AX58400 Product Brief

Release Date: 11/05/2021

EtherCAT Slave Controller with Dual-Core MCU

The AX58400 EtherCAT Slave Controller w/ Dual-Core MCU is a System-in-Package (SiP) product based on the STM32H755 microcontroller from STMicroelectronics. AX58400 is equipped with Dual-Core 32-bit ARM® Cortex®-M7 core with DSP extension runs up to 480 MHz, 32-bit ARM® Cortex®-M4 core with Adaptive Real-Time Accelerator (ST ART Accelerator™) runs up to 240 MHz and EtherCAT Slave Controller (ESC) with two integrated Fast Ethernet PHYs. AX58400 supports AES/TDES/HASH/HMAC hardware cryptographic accelerators, ROP/PCROP/Anti-tamper security techniques, true random number generator, and additional communication interfaces such as 10/100Mbps Ethernet MAC, USB 2.0 OTG, Camera I/F, TFT-LCD Controller, JPEG Codec, SPI/UART/I2C/I2S/SAI/CAN/SDMMC/ADC/DAC/HDMI-CEC/PWM/DFSDM, etc.

The AX58400 is interoperable with all EtherCAT systems with standard EtherCAT protocols such as CoE, FoE, VoE, etc. and is suitable for motor/motion control, digital I/O control, sensors data acquisition, robotics, EtherCAT IO-Link master, EtherCAT Junction slave module, EtherCAT communication module, etc. industrial automation fieldbus applications.

Key Features

- **A System-in-Package (SiP) product based on ST STM32H755 microcontroller and ASIX EtherCAT slave controller**
- **STM32H755 Microcontroller**
  - **Dual-Core ARM® Cortex®-M7 & Cortex®-M4 RISC Cores**
    - ARM® Cortex®-M7 core with double-precision FPU and L1 cache: 16 Kbytes of data and 16 Kbytes of instruction cache, running up to 480 MHz
    - ARM® Cortex®-M4 core with FPU, Adaptive Real-Time Accelerator (ST ART Accelerator™) for internal Flash and external memories, running up to 240 MHz
    - Dual bank 2 Mbytes Flash memory and 1 Mbyte SRAM
    - Dual mode Quad-SPI memory interface up to 133 MHz
  - **Communication/Analog Interfaces**
    - 1x 10/100Mbps Ethernet MAC with IEEE 1588
    - 2x USB OTG interfaces
    - 1x Digital Camera interface
    - 4x I2C, 6x SPI, 3x I2S, 4x SAI, 2x CAN
    - 4x UART, 4x USART and 1x LPUART
    - 1x SPDIFRX interface, 1x SWPMI
    - 2x SDMMC host interfaces (SD/SDIO/MMC)
    - 1x HDMI-CEC
    - 3x 16-bit ADC, 2x 12-bit DAC
    - 1x Temperature Sensor
    - 2x Ultra-low-power Analog Comparators
    - 2x Operational Amplifiers
    - 1x DFSDM (Digital Filters for Σ-Δ Modulator)
    - Up to 97 GPIOs with interrupt capability
  - **Graphics**
    - TFT-LCD controller up to XGA resolution
    - Hardware JPEG Codec
    - ST Chrom-ART graphical hardware Accelerator™ (DMA2D) to reduce CPU loading

Block Diagram

EtherCAT®

ASIX Electronics Corporation
4F, No. 8, Hsin Ann Road, Hsinchu Science Park, Hsinchu, 30078, Taiwan
TEL: +886-3-5799500 FAX: +886-3-5799558
Email: sales@asix.com.tw
https://www.asix.com.tw/

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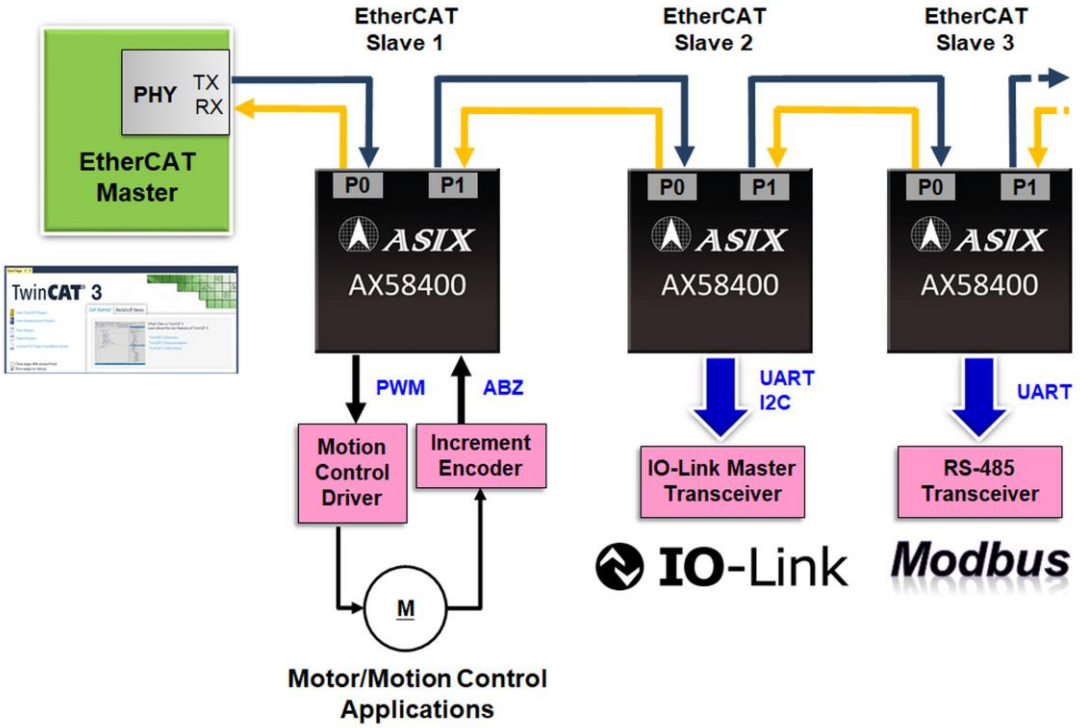
- **Timers and Watchdog**
  - 1x high-resolution timer (2.1 ns max resolution)
  - 2x 32-bit timers with up to 4 IC/OC/PWM or pulse counter and quadrature (incremental) encoder input (up to 240 MHz)
  - 2x 16-bit advanced motor control timers (up to 240 MHz)
  - 10x 16-bit general-purpose timers (up to 240 MHz)
  - 5x 16-bit low-power timers (up to 240 MHz)
  - 2x independent watchdogs, 2x window watchdogs
  - 2x SysTick timers
  - RTC with sub-second accuracy and hardware calendar
- **Clock Management**
  - Internal oscillators: 64 MHz HSI, 48 MHz HSI48, 4 MHz CSI, 32 KHz LSI
  - External oscillators: 4MHz~48 MHz HSE, 32.768 KHz LSE
  - 3x PLLs with Fractional mode
- **Low-power Consumption**
  - VBAT battery operating mode with charging capability
  - CPU and domain power state monitoring pins
  - 2.95 µA in Standby mode (Backup SRAM OFF, RTC/LSE ON)
  - High power-efficiency SMPS step-down converter regulator to directly supply VCORE and/or external circuitry
  - Low-power modes: Sleep, Stop, Standby and VBAT supporting battery charging
- **Security and Cryptographic Accelerator**
  - Return-Oriented Programming (ROP), Proprietary Code Read-Out Protection (PC-ROP), active anti-tamper
  - AES-128/192/256, Triple-DES, HASH (MD5/SHA-1/SHA-2), HMAC hardware cryptographic accelerators
  - True Random Number Generator (RNG)
- **96-bit Unique Identifier (UID)**

- **EtherCAT Slave Controller (ESC) Sub-system**
  - 2 integrated Fast Ethernet PHYs
  - 3rd Fast Ethernet MII Port for flexible EtherCAT network configuration
  - 9KB DPRAM, 8 FMMUs and 8 Sync Managers
  - 64-bit Distributed Clock
- **225LD EHS-TFBGA 13x13 mm, 0.8-mm pitch, RoHS Compliant Package**
- **Operating Temperature Range: -40 to +85˚C**

Target Applications

- Motor/Motion Control
- Digital I/O Control
- Robotics
- Sensors Data Acquisition
- EtherCAT to IO-Link Master Gateway
- EtherCAT Junction Slave Module
- Communication Module
- Operator HMI Interfaces



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