
Features

- 8-port 10/100/1000Mb/s Ethernet MII/GMII Switch
- Provides Packet Switching Functions Between 8 Ethernet Ports
- Advanced CoS (Class of Service) Supports 4-level Priority Switching
- Duplex Mode Auto-negotiation Supported
- Full-duplex Flow Control (802.3x) and Half-duplex Back Pressure
- VLAN 802.1Q or Port-based Supported (Port-based, MAC-based and Protocol Based)
- ARP/Broadcast Filter (Optional)
- 8 GbE Ports with Non-blocking Switching Performance
- Supports Automatic Address Learning and Aging
- Integrated MAC and VLAN Address Tables
- On-chip Packet Buffer Supports Store-and-Forward Switching Architecture
- SPI (RS-232 Interface) for Setup and Unmanaged Operation
- Multicast and Broadcast Storm Control
- Up to 36-Kbyte Media Access Control (MAC) Address Cache
- 1.8V and 3.3V Supply

Description

The AT79C1030 device combines all the functions of a high-speed switch, including packet buffer, Media Access Controllers (MAC), address management, and a non-blocking switch fabric. It complies with IEEE 802 specification, providing compatibility with all industry standard Ethernet, Fast Ethernet, and Gigabit Ethernet devices.

The AT79C1030 utilizes the *Store and Forward* switching architecture to manage packet switching between the eight independent Ethernet ports. The switch records (learning), the relation between MAC addresses (including VLAN information) and the actual ports. Next, the switch will resolve (forwarding) the destination MAC address of the ingress packet, then it selects the related ports to transmit the packet. The device is utilizing and maintaining a MAC address table and a VLAN table to accomplish this task.

Using *Store and Forward*, the device reads the whole incoming frame into an internal on-chip buffer and calculates its own frame check sequence. The switch then compares its CRC figure to the frame's CRC. If the two CRCs are the same, the switch will consult its address look-up table, create the virtual link and then forward the frame. The Switch Core uses the packet head information to perform packet filter, packet drop, address table look up, priority category, etc. After the device completes the task of forwarding decision, then all the forwarding information will be sent to the forwarding module.

Each port has an independent forwarding module. The module puts the forwarding information of the packets forwarded to each respected port. This information includes:

1. The packet buffer location
2. The size of the packet
3. VLAN information

Four level priority queues are employed at each port. The transmission module fetches the forwarding information from these different priority queues according to the round robin rule and transmits the related packet. The higher priority level queues are more likely to send the packets recorded in it and are less likely to discard these packets. After resolving each ingress packet, the switch engine can use the obtained information to perform protocol processing. The device supports VLAN mode switch, which means only ports belonging to the same VLAN can switch packets. This device



8-Port Gigabit Ethernet CoS Switch

AT79C1030

Summary

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Note: This is a summary document. A complete document is available under NDA. For more information, please contact your local Atmel sales office.

also supports filtering special packets to prevent unnecessary flow, such as broadcast storms, so broadcast/ARP packets can be discarded according to user settings.

Overview

Ethernet Packet Reception and Transmission

The AT79C1030 complies with the IEEE 802.3 MII/GMII specification. The switch supports full/half duplex mode.

- In full-duplex mode, from the same port, the switch receives and transmits packets at the same time; line flow control is performed by sending or resolving pause frames.
- In half-duplex mode, reception and transmission can't take place from the same port at the same time. When a collision occurs, the packet should be retransmitted according to the back-off algorithm. Line flow control is implemented by the back-pressure algorithm.

The switch works in 10/100/1000Mb/s in both full/half duplex modes. The full or half duplex mode and data rate are selected via auto-negotiation or manually. In order to support auto-negotiation the MDIO interface is implemented.

Receiving Operation

The device calculates the size of an ingress packet and decides whether the size of the packet is legal. At the same time, a CRC check is performed to verify whether the input packet data is right.

Transmitting Operation

The switch adds, removes, or changes the tag of the egress packet according to the related settings. The device re-calculates the CRC of this packet again to ensure sending the right packet in case the packet data is modified.

Figure 1. AT79C1030 Block Diagram

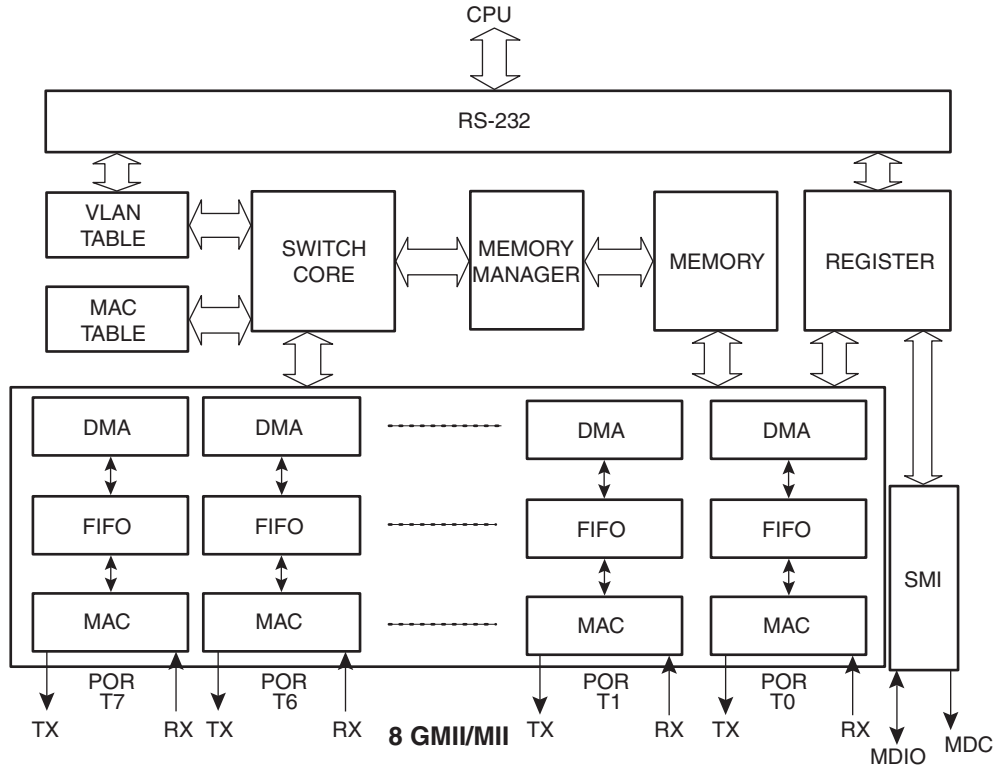
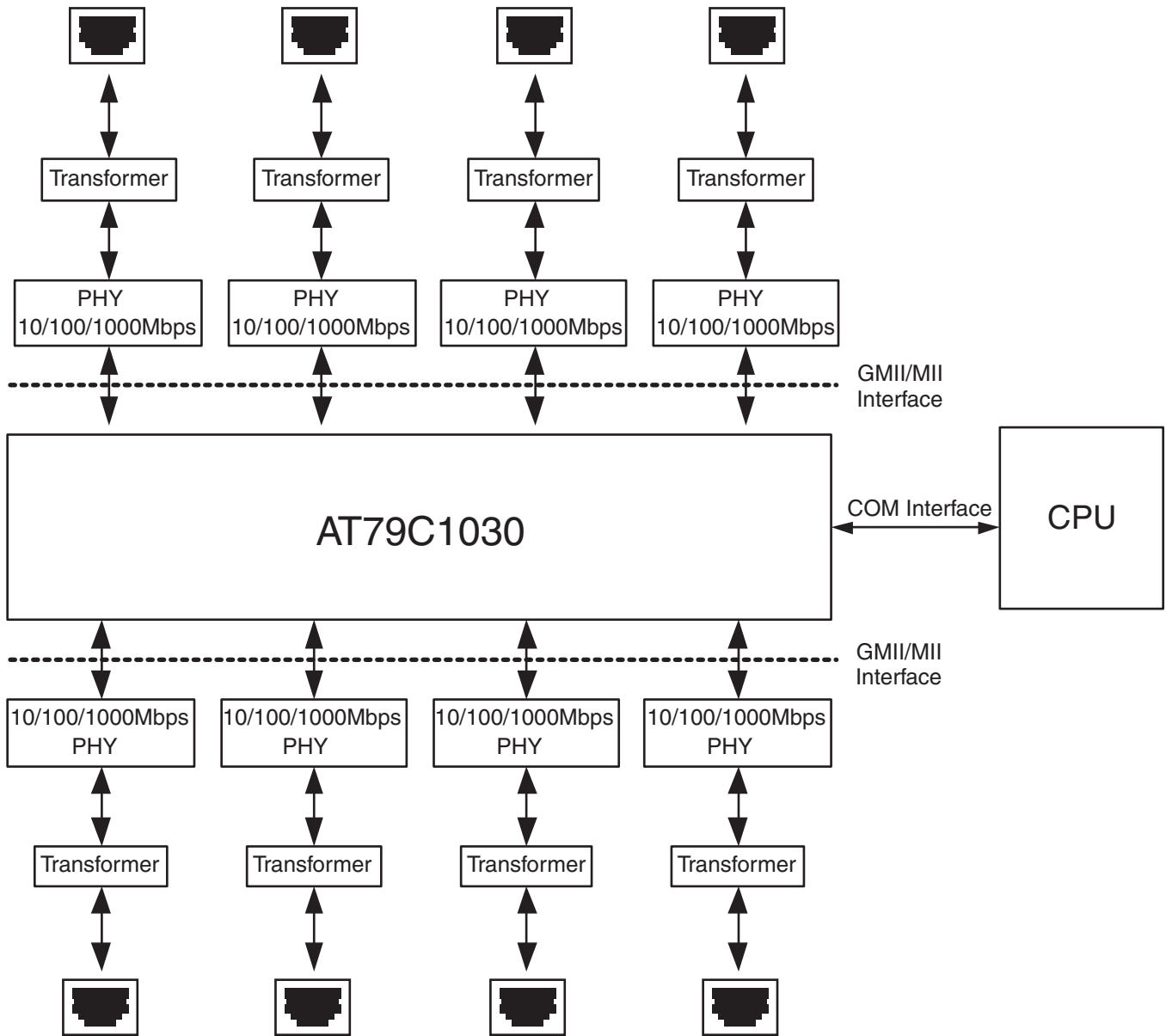


Figure 2. Application Diagram





Electrical Characteristics

Absolute Maximum Ratings*

Parameter	Range	Unit
Power Supply VCC (Digital Logic)	1.8 \pm 5%	V
Power Supply VIO (Input/Output)	3.3 \pm 10%	V
Storage Temperature	-65 to 140	$^{\circ}$ C
IOL per I/O pin	TBD	
Power Dissipation	1.9	W
Commercial	0 to -70	$^{\circ}$ C

*NOTICE: Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



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