** Photo shows prototype enclosure that is subject to change.*

Elma Bustronic BTSD08 Quick Start Manual

User Manual

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Table of Contents

Revision	Revision History	Date
0.9	Document Creation	June 8, 2010
1.0	Removed references to older product numbers	June 21, 2010
1.1	Minor wording changes	June 22, 2010

Product: BTSD08
Status: Released

ESD Caution

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

Introduction

Product Overview

The BTSD08 SerDes Serial-Port Validation Tester provides an affordable way to determine the operating characteristics of the receive/transmit channels in your serializer/deserializer (SerDes) communications interfaces. Developed for use in both device characterization and production test, the BTSD08 provides seamless operation with existing automated test equipment (ATE) platforms and characterization lab equipment.

The BTSD08 Tester provides eight simultaneous differential output channels operating at data rates up to 6.375 Gbps. The Tester also provides eight flexible receivers with integrated Bit Error Rate Testers (BERTs). Clock control, alignment control, delay controls, programmable triggers and output flags all simplify the integration of the BTSD08 into your test environment. The BTSD08 provides support for many HSIO standards, referred to as "BTSD08 Personalities". These include PCI Express and HyperTransport, and HDMI, and will soon include MIPI, SATA, USB 2.0, and other additional standards.

The BTSD08 General Programming Interface (GPI) software provides an easy-to-use environment for device characterization and test-plan development using the BTSD08 Tester. Through a provided GUI, all BTSD08 functionality can be accessed in an intuitive hierarchically fashion. Software "Wizards" are provided to allow rapid implementation of standard SerDes tests, including acquisition and analysis of RX channel eye-diagrams, separation and calculation RX jitter statistics (RJ, DJ, and TJ), injection of TX jitter frequencies and amplitudes, and measurement of channel skew. The GUI includes built-in data logging and convenient data retrieval capabilities for characterization and analysis.

The BTSD08 General Programming Interface is based on the Python programming language. The provided GUI is able to convert test sequences to executable scripts which can be easily integrated into a production floor environment, or into applications such as MATLAB and LabView.

Quick-Start Documentation

This Quick Start Manual will provide the information required for a user to get up and running with the BTSD08 tester. It will describe the required hardware and interconnection including a detailed description. On the software side, this manual will specify the system requirements, describe the software installation process, and provide a step-by-step guide to some of the basic features of the BTSD08 GPI Graphic User Interface.

The product specifications for the BTSD08 and a complete description of the BTSD08 GPI can be found in the "Related Documents" section below.

Document Title	Publication Number	Source
BTSD08 Data Sheet	TBD	Elma Bustronic Corp.
BTSD08 GPI User Manual	TBD	Elma Bustronic Corp.

Table 1. Related Documents Table

Quick Start Hardware Description

Hardware Requirements

The requirements for this Quick Start Manual are:

- 1 x BTSD08 SerDes Tester
- 1 x USB to SPI Adapter Board
- SMA cables as required

PC Controlled Application

A USB to SPI Adapter Board is used to control the BTSD08 from a PC. The SPI header is connected to BTSD08 as shown in Figure 1.

Figure 1 USB to SPI Adapter Board showing connection of SPI header [notice pin 1 (red) is on the right]

ATE Controlled Application

In an ATE application, the BTSD08 is connected directly to the tester via the SPI interface. In this environment, the ATE is the controlling device (Master) and the BTSD08 is the device being controlled (Slave). The BTSD08 can synchronize its actions to external events through triggers, and can raise flags to signal internally-generated events, such as the completion of a command or test. Triggers and flags are both host- configurable through the command interface. The SPI interface between the BTSD08 and the ATE is composed of only four signals as follows:

Master Out Slave In (MOSI, Data signal driven by ATE)
Master In Slave Out (MISO, Data signal driven by BTSD08)
Serial Clock (SCLK, clock signal driven by ATE)
Slave Select (SSN, active low signal used to select target BTSD08, driven by ATE)
The pinout of the SPI header is shown in Table 2.

Pin Name	Pin Number
Reserved	1
GND	2
Reserved	3
NC	4
MISO (Master In / Slave Out)	5
NC	6
SCLK (Serial Clock)	7
MOSI (Master Out / Slave In)	8
SSN (Slave Select, Negative Logic)	9
NC	10

Table 2. SPI Connector Pin Assignment

The SPI bus timing and control register descriptions can be found in the Command Interface Design document.

Quick Start Hardware Description

There are eight receiver (IN 1-8) and eight transmitter (OUT 1-8) channels available for connection via standard SMA connectors. Tx/Rx Channels 1-4 are located under the top-left panel and Tx/Rx Channels 5-8 are located under the top-right panel (see Figure 2). In order to access the SMA connections, the user must pull both black round pins upward until a click is observed. This will release the retaining force. Once properly released, the cover can be removed. Specific Channel locations can be viewed on the PCB inside the enclosure.

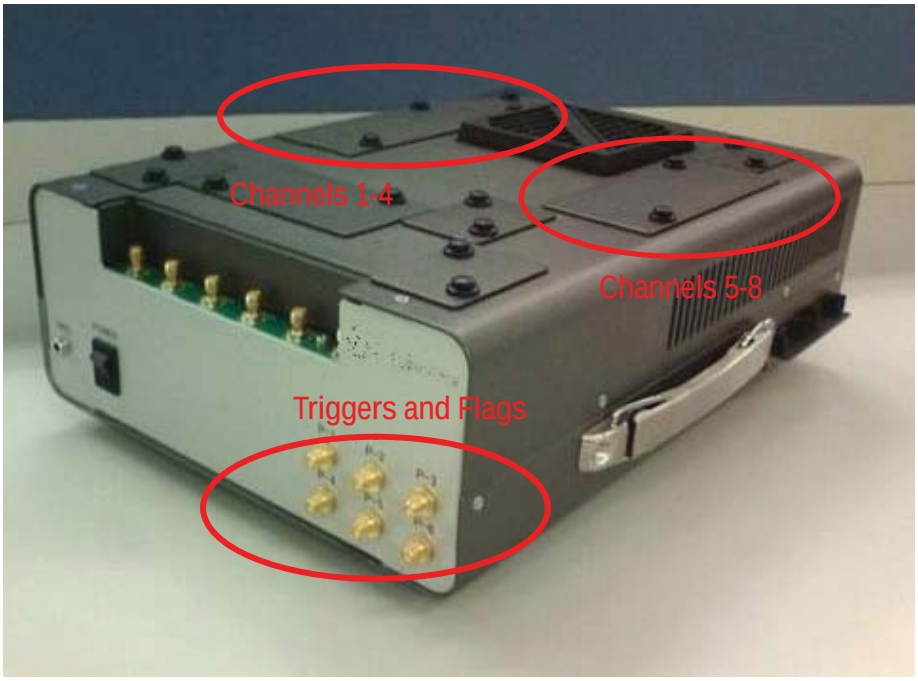


Figure 2 BTSD08 in a prototype enclosure showing High Speed Channel, Trigger and Flag locations

Software Installation

System Requirements

The BTSD08 General Programming Interface (GPI) software provides an easy-to-use environment for device characterization and test-plan development using the BTSD08 Tester. To run the software, the following components are required:

- A PC installed with Windows XP or Vista.
- The drivers for the USB to SPI adapter board. See the FTDI driver installation instructions below.
- The installation files for Python, version 2.6. See python installation instructions below.
- The BTSD08 software release, which includes two files:
    - BTSD08_Python.zip
    - BTSD08_GUI.zip

Software Installation

Installation Instructions

1. FTDI Driver Installation

The BTSD08_GPI software communicates with the BTSD08 hardware via an FTDI device (connected via USB). If you don't already have required FTDI drivers installed on your Windows computer, you will need to download them from the FTDI web site.

To do this, follow the instructions found at http://www.ftdichip.com/Documents/InstallGuides.htm

The latest drivers can be found at http://www.ftdichip.com/Drivers/D2XX.htm

Note that the driver version used in our product development is 2.06.

You may wish to use the "usbview" utility program linked to on the following FTDI page: http://www.ftdichip.com/Resources/Utilities.htm

This program will allow you to check that your computer can "see" the FTDI device over USB.

2. Python Installation

In order to use the GPI software, you need to have the Python language (version 2.6) installed on your computer.

If you don't already have Python 2.6 installed on your computer, it is available from the main Python website: http://www.python.org/

Perform the installation downloading the file "python-2.6.5.msi" and double-clicking on the icon.

3. BTSD08 Software Installation

A release of BTSD08_GPI consists of the following two zip files:

- BTSD08_Python.zip
- BTSD08_GUI.zip

Copy those files to an appropriate folder on your machine and unzip them. You will then have two folders: "BTSD08_Python" and "BTSD08_GUI". In the BTSD08_GUI folder there is a file named "BTSD08_GUI.ini". Edit that .ini file (e.g. in NotePad) and change 'pythonFolderPath' to the full path to the BTSD08_Python folder.

For example, if your BTSD08_Python folder is at "C:\MyStuff\Elma\BTSD08_Python", then set pythonFolderPath as follows: pythonFolderPath= C:\MyStuff\Elma\BTSD08_Python

Note that the path is case-sensitive.

Also contained in the "BTSD08_GUI.ini" file is a GUI preference called 'testDefaultPath'. This specifies the default save and load locations for all tests. This follows the same format as specified above for 'pythonFolderPath'. This preference is disabled by default. To enable it, remove the ';' found at the beginning of the line. (The semi-colon is the comment character for INI files.)

4. BTSD08 Test Example

Double-click on the "BTSD08_GUI.exe" icon in the BTSD08_GUI folder and you should see the first "welcome" window of the GUI.

Troubleshooting:

If you get a Python error message saying that it can't find some "system", that probably means that you didn't specify the correct path to the BTSD08_Python folder in the BTSD08_GUI.ini file.

In the BTSD08_GUI folder, there is a sub-folder "SampleTests". Each of the folders in "SampleTests" is a folder that can be loaded into the BTSD08 GUI where you will be able to examine the parameters used for that Test and the results from running that Test. The example folder "BertScanTest" is provided with the BTSD08 software installation files. A step-by-step guide to using this sample test folder is provided in the following section.

BTSD08 GPI Demonstration

When the BTSD08 GUI starts, it provides the user with three options:

- Create a new Test via a wizard
- Create a new Test manually
- Open an existing Test folder

The step-by-step guide on the following page will demonstrate the third of these three options. It will allow the user to generate and view a bathtub curve for a signal appearing on Channel 8 of the BTSD08, and provide an overview of several of the GUI's features.

Step-By-Step Guide: Performing a BertScan Test

1. Preliminary hardware setup:
On the BTSD08, open the top-right panel (see Figure 1) and connect OUT8(+) and OUT8(-) to IN8(+) and IN8(-) as shown in the figure below.

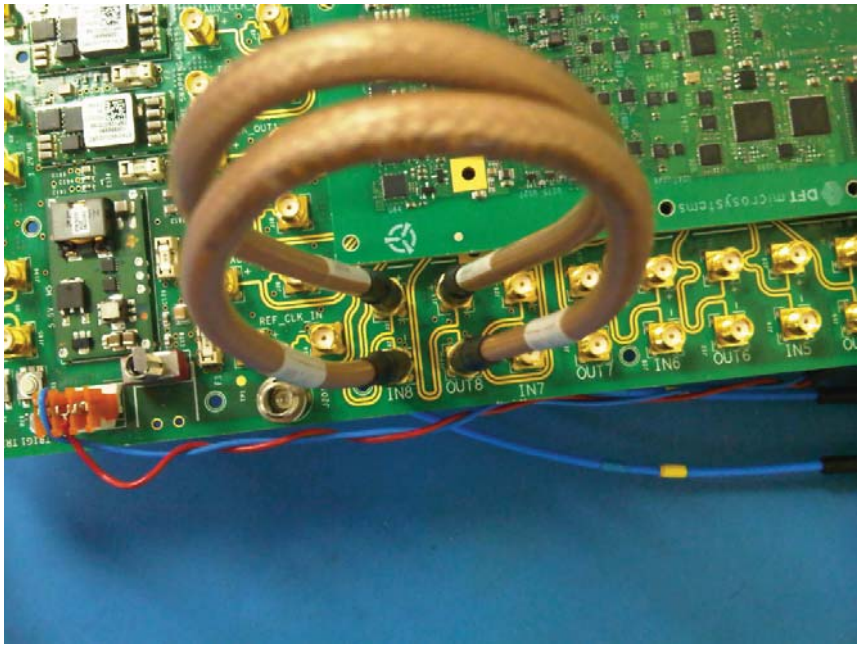
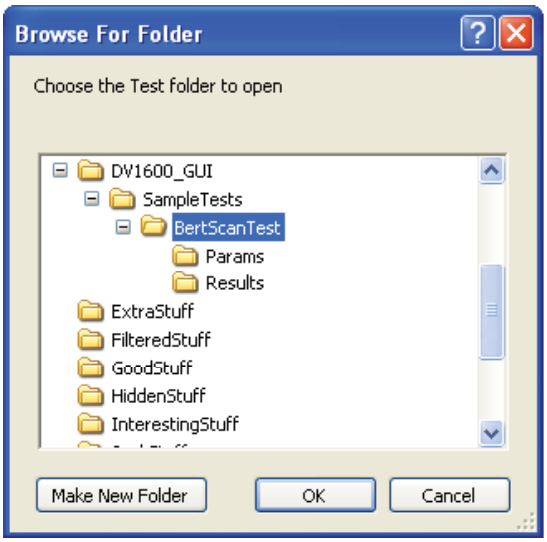


Figure 3 Connection of Channel 8 for the BertScan Test

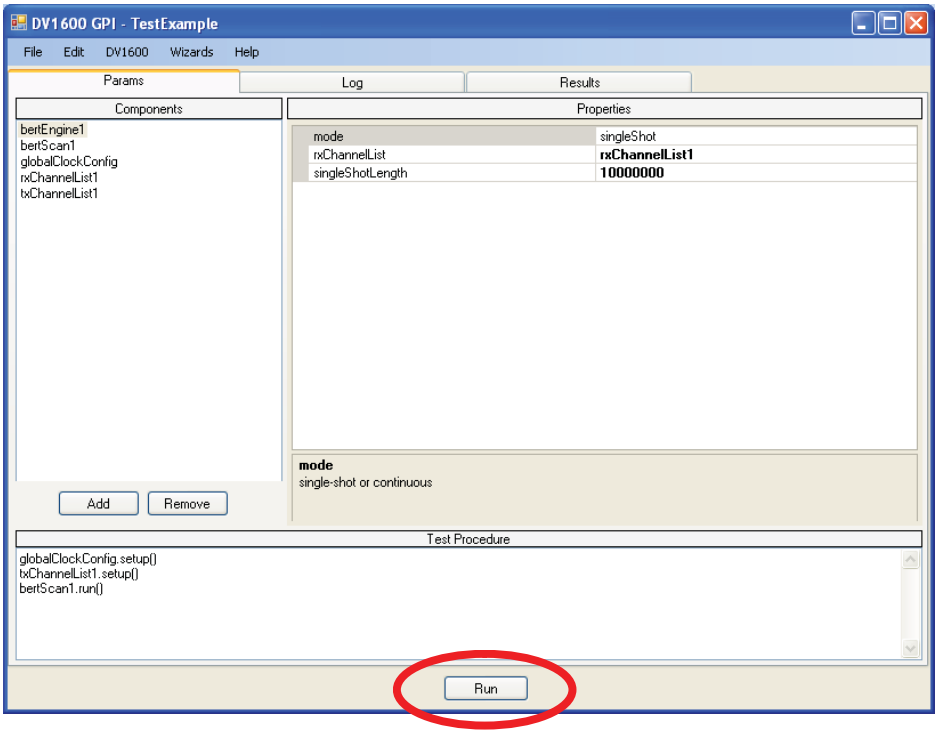
2. On the PC, double-click on the "BTSD08_GUI.exe" icon in the BTSD08_GUI folder. You should see the first "welcome" window of the GUI.

Select "Open an existing Test file", as shown below.

3. Next, select the folder called “BertScanTest” under “SampleTests”

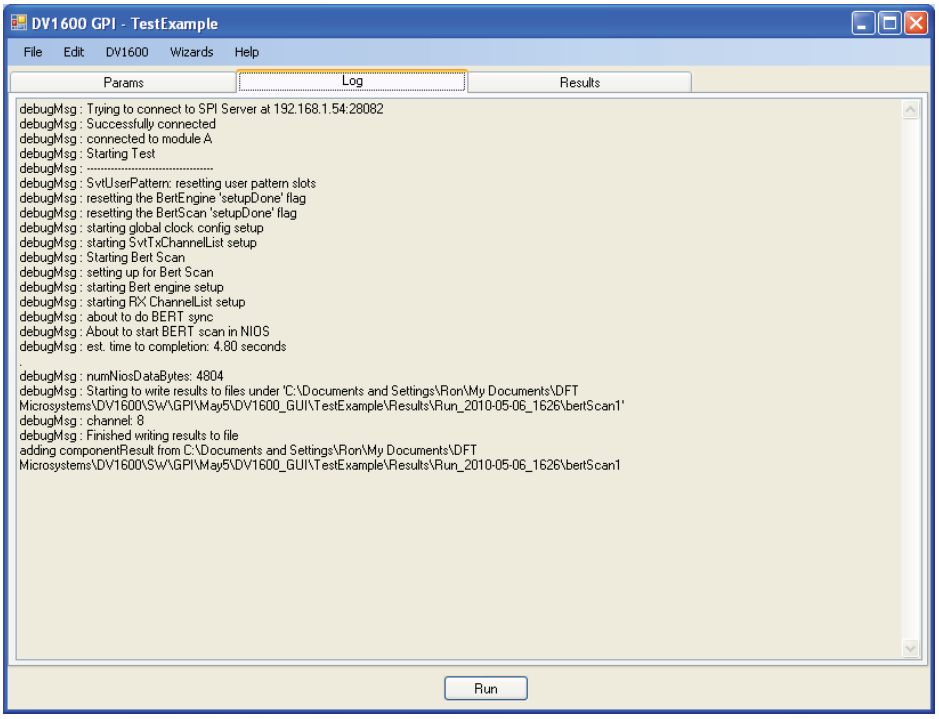


4. Verify that the test procedure is properly loaded. It should appear as shown below.

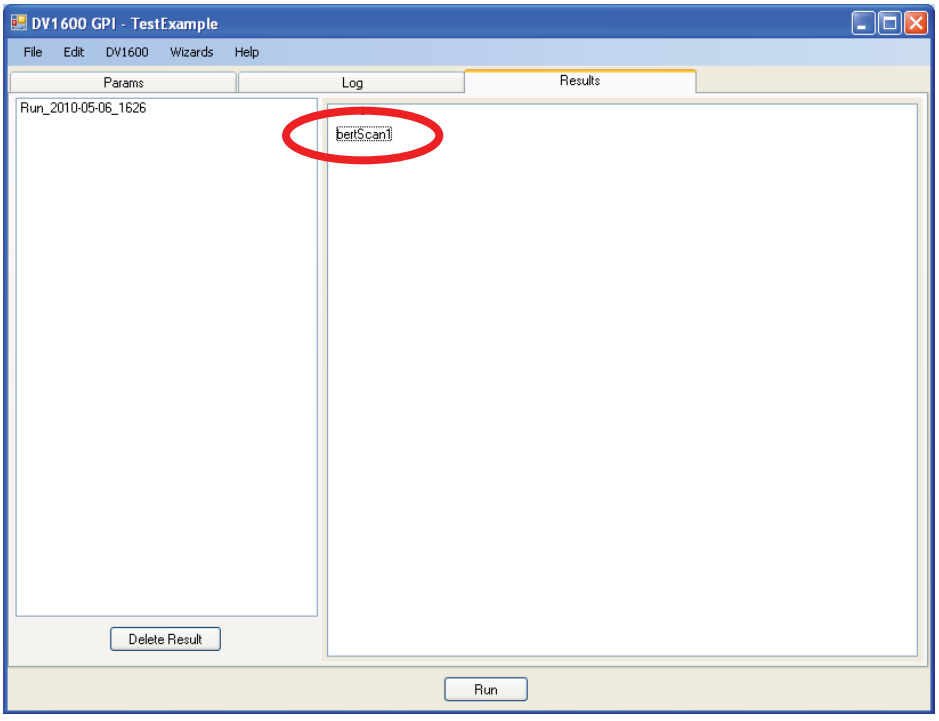


Step-By-Step Guide: Performing a BertScan Test

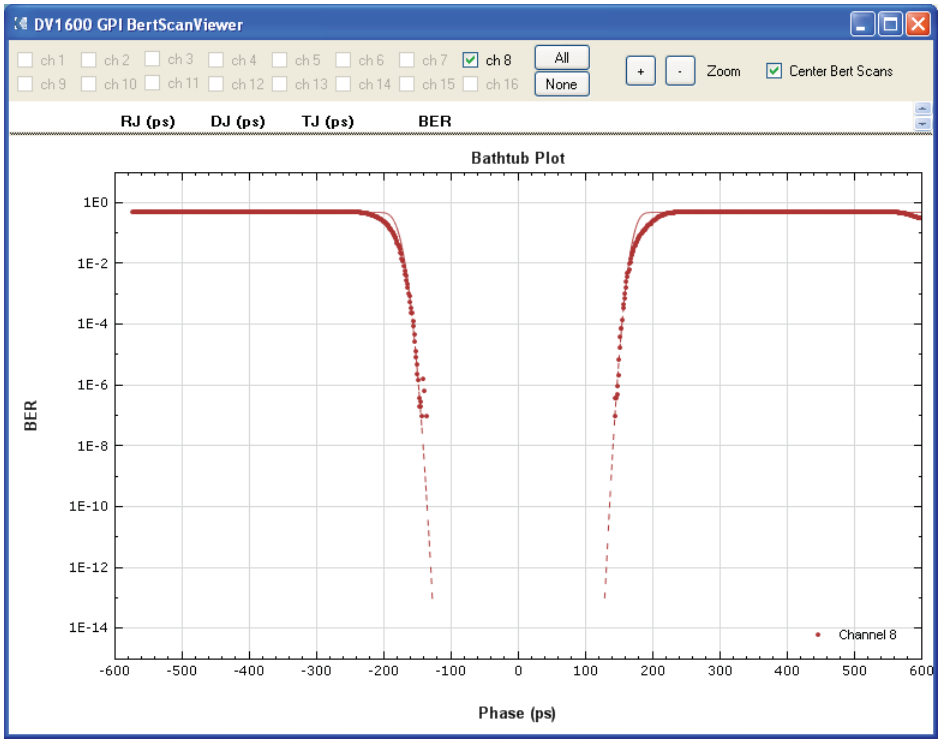
5. Press the “Run” button
6. Review the log during test execution



7. In the Results window, click on “bertScan1”



8. View the Bathtub Curve for the signal appearing on Channel 8.



Appendix A. Glossary

BER Bit Error Rate

BERT Bit Error Rate Tester

CML Current Mode Logic

DDJ Data Dependant Jitter

DJ Deterministic Jitter

Deterministic jitter repetitive predictable jitter caused by consistent circuit characteristics

GPI General Programming Interface

Jitter The deviation in time or phase of a transmission signal.

LVPECL Low Voltage Positive Emitter Coupled Logic

LVTTL Low Voltage TTL

RJ Random Jitter (unpredictable jitter caused by random events or noise in the circuit)

SerDes Serializer / Deserializer

SJ Sinusoidal Jitter

SPI Serial Peripheral Interface

TJ Total Jitter