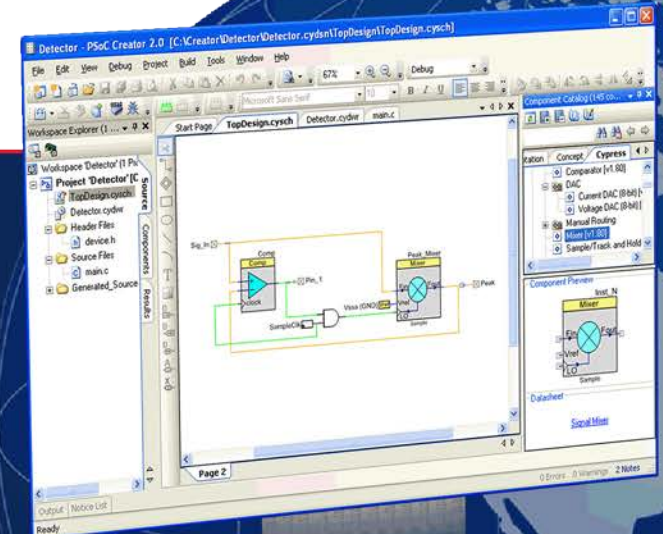




Quick Presentation: EZ-PD CCG4: Two-Port Type-C Controller With Power Delivery

CCG4 = Type-C Controller Gen 4
Type-C = Reversible Slim USB Connector

Design Your Desktop and Notebook PCs With Two
Type-C Ports Using CCG4



USB Type-C: Connector of the Future

USB Type-A and Type-B are the current USB-IF standards, but they have limitations

They use large connectors that prevent slim industrial designs (plug height: A = 4.5 mm; B = 10.4 mm)

They require a fixed plug orientation and a fixed cable direction

They carry only USB signals

Power delivery implementation on them is complicated, expensive and limited to 7.5 W

USB Type-C is the new USB-IF standard that solves these problems and enables:

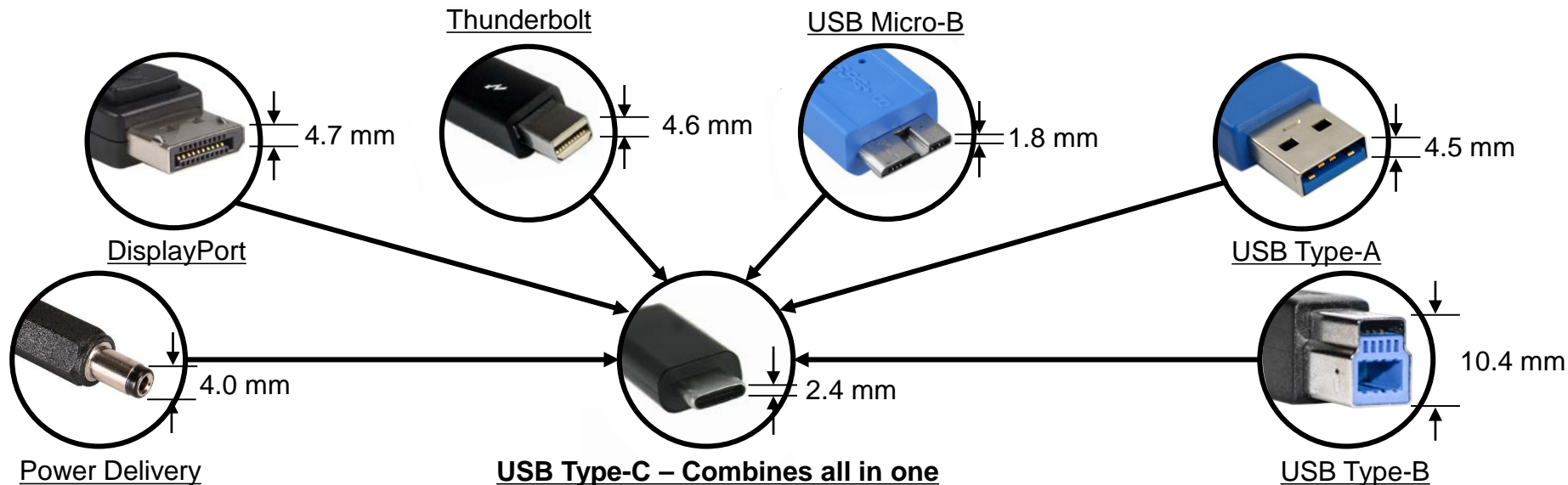
Slim industrial design with a 2.4-mm plug height

Reversible plug orientation and cable direction

Transport of both USB along with either DisplayPort or Thunderbolt signals on the same connector

Easy implementation of low-cost power delivery up to 100 W

USB Type-C is the new, slimmer, all-in-one, 100-W connector



USB Type-C Port Controllers

A \$436M Market by 2020



USB Type-C port controllers are projected to grow from \$15M in 2015 to \$436M in 2020 at a 96% CAGR¹

The USB Type-C port is universal: it is slimmer, reversible, handles multiple protocols and supports up to 100-W PD

Every PD-capable, multiple-protocol USB Type-C port requires a dedicated controller

This fast-growing market requires a USB-IF certified solution that:

Marks cables electronically with a controller IC embedded in the cable plug to report the cable's characteristics (e.g., current rating)

Multiplexes USB signals with Thunderbolt or DisplayPort signals on the same connector

Supports all Power Delivery profiles² up to 100 W, for notebooks, tablets, monitors, USB cables and power adapters

Authenticates approved USB Type-C cables, devices and accessories

Cypress has been “Making USB Universal®” since 1996

Cypress has shipped over 1.4 billion USB controllers with industry-leading quality

Cypress has been a leading supplier in every generation of USB technology: USB 1.1, USB 2.0 and USB 3.0

Accelerate your conversion to USB Type-C and PD with Cypress's CCGx Type-C port controllers

Cypress CCGx Design Wins



Eliteone All-In-One PC
By HP



Elitebook Notebook PC
By HP



Elitedesk Desktop PC
By HP



USB Type-C Cable
By Belkin

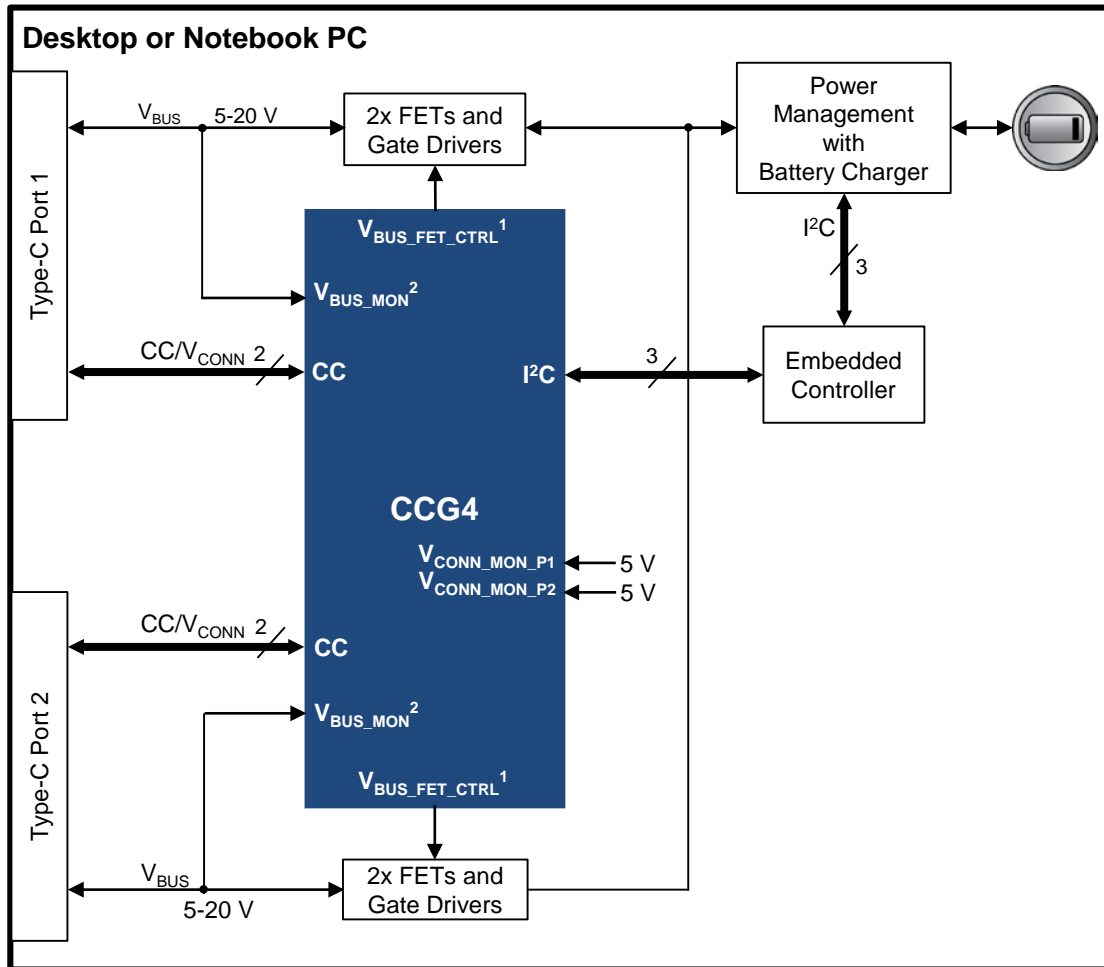


Type-C to HDMI Dongle
By Lenovo

¹ Gartner 2015 and Cypress estimates

² A USB-IF specified combination of voltage and current ratings that define the power provided (e.g., 20 V and 5 A: 100-W power provided)

CCG4 Reduces BOM



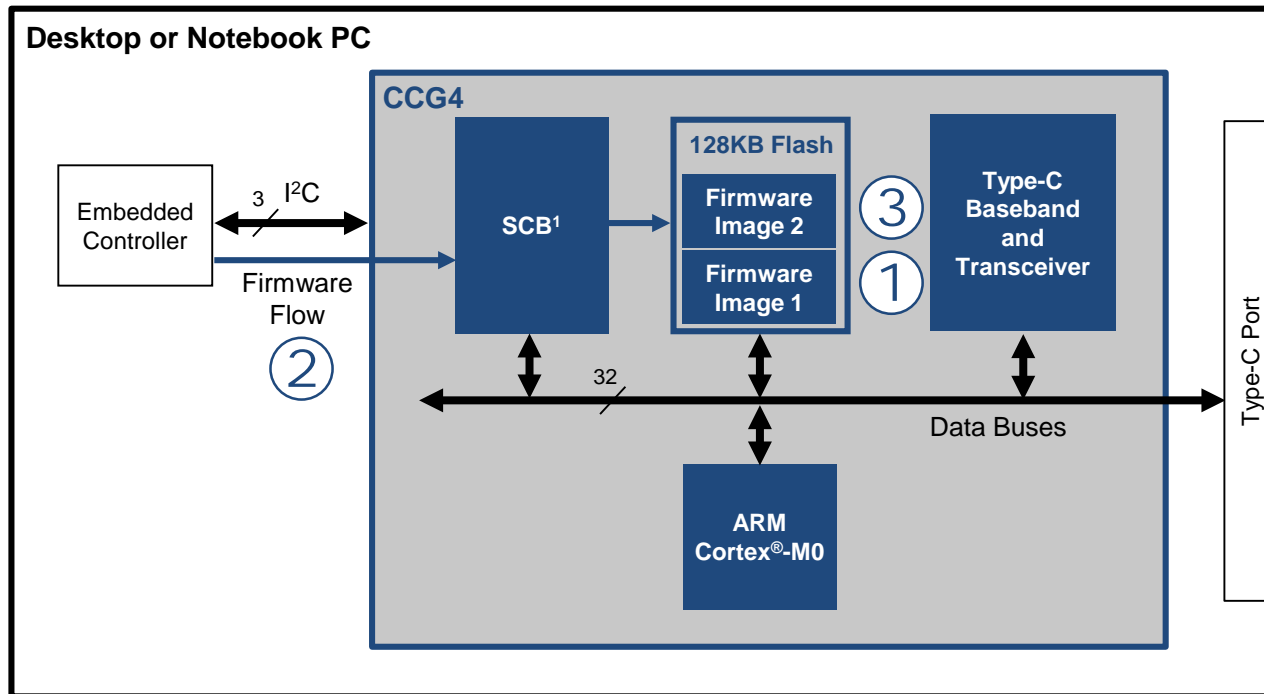
CCG4 reduces BOM by integrating:

- Two Type-C and Power Delivery controllers
- Two V_{CONN} FETs
- 15-kV ESD protection circuitry on CC lines
- Overvoltage protection
- Overcurrent protection

¹ $V_{BUS_FET_CTRL}$ = Gate driver output to control external FET

² V_{BUS_MON} = Input to detect undervoltage and overvoltage conditions

Fail-Safe Bootup With CCG4



1. Firmware Image 1 is currently being used
2. New firmware (Firmware Image 2) is updated—via I²C—while Firmware Image 1 is in use
3. If the update is successful, CCG4 will boot from Firmware Image 2, otherwise it will boot from Firmware Image 1

¹ Serial communication block (I²C or UART or SPI)

CCG4 Solution Example: Type-C Desktop PC With Power Delivery



Cypress Solution Value

Design Challenges

- Reduce complexity of multiple Type-C port designs
- Support firmware update and reliable bootup
- Keep pace with USB-IF standards changes

CCG4 Solution

- Provides two Type-C ports with Power Delivery¹
- Contains dual firmware images for a Fail-Safe Bootup²
- Supports field upgrades with fully compliant firmware

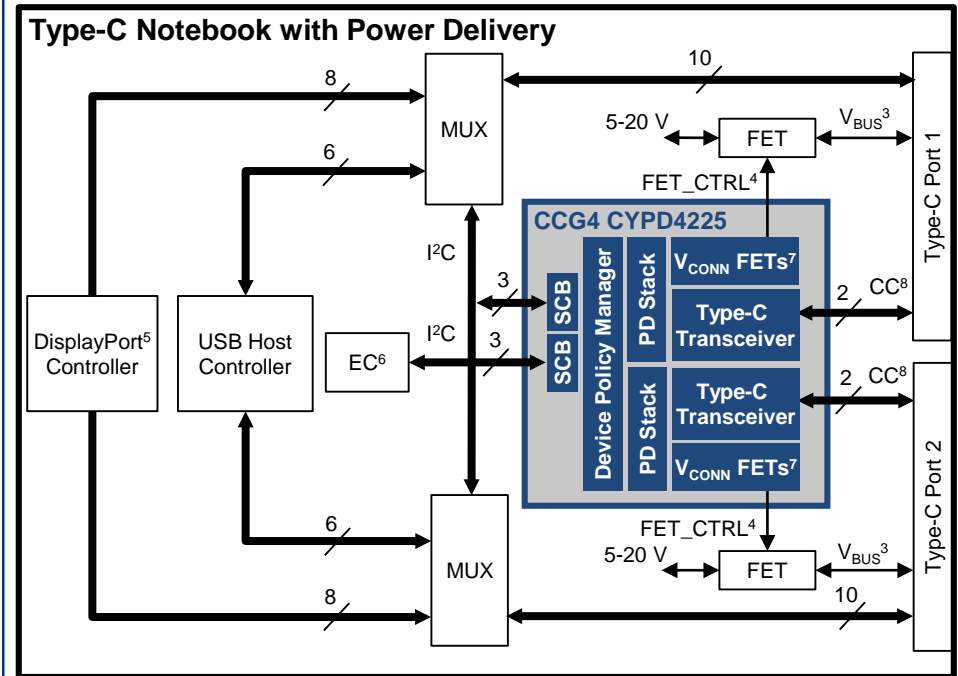
Suggested Collateral

- Webpage: [CCG4 Webpage](#)
- Datasheet: [CCG4 Datasheet](#)
- Demo Kit: [CCG4 Development Kit](#)
- Video: [CCG4 Demo Video](#)

Hot To Get Started

Get a [CCG4 Development Kit](#)

Block Diagram



Type-C Desktop with Power Delivery¹

CCG4 supports both Power Delivery¹ provider and consumer roles, allowing a desktop to provide power to or consume power from its Type-C port

¹ A new USB standard that increases power delivery over V_{BUS} from 7.5 W to 100 W

² A mechanism to keep the Type-C port controller functional in an event of a firmware update failure

³ The power wire of the USB bus

⁴ Signal to control V_{BUS} FET

⁵ A digital display interface standard developed by the Video Electronics Standards Association (VESA)

⁶ Embedded controller is a keyboard controller on a PC motherboard, often used as a general purpose MCU

⁷ A field-effect transistor that provides power to a Type-C controller inside an EMCA

⁸ Configuration Channel