

## Strengthening technological capabilities for the future and intellectual property activities to support it



Murata will accelerate technological innovation in order to ensure that we continue to create new value. We conduct development in-house, from materials to processes, Manufacturing technology, product design, analysis, and evaluation. In doing so, we develop and accumulate our own fundamental technologies and are creating technology platforms that can be applied to new developments. The appropriate securing and accumulation of intellectual property is becoming increasingly important for maintaining and strengthening the competitiveness of companies. We protect and utilize newly created intellectual property by applying for and obtaining rights to it as patents, or by keeping it confidential as know-how, thereby securing further business advantages.

### Forming core technologies of the future by promoting development of elemental technology

Murata has six platform technology domains. By adding core technologies acquired through M&As to Murata's unique core technologies that have been refined over many years, we will create further differentiated technologies and innovations. In addition, we will utilize the technologies and experience we have developed through research and development of components, devices and modules, and combine them with software and communication networks to create a third layer of business.

#### Platform technologies and core technologies

<b>Materials technology</b>	Materials design                      Materials processing Materials technology is the technology to simulate and model material composition, crystal state, crystal structures, and electrical properties, as well as to disperse and combine these materials while controlling particle sizes and crystal structures.
<b>Front-end process technology</b>	Laminating & stacking                      Printing                      Sintering                      Surface treatment                      Precision processing                      Semiconductor devices                      Semiconductor and MEMS fine processing Front-end process technology includes dielectric sheet formation and lamination technology, internal electrode and wiring formation technology on ceramic sheets, fine processing on semiconductor wafers, and Semiconductor and MEMS device design technology.
<b>Back-end process technology</b>	Packaging                      Measurement & testing Back-end process technology mainly includes the technology to achieve miniaturization and high reliability of devices through high thermal resistance bonding, hermetic sealing and more complex 3D assemble and package, as well as measurement and testing technologies to evaluate and select such technologies.
<b>Manufacturing technology</b>	Equipment design                      Automation                      Industrial engineering Manufacturing technology includes equipment design technology to achieve unique manufacturing technologies, automation technology to convey ultra-small and odd-shaped products at high speeds and with low damage, and control technology to manufacture high-quality products.
<b>Product design technology</b>	High frequency design                      Device design                      Simulation                      Modeling                      Circuit design                      Software                      High reliability design Product design technology includes, mainly, the technology to design RF components and modules, to achieve high performance and small devices using software, etc., to achieve high reliability under harsh environmental conditions, and to model and simulate phenomena such as electromagnetic field analysis, thermal analysis, and stress analysis.
<b>Analytical technology</b>	Materials characterization                      Failure analysis Analytical technology includes the technology to physically and electronically evaluate material compositions through non-destructive analysis, thermal analysis, organic and inorganic analysis, and surface analysis, and technology to identify the cause of failures that occurred in materials and products through the abovementioned analytical methods.

### “Preparation” for innovation creation

Murata launched the Preparation Project in fiscal 2020. In the Project, candidates for the next generation of management leaders spent several months discussing with the current management to determine the direction of change in the business environment expected in 2030 and beyond, to identify opportunities and risks as hypotheses, and to clarify events that should be addressed today. In terms of technological “preparation,” we view the development of technologies and businesses for the spread of 6G and the resolution of environmental issues as future business opportunities, and we are plotting a technological roadmap that will lead to the development of new technologies and production process reforms for the company.

Murata is also working to create new businesses by combining its core technologies in materials, processes, and other areas with new business domains. Currently, we are working to determine a business theme that will develop new businesses from a long-term perspective of 10 to 20 years into the future, targeting the domain of solving social issues. We also intend to focus on partnerships and collaborations with external parties. (▶ P.23 Message from the Director of Corporate Technology & Business Development Unit)

Going forward, Murata will continue to “prepare” for sustainable growth in the future from various angles.

## Intellectual property activities that support Murata's technologies and businesses

### Organizational structure for intellectual property activities

Murata's intellectual property function consists of two departments: the corporate IP Department and the IP Planning Department. Within this context, they provide prompt support for business and development by deploying personnel who are closely connected to sites, and contribute to business growth by strengthening intellectual property governance from a corporate perspective. We have also established intellectual property sites overseas and have a system in place to promptly protect and utilize intellectual property that has been created locally. The details of intellectual property activities are continuously reported to the Board of Directors to enhance the use of intellectual property information in management and strengthen intellectual property risk management. In February 2022, Murata was selected as one of the Clarivate Top 100 Global Innovators 2022\* as a recognition of these efforts, which were highly acclaimed externally.

\* For more information, please see here. <https://corporate.murata.com/en-global/newsroom/news/company/general/2022/0224>

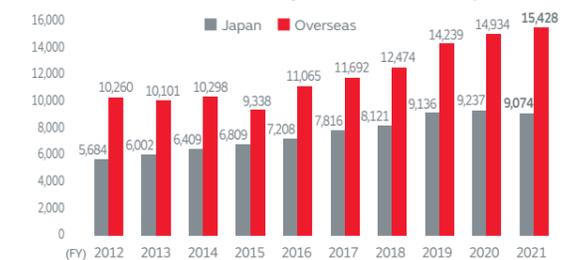
	Roles	Features
<b>Corporate IP Department</b>	<ul style="list-style-type: none"> <li>● Formulation of intellectual property strategies that are tied to business and development strategies</li> <li>● Construction of a strong intellectual property portfolio with an awareness of rights utilization</li> </ul>	On-site-based approach
<b>IP Planning Department</b>	<ul style="list-style-type: none"> <li>● Provision of intellectual property information for portfolio management</li> <li>● Intellectual property risk management, including contract negotiation and dispute resolution</li> <li>● Identification and resolution of intellectual property issues from a company-wide perspective</li> </ul>	Corporate perspective

For more information on our measures concerning intellectual property, please see here. <https://corporate.murata.com/en-global/csr/governance/ip>

### In-house awareness and employee training

Murata established “Basic Policy for Intellectual Property Activities” to encourage employees to engage in the intellectual property activities that would benefit the business beyond the organizational framework. We are raising awareness of intellectual property throughout the Group through stratified/vocational training, confidential information management training, holding intellectual property awareness forums, and the development and operation of an e-learning environment.

### Trends in the number of patents owned by Murata



### Planning and execution of global intellectual property utilization strategies

Murata uses objective information-based analysis in making comparisons with competitors in terms of patent competitiveness and asset value. We formulate intellectual property strategies based on these analyses and the growth strategies of each business, with the aim of creating an optimal intellectual property portfolio.

In addition, as Murata's ratio of sales outside of Japan to net sales increases, we are evaluating our intellectual property portfolio from a global perspective. By utilizing the information obtained from the analysis and evaluation to review our intellectual property strategy, we are helping to maintain and improve the competitive advantage of our businesses.

Especially in the third layer of business domain, the intellectual property function is involved from the early phases of research and development, conducting business environment surveys and technology searches from an intellectual property perspective to support commercialization promotion and business model development. In this way, the scope of activities

of the intellectual property function is being expanded in line with the expansion of Murata's business domains, and efforts are being made to ensure that the technologies and know-how that are the source of Murata's competitiveness are protected.

### Analysis of a specific business using intellectual property information (example)

