FNIRSi 菲尼瑞斯

2C53T

50M双通道示波器万用表

50M DUAL CHANNEL OSCILLOSCOPE MULTIMETER MANUAL

目 录

CATALOG

用户须知

- 本手册详细介绍了产品的使用方法和注意事项,请仔细阅读本手册按说明规范使用本产品,以便发挥产品的最佳性能。
- 不要在易燃、易爆的环境中使用仪器。
- 仪器更换的废旧电池和报废的仪器不可与生活垃圾一同处理,请按国家或者当地的相关法律规定处理。
- 仪器出现任何的质量问题,或对使用仪器有任何疑问时,请及时联系我们,我们将第一时间为您解决。

一、产品简介

FNIRSI-2C53T是FNIRSI推出的一款功能全面,高实用性,针对于维修行业和研发行业人群的三合一双通道数字示波表。该设备具备了示波器、万用表以及信号发生器三大功能。示波器采用FPGA+MCU+ADC硬件架构,具有250MS/s的采样率,50Mhz模拟带宽,内置高压保护模块,最大支持±400V的峰值电压测量;支持波形截图保存、查看,方便进行二次分析。万用表功能为4位半20000点真有效值,支持交直流电压电流测量,电容、电阻、二极管、通断等测量功能,无论专业人员、工厂、学校、爱好者或家庭使用,均为一台理想的多功能仪表。内置DDS函数信号发生器,可输出13种函数信号,所有信号最大输出50KHz,步进1Hz;输出频率、幅值、占空比可调。使用2.8寸320*240分辨率高清液晶显示屏,内置3000mAh可充电锂电池,待机时间长达6小时。以小巧的体积给用户提供更多、更强的实用功能,同时具有很好的便携性。

示波器通道1接口

示波器通道2接口

函数信号发生器输出口

屏幕显示

按键区域

万用表接口

充电指示灯

充电接口

复位按键

设备支架

三、整机参数

屏幕	2.8寸真彩屏
分辨率	320*240
充电	TYPE-C（5V/1A）
电池	3000mAh锂电池
支持功能	示波器、信号发生器、数字万用表（详见功能参数）
待机时间	6小时（实验室理论最大值）
产品尺寸	167x89x35mm
重量	300g

四、按键与功能介绍

1.1示波器-按键操作说明

按键	按键方式	功能
⏻	短按	关机/开机
MENU	短按	返回
	长按	主页（功能选择页）
CH1	短按	CH1设置
CH2	短按	CH2设置

按键	按键方式	功能
AUTO	短按	AUTO
	长按	基线校准※
II▶	短按	运行停止
	长按	50%居中
SAVE	短按	保存
	长按	进入九宫格
CH1⇄CH2 **MOVE**	短按	切换CH1 / CH2调节
	长按	快捷进入万用表
SELECT	短按	选择方向键移动的功能
	长按	快捷进入示波器
✿ **TRIGGER**	短按	触发设置
	长按	快捷进入信号发生器
PRM	短按	参数选择
	长按	显示测量参数/隐藏测量参数

※基线校准过程时间较久,请耐心等待,校准过程中请勿操作设备,如不慎操作设备打断校准,请重新校准。(基线校准需拔出探头校准)
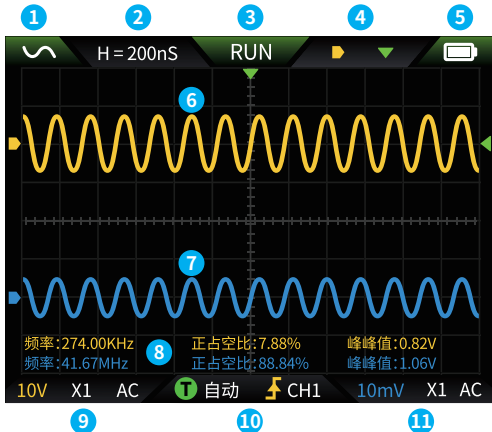
①**函数型号发生器接口状态提示：**13种波形：正弦波 ∿ 、矩形

波 ⊓⊔ 、锯齿波 ⋀ 、半波 ∩ 、全波 ⋀ 、正阶梯波 ⌐ 、

反阶梯波 ⌐ 、指数升 ⟋ 、指数降 ⟍ 、直流 ▬ 、多音

频 ⋀ 、辛克脉冲 ⋀ 、洛伦茨波 ⋁ ，灰色代表波形输出关闭。

②**时基：**水平时基,表示水平方向一大格代表的时间长度

③**触运行暂停指示图标：**RUN表示运行,STOP表示暂停

④ V H ：代表左右按键控制时基,上下按键控制通道的(黄色代表通道

1, 蓝色代表通道2) 垂直灵敏度；

▶ ▼ ：代表左右按键控制水平触发移动,上下按键控制通道(黄色代

表通道1,蓝色代表通道2) 波形上下移动；

◀ ▼ ：代表左右按键控制水平触发移动,上下按键控制触发电平移动；

X1 Y1 ：当光标测量开启时, 代表上下按键控制光标上下移动

左右按键控制光标左右移动

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⑤**电量指示灯：**足电 和不足电 ，当电量过低的时候会弹窗提示电量过低倒计时自动关机。

⑥**通道1数据采集的波形**   ⑦**通道2数据采集的波形**

⑧**测量参数显示**   ⑨**通道1垂直灵敏度、探头倍率、耦合展示**

⑩**触发模式、触发沿、触发通道展示**

⑪**通道2垂直灵敏度、探头倍率、耦合展示**

1.3示波器-波形截屏保存

①**保存截图：**短按 **SAVE**，会弹窗提示 **保存中...**，如右图；预计2秒后会弹窗保存成功。

此时波形界面已储存BMP格式的图片，图片命名会已"img_序号"命名，可以机器自身查看删除，也可以插入TYPEC连接电脑查看。

②**查看截图：**长按 **SAVE** 进入查看保存波形截屏页面，按 ▌▌▶ 进入已保存波形截屏界面， 依次对应

 四个按键，多选波形操作时，方向键选择对应波形，▌▌▶ 按键勾选。

> ⚠ **注意**
>
> 存满了必须手动删除才能再存

通道	双通道
采样率	250MS/s
模拟带宽	50M（双通道独立50M）
存储深度	1Kpts
输入阻抗	1MΩ
时基范围	10ns-20s
垂直灵敏度	10mV/div-10V/div（X1档）
最大测量电压	±400V
触发模式	自动、正常、单次
触发类型	上升沿、下降沿
显示模式	Y-T/滚动/X-Y
耦合	交流/直流
余晖	OFF、500ms、1s、∞
运算	8种基础运算+FFT运算
波形截屏保存	支持
导出波形图像	支持
光标测量	支持

按键	按键方式	功能
⏻	短按	关机/开机
MENU	短按	返回
	长按	返回主页(功能选择页)
�II▶	短按	确认
	长按	运行 / 停止
C1⇆C2 MOVE	长按	快捷进入万用表
◄♦► SELECT	长按	快捷进入示波器
✿ TRIGGER	长按	快捷进入信号发生器
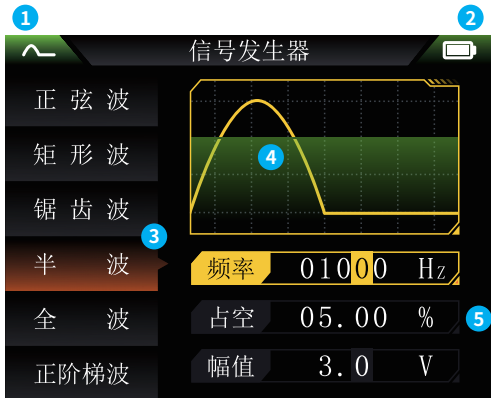
① **输出状态指示：**共13种：详细状态见07页1.2-①描述。

② **电量指示灯：**足电 🔋 和不足电 🔋，当电量过低的时候会弹窗提示电量过低倒计时自动关机。

③ **输出波形选择，共13种：**正弦波、矩形波、锯齿波、半波、全波、正阶梯波、反阶梯波、指数升、指数降、直流、多音频、辛克脉冲、洛伦茨波

④ **波形示意图：灰色代表关闭。**

⑤ **波形调节的参数**

操作：先按方向键上下选择输出的波形，然后在按方向键右按键进入波形设置参数（通过方向键调节完成设置）

2.3函数信号发生器-参数

通道	单通道
频率	1Hz-50KHz
幅度	0.1-3.0V

3.1数字万用表-按键说明

按键	按键方式	功能
⏻	短按	关机/开机
MENU	长按	主页(功能选择页)
AUTO	短按	自动测量
❚❚▶	短按	数据保持
ⓒ1⇆ⓒ2 MOVE	短按	切换交流/直流、二极管/通断等
◀	短按	根据UI向左依次切换档位
▶	短按	根据UI向右依次切换档位

①**REL：**相对测量

②**具体测量的档位**

③**电量指示**

④**量程刻度条**

⑤**HOLD：**数据保持

⑥**测量的数值**

⑦**档位状态指示：**黄色代表选中，灰色未选中

⑧**测量的当前档位的数值中的最大值与最小值的平均值**

大电流测量:红笔接10A,黑笔接COM。

⚠ 注意

被测电流大于10A会烧坏保险丝,测量前请初步评估电流。

小电流测量:红笔接mA,黑笔接COM。

⚠ 注意

被测电流大于1A会烧坏保险丝,测量前请初步评估电流,
如不确定请先使用大电流档位测量。

自动、电压、电阻、电容、温度、二极管/通断测量:红笔接 V Ω ⊣⊢ ✈ •))) 🕭 ,黑笔接COM,测量时请根据需要测量的参数切换相应功能档位。

自动挡：只能自动识别电压、电阻两个档位，测量电压时，会自动识别交流电压/直流电压。

3.4参数

功能	量程	精度
直流电压	1.9999V/19.999V/199.99V/1000V	±(0.5%+3)
交流电压	1.9999V/19.999V/199.99V/750.0V	±(1%+3)
直流电流	19.999mA/199.99mA/1.9999A/9.999A	±(1.2%+3)
交流电流	19.999mA/199.99mA/1.9999A/9.999A	±(1.5%+3)
电阻	19.999MΩ/1.9999MΩ/199.99KΩ/19.999KΩ	±(0.5%+3)
	1.9999KΩ/199.99Ω	±(2.0%+3)
电容	999.9uF/99.99uF/9.999uF/999.9nF/99.99nF/9.999nF	±(2.0%+5)
	9.999mF/99.99mF	±(5.0%+20)
温度	(-55~1300℃)/(-67~2372°F)	±(2.5%+5)
二极管	✓	
通断	✓	

①设置单项选择：

语言		声光设置		开机启动
自动关机	USB共享	关于	恢复出厂设置

②具体设置详情：

【语　　言】：中文，English

【声光设置】：亮度：25~100；声音：0~10

【开机启动】：关、示波器、信号发生器、万用表，该设置用于设置开机自
　　　　　　　启动哪个功能板块。

【自动关机】：关、15分钟、30分钟、1小时。

【USB共享】：开启后可通过USB接口连接电脑传输图片等

【关于】：品牌信息、版本号

【恢复出厂设置】

※先按方向键上下选择对应的设置，然后在按 ||▶ 键右按键进入单项设
置的参数（通过方向键调节完成设置）

六、固件升级

①从官网获取最新的固件，并解压下载到桌面。

②使用USBA转Type-C数据线将设备连接电脑，按住 MENU按键，在按
⏻ 按键进入固件升级模式，此时电脑会弹出U盘；

③将固件复制到U盘，复制成功后，设备自动升级固件。

④观察升级百分比，升级完成后设备将会重启，如升级失败请第一时间联系官方客服。

七、自定义开机界面

1..准备好要替换的开机界面图片，更改命名为"LOGO2C53T.jpg"。

2.将设备开机，使用USBA转Type-C数据线将设备连接电脑

3.进入设置打开USB共享，将准备的开机LOGO拖入设备U盘中的"LOGO"文件夹中。

4. 操作完成后，下次开机就会更新自定义LOGO。

注意：更改LOGO前请仔细核对文件名、图片像素尺寸、格式等。

八、常用电路测试方法

1.电池或直流电压测量

档位选择

电池电压一般在 80V 以下,其他直流电压不确定,需要根据实际情况调节档位,若低于 80V 就用 1X 档位,高于 80V 就用 10×档位。(探头和示波器都设置为同一档)

①首先将示波器设置为 Auto 触发模式(开机后默认为 Auto 触发模式),Auto 触发模式用于测试周期信号(直流电压属于周期信号)。

②示波器设置到相应档位(开机后默认为 1X 档位) 。

③示波器设置为 DC 耦合模式 。

④插上探头,并且将探头手柄上的开关拨动到相应档位。

⑤确保电池有电或者直流电压有电压输出。

⑥将探头夹子接到电池负极或者直流电负极,探针接到电池或直流电正极。

⑦按一次【AUTO】按键,直流电信号就显示出来了,注意,电池电压或其他直流电压都属于直流信号,是没有曲线波形的,只有一条上下偏移的直线,而且这个信号的峰峰值 VPP 和频率 F 都为 0 。

2.晶振测量

档位选择

晶振遇到电容后很容易停止振荡,1X 探头的输入电容高达100~300pF,10X 档位在 10~30pF 左右,在1X档很容易停振,所以需设置为10X档位,即探头和示波器都要切换到 10X 档,(探头和示波器都设置为 10X 档)

①首先将示波器设置为Auto触发模式(开机后默认认为Auto触发模式),
　Auto触发模式用于测试周期信号(晶振谐振正弦信号就属于周期信
　号)。

②示波器设置为 10X 档位(开机后默认在 1X 档位)。

③示波器设置 AC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到 10X 档位。

⑤确保晶振主板已上电并且正在运行。

⑥将探头夹子接到晶振主板的地线上(供电的负极端),将探头帽往外拔出
　来,里面是针尖,将针尖接触到晶振的其中一个引脚。

⑦按一次【AUTO】按键,被测晶振的波形就显示出来了,如果 AUTO 调节后
　的波形过小或过大,可以在缩放模式下手动调节波形大小。

3.MOS 管或 IGBT 的 PWM 信号测量

档位选择

直接驱动 MOS 管或者 IGBT 的 PWM 信号电压一般在10V~20V以内,
PWM 前级控制信号也一般在 3~20V 内,1X 档最高测试 80V,所以测试
　PWM 信号用 1X 档位就足够了(探头和示波器都设置为 1X 档)。

①首先将示波器设置为 Auto 触发模式(开机后默认认为 Auto 触发模式),
　Auto 触发模式用于测试周期信号(PWM 属于周期信号) 。

②示波器设置为 1X 档位(开机后默认认为 1X 档位)。

③示波器设置为 DC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到 1X 档位。

⑤确保 PWM 主板此时有 PWM 信号输出。

⑥将探头夹子接到 MOS 管的 S 极,探针接到 MOS 管的 G 极。

⑦按一次【AUTO】按键,被测 PWM 波形就显示出来了,如果 AUTO 调节后
　的波形过小或过大,可以在缩放模式下手动调节波形大小。

4.信号发生器输出测量

> **档位选择**
>
> 信号发生器输出电压在 30V 以内,1X 档最高测试 80V,所以测试信号发生器输出用 1X 档位就足够了(探头和示波器都设置为 1X 档)

①首先将示波器设置为 Auto 触发模式(开机后默认为 Auto 触发模式),Auto 触发模式用于测试周期信号(信号发生器输出的信号就属于周期信号)。

②示波器设置为 1X 档位(开机后默认为 1X 档位)。

③示波器设置为 DC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到 1X 档位。

⑤确保信号发生器已开机工作并且正在输出信号。

⑥将探头夹子接到信号发生器输出线的黑色夹子上,探针接到信号发生器的红色输出线上。

⑦按一次【AUTO】按键,发生器输出的波形就显示出来了,如果AUTO调节后的波形过小或过大,可以在缩放模式下手动调节波形大小。

5.家用市电 220V 或 110V 测量

> **档位选择**
>
> 家用电一般 180~260V,峰峰值电压为 507~733V,某些国家的家用电为110V,峰峰值电压为 310V,1X 档最高测 80V,10X 档最高测 800V(10X 档最高可承受 1600 峰峰值),所以需设置为 10X 档位,即探头和示波器都要切换到 10X 档。

①首先将示波器设置为 Auto 触发模式(开机后默认为 Auto 触发模式),Auto 触发模式用于测试周期信号(家用电 50Hz 就属于周期信号)。

②示波器设置为 10X 档位(开机后默认在 1X 档位)。

③示波器设置为 DC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到 10X 档位。

⑤确保被测端有家用电输出。

⑥将探头夹子和探针接到家用电的 2 根线上,不用区分正负极。

⑦按一次【AUTO】按键,家用电的波形就显示出来了,如果 AUTO 调节后的波形过小或过大,可以在缩放模式下手动调节波形大小 。

6.电源纹波测量

档位选择

如果电源输出电压在 80V 以下就设置为 1X 档位(探头和示波器都设置为 1X 档),如果在 80~800V 的话就需要设置为 10X 档位(探头和示波器都设置为同一档)

①首先将示波器设置为 Auto 触发模式(开机后默认为 Auto 触发模 式),Auto 触发模式用于测试周期信号。

②示波器设置到相应档位(开机后默认为 1X 档位)。

③示波器设置为 AC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到相应档位。

⑤确保电源已上电并且有电压输出。

⑥将探头夹子接到电源输出的负极端,探针接到电源输出的正极端,并等待大约 10 秒钟,当黄色线和左边黄色箭头位置齐平时结束等待。

⑦按一次【AUTO】按键,电源纹波就显示出来了。

档位选择

逆变器输出电压和家用电差不多,一般也在几百 V 左右,所以需要设置为 10X 档位(探头和示波器都设置为 10X 档)

①首先将示波器设置为Auto触发模式(开机后默认为Auto触发模式),Auto触发模式用于测试周期信号(逆变器输出的信号就属于周期信号)。

②示波器设置为 10X 档位(开机后默认在 1X 档位)。

③示波器设置为 DC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到 10X 档位。

⑤确保逆变器已上电并且有电压输出。

⑥将探头夹子和探针接到逆变器的输出端,不用区分正负极。

⑦按一次【AUTO】按键,逆变器输出的波形就显示出来了,如果 AUTO 调节后的波形过小或过大,可以在缩放模式下手动调节波形大小。

8.功放或音频信号测量

档位选择

功放输出电压一般在 40V 以下,1X 档最高测试 80V,所以用 1X 档位就足够了(探头和示波器都设置为 1X 档)。

①首先将示波器设置为 Auto 触发模式(开机后默认认为 Auto 触发模式)。

②示波器设置为 1X 档位(开机后默认认为 1X 档位)。

③示波器设置为 AC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到 1X 档位。

⑤确保功放开机工作并且正在输出音频信号。

⑥将探头夹子和探针接到功放的 2 根线输出端,不用区分正负极。

⑦按一次【AUTO】按键,家用电的波形就显示出来了,如果 AUTO 调节后的
波形过小或过大,可以在缩放模式下手动调节波形大小 。

档位选择

汽车用通信信号般都低于 20V,1X 档最高测试 80V,所以测试汽车通
信号信号用 1X 档位就足够了(探头和示波器都设置为 1X 档)。

①首先将示波器设置为 Normal 触发模式(开机后默认为 Auto 触发模
式), Norma 触发模式专门用于测量非周期数字信号,如果用 Auto 触发
模式是抓不到非周期信号的。

②示波器设置到 1X 档位(开机后默认为 1X 档位)

③示波器设置为 AC 耦合模式

④插上探头,并且将探头手柄上的开关拨动到 1X 档位

⑤将探头夹子和探针接到通信线的其中 2 根信号线上,不分正负,如果信
号线有多根,则需要自己预先去判断出信号线,或者多次尝试选择其中
2 根线来试验。

⑥确保此时通信线上有通信信号。

⑦将垂直灵敏度调到 50mV 档位。

⑧时基调到 20uS 。

⑨当通信线路上有通信信号时,示波器就会捕捉到并显示在屏幕上,若捕
捉不到就需要尝试调节时基(1mS~6nS)和触发电压(红色箭头)多次调
试。

10.红外遥控接收器测量

档位选择

红外遥控信号一般为 3~5,1X 档最高测试 80V,所以测试汽车通信信号信号用 1X 档位就足够了(探头和示波器都设置为 1X 档)

① 首先将示波器设置为 Normal 触发模式(开机后默认为 Auto 触发模式), Normal 触发模式专门用于测量非周期数字信号,如果用 Auto 触发模式是抓不到非周期信号的,红外遥控信号属于非周期数字编码信号。

② 示波器设置到 1X 档位(开机后默认为 1X 档位)。

③ 示波器设置为 DC 耦合模式。

④ 插上探头,并且将探头手柄上的开关拨动到 1X 档位。

⑤ 将探头夹子接到红外接收器主板的地端(负极),探针接到红外接收头的数据引脚。

⑥ 将垂直灵敏度调到 1V 档位。

⑦ 时基调到 20uS。

⑧ 将触发红色箭头位置调到左边黄色箭头位置上面大约 1 个大格子距离。

⑨ 此时用遥控给红外接收头发送信号,示波器上面就会有波形出现。

11带有传感器(温度,湿度,压力,霍尔等等)的放大电路测量

档位选择

传感器信号一般都是比较微弱的,大约几个毫伏,这个小信号不能直接用示波器检测,这种传感器主板上面都有信号放大部示波器就可以测量这个被放大后的信号,用 1X 档位即可(探头和示波 器都设置为 1X 档)

①首先将示波器设置为 Auto 触发模式(开机后默认为 Auto 触发模 式)。

②示波器设置到 1X 档位(开机后默认为 1X 档位)。

③示波器设置为 DC 耦合模式。

④插上探头,并且将探头手柄上的开关拨动到 1X 档位。

⑤将探头夹子接到传感器主板的地端(电源负极),找到放大部分的输出端,并将探针接到这个输出端。

⑥将垂直灵敏度调到 50mV 档位。

⑦切换到键盘移动模式,将波形黄色箭头水平位置移动到最底端。

⑧时基调节到 500mS 进入大时基慢扫模式。

⑨如果黄色信号线出现在最顶部则需要减小垂直灵敏度,依次为 100mV,200mV,500mV 等等,当右边更新的信号开始不在最顶端时(一般在上下中间最好),此时就可以开始检测这个传感器接收的信号了。

九、注意事项

●当双通道同时使用时,2个探头的地线夹子必须要接在一起,严禁将2个探头的地线夹子分别接在不同电位上,尤其是大功率设备的不同电位端或者220V,否则将会烧坏示波器主板,因为2个通道是共地的,接于不同电位会导致主板内部地线短路,所有的示波器皆是如此。

●示波器BNC端输入最高容忍400V,严禁在1X探头开关下输入超过400V电压。

●充电时必须使用单独的充电头充电,严禁使用其他当前被测设备的电源或者USB,否则可能会在测试过程中导致主板地线短路而烧毁主板。

●使用产品前请检查外壳和接口附近绝缘体是否破损

●请手指握在表笔的防护装置后面

●当测量待测电路时,请勿触摸所有的输入端端口

●请在改变档位前断开测试表笔和电路连接

●当待测的直流电压高于36V,交流电压高于25V时,使用者应当注意防范,避免电击

●当电池电量过低时,会弹窗提示,请及时充电,以免影响测量性能

十、生产信息

产品名称:50M双通道示波器万用表

品牌/型号:2C53T

服务电话:0755-28020752

服务邮箱:support@fnirsi.com

商务邮箱:business@fnirsi.com

生产商:深圳市菲尼瑞斯科技有限公司

地址:广东省深圳市龙华区大浪街道伟华达工业园C栋西边8楼

网址:www.fnirsi.cn

执行标准:GB/T 15289-2013 GB-T 13978-1992

Notice to users

- This manual provides a detailed introductions to the product. Please read this manual carefully ensure obtain the best state of the product.
- Do not use the instrument in flammable and explosive environments.
- Waste batteries and instruments cannot be disposed of together with household waste. Please dispose of them in accordance with relevant national or local laws and regulations.
- If there are any quality issues with the device or if you have any questions about using the device, please contact "FNIRSI" online customer service and we will solve it for you in the first time.

1.Product Introduction

FNIRSI-2C53T is a versatile and highly practical three-in-one dual-channel digital oscilloscope launched by FNIRSI, designed for professionals in the maintenance and research industries. This device combines the functionalities of an oscilloscope, a multimeter, and a signal generator. The oscilloscope uses FPGA+MCU+ADC hardware architecture, featuring a 250MS/s sampling rate, a 50MHz analog bandwidth, and an integrated high-voltage protection module that supports peak voltage measurements up to ±400V. It also supports waveform screenshot saving and viewing for secondary analysis.

The multimeter function offers 4.5 digits with 20,000 counts true RMS, supporting AC/DC voltage and current measurements, as well as capacitance, resistance, diode, and continuity measurements, making it an ideal multifunctional instrument for professionals, factories, schools, enthusiasts, or home use. The built-in DDS function signal generator can output 13 types of function signals, with a maximum output frequency of 50KHz and a step size of 1Hz. The output frequency, amplitude, and duty cycle are adjustable. It features a 2.8-inch 320*240 resolution high-definition LCD screen and a built-in 3000mAh rechargeable lithium battery with a standby time of up to 6 hours. Its compact size provides users with more powerful practical functions and excellent portability.

Oscilloscope CH1

Oscilloscope CH2

Function signal generator output port

Screen display

Buttons

Multimeter Input

Charge indicator

Charging interface

Restoration

Bracket

3.Device Parameter

Display screen	2.8 inch HD color screen
Resolution ratio	320*240
Charging specifications	TYPE-C (5V/1A)
Battery	3000mAh lithium battery
Support functions	Oscilloscope, Signal generator, Multimeter (view functional parameters for details)
Standby time	6h (laboratory theoretical maximum)
Product volume	167*89*35mm
Weight	300g

4.Buttons & Functions Introduction

1.1 Oscilloscope - Key Operation Instructions

Button	Operation	Function
⏻	Short press	Power on /OFF
MENU	Short press	Back
	Long press	Home Page (function selection page)
CH1	Short press	CH1 setting
CH2	Short press	CH2 setting

Button	Operation	Function
AUTO	Short press	AUTO
	Long press	Baseline correction※
‖▶	Short press	Running stop
	Long press	50% Centered
SAVE	Short press	Save
	Long press	Enter the Nine Palace Grid
ⓒ⇆ⓒ2 MOVE	Short press	Switch CH1 / CH2 Adjustment
	Long press	Quick Access to Multimeter
⟨↕⟩ SELECT	Short press	Select Function for Directional Keys
	Long press	Quick Access to Oscilloscope
⚙ TRIGGER	Short press	Trigger settings
	Long press	Quick Access to Signal Generator
⚬= PRM	Short press	Parameter Selection
	Long press	Show measurement parameters/ Hide measurement parameters

※The baseline calibration process takes a long time, please be patient and do not operate the equipment during the calibration process. If the equipment is accidentally operated and the calibration is interrupted, please recalibrate. （Baseline calibration requires removing the probe）
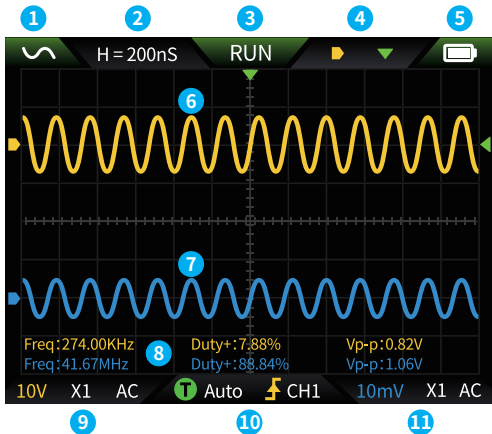
① **Function Generator Interface Status Indication:** 13 waveforms: Sine Wave , Square Wave , Sawtooth Wave , Half Wave , Full Wave , Step Wave , Reverse Step Wave , Index Up , Index Decrease , Direct Current , Multi-audio , Sink Pulse , Lorentz Wave . Gray indicates the waveform output is off.

② **Time Base:** Horizontal time base, representing the time length per major division in the horizontal direction.

③ **Trigger Run/Pause Indicator Icon:** RUN indicates running, STOP indicates paused.

④ V H : Represents the left and right buttons controlling the time base, and the up and down buttons controlling the vertical sensitivity of the channels (yellow represents channel 1, blue represents channel 2).

▶ ▼：Represents the left and right buttons controlling the horizontal trigger movement, and the up and down buttons controlling the vertical movement of the channel waveforms (yellow represents channel 1, blue represents channel 2).

◀ ▼：Represents the left and right buttons controlling the horizontal trigger movement, and the up and down buttons controlling the trigger level movement.

X1 Y1：When cursor measurement is enabled, represents the up and down buttons controlling the vertical movement of the cursor, and the left and right buttons controlling the horizontal movement of the cursor.

⑤**Battery Indicator Light：**Full Charge 🔋 and Low Charge 🔋. When the battery is too low, a low battery warning will pop up with a countdown to automatic shutdown.

⑥**Channel 1 waveform data acquisition**

⑦**Channel 2 waveform data acquisition**

⑧**Measurement parameter display**

⑨**Channel 1 vertical sensitivity, probe attenuation, coupling display**

⑩**Trigger mode, trigger edge, trigger channel display**

⑪**Channel 2 vertical sensitivity, probe attenuation, coupling display**

1.3 Oscilloscope - waveform screenshot saving

①**Save Screenshot：**Short press SAVE, and a **Saving...** progress popup will appear as shown on the right. After about 2 seconds, a popup will indicate that the save was successful. The waveform interface will have saved a BMP format image, named "img_number." You can view or delete it on the device, or connect to a computer via TYPE-C to view it.
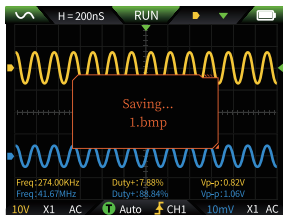
②**View Screenshot:** Long press **SAVE** to enter the saved waveform screenshot

viewing page.Press **||▶** to enter the saved waveform screenshot interface.

☑ ⬚ 🗑 ↩ The four buttons correspond

sequentially with **MOVE** **SELECT** **TRIGGER** **PRM** . When selecting multiple

waveforms, use the directional keys to select the corresponding waveform

and press the button **||▶** to check it.

> ## ⚠ NOTICE
>
> The storage is full and must be manually deleted before saving again.

1.4 Oscilloscope – Parameters

Channel	Dual channel
Sample Rate	250MS/s
Analog Bandwidth	50M(dual channel independent 50M)
Storage Depth	1Kpts
Impedance	1MΩ
Time Base Range	10ns-20s
Vertical Sensitivity	10mV/div-10V/div (X1)
Maximum Measured Voltage	±400V
Trigger Mode	AUTO/Normal/Single
Trigger Type	Rising edge, Falling edge
Display Mode	Y-T/Rolling/X-Y

Coupling Method	AC/DC
Persistence	OFF, 500ms, 1s, ∞
Math	8 Basic Operations + FFT
Waveform Screenshot Save	Supported
Export Waveform Image	Supported
Cursor Measurement	Supported

2.1 Function Signal Generator - Key Description

Button	Operation	Function
⏻	Short press	Power on/OFF
MENU	Short press	Back
	Long press	Home Page (function selection page)
�II▶	Short press	Confirm
	Long press	Run / Stop
ⓐ⇄ⓑ MOVE	Long press	Quick Access to Multimeter
⟨↕⟩ SELECT	Long press	Quick Access to Oscilloscope
✿ TRIGGER	Long press	Quick Access to Signal Generator
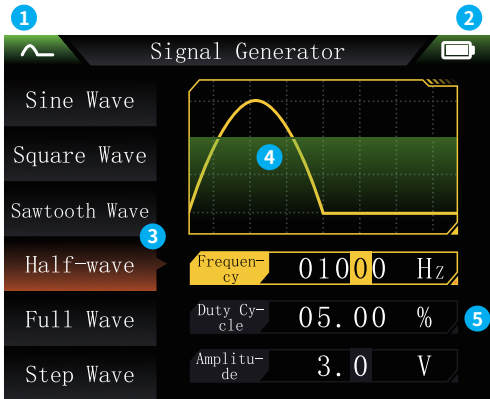
① **Output Status Indication:** a total of 13 types: Detailed statuses are described in section 1.2.

② **Battery Indicator Light:** Full Charge 🔋 and Low Charge 🔋 . When the battery is too low, a low battery warning will pop up with a countdown to automatic shutdown.

③ **Selection of 13 Output Waveforms:** Sine Wave, Square Wave, Sawtooth Wave, Half Wave, Full Wave, Step Wave, Reverse Step Wave, Index Up, Index Decrease, Direct Current, Multi-audio, Sink Pulse, Lorentz Wave.

④ **Waveform Schematic: Gray indicates closed**

⑤ **Parameters for Waveform Adjustment**

Operation: First use the directional keys to select the output waveform, then press the center key on the directional keys to enter waveform parameter settings (adjust settings using directional keys).

2.3 Function Signal Generator – Parameters

Channel	Single channel
Frequency	1Hz-50KHz
Amplitude	0.1-3.0tV

3.1 Digital Multimeter - Key Description

Button	Operation	Function
⏻	Short press	Power on /OFF
MENU	Long press	Home page (function selection page
AUTO	Short press	Automatic measurement
⏸▶	Short press	Data hold
C1⇄C2 MOVE	Short press	Switch AC/DC, Diode/Continuity, etc.
◀	Short press	Switch Range Leftward According to UI
▶	Short press	Switch Range Rightward According to UI

① **REL：**Relative Measurement

② **Specific Measurement Ranges**

③ **Battery Indicator**

④ **Range Scale**

⑤ **HOLD：**Data Hold

⑥ **Measurement Value**

⑦ **Range Status Indication：**Yellow indicates selected, gray indicates not selected

⑧ **Maximum, Minimum, and Average Values of Current Range's Measurements**

High current measurement: red test pen connected to 10A, black test pen connected to COM.

⚠ 注意

If the measured current is greater than 10A, it will burn out the fuse. lease preliminarily evaluate the current before measuring.

Low current measurement: red test pen connected to mA, black test pen connected to COM.

⚠ 注意

If the measured current is greater than 1A, it will burn the fuse. Before measuring, please preliminarily evaluate the current. If unsure, please use a high current gear for measurement first.

Automatic, voltage, resistance, capacitance, temperature, diode/ Continuity test measurement: red test pen connect VΩ⊣⊢ ⊶·›)) ⚕ black test pen connect to COM, please switch to the corresponding functional gear according to the required measurement parameters during measurement.

Automatic gear: It can only automatically identify voltage and resistance levels, and when measuring voltage, it will automatically identify AC voltage/DC voltage.

3.4 Parameters

Function	Range	Accuracy
DC Voltage	1.9999V/19.999V/199.99V/1000V	±(0.5%+3)
AC Voltage	1.9999V/19.999V/199.99V/750.0V	±(1%+3)
DC Current	19.999mA/199.99mA/1.9999A/9.999A	±(1.2%+3)
AC Current	19.999mA/199.99mA/1.9999A/9.999A	±(1.5%+3)
Resistance	19.999MΩ/1.9999MΩ/199.99KΩ/19.999KΩ	±(0.5%+3)
	1.9999KΩ/199.99Ω	±(2.0%+3)
Capacitance	999.9uF/99.99uF/9.999uF/999.9nF/99.99nF/9.999nF	±(2.0%+5)
	9.999mF/99.99mF	±(5.0%+20)
Temperature	(-55~1300°C)/(-67~2372°F)	±(2.5%+5)
Diode	✓	
Continuity test	✓	

5.Setting

System Settings

Language
Sound and light
Startup on Boot
Auto Shutdown
USB Sharing
About

○ 中文
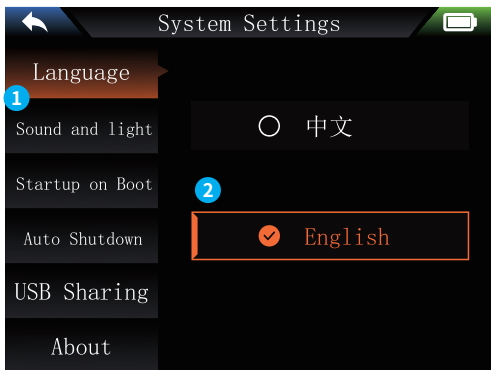
✓ English

①**Set single item selection：**
　Language　　　　　　　**Sound and light**　　　　　　**Startup on Boot**
　Auto Shutdown　　　**USB Sharing**　　　**About**　　　**Factory Reset**

②**Specific settings details：**
　【Language】：Chinese, English.
　【Sound and light】：Brightness: 25-100; Sound: 0-10.
　【Startup on Boot】：Turn off, oscilloscope, signal generator, and multimeter. This s　etting is used to set which functional block to start automatically when starting up
　【Auto Shutdown】：off, 15 minutes, 30 minutes, 1 hour.
　【USB Sharing】：After opening, you can connect to the computer via USB interface to transfer pictures, etc.
　【About】：Brand information and version number
　【Factory Reset】

※First press the direction keys to select the corresponding settings, and then press the direction keys to enter the parameters for individual settings (complete the settings by adjusting the direction keys)

6.Upgrade

① Obtain the latest firmware from the official website and unzip it to download to the desktop.
② Connect the device to the computer using the USBA to Type-C data cable, press and hold the **MENU** button, and then press the ⏻ to enter firmware upgrade mode, and the computer will pop up the USB flash drive;
③ Copy the firmware to the USB drive, and after successful replication, the device will automatically upgrade the firmware.
④ Observe the upgrade percentage. After the upgrade is completed, the device will restart. If the upgrade fails, please contact official customer service for help.

7.Customizing the Startup Screen

1. Prepare the replacement startup screen image and rename it to "LOGO2C53T.jpg".
2. Power on the device and connect it to the computer using a USBA to Type-C data cable.
3. Access settings and enable USB sharing. Drag the prepared startup LOGO into the "LOGO" folder on the device's USB drive.
4. Once the operation is complete, the custom LOGO will be updated for the next startup.

Notice:Before changing the logo, please carefully check the file name, image pixel size, format, etc.

8.Common In-circuit Testing Methods

1.Battery or DC voltage measurement

Gear selection

The battery voltage is generally below 80V, and other DC voltages are uncertain. It is necessary to adjust the gear according to the actual situation, if it is below 80V, use 1X gear, and if it is above 80V, use 10 gear × Gear position.
(Both the probe and oscilloscope are set to the same gear)

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup), which is used to test periodic signals (DC voltage belongs to periodic signals)

②Set the oscilloscope to the corresponding gear (default to 1X gear after startup)

③Set the oscilloscope to DC coupling mode

④Insert the probe and pull the switch on the probe handle to the corresponding gear position

⑤Ensure that the battery has power or DC voltage output

⑥Connect the probe clamp to the negative pole of the battery or DC negative pole, and connect the probe to the battery or DC negative pole
Positive electrode

⑦Press the [AUTO] button once, and the DC electrical signal will be displayed. Note that battery voltage or other DC voltages belong to DC signals, which have no curve or waveform, only a straight line with up and down offset, and the peak to peak VPP and frequency F of this signal are both 0

2. Crystal oscillator measurement

Gear selection

When the crystal oscillator encounters capacitance, it is easy to stop oscillation. The input capacitance of the 1X probe is as high as 100-300pF, and the 10X gear is around 10-30pF, it is easy to stop oscillation in the 1X gear, so it needs to be set to the 10X gear, that is, both the probe and oscilloscope should be switched to the 10X gear (both the probe and oscilloscope should be set to the 10X gear)

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup), which is used to test periodic signals (crystal oscillator resonance sine signals belong to periodic signals).

②Set the oscilloscope to 10X gear (default to 1X gear after startup).

③Oscilloscope setting AC coupling mode.

④Insert the probe and pull the switch on the probe handle to the 10X position.

⑤Ensure that the crystal oscillator motherboard is powered on and running.

⑥Connect the probe clamp to the ground wire of the crystal oscillator motherboard (negative pole of the power supply), pull out the probe cap, which is the needle tip inside, and make the needle tip contact one of the pins of the crystal oscillator.

⑦Press the 【 AUTO 】 button once, and the waveform of the tested crystal oscillator will be displayed. If the waveform after AUTO adjustment is too small or too large, you can manually adjust the waveform size in zoom mode.

3. PWM signal measurement of MOS transistor or IGBT

Gear selection

The PWM signal voltage for directly driving MOS tubes or IGBTs is generally within 10V~20V, and the PWM front-end control signal is also generally within 3-20V. The maximum test voltage for 1X gear is 80V, so using 1X gear for testing PWM signals is sufficient (both the probe and oscilloscope are set to 1X gear)

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup), which is used to test periodic signals (PWM belongs to periodic signals).

②Set the oscilloscope to 1X gear (default to 1X gear after startup).

③Set the oscilloscope to DC coupling mode.

④Insert the probe and move the switch on the probe handle to the 1X position

⑤Ensure that the PWM motherboard has PWM signal output at this time.

⑥Connect the probe clamp to the S pole of the MOS tube and the probe to the G pole of the MOS tube.

⑦Press the 【 AUTO 】 button once, and the measured PWM waveform will be displayed. If the waveform after AUTO adjustment is too small or too large, you can manually adjust the waveform size in zoom mode.

4. Signal generator output measurement

Gear selection

The output voltage of the signal generator is within 30V, and the maximum test voltage for 1X gear is 80V. Therefore, using 1X gear for testing the signal generator output is sufficient (both the probe and oscilloscope are set to 1X gear)

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup), which is used to test periodic signals (the signal output by the signal generator belongs to periodic signals).

②Set the oscilloscope to 1X gear (default to 1X gear after startup).

③Set the oscilloscope to DC coupling mode.

④Insert the probe and move the switch on the probe handle to the 1X position.

⑤Ensure that the signal generator is turned on and working and outputting signals.

⑥Connect the probe clamp to the black clamp on the output line of the signal generator, and connect the probe to the red output line of the signal generator.

⑦Press the [AUTO] button once, and the waveform output by the generator will be displayed. If the waveform after AUTO adjustment is too small or too large, you can manually adjust the waveform size in zoom mode.

5. Household electric supply 220V or 110V measurement

Gear selection

Household electricity is generally 180-260V, with a peak to peak voltage of 507-733V. In some countries, household electricity is 110V, with a peak to peak voltage of 310V. The highest measurement for 1X gear is 80V, and the highest measurement for 10X gear is 800V (10X gear can withstand up to 1600 peak to peak). Therefore, it is necessary to set it to 10X gear, which means that both the probe and oscilloscope must be switched to 10X gear.

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup), which is used to test periodic signals (50Hz for household appliances is considered a periodic signal).

②Set the oscilloscope to 10X gear (default to 1X gear after startup).

③Set the oscilloscope to DC coupling mode.

④Insert the probe and move the switch on the probe handle to the 10X position

⑤Ensure that there is a household electrical output at the tested end.

⑥Connect the probe clamp and probe to the two wires of the household appliance, without distinguishing between positive and negative poles.

⑦Press the [AUTO] button once, and the waveform of the household electricity will be displayed. If the waveform after AUTO adjustment is too small or too large, you can manually adjust the waveform size in zoom mode.

6. Power ripple measurement

Gear selection

If the power output voltage is below 80V, set it to 1X gear (both the probe and oscilloscope are set to 1X gear). If it is between 80-800V, set it to 10X gear (both the probe and oscilloscope are set to the same gear)

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup), which is used to test cycle signals.

②Set the oscilloscope to the corresponding gear (default to 1X gear after startup).

③Set the oscilloscope to AC coupling mode.

④Insert the probe and move the switch on the probe handle to the corresponding gear position.

⑤Ensure that the power supply is powered on and there is a voltage output.

⑥Connect the probe clamp to the negative terminal of the power output, connect the probe to the positive terminal of the power output, and wait for about 10 seconds, when the yellow line and the yellow arrow on the left end of the waiting period.

⑦Press the [AUTO] button once, and the power ripple will be displayed.

7. Inverter output measurement

Gear selection

The output voltage of the inverter is similar to that of household electricity, usually around a few hundred volts, so it needs to be set to the 10X gear (both the probe and oscilloscope are set to the 10X gear)

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup), which is used to test periodic signals (the signals output by the inverter belong to periodic signals).

②Set the oscilloscope to 10X gear (default to 1X gear after startup).

③Set the oscilloscope to DC coupling mode.

④Insert the probe and move the switch on the probe handle to the 10X position.

⑤Ensure that the inverter is powered on and has voltage output.

⑥Connect the probe clamp and probe to the output end of the inverter without distinguishing between positive and negative poles.

⑦Press the [AUTO] button once, and the waveform output by the inverter will be displayed. If the waveform after AUTO adjustment is too small or too large, the waveform size can be manually adjusted in zoom mode.

8. Power amplifier or audio signal measurement

Gear selection

The output voltage of the power amplifier is generally below 40V, and the maximum test voltage for 1X gear is 80V, so using 1X gear is sufficient (both the probe and oscilloscope are set to 1X gear).

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup)

②Set the oscilloscope to 1X gear (default to 1X gear after startup)

③Set the oscilloscope to AC coupling mode

④Insert the probe and move the switch on the probe handle to 1X position

⑤Ensure that the amplifier is turned on and working, and is outputting an audio signal

⑥Connect the probe clamp and probe to the two output terminals of the power amplifier, without distinguishing between positive and negative poles

⑦Press the [AUTO] button once, and the waveform output by the power amplifier will be displayed. If the waveform after AUTO adjustment is too small or too large, you can manually adjust the waveform size in zoom mode.

9. Automotive communication signals/bus signals measurement

Gear selection

Communication signals used in automobiles are generally lower than 20V, and the highest test voltage for 1X gear is 80V. Therefore, using 1X gear for testing automotive communication signal signals is sufficient (both the probe and oscilloscope are set to 1X gear)

①Firstly, set the oscilloscope to Normal trigger mode (default to Auto trigger mode after startup). The Norma trigger mode is specifically used to measure non periodic digital signals, and if you use Auto trigger mode, you cannot capture non periodic signals.

②Set the oscilloscope to 1X position (default to 1X position after startup).

③Set the oscilloscope to AC coupling mode.

④Insert the probe and move the switch on the probe handle to the 1X position.

⑤Connect the probe clamp and probe to two signal wires of the communication line, regardless of positive or negative. If there are multiple signal wires, you need to determine the signal wires in advance or try selecting two of them multiple times to test.

⑥Ensure that there is a communication signal on the communication line at this time.

⑦Adjust the vertical sensitivity to the 50mV gear.

⑧Set the time base to 20uS.

⑨When there is a communication signal on the communication line, the oscilloscope will capture it and display it on the screen. If it cannot be captured, it is necessary to try adjusting the time base (1mS~6nS) and triggering voltage (red arrow) multiple times for debugging

10. Infrared remote control receiver measurement

Gear selection

The infrared remote control signal generally ranges from 3 to 5, with a maximum test voltage of 80V in X gear. Therefore, using 1X gear for testing automotive communication signal signals is sufficient (both the probe and oscilloscope are set to 1X gear)

①Firstly, set the oscilloscope to Normal trigger mode (default to Auto trigger mode after startup). The Normal trigger mode is specifically used to measure non periodic digital signals. If use Auto, the trigger mode cannot capture non periodic signals, and the infrared remote control signal belongs to non periodic digital coding signal.

②Set the oscilloscope to 1X position (default to 1X position after startup).

③Set the oscilloscope to DC coupling mode.

④Insert the probe and move the switch on the probe handle to the 1X position.

⑤Connect the probe clamp to the ground terminal (negative pole) of the infrared receiver motherboard, and connect the probe to the data pin of the infrared receiver head.

⑥Set the vertical sensitivity to 1V gear.

⑦Set the time base to 20uS.

⑧Adjust the trigger red arrow position to approximately 1 large grid distance above the yellow arrow position on the left.

⑨At this point, use the remote control to send a signal to the infrared receiver, and a waveform will appear on the oscilloscope.

11. Amplification circuits with sensors (temperature, humidity, pressure, Hall, etc.) measurement

Gear selection

Sensor signals are generally relatively weak, about a few millivolts, and this small signal cannot be directly detected by an oscilloscope. This type of sensor has a signal amplifier on the motherboard, which can measure the amplified signal. The 1X gear can be used (both the probe and oscilloscope are set to 1X gear)

①Firstly, set the oscilloscope to Auto trigger mode (default to Auto trigger mode after startup).

②Set the oscilloscope to 1X position (default to 1X position after startup).

③Set the oscilloscope to DC coupling mode.

④Insert the probe and pull the switch on the probe handle to the 1X position.

⑤Connect the probe clamp to the ground terminal (negative pole of the power supply) of the sensor motherboard, locate the output terminal of the amplification section, and connect the probe to this output terminal.

⑥Adjust the vertical sensitivity to the 50mV gear.

⑦Switch to keyboard movement mode and move the yellow arrow horizontally to the bottom of the waveform.

⑧Adjust the time base to 500mS and enter the large time base slow scan mode.

⑨If the yellow signal line appears at the top, it is necessary to reduce the vertical sensitivity, which is 100mV, 200mV, 500mV, etc. When the updated signal on the right is not at the top (usually in the middle), the signal received by this sensor can be detected at this time.

9.Notice

● When dual channels are used simultaneously, the ground clamps of the two probes must be connected together. It is strictly prohibited to connect the ground clamps of the two probes to different potentials, especially at different potential terminals or 220V of high-power equipment. Otherwise, the oscilloscope motherboard will be burned because the two channels are grounded together, and connecting to different potentials will cause a short circuit in the internal ground wires of the motherboard, as is the case with all oscilloscopes.

● The maximum tolerance for the BNC input of the oscilloscope is 400V, and it is strictly prohibited to input voltage exceeding 400V under the 1X probe switch

● When charging, a separate charging head must be used. It is strictly prohibited to use the power supply or USB of other currently tested devices, otherwise it may cause a short circuit to the motherboard ground wire and burn the motherboard during the testing process.

● Before using the product, please check if the insulation near the shell and interface is damaged

● Please hold your finger behind the protective device of the pen

● When measuring the circuit to be tested, do not touch all input ports

● Please disconnect the test probe and circuit connection before changing the gear position

● When the DC voltage to be tested is higher than 36V and the AC voltage is higher than 25V, users should take precautions to avoid electric shock

● When the battery level is too low, a pop-up prompt will appear, please charge it in a timely manner to avoid affecting the measurement performance

10.Production Information

Any FNlRSl's users with any questions who comes to contact us will have our promise to get a satisfactory solution +an extra 6 months warranty to thanks for your support!

By the way, we have created an interesting community, welcome to contact FNiRSl staff to join our community.

Shenzhen FNIRSI Technology Co., LTD.

Add.: West of Building C , Weida Industrial Park , Dalang Street , Longhua District , Shenzhen , Guangdong , China
Tel: 0755-28020752
Web：www.fnirsi.cn
E-mail：business@fnirsi.com (Business)
E-mail：service@fnirsi.com(Equipment Service)

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