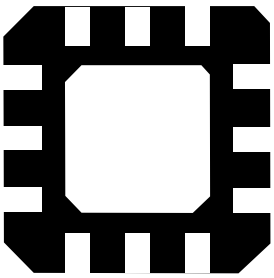
TCPP01-M12

Data brief

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

Product status link
TCPP01-M12

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

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.

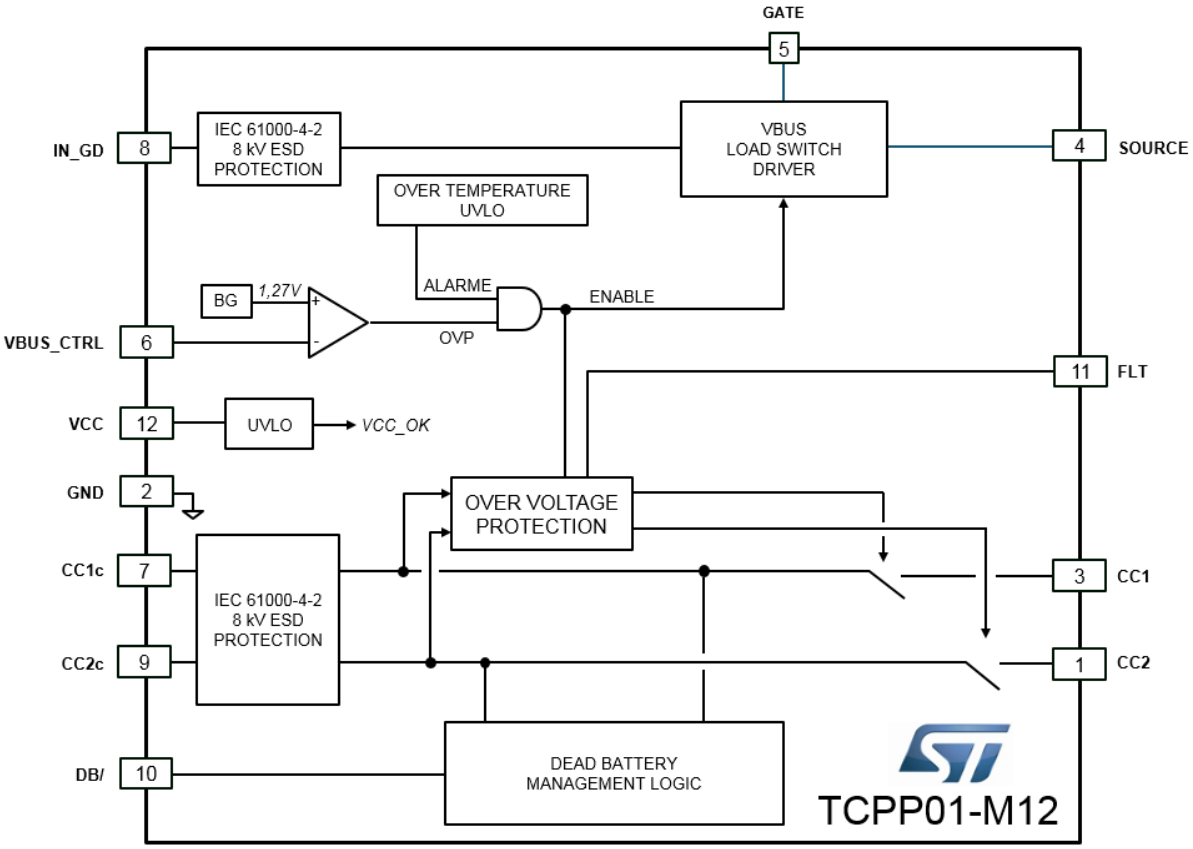
1 Pinout and functions

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

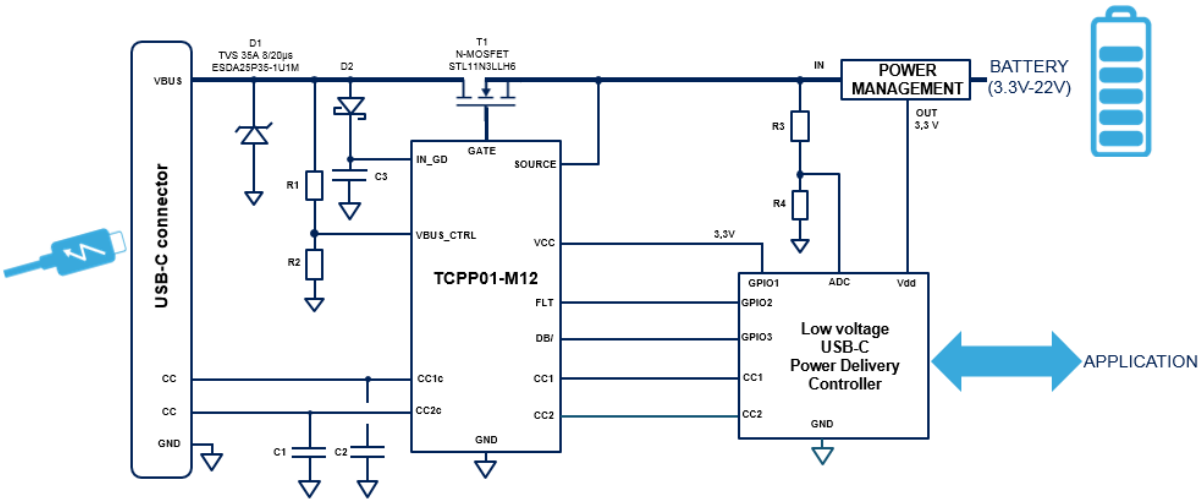
2 TCPP01-M12 simplified internal block diagram

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)**



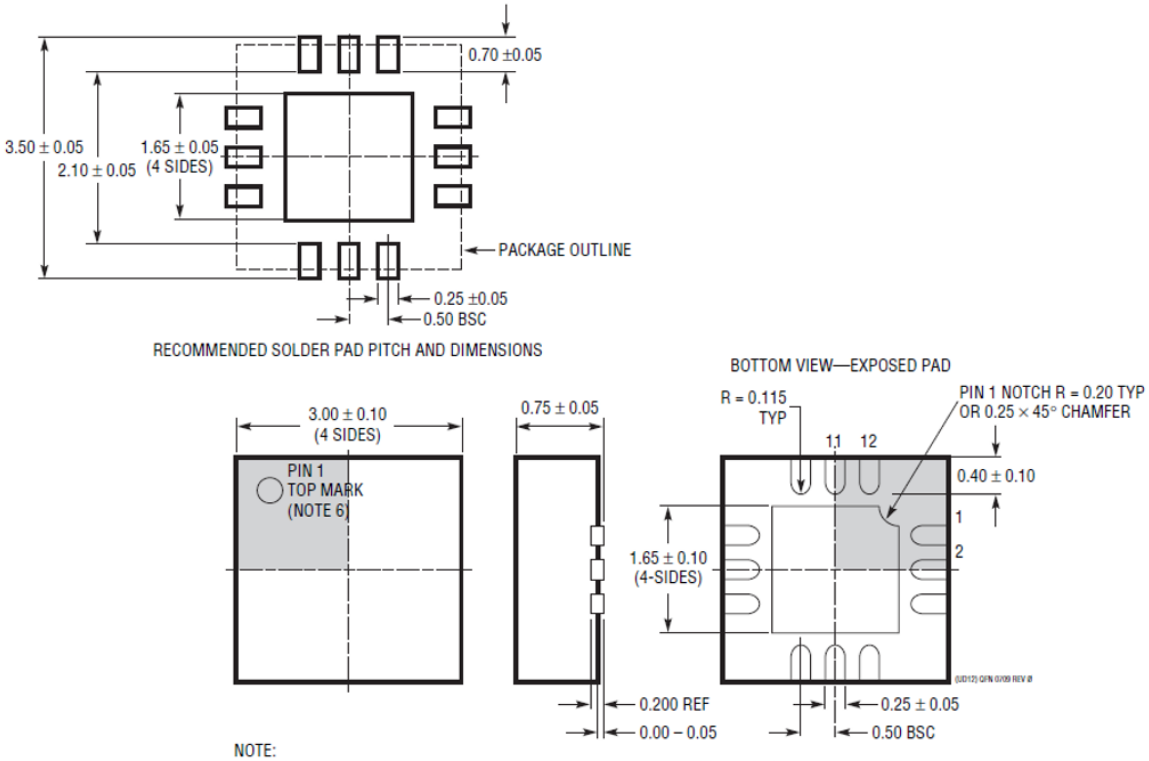
Note: DB/ is a pulled down TCPP01-M12 input: connect to 3,3V if not managed by MCU software T1 reference used in this example is STL11N3LLH6.

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



NOTE:
1. DRAWING CONFORMS TO JEDEC PACKAGE OUTLINE MO-220 VARIATION (WEED-1)
2. DRAWING NOT TO SCALE
3. ALL DIMENSIONS ARE IN MILLIMETERS
4. DIMENSIONS OF EXPOSED PAD ON BOTTOM OF PACKAGE DO NOT INCLUDE MOLD FLASH. MOLD FLASH, IF PRESENT, SHALL NOT EXCEED 0.15mm ON ANY SIDE
5. EXPOSED PAD SHALL BE SOLDER PLATED
6. SHADED AREA IS ONLY A REFERENCE FOR PIN 1 LOCATION ON THE TOP AND BOTTOM OF PACKAGE

5 Ordering information

Table 2. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TCPP01-M12	TCPP	µQFN 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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