QPT-0016
Wireless Charging Transmitter Module

Scope

- The purpose of the document is to specify the functional requirement of a WPC1.2.3 Qi Medium Power Tx Module.
  (WPC1.2.3 is compatible with WPC1.1).
- The Wireless Power supply's Tx Module should meet the ROHS requirement.

Applications

- Wireless charging pad
- Power bank
- Home appliances, Furniture
- Computer peripheral devices
- Car holder, GPS navigation

Product Characteristic

QPT-0016 is a WPC1.2.3 Qi Medium Power (15W) wireless charging platform: Its transmission efficiency is up to 76% and can provide up to 15W transmission capacity. It enables powering or charging for any WPC-Qi certified products. With fast charging function for Samsung mobile phone.
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 WPC1.2.3. The console will process the corresponding power adjustment based on the encoding of the receiving unit. This module has fulfilled the WPC1.2.3 Qi requirement and is certified by Qi.

Multiple LED indication scheme available for options						
LED	**Operational States**					
	Standby	**5W Rx**	**15W Rx Samsung Fast Charger**	**Charge Complete**	**Fault**	**Dynamic Power Limiting**
LED1, Red	Off	Off	Off	Off	On	Blink slow
LED2, Blue	Off	On	Breathing lamp	On	Off	Off
Standard no LED light, LED1 & LED2 for customer to choose, or design customer LED color.						

Input Characteristics

- Input Voltage & Frequency

Item	Minimum	Normal	Maximum
Input Voltage	11.0VDC	12.0VDC	13.0VDC
Frequency	125kHz		

- Input Current
  1.8A max. @ 12.0VDC Full load
- Inrush Current (cold)
  2.00A max. @ 12.0VDC Full load & Ambient temperature 25°C
- Energy Consumption
  At 11.5VDC or 12.5VDC, energy consumption ≤ 0.03A.

Output Characteristics (Rx_Module)

- Static Output Characteristics <Vo & R+N>

Output Power	Rated Load		Peak Load	Output Range	R+N
	Min. Load	Max. Load			
15W	0.10A	1.25A	1.50A	12V ± 5%	≤ 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 Power	Load Condition		Line Regulation	Load Regulation
	Min. Load	Max. Load		
15W	0.10A	1.25A	± 5%	± 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.
  15W NTC temperature is 80°C ± 5°C.

  External NTC : 5W / 7.5W / 10W NTC temperature is 60°C ± 5°C.
  15W NTC temperature is 80°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

- Burn-in

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

- 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)

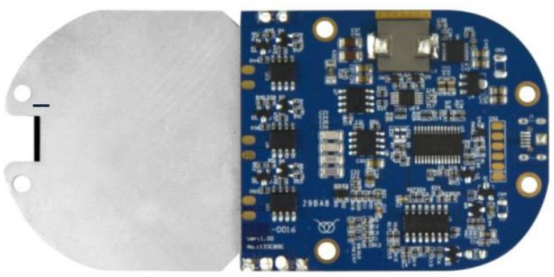
- EMC Standards

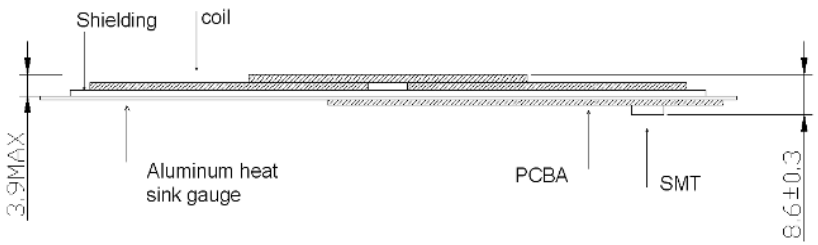
EN55032	EN55024

- WPC1.2.3_Qi Standards

Photo of Product

Front Side **Back Side**





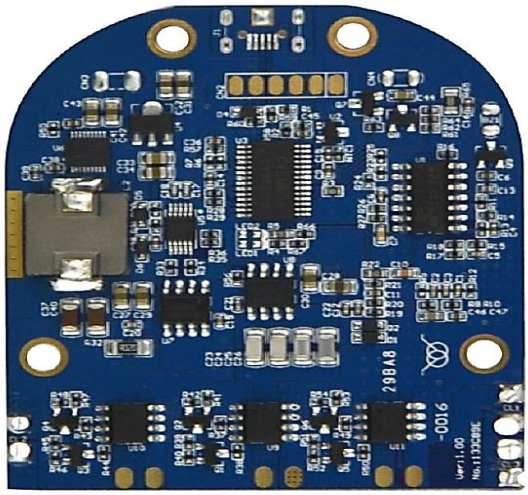
(Unit: mm)

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. 4.50mm.
  (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 the 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) In order to pass the EMI, it is recommended to connect the PCBA with the DC 12V power.

- PCBA Port Functional Illustration

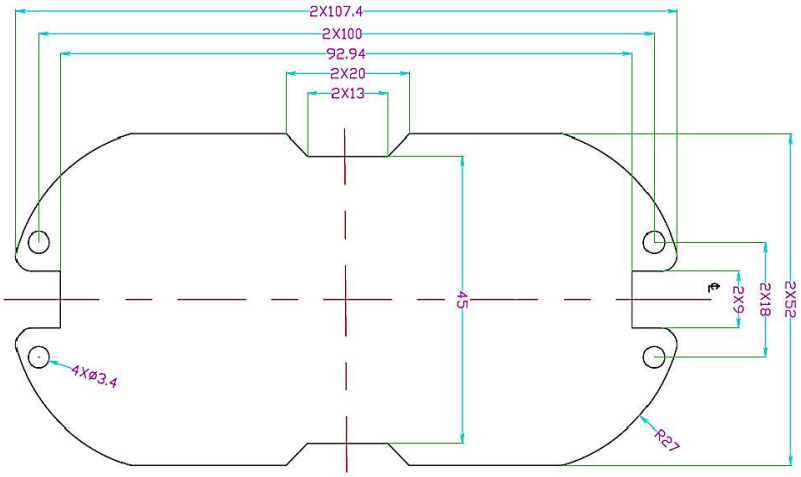


PCBA Size : 52(±0.3) * 53.5 * 4.7(±0.2) mm

Port	**CN3-L**	**CN3-R**	**J1**		**CN4**	**BZ1**
Function	GND	12V	MICRO USB		Fan	BUZZ
Port	**CN2-1**	**CN2-2**	**CN2-3**	**CN2-4**	**CN2-5**	**CN2-6**
Function	5V	QC3.0 D+	QC3.0 D-	LED1	LED2	GND
Port	**CL1**		**CL2**		**CL3**	
Function	Coil (upper)		Coil (middle)		Coil (lower)	

- Tx_Coil Spec :
  Coil + Shielding, 95 * 53 * 3.9mm (Max.)

- Aluminum Heat Sink Guage Spec



(Unit: mm)

Others

- Weight : 52 ± 2 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)