

# Wireless charging of mobile devices

Every day, we use a wide array of mobile electronic devices and gadgets for entertainment and communication purposes, whether to make our lives more comfortable, or simply to enhance them. But the functions these devices offer are becoming ever more complex, meaning their energy consumption also increases. At the same time, entertainment devices such as smart watches and headphones, medical equipment such as vital sensors and hearing aids, and of course all future wearables, should be as small as possible and practical to use.

Due to their use of finite resources, the traditional method of power supply using batteries is on its way out. For consumers, batteries mean constant costs, plus replacement is often inconvenient and the environmental impact is huge. Operation using rechargeable batteries or supercapacitors in conjunction with an inductive charging function is advantageous in every respect.

## Space-saving charging coils

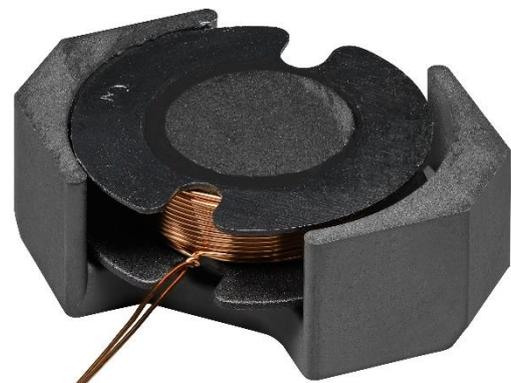


Receiver coil „charging coin“  
 Part no. [00608433](#)



When developing a wireless inductive charging system, the challenge lies in the receiver coil, which supplies current and voltage for charging the batteries in the end device. It must be able to efficiently receive the power from the charging station with dimensions that need to be as small as possible, so that it also fits into the intended housing. NEOSID therefore develops and manufactures small, customer-specific receiver coils, which can be individually integrated into the device's design.

A suitable transmitter coil is designed to provide an efficient charging system, characterised by optimum magnetic coupling and a high degree of efficiency.



Transmitter coil RM10, part no. [00653736](#),  
 alternatively available in size RM12, part no. [00653770](#)

## Retrofit solutions

There is often a requirement to convert an existing device that has previously been powered by batteries to use an inductive charging function instead. NEOSID's charging coin is one solution which can be integrated into lots of existing devices with only minimum modification. A frequently used variant has a diameter of 8.5mm and is 2.0mm thick. Together with a rechargeable button cell battery, its space requirements match those of a type R48/R754 battery with battery holder, as set out in IEC60086. This is a battery type used in hearing aids.

The matching coil for the charging station is larger, therefore offering efficient energy transfer with sufficient tolerance with regard to positioning, so the user can conveniently set their mobile device onto it. The variants of this coil with inductance values between around 10 $\mu$ H and 100 $\mu$ H are suitable for transfer frequencies of up to around 500 kHz.



Coin battery R48, Ø7.9mm, height 5.4mm



Receiver coil, Ø8.5mm, height 2.0mm

## Ferrite cores for inductive charging systems

The magnetically soft ferrite core plays a decisive role in the creation of inductive charging systems that are highly effective. When selecting materials, factors such as operating and modulation frequency, operating temperature range, magnetic quality and installation conditions play an important role. It is often necessary for the ferrite core in the charging system to be made into a special shape, as the installation space in many applications is predefined and limited. If this geometry is too demanding to be produced using presses, we use a special injection moulding process. As a result, we therefore offer manufacturers of mobile devices significantly greater freedom when it comes to designing their devices.

For this shaping method, the following conditions apply:

- Ferrite material thicknesses from 0.2mm
- Core volume from 1mm<sup>3</sup> to approx. 8000mm<sup>3</sup>
- Standard tolerance  $\pm 2\%$ , selective reduced to  $\pm 1\%$
- [>20 different ferrite raw materials](#)
- Permeabilities from  $8 < \mu_i < 2000$
- No mechanical finishing, such as grinding or milling, necessary
- Direct winding of high-insulation ferrite cores
- [Metallisation of ferrite materials](#) possible

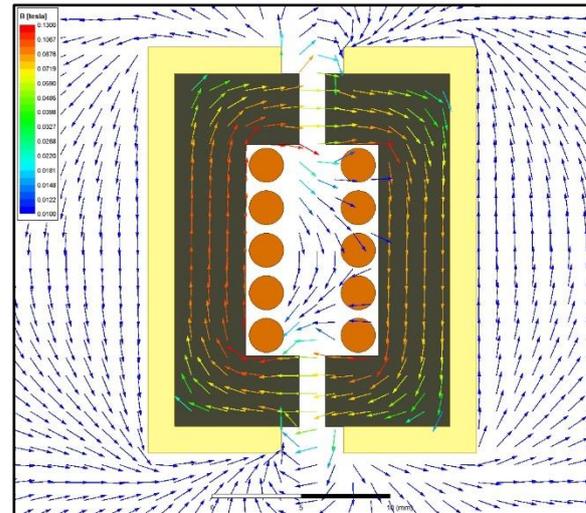


Ferrite pot-core

We produce our ferrites in geometries that are otherwise used only for thermoplastic or thermosetting plastic components. These advantages allow complex customised ferrite cores to be produced, providing the basis for the manufacture of precise coil systems. With regard to electrical efficiency, mechanical stability and integration in the complete device, these solutions represent a considerable further development for this product segment.

## Magnetic simulation in the product development

Designing the perfect ferrite core for a specific application is one of the greatest challenges of such a project. In the development stage, we work with complex 3D simulation tools, which enable us to examine the effectiveness of our designs on a theoretical level. An application-based simulation takes into consideration external influences on the charging system, for example placing it into a housing made from a ferromagnetic material. Similarly, the effects of axial and radial mechanical tolerance windows are determined in 2D and 3D simulations, in order to represent real operating conditions.



Example of wireless charging system simulation

For the simulation, we draw upon the detailed technical specifications of our more than 20 different ferrite and composite materials. As a result, we can deploy them during the simulation so that the correct material is determined on the basis of all required parameters.

## Process technology

Our manufacturing facilities work with the latest production machinery, thus ensuring cost-effective production for different batch sizes. A high manufacturing and testing depth result in an extremely high quality standard, with consistent results across the entire product life cycle.

**Tell us your requirements – we will offer you the perfect solution!**

Have we aroused your interest? Then get in touch with us about the latest generation of inductive charging systems.

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