

Scope

- The purpose of the document is to specify the functional requirement of a WPC V1.2.3 Qi Medium Power RX Module. (WPC V1.2.3 downward compatible WPC V1.1).
- The Wireless Power supply's RX Module shall meet the ROHS requirement.

Applications

- Smartphone, Notebooks, Tablets
- Wearable devices
- Game accessories
- Power bank, Charging case
- Computer peripheral devices
- Medical Care

Product Characteristic

QPR-0108 is a WPC V1.2.3 Qi Medium Power (15W) wireless charging RX Module: Its transmission efficiency is up to 76% and can provide up to 15W transmission capacity. It enables provide DC5V x 1.25A ; DC9V x 1.25A ; DC12 x 1.25A three output options, maximum output power of 15W. It adopts intelligent identification system while its transmitter and receiver unit adopts UART (Universal asynchronous receiver/ transmitter) encrypted transmission control signal which is stipulated by WPC V1.2.3 The console will process the corresponding power adjustment based on the encoding of the receiving unit.

Input Characteristics

- Input Voltage & Frequency

Item	Minimum	Normal	Maximum
Input Frequency	110kHz	145kHz	205kHz
Input Voltage	6.5VAC	12.5VAC	15.5VAC

- Energy Consumption
At 6.5VAC or 15.5VAC, Energy Consumption $\leq 0.01A$.

Output Characteristics (Rx Module)

- Static Output Characteristics (Vo & R+N)

Low Power TX (5W)

Output Voltage	Rated Load		Peak	Output Range	R + N
	Min. Load	Max. Load			
5V DC	0.05A	1A	1.2A	5V $\pm$ 5.0%	$\leq 250m$ Vp-p

Medium Power TX (15W)

Output Voltage	Rated Load		Peak	Output Range	R + N
	Min. Load	Max. Load			
9V DC	0.05A	1.25A	1.4A	5V $\pm$ 4.5%	$\leq 300m$ Vp-p
12V DC	0.05A	1.25A	1.5A	5V $\pm$ 4.0%	$\leq 300m$ Vp-p

Note:

Ripple & Noise: Measurement is done by 20MHz bandwidth oscilloscope and the output end paralleled a 0.1uF ceramic capacitor and a 47uF electrolysis capacitor.



- Line & Load Regulation

Output Voltage	Load Condition		Line Regulation	Load Regulation
	Min. Load	Max. Load		
5V DC	0.05A	1.25A	± 5.0%	± 5.0%
9V DC	0.03A	1.25A	± 4.5%	± 4.5%
12V DC	0.03A	1.25A	± 4.0%	± 4.0%

Protection Requirement

- Short Circuit Protection

When the output is short circuit to ground, the input power should decrease, the power supply remains undamaged and automatically recover when fault condition is removed.

- Over Current Protection

OCP Point Limited: 120%~130% auto restart.

The output will be blocked when output is over-current, and should automatically recover when fault condition is removed.

Reliability Requirements

- Reliability Test

Test Items	Test Conditions
Storage at high temperature test	+60°C, 16hours
Storage at low temperature test	-20°C, 16hours
Operating at high temperature test	+40°C, 8hours
Operating at low temperature test	-20°C, 8hours
High/Low temperature cycle test	+45°C (2Hrs) → -20°C (2Hrs) → +45°C (2Hrs) → -20°C (2Hrs) continually work 24hours

- Burn-in

2hours under 35°C (±5°C) environment, nominal input voltage, nominal load.

Environment Requirement

- Operating Temperature and Relative Humidity

0°C to +40°C, 20%RH to 80%RH @ altitude should be below 10000 feet.

- Storage Temperature and Relative Humidity

-20°C to +60°C, 10%RH to 90%RH (non-condensing) @ altitude should be below 30000 feet.

Execution Standards (Compatible with these specifications)

- EMC Standards

GB9254	GB17625.1	GB13837	FCC-Part15
EN55022	EN55024	CISPR22	EN61000-4-4
EN61000-3-2	EN61000-3-3	EN61000-4-2	EN61000-4-3
EN61000-4-5	EN61000-4-6	EN61000-4-8	EN61000-4-11

- WPC V1.2.3 Qi Standards

Photo of Product



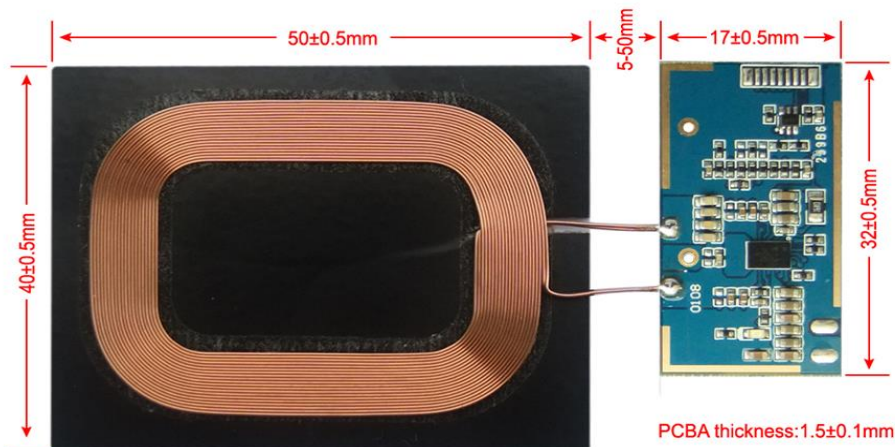
Module

- Product Design Proposal

According to the standardization of Qi, there are three principles need to be careful :

- (1) The distance between Tx Coil with PCB and other metal components is Min: 5.0mm.
- (2) The distance between the surface of Tx Coil and the surface of product (Working Face) is $2.0^{+0.25}_{-0.5}$ mm, which means the thickness of the working face plastic is not more than 2.5mm.
- (3) The surface distance between Tx Coil and Rx Coil is 3.0~4.5mm.

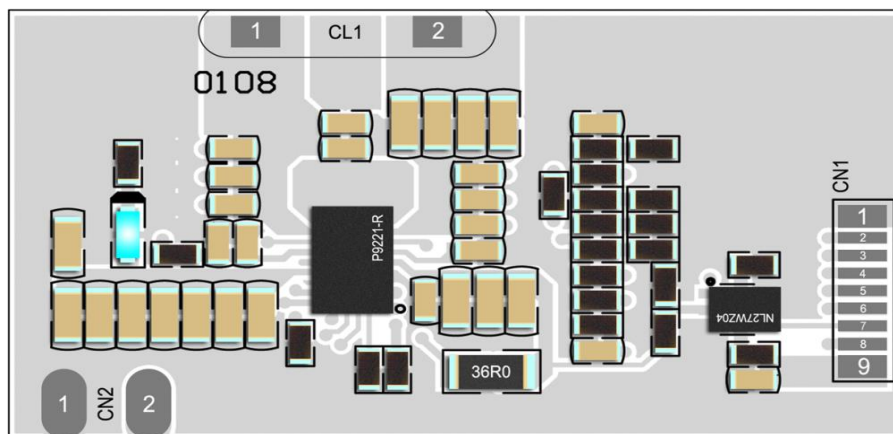
- PCBA Port Functional Illustration



PCBA : 32 * 17 * 1.5±0.1 mm

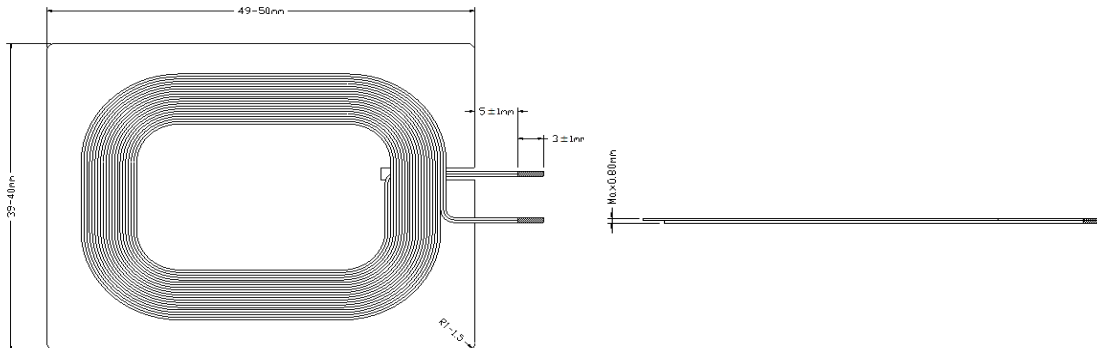
Coil + Shielding : 50 * 40 * 1.0±0.1 mm

Amount of space between the PCBA to Coil+Shielding as follows: 5 ~ 50 mm



Port	Pin	Name	Type	Description
CL1	1	AC1	I	AC input power from receiver resonant.
	2	AC2	I	
CN1	1	GND	GND	Power and logic ground
	2	SDA	I	MCU_MSTR_I2C_SDA
	3	SCL	I	MCU_MSTR_I2C_SCL
	4	WHG_THERM_P	O	Connect to thermal sensor positive
	5	WHG_THERM_N	I	Connect to thermal sensor negative
	6	DET_N	O	Open drain output that allows user to sense when receiver is on transmitter
	7	WPG_N	O	Open-drain output that allows user to sense when power is transferred to load
	8	TS	I	Temperature sense. Can be pulled high to send end power transfer (EPT) or end of charge (EOC) to TX
	9	Out	O	Output pin, used to deliver power to the load (5V / 9V / 12V)
CN2	1	GND	GND	Power and logic ground
	2	Out	O	Output pin, used to deliver power to the load (5V / 9V / 12V)

Rx Coil Spec



Electrical specification @25°C

Parameters	Unit	Limit
Inductance, LS @100kHz, 1.0V, 0.26mm*2 → 10Turns	uH	8.5 ± 10%
Q	---	> 20
DCR	mΩ	130 ± 10%

Others

- Weight : 8 ± 1 g
- Major Test Equipment
 - (1) DC Supply
 - (2) Qi Tx_Module
 - (3) Electronic Load
 - (4) DPO3014 Digital Phosphor Oscilloscope
 - (5) Logical Analyzer
 - (6) CATS II BST

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