

INTERNATIONAL STANDARD

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**Qi Specification version 2.0 –
Part 8: NFC Tag Protection**

**Spécification Qi version 2.0 –
Partie 8 : Protection des étiquettes NFC**

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IEC 63563-8

Edition 1.0 2025-02

INTERNATIONAL STANDARD

Qi Specification version 2.0 –
Part 8: NFC Tag Protection

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.240.99, 35.240.99

ISBN 978-2-8327-0191-1

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QI SPECIFICATION VERSION 2.0 –
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It is based on *Qi Specification version 2.0, NFC Tag Protection* and was submitted as a Fast-Track document.

The text of this International Standard is based on the following documents:

Draft	Report on voting
100/4252/FDIS	100/4283/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

The structure and editorial rules used in this publication reflect the practice of the organization which submitted it.

This document was developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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Version 2.0

April 2023

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RELEASE HISTORY

Specification Version	Release Date	Description
2.0	April 2023	Initial release of the v2.0 Qi Specification.

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1 General

The Wireless Power Consortium (WPC) is a worldwide organization that aims to develop and promote global standards for wireless power transfer in various application areas. A first application area comprises flat-surface devices such as mobile phones and chargers in the Baseline Power Profile (up to 5 W) and Extended Power Profile (above 5 W).

1.1 Structure of the Qi Specification

General documents

- Introduction
- Glossary, Acronyms, and Symbols

System description documents

- Mechanical, Thermal, and User Interface
- Power Delivery
- Communications Physical Layer
- Communications Protocol
- Foreign Object Detection
- NFC Tag Protection
- Authentication Protocol

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1.2 Scope

The *Qi Specification, NFC/RFID Card Protection* (this document) provides guidelines for detecting the presence of a Radio Frequency Identification (RFID) tag or Near Field Communication (NFC) card within the operating range of the Power Transmitter and preventing damage to the tag or card.

1.3 Compliance

All provisions in the *Qi Specification* are mandatory, unless specifically indicated as recommended, optional, note, example, or informative. Verbal expression of provisions in this Specification follow the rules provided in ISO/IEC Directives, Part 2.

Table 1: Verbal forms for expressions of provisions

Provision	Verbal form
requirement	“shall” or “shall not”
recommendation	“should” or “should not”
permission	“may” or “may not”
capability	“can” or “cannot”

1.4 References

For undated references, the most recently published document applies. The most recent WPC publications can be downloaded from <http://www.wirelesspowerconsortium.com>.

1.5 Conventions

1.5.1 Notation of numbers

- Real numbers use the digits 0 to 9, a decimal point, and optionally an exponential part.
- Integer numbers in decimal notation use the digits 0 to 9.
- Integer numbers in hexadecimal notation use the hexadecimal digits 0 to 9 and A to F, and are prefixed by "0x" unless explicitly indicated otherwise.
- Single bit values use the words ZERO and ONE.

1.5.2 Tolerances

Unless indicated otherwise, all numeric values in the *Qi Specification* are exactly as specified and do not have any implied tolerance.

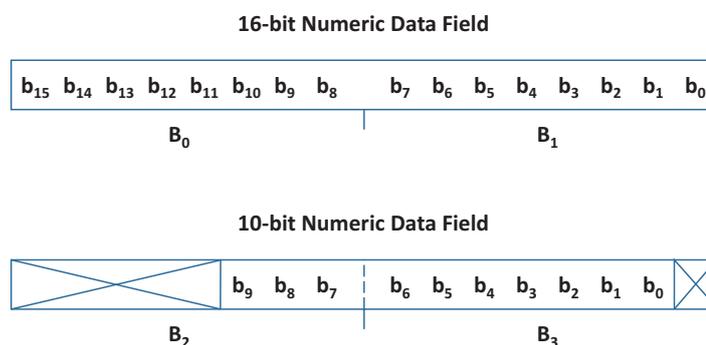
1.5.3 Fields in a data packet

A numeric value stored in a field of a data packet uses a big-endian format. Bits that are more significant are stored at a lower byte offset than bits that are less significant. Table 2 and Figure 1 provide examples of the interpretation of such fields.

Table 2: Example of fields in a data packet

	b₇	b₆	b₅	b₄	b₃	b₂	b₁	b₀
B₀	(msb)							
B₁	16-bit Numeric Data Field							(lsb)
B₂	Other Field					(msb)		
B₃	10-bit Numeric Data Field						(lsb)	Field

Figure 1. Examples of fields in a data packet



1.5.4 Notation of text strings

Text strings consist of a sequence of printable ASCII characters (i.e. in the range of 0x20 to 0x7E) enclosed in double quotes ("). Text strings are stored in fields of data structures with the first character of the string at the lowest byte offset, and are padded with ASCII NUL (0x00) characters to the end of the field where necessary.

EXAMPLE: The text string "WPC" is stored in a six-byte fields as the sequence of characters 'W', 'P', 'C', NUL, NUL, and NUL. The text string "M:4D3A" is stored in a six-byte field as the sequence 'M', ':', '4', 'D', '3', and 'A'.

1.5.5 Short-hand notation for data packets

In many instances, the *Qi Specification* refers to a data packet using the following shorthand notation:

<MNEMONIC>/<modifier>

In this notation, <MNEMONIC> refers to the data packet's mnemonic defined in the *Qi Specification, Communications Protocol*, and <modifier> refers to a particular value in a field of the data packet. The definitions of the data packets in the *Qi Specification, Communications Protocol*, list the meanings of the modifiers.

For example, EPT/cc refers to an End Power Transfer data packet having its End Power Transfer code field set to 0x01.

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1.6 Power Profiles

A Power Profile determines the level of compatibility between a Power Transmitter and a Power Receiver. Table 3 defines the available Power Profiles.

- *BPP PTx*: A Baseline Power Profile Power Transmitter.
- *EPP5 PTx*: An Extended Power Profile Power Transmitter having a restricted power transfer capability, i.e. $P_L^{(pot)} = 5 \text{ W}$.
- *EPP PTx*: An Extended Power Profile Power Transmitter.
- *BPP PRx*: A Baseline Power Profile Power Receiver.
- *EPP PRx*: An Extended Power Profile Power Receiver.

Table 3: Capabilities included in a Power Profile

Feature	BPP PTx	EPP5 PTx	EPP PTx	BPP PRx	EPP PRx
Ax or Bx design	Yes	Yes	No	N/A	N/A
MP-Ax or MP-Bx design	No	No	Yes	N/A	N/A
Baseline Protocol	Yes	Yes	Yes	Yes	Yes
Extended Protocol	No	Yes	Yes	No	Yes
Authentication	N/A	Optional	Yes	N/A	Optional

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2 Introduction

A Power Transmitter can damage Near Field Communication (NFC) tags present in the Operating Volume during any phase if the emitted power levels are above the defined limit values (see [Section 2, Introduction](#), and its subsections).

For more information about NFC tags, see <https://nfc-forum.org/>.

The highest risk of damage occurs in the *power transfer* phase, as shown in [Table 4](#).

Table 4: Risk of damage to NFC tags by protocol phase

Protocol phase	Risk of damage
Ping phase	Possible
Configuration phase	Possible
Negotiation phase	Possible
Power transfer phase	Likely

2.1 NFC tag detection and protection

The goal of this document is to describe how NFC tags can be detected and protected by extending the functionality of the Power Transmitter Product or Power Receiver Product.

2.1.1 NFC tag detection

By integrating an NFC transceiver into a Power Transmitter Product or into a Power Receiver Product, any NFC tag that can be present between the Power Transmitter Product and the Power Receiver Product can be reliably detected. The capabilities of the devices determines which one will execute NFC tag detection.

- If neither the Power Transmitter Product nor the Power Receiver Product can detect NFC tags, NFC tag protection does not happen and any NFC tag in the Operating Volume are susceptible to damage.
- If either the Power Transmitter Product or the Power Receiver Product (but not both) can detect NFC tags, that device should execute tag detection.
- If both the Power Transmitter Product and the Power Receiver Product can detect NFC tags, one or both of the devices should execute tag detection.

Selection of the device that should execute NFC tag detection happens when the Power Transmitter and Power Receiver exchange information in the negotiation phase.

See [Section 3, NFC tag protection and device communication](#), for further information.

2.1.2 Protecting NFC tags

A Power Transmitter can protect NFC tags by maintaining the magnetic field levels in all phases of the power transfer protocol below a defined limit value. This limit is defined by specific measurement methods using the Test Proximity Integrated Circuit Card (PICC) described in [Section 7, *Testing the impact of a Power Transmitter Product on an NFC tag*](#), and helps to ensure that NFC tags are not damaged.

NOTE: In rare cases, damage can still occur even at magnetic field levels below the limit value.

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