**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.

**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.

<table>
<thead>
<tr>
<th>LED</th>
<th>Operational States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>**Standby</td>
</tr>
<tr>
<td>LED1, Red</td>
<td>Off</td>
</tr>
<tr>
<td>LED2, Blue</td>
<td>Off</td>
</tr>
</tbody>
</table>

Standard no LED light, LED1 & LED2 for customer to choose, or design customer LED color.

**Input Characteristics**

- Input Voltage & Frequency

<table>
<thead>
<tr>
<th>Item</th>
<th>Minimum</th>
<th>Normal</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>11.0VDC</td>
<td>12.0VDC</td>
<td>13.0VDC</td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td>125kHz</td>
<td></td>
</tr>
</tbody>
</table>

- 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>

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Rated Load</th>
<th>Peak Load</th>
<th>Output Range</th>
<th>R+N</th>
</tr>
</thead>
<tbody>
<tr>
<td>15W</td>
<td>0.10A</td>
<td>1.25A</td>
<td>1.50A</td>
<td>12V ±5%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Output Power</th>
<th>Load Condition</th>
<th>Line Regulation</th>
<th>Load Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>15W</td>
<td>0.10A</td>
<td>± 5%</td>
<td>± 5%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Test items</th>
<th>Test conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage at high temperature test</td>
<td>+60°C, 16hours</td>
</tr>
<tr>
<td>Storage at low temperature test</td>
<td>-20°C, 16hours</td>
</tr>
<tr>
<td>Operating at high temperature test</td>
<td>+40°C, 8hours</td>
</tr>
<tr>
<td>Operating at low temperature test</td>
<td>-20°C, 8hours</td>
</tr>
<tr>
<td>High / Low temperature cycle test</td>
<td>+40°C (2Hrs) → -20°C (2Hrs) → +40°C (2Hrs) → -20°C (2Hrs) continually work 24hours</td>
</tr>
</tbody>
</table>

- Burn-in
2 hours at 35 °C (±5 °C) environment, nominal input voltage, nominal load.
Wireless Charging Transmitter Module

- 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

<table>
<thead>
<tr>
<th>Equal to or greater than</th>
<th>But Less than</th>
<th>Free Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb</td>
<td>Kg</td>
<td>In</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>21</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>41</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td>61</td>
<td>28</td>
<td>12</td>
</tr>
<tr>
<td>100</td>
<td>45</td>
<td>8</td>
</tr>
</tbody>
</table>

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 Illustration](image-url)

  PCBA Size : 52$(\pm0.3) \times 53.5 \times 4.7(\pm0.2)$ mm

<table>
<thead>
<tr>
<th>Port</th>
<th>CN3-L</th>
<th>CN3-R</th>
<th>J1</th>
<th>CN4</th>
<th>BZ1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>GND</td>
<td>12V</td>
<td>MICRO USB</td>
<td>Fan</td>
<td>BUZZ</td>
</tr>
<tr>
<td>Port</td>
<td>CN2-1</td>
<td>CN2-2</td>
<td>CN2-3</td>
<td>CN2-4</td>
<td>CN2-5</td>
</tr>
<tr>
<td>Function</td>
<td>5V</td>
<td>QC3.0 D+</td>
<td>QC3.0 D-</td>
<td>LED1</td>
<td>LED2</td>
</tr>
<tr>
<td>Port</td>
<td>CL1</td>
<td>CL2</td>
<td>CL3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Coil (upper)</td>
<td>Coil (middle)</td>
<td>Coil (lower)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

![Diagram](image)

(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)