Press Release
New KYOCERA Ceramic RFID Package With Embedded Antenna Increases Read Range up to 2X

IoT innovation accelerates expansion of RFID applications in automotive, mHealth, and numerous other markets

Kyoto/London, 14 June 2017 – Kyocera Corporation (President: Hideo Tanimoto) today announced that it has developed an ultra-small ceramic package utilizing a proprietary multilayer structure with a built-in RFID*1 antenna that can increase the read range up to 2X as compared with conventional packages of the same size. Starting mass production in May 2017, the product will be available worldwide in three sizes (from 6x3x1.7mm to 15x5x1.7mm), with an annual sales target of JPY 3 billion by 2020.

Kyocera’s proprietary technologies cultivated over many years in advanced ceramic materials and multilayer structures ensure a compact package with outstanding performance. The new ceramic package with a RFID antenna will help meet rising demand for RFID tags to support Internet of Things (IoT) applications.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Ceramic Package with Embedded RFID Antenna</th>
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<tbody>
<tr>
<td>Applications</td>
<td>Automotive, medical equipment control, factory automation and other industrial uses</td>
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<tr>
<td>External Dimensions (Length x Width x Height)</td>
<td>6x3x1.7mm, 10x5x1.7mm and 15x5x1.7mm</td>
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<td>Frequency Band</td>
<td>UHF (860-960MHz)</td>
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<td>Production Facility</td>
<td>Kagoshima Kokubu Plant</td>
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Development Background
As production of IoT devices continues to expand, RFID technology is expected to proliferate into the automotive and medical industries, factory automation and many other industrial fields — with a market expected to total JPY 100 billion (approx. USD 900 million) by 2020*. While packages utilizing organic or resin-based materials will be utilized for conventional RFID tags in common retail applications, many other applications will require durable RFID packages with higher resistance to harsh environments such as water, heat and chemicals, while still delivering greater read ranges.

Product Features

Up to 2X communication distance in the UHF band while maintaining compact size
In UHF band*³ testing, this new ceramic package with an embedded RFID antenna provided a read range between 1.5 and 2 times that of conventional RFID tags of the same size. Even as package size decreased, the Kyocera low-profile thin multilayer cavity structure continued to outperform the conventional RFID tags of similar outlines.

LTCC material offers excellent high-frequency properties and high flexural strength
These RFID packages are an excellent example of Kyocera’s extensive multilayer ceramic capability, using a proprietary Low Temperature Co-fired Ceramic (LTCC) formulation and a copper conductor metallization system. The packages take advantage of the low-loss and high-frequency benefits of LTCC, yet deliver the high flexural strength expected from High Temperature Co-fired Ceramic (HTCC).

Cavity structure for IC chip protection and ultra-small tag design
With a cavity designed specifically for an IC chip, this package offers excellent protection against mechanical stress and impact, while facilitating ultra-small, low-profile tag design.
Suitable for metallic products
In contrast to traditional tags that tend to block RF signals, Kyocera's ceramic package is designed to maximize read range in proximity to metal. This expands RFID feasibility in applications involving metallic products or objects, opening new potential uses in automotive, factory automation, healthcare and many other fields.

Wide range of products
Kyocera offers many options to meet diverse customer requirements. The packages are available in six base configurations — three different sizes for both the UHF and HF*4 (for ultra-short-distance communication) bands. To meet diverse customer demands, Kyocera offers built-in IC chip arrangement and device assembly, providing RFID tags as finished products, in addition to providing ceramic packages and customized designs upon request.

*1 Radio Frequency Identification
*2 Based on research by Kyocera
*3 Systems complying with the UHF Gen2 standard for RFID use the 860 to 960 MHz band
*4 Most HF RFID systems operate at 13.56 MHz
For more information on Kyocera: [www.kyocera.co.uk](http://www.kyocera.co.uk)

**About Kyocera**

Headquartered in Kyoto, Japan, Kyocera Corporation is one of the world's leading manufacturers of fine ceramic components for the technology industry. The strategically important divisions in the Kyocera Group, which is comprised of 231 subsidiaries (as of March 31, 2017), are information and communications technologies, products which increase quality of life, and environmentally friendly products. The technology group is also one of the oldest producers of solar energy systems worldwide, with more than 40 years of experience in the industry.

The company is ranked #522 on Forbes magazine’s 2017 “Global 2000” listing of the world’s largest publicly traded companies.

With a global workforce of over 70,000 employees, Kyocera posted net sales of approximately €11.86 billion in fiscal year 2016/2017. The products marketed by the company in Europe include printers, digital copying systems, microelectronic components, and fine ceramic products. The Kyocera Group has two independent companies in the United Kingdom: Kyocera Fineceramics Ltd. and Kyocera Document Solutions.

The company also takes an active interest in cultural affairs. The Kyoto Prize, a prominent international award, is presented each year by the Inamori Foundation — established by Kyocera founder Dr. Kazuo Inamori — to individuals and groups worldwide who have contributed significantly to the scientific, cultural, and spiritual betterment of humankind (converted at approximately €360,000 per prize category).

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