SLOVENSKI STANDARD
oSIST prEN IEC 63758-5-5:2026

01-december-2026

Specifikacija Qi - Različica 2.3 - 5-5.del: Mpp - Smernice za načrtovanje (informativno) (hitri postopek)

Qi specification - Version 2.3 - Part 5-5: Mpp - Design guidelines (Informative) (Fast Track)

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ICS:

29.240.99	Druga oprema v zvezi z omrežji za prenos in distribucijo električne energije	Other equipment related to power transmission and distribution networks
33.160.99	Druga avdio, video in avdiovizuelna oprema	Other audio, video and audiovisual equipment
35.200	Vmesniška in povezovalna oprema	Interface and interconnection equipment

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100/4547/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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☒ SUBMITTED FOR CENELEC PARALLEL VOTING	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Qi Specification - Version 2.3 - Part 5-5: MPP - Design guidelines (Informative) (Fast Track)

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

As this is a fast-track process offered by WPC, the Word file is not provided.

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WIRELESS POWER

CONSORTIUM

Qi Specification

MPP – Design Guidelines (Informative)

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Version 2.3

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Contents

1. General **6**

1.1 Structure of the Qi Specification 6
1.2 Scope 7
1.3 Compliance 7
1.4 References 7
1.5 Conventions 8
1.5.1 Notation of numbers 8
1.5.2 Tolerances 8
1.5.3 Fields in a data packet 8
1.5.4 Notation of text strings 9
1.5.5 Short-hand notation for data packets 9

Annex A: **10**

A.1 PTx Working with Legacy PRx 10
A.1.1 Background 10
A.2 Mitigation of Saturation for BPP 11
A.2.1 System Model 11
A.2.2 SHO Specifications 15
A.3 Loss-Split Modeling: A framework for calculating localized eddy-current losses 16
A.3.1 Introduction 16
A.3.2 Comparison between the standard T-Model and Loss-Split Model 17
A.3.3 Determining the Loss-Split Model Parameters 18
A.3.4 Calculating Power Loss using Loss-Split Model 20
A.4 Resistive Coupling Factor 22
A.4.1 Introduction 22
A.4.2 Definition of Mutual Resistance and Kr 22
A.4.3 Cause of Mutual Resistance 24
A.4.4 Why is Kr non-negligible 26

Annex B: Coil Specifications (Informative) **27**

B.1 PRx Coil Specifications 27
B.1.1 PRx Coil Spec 2 27
B.1.2 PRx Coil Spec 3 28
B.1.3 PRx Coil Spec 4 29
B.1.4 PRx Coil Spec 5 30
B.1.5 PRx Coil Spec 6 31
B.1.6 PRx Coil Spec 7 32
B.1.7 PRx Coil Spec 8 33
B.1.8 PRx Coil Spec 9 34
B.1.9 PRx Coil Spec 10 35
B.1.10 PRx Coil Spec 11 36
B.1.11 PRx Coil Spec 12 37
B.1.12 PRx Coil Spec 13 38

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oSIST prEN IEC 63758-5-5:2026 • https://standards.iteh.ai/catalog/standards/sist/186e3dac-37aa-439c-8d3a-a6c70252ab49/osist-pren-iec-63758-5-5-2026

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B.1.13 PRx Coil Spec 14 39
B.1.14 PRx Coil Spec 15 40
B.1.15 PRx Coil Spec 16 41
B.1.16 PRx Coil Spec 17 42
B.1.17 PRx Coil Spec 18 43
B.1.18 PRx Coil Spec 19 44
B.1.19 PRx Coil Spec 20 45
B.1.20 PRx Coil Spec 21 46
B.2 PTx Coil Specifications 47
B.2.1 PTx Coil Spec 3 47
B.2.2 PTx Coil Spec 4 48
B.2.3 PTx Coil Spec 5 49
B.2.4 PTx Coil Spec 6 50
B.2.5 PTx Coil Spec 7 51
B.2.6 PTx Coil Spec 8 52
B.2.7 PTx Coil Spec 9 53
B.2.8 PTx Coil Spec 10 54
B.2.9 PTx Coil Spec 11 55
B.2.10 PTx Coil Spec 12 56
B.2.11 PTx Coil Spec 13 57
B.2.12 PTx Coil Spec 14 58
B.2.13 PTx Coil Spec 15 59
B.2.14 PTx Coil Spec 16 60
B.2.15 PTx Coil Spec 17 61
B.2.16 PTx Coil Spec 18 62
B.2.17 PTx Coil Spec 19 63
B.2.18 PTx Coil Spec 20 64
B.2.19 PTx Coil Spec 21 65
B.2.20 PTx Coil Spec 22 66
Annex C: PRx Design Examples 67
C.1 Buck Chargers 67
C.2 Switched Capacitor Charger 68
C.3 PRx with both Buck and SWC Chargers 72
C.4 Design Considerations 74
C.4.1 Power Mode Transition for SWC Chargers 74
C.5 Design Considerations for Wireless Charging System using Switched Capacitor Charger 75
C.5.1 Introduction 75
C.5.2 Find LQKR in Magnetic Boundary 75
C.5.3 First Harmonic Analysis of Gain and Phase 79
C.5.4 Spice Circuit Simulation 79
C.5.5 Components Tolerance Analysis 81
C.6 Limitations of 25 W System Model 82
C.6.1 Limitation with 16 V Minimum Inverter Voltage 82
C.6.2 Selecting HPM and NPM with 16 V Minimum Inverter Voltage 84

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C.6.3 Limitations with 20 V Maximum Inverter Voltage 85
C.7 Design Considerations for WLC System with SWC Charger 87
C.7.1 PTx Voltage and Power Range Recommendations 87
C.7.2 PRx Mode Selection Recommendations 88
Annex D: Capacitive ASK Modulation 89
D.1 Introduction 89
D.2 General capacitive ASK Modulation 90
D.2.1 Introduction of Capacitive ASK modulation scheme 90
D.2.2 Modelling for the Capacitive ASK modulation 90
D.2.3 The voltage gain analysis for the Capacitive ASK modulation 93
D.2.4 Test results for the capacitive ASK modulation 95
D.2.5 Theoretical Analysis for the capacitive and load current ASK modulation 96
D.3 The design process for the capacitive ASK modulation 97
D.4 Negative Capacitive ASK Modulation 98
D.4.1 Negative capacitive ASK Modulation 98
D.4.2 Negative Capacitive ASK Modulation within the Operating Window 99
D.4.3 Comparison of Negative Capacitive ASK Modulation vs Load Modulation 102
D.4.4 Measurement Results of Negative capacitive ASK Modulation 104
D.4.5 Negative capacitive ASK Modulation Design Considerations 105

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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. An important application area comprises flat-surface devices such as mobile phones and chargers operating at power levels up to 25 W.

1.1 Structure of the Qi Specification

General documents

- Introduction
- Glossary, Acronyms, and Symbols
- Technical System Overview
- Power Profiles

System description documents

- Mechanical, Thermal, and User Interface
- Power Delivery
- Communications Physical Layer
- Communications Protocol
- Foreign Object Detection
- NFC Tag Protection
- Authentication Protocol
- MPP Communications Protocol
- MPP Magnetics Design
- MPP Power Delivery
- MPP Communications Physical Layer
- MPP Foreign Object Detection
- MPP Design Guidelines (Informative)
- Magnetic Covers
- Active Alignment System
- Thermal Management Protocol

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1.2 Scope

The *Qi Specification*, *MPP Design Guidelines (Informative)* (this document) details of informative design guidelines intended to improve product interoperability.

NOTE: This book contains no requirements for product design.

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.

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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 (table)

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	b_7	b_6	b_5	b_4	b_3	b_2	b_1	b_0
B_0	(msb)							
B_1	16-bit Numeric Data Field							(lsb)
B_2	Other Field					(msb)		
B_3	16-bit Numeric Data Field						(lsb)	Field

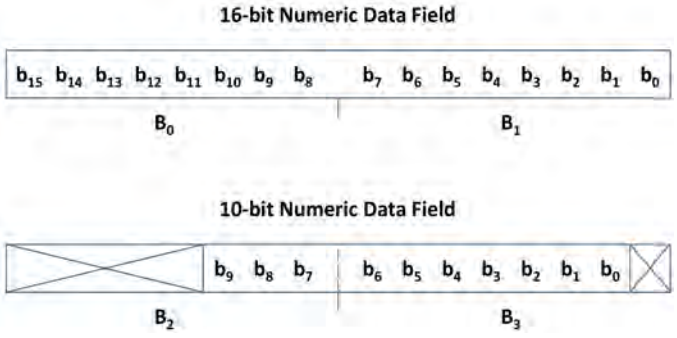


Figure 1 - Examples of fields in a data packet

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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Annex A:

A.1 PTx Working with Legacy PRx

A.1.1 Background

In certain scenarios, an MPP PTx needs to take additional care to work with a legacy PRx that implements the proprietary protocol that MPP was derived from. An example is "dead battery boot", where the PRx has an exhausted battery and runs on a one-time-programmable firmware image that was created before MPP was released.

The following requirement specifies what an MPP PTx needs to do in this situation.

A.1.1.1 PTx MPP-Legacy Spec 1

An MPP PTx shall operate in MPP Restricted mode with an operating frequency of 360 kHz, when all the following conditions are met:

- ID packet contains:
  - "Manufacturer Code" set to 0x005A
  - "Major version" set to 0x1
  - "Minor version" set to 0x2
- XID packet contains:
  - "XID Selector" (byte B0) set to 0xFE,
  - "Restricted" (byte B1, bit 7) set to ONE,

In MPP restricted mode, during the power transfer phase:

- PRx sends CEP and RP packets

PTx continuously advertises MPP capability (see MPP Communications Protocol, section 4.6)

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A.2 Mitigation of Saturation for BPP

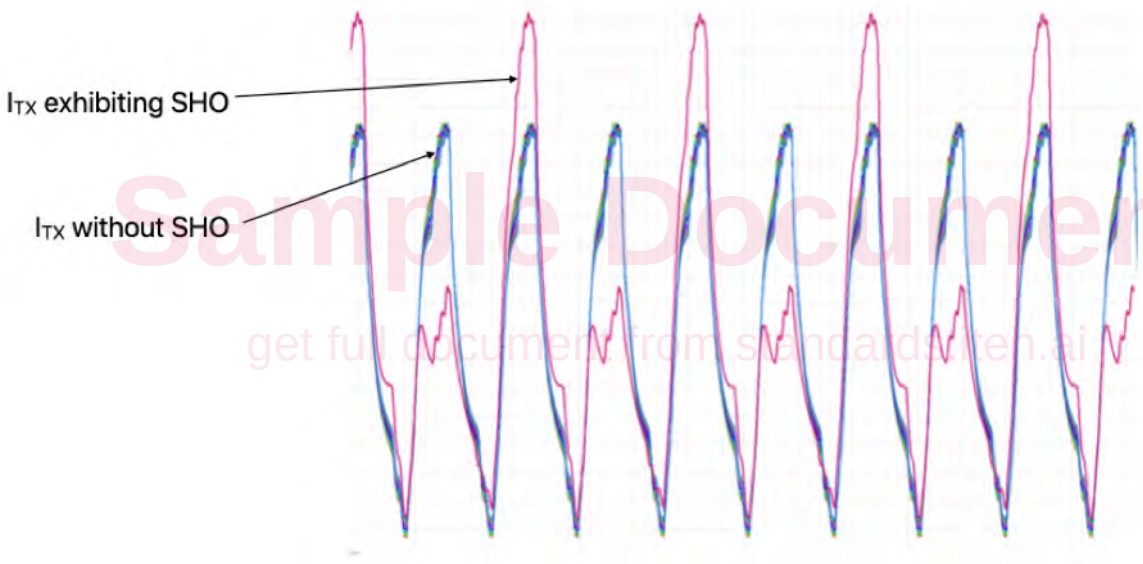
This annex introduces a mitigation method that an MPP PTx can employ to mitigate ferrite saturation problems with a Qi 1.3 BPP PRx. The intention is to allow initial and temporary support of Qi 1.3 BPP PRx products in the beginning of the Qi 2.0 lifecycle.

A.2.1 System Model

A.2.1.1 Introduction

MPP enables alignment between PTx and PRx via magnetic attach. The DC magnetic flux from the permanent magnets can result in saturation for some power receivers with low Bsat ferrite flux guides. In particular, the interaction of the DC and AC magnetic flux can lead to time-dependent ferrite saturation. When the ferrite saturates, the mated inductance drops and lower inductance results in higher coil currents. This time-dependent behaviour can induce sub-harmonic oscillation (refer herein as SHO). SHO can lead to ASK comms failure and possible disconnects.

Figure 2 shows two examples of the PTx current waveform: with and without SHO. SHO is marked by a pattern of every other positive cycle having excessive current followed by the next positive cycle having diminished current.



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Figure 2 - Comparison of PTx current with and without SHO .

SHO starts to occur at power levels that are high enough such that the combined DC and AC flux causes ferrite saturation. Below that power level, SHO does not occur. To provide 5W BPP performance to all Qi receivers, even in the case of ferrite flux guides, this section provides a suggested approach for SHO mitigation and the approach taken by the system model. This approach involves two steps:

1. SHO Detection
2. SHO Mitigation

A.2.1.2 SHO Detection

As indicated in Figure 2, SHO has a well-defined signature of where the amplitude varies every other cycle. This can be detected in many ways. Example detection schemes include:

Frequency domain approach:
Measure the energy at $f_{op}/2$ and compare it to the energy at f_{op}.

- A good detection criteria is: $E\{f_{op}/2\} > E\{f_{op}\}/40$ to indicate the onset of SHO.

Time domain approaches:
Compute the peak-to-valley over power cycles:

- $\delta_k = \max(I_t(t)) - \min(I_t(t)), t \in [kT, (k+1)T]$ where $T = \frac{1}{f_{op}}$

Then declare SHO if

- standard deviation of δ_k computed over N cycles exceeds a threshold (~1.25%), or if
- average of $|\delta_k - \delta_{k-1}|$over N cycles exceeds a threshold (~2.5%)

Alternatively, compute peak-to-valley changes over N groups of power cycles:

- $\Delta_j = \max_{k=j\ldots(N+j)} \delta_k - \min_{k=j\ldots(N+j)} \delta_k$

Then declare SHO if

- average value of Δj exceeds a threshold (~2.5%)

It's important that the SHO detection algorithm be robust and avoid false positive detections. To ensure this, two safeguards are recommended. First, for sufficiently low power levels, SHO detection is disabled. That is to prevent instabilities or noise in the low signal levels from triggering a false detection at power levels below the level where SHO can be induced. Second, some number of consecutive detections is required before SHO is declared. The overall algorithm is described by the flowchart in Figure 3. In the system model, the frequency-domain approach is used.

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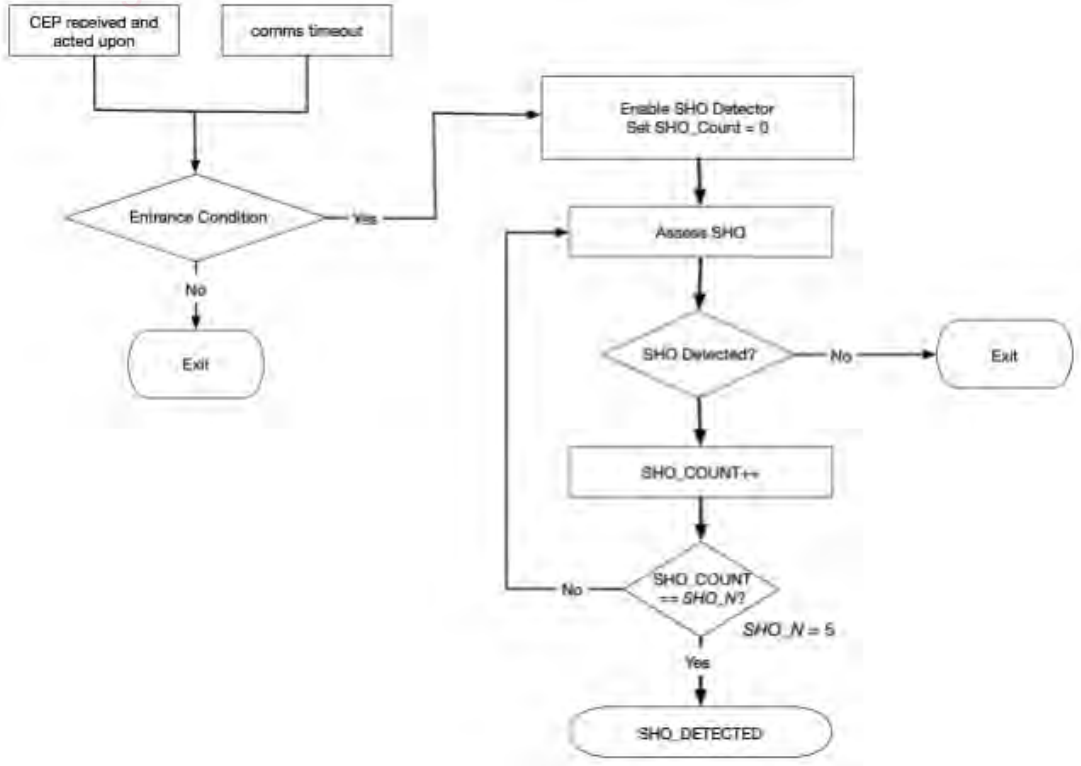


Figure 3 - System Model SHO detection flowchart.