

15 WATTS ON 24 GHZ AT REASONABLE PRICE



BASED ON THE TRINQUINT DEVICE
TGA4915



15 WATTS ON 24 GHZ AT REASONABLE PRICE

Initially, a **single** device was planned

A team effort **to build the first single** device amps

F6BVA design and prototyping

F1PYR initial PO of the first devices

F1VL test of the first amplifier sma/sma (~5W)

F2CT second PO > **40 devices**



15 WATTS ON 24 GHZ AT REASONABLE PRICE

The device is **TGA4915-CP** from **TriQuint**

Initially designed for the **Ka Band**

Just at the limit of our **24 Ghz band**

Much better in performance than expected in datasheet

8 Watt+ at **3db** compression

Recommended connexion are gold bondwires or ribbons

However can be **easily soldered** or glued by OMs

Binocular is mandatory

If glued use either : **Epotek 20** or **Chemtronics CW2400**

Most of our amps are soldered

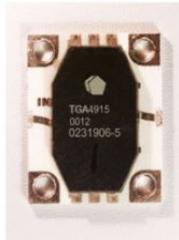
Only two power supplies : **+6V & -5V**

Low cost ~ **\$330** at Mouser (quote needed)

TriQuint SEMICONDUCTOR®

TGA4915-CP

7 W Ka Band Packaged Power Amplifier



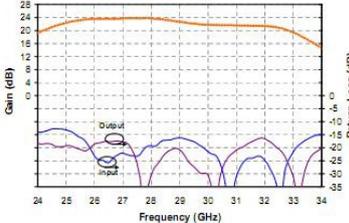
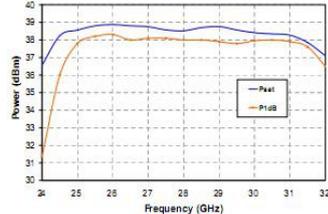
Key Features and Performance

- Frequency Range: 26 - 31 GHz
- 38 dBm Typical Psat @ Pin =21 dBm
- 22 dB Nominal Gain
- 15 dB Typical Return Loss
- 0.25µm pHEMT Technology
- Bias Conditions: Vd = 6V, Idq = 4.2 A
- Package Dimensions: 0.526 x 0.650 x 0.073 in.

Primary Applications

- Satellite Ground Terminals
- Point to Point

Preliminary Measured Performance
Bias Conditions: Vd=6 V Idq=4.2 A

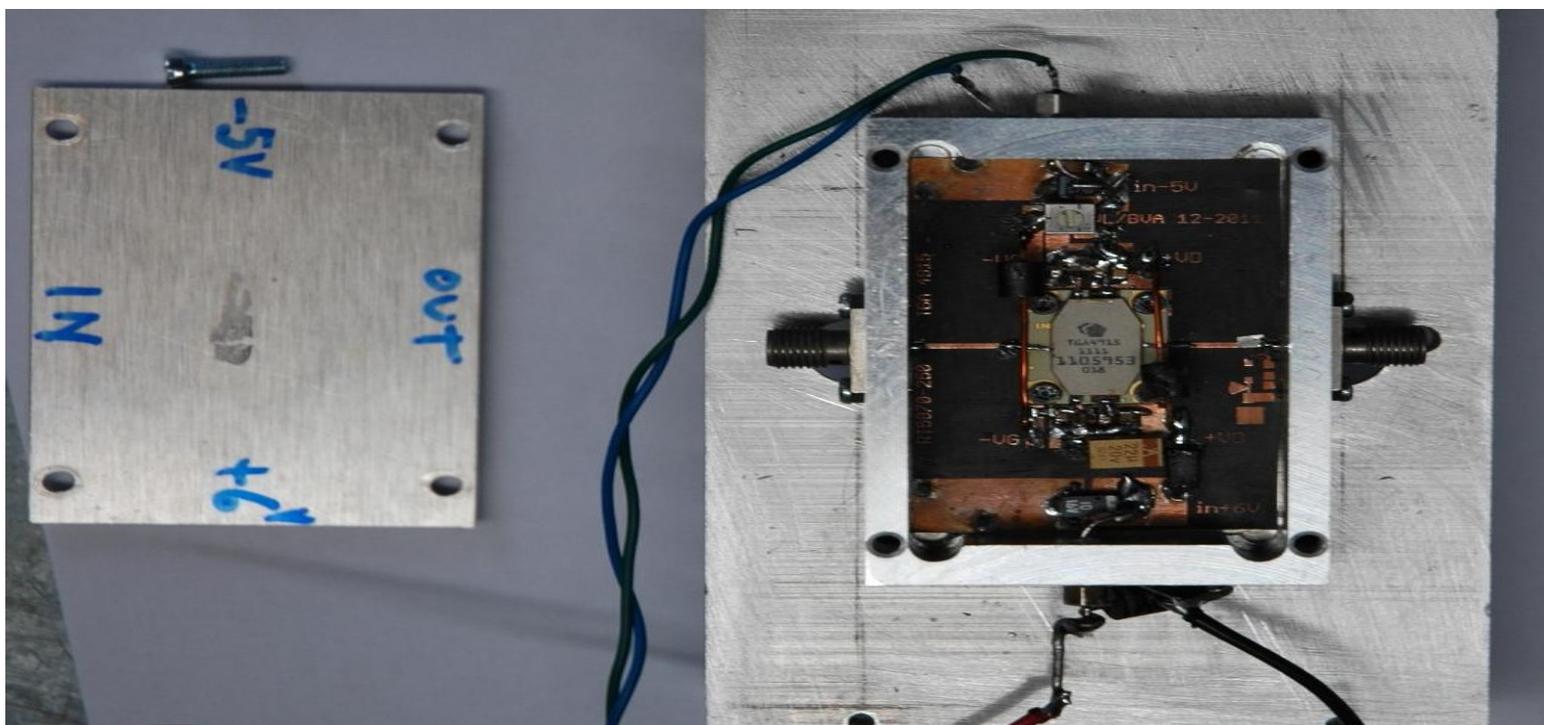


Datasheet subject to change without notice.

TriQuint Semiconductor: www.triquint.com (972)994-8465 Fax: (972)994-8504 Email: info-mmw@tqs.com
Apr 2009 © Rev A

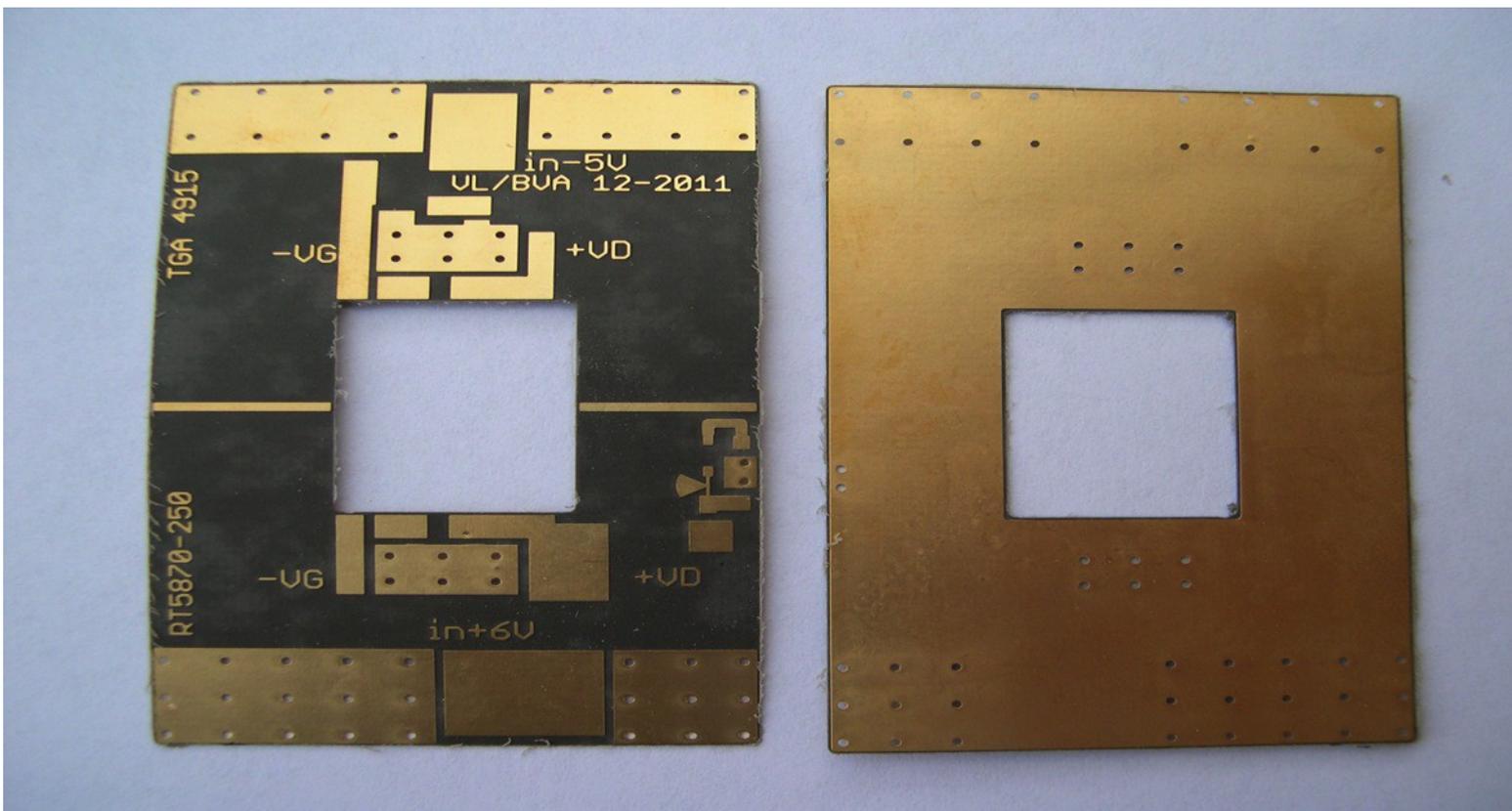
15 WATTS ON 24 GHZ AT REASONABLE PRICE

Initial single device amplifier from F1VL ==> 5Watts



15 WATTS ON 24 GHZ AT REASONABLE PRICE

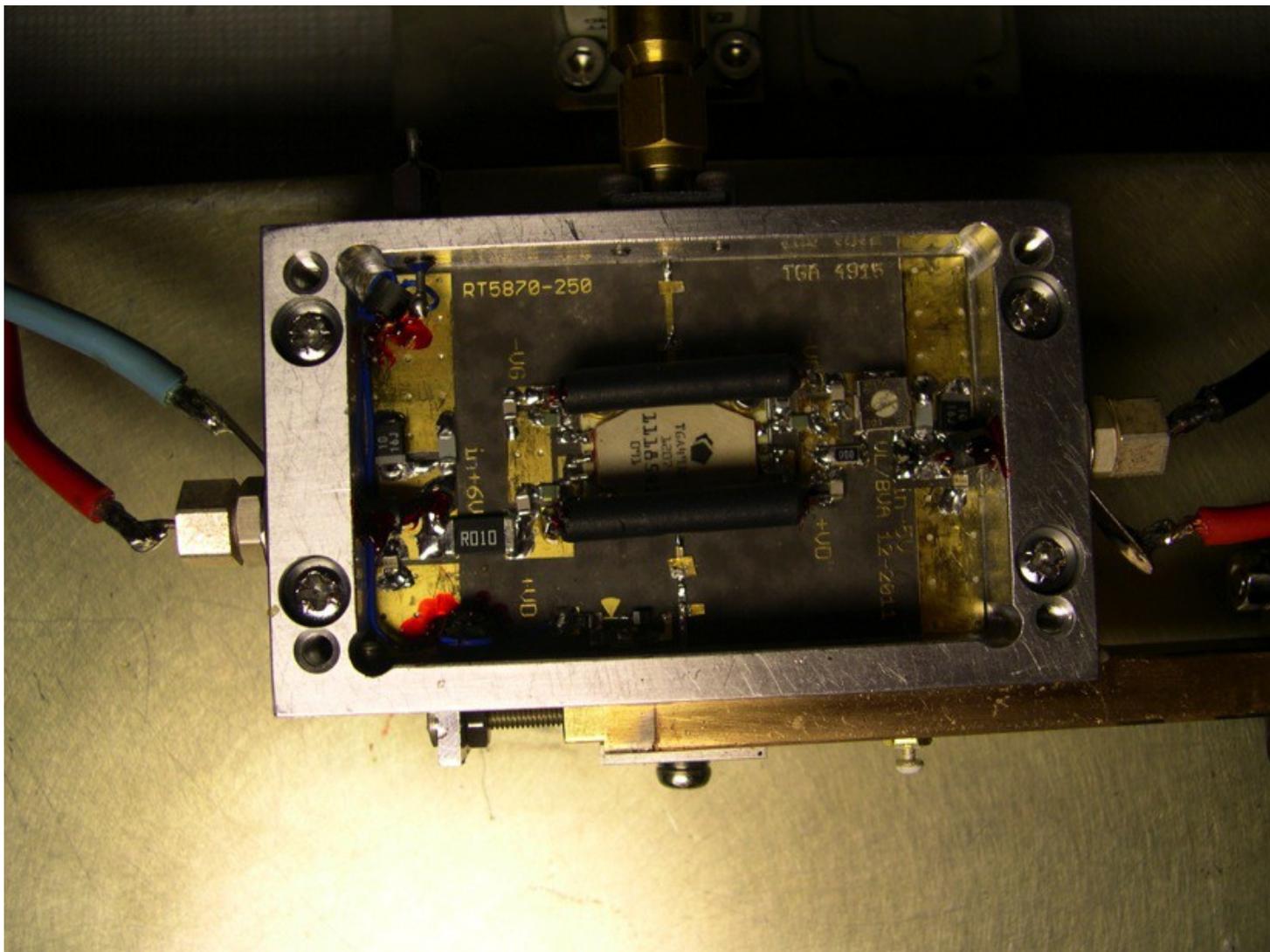
The success in the idea forced us to have a pro **PCB**
Thanks to **Michel F6BVA** for the design



Material **Rogers RT5870** - Thickness 0.010" (0.254mm) / Copper Cladding 1 oz (35µm)

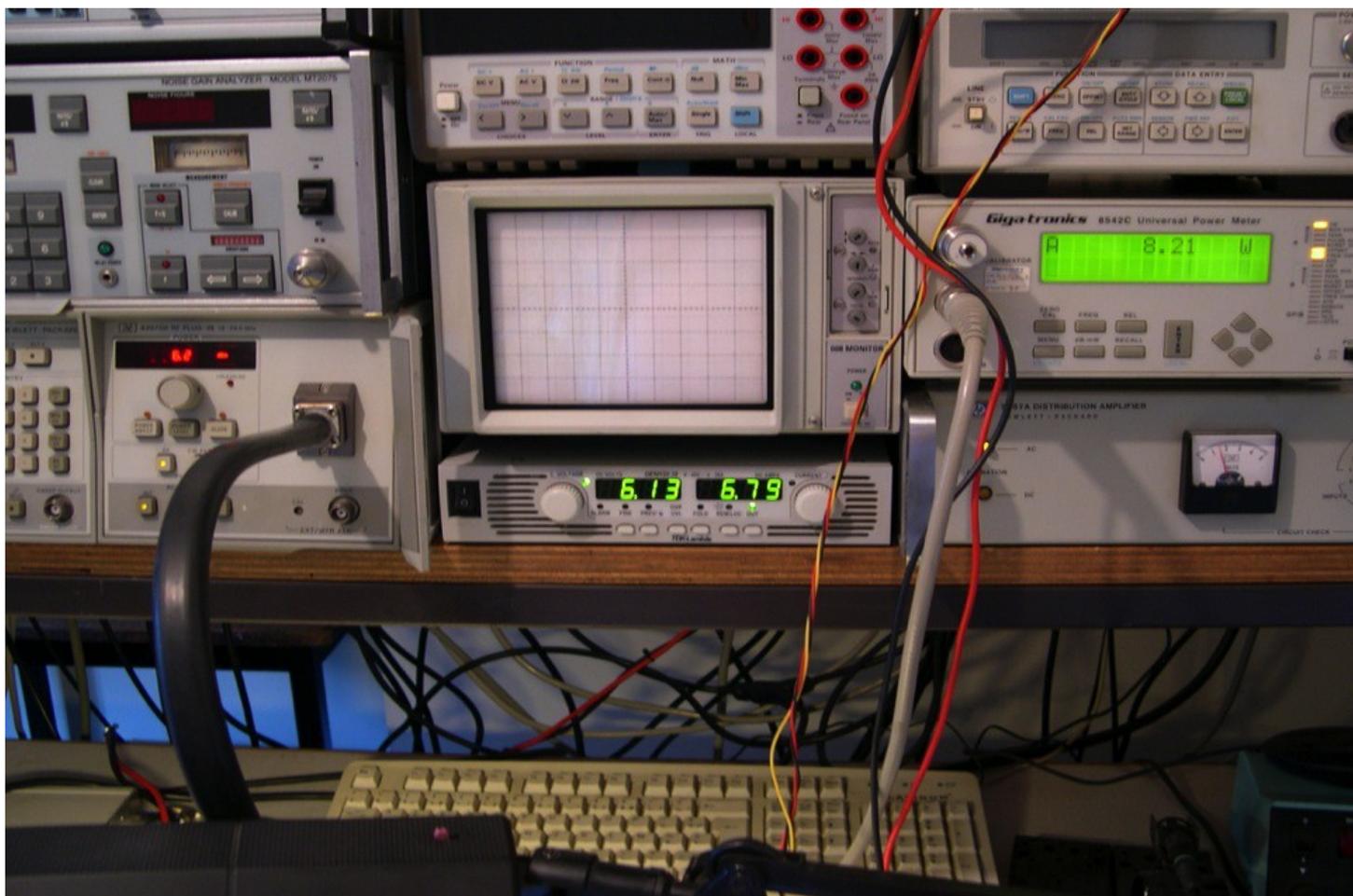
15 WATTS ON 24 GHZ AT REASONABLE PRICE

The first devices were more than promising
up to **8 watts**



15 WATTS ON 24 GHZ AT REASONABLE PRICE

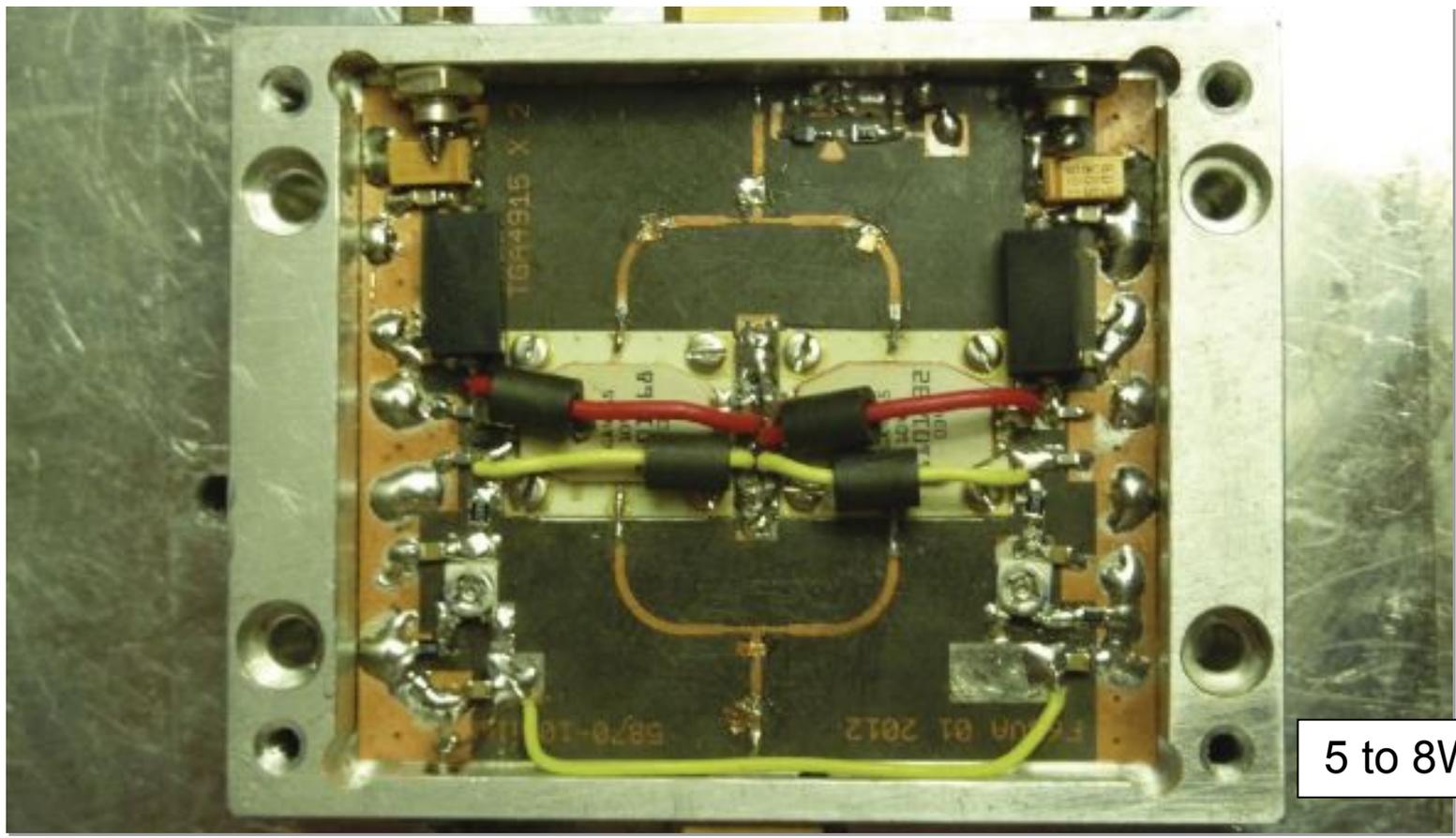
The first devices were more than promising
up to **8 watts**



15 WATTS ON 24 GHZ AT REASONABLE PRICE

Several EMEers wanted more than **8 Watts**
A new idea was to **couple two devices**

A first **unsucessfull** tentative



5 to 8W only

Certainly **due to subtrate losses** within the coupling



15 WATTS ON 24 GHZ AT REASONABLE PRICE

Several EMEers wanted more than **8 Watts**
A new idea was to **couple two devices**

I reminded **my microwave courses** from the 70's

Waveguide technology have **very low losses**

I decided to search **wr42 3db couplers**

15 WATTS ON 24 GHZ AT REASONABLE PRICE

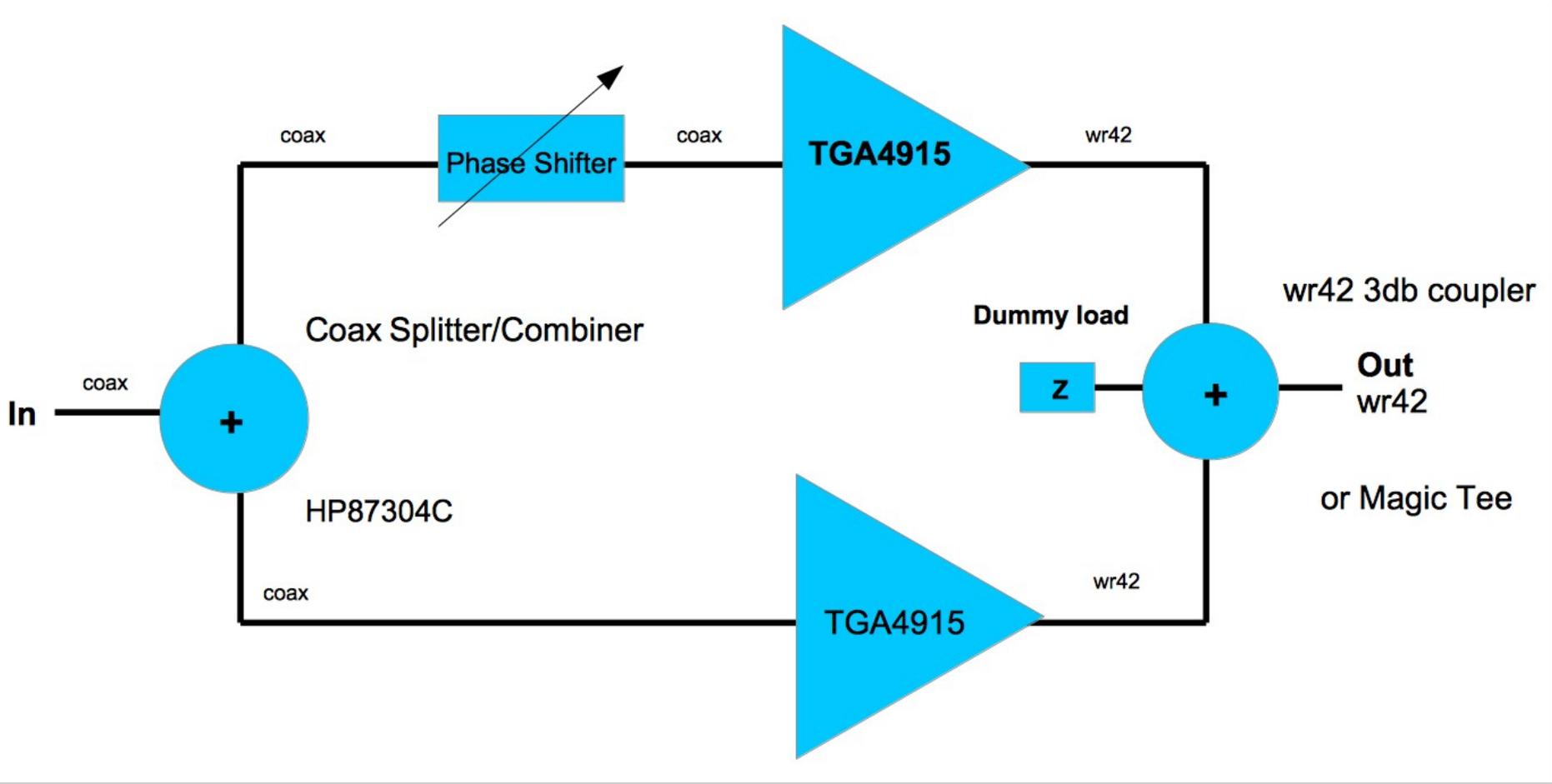
Several EMEers wanted more than **8 Watts**
A new idea was to **couple two devices**

Could find **this beauty** for free



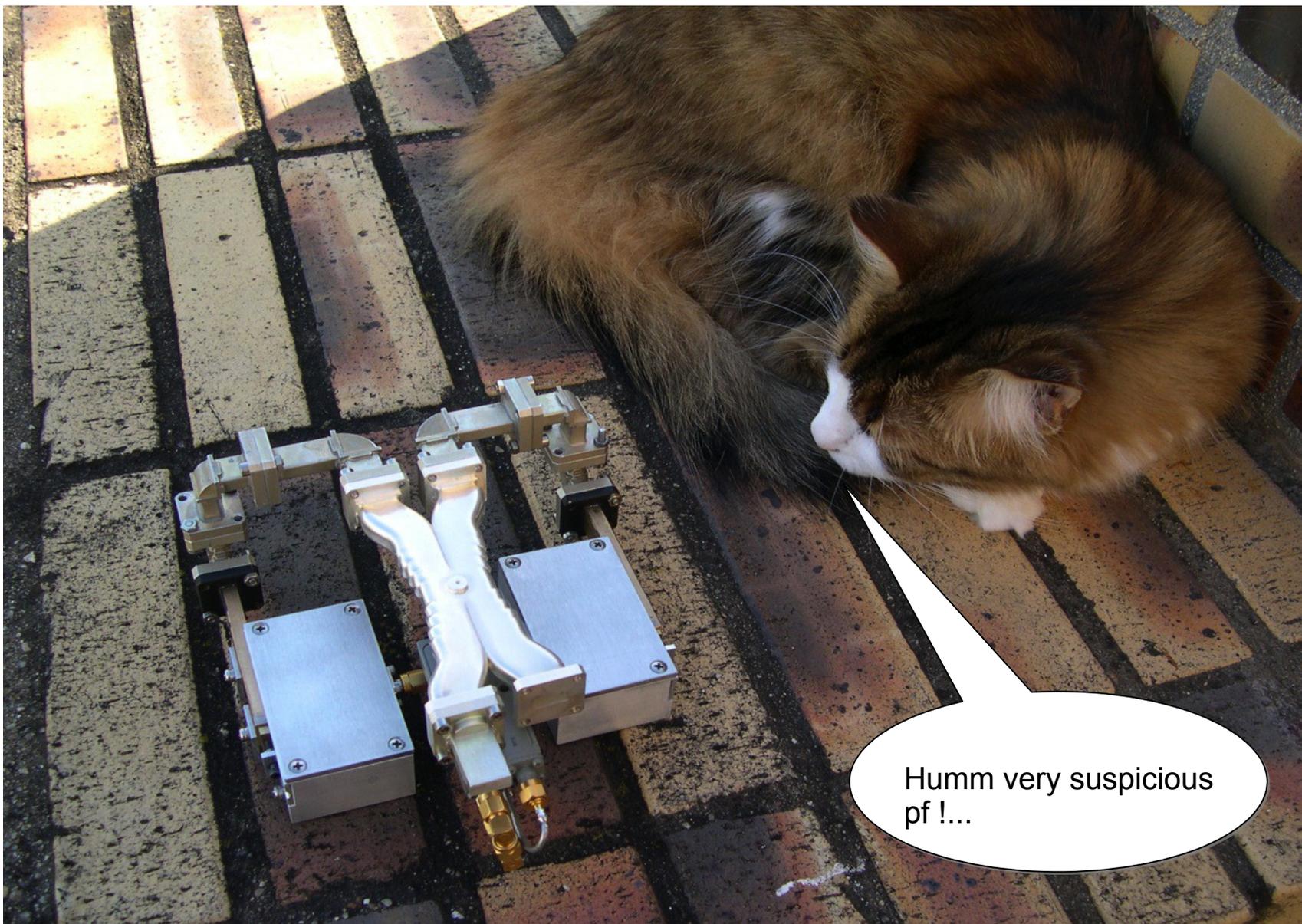


15 WATTS ON 24 GHZ AT REASONABLE PRICE



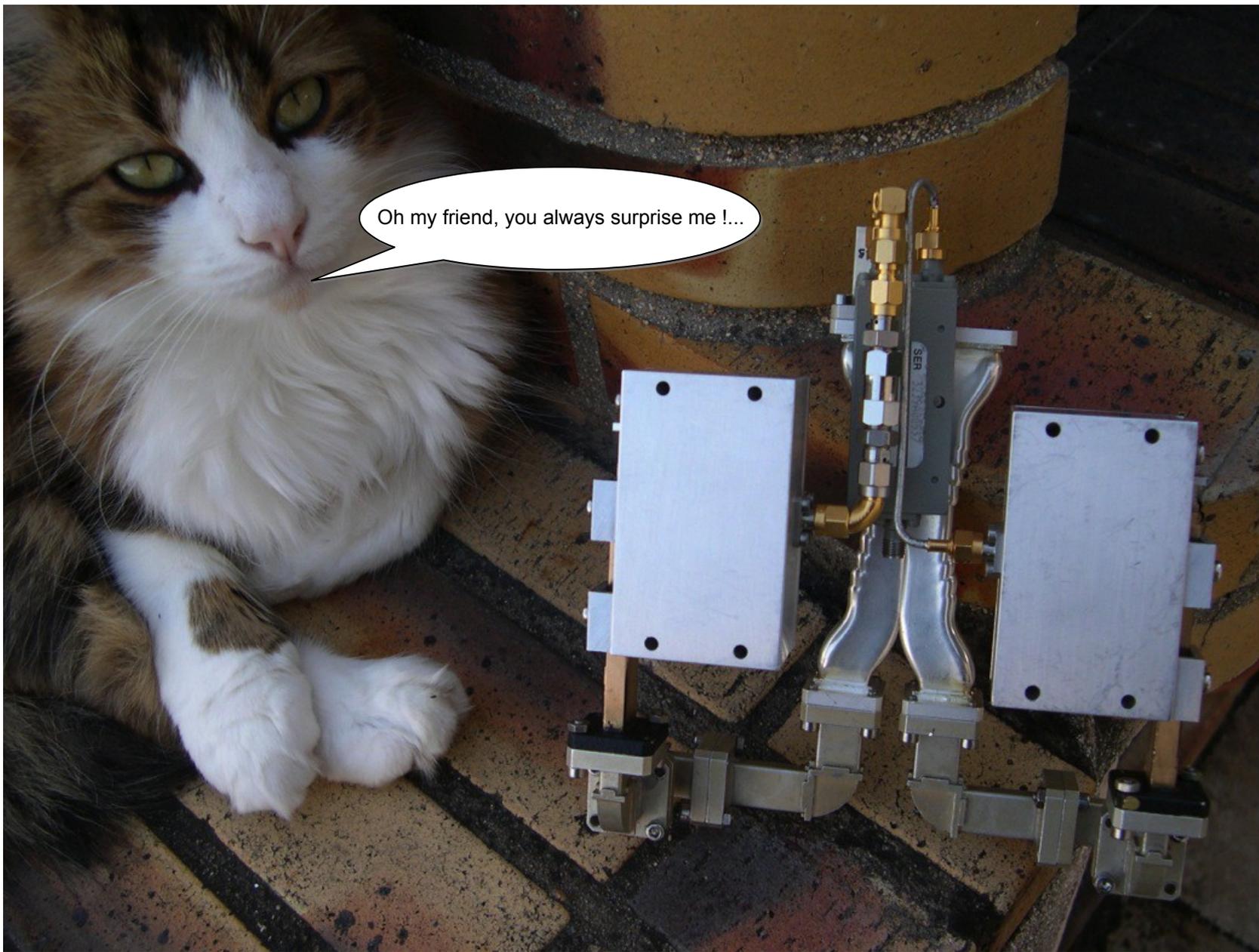


15 WATTS ON 24 GHZ AT REASONABLE PRICE



Hummm very suspicious pf !...

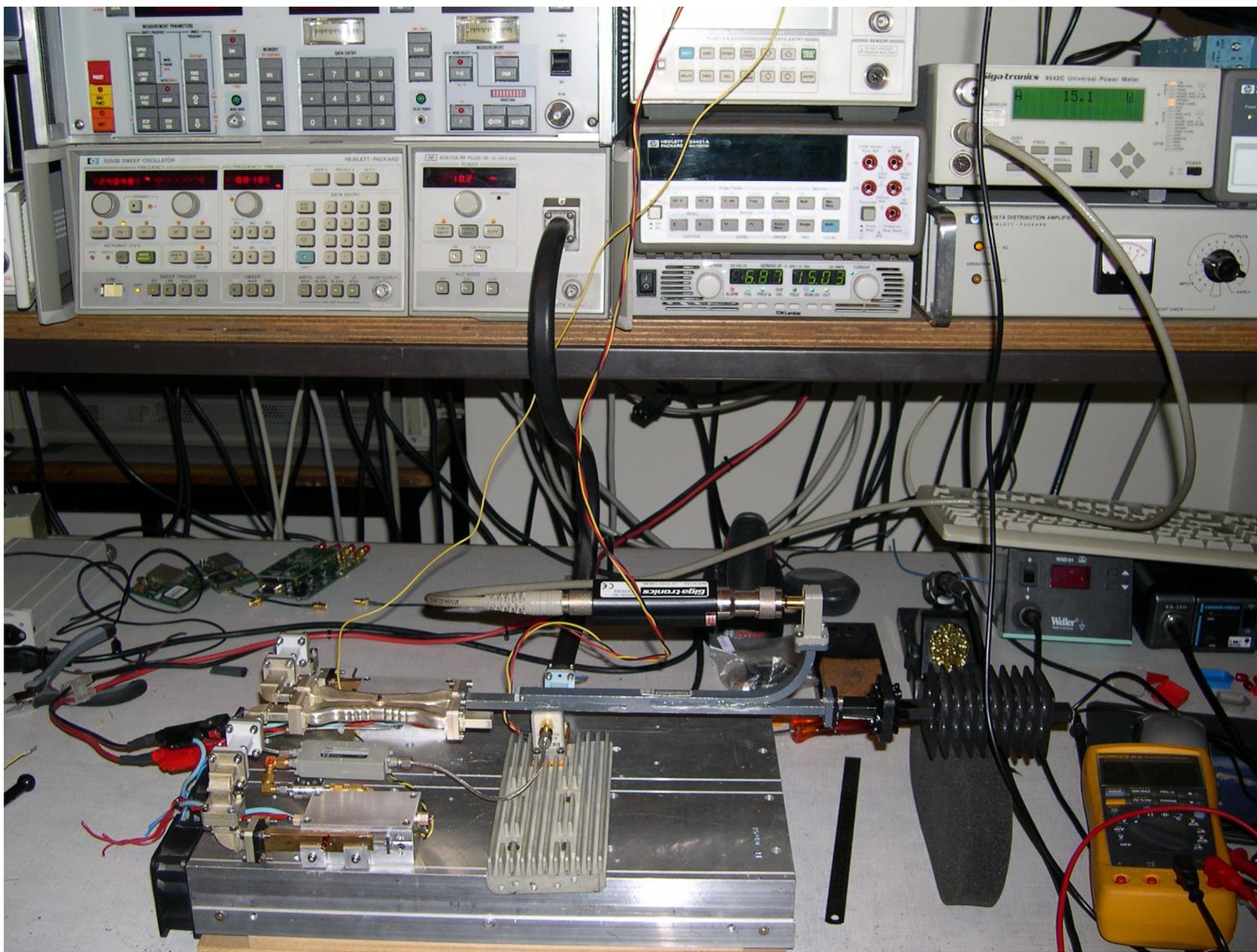
15 WATTS ON 24 GHZ AT REASONABLE PRICE



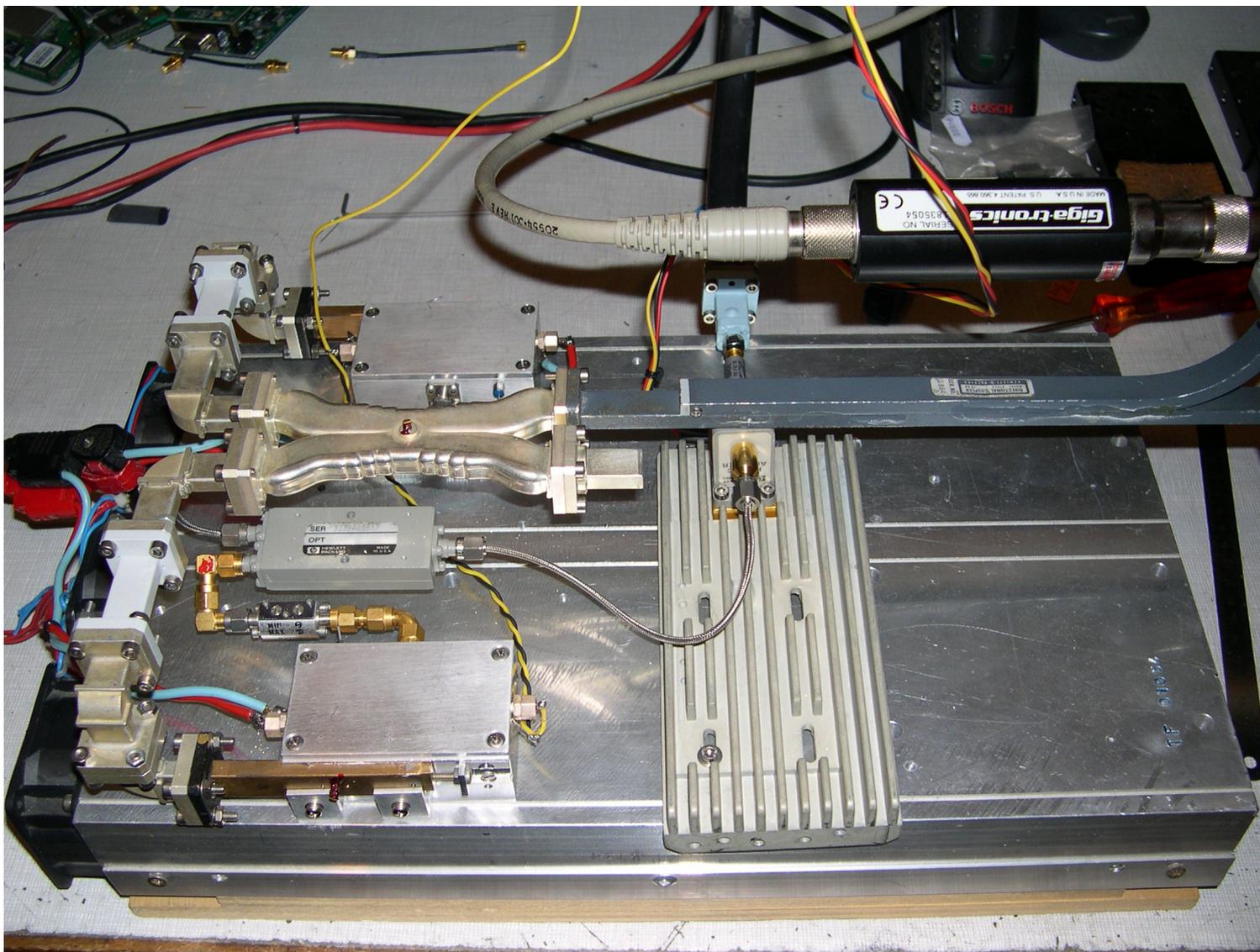


15 WATTS ON 24 GHZ AT REASONABLE PRICE

The Test Bench



The Test Bench





15 WATTS ON 24 GHZ AT REASONABLE PRICE

Cost evaluation of the project

Components	Source	Qty	Max\$	min\$
TGA4915-CP	TriQuint (Mouser)	2	600	600
Milled box	various – your choice	2	140	0
Pcb	F5BQP or other	2	50	50
Output coupler	Ebay or other	1	250	0
Input coupler	Ebay or other	1	100	0
Phase Shifter	Ebay or other	1	150	0
Radiator	Ebay or other	1	50	0
Various components	Ebay or other	—	50	0
Total			1390	650

Depending of your **purchasing choice and effort** on the construction, you should be in between



15 WATTS ON 24 GHZ AT REASONABLE PRICE

Conclusion

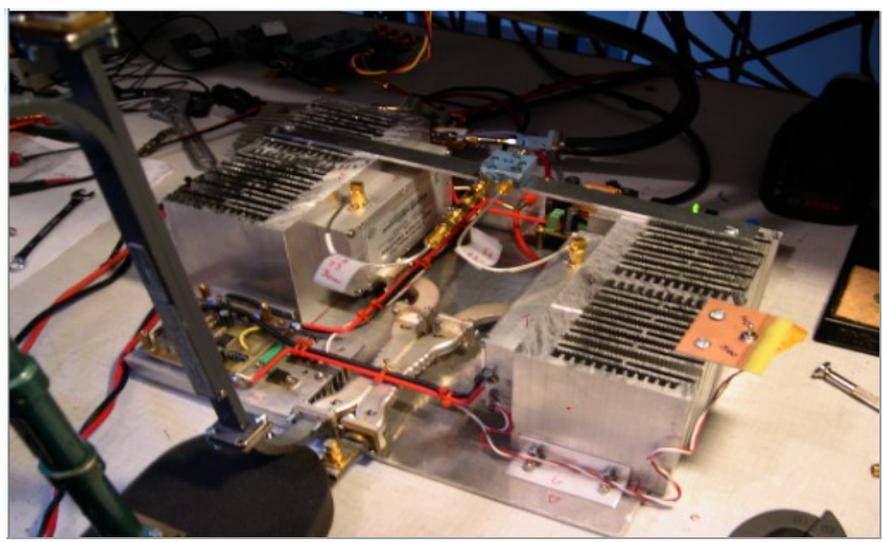
Single SSPA easy to build using high power Ku band devices

Dual SSPA coupled difficult to achieve for hams using stripline technology at 24Ghz

Extremely easy to couple dual or multiple devices using fully matched waveguide couplers

Other SSPA have been coupled using the same technique 2 x 10W DB6NT (F1PYR)

Now it's your time...





15 WATTS ON 24 GHZ AT REASONABLE PRICE

Some useful url / References

<http://f6bva.pagesperso-orange.fr/24Ghz/PA%2024%20TGA4915%20mono.pdf>

<http://www.triquint.com/products/p/TGA4915-CP>

Some useful components for the project (these are just exemples) :

<http://www.pasternack.com/phase-trimmers-category.aspx> (still working at 24Ghz)

<http://www.nardamicrowave.com/east/index.php?m=Products&e=list&categoryId=217> (also still working at 24Ghz)

http://www.minibend.com/catalog_viewitem.asp?pid=925

http://www.minibend.com/catalog_viewitem.asp?pid=711

Many thanks to

F6BVA for the initial design

F1PYR for the initial TGA PO

F1VL for the prototype testing

F8BTP for the mechanics

F2CT for the second TGA PO

All the others I've forgotten and Ebay our second mother...