

The USB Power Delivery Specification enables

more flexible power delivery along with data

over a single cable. Increased and low power

efficiency. The power source must be able to

levels (10-100 W) are delivered with maximum

provide short circuit current limiting to protect

its port from excessive current while at the same

time maintaining the maximum power needed by the peripheral without accidentally tripping.

In addition to providing port protection from

excessive current as mandated by power delivery,

this is a cost-effective solution when compared to a separate overcurrent protection IC.

DC/DC Converter

SRP6540-100N

MF-LSMF300/24X

V<sub>bus</sub>

((1

((2

SSRX1

SSTX1

SSRX2

SSTX2

USB

Connector

USB 1 Data

USB 2 Data

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+Vhos

ofile V<sub>bus</sub> I<sub>bu</sub>

5 V 2 A

12 V 1.5 A

12 V 3 A

5 V 2 A

20 V

5 V 2 A

12 V 5 A

2 A 5 V

2 A 5 V

3 A 3 A 12 V

5 A 20 V

USB PD

Controller

USB

Host

This solution provides this protection.

the maximum functionality of USB by providing

## PortNote SOLUTIONS

# USB **Power Delivery Protection**

## **Solution Products**

**Objective** 

Benefit



MF-LSMF300/24X



CDDFN10-0524P



CDDFN10-3324P



SRP6540-100M





PN-DESIGNKIT-57

## BOURNS

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### Solution

1 Multifuse<sup>®</sup> PPTC Resettable Fuse: MF-LSMF300/24X (Profile 3: 12 V, 3 A; Profile 4: 20 V, 3 A) 1 4-Channel 5.0 V TVS Diode Array: CDDFN10-0524P 3 4-Channel 3.3 V TVS Diode Arrays: CDDFN10-3324P 1 High-Current Power Inductor: SRP6540-100M

## **Compliance\***

UL60950, USB PD 1.0, USB 3.1

## Alternate Recommendations

MF-MSMF150/16X or MF-SMDF150 (Profile 2: 12 V, 1.5 A)

\*The schematic illustrates a possible combination of the solution products to achieve the stated protection goal and does not constitute the complete circuit design. Customers should verify actual device performance in their specific circuits and applications.

- 1. The Multifuse\* products (MF-LSMF300X/24X, MF-MSMF150/16X, MF-SMDF150) help ensure an application's compliance to
  - A. USB 3.1 (section 11.4.1.1.1) in that a polymer PTC may be used for overcurrent protection of the DC bus; and
  - B. UL60950-1 Section 2.5 (Limited Power Source Table 2B) in that any short circuit current shall be limited to less than 8 A within 5 seconds.
- 2. The inductor model SRP6540-100M is part of the DC DC converter which provides the power levels (profiles) as described in the USB PD 1.0 Standard.
- 3. The TVS diode arrays (CDDFN10-0524P and CDDFN10-3324P) provide ESD and Surge Protection to the Cable Connect Lines (CC1, CC2) and Data Lines of the USB Port. Customers should evaluate the effects of the capacitance of the TVS diode arrays on the quality of USB 3.1 data flow in their specific circuits and applications.
- 4. Profiles 1 and 5 as described are shown for informational purposes only. This PortNote\* Solution is applicable to profiles 2, 3 and 4.

Bourns<sup>®</sup> PortNote<sup>®</sup> solutions provide protection recommendations for typical port threats.

For more information, go to:

#### www.bourns.com

or email: protection@bourns.com

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