

USB Type-C ENGINEERING CHANGE NOTICE

Title: Ra Requirements

Applied to: USB Type-C Specification Release 2.4, Oct 2024

Brief description of the functional changes proposed:
<p>Captive cable systems may implement the eMarker functionality outside the cable itself. This ECR aims to clarify that in such cases presenting Ra at the plug end of the cable is still required even if the eMarker function is implemented in a self-powered device with a captive cable that does not require VCONN.</p> <p>Note: this is a change in direction from the initial version of this ECR where the proposal was to clarify that Ra was optional in this case but after WG review and considering how many Sources behave today, the WG decided to instead require Ra.</p>

Benefits as a result of the proposed changes:
Reduce complexity of the cable assembly in applicable captive cable systems.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
None, since the change doesn't invalidate existing Source designs that are compliant to existing spec.

An analysis of the hardware implications:
This simplifies the captive cable implementation by eliminating the need for an eMarker in the plug and not requiring a VCONN wire through the cable.

An analysis of the software implications:
None

An analysis of the compliance testing implications:
Compliance tests that check for Ra may have to be updated.

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Actual Change Requested

(a). Section 4.9

To Text:

[Add the following to the end of Section 4.9 but prior to the last paragraph.]

Figure 4-X1 illustrates an electronically marked direct connect device with a captive cable where the SOP' is powered by VCONN.

Figure 4-X1 Electronically Marked Direct Connect Device with a Captive Cable SOP' powered by VCONN

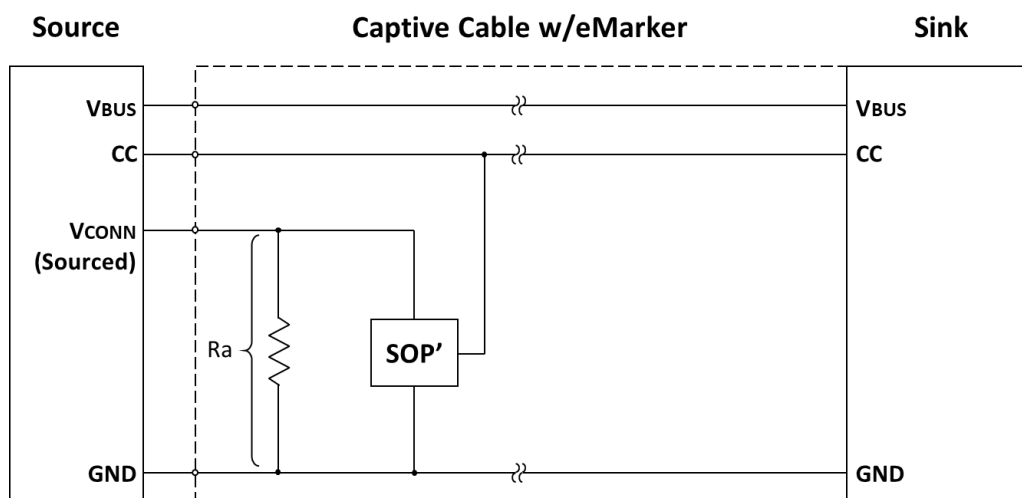
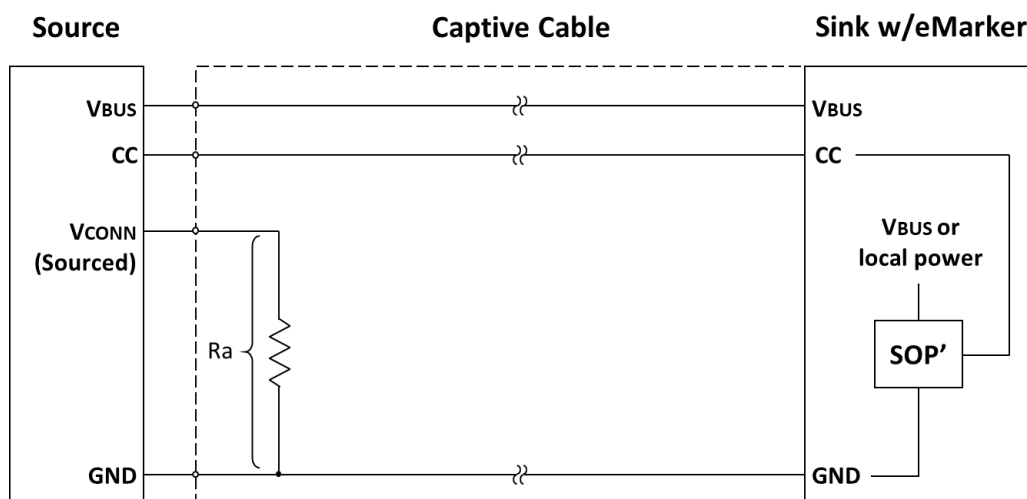


Figure 4-X2 illustrates an electronically marked direct connect device with a captive cable where the SOP' is not powered by VCONN. While the SOP' doesn't rely on VCONN for power, ***Ra shall*** still be implemented but is not required to be weakened or adhere to the Ra Management State Machine defined in Section 4.5.2.5. Note: Even if the SOP' is integrated into the SOP, the timing requirements in Section 4.5.2.4 still apply.

Figure 4-X2 Electronically Marked Direct Connect Device with a Captive Cable with SOP' Powered by VBUS or local power



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Figure 4-X3 illustrates an electronically marked direct connect device with no cable (e.g., thumb drive) where the SOP' is powered by VCONN.

Figure 4-X3 Electronically Marked Direct Connect Device with No Cable with SOP' Powered by VCONN

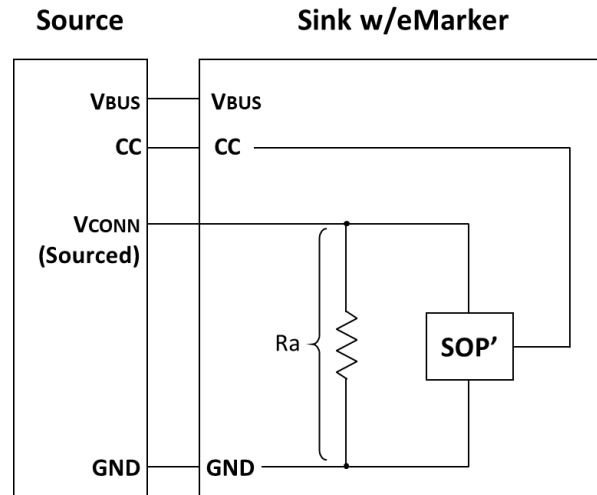
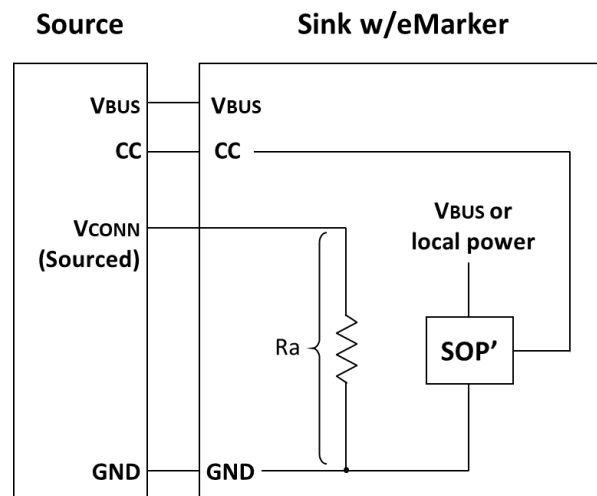


Figure 4-X4 illustrates an electronically marked thumb drive where the SOP' is not powered by VCONN. While the SOP' doesn't rely on VCONN for power, **Ra shall** still be implemented but is not required to be weakened or adhere to the Ra Management State Machine defined in Section 4.5.2.5. Note: Even if the SOP' is integrated into the SOP, the timing requirements in Section 4.5.2.4 still apply.

Figure 4-X4 Electronically Marked Direct Connect Device with No Cable with SOP' Powered by VBUS or local power



(b). Section 4.4.3, following Table 4-6

To Text:

[Edit existing text as indicated.]

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Any cable (or direct connect device) that uses VCONN to power circuitry **shall** implement cable Ra management as defined in Section 4.5.2.5. The cable **shall** remove or weaken **Ra** according to the state diagram behavior in Section 4.5.2.5. The cable **shall** reapply **Ra** according to the state diagram behavior in Section 4.5.2.5. The cable **shall** discharge VCONN to below **vVCONNDischarge** on a cable disconnect. The cable **shall** control **Ra** at each of its ends independently based on the VCONN on that end.

(c). Section 4.9

To Text:

[Edit existing text as indicated.]

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Passive cables that include an eMarker **shall** follow the Cable State Machine defined in Section 4.5.2.4 and Figure 4-20.

Any cable (or direct connect device) that uses VCONN to power circuitry is required to implement cable Ra management as defined in Section 4.5.2.5.

Once VCONN is available, all electronically marked cables **shall** use it as the only power source. If VCONN is applied after VBUS then until VCONN is available, the cable **may** remain unpowered or **may** draw power from VBUS. Within **tVCONNSwitch**, the cable **shall** switch from VBUS to VCONN. Cables that include an eMarker **shall** meet the maximum power defined in Table 4-6. The only exception is an Optically Isolated Active Cable (see Section 6.3), which can draw from both VCONN and VBUS.

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