RVT用ワイヤレスヘルスモニタリングシステムのためのC帯 20W級 GaN HPAの設計

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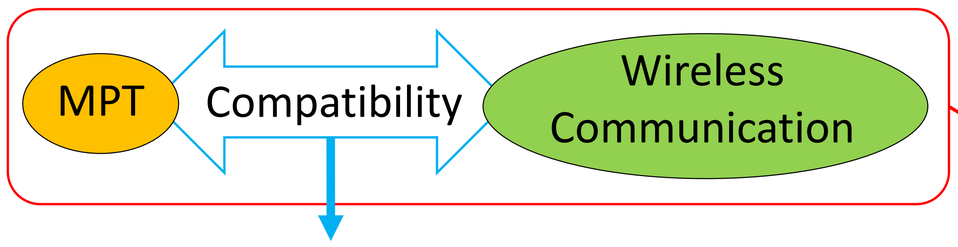
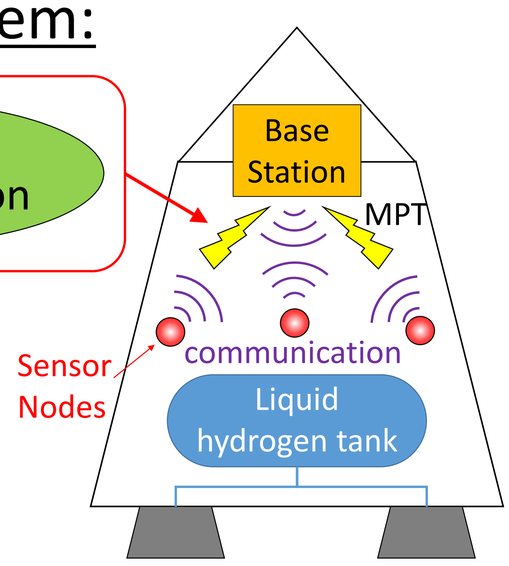
研究背景目的:

Wireless Health Monitoring System:



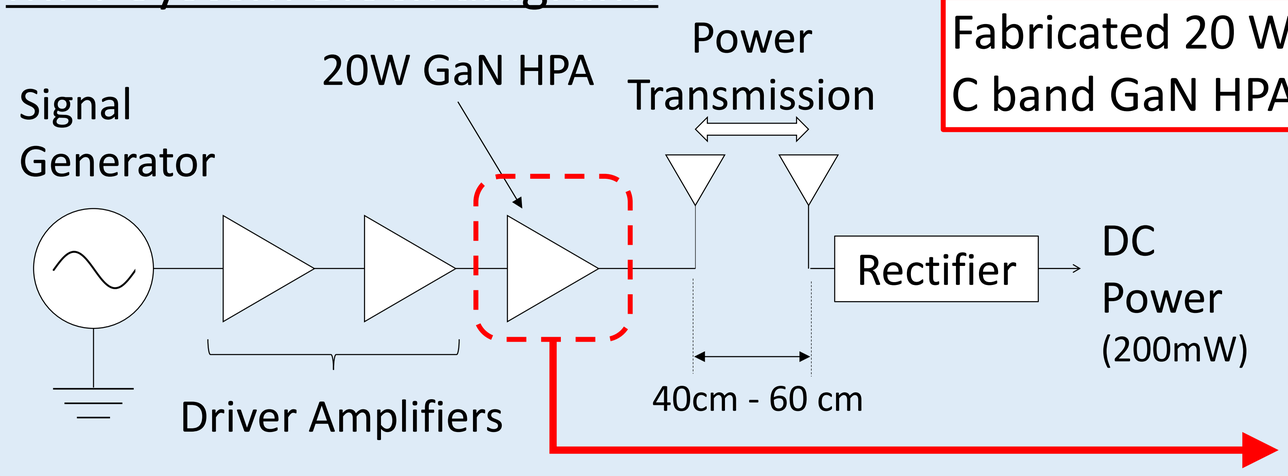
Separation of the frequency

- Communication: $f < 5.725$ GHz (IEEE802.11a/n)
- MPT: $f >$ C band

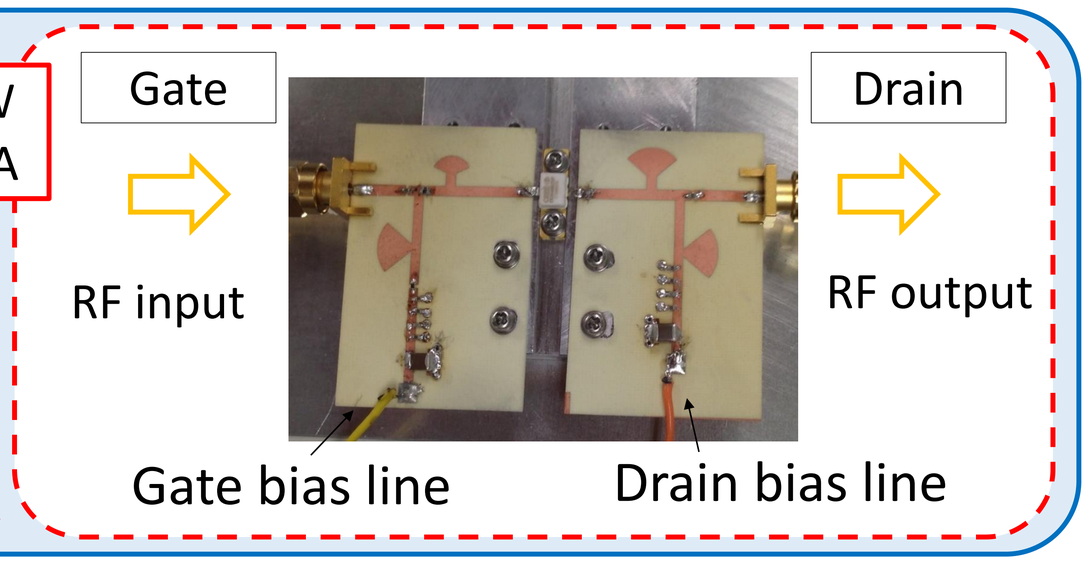


The feasibility of wireless health monitoring system in the reusable rocket has been studied. In this study, the C-band 20-W GaN HPA was designed and fabricated for MPT system with wireless communication.

MPT System Block diagram:



Fabricated 20 W C band GaN HPA



GaN HPA の設計:

Main line:

- GaN HEMT: CGH40025F, Cree
- Designed with non-liner model in the ADS simulator

Bias line:

- Implemented bypass capacitors for noise filtering and unconditional stability at C band frequency.

Measurement DC condition:

- Gate voltage -2.8 V, Drain voltage 28 V

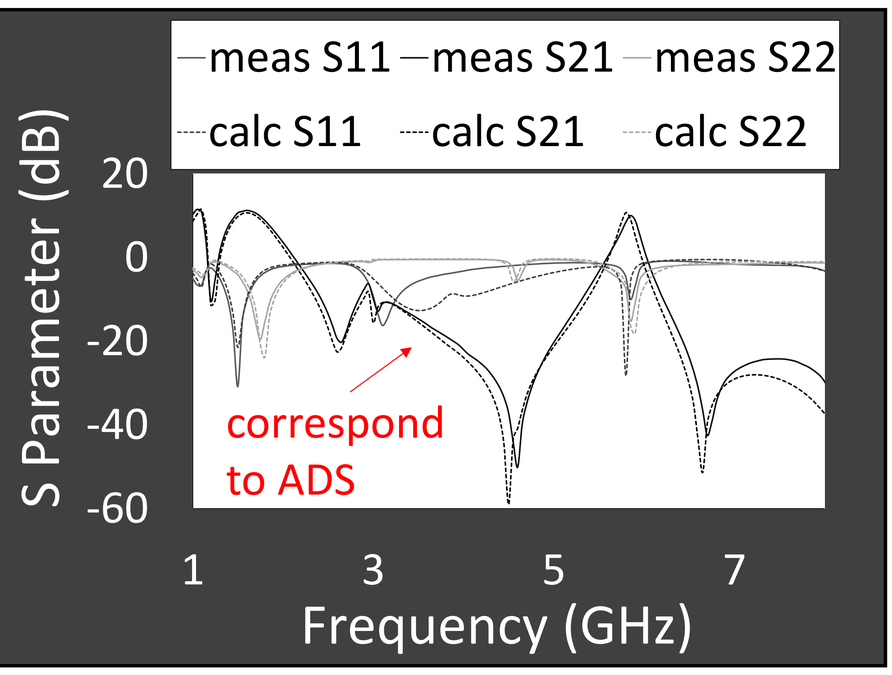
Specs of GaN HPA (5.95 GHz):

- Max output power: 43.0 dBm @ 37.0 dBm input
- Max PAE: 44.5 % @ 42.3 dBm output
- Gain: 6.83 dB @ 42.3 dBm and 4.0 dB gain compression

実験結果:

S parameter at small signal conditions →

The measured S-parameters corresponded to ADS simulation result. The max gain ($|S_{21}|$) was 10.83 dB



Input-output characteristics at large signal conditions →

Over 43 dBm (20 W) output power was obtained.