Compact General-Purpose 13.56MHz Wireless Charger Modules Facilitate Wireless Charging in Small, Thin Applications
[BP3621 (Transmitter) / BP3622 (Receiver)]

White Paper

Market Trend

In recent years, wireless power supply functionality that improves water and dust resistance by eliminating terminal contact is increasingly being adopted in smartphones, smart watches, and other applications. This capability is being demanded in thin, small applications as well. At the same time, however, as the availability and efficiency of the power supply can vary depending on the antenna shape, size, and distance, mounting requires repeated prototyping, adjustment, and evaluation on the application-side, incurring a large development burden for antenna design and layout. As a result, there are growing expectations for general-purpose wireless charging standards that can be used in compact applications.

Wireless Charging System and Standards

Various wireless charging methods exist, including magnetic resonance, which transmits power by resonating coils on both the transmitting and receiving sides in a magnetic field, and the electromagnetic induction method that transmits power using induced magnetic flux generated between the transmitting and receiving sides. ROHM wireless chargers utilize the magnetic resonance method along with the high 13.56MHz frequency band that supports the use of smaller antennas. Compatibility with a 13.56MHz integrated antenna board allows ROHM's compact wireless charger modules to easily provide wireless power supply functionality in smaller, thinner applications.

Method	Qi Electromagnetic Induction Method	13.56MHz Wireless Charger Magnetic Resonance Method
Frequency	200kHz	13.56MHz
Inductance	20μH	1μH
Antenna Size	 Φ20～50mm	 Several mm²
Data transmission	Not possible	Possible
Transmission Distance	Several cm	Several cm
Transmission Power	5～ 15W	～1W
Weight	Large	Small

Figure 1. Comparison of Wireless Charging Systems

Overview of ROHM's BP3621 and BP3622 13.56MHz Wireless Charger Modules

The BP3621 transmitter and BP3622 receiver introduced here are the industry's first (according to a ROHM study conducted in Nov. 2021) compact general-purpose 13.56MHz wireless charger modules that leverage optimized antenna and layout design technologies to provide up to 200mW in a compact 20mm × 30mm form factor. The development load required for prototyping, adjustment, evaluation, etc. necessary to optimize power supply efficiency can be significantly reduced, making it possible to easily realize wireless power supply for small and thin applications. In addition, the built-in antenna can support bidirectional data communication and NFC Forum Type 3 Tag, contributing to the expansion of communication functions in electronic applications.

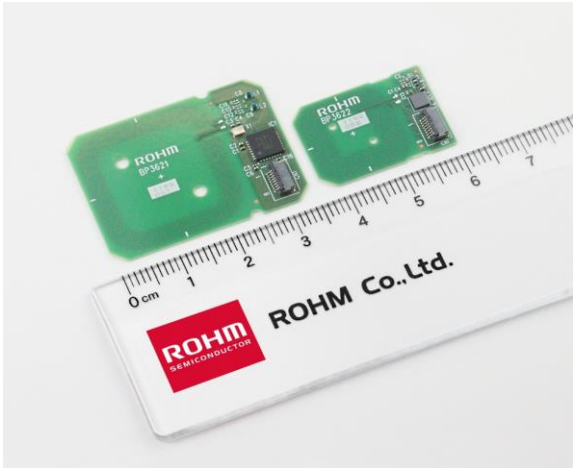

Photo 1. BP3621 and BP3622 Wireless Charger Modules

Next, we will introduce the specific functions and advantages of the BP3621 and BP3622.

Easily Achieves Wireless Charging Functionality while Significantly Reducing Development Load

These products utilize antenna design technology that matches and adjusts for the effects of design parameters through original simulation along with board layout technology that reduces wiring loss.
Incorporating these technologies in modules together with an integrated antenna board ensures optimal wireless charging performance. It enables product evaluation without the need for antenna/layout design or characteristics verification - in contrast to conventional solutions where the antenna and control circuit are configured separately.
This significantly reduces the number of developments and design load required for board modification, making it easy to achieve wireless charging functionality.

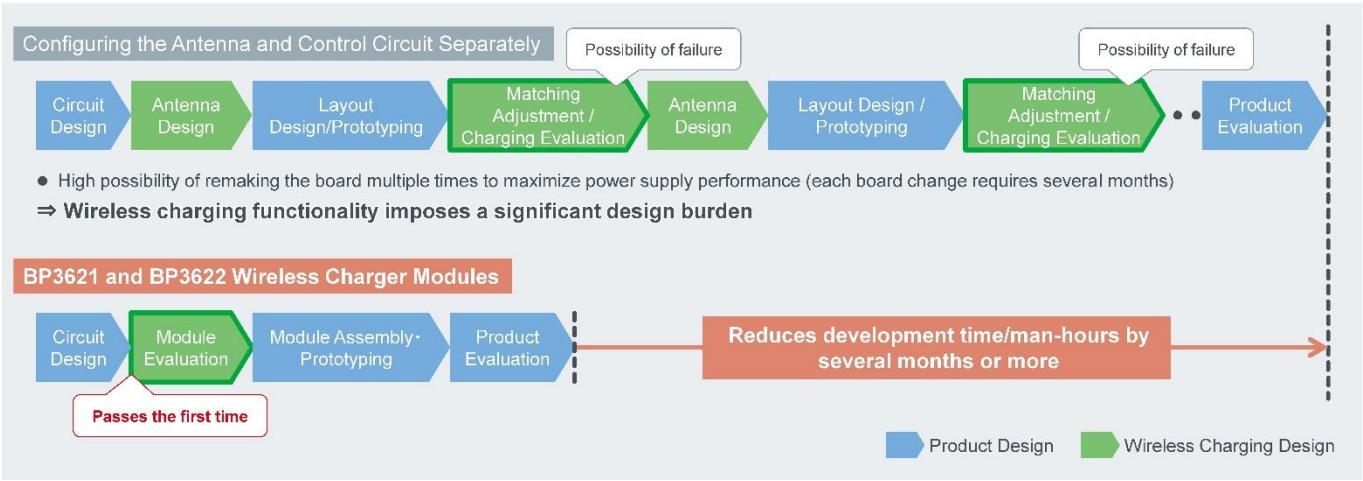

Figure 2. Development Flow Comparison

Increased Flexibility in Housing Design

Adopting the magnetic resonance method in the high 13.56MHz frequency band reduces antenna size while allowing ROHM to integrate the antenna, matching circuit, and wireless charger IC on a compact board (which is difficult to achieve with existing wireless charging standards).
The BP3621 transmitter and BP3622 receiver modules measure just 35.0mm × 26.0mm × 1.5mm and 24.0mm × 17.0mm × 1.5mm, respectively. The full-flat backside structure mounts all components on the top, making it easy to attach to the housing, contributing to simpler housing structures and greater design flexibility.

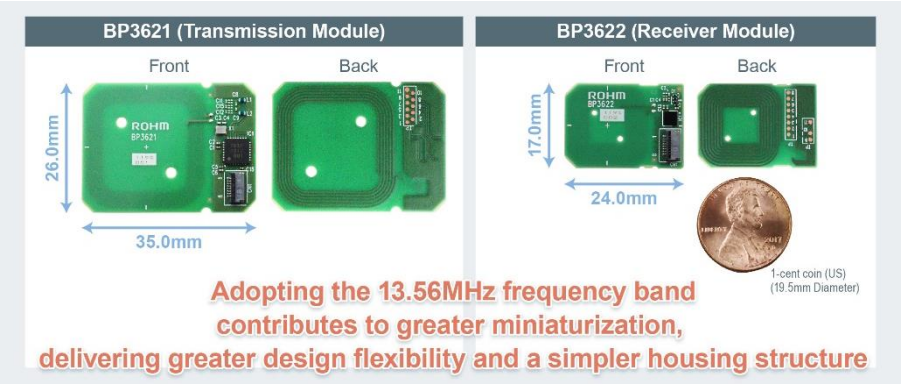

Figure 3. Product Size and Appearance

Antenna-Equipped Modules Expand Data Communication Capabilities

The same high frequency band as the NFC communication standard is used, allowing the built-in antenna to transmit both data and power.
Bidirectional data communication (256B Max. at 212kbps) as well as NFC Forum Type 3 Tag transmission are supported, allowing for functions ranging from firmware download and secure data transfer and rewriting of sensor/device/authentication information to transmitting battery output voltage values.

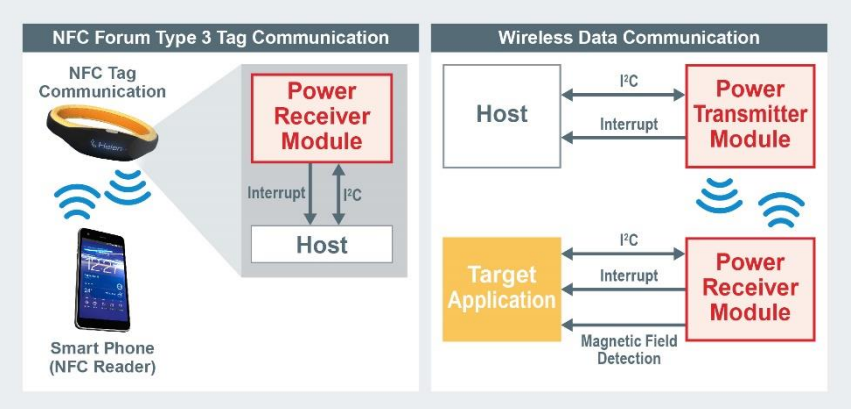

Figure 4. Wireless Data Communication Methods

Wireless Charger Module Usage Examples

Wireless charger modules are being considered for a variety of applications to improve convenience while achieving both water- and dust-proof functionality.
For PC keyboards, where wireless connectivity is becoming standard, supplying power from a tablet PC equipped with a transmitter module to a mobile keyboard with receiver module enables a complete wireless keyboard without the need for battery replacement and charging using a cable.

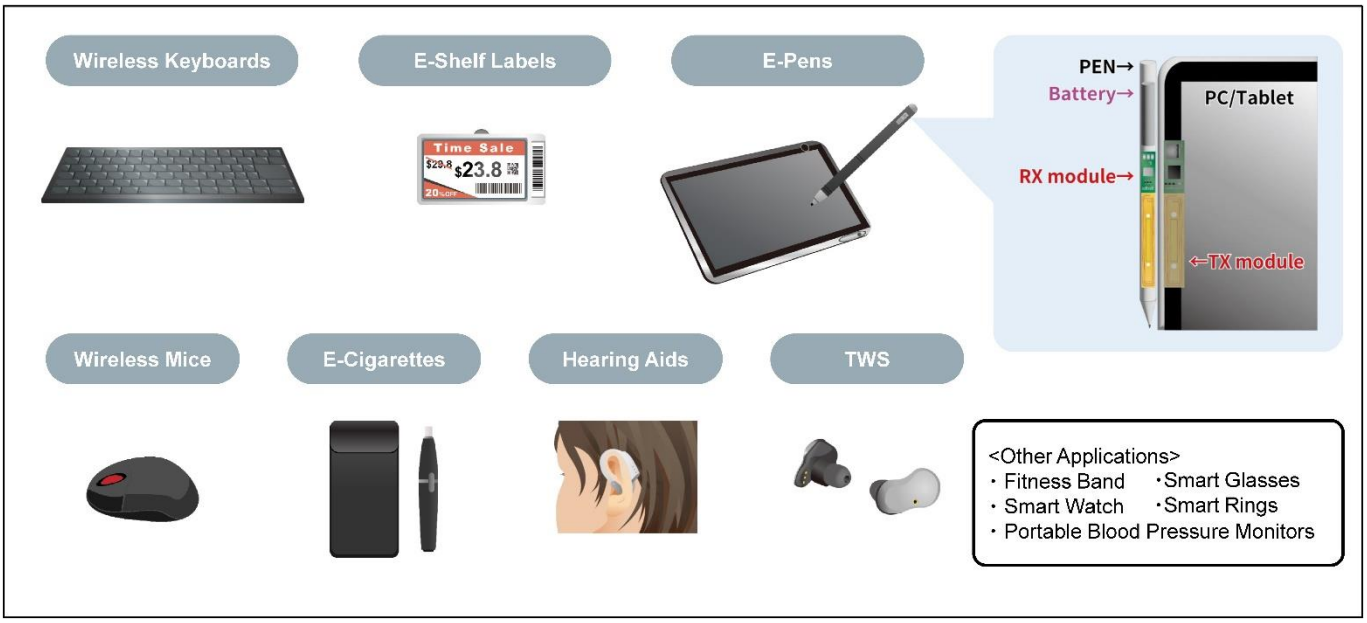

Figure 5. Application Examples

These modules are ideal for applications requiring dust- and water-proof performance, such as electronic shelf tags and GPS trackers.
And as the power receiver module weighs just 0.38g, there are many cases where the battery capacity and device weight can be reduced by simply installing this charger module. Further adoption is expected in the future.

Design Application Notes

ROHM has released an application note on its official website that helps users to easily implement wireless charger functionality and reduce development time
Included are settings for the primary functions such as charging and communication as well as connection methods.
Going forward, ROHM plans on strengthening its support system while expanding the number of evaluation boards to promote the further adoption of wireless charger modules.

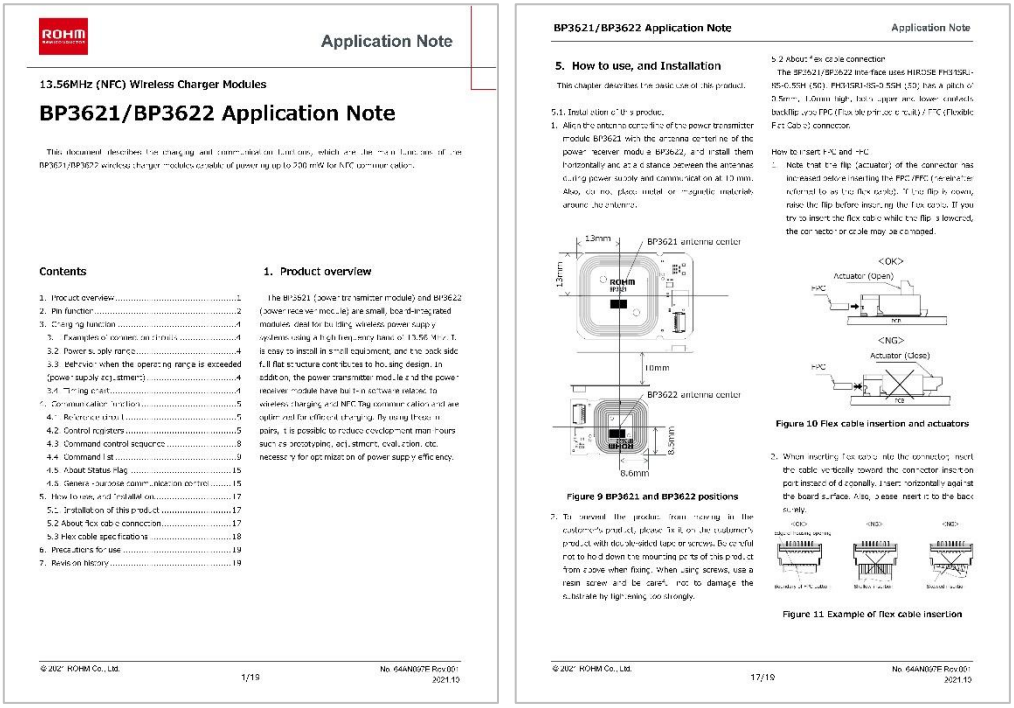

Figure 6. Application Note

Conclusion

ROHM will continue to expand its lineup of wireless charger modules in compact, high power types to support a wider range target applications while helping customers reduce both design and development load and improve application convenience.

	BP3621/BP3622	Next-Generation Prototypes		
Concept (Product Example)	Standard (ID tags/ PC peripheral devices)	Applied to thinner products (E-pens/Wearables)	Applied to smaller products (Hearing aids/Wireless earphones)	High output (Blood pressure monitors/electric shavers)
Product Image				
Max. Power Supply (mW)	200	140	200	1000
Power Supply Efficiency (%)	25	21	24	50
Transmitter Size (mm) Receiver Size (mm)	35.0× 26.0 24.0 × 17.0	6.0 × 45.8 3.0 × 30.0	Φ 11.3 Φ 9.3	37.0 × 26.0(T.B.D) 28.0 × 17.0(T.B.D)
Power Supply Distance (mm)	10	2.5	2.5	5
Functions	Charging + Communication	Charging only	Charging + Communication	Charging + Communication

Figure 7. Product Lineup

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