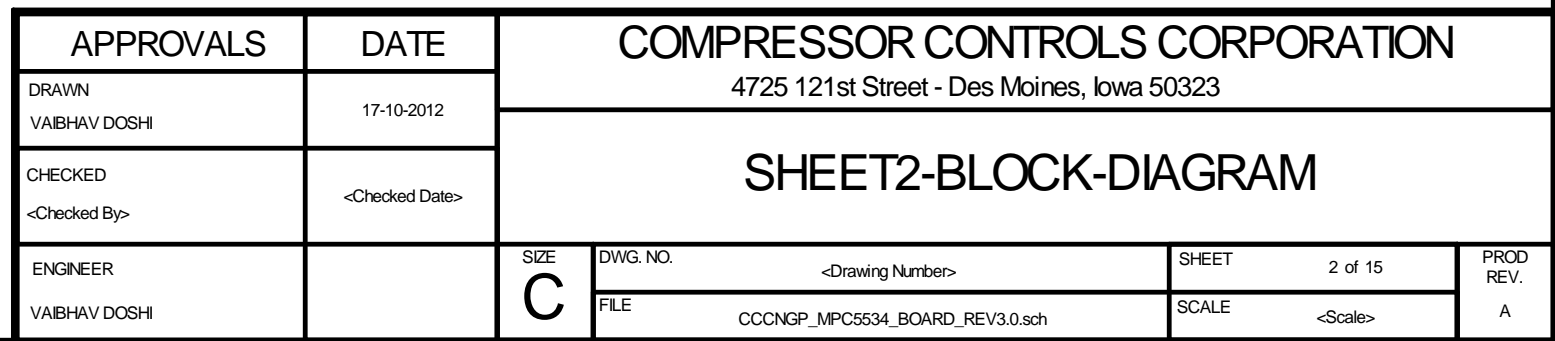
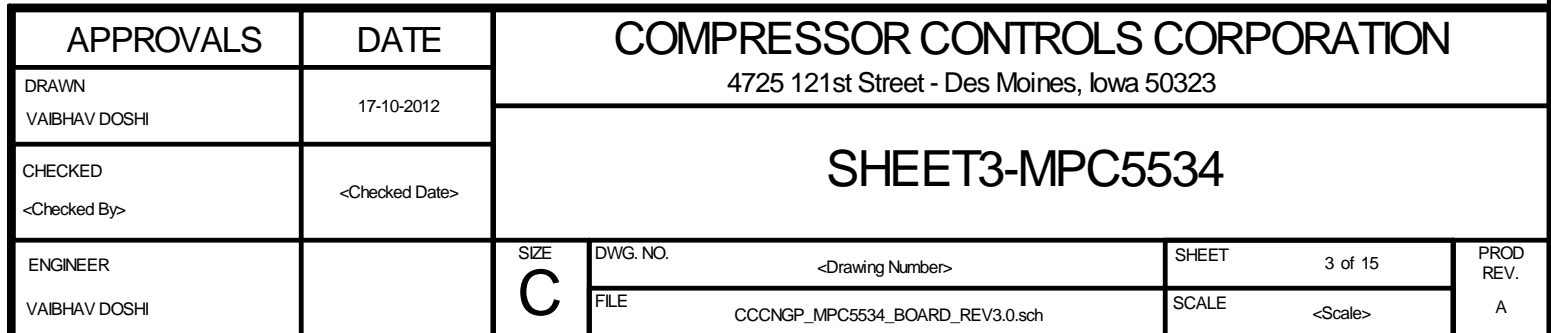


| 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|------------------------------|---|------------------------------|-------------------|-----------|------|--------|---------------------------------|-----|----------|------------------------|---------------------|------------|--|-----------|--|-------------------------|----------|----------------|---|-----|---------|---------------------------|--|---|-----------|------------------------------|---|--|--|--|---|------------------|-------------------|
| THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM COMPRESSOR CONTROLS CORP. | | DWG. NO. <Drawing Number> | | SH 1 | REV. A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div>PRODIGY</div> <div>MPC5534 MICROCONTROLLER BOARD</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| REVISION HISTORY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><thead><tr><th>REV</th><th>DATE</th><th>AUTHOR</th><th>DESCRIPTION/MODIFICATIONS</th></tr></thead><tbody><tr><td>1.0</td><td>29.04.11</td><td>R. Vasavi</td><td>Preliminary release</td></tr><tr><td>1.1</td><td>06.06.11</td><td>R. Vasavi</td><td>Added IOP board connectors Changed the JTAG/Nexus, CPLD & RS232 to right angled type</td></tr><tr><td>1.2</td><td>30.06.11</td><td>R. Vasavi</td><td>Changed the RS232 debug console to RS485 Moved the second SPI EEPROM to IOP board eTPU & eMIOS interfaces support for 16 DI & 16 DO Addition of mictor connectors</td></tr><tr><td>2.0</td><td>3.10.11</td><td>AJM</td><td>Added Termination on ECAT RX Lines Changed value of C218-C220</td></tr><tr><td>A</td><td>12.12.12</td><td>VAIBHAV DOSHI</td><td>Power supply for 1.5V,3.3V,5V changed MPC_CLK signal routed to IOP CPLD Voltage monitoring Op-Amp replaced EEPROM programming through MPC5534 availed MRAM replaced by 4MB MRAM eTPU and eMIOS lines powered by 3.3V Fault_LED circuitry added Programming connector replaced by Board edge type ECAT port 1 used to reduce power consumption</td></tr></tbody></table> | | | | | | REV | DATE | AUTHOR | DESCRIPTION/MODIFICATIONS | 1.0 | 29.04.11 | R. Vasavi | Preliminary release | 1.1 | 06.06.11 | R. Vasavi | Added IOP board connectors Changed the JTAG/Nexus, CPLD & RS232 to right angled type | 1.2 | 30.06.11 | R. Vasavi | Changed the RS232 debug console to RS485 Moved the second SPI EEPROM to IOP board eTPU & eMIOS interfaces support for 16 DI & 16 DO Addition of mictor connectors | 2.0 | 3.10.11 | AJM | Added Termination on ECAT RX Lines Changed value of C218-C220 | A | 12.12.12 | VAIBHAV DOSHI | Power supply for 1.5V,3.3V,5V changed MPC_CLK signal routed to IOP CPLD Voltage monitoring Op-Amp replaced EEPROM programming through MPC5534 availed MRAM replaced by 4MB MRAM eTPU and eMIOS lines powered by 3.3V Fault_LED circuitry added Programming connector replaced by Board edge type ECAT port 1 used to reduce power consumption | | | | | | |
| REV | DATE | AUTHOR | DESCRIPTION/MODIFICATIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| A | 12.12.12 | VAIBHAV DOSHI | Power supply for 1.5V,3.3V,5V changed MPC_CLK signal routed to IOP CPLD Voltage monitoring Op-Amp replaced EEPROM programming through MPC5534 availed MRAM replaced by 4MB MRAM eTPU and eMIOS lines powered by 3.3V Fault_LED circuitry added Programming connector replaced by Board edge type ECAT port 1 used to reduce power consumption | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><thead><tr><th colspan="2">APPROVALS</th><th>DATE</th><th colspan="3">COMPRESSOR CONTROLS CORPORATION</th></tr></thead><tbody><tr><td colspan="2">DRAWN VAIBHAV DOSHI</td><td>17-10-2012</td><td colspan="3">4725 121st Street - Des Moines, Iowa 50323</td></tr><tr><td colspan="2">CHECKED <Checked By></td><td><Checked Date></td><td colspan="3">SHEET1-TITLE</td></tr><tr><td colspan="2">ENGINEER VAIBHAV DOSHI</td><td></td><td>SIZE C</td><td>DWG. NO. <Drawing Number></td><td>SHEET 1 of 15</td></tr><tr><td colspan="2"></td><td></td><td>FILE CCCNCP_MPC5534_BOARD_REV3.0.sch</td><td>SCALE <Scale></td><td>PROD REV. A</td></tr></tbody></table> | | | | | | APPROVALS | | DATE | COMPRESSOR CONTROLS CORPORATION | | | DRAWN VAIBHAV DOSHI | | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | CHECKED <Checked By> | | <Checked Date> | SHEET1-TITLE | | | ENGINEER VAIBHAV DOSHI | | | SIZE C | DWG. NO. <Drawing Number> | SHEET 1 of 15 | | | | FILE CCCNCP_MPC5534_BOARD_REV3.0.sch | SCALE <Scale> | PROD REV. A |
| APPROVALS | | DATE | COMPRESSOR CONTROLS CORPORATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRAWN VAIBHAV DOSHI | | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| ENGINEER VAIBHAV DOSHI | | | SIZE C | DWG. NO. <Drawing Number> | SHEET 1 of 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | FILE CCCNCP_MPC5534_BOARD_REV3.0.sch | SCALE <Scale> | PROD REV. A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



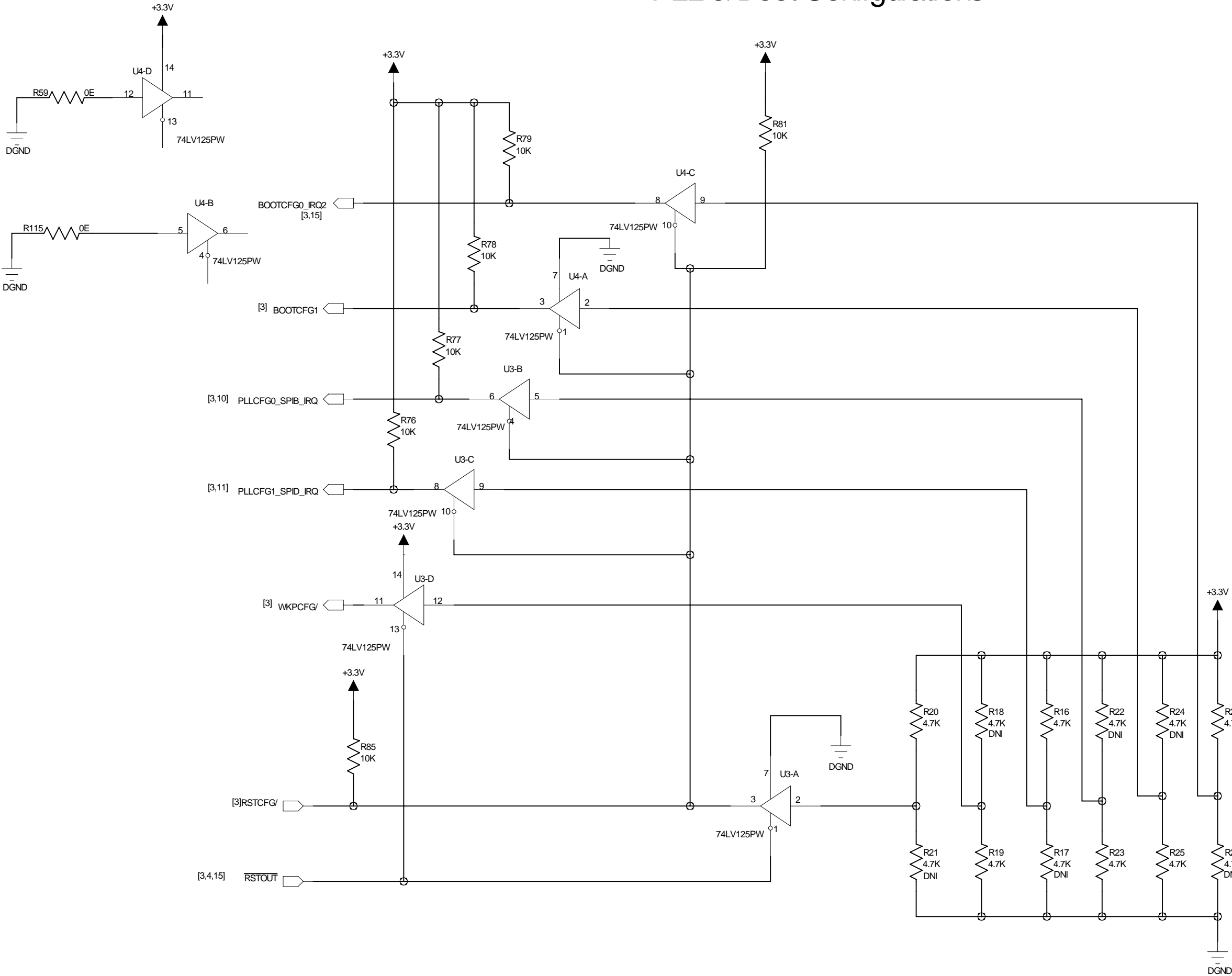
Clock to IOP-CPLD



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PLL & Boot Configurations

DWG. NO. <Drawing Number> SH 4 REV. A

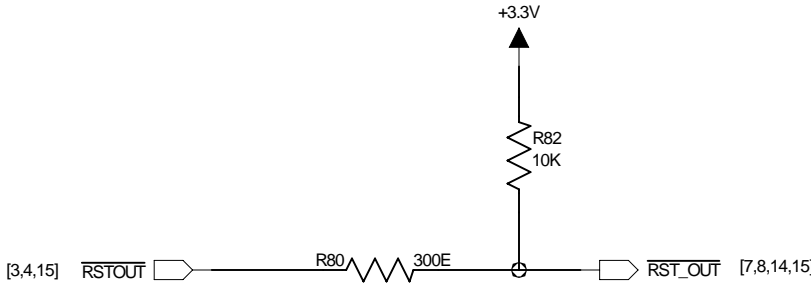


Configuration Table

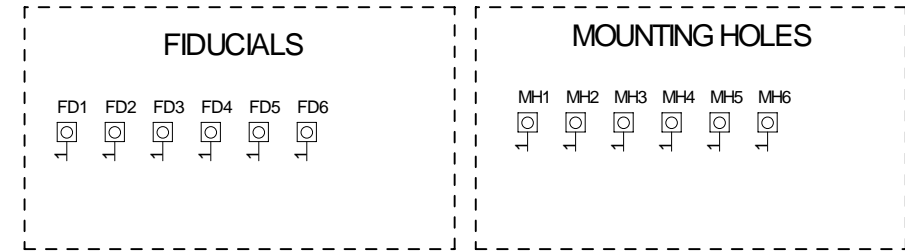
| RSTCFG | PLLCFG[1:0] | BOOTCFG[1:0] | Description |
|---------------------|-----------------------------|------------------------------|---------------------------------|
| Load R20 DNI R21 | Load R16,R23 DNI R17,R22 | | Clock Mode-Crystal Reference |
| Load R21 DNI R20 | Load R17,R22 DNI R16,R23 | | Clock Mode-External Oscillator |
| Load R21 DNI R20 | | Load R24,R27 DNI R25,R26 | Boot from external FLASH - CS0/ |
| Load R20 DNI R21 | | Load R25,R26 DNI R24, R27 | Boot from internal FLASH |

Configurations,
PLLCFG[1:0]= 10, crystal reference is used
BOOTCFG[1:0]=01, internal boot option is selected
RSTCFG=1, Boot from internal flash and clock source is crystal
WKPCFG=0, Weak pull down applied to eTPU and eMIOS pins at reset

Reset Out signal to devices on-board



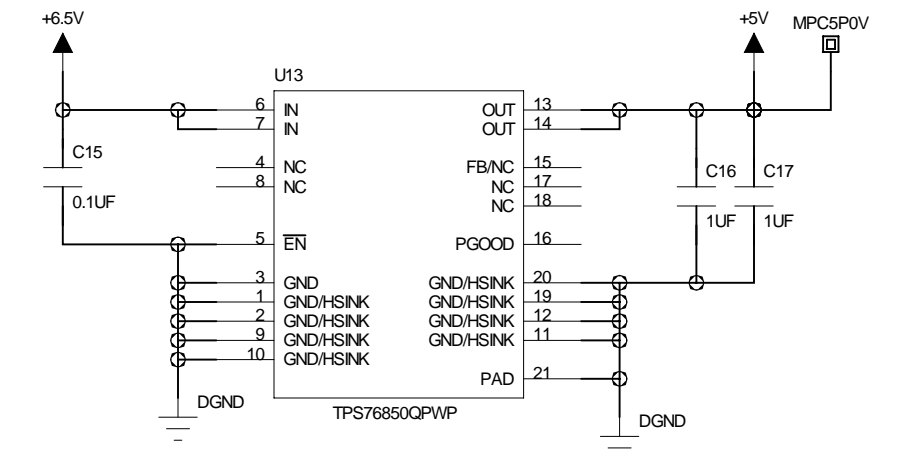
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| DRAWN VAIBHAV DOSHI | | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED <Checked By> | | <Checked Date> | SHEET4-MPC-CONFIGURATIONS | | | |
| ENGINEER VAIBHAV DOSHI | | | SIZE C | DWG. NO. <Drawing Number> | SHEET 4 of 15 | PROD REV. A |
| | | | FILE CCCONGP_MPC5534_BOARD_REV3.0.sch | SCALE <Scale> | | |



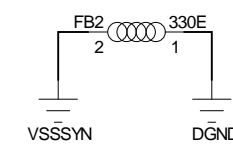
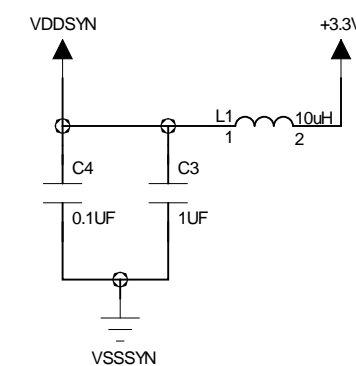
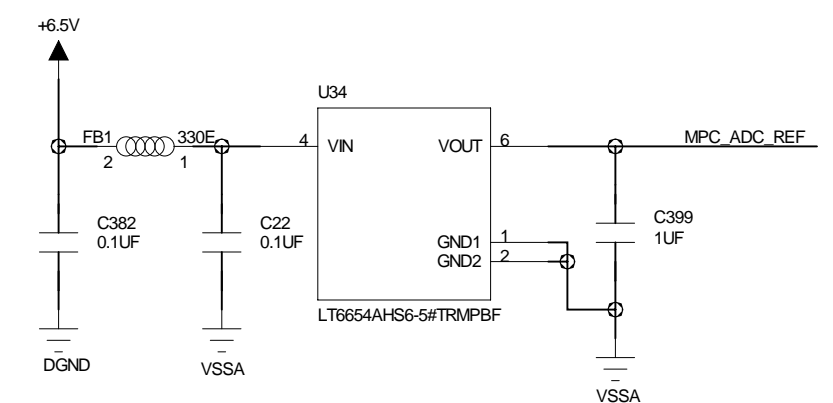
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| APPROVALS | DATE | COMPRESSOR CONTROLS CORPORATION | | | |
| DRAWN VAIBHAV DOSHI | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED <Checked By> | <Checked Date> | SHEET5-MPC5534_POWER | | | |
| ENGINEER VAIBHAV DOSHI | | SIZE C | DWG. NO. <Drawing Number> | SHEET 5 of 15 | PROD REV. A |
| | | FILE CCCNCP_MPC5534_BOARD_REV3.0.sch | SCALE <Scale> | | |

| | | |
|------------------------------|---------|-----------|
| DWG. NO. <Drawing Number> | SH 6 | REV. A |
|------------------------------|---------|-----------|

LDO-5V



5V REFERENCE



| | | | | | |
|---------------------------|----------------|--|------------------------------|------------------|--------------|
| APPROVALS | DATE | COMPRESSOR CONTROLS CORPORATION | | | |
| DRAWN VAIBHAV DOSHI | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED <Checked By> | <Checked Date> | SHEET6-POWER_SUPPLY | | | |
| ENGINEER VAIBHAV DOSHI | | SIZE C | DWG. NO. <Drawing Number> | SHEET 6 of 15 | PROD REV. |
| | | FILE CCCNCP_MPC5534_BOARD_REV3.0.sch | SCALE <Scale> | | A |

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DWG. NO.

<Drawing Number>

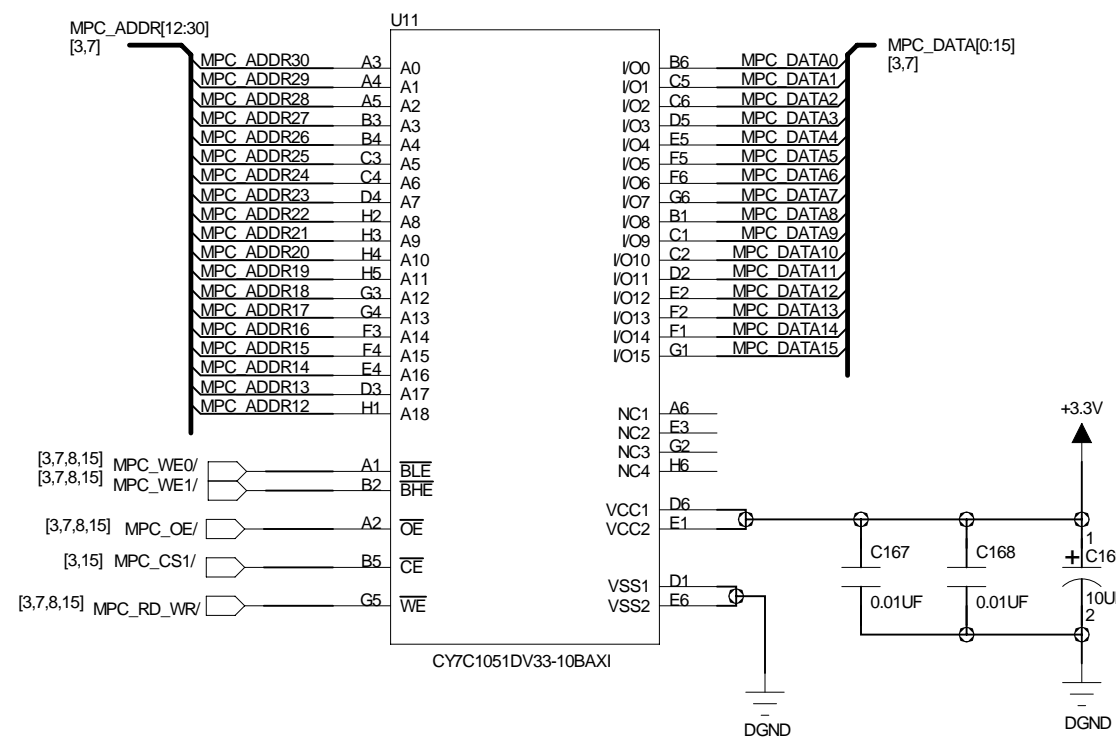
SH

7

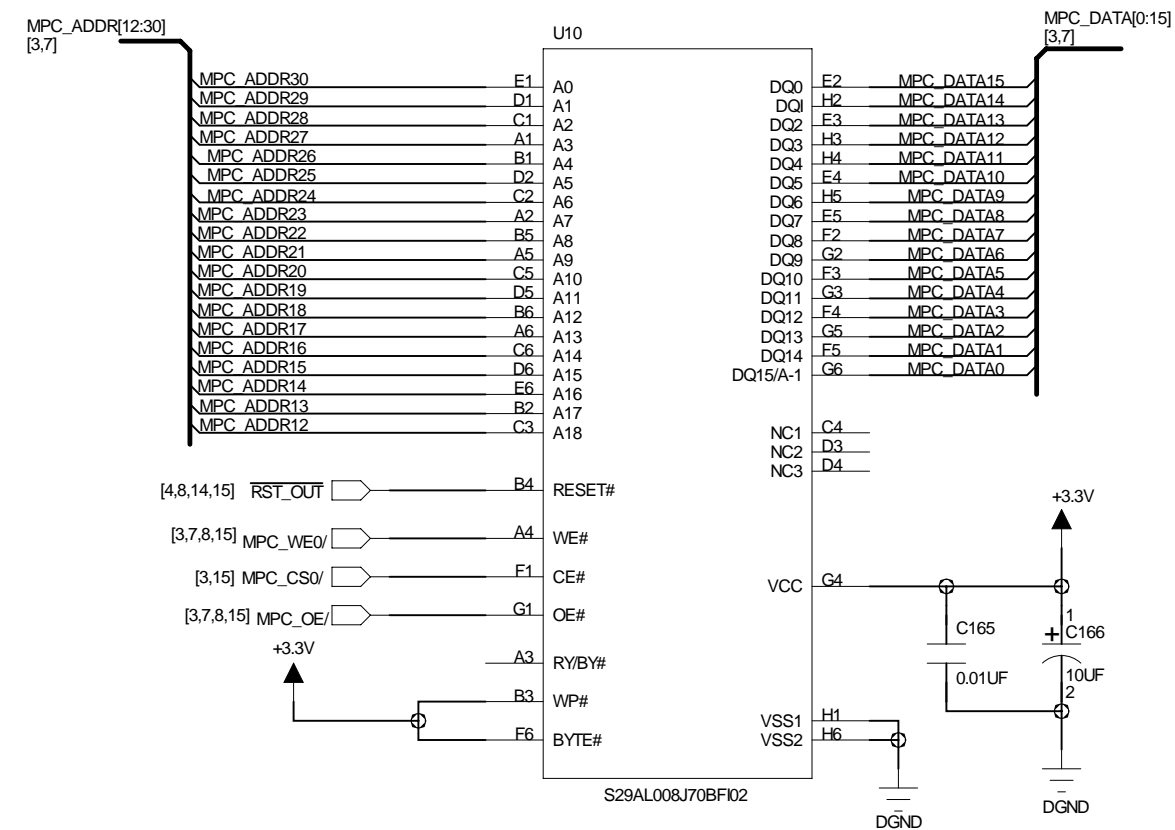
REV.

A

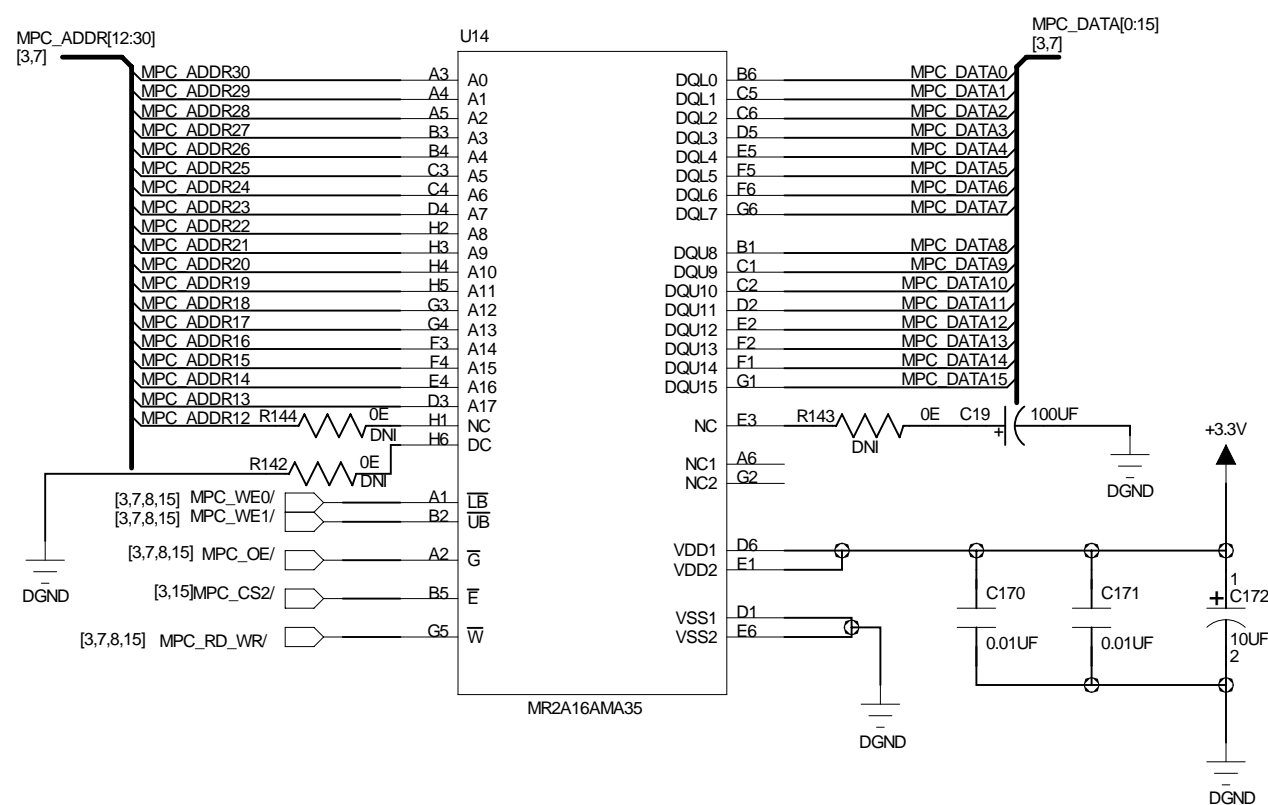
SRAM



NOR-FLASH



MRAM

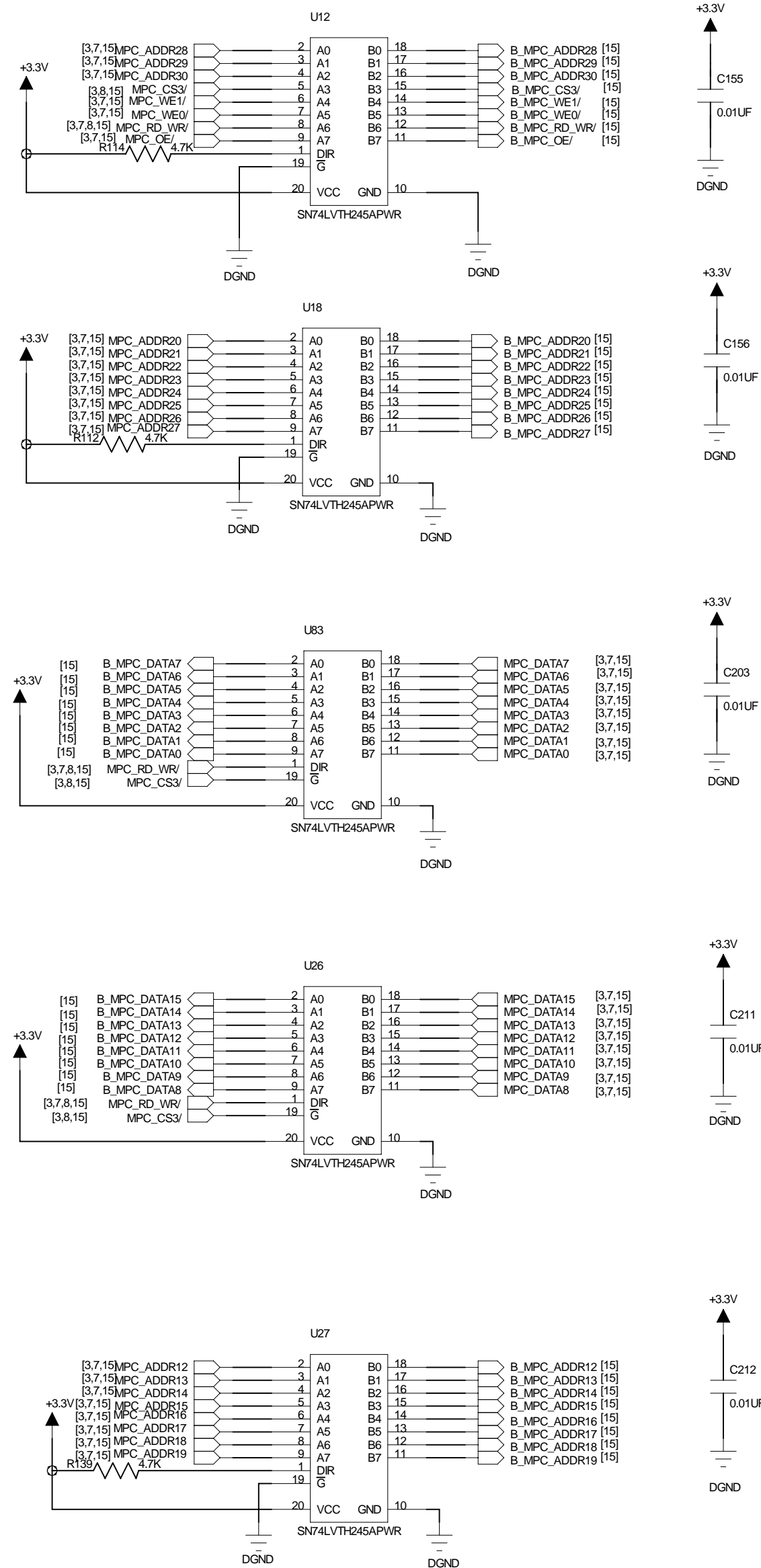


Note: Footprint is compatible to nvSRAM and 16M MRAM
LOAD R143 for nvSRAM CY14B104NA

| APPROVALS | | DATE | COMPRESSOR CONTROLS CORPORATION | | | |
|---------------|--|--------------|--|----------------------------------|---------|-----------|
| DRAWN | | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED | | <Checked By> | SHEET7-NOR_FLASH,SRAM,MRAM | | | |
| ENGINEER | | | SIZE | DWG. NO. | SHEET | PROD REV. |
| VAIBHAV DOSHI | | | C | <Drawing Number> | 7 of 15 | A |
| | | | FILE | CCCONGP_MPC5534_BOARD_REV3.0.sch | SCALE | <Scale> |

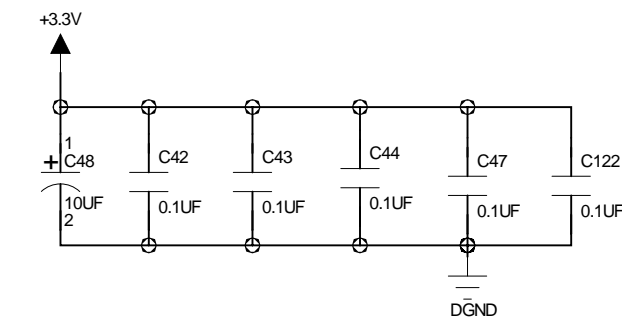
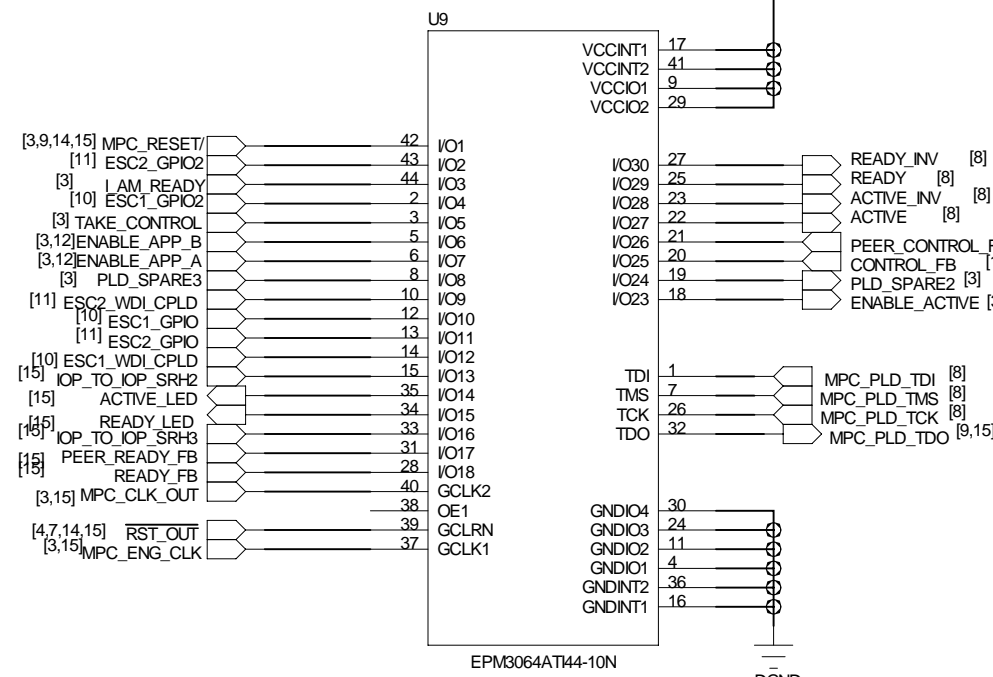
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Buffers on MPC Addr, data bus going to connector

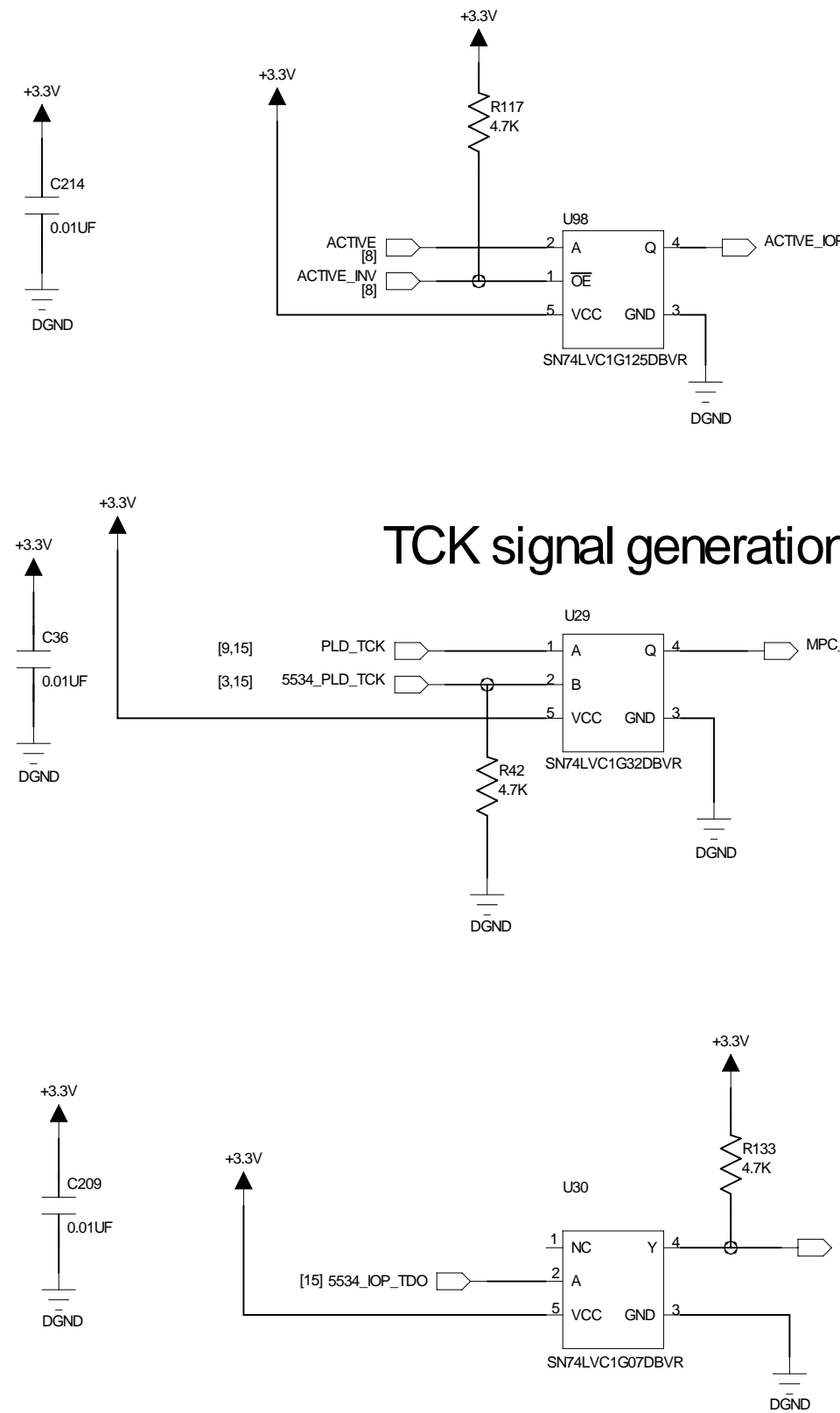


DWG. NO. <Drawing Number> SH 8 REV. A

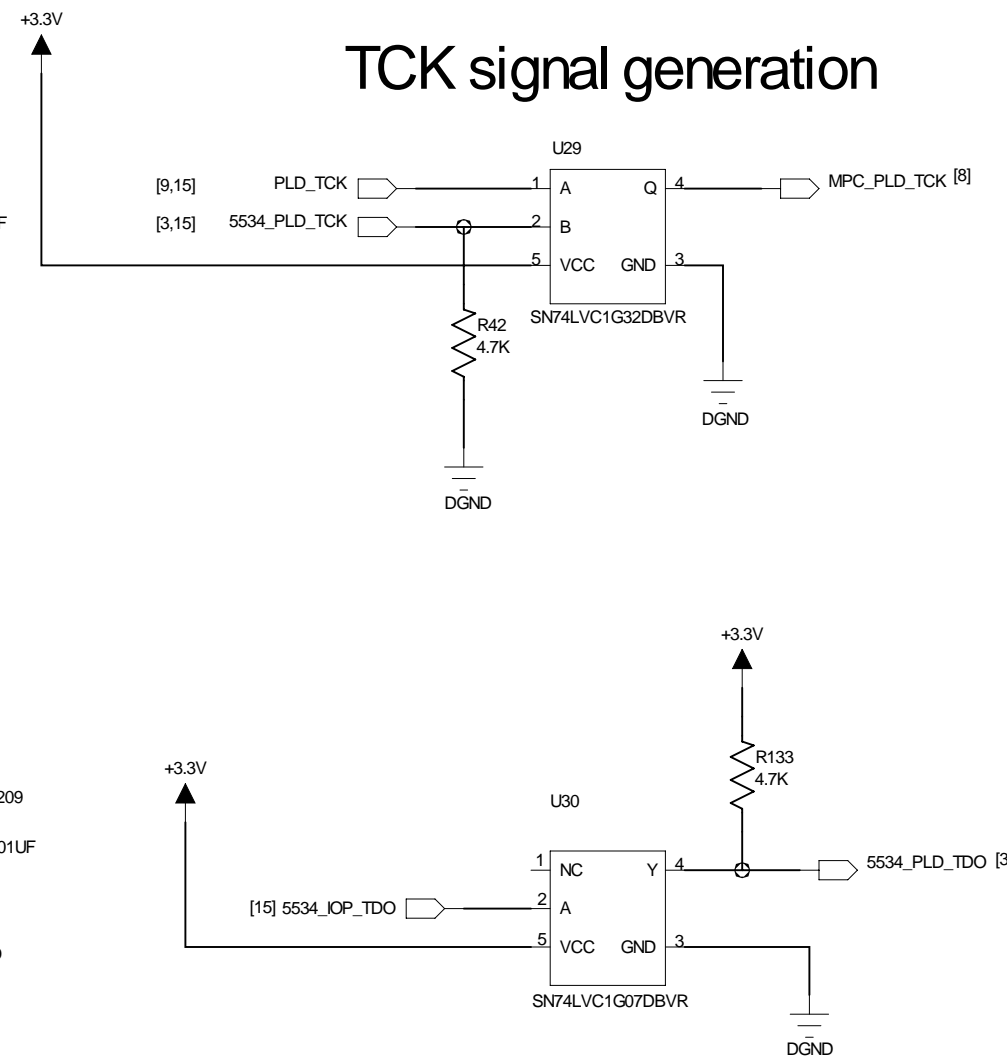
Health monitor CPLD



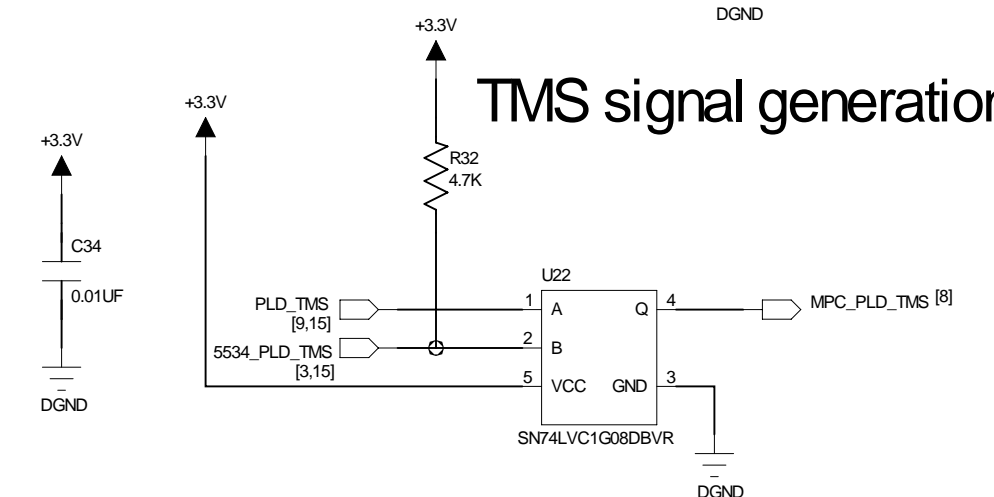
Buffers for Health signals



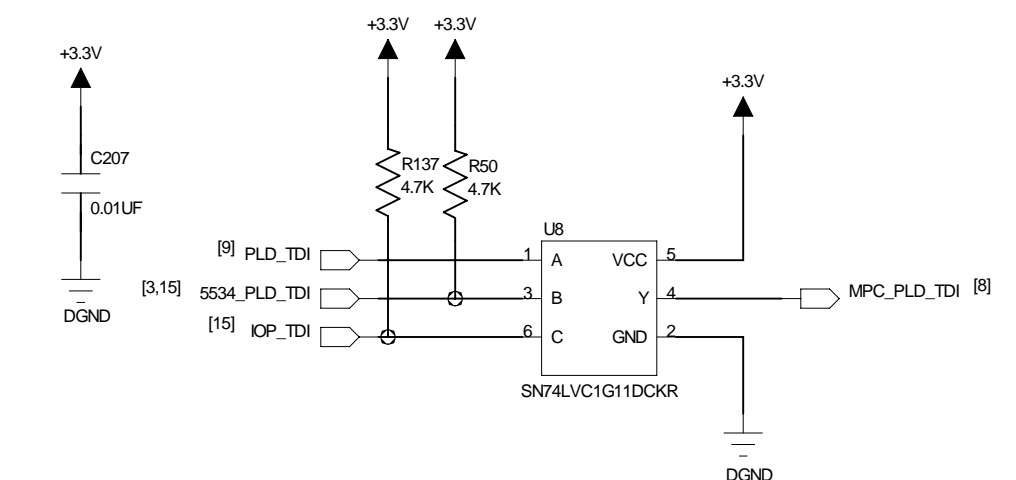
TCK signal generation



TMS signal generation



TDI signal generation

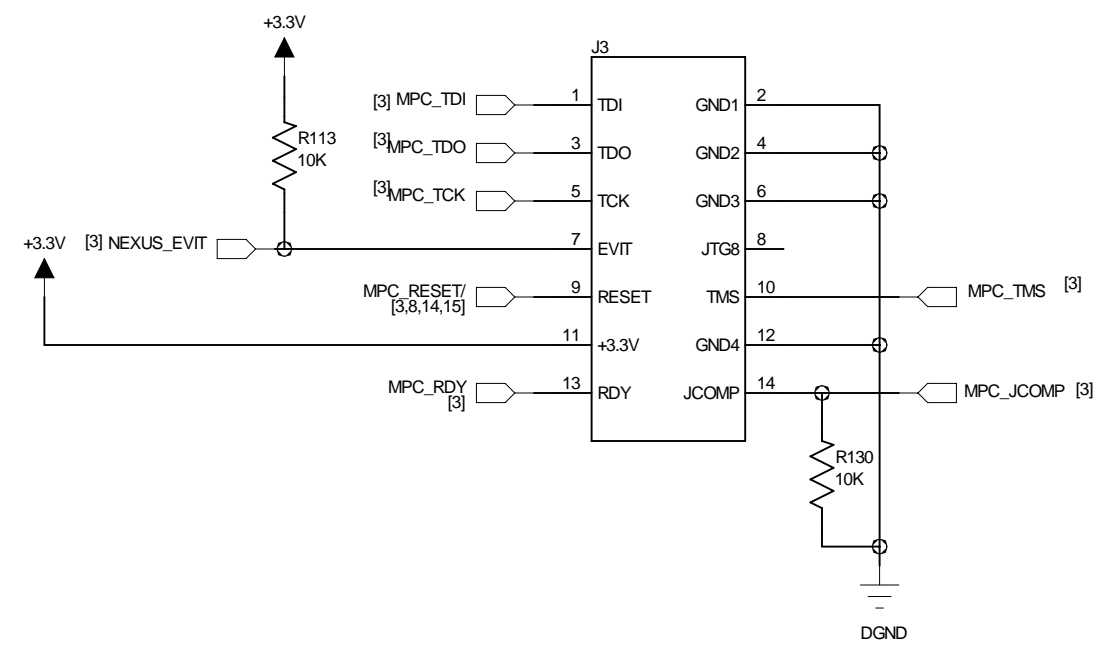


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|---------------|--|--------------|--|---------------------------------|-----------|
| DRAWN | | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | |
| CHECKED | | <Checked By> | SHEET8-CPLD,EBI_BUFFERS | | |
| ENGINEER | | | SIZE | DWG. NO. | SHEET |
| VAIBHAV DOSHI | | | C | <Drawing Number> | 8 of 15 |
| | | | FILE | CCCNCP_MPC5534_BOARD_REV3.0.sch | SCALE |
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| | | | | | A |

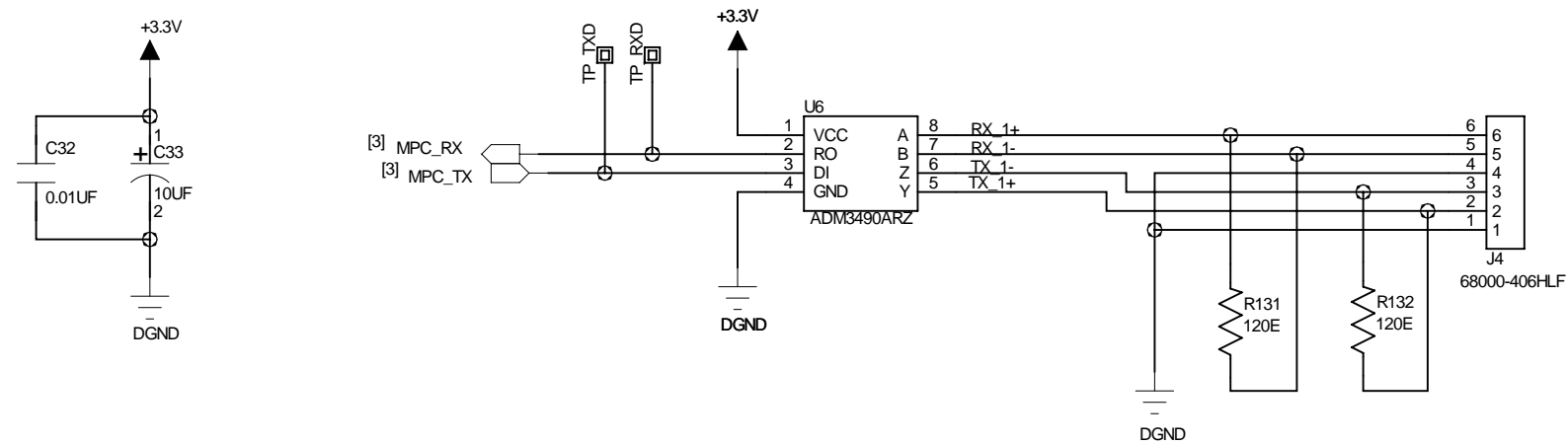
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| | | |
|------------------|----|------|
| DWG. NO. | SH | REV. |
| <Drawing Number> | 9 | A |

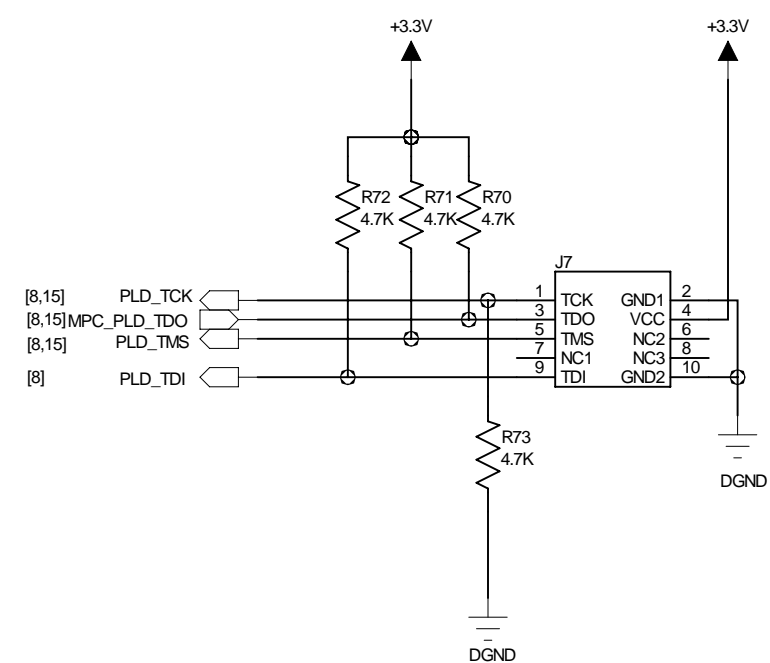
JTAG/NEXUS



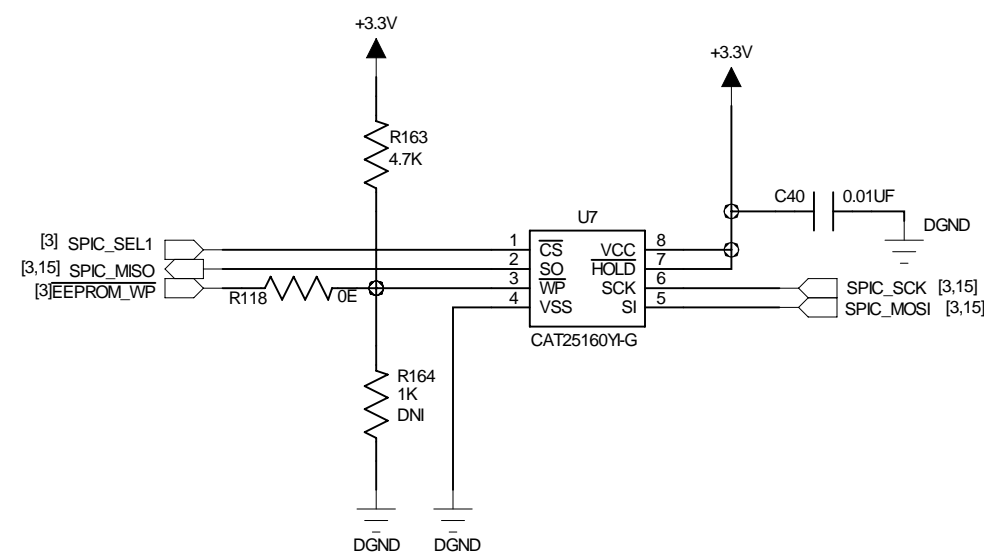
RS-485



JTAG programming for CPLD

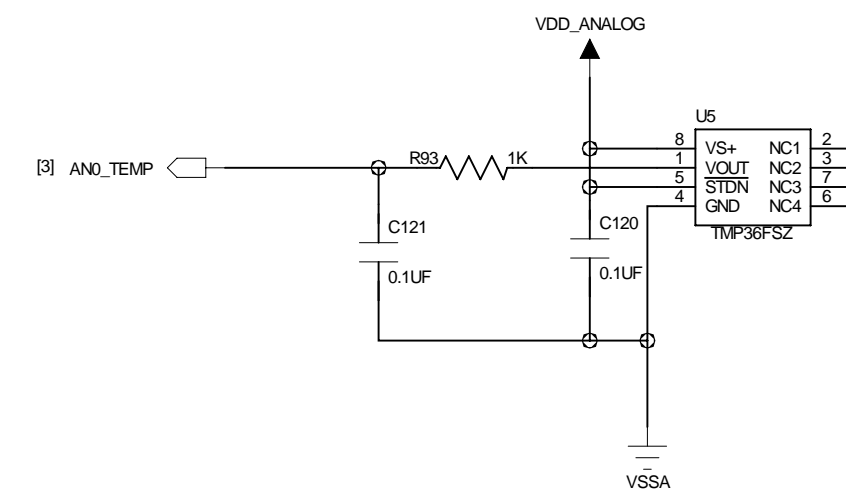


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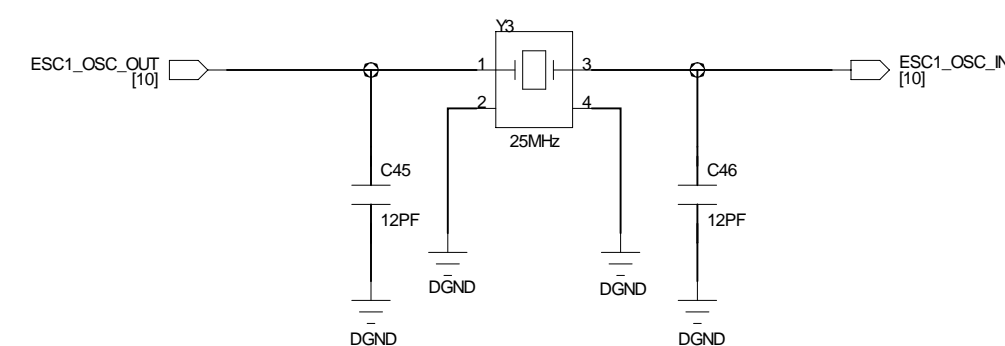


Note
'Write Protect' conditions are controlled by WPEN bit

TEMPERATURE SENSOR



| | | | | | | | |
|---------------------------|--|----------------|---|--|------------------|--|--------------|
| APPROVALS | | DATE | | COMPRESSOR CONTROLS CORPORATION | | | |
| DRAWN VAIBHAV DOSHI | | 17-10-2012 | | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED <Checked By> | | <Checked Date> | | SHEET9-JTAG,RS485,TEMP_SENSOR, | | | |
| ENGINEER VAIBHAV DOSHI | | SIZE C | DWG. NO. <Drawing Number> | | SHEET 9 of 15 | | PROD REV. |
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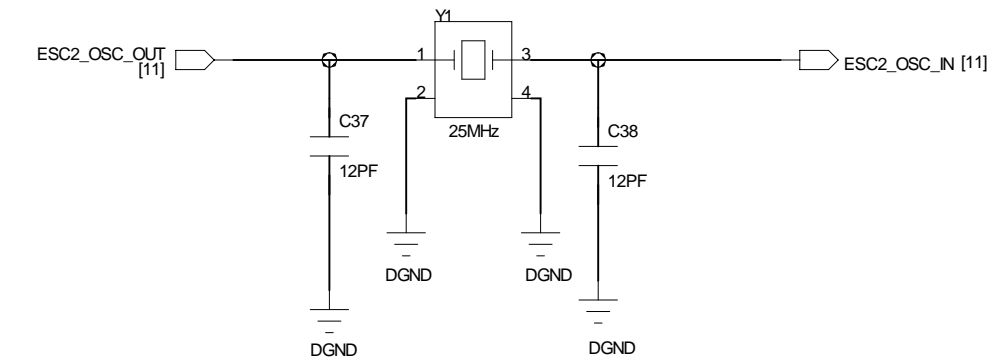
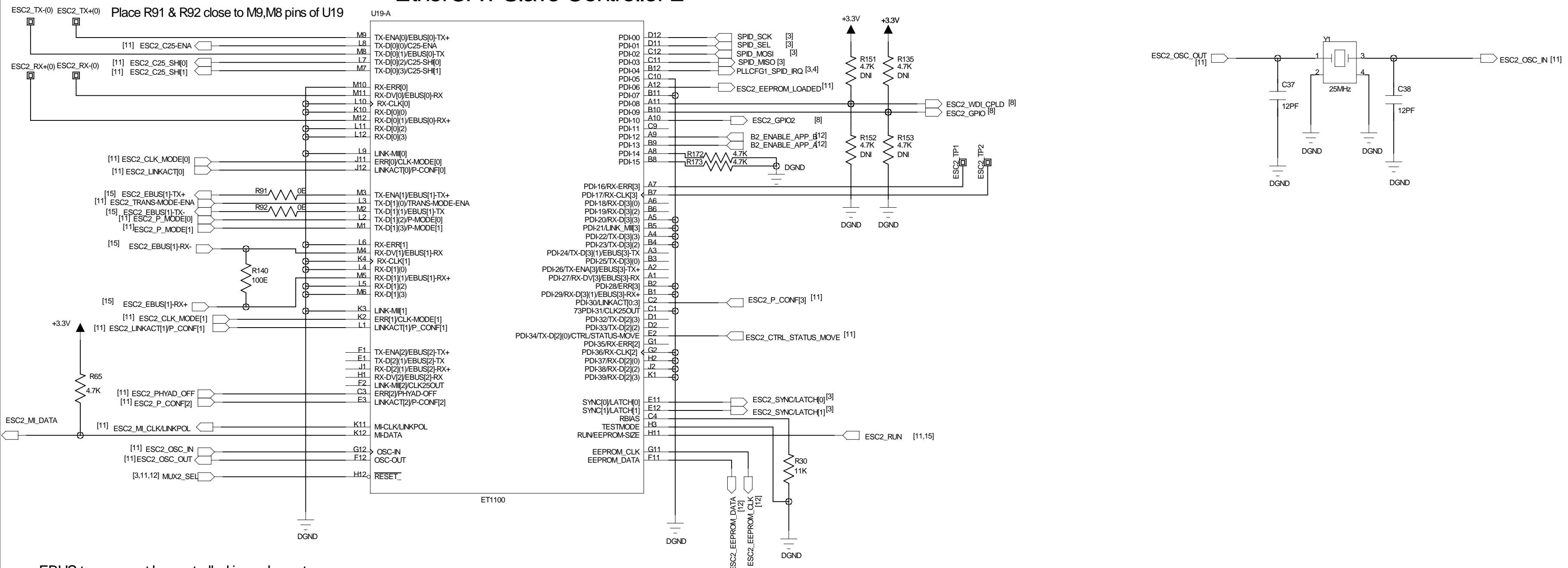


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| APPROVALS | | DATE | | COMPRESSOR CONTROLS CORPORATION | | | |
| DRAWN VAIBHAV DOSHI | | 17-10-2012 | | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED <Checked By> | | <Checked Date> | | SHEET10-ESC-1 | | | |
| ENGINEER VAIBHAV DOSHI | | | | SIZE C | DWG. NO. <Drawing Number> | SHEET 10 of 15 | PROD. REV. A |
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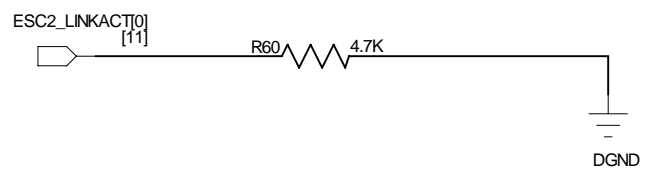
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EtherCAT Slave Controller 2

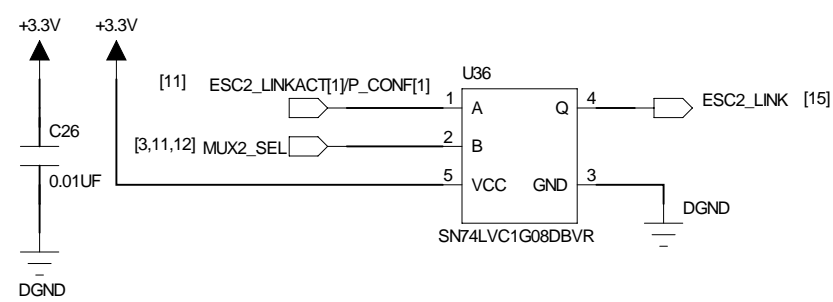
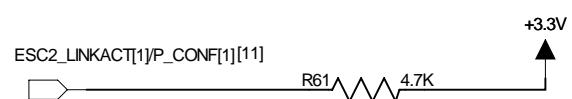
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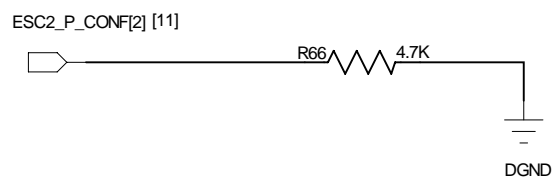
P_CONF[0]= 9 (Port0 = MI)(unused)



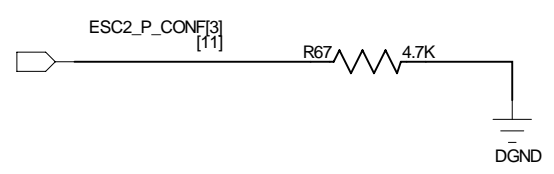
P_CONF[1]= 0 (Port1=EBUS)



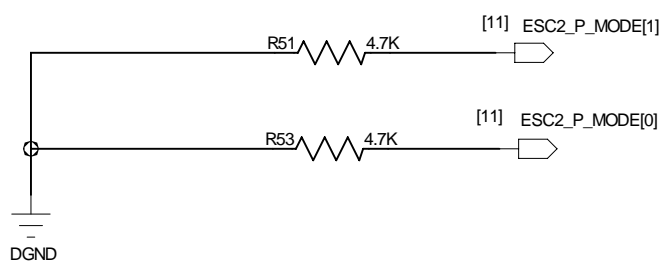
P_CONF[2]= 0 (unused)



P_CONF[3]= 0 (unused)



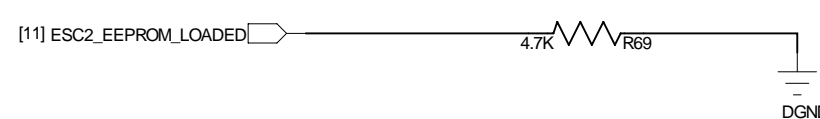
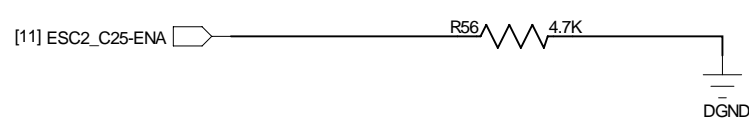
2 EtherCAT Ports enabled (P_MODE[1:0] = 00)



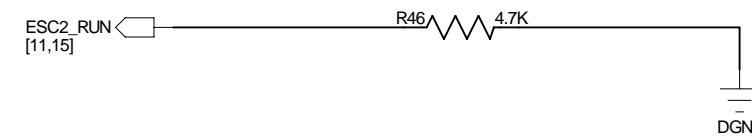
TX Shift [1:0]=00=0nS (unused)



CLK25OUT2 (PDI31) disabled



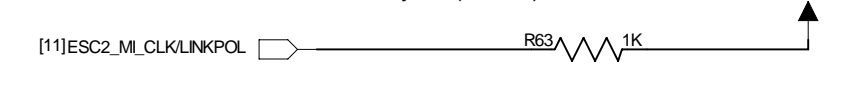
E2PROM-Size = 0 (16 kBit)



PHY offset address = 0 (unused)



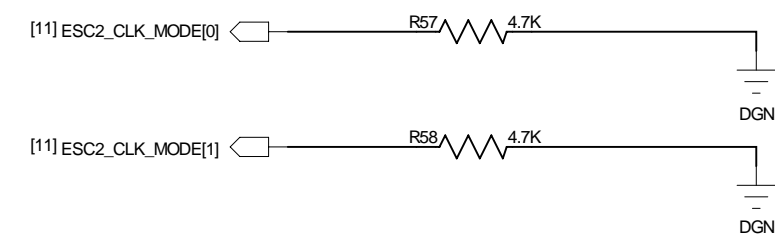
Link Polarity = 0 (unused)



Digital I/O control status signals not moved (unused)



CPU_CLK_MODE [1:0]=00=OFF
(config for PDI[7])



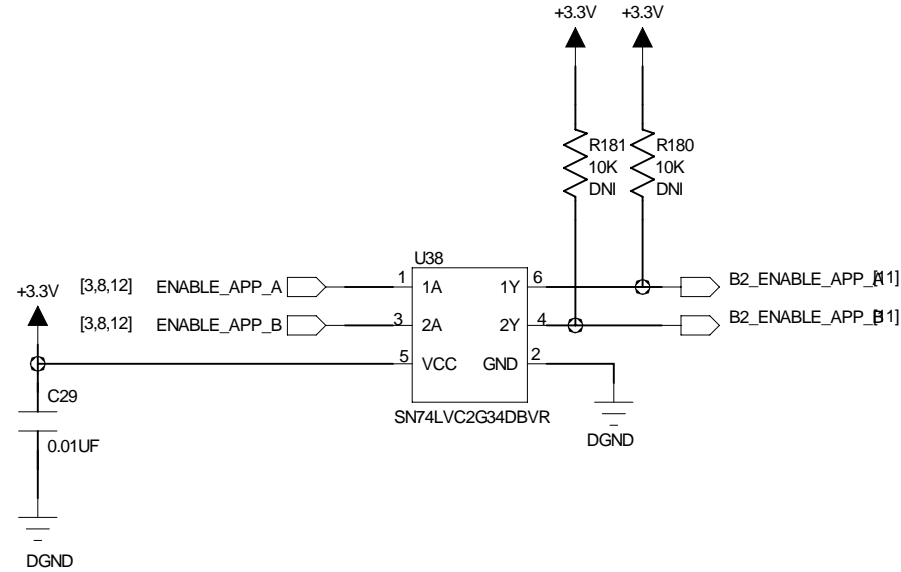
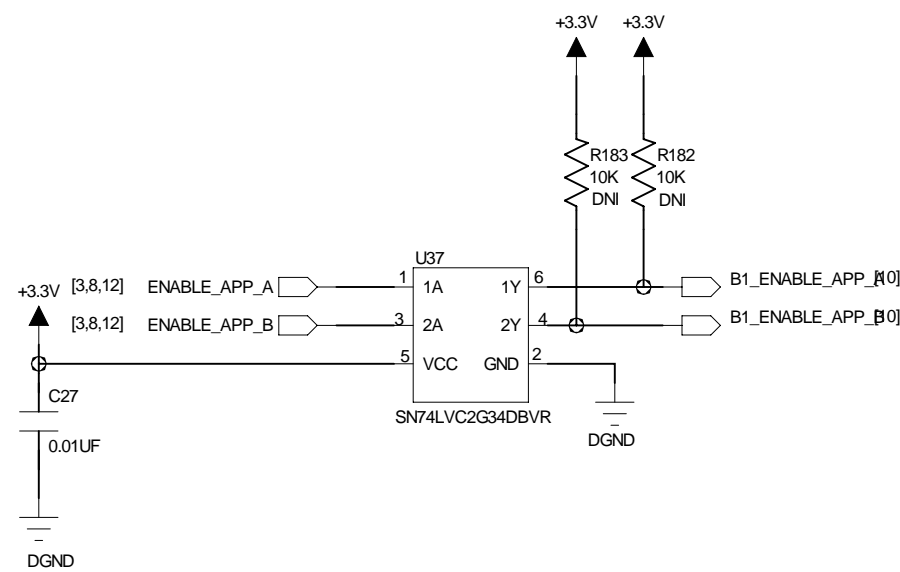
Transparent Mode disabled (TRANS_MODE_ENA = 0)



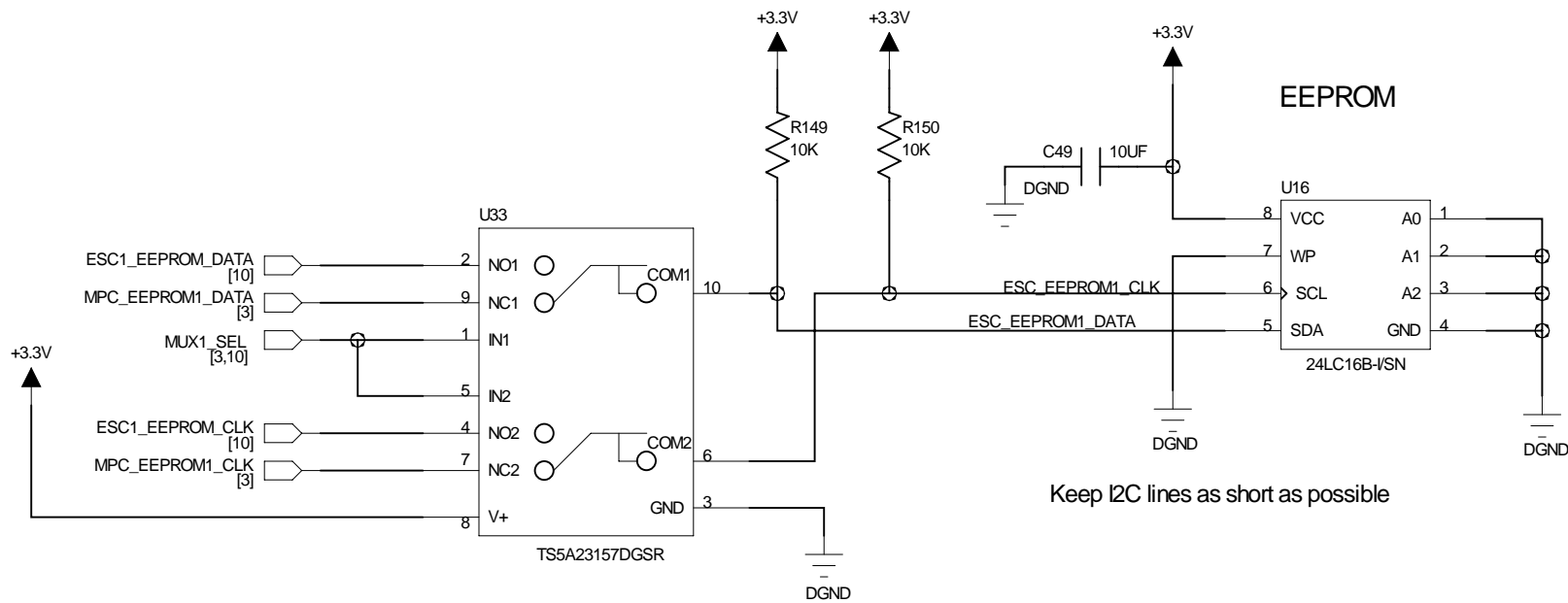
| APPROVALS | | DATE | COMPRESSOR CONTROLS CORPORATION | | | |
|-----------|---------------|----------------|--|---------------------------------|----------|-----------|
| DRAWN | VAIBHAV DOSHI | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED | <Checked By> | <Checked Date> | SHEET11-ESC-2 | | | |
| ENGINEER | VAIBHAV DOSHI | | SIZE | DWG. NO. | SHEET | PROD REV. |
| | | | C | <Drawing Number> | 11 of 15 | A |
| | | | FILE | CCCNMP_MPC5534_BOARD_REV3.0.sch | SCALE | <Scale> |

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR FOR MANUFACTURING PURPOSES WITHOUT WRITTEN PERMISSION FROM COMPRESSOR CONTROLS CORP.

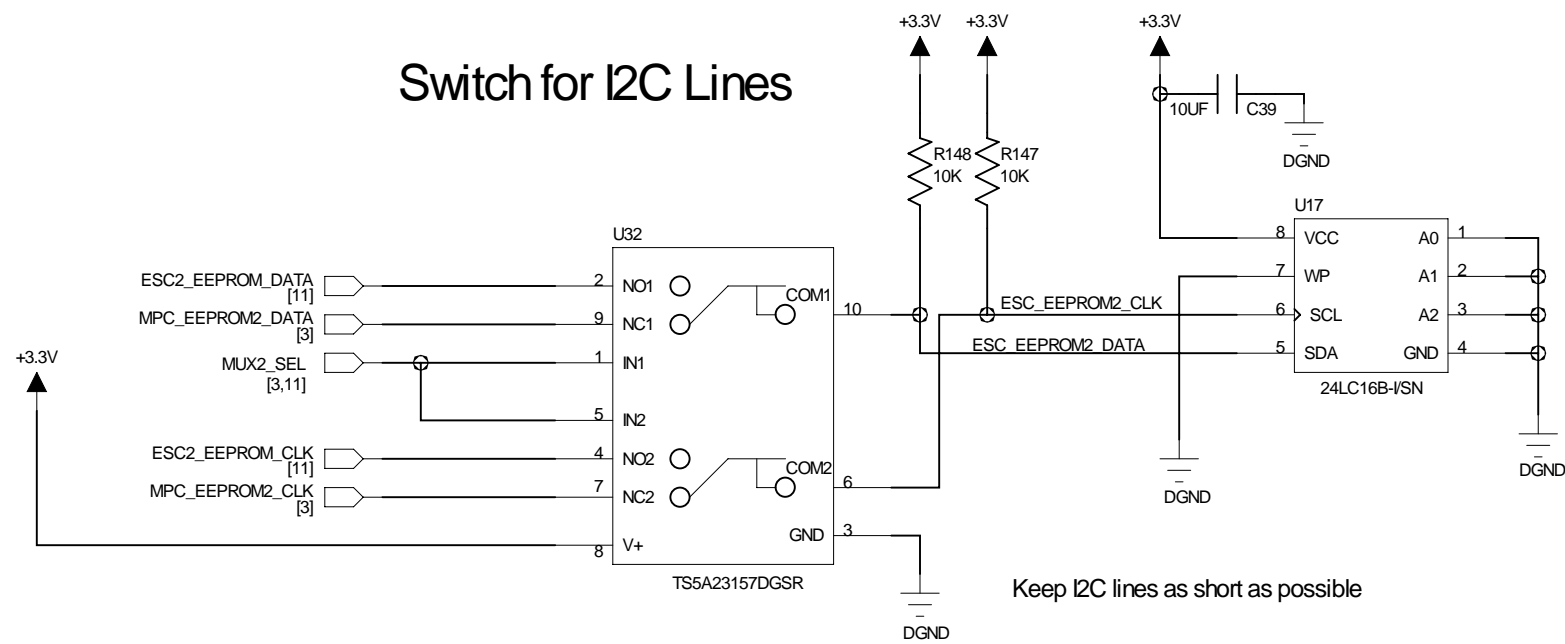
DWG. NO. <Drawing Number> SH 12 REV. A



Switch for I2C Lines



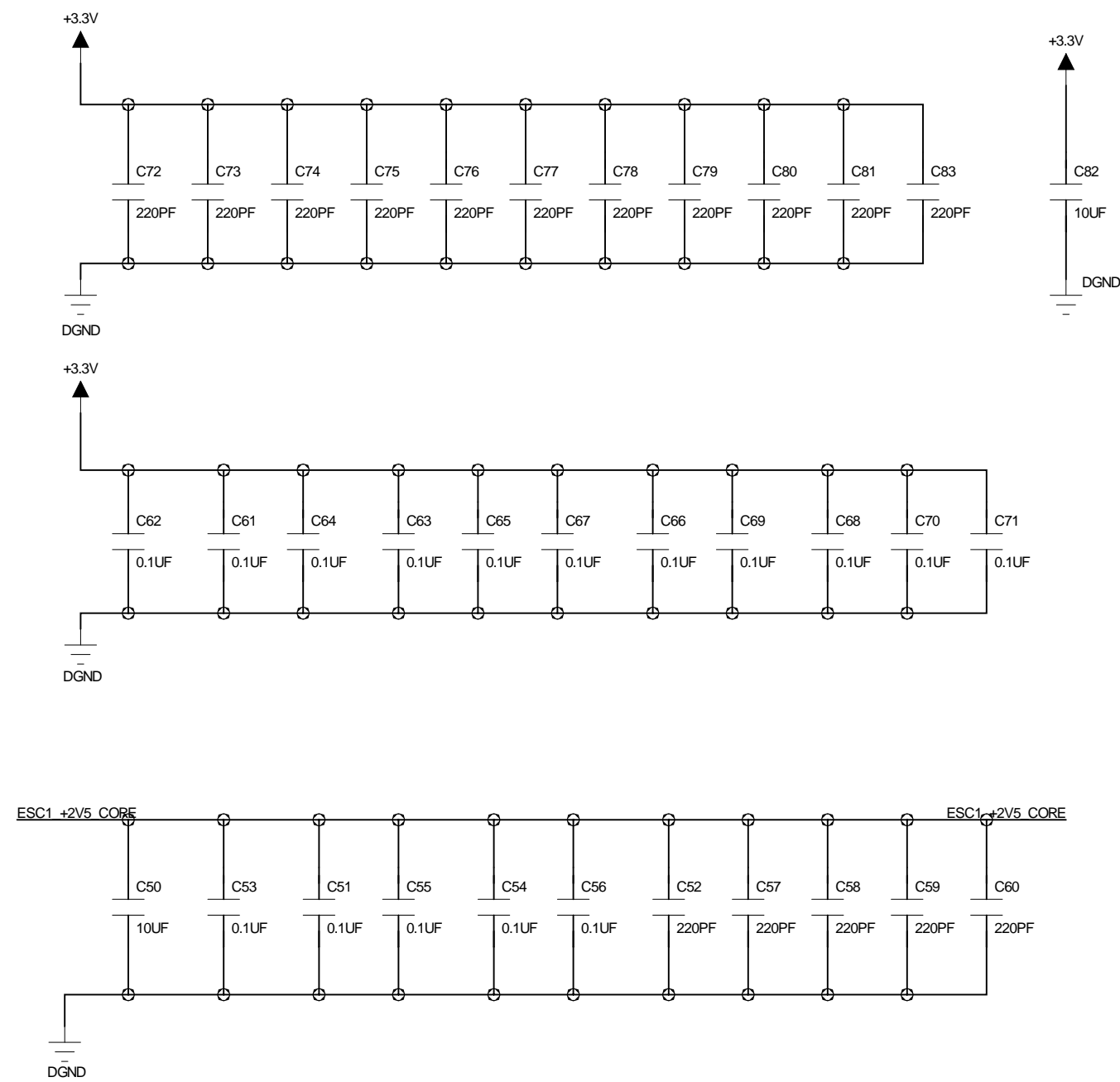
Switch for I2C Lines



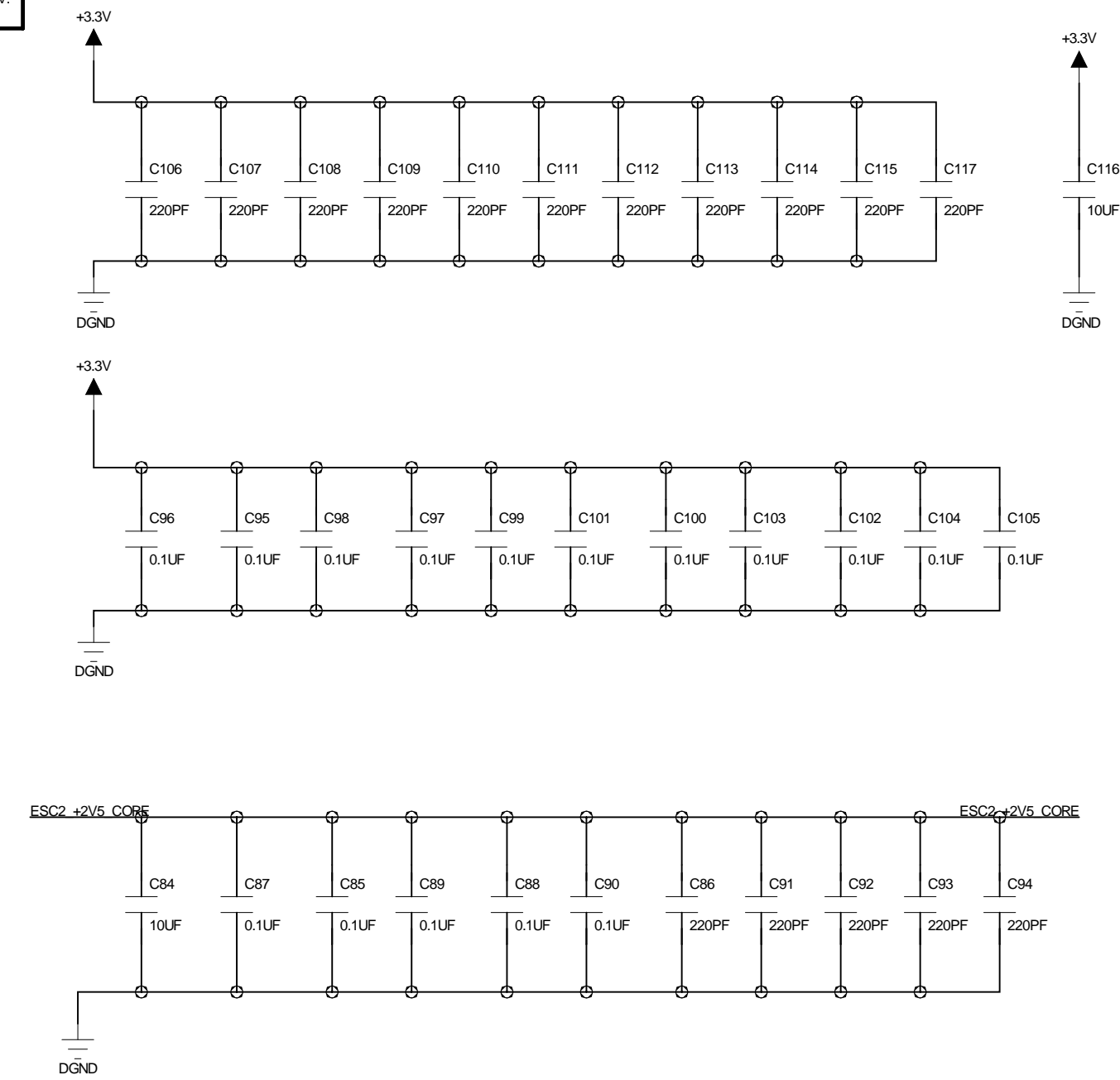
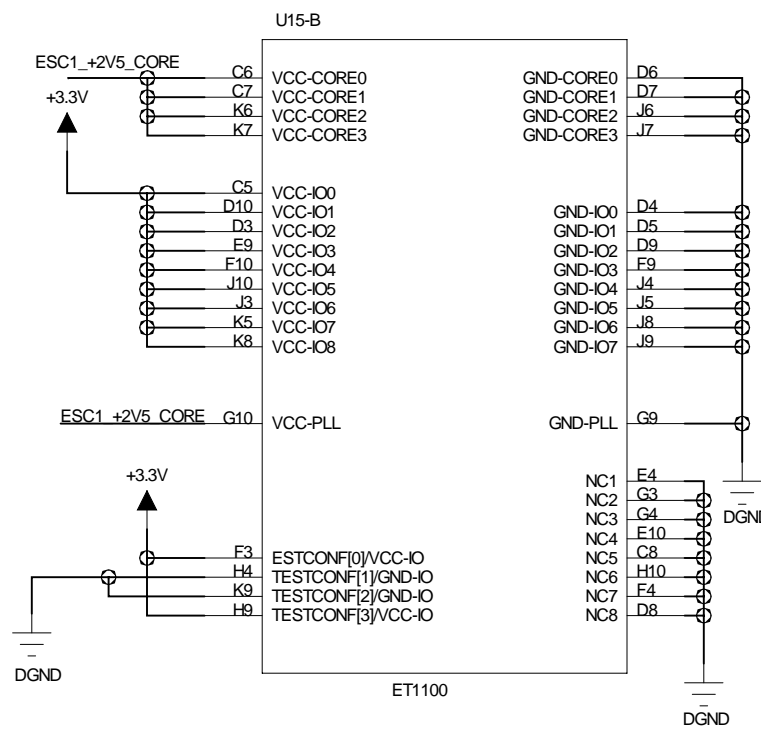
| APPROVALS | | DATE | COMPRESSOR CONTROLS CORPORATION | | | |
|---------------|--|--------------|--|---------------------------------|----------|------|
| DRAWN | | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED | | <Checked By> | SHEET12-ET1100_BUFFER&EEPROM | | | |
| ENGINEER | | | SIZE | DWG. NO. | SHEET | PROD |
| VAIBHAV DOSHI | | | C | <Drawing Number> | 12 of 15 | REV. |
| | | | | FILE | SCALE | A |
| | | | | CCCNBP_MPC5534_BOARD_REV3.0.sch | <Scale> | |

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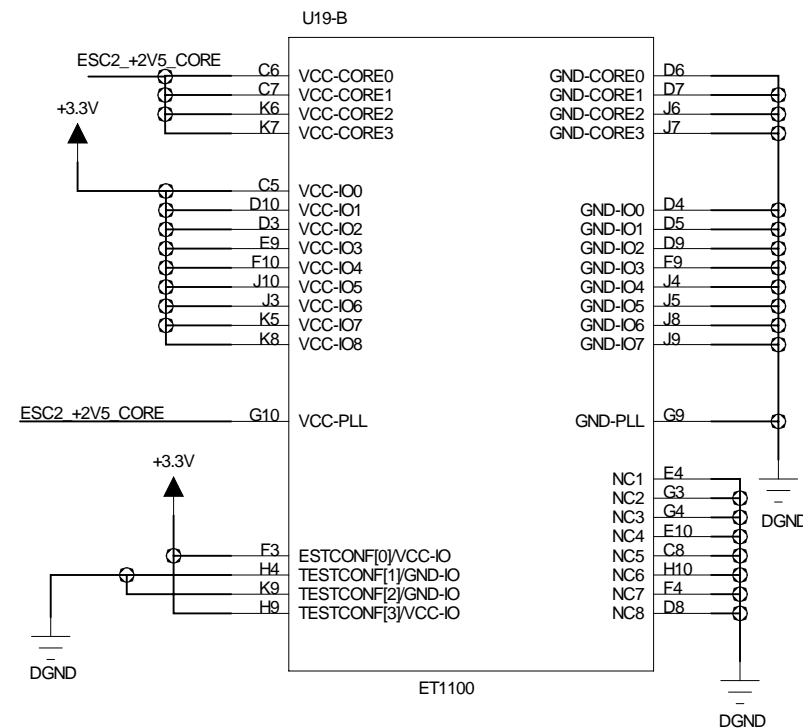
DWG. NO. <Drawing Number> SH 13 REV. A



EtherCAT Slave Controller 1- Power



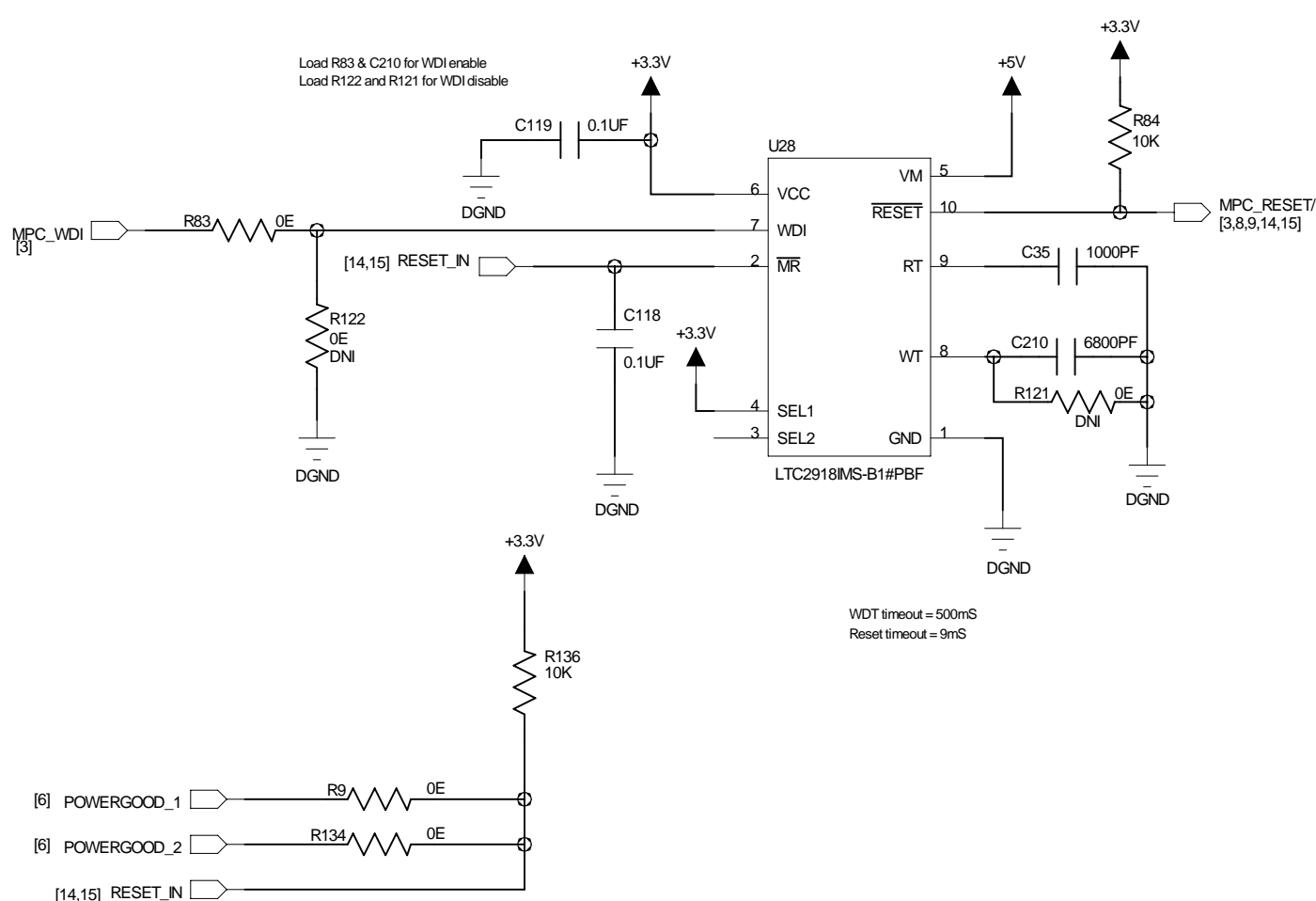
EtherCAT Slave Controller 2- Power



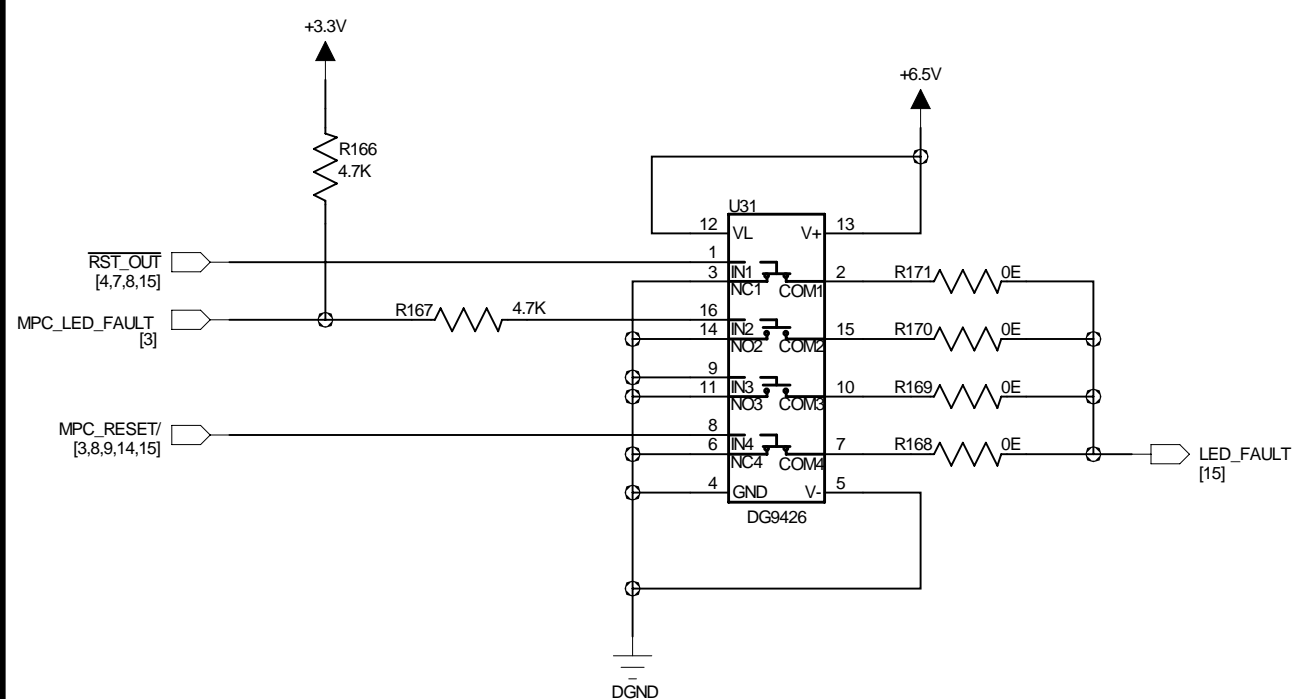
| APPROVALS | | DATE | COMPRESSOR CONTROLS CORPORATION | | | |
|---------------|--|----------------|--|---------------------------------|----------|-----------|
| DRAWN | | 17-10-2012 | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED | | <Checked Date> | SHEET13-ESC_POWER | | | |
| ENGINEER | | | SIZE | DWG. NO. | SHEET | PROD REV. |
| VAIBHAV DOSHI | | | C | <Drawing Number> | 13 of 15 | A |
| | | | FILE | CCCNCP_MPC5534_BOARD_REV3.0.sch | SCALE | <Scale> |

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND SUCH INFORMATION
MAY NOT BE DISCLOSED TO OTHERS FOR ANY PURPOSE NOR FOR MANUFACTURING
PURPOSES WITHOUT WRITTEN PERMISSION FROM COMPRESSOR CONTROLS CORP.

RESET CIRCUIT

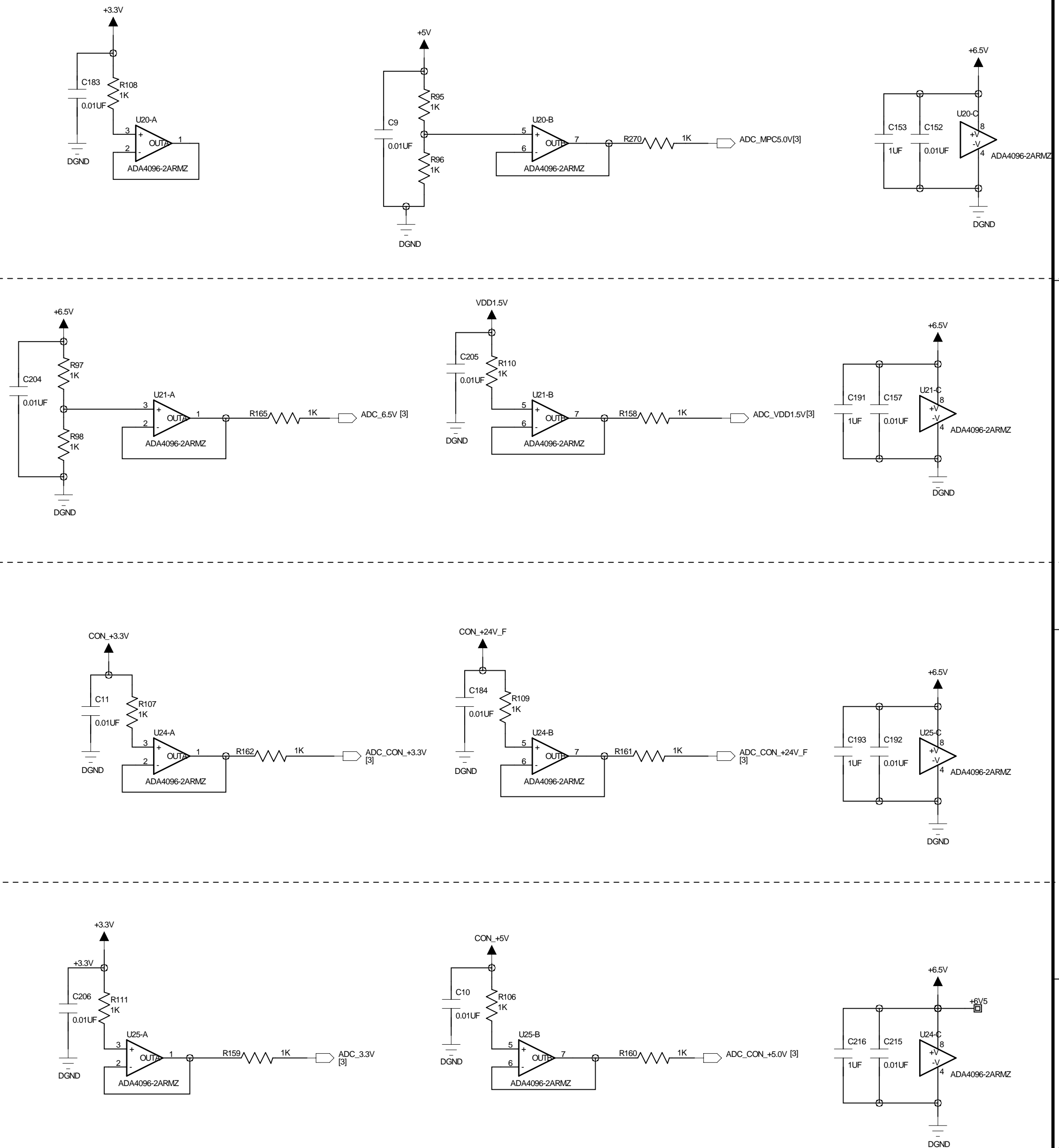


FAULT LED



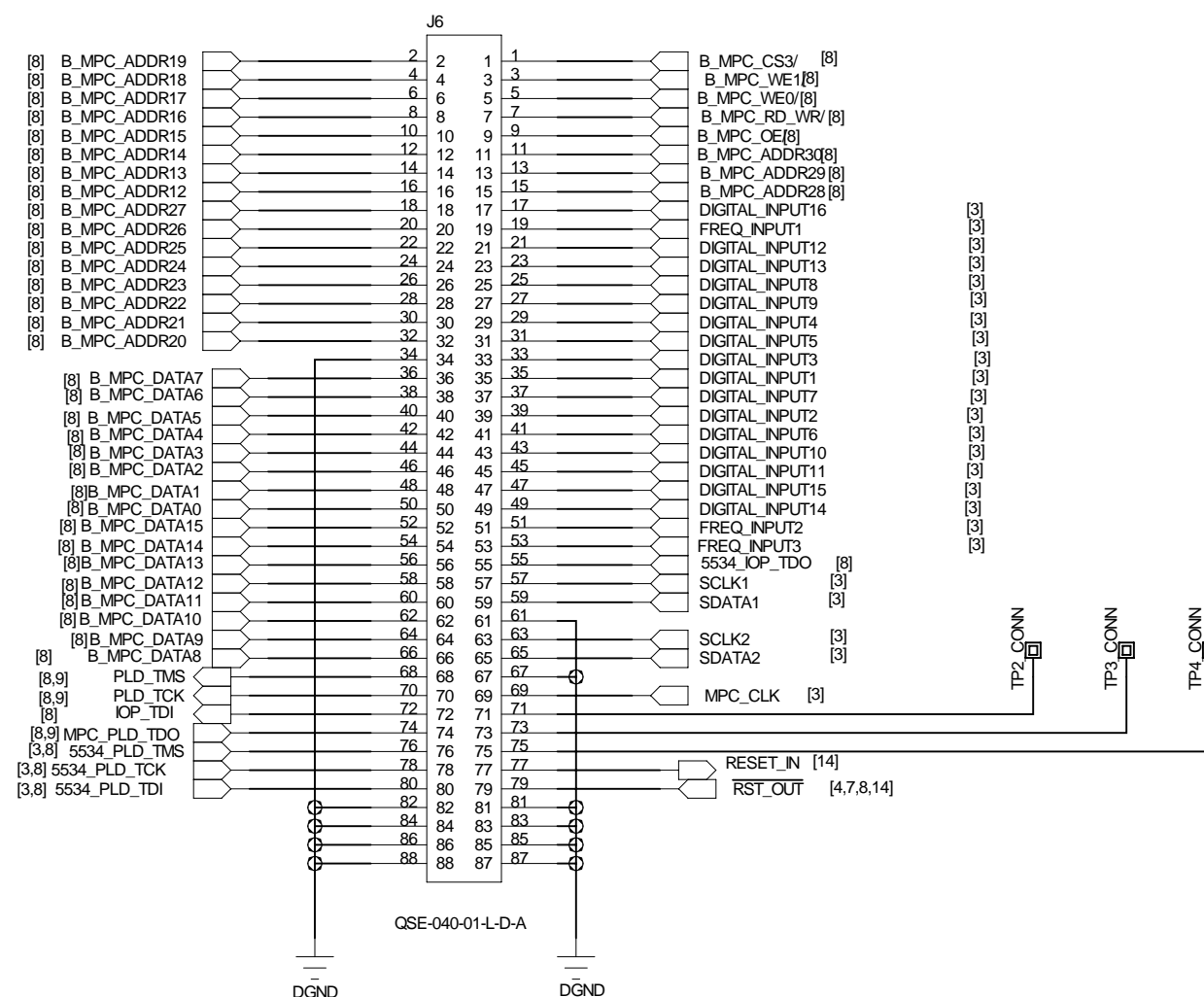
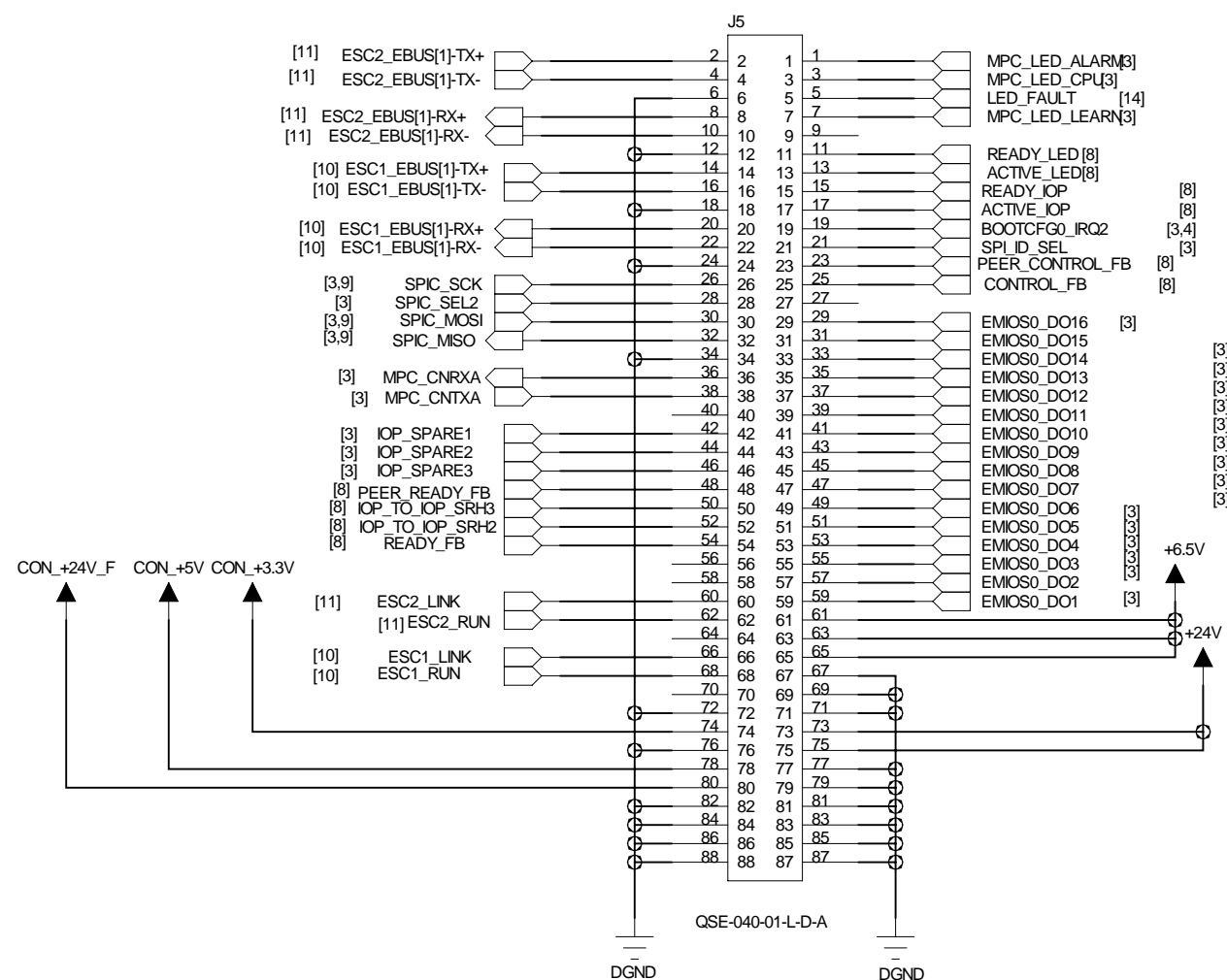
Note:
LED to be connected to this signal via resistor on IOP board

UNIT GAIN OP-AMP FOR VOLTAGE MONITOR

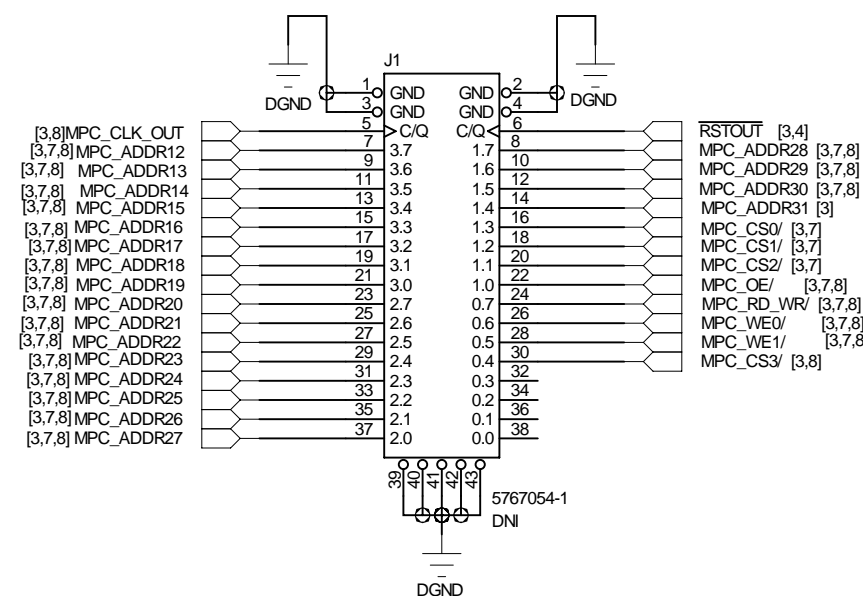
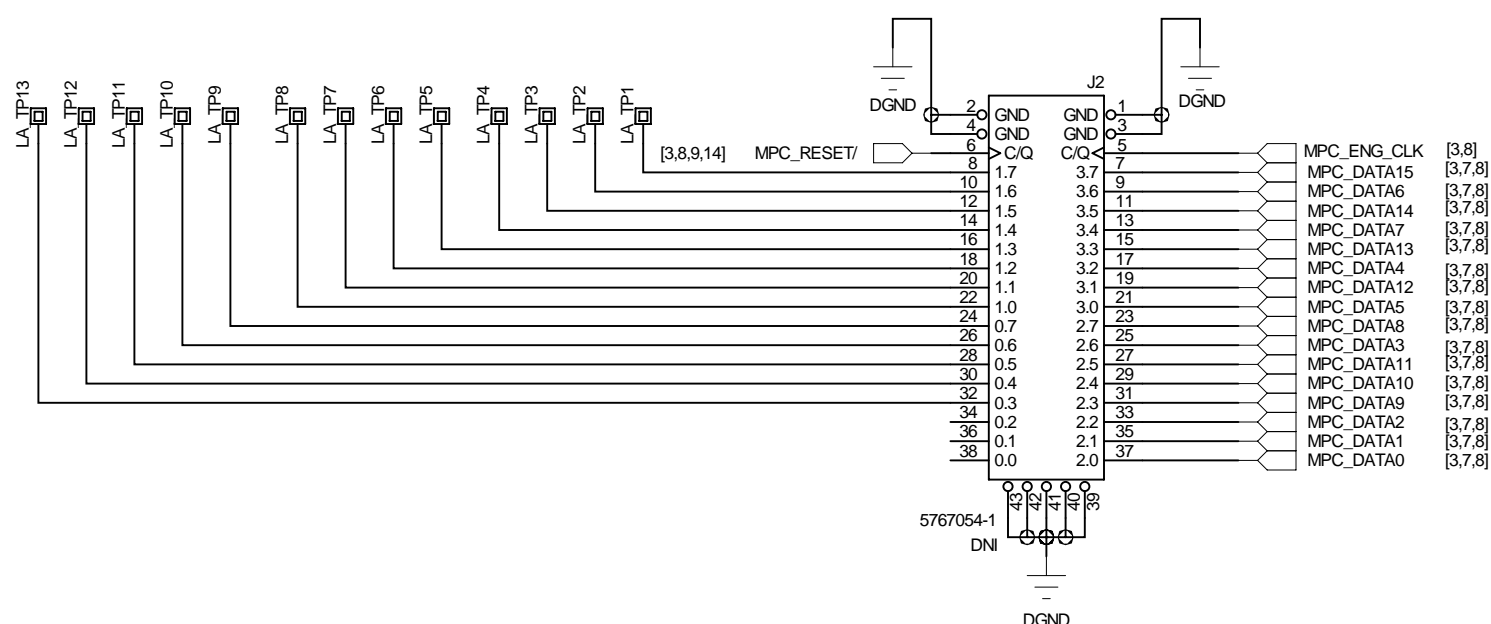


| | | | | | | | | | |
|---------------------------|--|----------------|------------------|---|---|--|----------------|---------------------|----------------|
| APPROVALS | | DATE | | COMPRESSOR CONTROLS CORPORATION 4725 121st Street - Des Moines, Iowa 50323 | | | | | |
| DRAWN VAIBHAV DOSHI | | 17-10-2012 | | SHEET14-RESET,POWER_MONITOR | | | | | |
| CHECKED <Checked By> | | <Checked Date> | | | | | | | |
| ENGINEER VAIBHAV DOSHI | | SIZE C | DWG. NO. FILE | | <Drawing Number> CCCNCP_MPC5534_BOARD_REV3.0.sch | | SHEET SCALE | 14 of 15 <Scale> | PROD REV. A |

IOP-CARD_CONNECTOR



MICTOR_CONNECTORS
LOGIC ANALYZERS



| | | | | | | | |
|---------------------------|--|----------------|--|--|---------------------------------|-------------------|--------------|
| APPROVALS | | DATE | | COMPRESSOR CONTROLS CORPORATION | | | |
| DRAWN VAIBHAV DOSHI | | 17-10-2012 | | 4725 121st Street - Des Moines, Iowa 50323 | | | |
| CHECKED <Checked By> | | <Checked Date> | | SHEET15-CONNECTOR | | | |
| ENGINEER VAIBHAV DOSHI | | | | SIZE C | DWG. NO. <Drawing Number> | SHEET 15 of 15 | PROD REV. |
| | | | | FILE | CCONGP_MPCS534_BOARD_REV3.0.sch | SCALE <Scale> | A |