

Product Specifications

File number : C G K 1 B T S 0 0 0 1

Smart Bluetooth Food Probe

K1-BTS

Design	Audit	Approved
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2022-6-15	2022-6-15	2022-6-15



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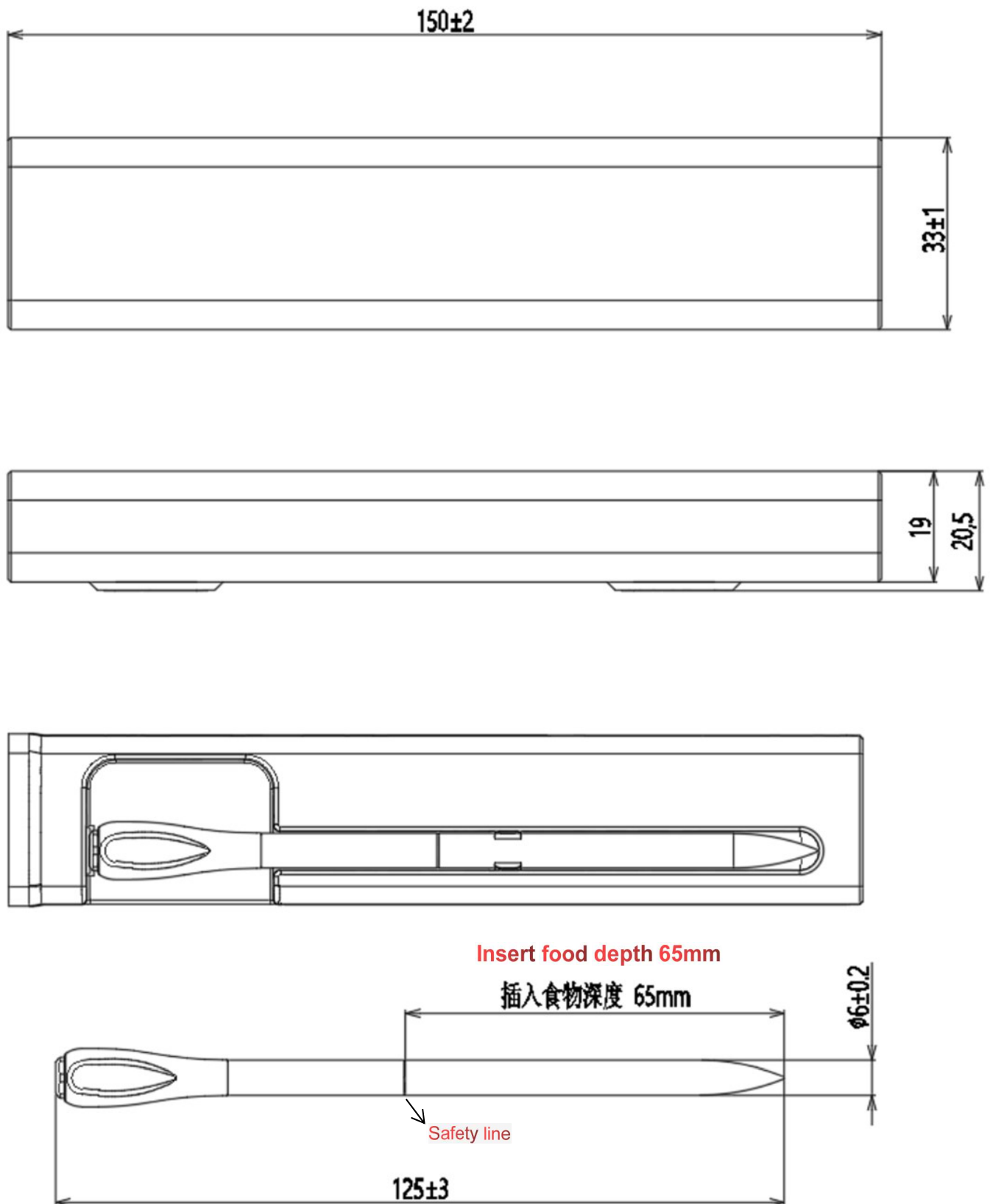
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1. Engineering drawings



2. Technical Specifications

Probe	Powered by	lithium battery
	Working voltage	1.8V~3.3V
	Power indicator	The power is sent to the app through Bluetooth
	Charging voltage	3.3V
	Recharging current	30mA
	Charging time	More than 8 hours for the first time
	Standby time	48 hours at 25°C
	Working time	48 hours at 85°C
	Working temperature	0°C ~ +100°C
	Temperature response time	<10 seconds (25°C→75°C underwater)
	Temperature accuracy	± 1.0°C(25°C ~ +85°C)
	Application ambient temperature	0 ~ + 300°C (The probe must be inserted more than 65mm deep into the cooking food, and the heating must be stopped when the food temperature reaches 100°C to prevent the probe from being overheated and damaged.)
	Ambient temperature accuracy	± 5.0°C
	Storage temperature	-10°C ~ +40°C
	Communication method	Bluetooth v5.0
	Working frequency	2402 ~ 2480MHz
	Transmission distance	In an open and dry environment, the transmission distance is greater than 30 meters
	Communication protocol	See item 6
	ESD Antistatic	Air discharge 8KV, contact discharge 4KV.
	Protection class	IP67
	Support system	Android & ios
Charging base	Powered by	1 AAA battery
	The output voltage	3.3V±0.2V
	Output current	30mA
	Battery indicator	Place the bluetooth probe in the charging base, press the button on the charging base, the LED light status is as follows: ①. Green light: Indicates that the battery is fully charged. ②. Red light: indicates that it is charging. There is no probe in the charging base, press the button on the charging base, the LED light status is as follows: ③. Green light: Indicates that the battery has electricity. ④. The light is off: Indicates that the battery is out of power or the battery is not installed.
	Working temperature	0°C ~ +40°C
	Storage temperature	-10°C ~ +40°C
Quiescent Current		< 4.0mA

3. Inspection standards (Factory test)

NO.	Item	Test method	Performance requirement	Inspection level	AQL
1	Outward appearance	Visual inspection	The surface of the probe head should be clean and tidy, No other unclean objects, in good condition without damage, No cracks, no exposed pins; the sensor head should be shiny, the surface should be free of oxidation, scratches, deformation, rust, black, thorns, etc. The food safety line identification of the probe should be clear and correct, and the size and position should be consistent with the specification. The surface of the charging base shell should be clean and tidy. No other unclean objects, in good condition without damage, No cracks, no scratches.	General inspection Level II	0.65
2	Size	Caliper	Meet the requirements of technical parameters (see the corresponding drawings for specific control dimensions)	General inspection Level II	0.25
3	Temperature accuracy	Immerse the probe end of the product in a constant temperature oil tank at $25\pm 3^{\circ}\text{C}$ and 75°C and keep it for 20 minutes, and then read the temperature value output by the blue probe through the mobile phone app or tooling.	$\pm 1.0^{\circ}\text{C}$	General inspection Level II	0.25
4	Temperature response time.	First, immerse the probe in a constant temperature box or constant temperature oil tank at $25\pm 3^{\circ}\text{C}$ for 20 minutes, record the temperature of the probe at this time, and then immerse the sample into the constant temperature oil tank at 75°C as soon as possible, and turn on the time recording while immersing. When the sensor temperature rise is 63.2% of the difference between the initial and final temperature, the time recording is ended, and the time spent in this process is the response time. The test results meet the specification requirements.	$< 10\text{ s}$	General inspection Level II	0.65
5	Quiescent Current	Insert the bluetooth probe into the charging base, wait for the charging base indicator to show that it is fully charged, and continue to charge for another 10 minutes. Then remove the dry battery of the charging base, connect an ammeter in series with an AAA battery (open-circuit voltage of the battery is $1.5\pm 0.1\text{V}$) to supply power to the charging base, and measure the quiescent current.	$< 4.0\text{mA}$	General inspection Level II	0.65
6	Bluetooth pairing connection	(1) The mobile phone is in a good network state and the Bluetooth switch is turned on; (2) First, if the mobile phone is connected to the uncharged probe, it shows that the connection is unsuccessful; (3) Then the probe is mounted on the charging base for charging, and the probe is taken out after it is fully charged; (4) When the Bluetooth product is in the radio mode to send the hotspot, the mobile phone APP starts the connection on the page, and the pairing can be successful without the phenomenon of pairing timeout. page, and it can be successfully paired without the phenomenon of pairing timeout.	The bluetooth probe can be charged normally, and the APP can be paired and connected normally.	General inspection Level II	0.25

4. Reliability test

NO.	项目 (Item)	技术要求 (Art Request)	测试条件 (Test Conditions)	测试设备 (Testing Equipment)
1	Drop test	There should be no visible damage to the appearance after the blue probe falls freely on the floor tile from a height of 1m, and the performance test meets the requirements.	At a height of 1m, release the Bluetooth probe from three directions (parallel to the ground, perpendicular to the ground with the probe end facing down, parallel to the ground with the tail facing down), let it fall freely to the floor tile, three times in each direction, and then Check the appearance and there should be no visible damage (slight scratches, slightly blunt tip of the needle, which does not affect the actual use and acceptable), and the Bluetooth connection and temperature detection function are normal.	/
2	Constant Damp Heat Test	Store the Bluetooth probe in an environment of $70\pm 2^{\circ}\text{C}$ and a relative humidity of $93\pm 3\%$ for 500 hours, take it out and restore it for 1h under normal conditions, and then check that the temperature measurement accuracy of the Bluetooth probe is $\pm 3^{\circ}\text{C}$.	Adjust the temperature and humidity of the test box, put the sample in the box for 500 hours, take out the sample, and restore it for 1 hour under normal conditions. After charging the Bluetooth probe, fully immerse the Bluetooth probe detection end in a constant temperature oil tank with a temperature deviation of $\pm 0.1^{\circ}\text{C}$ (submerged beyond the probe safety line), set the desired temperature point (25°C and 75°C) and keep it at this temperature point for 20 minutes, and then read the food temperature output by the Bluetooth probe through the mobile app or tooling. The temperature measurement accuracy of the temperature points 25°C and 75°C is $\leq 3^{\circ}\text{C}$.	temperature test chamber, mobile phone or tooling, High temperature oil tank
		Store the charging base in an environment of $40\pm 2^{\circ}\text{C}$ and $93\pm 3\%$ relative humidity for 48 hours, then take it out and restore it for 1h under normal conditions, and the charging function should be normal.	Adjust the temperature and humidity of the test box, put the sample in the box for 48 hours, take out the sample, restore it for 1 hour under normal conditions, and insert the blue probe into the charging base to check whether the charging function is normal.	Temperature test chamber
3	High temperature storage	Store the Bluetooth probe in a dry environment of $70^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 48h, take it out and restore it for 1h under normal conditions, and then check that the temperature measurement accuracy of the Bluetooth probe is $\pm 3^{\circ}\text{C}$.	Store the entire Bluetooth probe in a dry environment at $70^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 48h. The sample is taken out and placed under normal conditions for 1 hour. After charging the Bluetooth probe, fully immerse the Bluetooth probe detection end in a constant temperature oil tank with a temperature deviation of $\pm 0.1^{\circ}\text{C}$ (immersed beyond the probe safety line), and set the required temperature point (25°C and 75°C) and keep it at this temperature point for 20min, then read the food temperature output by the Bluetooth probe through the mobile app or tooling, the temperature measurement accuracy of the temperature point 25°C and 75°C is $\leq 3^{\circ}\text{C}$.	Temperature test chamber, mobile phone or tooling, High temperature oil tank
		Store the charging base in an environment of $70^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 48 hours, take it out and restore it for 1 hour under normal conditions, the charging function should be normal	Adjust the temperature of the test box, put the sample (without packaging, without battery) into the box for 48 hours, take out the sample, restore it for 1 hour under normal conditions, insert the Bluetooth probe into the charging base, and check whether the charging function is normal.	Temperature test chamber
4	Low temperature storage	Store the Bluetooth probe in a dry environment of $-40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 48h, take it out and restore it for 1h under normal conditions, and then check that the temperature measurement accuracy of the Bluetooth probe is $\pm 3^{\circ}\text{C}$.	Store the entire Bluetooth probe in a dry environment of $-40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 48h. The sample is taken out and placed under normal conditions for 1 hour. After charging the Bluetooth probe, fully immerse the Bluetooth probe detection end in a constant temperature oil tank with a temperature deviation of $\pm 0.1^{\circ}\text{C}$ (immersed beyond the probe safety line), and set the required temperature point (25°C and 75°C) and keep it at this temperature point for 20min, and then read the food temperature output by the Bluetooth probe through the mobile app or tooling. The temperature measurement accuracy of the temperature point 25°C and 75°C is less than or equal to 3°C .	Temperature test box, mobile phone or tooling, high temperature oil tank
		Store the charging base in an environment of $-40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 48 hours, take it out and restore it for 1 hour under normal conditions, the charging function should be normal	Adjust the temperature of the test box, put the sample (without packaging, without battery) into the box for 48 hours, take out the sample, restore it under normal conditions for 1 hour, insert the Bluetooth probe into the charging base, and check whether the charging function is normal.	Temperature test chamber

5	Hot and cold shock	After 300 cycles of cold and heat shock (in which the high temperature is 75°C for 1 hour, the low temperature is -25°C for 0.5 hours, and the temperature change time is less than 3 minutes), the Bluetooth probe recovers under normal conditions for 1 hour, and then checks the Bluetooth probe food test. Temperature accuracy is $\pm 3^{\circ}\text{C}$.	Set the temperature of the incubator, place the Bluetooth probe at a temperature of 75°C for 1 hour, then cool down from 75°C to -25°C within 3 minutes, then place it at an ambient temperature of -25°C for 0.5 hours, and finally within 3 minutes The temperature was raised from -25°C to 75°C. After 300 cycles, the sample was taken out for observation, and there was no structural loosening. It was placed under normal conditions for 1 hour. After charging the probe, fully immerse the probe end in a temperature deviation of $\pm 0.1^{\circ}\text{C}$. In the constant temperature oil tank (submerged beyond the probe safety line), set the required temperature point (25°C and 75°C) and keep it at this temperature point for 20 minutes, and then read the food temperature output by the Bluetooth probe through the mobile app or tooling. The temperature measurement accuracy of the temperature point 25°C and 75°C is $\leq 3^{\circ}\text{C}$.	Temperature test chamber, mobile phone or tooling, high temperature oil tank
6	High temperature work	Store the bluetooth probe in a dry environment at $85^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and work for 4 hours. After taking it out, check that the temperature measurement accuracy of the probe is within $\pm 3^{\circ}\text{C}$.	Store the entire probe in a dry environment at $85^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 4 hours. During the process, every half hour, the APP can be used to connect to the Bluetooth device and communicate normally. After the sample is taken out, fully immerse the probe end of the Bluetooth probe in a constant temperature oil tank with a temperature deviation of $\pm 0.1^{\circ}\text{C}$ (immersed beyond the probe safety line), set the desired temperature point (25°C and 75°C) and keep it at this temperature point 20min, and then read the food temperature output by the bluetooth probe through the mobile app or tooling. The temperature measurement accuracy of temperature point 25°C and 75°C $\leq 3^{\circ}\text{C}$	Temperature test box, mobile phone or tooling, high temperature oil tank.
7	low temperature work	Store the Bluetooth probe in a dry environment of $-25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 2 hours, and then check that the temperature measurement accuracy of the Bluetooth probe is within $\pm 3^{\circ}\text{C}$.	Store the entire Bluetooth probe in a dry environment of $-25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 2 hours. During the process, every half hour, the APP can be used to connect to the Bluetooth device and communicate normally. After the sample is taken out, fully immerse the probe end of the Bluetooth probe in a constant temperature oil tank with a temperature deviation of $\pm 0.1^{\circ}\text{C}$ (immersed beyond the probe safety line), set the required temperature points (25°C and 75°C) and set the temperature at this temperature point. Keep it on for 20 minutes, and then read the food temperature output by the Bluetooth probe through the mobile app or tooling. Temperature measurement accuracy at 25°C and 75°C $\leq 3^{\circ}\text{C}$.	Temperature test chamber, mobile phone or tooling, high temperature oil tank
8	Salt spray test	Salt spray test conditions: the spray pressure is set to 100kPa, the temperature in the salt spray test chamber is $35 \pm 2^{\circ}\text{C}$, the concentration of the salt solution is $(5 \pm 1)\%$, after 48 hours, the Bluetooth probe should be free of obvious corrosion and rust Phenomenon. After the experiment, the Bluetooth probe functioned normally, and the temperature measurement accuracy of food was within $\pm 3^{\circ}\text{C}$.	Adjust the test conditions according to the technical requirements. After the adjustment is completed, put the Bluetooth probe into the salt spray box. After 48 hours of storage, take out the sample and observe that there is no obvious corrosion and rust on the surface. Fully immerse the probe end of the Bluetooth probe in a constant temperature oil tank with a temperature deviation of $\pm 0.1^{\circ}\text{C}$ (immersed beyond the probe safety line), set the required temperature point (25°C and 75°C) and keep it at this temperature point for 20min, then Read the food temperature output by the Bluetooth probe through the mobile app or tooling. The temperature measurement accuracy of temperature points 25°C and 75°C is $\leq 3^{\circ}\text{C}$.	Salt spray test chamber, mobile phone or tooling, high temperature oil tank.
9	Vibration test	The Bluetooth probe should be able to withstand a vibration test with a frequency of 10-55Hz, a two-way amplitude of 1.5mm, and a duration of 2h in each of the three mutually perpendicular directions for a total of 6h. After the test, there is no obvious appearance damage and mechanical damage that affects the performance. After 2 minutes of recovery at normal temperature, check the appearance, the temperature measurement accuracy of the temperature point 25 °C and 75 °C is $\leq 3^{\circ}\text{C}$.	After the sample is subjected to vibration test as required, the appearance is checked after recovery at normal temperature for 2 minutes. The temperature measurement accuracy of temperature points 25°C and 75°C is $\leq 3^{\circ}\text{C}$.	Vibration testing machine

		<p>The charging base should be able to withstand the vibration test specified below. After the test, the remote control should meet the requirements of various indicators of appearance and function:</p> <p>The frequency range is 10~55Hz, the amplitude is 1.5mm, the scanning cycle is 5 times, and the vibration is sequentially on the vertical axis of the working surface</p>	<p>The charging base is fastened on the vibration test bench according to the normal working position in the state of no packaging and no battery installed. The vertical line of the comprehensive center of gravity of the charging base and the fixture should be located near the center of the vibration test bench. It should be transmitted to the charging base without passing through the vibration damping feet, handles or other buffer devices, and the device parts (bolts, pressure plates) that fasten the remote control should be prevented from resonating themselves during the vibration test. The charging base shall be subjected to the scanning vibration test 5 times each at a scanning frequency of one octave per minute according to the above two regulations. After the test, check that the appearance of the charging base is not damaged, insert the Bluetooth probe into the charging base, and check whether the charging function is normal.</p>	Vibration testing machine
10	Battery reverse test	<p>When the temperature of the charging base is 25°C, put the new battery in the battery compartment of the charging base for 30 minutes. The charging base should meet the requirements of various indicators of electrical performance:</p> <p>1) The battery installed in the battery compartment is a new battery with a battery voltage of $1.5 \pm 0.1\text{DCV}$;</p> <p>2) During the experiment, the charging base should not have fire, explosion and battery leakage; allow the battery to heat up slightly, but the surface temperature should not exceed 30°C.</p>	<p>Please exchange the positive and negative poles of the new batteries that match the charging base, and put the batteries in the remote control battery compartment for 30 minutes respectively. After the experiment, check the charging function of the charging base.</p>	
11	Dustproof and waterproof grade IPX7	<p>After the IPX7 test is over, the Bluetooth probe is charged normally and the Bluetooth is working normally.</p>	<p>Probe part: Test according to the standard GB 4208-2008/IEC 60529-2001 "Enclosure Protection Level (IP Code)". After the test, insert the Bluetooth probe into the charging base to check whether the charging function is normal and whether the Bluetooth probe works normal.</p>	Refer to third-party test reports
12	Salt spray test	<p>The spray pressure is 100kPa, the temperature in the salt spray experiment is $35 \pm 2^\circ\text{C}$, the concentration of the salt solution is $(5 \pm 1)\%$, and the test time is 48 hours. The Bluetooth probe should be free of obvious corrosion and rust; the probe functions normally. The temperature measurement accuracy of food is within $\pm 3^\circ\text{C}$.</p>	<p>Probe part: put the sample into the salt spray test box with the spray pressure of 100kPa, the temperature of the salt spray test at $35 \pm 2^\circ\text{C}$, and the concentration of the salt solution at $(5 \pm 1)\%$. After 48 hours, the Bluetooth probe should be free of obvious corrosion and rust. After the experiment, the Bluetooth probe functioned normally, and the temperature measurement accuracy of food was within $\pm 3^\circ\text{C}$.</p>	Salt spray test chamber

5. Product packaging and storage conditions

5.1 Product packaging

NO.	包装方式 (Packing method)	包装材料/尺寸 (Packing material / size)	数量 (Number)
1	包装盒 (Packing box)	175mm*80mm*30.5mm	1 pcs
2	包装箱 (carton)	325mm*254mm*201mm	30 pcs

5.2 Storage Conditions

5.2.1 储存温度(Storage Temperature): $-10^{\circ}\text{C}\sim+40^{\circ}\text{C}$

5.2.2 相对湿度(Relative Humidity): RH60% or less

5.2.3 远离腐蚀和阳光照射(Keep away from corrosive atmosphere and sunlight)

5.2.4 储存时间(Storage time): 1year.

6. Communication protocol

The temperature probe outputs temperature values (internal temperature, external temperature) and power (voltage) data in two ways: broadcast and connection. The specific specifications are as follows:

Broadcast method

BLE broadcasts once and can carry up to 31 bytes of user data (excluding active scan data). Broadcast data is composed of multiple fields with specific meanings, and each field is composed as follows:

length	type	Parameter
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Its meaning is:

Length: 1 byte. is the sum of type bytes and value bytes;

Type: 1 byte. Common types include: 0x01, which means broadcast attribute; 0x09, which means device name; 0xFF, which means manufacturer information; 0x03, which means UUID declaration;

Parameters: Multiple bytes.

The temperature probe uses the "manufacturer information" field as the carrier of the broadcast temperature value and power value; the complete broadcast data composition is listed as follows:

length	type	Parameters (example)	Description
02	01	06	Attribute ID, 06 means GeneralDiscoverable, BrEdrNotSupported
07	09	4B 31 2D 42 54 53	Equipment name: K1-BTS
OD	FF	06 00 70 CA EA 80 FD 02 AA 0B 13 01	Manufacturer information field, which contains information such as temperature and power

The specific meanings of the manufacturer information parameters in the above table are explained as follows:

Parameter field name	length (bytes)	Data example (hexadecimal)	Data example (Description)
Product ID	6	06 00 70 CA EA 80	Product identification code
Food temperature	2	FD 02	The temperature value of the food, the unit is 0.1℃. The low byte is in front, 0x02FD means 76.5℃
Ambient temperature	2	AA 0B	Ambient temperature value, the unit is 0.1℃. The low byte is in front, 0x0BAA means 298.6℃
Electricity	2	13 01	Battery voltage value, the unit is 0.01v. The low byte is in front, 0x0113 means 2.75v

To sum up, an example of a complete broadcast packet format is as follows:

02 01 06 07 09 46 54 30 30 30 31 0D FF 06 00 70 CA EA 80 FD 02 AA 0B 13 01

After the APP receives the broadcast data, it should parse the fields according to the above rules, and then parse the parameter fields after obtaining the manufacturer information parameters, and finally obtain the temperature and power data.

Connection method

After BLE is connected, data exchange is realized through the GATT protocol of BLE. According to the provisions of the GATT protocol, the temperature probe is the server side, and the mobile APP is the client side.

The composition of the temperature probe server:

The temperature probe transmits temperature and power data through the following services. The specific composition and attributes of the service are described as follows:

Custom service	Serve UUID	0x00, 0x00, 0xFF, 0xF0, 0x00, 0x00, 0x10, 0x00, 0x80, 0x00, 0x00, 0x80, 0x5F, 0x9B, 0x34, 0xFB
	Feature UUID	0x00, 0x00, 0xFF, 0xF1, 0x00, 0x00, 0x10, 0x00, 0x80, 0x00, 0x00, 0x80, 0x5F, 0x9B, 0x34, 0xFB
	Eigenvalues	The length is 20 bytes, with only notify and read attributes.
	CCCD	The (APP) client side's characteristic configuration descriptor has the write read attribute.

According to the definition of the Bluetooth core specification, the server side (temperature probe) should contain at least GAP and GATT services, plus the above-mentioned custom services, the complete service composition of the temperature probe is as follows:

GAP service	service UUID	1800
GATT service	service UUID	1801
Custom service	service UUID	0x00, 0x00, 0xFF, 0xF0, 0x00, 0x00, 0x10, 0x00, 0x80, 0x00, 0x00, 0x80, 0x5F, 0x9B, 0x34, 0xFB
	service UUID	0x00, 0x00, 0xFF, 0xF1, 0x00, 0x00, 0x10, 0x00, 0x80, 0x00, 0x00, 0x80, 0x5F, 0x9B, 0x34, 0xFB
	Eigenvalues	The length is 20 bytes, with only notify and read attributes.
	CCCD	The (APP) client side's characteristic configuration descriptor has the write read attribute.

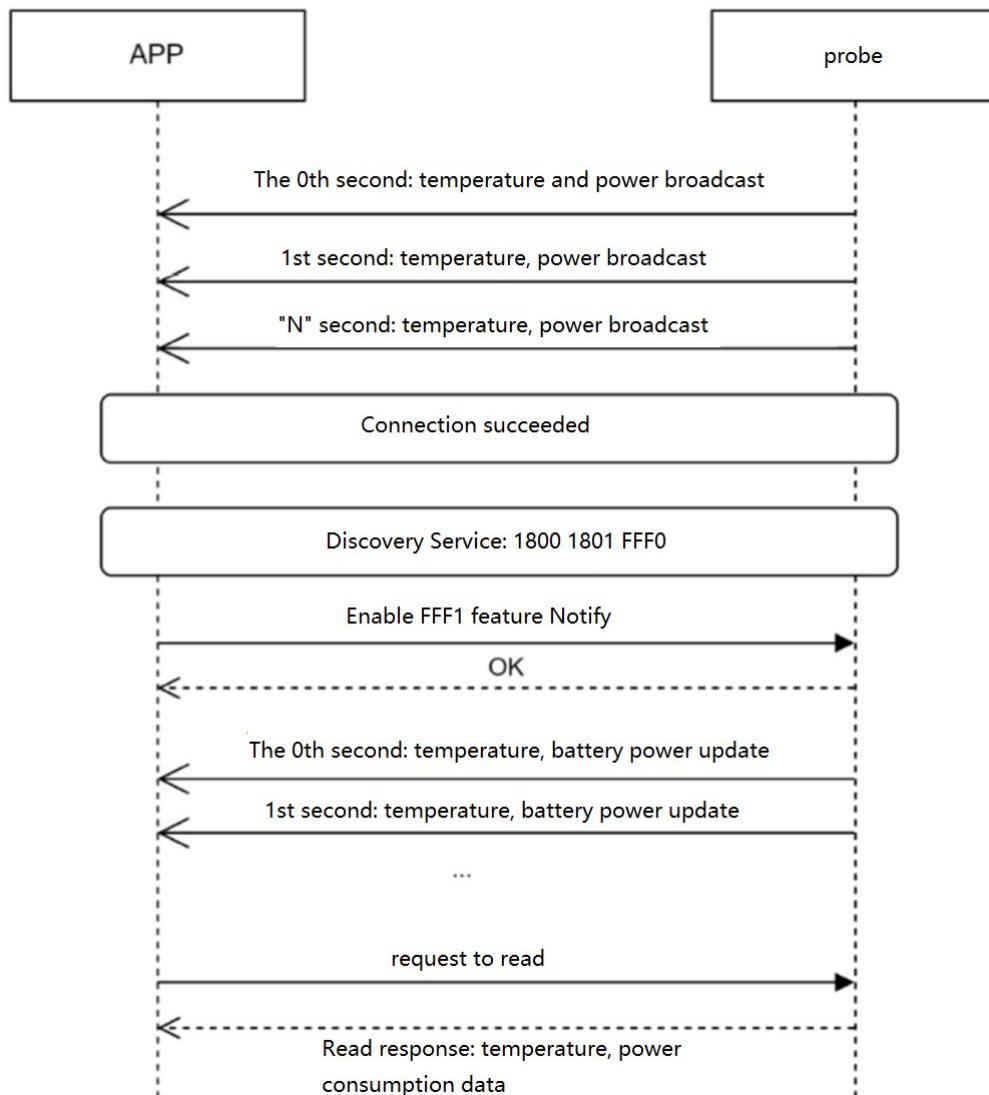
Custom service data format:

The maximum length of the value of the custom service is 20 bytes, and the temperature probe uses 6 bytes of it as the temperature and power data. The details are as follows:

Parameter field name	length (bytes)	Data example (hexadecimal)	Data example (Description)
Product ID	6	06 00 70 CA EA 80	Product identification code
Food temperature	2	FD 02	The temperature value of the food, the unit is 0.1℃. The low byte is in front, 0x02FD means 76.5℃
Ambient temperature	2	AA 0B	Ambient temperature value, the unit is 0.1℃. The low byte is in front, 0x0BAA means 298.6℃
Electricity	2	13 01	Battery voltage value, the unit is 0.01v. The low byte is in front, 0x0113 means 2.75v

That is, the APP receives a 20-byte notify data packet every 1s, and the first 6 bytes represent the temperature and battery value.

Description of the connection interaction process between the APP and the temperature probe:



7. Change record

Version	Change date	Change content	Editor	Approve
——	2022-06-15	First edition	Mr. Cen Zishuo	Qiu Hengshou