



SLOVENSKI STANDARD

oSIST prEN IEC 63254:2021

01-marec-2021

Upravljanje in vmesniki za WPT - Brežično 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)

iTeh STANDARD PREVIEW

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)

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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

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SECRETARIAT: Korea, Republic of	SECRETARY: Mr Ock-Woo Nam
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING
<p>Attention IEC-CENELEC parallel voting</p> <p>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.</p> <p>The CENELEC members are invited to vote through the CENELEC online voting system.</p>	

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TITLE:

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

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90 INTERNATIONAL ELECTROTECHNICAL COMMISSION
91

92
93 **MANAGEMENT AND INTERFACES FOR WPT - DEVICE TO DEVICE**
94 **WIRELESS CHARGING (D2DWC) FOR MOBILE DEVICES**
95 **WITH WIRELESS POWER TX/RX MODULE**
96

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129 committee XX:

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

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

131
132 Full information on the voting for the approval of this standard can be found in the report on voting
133 indicated in the above table.

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

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

- 138 • reconfirmed,
139 • withdrawn,
140 • replaced by a revised edition, or
141 • amended.

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

143
144

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

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146 **Management and Interfaces for WPT - Device to device wireless charging**
 147 **(D2DWC) for mobile devices with wireless power TX/RX module**
 148

149 **1. Scope**

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

162

163 **2. Normative references**

164 Not applicable.

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166 **3. Definitions and terminology**

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

168

169 **3.1. Definitions and terminology**

170 **3.1.1.**

171 **D2DWC (Device-to-Device Wireless Charging)**

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

175

176 **3.1.2.**

177 **D2DWC unit**

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

181

182 **3.1.3.**

183 **WPT (Wireless Power transfer)**

184 WPT is a technology that wirelessly sends energy to a load with no transmission line by
 185 converting electric energy to electromagnetic waves. To convert electric energy to
 186 electromagnetic waves, the electric energy is converted to RF signals of a specific frequency
 187 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

229 **3.2.4.**
 230 **RFU**
 231 Reserved for Future Use

232

233 4. Operation scenarios

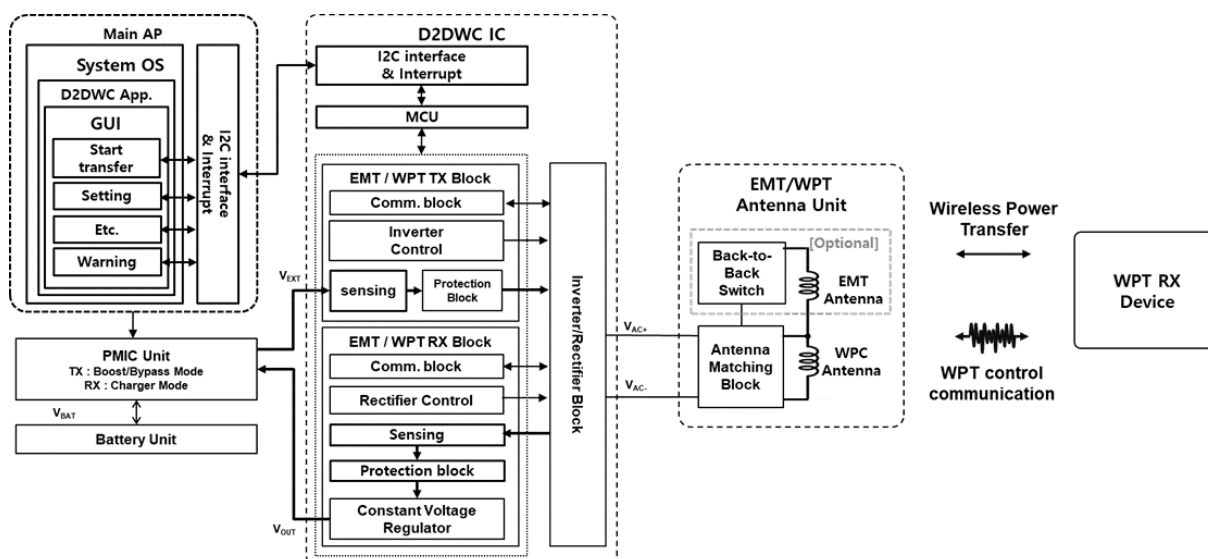
234 4.1. Architecture

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

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

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

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



264

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

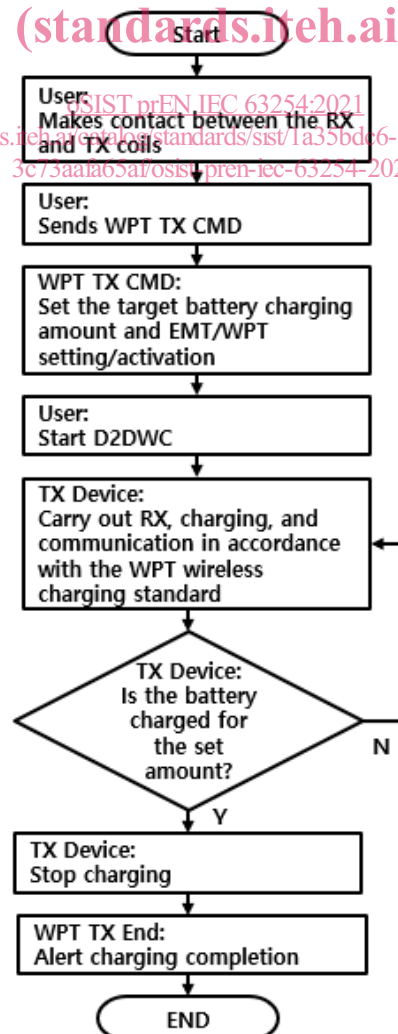
274 The total operation scenario of D2DWC is shown in figure 2. The user first makes contact
 275 between the coil parts of the TX and RX devices to perform WPT. The D2DWC then sends a
 276 command to drive the WPT function to the D2DWC unit connected via the I2C interface. The
 277 D2DWC unit reports 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.

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