

## ASNT\_PRBS34A Selectable PRBS9/PRBS10 Generator with USB Control Operation Manual



Fig. 1 ASNT\_PRBS34A board

- Broadband frequency range from 2Gbps – 32Gbps
- On board data rate multiplexer to reduce the input clock frequency
- Adjustable phase-shift for multiplexer' clock
- $1-2^{16}$  (any combination) divide ratio for sync output
- Differential CML inputs and outputs
- Minimal insertion jitter
- Fast rise and fall times
- 50% duty cycle sync output on any divide ratio
- Software controlled via USB 2.0 interface
- Single +5.0V supply

### DESCRIPTION

The ASNT\_PRBS34A is a broadband  $2^9-1$  or  $2^{10}-1$  PRBS generator intended for test, prototyping, microwave, and communication applications. A single-ended or differential clock from 1GHz to 16GHz can be used to drive the generator. A dual 1/256 divider block with differential Sync Output divides the input clock allowing a PRBS9 and PRBS10 pattern view on an oscilloscope by using a divide ratio 511 or 1023. The PRBS9/PRBS10 data output is multiplexed to double the data rate, giving a maximum data rate of 32Gbps. An on-board DAC module, software controlled via USB interface allows to phase adjust the multiplexer clock input for all input clock frequencies in a specified range to ensure the best output is achieved. The built-in PRBS generator reset switch presets PRBS generator to avoid the all zero-state lock-up.

### FUNCTIONAL BLOCK DIAGRAM

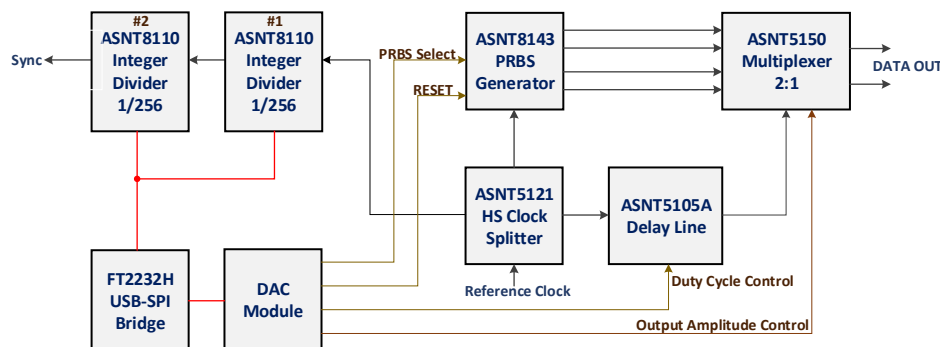


Fig. 2 Functional Block Diagram



## TERMINAL FUNCTIONS

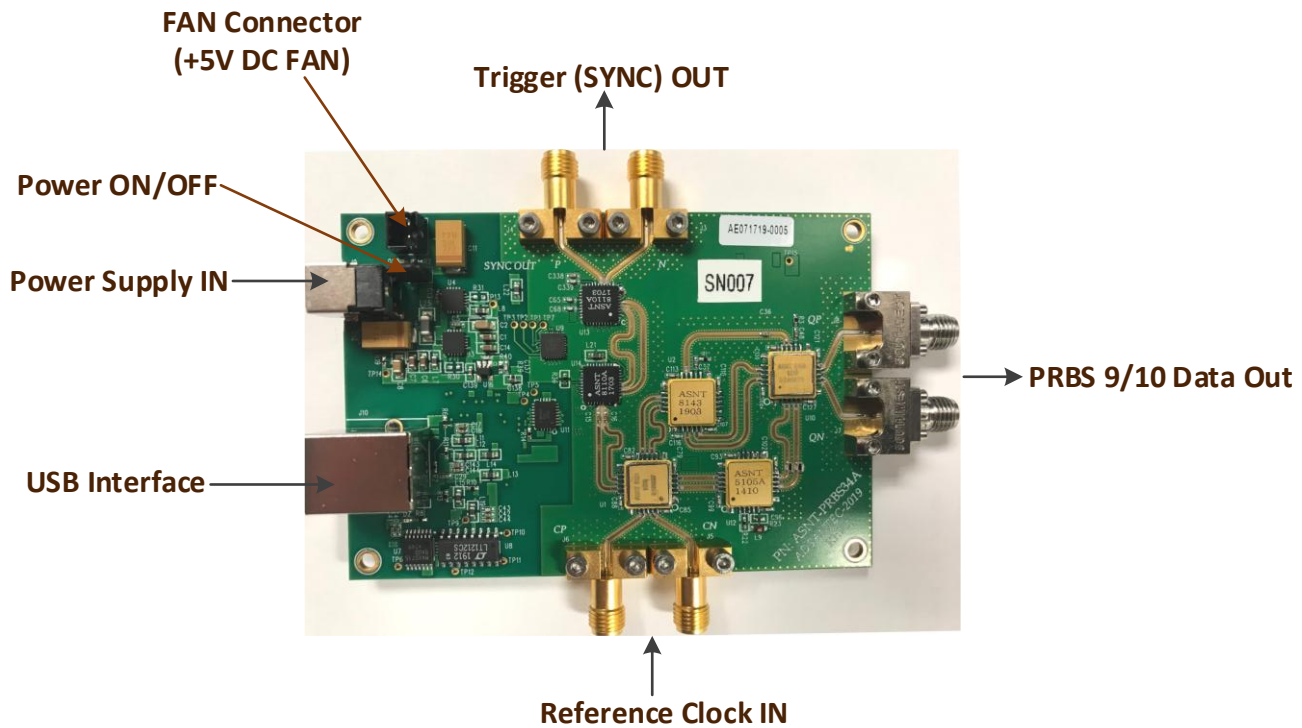


Fig. 3. Terminal Functions Diagram

## OPERATION

1. Measure  $50\Omega$  on all SMA connectors referenced to **vcc**.
2. Connect the power supply (provided) to the board.
3. Use a fan (not provided) to air cool the board during operation (**Required**).

The 5V/up to 0.2A FAN can be directly connected to the board (Terminal Functions section).

Digi-Key part number of the mating connector: H2083-ND; Mating jumper cables: Red – H2BXG-10112-R4-ND; Black - H2BXG-10112-B4-ND

3. Apply an **AC coupled** single-ended/differential clock signal to the Reference Clock Input.
4. Connect the PRBS Output to a  $50\Omega$  terminated **AC-coupled** oscilloscope single-ended/differentially.
5. Connect the Sync (Trigger) Output **AC-coupled** to oscilloscope trigger

Note: If using a single-ended input/output only, apply an AC coupled  $50\Omega$  termination to the unused input/output. This will reduce any noise presence.

6. Start the provided software and choose either a PRBS9 or a PRBS10 Pattern.
7. Follow the software operating instructions provided in the GUI interface section.



## GUI Interface

The provided GUI interface allows full PC control of the ASNT\_PRBS34A output signal parameters, including the output sync signal division ratio. After starting the software by engaging the provided .exe file the GUI window will appear as it's depicted in the picture below.

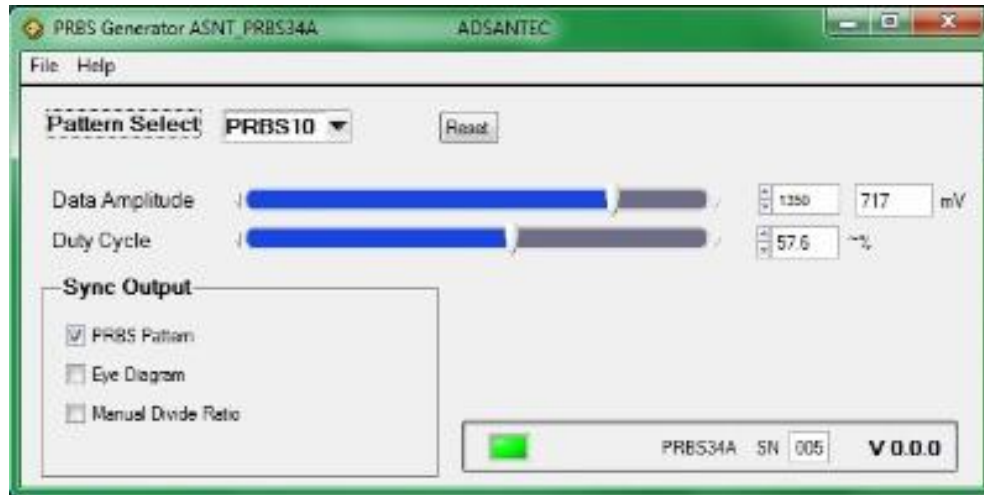


Fig. 4. ASNTPRBS34A GUI Interface

The software automatically connects to a powered and USB-connected ASNT\_PRBS34A board. When connected, the USB connection indicator changes the color from red to green and indicates the serial number of the board under test (in the provided example it's SN 005). The device is connected and ready for configuration. If necessary, reset the generator to avoid the all zero-state lock-up at the start up by clicking the **Reset button** (upper center). The user can choose the type of Sync output signal depending on the particular testing need by checking the appropriate box in the **Sync Output** section. The PRBS pattern type selection is realized by choosing the appropriate pattern in the **Pattern Select** dropdown menu. The interface also supports precision output data amplitude adjustment (**Data Amplitude**) and multiplexer clock input phase adjustment to ensure the best possible data output signal under full range of input clock frequencies (**Duty Cycle**).



## ELECTRICAL CHARACTERISTICS

| Parameter                  | Min                          | Typ      | Max  | Unit | Comments                 |
|----------------------------|------------------------------|----------|------|------|--------------------------|
| Power Supply               |                              | 5.0      |      | V    | Provided                 |
| Ivcc                       |                              | 2.1      |      | A    |                          |
| Power                      |                              | 10.5     |      | W    |                          |
| Operating Temperature      | -25                          | 30       | 60   | °C   |                          |
| <b>Clock Input</b>         |                              |          |      |      |                          |
| Frequency                  | 1                            |          | 16   | GHz  |                          |
| Single-Ended Swing         | 50                           | 400      | 1000 | mV   | Peak-to-Peak             |
| Common mode level          | vcc -0.8                     | vcc -0.2 | vcc  | V    |                          |
| Duty Cycle                 | 40%                          | 50%      | 60%  |      | Range of input tolerance |
| <b>Sync Output</b>         |                              |          |      |      |                          |
| Frequency                  | 0.0003                       |          | 16   | GHz  |                          |
| Single-Ended Swing         | 570                          | 600      | 630  | mV   | Peak-to-Peak             |
| Common-Mode Level          | vcc - (Single-Ended Swing)/2 |          |      |      |                          |
| Rise/Fall Times            | 15                           | 17       | 19   | ps   | 20% to 80%               |
| Duty Cycle                 | 45%                          | 50%      | 55%  |      |                          |
| <b>PRBS Output</b>         |                              |          |      |      |                          |
| Data rate                  | 2                            |          | 32   | Gbps |                          |
| Single-Ended Voltage Level | 400                          |          |      | mV   | Peak-to-Peak             |
| Common Mode Level          | vcc - (Single-Ended Swing)/2 |          |      | V    |                          |
| Duty Cycle                 | 40%                          | 50%      | 60%  |      |                          |
| Rise/Fall Time             | 20                           |          |      | ps   | 20% to 80%               |



## BOARD DIMENSIONS

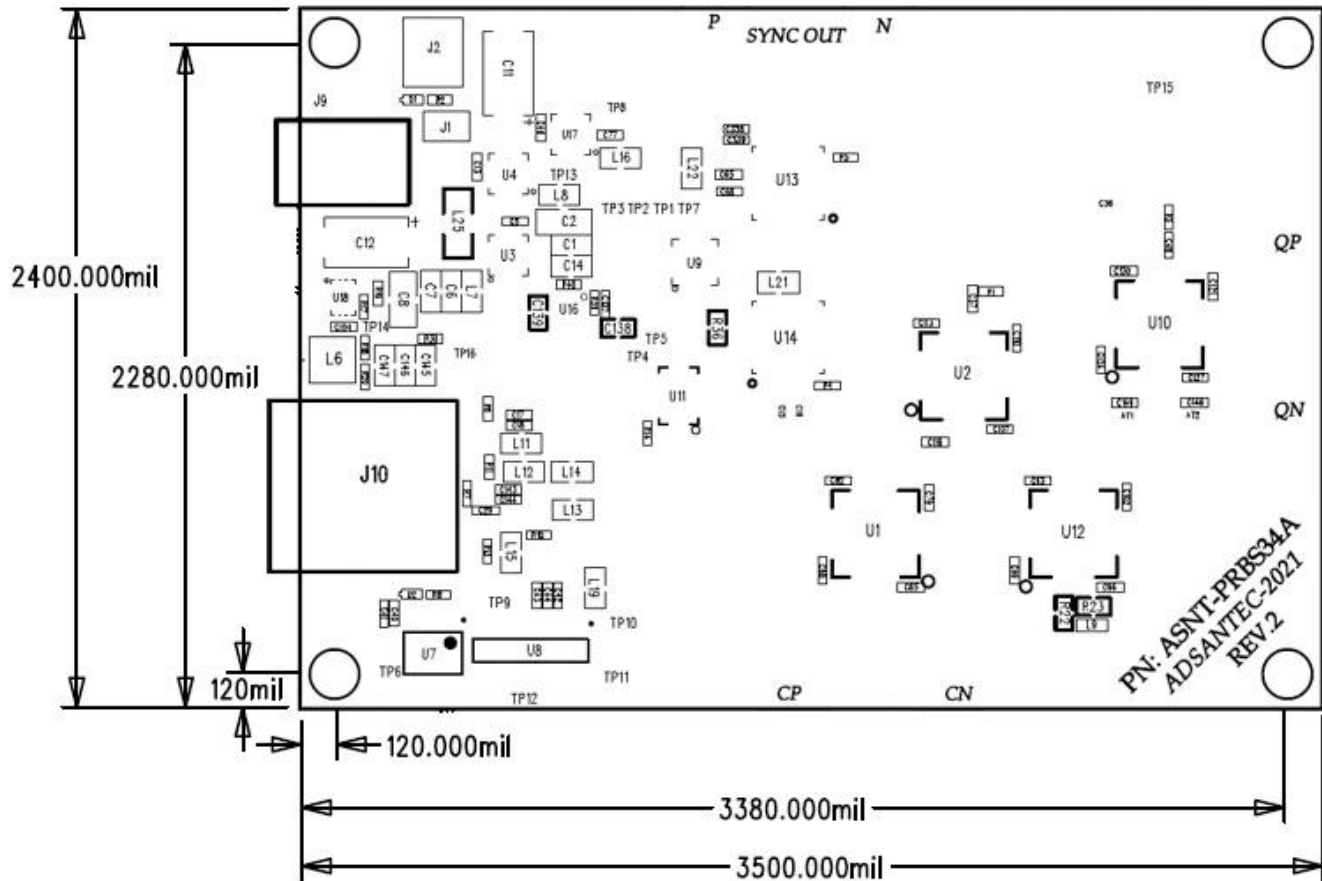


Fig. 5 Board Dimensions Diagram

## REVISION HISTORY

| Revision | Date    | Changes   |
|----------|---------|---|
| 1.1.2    | 05-2023 | Added Board Dimensions Section<br>Added Fig. 5 Board Dimensions Diagram |
| 1.0.2    | 11-2021 | Initial release   |