I3C Basic^{SM} Protocol Analyzer Plugin for Saleae Logic

Product Datasheet

Revision 1.6

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Binho, LLC
3000 Geary Blvd, Unit #402
San Francisco, CA 94118

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2   Protocol Support

The I3C Basic^{SM} Protocol Analyzer supports the I3C Basic^{SM} v1.1.1 Specification released on 9 June 2021, adopted by the MIPI Board on 23 July 2021. The I3C Basic^{SM} protocol specification is available from MIPI Alliance's website without any membership requirements. It can be accessed here: https://resources.mipi.org/mipi-i3c-basic-download

I3C Protocol decoding can be viewed at byte-level and at the transaction-level. Depending on the testing, having one or the other (or even both) turned on could be advantageous in making any issues easy to identify. Please check our Getting Started Guide to learn more about these different view levels.

2.1   SDR Mode

The analyzer supports 12.5MHz Single Data Rate (SDR) Mode decoding.

2.2   HDR Mode

The analyzer supports High Data Rate (HDR) Modes, including Double Data Rate (DDR) and Bulk Transport (BT) modes. Note that the Ternary modes (HDR-TSL and HDR-TSP) are not included in the I3C Basic specification, and are not supported by this analyzer plugin.

2.3   Protocols on top of I3C

As I3C gains traction, more and more organizations are adopting I3C as the standard for the transport layer of their high-level protocols. At this time, JESD300-5: SPD5118, SPD5108 Hub and Serial Presence Detect Device Standard, DMTF's MCTP, and most recently, ETSI SSP have each adopted I3C. Decoding these higher-level protocols is achieved using Saleae Logic's High-Level Analyzer (HLA) feature in conjunction with the I3C Basic Protocol Analyzer Plugin. The analyzer plugin release package includes the HLA for JESD300-5 Serial Presence Detect decoding.

Please reach out to support@binho.io for additional information regarding decoding support for protocols on top of I3C.

3   Software Compatibility

The I3C Basic^{SM} plugin for Saleae Logic works with both Logic 2.3.43+ and Logic 1.2.29+ versions of the Saleae Logic Desktop Software on all supported operating systems.

Please see the "Analyzer Features" section later in this document to learn more about the differences between Logic 2.x and Logic 1.x.

4   Device Compatibility

The I3C Basic Protocol Analyzer plugin for Saleae Logic will work on captures taken with any of the official Saleae Logic hardware devices. However it's important to note that not all of their devices can capture I3C transactions across the entirety of the I3C specification in terms of both clock speed and operating voltage.

For the best experience, it is our recommendation to use the Saleae Logic Pro 8 or Pro 16 devices when working with I3C Basic^{SM} protocol.

The table below details the hardware capabilities of each device in relation to the I3C Basic^{SM} specification.

Product	Voltage	Sample Rate
Gen1 Saleae Logic SPEC *(retired)*	Bus voltage must be 2.0V or higher.	Max Sample Rate is 24MS/s, which is not fast enough for 12.5MHz I3C.
Gen1 Saleae Logic 16 SPEC *(retired)*	Bus voltage must be 1.8V or higher.	Max Sample Rate is 100MS/s which is sufficient for 12.5MHz I3C.
Gen2 Saleae Logic 4 SPEC *(retired)*	Bus voltage must be 2.5V or higher.	Max Sample Rate is 12MS/s, which is not fast enough for 12.5MHz I3C.
Gen2 Saleae Logic 8 SPEC	Bus voltage must be 1.8V or higher.	Max Sample Rate is 100MS/s which is sufficient for 12.5MHz I3C.
Gen2 Saleae Logic Pro 8 SPEC	Bus voltage must be 1.2V or higher*	Max Sample Rate is 500MS/s which is sufficient for 12.5MHz I3C.
Gen2 Saleae Logic Pro 16 SPEC	Bus voltage must be 1.2V or higher*	Max Sample Rate is 500MS/s which is sufficient for 12.5MHz I3C.

* Per the additional information in Saleae Customer Support Portal regarding the voltage thresholds of Logic Pro 8 and Pro 16 devices, it can be determined that I3C communication at 1.0V _may_ work properly even though it's outside of the official product spec voltage range. As of the publication date of this datasheet, the voltage threshold of Logic Pro devices is 650mV +/- 15%. At the high edge of the tolerance band, it means a device will need to see 750mV to detect a rising edge, which is slightly above the typical 0.7*VDD = 700mV. [Source]

5   Analyzer Installation

The I3C Basic^{SM} analyzer plugin can be installed by following the guides provided by Saleae on their support website. Please see the links below for the process to install the plugin for each version of their desktop software.

Saleae Support: Instructions for Plugin Installation in Logic 2
https://support.saleae.com/faq/technical-faq/setting-up-developer-directory

Saleae Support: Instructions for Plugin Installation in Logic 1
https://support.saleae.com/faq/technical-faq/setting-up-developer-directory#logic-1.x

Once the plugin is added to the Saleae Logic desktop software, please follow the instructions in our Getting Started Guide

6   Analyzer Licensing

The analyzer licensing is implemented in a lightweight and flexible manner such that there is no IT burden to get up and running quickly. Flexible/On-Demand Licenses are available for PCs which have internet access. Node-locked file-based licenses are available for off-line / air-gapped PCs in labs that do not have internet access can use the analyzer plugin. Please see our Getting Started Guide for the specific details to set up the licenses.

There are several tiers of licensing which may lock/unlock various features as desired. Licenses can be time-limited or perpetual. Please see our website for up-to-date information on the various license packages available: https://binho.io/pages/i3c-basic-protocol-analyzer

We are committed to helping our customers succeed and look forward to helping create a licensing solution which works out well for their team size and use-case.

7   Using the Analyzer

After following the steps in the Installation and Licensing sections above, the I3C Basic^{SM} protocol analyzer can be used like any of the included analyzers. You can reference the official Saleae guide and documentation to learn how protocol analyzers can be used within Saleae Logic desktop software: https://support.saleae.com/user-guide/using-logic/using-protocol-analyzers

8   Analyzer Features

After following the steps in the Installation section above, the I3C Basic protocol analyzer can be used like any of the included analyzers. You can reference the official Saleae guide and documentation to learn how protocol analyzers can be used within Saleae Logic desktop software:
https://support.saleae.com/user-guide/using-logic/using-protocol-analyzers

8.1   Real-Time Decoding

Saleae Logic 1.2.29+ and Logic 2.x desktop software support real-time decoding.

8.2   Glitch Filtering

For better or for worse, Saleae Logic glitch filtering in Logic 2.x is handled at the time the capture is being recorded, so in this situation the only option is to trim it out from the capture which is a pain. In versions of Logic 1.x, it is possible to apply the glitch filter retroactively to remove artifacts like that.

Here's how to enable the glitch filter so that it runs when a capture is taken:
https://support.saleae.com/user-guide/using-logic/software-glitch-filter#enabling-the-glitch-filter

Another thing that can help with this is to set the voltage for Logic Pro 8/Pro 16 to 1.2V, even if you're using a higher voltage. You can see how to do that here:
https://support.saleae.com/user-guide/supported-voltages#logic-pro-8-and-logic-pro-16

8.3   Automation

Saleae Logic 1.x Desktop Software can be automated using their Socket API. You can learn how to automate the capture/export process using the Socket API here:
https://support.saleae.com/saleae-api-and-sdk/socket-api

Saleae Logic 2.3.56+ Desktop Software supports an entirely new automation API. You can find the details for this interface here: https://discuss.saleae.com/t/saleae-logic-2-automation-api/1685

In addition to the Saleae Logic Automation API, there is also a mechanism which can be used to stream the I3C decoded data out to an external script/application in real-time. Please contact us to learn more.

The analyzer plugin file package includes example python scripts demonstrating how to use the Saleae Logic 2 Automation API with the I3C Basic protocol analyzer.

8.4   High-Level Analyzer (HLA) Support

High Level Analyzers are Python modules that can further process the output of the I3C Basic analyzer. This is helpful when you want to extend the decoding of the low-level packets to their device-specific meanings within a higher-level protocol. Details can be found here: https://support.saleae.com/extensions/high-level-analyzer-quickstart

The I3C Basic^{SM} Analyzer plugin creates HLA frames which are a superset of the frames generated by the I2C analyzer. As such, previously-developed HLAs for I2C should be directly compatible with this analyzer. The source code (python) for our I3C Transactions HLA is distributed with the analyzer package and can be used as a reference to create your own custom HLAs that work with our I3C Basic^{SM} Analyzer plugin.

High-Level Analyzer support is only available in Saleae Logic 2.x Desktop Software versions.

8.5   Terminal View Support

Terminal View console logging is implemented with our I3C Transaction-level decoding. Details can be found here: https://support.saleae.com/user-guide/using-logic/data-table-and-terminal#terminal-view

Terminal View support is only available in Saleae Logic 2.x Desktop Software versions.

9   Customer Support

We're committed to the success of our customers and take pride in our products. We strive to provide quick responses via email and can be available for phone/video calls as necessary to support active license holders.

9.1   Bug Fixes

We fully believe that our analyzer has reached a reasonable level of maturity and is quite robust, however software is never bug-free. We'll be quick to help debug and resolve any issues with the analyzer as soon as they are reported. Updated versions of the analyzer with bug fixes will be made available to all active license holders without any charge.

9.2   Customization & Enhancements

Our team is available to perform customizations and enhancements to tailor the I3C Basic^{SM} Analyzer Plugin to the needs of your project. Please contact Customer Support to inquire about our development services.

10   Revision Log

Rev	Description of Changes	Date
1.0	Initial Release	3/23/22
1.1	Formatting Improvements Updated Company Address on Cover Page Additional Details Added to Protocol Support Section	5/9/22
1.2	Noted the minimum versions of Logic 1.x and Logic 2.x required for the plugin	6/17/22
1.3	Formatting Improvements Updated information on the following topics: - Decoding Protocols on top of I3C - 1.0V support - Flex/On-Demand Licensing - Logic 2.x Automation API	7/12/22
1.4	Updated information to include usage of I3C Transaction HLA	8/1/22
1.5	Formatting Improvements Added additional information for HLA and Terminal View	8/15/22
1.6	Added information about the JESD300-5 SPD Decoding HLA Added information about the Automation features	9/26/22