

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

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**Qi Specification version 2.0 –  
Part 4: Power Delivery**

**Spécification Qi version 2.0 –  
Partie 4 : Fourniture d'énergie**

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**QI SPECIFICATION VERSION 2.0 –**
**Part 4: Power Delivery****FOREWORD**

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It is based on *Qi Specification version 2.0, Power Delivery* and was submitted as a Fast-Track document.

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

Draft	Report on voting
100/4249/FDIS	100/4279/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

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# Qi Specification

## *Power Delivery*

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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, Power Delivery* (this document) comprises guidelines and requirements for Power Receiver design, including circuitry, power consumption, operating power levels, power transfer efficiency, and standby power.

## 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.

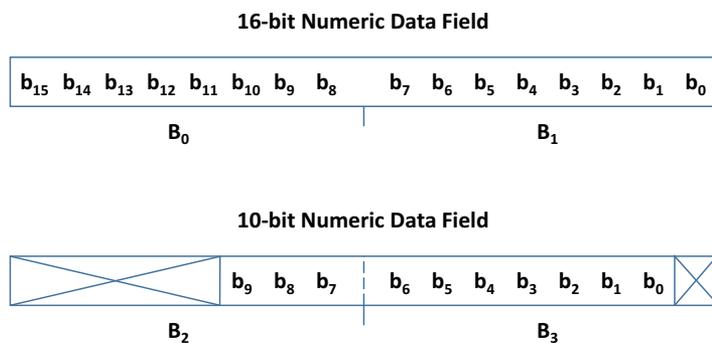
### 1.5.3 Fields in a data packet

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**

	<b>b<sub>7</sub></b>	<b>b<sub>6</sub></b>	<b>b<sub>5</sub></b>	<b>b<sub>4</sub></b>	<b>b<sub>3</sub></b>	<b>b<sub>2</sub></b>	<b>b<sub>1</sub></b>	<b>b<sub>0</sub></b>	
<b>B<sub>0</sub></b>	(msb) 16-bit Numeric Data Field (lsb)								
<b>B<sub>1</sub></b>									
<b>B<sub>2</sub></b>	Other Field					(msb)			
<b>B<sub>3</sub></b>	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

Figure 2 provides a simplified model of a wireless power system, consisting of six blocks. The three blocks to the left of the power transfer interface represent a Power Transmitter and its supply. The three to the right represent a Power Receiver and its Load. Typically, these blocks comprise the following elements.

*Supply*: in many cases a separate adapter such as a USB PD brick.

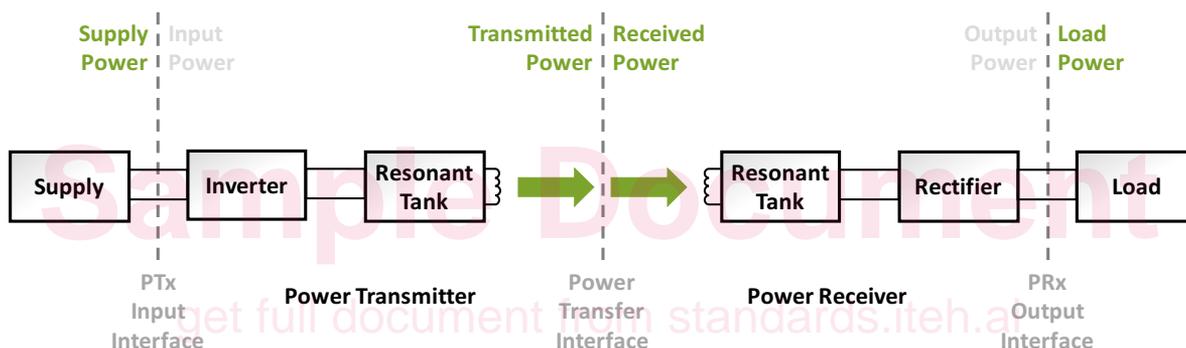
*Inverter*: a half-bridge or full-bridge for DC/AC conversion.

*Resonant Tank*: a coil and series capacitor boosting the power transfer capability.

*Rectifier*: either a diode bridge or an active (synchronous) bridge for AC/DC conversion.

*Load*: a power sink drawn by the Power Receiver Product, typically a mobile phone's power input to an internal battery charger.

Figure 2. Simplified model of a wireless power transfer system



With reference to Figure 2, the following definitions are central to the understanding of a wireless power system.

**Power Signal**—An alternating magnetic field.

**Supply Power**—The power dissipated from the supply.

**Power Transmitter**—A subsystem that can generate a Power Signal.

**Power Transmitter Product**—A device containing one or more Power Transmitters.

**Transmitted Power**—The power from the Power Signal dissipated by any object that is not an integral part of the Power Transmitter Product.

**Power Receiver**—A subsystem that can extract electric power from a Power Signal.

**Power Receiver Product**—A device containing a Power Receiver.

**Received Power**—The power from the Power Signal dissipated by any component that is an integral part of the Power Receiver Product.

**Test Power Transmitter**—A Power Transmitter Product designed to analyze and check the operation of a Power Receiver Product's wireless power functionality.

**Test Power Receiver**—A Power Receiver Product designed to analyze and check the operation of a Power Transmitter Product's wireless power functionality.

**Load Power**—The power dissipated in the Load.

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