
Getting Started with KSZ9897

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1.0 INTRODUCTION

This document is intended to provide a customer with all the essential information needed to select the correct Ethernet switch within the KSZ Gigabit Ethernet switch family and to quickly start designing both hardware (HW) and software (SW) for the KSZ9897 7-Port Gigabit Ethernet Switch. The KSZ family of Gigabit Ethernet Switches is popular and enables a non-blocking switching fabric with many advanced features. It can be used as a standard switch without requiring a processor. Alternatively, it can also be run in Managed mode to enable key features and set up the switch.

1.1 Sections

This document covers the following sections:

- [Section 2.0, "Product and Family Overview"](#)
- [Section 3.0, "Switch Configuration Options"](#)
- [Section 4.0, "Software Guide"](#)
- [Section 5.0, "Hardware and EVB Guide"](#)
- [Section 6.0, "The Microchip Knowledge Base"](#)
- [Section 7.0, "Documentation"](#)

1.2 References

Related documentation is covered in [Section 7.0, "Documentation"](#). The latest KSZ9897 documentation is available on the [KSZ9897](#) product page. Additionally, the EVB code referenced in this document is available from a GitHub link on the [Microchip Ethernet](#) page.

2.0 PRODUCT AND FAMILY OVERVIEW

The KSZ9897 belongs to a family of devices with various configurations and features enabled. [Table 1](#) describes this family of devices. The KSZ9897 device is a subset of and closely related to the KSZ9477, with some documentation and collateral shared between the two.

TABLE 1: I²C/SMBUS INTERFACE PIN STRAPPING TRUTH TABLE

Feature	KSZ9893R	KSZ9563	KSZ9567	KSZ9896	KSZ9897S	KSZ9897R	KSZ9477
Bandwidth	10Base-T / 100Base-TX / 1000Base-T						
Ports	3	3	7	6	7	7	7
Interfaces	1xRGMII/ MII/RMII	1xRGMII/ MII/RMII	1xSGMII, 1xRGMII/ MII/RMII	1xGMII/ RGMII/MII/ RMII	1xSGMII, 1xRGMII/ MII/RMII	2xRGMII/ MII/RMII	1xSGMII, 1xRGMII/ MII/RMII
Integrated 10/100/1000 BASE-T PHYs	2x	2x	5x	5x	5x	5x	5x
VLAN IDs	4K						
QoS	4 queues						
IEEE 1588v2/ 802.1AS		X	X				X
AVB							X
Network Fault Recovery (DLR/ HSR)							X
Energy Efficient Ethernet	X	X		X			
Temperature Range	0 to 70C, -40 to 85C	0 to 70C, -40 to 85C	-40 to 85C	0 to 70C, -40 to 85C	0 to 70C, -40 to 85C	0 to 70C, -40 to 85C	-40 to 85C
Package	64 Pin VQFN	64 Pin VQFN	128 Pin TQFP	128 Pin TQFP	128 Pin TQFP	128 Pin TQFP	128 Pin TQFP
Package Dimension	8x8 mm	8x8 mm	14x14 mm	14x14 mm	14x14 mm	14x14 mm	14x14 mm

3.0 SWITCH CONFIGURATION OPTIONS

The KSZ family of switches provides various methods for configuring and operating the switch. The method used will be determined by the required features and system availability. There are trade-offs and limitations to each method, and certain features can only be enabled via certain methods. The four main operation modes are:

- Pin-Strapping
- Serial Interface Configuration: I²C, SPI, MIIM
- Ethernet In-Band Access (IBA) Configuration
- Host Processor Configuration

Additional information can be found in *AN2577 Getting Started with Gigabit Ethernet Switch Configuration Options*.

4.0 SOFTWARE GUIDE

4.1 Linux® DSA

The KSZ9897 Linux® DSA driver is found in the Linux Kernel. Microchip® is continuously adding updates and features, along with the community. The latest kernel source can be found at <https://github.com/torvalds/linux/tags> with the latest formatted documentation at <https://www.kernel.org/doc/html/latest/>.

4.2 SPI Microchip® Driver

This driver is hosted on Microchip's GitHub and currently supports the Linux 6.6 kernel. Begin by selecting your needed kernel version from <https://github.com/Microchip-Ethernet/EVB-KSZ9477/tree/master/KSZ/linux-drivers/ksz9897> and follow the instructions in the linux-M.m/doc/README file.

Development of this driver began before Linux DSA reached maturity and still offers some capabilities beyond what is currently supported by Linux DSA.


Given that the KSZ9477 is a superset of the KSZ9897, many of the Microchip's drivers and evaluation products use the KSZ9477 instead of the KSZ9897.

5.0 HARDWARE AND EVB GUIDE

5.1 EVB-KSZ9897-1

An Unmanaged Mode Evaluation Board that is connected via a USB to Ethernet Bridge. The switch configuration is done through a Linux-based GUI or command-line tooling.

Visit the [EVB-KSZ9897-1](#) product page to access the latest collateral, including:

- *EVB-KSZ9897 Gigabit Ethernet Switch Evaluation Board User's Guide*
- *EVB-KSZ9897 Software User Guide, Software Image ISO, and Source Code* 
- *EVB-KSZ9897 Evaluation Board Bill of Materials*
- *EVB-KSZ9897 Evaluation Board Schematics (PDF)*
- *EVB-KSZ9897 Evaluation Board Gerber Files*
- *EVB-KSZ9897 Evaluation Board Design Files (Altium)*

5.2 EVB-KSZ9477-1

A Managed Mode Evaluation Board comes with a pre-programmed NAND flash that contains a Linux image. This image provides tools that can be used to exercise the board. Additionally, you can customize the image by building a custom kernel and either downloading it to the NAND flash or booting it through the microSD card slot located on the bottom of the PCB.

Visit the [EVB-KSZ9477-1](#) product page to access the latest collateral, including:

- *EVB-KSZ9477 Gigabit Ethernet Switch Evaluation Board User's Guide*
- *EVB-KSZ9477 Demo Images, Image Programming Guides, and Image Source Code*
- *EVB-KSZ9477 Software Setup Guide*
- *EVB-KSZ9477 Source Build Instructions*
- *EVB-KSZ9xxx Switch Driver Setup Guide*
- *EVB-KSZ9477 Evaluation Board Bill of Materials*
- *EVB-KSZ9477 Evaluation Board Schematics (PDF)*
- *EVB-KSZ9477 Evaluation Board Gerber Files*
- *EVB-KSZ9477 Evaluation Board Design Files (Altium)*
- *KSZ Switch Utilities User Guide*

5.2.1 USING THE KSZ9477 TO EVALUATE THE KSZ9897

The KSZ9897 device is a subset of and closely related to the KSZ9477, with the main difference being the additional support for PTP (IEEE®1588), AVB, and DLR/HSR in the KSZ9477. The KSZ9897S contains the same SGMII port as the KSZ9477 however, the KSZ9897R has a second RGMII port.

5.2.2 USING LINUX® DSA ON EVB-KSZ9477

The EVB-KSZ9477 can also be customized to run via the Linux DSA driver in a choice of Microchip provided Linux kernel versions. Here are the relevant KB articles:

- [EVB-KSZ9477: How to Use the Linux DSA Driver](#)
- [Building different Linux Kernel Version for SAMA5D3-EDS and EVB-KSZ9477](#)

6.0 THE MICROCHIP KNOWLEDGE BASE

Most support collateral for the KSZ9897 can be found on the [KSZ9897](#) product page on the Microchip website. This includes links to Evaluation Board (EVB), application notes, files, and ordering information through Microchip Direct.

There are other resources available through the [Microchip Knowledge Base \(KB\)](#). This database is searchable for pertinent information. For example, here are some relevant KB articles:

- [An Overview of Linux Drivers for KSZ Switch Families](#)
- [EVB-KSZ9477: How to Use the Linux DSA Driver](#)
- [Unused Ports on the KSZ9897, 9896, 9567, 9477, 8567 and 8565](#)

7.0 DOCUMENTATION

The [KSZ9897](#) product page includes links to many documentation resources, as shown in [Table 2](#).

TABLE 2: KSZ9897 DOCUMENTATION

Category	Resource	Notes
Data Sheet and Errata	KSZ9897R 7-Port Gigabit Ethernet Switch with Two RGMII/MII/RMII Interfaces	Core device data sheet - includes the device register map
	KSZ9897S 7-Port Gigabit Ethernet Switch with SGMII and RGMII/MII/RMII Interface	Core device data sheet - includes the device register map
	KSZ9897S Silicon Errata and Data Sheet Clarification	The errata document should be consulted by end system integrators to ensure the end application is not affected by device errata and follows necessary mitigation or workarounds.
	KSZ9897R Silicon Errata and Data Sheet Clarification	The errata document should be consulted by end system integrators to ensure that the end application is not affected by device errata and follows necessary mitigation or workarounds.
Schematic and PCB Design Guidelines	KSZ989x/KSZ956x/KSZ9477 Hardware Design Checklist	KSZ9897 schematic design requirements in a simple format
	Gigabit Ethernet Guide	Generalized system design guidance (schematic level and layout level) for Microchip Gigabit Ethernet applications
Modeling	KSZ9897R IBIS	KSZ9897R IBIS Model for SI (signal integrity) and timing simulation of the RGMII/MII/RMII interfaces
	KSZ9897S IBIS	KSZ9897S IBIS Model for SI (signal integrity) and timing simulation of the RGMII/MII/RMII interfaces

TABLE 2: KSZ9897 DOCUMENTATION (CONTINUED)

Category	Resource	Notes
Application Notes	Ethernet Theory of Operation	A basic introduction to Ethernet.
	Getting Started with Gigabit Ethernet Switch Configuration Options	A comparison of the switch management methods and which features are supported with each.
	Interfacing the SGMII Port on KSZ9xx7S and KSZ8567S Switches	Introduction to SGMII (Serial Gigabit media independent interface).
	Ethernet Compliance Testing for 10BASE-T, 100BASE-TX, and 1000BASE-T	Overview of the Ethernet compliance tests, including instructions on how to run the tests and interpret the results.
	Ethernet over Plastic Optical Fibre	Introduction to Plastic Optical Fibre with implementation guidance.
	Capacitive Coupling Ethernet Transceivers without Using Transformers	Guidance on how to implement a system without the use of transformers, which can save system costs and minimize the physical PCB size.
	Management Interfaces for Micrel Switches	Discussion on numerous switch management methods, both <i>in-band</i> (i.e., through ethernet) and <i>out-of-band</i> (i.e., through inter-chip interface). Note: <i>Micrel was acquired by Microchip Technology in 2015.</i>
	1000BASE-T Transmitter Distortion	Deep dive discussion on IEEE 802.3-2008 transmitter distortion specification and analysis of Microchip Ethernet PHY distortion test results.
	Transient Protection in Power Over Ethernet Applications	Guidance on how to implement PoE and properly protect the system components from PoE-related voltage transients.

APPENDIX A: APPLICATION NOTE REVISION HISTORY

TABLE A-1: REVISION HISTORY

Revision Level & Date	Section/Figure/Entry	Correction
DS00005513A (07-31-24)	All	Initial release

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