

One Connector to Rule Them All, or is it?



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The latest and the greatest, the new USB Type-C™ connector is high powered (up to 100W), high speed (up to USB 3.1 data rates), and – what every clumsy person like me has been waiting for – it has flip-ability. A new 24-pin connector even has pins to make it compatible with legacy BC1.2 charging. It sounds so great, so there must be a catch, right?

The personal electronics industry has quickly adopted USB Type-C connectors, from USB Power Delivery-capable devices, which uses a standard 15W USB Type-C connector. The automotive industry has already starting adopting this versatile new connector in their next-generation cars.

But what happens when there is only a USB Type-C port in a car and no Type-A port? The USB Type-C connector is supposed to be backwards-compatible, so as long as you use an adapter, you should be able to charge your device. Smart car manufacturers will have designed their ports with that capability. Unlike traditional Type-A or Type-B ports, which physically determine if the hardware is a host or a device, a USB Type-C port does not have a physical distinction to establish such a relationship. Instead, USB Type-C uses configuration channel (CC) pins CC1 and CC2 to negotiate the initial power and data relationships before normal USB enumeration occurs.

Since Type-A ports are already the host port, the D+/D- lines take care of the power and data to begin charging. So how do you resolve the discrepancy between the new and the old? The [TI Designs CISPR 25 Class 5 USB Type-C Port Reference Design with USB 3.0 Data Support](#) in [Figure 1](#) and [Figure 2](#) can solve that problem.

The reference design connects TI's [TPS25810](#) USB Type-C controller between the 5V power source and the Type-C connector V_{BUS} , while the [TPS254900](#) legacy controller's OUT pins connect to the [TPS25810](#) power supply to control the V_{BUS} discharge. With this setup, the TPS25810 takes care of the negotiation on CC lines when a Type-C to Type-C device is plugged in ([Figure 3a](#)), while the TPS254900 handles the negotiation for legacy devices when a Type-C to Type A device is plugged in ([Figure 3b](#)).



Figure 1. TIDA-00987 Board

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