

RTL8111E

Integrated Gigabit Ethernet Controller for PCI Express Applications

General Description

The RTL8111E supports the PCI Express 1.1 bus interface for host communications with power management, and is compliant with the IEEE 802.3u specification for 10/100Mbps Ethernet and the IEEE 802.3ab specification for 1000Mbps Ethernet. It also supports an auxiliary power auto-detect function, and will auto-configure related bits of the PCI power management registers in PCI configuration space. The RTL8111E features embedded One-Time-Programmable (OTP) memory to replace the external EEPROM (93C46/93C56/93C66).

Advanced Configuration Power management Interface (ACPI)—power management for modern operating systems that are capable of Operating System-directed Power Management (OSPM)—is supported to achieve the most efficient power management possible. PCI MSI (Message Signaled Interrupt) and MSI-X are also supported.

In addition to the ACPI feature, remote wake-up (including AMD Magic Packet and Microsoft Wake-up frame) is supported in both ACPI and APM (Advanced Power Management) environments. To support WOL from a deep power down state (e.g., D3cold, i.e., main power is off and only auxiliary exists), the auxiliary power source must be able to provide the needed power for the RTL8111E.

The RTL8111E is fully compliant with Microsoft NDIS5, NDIS6 (IPv4, IPv6, TCP, UDP) Checksum and Segmentation Task-offload (Large send and Giant send) features, and supports IEEE 802 IP Layer 2 priority encoding and IEEE 802.1Q Virtual bridged Local Area Network (VLAN). The above features contribute to lowering CPU utilization, especially benefiting performance when in operation on a network server.

The RTL8111E supports Receive Side Scaling (RSS) to hash incoming TCP connections and load-balance received data processing across multiple CPUs. RSS improves the number of transactions per second and number of connections per second, for increased network throughput.

Alert Standard Format (ASF 2.0) is also supported to provide system manageability in OS-absent environments. The ASF defines remote control and alerting interfaces that serve managed PCs in OS-absent states. The ASF capability can minimize on-site IT maintenance, improve system availability, and allow remote control of power management. The RTL8111E-VC-GR (only) supports ASF EEPROM-Less operation. Refer to the RTL8111E_EEPROM-Less_App_Note for details.

The RTL8111E supports Protocol offload. It offloads some of the most common protocols to NIC hardware in order to prevent spurious wake up and further reduce power consumption. The RTL8111E can offload ARP (IPv4) and NS (IPv6) protocols while in the D3 power saving state.

The RTL8111E supports IEEE 802.3az Draft 3.0, also known as Energy Efficient Ethernet (EEE). IEEE 802.3az operates with the IEEE 802.3 Media Access Control (MAC) Sublayer to support operation in Low Power Idle mode. When the Ethernet network is in low link utilization, EEE allows systems on both sides of the link to save power.

The device also features inter-connect PCI Express technology. PCI Express is a high-bandwidth, low-pin-count, serial, interconnect technology that offers significant improvements in performance over conventional PCI and also maintains software compatibility with existing PCI infrastructure.

The RTL8111E is suitable for multiple market segments and emerging applications, such as desktop, mobile, workstation, server, communications platforms, and embedded applications.

Features

- Integrated 10/100/1000 transceiver
- Auto-Negotiation with Next Page capability
- Supports PCI Express 1.1
- Supports pair swap/polarity/skew correction
- Crossover Detection & Auto-Correction
- Wake-on-LAN and remote wake-up support
- Microsoft NDIS5, NDIS6 Checksum Offload (IPv4, IPv6, TCP, UDP) and Segmentation Task-offload (Large send v1 and Large send v2) support
- Supports Full Duplex flow control (IEEE 802.3x)
- Supports jumbo frame to 9K bytes
- Fully compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3ab
- Supports IEEE 802.1P Layer 2 Priority Encoding
- Supports IEEE 802.1Q VLAN tagging
- Supports IEEE 802.3az Draft 3.0 (EEE)
- Embedded OTP memory can replace the external EEPROM
- Serial EEPROM
- Transmit/Receive on-chip buffer support
- Supports power down/link down power saving
- Built-in switching regulator
- Supports PCI MSI (Message Signaled Interrupt) and MSI-X
- Supports quad core Receive-Side Scaling (RSS)
- Supports Alert Standard Format 2.0 (ASF2.0)
- Supports Protocol Offload (ARP & NS)
- Supports Customized LEDs
- Supports 1-Lane 2.5Gbps PCI Express Bus
- Supports hardware ECC (Error Correction Code) function
- Supports hardware CRC (Cyclic Redundancy Check) function
- 48-pin QFN 'Green' package

Applications

- PCI Express Gigabit Ethernet on Motherboard, Notebook, or Embedded systems
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