STABILITY TEST OF 7 KW SSPA FOR SINGLE SPOKE RESONATOR

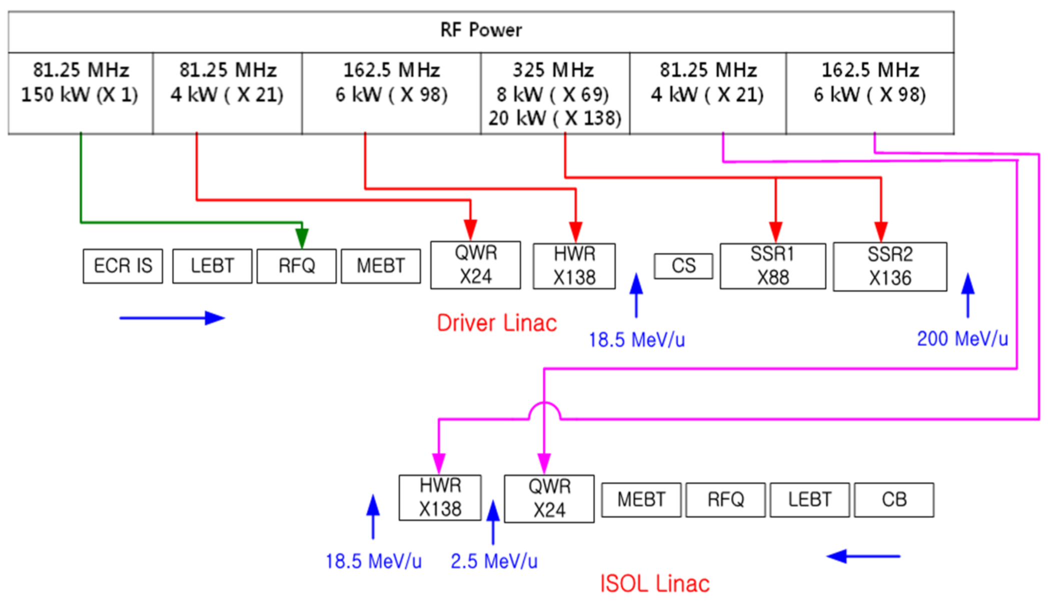
JaeEun Han, O-Ryung Choi, Heejin Do and J. W. Kim
Rare Isotope Science Project (RISP), Institute for Basic Science (IBS), Daejeon, Korea

ABSTRACT

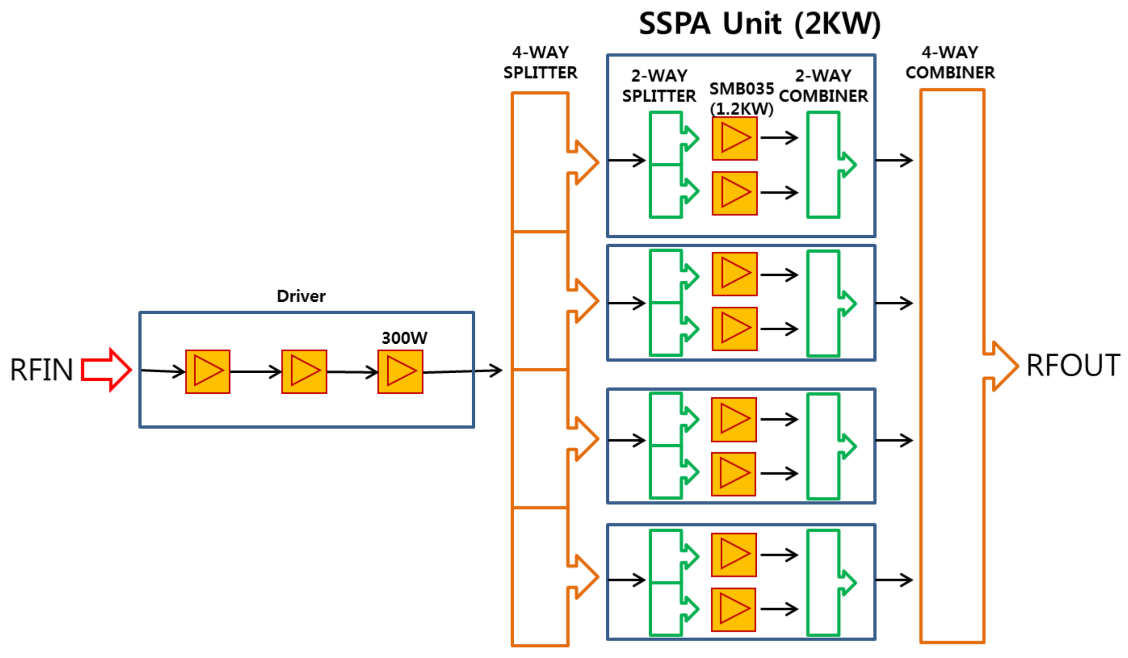
The RAON accelerator planned SC linac in Korea will use solid state power amplifiers to provide superconducting cavities with rf power. The RAON main accelerator is composed of a normal conducting injector and a superconducting linac. SC linac uses 3 types of SC cavities which are QWR, HWR and SSR. SSR is composed of two families at low and high beta. Each cavity is driven by a SSPA. SSPA which is developed by in house is based on the 2 kW module. This base module is equipped with four, 600 W semiconductor transistors including isolator combined by 4 way combiner of Gygel method (Isolated combiner). Four modules are combined again with same kind combiner obtain 7 kW of rf power. This paper describe the stability test result for 325 MHz, 7 kW SSPA.

INTRODUCTION

- *Schematics of RF Systems*



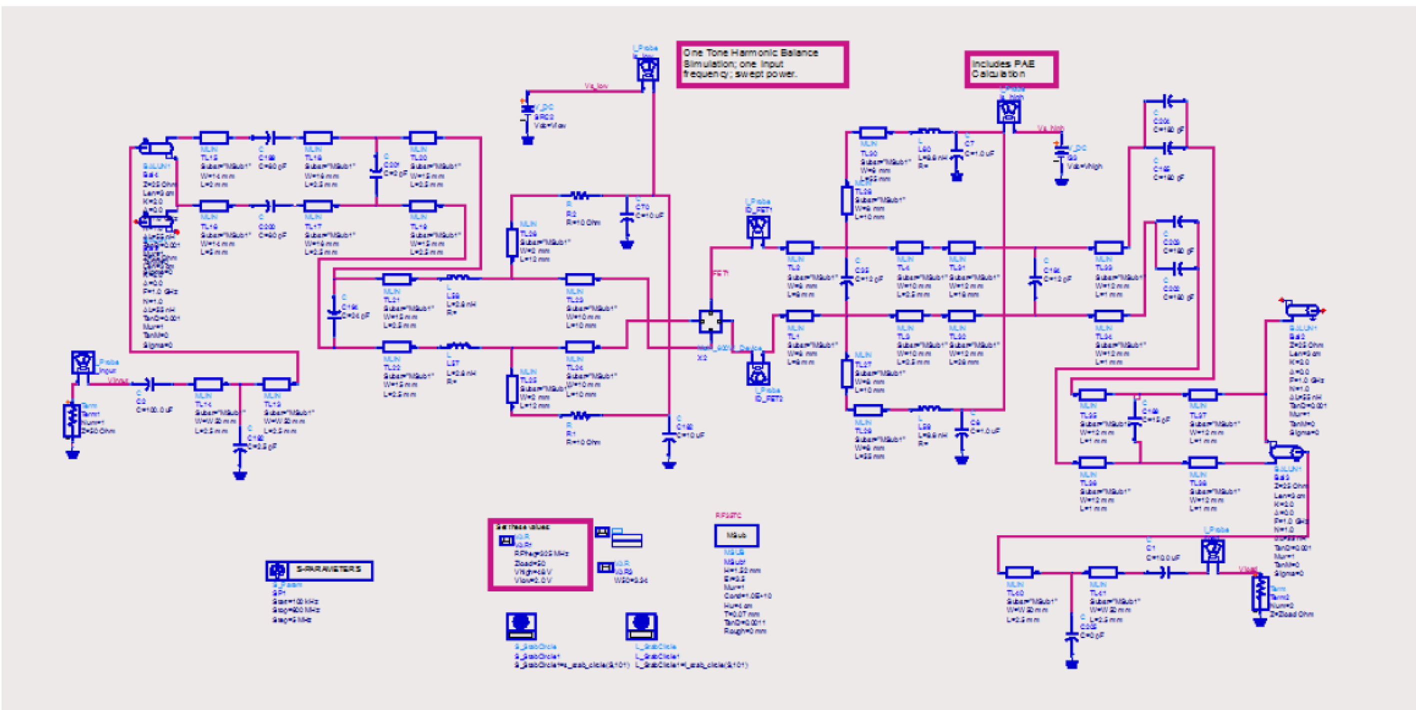
☐ The operating base RF frequency is 81.25 MHz for the RFQ and QWR, 162.5 MHz for HWR and 325 MHz for SSR1 and SSR2. RFQ which is composed normal conducting cavity is supplied 150 kW of RF power. QWR, HWR, SSR1 and SSR2 are composed superconducting cavities. They are supplied 4 kW, 6 kW, 8 kW and 20 kW of RF power respectively.

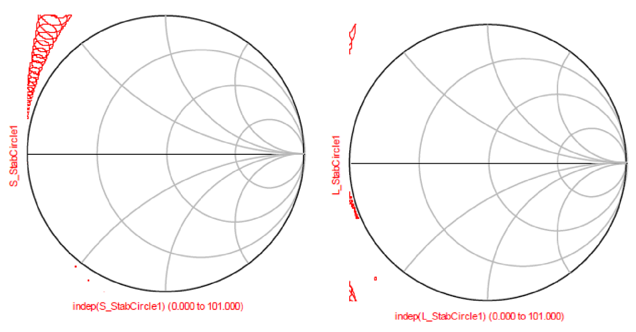


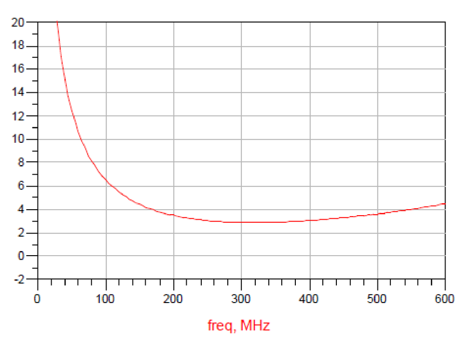
- *Block diagram of SSPA for SSR*

DESIGN OF 1 KW SSPA MODULE

The 1-kW module is based on a MOSFET transistor. Figure is a circuit diagram of the 1 kW SSPA. For optimized design, simulation was performed using the ADS code [1].



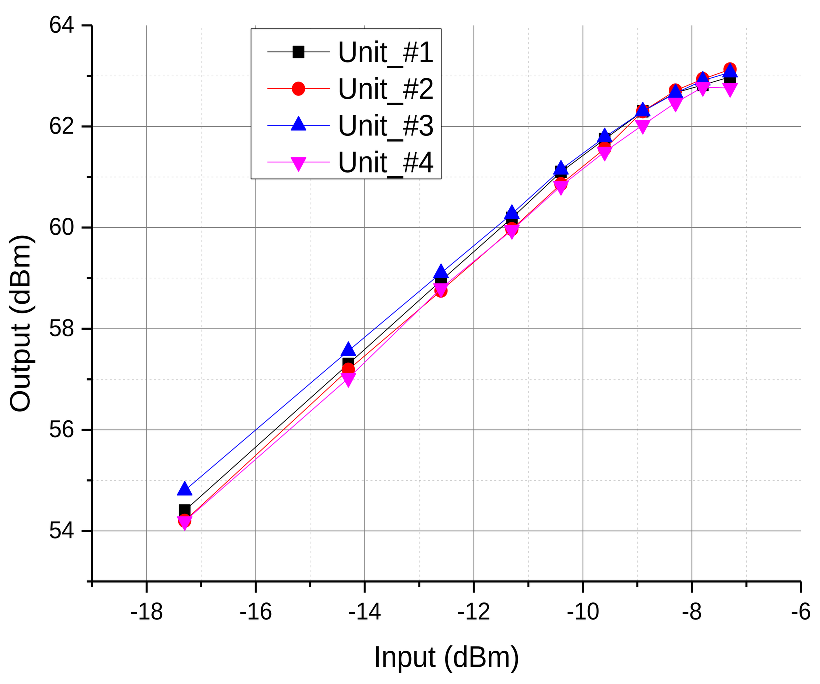




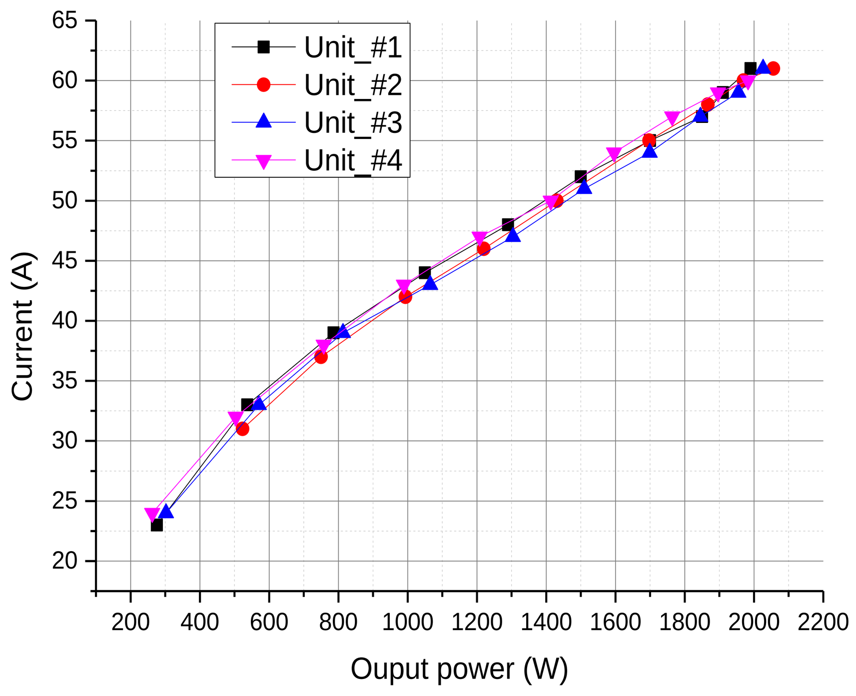
- *Stability after in/out matching*
- *K factor*

FULL POWER TEST

- *2 kW SSPA Unit Test*



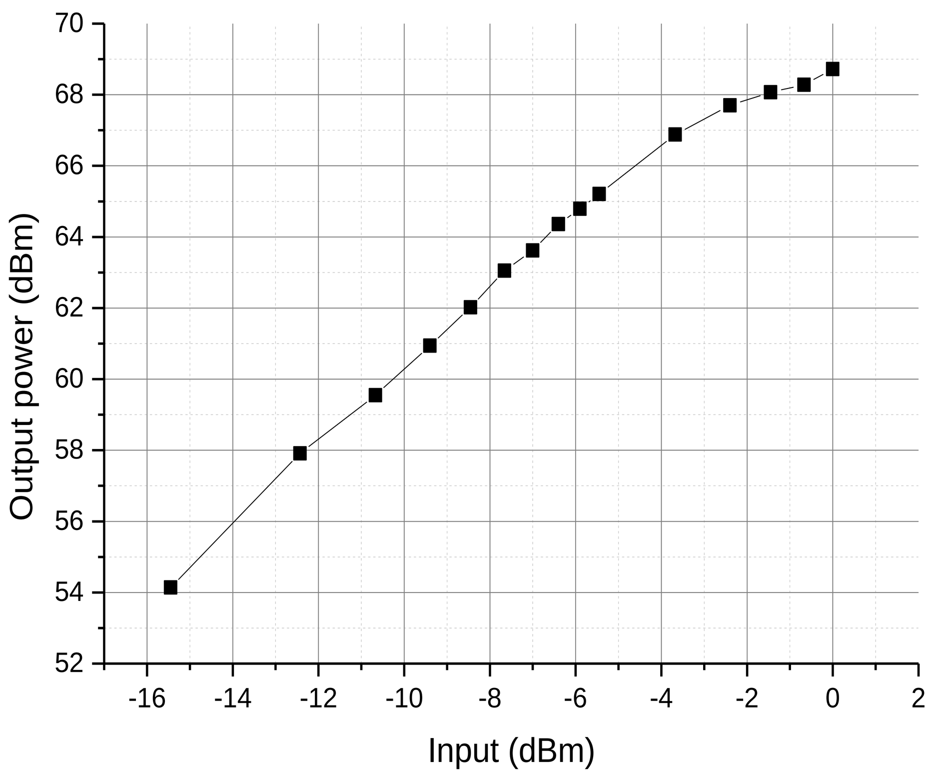
Gain Curve



Output power vs. Current

☐ The 2-kW SSPA is composed of four of 600 W module. 3 dB bandwidth of SSPA module is about +/- 3 %.

- *Full Power Test*



Gain Curve

REFERENCE

[1] A product of Freescale Semiconductor Inc., http://www.freescale.com..

[2] Robert E. Collin, Foundations for Microwave Engineering, The IEEE Press

ACKNOWLEDGEMENT

☐ This work was supported by the Rare Isotope Science Project of Institute for Basic Science funded by Ministry of Science, ICT and Future Planning and National Research Foundation of Korea (2011-0032011)