

# NFC user manual

## ● NFC introduction:

### 1. Theory Description:

Near field communication (NFC) is an emerging technology. Devices using NFC Technology (such as mobile phones) can exchange data when they are close to each other. It is evolved from the integration of contactless radio frequency identification (RFID) and interconnection and interworking technologies. By integrating inductive card readers, inductive cards and point-to-point communication functions on a single chip, Mobile terminals are used to realize mobile payment, electronic ticketing, access control, mobile identity recognition, anti-counterfeiting and other applications.

The full Chinese name of NFC is near field communication technology. NFC is developed on the basis of non-contact radio frequency identification (RFID) technology and wireless interconnection technology. It provides a very safe and fast communication method for various electronic products that are becoming more and more popular in our daily life. "Near field" in the Chinese name of NFC refers to radio waves adjacent to electromagnetic fields. Because radio waves are actually electromagnetic waves, they follow Maxwell's equation. Electric and magnetic fields will always alternate in energy conversion during the process of propagation from the transmitting antenna to the receiving antenna, and enhance each other during conversion. For example, the radio signals used by our mobile phones are propagated by using this principle, which is called far-field communication. Within 10 wavelengths of electromagnetic wave, the electric field and magnetic field are independent of each other. At this time, the electric field has little significance, but the magnetic field can be used for short-distance communication, which is called near-field communication.

The near-field communication service combines the near-field communication technology and mobile communication technology, and realizes various functions such as electronic payment, identity authentication, ticketing, data exchange, anti-counterfeiting, advertising and so on. It is a new service in the field of mobile communication. The near-field communication service enhances the function of mobile phones, makes users' consumption behavior gradually become electronic, and establishes a new user consumption and business model.

The application of NFC technology has been widely concerned all over the world. Different roles such as telecom operators and mobile phone manufacturers at home and abroad have carried out application pilot projects one after another. Some international associations and organizations have also actively carried out standardization work. According to the prediction of relevant institutions in the industry, mobile applications based on near-field communication technology will become the next killer application of mobile value-added services.

### 2. Comparison between NFC and RFID

First, the working modes are different. NFC integrates point-to-point communication function, reader function and contactless card function into one chip, while RFID consists of reader and tag. NFC technology can read or write, while RFID can only read and determine information.

Second, the transmission distance is different. The transmission distance of NFC is much smaller than that of RFID. The transmission distance of NFC is only 10 cm, and the transmission distance of RFID can reach several meters or even tens of meters. NFC is a close and private

communication mode. Compared with RFID, NFC has the characteristics of close distance, high bandwidth, low energy consumption and high security.

Third, the application fields are different. NFC is more used in the field of consumer electronic devices, and plays a huge role in the fields of access control, public transport, mobile payment, etc; RFID is better at long-distance identification and is more widely used in production, logistics, tracking and asset management.

#### Comparison between NFC and Bluetooth

NFC and Bluetooth are both short-range communication technologies. Compared with Bluetooth, which has been integrated into mobile phones for a long time and has been popularized, NFC has only been integrated into mobile phones in recent years, and so far it has only been integrated into a few mobile phones.

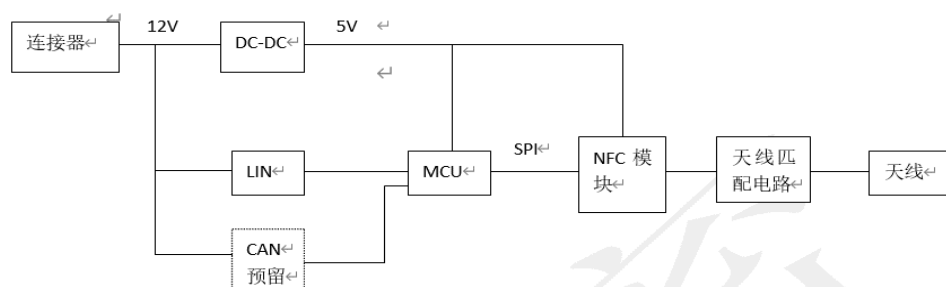
First, the establishment time is different. The NFC communication setup procedure is simple, and the communication establishment time is very short, only about 0.1s; However, the Bluetooth communication setup procedure is relatively complex, and the communication establishment time is long, which takes about 6S.

Second, the transmission distance is different. The NFC transmission distance is only 10cm, while the Bluetooth transmission distance can reach 10m. However, NFC is slightly better than Bluetooth in terms of transmission power consumption and security.

Third, the transmission speed and operating frequency are different. The NFC operating frequency is 13.56MHz, and the maximum transmission speed is 424 kbit/s, while the Bluetooth operating frequency is 2.4GHz, and the transmission speed can reach 2.1 mbit/s.

#### Comparison between NFC and infrared

Compared with infrared transmission, NFC has the same transmission distance, but faster than infrared transmission. The maximum transmission speed of NFC can reach 424 kbit/s, while the infrared transmission speed is about 100kbit/s. The establishment time of NFC is slightly faster than that of infrared. The establishment time of NFC is 0.1s, and the establishment time of infrared transmission is 0.5s. Infrared transmission must be strictly aligned to transmit data, and there must be no obstacles in the middle, while NFC has no such restrictions; In addition, NFC is safer and more reliable than infrared.



## ● NFC apply into Car

NFC is the abbreviation of near field communication, which means the short-range wireless communication technology of automobile. RFID is the abbreviation of radio frequency identification, which means radio frequency identification, also known as electronic tag. Nfc/rfid car key is a BMW digital key using NFC communication technology. The car can be unlocked and locked through the smart phone in hand. The owner does not need to carry the traditional

car key with him.



## How do you use it?

Each vehicle has its own unique NFC near-field communication password, which can be bound with a smart phone. After binding, take the smart phone to the door handle, and the door will be unlocked. When the owner enters the driver's seat, as long as the smart phone is placed on the wireless charging smart phone, the vehicle will start automatically. The vehicle information can also be obtained in real time through the vehicle app, such as the amount of remaining fuel, the temperature in the vehicle, etc. it can also be started remotely.

## What happens when you leave your key in the car without a key?

In this case, the car door may not be locked automatically and will remain unlocked all the time, because the car system will automatically lock the door only when the key is 3 to 5 meters away from the car. There are also some models that will automatically lock the doors after they have not been started for a period of time. The situation is different for different models. However, you must remember to turn off the engine and take away the smart key when you get off the car. Otherwise, the car may be driven away by others, or other situations may occur.

## FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is

no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should Use only the supplied antenna.