5760 MHz SSPA
(utilizing 4 FETs)

Based on the WA5TNY board

By : Charlie Kahwagi VK3NX

Preface: This paper is a short description of an Amplifier I built for 5.7GHz based on the “versatile” board design by WA5TNY, a very well known microwave experimenter. (I believe 2 of these boards were combined for ~20 W output for the first EME QSOs on 5.7 GHz.) I found the board very versatile in that a number of devices are suitable in it’s implementation. It is hoped that someone whom is looking for “power” on 5.7GHz will feel confident and inspired to “have a go” and build something as I did in my quest for descent power on this “magical” microwave band. Only very modest experience is required and if anyone is interested than the original article by WA5TNY has an excellent description on the history, development and implementation of this fantastic amplifier board and is a MUST READ. I have been lucky enough to implement it’s use with more modern devices that produce much more power than originally intended!

In my search for a power amplifier on 5.7 GHz I came across a circuit by WA5TNY described in an edition of “Central States Proceedings”, I think in 1987 (?). The board layout looked very simple and the circuit involved the use of a 5964-3 IMFET. These FETs were acquired from a fellow HAM and are useable and useful at 5760MHz for a Power Output of ~4W each. The initial board was built tested and utilized for terrestrial microwave use until more substantial FET’s became available and I tried some higher power versions.

Thanks to the generosity of a fellow “Ham” I was able to acquire some IM6472-8 FETs. These have the exact same package size so were a direct drop in replacement for the 5964-3 FETs but produce 8-10W each on 5.7 GHz with “snowflake” tuning.

In fact the circuit is useful for any similar sized FET that is useable at anywhere between 5-8 GHz at varying power levels. After some time I found some IM5964-8 devices and these worked very well allowing me to produce in excess of 30W at 5.7GHz.

In the initial tests I had less than optimum grounding techniques and was only able to produce 22W from the board which, after cable losses, meant only ~ 12-15W was at the feed. Nonetheless this was enough for me to copy my own echoes at moon apogee with
my 3.7m dish. After improving the grounding between the FET cases and the board the amplifier will now produce close to 40 W!

**Lesson learnt! The ground plane bonding between the PCB ground plane and the FET devices is critical at these frequencies for Max gain and power transfer!**

Below are some pictures of the amplifier I built. If anyone is interested in duplicating this wonderful design, then I will find the original article for them which has the schematic and artwork. Just let me know!

Utilising just one half of the board and some suitable devices, I have also built a “baby” version which produces 15-20 W and makes for a very useful “hilltopping” amplifier.

Visible in the above picture are the:
- Main board
- Input / output SMA relays
- DC-DC converter for SMA Relays (Bottom left)
- DC-DC converter and Regulator boards for FET bias (Back wall)
- 10 V Regulators’ board for FET drains (behind amp board)
- Input DC switching / Dc power control (Right wall)
Main Board showing input driver, microstripline splitters and combiners
The “above” board DC distribution rails for Drain and Gate supplies
Individual 3A Adjustable regulators for each FET device can be seen mounted to the Al spreader plate
Individual FET devices under the “Above board” DC distribution strips

- 5W Drain resistors and RF chokes in drain supply
- PCB RF chokes and decoupling Capacitor “1/4wL islands”
- “Snowflakes” for “peaking” Power output
Port-Port Isolation of the couplers/splitters is excellent and as such small 1206 50 ohm chip resistors were found to be satisfactory loads.

On the main output combiner several chip resistors were placed in Parallell to account for more power dissipation required.

A Negative Voltage Generator was used to convert 12V DC to -12V DC and a -5V regulator was used for the Gate Bias.

Each FET uses a separate/ individual 3A adjustable regulator to set the Drain Volts (In my case 10 V)

The Drain Regulators are setup so that an absence of Gate Bias will cause the Drain Volts to disappear!.......Very important for the survival of the FETs

The Bias is adjustable to each FET device independently

I have used with success the following FETs:
- IM5964-3
- IM6472-8
- IM5964-8
- TIM5964-8