# 433MHz remote control Product specification

# Microtips (DongGuan) Inc.

**Approval Sheet Form**

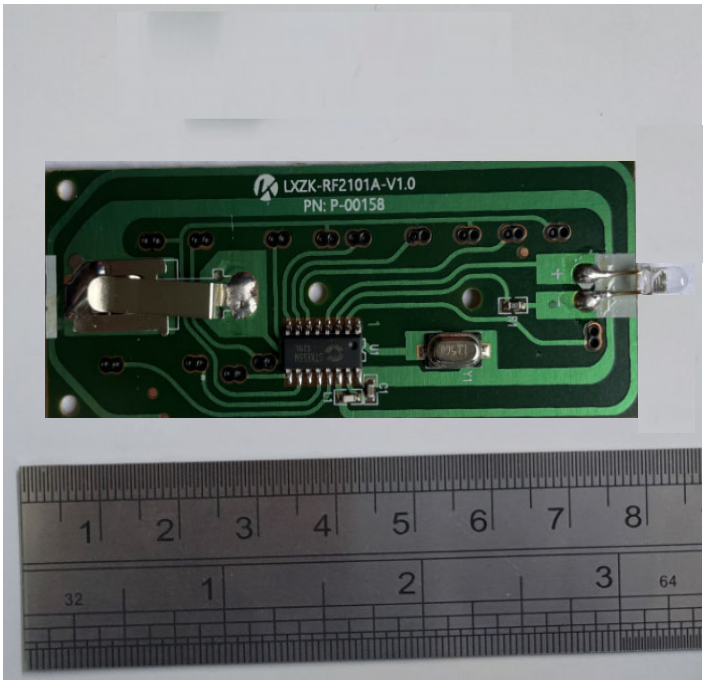
**433MHz Antenna series**
**Comply with RoHS specification**
**PN: NS-021-RF01-002**

## characteristic

1. The size of the antenna is only 76.1x30.7 mm。
2. Low energy loss and high antenna efficiency。
3. It has high stability under the condition of temperature and humidity change.

application

1. Lora 915M 868M 490M 433MHz band antenna application
2. Sub-1g 915M 868M 490M 433MHz band antenna application



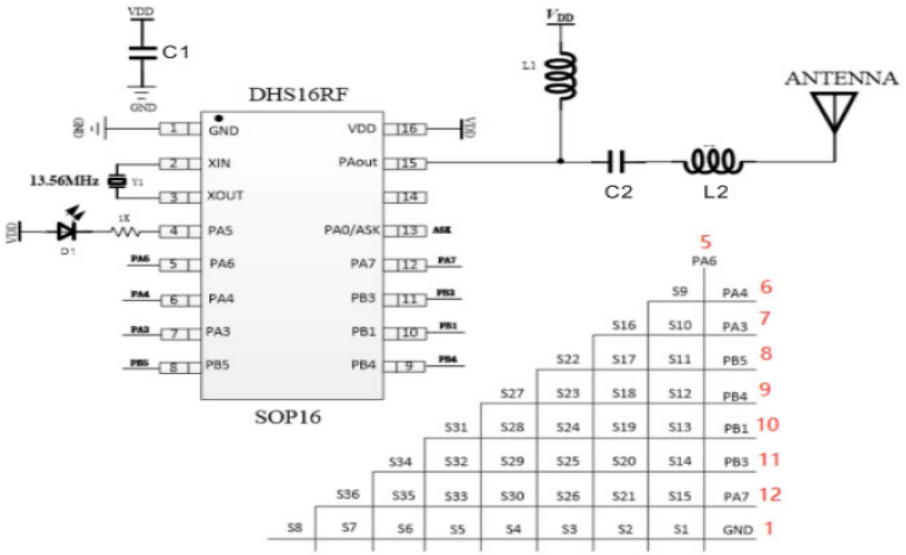

actual picture

electrical specification

| CA-S01 | Specification |
|---|---|
| 工作频率范围 Working Frequency | 400Mhz-960Mhz |
| 初始频段(GHz) | 433MHz |
| 带宽 Band Width | >80MHz |
| 阻抗 Impedance | 50Ω |
| 增益 Gain(dBi) | 7.2 |
| 驻波比 VSWR | <2 |
| 工作温度 Operation Temperature | -40℃~+85℃ |
| 可承受功率 Power Capacity | W |

The working frequency of antenna needs to be realized by debugging impedance matching devices.

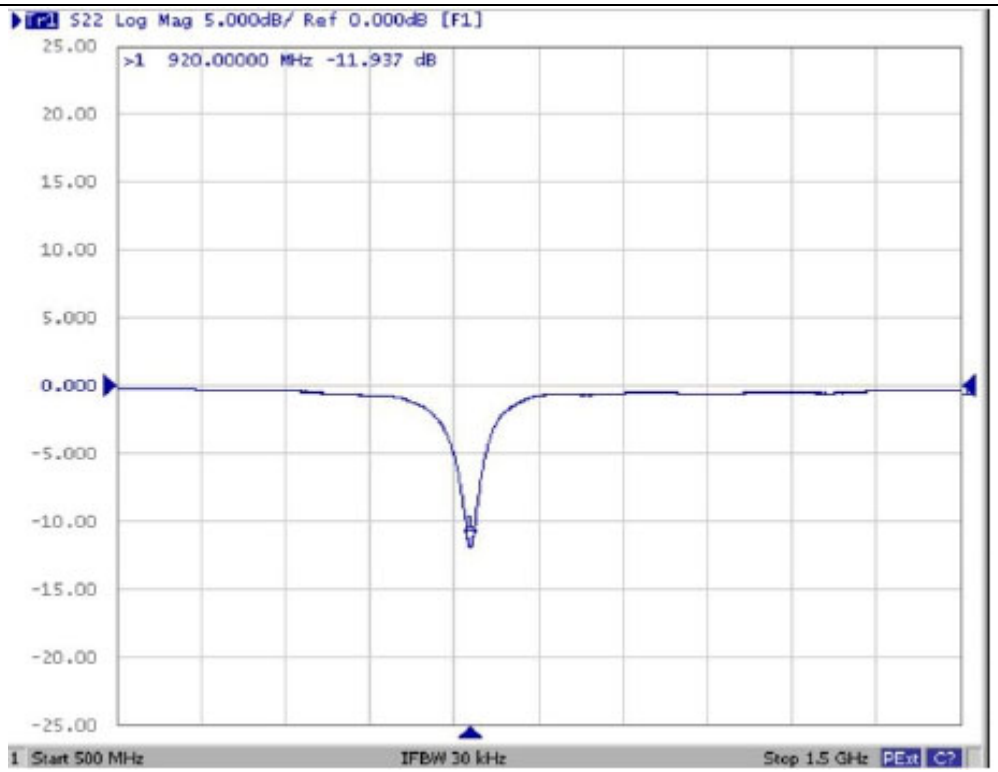
Antenna pad and trace design



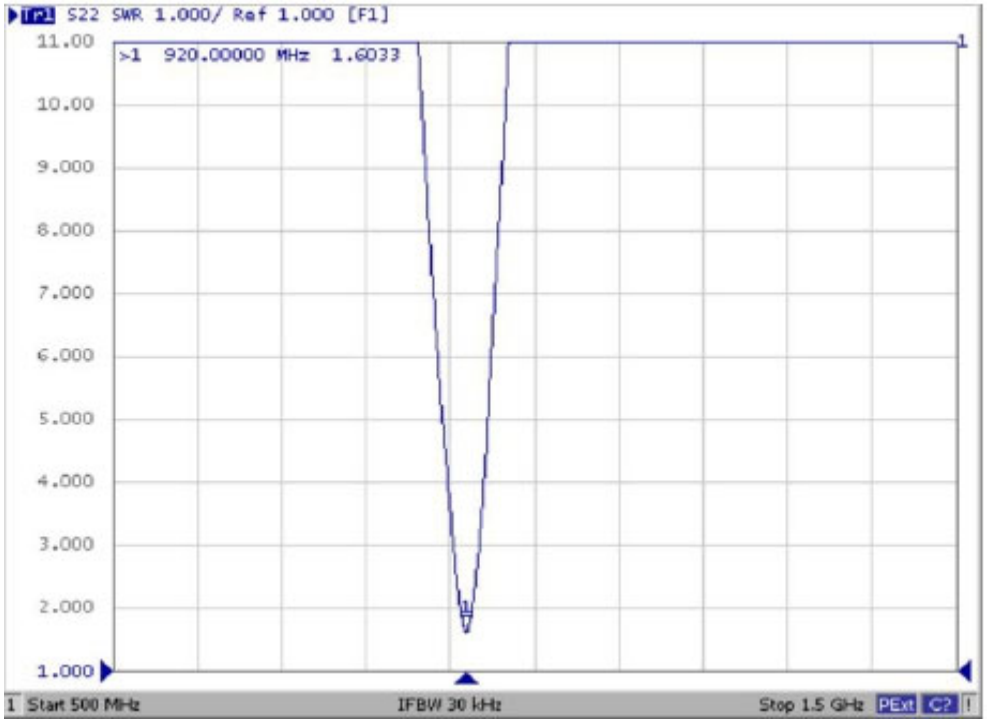

| | | |
|---|---|---|
| 433Mhz Matching device value | C2 | 15pF |
| | L2 | 68nH |
| | L1 | 270nH |

## Antenna test on test board (slab thickness 1.0mm)

Antenna S11 characteristics



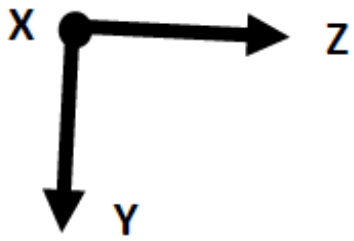

Antenna VSWR characteristics



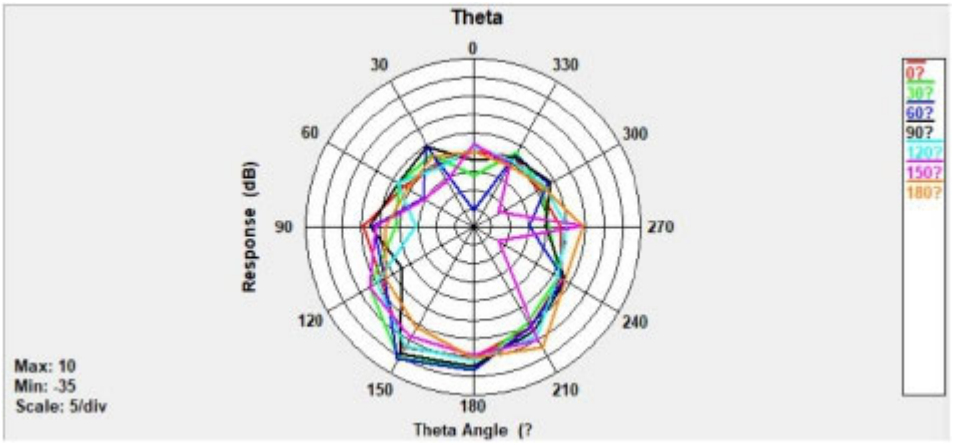

Efficiency and radiation maps

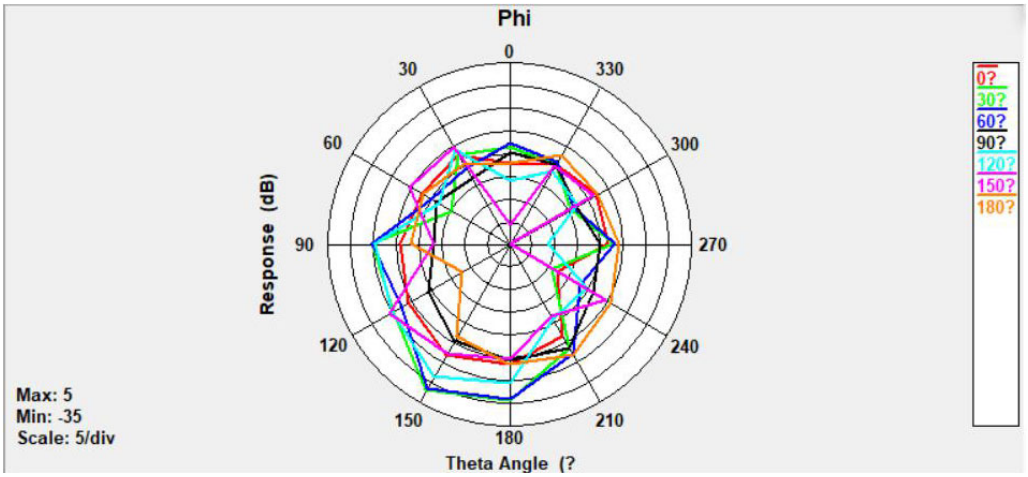
Efficiency, radiation pattern, gain and other performance are based on the test plate design of NS-021-RF01-002 antenna specification characteristics test data are。

Based on the test PCB board size and the test direction shown in the figure below. The following data were tested in ETS 3D microwave darkroom.



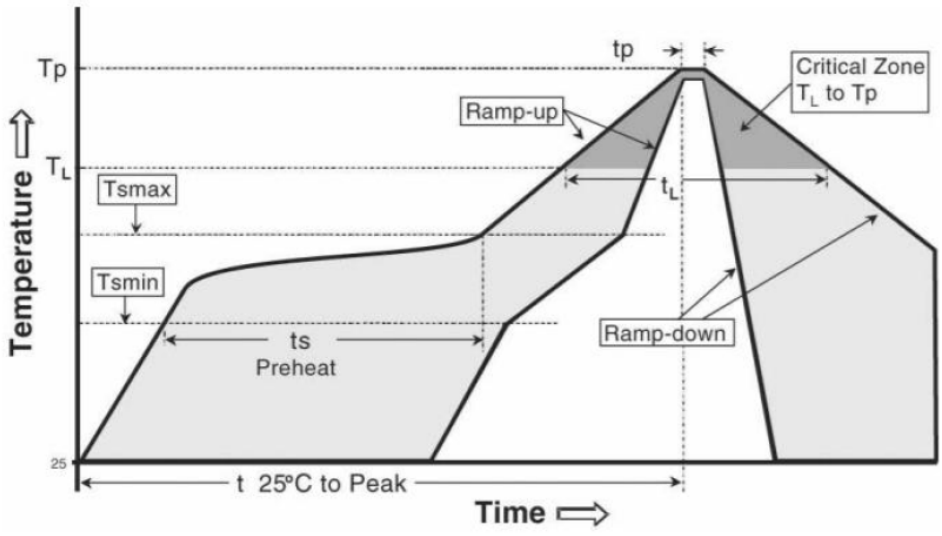

| | |
|---|---|
| **Gain and efficiency** | **bandwidth 423-443mhz** |
| **Peak Gain** | **7.2dBi** |
| **Average Gain across the band** | **5.6dBi** |
| **Gain Range across the band** | **2.2dBi~7.2dBi** |
| **Peak Efficiency** | **39.5%** |
| **Average Efficiency across the band** | **28.7%** |
| **Efficiency Range across the band** | **12.3%~39.5%** |

| | |
|---|---|
| **Theta @920 MHz** |  |

| | |
|---|---|
| **Phi @920 MHz** |  |
| **Total @920 MHz** |  |

Welding condition

Typical welding specifications for reliable and nondestructive welding are shown below



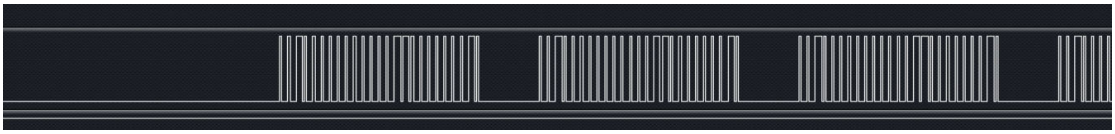
Remote control product specifications

| number | State the items | | Gauge lattice |
|---|---|---|---|
| 0 | Main engine size | | 85.7*39.7*7.MM shell: black |
| 1 | Product implementation standard | | GB/T 14960-1994 |
| 2 | Product storage environment | Ambient temperature | -20℃～45℃ |
| 3 | | Relative humidity | 45%～75% RH |
| 4 | | Atmospheric pressure | 86～106Kpa |
| 5 | | Ambient illumination(for use) | unlimited |
| 6 | Product use environment | Ambient temperature | -25℃～45℃ |
| 7 | | Relative humidity | 45%～75% RH |
| 8 | | Atmospheric pressure | 86～106Kpa |
| 9 | | Ambient illumination(for use) | unlimited |
| 10 | Product composition specification (Standard specification, te Don't ask for exclusions) | Key material | PET bulge |
| 11 | | Plastic material | ABS Raw material |
| 12 | | Key contact mode | PET printing carbon oil(carbon film contacts) |
| 13 | | Circuit board material | 94HB- 0.8mm Carbon oil filling hole |
| 14 | | PCB Model number | NS-021-RF01 |
| 15 | | Packing method | Self-adhesive bag |
| 16 | | IC Encapsulation mode | SOP16:OTP firmware |
| 17 | | Remote emission source | wireless 433 |
| 18 | | Remote transmitter code table | See attached code table |
| 19 | | Remote coding specification | Subject to sample |
| 20 | | Product appearance design | See attached drawing |
| 21 | | Type of battery used | Lithium-manganese dioxide battery |
| 22 | | Battery specification | CR2025*1 |
| 23 | Product inspection standard (unless special instructions, Tamb=25°C ) | Rated operating voltage | DC 3V |
| 24 | | Operating voltage range | DC 2.5V-4.2V |
| 25 | | Operating current range | ≤20mA |
| 26 | | Standby current | ≤10uA |
| 27 | | Operating frequency and modulation mode | 433.92KHz ±0.8% ASK |
| 28 | | Transmitting distance | ≥35m |
| 29 | | Directional emission Angle | 360° No blind spot |
| 30 | | Transmitted power | 10dBm |
| 31 | | Undervoltage emission distance | ≥15m |
| 32 | | Key free height | 0.5-1mm |
| 33 | | Key force | 250～350g |
| 34 | | Key load life | ≥1 Ten thousand times |
| 35 | | Free drop test | 76cm ( Hard floor ) /100cm( Wooden floor) |
| 36 | | Number of free drops | 6 times (once per side) |
| 37 | | Vibration test (30min) | Scanning cycles: 5 Frequency range: 30 ~ 55 ~ 30HZ<br>Three-dimensional direction; 1.5mm displacement range: 0.15mm |
| 38 | | High temperature storage test | 45℃ (2h) |
| 39 | | Low temperature storage test | -25℃(2h) |
| 40 | | Constant wet temperature test | 40℃ relative humidity 93%(48h) |

**Communication protocol**

**Annex 1**

**Code data (format) description**



**The encoding contains 24 bits, BYTE0+BYTE1+BYTE2+ end bit:**

**0:0.4msH + 1.2msL**

**1:1.2msH + 0.4msL**

**End bit: 0.4msH + 12msL**

**BYTE0, BYTE1 is the address code;**

**The high position is sent in front, and at least 5 frames are sent by a single press;**

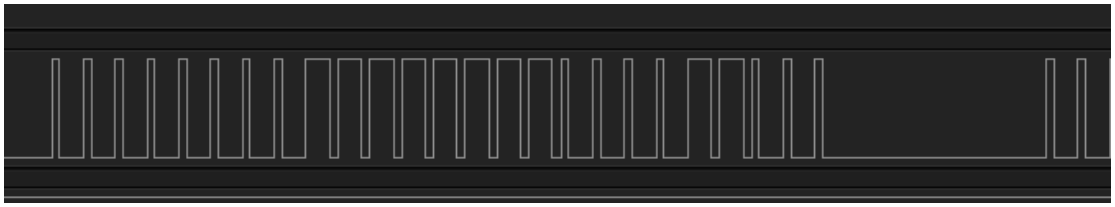
**The address code can be set to a fixed address code, FFFF, or other address value.**

**Can also be set to be a scroll code, each remote control address code is different. Scrolling code can achieve one-to-one function, that is, a remote control**

**Device, which controls only one receiving device.**

**BYTE2 is the key code value. Each key has a fixed code value.**

**As shown in the figure below the key value is 0C and the address code is 00,FF**



**Note:**

1. **Code value is hexadecimal, address code is different for each remote control, can realize a remote control of a device, do not interfere with each other.**
2. **If a remote control is not required for a receiving function, the receiving program can be made not to compare the address code, only compare the key code.**

**Receiving and decoding programming instructions**

**When the remote control does not send 433MHz signal, the wireless receiving chip signal pin (DATA) is irregular clutter, which is normal. When the remote control starts to send 433MHz signal, the receiving signal pin will appear regular waveform. Generally, the receiving program detects the signal of 12ms per frame code interval, and the decoding program enters and starts decoding. When writing the decoding program, it should be noted that the actual high level time is shorter than the theoretical value, and the high level time of each remote control will be somewhat different, so we set the high level time range as large as possible**

**When programming 0 for 0:0.4ms +1.2ms, the pulse width range of 0.4 should be enlarged as much as possible, and the range of 0.4 should be between 0.2 and 0.6**

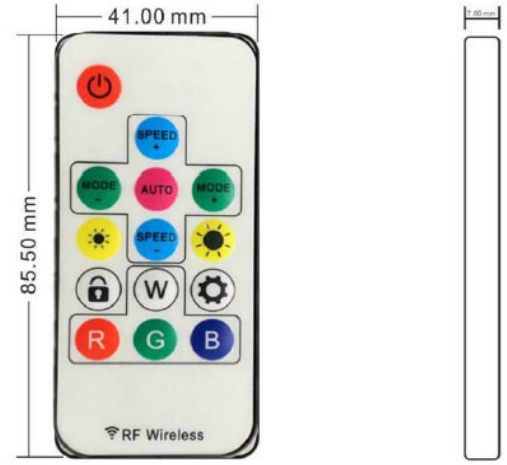
**When 1:1.2ms +0.4ms is programmed for 1, the pulse width range of 1.2 should be enlarged as much as possible. The range of 1.2 is between 0.8 and 1.4**

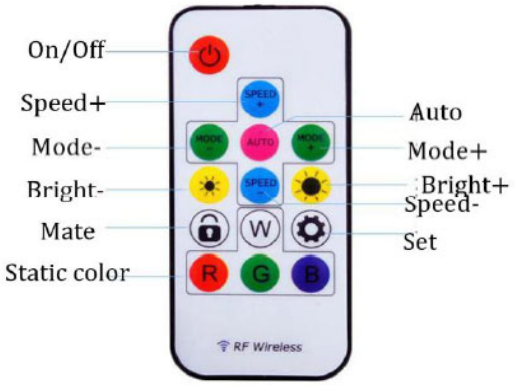
**The receiving and decoding takes the receiving 12ms interval time as the starting signal, and the 12ms interval time is regular. When receiving and decoding, the interval range is set between 8ms and 15ms to filter out some interference signals from external devices.**

**Note: The pulse width in the protocol is the standard length. The actual mass-produced products will have slightly longer pulse width due to the discreteness of MCU timing sequence Deviation, programming attention to software tolerance, tolerance range as far as possible.**

# Remote control picture and code table

**Remote control picture**




**Code value of the remote control: roll**