



- (RTL8389LM-GR) Layer 2 Light-Managed 28*10/100/1000M-Port Switch Controller
- (RTL8389L-GR) Layer 2 un-Managed 28*10/100/1000M-Port Switch Controller

General Description

The RTL8389LM and RTL8389L are Layer 2 light-managed and un-managed 28-port 10/100/1000M switch controllers and are provided in a LQFP-216 E-PAD package. The Memory interface of the RTL8389LM supports 16-bit SDRAM and SPI Flash. The RTL8389L only supports SPI Flash.

The RTL8389LM/RTL8389L supports 2 serially connected RSGMII interface ports to connect to 1 Quad Gigabit PHY (RTL8214 or RTL8214F). The RTL8389LM/RTL8389L supports six pairs of serially connected RSGMII-plus (5Gbps) interface ports to connect to three Octal Gigabit PHYs (RTL8218).

The RTL8389LM and RTL8389L have an embedded 300MHz MIPS-4KEc CPU supporting a 32-bit data bus and a 16MByte SPI flash (max.). Only the RTL8389LM supports one 16-bit, 64MByte SDRAM (max.).

There are 16K entries in the 4-way hash L2 table for MAC address learning and searching. The RTL8389LM/RTL8389L has a 4K-entry VLAN table for 802.1Q port-based, protocol-and-port-based, 802.1Q-based, IP-subnet-based, and ACL Rules-based VLAN operation to separate logical connectivity from physical connectivity. Support is provided for IVL (Independent VLAN Learning), SVL (Shared VLAN Learning), and IVL/SVL (both Independent and Shared VLAN Learning) for flexible network topology architecture. The RTL8389LM/RTL8389L supports a 512-entry Access Control List (ACL) that parses various protocol packet types and performs configurable actions, e.g., Permit/Drop, redirect, and traffic policing. An independent 512-entry IP Multicast table supports the L2 IP Multicast function.

The RTL8389LM/RTL8389L supports per-port ingress/egress bandwidth control and per-queue egress bandwidth control. It has 8 physical queues in each port. The RTL8389LM/RTL8389L provides three types of packet scheduling, including SP (Strict Priority), WFQ (Weighted Fair Queuing), and WRR (Weighted Round Robin). Each queue provides a leaky-bucket to shape the incoming traffic into the average rate behavior.

Port-based 802.1X and MAC-based 802.1X authentication prevent

unauthorized users from accessing internal servers. A 4K-entry VLAN table for 802.1Q port-based, protocol-and-port-based, 802.1Q-based, IP-subnet-based, and ACL Rules-based VLAN operation separates logical connectivity from physical connectivity. The RTL8389LM/RTL8389L also supports a 2-set port mirror configuration to mirror ingress and egress traffic. For network management purposes, complete MIB counter support reflects the switch status in real time. Support is provided for link aggregation to increase link redundancy, and increase linear bandwidth.

Features

- **Hardware Interface**
 - 28-port Gigabit wire speed forwarding capability
 - Supports 6-pairs of RSGMII-plus (5G) to connect to external 24-port 10/100/1000M Ethernet PHYs
 - Supports an extra 2 pairs of RSGMII (2.5G) to connect to an external 4-port 10/100/1000M Ethernet PHY or IntraLink interface
 - SDRAM and Flash Interface
 - RTL8389LM supports one 16-bit 64MByte SDRAM and 16MByte SPI flash interfaces
 - RTL8389L supports one 16MByte SPI flash interface
 - Embedded MIPS-4KEc with MMU
 - MIPS32 instruction set and 5-stage pipeline
 - 300MHz CPU clock rate
 - 16KByte I-Cache and 16KByte D-Cache
 - 32 Translation Look-aside Buffer (TLB) entries
 - Two UART interfaces to control the internal CPU via a Command Line Interface (CLI)
 - Supports EJTAG interface
- **L2 VLAN Function**
 - Supports IVL, SVL, and IVL/SVL
 - Supports IEEE 802.1Q VLAN
 - 4K-entry VLAN Table
 - Supports 4K FID for VLAN function
 - Port-based VLAN
 - Port-and-protocol-based VLAN
 - ACL-based VLAN
 - Supports up to 16 spanning tree instances for MSTP (IEEE 802.1s), RSTP, and STP
 - Supports 64-entry Q-in-Q (VLAN Stacking)
 - Keep VLAN Format Mode:
 - Untagged in, untagged out

- Priority tagged in, priority tagged out
- VLAN tagged in, VLAN tagged out

- **L2 MAC Function**

- 3.5Mbit SRAM Packet Buffer
- Packet length of 1522/1536/1552/9216Bytes
- 16K-entry L2 MAC table with 4-way hashing algorithm
- Independent 512-entry L2/IP Multicast table for multicast function
- 2-hash algorithm selection for L2 table searching/learning
- Supports IGMPv1/2/3 snooping
- Supports 48 Reserved Multicast Addresses processing
- Limited learned L2 MAC entry on each port

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- **L2 Miscellaneous Functions**

- Supports broadcast, multicast, unknown- multicast, and unknown-unicast packet suppression control with 1pps steps from 1pps to 1Mpps
- Supports IEEE 802.1x
 - Port-based 802.1x
 - MAC-based 802.1x
- Supports Port Mirroring
 - Supports two port mirror sets
 - Good packet, bad packet, unicast packet, and multicast packet mirror filter
 - ACL-based mirror
- Supports Link Aggregation (IEEE 802.3ad) for 8 groups of link aggregators with up to 8 ports per-group (based on SPA/DMAC/SMAC)
- Port isolation function to enhance port security
- Pattern matching, with two sets of 4-byte patterns on each port
- Supports proprietary CPU tags

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- **Access Control List (ACL) Function**

- 512-entry ACL table
- L2/L3/L4 format (e.g., DMAC, SMAC, and Ether-Type)
- 128 leaky-buckets for flow traffic policing; in 16Kbps steps up to 1Gbps maximum
- 128 log counters to enhance MIB count functionality
- Supports action to Drop/Permit/ Redirect/Copy to CPU/Mirror/Logging/ Policing/New CVID/New SVID

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- **QoS Functions**

- 8 physical queues per port
- Priority Assignment based on IEEE 802.1P priority, DMAC-based, SMAC-based, Ether-Type-based, CVID, SVID, IPv4/IPv6 TOS field, and IPv6 Flow Label/UDP source/destination port
- Strict Priority (SP) and Weighted Fair Queue (WFQ), Weighted Round Robin (WRR) packet scheduling
- QoS remarking for 802.1p and DSCP (includes IPv4/IPv6)
- Supports average packet rate control leaky-bucket per queue, in 16Kbps steps up to 1Gbps maximum
- Ingress port bandwidth control, in 16Kbps steps up to 1Gbps maximum
- Egress port bandwidth control, in 16Kbps steps up to 1Gbps maximum

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- **MIB Functions**

- Ethernet-like MIB (RFC 3635)
- Interface Group MIB (RFC 2863)
- RMON (RFC 2819)
- Bridge MIB (RFC 1493)
- Bridge MIB Extension (RFC 2674)

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- **Others**

- 0.13 μ m CMOS process
- 3.3V/1.05V dual power input
- RTL8389LM and RTL8389L: LQFP216 E-PAD package