

PATATO 27MHz AM Transceiver Kit

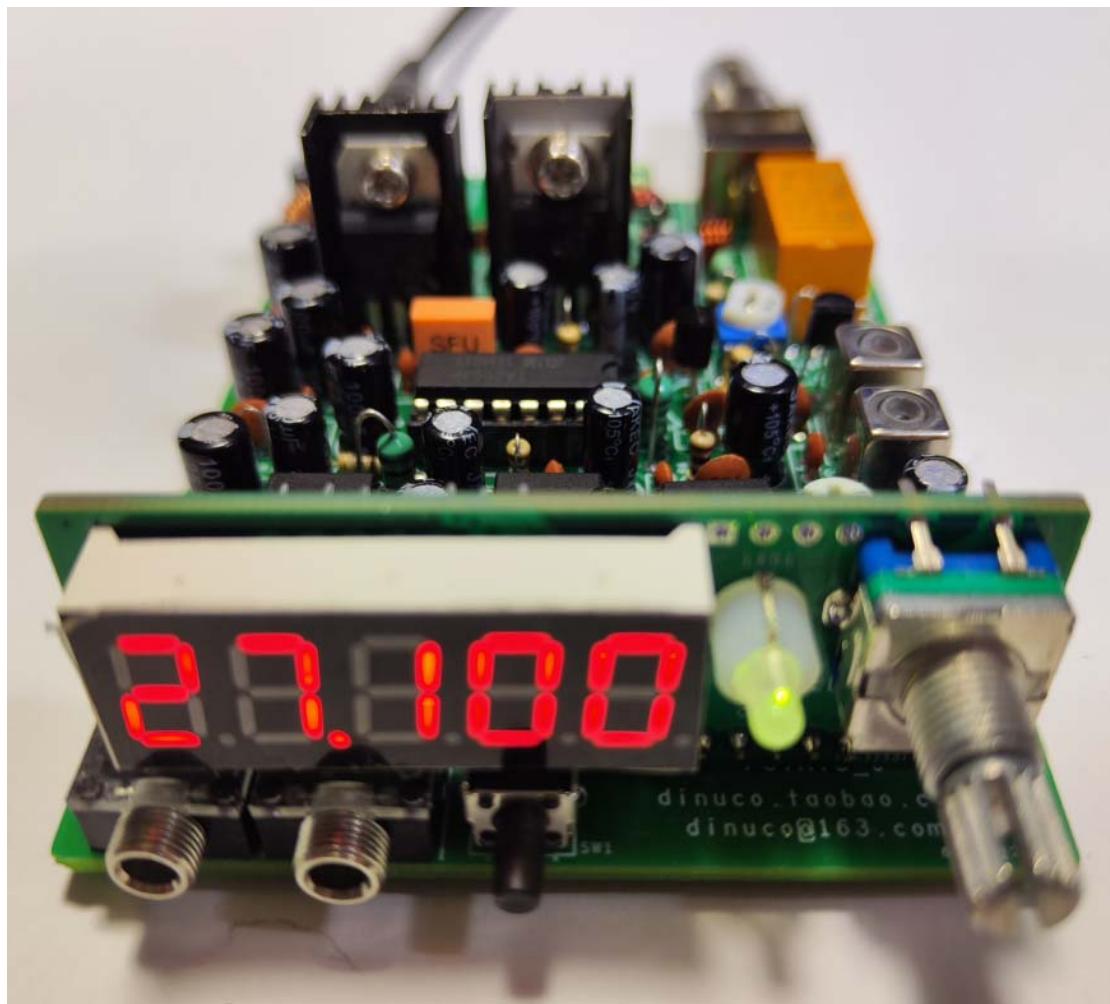
Assemble Manual V6.0

Overview

"PATATO" is designed by DINUCO. It is controlled by STC8H1K17 single chip microcomputer, A PLL device is used as local oscillator, and a high-speed driver chip is used as MOS FET driver, The 5W Class E power output is realized, and the LM386 is used to amplify the audio, and then the TIP42 is driven to modulate the Class E transmitting circuit.

The kit was developed by us, combined with the actual use of the domestic situation, corrected several key problems, after many debugging to form the current version.

The hardware described in this article is V6.0 and the main PCB labelled "POTATO_6".



Specifications

Power supply: 12V-13.8V (linear regulated power supply is recommended)

Antenna: 50 ohms, unbalanced

Typical receive current: 100mA

Typical Transmit current: 1000mA

Transmit power: 5W (PEP)

Operating frequency: 26.965-27.405MHz

Working mode: AM

Circuit Description

Refer to the circuit diagram shown on the last page of this document.

The core of the receiving part is a TA2003, which includes a balanced mixer. The antenna in the signal after two filters, into the mixer, PLL sent out the local oscillator signal, the two signals after mixing, the RF signal conversion to 455KHz IF signal, TA2003 output audio and then sent to the LM386 audio amplification, so as to complete the whole receiving process.

A driver chip is used as a buffer to the MOS FET for class E amplification., and finally the output impedance matching network is matched, and the high-frequency signal is filtered by LPF and then connected to the antenna. After the audio signal is amplified by LM386, TIP42 is driven to modulate the power supply of Class E amplification.

Component selection

L3, L4, and L5 are air core inductors. L3 uses 0.75 mm enamels to wind 6 times on the magnetic ring, L4 and L5 use 0.75 mm enamels to wind 4.5 times and 3.5 times on the 5 mm diameter drill (or pen), **respectively, paying attention to the direction of the circle.**

All capacitors less than 1000pF are high-frequency tiles, capacitors greater than 1uF are aluminum electrolytic capacitors, and all resistors are 1/4W 5% fixed resistors.

Assembly and Adjustment

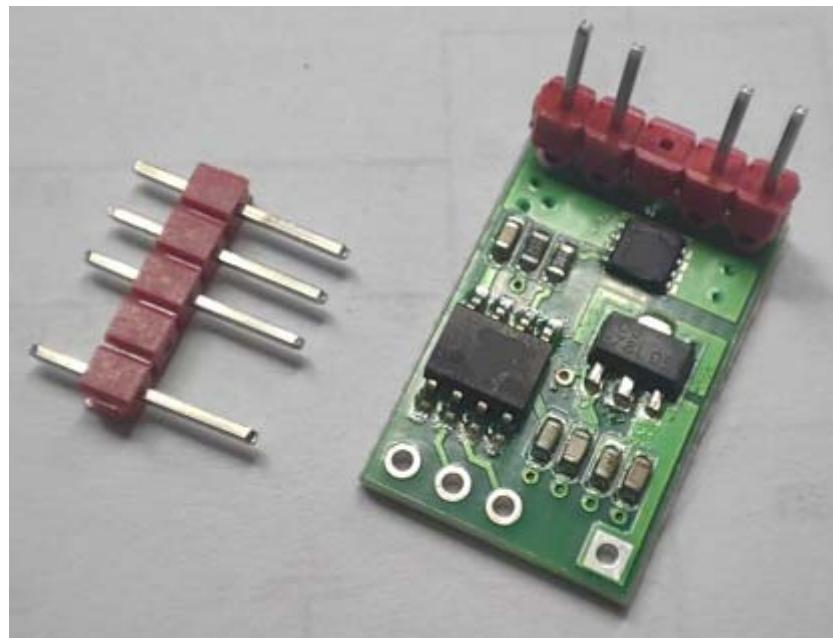
Test all transistors, resistors and capacitors with a multimeter before installing all components. Then install all components against the circuit diagram and the markings on the PCB board.

Generally follow the low to high order of installation. First weld the patch module, and then weld the plug-in device. After welding, check whether there is a solder short circuit.

Due to the MOS field effect tube in the kit, in order to prevent electrostatic breakdown, the soldering iron should be properly grounded or disconnected from the soldering iron power supply and used for waste heat welding.

After welding is completed, do not install devices to the integrated circuit socket, power on to check whether +5V is normal, if abnormal, it means that the MOS FET may weld breakdown, after checking +5V and then install devices to the integrated circuit socket, which can effectively avoid the core integrated circuit welding bad.

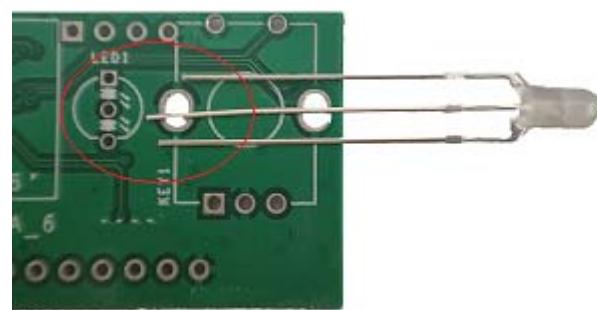
Remove the pin that not used on DRV board.



Please refer to the following figure for the installation direction of the DRV driver board.



Pay attention to the LED direction.



Note that insulation sheets and washers are not required for the 7805 heat sink, while insulation sheets and washers are required for the TIP42.



Everything is in order, check and then connect the power supply, the positive and negative

polarity of the power supply must not be connected wrong. Plug your Walkman headphones into the headphone socket and you should hear white noise. Connect 51 ohm resistance at the antenna end to make a fake load, connect the start meter, press PTT, modulate W2, and detect the whole machine emission current, which should be about 1.1A, W2 can not turn clockwise to the end.

Then hold a radio with shortwave reception capability next to it, press PTT, and adjust W1 to receive the best sound.

Note: 1 hand microphone needs to be close to speak in order to normal use, 2 W1 and W2 need to be adjusted to the most appropriate position repeatedly, and do not launch for a long time.

When receiving, select a frequency signal, carefully adjust T1 and T2, and receive the maximum sound. It is recommended to use a non-inductive driver or a plastic driver for adjustment.

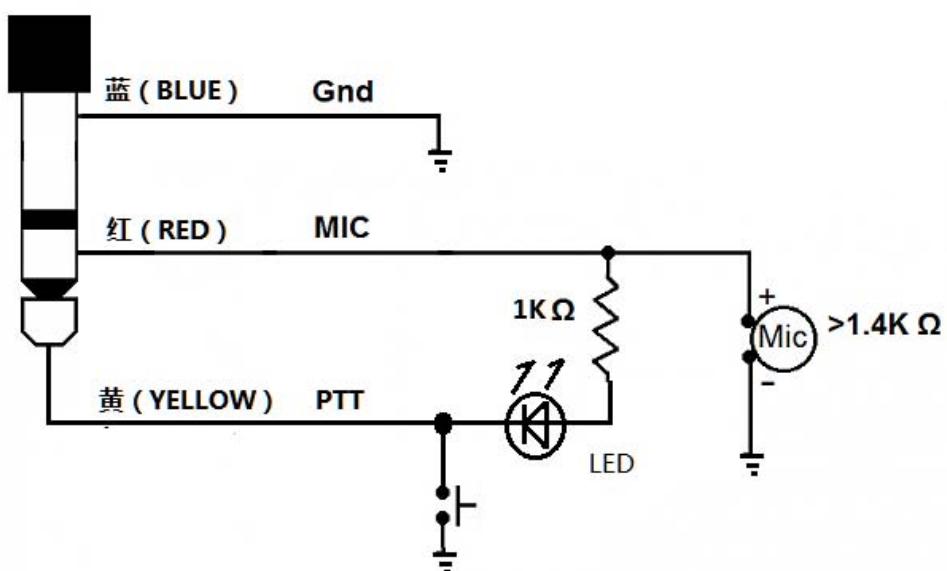
The power plug(5.5/2.1) requirements of the machine are as follows:



Instructions for use

When adjusting the frequency, if you press the encoder once, the machine will automatically change from 1KHz step to 10KHz step, which is convenient for quick adjustment, if you press the encoder again, the machine will return to 1KHz step.

There is a stereo plug in the kit. After opening the back cover, solder the microphone wire to the plug in the colors indicated in the image below.



1 After the machine is powered on for the first time, the machine is in frequency adjustment mode by default, and the digital LED displays numbers, representing the frequency value. The panel display as the following:



2 Do not press the SET button first, rotate the encoder to see whether the display frequency of the digital LED display changes.

3 Connect the antenna or fake load, press the set button, then C1_15 will be displayed, keep pressing the button, exit the configuration mode when C3_68 is displayed, and enter the working mode again. All modes are described as follows:

C1 15 Sound Settings. The default is 15 and can be adjusted between 0 and 25. The higher the volume, the louder the sound.

C2 15 Squelch threshold setting, default 15, can be adjusted between 0-25, the larger mean the stronger audio signal.

C3 55 crystal filter center frequency setting, the default setting is 55, the unit is 100Hz, the default IF frequency is 10 695000Hz +55*100Hz, if there is an error in the IF frequency, not aligned with the filter center frequency, you can fine-tune this value.

C4 53 25MHz Clock offset. The default value is 53 (unit: 100Hz). The default frequency is 25000Hz +53*100Hz. If there is any error in the receiving frequency, the 25MHz clock frequency on the PLL small board can be measured by the frequency meter, and the clock frequency offset can be adjusted according to the test value.

Note: C3 C4 can only be set with instruments and experience, and the modified value will not take effect immediately. You need to exit the configuration mode and adjust the working frequency to take effect.

Because it takes time to configure the EEPROM in the MCU, do not power off at will during configuration to avoid misoperation.

If the configuration is wrong, do not panic, hold down the SET key, re-power on, the machine will be restored to the default setting according to the SET key state.

Chassis mounting

This circuit board can be conveniently placed in a standard aluminum profile case with a size of 76mm*35mm*100mm (this case is not included in this kit, please purchase it yourself if necessary).

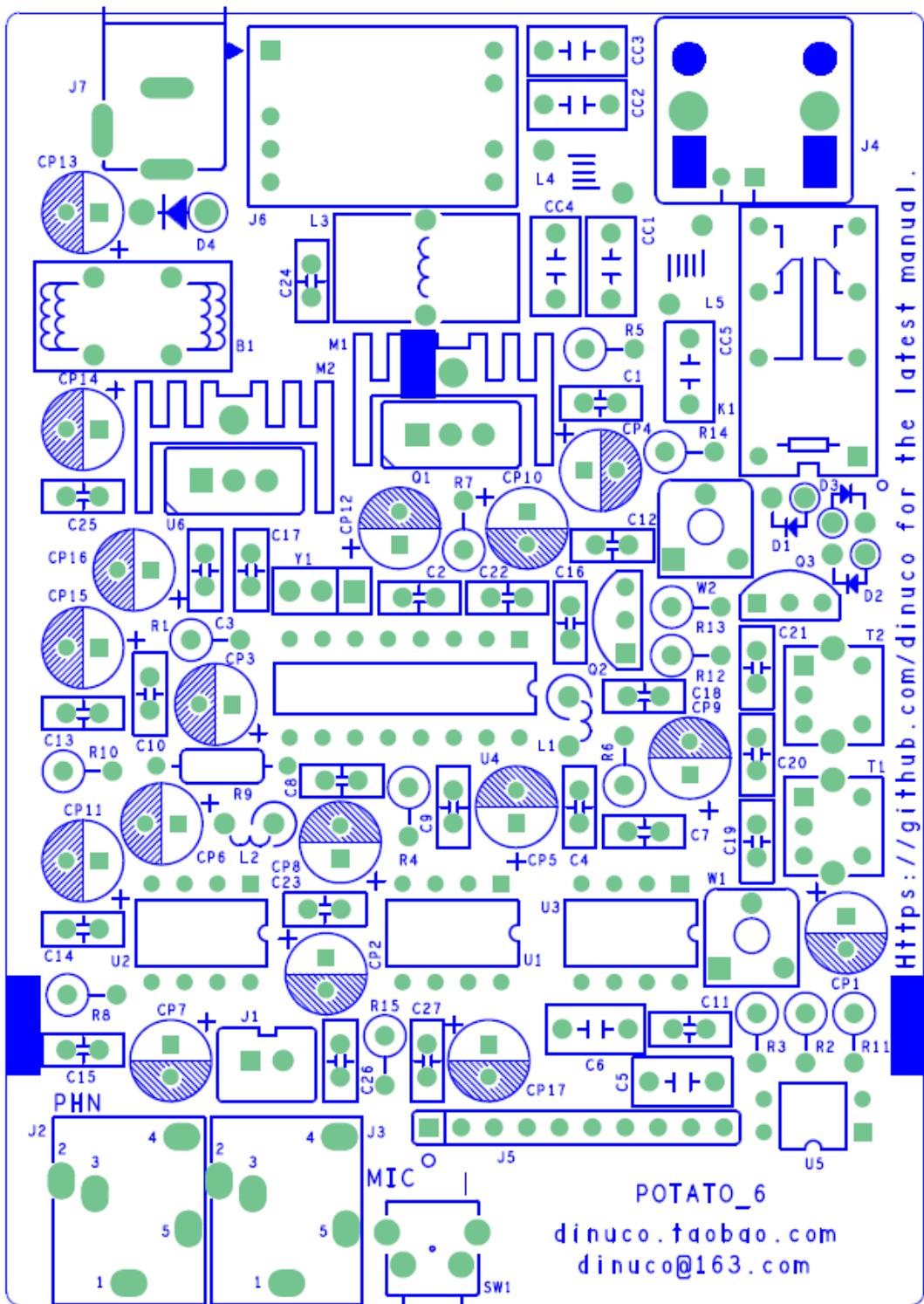
Parts List

| 1/4W resistor and adjustable resistor | | |
|---|---------------------|---|
| R1,R15 | 100 | |
| R2 | 4.7K | |
| R3,R5,R7,R11,R14 | 1K | |
| R4 | 10K | |
| R6,R8,R9,R10 | 10 | |
| R12 | 470 | |
| R13 | 100K | |
| W1 | 1K |  |
| W2 | 10K |  |
| Magnetic beads, inductors, transformers | | |
| T1,T2 | 7x7 IF transformer |  |
| L1,L2 | 100uH |  |
| ,L3 | N1065 Magnetic ring |  |
| L4,L5 | 0.75-5mm | air core inductor |
| B1 | T120604 | Common-mode inductance |
| Chip capacitance | | |
| C1,C2,C3,C7,C10,C11,C12,C13,C14,C15,C18,C24,C25,C26,C27 | 0.1uF(104) | |
| C23 | 100pF(101) | |
| C4,C8,C9,C16,C17,C22 | 0.01uF(103) | |
| C19,C21 | 18pF | |
| C20 | 2pF | |
| C5,C6 | 3.3uF /50V | |
| CC4 capacitor | | |
| CC1 | 120pF | |

| | | |
|--|---------------------|--|
| CC2, | 680pF | |
| CC3 | 240pF | |
| CC4,CC5 | 330pF | |
| Electrolytic capacitance | | |
| CP3,CP9,CP11,CP15,CP16 | 100uF /25V | |
| CP4,CP7,CP13,CP14,CP17 | 220uF /25V | |
| CP1,CP2,CP5,CP6,CP8,CP10 | 10uF /25V | |
| CP12 | 47uF /25V | |
| Transistor | | |
| D1,D2,D3 | 1N4148 | |
| D4 | P6KE16A | |
| Q1 | TIP42 | insulation pad and ring are required for heat sink |
| Q2 | J310 | |
| Q3 | 8050 | |
| Switch | | |
| SW1 | Button | |
| IC | | |
| U1,U3 | LM386 (DIP8) | with IC socket |
| U2 | FM62429 (DIP8) | with IC socket |
| U4 | TA2003 (DIP16) | with IC socket |
| U5 | PC817 | |
| U6 | 7805 (TO220) | with heat sink |
| Other device | | |
| J1 | Speaker socket | SPK |
| J2 | 3.5mm stereo socket | PHN (audio output) |
| J3 | 3.5mm stereo socket | MIC (input microphone) |
| J4 | BNC (Q9) socket | |
| J5 | CON10 Inserting pin | Connected to the LED display board |
| J6 | DRV Board | |
| J7 | Power socket | |
| K1 | HK19F-12V relay | |
| Blank PCB board ×1pcs and DRV board ×1pcs | | |
| Diameter 0.75mm enamelled wire | | |
| The display board includes a circuit board, a 3mm LED, a digital LED display, and an encoder | | |

After receiving the device, please check whether there is any missing, please contact us if there is any problem.

PCB Assembly Drawing



Resistor Color Codes and Ceramic Capacitor Identification

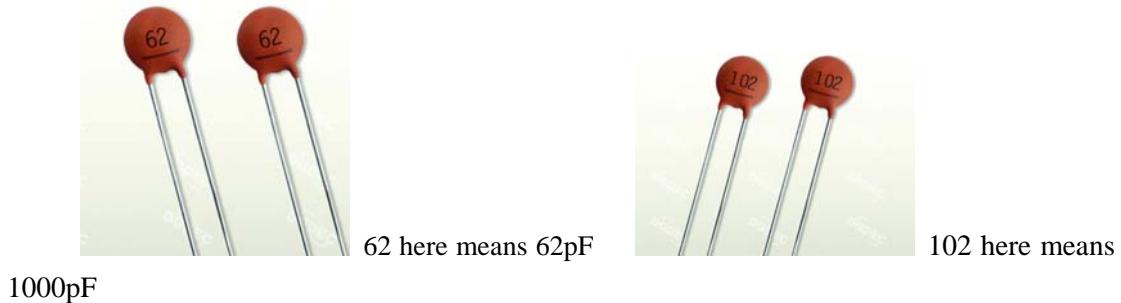
Resistors are marked using colored bands. Most resistors are 5% accuracy parts and marked with four bands. Less common 1% accuracy resistors are marked with 5 color rings. The following table can be used to read the value of these resistors:

电阻色环对照表

| 四环 | 五环 | 六环 | 温度系数 PPM/ $^{\circ}\text{C}$ | 误差 % | 乘数 (W) | 代表数值 | | | | | |
|-----------|----------|------------|------------------------------|---|--|-------------------|----|----|----|----|-----|
| | | | 100 50 15 25 | $\pm 1\%$ $\pm 2\%$ | 10^1 10^2 10^3 10^4 10^5 10^6 10^7 10^8 10^9 10^{-1} 10^{-2} | 1 2 3 4 5 6 7 8 9 | | | | | |
| | | | 10 5 | $\pm 0.5\%$ $\pm 0.25\%$ $\pm 0.1\%$ $\pm 0.05\%$ | | | | | | | |
| | | | 1 | $\pm 5\%$ $\pm 10\%$ | | | | | | | |
| 10K, 0.5% | 470K, 1% | 2.2K, 0.1% | 15PPM | | | | | | | | |
| 黑色 | 棕色 | 红色 | 橙色 | 黄色 | 绿色 | 蓝色 | 紫色 | 灰色 | 白色 | 金色 | 银白色 |

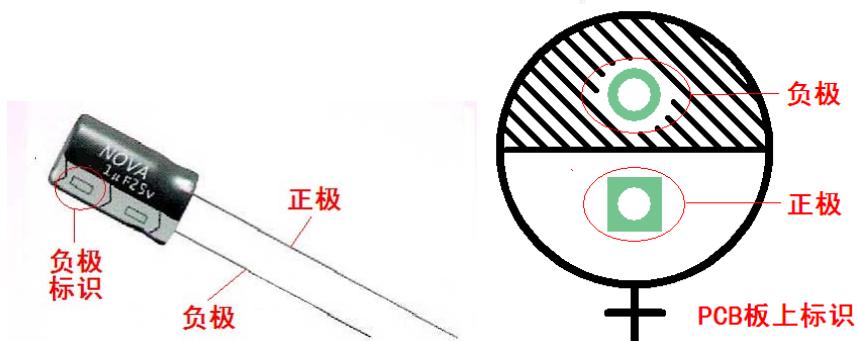
The capacitance of ceramic capacitors is generally denoted in units of pF (p meaning pico or 10^{-12}). However, some parts are directly labeled, such as 1000p, 220p, etc.

Most are labelled in exponential terms, such as 102,221. The first two digits are two most significant digits of the capacitor's value, the last digit being the number of zeros added after these digits. For example, "102" means that the leading digits are 10, while 2 means that 2 more zeros are added, i.e. 1000pF. Similarly, "221" means that the leading digits are 22, and 1 means that one further zero is added, i.e. 220pF.

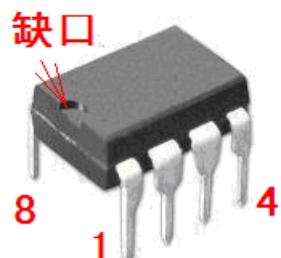


Polarity of Electrolytic Capacitors

Electrolytic capacitors are polarised. Please make sure that the positive and negative pins of these capacitors correspond correctly to the PCB markings when inserting these parts.



IC Identification

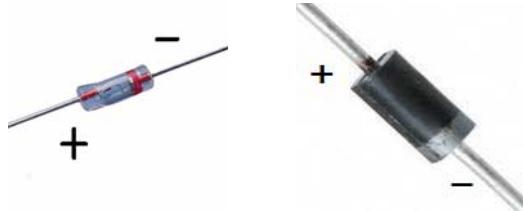


8 脚直插管脚排列

Identification of Transistors and Diodes

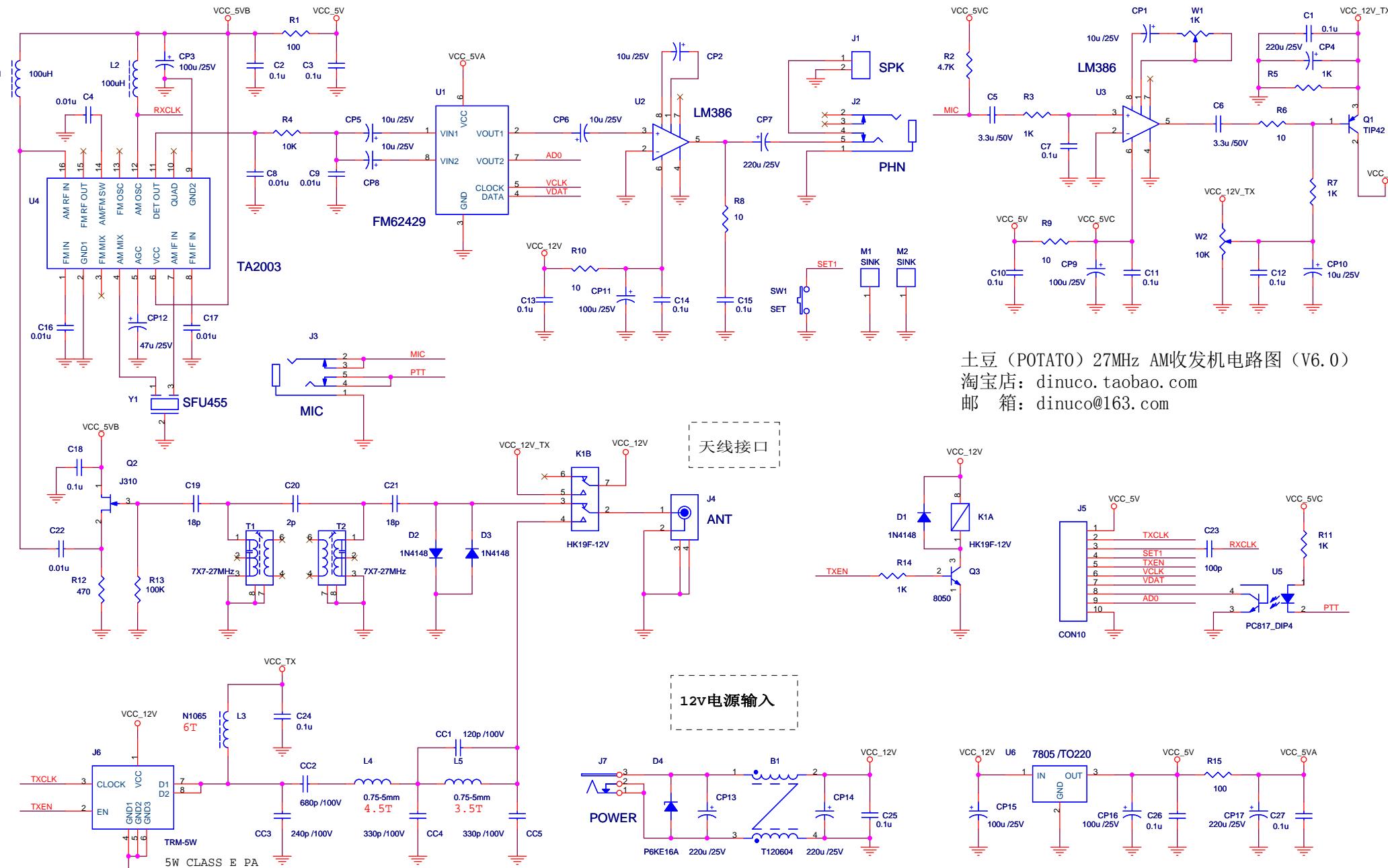


TO-92 package pin arrangement



1N4148 diode polarity

P6KE16A diode polarity



土豆 (POTATO) 27MHz AM收发机电路图 (V6.0)
淘宝店: dinuco.taobao.com
邮 箱: dinuco@163.com

| | | | | |
|------------------------------------|------------------------------------|----------------|--|--|
| Title | | 01.MAIN | | |
| Size A3 | Document Number POTATO_6 | Rev 6.0 | | |
| Date: Monday, November 17, 2025 | Sheet 1 | of 1 | | |

