



  
U S E R M A N U A L

Page

1/11

Established By  
Seoyon Electronics

W.P.C SYSTEM

Spec No.

## I N D E X

1. PURPOSE
2. SCOPE
3. ABBREVIATIONS AND DEFINITIONS
4. SYSTEM OVERVIEW

-	RELEASED	ALL	2017.05.26	W.C NO
Rev.NO	DESCRIPTION OF CHANGED	CHANGE PAGE	REV. DATE	REV. BY
REV. DATE 2017.05.26		SORT	PREPARED	CHECKED
(PLM MANAGEMENT SYSTEM)		A P P R O V A L	WON CHUL NO	HO NAM KIM
			APPROVED	GYEONG HEUM CHOI



# USER MANUAL

SPEC NO

(SHT/SHTS) 2/11

## Document Change History

Date	Ver.	Editor	Chap.	Description	CR#



Contents list page

<b>1. PURPOSE.....</b>	<b>3</b>
<b>2. SCOPE.....</b>	<b>4</b>
<b>3. ABBREVIATIONS AND DEFINITIONS.....</b>	<b>4</b>
<b>4. SYSTEM OVERVIEW.....</b>	<b>6</b>
4.1. SYSTEM DESCRIPTION.....	6
4.2. OPERATION PRINCIPLE.....	6
4.3. ROLE AND CHARACTERISTICS OF W.P.C PING.....	8
4.4. W.P.C COMMUNICATION AND CHARGING CHARACTERISTICS.....	9
4.5. PACKET LIST OF W.P.C CONTROLLER.....	9
4.6. W.P.C FLOW CHART.....	10
4.7. HARDWARE CONFIGURATION.....	10
4.8. SYSTEM CONFIGURATION.....	11
4.9. W.P.C OPERATION CONDITION.....	11
4.9.1. W.P.C OPERATING VOLTAGE.....	11
4.9.2. W.P.C INPUT/OUTPUT SPECIFICATIONS.....	12
4.9.2.1.UNIT Input/Output Interface.....	12

## 1. PURPOSE

This specification specifies general functional requirements, quality requirements and constraints applicable to the wireless charging system. If there is a difference between this specification and the drawings, the drawings take precedence.



## 2. SCOPE

This specification specifies general functional requirements, quality requirements and constraints applicable to the wireless charging system. If there is a difference between this specification and the drawings, the drawings take precedence.

## 3. ABBREVIATIONS AND DEFINITIONS

Item, abbreviation, acronym	Description
WPC	Wireless Power Charger
Active Area	An interface surface portion through which magnetic flux penetrates sufficiently when the base station provides power to the mobile device
Power Transmitter	Wireless power transmission system Subsystem of base station that generates inductive power in Active Area and controls power transmission to RX
Base Station	Devices that transmit power wirelessly
Digital Ping	Application of Power Signal for RX Detection and Device Identification
Free Positioning	Place the mobile device on the interface surface of the base station. The user does not need to align the active area of the mobile device with the active area of the base station.
Guided Positioning	One way to locate a mobile device on the interface surface of the base station is to provide feedback for the user to align the active area of the mobile device to the active area of the base station
Interface Surface	Base station and mobile device Connected surface
Mobile Device	Devices that can consume inductive power in active area in wireless power transmission system
Packet	Data structure that RX uses to communicate messages to TX
Power Receiver	Wireless Power Transmission System Subsystem of Mobile Device that acquires inductive power in Active Area and controls the validity of its output power
Power Signal	Vibrating flux surrounded by primary cell and secondary coil
Power Transfer Contract	A set of boundary conditions with parameters having characteristics for power transmission from TX to RX



# USER MANUAL

SPEC NO

(SHT/SHTS) 5/11

Primary Cell	A single Primary Cell or Primary Cell used to provide high magnetic flux through the Active Area
Secondary Coil	Parts of RX that switch from magnetic flux to electromotive force

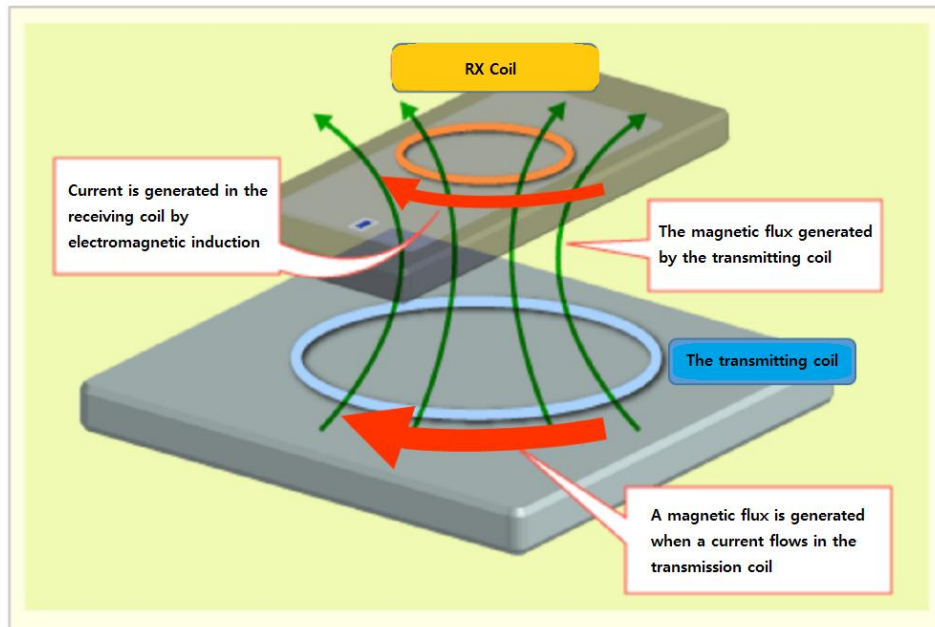
**Table 1 : ABBREVIATIONS**



## 4. SYSTEM OVERVIEW

### 4.1. SYSTEM DESCRIPTION

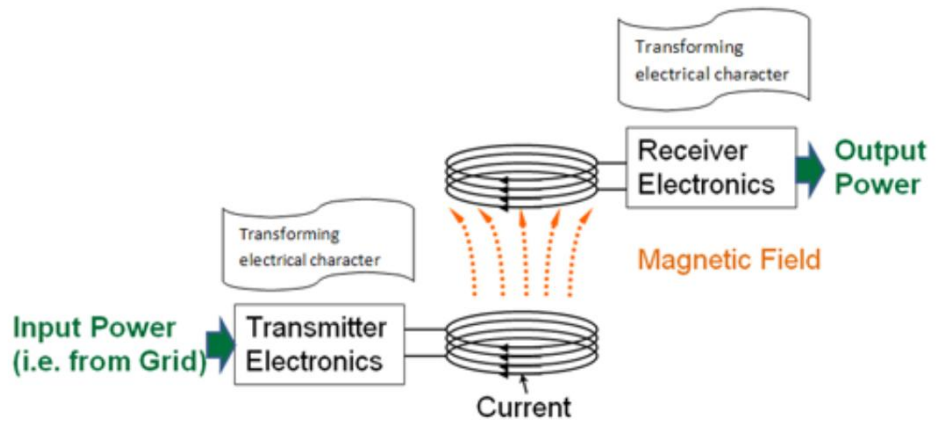
A wireless charger (WPC) installed in a vehicle is a system that transmits power to a mobile phone or a power receiver by power transmission by magnetic induction of a WPC coil and a cell phone coil without a USB connection.



Picture 1 :OPERATION PRINCIPLE

### 4.2. OPERATION PRINCIPLE

WPC transmits power by magnetic induction to the overlapping area of the coil inner diameter of WPC and the coil inner diameter of WPC with LC resonance (111KHZ).



Picture 2 : POWER FLOW

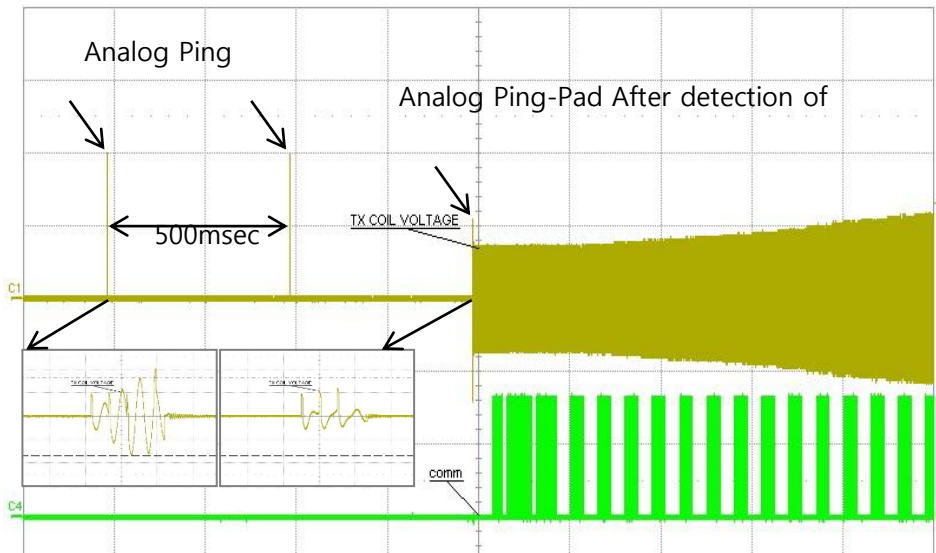


### 4.3. ROLE AND CHARACTERISTICS OF W.P.C PING

- Analog Ping : Meter reading on wireless charge controller
- Digital Ping : Verify that the meter reading is a wireless charger WPC receiver

Packet Input Sequence	Packet	Purpose	Division
1	Signal Strength	Receiver Type	Digital Ping
2	Identification	Information such as the receiver manufacturer	
3	Configuration	Receiver internal information	
4	End Power Transfer	Stop power transmission	Digital Ping

Table 2 : Digital Ping Packe



Picture 3 : Receiver Recognition (Ping) Phase and Power Transfer Phase

Ping Division	Voltage	Timing	Frequency
Analog	SIDE : $3.5V \pm 0.5V$	500ms	$111kHz \pm 5kHz$
	Center : $3.0V \pm 0.5V$	500ms	$111kHz \pm 5kHz$
Digital	-	64ms	$111kHz \pm 5kHz$

Table 3 : Ping Specification





#### 4.4. W.P.C COMMUNICATION AND CHARGING CHARACTERISTICS

Wireless Charging Transmits messages with uni-directional in-band (ASK) communication using a specific frequency between the transmit coil and the receive coil.

The wireless charger transmit coil transmits the power of the MAX15W and the operating frequency is 111KHZ.

Confidential

Picture 4 : Wireless charging controller communication method

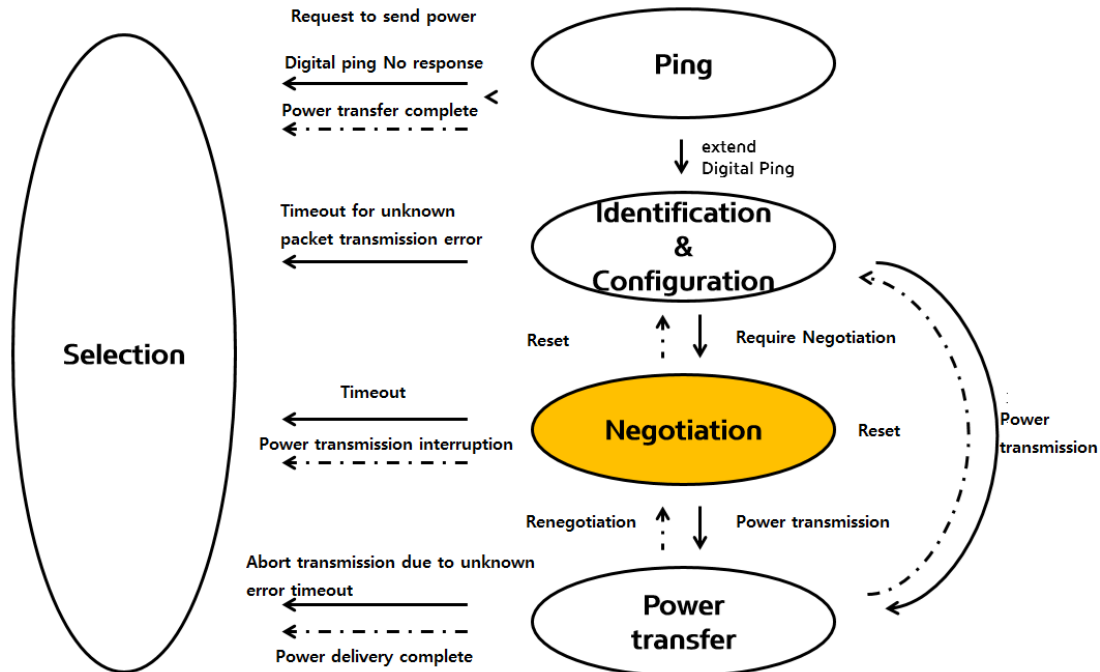
#### 4.5. PACKET LIST OF W.P.C CONTROLLER

Header*	Packet Types	Message Size
<i>ping phase</i>		
0x01	Signal Strength	1
0x02	End Power Transfer	1
<i>identification &amp; configuration phase</i>		
0x06	Power Control Hold-off	1
0x51	Configuration	5
0x71	Identification	7
0x81	Extended Identification	8
<i>power transfer phase</i>		
0x02	End Power Transfer	1
0x03	Control Error	1
0x04	Received Power	1
0x05	Charge Status	1

Table 4 : W.P.C Packet List



#### 4.6. W.P.C FLOW CHART



Picture 5 : W.P.C Flow Chart

#### 4.7. HARDWARE CONFIGURATION

The hardware configuration consists of Control, wireless charging, and wireless charging antenna coils.

- CONTROL CIRCUIT
  1. Control of wireless charger operation
  2. INDICATOR operation control
  3. CAN communication control
- W.P.C CIRCUIT
  1. Wireless Charging Antenna Coil transfers the power received from BATTERY
  2. Check the unidirectional Inventory (ASK) data received from the mobile phone to control the transmission power
  3. Control the amount of transmission power through voltage variation
  4. Control of rechargeable coil selection function among 3 coils
- Wireless Charging Antenna Coil
  1. Delivered power from wireless charging circuit to mobile phone



## 4.8. SYSTEM CONFIGURATION

Confidential

Picture 6 : WPC BLOCK DIAGRAM

## 4.9. W.P.C OPERATION CONDITION

### 4.9.1.W.P.C OPERATING VOLTAGE

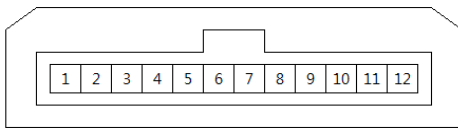
OPERATION	Signal	Value		Protection				Chattering Time	Re marks
		LOW	HIGH	Under		Over			
				Detect	Release	Detect	Release		
CAN	B+	6.8V	7V	7.0V	7.5V	18V	17.5V	30ms	
WPC	B+	8.5V	9V	9.0V	9.5V	16.5V	16.0V	30ms	
	A_ACC	7.1V	7.8V	-	-	-	-	30ms	
	LF_Searching	3.0V	5.6V	-	-	-	-	10ms	
	LED_AMBER	8.5V	9V	-	-	-	-	-	500ms
	LED_GREEN	8.5V	9V	-	-	-	-	-	500ms

Table 5 : W.P.C OPERATING VOLTAGE

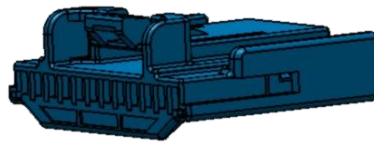


#### 4.9.2.W.P.C INPUT/OUTPUT SPECIFICATIONS

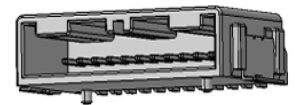
- UNIT CONNECTOR : KET MG645877
- UNIT WIRING CONNECTOR : KET MG655823



<PIN MAP>



<WIRING CONNECTOR>



<UNIT >CONNECTER

Picture 7 : UNIT CONNECTOR (12PIN)

##### 4.9.2.1.UNIT Input/Output Interface

Pin	Designation	PIN Description	Diagnosis	Short circuit proof
1	B+	BATTERY Voltage Input		N/A
2	A_ACC	ACC Voltage Input		N/A
3	N.C.	NO.CONNECT		N/A
4	L_LFSearchingOn_IN	SMK Searching State Input		Pull-up resistor/diode
5	B-CAN_HI	LS-CAN High Level Signal		IC self protection
6	B-CAN_LO	LS-CAN Low Level Signal		IC self protection
7	N.C.	NO.CONNECT		N/A
8	P_LED_GREEN	Charging State Output		Current limit circuit applied (PWM operation)
9	P_LED_AMBER	Charging State Output		Current limit circuit applied (PWM operation)
10	GND_ECU	Ground CONNECT INDICATOR		N/A
11	N.C.	NO.CONNECT		N/A
12	GND_POWER	Ground		N/A

Table 6 : UNIT Input / Output Inerface



# U S E R M A N U A L

SPEC NO

(SHT/SHTS) 13/11

## 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.

This equipment has been tested and found to comply with the limits for a digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

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

This device complies with RF exposure requirement.



# U S E R M A N U A L

SPEC NO

(SHT/SHTS) 14/11

## IC

This device complies with Industry Canada license-exempt RSS standard(s).

Operation is subject to the following two conditions:

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

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et.
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radio electrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

This device complies with RF exposure requirement.

Cet appareil est conforme à l'exigence d'exposition RF.