

KSZ9893RNX

3-Port Gigabit Ethernet Switch with RGMII/MII/RMII Interface

Highlights

- · Non-blocking wire-speed Ethernet switching fabric
- Full-featured forwarding and filtering control, including Access Control List (ACL) filtering
- Full VLAN and QoS support
- Two ports with integrated 10/100/1000BASE-T PHYs
- One port with 10/100/1000 Ethernet MAC and configurable RGMII/MII/RMII interface
- IEEE 802.1X port-based authentication support
- EtherGreen[™] power management features, including low power standby and IEEE 802.3az
- Flexible management interface options: SPI, I²C, MIIM, and in-band management via any port
- Commercial/Industrial temperature range support
- 64-pin VQFN (8 x 8mm) lead-free package

Target Applications

- Stand-alone 10/100/1000Mbps Ethernet switches
- VoIP infrastructure switches
- Broadband gateways/firewalls
- · Wi-Fi access points
- Integrated DSL/cable modems
- Security/surveillance systems
- Industrial control/automation switches
- · Networked measurement and control systems

Features

- Switch Management Capabilities
 - 10/100/1000Mbps Ethernet switch basic functions: frame buffer management, address look-up table, queue management, MIB counters
 - Non-blocking store-and-forward switch fabric assures fast packet delivery by utilizing 4096 entry forwarding table with 128kByte frame buffer
 - Jumbo packet support up to 9000 bytes
 - Port mirroring/monitoring/sniffing:
 - ingress and/or egress traffic to any port
 - MIB counters for fully-compliant statistics gathering 34 counters per port
 - Tail tagging mode (one byte added before FCS) support at host port to inform the processor which ingress port receives the packet and its priority
 - Loopback modes for remote failure diagnostics
 - Rapid spanning tree protocol (RSTP) support for topology management and ring/linear recovery
 - Multiple spanning tree protocol (MSTP) support

- Two Integrated PHY Ports
 - 1000BASE-T/100BASE-TX/10BASE-T IEEE 802.3
 - Fast Link-up option significantly reduces link-up time
 - Auto-negotiation and Auto-MDI/MDI-X support
 - Energy-Efficient Ethernet (EEE) support with lowpower idle mode and clock stoppage
 - On-chip termination resistors and internal biasing for differential pairs to reduce power
 - LinkMD® cable diagnostic capabilities for determining cable opens, shorts, and length
- One Configurable External MAC Port
 - Reduced Gigabit Media Independent Interface (RGMII) v2.0
 - Reduced Media Independent Interface (RMII) v1.2 with 50MHz reference clock input/output option
 - Media Independent Interface (MII) in PHY/MAC mode
- Advanced Switch Capabilities
 - IEEE 802.1Q VLAN support for 128 active VLAN groups and the full range of 4096 VLAN IDs
 - IEEE 802.1p/Q tag insertion/removal on per port basis
 - VLAN ID tag/untag options on per port or VLAN basis
 - IEEE 802.3x full-duplex flow control and half-duplex back pressure collision control
 - IEEE 802.1X (Port-Based Network Access Control)
 - IGMP v1/v2/v3 snooping for multicast packet filtering
 - IPv6 multicast listener discovery (MLD) snooping
 - IPv4/IPv6 QoS support, QoS/CoS packet prioritization
 - 802.1p QoS packet classification with 4 priority queues
 - Programmable rate limiting at ingress/egress ports
 - Broadcast storm protection
 - Four priority queues with dynamic packet mapping for IEEE 802.1p, IPv4 DIFFSERV, IPv6 Traffic Class
 - MAC filtering function to filter or forward unknown unicast, multicast and VLAN packets
 - Self-address filtering for implementing ring topologies
- Comprehensive Configuration Registers Access
 - High-speed 4-wire SPI (up to 50MHz), I²C interfaces provide access to all internal registers
 - MII Management (MIIM, MDC/MDIO 2-wire) Interface provides access to all PHY registers
 - In-band management via any of the three ports
 - I/O pin strapping facility to set certain register bits from I/O pins at reset time
 - On-the-fly configurable control registers
- Power Management
 - IEEE 802.3az Energy Efficient Ethernet (EEE)
 - Energy detect power-down mode on cable disconnect
 - Dynamic clock tree control
 - Unused ports can be individually powered down
 - Full-chip software power-down
 - Wake-on-LAN (WoL) standby power mode

TO OUR VALUED CUSTOMERS

It is our intention to provide our valued customers with the best documentation possible to ensure successful use of your Microchip products. To this end, we will continue to improve our publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced.

If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via E-mail at docerrors@microchip.com. We welcome your feedback.

Most Current Documentation

To obtain the most up-to-date version of this documentation, please register at our Worldwide Web site at:

http://www.microchip.com

You can determine the version of a data sheet by examining its literature number found on the bottom outside corner of any page. The last character of the literature number is the version number, (e.g., DS3000000A is version A of document DS30000000).

Errata

An errata sheet, describing minor operational differences from the data sheet and recommended workarounds, may exist for current devices. As device/documentation issues become known to us, we will publish an errata sheet. The errata will specify the revision of silicon and revision of document to which it applies.

To determine if an errata sheet exists for a particular device, please check with one of the following:

Microchip's Worldwide Web site; http://www.microchip.com

• Your local Microchip sales office (see last page)

When contacting a sales office, please specify which device, revision of silicon and data sheet (include -literature number) you are using.

Customer Notification System

Register on our web site at www.microchip.com to receive the most current information on all of our products.

1.0 INTRODUCTION

1.1 General Description

The KSZ9893RNX is a highly-integrated, IEEE 802.3 compliant networking device that incorporates a layer-2+ managed Gigabit Ethernet switch, two 10BASE-T/100BASE-TX/1000BASE-T physical layer transceivers (PHYs) and associated MAC units, and one MAC port with a configurable RGMII/MII/RMII interface for direct connection to a host processor/controller, another Ethernet switch, or an Ethernet PHY transceiver.

The KSZ9893RNX is built upon industry-leading Ethernet technology, with features designed to offload host processing and streamline the overall design:

- Non-blocking wire-speed Ethernet switch fabric
- Full-featured forwarding and filtering control, including port-based Access Control List (ACL) filtering
- Full VLAN and QoS support
- Traffic prioritization with per-port ingress/egress queues and by traffic classification
- Spanning Tree support for RSTP and MSTP
- IEEE 802.1X port-based authentication support

A host processor can access all KSZ9893RNX registers for control over all PHY, MAC, and switch functions. Full register access is available via the integrated SPI or I²C interfaces, and by in-band management via any one of the data ports. PHY register access is provided by a MIIM interface. Flexible digital I/O voltage allows the MAC port to interface directly with a 1.8/2.5/3.3V host processor/controller/FPGA.

Additionally, a robust assortment of power-management features including IEEE 802.3az Energy-Efficient Ethernet (EEE) for power savings with idle link, and Wake-on-LAN (WoL) for low power standby operation, have been designed to satisfy energy-efficient system requirements.

The KSZ9893RNX is available in commercial (0°C to +70°C) and industrial (-40°C to +85°C) temperature ranges. An internal block diagram of the KSZ9893RNX is shown in Figure 1-1.



FIGURE 1-1: INTERNAL BLOCK DIAGRAM

2.0 PACKAGE INFORMATION

2.1 Package Drawings

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

FIGURE 2-1: PACKAGE (DRAWING)



KSZ9893RNX

FIGURE 2-2: PACKAGE (DIMENSIONS)



FIGURE 2-3: PACKAGE (LAND PATTERN)



Microchip Technology Drawing C04-2437A

APPENDIX A: PRODUCT BRIEF REVISION HISTORY

TABLE A-1: REVISION HISTORY

Revision	Section/Figure/Entry	Correction
DS00002318A (12-16-16)	Initial Document Release	

THE MICROCHIP WEB SITE

Microchip provides online support via our WWW site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- General Technical Support Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- Business of Microchip Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://www.microchip.com/support

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO. Device	XX Package	<u>X</u> │ Temp. 1 Range	[<u>XX]</u> 	1) eel		Exar a)	mples: KSZ9893RNXC 64-pin VQFN package, Commercial temperature, Standard packaging		
Device:	KSZ98	393R = 3-Port	t Switch wit	th 1 RGMII/MII/RMII Interfac	e	b)) KSZ9893RNXI-TR 64-pin VQFN package, Industrial temperature, Tape and reel		
Package:	NX	= 64-pin VG	QFN						
Temperature Range:	C I	$= 0^{\circ}C \text{ to}$ $= -40^{\circ}C \text{ to}$	+70°C +85°C	(Commercial) (Industrial)					
Tape and Reel Option:	Blank -TR	= Standard = Tape and	packaging Reel ⁽ Note	(tray) 9 1)		Note	1:	Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.	

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REP-RESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, AVR, AVR logo, AVR Freaks, BeaconThings, BitCloud, CryptoMemory, CryptoRF, dsPIC, FlashFlex, flexPWR, Heldo, JukeBlox, KEELOQ, KEELOQ logo, Kleer, LANCheck, LINK MD, maXStylus, maXTouch, MediaLB, megaAVR, MOST, MOST logo, MPLAB, OptoLyzer, PIC, picoPower, PICSTART, PIC32 logo, Prochip Designer, QTouch, RightTouch, SAM-BA, SpyNIC, SST, SST Logo, SuperFlash, tinyAVR, UNI/O, and XMEGA are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, EtherSynch, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and Quiet-Wire are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Adjacent Key Suppression, AKS, Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, CryptoAuthentication, CryptoCompanion, CryptoController, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KleerNet, KleerNet logo, Mindi, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PureSilicon, QMatrix, RightTouch logo, REAL ICE, Ripple Blocker, SAM-ICE, Serial Quad I/O, SMART-I.S., SQI, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademark of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2016, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 9781522411130

QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV = ISO/TS 16949=

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.



Worldwide Sales and Service

AMERICAS

Corporate Office 2355 West Chandler Blvd. Chandler, AZ 85224-6199 Tel: 480-792-7200 Fax: 480-792-7277 Technical Support: http://www.microchip.com/ support

Web Address: www.microchip.com

Atlanta Duluth, GA Tel: 678-957-9614 Fax: 678-957-1455

Austin, TX Tel: 512-257-3370

Boston Westborough, MA Tel: 774-760-0087 Fax: 774-760-0088

Chicago Itasca, IL Tel: 630-285-0071 Fax: 630-285-0075

Dallas Addison, TX Tel: 972-818-7423 Fax: 972-818-2924

Detroit Novi, MI Tel: 248-848-4000

Houston, TX Tel: 281-894-5983

Indianapolis Noblesville, IN Tel: 317-773-8323 Fax: 317-773-5453 Tel: 317-536-2380

Los Angeles Mission Viejo, CA Tel: 949-462-9523 Fax: 949-462-9608 Tel: 951-273-7800

Raleigh, NC Tel: 919-844-7510

New York, NY Tel: 631-435-6000

San Jose, CA Tel: 408-735-9110 Tel: 408-436-4270

Canada - Toronto Tel: 905-695-1980 Fax: 905-695-2078

ASIA/PACIFIC

Asia Pacific Office Suites 3707-14, 37th Floor Tower 6, The Gateway

Harbour City, Kowloon Hong Kong Tel: 852-2943-5100 Fax: 852-2401-3431

Australia - Sydney Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

China - Beijing Tel: 86-10-8569-7000 Fax: 86-10-8528-2104

China - Chengdu Tel: 86-28-8665-5511 Fax: 86-28-8665-7889

China - Chongqing Tel: 86-23-8980-9588 Fax: 86-23-8980-9500

China - Dongguan Tel: 86-769-8702-9880

China - Guangzhou Tel: 86-20-8755-8029

China - Hangzhou Tel: 86-571-8792-8115 Fax: 86-571-8792-8116

China - Hong Kong SAR Tel: 852-2943-5100

Fax: 852-2401-3431 China - Nanjing Tel: 86-25-8473-2460 Fax: 86-25-8473-2470

China - Qingdao Tel: 86-532-8502-7355 Fax: 86-532-8502-7205

China - Shanghai Tel: 86-21-3326-8000 Fax: 86-21-3326-8021

China - Shenyang Tel: 86-24-2334-2829 Fax: 86-24-2334-2393

China - Shenzhen Tel: 86-755-8864-2200 Fax: 86-755-8203-1760

China - Wuhan Tel: 86-27-5980-5300 Fax: 86-27-5980-5118

China - Xian Tel: 86-29-8833-7252 Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen Tel: 86-592-2388138 Fax: 86-592-2388130

China - Zhuhai Tel: 86-756-3210040 Fax: 86-756-3210049

India - Bangalore Tel: 91-80-3090-4444 Fax: 91-80-3090-4123

India - New Delhi Tel: 91-11-4160-8631 Fax: 91-11-4160-8632

India - Pune Tel: 91-20-3019-1500

Japan - Osaka Tel: 81-6-6152-7160 Fax: 81-6-6152-9310

Japan - Tokyo Tel: 81-3-6880- 3770 Fax: 81-3-6880-3771

Korea - Daegu Tel: 82-53-744-4301 Fax: 82-53-744-4302

Korea - Seoul Tel: 82-2-554-7200 Fax: 82-2-558-5932 or 82-2-558-5934

Malaysia - Kuala Lumpur Tel: 60-3-6201-9857 Fax: 60-3-6201-9859

Malaysia - Penang Tel: 60-4-227-8870 Fax: 60-4-227-4068

Philippines - Manila Tel: 63-2-634-9065 Fax: 63-2-634-9069

Singapore Tel: 65-6334-8870 Fax: 65-6334-8850

Taiwan - Hsin Chu Tel: 886-3-5778-366 Fax: 886-3-5770-955

Taiwan - Kaohsiung Tel: 886-7-213-7830 Taiwan - Taipei

Tel: 886-2-2508-8600 Fax: 886-2-2508-0102

Thailand - Bangkok Tel: 66-2-694-1351 Fax: 66-2-694-1350

EUROPE

Austria - Wels Tel: 43-7242-2244-39 Fax: 43-7242-2244-393

Denmark - Copenhagen Tel: 45-4450-2828 Fax: 45-4485-2829

Finland - Espoo Tel: 358-9-4520-820

France - Paris Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

France - Saint Cloud Tel: 33-1-30-60-70-00

Germany - Garching Tel: 49-8931-9700 **Germany - Haan** Tel: 49-2129-3766400

Germany - Heilbronn Tel: 49-7131-67-3636

Germany - Karlsruhe Tel: 49-721-625370

Germany - Munich Tel: 49-89-627-144-0 Fax: 49-89-627-144-44

Germany - Rosenheim Tel: 49-8031-354-560

Israel - Ra'anana Tel: 972-9-744-7705

Italy - Milan Tel: 39-0331-742611 Fax: 39-0331-466781

Italy - Padova Tel: 39-049-7625286

Netherlands - Drunen Tel: 31-416-690399 Fax: 31-416-690340

Norway - Trondheim Tel: 47-7289-7561

Poland - Warsaw Tel: 48-22-3325737

Romania - Bucharest Tel: 40-21-407-87-50

Spain - Madrid Tel: 34-91-708-08-90 Fax: 34-91-708-08-91

Sweden - Gothenberg Tel: 46-31-704-60-40

Sweden - Stockholm Tel: 46-8-5090-4654

UK - Wokingham Tel: 44-118-921-5800 Fax: 44-118-921-5820

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Ethernet ICs category:

Click to view products by Microchip manufacturer:

Other Similar products are found below :

EZFM6324A S LKA5 EZFM6364A S LKA7 12200BS23MM EZFM5224A S LKA3 VSC8522XJQ-02 WGI219LM SLKJ3 JL82599EN S R1ZS EZFM6348A S LKA6 WGI219V SLKJ5 BCM84793A1KFSBG BCM56680B1KFSBLG BCM53402A0KFSBG BCM56960B1KFSBG EZX557AT2 S LKVX BCM56842A1KFTBG BCM56450B1KFSBG EZX557AT S LKW4 RTL8153-VC-CG CH395L BCM56864A1IFSBG WGI219LM SLKJ2 KSZ8462FHLI KSZ8841-16MVLI KSZ9897STXC KSZ8842-16MVLI KSZ8893MQL VSC8244XHG ADIN2111BCPZ FIDO2100BGA128IR0 FIDO5210BBCZ FIDO5200CBCZ ADIN1110BCPZ ADIN1110CCPZ ADIN1100BCPZ ADIN1110CCPZ-R7 ADIN1100CCPZ-R7 DM9000EP DM9161AEP HG82567LM S LAVY LAN9210-ABZJ LAN91C93I-MS LAN9221-ABZJ LAN9221I-ABZJ LAN9211-ABZJ EZFM4105F897C S LKAM EZFM4224F1433E S LKAD EZFM4224F1433I S LKAE FBFM2112F897C S LJLS JL82576GB S LJBM JL82576NS S LJBP