Application Note

Testing of Modular Plug Terminated Links (MPTLs) using Fluke DSX-5000 or DSX-8000

Application Note ID:
NS-AN-22-0001-01-06-22

Date:
01-06-2022

Product Line:
Modular Plugs

Part Numbers Affected:
6APLG-S6A, 47613-EZ6

Today's networking systems have evolved. Historically, most network computing devices were in offices or equipment rooms, with the horizontal cabling terminating at a panel or equipment outlet, and devices connected with a conventional patch cord. However, with the Internet of Things (IoT) and intelligent buildings, increasingly more devices – such as security cameras, Wi-Fi access points and IP clocks – are becoming IP enabled and connecting to the copper horizontal cabling infrastructure. Often, it's impractical to connect these types of devices to a typical panel or jack.

MPTL is now finalized as described in ANSI/TIA-568.2-D Annex F. The standard also defines specifically how an MPTL will be tested. Leviton warrants MPTLs with a Limited Lifetime Warranty when installed, terminated, and tested with successful results per ANSI/TIA-568.2-D Annex F. Leviton guarantees the MPTL to meet or exceed TIA standards compliant requirements when installed, terminated, and tested per the above referenced standard, but no specific margins over standards limits are guaranteed.

Note: This Applications Note assumes that the test personnel have a basic familiarity with the Fluke DSX Field Test Instrument. This tester is used for illustrative purposes only The MPTL test can be performed using any approved field certification instrument with the capability (check with test unit manufacturer) listed on the Leviton Warranty Portal.

For other testers, follow the test equipment manufacturer's specific instructions.

The MPTL is a permanent link which is terminated with a jack on one end and a plug on the other end. Like a regular (jack-to-jack) Permanent Link, it may be up to 90 meters in length. MPTLs are meant to be used for applications where it makes sense to terminate the link with a plug, such as WAPs or cameras.

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The MPTL may be up to 90 meters in length

MPTL – One end terminated in a plug, the other in a jack

The MPTL must be tested with a Permanent Link Adapter on the jack end and a Patch Cord Adapter (**NOT a Channel Adapter**) on the plug end of the link. The Patch Cord Adapter must be of the same category as the cable being tested.

Category Specific Patch Cord Adapters

Permanent Link Adapter

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When setting up the Fluke DSX-5000 or DSX-8000 for an MPTL test:

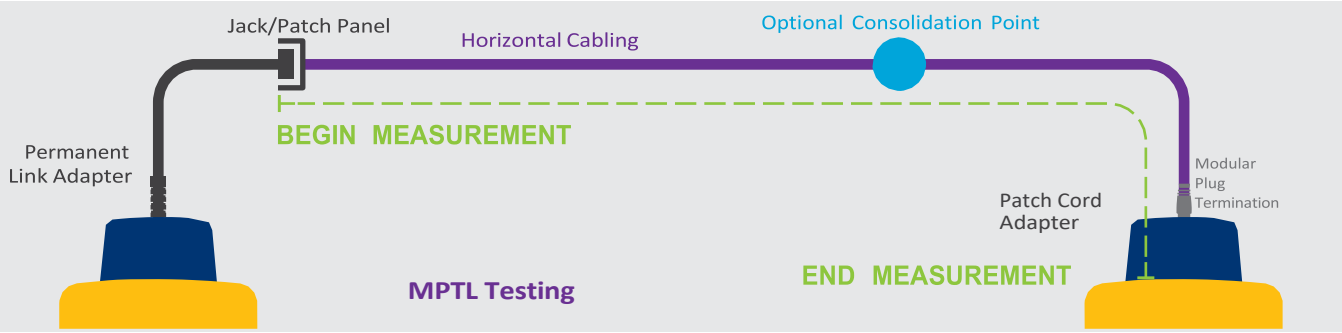
- For Category 6 installation, chose:
  - ‘TIA’
  - ‘Cat 6’
  - ‘MPTL’ – if the active devices are POE, we recommend selecting ‘MPTL (+POE)’
- Perform the test using a Category 6 Patch Cord Adapter on the plug end of the link.

- Category 6A installation, chose:
  - ‘TIA’
  - ‘Cat 6A’
  - ‘MPTL’ – if the active devices are POE, we recommend selecting ‘MPTL (+POE)’
- Perform the test using a Category 6A Patch Cord Adapter on the plug end of the link.

MPTL test limits are the same as Permanent Link limits per category rating.

Steps for testing MPTL:

- Setup Fluke DSX Test Instrument for Cat 6 or Cat 6A MPTL as noted above (select cable type, test limit…etc.)
  - Save the tester setup
- Plug Permanent Link Adapter into DSX main unit
  - This adapter will plug into jack or patch panel
- Plug proper category Patch Cord Adapter into DSX remote unit
  - Field terminated plug will plug into this adapter
- Select ‘Test’
  - Save test results



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Modular Plug and Cable Compatibility

The Leviton plugs and cable listed in the following table have been tested and approved for compatibility by Leviton:

Leviton Connector	Berk-Tek LANmark-	OD	Insulated Conductor OD	Shielded or Unshielded
EZ-RJ Plug (Part # 47613-EZ6)	6 CMR	0.210”	0.039”	UTP
	6 CMP	0.220”	0.040”	UTP
	1000 CMR	0.230”	0.039”	UTP
	1000 CMP	0.230”	0.040”	UTP
	2000 CMR	0.231”	0.039”	UTP
	2000 CMP	0.220”	0.037”	UTP
	6 OSP	0.250”	0.040”	UTP
	1000 OSP	0.245”	0.040”	UTP
Tool-free Universal Plug (Part # 6APLG-S6A) (This plug may also be used with all of the cables listed under the EZ-RJ Plug above)	LM-RDT CMP	0.230”	0.043”	UTP
	SST CMR	0.275”	0.047”	UTP
	SST CMP	0.255”	0.042”	UTP
	XTP CMR	0.275”	0.047”	UTP
	XTP CMP	0.275”	0.042”	UTP
	10G2 CMR*	0.320”	0.047”	UTP
	10G2 CMP	0.320”	0.044”	UTP
	10G FTP CMR*	0.300”	0.044”	F/UTP
	10G FTP CMP	0.275”	0.042”	F/UTP
	6 FTP CMR	0.280”	0.045”	F/UTP
	6 FTP CMP	0.285”	0.045”	F/UTP
	10G OSP*	0.355”	0.047”	UTP

* Terminate without plug rear nut assembly

Note: Gel removal is a must prior to terminating OSP cables. The use of Polywater® Corp. Hydrosol™ Cable gel remover is the approved solvent.

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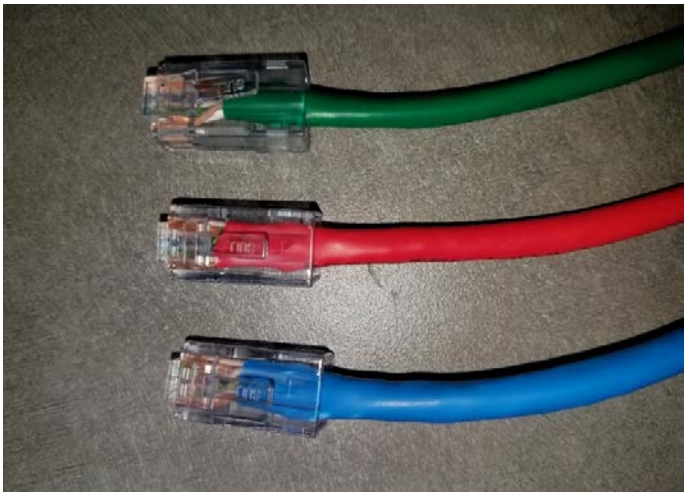

Leviton EZ-RJ Category 6 Plug easily terminates to Berk-Tek LANmark-6 (green shown), LANmark-1000 (red shown), or LANmark-2000 (blue shown)

Leviton Category 6A Tool-free Universal Plug shown terminated on various Berk-Tek Category 6A Shielded and Unshielded (UTP) cables. Where cable jacket is slightly too large (over 0.300 inch OD) the rear nut assembly may be omitted (as shown on the black LANmark 10G2 CMR above) with no loss of termination integrity. (10G2 CMR has nominal OD of 0.320 inches).

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Guidelines for Best Installation Practices

The guide is intended to provide basic guidelines for the installation of Berk-Tek copper cabling products. The use of this guide is not a substitute for installation training through the Leviton Certification program. Installation practices outlined in ANSI/TIA-568-D and the BICSI Telecommunications Distribution Methods Manual (TDMM) must be followed.

Maximum Cable Lengths

Per the channel and permanent link requirements of ANSI/TIA-568-D:

1. 90-meter horizontal cabling
2. 10-meter total patch cables

Cable Slack

It is recommended to provide additional cable slack at both ends to accommodate future cabling system changes:

1. Telecommunications closet: 10 feet
2. Telecommunications outlet: 12 inches for twisted pairs cables

Maximum Cable Pull Force

UTP Cables: 25 lbs.-f

Handling of Cable Boxes

Boxes must be stored and handled in an upright position to reduce the chance of twisting and kinking the cable, especially if the box is partially used.

Cable Bend Radius

UTP: 4 times the cable diameter
F/UTP: 8 times the cable diameter

Cable Management and Pulling Practices

Eliminate cable stress:

1. Control tension in suspended cable runs by limiting spans between supports to 5 ft or less.
2. Avoid tightly cinched cable bundles.
3. Avoid kinking during installation.
4. Avoid changing the geometry of the cable

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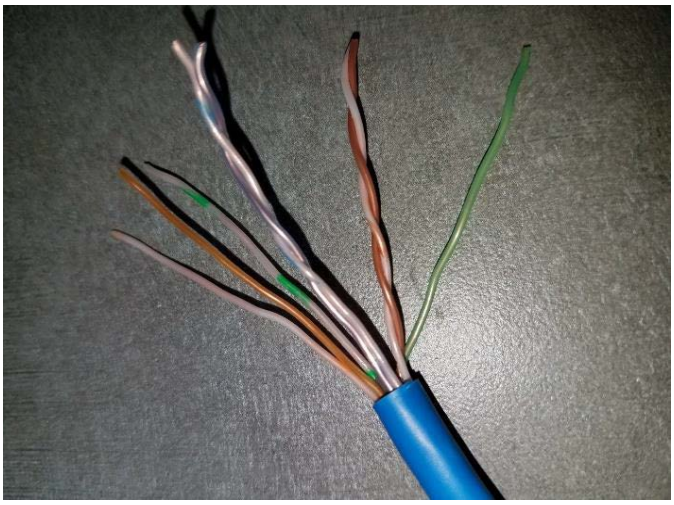
Cabling hints for MPTL Success:

Follow manufacturers' recommendations

1. Do not use tie wraps.
2. Do not use staples.
3. When pulling apply pulling force evenly to all conductors in the cable.
4. When dressing the cable, avoid kinking the cable and exceeding maximum bend radius.

Installation Instructions for the Category 6 EZ-RJ Plug:

Strip a little more cable jacket than one might think strictly necessary – about 1.5 inches will be good. Prepare the cable for termination. Remove cable strip string and center spline (if one is present). Inspect pairs for any insulation damage. If any damage is observed, cut off damaged portion, re-strip, and prepare the cable again.



When straightening pairs DO NOT drag a tool along the twisted pair to straighten the wires. This damages pairs by flattening/distorting the conductors. Observe the blue pair in the photo at left. Start pair untwisting from the base of the pair, by pinching the pair between fingers and sliding fingers up the pair as untwisting is done. This will result in very straight individual wires.

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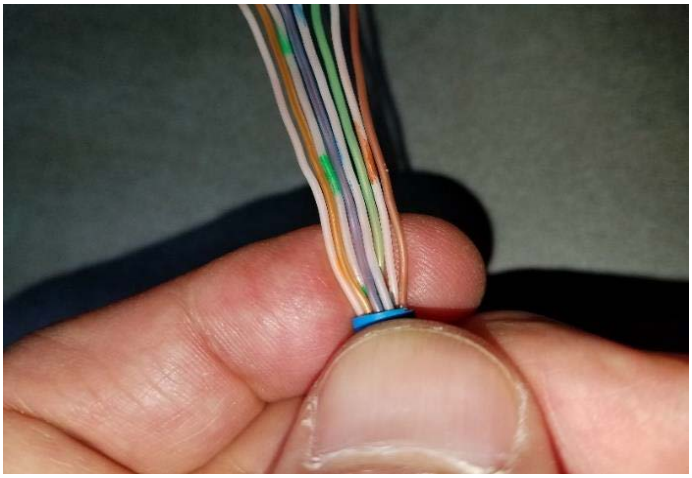
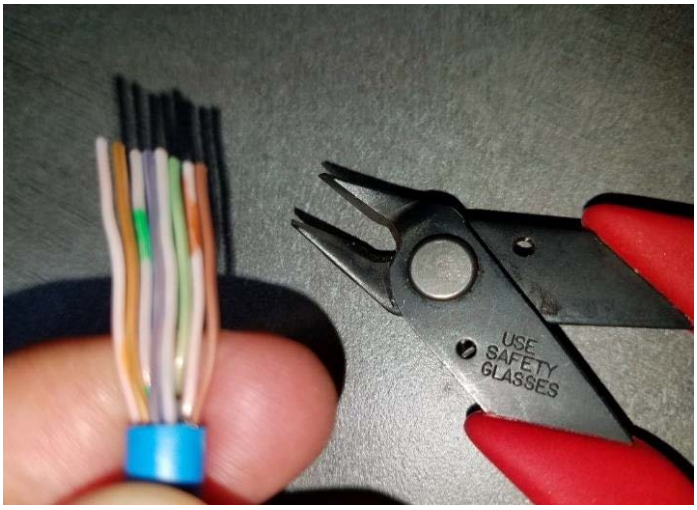
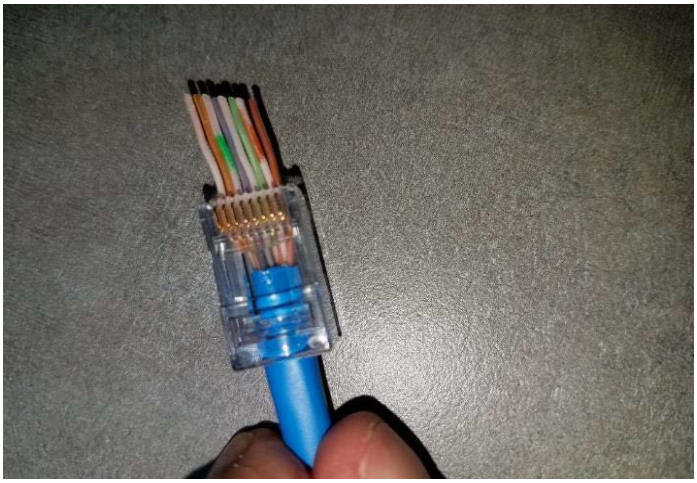


Carefully arrange wires in the desired order. T568B wiring is shown here.



Use flush cutters to trim the wires off at a slight angle. This will greatly aid successful wire insertion into the EZ-RJ Category 6 Plug.



Insert wire far enough into plug so that when crimped, the plug strain relief will press against the cable jacket. Cable jacket should intrude into plug as far as possible, maintaining Category 6 pair twists as close as possible to the termination point. Note that uncut wires are meant to protrude through front of plug.

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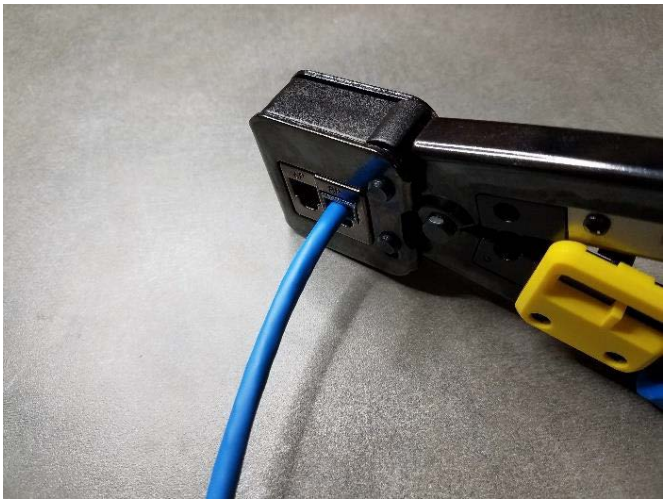
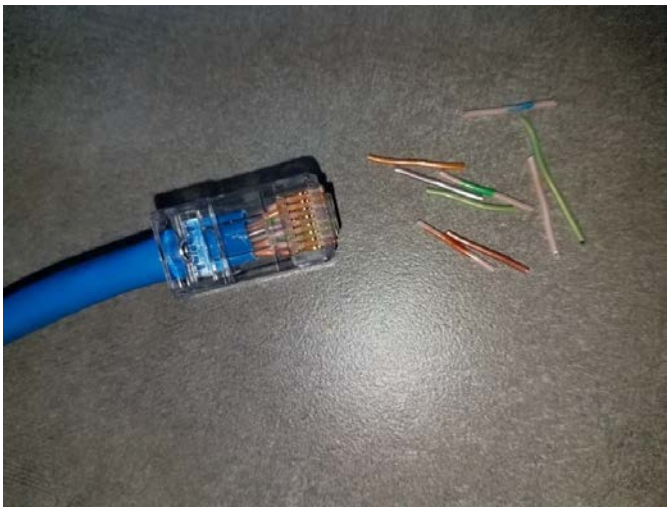


Seat the plug all the way into the Leviton EZ-RJ45 Crimp Tool (part number 40489-ACT). A fully seated plug will contact a stop inside of the tool. Squeeze tool handles fully together to crimp the plug



Tool will:

1. Seat the plug contacts into the individual wires.
2. Trim off wires at front of plug.
3. Activate strain relief crimp onto cable jacket (near rear of plug).

Cat 6A Tool-Free Plug Instruction Sheet

Please note: For instructions for the Cat 6A tool-free plug, please reference: https://www.leviton.com/en/docs/Leviton_IST_6APLG-S6A_Cat6A_Tool_Free_Plug.pdf
You can also visit: https://www.leviton.com/en/support/contact-us/product-support/networking/network-solutions-videos to view a video of the plug termination. (In the Copper Systems section of the video library, several Category 6A Tool-Free Plug videos may be found).

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Warranty

After installing, terminating, and testing MPTLs according to ANSI/TIA-568.2-D Annex F, as illustrated in this document, submit the passing test results to the Leviton Contractor Program Manager. Upon receipt and processing of passing test results, all MPTLs will be covered under the Leviton Limited Lifetime Warranty. Submit MPTL test results as you would all other link or channel test results.

Please note that OSP cables are warranted for OSP applications as defined in their specification page online. Leviton field terminated connectors (or any Leviton connector unless specified as OSP) are not designed for OSP environments and therefore are not covered under warranty if exposed to an OSP environment. All MPTLs are guaranteed to meet or exceed TIA standard compliant requirements when installed, terminated, and tested in accordance with ANSI/TIA-568.2-D Annex F. But no specific margins over standards limits are guaranteed.

Another Method for Creating an MPTL – The Leviton VXC Plenum Assembly

The VXC™ Plenum Assembly is a connecting cord designed for applications in environments that require CMP flame rated cables, such as WAPs, cameras, and other smart building applications. The cable assembly provides superior alien crosstalk suppression and protects critical data from EMI (electromagnetic interference) and RFI (radio frequency interference). It is ideal for use in a UTP Cat 6A system, or as part of a Cat 6A shielded system. Installing the VXC Assembly is easy. The Coupler end installs directly onto the horizontal cable run and provides a standard 8-position modular plug termination. Testing is the same as outlined earlier in this Applications Note.

VXC Plenum Assembly (Part number SBCPI-18L)

Successful Use of Leviton EZ-RJ Category 6 Plugs for MPTLs

When using Category 6 cable, be sure that Category 6 EZ-RJ Modular Plugs are being used. There are EZ-RJ Category 5e Plugs available and they will not pass a Category 6 MPTL Test. The two plug types look very much alike, but a detailed examination will reveal which one is in hand.

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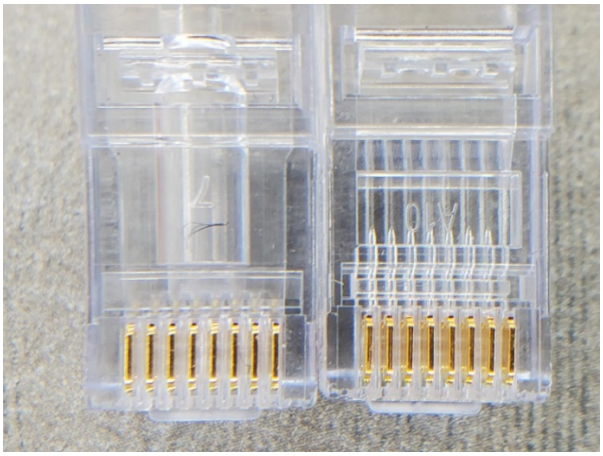
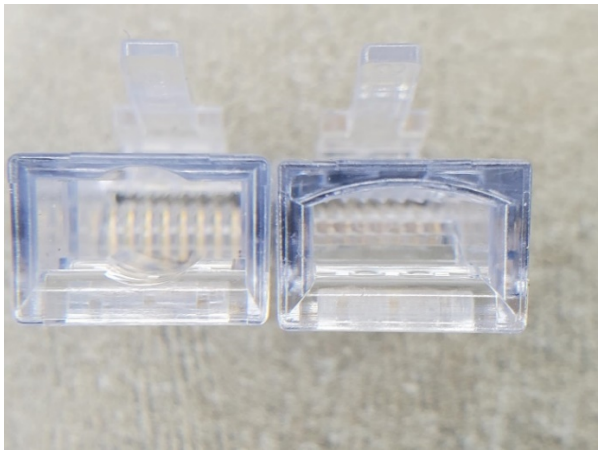
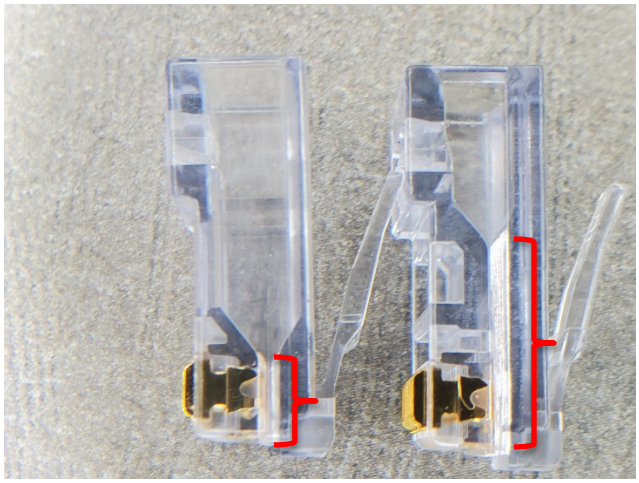
The three photos below show the Category 6 Plug on the left, and the Category 5e Plug on the right.



Cat 6 Plug allows cable jacket (and pair twists) to be seated deeper into plug



Cat 5e Plug has an “arch” across the rear opening of the plug



Flat wire area (pairs untwisted) inside plug is much shorter for the Cat 6 Plug

Cat 6 EZ-RJ Plug (left) Cat 5e EZ-RJ Plug (right)

The Leviton Lifetime Warranty requires the use of Leviton Plugs in MPTL terminations. The use of another manufacturer’s plugs is not authorized and any MPTLs using another brand of plug will not be covered under the Leviton Lifetime Warranty.

Plugs are meant to be crimped with a crimp tool with a matched crimp die. The Leviton EZ-RJ45 Crimp Tool (part number 40989-ACT) must be used with the EZ-RJ Category 6 Plug (47613-EZ6). Use of any other brand of modular plug crimp tool is not supported and will likely result in a poor plug termination and substandard link performance.

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