

PGY-I2C/SPI-EX-PD: I2C/SPI Protocol Exerciser & Analyzer



I2C/SPI Protocol Exerciser & Analyzer

I2C is a two-wire interface to connect low speed devices like micro-controllers, EEPROM's, A/D & D/A converters, I/O interfaces, and other small peripherals in embedded systems. I2C bus is used by many IC's and is simple to implement. Any microcontroller can communicate with I2C buses. I2C bus can communicate in slow devices and can also use high speed modes to transfer large amounts of data.

SPI is one of the widely used interfaces between micro-controller and peripheral IC's such as sensors, ADC's, DAC's, shift registers, SRAM, and others. SPI is synchronous, full-duplex master-slave based interface. Both master and slave can transmit data at the same time. The SPI interface can be a 3 wire or 4-wire

PGY-I2C/SPI-EX-PD is the leading instrument that enables the design and test engineers to test the respective I2C or SPI designs for its specifications by configuring PGY-I2C/SPI-EX-PD as master/slave, generating I2C/SPI traffic and decoding I2C/SPI Protocol decode packets.

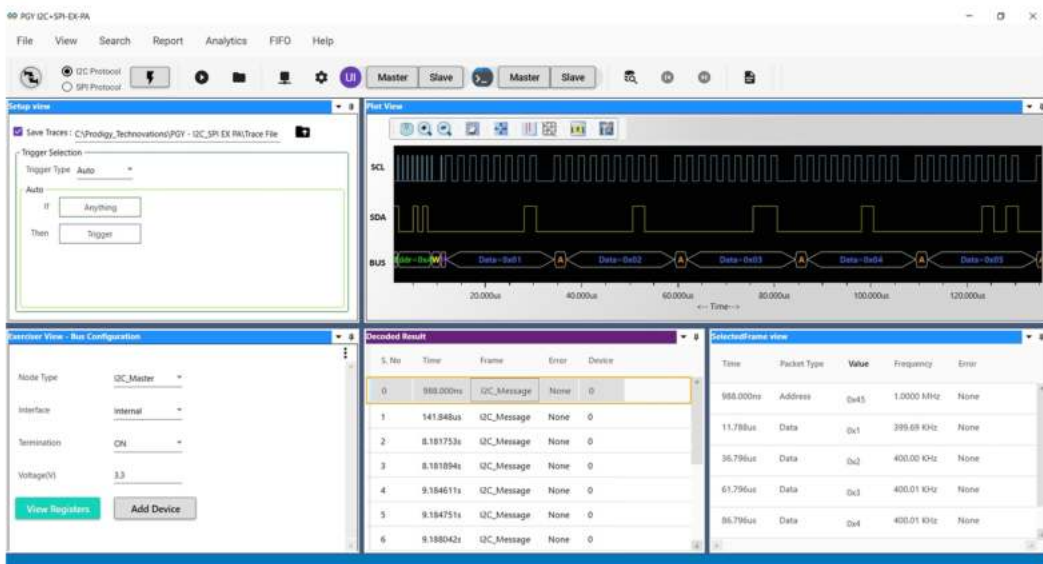
Features

- ◆ Support I2C specifications
- ◆ Support SPI specifications
- ◆ Ability to configure it as Master or Slave
- ◆ Generate different I2C/SPI Packets
- ◆ Variable data speeds.
- ◆ Generate I2C/SPI traffic and Protocol decode of the Bus
- ◆ Timing diagram of Protocol decoded bus
- ◆ Listing view of Protocol activity
- ◆ Ability to write exerciser script to combine multiple data frame generation at different data speeds
- ◆ USB2/3 host computer interface
- ◆ Continuous streaming protocol activity to host system HDD/SSD
- ◆ API support for automation in Python or C#

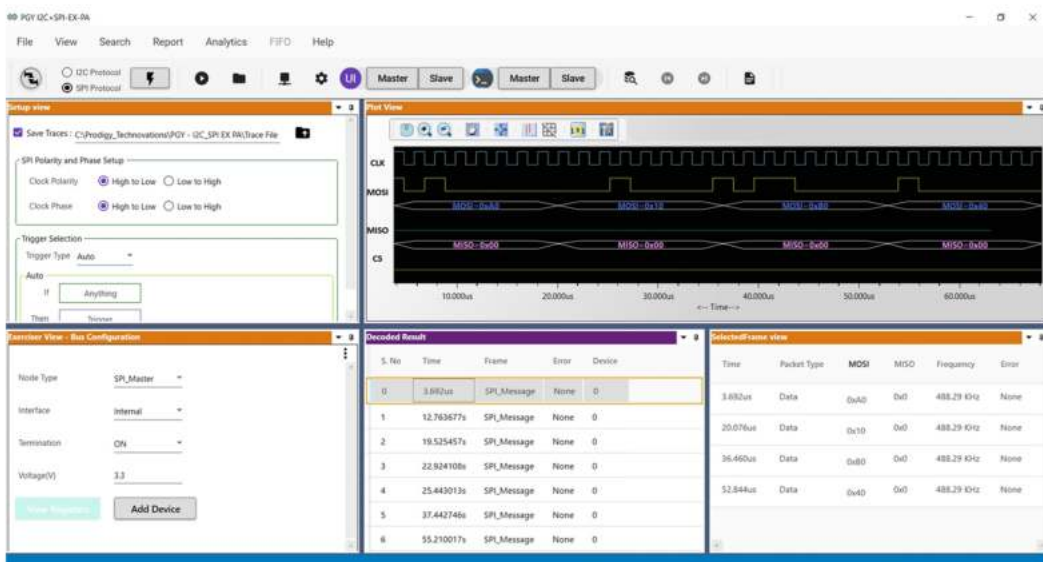
Product Setup



Comprehensive Protocol Analysis using Multi-View



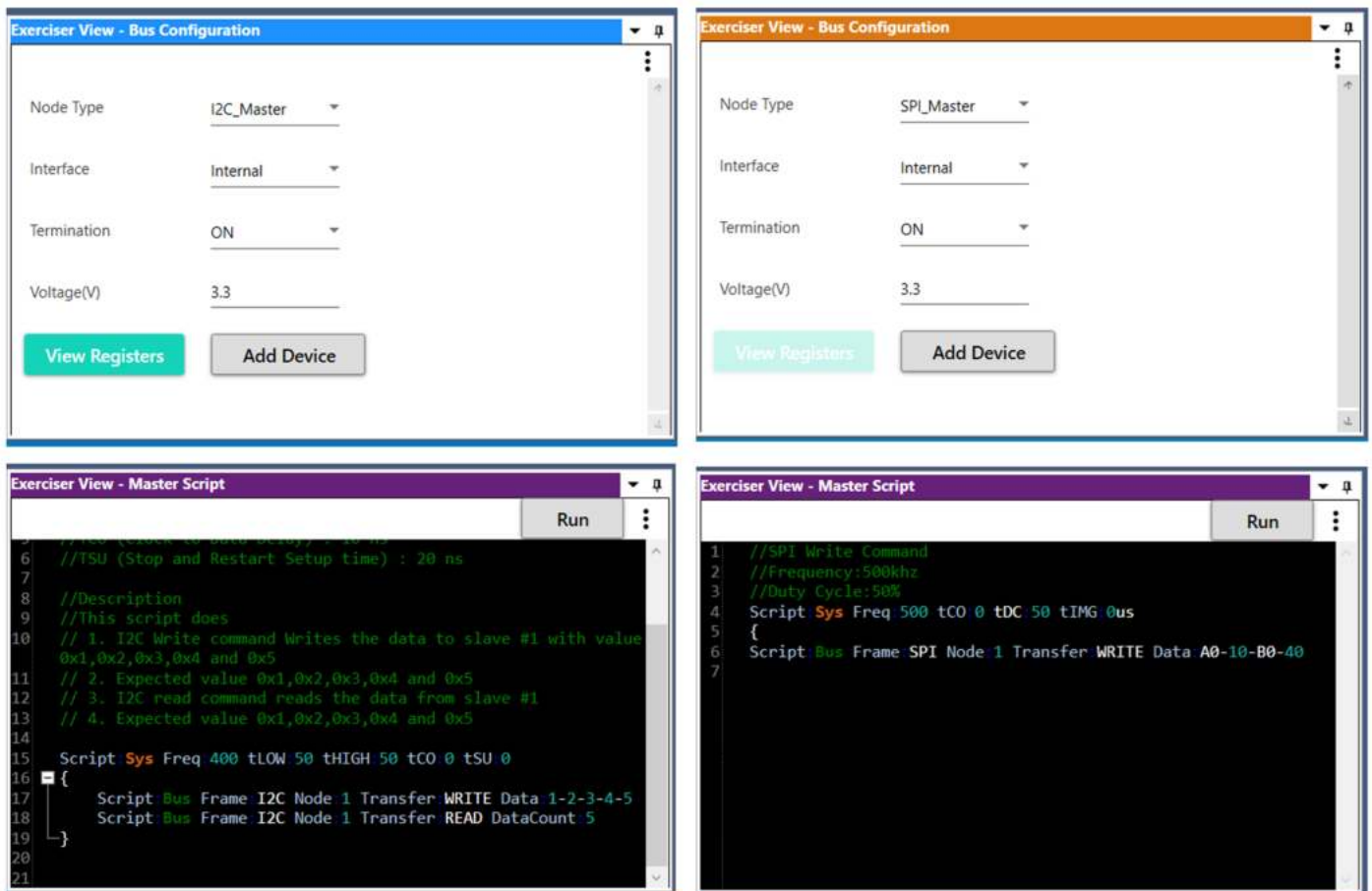
GUI for I2C Protocol



GUI for SPI Protocol

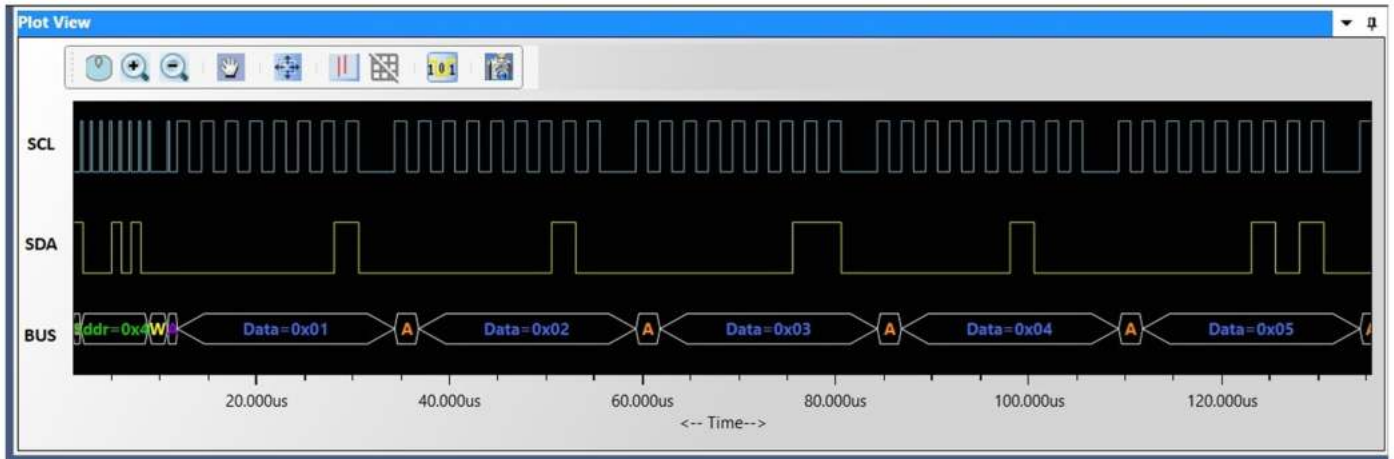
Multidomain View provides the complete view of I2C or SPI Protocol activity in single GUI. User can easily setup the analyser to passively monitor or use the exerciser to generate I2C or SPI traffic using a GUI or script. User can set different trigger conditions from the setup menu to capture Protocol activity at specific event and decode the transition between Master and Slave. The decoded results can be viewed in timing diagram and Protocol listing window with autocorrelation. This comprehensive view of information makes it industry best, offering an easy to use solution to debug the I2C or SPI protocol activity. Continuous streaming protocol activity to host system HDD/SSD ensures seamless roll mode operation without the need to recapture data when DUT/s are set to different states thereby saving test times.

Exerciser

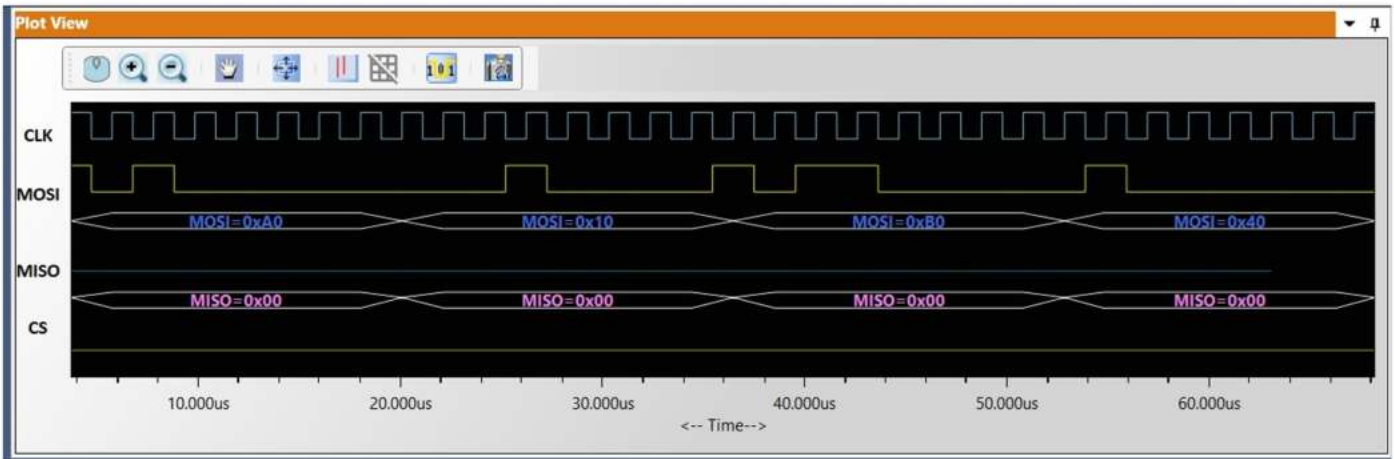


PGY- I2C/SPI -EX-PD supports I2C or SPI traffic generation using GUI and Script. User can generate traffic using the GUI to test the DUT. Script based GUI provides flexibility to emulate the complete expected traffic in real time.

Timing Diagram and Protocol Listing View



Plot View for I2C Protocol



Plot View for SPI Protocol

Timing view provides the plot of Clock and data signals with bus diagram. Overlaying of Protocol bits on the digital timing waveform will help easy debugging of Protocol decoded data. Cursor and Zoom features will make it convenient to analyse Protocol in timing diagram for any timing errors.

| Decoded Result | | | | | SelectedFrame view | | | | |
|----------------|-----------|-------------|-------|--------|--------------------|-------------|-------|------------|-------|
| S. No | Time | Frame | Error | Device | Time | Packet Type | Value | Frequency | Error |
| 0 | 988.000ns | I2C_Message | None | 0 | 988.000ns | Address | 0x45 | 1.0000 MHz | None |
| 1 | 141.848us | I2C_Message | None | 0 | 11.788us | Data | 0x1 | 399.69 KHz | None |
| 2 | 8.181753s | I2C_Message | None | 0 | 36.796us | Data | 0x2 | 400.00 KHz | None |
| 3 | 8.181894s | I2C_Message | None | 0 | 61.796us | Data | 0x3 | 400.01 KHz | None |
| 4 | 9.184611s | I2C_Message | None | 0 | 86.796us | Data | 0x4 | 400.01 KHz | None |
| 5 | 9.184751s | I2C_Message | None | 0 | | | | | |
| 6 | 9.188042s | I2C_Message | None | 0 | | | | | |

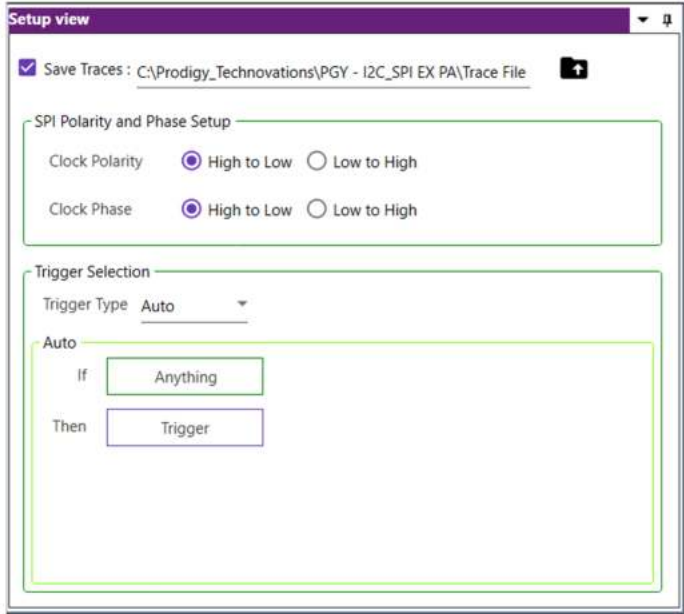
Result View for I2C Protocol

| Decoded Result | | | | | SelectedFrame view | | | | | |
|----------------|------------|-------------|-------|--------|--------------------|-------------|------|------|------------|-------|
| S. No | Time | Frame | Error | Device | Time | Packet Type | MOSI | MISO | Frequency | Error |
| 0 | 3.692us | SPI_Message | None | 0 | 3.692us | Data | 0xA0 | 0x0 | 488.29 KHz | None |
| 1 | 12.763677s | SPI_Message | None | 0 | 20.076us | Data | 0x10 | 0x0 | 488.29 KHz | None |
| 2 | 19.525457s | SPI_Message | None | 0 | 36.460us | Data | 0xB0 | 0x0 | 488.29 KHz | None |
| 3 | 22.924108s | SPI_Message | None | 0 | 52.844us | Data | 0x40 | 0x0 | 488.29 KHz | None |
| 4 | 25.443013s | SPI_Message | None | 0 | | | | | | |
| 5 | 37.442746s | SPI_Message | None | 0 | | | | | | |
| 6 | 55.210017s | SPI_Message | None | 0 | | | | | | |

Result View for SPI Protocol

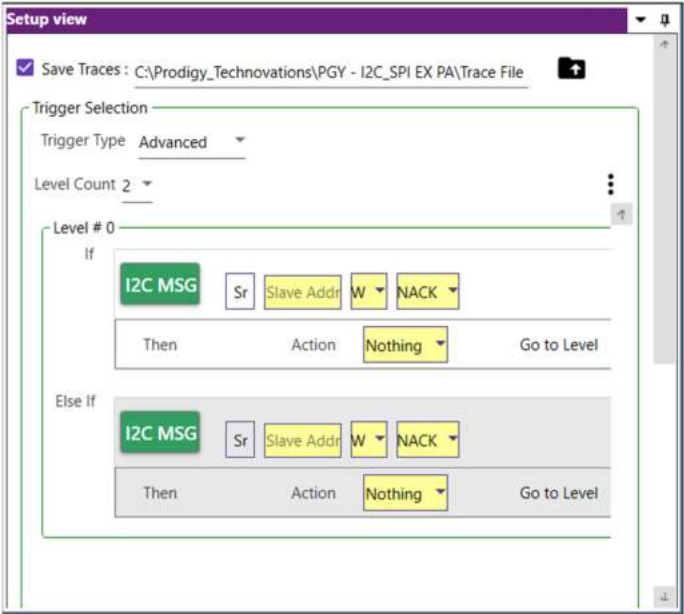
Protocol window provides the decoded packet information in each state and all packet details. Selected frame in Protocol listing window will be auto correlated in timing view to view the timing information of the packet.

Powerful Trigger Capabilities



The screenshot shows the 'Setup view' for I2C protocol configuration. It includes a 'Save Traces' checkbox with a file path, 'SPI Polarity and Phase Setup' with radio buttons for 'High to Low' and 'Low to High' for both Clock Polarity and Clock Phase, and a 'Trigger Selection' section with a dropdown for 'Trigger Type' set to 'Auto' and a simple 'If-Then' trigger logic.

Setup View for I2C Protocol



The screenshot shows the 'Setup view' for SPI protocol configuration. It includes a 'Save Traces' checkbox with a file path, 'Trigger Selection' with a dropdown for 'Trigger Type' set to 'Advanced' and 'Level Count' set to 2. It features a multi-level trigger logic with 'If' and 'Else If' conditions, each containing 'I2C MSG' with fields for Slave Address (Sr), Write (W), and NACK, followed by 'Then' actions and 'Go to Level' options.

Setup View for SPI Protocol

PGY-I2C/SPI-EX-PD supports simple trigger capabilities. Analyzer can trigger on any of the Protocol packet. Advanced Trigger provides the flexibility to monitor Multiple trigger conditions and can set multiple state trigger machine. User can initiate a timer and trigger on set timer values.

| PGY-I2C/SPI-EX-PD Specification | Features | PGY-I2C/SPI-EX-PD |
|---------------------------------|--|-------------------|
| Exerciser: | | |
| Interfaces supported | I2C or SPI | ✓ |
| Configurable | 1 I2C Master + 3 I2C Slaves OR 1 SPI Master+ 1 SPI Slave | ✓ |
| I2C/SPI Traffic Generation | Custom I2C/SPI traffic generation | ✓ |
| Clock Frequency | Up to 3.4 MHz for I2C. Variable up to 32 MHz, Fixed Up to 50 MHz for SPI | ✓ |
| FIFO Capacity | I2C: Yes, 8K read and 8K write on master & 1K on Slave. | ✓ |
| Voltage Drive Level | 1V to 3.3V for I2C. 1V to 3.3V for SPI. Variable in steps of 100mV | ✓ |
| Command sequence Support | All command sequence is supported | ✓ |
| Clock Duty Cycle variation | User Define for I2C. 25%, 50%, or 75% for SPI | ✓ |
| Clock & Data Delay | User defined for I2C. User defined for SPI. | ✓ |
| Delay between two messages | Customisable Delay | ✓ |
| API Support | I2C: Yes. SPI: Yes. | ✓ |
| Protocol Analysis: | | |
| Supports | I2C/SPI protocol decode | |
| Protocol Views | Timing Diagram View Protocol Listing View Bus-Diagram to display Protocol packets with timing diagram plot | ✓ |
| Protocol Trigger | I2C Trigger Capabilities: <ul style="list-style-type: none"> • Auto Trigger • Message trigger- Trigger Slave Address for write or read command on NACK and Trigger Slave Address and Data for Write or Read command on ACK. • Advanced multi-level, multiple condition trigger. | ✓ |
| Capture Duration | Continuous streaming Protocol Data | ✓ |
| Report Generation | CSV/PDF format | ✓ |
| Host Connectivity | USB 3.0 / 2.0 interface | ✓ |
| Dimension | 157mm x 90.2mm x 26.6mm | |
| Net Weight | 290 gms / 0.63 lbs | |
| Gross Weight | 1.05 kg / 2.31 lbs | |

Ordering Information

PGY-I2C/SPI-EX-PD: I2C/SPI Protocol Exerciser and Analyzer (Please mention the specification needed)

Deliverables for PGY-I2C/SPI-EX-PD

- PGY-I2C/SPI-EX-PD Unit
- USB3.0 cable
- PGY-I2C/SPI-EX-PD Software in CD
- 12V DC adopter
- Flying lead probe cable with female connector to connect to DUT

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About Prodigy Technovations Pvt Ltd

Prodigy Technovations Pvt Ltd (www.prodigytechno.com) is a leading global technology provider of Protocol Decode, and Physical layer testing solutions on test and measurement equipment. The company's ongoing efforts include successful implementation of innovative and comprehensive protocol decode and physical Layer testing solutions that span the serial data, telecommunications, automotive, and defence electronics sectors worldwide.