

USB Power Delivery ENGINEERING CHANGE NOTICE

Title: OT mitigation clarification

**Applied to: USB Power Delivery Specification Revision 3.1
Version 1.3**

Brief description of the functional changes proposed:
This ECR proposed adding some recommendation text related to a Source managing to avoid over temperature situations.

Benefits as a result of the proposed changes:
Spec already requires Sources to address over temperature situations although the limits and methods for doing so are not defined. This ECR simply adds text to recognize that the methods available to the Source include reducing the available power for Sinks as a means to avoid reaching a critical OT situation.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
Changes no requirements.

An analysis of the hardware implications:
Changes no requirements but some designs might increase in complexity if wanting to be more proactive about managing thermal conditions.

An analysis of the software implications:
No impact.

An analysis of the compliance testing implications:
In theory, compliance testing has already got to tolerate Source behaviors changing due to thermal limitations. Most likely though, compliance testing doesn't do anything specifically for this but rather testing is done in an environment where thermal overload isn't likely, e.g., they test under normal ambient room temperature conditions.

USB Power Delivery ENGINEERING CHANGE REQUEST FORM

(d). Section 7.1.7.2 “Over Temperature Protection”, Page 253

New Text:

Sources **Shall** implement over temperature protection to prevent damage from temperature that exceeds the thermal capability of the Source. The definition of thermal capability and the monitoring locations used to trigger the over temperature protection are left to the discretion of the Source implementation.

Sources **Should** attempt to send a **Hard Reset** message when over temperature protection engages followed by an **Alert** Message indicating an OTP event once an Explicit Contract has been established. The over temperature protection response **May** engage at either the port or system level. Systems or ports that have engaged over temperature protection **Should** attempt to resume default operation and **May** latch off to protect the port or system.

The Source **Shall** renegotiate with the Sink (or Sinks) after choosing to resume default operation. The decision of how to renegotiate after an over temperature event is left to the discretion of the Source implementation.

The Source **Shall** prevent continual system or port cycling if over temperature protection continues to engage after initially resuming either default operation or renegotiation. Latching off the port or system is an acceptable response to recurring over temperature.

During the over temperature response and subsequent system or port shutdown, all affected Source ports operating with V_{BUS} greater than **vSafe5V** **Shall** discharge V_{BUS} to **vSafe5V** by the time **tSafe5V** and **vSafe0V** by the time **tSafe0V**.

To Text:

Sources **Shall** implement over temperature protection **(OTP)** to prevent damage from temperature that exceeds the thermal capability of the Source. The definition of thermal capability and the monitoring locations used to trigger the **OTP** are left to the discretion of the Source implementation.

In order to avoid reaching an OTP event, Sources **May** proactively reduce the available power being offered to the Sink, even though these offers might be lower than the Source would be expected to offer during normal thermal operating conditions. Prior to reducing power, the Source **Should** generate **Alert** Message indicating an Operating Condition Change and set the Temperature Status bit in the SOP **Status** Message to Warning (10b).

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