VC36+
VC35+
VC34+
VC33+
VC32+
VC31+
VC30+

C67 0.1 uF 50V
C60 0.1 uF 50V
C69 0.1 uF 50V
C70 0.1 uF 50V
C71 0.1 uF 50V
C72 0.1 uF 50V

1k R79-1
1k R79-2
1k R79-3
1k R79-4
1k R79-5
1k R79-6
1k R79-7

D73-1
D73-2
D73-3
D74-1
D74-2
D74-3

C61 0.1 uF 50V
C62 0.1 uF 50V
C63 0.1 uF 50V
C64 0.1 uF 50V
C65 0.1 uF 50V
C66 0.1 uF 50V

IC6CELLIF
BQ76PL536

1 VC6+
3 VC5+
5 VC4+
7 VC3+
9 VC2+
11 VC1+
13 VC0

R73 47
Q31
D11
R38 1M

R74 47
Q32
D12
R37 1M

R75 47
Q33
D13
R36 1M

R76 47
Q34
D14
R35 1M

R77 47
Q35
D15
R34 1M

R78 47
Q36
D16
R33 1M

IC6BALANCEIF
BQ76PL536

2 CB6
4 CB5
6 CB4
8 CB3
10 CB2
12 CB1

R17 1.47k
6-TS1

R16 1.82k

R19 1.47k
6-TS2

R18 1.82k

6-REG50

LED2

IC6THERM/GPAI/GPIO
BQ76PL536

20 TS1+
19 TS1-
61 TS2+
60 TS2-

48 GPAI+
47 GPAI-

45 GPIO
31 AUX

R160 10k

R20 1.47k

Q38

VC30+

cell circuits ref.
    BQ76PL536 datasheet (SLUSA08A) - rev. A, pp. 47-50
    "Improving Communications with the bq76PL536" (SLUA562), Aug. 2010
        (schematics in Appendix B)
    bq76PL536BEVM-3 Stack Design schematic, 11/9/2012

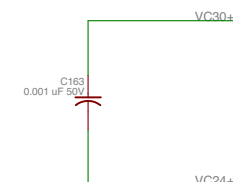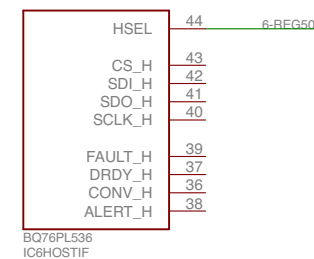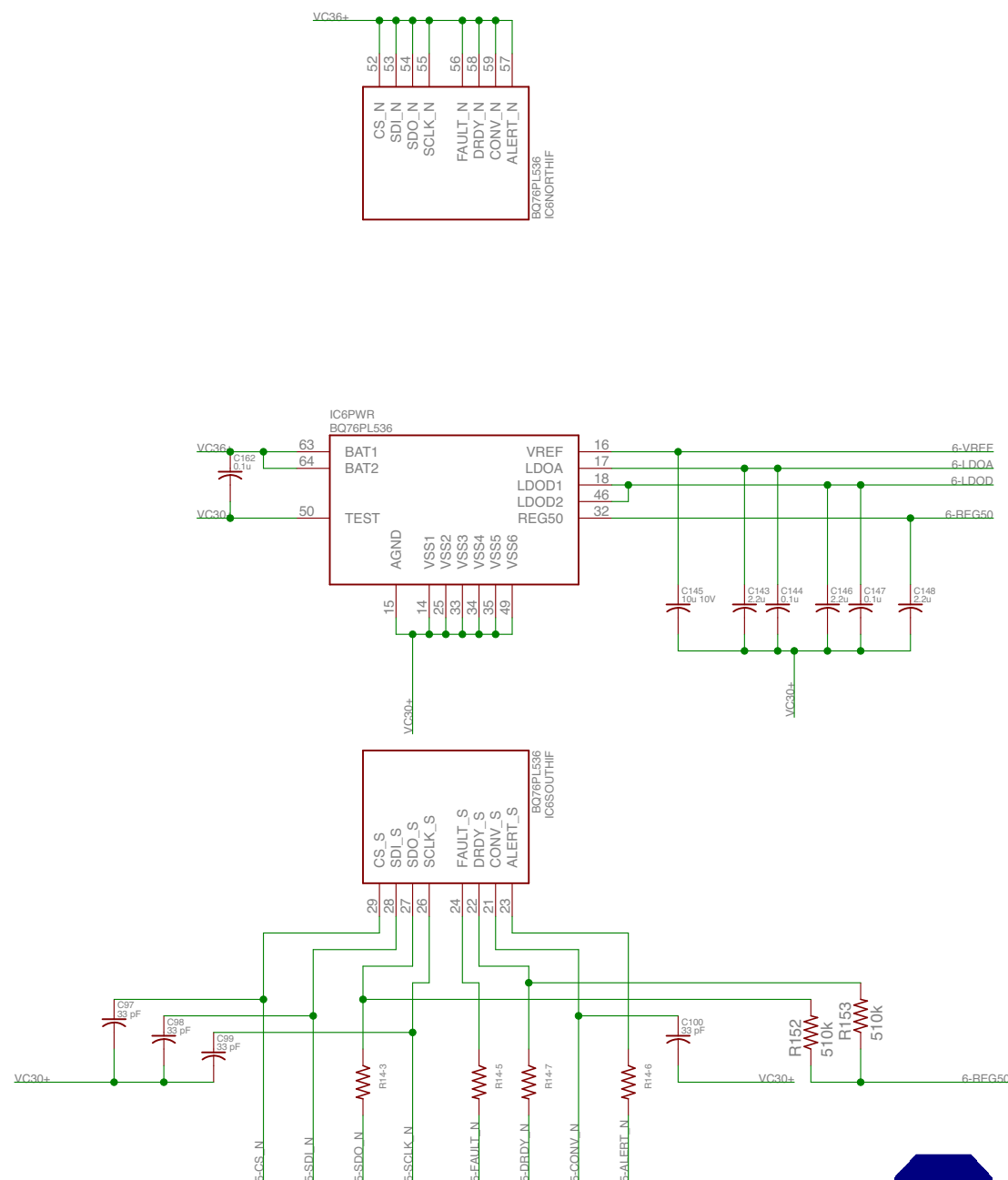Device #6 cell interface, balancing, thermistors, GPIO
RELEASE

C

Board: Battery Interface Module r02
Drawn by Aaron Bonnell-Kangas
Revision date: r02 - 2014-02-10
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VC36+

52 53 54 55 56 58 59 57

CS_N
SDI_N
SDO_N
SCLK_N
FAULT_N
DRDY_N
CONV_N
ALERT_N

BQ76PL536
IC6NORTHIF

HSEL 44 6-REG50

CS_H 43
SDI_H 42
SDO_H 41
SCLK_H 40

FAULT_H 39
DRDY_H 37
CONV_H 36
ALERT_H 38

BQ76PL536
IC6HOSTIF

IC6PWR
BQ76PL536

VC36+
C162
0.1u
63 BAT1
64 BAT2

VREF 16 6-VREF
LDOA 17 6-LDOA
LDOD1 18 6-LDOD
LDOD2 46
REG50 32 6-REG50

VC30 50 TEST

AGND VSS1 VSS2 VSS3 VSS4 VSS5 VSS6
15 14 25 33 34 35 49

VC30+

C145 C143 C144 C146 C147 C148
10u 10V 2.2u 0.1u 2.2u 0.1u 2.2u

VC30+

VC30+
C163
0.001 uF 50V

VC24+

BQ76PL536
IC6SOUTHIF

CS_S
SDI_S
SDO_S
SCLK_S
FAULT_S
DRDY_S
CONV_S
ALERT_S

29 28 27 26 24 22 21 23

C97
33 pF
C98
33 pF
C99
33 pF

C100
33 pF

R152
510k
R153
510k

VC30+ VC30+ 6-REG50

R14-3 R14-5 R14-7 R14-6

5-CS_N
5-SDI_N
5-SDO_N
5-SCLK_N
5-FAULT_N
5-DRDY_N
5-CONV_N
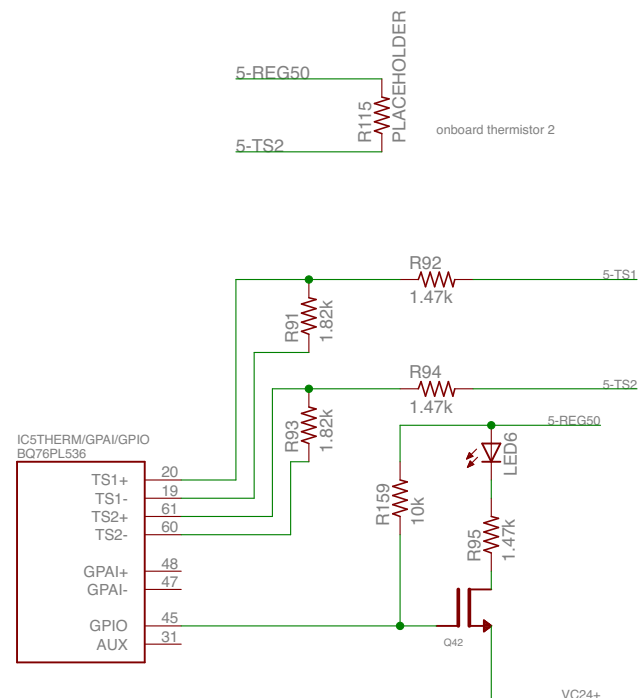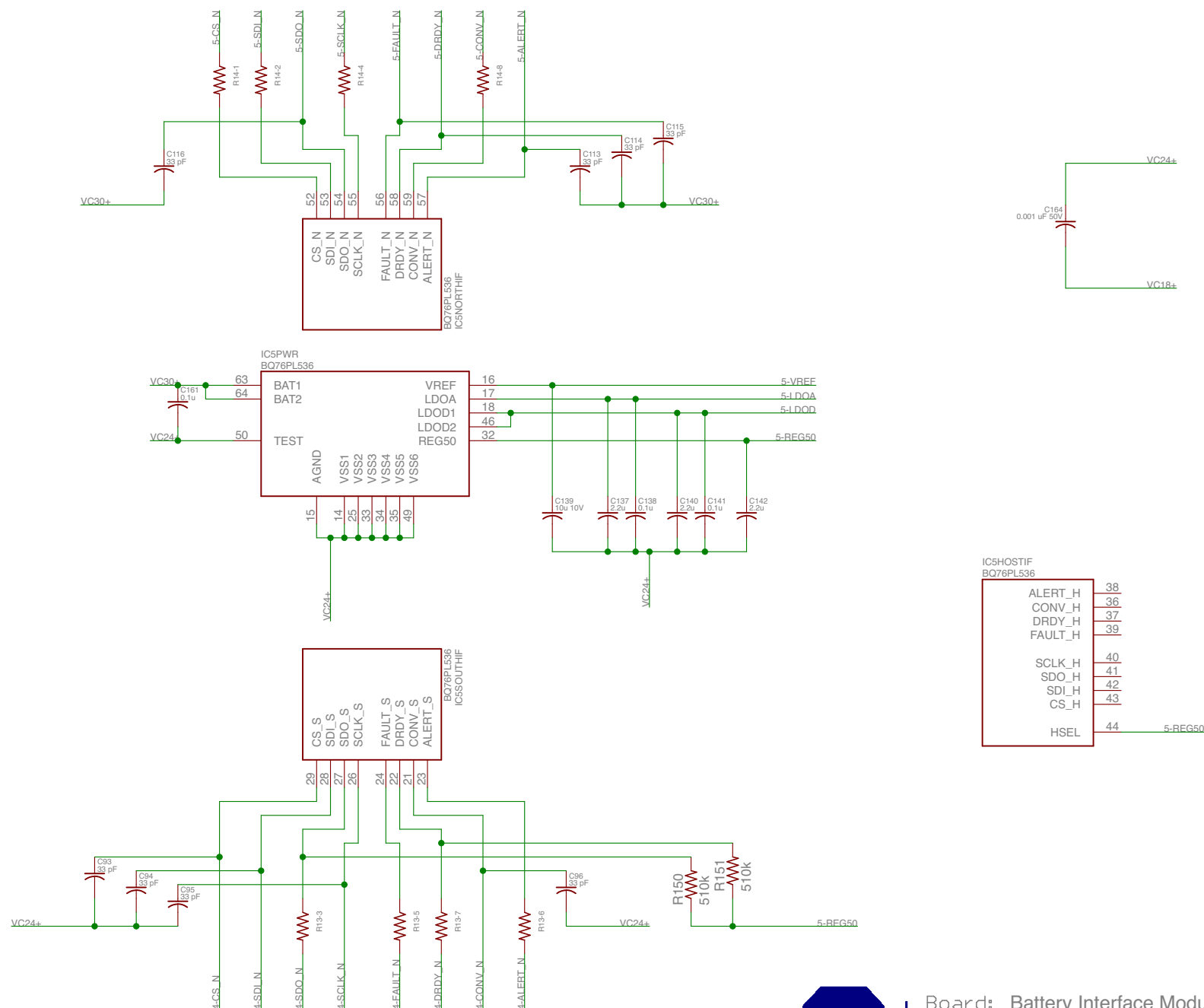5-ALERT_N

Device #6 stack comms + power
RELEASE

C

Board: Battery Interface Module r02
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VC30+
VC29+
VC28+
VC27+
VC26+
VC25+
VC24+

C55 0.1 uF 50V
C56 0.1 uF 50V
C57 0.1 uF 50V
C58 0.1 uF 50V
C59 0.1 uF 50V
C60 0.1 uF 50V

1k R5-1
1k R5-2
1k R5-3
1k R5-4
1k R5-5
1k R5-6
1k R5-7

D1-1
D1-2
D1-3
D2-1
D2-2
D2-3

C49 0.1 uF 50V
C50 0.1 uF 50V
C51 0.1 uF 50V
C52 0.1 uF 50V
C53 0.1 uF 50V
C54 0.1 uF 50V

IC5CELLIF
BQ76PL536

| Pin | Signal |
|---|---|
| 1 | VC6+ |
| 3 | VC5+ |
| 5 | VC4+ |
| 7 | VC3+ |
| 9 | VC2+ |
| 11 | VC1+ |
| 13 | VC0 |

5-REG50
5-TS2

R115 PLACEHOLDER    onboard thermistor 2

R49 47
Q7
5.1V D43
R101 1M

R50 47
Q8
5.1V D44
R100 1M

R51 47
Q9
5.1V D45
R99 1M

R52 47
Q10
5.1V D46
R98 1M

R53 47
Q11
5.1V D47
R97 1M

R54 47
Q12
5.1V D48
R96 1M

IC5BALANCEIF
BQ76PL536

| Pin | Signal |
|---|---|
| 2 | CB6 |
| 4 | CB5 |
| 6 | CB4 |
| 8 | CB3 |
| 10 | CB2 |
| 12 | CB1 |

R92 1.47k    5-TS1
R91 1.82k
R94 1.47k    5-TS2
R93 1.82k
R159 10k
LED6
5-REG50
R95 1.47k

IC5THERM/GPAI/GPIO
BQ76PL536

| Pin | Signal |
|---|---|
| 20 | TS1+ |
| 19 | TS1- |
| 61 | TS2+ |
| 60 | TS2- |
| 48 | GPAI+ |
| 47 | GPAI- |
| 45 | GPIO |
| 31 | AUX |

Q42
VC24+

Device #5 cell interface, balancing, thermistors, GPIO
RELEASE

C

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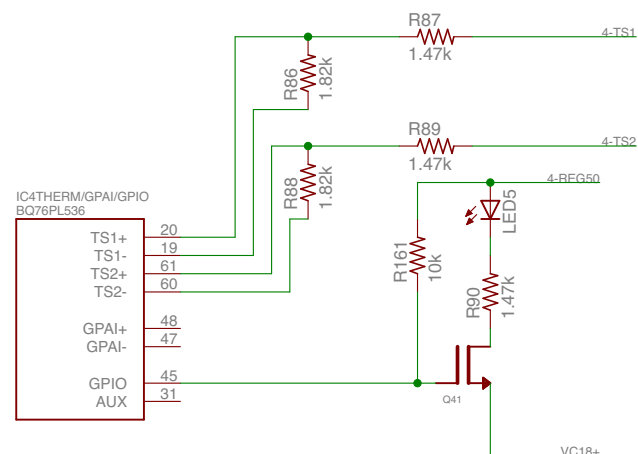Last modified date: 2/13/14 12:59 PM

VC24+

C164
0.001 uF 50V

VC18+

5-CS_N
5-SDI_N
5-SDO_N
5-SCLK_N
5-FAULT_N
5-DRDY_N
5-CONV_N
5-ALERT_N

R14-1
R14-2
R14-4
R14-8

C116
33 pF

C113
33 pF

C114
33 pF

C115
33 pF

VC30+

VC30+

52 53 54 55 56 58 59 57

CS_N
SDI_N
SDO_N
SCLK_N
FAULT_N
DRDY_N
CONV_N
ALERT_N

BQ76PL536
IC5NORTHIF

IC5PWR
BQ76PL536

VC30+

C161
0.1u

63 BAT1
64 BAT2

50 TEST

VREF 16
LDOA 17
LDOD1 18
LDOD2 46
REG50 32

5-VREF
5-LDOA
5-LDOD
5-REG50

AGND

VSS1
VSS2
VSS3
VSS4
VSS5
VSS6

15 14 25 33 34 35 49

VC24+

C139
10u 10V

C137
2.2u

C138
0.1u

C140
2.2u

C141
0.1u

C142
2.2u

VC24+

VC24+

IC5HOSTIF
BQ76PL536

ALERT_H 38
CONV_H 36
DRDY_H 37
FAULT_H 39

SCLK_H 40
SDO_H 41
SDI_H 42
CS_H 43

HSEL 44

5-REG50

BQ76PL536
IC5SOUTHIF

29 28 27 26 24 22 21 23

CS_S
SDI_S
SDO_S
SCLK_S
FAULT_S
DRDY_S
CONV_S
ALERT_S

C93
33 pF

C94
33 pF

C95
33 pF

C96
33 pF

R13-3
R13-5
R13-7
R13-6

R150
510k

R151
510k

VC24+

VC24+

5-REG50

4-CS_N
4-SDI_N
4-SDO_N
4-SCLK_N
4-FAULT_N
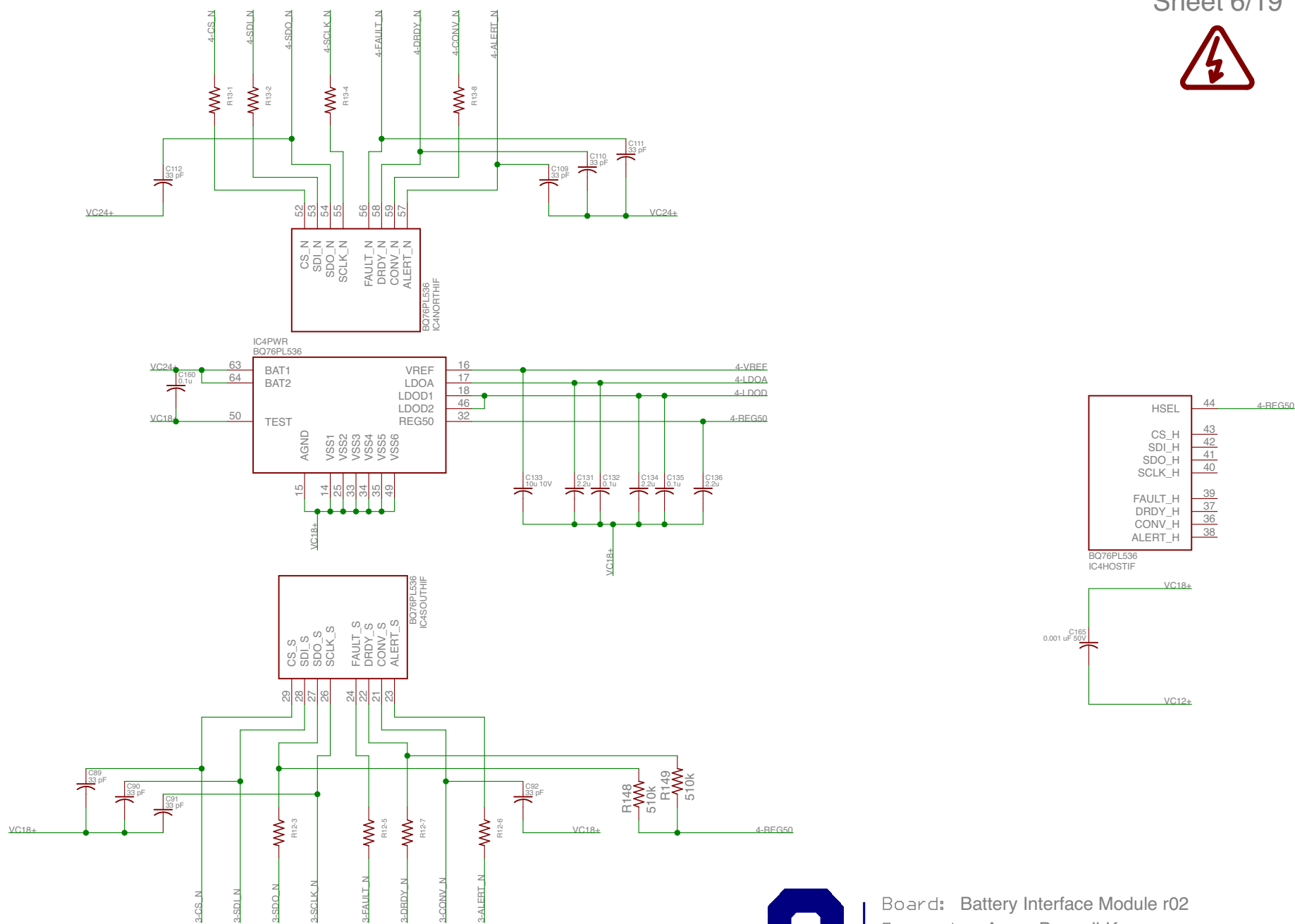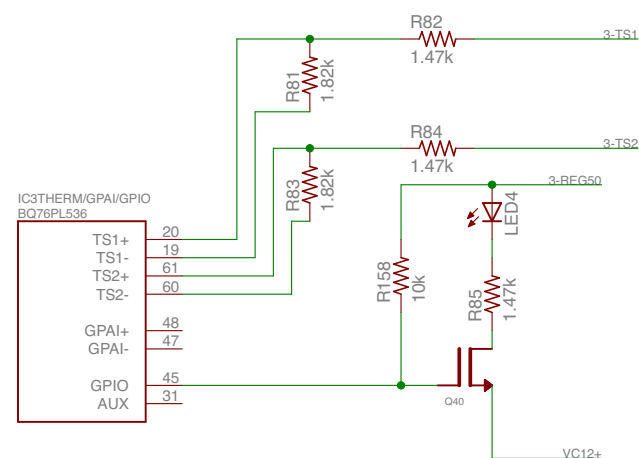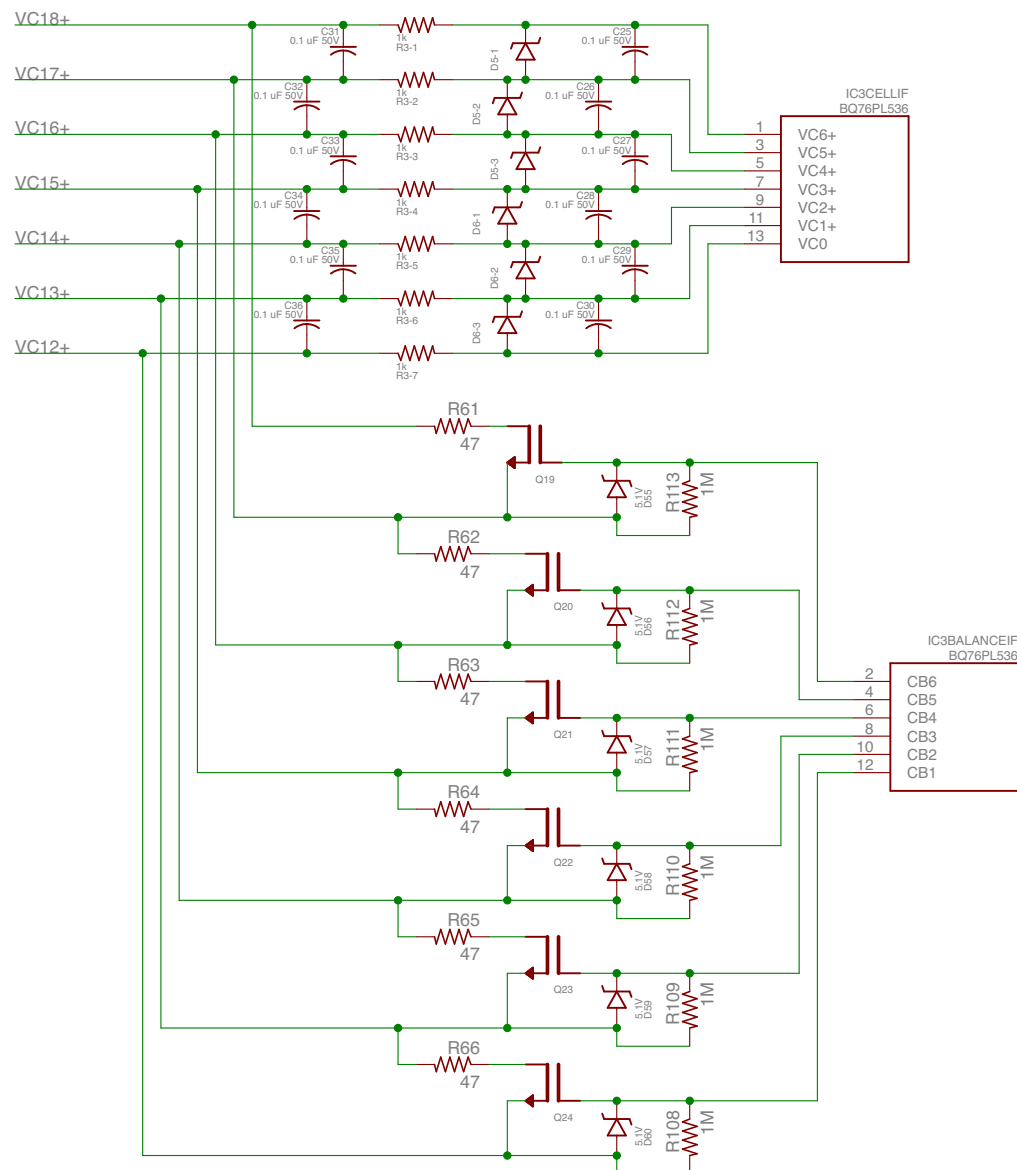4-DRDY_N
4-CONV_N
4-ALERT_N

Device #5 stack comms + power
RELEASE

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VC24+

VC23+

VC22+

VC21+

VC20+

VC19+

VC18+

C43 0.1 uF 50V
R4-1 1k
D3-1
C37 0.1 uF 50V

C44 0.1 uF 50V
R4-2 1k
D3-2
C38 0.1 uF 50V

C45 0.1 uF 50V
R4-3 1k
D3-3
C39 0.1 uF 50V

C46 0.1 uF 50V
R4-4 1k
D4-1
C40 0.1 uF 50V

C47 0.1 uF 50V
R4-5 1k
D4-2
C41 0.1 uF 50V

C48 0.1 uF 50V
R4-6 1k
D4-3
C42 0.1 uF 50V

R4-7 1k

IC4CELLIF
BQ76PL536

| Pin | Signal |
|---|---|
| 1 | VC6+ |
| 3 | VC5+ |
| 5 | VC4+ |
| 7 | VC3+ |
| 9 | VC2+ |
| 11 | VC1+ |
| 13 | VC0 |

R55 47
Q13
D49 5.1V
R107 1M

R56 47
Q14
D50 5.1V
R106 1M

R57 47
Q15
D51 5.1V
R105 1M

R58 47
Q16
D52 5.1V
R104 1M

R59 47
Q17
D53 5.1V
R103 1M

R60 47
Q18
D54 5.1V
R102 1M

IC4BALANCEIF
BQ76PL536

| Pin | Signal |
|---|---|
| 2 | CB6 |
| 4 | CB5 |
| 6 | CB4 |
| 8 | CB3 |
| 10 | CB2 |
| 12 | CB1 |

R87 1.47k
4-TS1

R86 1.82k

R89 1.47k
4-TS2

R88 1.82k

4-REG50

LED5

R161 10k

R90 1.47k

IC4THERM/GPAI/GPIO
BQ76PL536

| Pin | Signal |
|---|---|
| 20 | TS1+ |
| 19 | TS1- |
| 61 | TS2+ |
| 60 | TS2- |
| 48 | GPAI+ |
| 47 | GPAI- |
| 45 | GPIO |
| 31 | AUX |

Q41

VC18+

Device #4 cell interface, balancing, thermistors, GPIO
RELEASE

4-CS_N
4-SDI_N
4-SDO_N
4-SCLK_N
4-FAULT_N
4-DRDY_N
4-CONV_N
4-ALERT_N

R13-1
R13-2
R13-4
R13-8

C112
33 pF

C111
33 pF
C110
33 pF
C109
33 pF

VC24+
VC24+

52 CS_N
53 SDI_N
54 SDO_N
55 SCLK_N
56 FAULT_N
58 DRDY_N
59 CONV_N
57 ALERT_N

BQ76PL536
IC4NORTHIF

IC4PWR
BQ76PL536

VC24   63 BAT1        VREF    16   4-VREF
       64 BAT2        LDOA    17   4-LDOA
C160      LDOD1       18   4-LDOD
0.1u      LDOD2       46
VC18   50 TEST        REG50   32   4-REG50

AGND  VSS1 VSS2 VSS3 VSS4 VSS5 VSS6
15   14  25  33  34  35  49

VC18+

C133      C131   C132   C134   C135   C136
10u 10V   2.2u   0.1u   2.2u   0.1u   2.2u

VC18+

BQ76PL536
IC4SOUTHIF

CS_S SDI_S SDO_S SCLK_S FAULT_S DRDY_S CONV_S ALERT_S
29   28   27   26     24     22    21    23

C89   C90   C91                                   C92
33 pF 33 pF 33 pF                                 33 pF

VC18+
R12-3  R12-5  R12-7  R12-6

R148   R149
510k   510k

VC18+          4-REG50

3-CS_N
3-SDI_N
3-SDO_N
3-SCLK_N
3-FAULT_N
3-DRDY_N
3-CONV_N
3-ALERT_N

HSEL   44   4-REG50
CS_H   43
SDI_H  42
SDO_H  41
SCLK_H 40
FAULT_H 39
DRDY_H  37
CONV_H  36
ALERT_H 38

BQ76PL536
IC4HOSTIF

VC18+

C165
0.001 uF 50V
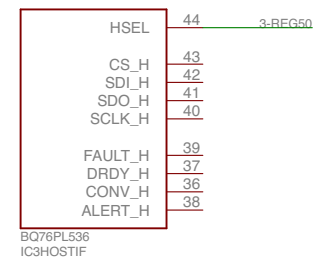
VC12+

Device #4 stack comms + power
RELEASE

Board: Battery Interface Module r02
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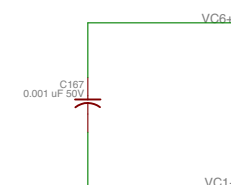Revision date: r02 - 2014-02-10
Last modified date: 2/13/14 12:59 PM

VC18+
VC17+
VC16+
VC15+
VC14+
VC13+
VC12+

C31 0.1 uF 50V
C32 0.1 uF 50V
C33 0.1 uF 50V
C34 0.1 uF 50V
C35 0.1 uF 50V
C36 0.1 uF 50V

1k R3-1
1k R3-2
1k R3-3
1k R3-4
1k R3-5
1k R3-6
1k R3-7

D5-1
D5-2
D5-3
D6-1
D6-2
D6-3

C25 0.1 uF 50V
C26 0.1 uF 50V
C27 0.1 uF 50V
C28 0.1 uF 50V
C29 0.1 uF 50V
C30 0.1 uF 50V

IC3CELLIF
BQ76PL536

| 1 | VC6+ |
| 3 | VC5+ |
| 5 | VC4+ |
| 7 | VC3+ |
| 9 | VC2+ |
| 11 | VC1+ |
| 13 | VC0 |

R61 47
R62 47
R63 47
R64 47
R65 47
R66 47

Q19
Q20
Q21
Q22
Q23
Q24

5.1V D55
5.1V D56
5.1V D57
5.1V D58
5.1V D59
5.1V D60

R113 1M
R112 1M
R111 1M
R110 1M
R109 1M
R108 1M

IC3BALANCEIF
BQ76PL536

| 2 | CB6 |
| 4 | CB5 |
| 6 | CB4 |
| 8 | CB3 |
| 10 | CB2 |
| 12 | CB1 |

R82 1.47k
R81 1.82k
R84 1.47k
R83 1.82k

3-TS1
3-TS2
3-REG50

IC3THERM/GPAI/GPIO
BQ76PL536

| TS1+ | 20 |
| TS1- | 19 |
| TS2+ | 61 |
| TS2- | 60 |
| GPAI+ | 48 |
| GPAI- | 47 |
| GPIO | 45 |
| AUX | 31 |

LED4
R158 10k
R85 1.47k
Q40
VC12+

Device #3 cell interface, balancing, thermistors, GPIO
RELEASE

C

Device #3 stack comms + power

RELEASE

Board: Battery Interface Module r02
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VC12+
VC11+
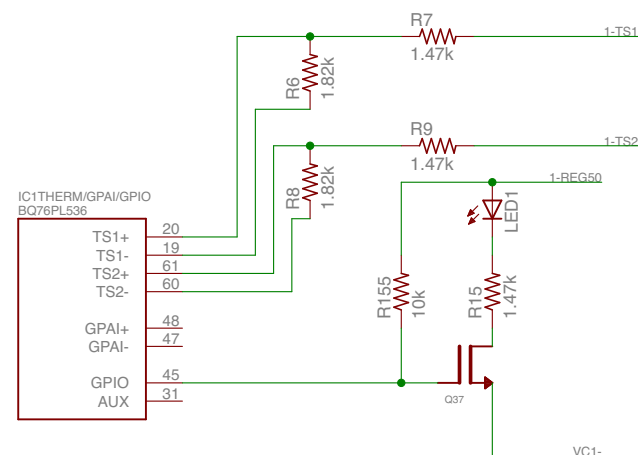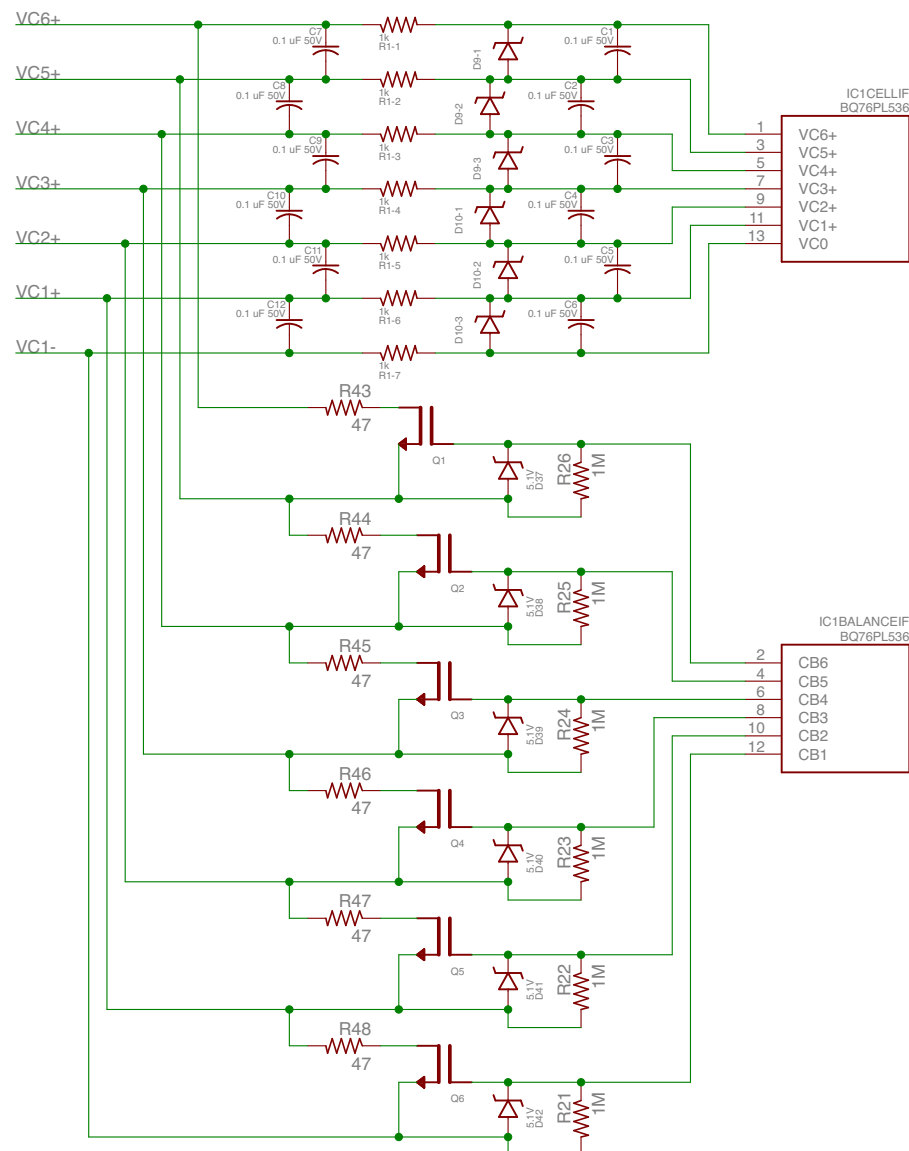VC10+
VC9+
VC8+
VC7+
VC6+

C19 0.1 uF 50V
C20 0.1 uF 50V
C21 0.1 uF 50V
C22 0.1 uF 50V
C23 0.1 uF 50V
C24 0.1 uF 50V

R2-1 1k
R2-2 1k
R2-3 1k
R2-4 1k
R2-5 1k
R2-6 1k
R2-7 1k

D7-1
D7-2
D7-3
D8-1
D8-2
D8-3

C13 0.1 uF 50V
C14 0.1 uF 50V
C15 0.1 uF 50V
C16 0.1 uF 50V
C17 0.1 uF 50V
C18 0.1 uF 50V

IC2CELLIF
BQ76PL536

| 1 | VC6+ |
| 3 | VC5+ |
| 5 | VC4+ |
| 7 | VC3+ |
| 9 | VC2+ |
| 11 | VC1+ |
| 13 | VC0 |

R67 47
R68 47
R69 47
R70 47
R71 47
R72 47

Q25
Q26
Q27
Q28
Q29
Q30

D61 5.1V
D62 5.1V
D63 5.1V
D64 5.1V
D65 5.1V
D66 5.1V

R32 1M
R31 1M
R30 1M
R29 1M
R28 1M
R27 1M

IC2BALANCEIF
BQ76PL536

| 2 | CB6 |
| 4 | CB5 |
| 6 | CB4 |
| 8 | CB3 |
| 10 | CB2 |
| 12 | CB1 |

IC2THERM/GPAI/GPIO
BQ76PL536

| TS1+ | 20 |
| TS1- | 19 |
| TS2+ | 61 |
| TS2- | 60 |
| GPAI+ | 48 |
| GPAI- | 47 |
| GPIO | 45 |
| AUX | 31 |

R39 1.82k
R41 1.82k
R40 1.47k
R42 1.47k
R157 10k
R80 1.47k

2-TS1
2-TS2
2-REG50
LED3
Q39
VC6+

2-REG50
R114 PLACEHOLDER
2-TS2

onboard thermistor 1

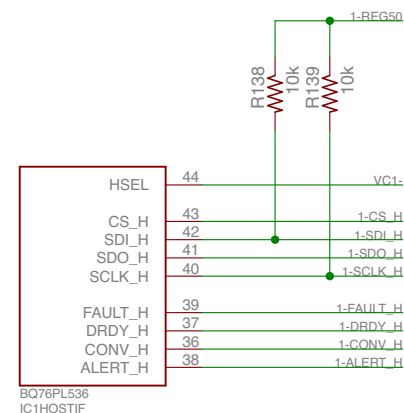Device #2 cell interface, balancing, thermistors, GPIO
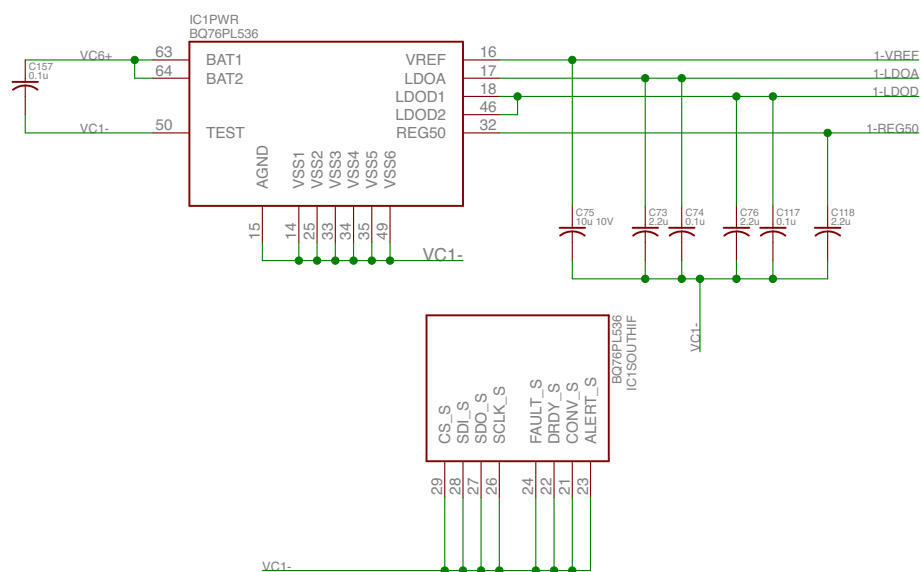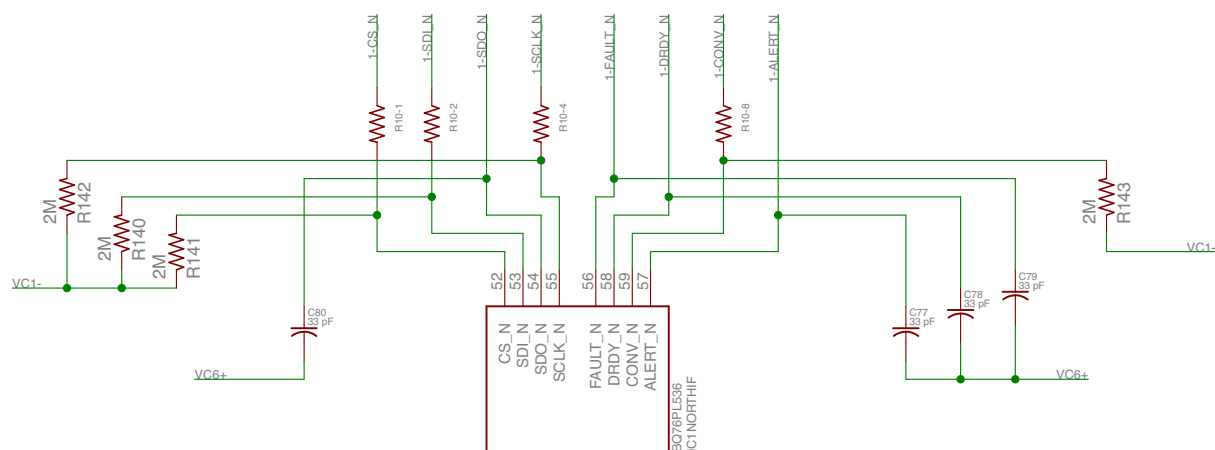**RELEASE**
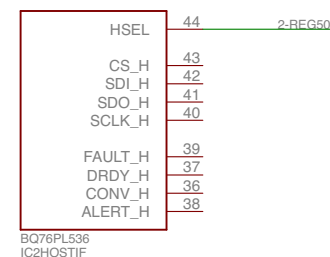
Board: Battery Interface Module r02
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Device #2 stack comms + power

**RELEASE**

VC6+
VC5+
VC4+
VC3+
VC2+
VC1+
VC1-

C7 0.1 uF 50V   R1-1 1k   D9-1   C1 0.1 uF 50V
C8 0.1 uF 50V   R1-2 1k   D9-2   C2 0.1 uF 50V
C9 0.1 uF 50V   R1-3 1k   D9-3   C3 0.1 uF 50V
C10 0.1 uF 50V  R1-4 1k   D10-1  C4 0.1 uF 50V
C11 0.1 uF 50V  R1-5 1k   D10-2  C5 0.1 uF 50V
C12 0.1 uF 50V  R1-6 1k   D10-3  C6 0.1 uF 50V
R1-7 1k

IC1CELLIF
BQ76PL536

| 1 | VC6+ |
| 3 | VC5+ |
| 5 | VC4+ |
| 7 | VC3+ |
| 9 | VC2+ |
| 11 | VC1+ |
| 13 | VC0 |

R43 47   Q1   5.1V D37   R26 1M
R44 47   Q2   5.1V D38   R25 1M
R45 47   Q3   5.1V D39   R24 1M
R46 47   Q4   5.1V D40   R23 1M
R47 47   Q5   5.1V D41   R22 1M
R48 47   Q6   5.1V D42   R21 1M

IC1BALANCEIF
BQ76PL536

| 2 | CB6 |
| 4 | CB5 |
| 6 | CB4 |
| 8 | CB3 |
| 10 | CB2 |
| 12 | CB1 |

R7 1.47k   1-TS1
R6 1.82k
R9 1.47k   1-TS2
R8 1.82k
1-REG50
LED1
R155 10k   R15 1.47k

IC1THERM/GPAI/GPIO
BQ76PL536

| TS1+ | 20 |
| TS1- | 19 |
| TS2+ | 61 |
| TS2- | 60 |
| GPAI+ | 48 |
| GPAI- | 47 |
| GPIO | 45 |
| AUX | 31 |

Q37
VC1-

Device #1 cell interface, balancing, thermistors, GPIO
**RELEASE**

C

1-CS_N
1-SDI_N
1-SDO_N
1-SCLK_N
1-FAULT_N
1-DRDY_N
1-CONV_N
1-ALERT_N

R10-1
R10-2
R10-4
R10-8

2M R142
2M R140
2M R141
2M R143

VC1-
VC1-
VC6+

C80 33 pF
C77 33 pF
C78 33 pF
C79 33 pF

VC6+

52 CS_N
53 SDI_N
54 SDO_N
55 SCLK_N
56 FAULT_N
58 DRDY_N
59 CONV_N
57 ALERT_N

BQ76PL536
IC1NORTHIF

IC1PWR
BQ76PL536

VC6+ 63 BAT1
64 BAT2
VC1- 50 TEST

16 VREF    1-VREF
17 LDOA    1-LDOA
18 LDOD1   1-LDOD
46 LDOD2
32 REG50   1-REG50

AGND
VSS1 VSS2 VSS3 VSS4 VSS5 VSS6

15 14 25 33 34 35 49    VC1-

C157 0.1u

C75 10u 10V
C73 2.2u
C74 0.1u
C76 2.2u
C117 0.1u
C118 2.2u

VC1-

1-REG50

R138 10k
R139 10k

44 HSEL    VC1-
43 CS_H    1-CS_H
42 SDI_H   1-SDI_H
41 SDO_H   1-SDO_H
40 SCLK_H  1-SCLK_H
39 FAULT_H 1-FAULT_H
37 DRDY_H  1-DRDY_H
36 CONV_H  1-CONV_H
38 ALERT_H 1-ALERT_H

BQ76PL536
IC1HOSTIF

BQ76PL536
IC1SOUTHIF

29 CS_S
28 SDI_S
27 SDO_S
26 SCLK_S
24 FAULT_S
22 DRDY_S
21 CONV_S
23 ALERT_S
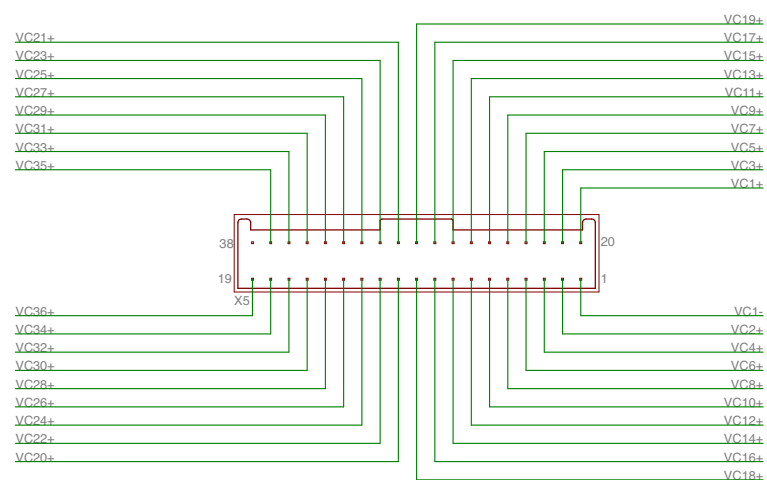
VC1-

Device #1 stack comms + power
RELEASE

Board: Battery Interface Module r02
Drawn by Aaron Bonnell-Kangas
Revision date: r02 - 2014-02-10
Last modified date: 2/13/14 12:59 PM

VC21+
VC23+
VC25+
VC27+
VC29+
VC31+
VC33+
VC35+

VC19+
VC17+
VC15+
VC13+
VC11+
VC9+
VC7+
VC5+
VC3+
VC1+

X5-CONN
BOM-PART

X5-TERM
BOM-PART

38
19
20
1

X5

VC36+
VC34+
VC32+
VC30+
VC28+
VC26+
VC24+
VC22+
VC20+

VC1-
VC2+
VC4+
VC6+
VC8+
VC10+
VC12+
VC14+
VC16+
VC18+

Cell connector
RELEASE

Board: Battery Interface Module r02
Drawn by Aaron Bonnell-Kangas
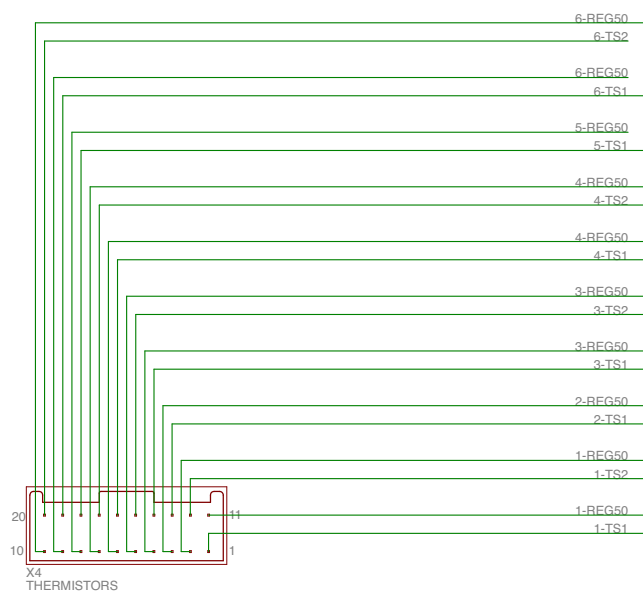Revision date: r02 - 2014-02-10
Last modified date: 2/13/14 12:59 PM

6-REG50
6-TS2

6-REG50
6-TS1

5-REG50
5-TS1

4-REG50
4-TS2

4-REG50
4-TS1

3-REG50
3-TS2

3-REG50
3-TS1

2-REG50
2-TS1

1-REG50
1-TS2

1-REG50
1-TS1

X4-CONN
BOM-PART

X4-TERM
BOM-PART

20    11

10    1

X4
THERMISTORS

Thermistor connector
RELEASE

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C192 value is noncritical >0.15 uF

OK to pop R135 w/ 1k 1% -abk

R135 is specified at 1k 5% in r01 - this will still maintain 3V3 within spec
but it would be nice if somebody picked a resistor very near 1100 ohm

ref. WEBENCH design

12V - 3V3 power
RELEASE

Board: Battery Interface Module r02
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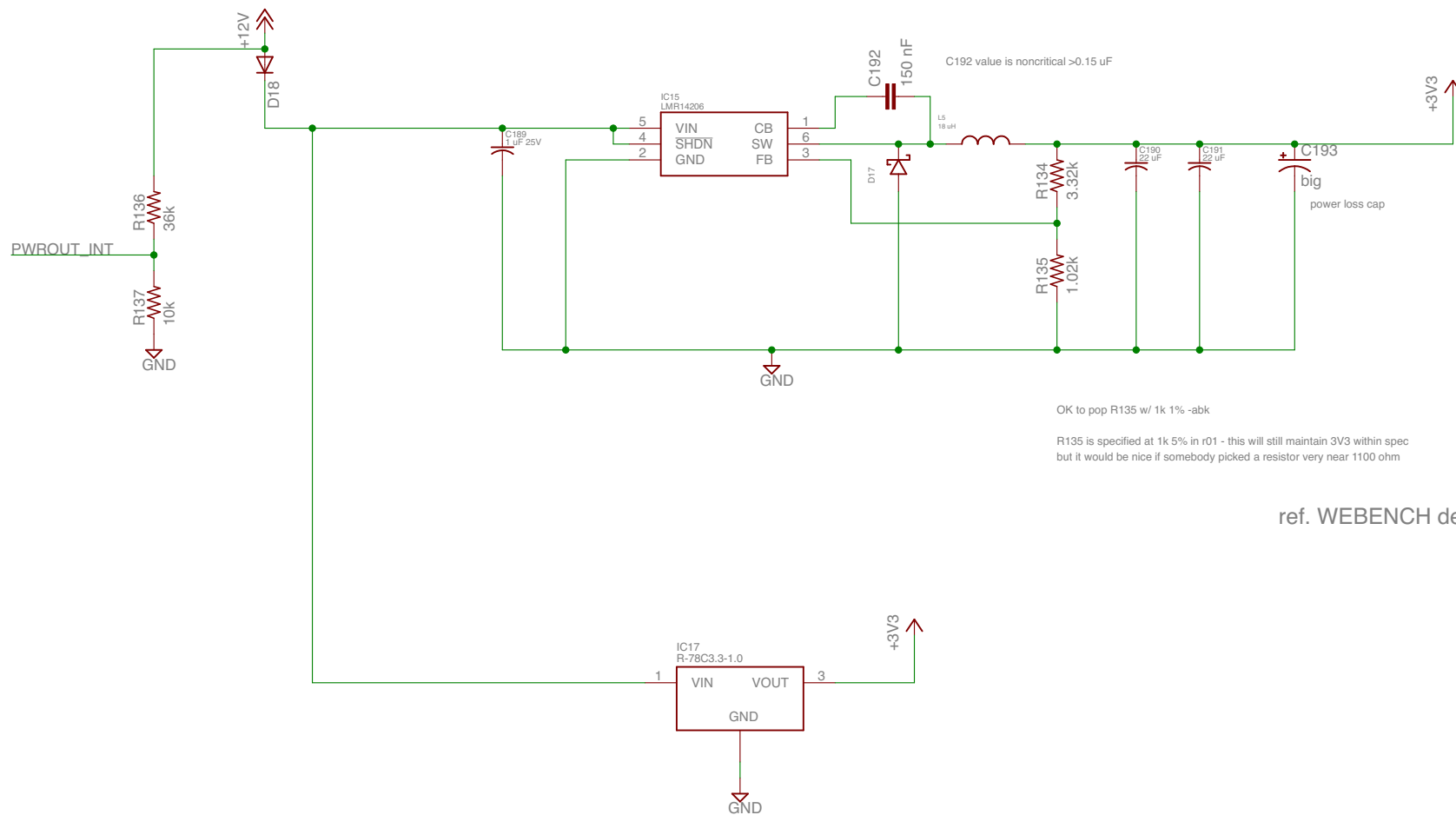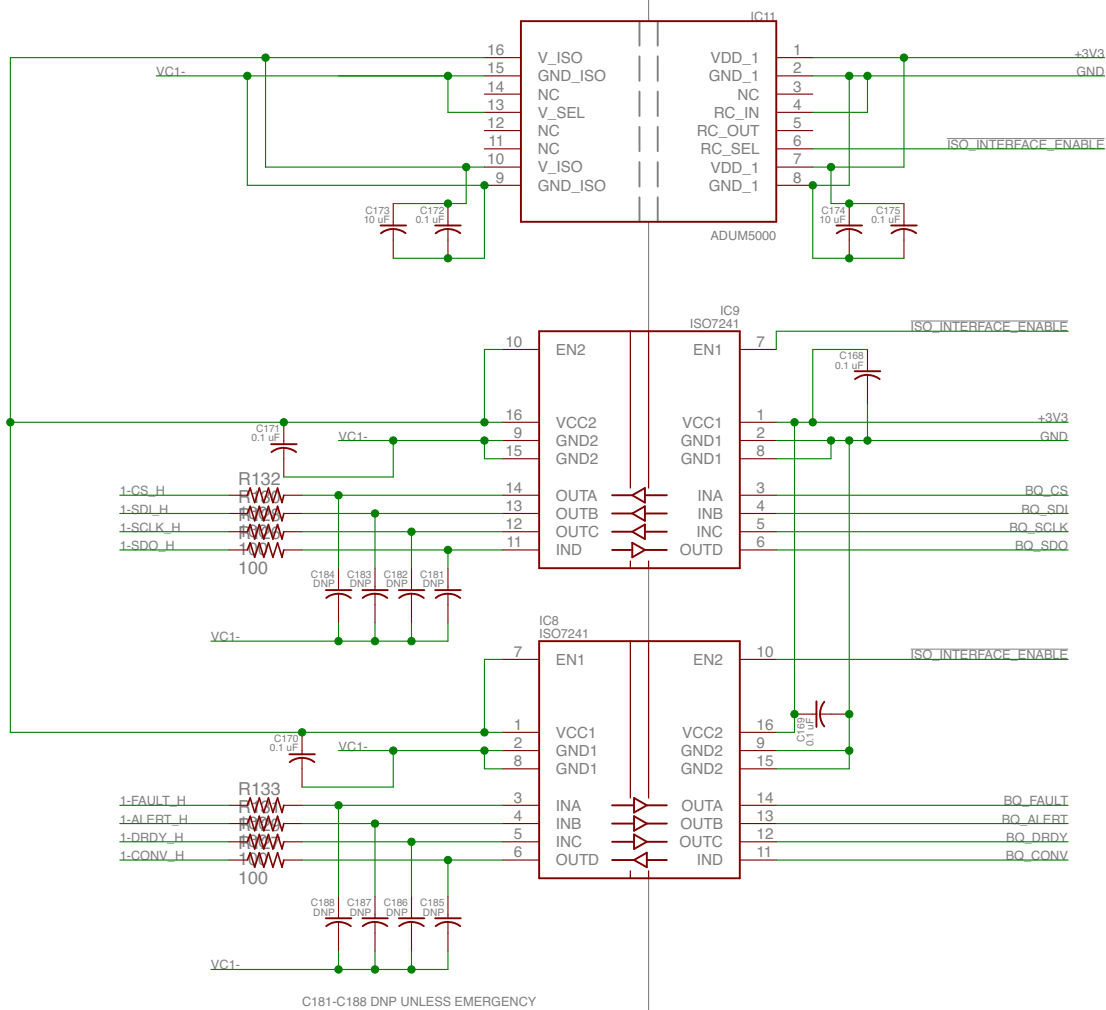Revision date: r02 - 2014-02-10
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Battery side | Host side

IC11

| 16 | V_ISO | VDD_1 | 1 | +3V3 |
| 15 | GND_ISO | GND_1 | 2 | GND |
| 14 | NC | NC | 3 | |
| 13 | V_SEL | RC_IN | 4 | |
| 12 | NC | RC_OUT | 5 | |
| 11 | NC | RC_SEL | 6 | ISO_INTERFACE_ENABLE |
| 10 | V_ISO | VDD_1 | 7 | |
| 9 | GND_ISO | GND_1 | 8 | |

VC1-

ADUM5000

C173 10 uF   C172 0.1 uF

C174 10 uF   C175 0.1 uF

IC9
ISO7241

| 10 | EN2 | EN1 | 7 | ISO_INTERFACE_ENABLE |
| 16 | VCC2 | VCC1 | 1 | +3V3 |
| 9 | GND2 | GND1 | 2 | GND |
| 15 | GND2 | GND1 | 8 | |
| 14 | OUTA | INA | 3 | BQ_CS |
| 13 | OUTB | INB | 4 | BQ_SDI |
| 12 | OUTC | INC | 5 | BQ_SCLK |
| 11 | IND | OUTD | 6 | BQ_SDO |

C168 0.1 uF

C171 0.1 uF   VC1-

R132

1-CS_H
1-SDI_H
1-SCLK_H
1-SDO_H

100

C184 DNP   C183 DNP   C182 DNP   C181 DNP

VC1-

IC8
ISO7241

| 7 | EN1 | EN2 | 10 | ISO_INTERFACE_ENABLE |
| 1 | VCC1 | VCC2 | 16 | |
| 2 | GND1 | GND2 | 9 | GND |
| 8 | GND1 | GND2 | 15 | |
| 3 | INA | OUTA | 14 | BQ_FAULT |
| 4 | INB | OUTB | 13 | BQ_ALERT |
| 5 | INC | OUTC | 12 | BQ_DRDY |
| 6 | OUTD | IND | 11 | BQ_CONV |

C169 0.1 uF

C170 0.1 uF   VC1-

R133

1-FAULT_H
1-ALERT_H
1-DRDY_H
1-CONV_H

100

C188 DNP   C187 DNP   C186 DNP   C185 DNP

VC1-

C181-C188 DNP UNLESS EMERGENCY

Isolated comms interface
RELEASE

IC7
TMS320F28034PNT

| Left pins | | |
|---|---|---|
| BQ_ALERT | 69 | GPIO0/EPWM1A |
| BQ_FAULT | 68 | GPIO1/EPWM1B/COMP1OUT |
| | 67 | GPIO2/EPWM2A |
| | 66 | GPIO3/EPWM2B/SPISOMIA/COMP2OUT |
| LED_BALANCING | 63 | GPIO4/EPWM3A |
| LED_GP | 62 | GPIO5/EPWM6B/LINRXA/HRCAP2 |
| | 50 | GPIO6/EPWM4A/EPWMSYNCI/EPWMSYNCO |
| | 49 | GPIO7/EPWM4B/SCIRXDA |
| | 43 | GPIO8/EPWM5A/ADCSOCAO |
| LED1 | 39 | GPIO9/EPWM5B/LINTXA/HRCAP1 |
| | 65 | GPIO10/EPWM6A/ADCSOCBO |
| | 61 | GPIO11/EPWM6B/LINRXA/HRCAP2 |
| | 47 | GPIO12/TZ1/SCITXDA/SPISOMIB |
| BQ_SDO | 76 | GPIO13/TZ2/SPISOMIB |
| BQ_SCLK | 77 | GPIO14/TZ3/LINTXA/SPICLKB |
| BQ_CONV | 75 | GPIO15/TZ1/LINRXA/SPISTEB |
| | 46 | GPIO16/SPISOMIA/TZ2 |
| | 42 | GPIO17/SPISOMIA/TZ3 |
| | 41 | GPIO18/SPICLKA/LINTXA/XCLKOUT |
| | 55 | GPIO19/XCLKIN/SPISTEA/LINRXA/ECAP1 |
| ISO_INTERFACE_ENABLE | 78 | GPIO20/EQEP1A/COMP1OUT |
| GP_BUTTON | 79 | GPIO21/EQEP1B/COMP2OUT |
| BQ_CS | 1 | GPIO22/EQEP1S/LINTXA |
| | 4 | GPIO23/EQEP1I/LINRXA |
| BQ_SDI | 80 | GPIO24/ECAP1/SPISIMOB |
| | 44 | GPIO25/SPISOMIB |
| | 37 | GPIO26/HRCAP1/SPICLKB |
| BALANCE_BUTTON | 31 | GPIO27/HRCAP2/SPISTEB |
| CAN_RESET | 40 | GPIO28/SCIRXDA/SDAA/TZ2 |
| LED0 | 34 | GPIO29/SCITXDA/SCLA/TZ3 |

| Right pins | | |
|---|---|---|
| GPIO30/CANRXA | 33 | CAN-RX |
| GPIO31/CANTXA | 32 | CAN-TX |
| GPIO32/SDAA/EPWMSYNCI/ADCSOCAO | 2 | |
| GPIO33/SCLA/EPWMSYNCO/ADCSOCBO | 3 | |
| GPIO34/COMP2OUT/COMP3OUT | 74 | BQ_DRDY |
| GPIO35/TDI | 59 | TDI |
| GPIO36/TMS | 60 | TMS |
| GPIO37/TDO | 58 | TDO |
| GPIO38/TCK/XCLKIN | 57 | TCK |
| GPIO39 | 56 | |
| GPIO40/EPWM7A | 64 | |
| GPIO41/EPWM7B | 48 | |
| GPIO42/COMP1OUT | 5 | |
| GPIO43/COMP42OUT | 6 | |
| GPIO44 | 45 | |
| ADCINA0 | 18 | |
| ADCINA1 | 17 | |
| ADCINA2/COMP1A/AIO2 | 16 | |
| ADCINA3 | 15 | |
| ADCINA4/COMP2A/AIO4 | 14 | |
| ADCINA5 | 13 | |
| ADCINA6/COMP3A/AIO6 | 12 | PWROUT_INT |
| ADCINA7 | 11 | |
| ADCINB0 | 23 | |
| ADCINB1 | 24 | |
| ADCINB2/COMP1B/AIO10 | 25 | |
| ADCINB3 | 26 | |
| ADCINB4/COMP2B/AIO12 | 27 | |
| ADCINB5 | 28 | |
| ADCINB6/COMP3B/AIO14 | 29 | |
| ADCINB7 | 30 | |
| VREFHI | 19 | |
| VREFLO | 22 | |
| XRS | 9 | XRS |
| TRST | 10 | TRST |
| X1 | 52 | |
| X2 | 51 | |
| VREGENZ | 73 | GND |
| TEST2 | 38 | |

Power pins:
- VSS 8, 35, 53, 71 — GND
- VSSA 21 — L3 — GND
- VDDA 20 — L4 — +3V3
- VDD 7, 54, 72
- VDDIO 36 (L2), 70 (L1)

↑ symbol indicates pin is pulled up at boot

C152 2.2 uF
C151 2.2 uF
C150 2.2 uF
C149 2.2 uF
C153 2.2 uF
C154 2.2 uF

C155 8.0 pF — GND
C156 8.0 pF — GND
X1

10k R154 — GND

F28035 connections
RELEASE

TERM-1

TERM-2

R123 36k

R124 36k

CANL

120 R125

6

IC10 ADG719

+V

5 CANH

4

R122 10k

R121 10k

1 A
2 B

Y 4

1

GND

GND

GND

GND

+3V3

IC16

+3V3

CAN-TX

1 D        RS 8
3 VCC    CANH 7
2 GND    CANL 6
4 R      VREF 5

R120 0R

CANH

CANL

GND

C180 2.2 uF

CAN-RX

GND

SN65HVD230

pogo pin conn - use Panduit CBP25-C for fastening

JTAG

TMS      1       2   TRST
TDI      3       4   GND
+3V3     5
TDO      7       8
TCK      9      10
        11      12
EMU0    13      14   EMU1

X6

+12V

SHIELD   1       3   TERM-1
CANL     4   5       CANH
         6       8

X3 CAN1

GND

+12V

SHIELD   1       3   TERM-2
CANL     4   5       CANH
         6       8

X2 CAN2

GND

+3V3

IC12G$1 SN74AHC1G86

5 VCC

3 GND

GND

X2-3_CONN
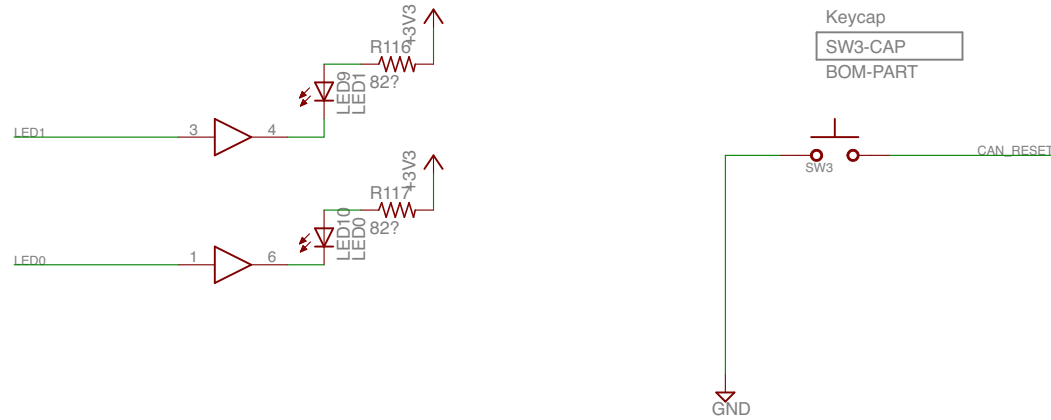BOM-PART

X2-3_TERM
BOM-PART

CAN interface and termination, JTAG
RELEASE

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R116 +3V3
82?
LED9
LED1
LED1 3 4

R117 +3V3
82?
LED10
LED0
LED0 1 6

Keycap
SW3-CAP
BOM-PART

CAN_RESET
SW3

GND

IC13G$3
SN74LVCG207DBV
+3V3
5 VCC
2 GND
GND

IC14G$3
SN74LVCG207DBV
+3V3
5 VCC
2 GND
GND

SW1
BALANCE

+3V3
R119
82
GND

BALANCE_BUTTON

LED_BALANCING 3 4

SW2
GP_BUTTON

+3V3
R118
82
GND

GP_BUTTON

LED_GP 1 6
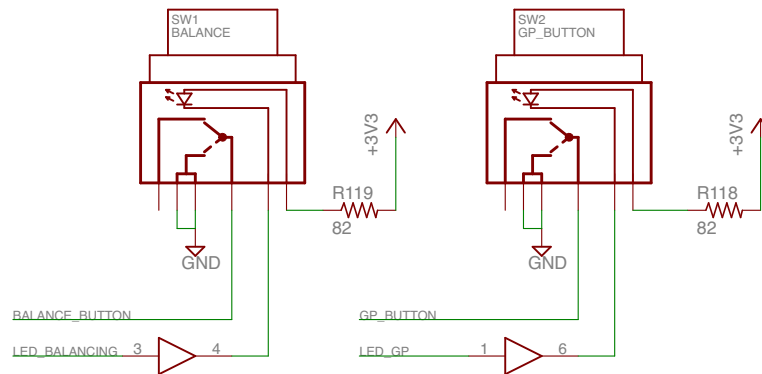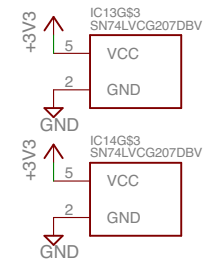
Buttons and LEDs
RELEASE

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