BS EN IEC 63254:2022

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

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The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio-visual equipment.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Management and interfaces for WPT - Device-to-device wireless charging (D2DWC) for mobile devices with wireless power TX/RX module (IEC 63254:2022)

Gestion et interfaces pour WPT - Chargement sans fil de dispositif à dispositif (D2DWC) pour dispositifs mobiles avec module TX/RX d'énergie sans fil (IEC 63254:2022)

Management und Schnittstellen für WPT - Drahtloses Laden von Gerät zu Gerät (D2DWC) für mobile Geräte mit drahtlosem Power TX/RX-Modul (IEC 63254:2022)

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European foreword

The text of document 100/3799/FDIS, future edition 1 of IEC 63254, prepared by IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63254:2022.

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- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-08-02
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MANAGEMENT AND INTERFACES FOR WPT – DEVICE-TO-DEVICE WIRELESS CHARGING (D2DWC) FOR MOBILE DEVICES WITH WIRELESS POWER TX/RX MODULE

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Draft	Report on voting
100/3799/FDIS	100/3820/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.

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

1 Scope

This document defines the specification and the control protocol of the D2DWC module for the use of wireless power TX and RX functions by a single device. The related antenna physical design examples for sharing information are presented in Annex A.

This document proposes the D2DWC module circuit requirement, which consists of the D2DWC main AP, D2DWC IC, the EMT/WPT antenna unit and the PMIC unit. In Clause 5, the register information and message protocols for WPT control are defined in order to implement the WPT TX function.

In this document, 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 within the 100 kHz to 350 kHz frequency range can be included in the scope of this document.

This document can be used for mobile wireless power transfer in mobile phones and other mobile devices, IoT devices, micro-sensor industries and related application fields.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions

3.1.1
D2DWC
device-to-device wireless charging
wireless charging technology that uses a magnetic field-transmission function between mobile devices, which can simultaneously perform wireless power TX and RX functions

3.1.2
D2DWC unit
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

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3.1.3
WPT
wireless power transfer
technology that wirelessly sends energy to a load with no transmission line by converting electric energy to electromagnetic waves

Note 1 to entry: 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.

3.1.4
EMT
elective magnetic transmission
technology for transmitting elective magnetic waves and is currently used to create and send magnetic waves for magnetic billing service of mobile phones

3.1.5
PMIC
power-management IC
device for managing battery charging, which includes a boost function

3.1.6
SPI
serial peripheral interface
synchronized serial data connection standard for operation in full-duplex communication mode

3.1.7
UART
universal asynchronous receiver/transmitter
device for receiving and sending data after converting parallel data to serial data

3.1.8
I^2C Bus
inter-integrated circuit bus
protocol for transmitting clocks, data, and commands

3.1.9
WPC Class 0 specification
specification used to load the battery of devices such as mobile phones, tablets, and small accessories

Note 1 to entry: It has a maximum transmission power of 15 W.

Note 2 to entry: Power class 0 is defined by the WPC (World Power Consortium).

3.2 Abbreviated terms

WPT	wireless power transfer
TX	transmitter
RX	receiver
RFU	reserved for future use
MCU	micro controller unit

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4 Operation scenarios

4.1 Architecture

This document proposes the physical definition and control information of modules for wireless power transfer (WPT) between 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:

a) D2DWC unit for performing magnetic field transmission function and wireless charging TX/RX among mobile devices,

b) PMIC unit for battery charging,

c) EMT/WPT antenna unit for both EMT function and WPT TX/RX, and

d) microcontroller unit (MCU) for monitoring and controlling the D2DWC unit.

Among these components, the D2DWC unit consists of an EMT module, a WPT TX/RX module, an EMP/WPT TX mux, and a 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.

In order 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 shall be used for three functions, for which the EMT and WPT functions shall 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 wireless power transfer and reception. Information related to regulation and certification is presented in Annex B.

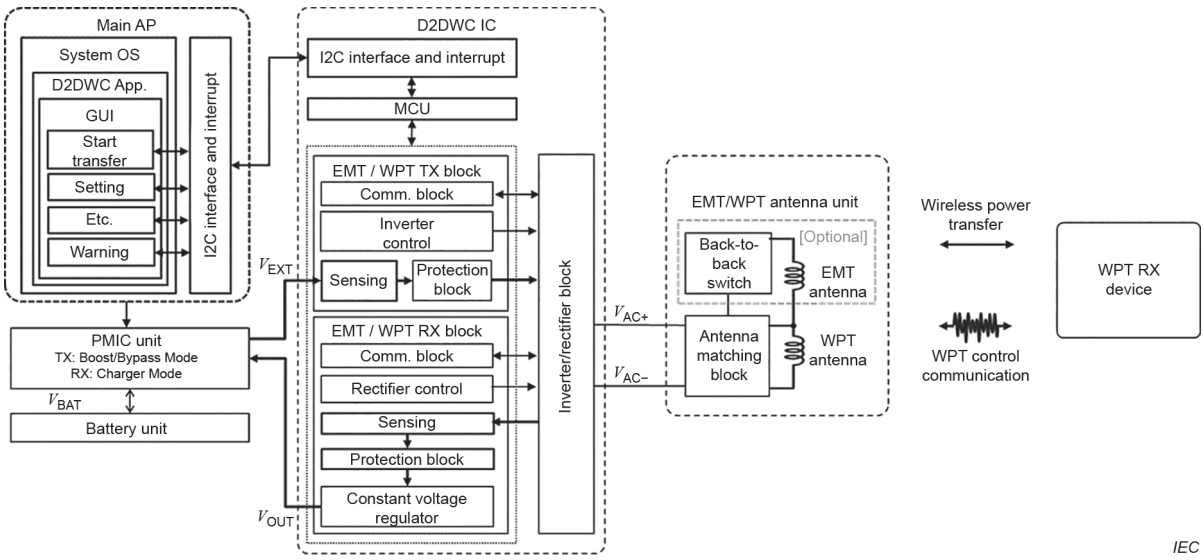

Figure 1 – Overall architecture of the proposed EMT/WPT module

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