

Instruments Apps

Data Logger

1.946 DMM

I-V Characterizer

Power Supply

Scope

I-V Tracer

I-V Characterizer-1

Settings Table Graph

TSP-Link Connected

☒ DC ☐ Pulse Bias/Sweep Points

Is Stepper? ☐

SMU 1 - Bias
Level: 1.00V
Limit: 1.00mA

SMU 2 - List Sweep
Start Level: 1.00V
Points: 5
Limit: 1.00mA

SMU 3 - Sweep
Start Level: 0.00V
Stop Level: 5.00V
Points: 5

SMU 4 - Disabled

Source

Mode

Pulse Level

Bias Level

Width

Limit

Range

Delay

Measure

Range

Minimum Auto Range

Enabled Measurements ☒ Voltage ☒ Source Readback ☒ Current ☐ Resistance ☐ Power

NPLC

Autozero

Triggering

Wait for a input trigger on

Generate

Input Terminals Output Off

Sense High Capacitance

Minimum Auto Range should be collapsed if the Range is not "Auto".

The sourcing function should always be listed first.

For the triggering:
The phrase "input trigger" will change to "output trigger" when the verb phrase "Wait for" is changed to "Generate".

The options "at the start/end of the test" change to "at the start/end of each step" when a stepper is enabled.

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Settings Table Graph

TSP-Link Connected

DC Pulse Bias/Sweep Points 5 Source To Measure Delay 10 ms

My 2636B

SMU 1 - Bias
Level: 1.00V
Limit: 1.00mA

SMU 2 - List Sweep
Start Level: 1.00V
Points: 5
Limit: 1.00mA

SMU 3 - Sweep
Start Level: 0.00V
Stop Level: 5.00V

SMU 4 - Disabled

My 2nd 2636B

Stepper

Source

Mode Voltage Bias Range Auto

Bias Level 5 V Minimum Auto Range 200 mV Limit 100 mA

Measur

Enabled Measurements

☒ Voltage ☒ Source Readback ☒ Current ☐ Resistance ☐ Power

Range Auto Minimum Auto Range 100 mA NPLC 1 Autozero Once

Triggering

Wait for a rising edge input trigger on Digital I/O 1

Generate falling edge either edge

at the start of the test
at the end of the test
at the start of each source-meas
at the end of each source-meas

Input Terminals Rear Output Off Normal

Sense 2-Wire High Capacitance Off

My 2636B

My 2nd 2636B

Instruments

Minimum Auto Range should be collapsed if the Range is not "Auto".

Might want to consider a source delay to allow for a power up order.

For the triggering:
The phrase "input trigger" will change to "output trigger" when the verb phrase "Wait for" is changed to "Generate".

The options "at the start/end of the test" change to "at the start/end of each step" when a stepper is enabled.

Triggering is really here for illustrative purposes. Actual requirements need to be determined.

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Settings Table Graph

TSP-Link Connected

DC Pulse Bias/Sweep Points 5 Source To Measure Delay 10 ms

My 2636B

SMU 1 - Sweep
Start Level: 0.00V
Stop Level: 5.00V
Limit: 1.00mA

SMU 2 - List Sweep
Start Level: 1.00V
Points: 5
Limit: 1.00mA

SMU 3 - Sweep
Start Level: 0.00V
Stop Level: 5.00V
Limit: 1.00mA

SMU 4 - Disabled

My 2nd 2636B

Stepper

Source

Mode Voltage Sweep Range Auto

Sweep Type Dual Linear Minimum Auto Range 200 mV

Start Level 0 V Limit 100 mA

Stop Level 2 V Step 0.5 V

Measur

Enabled Measurements

☒ Voltage Range Auto

☒ Source Readback Minimum Auto Range 100 mA

☒ Current NPLC 1

☐ Resistance Autozero Once

☐ Power

Triggering

Wait for a rising edge input trigger on Digital I/O 1

Generat falling edge either edge

at the start of the test

at the end of the test

at the start of each source-meas

at the end of each source-measur

Input Terminals Rear Output Off Normal

Sense 2-Wire High Capacitance Off

Instruments

Minimum Auto Range should be hidden if the Range is not "Auto".

Dual sweep is merged in the Sweep Type combo instead of being a separate checkbox.

For the triggering:
The phrase "input trigger" will change to "output trigger" when the verb phrase "Wait for" is changed to "Generate".

The options "at the start/end of the test" change to "at the start/end of each step" when a stepper is enabled.

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Scope

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Settings Table Graph

TSP-Link Connected

DC

Pulse

Bias/Sweep Points

5

Source To Measure Delay

10 ms

My 2636B

SMU 1 - Sweep

Level: 1.00V

Limit: 1.00mA

Step Count: 3

SMU 2 - List Sweep

Start Level: 1.00V

Points: 5

Limit: 1.00mA

SMU 3 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

SMU 4 - Disabled

Stepper

Step Count

3

Source

Mode

Voltage Sweep

Range

Auto

Sweep Type

Dual Linear

Minimum Auto Range

200 mV

Start Level

0 V

Limit

100 mA

Stop Level

2 V

Step

1 V

Measur

Enabled Measurements

Voltage

Source Readback

Current

Resistance

Power

Range

Auto

Minimum Auto Range

100 mA

NPLC

1

Autozero

Once

Triggering

Wait for

Generat

a

rising edge

falling edge

either edge

input trigger on

Digital I/O 1

at the start of the test

at the end of the test

at the start of each source-meas

at the end of each source-measur

Input Terminals

Rear

Sense

2-Wire

Output Off

Normal

High Capacitance

Off

Minimum Auto Range should be hidden if the Range is not "Auto".

Dual sweep is merged in the Sweep Type combo instead of being a separate checkbox.

For the triggering:
The phrase "input trigger" will change to "output trigger" when the verb phrase "Wait for" is changed to "Generate".

The options "at the start/end of the test" change to "at the start/end of each step" when a stepper is enabled.

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Settings

Table

Graph

TSP-Link Connected ●

DC

Pulse

Bias/Sweep Points

5

Source To Measure Delay

10 ms

My 2636B

SMU 1 - Bias

Level: 1.00V

Limit: 1.00mA

My 2nd 2636B

SMU 2 - List Sweep

Start Level: 1.00V

Points: 5

Limit: 1.00mA

SMU 3 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

SMU 4 - Disabled

Stepper

Source

Mode

Voltage List Sweep

Range

Auto

Minimum Auto Range

200 mV

Limit

100 mA

Index	Level (V)
1	1
2	5
3	1
4	5
5	1

Import

Export

Measur

Enabled Measurements

☒ Voltage

☒ Source Readback

☒ Current

☐ Resistance

☐ Power

Range

Auto

Minimum Auto Range

100 mA

NPLC

1

Autozero

Once

Triggering

Wait for

Generat

a

rising edge

falling edge

either edge

input trigger on

Digital I/O 1

at the start of the test

at the end of the test

at the start of each source-meas

at the end of each source-measur

+

Input Terminals

Rear

Sense

2-Wire

Output Off

Normal

High Capacitance

Off

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▶

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Instruments

Minimum Auto Range should be collapsed if the Range is not "Auto".

Dual sweep is merged in the Sweep Type combo

For the triggering:
The phrase "input trigger" will change to "output trigger" when the verb phrase "Wait for" is changed to "Generate".

The options "at the start/end of the test" change to "at the start/end of each step" when a stepper is enabled.

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Scope

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Settings

Table

Graph

TSP-Link Connected

○ DC

● Pulse

Timing Parameters

Period

10 ms

Pulses

5

SMU 1

SMU 2

SMU 3 Disabled

0

0.002

0.004

0.006

0.008

0.01

My 2461

SMU 1 - Sweep

Start Level: 0.00V

Start Level: 5.00V

Limit: 100mA

SMU 2 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

SMU 3 - Disabled

My 2nd 2636B

Stepper

Source

Mode

Voltage Sweep

Width

4 ms

Sweep Type

Dual Linear

Duty Cycle

40%

Start Level

0 V

Pulse Limit

100 mA

Stop Level

5 V

Bias Limit

100 mA

Bias Level

0V

Range

Best Fixed (20V)

Measure

Measurement Mode

● Top of Pulse

○ Complete Waveform

Measurement Delay

3 ms

Range

1 A

Aperture

1 ms

Triggering

Wait for

Generat

a

rising edge

falling edge

either edge

input trigger on

Digital I/O 1

at the start of the test

at the start of each period

at the start of each rising edge

Input Terminals

Rear

Output Off

Normal

Sense

2-Wire

High Capacitance

Off

Question:
Do we have any VOC from how ACS or Clarius does their timing dialog?

Initial timing dialog concept.


X-axis can be zoomed to show more detail when dealing with low duty cycle pulses.

Question:
For the 2461, do we really need to expose separate limit controls for pulse and bias? We could set them to the same value and when in extended region, just set the bias to the max DC region.


Triggering is really here for illustrative purposes. Actual requirements need to be determined.

Instruments


Apps




Data Logger




1.946
DMM




I-V Characterizer



Power Supply



Scope



I-V Tracer

I-V Characterizer-1

Settings

Table

Graph

TSP-Link Connected

○ DC

● Pulse

Timing Parameters

Period

10 ms

Pulses

5

SMU 1

SMU 2

SMU 3 Disabled

My 2461

SMU 1 - Sweep

Start Level: 0.00 V

Stop Level: 5.00 V

Limit: 1.00 mA

My 2nd 2636B

SMU 2 - Sweep

Start Level: 0.00 V

Stop Level: 5.00 V

Limit: 1.00 mA

SMU 3 - Disabled

Stepper

Source

Mode

Voltage Sweep

Width

4 ms

Sweep Type

Dual Linear

Duty Cycle

40%

Start Level

0 V

Pulse Limit

100 mA

Stop Level

5 V

Bias Limit

100 mA

Bias Level

0V

Range

Best Fixed (20V)

Measure

Measurement Mode

○ Top of Pulse

● Complete Waveform

Sample Rate

1 MS/s

Range

1 A

Aperture

1 us

Triggering

Wait for

Generat

a

rising edge

falling edge

either edge

input trigger on

Digital I/O 1

at the start of the test

at the start of each period

at the start of each rising edge

Input Terminals

Rear

Output Off

Normal

Sense

2-Wire

High Capacitance

Off

Question:
Do we have any VOC from how ACS or Clarius does their timing dialog?

Initial timing dialog concept.

X-axis can be zoomed to show more detail when dealing with low duty cycle pulses.

Question:
For the 2461, do we really need to expose separate limit controls for pulse and bias? We could set them to the same value and when in extended region, just set the bias to the max DC region.

Question:
We need to think if aligning the terms we use to set digitizer speed makes sense. Currently the 2461 calls out sample rate and aperture, the 265x uses just aperture.

Triggering is really here for illustrative purposes. Actual requirements need to be determined.

Instruments

Apps

Data Logger

1.946 DMM

I-V Characterizer

Power Supply

Scope

I-V Tracer

I-V Characterizer-1

Settings

Table

Graph

TSP-Link Connected

○ DC

● Pulse

Timing Parameters

Period

10 ms

Pulses

5

SMU 1

SMU 2

SMU 3 Disabled

0

0.002

0.004

0.006

0.008

0.01

My 2461

SMU 1 - Sweep

Start Level: 10mA

Stop Level: 10A

Limit: 100mA

SMU 2 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

Limit: 100mA

SMU 3 - Disabled

My 2nd 2636B

Stepper

Source

Mode

Voltage Sweep

Pulse Source

Pulser

Sweep Type

Logarithmic

Width

SMU

Start Level

10 mA

Delay

1 ms

Stop Level

10 A

Duty Cycle

40%

Asymptote

0 A

Source Protection

40 V

Bias Level

0 A

Sense Protection

20 V

Range

Best Fixed (20V)

Measure

Measurement Mode

● Top of Pulse

○ Complete Puls#

Measurement Delay

9 us

Range

1 A

Aperture

1 us

Triggering

Wait for

a

rising edge

input trigger on

Digital I/O 1

Generat

falling edge

either edge

at the start of the test

at the start of each period

at the start of each rising edge

Input Terminals

Rear

Output Off

Normal

Sense

4-Wire

High Capacitance

Off

Question:
Do we have any VOC from how ACS or Clarius does their timing dialog?

Initial timing dialog concept.

X-axis can be zoomed to show more detail when dealing with low duty cycle pulses.

Question:
For the 2461, do we really need to expose separate limit controls for pulse and bias? We could set them to the same value and when in extended region, just set the bias to the max DC region.

Triggering is really here for illustrative purposes. Actual requirements need to be determined.

Instruments
Apps

I-V Characterizer-1
Settings Table Graph

Data Logger

1.946
DMM

I-V Characterizer

Power Supply

Scope

I-V Tracer

TSP-Link Connected ●

☐ DC
 ☒ Pulse

Timing Parameters

Period

Pulses

SMU 1

SMU 2

SMU 3 Disabled

My 2461

My 2nd 2636B

SMU 1 - Sweep

Start Level: 10mA

Stop Level: 10A

Limit: 100mA

SMU 2 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

Limit: 100mA

SMU 3 - Disabled

☐ Stepper

Source

Mode Pulse Source

Sweep Type Width

Start Level Delay

Stop Level Duty Cycle

Asymptote Source Protection

Bias Level Sense Protection

Range

Measure

Measurement Mode ☐ Top of Pulse → ☒ Complete Pulse Sample Rate

Range ☐ Auto Aperture Aperture

Triggering

Wait for a input trigger on

Generat

☒

Input Terminals Rear Output Off

Sense 4-Wire High Capacitance

Question:

Do we have any VOC from how ACS or Clarius does their timing dialog?

Initial timing dialog concept.

X-axis can be zoomed to show more detail when dealing with low duty cycle pulses.

Question:

For the 2461, do we really need to expose separate limit controls for pulse and bias? We could set them to the same value and when in extended region, just set the bias to the max DC region.

Triggering is really here for illustrative purposes. Actual requirements need to be determined.

Instruments Apps

Data Logger

1.946 **DMM**

I-V Characterizer

Power Supply

Scope

I-V Tracer

I-V Characterizer-1

Settings Table Graph

TSP-Link Connected

☐ DC ☒ Pulse

Timing Parameters

Period

Pulses

SMU 1

SMU 2

SMU 3 Disabled

0 0.002 0.004 0.006 0.008 0.01

My 2461

SMU 1 - Sweep

Start Level: 0.00V

Start Level: 5.00V

Limit: 100mA

My 2nd 2636B

SMU 2 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

SMU 3 - Disabled

☐ Stepper

Source

Mode

Width

Sweep Type

Delay

Start Level

Duty Cycle 40%

Stop Level

Pulse Limit

Bias Level

Bias Limit

Range Best Fixed (20V)

Measure

Measurement Mode ☒ Top of Pulse ☐ Complete Waveform

Measurement Delay

Range

NPLC 0.05

Triggering

Wait for a input trigger on

Generat

Input Terminals Rear

Output Off

Sense

High Capacitance

Instruments

Question:
Do we have any VOC from how ACS or Clarius does their timing dialog?

Initial timing dialog concept.

X-axis can be zoomed to show more detail when dealing with low duty cycle pulses.


Question:
For the 2461, do we really need to expose separate limit controls for pulse and bias? We could set them to the same value and when in extended region, just set the bias to the max DC region.

We can auto-calculate the NPLC from the remaining time of top of the pulse and use that value.


Triggering is really here for illustrative purposes. Actual requirements need to be determined.

Instruments


Apps




Data Logger




1.946
DMM




I-V Characterizer



Power Supply



Scope



I-V Tracer

I-V Characterizer-1

Settings

Table

Graph

TSP-Link Connected

○ DC

● Pulse

Timing Parameters

Period


10 ms

!


Pulses

6

SMU 1



SMU 2



0

0.002

0.004

0.006

0.008

0.01

My 2461

SMU 1 - Sweep

Start Level: 0.00V

Start Level: 5.00V

Limit: 100mA

My 2nd 2636B

SMU 2 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

SMU 3 - Disabled

Stepper

Source

Mode

Voltage Sweep

Width

10 ms

Sweep Type

Linear

Delay

1 ms

Start Level

0 V

Duty Cycle

40%

Stop Level

5 V

Pulse Limit

100 mA

Bias Level

0V

Bias Limit

100 mA

Range

Best Fixed (20V)

Measure

Measurement Mode

● Top of Pulse

○ Complete Waveform

Measurement Delay

3 ms

Range

1 A

NPLC

0.05

Triggering

Wait for

Generat

a

rising edge

falling edge

either edge

input trigger on

Digital I/O 1

at the start of the test

at the start of each period

at the start of each rising edge

Input Terminals

Rear

Output Off

Normal

Sense

2-Wire

High Capacitance

Off

▶

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▶

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Instruments

Question:
Do we have any VOC from how ACS or Clarius does their timing dialog?

Initial timing dialog concept.

X-axis can be zoomed to show more detail when dealing with low duty cycle pulses.

Question:
For the 2461, do we really need to expose separate limit controls for pulse and bias? We could set them to the same value and when in extended region, just set the bias to the max DC region.

We can auto-calculate the NPLC from the remaining time of top of the pulse and use that value.

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Apps

Data Logger

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Power Supply

Scope

I-V Tracer

I-V Characterizer-1

Settings

Table

Graph

TSP-Link Connected

○ DC

● Pulse

Timing Parameters

Period

20 ms

!

Pulses

6

SMU 1

SMU 2

Pulse Period = Pulse Delay + Pulse Width + Pulse Off Time

SMU 1: The pulse off time is out of range. Ensure the value is within limits and doesn't cause the pulse duty cycle to exceed 3%. Valid values are 333e-6 s to 10 s.

My 2461

SMU 1 - Sweep

Start Level: 0.00V

Start Level: 5.00V

Limit: 100mA

My 2nd 2636B

SMU 2 - Sweep

Start Level: 0.00V

Stop Level: 5.00V

SMU 3 - Disabled

Stepper

Source

Mode

Voltage Sweep

Width

10 ms

Sweep Type

Linear

Delay

1 ms

Start Level

0 V

Duty Cycle

50%

Stop Level

5 V

Pulse Limit

100 mA

Bias Level

0V

Bias Limit

100 mA

Range

Best Fixed (20V)

Measure

Measurement Mode

● Top of Pulse

○ Complete Waveform

Measurement Delay

3 ms

Range

1 A

NPLC

0.05

Triggering

Wait for

Generat

a

rising edge

falling edge

either edge

input trigger on

Digital I/O 1

at the start of the test

at the start of each period

at the start of each rising edge

Input Terminals

Rear

Output Off

Normal

Sense

2-Wire

High Capacitance

Off

Question:
Do we have any VOC from how ACS or Clarius does their timing dialog?

Initial timing dialog concept.

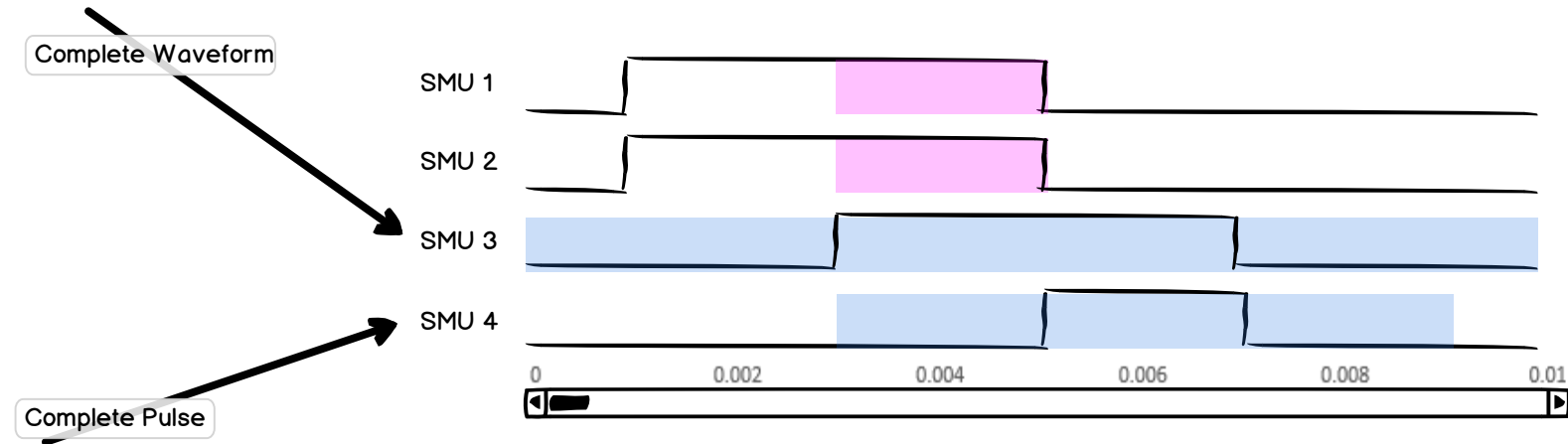
X-axis can be zoomed to show more detail when dealing with low duty cycle pulses.

Question:
For the 2461, do we really need to expose separate limit controls for pulse and bias? We could set them to the same value and when in extended region, just set the bias to the max DC region.

We can auto-calculate the NPLC from the remaining time of top of the pulse and use that value.

Triggering is really here for illustrative purposes. Actual requirements need to be determined.

Triggering is really here for illustrative purposes.
Actual requirements need to be determined.



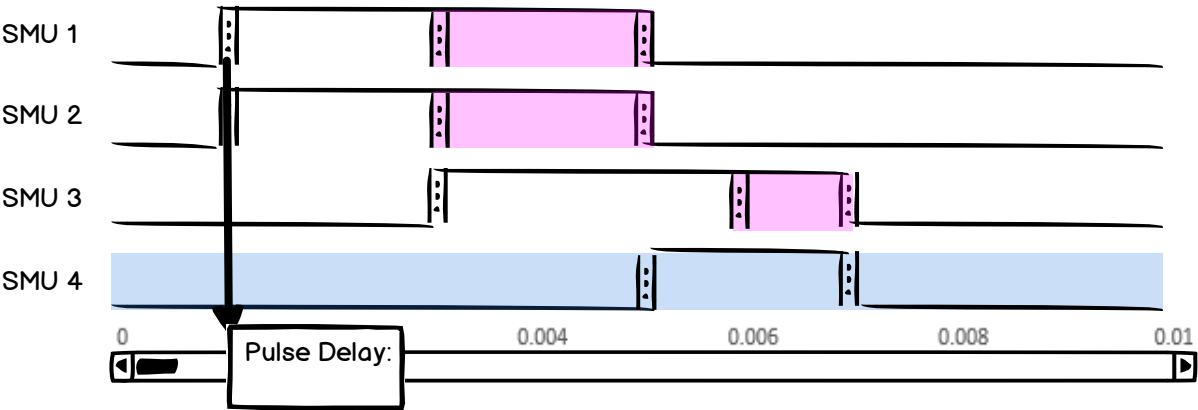
Bias only channels don't need to appear here.

We could use a different color for complete waveform/pulse measure mode.

Allow zooming in the x-direction. Show horizontal scroll bar when zoomed.

Remember: Complete Pulse is the new measure mode we created for 2601B-Pulse. It will collect up to 1 pulse width's worth prior to the rising edge and upto 1 pulse width's worth following the falling edge.

When dragging, a callout should appear that shows the current value. We will also have to think about adding snapping so that users can line up things.



This would allow modification of the pulse delay, pulse width, and measure delay (for top of pulse only).

Big Question:
Is this a feature that customers would use?