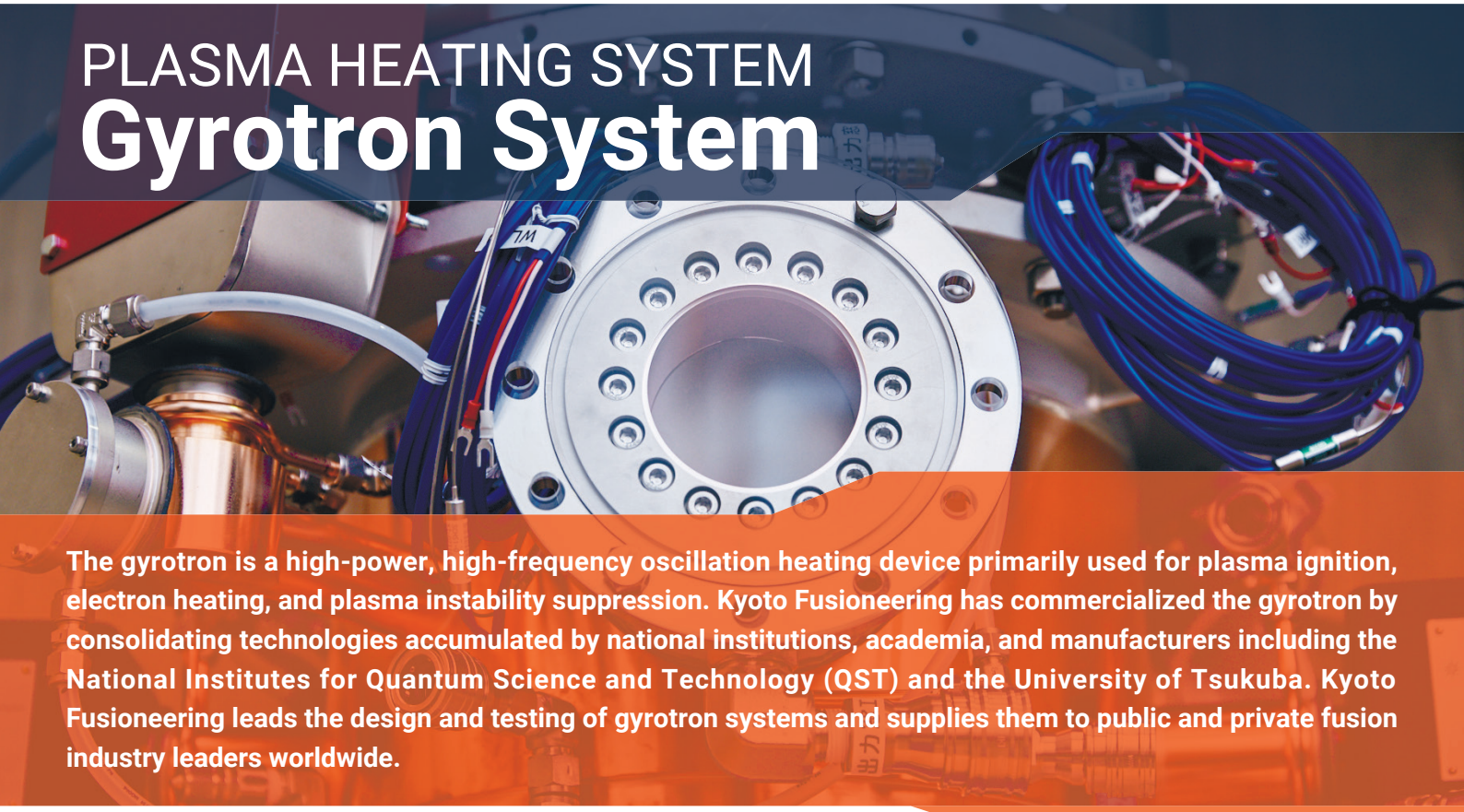
KYOTO FUSIONEERING

PLASMA HEATING SYSTEM

Gyrotron System



The gyrotron is a high-power, high-frequency oscillation heating device primarily used for plasma ignition, electron heating, and plasma instability suppression. Kyoto Fusioneering has commercialized the gyrotron by consolidating technologies accumulated by national institutions, academia, and manufacturers including the National Institutes for Quantum Science and Technology (QST) and the University of Tsukuba. Kyoto Fusioneering leads the design and testing of gyrotron systems and supplies them to public and private fusion industry leaders worldwide.

World-leading Gyrotron Offering

The gyrotron is a microwave source capable of generating 1 Mega-Watt (MW) class power generation at millimeter wavelength range (approximately 20–250 GHz).

The wave oscillating in the resonator is shaped to the RF beam by the mode converter and mirrors, and outputs through a vacuum-sealed window. Gyrotrons can be designed to oscillate at multiple frequencies by adjusting operation parameters.

Kyoto Fusioneering is ready to provide high-performance gyrotron systems to customers around the world. The offering is a complete gyrotron system, including the gyrotron, superconducting magnet (SCM), matching optics unit (MOU), high-voltage power supply, and other ancillary equipment and systems.

Frequency	Output Power	HE_{11} Mode Purity	Pulse Width	Efficiency
28 - 250 GHz	1 MW	> 90%	- CW Operation	≒ 50%

Our Partners

Kyoto Fusioneering collaborates with major Japanese companies such as Canon Electron Tubes & Devices (gyrotron tube), Japan Superconductor Technology known as JASTEC (superconducting magnet), and KYOCERA (ceramic window) to deliver advanced and complete products for the industrial application of the gyrotrons.

Key Features of Gyrotron Tube

PURPOSES

- Plasma Diagnostic
- Plasma Heating

MULTI-FREQUENCY OSCILLATION

- 28, 35 GHz
- 104, 137, 170, 203 GHz* (Selectable)

*Single frequency can be designed

SIZE
~ 3 m
WEIGHT
< 1,000 kg

	236 GHz	203 GHz*	170 GHz*	137 GHz*	104 GHz*	35 GHz**	28 GHz**
Oscillation Mode	$TE_{43,15}$	$TE_{37,13}$	$TE_{31,11}$	$TE_{25,9}$	$TE_{19,6}$	$TE_{10,6}$	$TE_{8,5}$
Output Mode	Gaussian Beam						
Typical Output Power	1 MW (To be tested)	1 MW	1 MW	1 MW	1 MW	1 MW	1 MW

*R. Ikeda, *et al.*, Journal of Infrared, Millimeter, and Terahertz Waves **38** (2017) 531–537
T. Kariya, *et al.*, Nuclear Fusion **59 (2019) 066009.

Our Gyrotron Team

The team consists of experienced researchers and engineers such as from QST, Toshiba, Hitachi, and NIFS, led by expert scientific leaders:

Prof. Keishi Sakamoto - Director, CTO, Head of Technical Development Department

Led the research and development of the high-power gyrotron at QST for many years and realized the first multi-frequency 1 MW CW class gyrotron. Served as a professor at the University of Tsukuba and Kyoto University, and as a director of the Plasma and Fusion Society of Japan. Ph.D from Kyushu University.

Kenichi Hayashi – Vice President, Head of Electro Magnetic Technology Team

Served as a General Manager of the Electron Tube Division and Senior Manager of Electron Tube Engineering Department in Toshiba Electron Tubes & Devices CO.,LTD.

Dr. Yosuke Hirata - Head of Electro Magnetic Development Team

Started his R&D career at Toshiba Corporation in the gyrotron, and high-power mm-wave transmission development followed by various simulations and mechanics for nuclear power plants. A visiting scientist at UC Davis. Involved in the IFMIF project at QST in developing the central control system. Ph.D from Kyoto University.

Kyoto Fusioneering., Ltd
email: biz@kyotofusioneering.com

Our Website