Cypress Roadmap: USB Controllers

Q2 2017

USB Portfolio

	Device	Hub	Bridge	Host	Storage	Type-C
USB 3.1	**CYUSB301x** **FX3** 32-Bit Bus to USB 3.1 Gen 1 ARM9, 512KB RAM	**CYUSB33xx** **HX3** USB 3.1 Gen 1, Shared Link™[1] BC 1.2[2], Ghost Charge™[3]	**CYUSB306x** **CX3** CSI-2[4] to USB 3.1 Gen 1 4 CSI-2[4] Lanes, 1 Gbps/Lane		**CYUSB303x** **FX3S** 16-Bit Bus to USB 3.1 Gen 1 RAID[5], Dual SDXC[6]/eMMC[7]	**CYPD1xxx** **CCG1** USB Type-C Port Controller 1 PD Port, 5 Profiles, 100 W
	FX3PD USB 3.1 Gen 2 Type-C Peripheral Controller with PD **Contact Sales**	NEW **CYUSB333x** Q217 **HX3C** 4 Ports: 1 Type-C, 3 Type-A USB PD, Billboard, BC1.2[2]	**CYUSB361x** **GX3** USB 3.1 Gen 1 to GigE Energy Efficient Ethernet		**CYUSB302x** **SD3** USB 3.1 Gen 1 SD Reader SDXC[6]/eMMC[7], RAID[5]	**CYPD2xxx** **CCG2** USB Type-C Cable Controller 1 PD Port, Termination, ESD
		HX3PD USB 3.1 Gen 2 Type-C Hub with PD **Contact Sales**	**DX3** USB 3.1 Gen 1 to DSI[8] TX **Contact Sales**			**CYPD3xxx** **CCG3** USB Type-C Port Controller 20-V, Crypto, Billboard
USB 2.0	**CY7C6801x/53** **FX2LP** 16-Bit Bus to USB 2.0 8051, 16KB RAM	**CY7C656x4** **HX2VL** 4 Ports 4 Transaction Translators		**CYWB016xBB** **Bay™** HS USB OTG Dual SDXC[6]/eMMC[7]	**CYWB0x2xABS** **Arroyo™, Astoria™** 16-Bit Bus to USB 2.0 8051, Dual SD/eMMC[7]	**CYPD4xxx** **CCG4/CCG4M** USB Type-C Port Controller 2 PD Ports,128KB Flash, Mux
	CY7C68003 **TX2UL** ULPI[9] PHY 13, 19.2, 24, 26 MHz	**CY7C656x1** **HX2LP** 4 Ports, Industrial Grade 1 Transaction Translator			**CY7C6803x** **NX2LP** NAND Flash to USB 2.0 8051, 15KB RAM	NEW Q217 **CCG3PA** USB Type-C Port Controller **Contact Sales**
	CYUSB201x **FX2G2** 32-Bit Bus to USB 2.0 ARM9 512KB RAM				**CY7C683xx** **AT2LP** Parallel ATA to USB 2.0 8051	NEW Q217 **CCG5** USB Type-C Port Controller **Contact Sales**
USB 1.1	**CY7C638xx** **enCoRe™ II** M8C MCU, 20 GPIOs SPI, 8KB Flash		**CY7C6521x** **USB-Serial** UART/SPI/I²C to USB 2 Channels, CapSense®	**SL811HS** FS USB Host/Device 256Byte RAM		**Type-C products apply to any USB speed**
	CY7C64215 **enCoRe III** M8C MCU, 50 GPIOs, ADC I²C/SPI, 16KB Flash		**CY7C65213** **USB-to-UART (Gen 2)** 3 Mbps, 8 GPIOs	**CY7C67300** **EZ-Host** 4 Ports, FS USB OTG 32 GPIOs		
	CY7C643xx **enCoRe V** M8C MCU, 36 GPIOs, ADC I²C/SPI, 32KB Flash		**CY7C65210/7** **USB Billboard** ARM Cortex M0 1 or 2 UART/SPI/I²C channels	**CY7C67200** **EZ-OTG™** 2 Ports, FS USB OTG 25 GPIOs		

[1] Simultaneous USB 2.0 and SuperSpeed traffic on the same port
[2] Battery Charging specification v1.2
[3] Enables USB charging without host connection
[4] Camera Serial Interface v2.0
[5] Redundant array of independent disks
[6] SD extended capacity
[7] Embedded Multimedia Card
[8] Display Serial Interface
[9] UTMI low-pin interface

Status	Concept	Development	Sampling	Production
Availability			QQYY	QQYY

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EZ-PD CCG2

USB Type-C and PD Port Controller

Applications

USB Type-C Electronically Marked Cabled Assembly (EMCA) and powered accessories

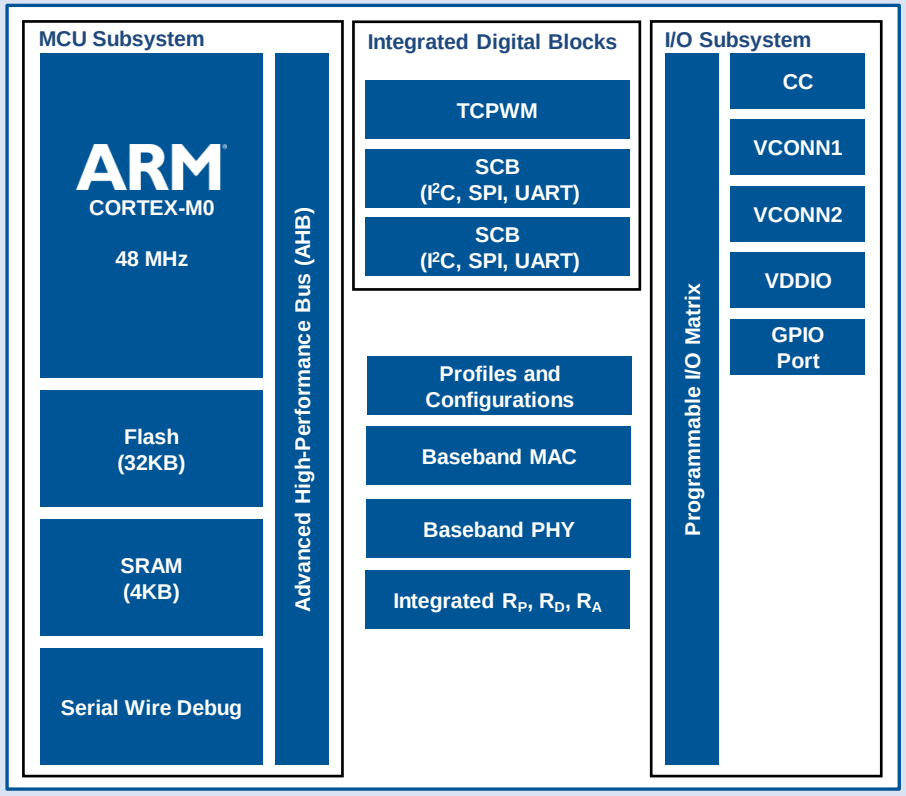
Features

- **32-bit MCU Subsystem**
  - 48-MHz ARM® Cortex® -M0 CPU with 32KB Flash and 4KB SRAM
- **Integrated Digital Blocks**
  - Integrated timer/counter/pulse-width modulators (TCPWMs)
  - Two SCBs[1] configurable to I²C, SPI or UART modes
- **Type-C Support**
  - Integrated transceiver, supporting one Type-C port
  - Integrated termination resistors (R_P, R_D, R_A)[2]
- **Power Delivery (PD) Support**
  - Standard power profiles
- **Low-Power Operation**
  - Two independent V_{CONN} rails with integrated isolation
  - Independent supply voltage pin for GPIO
  - 2.7–5.5-V operation; Sleep: 2.0 mA; Deep Sleep: 2.5 µA
- **System-Level ESD on CC and VDD Pins**
  - ±8-kV Contact, ±15-kV Air Gap IEC61000-4-2 Level 4C
- **Packages**
  - 20-ball CSP (3.3 mm^2) with 0.4-mm ball pitch, 14-pin DFN (2.5 x 3.5 mm) with 0.6-mm pin pitch and 24-pin QFN (4 mm^2) with 0.55-mm pin pitch

Collateral

Datasheet: CCG2 Datasheet
Reference Design Kit: CCG2 RDK
Evaluation Kit: CCG3 EVK

CCG2: USB Type-C Port Controller With PD



Availability

Production: Now

[1] Serial communication block configurable as UART, SPI or I²C
[2] Termination resistors: R_P read as a DFP, R_D as a UFP, R_A as an EMCA

EZ-PD CCG3

USB Type-C and PD Port Controller

Applications

Accessories and power adapters

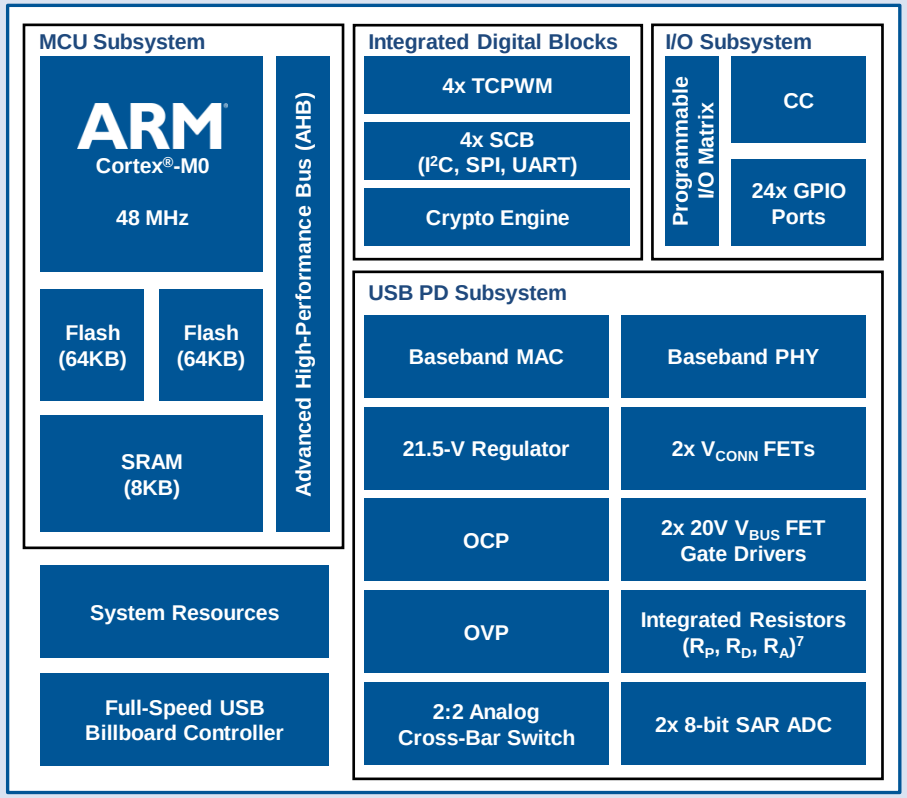
Features

- **One Type-C Port with Integrated Transceiver**
  - Alternate Modes[1], Crypto Engine[2] for USB Authentication[3]
- **Power Delivery (PD) Support for Standard Power Profiles**
- **Integrated Digital Blocks for V_{BUS} Power and MUX Interface**
  - 4 timers/counters/pulse-width modulators (TCPWM), 24x GPIOs
  - 4 serial communication blocks (SCBs) configurable as master/slave I^2C, SPI or UART
  - USB Billboard Controller[4] with Billboard Device Class[5] support
- **Integrated Analog Blocks for Overvoltage (OVP) and Overcurrent Protection (OCP)**
  - 21.5-V OVP and OCP; 2:2 cross-bar switch
- **32-bit ARM® Cortex®-M0 CPU with MCU Subsystem**
  - 2x64KB Flash for fail-safe updates over CC, I^2C or USB interfaces
- **Low-Power Operation**
  - 2x V_{BUS} Gate Drivers[6], for consumer and provider power paths
  - 2x high-voltage (5–21.5 V, 25 V, maximum) V_{BUS} voltage inputs
  - Sleep: 2.0 mA; Deep Sleep: 2.5 µA with wake-on-I^2C or wake-on-CC
- **System-Level ESD on CC/V_{CONN}, V_{BUS}, and SBU Pins**
  - ±8-kV Contact, ±15-kV Air Gap IEC61000-4-2 Level 4C
- **Packages**
  - 42-ball (8.38 mm^2) CSP, 40-pin (36 mm^2) QFN and 32-pin (25 mm^2) QFN

Collateral

Datasheet: CCG3 Datasheet

CCG3: USB Type-C Port Controller



Availability

Production: Now

[1] Mode of operation in which the data lines are repurposed to transmit non-USB data
[2] The encryption hardware and software required to implement USB Authentication
[3] A USB-IF specification that defines the authentication protocol for Type-C accessories
[4] A USB Device controller that informs the USB Host of the supported Alternate Modes
[5] A specification that defines the method for a USB Device to communicate the supported Alternate Modes
[6] Circuits to control the gates of external power Field-Effect Transistors (FETs) on V_{BUS} (5-20 V)
[7] Termination resistors: R_P read as a DFP, R_D as a UFP, R_A as an EMCA

EZ-PD CCG4/4M

Dual-Port USB Type-C and PD Port Controller

Applications

Notebooks, tablets, monitors, docking stations

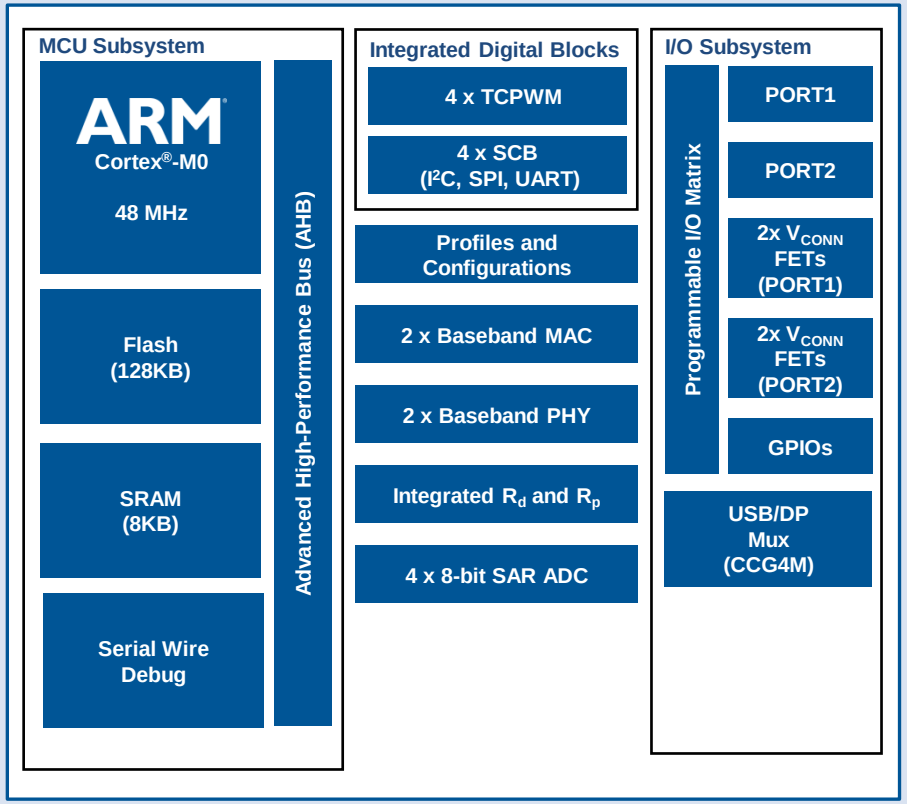
Features

- **Integrated USB Type-C Transceivers Support Two Type-C Ports**
  - Integrated 2x 1-W V_{CONN} FETs and 2x FET control signals, per port programmable R_P[1] and removable R_P, and R_D[2] terminations
  - Supports dead battery mode operation
  - Integrated SuperSpeed USB/DisplayPort (DP) Mux (CCG4M)
- **Increased Flash Enables Fail-Safe Bootup**
  - Integrates 128KB Flash to store dual FW images for fail-safe boot
- **Integrated Digital Blocks for Inter-Chip Communications**
  - Four serial communication blocks (SCBs) master or slave configurable to I²C, SPI or UART
  - SCBs interconnect CCG4 with embedded controller, two alternate muxes and Thunderbolt controller (optional)
- **Integrated Blocks for Overvoltage (OVP) and Overcurrent Protection (OCP)**
  - Four 8-bit SAR ADCs configurable for OVP and OCP
- **Low-Power Operation**
  - 2.7–V to 5.5-V operation and independent supply voltage for GPIO; Sleep: 2.0 mA; Deep Sleep: 2.5 µA with wake-on-I²C or wake-on-configuration channel (CC)
- **System-Level ESD on CC Pins**
  - ±8-kV Contact, ±15-kV Air Gap IEC61000-4-2 Level 4C
- **32-bit ARM® Cortex®-M0 CPU with MCU Subsystem**
  - 128KB Flash, upgradable over CC lines or I²C interface
- **Packages**
  - 40-pin QFN, 96-ball BGA (CCG4M)

Collateral

Datasheet: CCG4 Datasheet

CCG4/4M: USB Type-C Port Controller



Availability

Production: Now

[1] Termination resistor read as a DFP
[2] Termination resistor read as a UFP

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EZ-USB FX3

USB 3.1 Gen 1 Peripheral Controller

Applications

Industrial cameras, medical and machine vision cameras, 3-D and 1080p full HD and 4K Ultra HD (UHD) cameras. document and fingerprint scanners, videoconferencing and data acquisition systems, video capture cards and HDMI converters, protocol and logic analyzers, USB test tools and software-designed radios (SDRs)

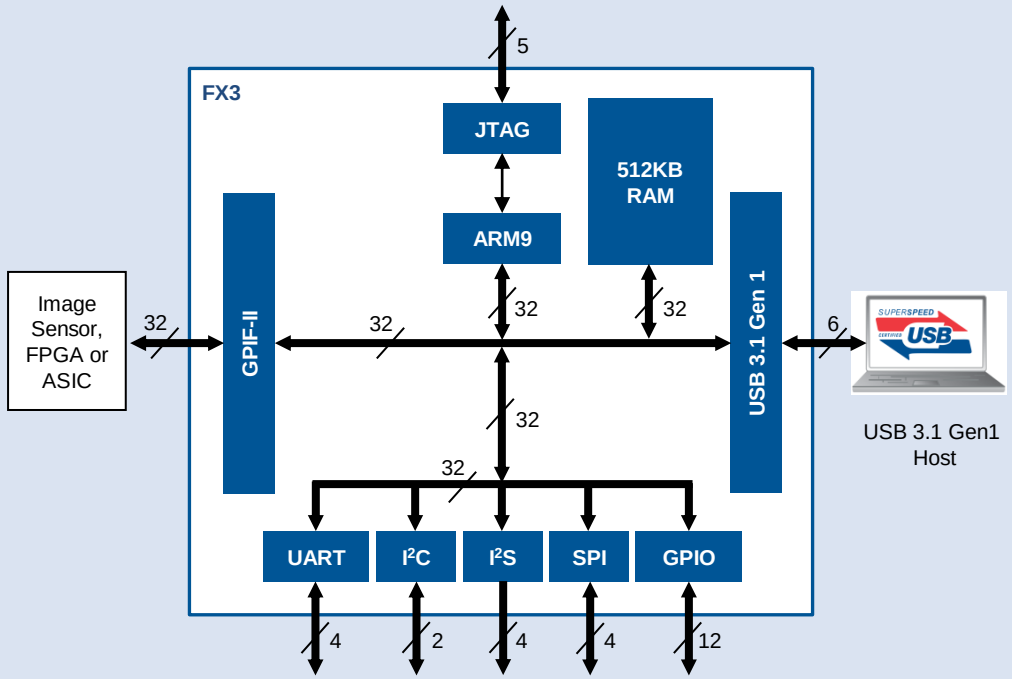
Features

- **USB 3.1 Gen 1-Compliant Peripheral Controller**
  - USB-IF-certified (TID: 340800007)
  - Up to 32 USB endpoints
- **Fully Accessible 32-bit, 200-MHz ARM® 926EJ Core**
  - 512KB of embedded SRAM for code space and buffers
- **32-bit, 100-MHz, flexible GPIF II Interface**
  - Other peripheral interfaces such as I^2C, I^2S, UART, SPI and 12 GPIOs
  - Unused I/O pins can be used as GPIOs
  - 19.2-MHz crystal or 19.2-MHz, 26-MHz, 38.4-MHz and 52-MHz clock input
- **Flexible Clock Options**
- **Packages**
  - 121-ball BGA (10 mm^2), 131-ball WLCSP (4.7 x 5.1 mm)

Collateral

Datasheet: FX3 Datasheet
Development Kit: FX3 SuperSpeed Explorer Kit
Software Development Kit: EZ-USB FX3 SDK

FX3: USB 3.1 Gen 1 Peripheral Controller



Availability

Production: Now

EZ-USB FX3S

USB 3.1 Gen 1 RAID[1]-on-Chip

Applications

Servers, routers, mobile storage, USB Flash drives, POS terminals, automatic teller machines (ATM), SDIO expanders and data logging devices

Features

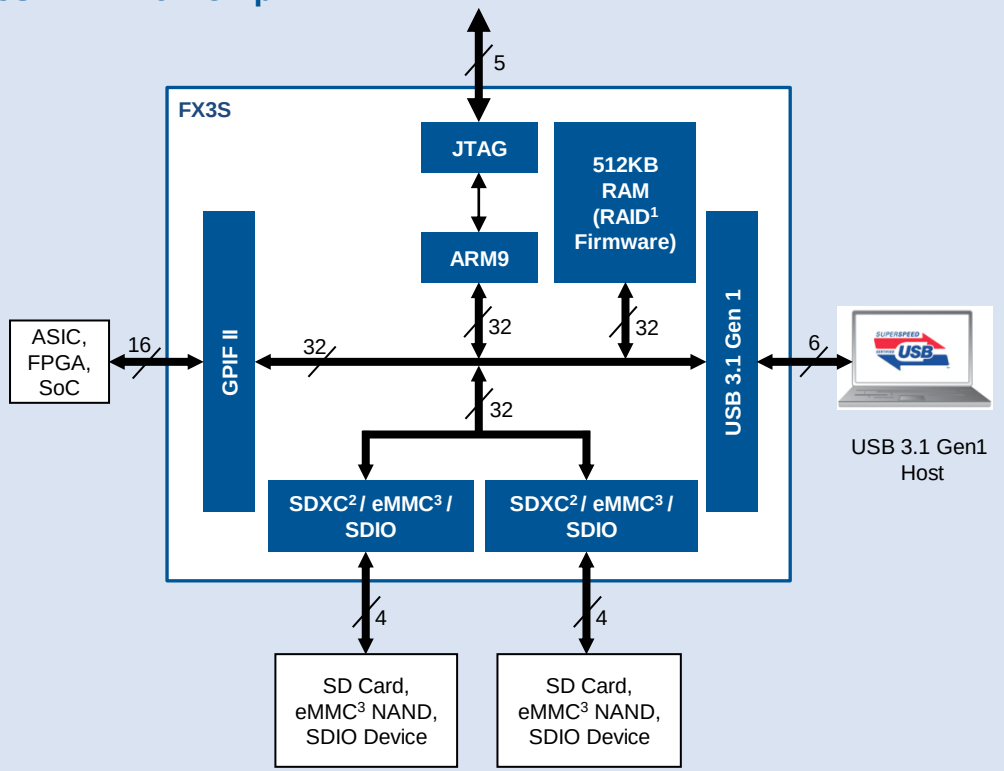
- **USB 3.1 Gen 1-Compliant Peripheral Controller**
  - USB-IF-certified (TID: 340800007)
  - Up to 32 USB endpoints
- **Fully Accessible 32-bit, 200-MHz ARM® 926EJ Core**
  - 512KB of embedded SRAM for code space and buffers
- **32-bit, 100-MHz, Flexible GPIF II Interface**
  - Other peripheral interfaces such as I²C, I²S, UART, SPI and 12 GPIOs
  - Unused I/O pins can be used as GPIOs
- **Two SDXC[2], eMMC[3] 4,4, or SDIO 3.0 Interfaces**
  - Support RAID0 or RAID1 configurations
- **Flexible Clock Options**
  - 19.2-MHz crystal or 19.2-MHz, 26-MHz, 38.4-MHz and 52-MHz clock input
- **Packages**
  - 121-ball BGA (10 mm²), 131-ball WLCSP (4.7 x 5.1 mm)

Collateral

Datasheet: FX3S Datasheet
Kit: FX3S RAID[1]-on-Chip Boot Disk Kit
Software Development Kit: EZ-USB FX3 SDK

[1] Redundant array of independent disks
[2] SD extended capacity
[3] Embedded Multimedia Card

FX3S: RAID[1]-on-Chip



Availability

Production: Now

EZ-USB CX3

MIPI[1] CSI-2 to USB 3.1 Gen 1 Bridge

Applications

Industrial, medical and machine vision cameras, 1080p full HD and 4K Ultra HD (UHD) cameras, document scanners, fingerprint scanners, game consoles, videoconferencing systems, notebook PCs, tablets and image acquisition systems

Features

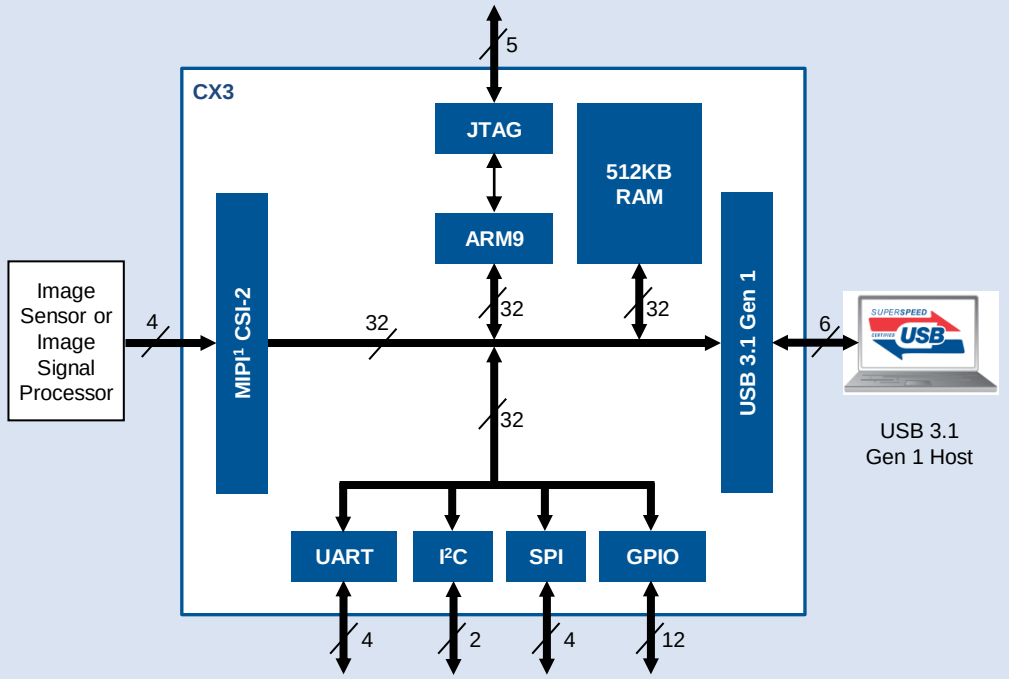
- **USB 3.1 Gen 1-Compliant Peripheral Controller**
  - Up to 32 USB endpoints
- **Fully Accessible 32-bit, 200-MHz ARM® 926EJ core**
  - 512KB of embedded SRAM for code space and buffers
- **Four-Lane MIPI[1] Camera Serial Interface v2.0 (CSI-2) Input**
  - Camera Control Interface (CCI) for image sensor configuration
  - Other peripheral interfaces such as I²C, UART, SPI and 12 GPIOs
- **Supports Industry-Standard Video Data Formats**
  - RAW8/10/12/14[2], YUV422/444[3], RGB888/666/565[4]
- **Supports Uncompressed Streaming Video**
  - 4K UHD at 15 fps, 1080p at 30 fps, 720p at 60 fps
- **Packages**
  - 121-ball BGA (10 x 10 x 1.7 mm)

Collateral

Datasheet: CX3 Datasheet
Reference Design Kit: CX3 Reference Design Kit
Software Development Kit: EZ-USB FX3 SDK

[1] Mobile Industry Processor Interface
[2] Video format for raw video data
[3] Video format for luminance and chrominance components
[4] Video format for red, green and blue pixel components

CX3: MIPI[1] CSI-2 to USB 3.1 Gen 1 Bridge



Availability

Production: Now

EZ-USB GX3

USB 3.1 Gen 1 to GigE[1] Bridge

Applications

USB dongles, docking stations and port replicators, network printers and security cameras, ultrabooks and home gateways, game consoles and portable media players, DVRs, IP set-top boxes and IP TVs and other embedded systems

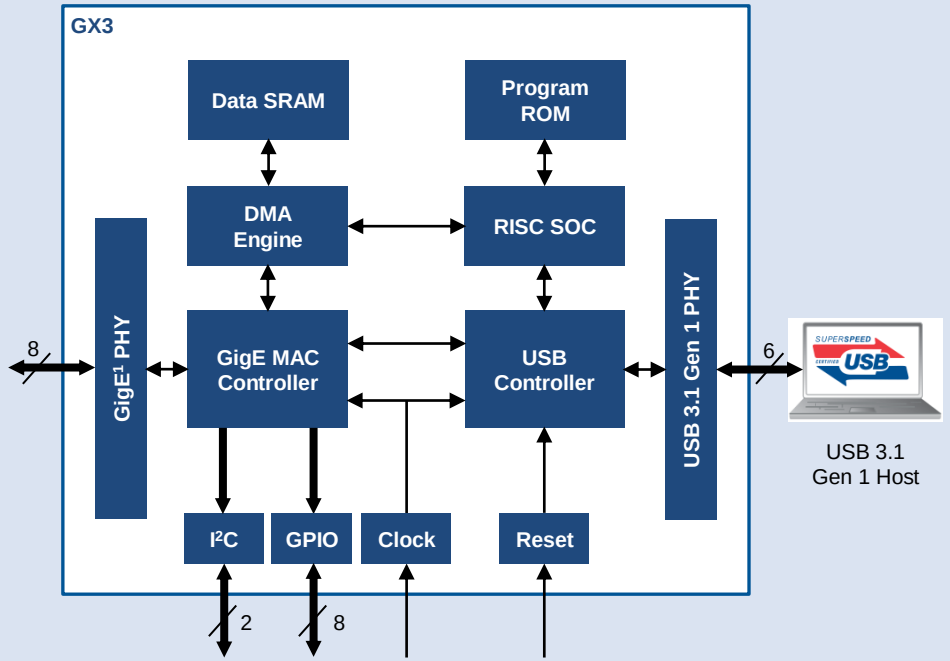
Features

- **One-Chip USB 3.1 Gen 1 to 10/100/1000M GigE Bridge**
  - Integrates USB 3.1 Gen 1 PHY and GigE PHY
  - Integrates USB 3.1 Gen 1 Controller and GigE MAC[2]
  - Needs only a 25-MHz crystal to drive both USB and GigE1 PHY
- **IEEE 802.3az[3] Support for Low-Power Idle State**
  - Supports dynamic cable length and power adjustment
  - Offers multiple power management wake-on-LAN[4] features
- **Supports Optional EEPROM to Store USB Descriptors**
  - Integrates on-chip power-on-reset (POR) circuitry
- **Packages**
  - 68-QFN (8 x 8 x 0.85 mm)

Collateral

Datasheet: GX3 Datasheet
Reference Design Kit: GX3 Reference Design Kit
Software & Drivers: GX3 Drivers

GX3: USB 3.1 Gen 1 to GigE[1] Bridge



Availability

Production: Now

[1] Gigabit Ethernet
[2] Media access controller that provides the address to an Ethernet node
[3] A new-energy efficient Ethernet standard
[4] An Ethernet standard that allows a computer to be turned on by a network message

EZ-USB HX3

USB 3.1 Gen 1 Hub

Applications

Docking stations for notebook PCs and tablets, PC motherboards , servers, televisions and monitors, retail hub boxes, printers and scanners, set-top boxes, home gateways, routers and game consoles

Features

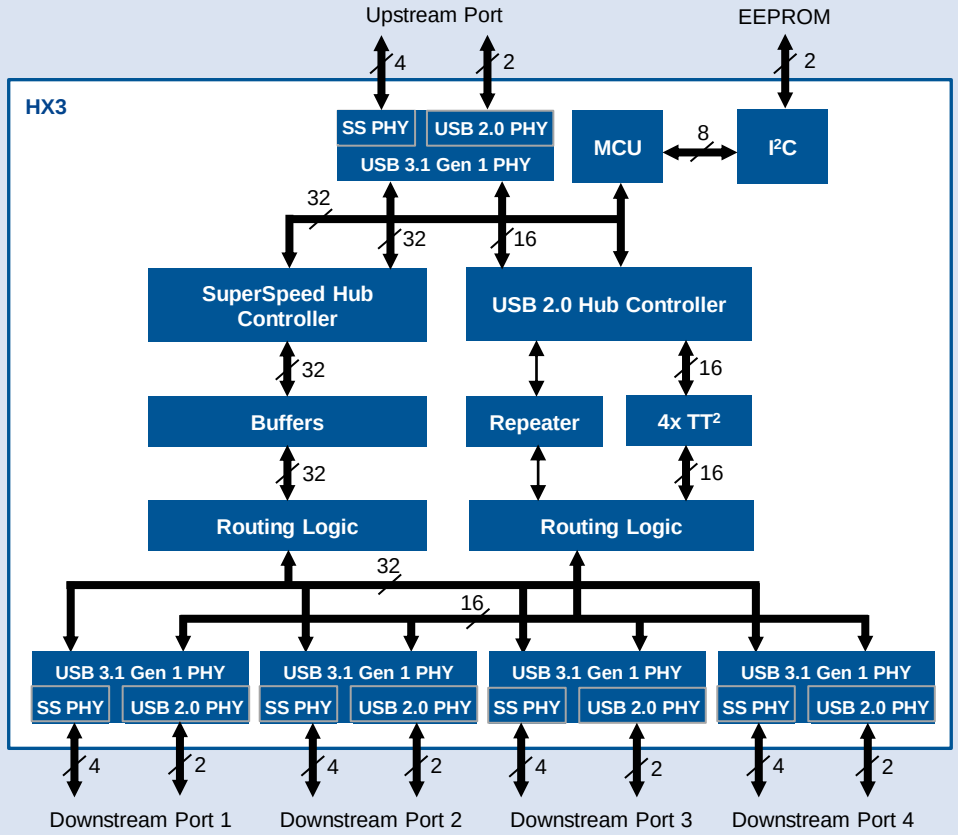
- **USB 3.1 Gen 1-Compliant Four-Port Hub Controller**
  - USB-IF certified (Test ID: 330000047)
  - WHQL certified for Windows 7, Window 8, Windows 8.1
- **Shared Link™**
  - Supports simultaneous USB 2.0 and USB SuperSpeed (SS) devices on the same port
- **Ghost Charge™**
  - Enables USB charging while the hub is disconnected from a USB Host
- **Charging Standard support**
  - USB-IF Battery Charging (BC) v1.2, Apple Charging Standard
  - Charging an OTG Host in an ACA-Dock
- **Programming of External EEPROM via USB**
- **Configurable USB SS and USB 2.0 PHY (drives 11" trace)**
- **Packages**
  - 68-QFN (8 x 8 x 1.0 mm), 88-QFN (10 x 10 x 1.0 mm), 100-BGA (6 x 6 x 1.0 mm)

Collateral

Datasheet:	HX3 Datasheet
Kit:	CY4609, CY4603, CY4613
Configuration Utility:	Blaster Plus[1]
App Notes:	HX3 Hardware Design Guide (AN91378)

[1] A Cypress GUI-based PC application for setting HX3 configuration parameters [2] Transaction translator

HX3: USB 3.1 Gen 1 Hub



Availability

Production: Now

EZ-USB HX3C

USB 3.1 Gen 1 Type-C PD Hub

Applications

USB Type-C charging hubs, adapters and accessories, docking stations for notebook PCs and tablets, televisions and monitors, PC motherboards and servers, set-top boxes, home gateways and routers

Features

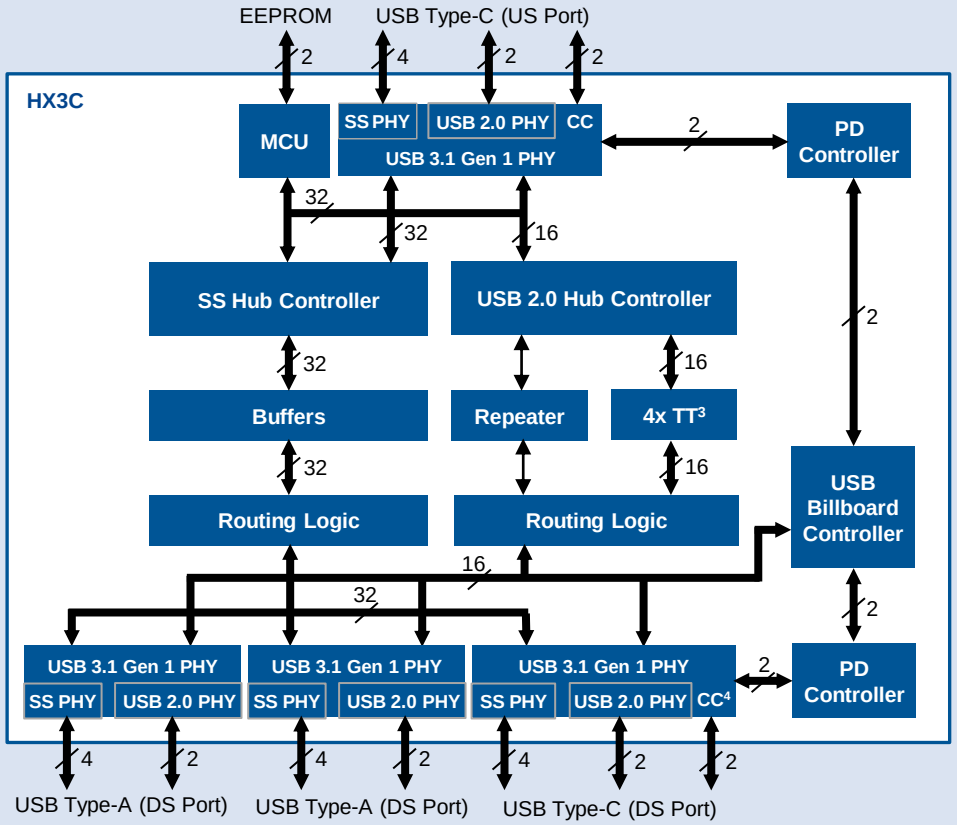
- **USB 3.1 Gen 1-Compliant Hub Controller with Type-C and PD**
  - Upstream (US): Type-C, Downstream (DS): 1 Type-C and 2 Type-A ports
- **Integrated Type-C Transceivers, Supporting Two Type-C Ports**
  - Integrated termination resistors (R_P and R_D)[1]
  - Integrated USB Billboard Controller[2]
- **Charging Support**
  - USB PD, BC v1.2, Apple Charging Standard
  - PD policy engine configures power profiles dynamically
- **Ghost Charge™**
  - Charging DS without US connection
- **Firmware Upgradable Over USB**
- **System-Level ESD on Configuration Channel (CC) Pins**
  - 8 kV Contact, 15 kV Air
- **Configurable USB SS and USB 2.0 PHY (drives 11" trace)**
- **Packages**
  - 121-ball BGA (10 mm x 100 mm, 0.8 mm ball-pitch)

Collateral

Datasheet: HX3C Datasheet

Reference Design: HX3C Type-C Monitor/Dock Reference Design

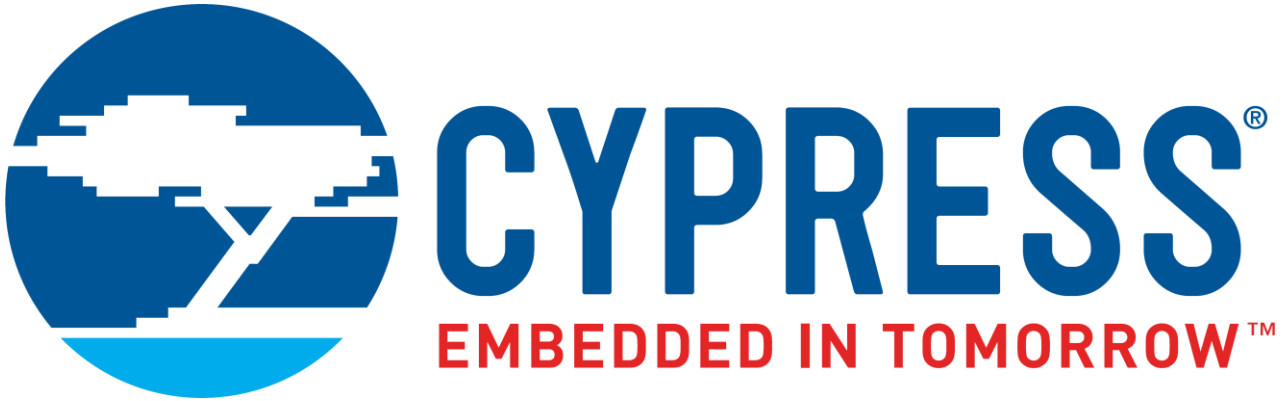
HX3C: USB 3.1 Gen 1 Type-C PD Hub



Availability

Samples: Now **Production:** Q2 2017

[5] Termination resistors: R_P read as a DFP, R_D as a UFP [2] A USB Device controller that is used to implement the USB Billboard Device Class Informs the USB Host of the supported Alternate Modes as well as any failures [3] Transaction Translator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