Q1 2012 Volume 46

Micrel New Product Highlights

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MIC94300/MIC94310 - Power Supply Output Noise Attenuators

The MIC94300 integrated load switch and the MIC94310 DC/DC regulator incorporate Micrel's Ripple Blocker™ active filter technology to provide high-frequency ripple attenuation (switching noise rejection) for applications where switching noise cannot be tolerated by sensitive downstream circuits.

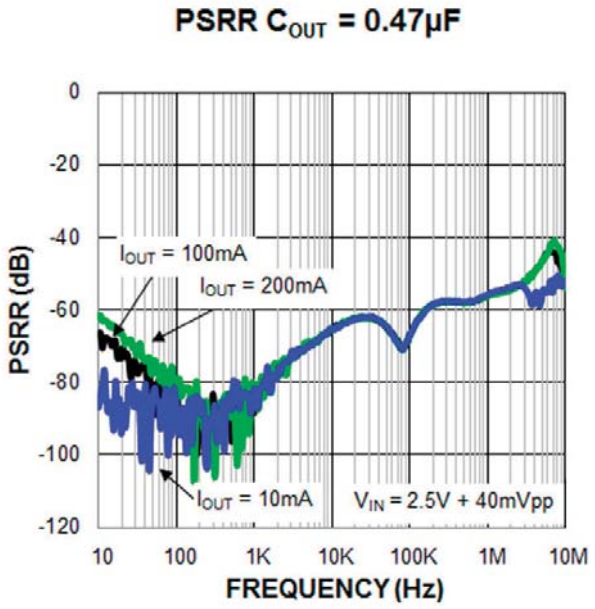
The MIC94300/MIC94310 are rated at up to 200mA and operate from an input voltage of 1.8V to 3.6V. These products also include linear current limiting and thermal shutdown to ensure full protection from damage due to fault conditions.

Packaged in a 0.88mm x 0.88mm 4-ball CSP or 4-pin 1.2mm x 1.6mm Thin MLF® package, these devices have a junction operating temperature range of -40°C to +125°C.

RIPPLE BLOCKER™
A MICREL PRODUCT

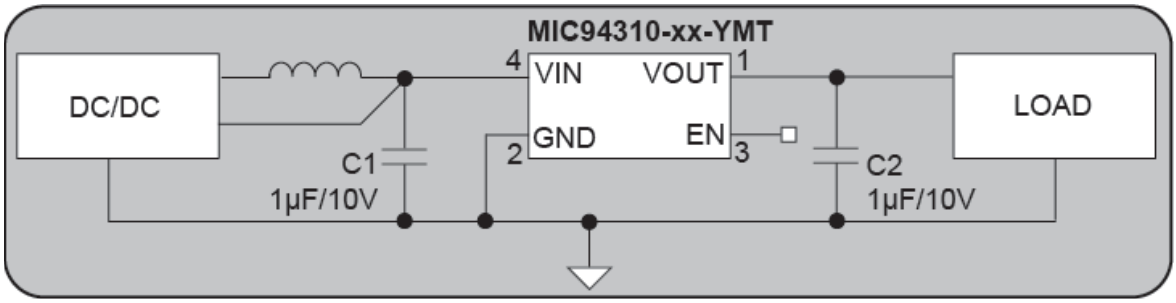
Key Benefits

- Attenuates ripple voltage in any power supply design
  - 80dB PSRR at 1kHz
  - 60dB PSRR at 5MHz
- Clean system power to increase overall system performance
  - Higher RF transmission strength
  - Increased dynamic signal integrity
- Saves space and cost
  - Up to 63% smaller than discrete alternatives



Applications

- Medical imaging
- Tablet PCs, notebook computers and webcams
- Webcams, digital still, and video cameras
- Videoconferencing
- Bar code scanners
- Smart phone cameras and RF stages
- Global Positioning Systems (GPS)
- Automotive and industrial applications

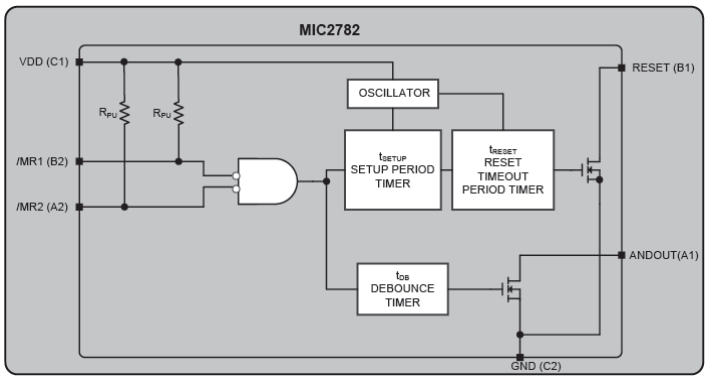


MIC94310 Typical Application

MIC2782 - Dual-Input Push Button Reset IC with Immediate and Delayed Outputs

The MIC2782 is a two input, two output push button reset IC. It will generate a reset pulse for a factory programmed reset timeout period after both manual reset inputs have been held to a logic-low for the factory programmed setup period. The MIC2782 also has an ANDOUT logic output which will activate if both inputs are held low for longer than a debounce time (1.5ms), and deactivate if one or both inputs are released for longer than a debounce time (1.5ms). The RESET and ANDOUT outputs are active-low, open-drain NMOS outputs.

The MIC2782 operates over the 1.5V to 5.5V supply voltage range, consuming just 2.2µA of supply current at 3.3V. The device features 65kΩ internal pull-up resistors on both of the inputs (/MR1 and /MR2). The device offers factory programmed setup periods of 6s, 8s, 10s, or 12s and reset timeout periods of 0.5s, 1s or 2s.



MIC2782 Block Diagram

Features

- 1.5V to 5.5V Operating Supply Voltage Range
- 2.2µA Supply Current with /MR1, /MR2 not asserted
- Factory programmed setup periods of 6s, 8s, 10s or 12s
- Factory programmed reset timeout periods of 0.5s, 1s or 2s
- Integrated 65kΩ /MR1 and /MR2 Pull-up Resistors
- Supports single push button reset with /MR1 tied to /MR2
- RESET asserts after /MR1 and /MR2 are asserted low for a setup period
- ANDOUT asserts after /MR1 and /MR2 are asserted low for a debounce time (1.5ms)
- Open-Drain RESET and ANDOUT Outputs
- 6-bump, 0.4mm pitch, 0.8mm x 1.2mm Wafer Level Chip Scale Package (WLCSP)

Applications

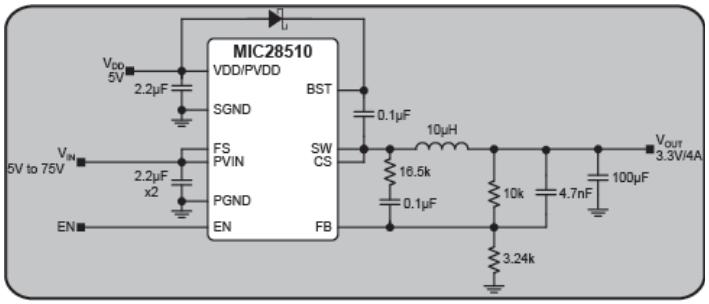
- Smart Phones
- Tablets
- eBooks
- Portable Games
- Portable Navigation Devices

MIC28510 - 75V/4A Hyper Speed Control™ Synchronous DC/DC Buck Regulator Super-Switcher II™

The Micrel MIC28510 is an adjustable-frequency, synchronous buck regulator featuring unique adaptive on-time control architecture. The MIC28510 operates over an input supply range of 4.5V to 75V and provides a regulated output of up to 4A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of ±1%.

Micrel's Hyper Speed Control™ architecture allows for ultra-fast transient response while reducing the output capacitance and also makes (High V_{IN})/(Low V_{OUT}) operation possible. This adaptive t_{ON} ripple control architecture combines the advantages of fixed-frequency operation and fast transient response in a single device.

The MIC28510 offers a full suite of protection features to ensure protection of the IC during fault conditions. These include undervoltage lockout to ensure proper operation under power-sag conditions, internal soft-start to reduce inrush current, foldback current limit, "hiccup" mode short-circuit protection and thermal shutdown.



MIC28510 Typical Application

Features

- Hyper Speed Control™ architecture enables:
  - High Delta V operation (V_{IN} = 75V and V_{OUT} = 0.8V)
  - Small output capacitance
- 4.5V to 75V voltage input
- 4A output current capability, up to 95% efficiency
- Adjustable output down to 0.8V
- ±1% FB accuracy
- Any Capacitor™ Stable
  - Zero-ESR to high-ESR output capacitors
- 100kHz to 500kHz switching frequency
- Internal compensation
- Foldback current-limit and "hiccup" mode short-circuit protection
- Thermal shutdown
- Supports safe startup into a pre-biased load
- -40°C to +125°C junction temperature range
- 28-pin 5mm × 6mm MLF® package

Applications

- Distributed Power Systems
- Communications/Networking Infrastructure
- Industrial Power
- Solar Energy

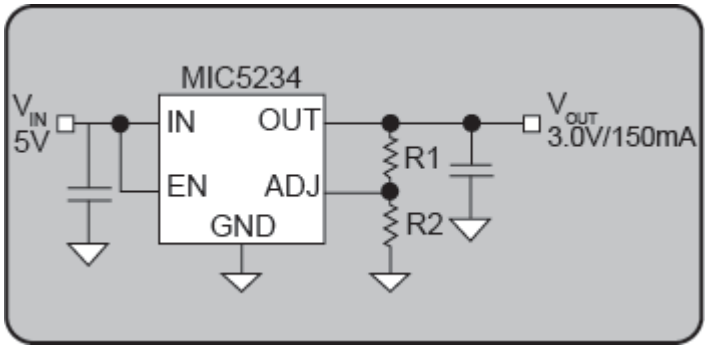
MIC5234 - Low-Quiescent Current 150mA LDO Regulator

The MIC5234 is a low-quiescent current, µCap low-dropout regulator. With a maximum operating input voltage of 30V and quiescent current of 20µA, it is ideal for supplying keep-alive power in systems with high-voltage batteries.

Capable of 150mA output, the MIC5234 has a dropout voltage of only 320mV. It can also survive an input transient of -20V to +32V. The MIC5234 requires only a 2.2µF output capacitor for stable operation.

The MIC5234 includes a logic compatible enable input. Other features of the MIC5234 include thermal shutdown, current limit, overvoltage shutdown, load dump protection, reverse-leakage and reverse battery protection.

The MIC5234 is available in an 8-pin ePad SOIC package with a junction operating range from -40°C to +125°C.



MIC5234 Typical Application

Features

- Ultra low quiescent current (IQ = 20µA @ IO = 100µA)
- Wide input voltage range: 2.3V to 30V
- Low dropout:
  - 230mV @50mA
  - 320mV @150mA
- Adjustable output voltage
- Typical ±1.0% initial output accuracy
- Logic compatible enable input
- Overcurrent protection
- Thermal-shutdown protection
- Reverse-leakage and reverse-battery protection
- Thermally enhanced 8-pin ePad SOIC package

Applications

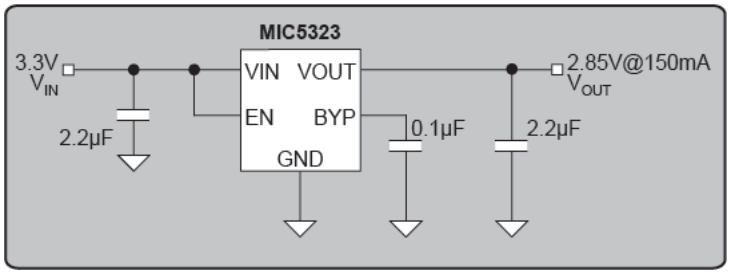
- "Keep-alive" supply in notebook and portable personal computers
- Logic Supply from high-voltage batteries
- Automotive Electronics
- Battery-Powered Systems

MIC5323 - High PSRR Low Noise 300mA µCap Ultra-Low Dropout LDO Regulator

The MIC5323 is a high-performance, 300mA LDO regulator, offering extremely high PSRR and very low noise while consuming low ground current. Ideal for battery operated applications, the MIC5323 features 2% accuracy, extremely low dropout voltage (120mV @ 300mA), and low ground current at light load (typically 90µA). When disabled, the MIC5323 typically consumes less than 1µA.

The MIC5323 is a µCap design that can operate with small ceramic output capacitors for stability, thereby reducing required board space and component cost.

The MIC5323 is available in fixed output voltages and adjustable output voltages in the super compact 6-pin 2mm × 2mm Thin MLF® and thin SOT-23-5 packages.



MIC5323 Typical Application

Features

- Ultra-low dropout voltage of 120mV @ 300mA
- Input voltage range: 2.65 to 5.5V
- Stable with ceramic output capacitor
- 300mA guaranteed output current
- Low output noise - 20µVrms
- High PSRR, up to 80dB @1kHz
- Less than 30µs turn-on time with CBYP = 0.1µF
- High output accuracy: ±2.0% over temperature
- Thermal shutdown protection
- Current limit protection
- 6-pin 2mm × 2mm Thin MLF® package
- Thin SOT-23-5 package

Applications

- Cellular Phones
- Notebook and Tablet Computers
- Fiber Optic Modules
- Portable Electronics
- Instrumentation Systems
- Audio CODEC Power Supplies

SM802121 - ClockWorks™ 10GbE (156.25MHz), Ultra-Low Jitter, LVPECL Frequency Jitter

The SM802121 is a member of the ClockWorks™ family of devices from Micrel and provides an extremely low noise timing solution for 10GbE Ethernet clock signals. It is based upon a unique patented RotaryWave® architecture that provides very low phase noise.

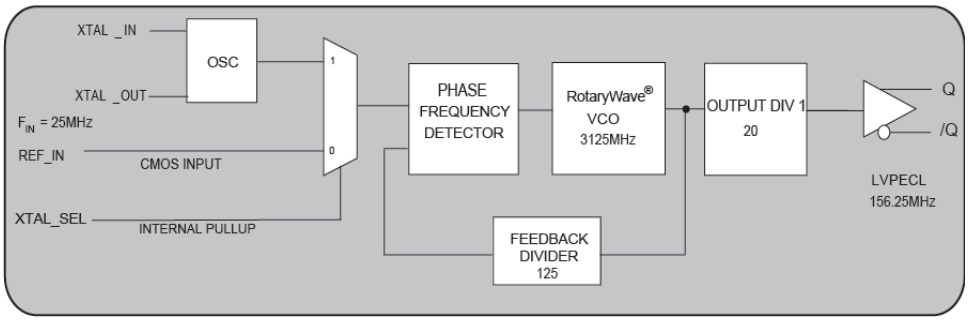
The device operates from a 2.5V or 3.3V power supply and synthesizes a single LVPECL output clock at 156.25MHz. The SM802121 accepts a 25MHz crystal or LVCMOS reference clock.

Features

- Generates one LVPECL clock outputs at 156.25MHz
- 2.5V or 3.3V operating range
- Typical phase jitter @ 156.25MHz
  - (1.875MHz to 20MHz): 110fs
- Industrial temperature range (-40°C to +85°C)
- 24-pin 4mm × 4mm QFN package

Applications

- 10 Gigabit Ethernet
- Enterprise switches and servers



SM802121 Block Diagram

SM802123 - ClockWorks™ 125MHz/25MHz Ultra-Low Jitter, LVCMOS Frequency Synthesizer

The SM802123 is a member of the ClockWorks™ family of devices from Micrel and provides an extremely low noise timing solution. It is based upon a unique patented RotaryWave® architecture that provides very low phase noise.

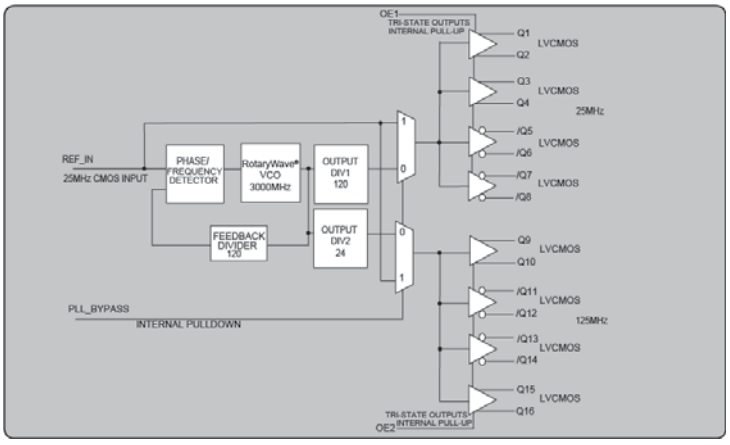
The device operates from a 2.5V or 3.3V power supply and synthesizes 16 LVCMOS output clocks, eight at 125MHz and eight at 25MHz. The SM802123 accepts a 25MHz LVCMOS reference input.

Features

- Generates eight LVCMOS output clocks at 125MHz and eight LVCMOS output clocks at 25MHz
- 2.5V or 3.3V operating range
- Typical phase jitter @ 125MHz
  - (1.875MHz to 20MHz): 115fs
- Industrial temperature range (-40°C to +85°C)
- 44-pin 7mm × 7mm QFN package

Applications

- Gigabit Ethernet (GbE)



SM802123 Block Diagram

SM802124 - ClockWorks™ Dual 125MHz Ultra-Low Jitter, CMOS Frequency Synthesizer

The SM802124 is a member of the ClockWorks™ family of devices from Micrel and provides an extremely low-noise timing solution for Ethernet clock signals. It is based upon a unique patented RotaryWave® architecture that provides very low phase noise.

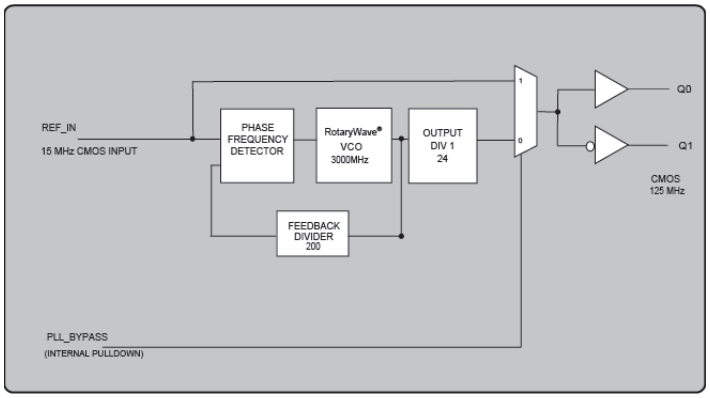
The device operates from a 3.3V or 2.5V power supply and synthesizes two CMOS output clocks at 125MHz from a 15MHz LVCMOS reference clock.

Features

- Generates two LVCMOS clock outputs at 125MHz
- 2.5V or 3.3V operating range
- Typical rms phase jitter @ 125MHz
  - 1.875MHz to 20MHz : 85fs (Input source dependent)
- Industrial temperature range (–40°C to +85°C)
- Green, RoHS, and PFOS compliant
- 24-pin 4mm × 4mm QFN package

Applications

- Gigabit Ethernet
- Enterprise switches and servers



SM802124 Block Diagram

SM802128 - ClockWorks™ 10GbE Octal 156.25MHz/312.5MHz, Ultra-Low Jitter, LVPECL Frequency Synthesizer

The SM802128 is a member of the ClockWorks™ family of devices from Micrel and provides an extremely low-noise timing solution for 10GbE Ethernet clock signals. It is based upon a unique patented RotaryWave® architecture that provides very low phase noise.

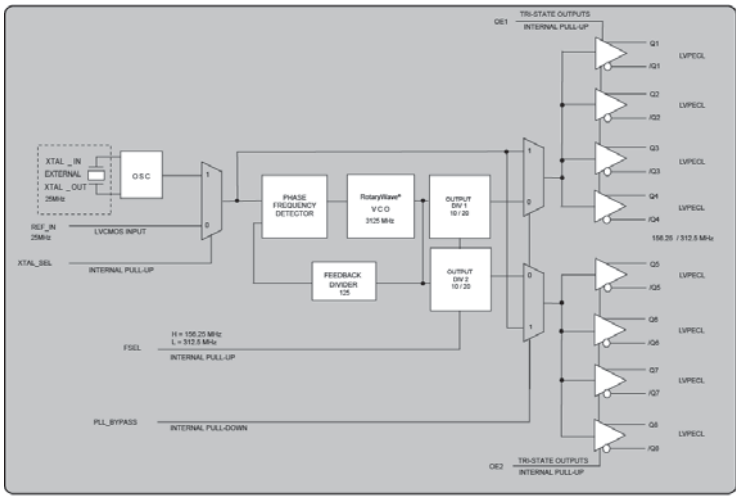
The device operates from a 3.3V or 2.5V power supply and synthesizes eight LVPECL output clocks at 156.25MHz or 312.5MHz. The SM802128 accepts a 25 MHz crystal or LVCMOS reference clock.

Features

- Generates eight LVPECL clocks at 156.25MHz or 312.5MHz
- 2.5V or 3.3V operating range
- Typical phase jitter @ 156.25MHz
  - 1.875MHz to 20MHz : 110fs (with crystal reference)
- Industrial temperature range (–40°C to +85°C)
- Green, RoHS, and PFOS compliant
- 44-pin 7mm × 7mm QFN package

Applications

- 10 Gigabit Ethernet/XAUI
- Data Center/Enterprise switches and routers



SM802128 Block Diagram

KSZ9031RN - Gigabit Ethernet Transceiver with RGMII Support (Preliminary)

The KSZ9031RN is a completely integrated, triple speed (10Base-T/100Base-TX/1000Base-T) Ethernet physical layer transceiver for transmission and reception of data over standard CAT-5 unshielded twisted pair (UTP) cable.

The KSZ9031RN provides the Reduced Gigabit Media Independent Interface (RGMII) for direct connection to RGMII MACs in Gigabit Ethernet Processors and Switches for data transfer at 10/100/1000 Mbps speed.

The KSZ9031RN reduces board cost and simplifies board layout by using on-chip termination resistors for the four differential pairs and by integrating a LDO controller to drive a low cost MOSFET to supply the 1.2V core.

The KSZ9031RN provides diagnostic features to facilitate system bring up and debugging in production testing and in product deployment. Parametric NAND tree support enables fault detection between KSZ9031 I/Os and board. Remote and local loopback functions provide verification of analog and digital data paths.

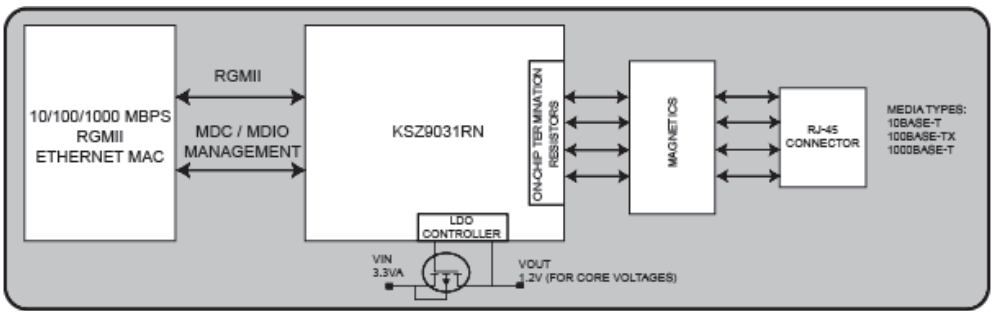
The KSZ9031RN is available in a 48-pin, lead-free QFN package.

Features

- Single chip 10/100/1000 Mbps IEEE 802.3 compliant Ethernet transceiver
- RGMII interface compliant to RGMII Version 1.3
- RGMII I/Os with 3.3V/2.5V tolerant and programmable timings to adjust and correct delays on Tx and Rx paths
- Auto-Negotiation to automatically select the highest link up speed (10/100/1000 Mbps) and duplex (half/full)
- On-chip termination resistors for the differential pairs
- On-chip LDO controller to support single 3.3V supply operation - requires only external FET to generate 1.2V for the core
- Jumbo frame support up to 16KB
- 125 MHz Reference Clock Output
- Programmable LED outputs for link, activity and speed
- Baseline Wander Correction
- Energy Detect Power Down Mode for reduced power consumption when cable not attached
- Parametric NAND Tree support for fault detection between chip I/Os and board
- Loopback modes for diagnostics
- Energy Efficient Ethernet (EEE) support
- Wake On LAN (WOL) support with robust custom packet detection
- Automatic MDI/MDI-X crossover for detection and correction of pair swap at all speeds of operation
- Automatic detection and correction of pair swap, pair skew and pair polarity
- MDC/MDIO Management Interface for PHY register configuration
- Interrupt pin option
- Power down and power saving modes
- Operating Voltages
  - Core: 1.2V (external FET or regulator)
  - I/O: 1.8V, 2.5V, or 3.3V
  - Transceiver: 3.3V
- 48-pin QFN 7mm x 7mm package

Applications

- Laser/Network Printers
- Network Attached Storage (NAS)
- Network Servers
- Gigabit LAN on Motherboards (GLOM)
- Broadband Gateway
- Gigabit SOHO/SMB Routers
- IPTV
- IP Set-Top Boxes
- Game Consoles
- Triple-Play (data, voice, video) Media Centers
- Media Converters



KSZ9031RN Block Diagram

Analog Products - Quarterly Releases

Part Number	Description	Evaluation Board	Production	Package(s)	Comments
High Performance Active Filters					
MIC94300	Ripple Blocker Noise Attenuating Switch	YES	YES	4-bump CSP, 4-pin Thin MLF®	Datasheet online
MIC94310	Ripple Blocker Noise Attenuating Regulator	YES	YES	4-bump CSP, 4-pin Thin MLF®	Datasheet online
Switch-Mode Regulators					
MIC28510	75V / 4A SuperSwitcher II™ Buck Regulator	YES	YES	28-pin MLF®	Datasheet online
LDOs					
MIC5234	Low Quiescent Current 150 mA LDO	Mar-12	YES	8-pin ePad SOIC	Datasheet online
MIC5323	High PSRR 300mA μCap LDO	Mar-12	YES	SOT-23-5, 6-pin Thin MLF®	Datasheet online
High Performance Analog ICs					
MIC2782	Dual Input Push Button Reset IC	Mar-12	YES	6-bump CSP	Datasheet online

HBW Products - Quarterly Releases

Part Number	Description	Evaluation Board	Production	Package(s)	Comments
Clockworks™					
SM802121	ClockWorks™ 10GbE (156.25MHz), Ultra-Low Jitter, LVPECL Frequency Jitter		YES	24-pin QFN	Datasheet online
SM802123	ClockWorks™ 125MHz/25MHz Ultra−Low Jitter, LVCMOS Frequency Synthesizer		YES	44-pin QFN	Datasheet online
SM802124	ClockWorks™ Dual 125MHz Ultra−Low Jitter, CMOS Frequency Synthesizer		YES	24-pin QFN	Datasheet online
SM802128	ClockWorks™ 10GbE Octal 156.25MHz / 312.5MHz, Ultra−Low Jitter, CMOS Frequency Synthesizer		YES	24-pin QFN	Datasheet online

Ethernet Products - Quarterly Releases

Part Number	Description	Evaluation Board	Production	Package(s)	Comments
Physical Layer Transceivers					
KSZ9031RN	Gigabit Ethernet Transceiver with RGMII Support (Preliminary)		Preliminary	48-pin QFN	Datasheet online

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