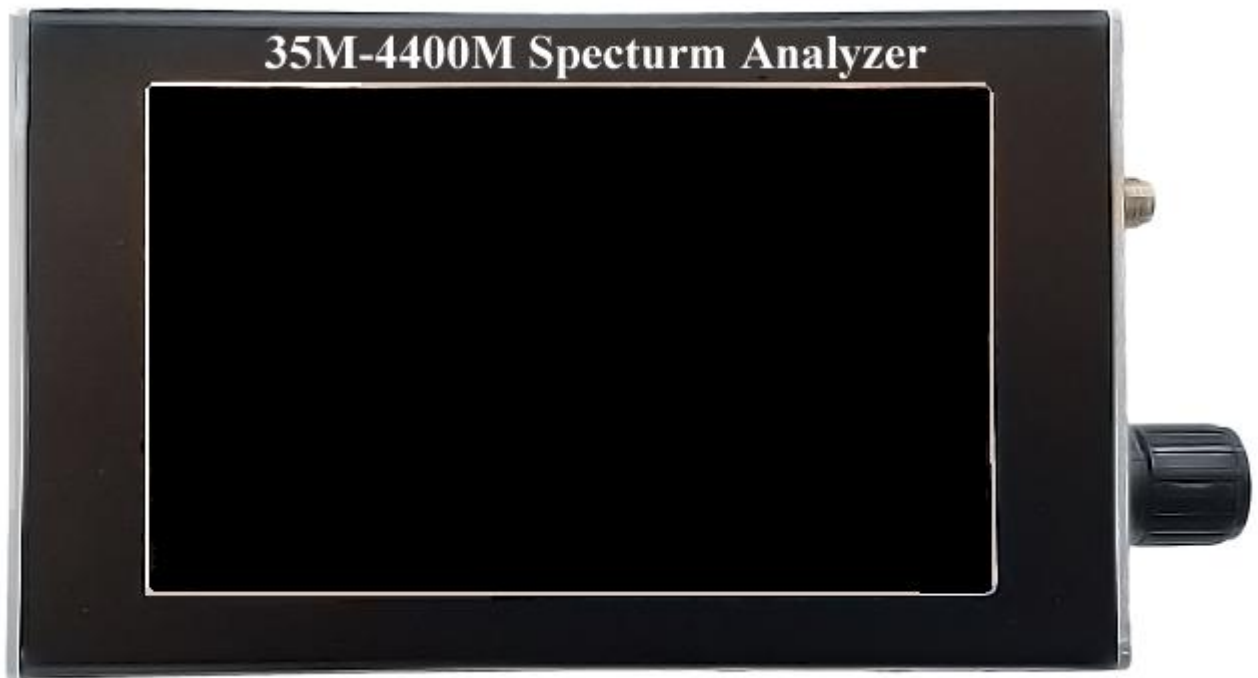


# LTDZ\_35M-4400M 手持频谱仪使用说明书

LTDZ- 35m-4400m handheld spectrometer Operation manual

(中文@English)



## 一、产品描述

1、尺寸：145mm\*70mm\*30mm。

2、重量：250g(不含电池)。Weight: 250g (excluding battery).

3、采用 stm32f407 单片机（主频 168M ）+4.3 寸 TFTLCD （480\*800）彩色液晶屏幕。

4、全铝合金外壳+旋转编码器控制+全英文显示界面+usb 供电。

5、支持 usb 供电和锂电池供电两种模式。因为运输安全因素，厂家不配电池，用户如果需要可以自己增加一块电池，产品内部已经集成锂电池充电电路，简单安装既可，配有安装电池方法。

## 1、Product description

(1).Size: 145mm \* 70mm \* 30MM.

(2) .Weight: 250g (excluding battery). Weight: 250g (excluding battery).

(3). Adopt stm32f407 single chip computer (main frequency 168m) + 4.3-inch TFTLCD (480 \* 800) color LCD screen.

(4). All aluminum alloy shell + rotary encoder control + all English display

interface + USB power supply.

(5). USB power supply and lithium battery power supply are supported. Because of the transportation safety factor, the manufacturer does not have batteries. If the user needs to add a battery, the product has integrated the lithium battery charging circuit, which is easy to install and equipped with the battery installation method.

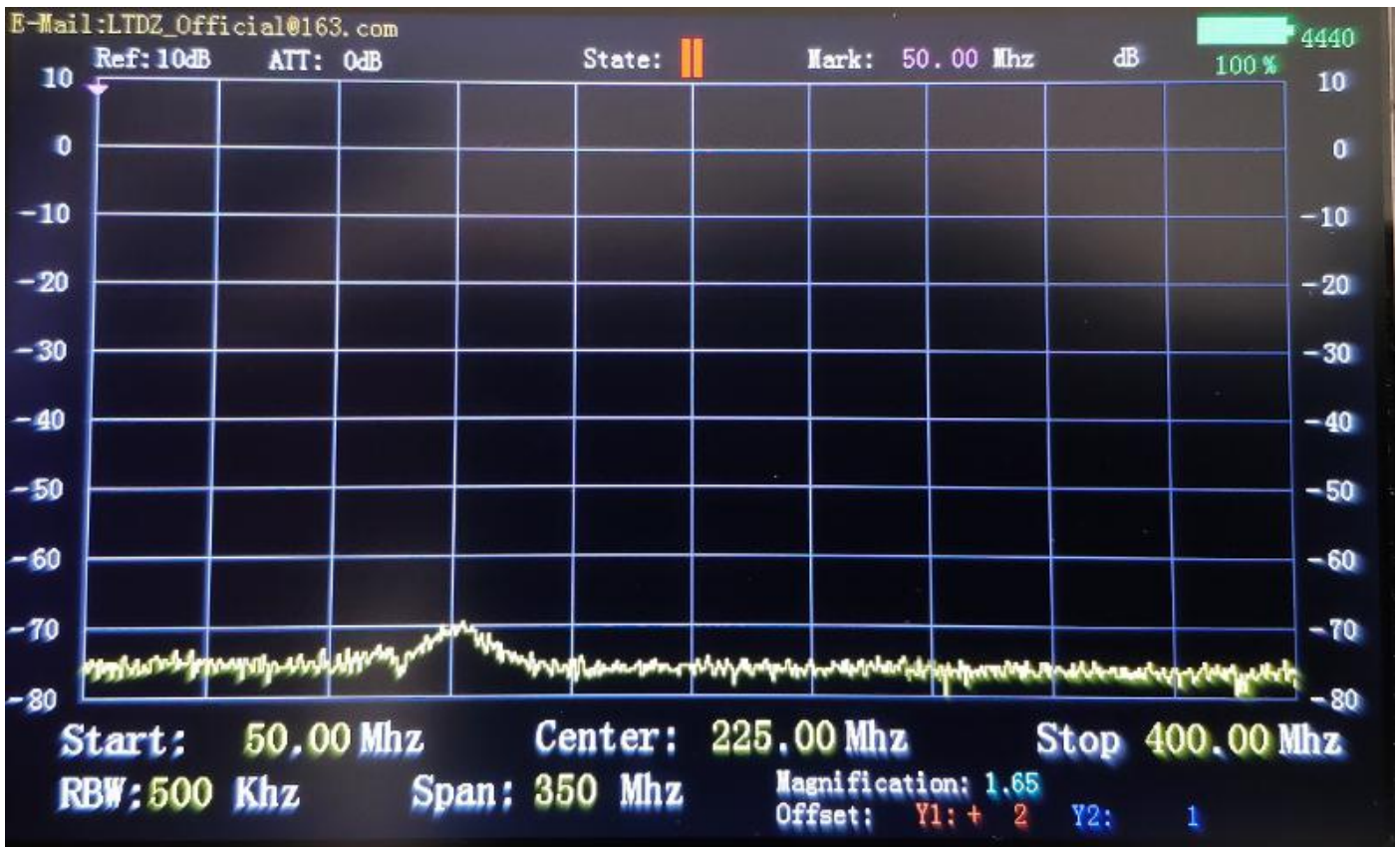
## 二、性能指标

- 1、频谱显示范围：35M-4400Mhz；输入阻抗：50 欧姆。
- 2、RBW: 10khz、50khz、100khz、200khz、500khz 共计 5 个档位可调。
- 3、屏幕扫描点数：700 点。
- 4、扫描跨度：7M(10Khz)、35M(50khz)、70M(100Khz)、140M(200Khz)、350M(500Khz)。
- 5、dBm 范围：-80dB -----10dB（支持手动调整校准幅度），本机内部不带放大电路，如需要测量小信号，需要外置放大器。
- 6、最大接入信号：10dB。
- 7、工作方式：超外差扫描式频谱仪，单次扫描时间 800ms。

## 2. Performance index

- (1). Spectrum display range: 35m-4400mhz; input impedance: 50 ohm.
- (2). RBW: 10kHz, 50KHz, 100kHz, 200kHz and 500KHz are adjustable.
- (3). Number of screen scanning points: 700.
- (4). Scanning span: 7m (10kHz), 35m (50KHz), 70m (100kHz), 140m (200kHz), 350m (500KHz).
- (5). DBM range: - 80dB ----- 10dB (support manual adjustment of calibration amplitude). There is no amplification circuit inside the machine. If small signal needs to be measured, external amplifier is required.
- (6). Maximum access signal: 10dB.
- (7). Working mode: superheterodyne scanning spectrometer, single scanning time 800ms.

### 三、编码功能以及相关设置说明



显示界面 **Display interface**

- 1、通过编码器按键功能，启动扫描和停止扫描。
- 2、在扫描模式中，旋转编码器可以改变浮标位置。
- 3、在停止扫描时，旋转编码器，可以选择需要改变的选项值，通过按键和旋转进行更改相关参数。

4、Magnification offset(Y1 Y2)可以微调显示频谱的放大倍数和偏移量

1. Start scanning and stop scanning through encoder key function.
2. In the scanning mode, the rotary encoder can change the position of the buoy.
3. When scanning is stopped, rotate the encoder, select the option value to be changed, and change the relevant parameters by pressing the key and rotating.
4. The magnification offset (y1y2) can fine tune the magnification and offset of the display spectrum

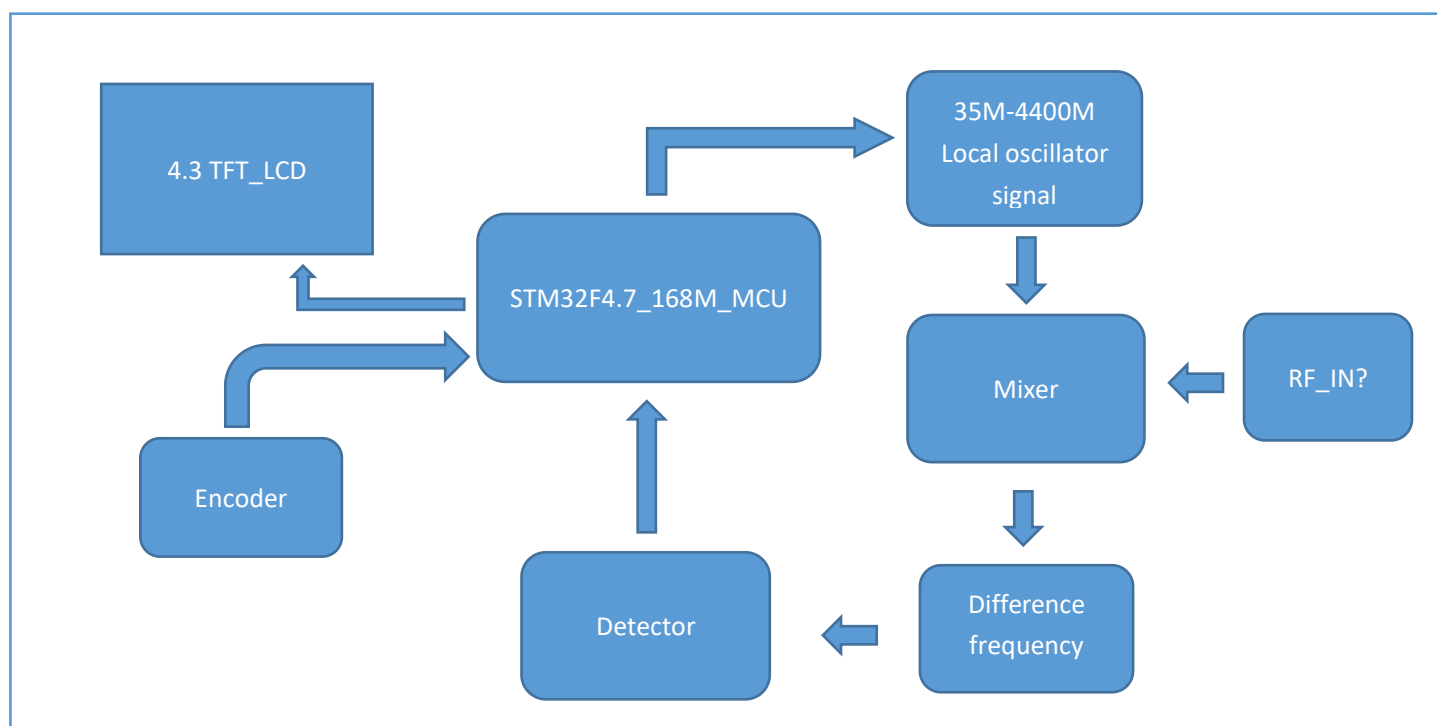
### 四、产品工作原理详解。

本产品采用超外差扫描工作原理。通过 ADF4351 锁相环芯片产生一个 35M-4400M 的基准信号源，与外测信号混频产生差频信号，通过滤波器后进入检波器电路，对差频信号幅度进行检波，变换成电压信号送入单片机 ADC 进行采样。单片机经过处理以后通过 4.3 寸

TFT 显示屏显示出频谱。扫描式频谱仪，可以非常准确的测出 35M-4400M 频率范围的待测信号频率，通过检测差频幅度估算出待测信号幅度。因为扫描范围非常大(35m-4400m)，不同频段的硬件电路是一样的，所以所测幅度会有误差，为了解决此问题，增加了增益倍数 (magnification ) 和偏移 (offset Y1 Y2) 两个功能。

#### 4. Detailed explanation of product working principle.

This product adopts superheterodyne scanning principle. A 35m-4400m reference signal source is generated by adf4351 PLL chip, and the difference frequency signal is generated by mixing with the external measurement signal. After passing the filter, it enters the geophone circuit to detect the difference frequency signal amplitude and transform it into voltage signal and send it to the single chip ADC for sampling. After processing, the single-chip microcomputer displays the spectrum through a 4.3-inch TFT display screen. Scanning spectrometer can measure the frequency of the signal to be measured in the frequency range of 35m-4400m, and estimate the amplitude of the signal to be measured by detecting the difference frequency amplitude. Because the scanning range is very large (35m-4400m), the hardware circuits of different frequency bands are the same, so there will be errors in the measured amplitude. In order to solve this problem, two functions of gain multiple and offset y1y2 are added.



工作原理框图 Working principle block diagram

## 五、微调控制相关说明

### 1、源代码关于数据处理相关设置

```
ADC0=750-Offset_Y1-((Get_Adc(0)+Offset_Y2)>>2)*Magnification;
```

### 2、相关参数说明

ADC0: 处理后的最终结果

Offset\_Y1: 波形上下移动参数 (默认为 10)

Get\_Adc(0): 检波器测得差频信号电压值

Offset\_Y2: 单片机测得差频信号原始电压值 (默认为 0)

Magnification: 波形放大倍数 (默认为 1.57)

### 3、修改后效果

更改 Offset\_Y1, 屏幕显示波形会明显整体抬高或者下移。

更改 Magnification, 会明显放大或者缩小频谱图高度。

更改 Offset\_Y2, 会修改原始 adc 数据的偏移量, 会轻微调整频谱图的高度, 慎用。

## 5. fine-tuning control related instructions

(1), the source code on the data processing related settings  $ADC0 = 750 - Offset\_Y1 - ((Get\_Adc(0) + Offset\_Y2) \gg 2) * Magnification;$

(2), related parameter description

ADC0: Final result after processing

Offset\_Y1: Waveform up and down movement parameters (default is 10)

Get\_Adc(0): The detector measures the difference frequency signal voltage value

Offset\_Y2: The original voltage value of the difference frequency signal measured by the single-chip microcomputer (default is 0)

Magnification: Waveform magnification (default is 1.57)

(3), the effect after modification

changed Offset\_Y1, the waveform on the screen will be significantly raised or lowered overall.

Changing Magnification will significantly enlarge or reduce the spectrogram height.

Changing Offset\_Y2 will modify the offset of the original adc data, which will

slightly adjust the height of the spectrogram and use it with caution.

六、客户自己增加电池教程 Six, customers increase their battery tutorial

1、拧下挡板螺丝 1. Unscrew the bezel screw



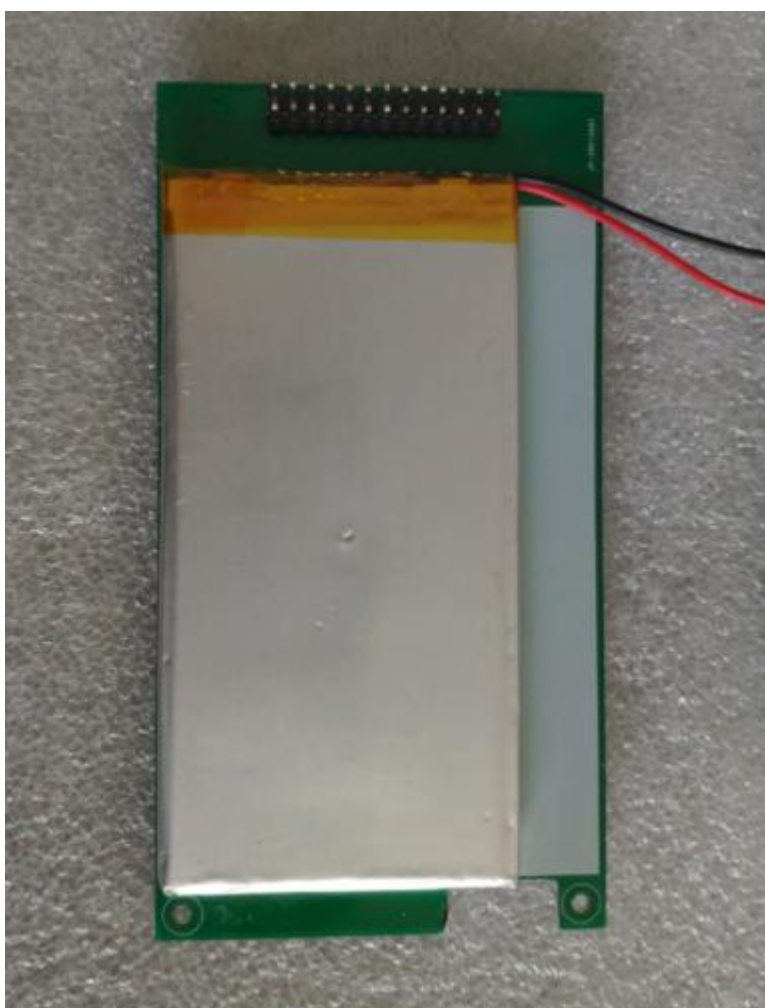
2、拆下屏幕 2, remove the screen



3、焊接电池。Welding the battery. "+" red; "-" black;



4、电池按照正负极焊接好以后，将电池粘到屏幕背面。4. After the battery is soldered to the positive and negative poles, stick the battery to the back of the screen.



电池尺寸：50\*100\*5mm Battery size: 50 \* 100 \* 5mm

5、组装好屏幕，装进外壳，拧上挡板即可。

七、感谢支持本产品，如果您有问题或者建议可以发送邮件到

LTDZ\_Official@163.com

Thank you for supporting this product. If you have any questions or suggestions, you can send an email to [ltdz-official@163.com](mailto:ltdz-official@163.com)

# Over And Thanks!

LTDZ

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