PANDUIT TX6A™ 10GIG™ COPPER CABLING SYSTEM
## TESTING PROCEDURES   PN524

Introduction

Copper cabling transmission performance depends on cable characteristics, connecting hardware, patch cords and cross-connect wiring, the total number of connections, and the care with which they are installed and maintained. To qualify for a *PANDUIT* System Warranty, post-installation performance testing must be done using Panduit approved field test instruments to verify that the installed cabling will meet or exceed the performance requirements of the designated classification defined in the Commercial Building Telecommunication Standards. These standards based test results should then be submitted to the *PANDUIT* Warranty Department for review.

PANDUIT offers warranty on the *TX6A™ 10GIG™* Copper Cabling System for the current standards, or ANSI/TIA-568B.2-10 to channel, or ISO 11801 Amendment 1 Class E_A Ch AMD1.

Channel Test Configuration

The channel test configuration is to be used by system designers and users of data communications systems to verify the performance of the overall channel. Channel performance is the most critical to the end user, as this is how their network will perform. The channel includes up to 90 m (295 ft) of horizontal cable, a work area equipment cord, a telecommunications outlet/connector, an optional transition/consolidation connector, and two connections in the telecommunications room. TIA/EIA recommends and ISO requires that the consolidation point be located at least 5 m (16.4 ft) from the telecommunications room to reduce the effect of multiple connections in close proximity on NEXT loss and return loss. Per the TIA standard, the total length of equipment cords, patch cords or jumpers and work area cords shall not be more than 10 m (32.8 ft). If total patch cords are longer than 10 meters, the entire channel length must be de-rated by the length exceeding 10 meters depending either by 20% or 50% depending on the patch cord cable type used. The connections to the equipment at each end of the channel are not included in the channel definition. The channel definition does not apply to those cases where the horizontal cabling is cross-connected to the backbone cabling. A schematic representation of a channel can be found below.

TIA/EIA-568B.2-10
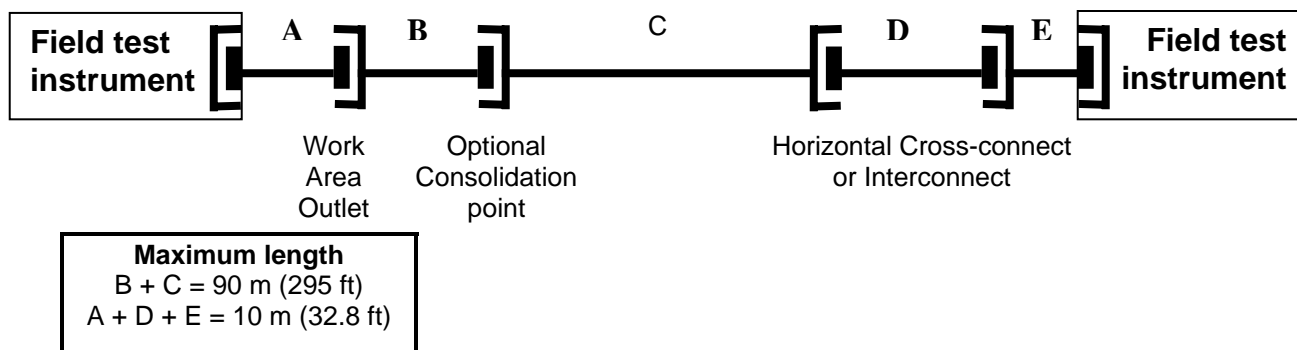
For Technical Support: www.panduit.com/resources/install_maintain.asp

PANDUIT System Warranty

PANDUIT has different types of warranties. These include the *CERTIFICATION PLUS*™ System Warranty and the *PAN-NET*™ Performance Guarantee. Each warranty is standards based. *PANDUIT* will typically provide a system warranty in the following way:

Channel Warranty is based on passing channel test results. (It is recommended to keep the patch cords installed after testing as there may be variations between patch cords)

As stated previously, passing test results must be obtained using an approved field test instrument. *PANDUIT* Corp. places each handheld test instrument thru an evaluation before approving it for use in the field. This ensures the integrity of the test data submitted for warranty.

Current field testers approved for 10Gig/Category 6A:

- Fluke DTX-1800
- Agilent Wirescope Pro N2640A

Testing Required for TIA/EIA CAT6A Channel Operation Warranty

PANDUIT requires that internal channel performance be verified for each link to obtain the warranty. *PANDUIT* does not require that field alien crosstalk testing be performed, as the *TX6A™ 10GIG*™ Copper Cabling System has been thoroughly lab tested and verified to meet alien crosstalk requirements under worse case conditions of 6-around-1 tightly bundled configuration. The customer may wish to perform optional alien testing and this procedure is included for reference.

Fluke DTX-1800 Series Digital Cable Analyzer

PANDUIT has evaluated the Fluke DTX-1800 Series Digital Cable Analyzer and approves the use of this tester for the certification of installed 10Gig cabling channels. In order to verify that the installed cabling will meet or exceed the performance requirements of the designated classification defined in the ANSI/TIA/EIA Category 6A Standard, it is important that the following steps are followed.

Channel Testing

1) Verify that your DTX-1800 Series tester has the most up-to-date software (software version 2.12 or better is required). The latest software updates can be found on the Fluke website at: http://www.flukenetworks.com/fnet/en-us/supportAndDownloads/downloadsAndUpdates/?pid=50004

2) Perform a Set Reference procedure in the special functions prior to testing. Fluke Networks recommends that a Set Reference procedure be performed every 30 days to ensure the maximum accuracy of the test results. DTX Reference Module part# DTX-REFMOD, is recommended for Cat6A testing.

For detailed instructions on Set Reference procedure, refer to Fluke Network's *DTX-1800 Series Users Manual* page 20, on "Setting the Reference for Twisted Pair Cabling". The link for the User's Manual is:
http://www.flukenetworks.com/fnet/en-us/techdocs/Manuals.htm?pid=50004

Note: Fluke Networks also recommends factory calibration once a year to ensure that the test tool meets or exceeds the published accuracy specifications.

3) Select the Fluke Channel Adapter (# DTX-CHA001A (AxTalk)) and attach them to the DTX-1800 Series Main and Remote unit.


4) Select from the following Fluke Test Limts, for which warranty is desired:

- **TIA Cat 6A Channel**
- **ISO ClassE$_A$ Ch AMD1**

5) For channel testing, install all patch cords prior to testing.

Note: *PANDUIT* recommends for installers to install and test a few channels before completing the entire system.

6) Begin testing your installed channels with the Fluke DTX-1800 Series Digital Cable Analyzer and save all test results.
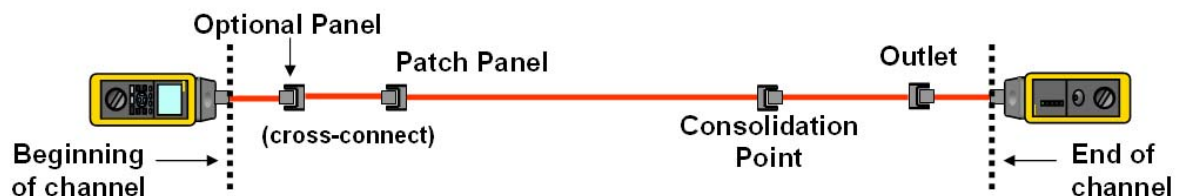
7) Troubleshoot and repair any failing channels. Channels resulting in a PASS* are considered a PASS and will be acceptable for warranty.

Note: The Fluke HDTDX analyzer and HDTDR test are very helpful when troubleshooting failing channels. Both can be found on the SINGLE TEST menu and will also run automatically when a failure occurs. Also make sure that Store Plot Data is set to Extended under Setup/Instrument settings.

8) Submit electronic channel test reports to the *PANDUIT* Warranty Department with all required warranty paperwork. A channel warranty will then be given based on passing test results.

Note: *PANDUIT* recommends for installers to install and test a few channels before completing the entire system.

Alien Crosstalk Testing (Optional)

Alien Crosstalk testing is not needed for shielded cable systems. For UTP systems, Alien Crosstalk testing can be done with the Fluke DTX1800 using part# DTX-10GKIT (recommended).

The Alien Test Kit contains the following items:
- DTX-PLA002 Permanent Link adapters
- AxTALK Analyzer Software- (software version 3.0 or newer is required). The latest software updates can be found on the Fluke website at: http://www.flukenetworks.com/fnet/en-us/supportAndDownloads/downloadsAndUpdates/?pid=50004
- DTX-ATERM Link Terminators (2)
- RJ45 to RJ45 Couplers (2) for channel testing
- DTX- CHA001A channel test heads
- DTX-AXTK1 (2) Alien Crosstalk Modules

Items needed in addition to the kit:
- Patch cords (2)
- Laptop computer

Process description:

1. Determine bundles and cables to test:

- Select the longest and shortest links
- Apply rules for TIA 568-B.2-10

2. For alien testing, Fluke recommends performing a Set Reference at least once a day.

3. Perform permanent link internal testing to the appropriate standard and save all internals of the bundle under test to a separate folder. All links must pass internals.

4. Open the AxTalk Analyzer application and click on the new icon to start a new victim file. Browse for the folder containing the bundle internal tests. Select the file to be used as the victim link. By saving, the application will automatically title as the victim file as titled from the internal file selected.

5. Select the appropriate standard from the test limit menu.

6. Select end 1 and PSANEXT from the radio buttons. Run test and follow the directions. Connect the main and remote as shown below. The Main will always be the victim and the Remote the disturber. For PSANEXT both units are on the same end and the opposite end will have terminated plugs. Run a separate disturber test for each non-victim link of the bundle for end 1, while making the appropriate connection changes. This involves moving the remote and termination plug to the next disturber.
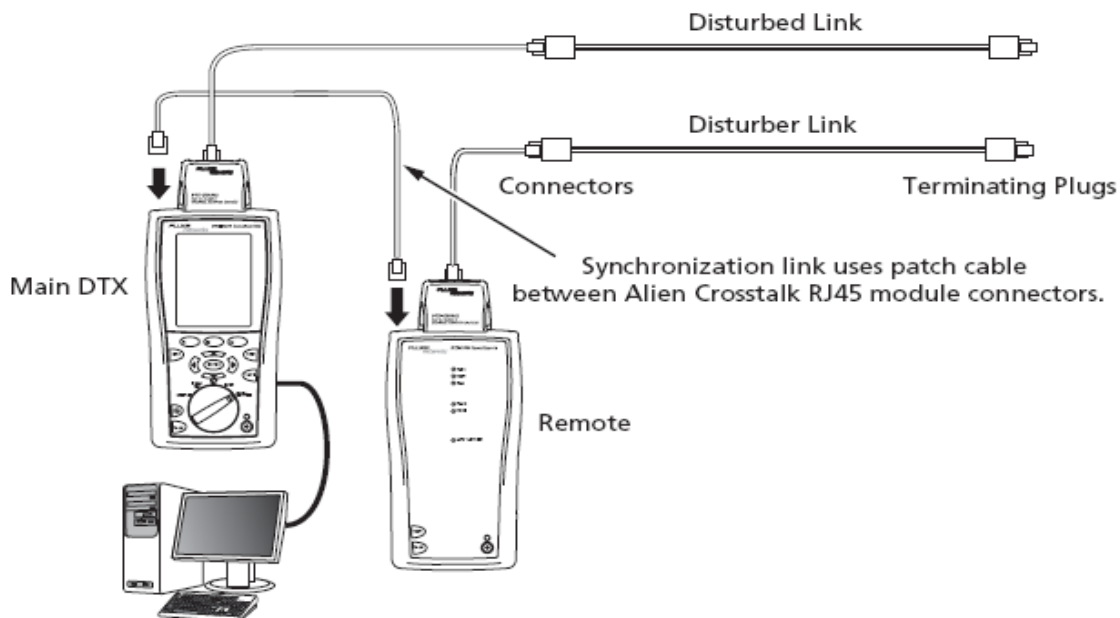
7. When finished select end 2 and repeat.

8. When finished, select PSAACR-F. Repeat as for PSANEXT but now the main and remote units will be on opposite ends as shown below. If the patch cord is not long enough, use 2 patch cords and a separate link as the synchronization link.
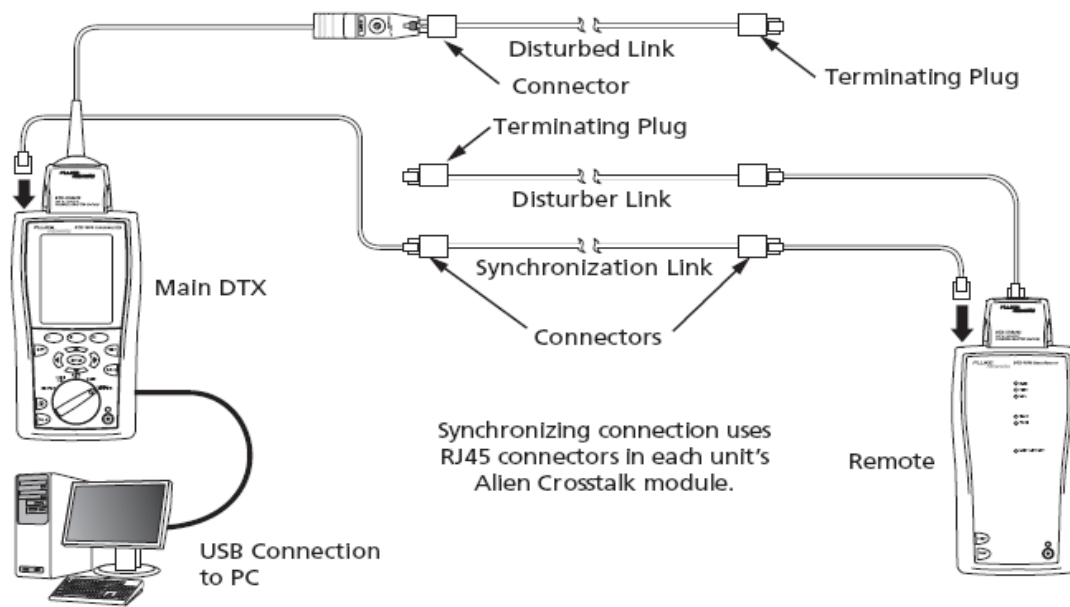
9. When finished, select end 2 and repeat.

Pass/fail determination:

- Any single failure of any pair will result in an overall fail.

For additional information, see Alien Crosstalk User Manual located under the help tab in the AxTalk Analyzer application.

Approved Test Leads For *PANDUIT® MINI-COM® TX6A™ 10GIG™* Jack Modules and *DP6™ 10GIG™* Patch Panels							
Channel							
	Firmware Version	**Software Version**	**Calibration Equipment**	**Autotest**	**Test Leads**	**Personality Module**	**Comments**
Fluke: Networks DTX-1800 Series Cable Analyzer Fluke Networks Website	Software: V2.04 or later	Linkware Software V3.01 or later	-	TIA Cat6A Channel	Part # DTX-CHA001 Cat6 / Class E Channel Adapter	N/A	1. Consult Fluke Networks' website for the latest Firmware and Software Version. 2. It is **STRONGLY RECOMMENDED** that the tester is calibrated prior to testing
Agilent: WireScope Pro N2640A Agilent Technologies Website	WireScope Pro Software 2.1.9 or later	WireScope Pro (ScopeData Pro II) Software 2.19 or later	-	Cat6A: Channel	Part # N2644A-100 Universal Cat6A Channel SmartProbe	N/A	1. Consult Agilent's website for the latest Software Version. 2. Calibration with the Precision Calibration is **STRONGLY RECOMMENDED**. 3. Tester holds last calibration. Tester must be recalibrated if using a different DualRemote, upgrading the software, when transitioning from Cat7/Class F copper cable test to Cat6A/Class E or lower performance categories, or after 30 days. 4. Universal Cat6A Channel SmartProbes should be in optimal condition. See owner's manual.

For Technical Support: www.panduit.com/resources/install_maintain.asp

Appendix A
Standards Limits

TIA Category 6A Channel

Freq. (MHz)	Insertion Loss (db)	NEXT (dB)	PSNEXT (dB)	Return Loss (dB)	ACR-F (dB)	PS ACR-F (dB)	ACR-N (dB)	PSACR-N (dB)
1	3	65.0	62.0	19.0	63.3	60.3		
4	4.2	63.0	60.5	19.0	51.2	48.2		
8	5.8	58.2	55.6	19.0	45.2	42.2		
10	6.5	56.6	54.0	19.0	43.3	40.3		
16	8.2	53.2	50.6	18.0	39.2	36.2		
20	9.2	51.6	49.0	17.5	37.2	34.2		
25	10.2	50.0	47.3	17.0	35.3	32.3		
31.25	11.5	48.4	45.7	16.5	33.4	30.4		
62.5	16.4	43.4	40.6	14.0	27.3	24.3		
100	20.9	39.9	37.1	12.0	23.3	20.3		
200	30.1	34.8	31.9	9.0	17.2	14.2		
250	33.9	33.1	30.2	8.0	15.3	12.3		
350	40.6	30.3	27.3	6.6	12.4	9.4		
500	49.3	26.1	23.2	6.0	9.3	6.3		

ISO Class E$_A$ Ch AMD1

Freq. (MHz)	Insertion Loss (db)	NEXT (dB)	PSNEXT (dB)	Return Loss (dB)	ACR-F (dB)	PS ACR-F (dB)	ACR-N (dB)	PSACR-N (dB)
1	4	65.0	62.0	19.0	63.3	60.3	61	58.0
4	4.2	63.0	60.5	19.0	51.2	48.2	58.9	56.4
8	5.8	58.2	55.6	19.0	45.2	42.2	52.4	49.8
10	6.5	56.6	54.0	19.0	43.3	40.3	50.1	47.5
16	8.2	53.2	50.6	18.0	39.2	36.2	45.0	42.4
20	9.2	51.6	49.0	17.5	37.2	34.2	42.5	39.8
25	10.2	50.0	47.3	17.0	35.3	32.3	39.8	37.1
31.25	11.5	48.4	45.7	16.5	33.4	30.4	36.9	34.2
62.5	16.4	43.4	40.6	14.0	27.3	24.3	28.0	24.2
100	20.9	39.9	37.1	12.0	23.3	20.3	19.0	16.2
200	30.1	34.8	31.9	9.0	17.2	14.2	4.7	1.8
250	33.9	33.1	30.2	8.0	15.3	12.3	-0.8	-3.7
350	40.6	30.6	27.6	6.6	12.4	9.4	-10.0	-13.0
500	49.3	27.9	24.8	6.0	9.3	6.3	-21.4	-24.5

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PANDUIT TX6A™ 10GIG™ Copper Cabling System Product List

Part Number	Description
Jack Modules	
CJ6X88TG**	*MINI-COM® TX6A™ 10GIG™* UTP Jack Module
CJS6X88TGY	*MINI-COM ® TX6A™ 10GIG™* Shielded Jack Module
Cable	
PUR6X04**	*TX6™ 10GIG™* CMR UTP Copper Cable
PUR6A04**	*TX6A™ 10GIG™* CMR UTP Copper Cable
PUP6X04**	*TX6™ 10GIG™* CMP UTP Copper Cable
PUP6A04**	*TX6A™ 10GIG™* CMP UTP Copper Cable
PUL6X04**	*TX6™ 10GIG™* LSZH UTP Copper Cable
PUC6X04**	*TX6™ 10GIG™* CM UTP Copper Cable
PSR6004**	*TX6™ 10GIG™* CMR U/FTP Copper Cable
PSP6004**	*TX6™ 10GIG™* CMP U/FTP Copper Cable
PUFL6X04**	*TX6™ 10GIG™* LSZH U/FTP Copper Cable
PSL7004**	*TX6™ 10GIG™* LSZH S/STP Category 7 Copper Cable
Patch Cords	
UTP6X**Y	*TX6™ 10GIG™* UTP Patch Cords
UTP6A**	*TX6A™ 10GIG™* UTP Patch Cords
STP6X**	*TX6™ 10GIG™* STP Patch Cords
Data patch Panels	
DP**6X88TGY	*DP6™ 10GIG™* Modular Punchdown Patch Panel
DPA**6X88TGY	*DP6™ 10GIG™* Angled Modular Punchdown Patch Panel
Modular Panels	
CPPL**WBLY	*MINI-COM®* Modular Faceplate Patch Panels
CPPL**M6BLY	*MINI-COM®* M6 Style Modular Faceplate Patch Panels
CPPLA**WBLY	*MINI-COM®* Angled Modular Faceplate Patch Panels
CP**BLY	*MINI-COM®* All Metal Shielded Modular Patch Panels
CPPL**WRBLY	*MINI-COM®* Recessed Modular Faceplate Patch Panels
CPP**FMWBLY	*MINI-COM®* Flush Mount Modular Patch Panels
CPPA**FMWBLY	*MINI-COM®* Angled Flush Mount Modular Patch Panels

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