram of the amplifier is shown in Fig. 006/1. Input/output matching is achieved using microstrip stub elements and lengths of 50 ohm microstrip transmission line. DC blocking at input and output is provided by high-performance microwave chip capacitors. DC power for the gate and drain of the FET is fed via high impedance chokes to the microstrip lines, and low frequency stability is assured by chip resistors and decoupling capacitors at the "cold" ends of the bias inductors.

The layout of the amplifier is shown in Figs 006/2 and 006/3. Construction follows the method described in the first part of this booklet. The connections and correct lead length for the FET are given in Fig 006/4. It is worth considering what sex of connector to put on the input and output of the module. For example, G3WDG's prototype uses a male input connector and a female output connector for direct insertion into an existing system. This avoids the need for back-to-back connectors or extra semirigid cables, keeping losses and expense to a minimum.

The power supply for the G3WDG006 is configured for 8 volts. Referring to Fig 5 and 6, zener diode is required, without the link, and the i.c. regulator required is a uA7808. The value of R1 is 1k.

Tuning up of the amplifier is straightforward, the only adjustment required is to set the drain current to 100mA using VR1.

The performance of some prototype amplifiers is shown in Fig 006/5. In use the prototypes have proved to be rugged with no device failures. It is not recommended to drive the amplifier with more than 50mW, nor to run it into poorly matched loads, as damage to the GaAs FET could occur.

Parts list

C1, C5	2.2pF ATC SMD
C2, C4	180pF SMD (0805 size)
C3, C6	10uF Tantalum bead
R1	47R SMD (0805 size)
R2	10R SMD (0805 size)
VR1	2.2k (miniature)
L1, L2	wire inductors 0.2mm dia
ZD1	3.3V 400mW
ZD2	10V 400mW
F1	MGF1801
Misc:	Tinplate box type 7750 (Piper Communications)
	2 off SMA flange connectors
	1000pF feedthrough capacitor
	G4FRE023 psu board and components
	6 off 1mm veropins
	G3WDG006 pcb

Items in G3WDG006 short kit

G4FRE023 PCB	1
G3WDG006 PCB	1
2.2pF ATC (loose)	2
47R chip (green)	1
10R chip	1
180pF chip	2
Veropins	6
MGF1801	1
Booklet	1

Note: MGF1801 devices are tested and are guaranteed by the manufacturer to be fully working. Please observe the handling and assembly instructions above exactly to ensure you do not damage the device during assembly. Devices are supplied in manufacturers original packing, unopened. The Microwave Committee Components Service cannot undertake to replace damaged devices free-of-charge.

Acknowledgement

Thanks are due to G3LYP and VK2ALU for their help in evaluating this design.

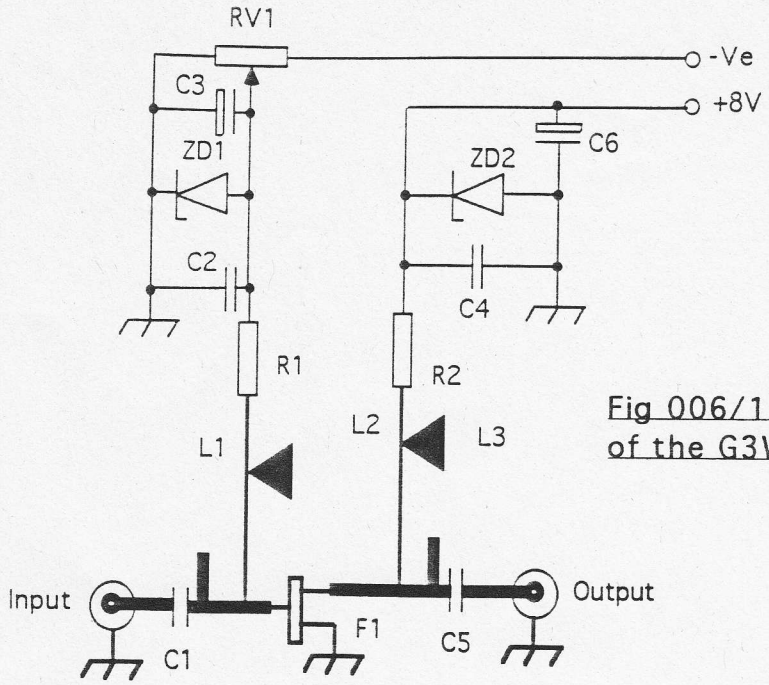

Fig 006/1 Circuit diagram of the G3WDG006 power amplifier

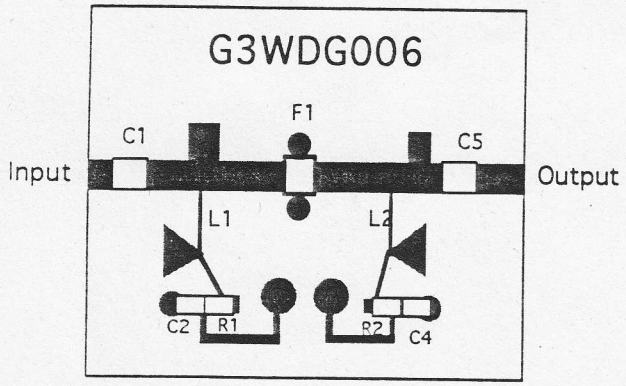

Fig 006/2 Layout of RF components

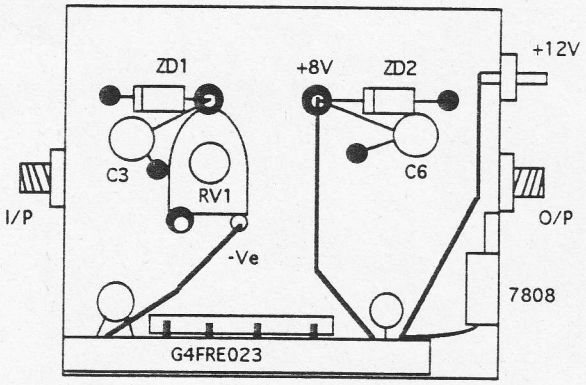

Fig 006/3 Layout of DC circuitry

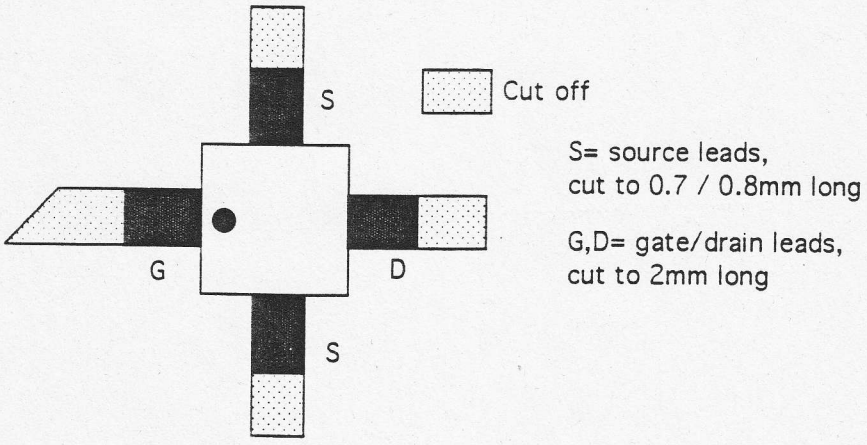

Fig 006/4 MGF1801 connections and lead preparation

Fig. 006/5 Performance of 3 prototypes

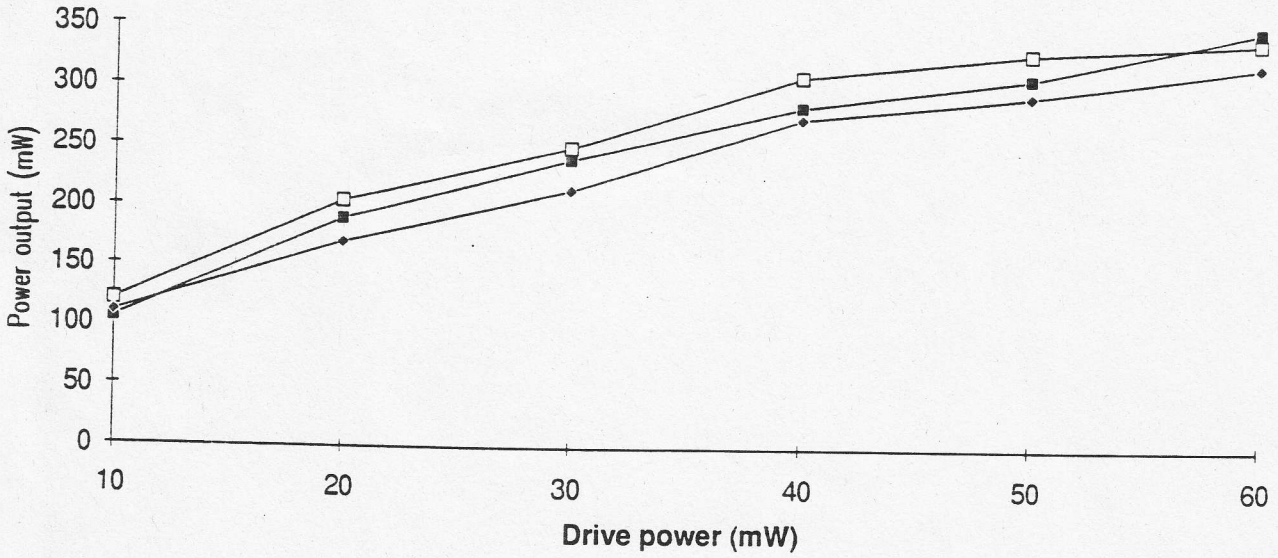

Fig 006/6 Power output of typical G3WDG006, Pin=50mW