

Scope

- The purpose of the document is to specify the functional requirement of a WPC1.2.4_Qi Medium Power RX Module. (WPC1.2.4 downward compatible WPC1.1).
- 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-6011 is WPC 1.2.4 Qi compatible medium power wireless charging and receiving module: its transmission efficiency can reach $75\% \pm 5\%$, and it can also provide transmission capacity up to 15W. It can provide DC5V×1A, DC9V×1A and DC12V×1.25A, and the maximum output power is 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 WPC1.2.4. The console will process the corresponding power adjustment based on the encoding of the receiving unit. This module has fulfilled the WPC1.2.4 Qi requirement and is certified by Qi.

Input Characteristics

- Input Voltage & Frequency

Item	Minimum	Normal	Maximum
Input Frequency	110kHz	145kHz	205kHz
Input Voltage	6.5VAC	7.5VAC	15.5VAC

- Energy Consumption

At 7.5VAC or 15.5VAC, Energy Consumption $\leq 0.01A$

Output Characteristics

- Static Output Characteristics (Vo & R+N)

Output Voltage	Rated Load		Peak Load	Output Range	R + N
	Min. Load	Max. Load			
1	5V DC	0.05A	1.25A	5V $\pm 5.0\%$	$\leq 250m Vp-p$
2	9V DC	0.05A	1.25A	5V $\pm 4.5\%$	$\leq 300m Vp-p$
3	12V DC	0.05A	1.25A	5V $\pm 4.0\%$	$\leq 300m Vp-p$

Note:

- (a) There are two output modes for the output voltage of the module, one is 5V/1A & 9V/1A, the other is 5V/1A & 12V/1.25A; only one working state can be selected for the two modes.
- (b) Ripple & Noise: Measurement is done by 20MHz bandwidth oscilloscope and the output terminal paralleled a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor.

- Line & Load Regulation

Output Voltage	Load Condition		Line Regulation	Load Regulation
	Min. Load	Max. Load		
1 5V DC	0.05A	1.25A	± 5.0%	± 5.0%
2 9V DC	0.03A	1.25A	± 4.5%	± 4.5%
3 12V DC	0.03A	1.25A	± 4.0%	± 4.0%

Protection Requirements

- Short Circuit Protection

The input power will decrease when the output shorts to GND, no damage to power supply, and resume to work when the fault condition is removed.

- Over Current Protection

OCP Point Limited: 110%~130% auto restart.

The output shall hiccup when the over current applied to the output, and shall be self-recovery when the 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	+40°C (2hrs) → -20°C (2hrs) → +40°C (2hrs) → -20°C (2hrs) continually work 24hours

- Burn-in Test

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

- Vibration Test

(1) Amplitude: 2 mm (3) Direction: X, Y
 (2) Frequency: 12.4 Hz (4) Time: 30 minutes/pc

- Dropping Test

(1) Test height: Determined by weight
 (2) Drop times: 10 times (one corner, three edge, six surface)
 (3) Drop platform: 1~2cm thickness solid wood

Equal to or greater than		But Less than		Free Fall	
lb	Kg	lb	Kg	In	mm
0	0	21	10	30	760
21	10	41	19	24	610
41	19	61	28	18	460
61	28	100	45	12	310
100	45	150	68	8	200

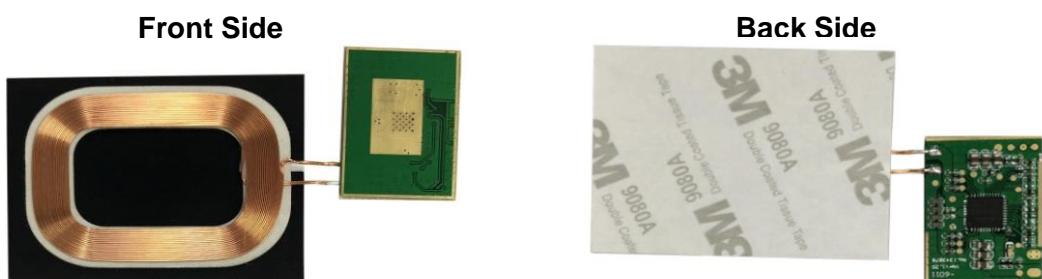
Environment Requirement

- Operating Temperature and Relative Humidity
0°C to +40°C, 20%RH to 80%RH @ sea level shall below or no more than 10000 feet
- Storage Temperature and Relative Humidity
-20°C to +60°C, 10%RH to 90%RH (non-condensing) @ sea level shall below 30000 feet.

Execution Standards (Compatible with these specifications)

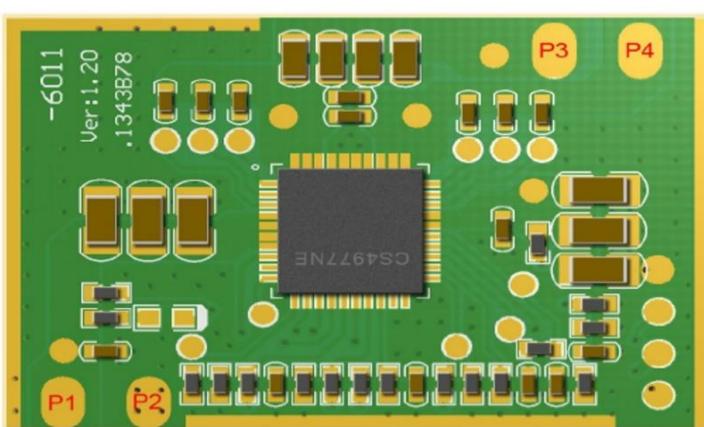
- EMC Standards
EN55032 EN55024
- WPC_Qi V1.2.4 Standards

Photo of Product



Module

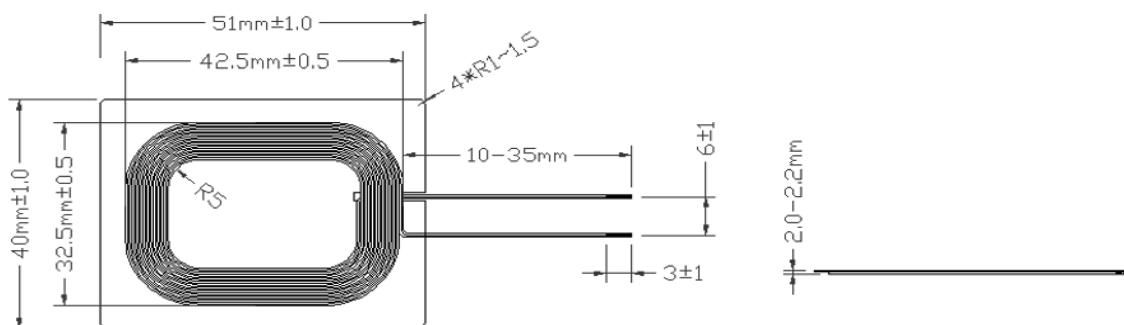
- Product design proposal
According to the standardization of QI, Please note below 3 points :
(1) The distance between Tx Coil with PCB and other metal components is Min: 4.5mm.
(2) The distance between the surface of Tx coil and the surface of product (Working Face) is $2.0_{-0.5}^{+0.25}$ mm, which means thickness of the working face plastic is not more than 2.25mm.
(3) The surface distance between Tx Coil and Rx Coil is 3.0~4.5mm.
(4) Added cooling device to 22uH inductor to do heat treatment (similar to the computer CPU cooling method).
(5) It is recommended to use a DC12V power supply with a common mode inductor to connect the power supply of the PCBA in view of EMI.
- PCBA Port Functional Illustration



PCBA Size : 29 * 20 * 2.0 mm

Port	Function
Pin 1	OUT_VCC
Pin 2	OUT_GND
Pin 3	Coil_1
Pin 4	Coil_2

- Tx_Coil Spec



Coil + Shielding : 51 * 40 * 2.0 (+0.2) mm

Electrical specification @25°C

Parameters	Unit	Limit
Inductance, LS @100kHz, 1.0V, 0.3mm*2 ~10Turns	uH	5.0 ± 10%
Q	---	> 10
DCR	mΩ	130 ± 10%

Others

- Weight : 6 ± 1 g
- Major Test Equipment
 - (1) DC Supply
 - (2) Rx Module
 - (3) Electronic Load
 - (4) DPO3014 Digital Phosphor Oscilloscope
 - (5) Logical Analyzer
 - (6) Q110 Qi BST (Base Station Tester)