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XKT001

Wireless
power supply
chip

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XKT001 wireless power
transmitter chip

Wireless charging, power supply smart
chip

directory

I. Overview

The XKT001 chip is a new wireless charging solution launched by Xinketai Semiconductor, with an operating voltage of 3.3V to 18V, and under special requirements, it can directly use a 4.2V lithium battery to directly provide power to the transmit part. The chip is available in the SOT23-6 package, and the size can be further reduced. A large number of optimizations have also been made on the peripheral devices, so that the size of the finished product is further compressed, and the production process and cost are further optimized. The chip design operating frequency range is 1KHz-3.5MKHz, allowing the chip to have more frequency options in circuit design. Its high-frequency output can replace the winding coil with a PCB printed coil, and the high-power output can be achieved, which greatly simplifies the production process. The chip reserves a high sensitivity control pin(6 pins) to be high to open, low to off, in the process design, it can be applied to the control signal to achieve low power consumption and other special requirements. It can also be applied to a control signal below the operating frequency to control the working state of the receiving part of the working end. Make back-end functional design more diverse and free.

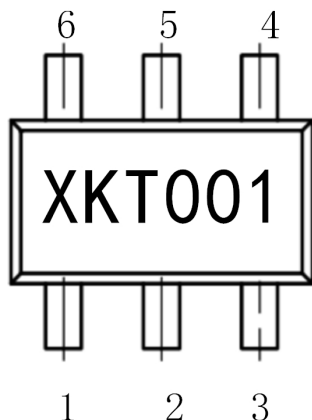
Second, the characteristics

- * Small size, SOT23-6 package
- * High operating frequency
- * High degree of integration, few peripheral devices
- * High output power
- * Wide range of applications
- * Free design control function
- * Under the special design, the working state of the receiving part can be controlled
- * Operating voltage:DC 3.3~18V
- * Operating frequency:1KHz~3.5MHz
- * Coils can be implemented using printed PCB boards

Third, the scope of application

It can be used for battery charging and wireless direct power supply of embedded product power supply, medical products, security products, waterproof products, toy products, adult products, digital products, LEDs, mining equipment, handheld household appliances, etc.

4. Foot map and description



Pin number	Pin name	Withstand voltage value (V).	Feature description
1	VDD	0-18	power supply
2	OUT	-	Function output
3	GND	-	Power ground
4	R	-	resistance
5	R	-	resistance
6	N/F	0-18	Control end, set high work, set low off output, can access custom control signals

Note: The 4-pin 5-pin string resistor can be adjusted for frequency, but it is not recommended to modify it without permission, which is extremely risky.

Fifth, the use of chips instructions

Since the wireless charging industry is an emerging industry, when doing product design, there is a big difference from traditional electronic product design. Therefore, in the case of not very good understanding of wireless charging circuits, please design the circuit strictly according to the use method. Do not change the way the product works and parameters without permission.

In product design, the material of the capacitor is an extremely important parameter (the default use of NPO material), there is a label of the material of the device must pay attention to, can not use other materials or packages to replace! (To save costs, the following guides on how to use X7R materials or CBB materials as alternatives.)

In the selection of the coil, because the coil parameter acquisition is to use the company's bridge to measure, different coil manufacturers bridge parameters have a certain deviation, which will lead to inaccurate inductance after the sample is obtained, resulting in a relatively large deviation after the circuit is made. The best state is to get the company's coil sample and send it to the coil supplier for actual measurement before proofing testing. If it is a direct proofing, please refer to the following design post-test method to judge for yourself. In the selection of the material of the coil, the thicker the wire diameter, the greater the power that can be designed. The larger the outer diameter area of the coil, the greater the output power and the farther the distance; the fewer the number of coil layers, the better the output effect. In the selection of wire: multi-stranded thread is better than yarn wrapped thread, and yarn wrapped thread is better than ordinary enameled thread. Among them, the yarn wrapping thread has the highest pressure resistance and the multi-strand thread has the lowest pressure resistance. When selecting printed PCB as the coil, due to the amount of inductance made by the PCB and its difficulty in determining, we try to use the standard PCB coil template provided by the company to design, and pay attention to the line width and copper thickness when designing PCB board thickness, etc., will have an impact on inductance and output power.

About the selection of magnetic separator. The material of the wireless charging spacer will generally use ferrite material as a magnetic shielding material, and the market is divided into soft magnetic and hard magnetic. When the separator is applied directly to the coil, it increases the inductance of the coil, and the value of the inductance increase is related to the material of the magnetic sheet and is proportional to the area covering the coil (our modules usually do not increase the magnetic barrier). Therefore, when referring to the inductance of a coil, if it is necessary to add a magnetic shield as a shield, then the inductance after the magnetic barrier sheet should be added as a reference value. (When asking for the coil factory, you can ask them to paste the inductance after the magnetic barrier for their own needed value, and the magnetic sheet material used by the coil factory is generally better material). If you add a magnetic isolator to the coil, the inductance will become larger after the magnetic barrier is added, at this time, the coil itself needs to be removed for several turns, so that the inductance can maintain the original inductance unchanged. Those who have electric bridges can use electric bridges to measure and dismantle.

Set the meaning of the nearest use distance: in order to increase the use distance, so the power of the module has been strengthened, the closer the distance, the greater the output power, the higher the peak voltage, if the distance is too close, there will be a certain probability of breaking through the low-withstand voltage device. (When the product is designed in the shell, the shell will have a certain thickness, so it is necessary to increase the use distance, if you

need to use a closer distance, please contact the supplier and modify it under the guidance of the supplier.))

Nearest use distance judgment: If the circuit is adjusted, the distance between the coils will change accordingly. The judgment method is that the transmission is powered on, the receiving part is removed from the electricity part, the no load is close to the transmission coil, and the static current of the transmission will change accordingly, and the static current emitted at this time reaches 150mA, then the distance at this time is the nearest use distance, if it is close again, there is a risk of damaging the device.

Sixth, typical circuit design

Order in circuit design:

First design the transmission circuit, the transmission circuit design is stable and then design the receiving circuit, and then the transmission circuit and the receiving circuit no-load matching test, the test is stable and then hang the load test, the above test is the aging test after the standard, and then trial production, and finally enter the mass production program.

Transmission circuit design methods and requirements :

In the production of the transmission circuit, please strictly follow the circuit to design, the circuit's device material can not be replaced at will, the package of the resistor can be selected according to its own requirements. If the value of the device in the circuit is modified, all test methods provided in this datasheet will be invalidated.

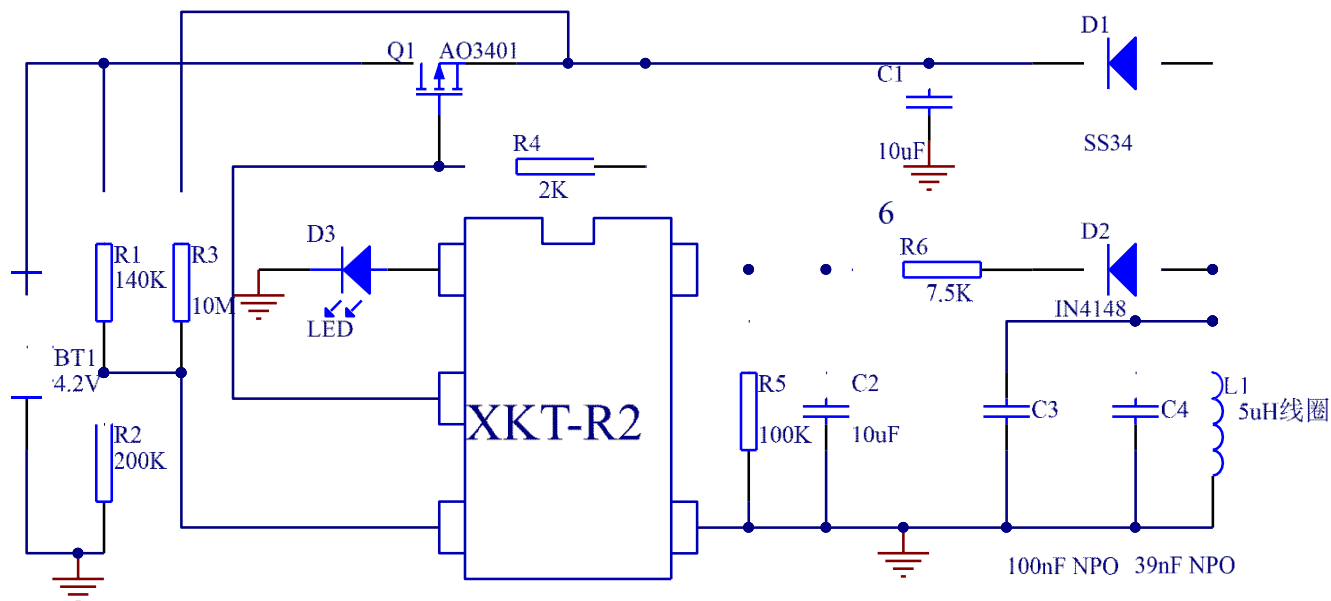
Transmit circuit:5V supply

Design Requirements for Receiving Constant Voltage Output Circuit(T3168):The T3168 chip scheme is a constant voltage output, and the output characteristic is to provide a constant voltage power supply for the power consumption part. The output voltage can be adjusted by R1 to increase the resistance value and increase the voltage (reference values:5V/6.2K,12V/18K). In addition to L1 and C1, other devices can adjust the package size according to the size of the output current, C2 and C3 are filter capacitors, for stability, the package size can not be lower than 0805.

Device List :

Device location	Device type	Device parameters	Device package	remark	Device location	Device type	Device parameters	Device package	remark
R1	resistance	6.2K	0603	Adjust the output voltage	D1	Schottky diodes	SS34	1210	
R2	resistance	2K	0603		D2	diode	IN5819	1206	
R3	resistance	100K	0603		DW1	Regulator tube	24V regulated	1206	
C1	capacitance	68nF	1206	NPO Material	IC1	chip	T3168	SOP-8	
C2	capacitance	10uF25V	1206	X7R	L1	coil	10uH		Receive coil
C3	capacitance	10uF16V	0805	X7R	L2	inductance	10uH	CD32	Smd inductance

Receiver rechargeable battery output circuit :



Design requirements for receiving battery charging circuit(XKT-R2):XKT-R2 is directly charged to the equivalent capacitive load of the battery, judged by the output voltage, and the output to the set voltage output is powered off. Suitable for charging energy storage devices with voltages of 4.2V and above. The back end is directly connected to the battery, if you want to add the charging management chip in the rear end, then,the output cutoff voltage ofthe XKT-R2 chip should be set to be lower than the charging management chip, otherwise the charging management will be turned off first, which will cause XKT-R2 to switch repeatedly. In the circuit, the D3 LED light is the charging indicator, the light is on when charging, and it is extinguished after filling,if theD3LED is not used, it cannot be removed directly, and it needs to be replaced with a 3V regulator diode. Otherwise the circuit will not work. R1 is the output cutoff voltage modification point, the resistance value is increased, and the cutoff voltage is increased to suit different batteries.

Device List :

Device location	Device type	Device parameters	Device package	remark	Device location	Device type	Device parameters	Device package	remark
R1	resistance	140K	0603	Adjust the output voltage	C3	capacitance	100nF	1206	NPO Material
R2	resistance	200K	0603		C4	capacitance	39nF	1206	NPO Material
R3	resistance	10M	0603		D1	Schottky diodes	SS34	1210	Adjusted according to current
R4	resistance	2K	0603		D2	diode	IN4148	0810	
R5	resistance	100K	0603		D3	LED	LED red	0603	
R6	resistance	7.5K	0603		IC1	chip	XKT-R2	SOT23-5	
C1	capacitance	10uF50V	0805	X7R	L1	coil	5uH		The actual size shall prevail
C2	capacitance	10uF50V	0805	X7R	BT1	Capacitive load	lithium battery		Output

Typical circuit derivation module scheme:

Module number	Supply voltage (V)	Maximum output power Rate(V/mA).	Effective distance (MM)	Outside the launch coil Diameter(M M).	Outside the receiving coil Diameter(M M).	Coil yes or no Magnetic sheet	Launch to be electromechan ical ±20mA).	remar k	Launch lines Circle number	Receive line Circle ,
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1. 5V supply 5V2A high power output circuit

Multiple parallel output high-power circuits

3uH 48mm105 strand coil

VDD 5V

104 NPO

104 NPO

L1 C3 C2

IC2 XKT-335*3

IC1 XKT-001

N/F

R3 200K

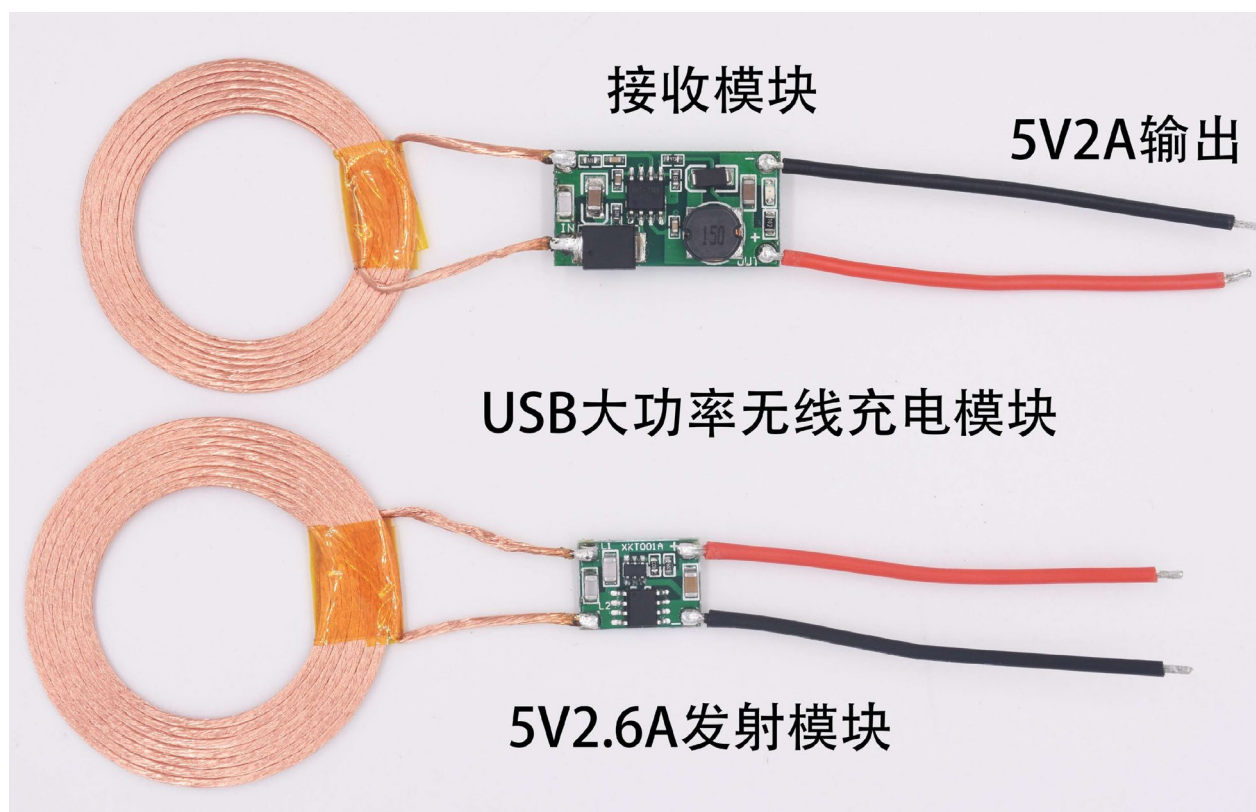
C1 47uF/16V

R2 82K

4 5 3 4

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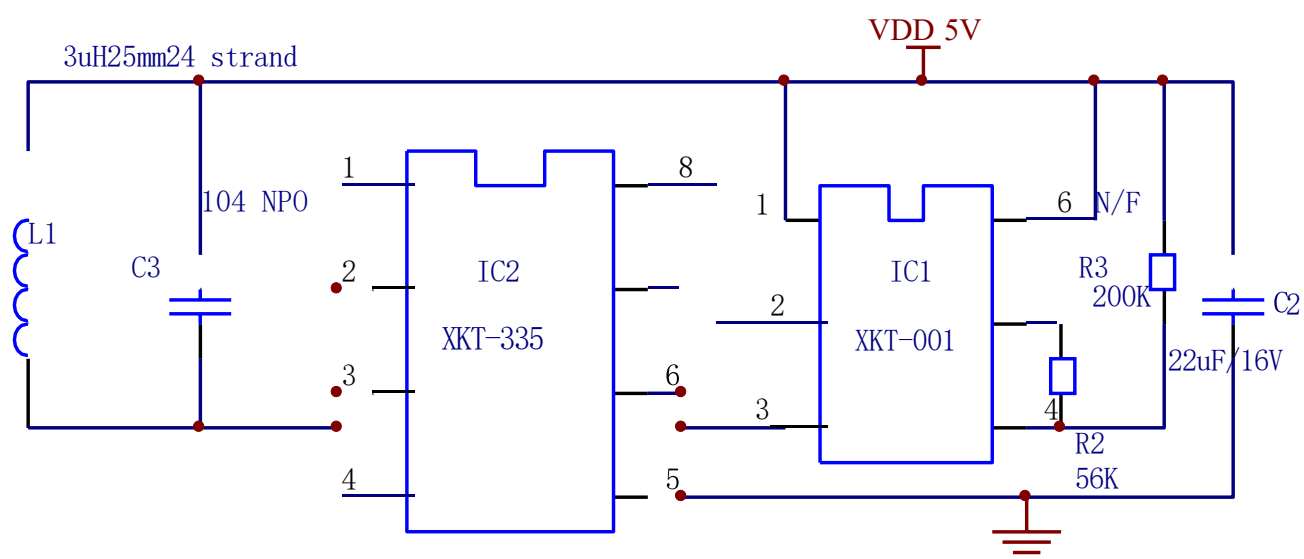
Module physical drawing number XKT001-01



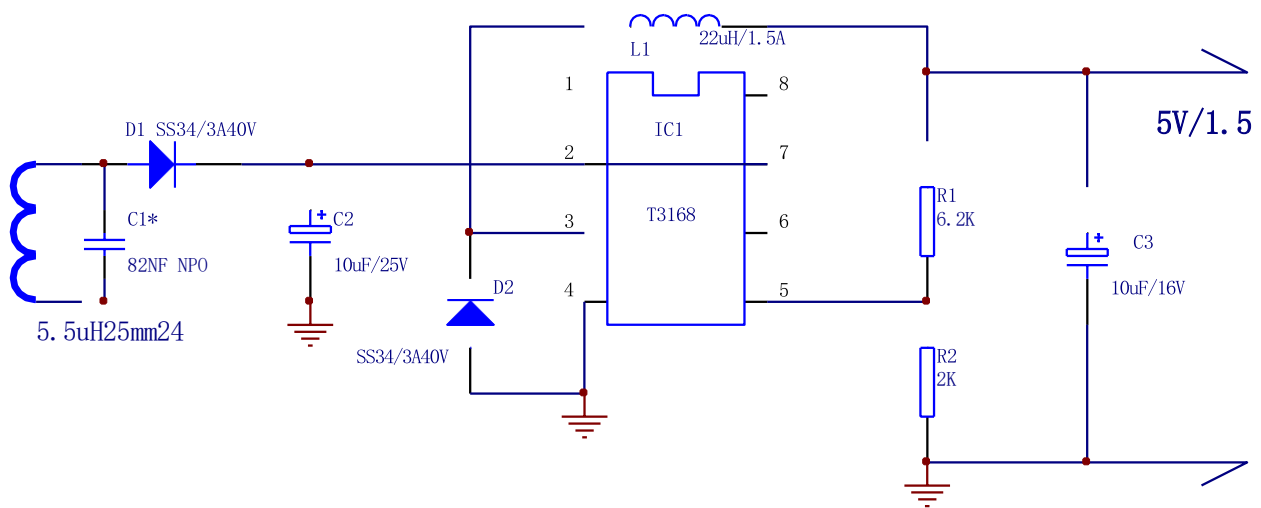
2. Ultra-thin coil 5V power supply 5V1A output circuit

Transmit circuit

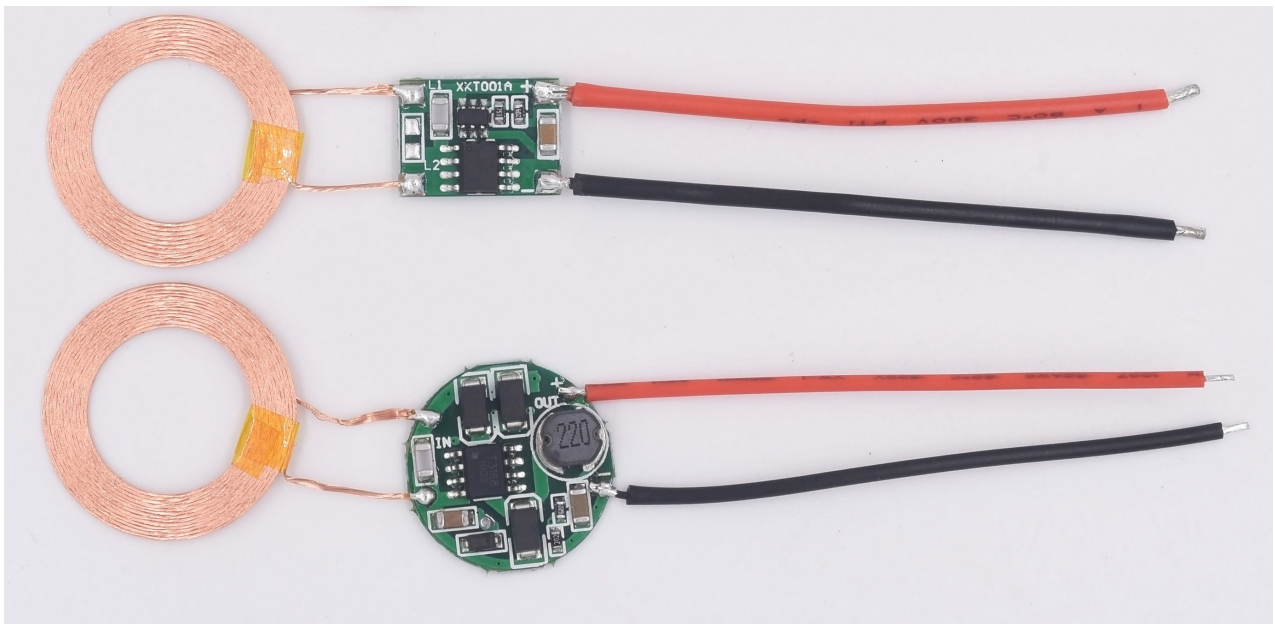
XKT001-02



Receive circuit

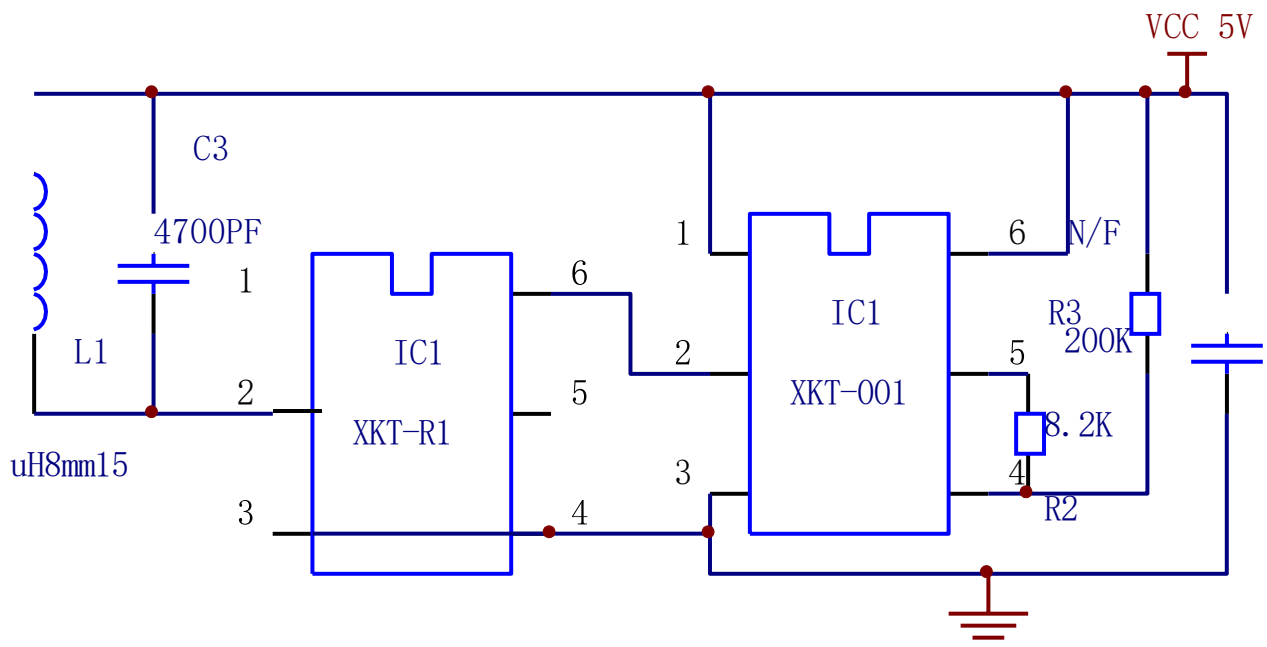


Physical drawing of the module

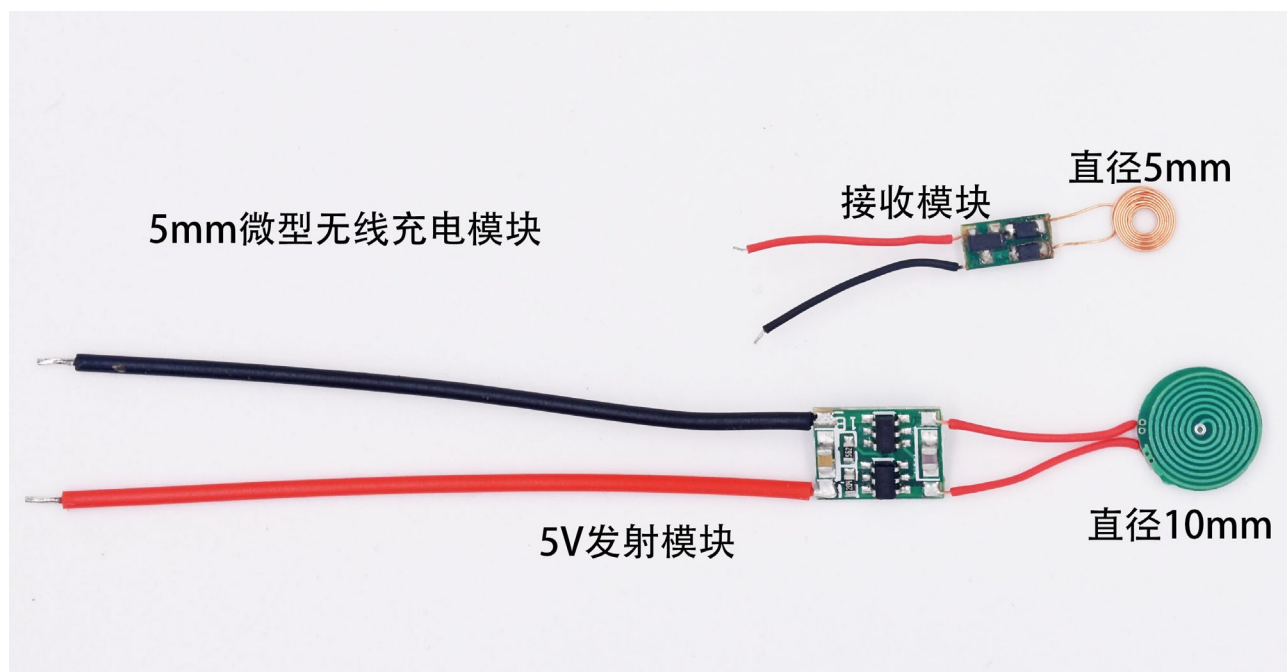
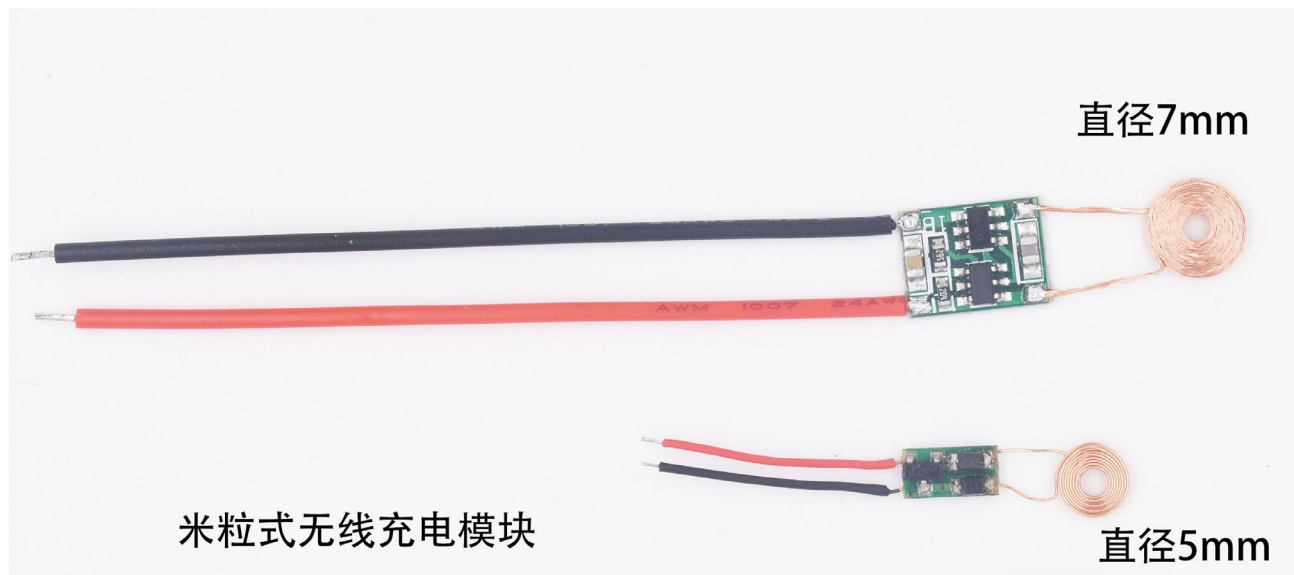


3. High-frequency melee wireless charging solution

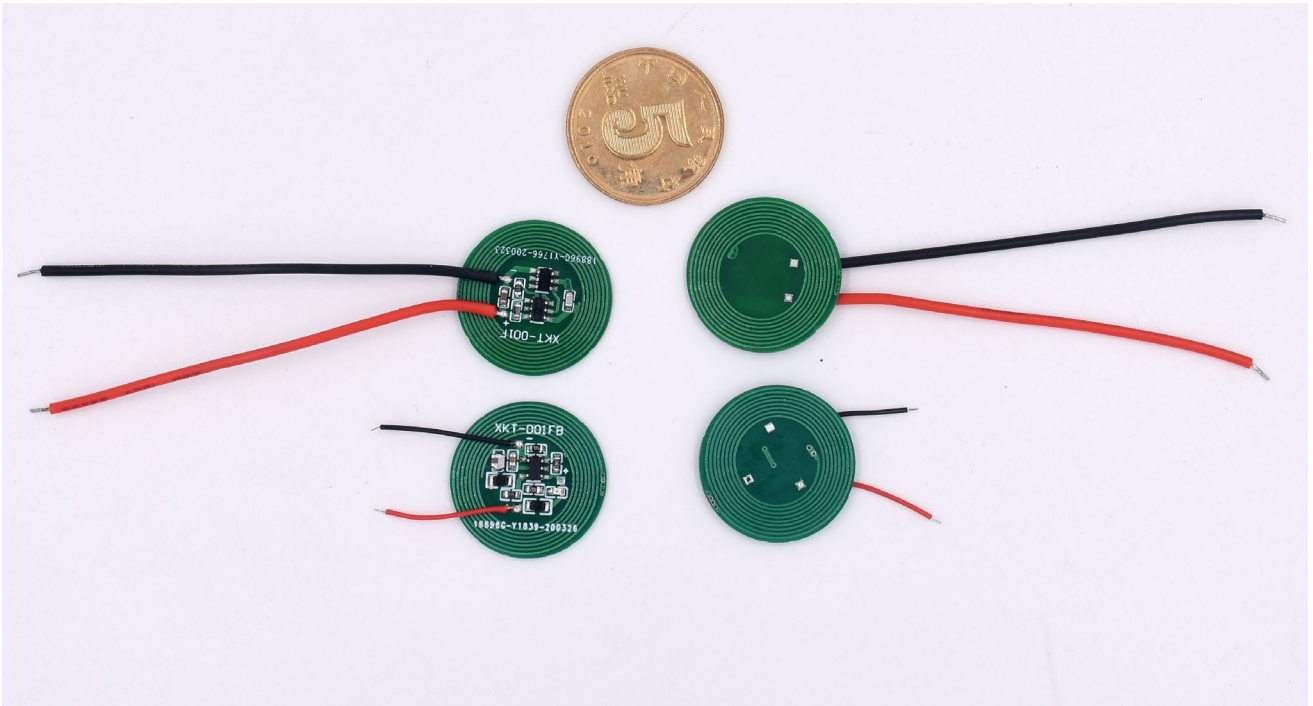
Transmit circuit



Module physical



It is possible to use a very small PCB directly as a transceiver module



Eighth, the replacement principle of capacitors

Note: If you are looking for maximum stability, NPO capacitors are preferred. All test samples introduced by our company are taken

NPO capacitors used.

Due to the fact that many guests have privately replaced the NPO capacitor with X7R material, there have been many quality problems with the product. The following is a description of the considerations for replacement. Note: According to the company's design requirements, there are devices that require the use of NPO capacitors, or it is strongly recommended not to replace them with other materials, if it is very sensitive to cost, you can use CBB capacitors (polypropylene film capacitors) instead.

CBB Capacitors (Polypropylene Film Capacitors): The same as NPO capacitors, the same high-frequency capacitors, the use effect is the same as NPO capacitors. The difference is that NPOs are high-frequency ceramic capacitors, high temperature resistant, and have a smd package for easy production. CBB capacitors are film capacitors that are not resistant to high temperatures, so they are only packaged in plug-ins and need to be soldered during production. Because CBB capacitors are thin film organic materials and are not resistant to high temperatures, the time must not be too long when passing through the tin furnace, or the soldering temperature must not be too high, and the soldering time cannot be long, otherwise the pins of the capacitor will fall off internally and cause chip damage. (When purchasing CBB material capacitors, because there are many varieties of film materials, it is highly confusing, the material must be polypropylene, and the D value (loss angle) must be less than 10 when measuring on the bridge, The reference value is around 3.)

When replacing the NPO capacitor with the X7R capacitor, it should be noted that due to the large internal resistance of the X7R capacitor and the heat generation, it is in the output current Greater than 300mA cannot use X7R capacitors. Because thermal expansion and contraction will lead to deformation of the capacitor, the capacitor may break due to thermal expansion and contraction during mass production, resulting in circuit failure. Therefore, when choosing X7R, the package must be 1206 and above, **and it must be a thick package**, and when the current is relatively large, multiple capacitors can be used in parallel to achieve the capacity to disperse the heat generation, and the copper skin on both sides of the capacitor and nearby is required Widen and spread copper, do a good job of heat dissipation, so that the temperature of the

capacitor can be effectively controlled.

X7R capacitor because it is a conventional capacitor, so there are many kinds of accuracy, because the capacitance deviation used in wireless charging will have a very large impact on the circuit, so the error of the capacitor should be selected with a very high accuracy (NP0 capacitance error is 5%). Otherwise, the consistency of the product will be abnormally poor during mass production, and the general accuracy error cannot be higher than 10%.

Due to the internal resistance loss of the X7R capacitor, direct replacement of the material will lead to an increase in quiescent current, and the final value should not exceed 100mA!

9. Work limits

Operating temperature : -55° C to +125° C

Storage temperature:14° C
Maximum Operating
Voltage:18V
Minimum Operating
Voltage:3.3V
Scheme output maximum drive current:1000mA

10. Encapsulation form

Package Outline

