



PRODUCT SPECIFICATION FOR APPROVAL

产品规格承认书

CUSTOMER NAME / 客户名称 : _____

CUSTOMER ITEM / 产品名称 : _____

PRODUCT MODEL / 产品型号 : _____

APP Date / 日期 : _____

APPROVAL SIGNATURE / 客户承认签章

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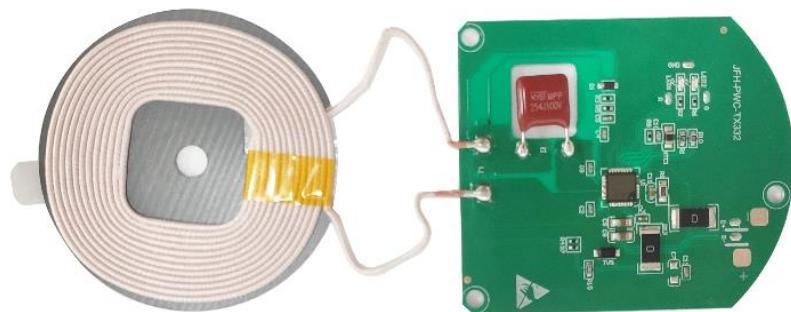
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|----------------|----------------|----------------------|-------------------|
| | | | |

Product Specification

产品规格书

Product name/产品名称:**15W 发射模组****Model No/ 产品型号:****JFH-PWC-TX332****File number /文件编号:****Revision/版本号:****Date/日期:**

| APPROVED BY 批 淮 | CHECKED BY 审 核 | DESIGNED BY 制 作 |
|--------------------|-------------------|--------------------|
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Reversion History / 更新记录

1. Scope/概述

- 1.1 The purpose of the document is to specify the functional requirement of a WPC_Qi Medium Power Tx Module.
本产品符合 WPC_Qi 协议发射模块的功能要求
- 1.2 The Wireless Power supply's Tx Module should meet the ROHS requirement.
无线供电的 TX 模块应符合 ROHS 要求.

2. Product Characteristic/产品特点

JFH-PWC-TX332 is a WPC Qi Medium Power wireless charging platform: Its transmission efficiency is up to $80\% \pm 5\%$ 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.

JFH-PWC-TX332 是 WPC Qi 兼容的多功能无线充电平台：其传输效率最高点可达 $80\% \pm 5\%$ ，也可提供高达 15W 的传输容量。它可以跟任何 WPC-Qi 认证产品供电或充电；还能为三星手机提供快速无线充电。

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. The console will process the corresponding power adjustment based on the encoding of the receiving unit. This module has fulfilled the WPC Qi requirement.

它采用智能识别系统并且它的发射和接收单元采用 UART (通用异步接收器/发送器) 加密传输控制信号，这是由 WPC 所规定.控制台将基于接收单元编码进行对应的功率调整。此模块达到了 WPC Qi 的要求

| LED | Operational States/操作状态 | | | | |
|------------|--|-----------------|--|----------------------------|-------------|
| | Standby 待机 | 5W RX 5W 接收器 | 15W RX Samsung Fast Charger 15W 和三星快充 | Charge Complete 充电完成 | Fault 异常 |
| LED1_Red | On | Off | Off | On | Flashing |
| LED2_Green | Off | On | On | Off | Off |
| 外接 LED | <p>Remark: If with a dual LED indicator, dual LED should using the same negative pole, and limit the current $\leq 10\text{mA}$. If the current $\geq 10\text{mA}$, please connect LDO to supply power to LED light separately.</p> <p>注意：使用双色LED灯时，要用共阴极的LED灯；LED灯的电流限制在$\leq 10\text{mA}$,如果$\geq 10\text{mA}$时请外接 LDO 单独给 LED 灯供电使用</p> | | | | |

3. Input Characteristics / 输入特性

3.1. Input Voltage / 输入电压

| Item/项目 | | Minimum/最小 | | Normal/标准 | | Maximum/最大 | |
|-----------------------------|----------------------|--------------|--------------|-------------------------|-------------|------------------------|---|
| Input Voltage/输入电压 | | 5.00Vdc | | 12.0Vdc | | 12.50Vdc | |
| Charging Mode 输出模式 | Qi_5W 模式 | Qi_10W 模式 | Qi_15W 模式 | Samsung Fast Charger | | iPhone Fast Charger | |
| Frequency 频率 | 110~205KHZ | | | | | | |
| TX Input Voltage TX 输入电压 | Rx_Module 类别/RX 模组类别 | | | | | | |
| | Qi-5W | Qi-10W | Qi-15W | Apple 7.5W | Samsung 10W | | |
| 12.0Vdc | √ | √ | √ | √ | | √ | √ |

3.2. Input Current/输入电流

1.80Amax. @ 12.0Vdc Full load

3.3. Inrush Current (cold) /浪涌电流 (冷电流)

2.0Amax. @ 12.0Vdc Full load & Ambient temperature 25 °C

3.4. Energy Consumption/损耗

At 11.50VDC or 12.50VDC, Energy Consumption \leq 0.02~0.04A

4. Output Characteristics (Rx_Module) / 输出特性

4.1. Static Output Characteristics / 静态输出特性

| Output | Rated Load/额定负载 | | Peak Load | Output Range 输出电压范围 |
|--------|-----------------|-----------|-----------|------------------------|
| Power | Min. Load | Max. Load | | |
| 15W | 0.10A | 1.25A | 1.50A | 12V±5% |

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.

注意: 纹波与噪声:量测时示波器选用 20MHz 带宽限制,输出端要并联一颗 0.1uF 的陶瓷电容和一颗 47uF 的电解电容。

4.2. Sensing distance/感应距离

| Mobile phone | IPhone | HUAWEI | XIAOMI | SANSUMG |
|------------------------|------------------------------|--------|--------|---------|
| Sensing distance (MAX) | 10mm (IPhone12/13/14 6mm) | 10mm | 7mm | 10mm |

4.3. Line & Load Regulation/线性&负载调整率

| Output | Load Condition/负载条件 | | Line Regulation 线性调整率 | Load Regulation 负载调整率 | Remark |
|--------|---------------------|-----------|--------------------------|--------------------------|--------|
| Power | Min. Load | Max. Load | | | |
| 15W | 0.10A | 1.25A | ±5% | ±5% | |

5. Protection Requirement/保护要求

5.1. Short Circuit Protection/短路保护

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

输出对地短路，输入功率减少，电源不得损坏，并应自恢复时解除故障条件

5.2. Over Current Protection/过流保护

OCP Point Limited: 110%-130% auto restart

OCP 限制: 110% - 130% 自动重启

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

当电流输出过量时会有阻碍，然后会自动恢复并解除故障。

5.3. FOD function /FOD 功能

5.3.1 The FOD full name Foreign Body Detection. The FOD function test of the Qi wireless charging TX terminal must be use the dedicated receiver TPR#5 and four standard foreign objects (FO#1, FO#2, FO#3, FO#4) in the WPC specification.

During FOD function test of Qi wireless charging TX device, its output power is adjusted according to the power tolerance packet of TPR#5 to make the TX transmitted power equal to the required power of TPR#5 ($\pm 1\%$ tolerance allowed), so as to ensure that the receiver device will not be damaged due to excessive power.

When there are foreign body FO#1/2/3/4 between the working interface of TX device and TPR#5, the output power of TX device will increase due to the absorption of electromagnetic wave by foreign body. When the embedded software system of TX device detects that the output power is over the threshold value set by TPR#5, it is judged that foreign body exists between the working interface of TX/RX, and then stop the power output and flash red light for warning.

When the FOD protection is triggered, because of the TX device has stopped power output, power detection cannot be performed again. Therefore, remove the foreign body FO#1/2/3/4 from the working interface of TX/RX, TX device will not return to normal operation, and TPR#5 needs to be replaced.

WPC specification requires that when FO #1/2/4 are between the TX device and the TPR#5 working interface, TX stops working or FO temperature is lower than 60°C is qualified. When FO#3 is between the TX device and the TPR#5 interface, TX stops working or FO temperature is lower than 80°C is qualified.

In theory, any Qi certified RX device (such as a mobile phone) can replace the TRP#5 and FO#1 /2/3/4. But the RX device manufacturer has component tolerance in mass production, so it cannot be ensured that the TX device will detect FO#1/2/3/4 between the phone and the TX interface.

FOD 功能即 《异物检测》。Qi 无线充电 TX 端的 FOD 功能测试，必须使用 WPC 规范指定的专用接收器 TPR#5 搭配四款标准的异物（FO#1、FO#2、FO#3、FO#4）进行测试：

Qi 无线充电 TX 设备在进行 FOD 功能测试时，他的输出功率根据 TPR#5 的功率误差包进行调整，使 TX 设备的发射功率与 TPR#5 的需求功率相等（允许±1%的误差），以确保接收设备不会因功率过高而损坏。当 TX 设备的工作界面与 TPR#5 的工作界面之间，存在 FO#1~FO#4 异物时，因异物对电磁波的吸收，使 TX 设备的输出功率增大，当 TX 设备的内嵌软件系统，侦测到输出功率大于 TPR#5 需求功率设定的门槛值，就判断为 TX/RX 的工作界面之间存在 FO (异物)，即停止功率输出，并闪红灯进行提示；当 FOD 保护已经被触发时，因 TX 设备已经停止功率输出，就不能再进行功率检测，所以此时把 FO#1~ FO#4 异物从 TX/RX 的工作界面中移除，TX 设备也不会恢复正常工作，需要重新放置 TPR#5；WPC 规范要求，当 FO#1、2、4 处于 TX 设备与 TPR#5 工作界面之间时，TX 停止工作或者 FO 温度低于 60°C 属于合格；当 FO#3 处于 TX 设备与 TPR#5 工作界面之间时，TX 停止工作或者 FO 温度低于 80°C 属于合格。

理论上来说，任何通过 Qi 认证的 RX 设备（比如手机），都可以替代 TRP#5 合 TX 设备检测出 FO#1~FO#4 异物，但 RX 设备制造商在批量生产时，元件本身存在误差，所以不能确保 TX 设备能检测到手机与 TX 工作界面之间的 FO#1~FO#4。

Note: Qi certified module are shipped separately, the FOD function will be affected by customer product structure, shell thickness and surrounding metal. In serious cases, the product will not work.

备注：通过 Qi 认证的模组单独出货时，因客人的产品结构，壳料厚度及周边有金属都会影响 FOD 功能，严重情况时，会使产品功能不能工作。

5.4. NTC function /NTC 功能

5.4.1 PCBA with NTC : 5W/7.5W/10W/15W NTC temperature is $80^{\circ}\text{C} \pm 5^{\circ}\text{C}$

PCBA 贴片 NTC 功能：该 NTC 的温度设定值为：(5W/7.5W/10W /15W $80^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

6. Reliability Requirements/可靠性要求

6.1. Reliability Test/可靠性测试

N/A

6.2. Vibration Test /震动测试

N/A

7. Environment Requirement/环境要求

7.1 . Operating Temperature and Relative Humidity/操作温度和相对湿度

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

7.2 . Storage Temperature and Relative Humidity/储存温度和相对湿度

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

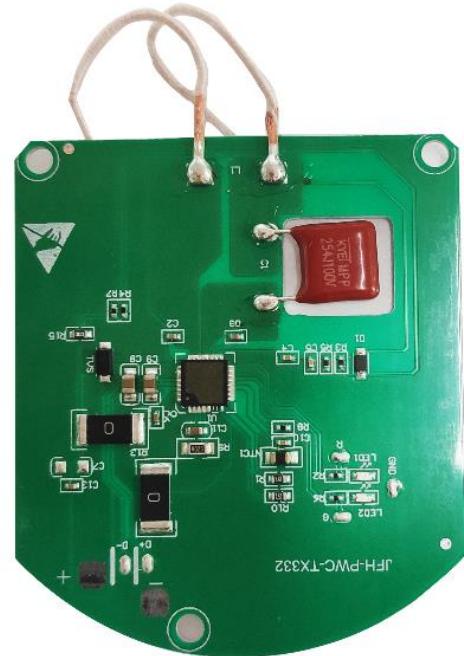
8. Execution Standards/执行标准(Compatible with these specifications)/

8.1. WPC_Qi Standards/ WPC_Qi 标准

9. Photo of Product/产品照片



Module Back Side 模块后面



Module Front Side 模块前面

10. Module/模块

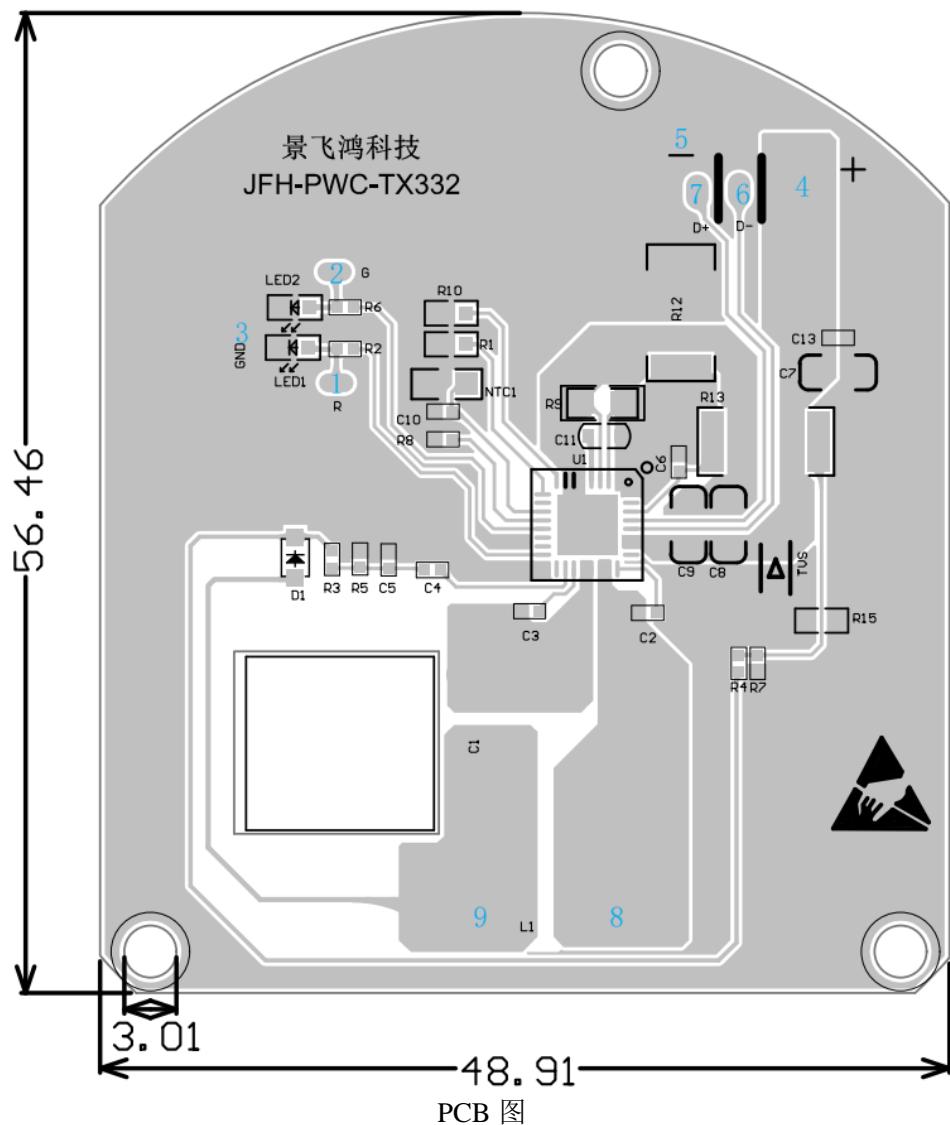
10.1 Product design proposal / 产品设计要求

According to the standardization of Qi, Please note below 3 points:

为了要符合 Qi 的标准, 有三个项目要注意:

1. The distance between Tx Coil with PCB and other metal components is Min: 4.5mm/
输出线圈, PCB 和其他金属部件之间的最小距离: 4.50mm;
2. The distance between the surface of Tx coil and the surface of product (Working Face) is $3.0^{+0.5}_{-0.2}$ mm,
which means the thickness of the working face plastic is not more than 2.25mm;
Tx 线圈表面和产品的表面之间的距离 (正面) 是 $3.0^{+0.5}_{-0.2}$ mm, 即正面塑料的厚度不超过 2.25mm
3. The surface distance between Tx Coil and Rx Coil is 3.0 – 4.5mm
输出线圈和接收线圈之间的表面距离为 3.0– 4.5mm
4. 为了好通过 EMI, 建议用 DC 12V 的电源外加共模电感连接 PCBA 的电源

10.2 PCBA Port Functional Illustration/PCBA 功能说明



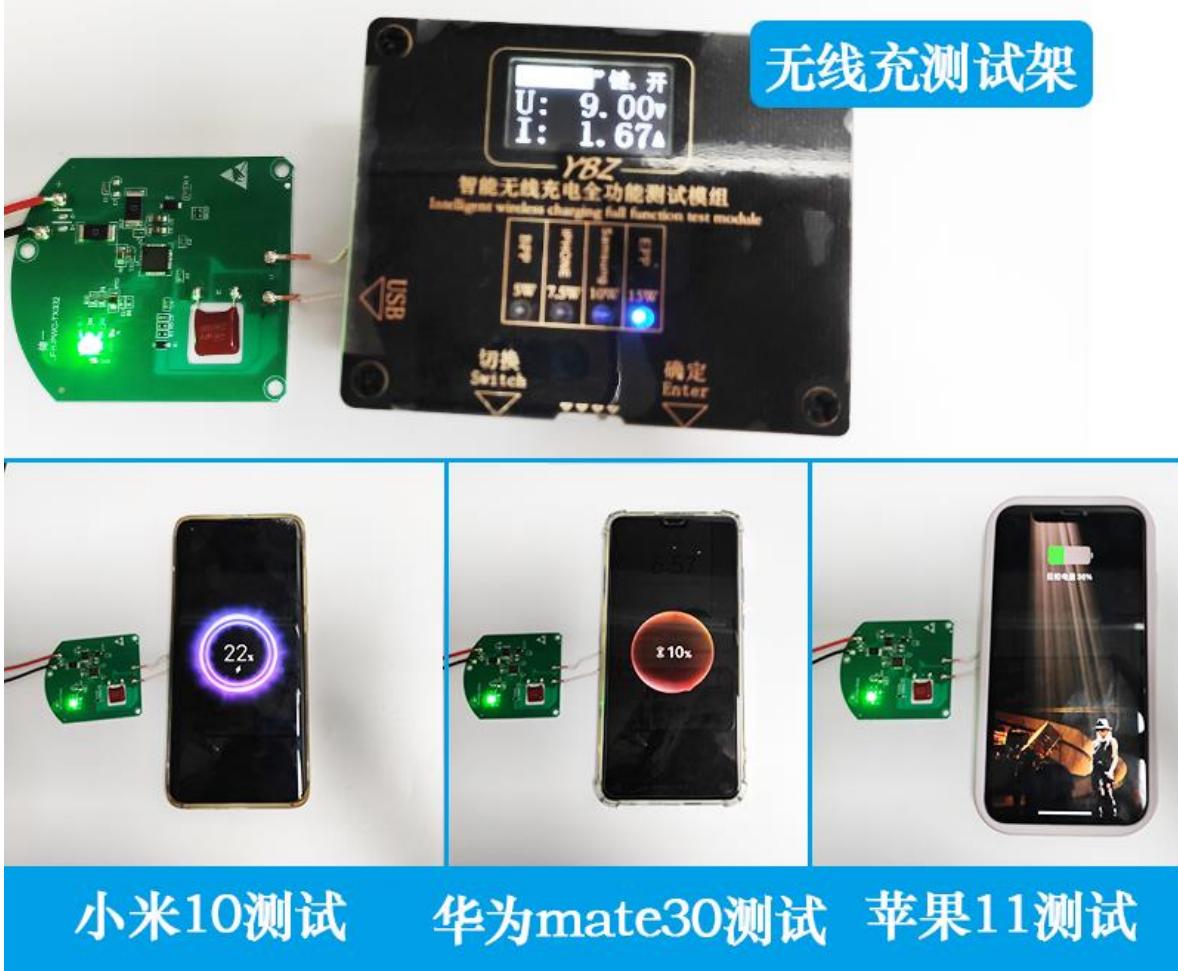
PCBA :56.46(± 0.5)*48.91(± 0.5)*3.5mm(MAX)

| Port | Pin1 | Pin2 | Pin3 | Pin4 |
|----------|------------------|--------------------|----------------|---------|
| Function | RED LED+ (外接) | Green LED+ (外接) | LED- (外接) | VIN+ |
| Port | Pin5 | Pin6 | Pin7 | Pin8/9 |
| Function | VIN- | USB D- (外接) | USB D+ (外接) | TX Coil |

10.3. Tx_Coil Spec: TX 线圈规范 (MPA2)

Coil + Shielding : 50(± 0.5) * 3.0mm (Max)

Coil Lead length: 35mm

10.4. Product test : 产品测试**10.5. Efficiency test: 效率测试**

$$\eta \approx 80.1\%$$

11. Other Features / 其他特性**11.1. Weight 重量**

19.2±2g



*All dimensions are nominal

| Device | Package Type | Package Drawing | SPQ | L(mm) | W(mm) | H(mm) |
|---------------|--------------|-----------------|-----|-------|-------|-------|
| JFH-PWC-TX332 | Module | MOD | | | | |

12. Inspection Standards/检查标准

| NO. | Test project | Test standard | Sample Level | Test standard |
|-----|----------------|---------------|--------------|-----------------|
| 1 | Performance | | | Serious defect: |
| 2 | Size | | | Main defect: |
| 3 | Shell, Package | | | Petit defect: |

13. Major Test Equipment/测试仪器

- 13.1. DC Supply
- 13.2. Rx_Module
- 13.3. ELECTRONIC LOAD
- 13.4. Logical Analyzer
- 13.5. Q110 Qi BST (Base Station Tester)

14. Statement/声明

All rights reserved by Shenzhen JFH Technology Co.,Ltd. for all of this specification for approval.