

HDMI Terminator Test Adapter

User Manual



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Introduction

This user's guide documents the functionality of the HDMI Terminator Test Adapter (HDMI-TPA-T). The HDMI terminator is used to terminate the TMDS signals that are not being tested to 3.3V. Termination of these signals is required for proper operation of the HDMI protocol. Power is provided by USB connection. This test adapter does not terminate HEAC signals, which require 5V termination.

The HDMI Terminator test adapter is shown in Figure 1.

NOTE: To avoid damaging the HDMI Terminator TPA, use the handling techniques described in the Care and Handling section before making any connections or configuring a test setup.

Always use a static-safe workstation when performing tests, as explained in the "Electrostatic Discharge Information" section.

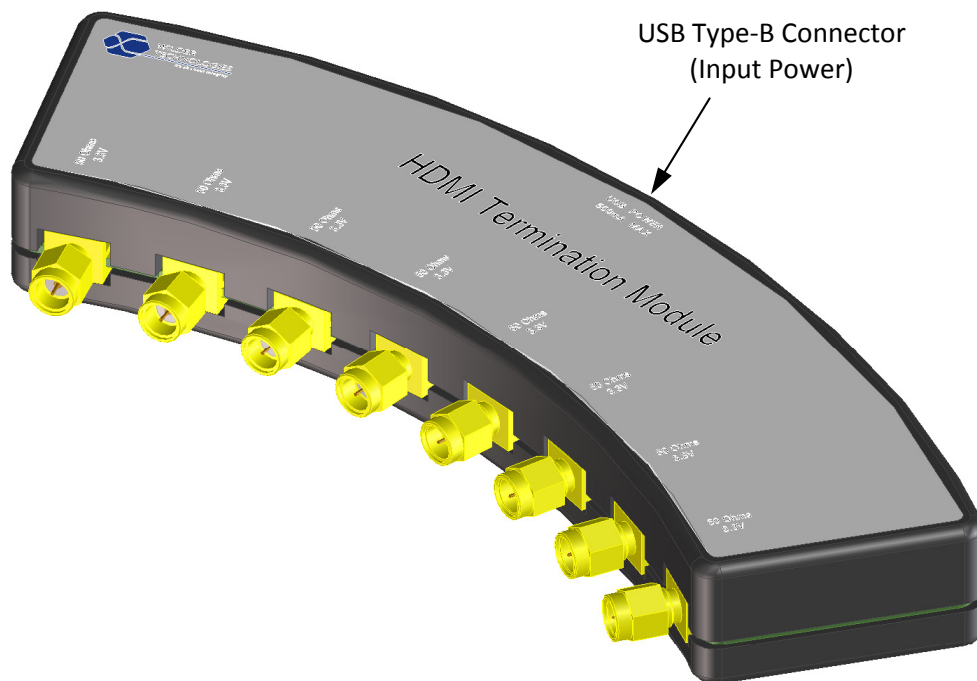


Figure 1. HDMI Terminator Test Adapter

Product Inspection

Upon receiving the HDMI-TPA-T from Wilder Technologies, perform the following product inspection:

- Inspect the outer shipping container, foam-lined instrument case or storage box, and product for damage. Retain the outer cardboard shipping container until the contents of the shipment have been inspected for completeness and the product has been checked mechanically and electrically. Use the foam-lined instrument-case or storage box for secure storage of the Wilder Technologies HDMI Terminator Test Adapter when not in use.
- Locate the shipping list and verify that all items ordered were received.
- In the unlikely event that the product is defective or incomplete, the “Limited Warranty” section discusses how to contact Wilder Technologies for technical assistance and/or how to package the product for return.

The HDMI Terminator Test Adapter Care and Handling Precautions

The HDMI Terminator Test Adapter requires careful handling to avoid damage. Improper handling techniques, or using too small a cable bend radius, can damage the coaxial cable connections themselves. This can occur at any point along the cable. To achieve optimum performance and to prolong the HDMI-TPA-T's life, observe the following handling precautions:

- **CAUTION 1: Avoid Torque Forces (Twisting)**
Twisting the HDMI-TPA-T as a unit, with one end held stationary, in excess of +/- 90° may damage or severely degrade performance of connected test adapter cables. Adherence to Caution 5 (below) helps to avoid exceeding twist limits.
- **CAUTION 2: Avoid Sharp Cable Bends**
Never bend connected cables beyond the minimum bend radius as specified by the cable manufacturer or those specified in the HDMI-TPA User Manual.
- **CAUTION 3: Avoid Cable Tension (Pull Forces)**
Avoid applying tension to the HDMI-TPA-T/HDMI Test Adapter cable interface. Always place the HDMI-TPA-T and equipment on a surface that allows adjustment to eliminate tension on the HDMI-TPA-T and attached HDMI-TPA cables. Use adjustable elevation stands or apparatus to accurately place and support the HDMI-TPA-T and attached HDMI-TPA cables.
- **CAUTION 4: Connect the HDMI-TPA-T Last**
To prevent twisting, bending, or applying tension to the coaxial cables when connecting a HDMI-TPA, always attach the HDMI-TPA to the device under test (DUT) or cable under test before attaching any SMA connectors to the test instrumentation, followed by the SMA connections to the HDMI-TPA-T.

If the HDMI-TPA-T must be turned or twisted to make connection to the DUT, avoid using the HDMI-TPA-T housing alone to make this occur. Try to distribute the torque forces along the length of the test setup and cabling. If this is not possible, it is recommended to first loosen or disconnect the SMA connections at the HDMI-TPA-T, make the connection to the DUT and then re-tighten or attach the test equipment leads.

NOTE: Refer to the appropriate HDMI-TPA User Manual for specific cautions and instructions pertaining to the HDMI-TPA in use.

- **CAUTION 5: Carefully Make SMA Connections**

To connect the HDMI-TPA-T SMA connectors, follow these steps:

1. Hold the TPA stationary by grasping the TPA near the SMA connector.
2. Insert the mating SMA barrel and hand-tighten the free-spinning SMA nut onto the connector while avoiding pulling, bending, or twisting the HDMI-TPA coaxial cable.
3. When attaching HDMI-TPA cables to the HDMI-TPA-T, it is recommended that the HDMI-TPA SMA connectors be mechanically held and the TPA coaxial cables be tightened to the equipment manufacturer's torque recommendations, normally 5 in-lbs, using a 5/16-inch open-end wrench.

If the test set-up requires repositioning, first loosen or disconnect the SMA connections to avoid twisting, bending, or tension.

- **CAUTION 6: Independently Support Instrument Cables**

Excessive weight from the HDMI-TPA-T connected to the HDMI-TPA can cause damage or affect the test adapter performance. Be sure to provide appropriate means to support and stabilize all test set-up components.

General Test Adapter and Connectors

Observing simple precautions can ensure accurate and reliable measurements.

Handling and storage

Before each use of the HDMI-TPA-T, ensure that all connectors are clean. Handle the HDMI-TPA-T carefully and store the HDMI-TPA-T in the foam-lined instrument case or storage box when not in use, if possible. Do not set connectors contact end down. Install the SMA protective end caps when the HDMI-TPA-T is not in use.

Visual inspection

Be sure to inspect all test adapter cables carefully before making a connection. Inspect all test adapter cables for metal particles, scratches, deformed threads, dents, or bent, broken, or misaligned center conductors. Do not use test adapters with damaged cables.

Cleaning

If necessary, clean the connectors using low-pressure (less than 60 PSI) compressed air or nitrogen with an effective oil-vapor filter and condensation trap. Clean the HDMI-TPA-T SMA connector threads, if necessary, following the manufacturers cleaning procedures. If necessary, clean the HDMI-TPA-T SMA connectors using a lint-free swab or cleaning cloth moistened with isopropyl alcohol. Always completely dry a connector before use. Do not use abrasives to clean the connectors. Re-inspect connectors, making sure no particles or residue remains.

Making Connections

Before making any connections, review the “Care and Handling Precautions” section. Follow these guidelines when making connections:

- Align cables carefully
- Make preliminary connection lightly
- To tighten, turn connector nut only
- Do not apply bending force to test adapter cables
- Do not over-tighten preliminary connections
- Do not twist cables
- Use a torque wrench, and do not tighten past the “break” point of the torque wrench

Electrostatic Discharge Information

Protection against electrostatic discharge (ESD) is essential while connecting, inspecting, or cleaning the HDMI-TPA-T test adapter and connectors attached to a static-sensitive circuit (such as those found in test sets).

Electrostatic discharge can damage or destroy electronic components. Be sure to perform all work on electronic assemblies at a static-safe work station, using two types of ESD protection:

- Conductive table-mat and wrist-strap combination
- Conductive floor-mat and heel-strap combination

When used together, both of these types provide a significant level of ESD protection. Used alone, the table-mat and wrist-strap combination provide adequate ESD protection. To ensure user safety, the static-safe accessories must provide at least 1 M Ω of isolation from ground. Acceptable ESD accessories may be purchased from a local supplier.

WARNING: These techniques for a static-safe work station should not be used when working on circuitry with a voltage potential greater than 500 volts.

Application Reference

The HDMI-TPA-T supports the TMDS signals that are not being tested as required by the HDMI CTS PHY. They have been designed specifically to support the measurements contained in the CTS PHY, limited only by the specifications, environmental, care and handling as stated in this document.

The following example is a suggestion for a possible testing setup.

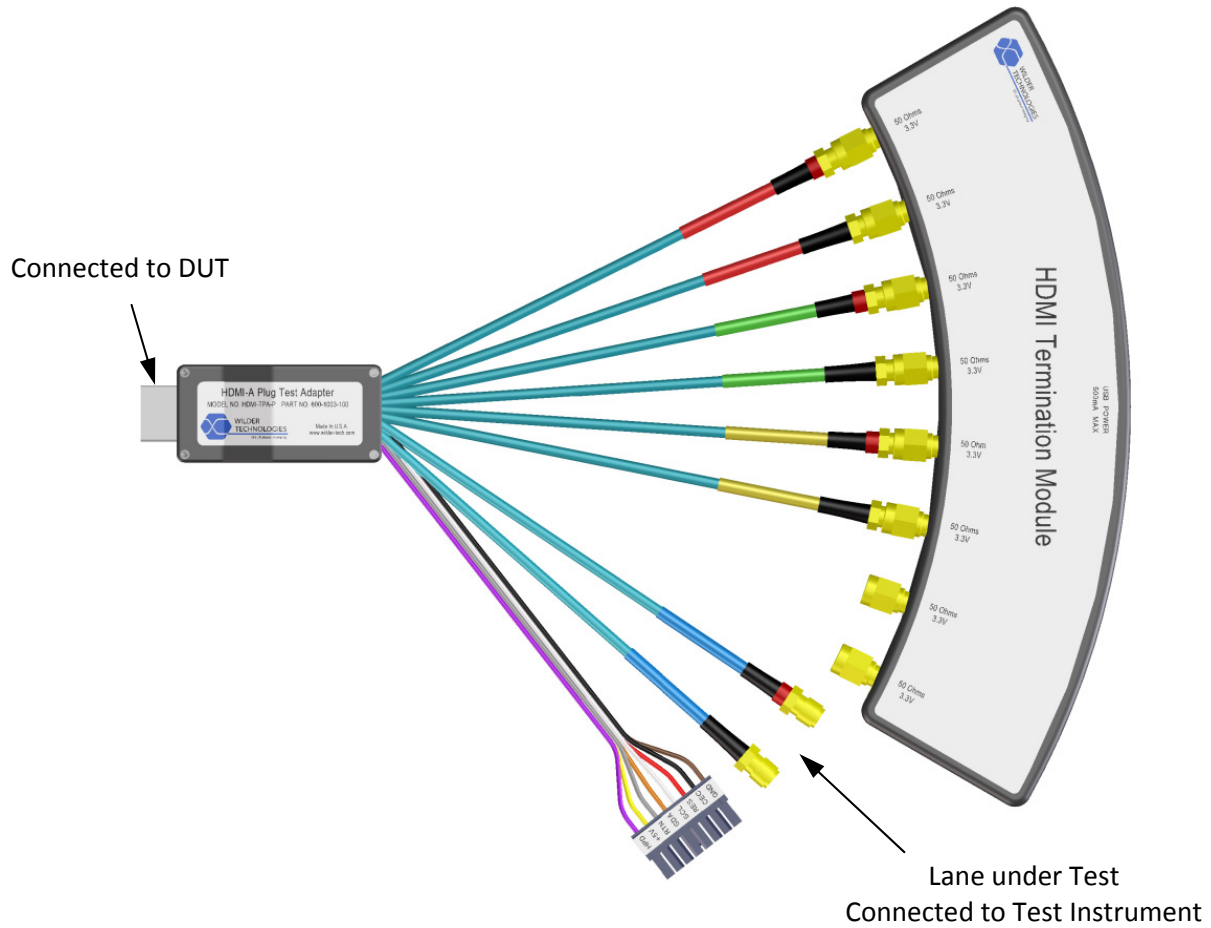


Figure 2. HDMI-TPA-P with untested Lanes shown connected to the HDMI-TPA-T

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Table 1. Connections for the HDMI Terminator Test Adapter

LABEL	DESCRIPTION
50 ohm, 3.3 V	Any TMDS signal not being tested
50 ohm, 3.3 V	Any TMDS signal not being tested
50 ohm, 3.3 V	Any TMDS signal not being tested
50 ohm, 3.3 V	Any TMDS signal not being tested
50 ohm, 3.3 V	Any TMDS signal not being tested
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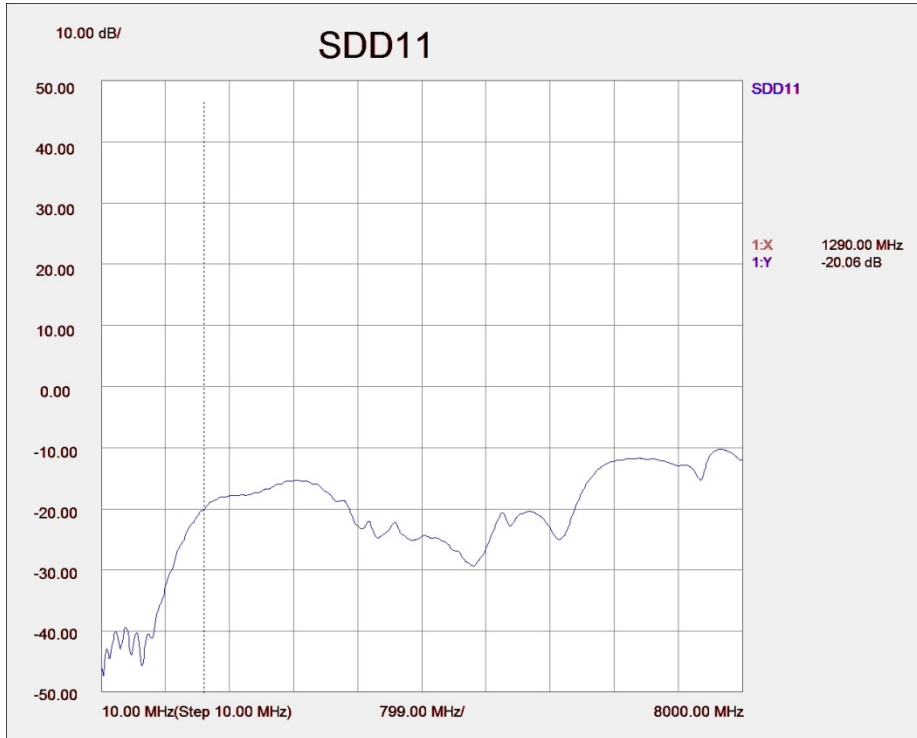


Figure 3. Typical balanced return loss of HDMI-TPA-T

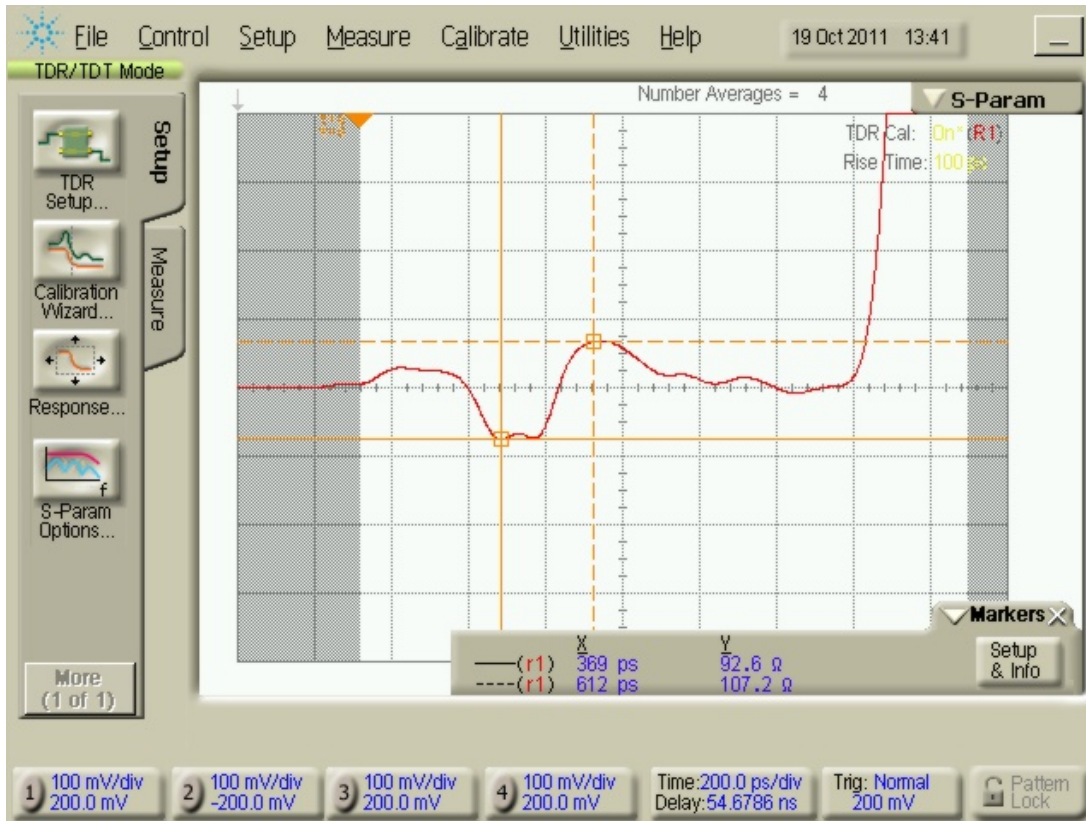


Figure 4. Typical Differential TDR of HDMI-TPA-T at 100 ps Rise Time

HDMI Terminator Electrical Specifications

NOTE: All specifications in this manual are subject to change.

Table 2. Electrical Specifications, HDMI Terminator TPA

SPECIFICATION	MINIMUM	TYPICAL	MAXIMUM	NOTES
Balanced Return Loss (GHz), at -20 db		7.44		HDMI Termination without power applied.
VSWR, at 7.5 GHZ		1.21:1		HDMI Termination without power applied.
Resistance of termination (ohms)	49	50	51	
Termination Voltage (V)	3.2	3.3	3.4	

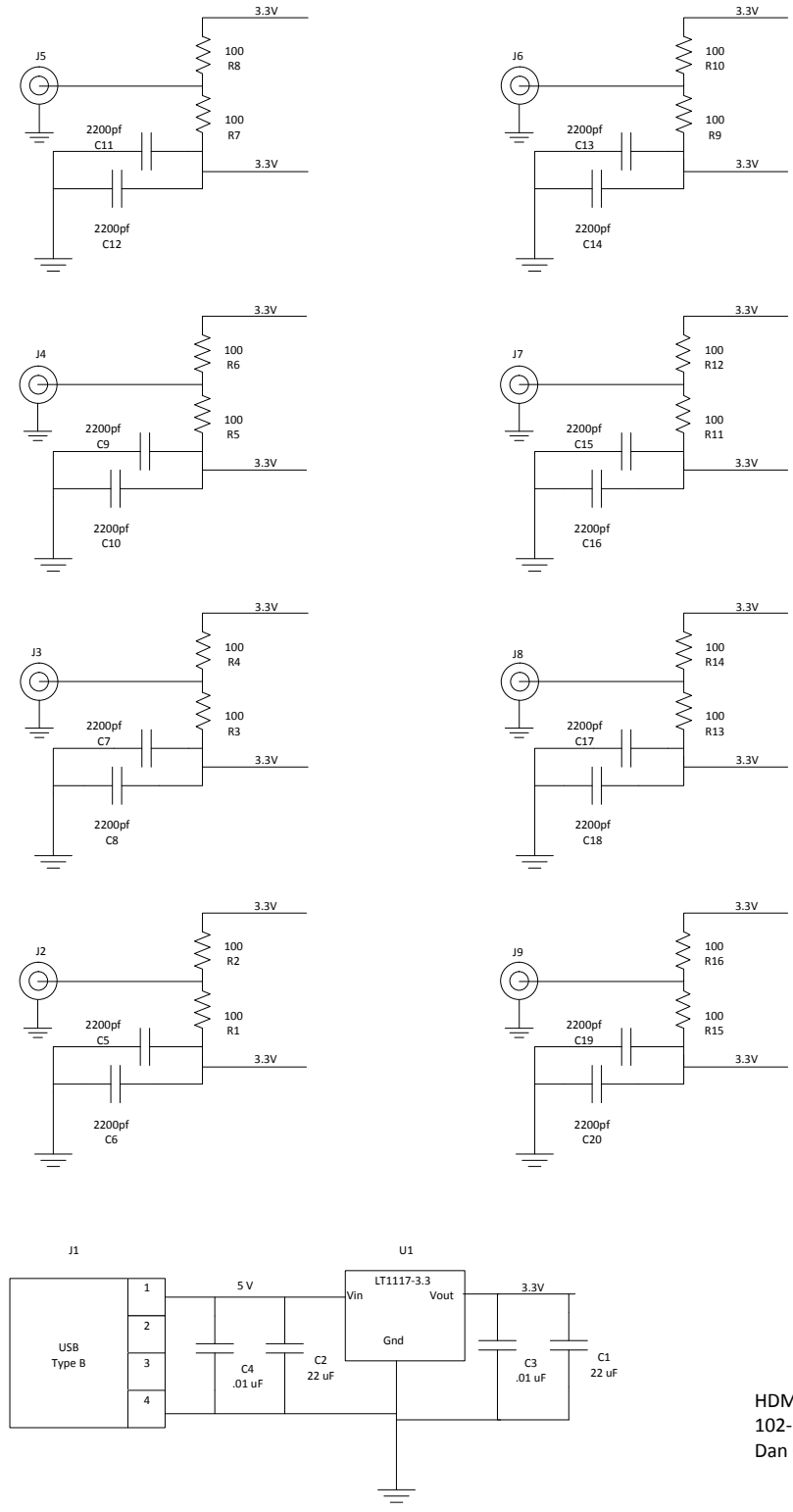
Other Mechanical and Environmental Specifications

NOTE: All specifications in this manual are subject to change.

Table 3. General Specifications

ITEM	DESCRIPTION
Usage Environment	Controlled indoor environment
Operating Temperature	0°C to +55°C (32°F to +131°F) (Characteristic)
Storage Temperature	-40°C to +70°C (-40°F to +158°F) (Characteristic)

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HDMI Terminator Board
102-1066-000
Dan Clayson

Figure 5. HDMI-TPA-T Schematic Diagram

Wilder Technologies, LLC – Limited Warranty

Wilder Technologies, LLC warrants that each Test Adapter, 1) is free from defects in materials and workmanship and, 2) conforms to Wilder Technologies specifications for a period of 12 months. **See Consumable and Fragile Material Warranty for exceptions to the 12 month warranty**

The warranty period for a Test Adapter is a specified, fixed period commencing on the date of ship from Wilder Technologies, LLC. If you did not purchase your Test Adapter directly from Wilder Technologies, LLC, the serial number and a valid proof of purchase will be required to establish your purchase date. If you do not have a valid proof of purchase, the warranty period will be measured from the date of ship from Wilder Technologies, LLC.

If, during the warranty period, the Test Adapter is not in good working order, Wilder Technologies, LLC will, at its option, repair or replace it at no additional charge, except as is set forth below. In some cases, the replacement Test Adapter may not be new and may have been previously installed. Regardless of the Test Adapter's production status, Wilder Technologies, LLC appropriate warranty terms apply.

Consumable and Fragile Material Warranty

Wilder Technologies, LLC warrants that consumable materials and all fragile materials supplied by Wilder Technologies, LLC either as part of an instrument or system, or supplied separately, will be free from defects in material and workmanship at the time of shipment.

Extent of Warranty

The warranty does not cover the repair or exchange of a Test Adapter resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which Wilder Technologies, LLC is not responsible. The warranty is voided by removal or alteration of Test Adapter or parts identification labels. The initial three months are unconditional; the remaining months excludes plugs, receptacles and SMA connectors. Connectors are wear items and excluded from the warranty after the initial three months.

These warranties are your exclusive warranties and replace all other warranties or conditions, express or implied, including but not limited to, the implied warranties or conditions of merchantability and fitness for a particular purpose. These warranties give you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction. Some jurisdictions do not allow the exclusion or limitation of express or implied warranties, so the above exclusion or limitation may not apply to you. In that event, such warranties are limited in duration to the warranty period. No warranties apply after that period.

Items Not Covered by Warranty

Wilder Technologies, LLC does not warrant uninterrupted or error-free operation of a Test Adapter.

Any technical or other support provided for a Test Adapter under warranty, such as assistance via telephone with "how-to" questions and those regarding Test Adapter set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND**.

Warranty Service

Warranty service may be obtained from Wilder Technologies, LLC by returning a Wilder Technologies, LLC Returns Material Authorization and the Test Adapter to Wilder Technologies, LLC during the warranty period. To obtain RMA number, contact support@wilder-tech.com.

You may be required to present proof of purchase or other similar proof of warranty entitlement. You are responsible for any associated transportation charges, duties and insurance between you and Wilder Technologies, LLC. In all instances, you must ship Test Adapters in Wilder Technologies, LLC approved packaging. Information on packaging guidelines can be found at: www.wilder-tech.com. Wilder Technologies, LLC will ship repaired or replacement Test Adapter Delivery Duty Prepaid (DDP) and will pay for return shipment. You will receive title to the repaired or replacement Test Adapter and you will be the importer of record.

Wilder Technologies, LLC – Terms & Conditions of Sale

- 1. Other Documents:** This Agreement may NOT be altered, supplemented, or amended by the use of any other document(s) unless otherwise agreed to in a written agreement signed by both you and Wilder Technologies, LLC. If you do not receive an invoice or acknowledgement in the mail, via e-mail, or with your Product, information about your purchase may be obtained at support@wilder-tech.com or by contacting your sales representative.
- 2. Payment Terms, Orders, Quotes, Interest:** Terms of payment are within Wilder Technologies, LLC's sole discretion, and unless otherwise agreed to by Wilder Technologies, LLC, payment must be received by Wilder Technologies, LLC prior to Wilder Technologies, LLC's acceptance of an order. Payment for the products will be made by credit card, wire transfer, or some other prearranged payment method unless credit terms have been agreed to by Wilder Technologies, LLC. Invoices are due and payable within the time period noted on your invoice, measured from the date of the invoice. Wilder Technologies, LLC may invoice parts of an order separately. Your order is subject to cancellation by Wilder Technologies, LLC, in Wilder Technologies, LLC's sole discretion. Unless you and Wilder Technologies, LLC have agreed to a different discount, Wilder Technologies, LLC's standard pricing policy for Wilder Technologies, LLC-branded systems, which includes hardware, software and services in one discounted price, allocates the discount off list price applicable to the service portion of the system to be equal to the overall calculated percentage discount off list price on the entire system. Wilder Technologies, LLC is not responsible for pricing, typographical, or other errors in any offer by Wilder Technologies, LLC and reserves the right to cancel any orders resulting from such errors.
- 3. Shipping Charges; Taxes; Title; Risk of Loss:** Shipping, handling, duties and tariffs are additional unless otherwise expressly indicated at the time of sale. Title to products passes from Wilder Technologies, LLC to Customer on shipment from Wilder Technologies, LLC's facility. Loss or damage that occurs during shipping by a carrier selected by Wilder Technologies, LLC is Wilder Technologies, LLC's responsibility. Loss or damage that occurs during shipping by a carrier selected by you is your responsibility. You must notify Wilder Technologies, LLC within 7 days of the date of your invoice or acknowledgement if you believe any part of your purchase is missing, wrong or damaged. Unless you provide Wilder Technologies, LLC with a valid and correct tax exemption certificate applicable to your purchase of Product and the Product ship-to location, you are responsible for sales and other taxes associated with the order. **Shipping dates are estimates only.**
- 4. WARRANTY:** WILDER TECHNOLOGIES, LLC, warrants that the item(s) manufactured under the Buyer's contract shall be free from defects in materials and workmanship furnished by WILDER TECHNOLOGIES, LLC, and shall conform to the applicable drawings and specifications. WILDER TECHNOLOGIES, LLC'S liability herein, for breach of warranty, contract or negligence in manufacturing, shall be limited to repair or replacement. Repair or replacement of defective items will be applicable only if the Buyer notifies WILDER TECHNOLOGIES, LLC, by written notice within 30-days of delivery. All claims shall be addressed to: support@wilder-tech.com or WILDER TECHNOLOGIES, LLC, 6101A East 18th Street, Vancouver, Washington 98661 U.S.A.; ATTENTION: Customer Service Manager. WILDER TECHNOLOGIES, LLC, reserves the right to inspect at the Buyer's plant all items claimed to be defective or nonconforming prior to authorizing their return. WILDER TECHNOLOGIES, LLC, assumes no liability for the results of the use of its components in conjunction with other electric, electronic or mechanical components, circuits and/or systems. The foregoing constitutes the sole and exclusive remedy of the Buyer and the exclusive liability of WILDER TECHNOLOGIES, LLC, and is IN LIEU OF ANY AND ALL OTHER WARRANTIES, STATUTORY, IMPLIED OR EXPRESSED AS TO MERCHANTABILITY, FITNESS FOR THE PURPOSE SOLD, DESCRIPTION, QUALITY, and PRODUCTIVENESS OR ANY OTHER MATTER. Without limiting the foregoing, in no event shall WILDER TECHNOLOGIES, LLC, be liable for loss of use, profit or other collateral, or for special and/or consequential damages.
- 5. RETURNED GOODS:** WILDER TECHNOLOGIES, LLC, will accept only those goods for return that have been authorized for return. All goods authorized for return shall be assigned a Returned Material Authorization (RMA) Number. The RMA Number shall be clearly marked on the shipping container(s) and all documentation accompanying the goods authorized for return. The RMA Number shall be assigned by WILDER TECHNOLOGIES, LLC pursuant to the conditions set forth in Paragraph 4, WARRANTY.
- 6. UNITED STATES GOVERNMENT CONTRACTS:** In the event this offer is accepted under Government contract, WILDER TECHNOLOGIES, LLC, agrees to accept clauses required by Government regulations and to waive WILDER TECHNOLOGIES, LLC conditions inconsistent therewith. WILDER TECHNOLOGIES, LLC, certifies that it is a regular manufacturer or dealer of the goods and/or services offered herein and that the prices offered do not exceed those charged to any customer for like quantities, services or materials under the same conditions.

Compliance with Environmental Legislation

Wilder Technologies, LLC, is dedicated to complying with the requirements of all applicable environmental legislation and regulations, including appropriate recycling and/or disposal of our products.



WEEE Compliance Statement

The European Union adopted Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE), with requirements that went into effect August 13, 2005. WEEE is intended to reduce the disposal of waste from electrical and electronic equipment by establishing guidelines for prevention, reuse, recycling and recovery.

Wilder Technologies has practices and processes in place to conform to the requirements in this important Directive.

In support of our environmental goals, effective January 1st, 2009 Wilder Technologies, LLC has partnered with E-Tech Recycling of Beaverton, Oregon, www.etechnology.com, to recycle our obsolete and electronic waste in accordance with the European Union Directive 2002/96/EC on waste electrical and electronic equipment ("WEEE Directive").

As a service to our customers, Wilder Technologies is also available for managing the proper recycling and/or disposal of all Wilder Technologies products that have reached the end of their useful life. For further information and return instructions, contact support@wilder-tech.com.

Glossary of Terms

TERMINOLOGY	DEFINITION
Aggressor	A signal imposed on a system (i.e., cable assembly) to measure response on other signal carriers.
Cable	USB Cable with USB Type-A connector for connection to the PC and USB Type-B connector on the HDMI Terminator TPA end. This is used to source power to the HDMI Terminator TPA.
HDMI-TPA	HDMI Test Point Access. A specialized assembly that interfaces to a HDMI receptacle or plug and enables access of signals for measurement or stimulation.
Informative	The designation of a test that is not required for compliance but is considered important from a characterization standpoint. It is provided for informational purposes only.
Normative	The designation of a test that is required for compliance.
Sink Device	A device that contains A/V stream sinks for display and/or sound.
Source Device	A device that contains a stream source and originates an isochronous A/V stream.
TMDS	Transition Minimized Differential Signaling
Victim	A signal carrier on a system that has a response imposed on it by other signals in the system.

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It's all about integrity

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