KB9012 Embedded Controller firmware reverse engineering

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coreboot conference
San Francisco 2016

Situation and Motivation

Personal Use Case

Use of technology:

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- Freedom-respecting computers

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Free software support:

- CrOS EC
- Lynxis 2015 GSoC project

Hardware Investigation

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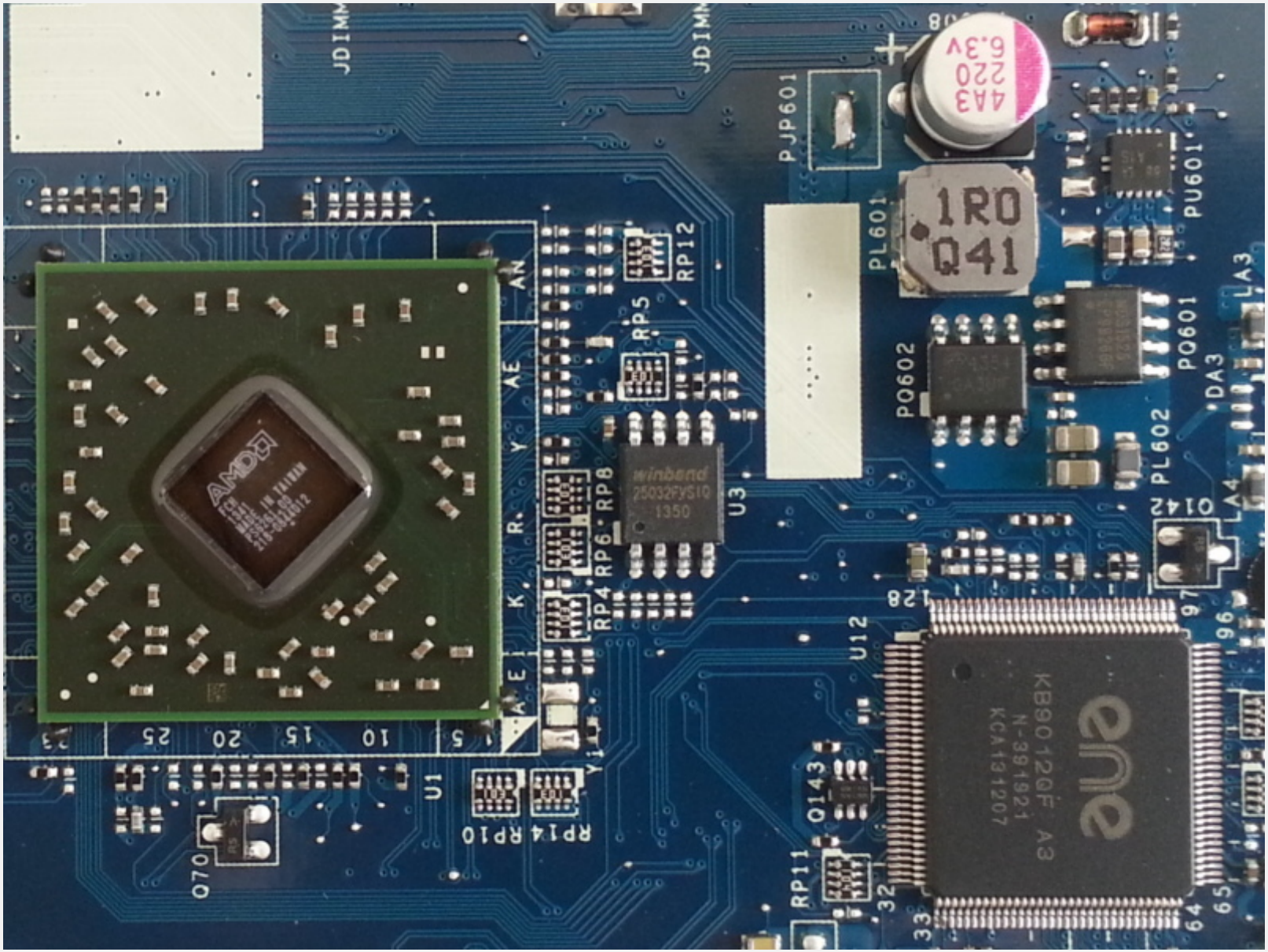

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  - Platform description
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- Storage memory (128 kiB flash)
- Volatile memory (4 kiB SRAM)
- Controllers:
  - LPC, SMBUS (I2C), SPI
  - GPIO, ADC, DAC
  - Keyboard, PS/2
  - IR, FAN, OW
  - Some more

Development Setup

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Hardware

Serial and Debug Output

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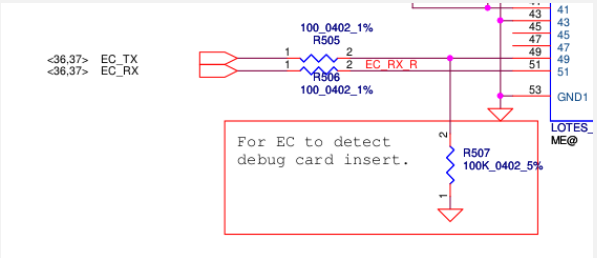
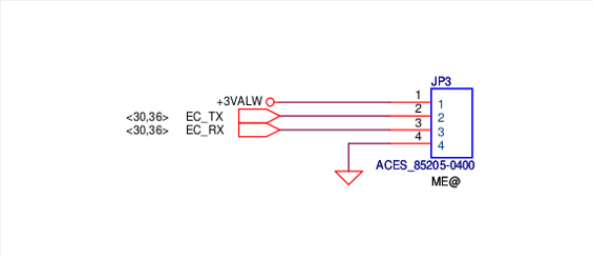
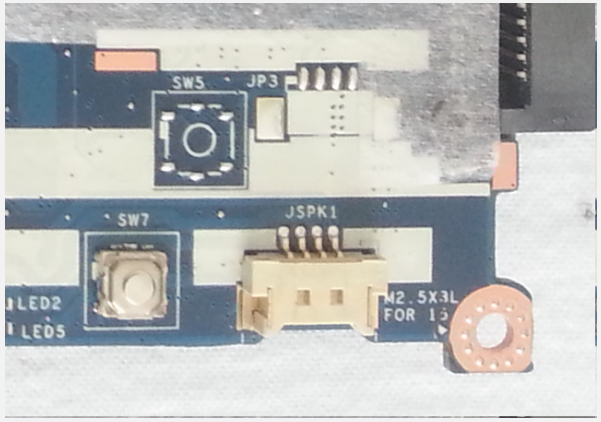
```
KSTART!R
EF-01,E7,E0,ON01,NON1N2N3N3N4N5N6EXN7
EF-01,E0,F0,N8NANANANANANANBNBNBNBNBNBNB
I52,KC52,DA4,KDA4,OOO,NBO,
e59,Kc59,dE9,KdE9,
KxFF,NB
I52,KC52,DA4,KDA4,OOO,O,
e59,Kc59,NBdE9,KdE9,NBNBNBNB
MC4E,MDED,
EF-01,EO,ED,MrFF,
MC4E,MDEC,
EF-01,EO,EC,Mr06,NBVFF,NBC,RFA,OFA,RAA,K20
MC42,MDOO,
MC4E,MDEB,
EF-01,EO,EB,Mr55,O,NB
```







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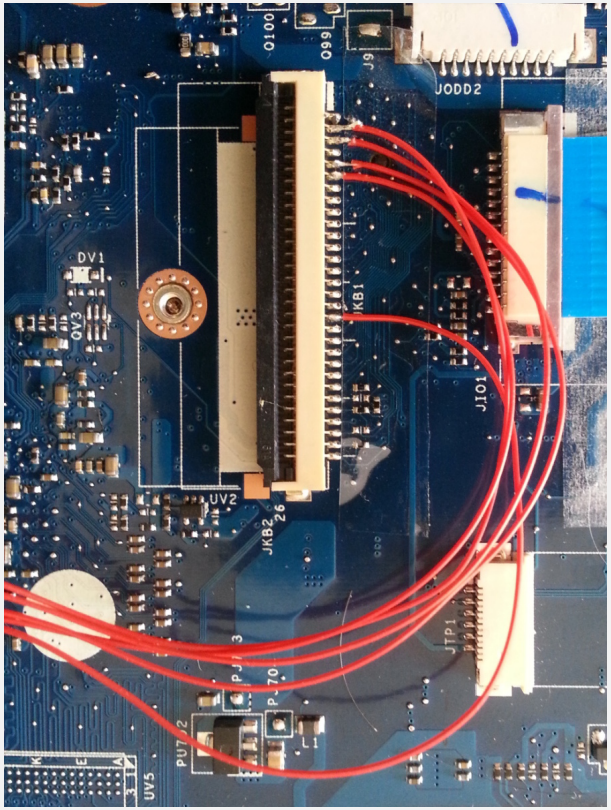

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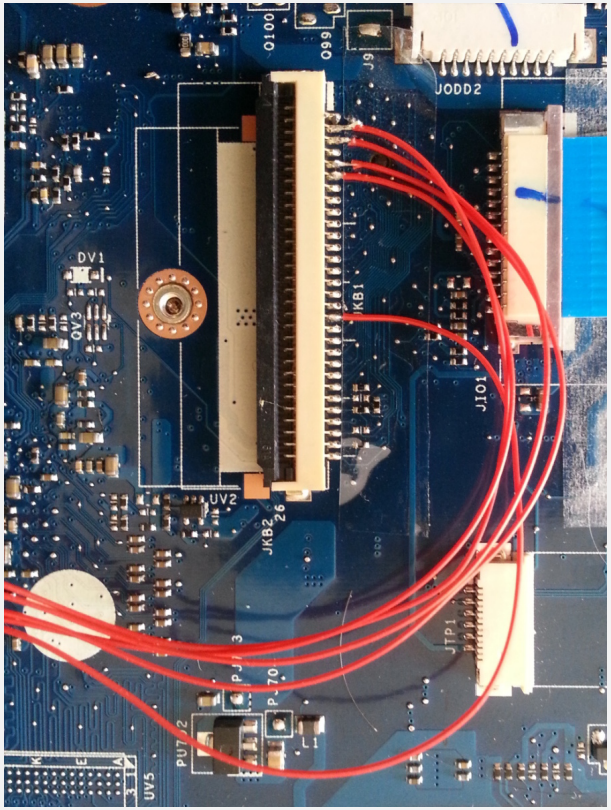
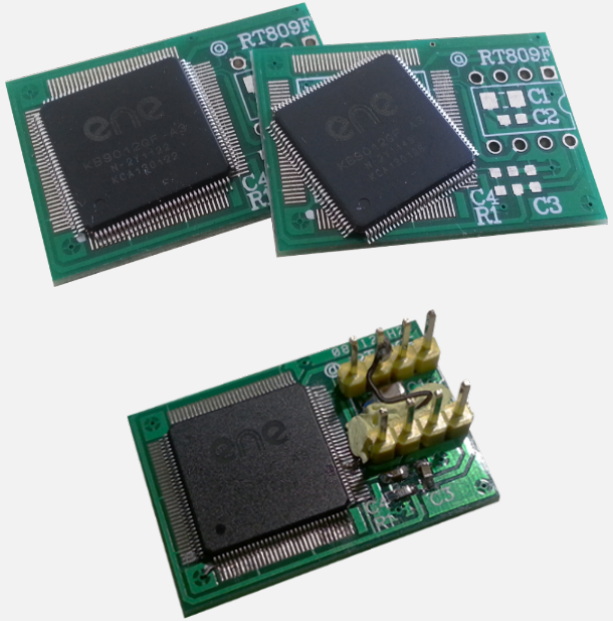


Flashrom support (under review)!

Early Investigation

Development board:



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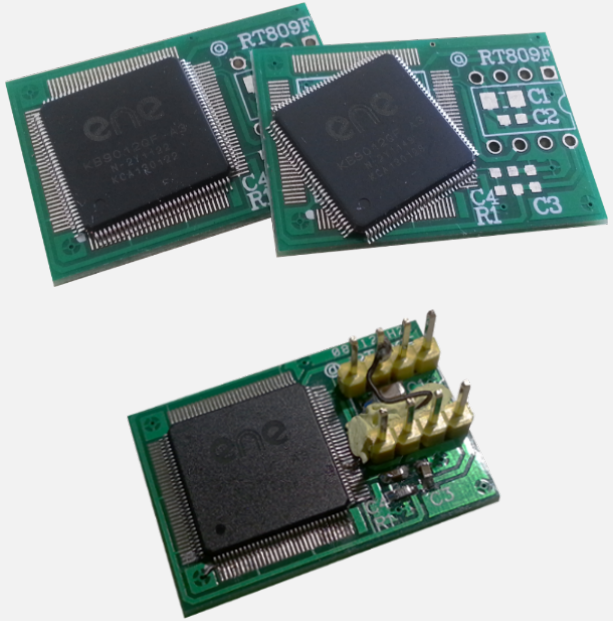

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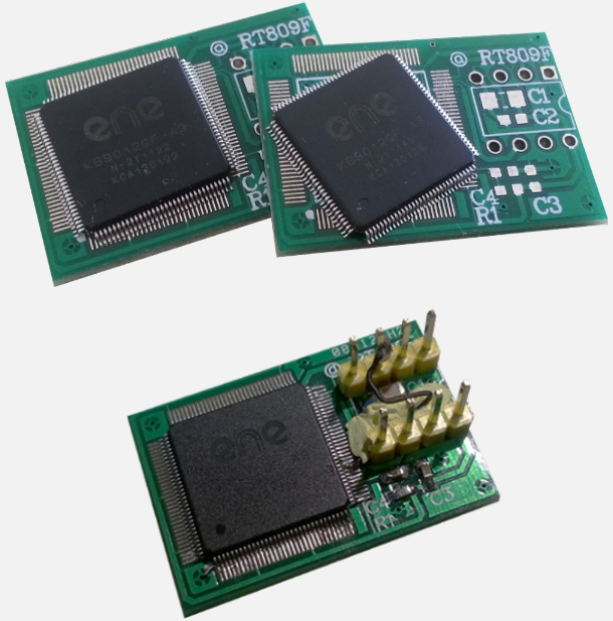

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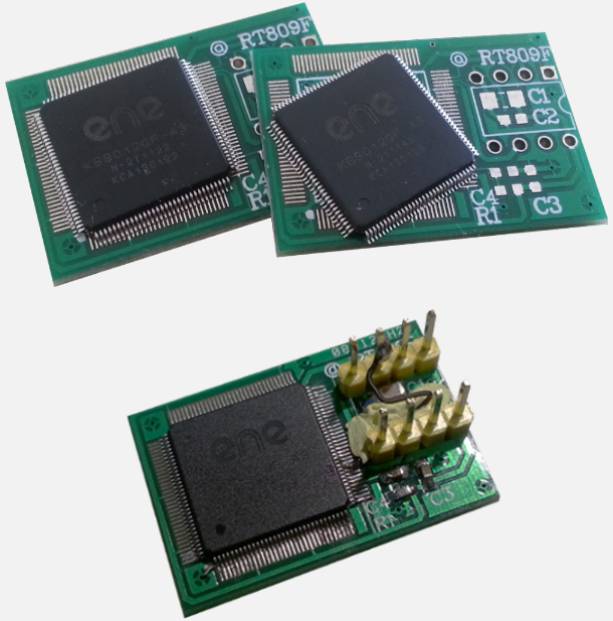

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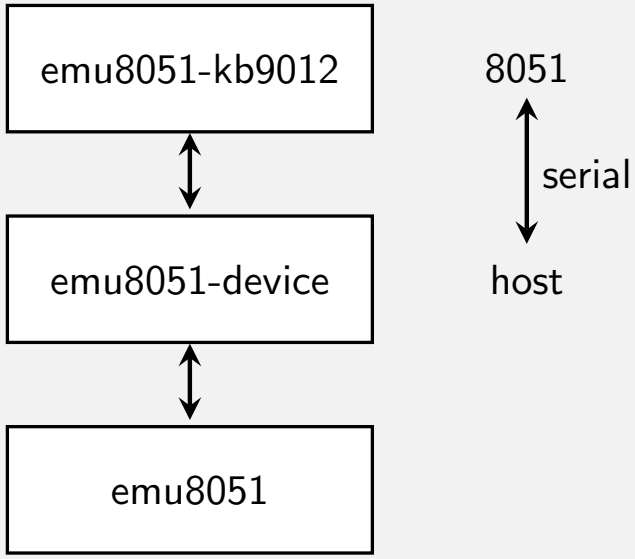

Free Software EC Implementation

Functional Free EC Firmware

Associated constraints, requirements:

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Origami Embedded Controller firmware (Origami-EC)

A flexible free software embedded controller firmware implementation for 8051-based platforms.

Origami-EC

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- Event-driven, no task and context switch

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Roadmap and Discussion

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- Contributions (technical or not) are welcome!

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- Origami-EC public release
- Associated infrastructure:
  - Development repository
  - Documentation
  - Mailing list
- emu8051, emu8051-device public release
- Contributions (technical or not) are welcome!

Thank-you!