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TCP series

Optimum partitioning for robust and smarter USB Type-C connectors



Migrate to USB Type-C connectors with the TCP series companion chip for STM32 microcontrollers.

By separating the low-voltage MCU for the USB Power Delivery protocol from the high-voltage controls and protection chip (Type-C Port Protection series), partitioning allows design flexibility, smarter functions, and space saving, with cost benefits over legacy solutions.

The TCP series facilitates the migration from legacy USB Type-A or Type-B to Type-C connectors while protecting against defective chargers or sink devices, CC line shorts to V_{BUS} , and electrostatic discharges as per IEC 61000-4-2 level 4, $\pm 8kV$ contact discharge.

KEY FEATURES & BENEFITS

Protection against most common electrical surges occurring with USB Type-C connectors:

- Overvoltage protection on CC lines (6 V) and V_{BUS} (up to 24 V) with external N-channel MOSFET
- Overcurrent protection on CC lines and V_{BUS} (Source and Dual Role Power)
- $\pm 8kV$ ESD protection on V_{BUS} and CC lines as per IEC 61000-4-2 Level 4

Certified solution against USB-C PD3.1 Standard Power Range

Null power consumption when no cable attached

KEY APPLICATIONS

Any battery-powered device with USB-C charging port:

- Wireless speakers, TWS, headsets
- Point of sale devices
- Drones
- Power tools
- E-cigarettes
- Digital still cameras

Computers and peripherals:

- Mouses, keyboards, and monitors
- Game consoles and controllers

Sourcing devices:

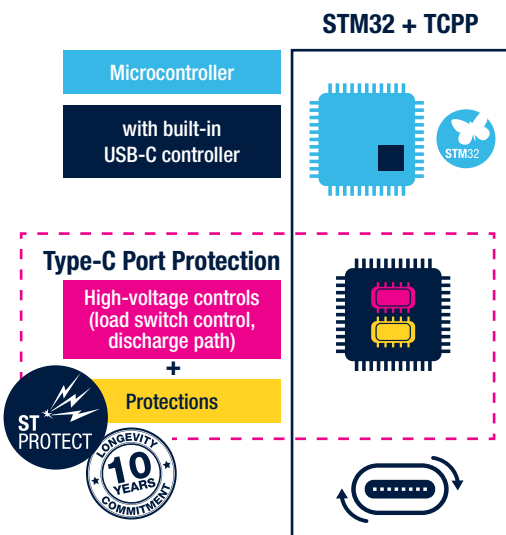
- Power banks, e-bike batteries
- Multiport chargers
- Docking and USB hubs

STMicroelectronics solution for cost-effective and smarter USB Type-C

Tailored for every application

3 different products are available in the TCP P series, each corresponding to a major use case of the USB-C specification. Each TCP P device provides the required protection features for specific use cases and allows precise cost control of your USB-C implementation.

TCP P01-M12, TCP P02-M18, and TCP P03-M20 are compliant with the latest USB-C Power Delivery 3.1 SPR (Standard Power Range) specification, meaning they are able to manage up to 100 W (20 V / 5 A) contract negotiation. The integrated gate driver is compliant with the voltage levels of the Programmable Power Supply (PPS) feature to enable fast and optimum charging.



STM32-UCPD* (USB-C Power Delivery)				
STM32G0	STM32G4	STM32L5	STM32U5	STM32H5
Cortex-M0+ MCUs Efficiency at its best!	Mixed-signal Cortex-M4 MCUs	M33 Excellence in ULP with more security	The flagship ultra-low-power MCUs	M33 Performance and security: the best of both worlds

TCP P - Type-C Port Protection				
USB-C pins protections		SINK TCP P01-M12	SOURCE TCP P02-M18	Dual Role Power TCP P03-M20
CC1, CC2 pins	ESD ±8kV, OVP	X	X	X
	V _{conn} OCP, discharge		X	X
V _{BUS} pin	Gate driver	Sink	Source	Sink / Source
	OVP	X		X
	OCP, current sense		X	Bi-directional
	Discharge		X	X

OVP: Over Voltage Protection OCP: Over Current Protection

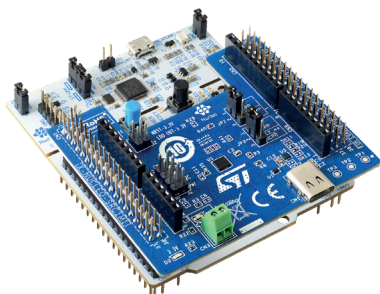
*UCPD: USB Type-C Power Delivery Controller, embedded in STM32 microcontrollers

Development tools in STM32 ecosystem

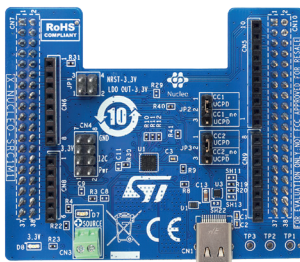
As STM32 companion chips, the TCP P series is fully integrated inside STM32 ecosystem. Customers can benefit from the STM32Cube software suite (X-CUBE-TCP P) and a wide range of hardware tools.

The TCP P series includes three expansion boards for STM32 Nucleo, available on ST.com. They allow quick evaluation according to the desired Type-C configuration of the application.

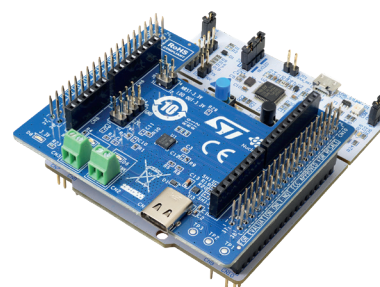
The STM32 ecosystem simplifies prototyping and reduces time to market.



X-NUCLEO-SNK1M1
Sink application



X-NUCLEO-SRC1M1
Source application



X-NUCLEO-DRP1M1
Dual Role Power application



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