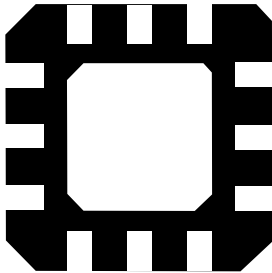


USB type-C port protection for USB power delivery



μQFN-12L package

Features

- ESD protection IEC 61000-4-2 level 4 for CC1, CC2 and V_{BUS} (±8 kV contact discharge, ±15 kV air discharge)
- 22 V overvoltage protection on CC lines against short-to-V_{BUS} overvoltage
- Externally programmable Over Voltage Protection on V_{BUS} line
- Integrated V_{BUS} gate driver for external N-MOSFET
- Over temperature protection
- Integrated “dead battery” management
- Open-drain fault reporting
- Low power mode for battery-operated SINK applications
- Operating junction temperature from -40°C to 85°C
- ECOPACK[®]2 compliant

Applications

Where current limitation is required in factory automation application:

- USB type-C power delivery, PPS compliant
- USB type-C used in sink configuration
- USB type-C used in source configuration
- USB type-C for UFP (upstream facing port) or DFP (downstream facing port) configuration
- USB type-C used in dual role port

Description

The TCPP01-M12 (type-C port protection) is a single chip solution for USB type-C port protection that facilitates the migration from USB legacy connectors type-A or type-B to USB type-C connectors. The TCPP01-M12 features 22 V tolerant ESD protection as per IEC61000-4-2 Level 4 on USB type-C connector communication channel (CC) and V_{BUS} lines. To allow fast certification for USB power delivery, the TCPP01-M12 provides overvoltage protection on CC1 and CC2 pins when these pins are subjected to short circuit with the V_{BUS} pin that may happen when removing the USB type-C cable from its receptacle. For sink applications, TCPP01-M12 triggers an externally programmable N-MOSFET overvoltage protection on V_{BUS} pin when a defective power source applies a voltage higher than selected OVP threshold. Also, the TCPP01-M12 integrates a “dead battery” management logic that is compliant with the USB power delivery specification. The V_{BUS} N-MOSFET load driver can also be used in source applications.

Product status link

[TCPP01-M12](#)

Product summary

Order code	TCPP01-M12
Package	μQFN-12L
Packing	Tape and reel

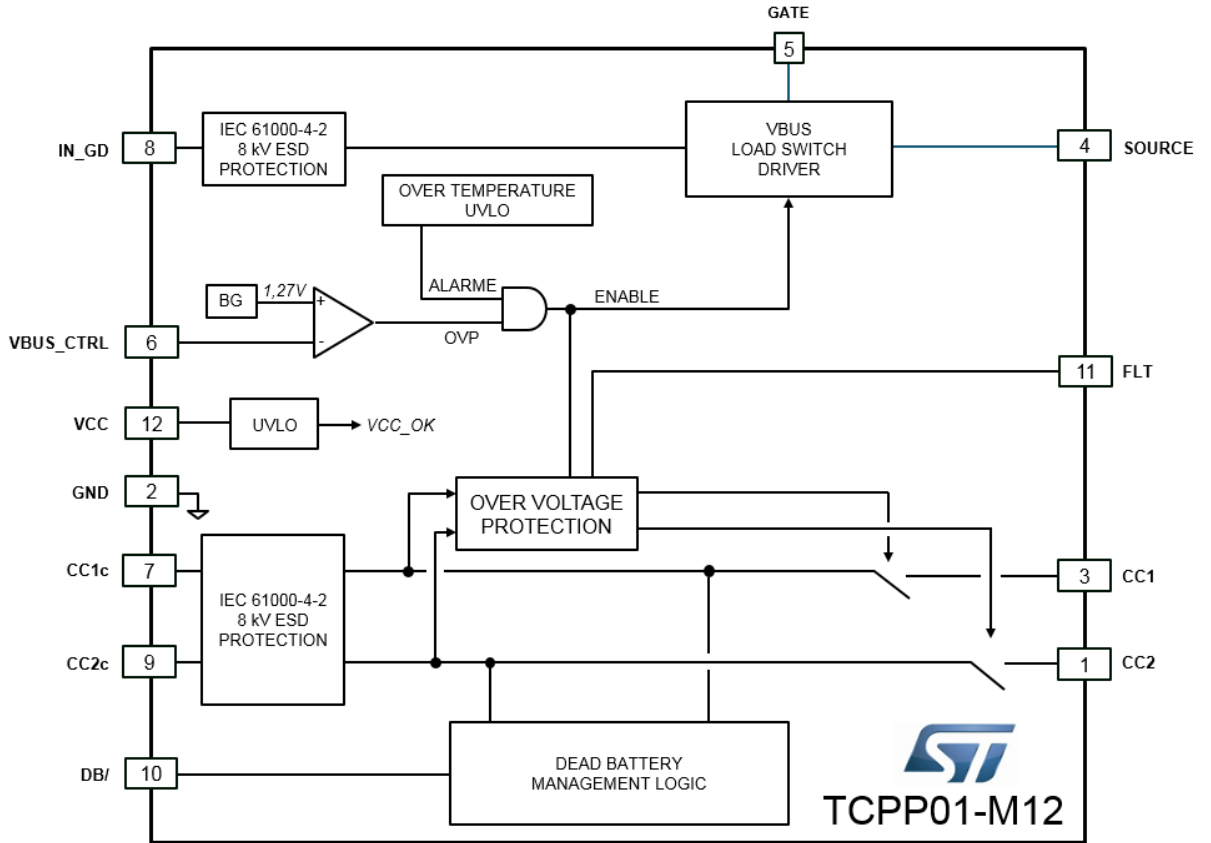
1 Pinout and functions

Table 1. Pinout and functions

Name	Pin #	Type	Description
CC2	1	Input / Output	System-side for the CC2 OVP FET
GND	2	Ground	Ground
CC1	3	Input / Output	System-side for the CC1 OVP FET
Source	4	Power	V _{BUS} load switch source
GATE	5	Output	V _{BUS} load switch gate control
V _{BUS_CTRL}	6	Input	Programmable V _{BUS} OVP threshold (set by external resistor bridge)
CC1c	7	Input / Output	Connector side for CC1 OVP FET
IN_GD	8	Power	Connector side for V _{BUS}
CC2c	9	Input / Output	Connector side for CC2 OVP FET
DB/	10	Input	Dead battery resistors management
FLT	11	Output	Fault reporting flag (open-drain)
V _{CC}	12	Input	3.3 V power supply
Exposed pad	13	Ground	Ground

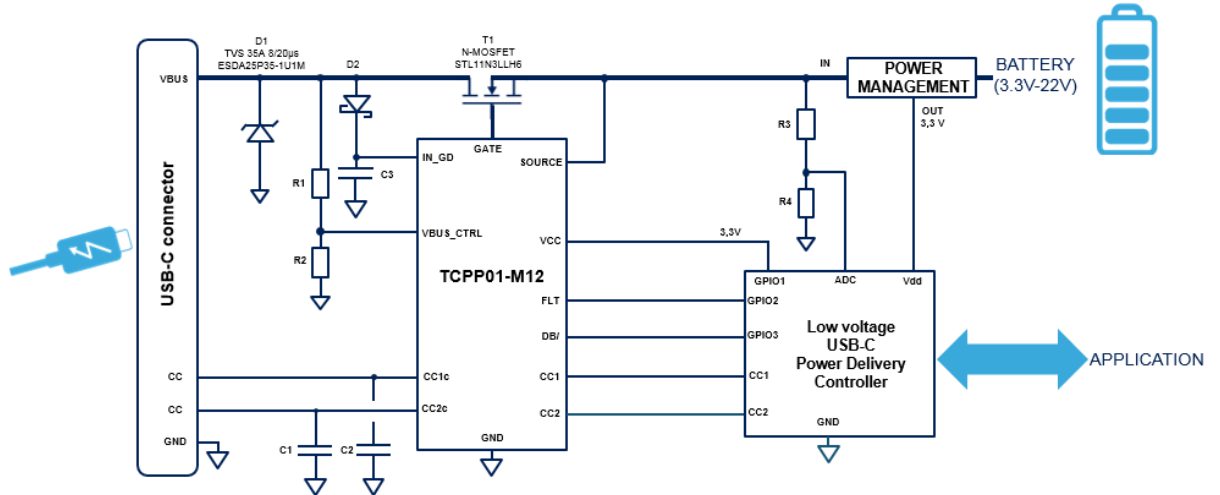
2 TCPP01-M12 simplified internal block diagram

Figure 1. Block diagram



3 Typical sink application use-case

Figure 2. USB Type-C power delivery – SINK application with battery (3.3 V to 22 V)



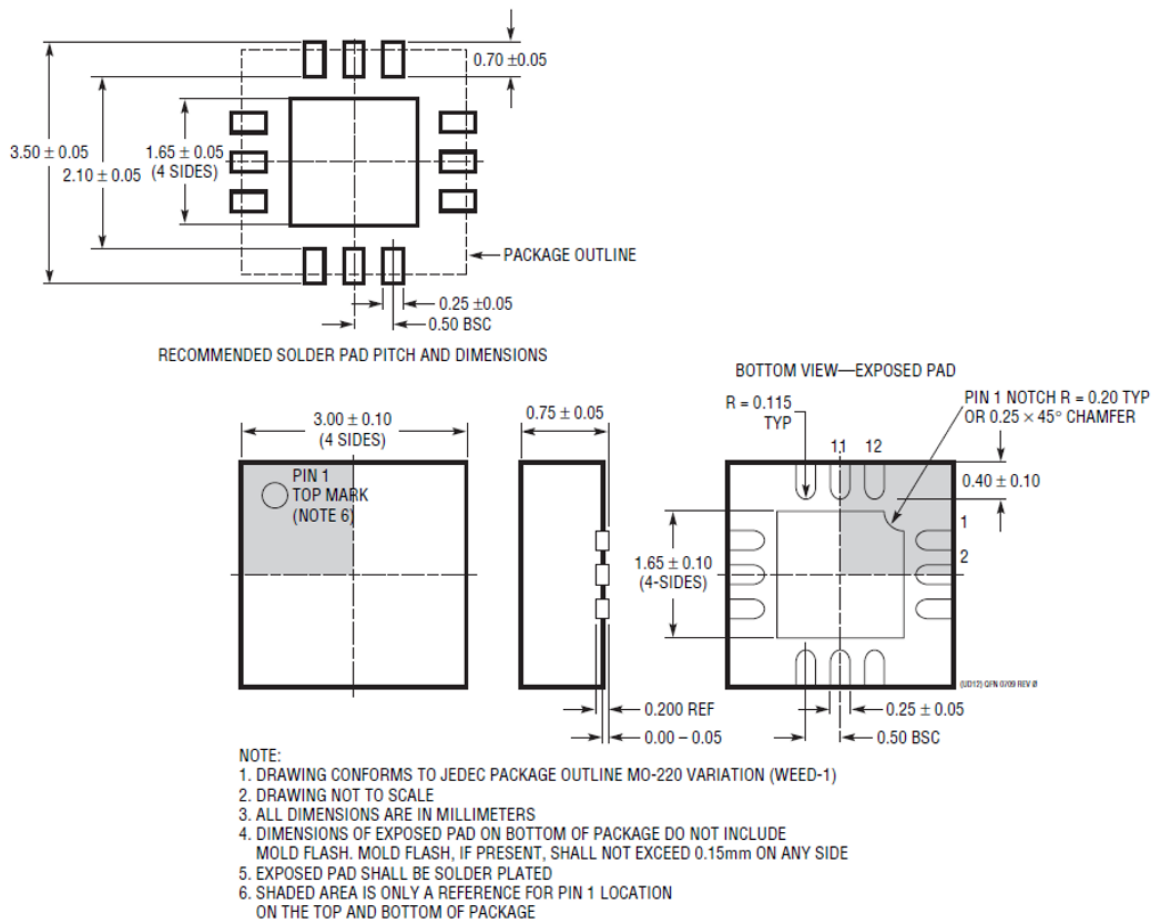
Note: DB/ is a pulled down TCPP01-M12 input: connect to 3,3V if not managed by MCU software T1 reference used in this example is [STL11N3LLH6](#).

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK®** packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

4.1 QFN 3X3-12L package information

Figure 3. QFN 3X3-12L package outline



5 Ordering information

Table 2. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TCPP01-M12	TCPP	μ QFN 3X3 – 12L	20 mg	3000	Tape and reel

Revision history

Table 3. Document revision history

Date	Revision	Changes
01-Mar-2019	1	Initial release.
05-Mar-2019	2	Updated Table 2. Ordering information.

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