

**BERTScope
SATA TEE
Instructions**

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- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

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General Safety Summary

Review the following 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.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

To Avoid Fire or Personal Injury

Connect and disconnect properly. Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Ground the product. This product is indirectly grounded through the grounding conductor of the mainframe power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

The inputs are not rated for connection to mains or Category II, III, or IV circuits.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Power disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Do not operate without covers. Do not operate this product with covers or panels removed.

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

Provide proper ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Terms in This Manual These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



CAUTION
Refer to Manual



Earth Terminal



Chassis Ground

Environmental considerations

This section provides information about the environmental impact of the product.

Product end-of-life handling

Observe the following guidelines when recycling an instrument or component:

Equipment recycling. Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. To avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Support/Service section of the Tektronix Web site (www.tektronix.com).

Restriction of Hazardous Substances

This product is classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

Operating instructions

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 DUT to be set to the proper Built In Self Test (BIST) mode for testing without disconnecting the SATA connector.



3025-006

Figure 1: BERTScope SATA TEE

The DUT 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

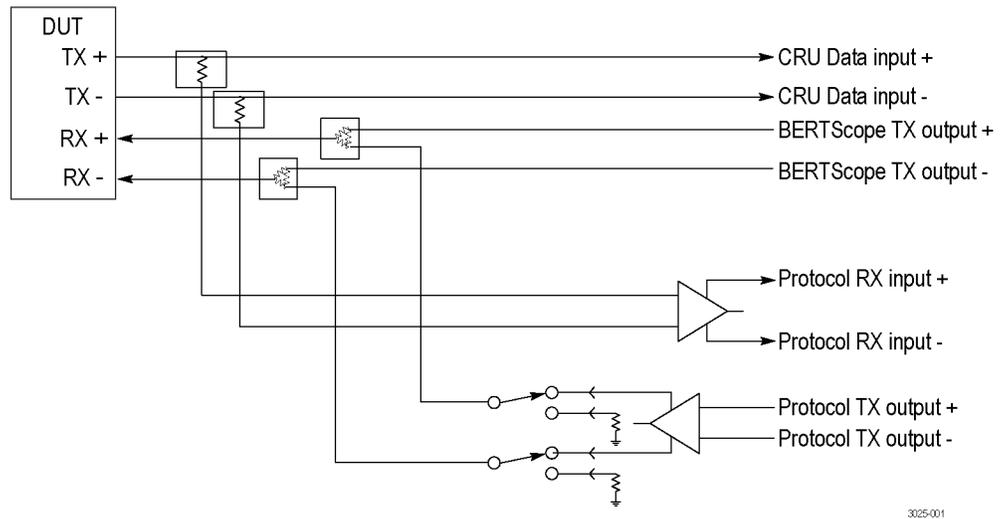


Figure 2: SATA Tee functional block diagram

Connect the cables

Connect the cables to the PUT, BERTScope, and Protocol Analyzer as indicated on the label on the SATA TEE.

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 information

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

Operate PUTs that support disconnect

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

Operate PUTs that do not support disconnect

1. Turn the BERTScope pattern generator outputs off and switch the Tee to the Protocol position.
2. Use the protocol generator to 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 (such as, 1000 mV_{p-p} on each leg of the differential signal).

This may require 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.
5. Lower the BERTScope PG outputs to the proper voltage level and then proceed with the 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 shown in the following table:

Table 1: Connector pin-outs

Pin number	Description
1 ¹	Control
2	Ground
3	+5 V
4	(not connected)
5	(not connected)
6	Ground

¹ 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:

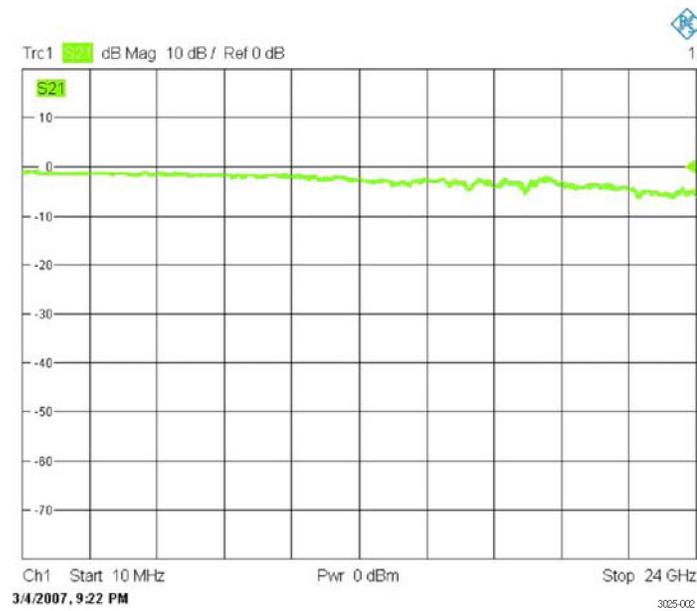


Figure 3: Insertion loss PUT TX path

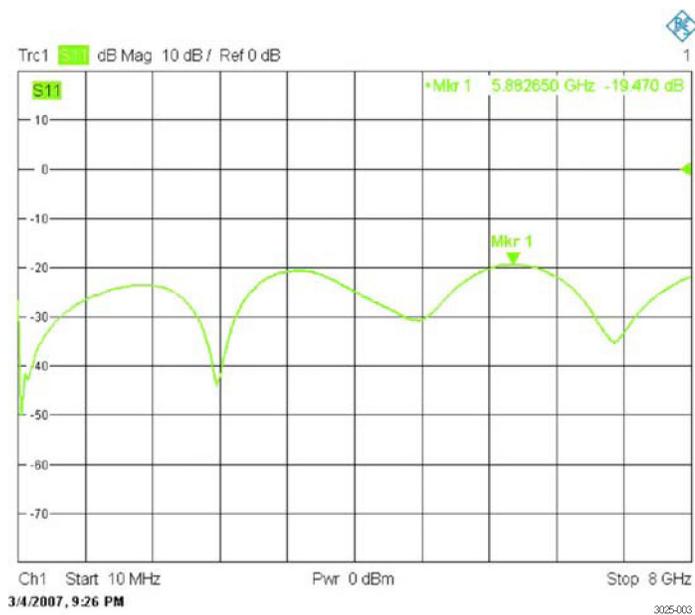


Figure 4: Return loss PUT TX path

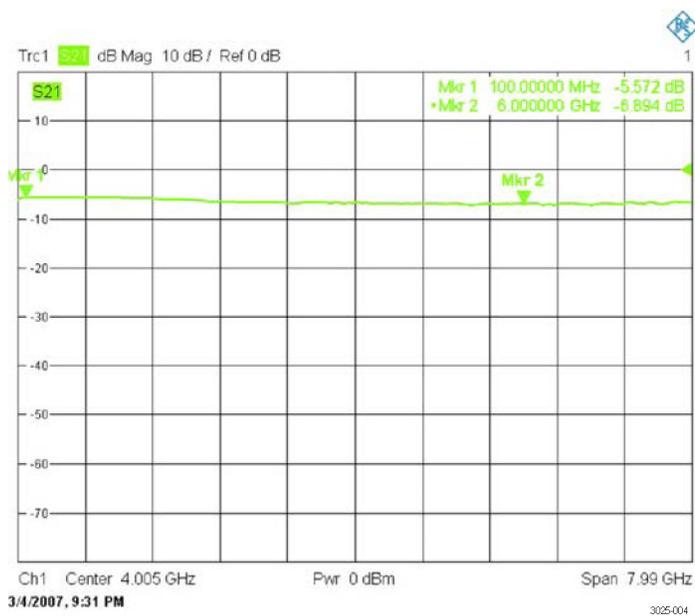


Figure 5: Insertion loss PUT RX path

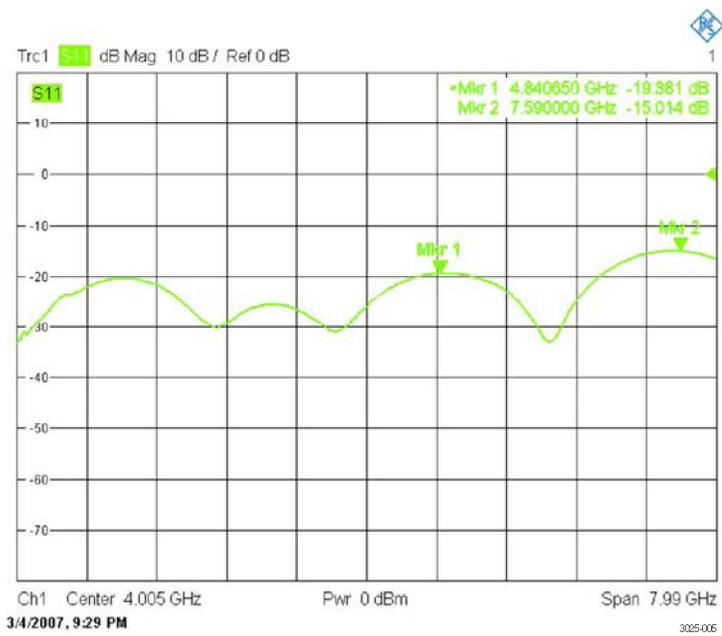


Figure 6: Return loss RX path