An 1.5 GHz, 13.5kW CW high-power magnetron for a superconducting RF accelerator has been developed by Andesun Technology Group Co., Ltd. with Nanjing Sanle Electronic Information Industry Group Co., Ltd., in order to replace the klystron, that could reduce the power source cost to about one-third. The cavity, output power antenna and coupling door-nob have been optimized by using CST Studio. Testing results have shown that the resonance frequency and output power have met the requirements, and the efficiency of the magnetron is higher that 78.45%.

1. Introduction

- Using a magnetron instead of a klystron as a microwave power source for an SRF accelerator can reduce operating costs by about one-third.
- An 1.5 GHz, 13.5kW CW high-power magnetron has been developed by Andesun Technology Group Co., Ltd. with Nanjing Sanle Electronic Information Industry Group Co., Ltd.
- The prototype measurement shows that the output power of the magnetron reached 14.23kW, and the whole tube efficiency is 78.45%.

2. Design of the magnetron

2.1 The parameters of the magnetron

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Working frequency</td>
<td>1.5 GHz</td>
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<tr>
<td>Average output power</td>
<td>13.5kW</td>
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<tr>
<td>Peak power</td>
<td>17 kW</td>
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<tr>
<td>Efficiency</td>
<td>78.45%</td>
</tr>
<tr>
<td>VSWR</td>
<td>&lt;1.14</td>
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<tr>
<td>Way of working</td>
<td>CW</td>
</tr>
</tbody>
</table>

2.2 Cavity and output structure design

- The simulation model
- The electric field distribution of the π mode

2.3 Whole magnetron simulation

- S11 of the output structure
- The finished cavity and output antenna
- The electron distribution in the interaction space
- The output signal of the magnetron

3. Testing system and products

- The excitation chamber
- The prototype of 1.5GHz CW magnetron
- The schematic diagram of the power test of the magnetron
- The test platform of magnetron

4. Testing results

- Testing results of 1.5GHz CW magnetron
- The output signal of the magnetron

5. Conclusions

A 1.5GHz high-power CW magnetron for SRF accelerator is successfully developed by Andesun Technology Group Co., Ltd. with Nanjing Sanle Electronic Information Industry Group Co., Ltd. The test results show that the 1.5GHz magnetron meets the design requirements and can meet the application requirements of SRF accelerator.

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