

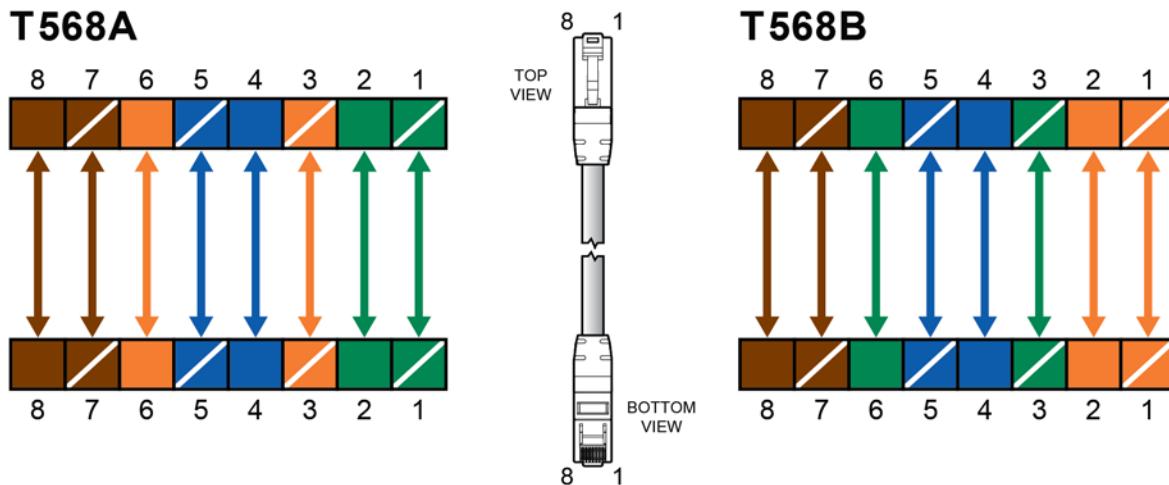
Patch Cord Wiring Guide

Introduction

Panduit is a leading supplier of structured cabling systems and Unified Physical Infrastructure (UPI), enabling the physical infrastructure to be scalable, flexible, and easily manageable, while supporting Ethernet communications at ever-increasing data rates. Panduit is aware of confusion in the marketplace regarding patch cord wiring schemes and when they should be employed. These wiring schemes include T568A, T568B, crossover (flipped), and rolled (roll-over). The purpose of this technical reference is to eliminate any confusion, by providing an overview of each wiring scheme as well as typical deployment strategies in structured cabling systems.

T568A & T568B Wiring

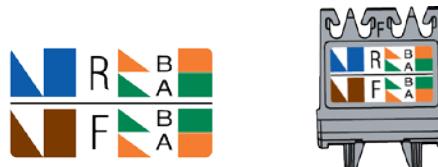
T568A and T568B wiring schemes are defined in the ANSI/TIA-568-C.2 standard for 4-pair (8-position, 8-conductor) RJ45 interfaces. T568A and T568B are straight-through wiring schemes. Each conductor inside the patch cable connects to the same pin on both modular plug ends. As shown in the illustration below, the only difference between T568A and T568B is the orientation of the green and orange pairs.



When used in traditional fashion, there is no functional difference between patch cords with T568A or T568B wiring schemes. Both wiring schemes are acceptable in network topologies, and are essentially interchangeable. T568A is the default wiring scheme in ANSI/TIA-568-C.2, with T568B listed as being optional. ANSI/TIA-568-C.2, is the most popular wiring scheme in modern installations. T568B is also consistent with the older AT&T 258A wiring scheme that many installers are already accustomed to. The US Government has standardized on T568A. It is the required wiring scheme for all government installations and in all performance categories.

Although completely interchangeable in traditional plug-to-plug form, installers must be cognizant of the patch cord wiring scheme if they cut the patch cord to terminate a jack module on one end. This technique is often used when the modular plug is connected to a switch, and the jack module is installed in a modular patch panel. To

ensure the jack-to-plug link transmits Ethernet traffic, the jack module must be terminated using the same wiring scheme as the patch cord modular plug. Installers appreciate that the termination cap on all Panduit jack modules includes a wire map label that illustrates the correct conductor positions for T568A and T568B termination.



Panduit manufactures a complete line of patch cords in Category 6A, 6, and 5e performance categories. These include UTP, shielded, standard diameter, small diameter (SD), in CM and/or LSZH flame ratings. The table below summarizes Panduit's patch cord offerings and the part numbers for each cord wired T568A or T568B.

T568A & T568B Wiring Patch Cord Part Numbers

Patch Cord Type	Standard T568 Wire Scheme	Part Number	Alternate T568 Wire Scheme	Part Number
Cat 6A UTP (CM)	T568B	UTP6A**xx	T568A	UTP6A**xxA/N
Cat 6A UTP (LSZH)	T568B	UTP6AL**xx	T568A	UTP6AL**xxA/N
Cat 6A SD UTP (CM)	T568B	UTP6ASD**xx	T568A	UTP6ASD**xxA/N
Cat 6A SD UTP (LSZH)	T568B	UTP6ASDL**xx	T568A	UTP6ASDL**xxA/N
Cat 6A Shielded (CM/LSZH)	T568B	STP6X**xx	T568A	STP6X**xxA/N
Cat 6 UTP (CM)	T568B	UTPSP**xxY	T568A	UTPSP**xxA/NY
Cat 6 UTP (LSZH)	T568B	UTPSPL**xxY	T568A	UTPSPL**xxA/NY
Cat 6 SD UTP (CM/LSZH)	T568B	UTP28SP**xx	T568A	UTP28SP**xxA/N
Cat 5e UTP (CM)	T568A	UTPCH**xxY	T568B	UTPCH**xxB/NY
Cat 5e UTP (LSZH)	T568A	UTPCHL**xxY	T568B	UTPCHL**xxB/NY
Cat 5e SD UTP (CM/LSZH)	T568A	UTP28CH**xx	T568B	UTP28CH**xxB/N
Cat 5e Shielded (CM/LSZH)	T568A	STPCH**Bxx	T568B	STPCH**BxxB/N

** = Length xx = Color Code /N = Non-Standard Part Number

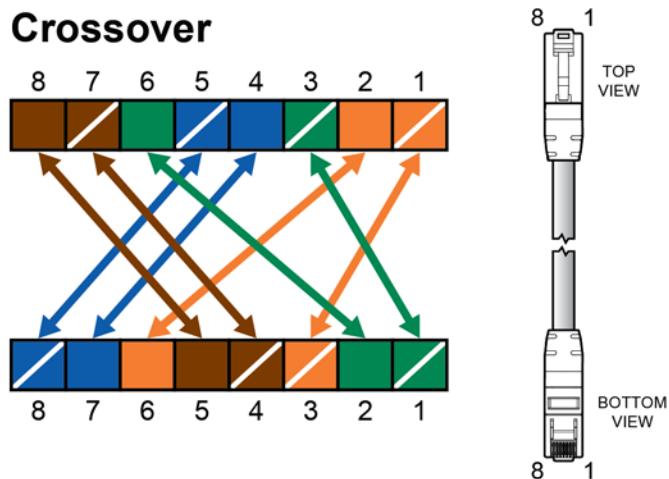
Panduit's standard Category 5e patch cords are wired T568A at the factory with standard Category 6A and Category 6 patch cords are wired T568B. Through extensive validation testing, Panduit confirmed improved Near End Cross Talk (NEXT) margins were obtained by wiring higher bandwidth cords to T568B. The reason relates to the pair lays within the patch cable, and how the conductors are manipulated into position within the modular plugs.

Crossover (Flipped) Wiring

Although not specifically defined in ANSI/TIA-568-C.2, crossover patch cords, also known as flipped patch cords, are used to connect a PC directly to another PC, a hub to hub, or switch to switch. The term crossover is used because the send and receive pairs are crossed from one modular plug (end 1) to the other (end 2).

Most modern hubs and switches have auto-sensing ports that allow the use of straight patch cords (T568A or T568B) for direct connections; however, regardless of equipment capabilities, many installers prefer the use of crossover cords for all direct connections. For visual differentiation, it is common for crossover cords to be deployed in a different color than standard straight-through cables.

Users should be aware that many low end crossover cords on the market support data transition rates of only 10/100 megabits per second. This is because only 2 of the 4 conductor pairs have been crossed. As shown in the illustration below, Panduit cords crossover all 4 pairs. Known as "full crossover", Panduit cords transmit data on all 4 pairs at speeds up to 1 gigabit per second.



Because of their popularity, Panduit stocks a standard offering of Category 6 UTP crossover patch cords. Standard foot lengths include 2 to 10 feet (one foot increments) 15 and 20 feet. Standard meter lengths include 2 to 5 meters (one meter increments) 1 and 1.5 meters. Standard colors are RD (Red), YL (Yellow), and GY (Gray). The table below shows the part number matrix for these standard cords.

Cross Over Patch Cord Part Numbers - Standard

Patch Cord Type	Part Number
Cat 6 UTP (CM)	UTPSP**xxFY

** = Length xx = Color Code

The table below provides a part number matrix that should be referenced when ordering a crossover cord in different performance levels, lengths, and standard colors.

Cross Over Patch Cord Part Numbers

Patch Cord Type	Part Number
Cat 6A UTP (CM)	UTP6A**xxF/N
Cat 6A UTP (LSZH)	UTP6AL**xxF/N
Cat 6A SD UTP (CM)	UTP6ASD**xxF/N
Cat 6A SD UTP (LSZH)	UTP6ASDL**xxF/N
Cat 6A Shielded (CM/LSZH)	STP6X**xxF/N
Cat 6 UTP (CM)	UTPSP**xxF/NY
Cat 6 UTP (LSZH)	UTPSPL**xxF/NY
Cat 6 SD UTP (CM/LSZH)	UTP28SP**xxF/N
Cat 5e UTP (CM)	UTPCH**xxF/NY
Cat 5e UTP (LSZH)	UTPCHL**xxF/NY
Cat 5e SD UTP (CM/LSZH)	UTP28CH**xxF/N
Cat 5e Shielded (CM/LSZH)	STPCH**BxxF/N

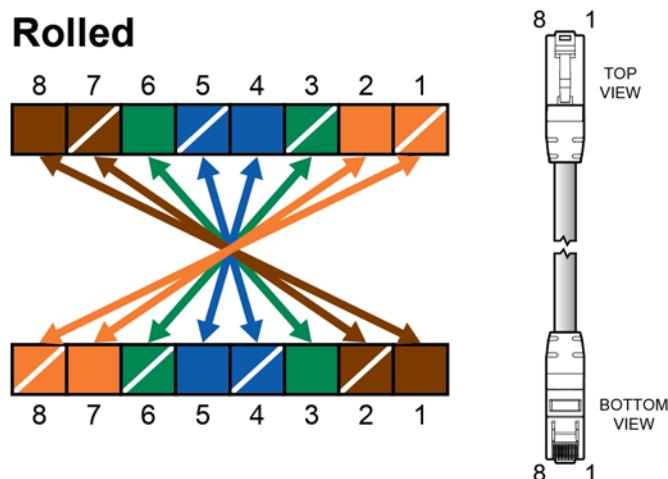
** = Length xx = Color Code /N = Non-Standard Part Number

Rolled (Roll-Over) Wiring

Rolled (roll-over) patch cords are not used for network connectivity. These patch cords serve a unique purpose, and are used to connect the serial port or modem on a PC to the console port of a Cisco® router or switch.

Rollover patch cords are often referred to as Cisco console cables because they facilitate the configuration of a Cisco network router or switch from a PC. An RJ45 to DB9 or RJ45 to DB-25 adapter will be needed to connect the cord to the PC serial port or modem.

As shown in the illustration below, a roll-over patch cord completely reverses the pin configurations between the two modular plugs. Pin 1 on modular plug end 1 connects to pin 8 on modular plug end 2. Pin 2 on modular plug end 1 connects to pin 7 on modular plug end 2, and so on.



Rolled (roll-over) wiring is also available in all Panduit patch cord types. The table below provides a part number matrix that should be referenced when ordering rolled patch cords in different performance levels, lengths, and standard colors.

Rolled Patch Cord Part Numbers

Patch Cord Type	Part Number
Cat6A UTP (CM)	UTP6A**xxR/N
Cat6A UTP (LSZH)	UTP6AL**xxR/N
Cat6A SD UTP (CM)	UTP6ASD**xxR/N
Cat6A SD UTP (LSZH)	UTP6ASDL**xxR/N
Cat6A Shielded (CM/LSZH)	STP6X**xxR/N
Cat6 UTP (CM)	UTPSP**xxR/NY
Cat6 UTP (LSZH)	UTPSPL**xxR/NY
Cat6 SD UTP (CM/LSZH)	UTP28SP**xxR/N
Cat5e UTP (CM)	UTPCH**xxR/NY
Cat5e UTP (LSZH)	UTPCHL**xxR/NY
Cat5e SD UTP (CM/LSZH)	UTP28CH**xxR/N
Cat5e Shielded (CM/LSZH)	STPCH**BxxR/N

** = Length xx = Color Code /N = Non-Standard Part Number

Summary

Panduit, a leading supplier of structured cabling systems and UPI, has the capability of manufacturing any patch cord with a T568A, T568B, crossover (flipped), or rolled (roll-over) wiring scheme. These cords can be manufactured in any cord type, length, or standard color. Contact Panduit customer service to initiate your order for any patch cord described in this technical reference.

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