SLOVENSKI STANDARD
oSIST prEN IEC 63254:2021

01-marec-2021

Upravljanje in vmesniki za WPT - Brezžično polnjenje med napravami (D2DWC) za mobilne naprave z brezžično napajalno močjo modula TX/RX (TA 15)

Management and Interfaces for WPT - Device to device wireless charging (D2DWC) for mobile devices with wireless power TX/RX module (TA 15)

Gestion et interfaces pour WPT - Chargement sans fil de dispositif à dispositif (D2DWC) pour dispositifs mobiles avec module TX/RX d'énergie sans fil (TA 15)

Ta slovenski standard je istoveten z: prEN IEC 63254:2021

ICS:

29.200	Usmerniki. Pretvorniki. Stabilizirano električno napajanje	Rectifiers. Convertors. Stabilized power supply
33.160.01	Avdio, video in avdiovizualni sistemi na splošno	Audio, video and audiovisual systems in general

oSIST prEN IEC 63254:2021 **en,fr,de**

100/3534/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 63254 ED1**	
DATE OF CIRCULATION: **2021-01-08**	CLOSING DATE FOR VOTING: **2021-04-02**
SUPERSEDES DOCUMENTS: **100/3415/CD, 100/3478A/CC**	

IEC TA 15 : WIRELESS POWER TRANSFER

SECRETARIAT: Korea, Republic of	SECRETARY: Mr Ock-Woo Nam
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

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

Attention IEC-CENELEC parallel voting

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Management and Interfaces for WPT - Device to device wireless charging (D2DWC) for mobile devices with wireless power TX/RX module (TA 15)

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

Rev	Date	Description
01	2018.12.14	Circulation to experts for review
02	2019.05.31	Circulation after modifying as DoC
03	2020.02.14	Circulation after modification as following 1st WD CRM
04	2020.08.03	Circulation after modification as following 1st CD

20 CONTENTS

21

89

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MANAGEMENT AND INTERFACES FOR WPT - DEVICE TO DEVICE WIRELESS CHARGING (D2DWC) FOR MOBILE DEVICES WITH WIRELESS POWER TX/RX MODULE

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.

5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC XXX has been prepared by subcommittee XX: TITLE, of IEC technical committee XX:

The text of this standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

The National Committees are requested to note that for this publication the stability date is ....

143 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE
144 PUBLICATION STAGE.

145

Management and Interfaces for WPT - Device to device wireless charging (D2DWC) for mobile devices with wireless power TX/RX module

1. Scope

This standard defines specification and control protocol of D2DWC module for using wireless power TX and RX functions by only one single device. And the related antenna physical design examples are presented in Annex A for sharing information. This standard propose D2DWC module circuit requirement which are consisted with the D2DWC main AP, D2DWC IC, EMT/WPT Antenna Unit and PMIC unit. In the Chapter 5, 'Specifications and control protocol of D2DWC', the register information and message protocols for WPT control are defined in order to implement the WPT TX function. In this standard, the interface and protocol in the wireless power process of the mobile device can be used in accordance with the corresponding wireless power transfer standard. Any wireless power transfer standard working inside 100 – 350 kHz frequency range can be included from the scope of this standard. This standard can be used to mobile wireless power transfer in mobile phones and other mobile devices, IoT, and micro-sensor industries and related application fields.

2. Normative references

Not applicable.

3. Definitions and terminology

For the purposes of this document, the following terms, definitions, and abbreviations apply.

3.1. Definitions and terminology

3.1.1.
D2DWC (Device-to-Device Wireless Charging)

D2DWC is wireless charging technology that uses a magnetic field-transmission function among mobile devices, which can simultaneously perform wireless power TX and RX functions.

3.1.2.
D2DWC unit

The D2DWC unit is an IC that enables wireless power transmission/reception, and includes a magnetic field-transmission function, Mux, which allows the selection of WPT TX, and a transmission inverter.

3.1.3.
WPT (Wireless Power transfer)

WPT is a technology that wirelessly sends energy to a load with no transmission line by converting electric energy to electromagnetic waves. To convert electric energy to electromagnetic waves, the electric energy is converted to RF signals of a specific frequency and the energy is transmitted through the electromagnetic waves generated from them.

188

189 **3.1.4.**
190 **EMT (Elective Magnetic Transmission)**
191 EMT is a technology for transmitting elective magnetic waves and is currently used to create
192 and send magnetic waves for magnetic billing service of mobile phones.

193

194 **3.1.5.**
195 **PMIC (Power-Management IC)**
196 PMIC is a power-management IC for battery charging and includes the boost function.

197

198 **3.1.6.**
199 **SPI (Serial Peripheral Interface)**
200 SPI is a synchronized serial data connection standard for operation in full-duplex
201 communication mode.

202

203 **3.1.7.**
204 **UART (Universal Asynchronous Receiver/Transmitter)**
205 UART is a universal asynchronous receiver/transmitter for receiving and sending data after
206 converting parallel data to serial data.

207

208 **3.1.8.**
209 **I²C Bus (Inter-Integrated Circuit Bus)**
210 I²C Bus is an inter-integrated circuit bus protocol for transmitting clocks, data, and commands.

211

212 **3.1.9.**
213 **WPC Class 0 specification**
214 Power class 0 is defined by WPC (Wireless Power Consortium). This class 0 specification is
215 used to load the battery of devices such as mobile phones, tablets, and small accessories. It
216 has a maximum transmission power of 15W.

217

218 **3.2. Abbreviations**

219 For the purposes of this document, the following abbreviations apply:

220 **3.2.1.**
221 **WPT**
222 Wireless Power Transmitter

223 **3.2.2.**
224 **TX**
225 Transmitter

226 **3.2.3.**
227 **RX**
228 Receiver

3.2.4.
RFU
Reserved for Future Use

4. Operation scenarios

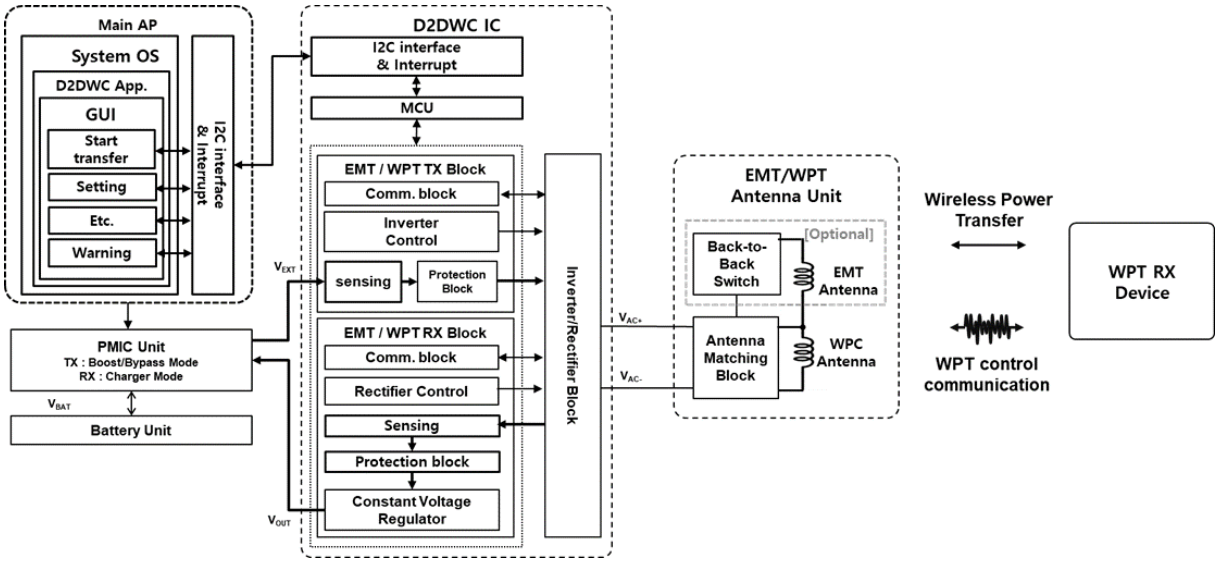
4.1. Architecture

This standard proposes the physical definition and control information of modules for wireless power transfer (WPT) among mobile devices that are operated by batteries instead of a constant power supply and simultaneously support wireless power TX and RX. The total architecture for the D2DWC technical standard proposed herein is shown in figure 1.

To implement the features of the D2DWC, the following components are required: 1) D2DWC unit for performing magnetic field transmission function and wireless charging TX/RX among mobile devices, 2) PMIC unit for battery charging, 3) EMT/WPT antenna unit for both EMT function and WPT TX/RX, and 4) microcontroller unit (MCU) for monitoring and controlling the D2DWC unit.

Among them, the D2DWC unit consists of an EMT module, WPT TX/RX module, EMP/WPT TX Mux, and Power Amp module. The EMT module can control and transmit magnetic waveforms, and uses the same bandwidth as that of the frequencies specified in the WPT for use in billing services, etc. The WPT TX/RX module has the functions to perform wireless power transfer and reception. For WPT, it determines which magnetic field waveform to send through the EMT module and Mux. The EMT/WPT TX Mux selects the waveform after selecting the EMT and WPT TX signals. Finally, the Power Amp module sends the magnetic field waveforms during EMT or WPT TX.

To examine each IC and module, for WPT, the D2DWC unit uses the Mux to select and send EMT and WPT TX, and a transmission inverter to generate and transmit magnetic fields, which is shared between EMT and WPT. Furthermore, the WPT module can selectively perform the TX/RX function. Outside of the D2DWC unit, there is one EMT/WPT antenna that must be used for three functions, for which the EMT and WPT functions must be performed with the same frequency. The antenna is shared for EMT and WPT functions, but the antenna can be switched selectively depending on the EMT frequency. At a given frequency, the same antenna may be used for both EMT and WPT TX. The optional EMT antenna is indicated to show the selective change in the antenna length according to the impedance matching between the TX and RX. Finally, the D2DWC unit is externally connected to the PMIC for battery charging, and battery charging/discharging occurs during the wireless power transfer and reception.



265 **Figure 1 — Overall architecture of the proposed EMT/WPT module proposed in the D2DWC**
266 **technical standard**

267

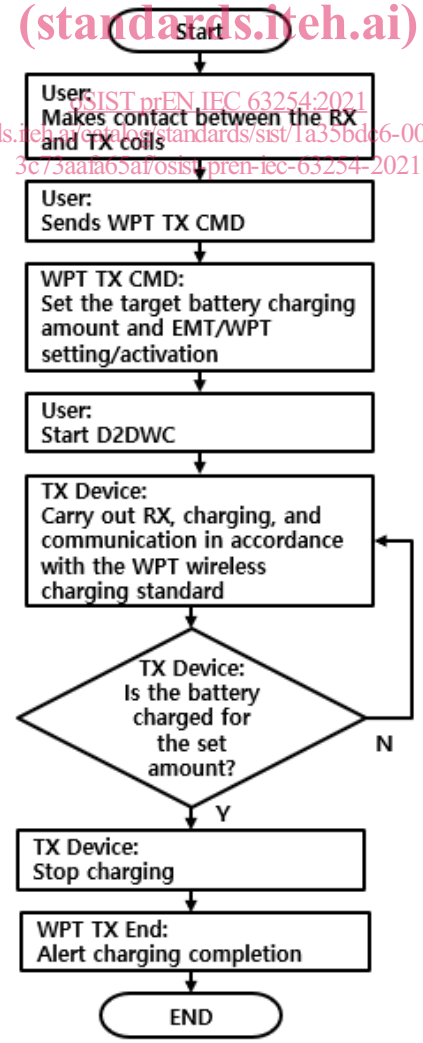
268 ## 4.2. Communication procedure for D2DWC

269 In the D2DWC standard, WPT can be controlled in accordance with the WPT standard used
270 by the user, and the class-0 WPT in the WPC standard is used as an example. For this case,
271 the total operation procedure of the D2DWC and the WPT TX/RX operations are presented in
272 this section.

273 ### 4.2.1 Total operation scenario of D2DWC

274 The total operation scenario of D2DWC is shown in figure 2. The user first makes contact
275 between the coil parts of the TX and RX devices to perform WPT. The D2DWC then sends a
276 command to drive the WPT function to the D2DWC unit connected via the I2C interface. The
277 D2DWC unit reports the current charging amount to the user, who checks the charging
278 amount of his/her device battery and determines the desired charging amount and speed.
279 Once charging starts, the WPT TX device draws power from the battery and applies power to
280 the WPT TX coil and the power is cut off in the RX coil. Wireless charging is performed
281 between the WPT TX and RX devices, which are controlled in accordance with the mobile
282 TX/RX combined device environment proposed in this standard. Finally, when the power is
283 transmitted for the amount set in the command, wireless charging is stopped in the WPT TX.

284



285