

FuturePlus® Systems

FS4120 USB Bus Analyzer

Quick Start Instructions

Analyzer Setup

Step 1 – Connect the FS4120 to your Agilent logic analyzer. Older analyzers (16716 and below) can only be used with the FS/LS (USB 1.1) channel.

For USB 1.1 state analysis, connect analyzer pods 1 & 2 to FS4120 Pods A1 & A2; add pod A3 for timing analysis. Connect analyzer channels 1 and 2 to Pods B1 and B2 to use the HS/FS (USB 2.0) channel.

Full-speed USB traffic can be analyzed by either channel. It is not necessary to hook analyzer pods to unused channels.

Step 2 – Connect the probe between your host computer and the USB device to the stacked USB connectors on the right side of the probe. Use ONLY the two supplied 3' USB cables on the HS/FS channel, and the 6' USB cable on the FS/LS channel.

Step 3 – Install analyzer software. **Mainframe users:** Select *System Administrator Tools, Software, Install, Flexible Disk, Apply*, select the desired filename, then click on *Install*. **Agilent 1680/90/900 users:** insert CD-ROM, and run both .exe files.

Step 4 – Load the desired analyzer configuration file from the *logic/configs/futureplus/FS4120* directory (mainframes) or for 1680/90/900 users select configuration file from folder that was placed on the desktop during installation:

Logic Analyzer	State & Timing
<i>FS/LS Channel (USB 1.1 Only)</i>	
16550*	CUSB41_1
16555/6/7*	CUSB41_2
16710/1/2	CUSB41_1
16715/6	CUSB41_3
16717/8/9	CUSB41_3
16740 Series	CUSB41_3
16750/1/2	CUSB41_3
1691X	CUSB41_3
1680/90	CUSB41_6

*Supports only the 16700/702 frames.

HS/FS Channel	USB 2.0	-	USB 1.1
16715/6/7/8/9	CUSB41_4		CUSB41_5*
16740 Series	CUSB41_4		CUSB41_5*
16750/1/2	CUSB41_4		CUSB41_5*
1691X	CUSB41_4		CUSB41_5*
1680/90	CUSB41_7		

*Requires 2 separate cards

Step 5 – Load the IA. **Mainframe users:** select the IA from the Invasm menu. **Agilent 1680/90 users:** Tools, New, then select the IA.

Switch Settings – FS/LS Channel

The FS/LS channel is locked in low speed (LS) by the LS ONLY switch which illuminates the LS ONLY lamp.

Switch Settings – FS/HS Channel

Start of Frame Suppression (SOF SUP) - SOF PIDs may be suppressed, leaving more analyzer memory for other data. The SOF SUP indicator glows green when enabled, flashing orange when SOFs are suppressed.

Input - NAK Suppression (IN/NAK SUP) - IN-NAK PID combinations can also be suppressed to save analyzer memory when intensive input polling takes place. When enabled, the IN/NAK SUP indicator glows green, flashing orange when a suppression takes place.

Note: no indication of suppressed SOF or IN/NAK PID activity is shown on analyzer listings.

TRIG OUT: 'Scope Trigger, Speed Lock and Test Switch Selector The TRIG OUT signal synchronizes oscilloscope displays with the serial USB data accessible on the D+ and D-SMA connectors. **Note: Do not load the D+/D- lines with high capacitance test leads or data corruption may take place!**

TRIG OUT - Select these functions using a small screwdriver:

Position	Trigger or Function
0	Any Error
1	IN PID
2	OUT PID
3	DATA PID
4	SOF PID
5	TOKEN PID
6	SPLIT PID
7	Lock full speed; Trig Out = Any Error
8	Lock high speed; Trig Out = Any Error
9	Test – sends a walking 1 pattern to analyzer pods B1 & B2

USB Power Analysis

Use the FS4120 Power Monitor channel to measure inrush and static current. This channel is fused internally with a thermally resettable 1.1 amp fuse for power protection. (Remove power for 60 seconds to reset this fuse.)

Measuring Inrush Current with an Oscilloscope

Direct oscilloscope measurements of inrush current are less accurate than using a current probe due to slew-rate limitations in the current sensing amplifiers, but careful interpretation will give good results.

Step 1 – Set the SENSE SELECT switch to the middle (off) position to remove power to the device under test (DUT).

Step 2 – Connect the FS4120 to an analyzer pod to power it up. The analyzer is used only for power in this application.

Step 3 – Connect your device to the top USB connector of the stacked pair in the Power Monitor channel, and your power source or host computer to the bottom connector. **Note: No current indication will be made if these connections are reversed.**

Step 4 – Set the range switch for the full-scale current range to be used. The oscilloscope output voltage is 1 volt when the selected full-scale current is drawn by the DUT. **Caution: Do NOT draw more than 1 amp of current through the FS4120 or internal damage may result.**

Step 5 – Connect an oscilloscope to the CURRENT SMA connector, and adjust the display for a zero-current baseline.

Step 6 – Switch the SENSE SELECT switch to the INTERNAL SENSE (left) position to apply power to the DUT. Observe the inrush and static current on the oscilloscope display.

Measuring Inrush Current with a Current Probe
Perform Steps 1 – 4 above, then:

Step 1 – Place a loop of 24 ga (or heavier) insulated wire between the two EXT SENSE (white) jacks on the FS4120. Clamp your current probe around this loop and connect it to an oscilloscope for readout.

Step 2 – Switch the SENSE SELECT switch to the External SENSE (right) position to apply power to the DUT. Observe the inrush and static current on the oscilloscope display.

FS4120 USB Analyzer Probe Controls and Connections

