

TF-XGbT Compliance Test Fixture (For use with TekExpress XGbT-10GBASE-T Automated Solutions)

Reference



077-0390-02

Tektronix

**TF-XGbT Compliance Test Fixture
(For use with TekExpress XGbT-10GBASE-T Automated
Solutions)**

Reference

Revision A

www.tektronix.com

077-0390-02

Tektronix

Copyright © Tektronix. All rights reserved. Licensed software products are owned by Tektronix or its subsidiaries or suppliers, and are protected by national copyright laws and international treaty provisions.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Contacting Tektronix

Tektronix, Inc.
14150 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

For product information, sales, service, and technical support:

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

Warranty

Tektronix warrants that the product will be free from defects in materials and workmanship for a period of three (3) years from the date of original purchase from an authorized Tektronix distributor. If the product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Batteries are excluded from this warranty. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, shipping charges prepaid, and with a copy of customer proof of purchase. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) 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.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

[W16 – 15AUG04]

Table of Contents

Environmental Considerations	ii
General Information.....	1
TF-XGbT Product Features.....	1
TF-XGbT Supplied Components	2
Characteristics Information	3
Recommended Tektronix Oscilloscopes and Accessories.....	3
XGbT 10GBASE-T Compliance Testing	5
Clock Frequency, Droop, Jitter-Master, Linearity, and Power Spectral Density Measurements	5
Jitter-Slave Measurement	9
Return Loss Measurement	12
Ordering Information.....	15

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. In order 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 has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

General Information

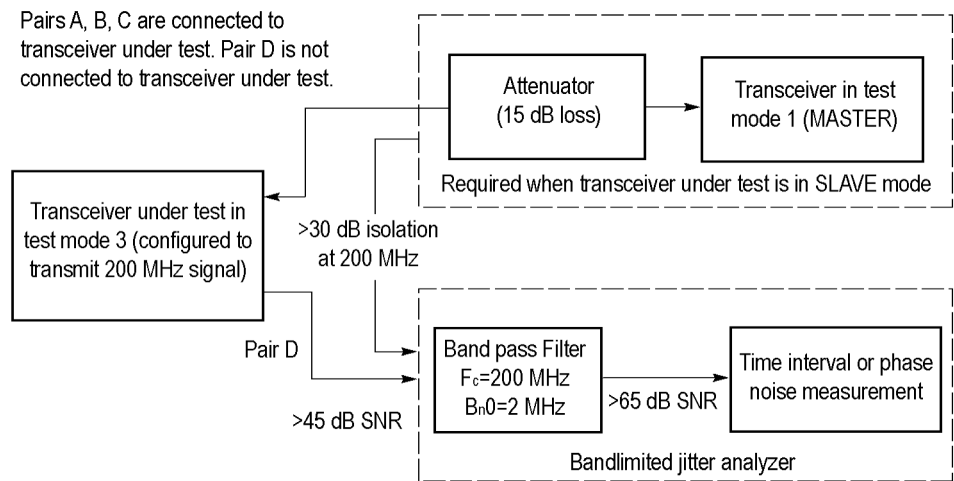
This document provides a quick reference to the TF-XGbT Test Fixture and its use with the Tektronix TekExpress XGbT-10GBASE-T Automated Solutions.

TF-XGbT Product Features

The TF-XGbT Test Fixture provides easy access to 10GBASE-T electrical signals to perform conformance testing and device characterization for measurements covered under sub clause 55.5.3 & 55.8.2.1 of IEEE Standard 802.3an-2006. This fixture is used to provide fast and accurate design debugging and validation.

The TF-XGbT test fixture offers following capabilities:

- Support for 10GBASE-T technologies enables comprehensive testing
- Support for wide spectrum of tests saves time
- On-board test points for accurate removal of disturbing signals ensures reliable results
- Return Loss Calibration Board reduces testing time
- Test Channel for 10GBASE-T Jitter Slave tests ensures tests as per standard



TF-XGbT Supplied Components

The components that are required to perform the XGbT-10GBASE-T transmitter tests are listed as follows:

Table 1: TF-XGbT supplied components

SI number	TF- XGbT test fixture	Quantity	Description
1	XGbT test fixture main board	1	<p>The main test fixture consists of three sections: TC1, TC2, and TC3.</p> <p>Section TC1: For Droop, Transmitter Timing Jitter-Master, Transmit Clock Frequency, Transmitter Linearity, and Transmitter Power Spectral Density (PSD) and Power Level compliance test measurements.</p> <p>NOTE. Includes eight SMA Male-to-Female Adapters and eight 50 ohms SMA terminators mounted on the SMA connectors.</p> <p>Section TC2: Transmitter Timing Jitter-Slave compliance test measurement.</p> <p>NOTE. Includes two SMA Male-to-Female Adapters mounted on the SMA connectors.</p> <p>Section TC3: Return Loss compliance test measurement.</p> <p>NOTE. Includes two SMA Male-to-Female Adapters mounted on the SMA connectors.</p>
2	XGbT test fixture calibration board	1	Section TC3A: For return loss calibration.
3	RJ45 Patch cord	2	0.08 meters shielded RJ45 cable to connect the Test Fixture to the return loss calibration board and Device Under Test.
4	50 Ω terminator SMA	8	To terminate the unused pairs on main test fixture board.
5	China RoHS sheet	1	Tektronix Supplemental Product Information Sheet for the People's Republic of China (071-2179-XX).

NOTE. SMA connectors shall be used to probe the differential signals using 12-inch SMA male cable with P7380SMA probe.

CAT-6 3-inch Shielded RJ45 cables shall be used to connect the TF-XGbT Test Fixture to the return loss calibration board. CAT-6 Cable supports up to 250 MHz bandwidth and supports 10GbE applications.

CAT-6 RJ-45 connectors are used in the test fixture, CAT-6 connectors are made to higher standards that help reduce noise caused by crosstalk and system interference.

Berg sticks shall also be used to probe differential signals using the P6330 probe.

Characteristics Information

The following electrical characteristics are the specification of the TF-XGbT test fixture:

Table 2: Electrical characteristics

Description	Specification	
Bandwidth	2 GHz	
Attenuation between the master and slave in Jitter (2 GHz bandwidth)	15 dB \pm 1 dB	
Isolation (between transmitter and Pair D)	> 30 dB	
Insertion loss	0 - 500 MHz	<0.9 dB
	500 MHz - 1 GHz	<1.5 dB
	1 GHz - 2 GHz	<3 dB
RJ45 Shielded Patch cord	CAT-6A	

Recommended Tektronix Oscilloscopes and Accessories**Table 3: Recommended oscilloscopes and accessories**

Oscilloscope	Accessories
DPO/DSA70404B	P7380SMA / Matched-pair SMA cables (TCA-SMA connector)
DPO/DSA70604B	P6330/P7330/P7350/ P7380SMA / Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
DPO/DSA70804B	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
DPO/DSA71254B	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
DPO/DSA71604B	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
DPO/DSA72004B	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA

Table 3: Recommended oscilloscopes and accessories (cont.)

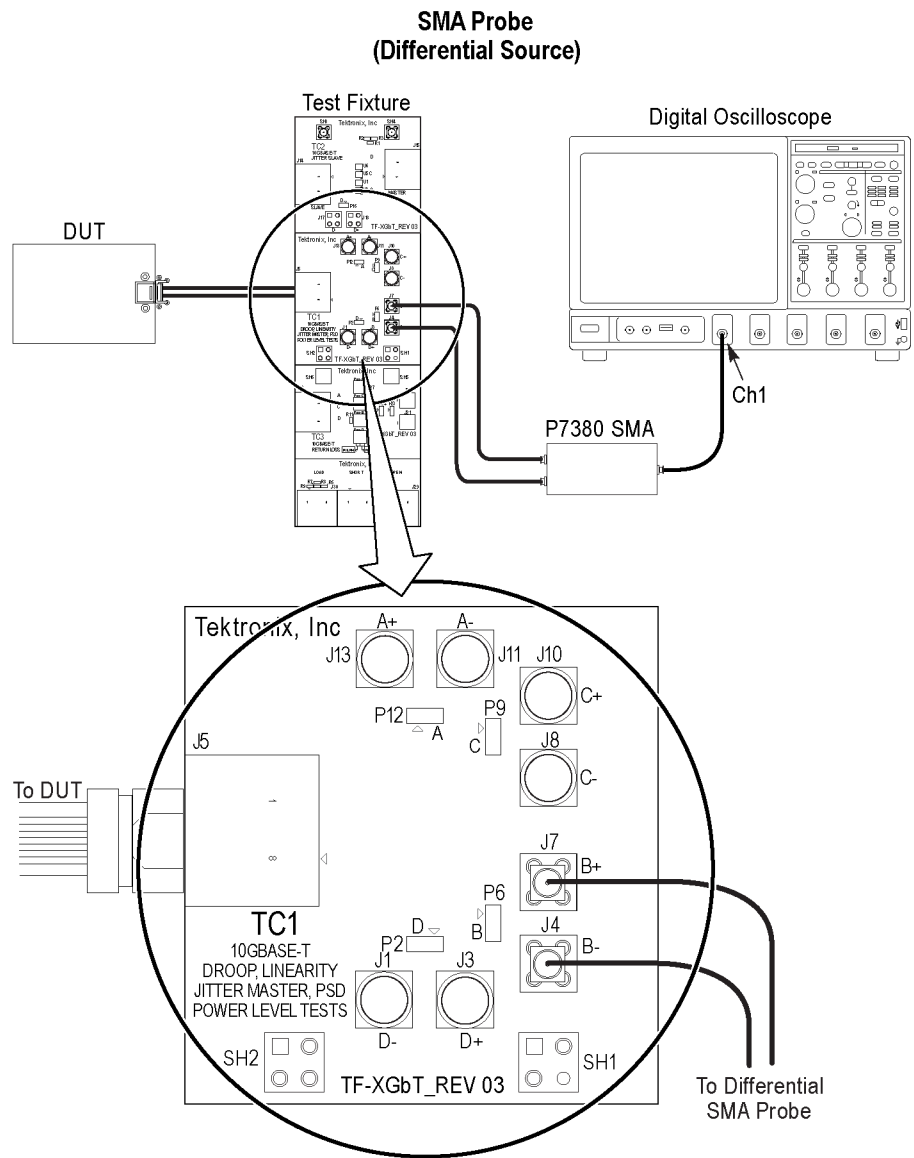
Oscilloscope	Accessories
MSO70404	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
MSO70604	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
MSO70804	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
MSO71254	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
MSO71604	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA
MSO72004	P6330/P7330/P7350/P7350SMA/P7380SMA/P7313SMA/ Matched-pair SMA cables (TCA-SMA connector)/P7520, P7516, P7513A, P7508, P7506, and P7504 (TriMode probes)/P7350SMA/P7380SMA/P7313SMA

XGbT 10GBASE-T Compliance Testing

Clock Frequency, Droop, Jitter-Master, Linearity, and Power Spectral Density Measurements

The test setup for performing Clock Frequency, Droop, Jitter-Master, Linearity, and Power Spectral Density as described in IEEE 802.3an-2006 using SMA probe (differential source), Differential probe (differential source), and SMA cable (single-ended source) is as follows:

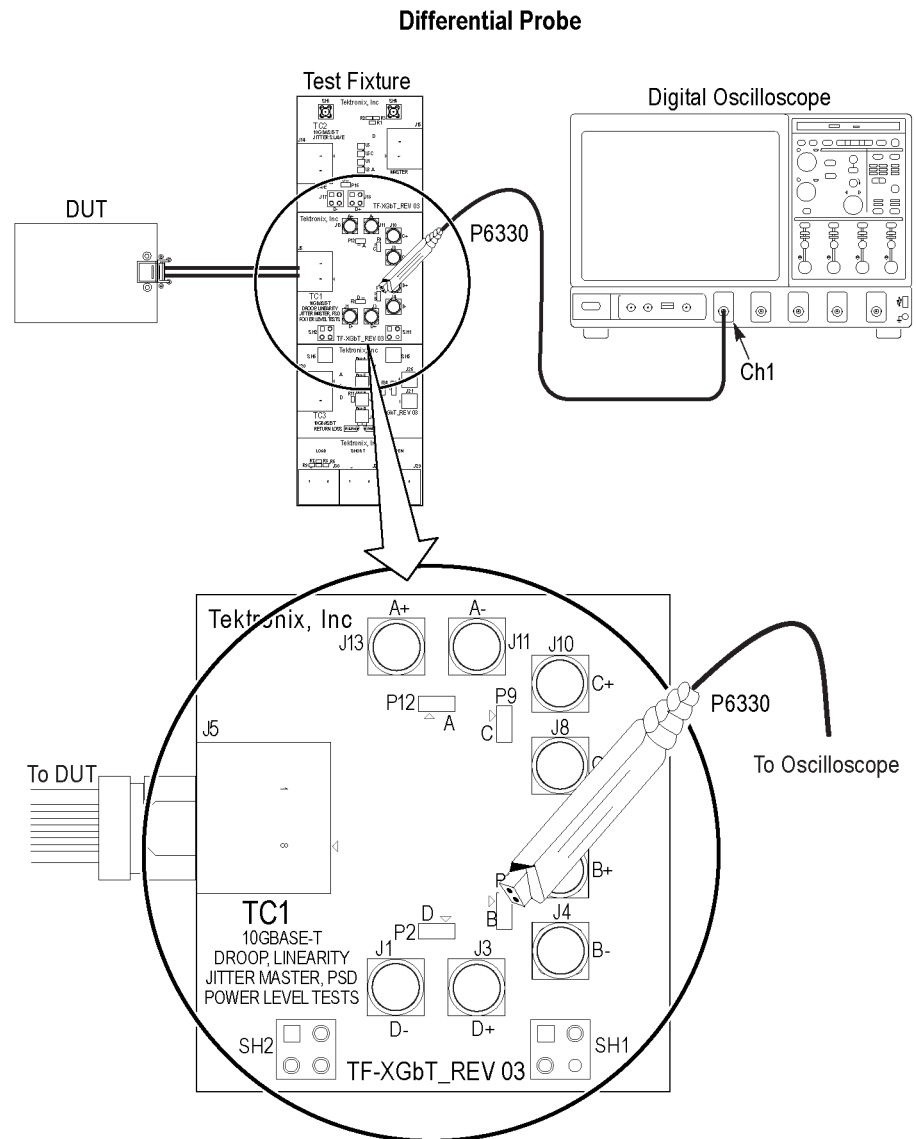
**Connections with SMA
Probe (Differential Source)**



Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

0390-002

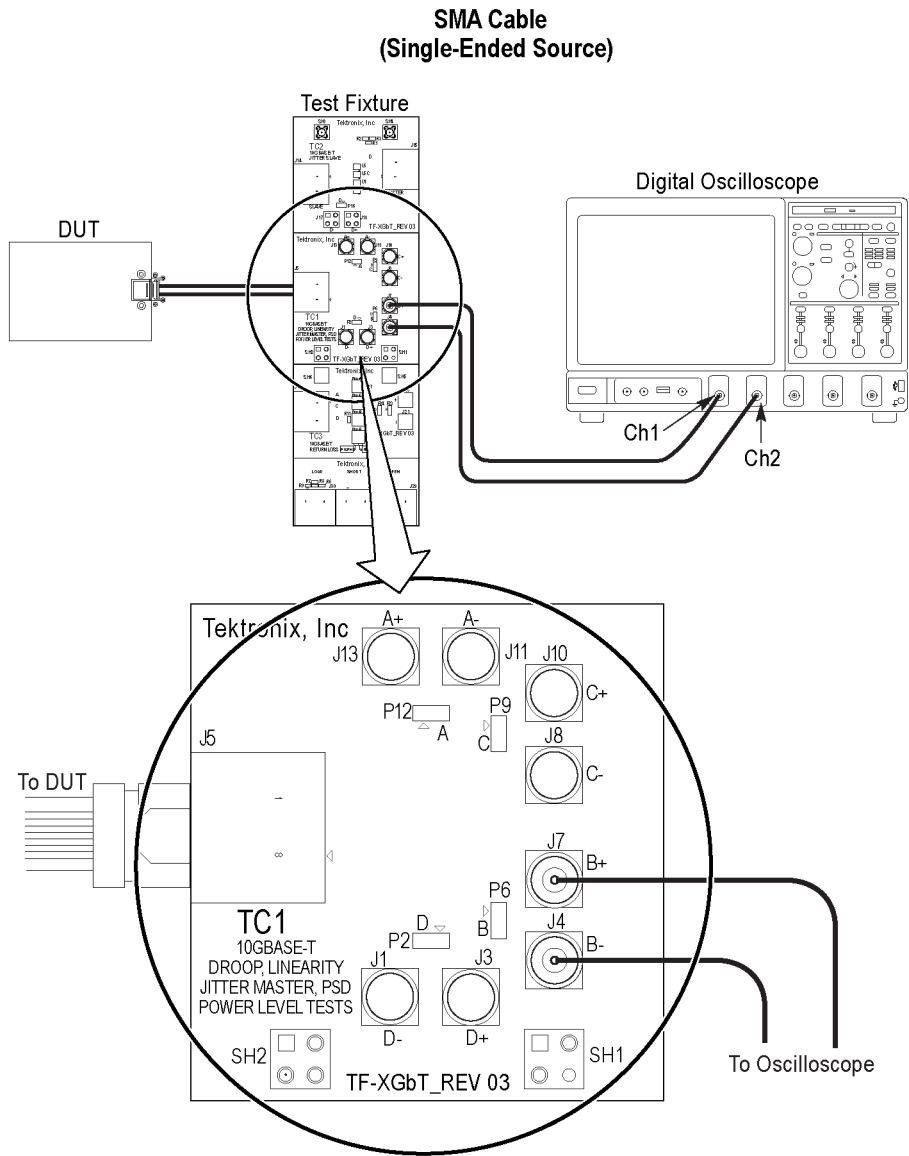
Connection with a
Differential Probe
(Differential Source)



Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

0390-003

Connections with SMA Cables (Single-Ended Source)



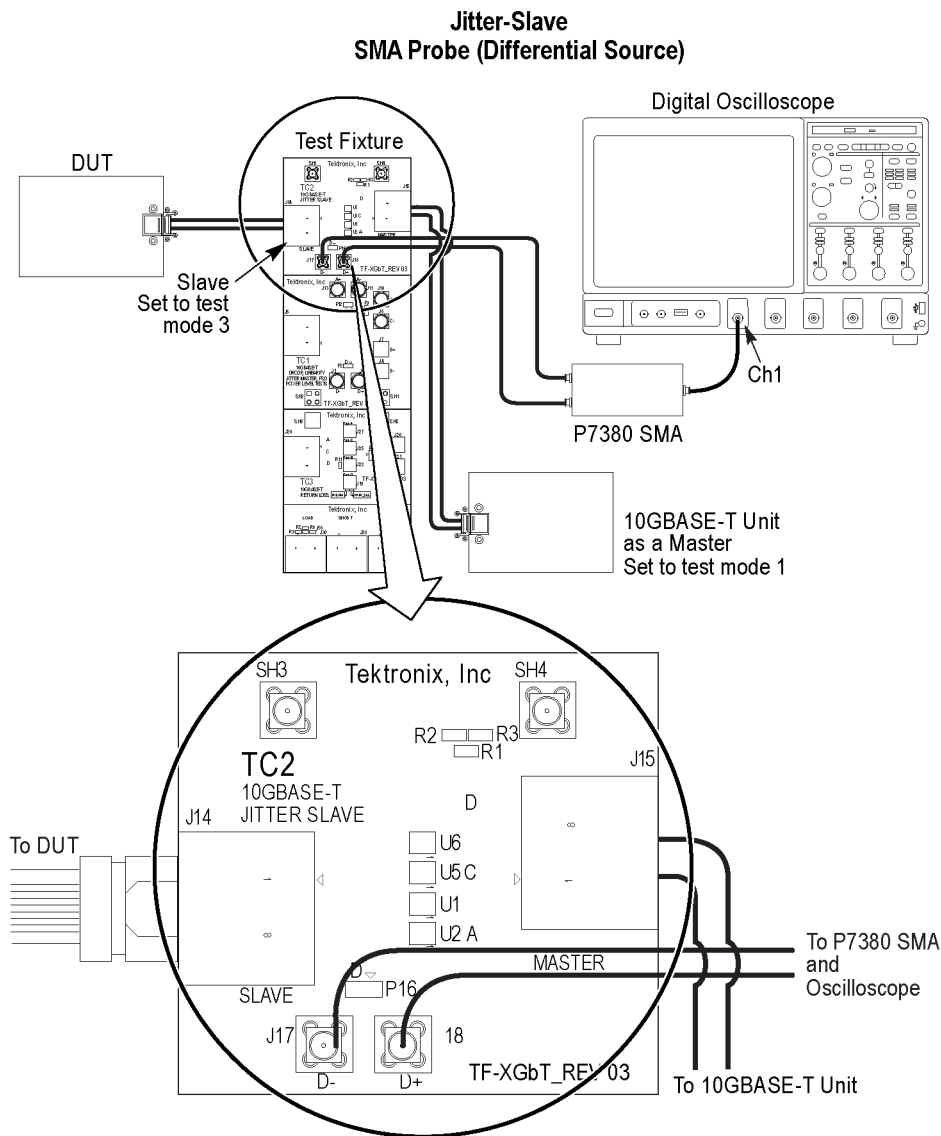
Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

0380-004

Jitter-Slave Measurement

The test setup for performing Jitter-Slave Measurement as described in IEEE 802.3an-2006 using an SMA probe (differential source), Differential probe (differential source), and SMA cable (single-ended source) is as follows:

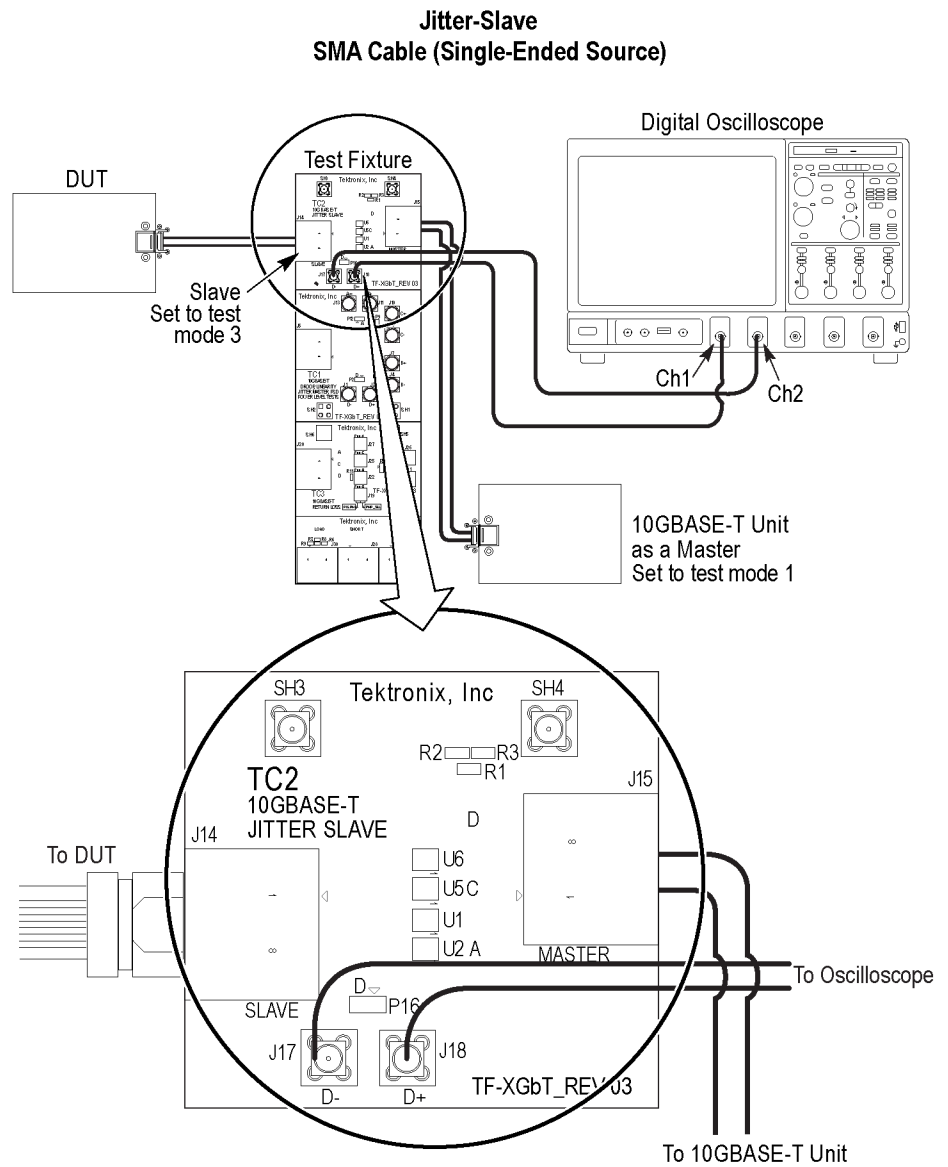
Connections with SMA Probe (Differential Source)



Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω .

0380-005

Connections with SMA
Cables (Single-Ended
Source)



Note: When using high input impedance differential probe, ensure that each of the single ended lanes is terminated with 50 Ω.

0390-007

Return Loss Measurement

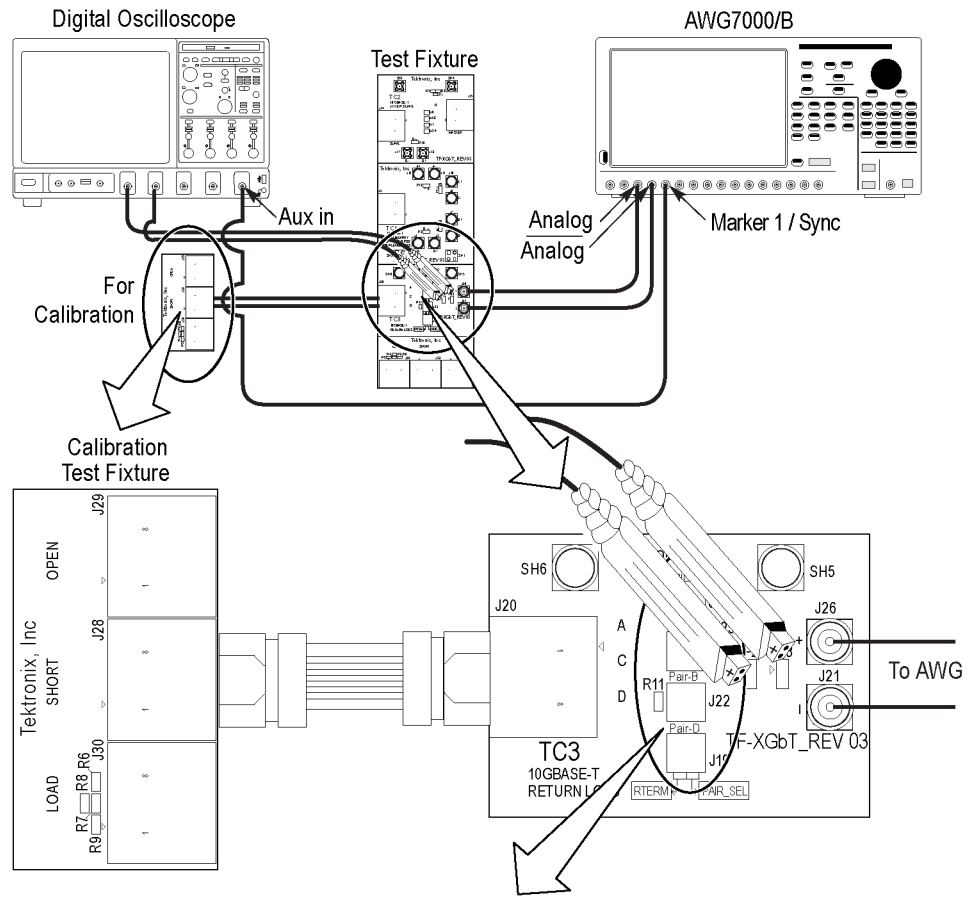
The application ensures that the calibration is done at least once on the selected lane before performing the Return Loss Measurement. When the measurement is selected, a dialog box appears. Select live calibration or use the existing calibrated files.

You can either verify if the Short, Load, and Open calibration factors are good enough and then apply these calibrated values for performing the measurement, or directly apply the calibrated factors for the Return Loss measurement.

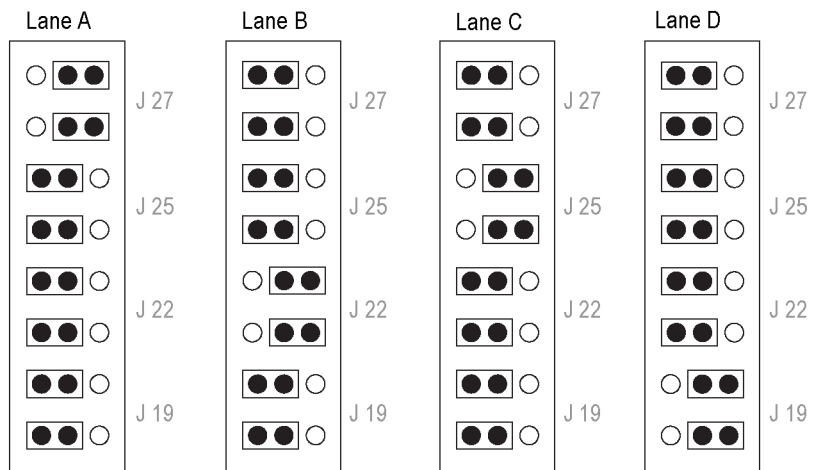
The test setup for calibrating and performing the Return Loss Measurement as described in IEEE 802.3an-2006 using a differential probe is as follows:

Connection for calibrating the measurement

Return Loss Calibration

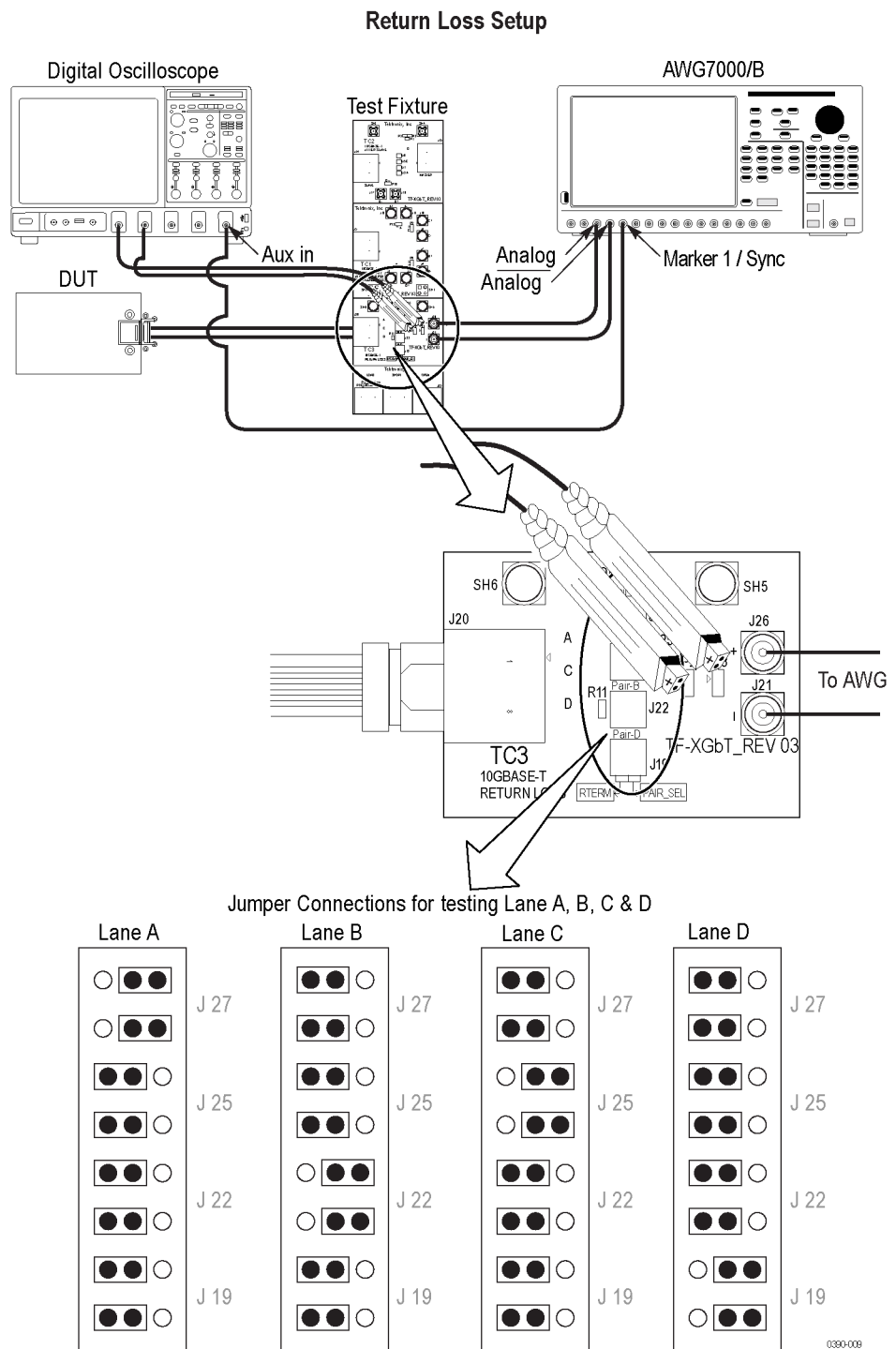


Jumper Connections for testing Lane A, B, C & D



NOTE. ●● is used to denote short jumpers.

Return loss measurement setup



NOTE. ●● is used to denote short jumpers.

Ordering Information

XGbT 10GBASE-T Automation Solution

Includes. Application CD, electronic documentation, and USB flash drive.

To Order Along with Oscilloscope

The options are as follows:

- Opt. TEKEXP
- Opt. XGbT

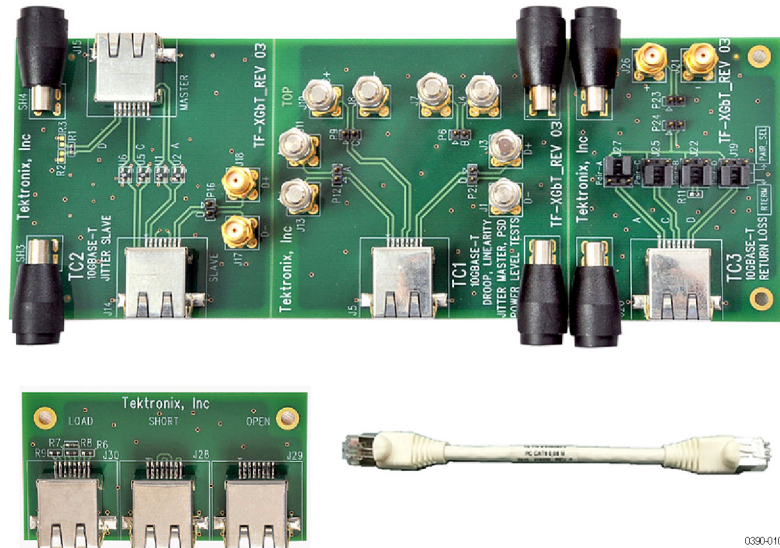
To Upgrade for Existing Oscilloscope

DPO/DSA70000 (TEKEXP). Order DPO7UP

DPO/DSA70000 (XGbT). Order DPO7UP

XGbT Test Fixture

TF-XGbT. XGbT Test Fixture



0330-010