



Featuring
anti-moisture
corrosion
prevention

NX20P0477 USB Type-C Faults Protection (OVP)

OVERVIEW

The NX20P0477 single-chip USB Type-C port overvoltage protection solution features an integrated anti-moisture corrosion prevention algorithm. CC1/CC2 pins in the system side are protected from the 28 V short pins located right next to the V_{BUS} pins.

This overvoltage protection solution is 28 V DC tolerant on CON_CC pins in the connector side and quickly disconnects switches if the voltage is above the overvoltage threshold. CC pins in the system side are protected from high voltage.

The NX20P0477 solution converts these USB-standard R_p currents—80 μA , 180 μA or 330 μA —from the CC/PD controller to an ultra-low current source to prevent corrosion. The CC/PD controller may recognize water on CC pins as detected Sink, the corrosion will be accelerated by CC/PD controller provides 5 V through V_{BUS} pins.

FEATURES AND BENEFITS

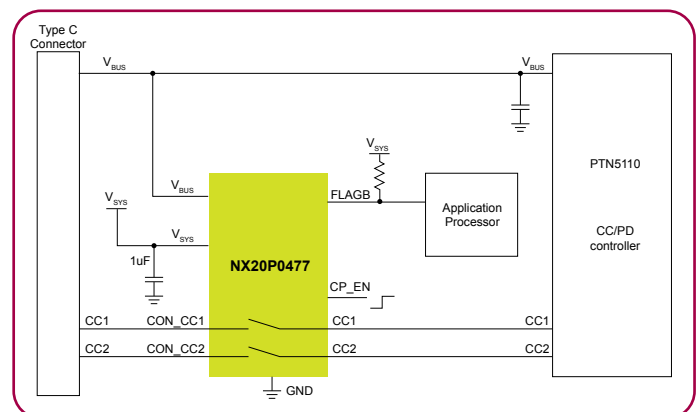
- ▶ USB Type-C CC1 and CC2 short protection to VBUS
 - CON_CC1/CON_CC2: 28 VDC AMR
- ▶ Rd clamp circuit in CON_CC1/CON_CC2 in dead battery condition
- ▶ Smart corrosion prevention scheme with low current source
- ▶ 250 m Ω low R_{DS(on)} switch
- ▶ Robust ESD immunity for CON_CC1/CON_CC2
 - IEC 61000-4-2 contact discharge: 8 KV
 - IEC 61000-4-2 air discharge: 15 KV
- ▶ +/-40 V surge protection on CON_CC1/CON_CC2
- ▶ Low leakage current: 14 μA

- ▶ CC1/CC2 leakage current: < 1 μA
- ▶ Fast OVP turn-off time: 60 ns
- ▶ Specified from -40°C to +85°C
- ▶ WLCSP 9 bumps, 1.49 x 1.49 x 0.555 mm

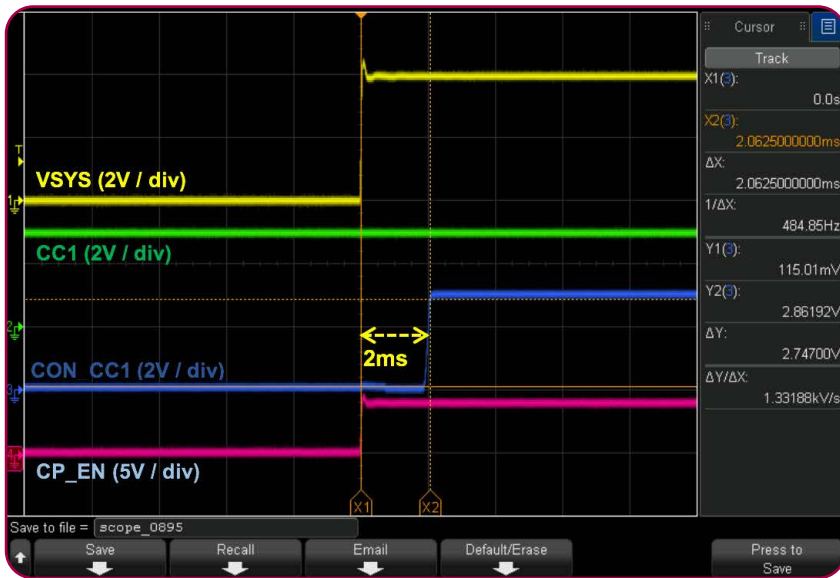
APPLICATIONS

- ▶ Smartphones
- ▶ Tablets
- ▶ Portable devices

USB TYPE-C CC LINE PROTECTION WITH CORROSION PREVENTION

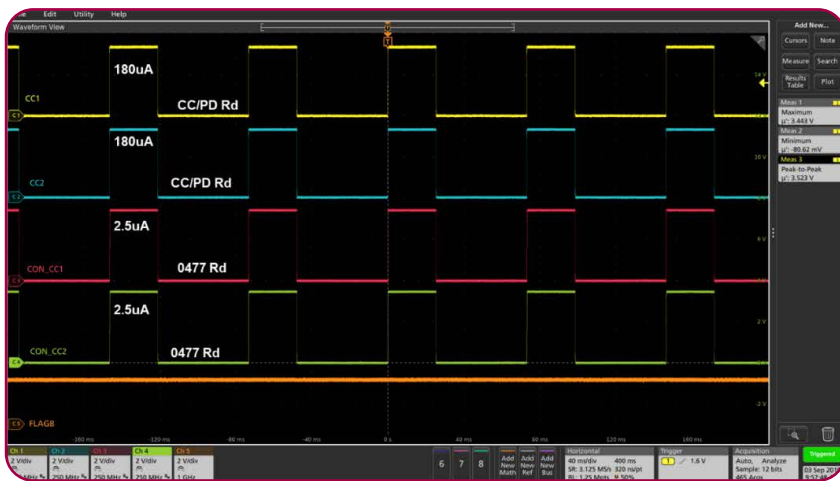


STARTUP



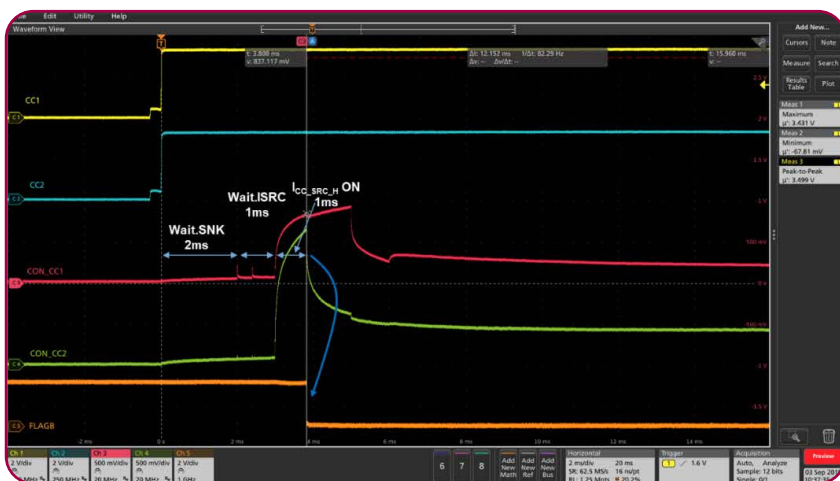
Start up: 2 ms power-up time from valid power source of V_{SYS} . When V_{SYS} is below $VSYSUVLO$, NX20P0477 stays in shutdown mode, where both CC switches are turned off. Once V_{SYS} is above $VSYSUVLO$, then NX20P0477 transitions to active state by turning the CC switch on within power-up time.

STANDBY



Standby: USB-PD standard requires 80 μA or 330 μA as RP to detect the sink device. NX20P0477 converts the USB standard current source from CC/PD controller to build-in a low current source (Typical $ICC_SRC = 2.5 \mu A$) to prevent corrosion from happening.

TAP WATER DETECTION



Tap water detection: When tap water is injected into the Type-C connector, the switch stays off. When water contacts the Type-C connector pin, NX20P0477 detects something has changed and enables the internal current source for $TSRC_WAIT$, which then enables the current source for TCC_DEB . During this time, CON_CC voltage increases and NX20P0477 detects water, so the switch stays off and $FLAGB$ is pulled down.