

AX58200 Product Introduction

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Revision History

Revision	Date	Description
0.10	2019/12/09	Preliminary release
1.00	2019/12/19	1. Added Section 4 and 5-2.
1.01	2019/12/26	1. Updated Figure 8 and modified some descriptions in Section 5-2.
1.02	2020/04/28	1. Updated Figure 5, 6, 7.
1.10	2021/11/17	1. Added AX58200 Motor Control demo kit information. 2. Modified some descriptions in Section 1, 2, 3, 4, 5.
1.20	2022/01/27	Corrected top of page description.

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1. Introduction

This document provides an overview of AX58200 2/3-port EtherCAT slave controller SoC with two integrated Fast Ethernet PHYs.

The AX58200 is equipped with ARM® Cortex®-M4F core with DSP extension runs up to 192 MHz, embedded 512 KB dual bank Flash memory for supporting Over-The-Air (OTA) firmware upgrade, embedded 160 KB SRAM which includes 32 KB cache supporting eXecute-In-Place (XIP) to speed up the code execution from external SPI Flash. Factory pre-loaded 32 KB bootloader for secure boot, built-in 4 KB Secure Protection ROM for providing a safe space to save confidential program or data. Supports additional communication interfaces such as 10/100Mbps Ethernet MAC with RMII and hardware cryptography accelerator, HS USB OTG, SPI/UART/I2C/I2S/CAN/PWM, etc.



The AX58200 EtherCAT Slave Controller (ESC) integrates two embedded Fast Ethernet PHYs which can support both copper and fiber Ethernet applications, embedded 9 KB RAM, eight Fieldbus Memory Management Units (FMMUs), eight Sync Managers and 64-bit distributed clock. AX58200 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 to IO-Link master gateway, EtherCAT to Modbus TCP gateway, etc. industrial automation fieldbus applications.

The AX58200 is available in small 144-pin HSFBGA 10x10 mm, 0.8 mm pitch, RoHS compliant package and in operating temperature range from -40 to 85°C.

ASIX offers AX58200 evaluation board, demo kit and free Board Support Package (BSP) which includes reference schematics, PCB design guidelines, hardware/software design guides, software tools, sample firmware sources, etc. for designers to easily design the AX58200 EtherCAT slave products.

2. Block Diagram

The following are AX58200 block diagram and major features,

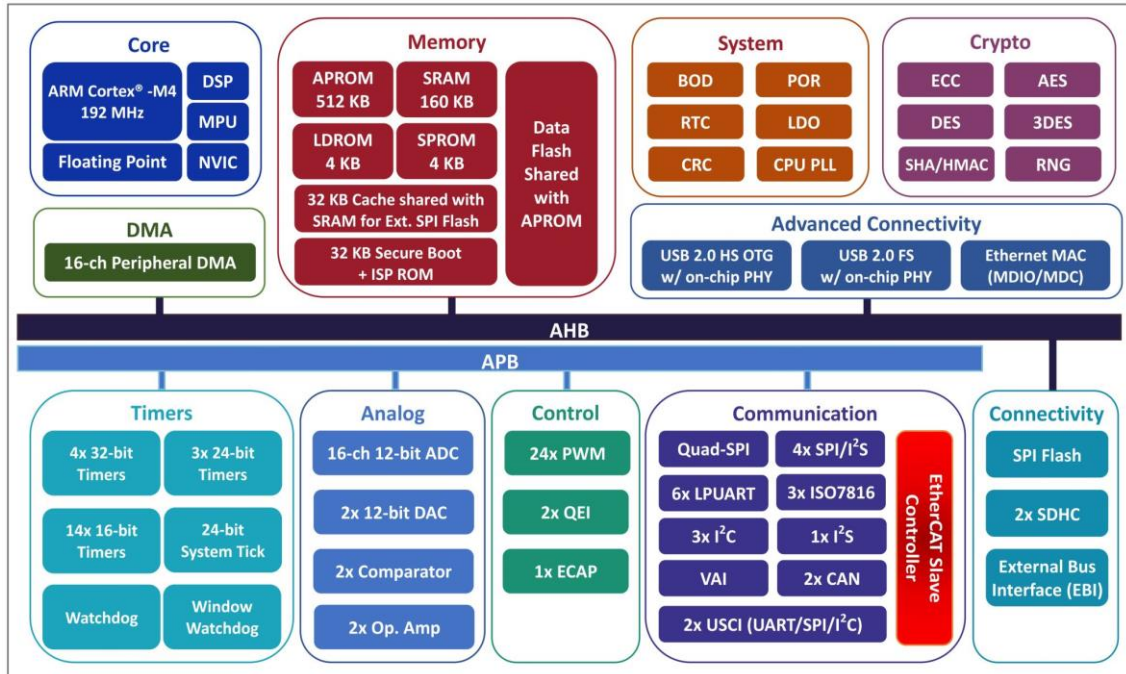


Figure 1. AX58200 Block Diagram

Processor	On-chip Flash (Bytes)	On-chip Data RAM (Bytes)	On-chip Boot Loader ROM (Bytes)	Security Protection ROM (Bytes)	USB OTG	Ethernet MAC
ARM Cortex-M4F 192MHz	512K Dual bank	160K	32K	4K	HS	10/100 Mbps (w/ RMII)
ESC Fast Ethernet	ESC RAM (Kbytes)	ESC FMMU	ESC Sync Managers	ESC Distributed Clock	CAN	LPUART
2 x Internal PHY 1 x MII	9	8	8	64-bit	2	6
ISO-7816-3	Quad-SPI	I2C	I2S	USCI	SD Host Controller	SPI Flash I/F
3	1	3	1	2	2	1
Timers	PWM	ECAP	QEI	ADC	DAC	Analog Comparator
4*32-bit	24*16-bit	1	2	1*12-bit	2*12-bit	2
Operational Amplifier	Die Temperature Sensor (DTS)	Watchdog Timer	RTC	Secure Boot	Package/ Size	Temperature Range (°C)
2	1	Yes	Yes	Yes	HSFBGA-144 10x10 mm 0.8 mm pitch	-40 ~ +85

Figure 2. AX58200 Major Features

3. Target Applications

The following are AX58200 typical target applications.

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

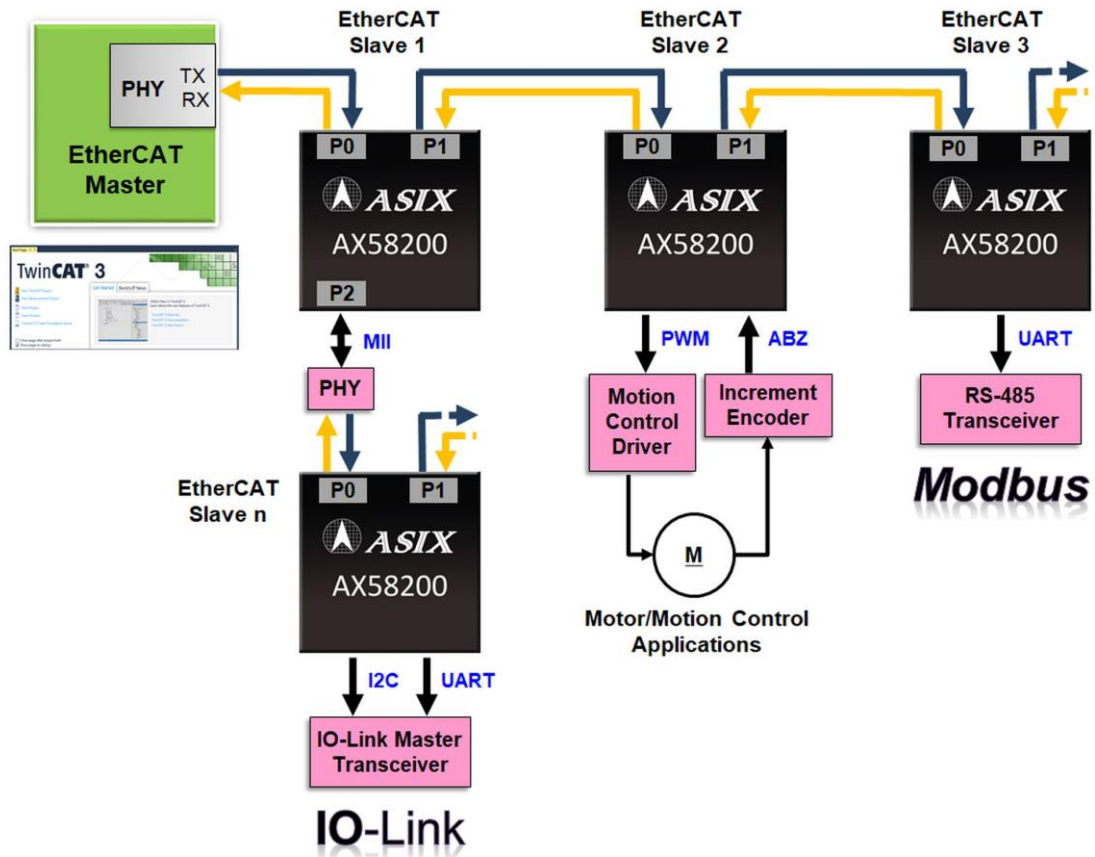


Figure 3. AX58200 Target Applications

4. Order Information

The following are the ordering information of AX58200 silicon and AX58200 boards. Please contact ASIX's Sales (sales@asix.com.tw) for more details.

Part Number	Description
AX58200 BI	144-pin HSFBGA RoHS compliant package, Operating temperature range: -40 to 85°C.

AX58200 Boards	Description
AX58200-TSB-1	This is AX58200 evaluation board.
AX58200-DMK-ADIO-1	This is AX58200 ADIO demo kit combined AX58200 evaluation board and AX58200 Analog/Digital I/O expansion board.
AX58200-DMK-MOTOR-1	This is AX58200 Motor Control demo kit combined AX58200 evaluation board (Motor) and AX58200 servo drive expansion board.

Figure 4. Ordering Information

5. AX58200 Evaluation Board/Demo Kits

ASIX Electronics offers AX58200 evaluation board and various AX58200 demo kits for designers to evaluate AX58200 functionalities on different target applications.

5-1. AX58200 Evaluation Board

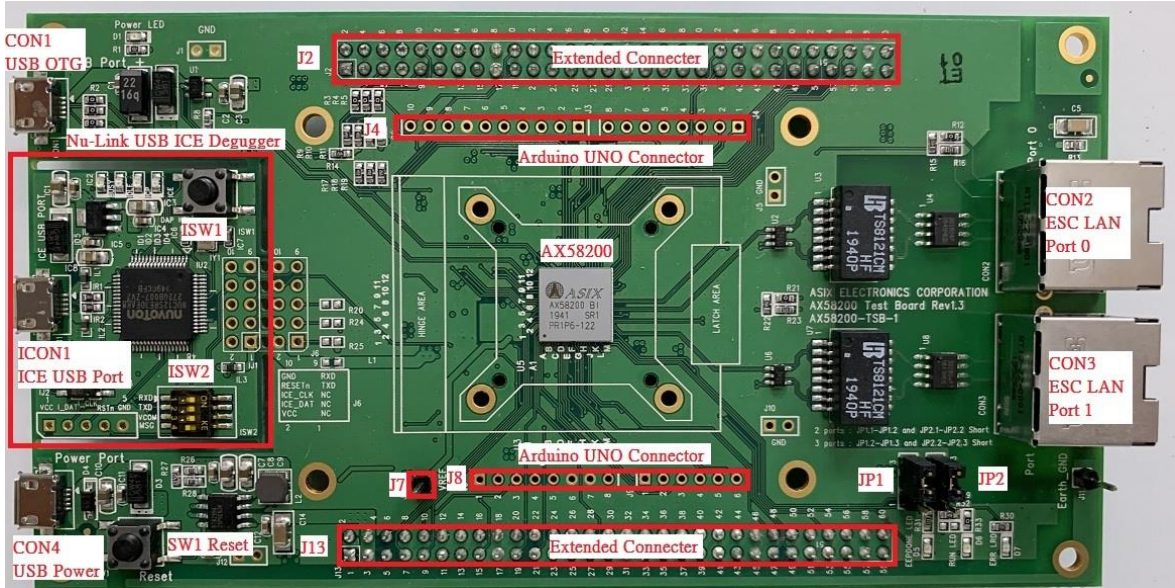


Figure 5. AX58200 Evaluation Board

The following is the AX58200 evaluation board overview.

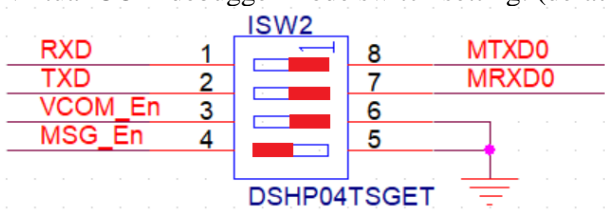
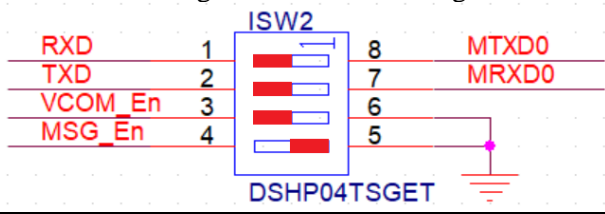
Names	Descriptions
CON1 (USB OTG)	USB OTG port connector
CON2/CON3 (ESC LAN Port 0/1)	EtherCAT slave Ethernet port 0 & port 1
CON4 (USB Power)	Micro-USB 5V power connector Provide alternate 5V power source for AX58200 evaluation board, and provide extra 5V power source for USB OTG port
SW1	Reset button
J2, J13	Extended interface connectors
J4, J8	Arduino UNO connectors
Nu-Link USB ICE Debugger	
ICON1 (ICE USB Port)	USB connector of Nu-Link ICE debugger Provide 5V power source for AX58200 evaluation board during debugging
ISW1	ICP offline programming push button
ISW2	<p>Virtual COM debugger mode switch setting: (default)</p>  <p>USB Flash storage mode switch setting:</p> 
JP1, JP2	ESC port number 2 ports mode => JP1.1-JP1.2 Short , JP2.1-JP2.2 Short 3 ports mode => JP1.2-JP1.3 Short , JP2.2-JP2.3 Short

Figure 6. AX58200 Evaluation Board Overview

The following is the overview of AX58200 Analog/Digital I/O Expansion Board. Please refer to [Section 5-1](#) for the overview of AX58200 Evaluation Board.

Names	Descriptions
CON1 (ESC LAN Port 2)	EtherCAT slave Ethernet port 2
P1 (COM Port)	COM port for UART debug console
SW1, SW2	16-bit EtherCAT ID rotate switch SW1 (High byte ID) & SW2 (Low byte ID) (Default: set SW1=0, SW2=0)
S1	8-bit DIP switch for Digital Input demo
D1~D8	8 LEDs for Digital Output demo
J5	Analog Input connector
VAR1	Variable 100K ohm resistor for Analog Input demo
J8	Analog Output connector
J10, J11	Extended interface connectors

Figure 9. AX58200 Analog/Digital I/O Expansion Board Overview

5-3. AX58200 Motor Control Demo Kit

The AX58200 Motor Control demo kit includes AX58200 Evaluation Board (Motor) and AX58200 Servo Drive Expansion Board.

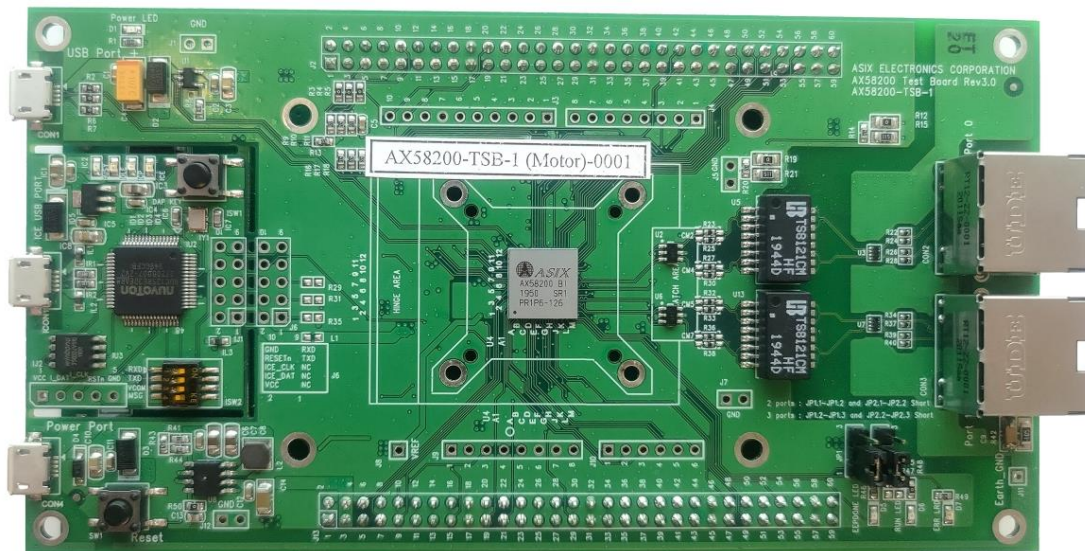


Figure 10. AX58200 Motor Control Demo Kit (Top Board) – AX58200 Evaluation Board (Rev3.0)

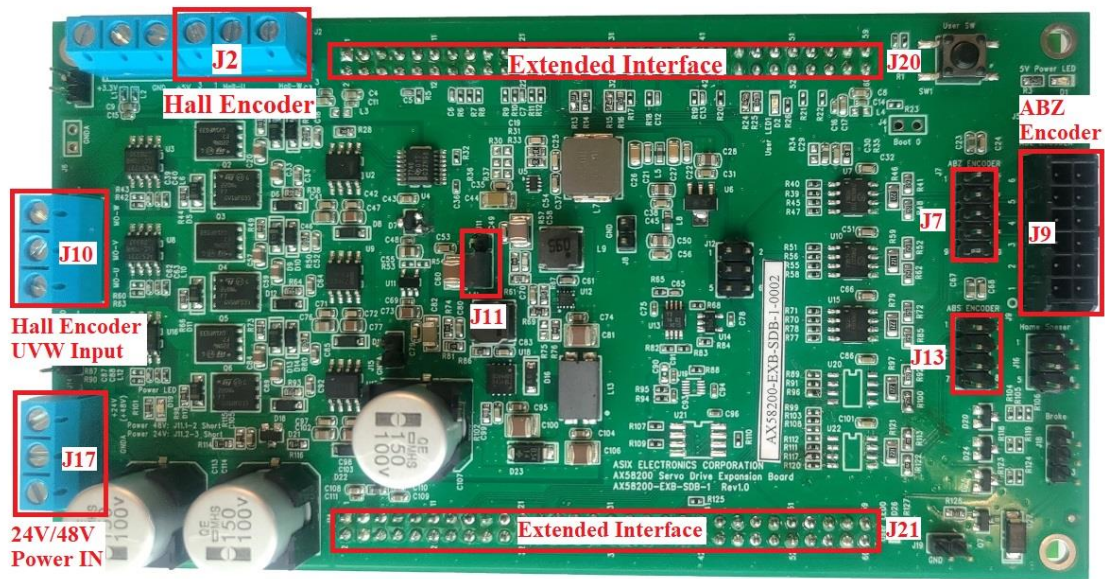


Figure 11. AX58200 Motor Control Demo Kit (Bottom Board) – AX58200 Servo Drive Expansion Board

The following is the overview of AX58200 Servo Drive Expansion Board.

Names	Descriptions
J17	24V/48V DC Power Input
J11	24V/48V DC Power Input Setting (24V: Short J11.2-J11.3 (default): 48V: Short J11.1-J11.2)
J2, J10	UVW Hall Encoder Interfaces
J7, J9, J13	ABZ Incremental Encoder Interfaces
J20, J21	Extended interface connectors

Figure 12. AX58200 Servo Drive Expansion Board Overview

6. Software Development Tools

ASIX offers AX58200 Board Support Package (BSP) which include reference schematic, PCB layout/gerber/BOM files, application design note and software tools/demo sample source/SSC tool configuration import files, etc. Please contact ASIX Sales (Sales@asix.com.tw) for details.

6-1. Software Compiler Tool

The AX58200 software modules are developed in C language under Keil MDK-ARM uVision5 Development Tool environment. Designers can purchase the **Keil MDK-ARM uVision5 Development Tool** from Keil's web site (<https://developer.arm.com/tools-and-software/embedded/keil-mdk>).

6-2. Software Debugger & ICP Flash Programming Tools

The AX58200 evaluation board integrates a Nu-Link USB ICE debugger for software debugging and ICP Flash programming. Please install the “NuMicro Nu-Link Driver for Keil” and “NuMicro ICP Programming Tool” firstly.

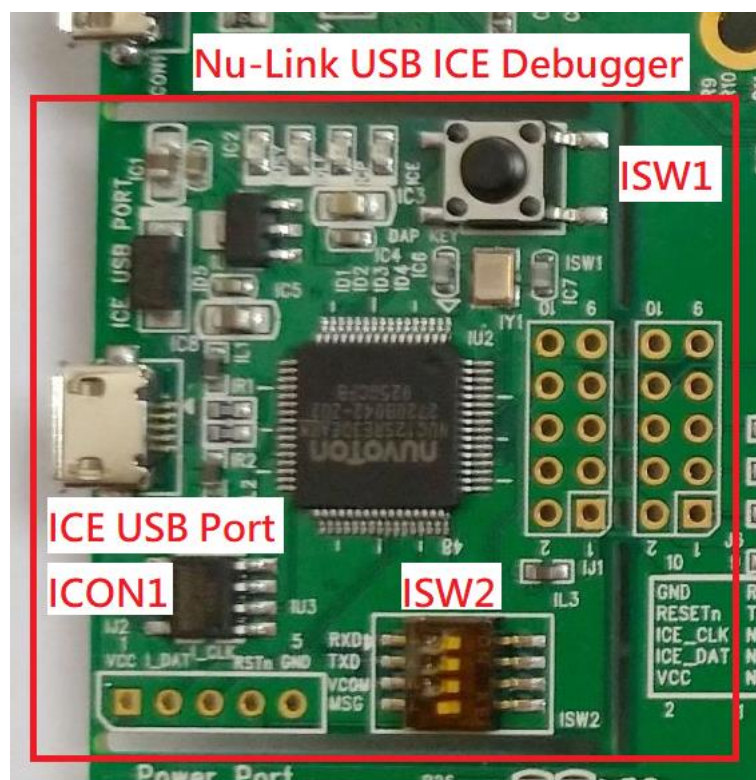


Figure 13. AX58200 Nu-Link USB ICE Debugger

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**4F, No.8, Hsin Ann Rd., Hsinchu Science Park,
Hsinchu, Taiwan, R.O.C.**

TEL: +886-3-5799500

FAX: +886-3-5799558

Email: support@asix.com.tw

Web: <https://www.asix.com.tw/>