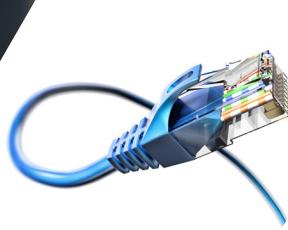


High-Throughput Ethernet Interface Solutions

High Performing, Power Efficient, Easy to Use





A Complete Portfolio Providing Reliable Ethernet Connectivity

Microchip's broad Ethernet portfolio extends from 10 Mbps transceivers, bridges and controllers up to 200 Gbps 64-port switches. Important features enabling Time Sensitive Networking (TSN), functional safety and data security are coupled with measures to reduce system level power consumption that enable designers to deliver solutions that help achieve environmental sustainability goals.

Ethernet Made Easy

- Development boards that make evaluation easy
- Application Notes and Code Examples
- Extensively tested for MPLAB® Harmony, Windows®, macOS and Linux® operating systems
- LANCheck online design review that leverages in-house Ethernet experts for your design
- Turnkey Linux software packages for Enterprise, industrial, and carrier applications
- Stringent compliance testing to major standards
- Hardware and software for Time Sensitive Networking (TSN)

Our Ethernet Portfolio

Transceivers (PHYs)

- Speeds of up to 1 Gigabit for copper and 10 Gigabits for optical
- Commercial-, industrial- and automotive-grade
- PHY-level IEEE 1588v2 time stamping
- Reduced power mode for sustainability

Bridges/Controllers

- Enable Ethernet with your processor's USB or PCIe® port
- Add Ethernet with reduced microcontroller (MCU)/ MPU/SoC overhead via a variety of processor interfaces

Switches

- Up to 64 ports, up to 25 Gigabit speeds, advanced features and industrial and automotive temperatures
- Time Sensitive Networking (TSN) support

Applications

5G

- Wireless 4G/LTE modems
- Broadband modems and routers
- Network infrastructure (routers, switches, access points and bridges)
- Wireless 5G small cell

Industry 4.0

- Industrial automation
- Beverage, volatile liquid and gas production
- Industrial / Embedded PCs
- Programmable Logic Controllers (PLCs)
- EtherCAT & Ethernet Connected Sensors

Internet of Things (IoT)

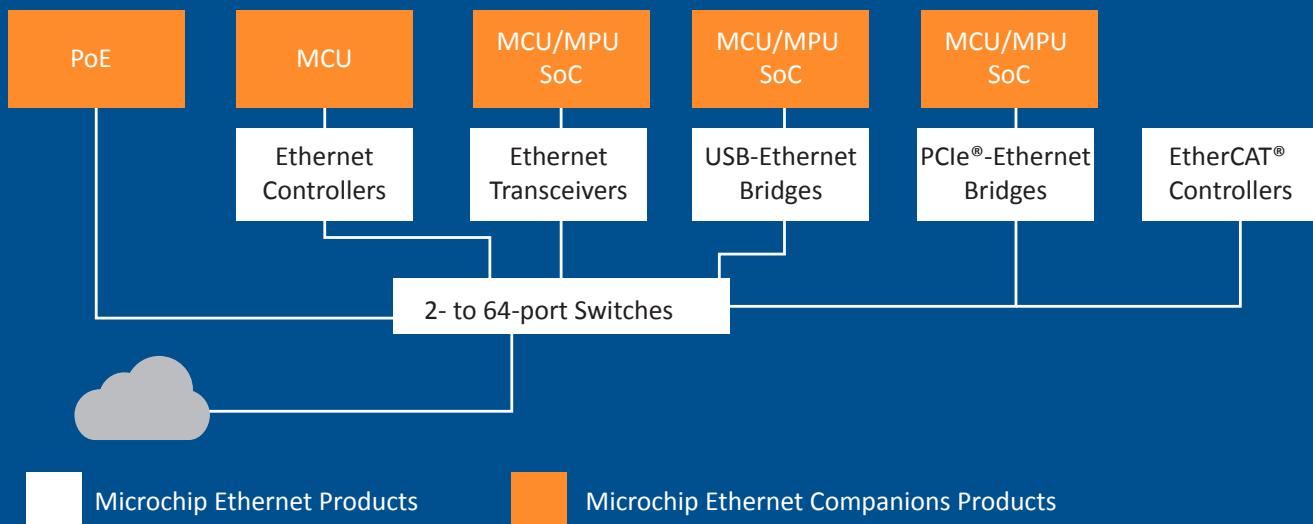
- Home/building/lighting automation
- Smart energy/smart grid
- Remote equipment monitoring
- Security and IP cameras

Specialty

- Automated Driver Assistance Systems (ADAS)
- Military, Aerospace and Defense



Our Ethernet Products



Design Check Online Design Review

Our Design Check Online Design Review services are personalized, value-added services available to our customers. Design Check will support your design process by providing guidance through the complete design cycle—from initial schematic design to PCB design. After an initial Design Check registration, you may submit the design schematic, PCB layout or PCB routing design information to a confidential and secure environment where it is analyzed by our engineers who will provide you with personalized feedback. Submit your design today at www.microchip.com/design-check-services.



Software Drivers

We develop, test and certify software drivers for MPLAB Harmony, Microsoft Windows, MacOS, Linux OS, Autosar, FreeRTOS, QNX and many proprietary stacks used in MCU-, MPU- and SoC-based systems. We include MPLAB Harmony drivers in the download of the software and they also support our starter kits, allowing you to get your application online quickly. Our Windows drivers comply with our rigorous Windows Logo Program for Hardware (WHQL), ensuring seamless operation in Windows-based systems. Visit our Embedded Software website for more information: <http://www.microchip.com/mplab/embedded-software-center> and www.microchip.com/mplab/embedded-software-center.

Our software for Ethernet switching applications provides a comprehensive set of features for enterprise, carrier and industrial designs. Customizable and turnkey solutions shorten development cycles and reduce your costs. See our website for links to software drivers: www.microchip.com/design-centers/ethernet/software.

Additional MPLAB Harmony Software

- TCP/IP stack
- WolfSSL SSL/TSL encryption library
- USB host/device stack

Supported Applications

- VSC6819 WebStaX for basic L2 Enterprise Switch Applications
- VSC6816 SMBStaX for Advanced L2+ Enterprise Switch Applications
- VSC6817 IStaX for industrial TSN Ethernet Switch Applications
- LMStaX
- FreeRTOS
- Linux
- Windows
- Android
- QNX
- VxWorks
- FreeBSD

Ethernet Switch and PHY API

- VSC6803 Microchip Ethernet Switch Application Programming Interface (MESA)

Devices With Available Drivers

- PHY transceivers
- Bridging devices
- Ethernet controllers
- Ethernet switches



Transceivers (PHYs)

Microchip's 10/100, Gigabit PHY, multi-Gigabit and multi-port options seamlessly attach to SoCs, MCUs and CPUs with industry standard interfaces (GMII, RGMII, RMII, MII, SGMII). Designed with Energy-Efficient Ethernet and Wake-On-LAN, the devices lower power consumption, minimize emissions and increase immunity to noisy environments. The availability of high-temperature versions make these devices ideal for industrial and automotive applications. LinkMD®+ enables advanced diagnostics, critical to maintaining scalable network deployments.

Available Features

- Standard Media Access Control (MAC) interface
- Single Pair Ethernet (SPE)
- On-chip termination
- Wake on LAN
- Energy-efficient Ethernet (802.3az)
- LinkMD+ with signal quality indicator
- MACsec
- TC10 remote low power sleep and wake
- High precision IEEE 1588v2
- EtherCAT® Approved



Ethernet PHYs – 10/100

Feature	KSZ8041	KSZ8041F	KSZ8081	KSZ8091	LAN8770**
AEC-Q100	✓	-	-	-	✓
Interface	MII/RMII	MII	MII/RMII	MII/RMII	MII/RMII/RGMII
Ethercat	-	-	✓	-	-
Fiber Support	-	✓	-	-	-
EEE	-	-	-	✓	-
Single Supply?	-	-	✓	✓	✓
WoL	-	-	-	✓	TC10
Linux® Driver	Mainline	Mainline	Mainline	Mainline	-
Temp. Min.	-40	-40	-40	-40	-40
Temp. Max.	+85	+85	+85	+85	+125
Packages	32-QFN	48-TQFP	24-VQFN, 48-VQFN	24/32-VQFN, 48-VQFN	32-VQFN, 36-VQFN

*Two Wire Ethernet

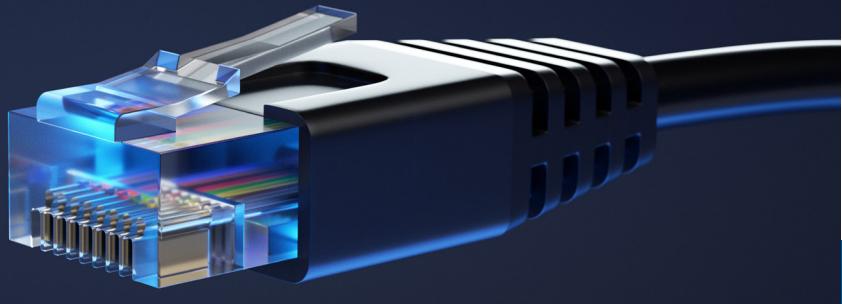
Ethernet PHYs – 10/100/1000

Feature	KSZ9031	KSZ9131	LAN8830	LAN8831	LAN8840	LAN8841	VSC8531	VSC85412
AEC-Q100	✓	✓	-	-	-	-	-	-
Interface	MII, RGMII, GMII	MII, RGMII, GMII	RGMII	MII, RGMII, GMII	RGMII	MII, RGMII, GMII	RMII/RGMII	RMII/RGMII/ GMII
1588v2	-	-	-	-	✓	✓	-	✓ ³
Ethercat	-	-	-	-	-	-	✓	✓
Fiber Support	-	-	-	-	-	-	-	-
EEE	-	✓	✓	✓	✓	✓	✓	✓
Single Supply?	✓	✓	✓	✓	✓	✓	-	-
Linux® Driver	Mainline	Mainline	Mainline ¹	Mainline ¹	Mainline ¹	Mainline ¹	MCHP	MCHP
Temp. Min.	-40	-40	-40	-40	-40	-40	-40	-40
Temp. Max.	+105	+105	+105	+105	+105	+105	+125	+125
Packages	48-VQFN, 64-VQFN	48-VQFN, 64-VQFN	48-VQFN	64-VQFN	48-VQFN	64-VQFN	48-VQFN	68-VQFN

1. Q1 2023

2. Military and Aerospace approved

3. IEEE1588 Start of Frame support



PHY Evaluation Boards

Getting started with our Ethernet PHYs is easy. Several development board options are available, from MCU/MPU boards with a specific on-board PHY, to modular development boards accommodating one of the PHY Daughter boards. Our most popular options are below but you can find a complete list of PHY evaluation boards at [HYPERLINK "http://www.microchip.com/EthernetPHY"](http://www.microchip.com/EthernetPHY) www.microchip.com/EthernetPHY.

Several development board options are available, from MCU/MPU boards with a specific on-board PHY, to modular development boards accommodating one of the PHY Daughter boards.

Development boards With On-Board PHYs



ATSAME54-XPRO

An XPro development board based on the SAM E54 high performance micro-controller series featuring a 32-bit ARM® Cortex®-M4F processor, running up to 120 MHz with the on-board KSZ8081 10/100 PHY.



SAMA5D27 SOM1 Kit1

A development board based on the high performance 32-bit Arm Cortex-A5 SAMA5D27 System-On-Module (SOM) running up to 500 MHz with on-board KSZ8081 10/100 PHY. The SAMA5D27-SOM1 is delivered with a free Linux distribution and bare metal C code examples.



ATSAM4E-XPRO Evaluation Kit

An XPro development board based on the SAM4E featuring the ARM® Cortex®-M4 processor, running up to 120 MHz with the on-board KSZ8081 10/100 PHY.



VSC8541 Evaluation Board

VSC8541EV provides a way to evaluate the VSC8541 and VSC8531 devices in multiple configurations. Two RJ-45 connectors are provided for the copper media interface from each device. The MAC interface is exposed through 0.1 inch pin-headers. For standalone access to all device features, an external microcontroller is used to configure both the VSC8541 and the VSC8531 through the MDIO bus.



EVB-LAN8814 (EV53D52A)

The EVB-LAN8814 supports the evaluation of LAN8814 and LAN8804. It is useful for initial hardware bring-up and software driver integration. It provides full access to the LAN8814/04 I/Os on a managed platform. Linux kernel driver and User space API support. Demo application is provided to aid setup and connection to PTP link partners.



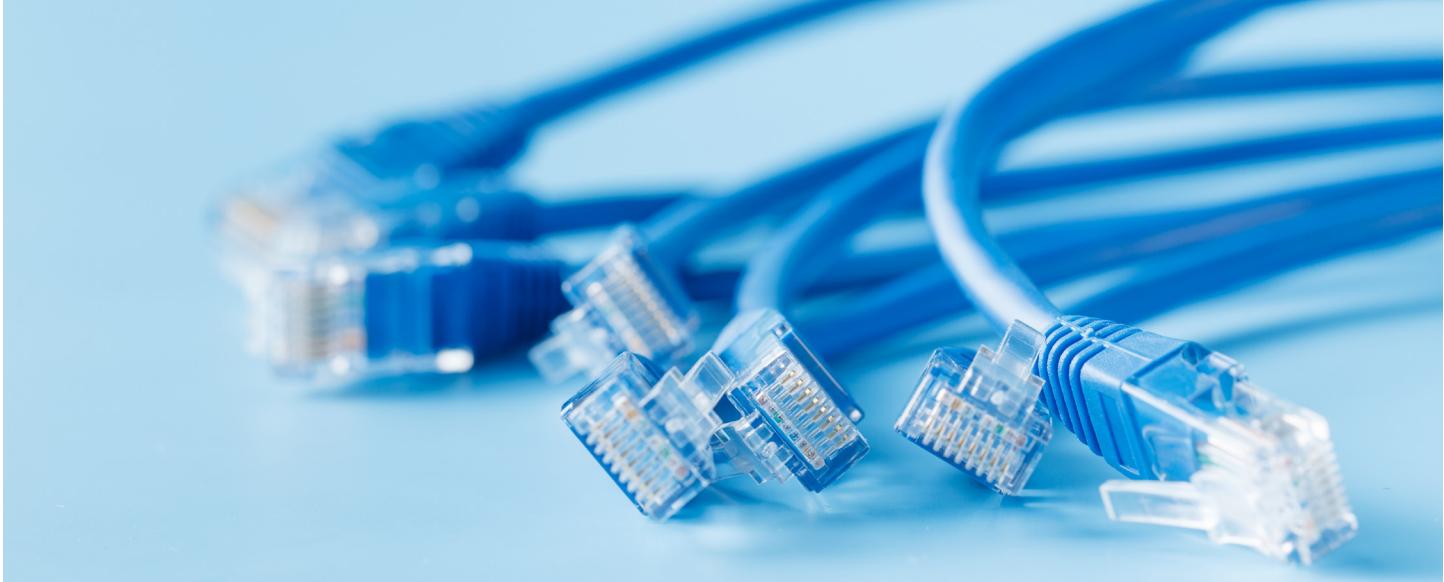
EVB-LAN8770M_MC (EV02N47A)

The EVB-LAN8770M_MC is a media converter evaluation board between 100BASE-TX and 100BASE-T1 Ethernet PHY technology.



EVB-LAN8770-RMII (EV48S68A)

The EVB-LAN8770_RMII board is a 100BASE-T1 Ethernet PHY plug-in card for the SAMS70/E70/V70/V71 Xplained Ultra board.



Development Boards Socketed for PHY Daughter Boards



SAM E70 Xplained Ultra Evaluation board

DM320113 The SAM E70 Xplained Ultra Evaluation Kit is a hardware platform for evaluating the ATSAME70 an Arm Cortex-M7 running at up to 300 MHz with an integrated MAC supporting any AC320004x PHY Daughter Board.



SAM E54 Curiosity Ultra Evaluation board

DM320210 is Microchip's latest generation of development platforms with high modularity. The SAME54 is based on the ARM Cortex M4 core running up to 120MHz with integrated 10/100 MAC supporting AC320004x PHY Daughter Boards.



PIC32MZ EF Curiosity 2.0 Development Board

DM320209 is based on the PIC32MZ with Floating Point Unit (EF), a MIPS M5150 core running at up to 200 MHz, up to 2 MB of flash and 512 KB SRAM with a broad set of peripherals including a socket for 10/100 Ethernet PHY Daughter Boards. (KSZ8061 AC320004-6 included).



SAMA5D3 Ethernet Development System (EDS)

DM320114 is based on the SAMA5D36 Microprocessor, a high-performance, ultra-low-power ARM Cortex-A5 processor running up to 536MHz with a floating-point unit that features a Gigabit EMAC and/or 10/100 EMAC. The platform is ready for any 10/100 Daughter Board and/or an EDS Daughter boards.



Ethernet PHY Daughter Boards

Ethernet PHY Daughter Boards enable modular development of a platform design that fits your needs. The original 10/100 Ethernet Daughter Boards were designed to plug into multiple development platforms to take advantage of MCUs with integrated 10/100 Ethernet MACs.

PHY Device	Ports	Description	Daughter Board
KSZ8041	1	10/100 PHY	AC320004-5
KSZ8061	1	10/100 PHY	AC320004-6
KSZ8863	2	10/100 PHY	AC320004-7
LAN8720	1	10/100 PHY	AC320004-3
LAN8770	1	100BASE-T1 PHY	EV48S68A
KSZ9131	1	10/100/1000 PHY	EV16T60A



The Ethernet Development System (EDS) Daughter Boards represent Microchip's latest generation develop platform supporting 10/100/1000 Mbps Ethernet PHYs. The EDS connector that is on the bottom side of these boards delivers the performance needed for Gigabit+ PHY speeds.

For the latest Ethernet PHY Daughter board offering go to www.microchip.com/EDB



PIC32 Ethernet Starter Kit II (DM320004-2)

This kit provides the easiest and lowest-cost method to experience 10/100 Ethernet development with PIC32 MCUs. It is combined with LAN8720A and our free TCP/IP software.



KSZ9131RNX Gigabit Ethernet Evaluation Board (KSZ9131RNX-EVAL)

This board features an integrated triple-speed (10Base-T/100Base-TX/1000Base-T) Ethernet physical layer transceiver for transmission and reception of data over a CAT-5 UTP cable. The KSZ9131RNX provides RGMII for direct connection to RGMII MACs.



KSZ8061MNX Evaluation Board (KSZ8061MNX-EVAL)

This board allows you to test the KSZ8061MNZ PHY with Quiet-WIRE technology. Additionally, a second PHY, the KSZ8081 (10/100 Ethernet PHY), is used to provide a second-line interface for simple full-duplex traffic through the KSZ8061. This board is not intended for evaluation of the KSZ8081.



LAN8742 10/100 High-Speed Ethernet Transceiver Evaluation Board (EVB8742)

This board has a standard 40-pin MII connector for RMII configurations and supports WoL and cable diagnostics.



For SoCs and MPUs/CPUs that have USB or PCIe but no Ethernet-standard interface, we offer a portfolio of bridge devices. These devices are fully integrated with on-chip USB or PCIe and Ethernet MAC/PHYs to minimize application size and BOM costs. We provide Windows, macOS and Linux and QNX drivers to enable transparent operation and compatibility.

Our Ethernet bridge devices are compatible with USB 2.0, USB 3.1 Gen1, PCIe and HSIC, delivering up to Gigabit performance.

Available Features

- Wire speed: USB 3.1 Gen1 to Ethernet
- Internal or external PHY interface
- Small 6 × 6 mm, 48-pin package
- On-chip configuration OTP memory
- Bridge USB 3.1, PCIe to 1000BASE-T1 or HDBase-T
- EEE 802.3az
- WoL and Microsoft Always On Always Connected (AOAC)
- Single Pair Ethernet (802.3bw)

Ethernet Bridges

Feature	LAN9730	LAN9500A	LAN9512/3/4	LAN7500	LAN7850	LAN7800	LAN7801	LAN7430	LAN7431
Ethernet Bridge	HSIC to 10/100	USB 2.0 to 10/100		USB 2.0 to 10/100/1000	USB 2.0/ HSIC to 10/100/1000	USB 3.1 Gen1 to 10/100/1000	PCIe® to 10/100/1000		
Integrated Ethernet PHY	✓	✓	✓	✓	✓	✓	-	✓	-
NetDetach™ Technology	✓	✓	-	✓	✓	✓	✓	✓	✓
WoL	✓	✓	✓	✓	✓	✓	✓	✓	✓
PME Support	✓	✓	-	✓	✓	✓	✓	✓	✓
EEE	-	-	-	-	✓	✓	✓	✓	✓
IEEE® Standard 1588	-	-	-	-	-	-	-	✓	✓
Temperature	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 85°C	-40 to 105°C AEC-Q100	-40 to 105°C	-40 to 105°C, AEC-Q100
Packages	56-pin QFN	64-pin QFN		56-pin QFN	56-pin QFN	48-pin QFN	64-pin QFN	48-pin SQFN	72-pin SQFN
MAC I/F	MII and Turbo MII		-	-	-	-	RGMII	-	RMII/RGMII



Bridge Evaluation Boards

The low-cost dongle format of USB-to-Ethernet bridges makes it easy to get started. We provide a complete suite of software drivers for Linux, MacOS and Windows. Our most popular options are below but you can find a complete list of bridge evaluation boards at www.microchip.com/design-centers/ethernet/ethernet-devices/products/ethernet-bridges.



LAN7500 High-Speed USB 2.0-to-10/100/1000 Ethernet Evaluation Board (EVB-LAN7500)

This board is a fully functional, bus-powered USB-to-Ethernet solution with on-board Ethernet RJ45 and USB Type A connectors. The on-board 4K EEPROM loads the USB configuration parameters and MAC address. Software drivers for Windows, MacOS and Linux operating systems are available.



LAN7800 Super-Speed USB-to-Ethernet Low-Cost Evaluation Board (EVB-LAN7800-LC1)

With an ultra-low cost BOM, this evaluation board integrates the USB Type-C connector to implement a super-speed data transfer to Gigabit Ethernet with an on-board RJ45 connector. Linux, OS X and Windows drivers are available.



LAN9512 High-Speed USB Hub-to-Ethernet Evaluation Board (EVB9512)

This board provides a two-port USB 2.0 hub with an integrated 10/100 Ethernet controller and USB connectivity via one Type B upstream USB connector and two Type A downstream USB connectors. An RJ-45 Ethernet jack with integrated magnetics and link/activity LEDs provides 10/100 Ethernet connectivity. The board supports both bus-powered and self-powered modes of operation.



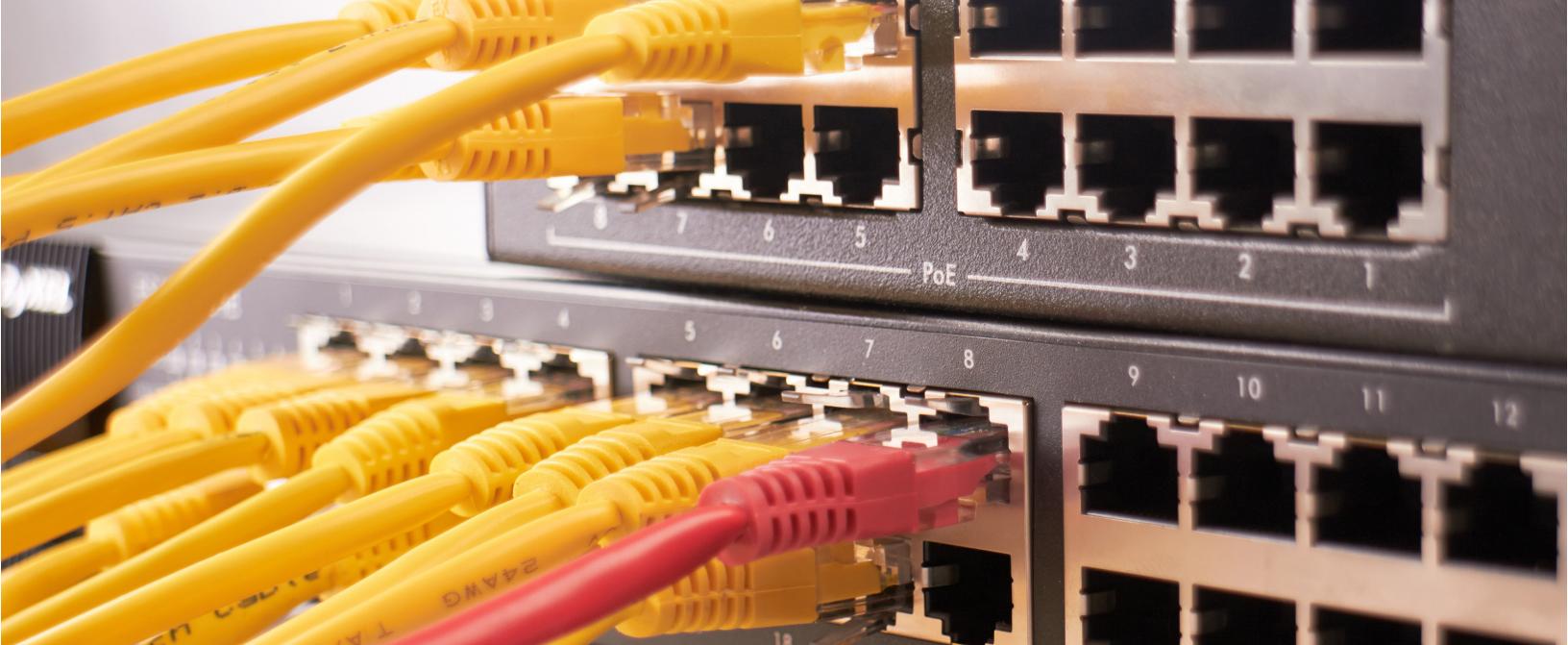
LAN7430 PCIe-to-Gigabit Ethernet Evaluation Board (EVB-LAN7430)

This board enables comprehensive evaluation of basic networking through to IEEE 1588 Precision Time Protocol (PTP). We provide connectors for access to accurate timing signals. JTAG is available via headers or mapping.



LAN9513/LAN9514 High-Speed USB 2.0 TO 10/100 Ethernet Hub Customer Evaluation Board (EVB-LAN9514)

The EVB9514 is an Evaluation Board EVB that utilizes the LAN9514 to provide a four port USB 2.0 hub with an integrated 10/100 Ethernet controller. The EVB9514 provides USB connectivity via one type B upstream USB connector and four type A downstream USB connectors. An RJ-45 integrated magnetics Ethernet jack with link/activity LEDs provides 10/100 Ethernet connectivity. The EVB9514 supports both bus-powered and self-powered modes of operation.



Switches

You can implement managed or unmanaged networks using our portfolio of 10/100, Gigabit and multi-Gigabit switches. These L2+ switches feature multiple ports, extensive advanced switch functionality and a small footprint, assuring optimal network performance. For real-time control, like Time-Sensitive Networking (TSN), our switches feature IEEE 1588 v2 PTP with nanosecond precision, traffic scheduling/shaping and path reservation.

Available Features

Time-Sensitive Networking with Single-Chip Ethernet Switch

- Our new family of Ethernet Switches provides the industry's most complete Time-Sensitive Networking (TSN) feature set.

- | | | |
|--|---|---|
| <ul style="list-style-type: none">• Up to 25 Gbps speeds• Single Pair Ethernet• Audio/Video Bridging (AVB)• Energy Efficient Ethernet IEEE 802.3az• IEEE 802.1Qav-based traffic scheduler• Time Aware Shapers• TSN Stream Policing | <ul style="list-style-type: none">• High Precision Time Synchronization• Redundancy• Delay reduction• IEEE 802.1X port-based authentication• PTP (IEEE 1588 v2, IEEE 802.1AS-2020)• Network fault recovery (DLR/HSR)• Industrial temperatures | <ul style="list-style-type: none">• DLR/HSR• Ethernet ring protection G.8032• Media redundancy protocol - MRP• FRER - 802.1CB• Telecom Profiles (G.8265, G.8275)• LinkMD+ cable diagnostics with signal quality indicator• Synchronous Ethernet support |
|--|---|---|



Ethernet Switches

Gigabit Switch Family

Feature	LAN9370	LAN9371	LAN9372	LAN9373	LAN9374	LAN9381	KSZ9477	KSZ956x	KSZ989x	
Bandwidth	100BASE-TX/T1							10Base-T/100Base-TX/1000Base-T		
Ports	4	3	5	5	6		7	3, 7	3, 6, 7	
Interface	RGMII/RMII/MII			SGMII	RGMII/ RMII/MII		SGMII/RGMII/GMII/RMII/MII			
Cable Diagnostics	LinkMD®+ with signal quality indicator							LinkMD Technology	LinkMD+ with signal quality indicator	LinkMD Technology
IEEE® 1588 v2/802.1AS	✓	✓	✓	✓	✓		✓	✓	-	
AVB	✓	✓	✓	✓	✓		✓	✓	-	
TSN	✓	✓	✓	✓	✓		✓	✓	-	
Time Aware Scheduler	✓	✓	✓	✓	✓		✓	✓	-	
Low-Latency Cut-Through	✓	✓	✓	✓	✓		✓	✓	-	
Network Fault Recovery (DLR/HSR)	✓	✓	✓	✓	✓		✓	-	-	
EEE/WoL/TC10	✓	✓	✓	✓	✓		✓	✓	✓	
Temperature	-40 to 105°C AEC-Q100							-40 to 85°C		
Packages	64-pin QFN	128-pin TQFP	128-pin TQFP	128-pin TQFP	128-pin TQFP		128-pin TQFP	64-pin QFN, 128-pin LQFP, 128-pin LQFP, 128- pin TQFP	64-pin QFN, 128- pin TQFP	

Microchip offers an extensive line of Fast Ethernet switches to meet a variety of consumer, industrial and automotive needs. The following are just a portion of the entire portfolio. For the complete portfolio, please go to

<https://www.microchip.com/en-us/solutions/ethernet-technology/single-pair-etherne>

<https://www.microchip.com/en-us/products/high-speed-networking-and-video/ethernet/etherne>



3-Port Switches

Feature	KSZ8863	KSZ8873	KSZ8463	KSZ8563	LAN9303	LAN9353	LAN9355
Bandwidth	10Base-T/100Base-TX/100Base-FX			10Base-T/100Base-TX		10Base-T/100Base-TX/100Base-FX	
Interface	MII/RMII			MII/RMII/RGMII	MII/RMII/Turbo MII	SPI/SQI/RMII/MII	MII
EEE	-	-	✓	✓	-	✓	✓
V_{DD} I/O	1.8/2.5/3.3			3.3		1.6–3.3	
Cable Diagnostics	✓	✓	✓	✓	-	✓	✓
IEEE® 1588	-	-	✓	✓	-	✓	✓
Power	520 mW		330 mW	-	640 mW	555 mW	
Temperature	-40 to 85°C	-40 to 85°C (AEC-Q100)		-40 to 105°C (AEC-Q100)	-40 to 85°C		
Packages	48-pin LQFP	64-pin LQFP		64-pin QFN	56-pin QFN	64-pin QFN, 64-pin TQFP-EP	88-pin QFN, 80-pin TQFP-EP

Switches

4-Port to 9-Port Switches: KSZ Models

Feature	KSZ8864	KSZ8895	KSZ8794	KSZ8795	KSZ8775	KSZ8765	KSZ8565	KSZ8567	KSZ8999
Bandwidth	10/100Base-T/TX, 100Base-FX		10/100Base-T/TX with GigE Uplink			10/100BASE-T/TX, 100BASE-FX with GigE Uplink	10/100BASE-T/TX with GigE Uplink		10/100BASE-T/TX, 100BASE-FX
Number of Ethernet Ports	4	5	4	5		7		9	
Interface	MII/RMII (×2)		RGMII MII/RMII	GMII/RGMII MII/RMII	RGMII MII/RMII	GMII/RGMII MII/RMII	RGMII/MII/RMII	RGMII/MII/SGMII	MII, SNI
EEE/WoL	-	-	✓	✓	✓	✓	✓	✓	-
IEEE® 802.1X	-	-	-	-	-	-	✓	✓	-
V_{DD} I/O	1.8/2.5/3.3							3.3	
LinkMD® Technology	✓	✓	✓	✓	✓	✓	LinkMD+ with signal quality indicator		-
Power	253 mW	435 mW	430 mW	560 mW	460 mW	560 mW	-	-	1472 mW
Temperature	-40 to 85°C (AEC-Q100)		-40 to 85°C			-40 to 105°C (AEC-Q100)	-40 to 105°C (AEC-Q100)	-40 to 85°C	-40 to 85°C
Packages	64-pin QFN	128-pin LQFP	64-pin QFN	80-pin LQFP			128-pin TQFP		208-pin PQFP

4-Port to 64-Port Switches: VSC Models

4-Port to 64-Port Switches: VSC Models								
Features	VSC7511	VSC7512	VSC7513	VSC7514	VSC7440	VSC7546	VSC7549	VSC7558
Bandwidth	10/100/ 1000/2500 Mbps	10/100/ 1000/2500 Mbps	10/100/ 1000/2500 Mbps	10/100/ 1000/2500 Mbps	10/100/ 1000/2500 Mbps 10 Gbps	10/100/1000/ 2500 Mbps 5/10 Gbps	10/100/1000/ 2500 Mbps 5/10 Gbps	10/100/1000/ 2500 Mbps 5/10/25 Gbps
Ports	4	10	8	10	10	64	64	64
Interface	SGMII, 1000Base-T (4)	SGMII, QSGMII 1000Base-T (4)	SGMII, QSGMII 1000Base-T (4)	SGMII, QSGMII 1000Base-T (4)	SGMII 1000Base-T XFI	SGMII, QSGMII, USGMII, USXGMII, XFI	SGMII, QSGMII, USGMII, USXGMII, XFI	SGMII, QSGMII, USGMII, USXGMII, XFI
EEE	✓	✓	✓	✓		✓	✓	✓
V_{DD} I/O (V)	1.0/1.2/2.5	1.0/1.2/2.5	1.0/1.2/2.5	1.0/1.2/2.5	1.0/1.2/2.5	0.9/1.5/ 1.8/3.3	0.9/1.5/ 1.8/3.3	0.9/1.5/ 1.8/3.3
Cable Diagnostics	✓	✓	✓	✓	✓			
IEEE 1588	✓	✓	✓	✓	✓	✓	✓	✓
Temperature	-40 to +125°C	-40 to +125°C	-40 to +125°C	-40 to +125°C	-40 to +125°C	-40 to +110°C	-40 to +110°C	-40 to +110°C
Packages	172 VQFN	172 VQFN	256 PBGA	256 PBGA	172 VQFN	888 FCBGA	888 FCBGA	888 FCBGA

4-Port to 64-Port Switches: TSN Models

4-Port to 64-Port Switches: TSN Models					
Features	LAN9662	LAN9668	VSC7546TSN	VSC7549TSN	VSC7558TSN
Bandwidth	10/100/ 1000/2500 Mbps	10/100/ 1000/2500 Mbps	10/100/1000/ 2500 Mbps 5/10 Gbps	10/100/1000/ 2500 Mbps 5/10 Gbps	10/100/1000/ 2500 Mbps 5/10/25 Gbps
Ports	4	8	64	64	64
Interface	SGMII 1000Base-T (2)	RGMII, SGMII, QSGMII 1000Base-T (2)	SGMII, QSGMII, USGMII, USXGMII, XFI	SGMII, QSGMII, USGMII, USXGMII, XFI	SGMII, QSGMII, USGMII, USXGMII, XFI
EEE	✓	✓	✓	✓	✓
TSN	✓	✓	✓	✓	✓
V_{DD} I/O (V)	1.1/2.5/3.3	1.1/2.5/3.3	0.9/1.5/ 1.8/3.3	0.9/1.5/ 1.8/3.3	0.9/1.5/ 1.8/3.3
Cable Diagnostics	✓	✓			
IEEE 1588	✓	✓	✓	✓	✓
Temperature	-40 to +85°C	-40 to +85°C	-40 to +110°C	-40 to +110°C	-40 to +110°C
Packages	256 HSBGA	256 HSBGA	888 FCBGA	888 FCBGA	888 FCBGA

Switch Evaluation Boards

You can implement Ethernet networks with ease by starting with our switch evaluation boards. For development in MPLAB Harmony software framework, select the PIC32 Starter Kit for Ethernet II and the LAN9303 daughter card. For development with processors running Linux OS, choose from our evaluation boards with standard MAC interfaces. Our most popular options are below, but you can find a complete list of switch evaluation boards at www.microchip.com/design-centers/ethernet/ethernet-devices/products/ethernet-switches.



LAN9303 PHY Switch Daughter Board (AC320004-4)

Used with the PIC32 Ethernet Starter Kit II, this board provides an easy and low-cost way to implement 10/100 Ethernet switching. Combined with our free TCP/IP software, this kit gets your project running quickly.



KSZ8765 10/100 Ethernet Evaluation Board (KSZ8765CLX-EVAL)

This board features an integrated 5-port switch with Gigabit up-link. It contains four MAC/PHYs with two fiber ports, two copper ports and one GMAC interface that is configurable with GMII/RGMII/MII/RMII interfaces. We designed this board to allow Gigabit up-link with the Gigabit port of any processor.



KSZ9897 Gigabit Ethernet Evaluation Board (EVB-KSZ9897)

This board features a completely integrated triple speed (10Base-T/100BASE-TX/1000Base-T) Ethernet switch with seven ports. The board has six physical ports and one USB-to-Ethernet port. The board also features the LAN7800 USB-to-Ethernet bridge and KSZ9031 Gigabit PHY.



KS9477 Gigabit Ethernet Evaluation Board (EVB-KS9477)

This board features a completely integrated triple speed (10Base-T/100-Base-TX/1000Base-T) Ethernet switch with five ports and one SFP port. The Arm®-based ATSAMA5D3 host processor implements advanced switch management features such as IEEE 1588 v2, HSR/DLR ring redundancy, AVB and authentication and it is also reprogrammable.



VSC5640EV SPARX-5,-5I Evaluation Board, 12 SFP 8 SFP28

The VSC5640EV ethernet development system can be used to demonstrate the SparX-5,-5i Ethernet switches.



VSC5634EV - Ocelot, Elise, 8XRJ45, 2XSFP, Unmanaged Reference Board

The VSC5634EV ethernet development system can be used to demonstrate the VSC7511/12 Ocelot unmanaged Ethernet switches and the VSC8514 PHY devices.



VSC7514EV - Ocelot, 8XRJ45, 8XSFP, PTP, SyncE, Managed Reference Board

This is the evaluation board for the VSC7514 10-Port Gigabit Ethernet Switch (and the VSC7513).



EVB-LAN9370 (EV64C55A)

The EVB-LAN9370 board is a 100BASE-T1 Ethernet switch plug-in card for the SAMS70/E70/V70/V71 Xplained Ultra board.

Switch Evaluation Boards



EVB-LAN9668 (EV18W53A)

The EVB-LAN9668 is the evaluation board for the LAN9668 TSN Switch. The EVB-LAN9668 implements 8 Gigabit Ethernet ports with the LAN9668 Switch and LAN8814 PHYs.



EVB-LAN9662 (EV09D37A)

The EVB-LAN9662 CPU board is the evaluation board for the LAN9662 TSN switch.



EVB-LAN9662-Carrier (EV44Z97A)

The EVB-LAN9662-Carrier is the carrier for the CPU board.



EVB-LAN9383

The LAN9383 Evaluation Board provides a convenient and small-form-factor evaluation platform for our seven-port, safe and secure family of Time-Sensitive Networking (TSN) Gigabit Ethernet switches.

Controllers

For embedded applications, like those using MCUs, our Ethernet controller family offers many flexible interfaces, including SPI, PCI and 8-/16-/32-bit parallel host bus interfaces. All of these interfaces work with an integrated MAC and PHY, delivering 10/100 performance with minimal CPU overhead. We offer free compact TCP/IP stacks for 8-, 16- and 32-bit MCUs. Our Ethernet controllers are also available in small package options.

Available Features

- Variety of flexible processor interfaces
- Small 5 × 5 mm 32-pin packaging
- IEEE 1588 v2 PTP
- Hardware AES encryption engine
- Energy Efficient Ethernet (EEE) (802.3az)

Ethernet Controllers

We provide drivers for our award-winning MPLAB Harmony software framework and for open operating systems like Linux. Whether your application is large or small, we have the driver to cover your needs.

Feature	ENC28J60	ENC624J600	KSZ8851	LAN9250	LAN9221	KSZ8441	KSZ8462
Bandwidth	10Base-T	10/100Base-T/TX	10/100Base-T/TX, 100Base-FX	10/100Base-T/TX	10/100Base-T/TX	10/100Base-T/TX, 100Base-FX	10/100Base-T/TX, 100Base-FX
TX/RX Buffer	8 KB	24 KB	12 KB (RX), 6 KB (TX)	16 KB	16 KB	12 KB (RX), 6 KB (TX)	12 KB (RX), 6 KB (TX)
Interface	SPI	SPI, Parallel	SPI, 8-/16-bit, 16-/32 bit	SPI, 16-bit	16-bit	8-/16-bit	8-/16-bit
IEEE® 1588 v2	-	-	-	✓	-	✓	✓
WoL	-	-	✓	✓	-	-	-
EEE 802.3az	-	✓	✓	✓	-	✓	✓
Number of Ports	1	1	1 or 2	1	1	1	2
Cable Diagnostics	-	-	✓	✓	-	✓	✓
Power	790 mW	416 mW	330 mW	344 mW	522 mW	330 mW	330 mW
Temperature	-40 to 85°C		-40 to 85°C (AEC-Q100)	-40 to 85°C			
Packages	28-pin QFN, 28-pin SOIC 300 mil, 28-pin SPDIP, 28-pin SSOP 208 mil	48-pin QFN, 48-pin TQFP, 64-pin TQFP	32-pin QFN, 48-pin LQFP, 128-pin PQFP	56-pin VQFN		64-pin LQFP	

Controller Evaluation Boards

Adding an Ethernet controller to your application is easy. The Ethernet PICtail™ Plus daughter board used with the Explorer 16 is an ideal solution for your PIC24- and PIC32-based applications. For development in the MPLAB Harmony software framework, select the LAN9250 10/100 Ethernet Controller Evaluation Board. For development with processors running the Linux OS, the KSZ8851SNL evaluation board provides SPI-to-Ethernet connectivity. Our most popular options are below but you can find a complete list at www.microchip.com/design-centers/ethernet/ethernet-devices/products/ethernet-controllers.



Ethernet PICtail Plus Daughter Board (AC164123)

Designed for flexibility while evaluating and developing Ethernet control applications, you can plug this board into our Explorer 16 (DM240001) and use it with our TCP/IP stack to connect with any of our 16-bit MCUs.



KSZ8851SNL Evaluation Board (KSZ8851SNL-EVAL)

This board is for the evaluation of this single-port Ethernet controller. With a 32-pin QFN (5 × 5 mm) package, it is ideal for applications requiring SPI and provides a basic software driver and configuration utility.



LAN9250 10/100 Ethernet Controller Evaluation Board (EVB-LAN9250)

The simple yet highly functional host bus interface provides a glue-less connection to the most common MPUs and MCUs and you can access the device via SPI/SQI. You can also fit an optical fiber interface via an SFP module. You can interface the on-board PIC32MX MCU to the LAN9250 using an HBI or SPI interface.



EtherCAT®

Microchip's LAN9252 is a 2/3-port EtherCAT device controller (ESC) with dual integrated Ethernet PHYs which each contain a full-duplex 100BASE-TX transceiver and support 100Mbps (100BASE-TX) operation. The LAN9252 supports HP Auto-MDIX, allowing the use of direct connect or cross-over LAN cables. 100BASE-FX is supported via an external fiber transceiver. This device provides system developers a cost-effective solution for realizing EtherCAT device solutions.

Available Features

- Operates with/without host processor
- Fast SPI, quad SPI or 8-/16-bit interfaces
- Multi-function GPIO
- Compact 12 × 12 mm 64-pin package
- Flexible operation modes with up to three ports
- Integrated microcontroller

Product Features	LAN9252	LAN9253	LAN9254	LAN9255
EtherCAT Ports				
Number of ports available	1,2,3, 4*	1,2,3,4*	1,2,3,4*	1,2,3,4*
Number of PHY available	2 PHY, 1 MII**	2 PHY, 1 MII**	2 PHY, 1 MII**	2 PHY, 1 MII**
Integrated MCU	-	-	-	✓
Integrated Arm® Cortex®-M4F MCU	-	-	-	✓
10/100 Ethernet MAC (RMII)	-	-	-	✓
Process Data Interface (PDI)				
SPI/SQI	✓	✓	✓	✓
Link status LED	✓	✓	✓	✓
EtherCAT Error LED		✓	✓	✓
EEPROM				
EEPROM size (in bits)	1K to 4M	1K to 4M	1K to 4M	1K to 4M
EEPROM emulation	-	✓	✓	✓
Fibre support	✓	-	-	-
Auto MDIX	✓	✓	✓	✓
EtherCAT Wake Up	✓	✓	✓	✓
Power Over EtherCAT (EtherCAT P)	✓	✓	✓	✓
Target cycle time	125 µSec	76.9 µSec	76.9 µSec	76.9 µSec
Package	64 QFN, 64 TQFP	64 QFN	80 TQFP	128 TQFP
Extended Industrial Version	-40 to +105°C	-40 to +105°C	-40 to +105°C	-40 to +105°C

Development Tools

	Development Tool	Part Number	Description
	Add-On for EL9800 Development Platform	EVB-LAN9252-ADD-ON	This is designed to be used as an add-on board (ESC board) with the Beckhoff EL9800 EtherCAT® Evaluation Board. This board supports the SPI and DIGIO PDI modes of the LAN9252.
	PICtail™ Plus for Explorer 16 Platform	EVB-LAN9252-PICTAIL	This board is used to evaluate the LAN9252. It is an expansion board for the Explorer 16 Development Board (DM240001).
	3-Port EtherCAT Slave Controller Evaluation Kit with SPI PDI Interface	EVB-LAN9252-3PORT	This evaluation board is a stand-alone platform with SPI/SQI as the PDI interface. It supports the on-board PIC32MX or options for other SoCs.
	4-Port Slave Controller Evaluation Kit in Expansion Mode	EVB-LAN9252-4PORT	This board features a unique design by cascading two LAN9252 ESCs in a back-to-back configuration through the MII interface. It is a stand-alone platform to develop an EtherCAT slave device with SPI/SQI™ as the PDI interface. This board supports the on-board PIC32MX or options for other SoCs.
	EtherCAT Slave Controller Evaluation Kit with DIGIO PDI Interface	EVB-LAN9252-DIGIO	This board satisfies the demand for hardware-only EtherCAT slave devices. The exposed DIGIO interface can operate together with control signals without an attached MCU.
	EtherCAT Slave Controller Evaluation Kit with HBI PDI Interface	EVB-LAN9252-HBIPLUS	This board is a stand-alone platform to develop an EtherCAT slave device with PIC32 or other SoCs/MCUs/MPUs with more advanced features over the standard HBI board.
	EVB-LAN9255	EV25Y25A	EVB-LAN9255 allows engineers to develop using an integrated Cortex M4F microcontroller and EtherCAT device controller. Peripherals are provided on board with expansion via the popular mikroBUS Click Board™ interface. An ethernet MAC is available and allows connection to associated boards for single and dual port options. This hardware is fully supported within the Microchip Harmony Framework.
	EVB-LAN9253 D51 EVB-LAN9253 Ethercat Device Controller Evaluation Kit With SAMD51 Microcontroller	EV50P30A	EVB-LAN9253-D51 allows engineers to develop using the LAN9253 ESC together with a Cortex M4F Microcontroller. Peripherals are provided on board with expansion via the popular mikroBUS Click Board™ interface. This hardware is fully supported within the Microchip Harmony Framework. A identical board is available that carries LAN9252. Between these two platforms a user can observe pin compatibility and a migration path from LAN9252 towards LAN9253.
	EtherCAT controller with dual integrated Ethernet PHYs	LAN9254	Microchip's LAN9254 is a 3 port EtherCAT device controller (ESC) with dual integrated Ethernet PHYs which each provide a full-duplex 100BASE-TX transceiver and support 100Mbps (100BASE-TX) operation. The LAN9253 supports HP Auto-MDIX, allowing the use of direct connect or cross-over LAN cables. This device provides system developers a cost-effective solution for realizing EtherCAT device solutions.

Find out more at www.microchip.com/ethercat.

Microchip Technology Inc. | 2355 W. Chandler Blvd. | Chandler AZ, 85224-6199 | microchip.com