

USER MANUAL

WMI

Wireless Mobile Interface

D-WMI2020A	A2C166288 A2C166290 A2C166291 A2C166292 A3C011059 A3C011064 A3C054140 A3C054142 A3C017277 A3C027269 A3C017280 A3C011153
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1. System Overview

Continental Wireless Power Charger is developed for automotive applications under the name WMI which includes three functions like:

- WPC: Wireless power charger
- NFC: Near field communication

The WMI module and their implementation in different variants inside the vehicle is depicted in Fig. 1.



Fig. 1 : WMI module and WMI automotive implementation inside the vehicle

1.1 WPC

WPC feature of the WMI uses Qi standard of Wireless Power Consortium (WPC) for enabling wireless charging from a base station unit to mobile device. The power transfer method is based on near field magnetic induction between coils.

1.1.1 System Overview

The WMI wireless charger provides power transfer from the internal coil to the smartphones' battery. The power transfer technology is based on Qi standard operating with a fixed frequency of 127.7kHz \pm 6kHz.

1.1.2 WPC modes

A simple operational description of wireless power transfer can be summarized in two operational modes. The first mode with a defined burst sequence allows the transmitter to detect the smartphone Qi compliant. Then, the second mode allows the power transfer from the WMI to the smartphone. Details of each operational mode are presented below:

1.1.2.1 Ping mode

In this operational mode, the WMI module transmits a short time carrier signal with a specific pattern to detect a smartphone. When a mobile device is placed on the WMI, the identification and the collection of configuration information is done. Based on that

information, the transmitter creates a power transfer contract containing the maximum power to be delivered to the load.

1.1.2.2 Charging mode

After “Ping mode”, the power transfer starts. In this operational mode, the transmitter sends the carrier at a given level defined in the power contract in the operational “Ping mode”. The WMI controls the power transferred to the smartphone, in response to the control data messages sent by the smartphone.

1.1.2.3 Transmitter to receiver communications

The WMI transmitter communicates to the mobile device using Frequency Shift Keying, in which the Transmitter modulates the Operating Frequency of the Power Signal.

1.1.3 WPC parameters

Bellow in table 1, the technical parameters of the WMI WPC feature are specified:

Parameters	Values
Carrier frequency	127.7 kHz
Frequency shift	+/- 6 kHz
Supply voltage	12V battery
Voltage supply range	9V < Vbat < 16V
Max. power consumption	35W (25W typ)
Product operating temperature range	-40°C < Temp < 85°C
Smartphone operating temperature range	-20°C < Temp < 60°C
WPC chipset brand	IDT
WPC litz coil	Single coil MPA19 according to Qi standard
WPC litz coil gain @ 127.7kHz	-107.1 dBi
Max. output power	15W
Max. current consumption	3.5A (2A typ)
Vehicle fuse protection	7.5A
Product weight	270 g
Dimensions (X/Y/Z in mm)	170/90/33 mm

Table 1: WMI WPC technical parameters.

The rated output power from the WPC coil is Max. 15W transferred to the load. The receiver manages the wireless charger in order to guarantee stable 15W on the load.

1.2 NFC

NFC Reader used NFC (Near Field Communication) technology to enable the communication between phones and cards with the vehicle, having user functions like, BT pairing and Wi-Fi pairing.

The WMI integrates only one NFC transceiver at 13.56MHz connected via switches to an internal NFC antenna and to an external antenna. Only one NFC antenna is fed at a given time.

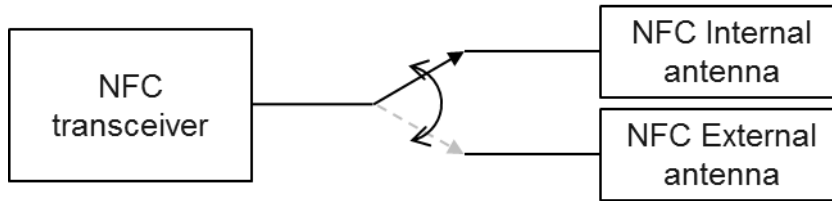


Fig. 2 : WMI NFC block diagram

1.2.1 NFC Parameters

Bellow in table 2, the technical parameters of the WMI NFC feature:

Parameters	Values
Carrier frequency	13.56 MHz
Modulation type	Amplitude Shift Keying (ASK)
Data rate max.	848 kbps
Supply voltage	12V battery
Voltage supply range	9V < Vbat < 16V
Product operating temperature range	-40°C < Temp < 85°C
Smartphone operating temperature range	-20°C < Temp < 60°C
NFC chipset brand	NXP Semiconductors
NFC chipset model number	NCF3340EHN
Vehicle fuse protection	7.5A

Table 2: WMI NFC technical parameters.

1.2.2 NFC antennas

The NFC reader is composed of two antennas, internal and external antenna.

- The **internal antenna** is that one is implemented inside the WMI module.
- The **external antenna** is that one connected to the WMI module.

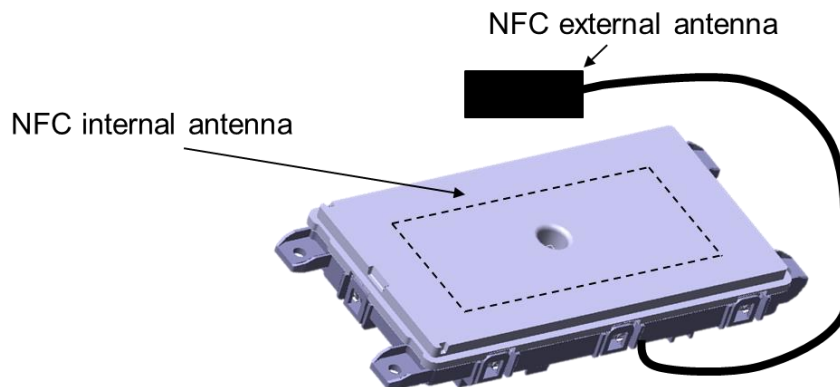
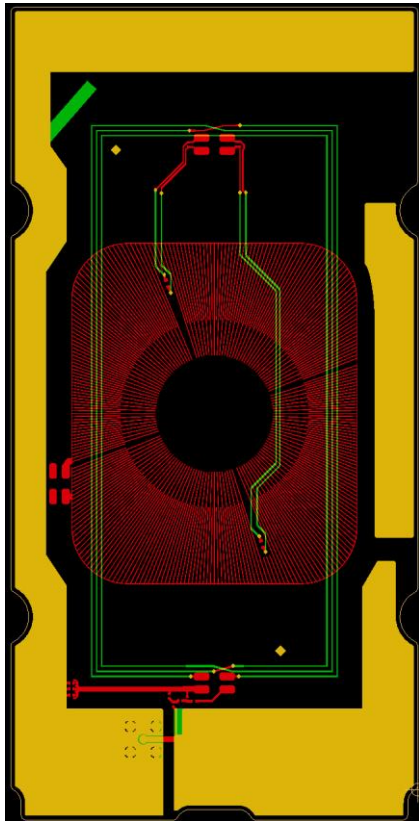


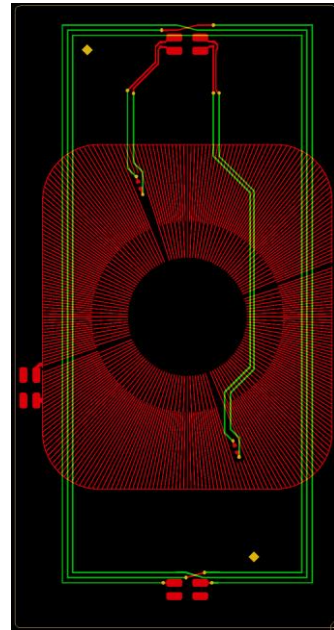
Fig. 3: NFC antennas of D-WMI2020A

1.2.2.1 NFC internal antenna:

Here bellow is shown the NFC antenna for High and Low WMI versions.



Large Antenna PCB: NFC internal antenna trace on antenna PCB is shown in green



Small Antenna PCB: NFC internal antenna trace on antenna PCB is shown in green

Fig. 4: NFC Internal antennas


The electrical parameters of the NFC internal antenna are listed in the following table


Parameters	Values
Antenna type	Planar Printed Coil on PCB
Number of turns	3
Antenna Size	109mm x 43mm
Antenna Gain (dBi) @ 13.56MHz	Large antenna = -50.8 dBi
Antenna Gain (dBi) @ 13.56MHz	Small antenna = -51 dBi


Table 3: NFC internal antenna electrical parameters.

1.2.2.2 NFC external antenna:

The NFC external antenna is an external component connected to the D-WMI2020A. Three variants of the external antenna are presents with the following dimensions and electrical characteristics.

NFC Ext 1: Cable length 260mm		
	Parameters	Values
	Antenna model number	A2C16632101
	Antenna type	Wire winding on plastic holder
	Number of turns	3
	Antenna Size	59mm x 34.7mm
	Antenna Gain (dBi) @ 13.56MHz	-53.3 dBi

NFC Ext. 2: Cable length 370mm		
	Parameters	Values
	Antenna model number	A3C020778
	Antenna type	Wire winding on plastic holder
	Number of turns	3
	Antenna Size	50mm x 34.7mm
	Antenna Gain (dBi) @ 13.56MHz	-55.4 dBi

NFC Ext. 3: Cable length 370mm for carbon cover		
	Parameters	Values
	Antenna model number	A3C020776
	Antenna type	Wire winding on plastic holder
	Number of turns	3
	Antenna Size	59mm x 34.7mm
	Antenna Gain (dBi) @ 13.56MHz	-58.1 dBi

2. WMI vehicle installation distance relative to human body

Minimum distances from WMI to human body are described here bellow.

These figures are mechanical separation distances from the transmitter to people seating within the car and do not represent the minimum compliance distance for RF exposure.

Minimum RF exposure distance compliance is demonstrated at 0cm as per ISED RSS102 issue 5 and FCC §2.1093 requirements.

	Separation distances from WMI to Human body (in cm) – WPC + NFC_int						
	Sitting on	Knee (side)	Leg (side)	Body (side)	Hand (top)	Arm (top)	Head (top)
Front	Driver	6.2	7.8	38.3	9.7	23.5	78.9
	Co-driver	19.6	20.4	40.5	12.6	23.5	78.9
Middle Storage Armrest	Driver	46.6	19.8	14.7	18.6	16.7	70.7
	Co-driver	46.6	19.8	14.7	18.6	16.7	70.7
Middle HVAC Armrest	Driver	53.9	33.8	16.6	19.6	5	59.1
	Co-driver	53.9	33.8	16.6	19.6	5	59.1
5 seater rear armrest	Rear	50.4	11.5	10.3	18.3	7.3	58.3
4 seater under armrest	Rear	35.4	10.8	18.4	12.4	12.9	69.3
4 seater outside armrest	Rear	7.5	8.7	29.7	0	12.5	70

	Separation distance from WMI to Human body (in cm) – NFC_ext						
	Sitting on	Knee (side)	Leg (side)	Body (side)	Hand (top)	Arm (top)	Head (top)
Front	Driver	30	7.4	31.5	7	19.9	65.4

3. Logos

- WEEE logo shall be printed in vehicle user manual.



- Safety mark shall be lasered on product label and printed in vehicle user manual.



4. Regulatory statements

- Safety statement shall be printed in vehicle user manual.

Operating conditions:

Please respect the operating temperature dependent on functional use case.

Product operating temperature range	-40°C < Temp < 85°C
Smartphone operating temperature range	-20°C < Temp < 60°C

NCC警語

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

ISED

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.



L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) L'appareil ne doit pas produire de brouillage;
- 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION TO USERS

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.