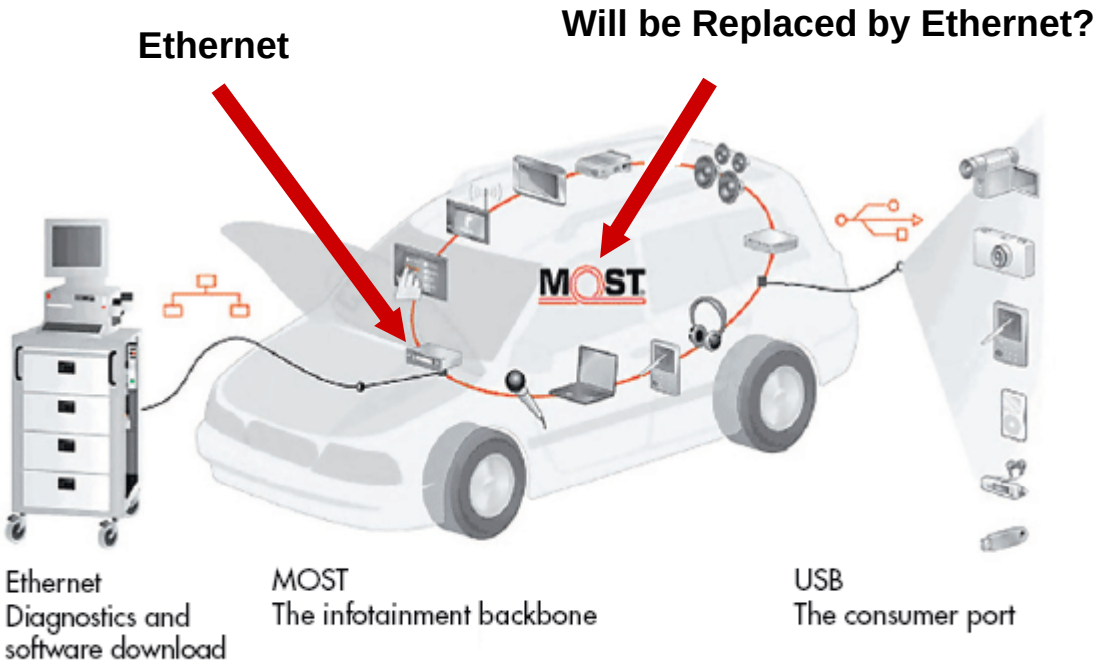
Automotive Update

Automotive Ethernet Solutions – Diagnostics Today, Infotainment Tomorrow



- **Initial applications include car diagnostics and software downloading**
- **Next Generation Ethernet as the Infotainment Backbone**

Why Ethernet?

Technology	Ethernet	MOST
Usage	Consumer, Communication, Computing, Industrial Control	Car only
Standards	Open (IEEE), field proven	Closed (MOST)
Media	Copper and Fiber (inc. POF)	POF
Topology	Ring, Daisy, Star, Hybrid	Ring
Speed	10Mbps to 10Gbps	25Mbps to 150Mbps
Volume production	Hundreds of Million chips per year	A few Million chips per year
Suppliers	Many	One (SMSC)
Cost	Low	High

Why Micrel for Automotive?

- **Micrel Ethernet is the leader in Industrial Ethernet Market**
- **Micrel is the "World's First Supplier of Automotive Qualified (AEC-Q100) Ethernet devices"**

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Innovation Through Technology™

Who We Are – Micrel Ethernet

- **Founded in 1996 (Kendin Communications Inc)**
- **Acquired by Micrel in 2001**
- **Patented Proprietary Mixed-Signal Fast Ethernet PHY:**
  - Lower Power
  - Small Die Size
  - Lower Cost Per Port
  - Superior Eye Diagram
- **Shipped over 350M ports up to date**

Micrel Ethernet Product Families – 'One Stop Shop'

- **PHY**
  - Fast Ethernet: MII, RMII, SS-SMII interfaces
  - Gigabit Ethernet
- **Ethernet Controller (MAC+PHY)**
  - Fast Ethernet: PCI, Generic Bus, SPI Bus
- **Switches**
  - Fast Ethernet: 2-port, 3-port, 5-port, 8-port, 9-port
- **SOC's**
  - Fast Ethernet: ARM9+5-port switch, ARM+2-port FE MAC
  - Gigabit Ethernet: ARM9+2-port Gigabit MAC

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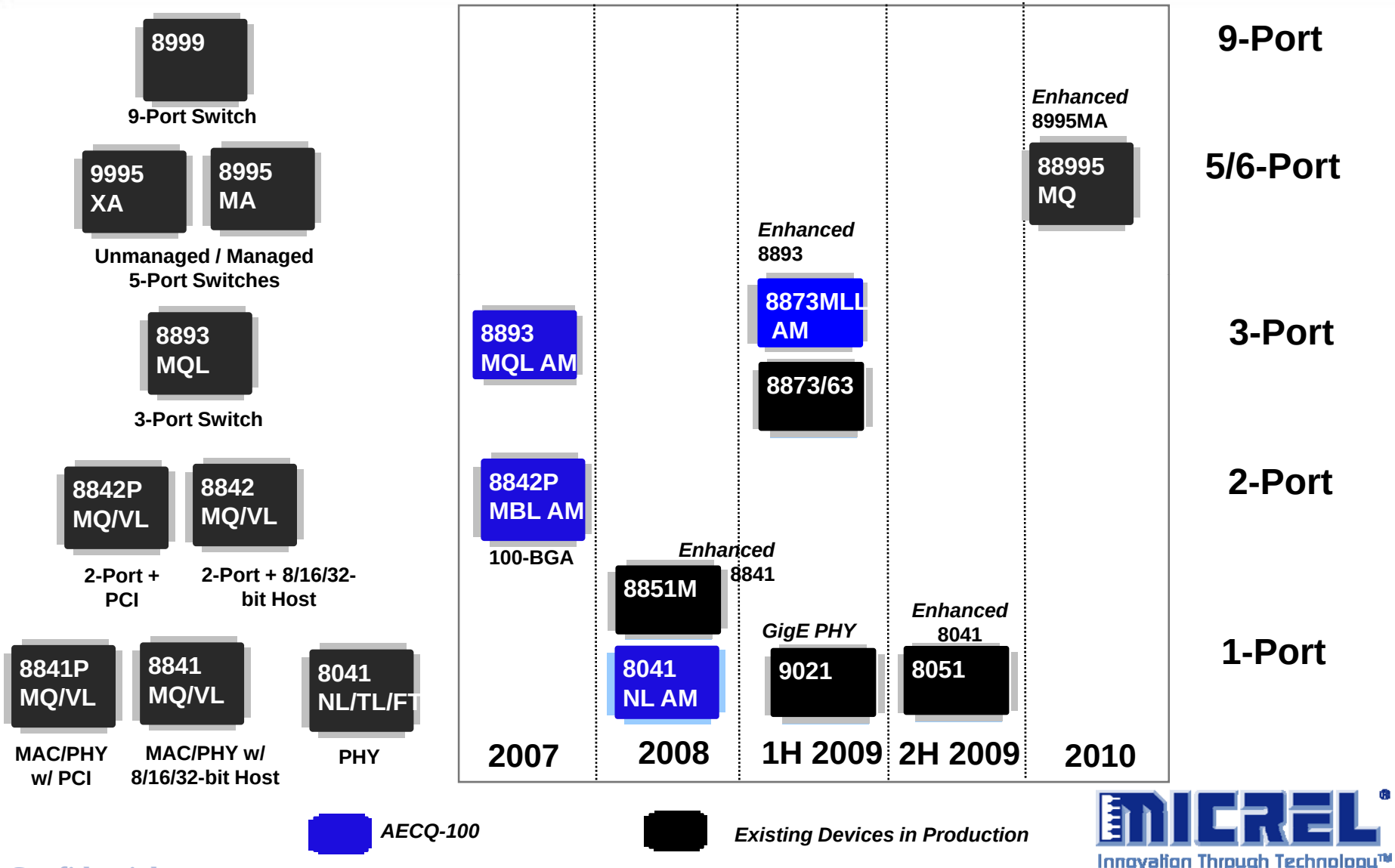
Ethernet Roadmap
'One-Stop Ethernet Shop'



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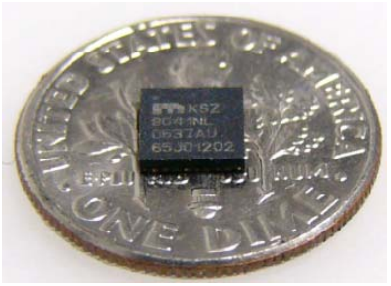
KSZ8041 Single-Port 10/100 PHY Family

- **Industry's Highest ESD Rating - 6KV**
  - Saving BOM Cost $$$!
- **Industry's Smallest Package (5x5mm)**
  - 70% Smaller Than Competition
- **Lowest Power in the Industry**
  - 175mW
- **AECQ-100 Qualified**
  - KSZ8041NL AM



KSZ8051 Next Gen Single-Port 10/100 PHY Family - Enhancements

- **Pin Compatible with current KSZ8041 family**
  - Also smaller 4mm x 4mm 24-QFN for RMII / SMII
- **Lower Power consumption (50% reduction)**
- **On-Chip Termination**
- **Flexible I/O voltage (1.8V to 3.3V)**
- **Intelligent Power-Down modes**
- **Configurable drive strength for shorter cables**
  - Lowers power consumption even further

'The Best just got even Better!!'

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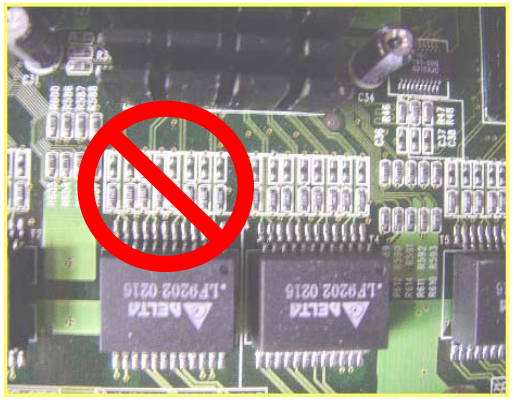
KSZ9021 Gigabit PHY Family – Overview

- On-chip LDO controller to support single 3.3V supply operation
- Supports 16KB Jumbo Frames
- Supports MDC clock up to 12.5MHz
- Supports MDI/MDIX auto crossover
- Programmable LED Modes to allow customization
- LinkMD® cable diagnostics and NAND tree support :
- Provides 125MHz clock to MAC to reduce need for expensive oscillator
- On-chip termination
- 64-QFN (GMII) 48-QFN (RGMII)



On-chip termination removes up to 12 external passives / port

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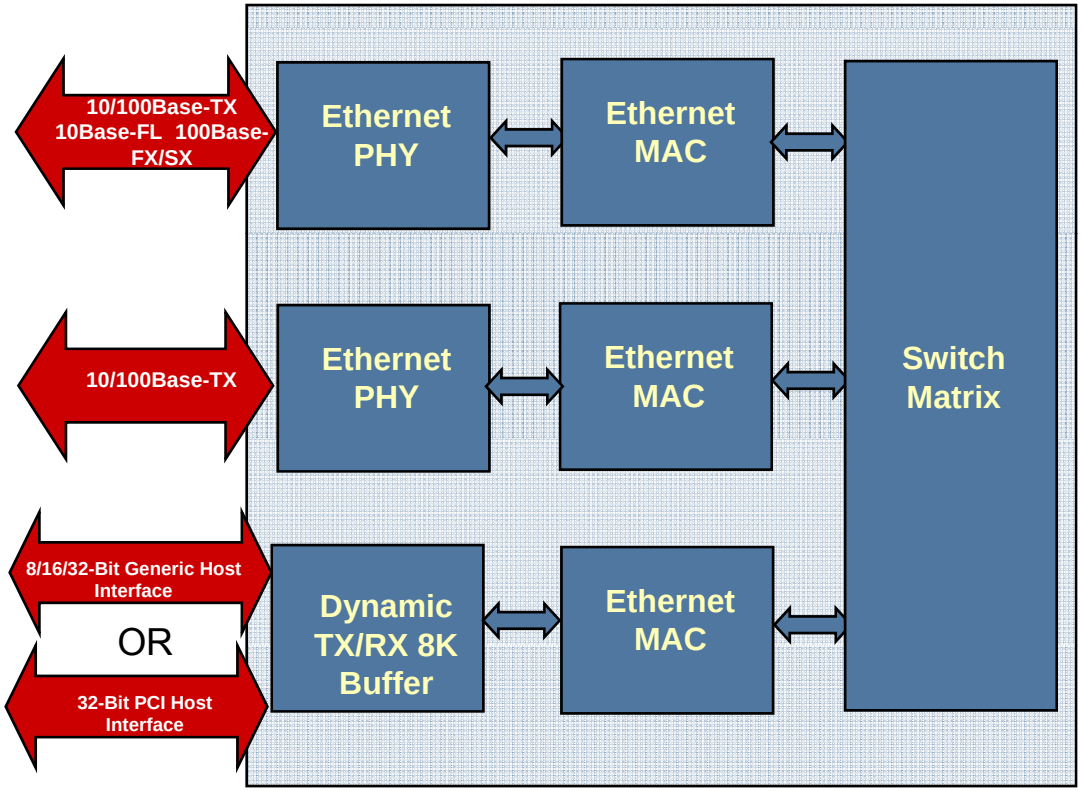
New! KSZ8851 Next Generation Controller

- **8,16,32-Bit & SPI non PCI Single Port Controller**
- **Improved Performance 80Mbps+ RX throughput w/ LOW CPU usage**
  - 18KB Buffer: RXQ = 12KB, TXQ = 6KB
  - Internal bus clock 125MHz and *new* 166MHz modes
  - Single Bus Timing for all access
  - Full DMA modes of operation
  - Extensive Filtering options
  - TCP/ UDP/ ICMP/ IPv6/ IPv4 Checksum Generation & Detection in H/W
- **Cost Reduced**
- **Package / Vcc Options:**
  - 128-Pin PQFP Pin Compatible with KSZ8841-xxMQL
  - 7mm x 7mm 48-Pin LQFP*
  - 5mmx 5mm 32-Pin QFN**
  - < 90mA Power Consumption
  - Single 3.3V supply with 1.8V, 2.5V, 3.3V flexible I/O options
- **Linux & WinCE driver support**

KSZ8851 Fully Released!!

* No 32-bit support ** SPI only

KSZ8842 2-Port Ethernet Controller



- **PCI, 8/16/32-bit Processor i/f**
- **10BT/100B-TX, 10B-FL/100B-FX/SX**
- **Dynamic buffer memory scheme**
- **HP Auto MDI-X crossover with disable option**
- **LinkMD™ Cable Diagnostic**
- **Capabilities MIB counters for full management on chip**
- **IPv6 Traffic Classification & Multicast Support**
- **4 Queue Priority – for Voice, Video and Data**
- **QoS priority: port, 802.1p & DSCP**
- **Industrial Temperature Range -40°C to +85°C**
- **128-PQFP, 128-LQFP, 100-LFBGA**

KSZ8842PMBL AM AECQ-100 Qualified

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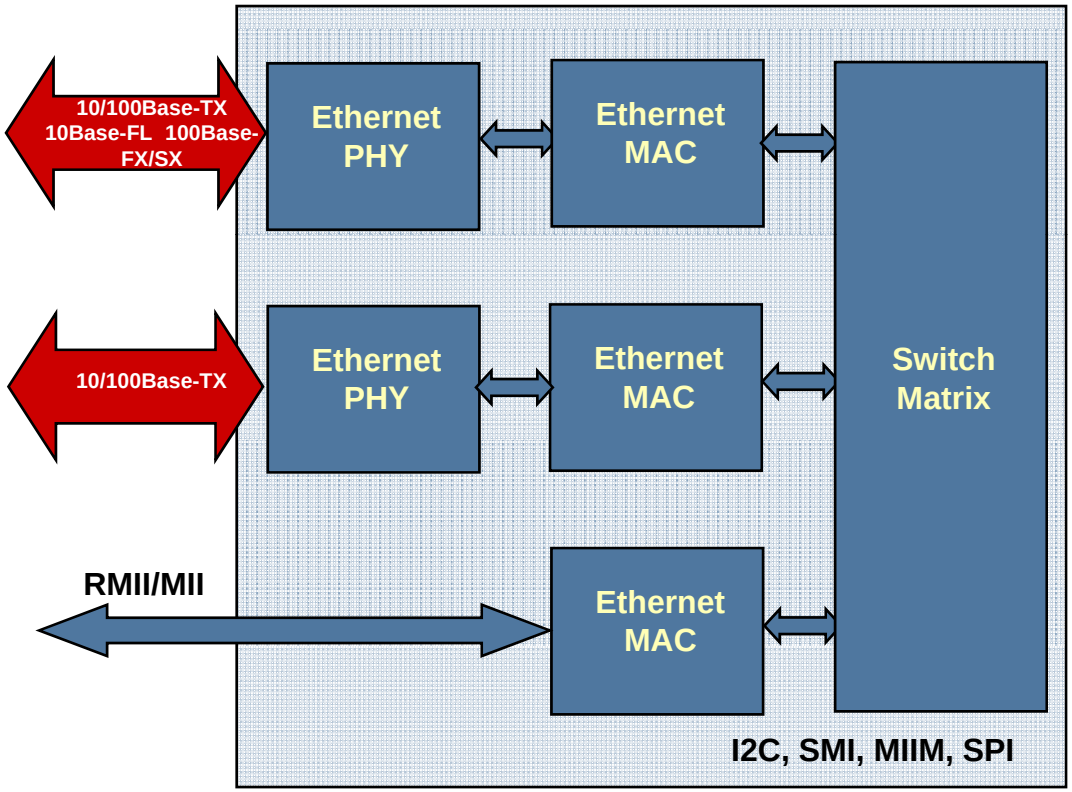
Existing 3-Port Ethernet Solution – KSZ8893M



- Same switch core as KSZ8842
- 10BT/100B-TX, 10B-FL/100B-FX/SX
- Dynamic buffer memory scheme
- HP Auto MDI-X crossover with disable option
- LinkMD™ Cable Diagnostic
- Capabilities MIB counters for full management on chip
- IPv6 Traffic Classification & Multicast Support
- 4 Queue Priority – for Voice, Video and Data
- QoS priority: port, 802.1p & DSCP
- Industrial Temperature Range -40°C to +85°C
- Available in 128-PQFP and 100-LFBGA

KSZ8893MQL AM AECQ-100 Qualified

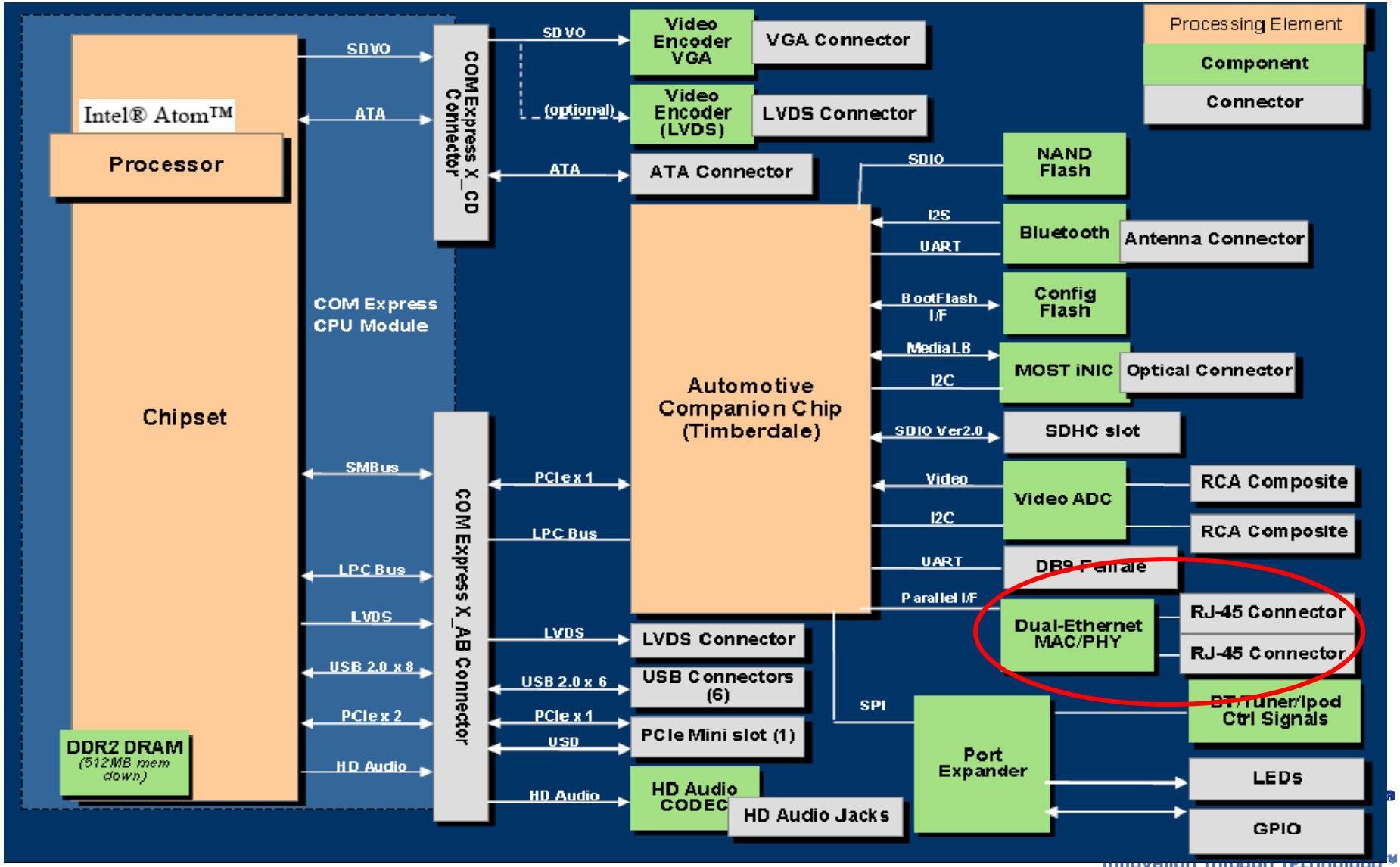
New! – KSZ8873M 3-Port Switch Family

- **Enhanced and Cost Reduced version of KSZ8893M**
- **Flexible interface support**
  - Dual MII Interfaces
  - Two-port Copper with MII or RMII
  - Two-port FX switch
  - 1-port FX and 1-port copper
- **Enhanced Features include**
  - Robust Design – HBM ESD 6KV
  - Lower Power Consumption, typically 250mW
  - Advanced Power Management modes
  - Enhanced Packet Filtering
- **Cost Savings**
  - Internal generated RMII 50MHz clock - saves expensive external 50MHz oscillator
- **Smallest package in the industry – 48-pin LQFP**
  - 7x7mm (vs. 14x20mm previous generation)
- **KSZ8873MLL AM**
  - AECQ-00 qualified

KSZ8873 Fully Released!!

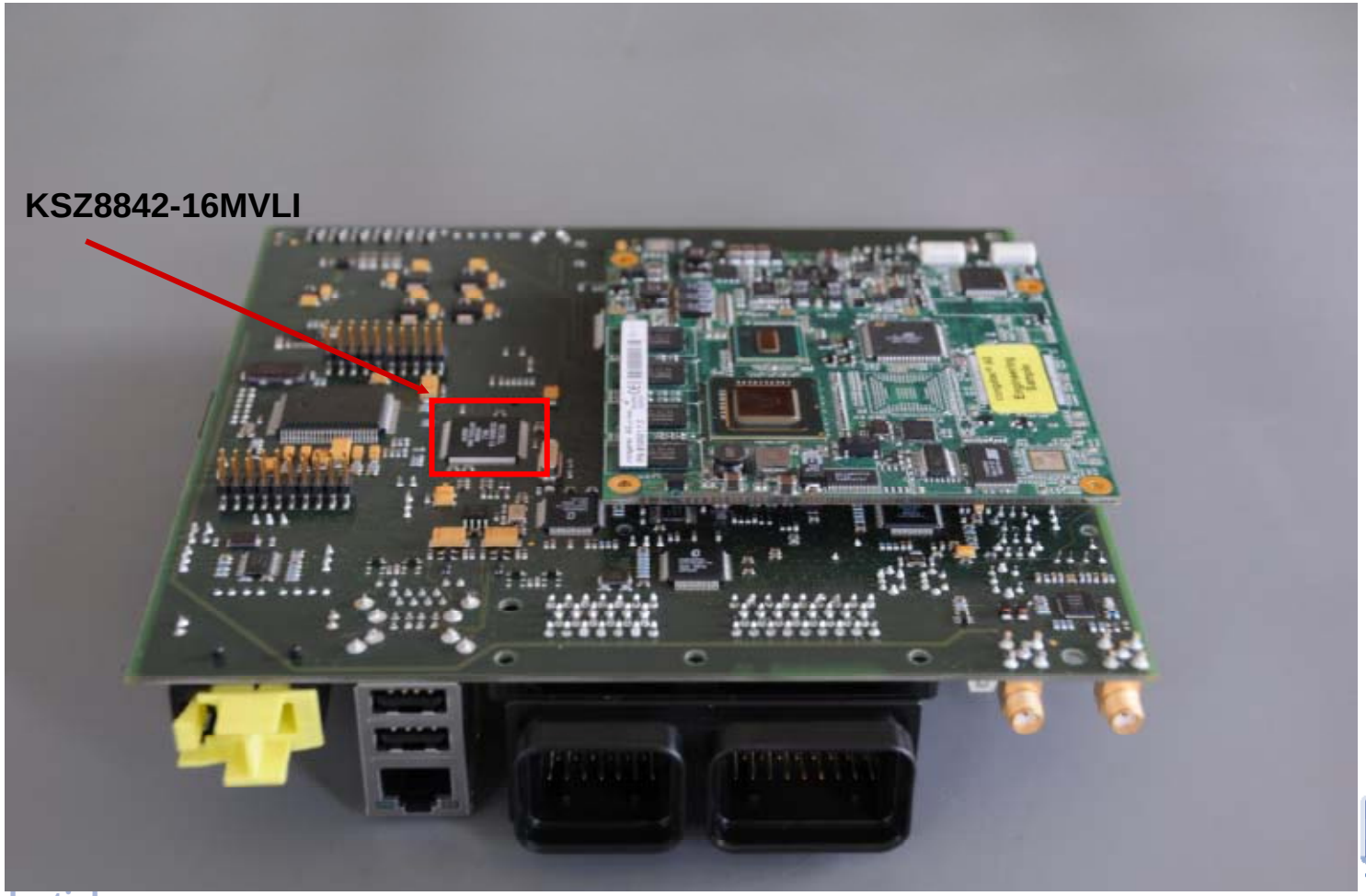
GENIVI Members

Russellville – In-Vehicle Infotainment (IVI) Open Source Development Platform



Russellville – GENIVI Platform

- **KSZ8842M 2-Port controller used in GENIVI Platform**
  - Only Ethernet device support with Linux, Moblin s/w driver support



RF Solutions
(Remote Controls, Keyfobs)

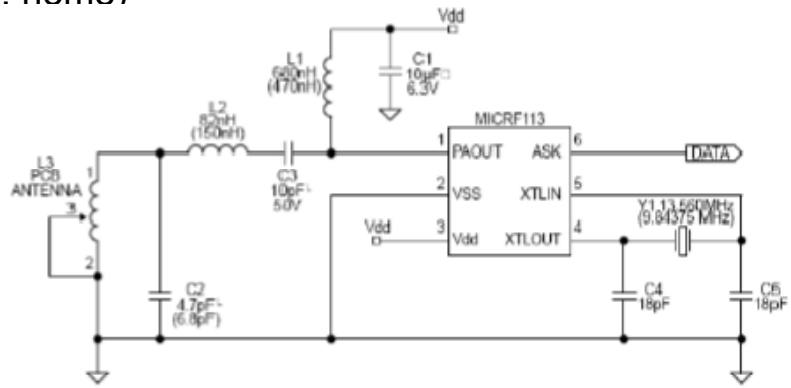
MICRF112, MICRF113
Low Cost RF Transmitters

Features

- Complete UHF transmitter on a monolithic chip
- Frequency range 300MHz to 450MHz
- Data rates up to 50kbps ASK Manchester Encoded, 10kbps FSK
  - MICRF113 = 10kbps ASK only, no FSK
- Output Power to +10dBm
- Operate with crystals or ceramic resonators

Applications

- Remote Control; (STB, HVAC, Consumer electronics; RKE, home)
- Security/Emergency systems
- Garage Door Opener Transmitters
- Remote Sensor Data Links
- Infrared Transmitter Replacement
- Tire Pressure Monitor System (TPMS)



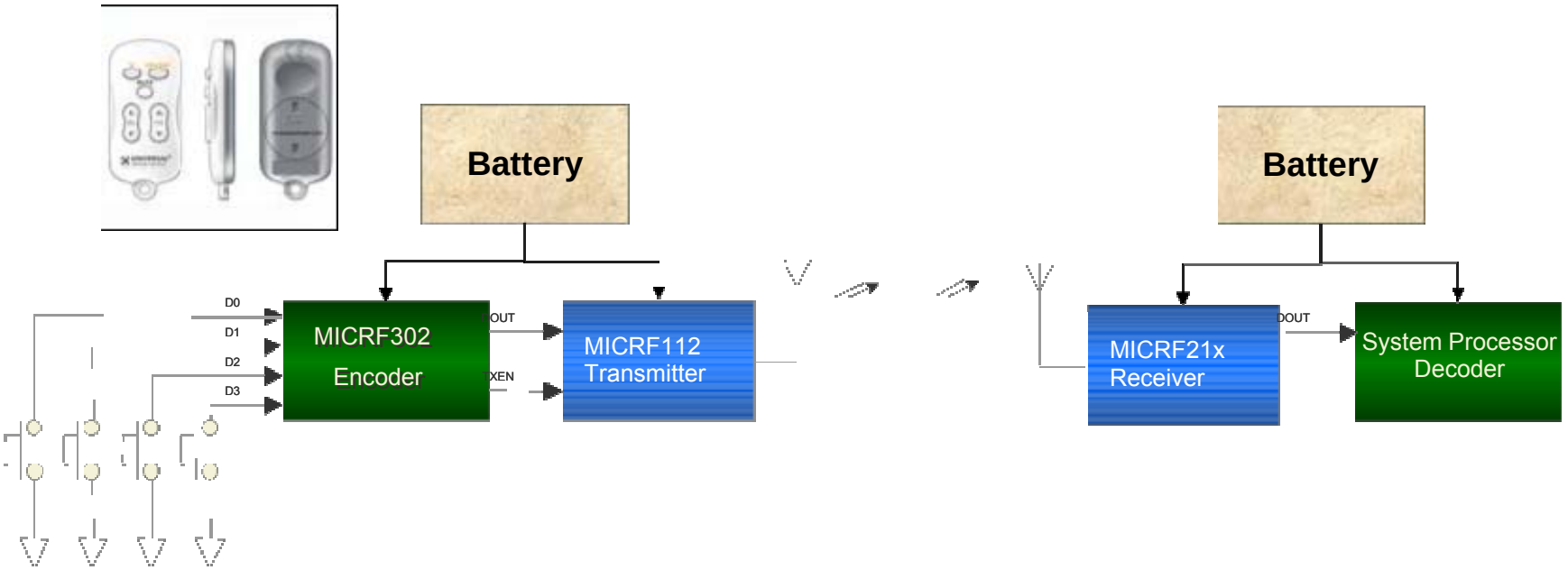
Support

- Complete Development/Reference Designs
- Design and Layout review provided

Micrel Advantages

- **1.8V to 3.6V Operating range: Great for coin cells, Li-Ion, etc.**
  - **Standby Current = 50nA typ.**
  - **Longest Battery life!!!**
- Lowest system cost and component count (Micrel Trademark!!!)
- Smallest Packages in Industry
  - Two different packages, QSOP20, QSOP16 (MICRF113 = SOT23 pkg only)

Simple Low Cost One-Way Wireless Link



Applications

- Remote Controls/Keyfobs (Toys, TVs, Stereos, Automobiles, Garage Door Openers, Lighting Control)
- Remote Monitoring: Patient, Thermostats, Status/Sensors, Alarms,

Micrel Advantages

- Can Operate on Single 3V Coin Cell Battery longer than any competitor
  - Lowest Current Consumption on the market
- Lowest BOM cost
- Simplest Solution: Fewest external components

MIC5280 & MAQ5280

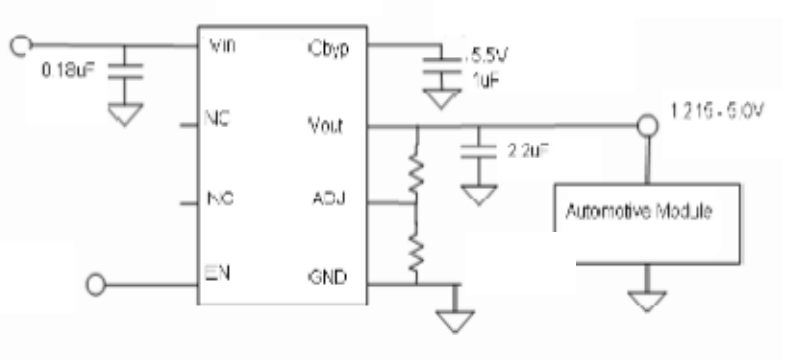
High-Voltage (120V) AEC-Q100 Qualified LDO

Surge Protection up to 120 VDC!

Features

- Vout: 1.215V to 5V
- 25 mA, 31 µA Quiescent Current µCap LDO
- ePAD SO-8 Thermal Pkg (θ_{JA} =41°C/W)

Vin: 4.5 to 120 VDC



Micrel Advantages

- **Industry's First 120VDC LDO!**
- **AEC-Q100 qualified (MAQ5280)**
- Can Handle Very large Load-Dump Require
  - ***No additional circuitry required!***
- PSRR: **> 80 dB**: perfect for RF applications