Hardware Change Log

*[P80 ACU]*

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| Document Reference: |  | | |
| Document Revision: |  | Date: | *05-03-2018* |
| **Comments** | | | |
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| Action | Name | Function | Signature | Date |
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# Changelog

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Revision | Author | Description |
|  |  |  |  |
| 12-12-2017 | 1 |  | Initial release first prototype - EDA build no. 17.1.9.592 |

# Purpose and Scope

This document describes the changes for each revision of the P80 ACU.

Raw PCB Number: ??

# Changes to be implemented (Pending)

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| No. | Description | BOM | Schematic | Layout | Who | Status |
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|  |  |  |  |  |  |  |
| 23 | Change HW mode vboost set point form app. 4,7V to app. 14V to get higher output power. On master schematic change R15 + R6 at resistor divider at INA- / INB- from 10k to ??k. | X |  |  | JOKR |  |
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|  |  |  |  |  |  |  |
| 27 | Rather than OR’ing 5V with Vsun for LDO, OR output of LDO with 5V from Stack. Investigate possible fail cases |  |  |  |  |  |
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# Revision 2 changes implemented

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Description | BOM | Schematic | Layout | Who | Status |
| 11 | LTC6101, to be changed to LTC6106 for low voltage channels |  | X |  | BGS | Done |
| 13 | MCU1 Crystal serial resistor R239 not mounted | X |  |  | BGS | Done |
| 14 | MCU2 Crystal serial resistor R251 not mounted | X |  |  | BGS | Done |
| 16 | FRAM U31 I2C address shall be [A2:A0]=001. Connect A0 to Vcc |  | X |  | BGS | Done |
| 17 | FRAM U61 I2C address shall be [A2:A0]=001. Connect A0 to Vcc |  | X |  | BGS | Done |
| 19 | Consider tuning MCU crystal frequency. Crystal Cload specified to 10pF. Calculated load with Cstray=4pF is 7,4pF. To get Cload closer to 10pF, change the two load capacitors to app. 12pF. | X |  |  | BGS | Done |
| 4 | Brownout detector should be removed and replaced by the watchdog/brownout detector used in P80 PMU |  | X |  | BGS | Done |
| 5 | One watchdog for each MCU and use the nMR input tied together for the JTAG interface |  | X |  | BGS | Done |
| 6 | Change load switches, find one that is retrying and has programmable latch-up limit  Missing component calculations |  | X |  | BGS | Done |
| 21 | The resistor R227 at nRESET must be of lower value. The internal pull-up at the two MCU’s are so strong that nRESET only can be pulled down to app. 2,4V.  Brownout detector changed to watchdog with built-in watchdog | X | X |  | JOKR | Done |
| 7 | Add input protection for the “global” comparator (U5 and U41) in each ACU200, see ACU210 |  | X |  | BGS | Done |
| 8 | Maybe use a reference for the “global” comparator (U5 and U41) instead of “vboost” divided by resistors. And at the same time use precision resistors for measuring the VBAT instead of the Zener. |  | X |  | BGS | Done |
| 12 | R2 and D2 does not impose any protection, remove or change to TVS.  Removed |  | X |  | BGS | Done |
| 18 | TVS diode 30V e.g. D7 has wrong footprint |  |  | X | JOKR | Done |
| 10 | The LDO supplying the converter logics can be changed to a switcmode converter. |  | X |  | BGS | Done |
| 15 | VBAT switch circuit, 1 + 2, Resistor R122 / R126 may need derating. Is exposed to 33Vdc at max VBAT.  Not relevant anymore | X | X |  | JOKR | Done |
| 29 | Update to correct GND scheme |  | X | X | BGS | Done |
| 31 | Add ESD protection to debug connector | X | X | X | BGS | Done |
| 30 | Change to new FRAM | X | X | X | BGS | Done |
| 3 | VCC routing on mid-layer 5 can be removed. Vias connected through VCC plane layer 7  PCB has to be rerouted |  |  | X | JOKR | Done |
| 1 | Suggestion: VBAT switch R126 or T2, if they have a bad soldering/disconnect, a single failure can turn off VBAT\_OUT. Cheap solution is to make a redundant open collector circuit (duplicate these components)  Not relevant anymore |  | X |  | JOKR | Done |
| 2 | Page 3: net BOOST\_OUT and V\_BAT are connected together. Net should only have one name. |  | X |  | JOKR | Done |
| 9 | Change the stacked capacitors and coil in the converter. Note the quality issues from P60. |  | X |  | BGS | Done |
| 24 | To change boost converter regulation mode change:  C4 changed to 5,2µF (2x2,2µF + 1µF)  I1 change to 15µH. 22µH  R10 = 33kohm, R14 = 3k3ohm, C9 = 10pF.  R159 changed to ??kohm (increase HW mode set point)  Removed SYNC clock, R9, R23: 1,8Mohm, C29, C30: 10pF, U9 and components around that IC.  Added 1Mohm feedback, U20A from OUTA\_C pin 1 to INA+ pin 3  Same changes to channel B | X | X | X | JOKR | Done |
| 25 | LDO supplying the converter logics should be changed to LTC3639 DC/DC converter.    Changes enable/SHDN pin from 0.3V to 0.7V threshold. Complies with KS logic. Refer to ltspice simulation for LTC3639 for component selection. Efficiency simulated from 88 to 93%. Expect nominel 85%.  Wurth Coil (74406043221)  Vripple <= 100mV (2%)  Note: Reused design from BP8 | X | X | X | CAF | Done |
| 26 | Rather than using a single LDO/Buck converter for two channels, reconfigure for adding redundancy by letting a single LDO/Buck power 4 channels and be overlapping. This allows for a single LDP/Buck to fail while ensure continued operation. Second failed LDO/Buck only causes 2 channels to discontinue operation. Overlapping could be as  Buck1: Boost[0..3]  Buck2: Boost[2..5]  Buck3: Boost[4..7]  Investigate possible fail cases.  Note: Not done as complexity is not worth it at the moment | X | X | X | CAF | Done |
| 28 | Update Killswitch circuitry to P80 Killswitch overview v3 | X | X | X | CAF | Done |
| 22 | Change boost converter regulation to CCM. On master schematic, change R3 from 10ohm to 100ohm (DAC output), I1 from 4,3µH to 10µH. Added feedback from OUTA to INA- R=10kohm. Apply changes to all converters.  Note: Implemented in 24 | X | X | X | JOKR | Done |
|  |  |  |  |  |  |  |