作为逻辑分析仪使用

2023-07-23

▶ 更新历史			
日期	版本	作者	更新内容
2023-07-23	v0.1	lxo	Release docs

一、开启逻辑分析仪功能

按下按键将指示灯切换为蓝色。如下图所示:



验证逻辑分析仪功能是否开启:

Windows环境打开设备管理器, Linux环境使用Isusb命令, 可以找到"USB TO LA"设备



- 1. Linux环境下SLogic Combo 8最大传输带宽320Mb/s,典型配置80M@4CH 40M@8CH。
- 2. Windows环境下SLogic Combo 8最大传输带宽160Mb/s,典型配置80M@2CH 40M@4CH。
- 如果上位机启动过程中,设备出现断连的情况,需要重新扫描并 连接设备

2.1. 快速使用

2.1.1. 引脚连接



上图为SLogic 8个通道的线序图,将目标设备的待测信号点连接至SLogic 任意空闲CH端口,并确保待测设备的GND与SLogic的GND相连接。

注意SLogic的GND线需要离待测点的位置越近越好,哪怕更近1cm也可能会增加采样质量

2.1.2. 下载和运行上位机

点击这里下载上位机

上位机软件用于观察和分析数字信号。Windows用户请下载exe后缀的文件, Linux用户请下载AppImage后缀的文件, 建议下载日期最新的版本。

当软件名为 PulseView-xxxx-230811-xxx.AppImage 时,日期则是2023 年08月11日。其他软件的日期命名规则类似。

Linux环境:

下载完成后,进入软件所在目录,使用快捷键 CTRL+ALT+T 打开终端,使用以下命令为软件赋予执行权限并以管理员身份运行:

1 chmod +x PulseView-x86_64-032323-1101.AppImage
2 sudo ./PulseView-x86_64-032323-1101.AppImage

Windows环境:

- 1. 下载完成后,点击exe文件并开始安装,根据安装引导一直点击next 即可安装完成。
- 2. 安装完成后,在快捷菜单界面可以找到上位机图标,双击运行

注:在Linux环境最大可支持80M@4通道、40M@8通道采样;由于 Windows环境下USB传输不稳定的限制,在Windows上最大只能支持 到80M@2通道、40M@4通道采样。

2.1.3. 扫描SLogic并连接

首次启动时会自动连接,也可以选择手动连接SLogic

手动连接步骤

- 1. 点击"Scan for devices xxx"扫描设备
- 2. 选择"SIPEED USB TO LA xxx"并点击OK连接设备

Connect to De	evice
Step 1: Choose the driver	
Sipeed Slogic Analyzer (sipeed-slogic	-analyzer) 🔹
Step 2: Choose the interface	
• USB	
Serial Port	
	- baud
○ <u>T</u> CP/IP	
192.168.1.100 5555	Protocol: Raw TCP
	FIOLOCOL.

Step 3: Scan for devices	1		
<u>S</u> can for dev	vices using d	river above	
Step 4: Select the device	2		
SIPEED USB TO LA with 8 (channels		
		3	
	[ОК	Cancel

2.1.4. 准备采样

1. 设置PulseView的通道数、采样点数和采样率

下图设置通道数为8,采样点数为1M samples,采样率为10Mhz。 此时的**采样时间**为1M / 10Mhz = 0.1s

	Session 1 - PulseView		- + ×
📄 🔍 Run 🕉 Session 1 🗙		采样点数、采样率	
Session 1 启动采样			协议解码 ◎ 🛛
	SIPEED USB TO LA	💥 🖊 1 M samples 💌 10 MHz 💌 🦇	12
· · · · · · · · · · · · · · · · · · ·	SIFEE USB IG EA	All None D3 V D4 V D5 V D6 V D7 V Analog Unnamed Non-changing Analog Named Changing	+900 ms +1000 ms
66			
			-

2.1.5. 开始采样

1. 点击Run启动采集,并获得采样结果

.	Session 1 - PulseView	- + ×
📄 🔍 Ri	un 🔉 Session 1 🗙	
Session 1		0
📑 🕶	🖹 👻 🔄 🖃 📲 SIPEED USB TO LA 🛛 👻 🥕 1 M samples 🔍 10 MHz 🔍 🦇 💆	
	+10 ms +20 ms +30 ms +40 ms +50 ms +60 ms +70 ms +80 ms + + + + + + + + + + + + + + + + + + +	90 ms +100 m
D3 D4		

若在采样过程中未使用D7通道,可能会观察到该通道的电平反转现象,该现象为正常情况不影响正常使用

2.1.6. 分析采样结果

1. 打开协议选择栏



2. 选择需要分析的协议



3. 配置协议的参数



4. 观察分析结果

Session 1							
-	🖹 • 🏝 • 🗈		SIPEED USB TO LA [S/N: SI 8	ich] 🛛 🔻 💥 🗶	1 M samples 💌 20 MHz 💌	• 🖾	
	+1600 µ s	+1800 μ s	+2000 µ s	+2200 µ s	+2400 µ s	+2600 µ s	+2800 µ s
	•						
PWM	PWM: Duty cycles/	49.987503%	50.00000%	49.987503%	50.00000%	49.987503%	50.00000%
	PWM: Periods …	200.1 µ s	200.0 µ s	200.1 µ s	200.0 µ s	200.1 µ s	200.0 µ s
DO	•						
D1							

根据分析结果然后开始调试吧~

2.2. 详细配置

2.2.1. 采样参数

采样参数包括有采样样本数量、采样频率和采样时间

- 1. 采集样本数量: 样本数量根据需求选择合适数值即可
- 2. 采样频率:根据被测信号频率选择,推荐选择大于10倍被测信号频 率(可参考奈奎斯特定理)
- 3. 采样时间:采样时间根据采集**样本数量**以及**采样频率**进行计算,计算 公式为:

时间(秒)=样本数/采样率

例如1M samples, 1Mhz时, 采样时间为1s



设置完成采集样本数量、采样频率后,将鼠标至于采集样本数量选择框 上,会显示当前参数的采样时间

2.2.2. 通道参数

点击通道的标签来设置通道参数,通道参数包括有标签名、标签颜色、通 道波形显示窗口宽度和信号触发方式

- 1. 标签名: 可根据采样信号意义设置, 便于多信号采样分辨信号
- 2. 标签颜色:根据个人喜好设置,便于多信号采样分辨不同信号
- 通道波形显示窗口宽度:根据信号幅值设置,单位为像素,信号幅值 变化大时,可提高该参数便于观察信号幅值变化
- 4. 信号触发方式:具有直接采样、高电平触发、低电平触发、下降沿触 发、上升沿触发以及边沿触发

(采集信号之前,可能存在许多无效信号,根据信号的规律来设置触发方式可以有效地过滤掉无效信号,从而提高采样效率和准确性。)

3	Name	D 0
	Color	
	Trace height	36 pixels
	Trigger	• / \ X

2.3. 调试波形

2.3.1. 视图操作

通过操作视图,可以更详细的观察波形

2023/11/30 上午11:23			作为	內逻辑分析仪使用	
▼		Session 1 - PulseVie	W		- + ×
📄 🔍 Run 🛛 🕉 Session 1 🗶	:				
Session 1					Ø 🕱
		SIPEED USB TO LA	- 💥 🖊 1	M samples 🔻 1 MHz 💌 📢	
+327200 µ s	+327300 µ s	+327400 µ s	+327500 µ +182 µ s +	327600 µ s +327700 µ s	+327800 μ s
					-
01					
D2					
02					
D2					
05					
DE					
		and the second se			

波形缩放: 鼠标滚轮 (中键) 向上滚动放大波形、向下滚动缩小波形

拖动波形:鼠标左键按住可以左右上下拖动波形显示区

区域放大: 鼠标双击某区域可放大该区域波形

通道滚动: "波形显示区"使用 Ctrl+鼠标滚轮(中键)可以快速上下滚 动通道

时间测量:您可以通过,在所需的位置右键点击鼠标点击"创建标记点

(Create Marker Here) "来标记位置,当您重复标记其他位置时,软件 会自动计算并在时间轴上显示两个标记点之间的时间长度 **调整通道顺序**:鼠标拖动通道标签即可拖动通道至指定位置

2.3.2. 协议解码

在抓取所需的数据后,为了便于对数据进行分析,可以使用协议解码功能 对数据进行解码,以下为一些常见协议的解码过程。

UART协议数据解码

1. 将串口的TX引脚到D0通道

2. 点击顶部工具栏**黄蓝波形图标**,搜索UART,双击选择串行接口类

UART

Session 1 - PulseView	- 🗆 😣
📋 🔍 Run 🕺 Session 1 🗶	
Session 1 @ B	Decoder Selector
Image: Signal of the second	🔍 UART 🔞
	Decoder • Name
	 All Decoders
	Embedded/industrial
There are no channels assigned to this decoder	
	Universal Asynchronous Receiver/
15	Transmitter (uart) Asynchronous, serial bus.
	UART (Universal Asynchronous Receiver Transmitter) is a simple serial
De	communication protocol which allows two devices to talk to each other.
	This decoder should work on all "UART-like" async
	protocols with one
· · · · · · · · · · · · · · · · · · ·	lags: Embedded/industrial

3. 点击波形显示窗口新增的UART通道的协议标签。

设置TX对应通道,数据格式,信号波特率以及字节序

						Sessio	on 1 - Pulse\	liew						• 😣
📑 🖉 🔍 RL	Name UART		Ê											
Session 1	Color										6 X	Decoder Selector		Ø×
I 📑 🕶 👔	UART		E	ED USB TO LA		- 🛣 🖊	1 M samples	▼ 1 MHz	- 🍋 🖾			0.007		•
	RX (UART receive line)			-19000 ms	-	18800 ms	-18600	ms	-18400 ms	-18200 ms		S UARI		8
	TX (UART transmit line)	D0 *		1 1 1	1 1			1 1	1 1 1	1 1 1		All Decoders	▼ Name	
	n (o un nanonic inc)											UART	Universal Asynchr	onous R…
	Baud rate	115200			_	_						Embedded/industr	Tal	
UART	Data bits	8 *			No input	data								
	Parity	none 👻												
	Stop bits													
	Bit order	lsb-first 💌												
D1	Data format	ascii 👻												
	Invert RX	no 👻												
D2	Invert TX	no 👻												
D4												Universal Async	hronous Receiver/	
												Transmitter (uar	rt)	
DS												Asynchronous, seria	al bus.	
												UART (Universal Asy Transmitter) is a sim	nchronous Receiver	^
D6												communication pro	tocol which allows two	devices
												to talk to each other		
D7												This decoder should	d work on all "UART-like"	" async
												protocols with one	Tags: Embedded	/industrial

4. 抓取数据,解析结果如下:

示例为UART的TX脚发送数据 "Hello SLogic!" (数据格式为 ascii, 波特率115200, 小端字节序)

	Session 1 - PulseView	
📃 🔍 Run 🛛 💥 Session 1 🗶		
Session 1		ØX
	SIPEED USB TO LA 🛛 👻 🗶 1 M samples 👻 20 MHz 👻 🦛 💆	
+2200 µs +2400 µs 	+2600 µs +2800 µs +3000 µs +3200 µs +3400 µs +3600 µs +3800 µs 	+4000 µs
UART - UART: TX bits UART: TX data		
		X
D1		
D3		
D4		

I2C协议数据解码

- 1. 将I2C的SCL引脚连接到D0通道, SDA引脚连接到D1通道
- 2. 点击顶部工具栏黄蓝波形图标,搜索I2C,双击选择第一项

Image: Session 1 X Image: Session 1 X Session 1 Image: Session 1 X Image: Session 1 X	_	Session 1 - PulseView			8
Session 1 Image: Supercorrection in the supercorection in the supercorection in the superco		Run 🕉 Session 1 🗙			
Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to thanks asigned to this decode Image: Control of the set to the set	Session 1	1 88	Decoder Selector		ØX
-19400 ms -19300 ms -19200 ms -19300 ms -19300 ms -18500 ms -18700 ms -18700 ms -18500	📑 🕶	🔻 🛅 💌 🙆 💌 😂 👎 📍 SIPEED USB TO LA 🛛 👻 🌋 🥕 🛚 I M samples 🔍 1 MHz 🔍 🌆 🔯	0.00		_
Image: Constraint of the second state of the seco		-19400 ms -19300 ms -19200 ms -19100 ms -19000 ms -18900 ms -18800 ms -18700 ms -18600 ms -18500 ms	S 12C		0
Image: Second			Decoder •	Name	
Image: Proceeding of the second se			I ² C	Inter-Integrated Circui	it
	1PC	Image: There are no charget 5 stic decoder	PC demux PC filter ▶ Embedded/industrial ▶ Util	I ^P C demultiplexer I ² C filter	
D& Inter-Integrated Circuit (i2c) Two wire, multi-master, serial bas.	D4		Inter-Integrated Cir Two-wire, multi-master	cuit (i2c) ; serial bus.	
DS PC (Inter-Integrated Circuit) is a bidirectional, multi- master bus using two signals (SCL = serial clock line, SDA =	D5	•	I ² C (Inter-Integrated Cir master bus using two signals (S	cuit) is a bidirectional, n GCL = serial clock line, SI	nulti- DA =
E serial data line).	D6		serial data line).	Tags: Embedded/ind	dustrial

3. 点击波形显示窗口新增的I2C通道的协议标签。

点击新增的I2C协议标签,设置的SCL、SDA所在通道

	Session 1 - PulseView		- 🗆 😣
	Run 🕺 Session 1 🗶		
Session 1	8	Decoder Selector	C X
📑 🕶	📮 🔊 🖕 🔊 📄 🕐 👎 SIPEED USB TO LA 🛛 👻 🎢 🕺 MHz 💌 🦇 🖄		
	Name I ² C -19100 ms -19000 ms -18900 ms -18800 ms -18700 ms -18600 ms -18500 ms	- <u>s</u> 12C	0
		Decoder All Decoders	Name
	I ² C \otimes	PC	Inter-Integrated Circuit
	SCI (Serial clock line)* D0 *	I ² C demux I ² C filter	I ² C demultiplexer I ² C filter
PC	No input data	Embedded/industrial	
	SDA (Serial data line)	▶ Util	
	Displayed slave address format shifted •		
	* Required channels		
	Stack Decoder *		
02			
D3			
D4		Inter-Integrated Cir	rcuit (i2c)
		Two-wire, multi-master	; serial bus.
D5		I ² C (Inter-Integrated Cir	cuit) is a bidirectional, multi-
		master bus using two signals (S	SCL = serial clock line, SDA =
D6		serial data line).	
D7			
			To an Each of the difference in t
		*	rags. Embeuded/Industrial

4. 抓取数据,解析结果如下:

示例为I2C发送0x68

		Sess	sion 1 - PulseView			
🔲 🔍 🔍 Run 🛛 💥 Sessio	n1 ×					
Session 1						8 3
📑 📲 • 🏝 • 🖻		SIPEED USB TO LA	🝷 💥 🏓 🛛 1 M san	nples 🔻 20 MHz	- 🤲 🖾	
+2500 μs	+2505 µs +	2510 µs +2515 µs	+2520 μs ΙΙΙΙΙΙΙ	+2525 μs	+2530 μs	+2535 μs +2540 μs
12C - 12C: Bits			0 0			
▶ I ² C: Address/data		Address write: 68	Write			
						~
D1						<u>~</u>
D2						
D3						
04						
DS						
D6						

SPI协议数据解码

1. 将SPI的MISO、MOSI、CLK、CS引脚依次连接至D0、D1、D2、

D3通道

2. 点击顶部工具栏黄蓝波形图标,搜索SPI,双击选择串行接口类SPI

Session 1 - Pulseview	
📋 🔍 Run 🛛 🕉 Session 1 🗶	
Session 1	Decoder Selector
📄 🗝 🔚 🕶 🖳 🖛 🙆 🦳 🎁 SIPEED USB TO LA 🛛 👻 🌋 🥕 1 M Samples 🔍 1 MHz 🔍 🚧	0 m
-19400 ms -19300 ms -19200 ms -19100 ms -19000 ms -18900 ms -18800 ms -18700 ms -18700 ms -18500 ms -18500 ms -	S Decoder Vame
	RGB LED (SPI) RGB LED string decoder (SPI) SD card (SPI mode) Secure Digital card (SPI m··· SPI Spial Peripheral Interface
Isen There are no channels assigned to this decoder	SPI flash/EEPROM SPI flash/EEPROM chips
	 ST25R39xx (SPI mo··· STMicroelectronics ST25R··· Display
	Embedded/industrial
	Memory
	Wireless/RF
	Serial Peripheral Interface (spi) Full-duplex, synchronous, serial bus.
<u>D5</u>	The SPI (Serial Peripheral Interface) protocol decoder supports synchronous
	SPI(-like) protocols with a clock line, a MISO and
	transfer in two directions, and an optional CS# pin.
	Either MISO or MOSI (but not both) can be
	optional.
	Tags: Embedded/industrial

3. 点击波形显示窗口新增的SPI通道的协议标签。

设置CLK、MISO、MOSI、CS对应通道,片选信号有效电平

				Session 1 - PulseView		- 🗆 😣
📑 🔍 RL	Name SPI		Ê			
Session 1	Color			Œ	Decoder Selector	Ø 8
1	SPI	0		SIPEED USB TO LA 🔹 💥 🥕 1 M samples 👻 1 MHz 💌 🍋 💆	0.00	•
	CLK (Clock) *	D2 -		-19100 ms -19000 ms -18900 ms -18800 ms -18700 ms -18600 ms -18500 ms	SPI	
	MISO (Master in, slave out)		1		All Decoders	Name
	MOSI (Master out, slave in)	D1			RGB LED (SPI)	RGB LED string decoder (SPI)
	MOSI (Mastel out, slave III)			_	SPI	Serial Peripheral Interface
SPI	CS# (Chip-select)	D3 •		No input data	SPI flash/EEPROM ST25R30xx (SPI mov	SPI flash/EEPROM chips
	CS# polarity	active-low 💌			 Display 	STREE CECTORIES ST2SK
	Clock polarity	0 -			 Embedded/industrial IC 	
	Clock phase	0 -			Memory	
D1	Bit order	msb-first 💌			Wireless/RF	
	Word size	8				
D2	* Required channels					
		Stack Decoder +	•			
D3						
04					Serial Peripheral In Full-duplex, synchrono	terface (spi) us, serial bus.
DS					The SPI (Serial Peripher decoder supports sync	al Interface) protocol
					SPI(-like) protocols with	a clock line, a MISO and
D6					transfer in two direction	ns, and an optional CS# pin.
D7					Either MISO or MOSI (br optional.	ut not both) can be
						Tags: Embedded/industrial

4. 抓取数据,测试结果如下:

示例为SPI发送0x00~0X09(时钟10Mhz,片选低电平有效)

Session 1 - PulseView	×
🖸 🔍 Run 🕺 Session 1 🕱	
Session 1	Ø×
📑 🗣 💼 🖷 🖶 🖶 🗇 📼 📖 📲 SIPEED USB TO LA 🛛 👻 🌽 100 M samples 👻 80 MHz 💌 🦛 💆	
+1062632 µs +1062630 µs +1062632 µs +1062634 µs +1062636 µs I I I I I I I I I I I I I I I I I I I	+1062638 µs
SPI: MISo bits	86
▶ SPI: MISO data 00 \ 00 \ 00 \ 00 \ 00 \ 00 \ 00 \ 0	
SPI: MISO transfers 00 00 00 00 00 00 00 00 00 00 00	
SPI: MOSI bits 0.00 0000 00 0000010 0 000010 0 0000100 0 01000 0 000000	84
▶ SPI: MOSI data 00 01 02 03 04 05 06 07 08 09	
> SPI: MOSI transfers 00 01 02 03 04 05 06 07 08 09	
	Π
	10
	_
4	•

示例为SPI发送0x00~0X09(时钟26Mhz,片选低电平有效)

ion 1	
	😑 🐻 👎 SIPEED USB TO LA 🔹 % 🥕 100 M samples 💌 80 MHz 👻 🐠 💆
+1062628500 n	s +1062639000 ns +1062629500 ns +1062631000 ns +1062631000 ns +1062631000 ns +1062631500 ns +106263100 ns +106263100 ns +1062631000 ns +1062631000 ns +1062631000 ns +1062631000 ns +1062631000 ns +1062631500 ns +1062631500 ns +1062631500 ns +1062631500 ns +1062631500 ns +106200 ns +106200 ns +106000 ns +1000000000000000000000000000000000000
SPI SPI: MISO bits	
SPI: MISO transfers	00 00 00 00 00 00 00 00 00 00 00
SPI: MOSI bits	\$2000020000000000000000000000000000000
SPI: MOSI transfers	
DO	
D1	
D2	
03	

2.4. 注意事项

逻辑分析仪连接被测系统时,需要注意以下事项:

- 逻辑分析仪与电脑是共地的,如果待测设备是强电系统,务必使用"USB隔离器"来进行隔离措施。否则,很可能会造成逻辑分析仪或 电脑损坏的风险
- 2. GND 通道与被测系统的 GND 必须可靠连接,尽可能的短
- 信号通道必须可靠连接至被测系统的待测信号位置,不可随意 "嫁 接",导致干扰的引入
- 如果不注意接线方式,很可能会引入很多毛刺,导致软件无法分析数据