

BERTScope™ SATA Tee Operating Manual

Part Number 0130-710-00.02



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Safety

Please review the following list of safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified. Only qualified personnel should perform service procedures.

1. Use Proper Power Source

The SATA Tee is powered from a standard PC power supply, through the hard disk drive power connector (+5 V, +12 V).

4. Do Not Operate with Cover Off

To avoid electric shock or fire hazard, do not remove covers while power is on.

5. Do Not Operate with Suspected Failures

If you suspect there is damage to this product, have it inspected by qualified service personnel before attempting to operate it.

6. Do Not Operate in Wet or Damp Conditions

To prevent electrical shock and damage to this product, do not operate in wet or damp conditions.

7. Do Not Operate in Explosive Atmosphere

The normal amount of heat generated by the equipment could ignite an explosive atmosphere.

Warranty

SyntheSys Research warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If a product proves defective during this period, SyntheSys Research will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product, at its option.

In order to obtain warranty service, you must notify SyntheSys Research of the defect before the warranty period expires and make appropriate arrangements for service. You shall be responsible for packaging and shipping the defective product to the service center designated by SyntheSys Research, with shipping charges prepaid. SyntheSys Research shall pay for the return shipment of the product to you if the shipment is to a location within the country where the service center resides. You shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other location.

This warranty shall not apply to any defect, failure, or damage caused by using this product improperly or by inadequate maintenance or care. SyntheSys Research shall not be obliged to furnish warranty service to repair damage resulting from connection to incompatible equipment or improper use. SyntheSys Research shall not be obliged to furnish warranty service to repair damage resulting from attempts by non-SyntheSys Research representatives or designees to install, repair, or service the product. SyntheSys Research shall not be obliged to furnish warranty service to repair any damage or malfunction caused by the use of non-SyntheSys Research supplies. SyntheSys Research shall not be obliged to furnish service under this warranty to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

SyntheSys Research disclaims any implied warranties of merchantability or fitness for a particular purpose. SyntheSys Research's responsibility to replace or repair the defective products is the sole and exclusive remedy for breach of this warranty. SyntheSys Research will not be liable for any indirect, incidental, special, or consequential damages irrespective of whether SyntheSys Research has advance notice of the possibility of such damages. This warranty is given by SyntheSys Research in lieu of any other warranties, express or implied.

Technical Support

If you have not already purchased extended warranty options for this product, you may do so at any time during the product's warranty period. This extended warranty provides continued warranty coverage for up to two additional years, supplementing the normal one-year warranty period.

For service or questions, please contact us at:

Service Department
SyntheSys Research Inc.
3475-D Edison Way
Menlo Park, CA 94025-1821 U.S.A.
Voice: +1 (650) 364-1853
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Website: www.bertscope.com

When you contact SyntheSys Research for service, please have your product model number, serial number, and purchase date information available. Our service department is available from 9:00 a.m. to 5:00 p.m. (Pacific Time), Monday through Friday.

Calibration

This product does not required periodic calibration.

BERTScope™ SATA Tee Operating Manual

Introduction

The BERTScope SATA Tee facilitates SATA compliance tests by switching the product under test (PUT) I/O lines between a protocol analyzer and the BERTScope. This allows the PUT to be set to the proper Built In Self Test (BIST) mode for testing without disconnecting the SATA connector.



Figure 1. BERTScope SATA Tee

The PUT Transmit (Tx) outputs are split with an asymmetrical splitter which sends a small fraction of the signal through an amplifier to the protocol Receiver (Rx) inputs. The majority of the signal is sent to the BERTScope CR inputs. This preserves the signal to noise ratio of the PUT Tx signal at the BERTScope inputs.

The BERTScope Tx outputs are connected to one side of a symmetrical 6 dB power combiner. The protocol generator Tx outputs are amplified and connected via a switch to the other leg of the combiner. The common legs of the combiners are connected to the PUT Rx inputs. When the switch is set to the “BERTScope” position, the protocol legs of the combiner are terminated into 50 Ω .

Functional Block Diagram

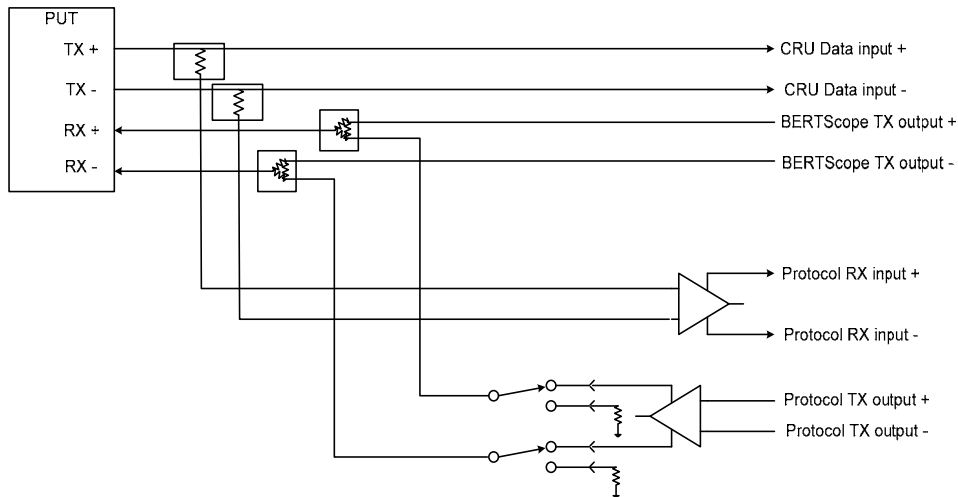


Figure 2. SATA Tee Functional Block Diagram

Connection

Connect cables to the PUT, BERTScope and Protocol Analyzer as indicated on the label. Use low loss cables to minimize measurement errors from signal attenuation. Connect the Power receptacle to an unused IDE hard drive power connector from the test system PC power supply.

Operation

There are two methods of operation, determined by whether the PUT supports disconnect:

For PUTs that support disconnect

1. With the BERTScope pattern generator outputs turned off, switch the Tee to the "Protocol" position.
2. Using the protocol generator, send the desired BIST command to the PUT and verify a successful transaction.
3. Switch the Tee to the "BERTScope" position and proceed with testing.

For PUTs that do not support disconnect

1. With the BERTScope pattern generator outputs off, switch the Tee to the “Protocol” position.
2. Using the protocol generator, send the desired BIST command to the PUT and verify a successful transaction.
3. Turn on the BERTScope pattern generator outputs to a voltage level higher than the protocol generator outputs (e.g. 1000 mV p-p on each leg of the differential signal). This may require some experimentation to determine the required voltage depending on the output voltage of the protocol generator. This step causes the BERTScope PG output signal to be the dominant signal source, swamping the protocol generator output signal.
4. Switch the Tee to the “BERTScope” position, lower the BERTScope PG outputs to the proper voltage levels, and proceed with testing.

Remote Control

The state of the SATA Tee switch can also be controlled electrically, enabling its use with automated or semi-automated testing systems. Remote control is accessible through the “CONTROL” connector.

The mating connector is a Molex part number 50-57-9406 housing with at least two contact pins (Molex part number: 16-02-0096). The connection pin-out is as follows:

- 1 – Control
- 2 – Ground
- 3 – +5 V
- 4 – (not connected)
- 5 – (not connected)
- 6 – Ground

Pin 1 is located on the side of the connector near the PUT Rx + connector.

The Control signal switches the SATA Tee from the normal BERTScope testing path to the Protocol connected path. The signal is pulled up internally to +3.3 volts. Switching to the Protocol connected path is performed by grounding this pin, either by shorting to Pin 2 or 6, or with an external open collector or open drain logic gate.

Note that the manual slide switch must be in the BERTScope position to enable Remote Control operation. Moving the switch to the Protocol position overrides remote control.

Performance Characterization

The BERTScope SATA Tee functionality was verified using a U-Link Drivemaster protocol analyzer system to ensure that the PUT could be programmed when the switch was in the “protocol” position. It was then characterized for insertion loss and return loss using a Rohde and Schwarz ZVA-24 Vector Network Analyzer. Measurements from these tests are shown below:

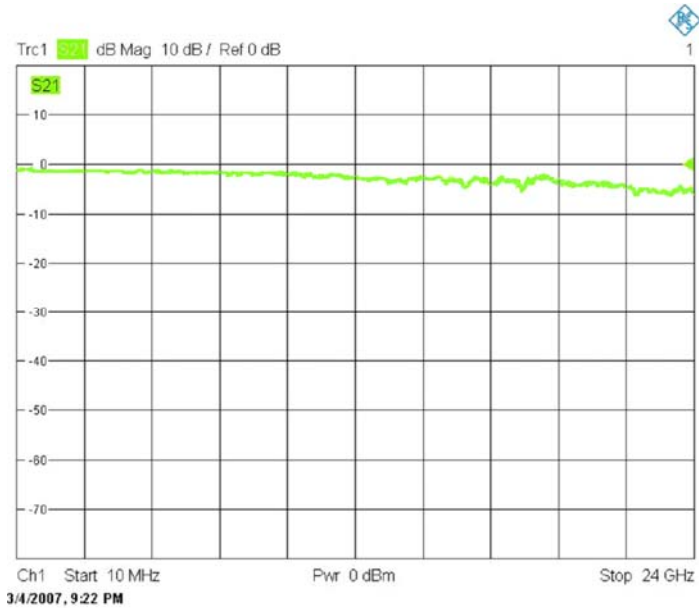


Figure 3. Insertion Loss PUT TX path

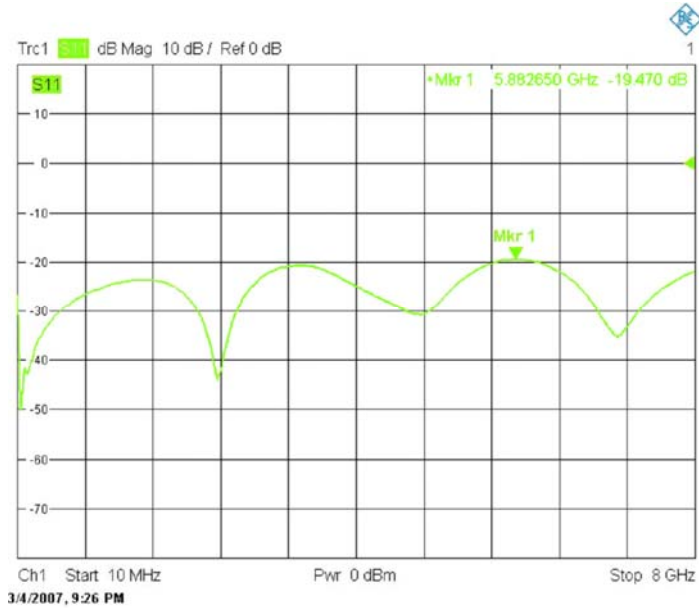


Figure 4. Return Loss PUT TX path

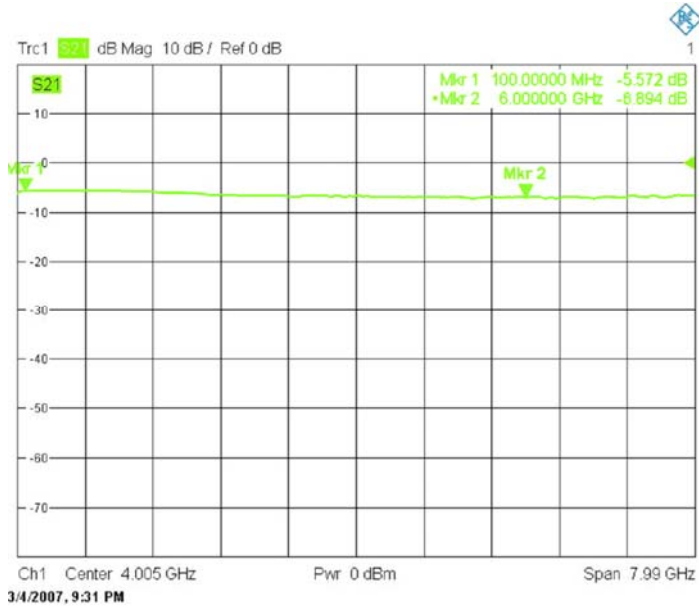


Figure 5. Insertion Loss PUT RX path

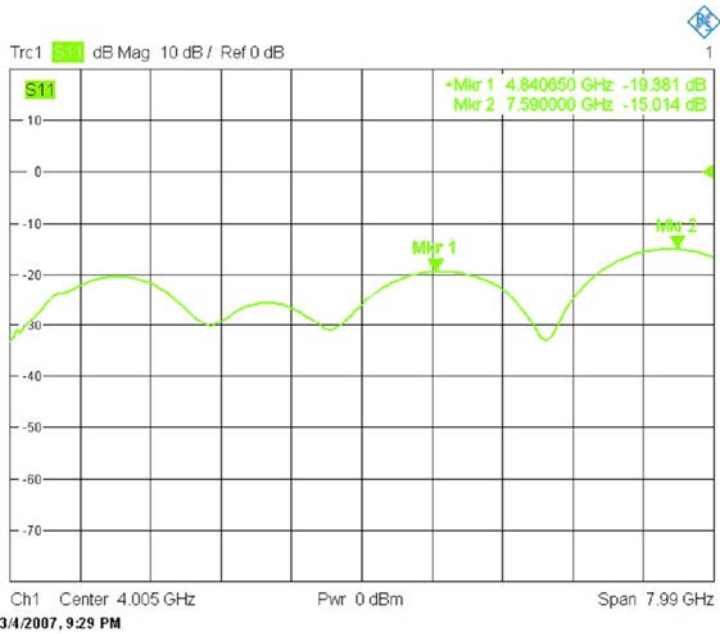


Figure 6. Return Loss PUT RX path