



NGK INSULATORS

EXEGER™



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NGK INSULATORS, LTD.

Exeger Operations AB

TACHIBANA ELECTRONIC SOLUTIONS CO., LTD.

Semtech Corporation

**NGK, Exeger, TACHIBANA ELECTRONIC SOLUTIONS and Semtech**  
**Develop a Maintenance-Free Indoor/Outdoor Position Tracker**  
**that is High-Precision, Ultra-thin and Compact**

**NGK INSULATORS, LTD. (hereinafter “NGK”), Exeger Operations AB (Stockholm, Sweden; CEO & Founder: Giovanni Fili; hereinafter “Exeger”), TACHIBANA ELECTRONIC SOLUTIONS CO., LTD. (Minato-ku, Tokyo; President: Toshimichi Shibata; hereinafter “TACHIBANA ELECTRONIC SOLUTIONS”), and Semtech Corporation (California, USA; President and CEO: Mohan Maheswaran; hereinafter “Semtech”), have developed a maintenance-free indoor/outdoor position tracker that is high-precision, ultra-thin and compact, together.**

The indoor/outdoor position tracker developed by the four companies has a power supply system that uses NGK's ultra-thin and compact “EnerCera®” (\*1) lithium-ion rechargeable battery and Exeger's “Powerfoyle” (\*2) solar cell that efficiently generates electricity both indoors and outdoors. It operates an ultra-thin board based on the “Zero Carbon LoRa® Evaluation Board” (\*3) circuit board sold by TACHIBANA ELECTRONIC SOLUTIONS using Semtech's LoRa® (\*4) connectivity IC and the “LoRa Edge™ LR1110” (\*5).

The tracker is maintenance-free and can be used both indoors and outdoors without battery replacement or charging (\*6) thanks to energy harvesting technology, which converts light such as indoor light and sunlight into electricity. In addition to providing highly accurate location information, the tracker enables record temperature, humidity and shock, and smooth data analysis by transmitting collected data to the Cloud via LoRa®. Because of its thinness of only 6 mm, the tracker can be used in wearable devices and logistics trackers as an independent IoT device equipped with a series of functions from location information acquisition to data transmission, and it will contribute to improved operational efficiency and labor savings by visualizing the movement of people and goods.

In the future, through experimentation and evaluation, the four companies plan to examine a solution business that utilizes location information, such as systems to protect children and the elderly, manage the activities of office personnel, and analyzing the movement lines of people in stores, factories, and other specific locations. As the indoor/outdoor position tracker can record not only location information but also temperature, humidity, and impact, the four companies additionally plan to develop applications in a wide range of fields going forward, such as temperature and humidity control of goods and containers. They intend to continue to leverage their knowledge in accelerating the global shift to IoT, promoting the social implementation of IoT devices in society, for which they expect growing demand.

## Roles of each company

|                                |                                                                                              |
|--------------------------------|----------------------------------------------------------------------------------------------|
| NGK                            | Development and supply of lithium-ion rechargeable batteries                                 |
| Exeger                         | Development and supply of solar cells                                                        |
| TACHIBANA ELECTRONIC SOLUTIONS | Project coordination, sales of evaluation trackers, customized proposals for mass production |
| Semtech                        | Development and supply of LoRa® communication ICs                                            |

(\*1) NGK's lithium-ion rechargeable battery "EnerCera":

Product Site: <https://www.ngk-insulators.com/en/product/energera.html>

Special Site: <https://energera.ngk-insulators.com/en/>

(\*2) Exeger's solar cell "Powerfoyle":

<https://www.exeger.com/powerfoyle/>

(\*3) TACHIBANA ELECTRONIC SOLUTIONS' circuit board "ZeroCarbon LoRa® Evaluation Board":

(\*4) LoRa®: A type of LPWA (Low Power Wide Area) wireless communication method that enables power-saving, long-range data transmission.

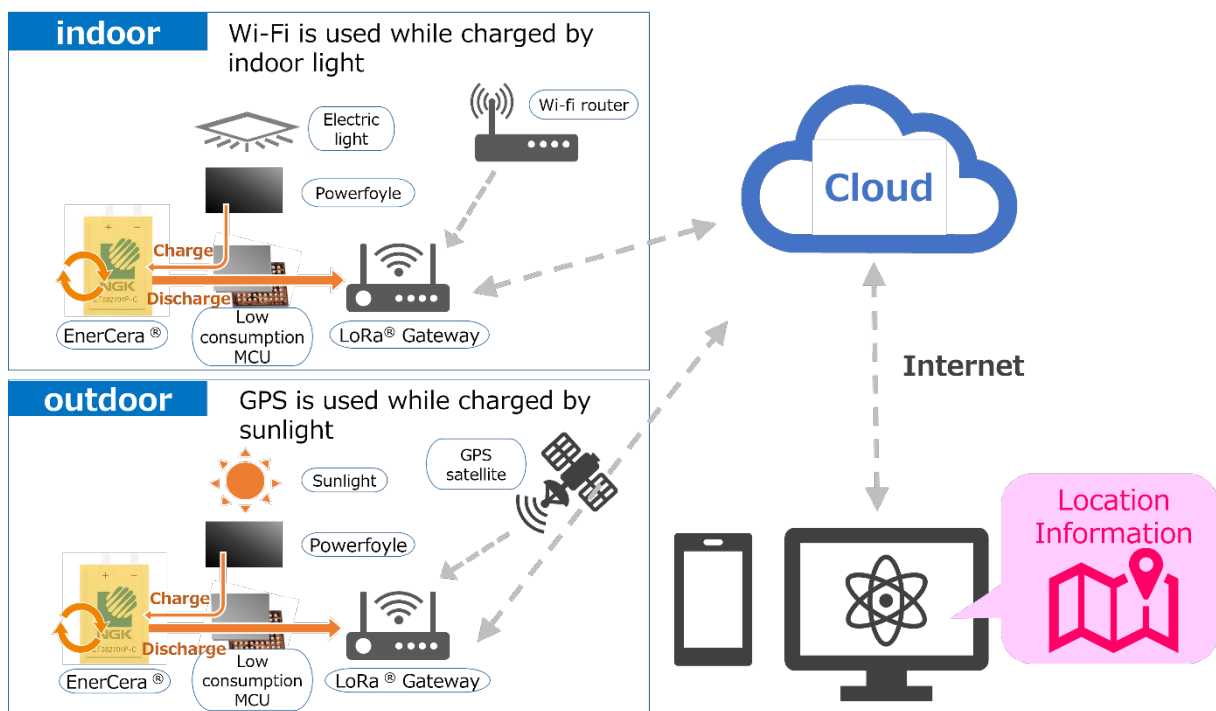
(\*5) Semtech's communication IC "LoRa Edge™ LR1110":

<https://www.semtech.com/company/press/semtech-ryoden-and-renesas-electronics-launch-zero-carbon-solution-with-the-lora-edge-platform-and-a-re-microcontroller>

(\*6) The situation varies depending on power consumption and usage environment, such as communication frequency and sensor measurement frequency.



Indoor/outdoor position tracker



Operation of indoor/outdoor position tracker

**\*About NGK INSULATORS, LTD.**

NGK INSULATORS (NGK) is a leading company in the field of ceramics. Since its foundation in 1919, NGK has used its unique ceramic technology to provide numerous ground-breaking products that solve social issues. Today, NGK is active in more than 20 countries worldwide, with business foci including mobility, energy, IoT and industry. As one of the largest manufacturers of ceramic substrates for automotive catalytic converters, NGK is actively reducing the strain on our global environment. Furthermore, NGK's products include the energy storage system "NAS" batteries, in addition to the compact, thin, and high-energy-density lithium-ion rechargeable battery "EnerCera" series, vital tools for sustainable energy infrastructure. Through providing innovative, high-quality products, NGK is committed to contributing to our society. In order to create a future where people can coexist with nature, NGK will continue to develop and provide products that support social infrastructure while preserving the environment. [www.ngk-insulators.com/en/](http://www.ngk-insulators.com/en/)  
EnerCera Special website <https://energera.ngk-insulators.com/en/>

**\*About Exeger Operations AB**

Exeger is a Swedish company with a unique solar cell technology that converts all forms of light into electrical energy. This material, Powerfoyle, is the world's only fully customizable solar cell. With its superior design properties, it can be integrated seamlessly into any electronic device. Powerfoyle enhances every product it is integrated into with extended or even unlimited battery life, putting the power of cutting-edge solar cell technology directly in the hands of people. Exeger is leading the way to energy independence through more sustainable and user-friendly products – with the vision to touch the lives of a billion people by 2030. For more information, visit <http://www.exeger.com/> and <https://www.powerfoyle.com/> .

**\*About TACHIBANA ELECTRONIC SOLUTIONS**

TACHIBANA ELECTRONIC SOLUTIONS is a semiconductor trading company in every field. Established in 2020 as a subsidiary of TACHIBANA ELETECH Co., Ltd., TACHIBANA ELECTRONIC SOLUTIONS will keep on providing highly added value not only in devices but also in total solutions and being a partner to help customers advanced.

TACHIBANA ELETECH: <https://www.tachibana.co.jp/en/>

TACHIBANA ELECTRONIC SOLUTIONS: <https://tachibana-denshi-solutions.co.jp/index.php>

**\*About Semtech Corporation**

Semtech Corporation (Nasdaq: SMTC) is a high-performance semiconductor, IoT systems and Cloud connectivity service provider dedicated to delivering high quality technology solutions that enable a smarter, more connected and sustainable planet. Our global teams are dedicated to empowering solution architects and application developers to develop breakthrough products for the infrastructure, industrial and consumer markets. To learn more about Semtech technology, visit us at [Semtech.com](http://Semtech.com) or follow us on [LinkedIn](#) or [Twitter](#).

Semtech is a core member of the LoRa Alliance<sup>®</sup>, a non-profit association of more than 500 companies worldwide, and owns the IP for the LPWA standard (ITU compliant) LoRa<sup>®</sup> communications. As of November 2022, more than 270 million end-node devices with LoRa<sup>®</sup> communications have been released worldwide.

*Semtech, the Semtech logo and LoRa are registered trademarks or service marks, and LoRa Edge is a trademark or service mark, of Semtech Corporation or its subsidiaries.*