QPT-0005
Wireless Charging Transmitter Module

Scope

- The purpose of the document is to specify the functional requirement of a WPC_Qi_V1.2.2 Wireless Power Supply's Tx Module. (Qi_V1.2.2 downward compatible Qi_V1.1.2).
- The Wireless Power supply's Tx Module shall meet the ROHS requirement.

Applications

- Smartphone
- Wearable devices
- Home appliances
- Portable consumer products

Product Characteristic

QPT-0005 is a V1.2.2 Qi-compliant multi-function wireless charging module with WPC_Qi A28 three coil scheme, its three transmitter coil can identify the location of the receiver automatically, so the user don't need to align the center, which able to enhance user experience. Its transmission efficiency is reached 75%. With the Qi certified receiver device the device provides 5W output power. It enables powering or charging for any WPC_Qi certified products.
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_Qi_V1.2.2. The console will process the corresponding power adjustment based on the encoding of the receiving unit. This module has fulfilled the WPC_Qi-V1.2.2 Qi requirement and is certified by Qi.

Multiple LED indication scheme available for options

Scheme	LED	Operational States				
		Standby	Power Transfer	Charge Complete	Fault	Dynamic Power Limiting
Generic	D6, Blue	Off	On	Off	Off	Off
	D5, Red	Off	Off	Off	On	Blink slow
Generic Opt 1	D6, Blue	Off	Blink slow	On	Off	Off
	D5, Red	Off	Off	Off	On	Blink slow
Generic Opt 2	D6, Blue	On	Blink slow	On	Off	Off
	D5, Red	On	Off	Off	On	Blink slow

A28 scheme using a DC5.0 V as power supply, the user can find suitable AC-DC power adapter easily. AC-DC power adapter is not a must during sales and production, in order to achieve the purpose of saving and environmental protection.

Input Characteristics

- Input Voltage & Frequency

Item	Minimum	Normal	Maximum
Input Voltage	4.75VDC	5.00VDC	5.50VDC
Chargng Mode	Qi_5W		
Frequency	110 ~ 205 kHz		

- Input Current
  1.6A max. @ 5.0VDC Full load
- Inrush Current (cold)
  2.0A max. @ 5.0VDC Full load & Ambient temperature 25°C
- Energy Consumption
  At 5.0VDC, average standby power consumption ≤ 0.15W.

Output Characteristics (Rx_Module)

- Static Output Characteristics <Vo & R+N>

Output Power	Rated Load		Peak Load	Output Range	R+N
	Min. Load	Max. Load			
5W	0A	1.0A	1.2A	4.75V ~ 5.25V	≤ 250m Vp-p

Note:
Ripple & Noise: Measurement is done by 20MHz bandwidth oscilloscope and the output end paralleled a 0.1uF ceramic capacitor and a 10uF electrolysis capacitor.

- Line & Load Regulation Characteristics

Output Power	Load Condition		Line Regulation Period	Load Regulation
	Min. Load	Max. Load		
5W	0A	1.1A	< 1S	± 5%

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)

  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

- FOD Function

  Pre-FOD function: During Tx standby state, put metal foreign body(diameter ≥ Φ20mm) in the center of Tx Coil, Tx will warn when it recognizes metal foreign body and red lights flashes.

  Post FOD function: During Tx is in normal working state, insert metal foreign body into the middle of Tx Coil & Rx Coil. Tx will warn when it recognizes metal foreign body, and the red light flashes & stops output.

- NTC Function

  PCBA with NTC : 5W / 7.5W / 10W NTC temperature is 60°C ± 5°C.

  External NTC : 5W / 7.5W / 10W NTC temperature is 60°C ± 5°C.

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

- Carton Vibration Test

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

- Carton 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 @ altitude shall be below 10000 feet.
- Storage Temperature and Relative Humidity
  -20°C to +60°C, 10%RH to 90%RH (non-condensing) @ altitude shall be below 30000 feet.

Execution Standards (Compatible with these specifications)

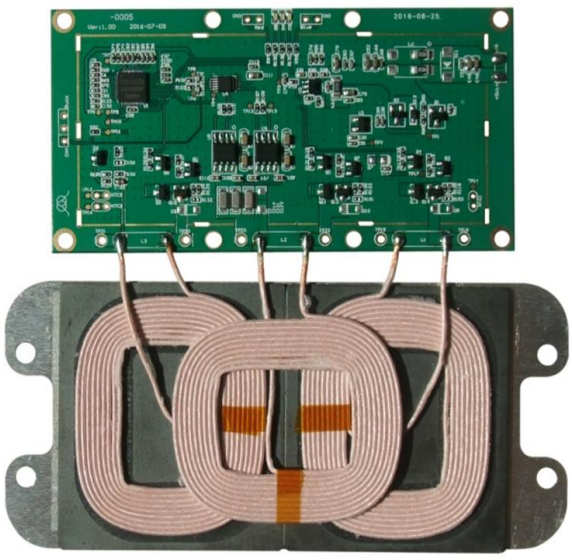
- EMC Standards

EN55032	EN55024

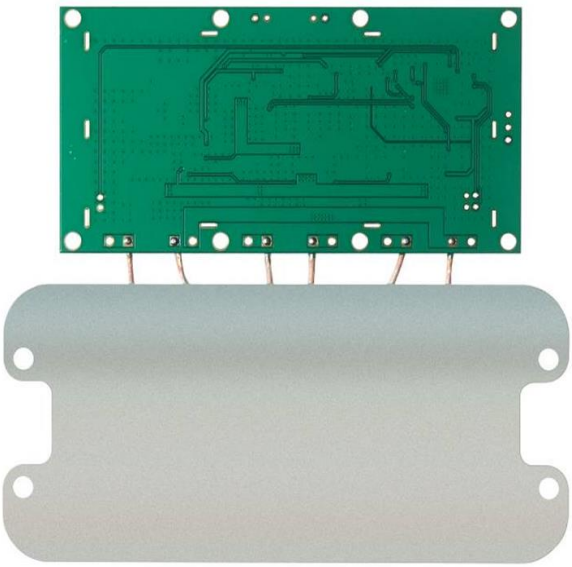
- WPC1.2.2_Qi Standards

Photo of Product

Front Side



Back Side

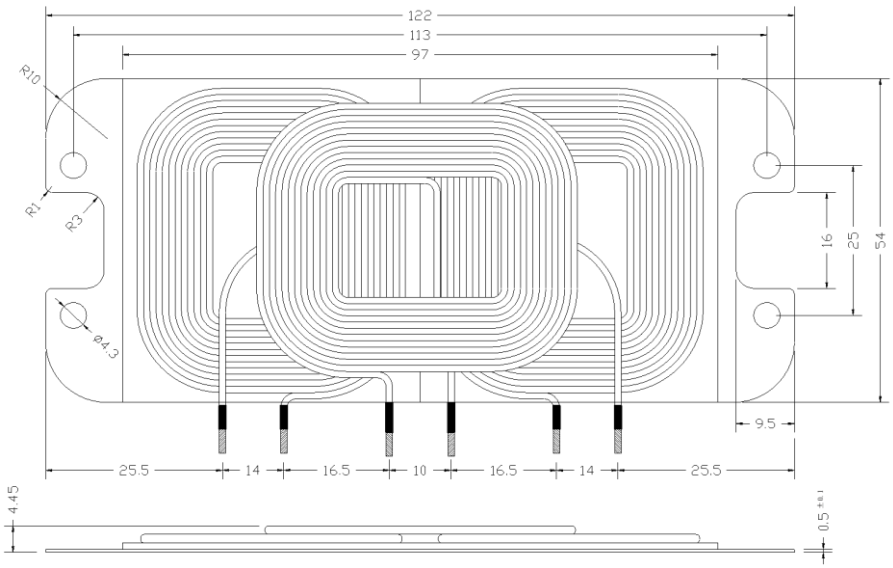


Module

- Product design proposal

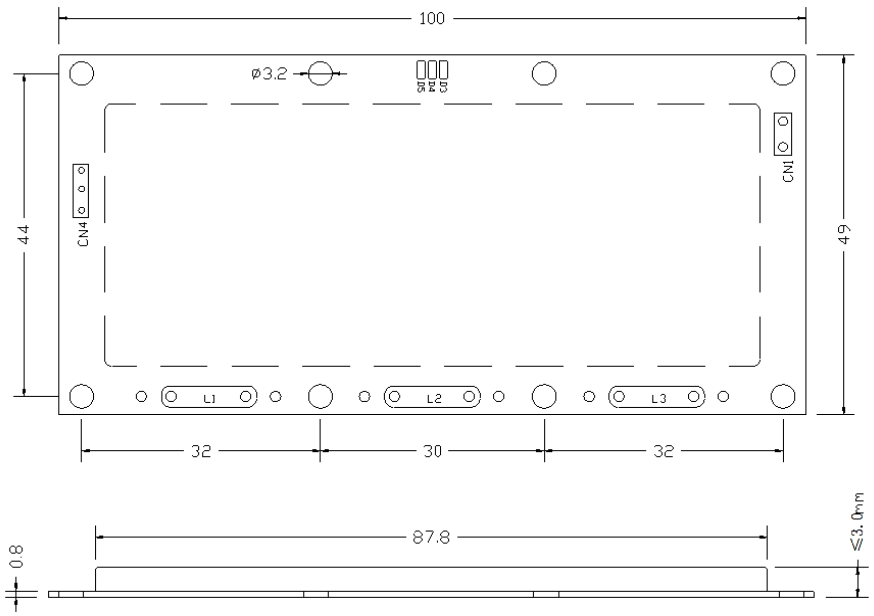
  In order to comply with relevant technical standards, there are three principles need to be careful：
  (1) Coil and PCBA can be placed either side by side or overlapping installed in the product.
  But the distance between Tx Coil with PCBA and other metal components is Min. 4.50mm.
  (2) The distance between the surface of Tx coil and the surface of product (Working Face) is 1.75~2.5mm, 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 ideal value is 3.0~4.5mm.

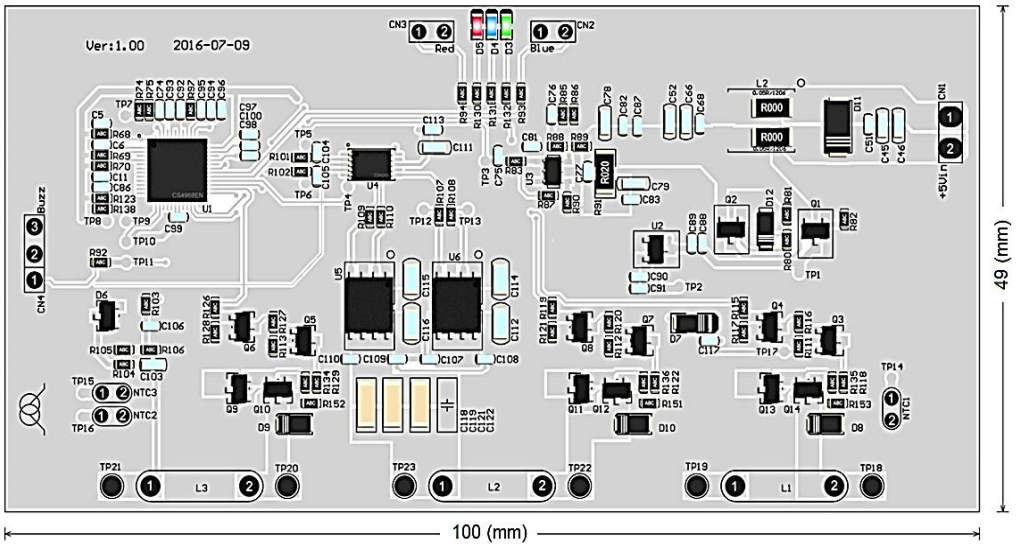
- PCBA Port Functional Illustration



(Unit: mm)

PCBA Size : 100 * 49 * 3.0 mm (Max.)

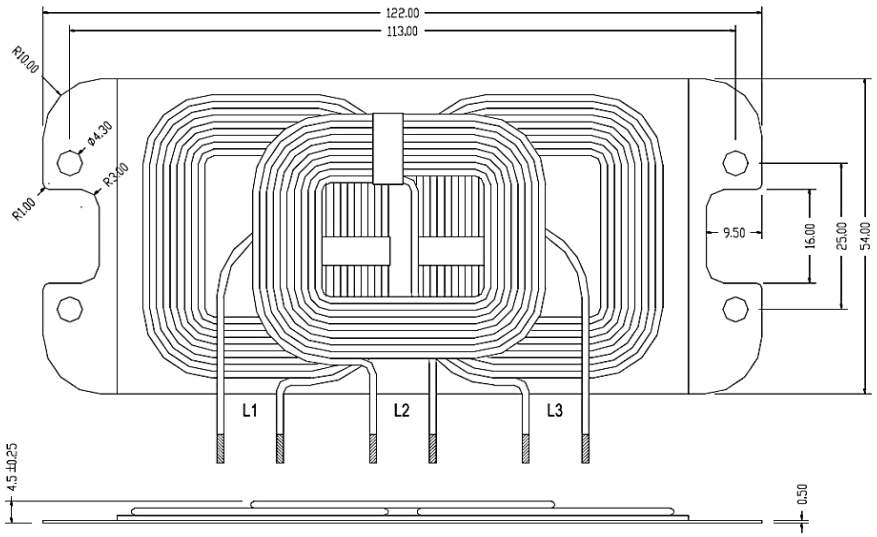




Port	CN1		CN2		CN3	
	Pin1	Pin2	Pin1	Pin2	Pin1	Pin2
Function	GND	DC5Vin	Blue LED-	Blue LED+	Red LED+	Red LED-

Port	CN4	L1	L2	L3	NTC1	NTC2	NTC3
Function	BUZZ	3 Coils			NTC	NTC	NTC

- Tx_Coil Spec :



(Unit: mm)

Electrical specification @25°C

Parameters	Unit	Limit		
		L1	L2	L3
Inductance, LS @100kHz, 1.0V, AWG20(AWG40*105) ~9Turns	uH	6.8 ± 10%	6.5 ± 10%	6.8 ± 10%
Q	---	50 ± 10%	45 ± 10%	50 ± 10%
DCR	mΩ	55 ± 10%	55 ± 10%	55 ± 10%