



# **MOSCAD-M™ RTU**

## *Schematics and Layouts*

**Hardware Manual**

**68P02962C30-O**

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# FOREWORD

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## General

The MOSCAD-M Schematics and Layout manual contains the MOSCAD-M RTU hardware details. The schematics, layout and parts lists for the Main board and I/O Expansion board are provided.

## Intended Audience

This manual is intended for use by experienced Motorola technicians familiar with similar types of equipment.

## Related Documents

The following publications are available separately:

*MOSCAD-M RTU Owner's manual*, Motorola publication 68P02961C50/98-08901C55

*MOSCAD-M RTU Configurator User's Guide*, Motorola publication 68P02961C55

*'C' Toolkit for MOSCAD Family RTUs*, Motorola publication 68P02956C75

*MOBAT Radio Service Manual*, Motorola publication 68P02963C10/98-08901C60

## SPECIFICATIONS

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### CPU

|                              |                                                                                                                            |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Processor:                   | Motorola 68VZ328 (16/32 bit) CMOS;<br>33 MHz clock                                                                         |
| Memory:                      | 1024 kb Flash for operating system and<br>user application, 512 kb RAM                                                     |
| Memory free for application: | 200 kb                                                                                                                     |
| Real-Time Clock:             | Hardware clock with year, month, date, day, hour,<br>minute, and second supported.                                         |
| Serial Data Ports:           |                                                                                                                            |
| Port 1:                      | RS-485 2-wire multi-drop or RS-232 (with<br>handshake) and dial-up modem support;<br>up to 57.6 kb/s, IP soap dish support |
| Port 2:                      | RS-232 (no handshake); up to 57.6 kb/s,<br>IP soap dish support                                                            |
| Port 3:                      | 1200 b/s DPSK to external radio, or<br>9600 b/s duo-binary to internal radio                                               |

### I/O

|                                  |                                                                                                                         |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| F457X models:                    | 12 digital inputs, 4 digital outputs (magnetic latch<br>relay) and 4 "open" FET outputs                                 |
| F458X models:<br>(MOSCAD-M Plus) | 15 digital inputs, 4 analog outputs, 4 digital<br>(magnetic latch relay), plus 4 "open" FET outputs,<br>1 analog output |
| DI specs:                        | 30V DC max input. Two inputs may be used as<br>fast counters (10 Hz max)                                                |
| AI specs:                        | 0-5V DC or 4-20 mA. 12 bit $\pm$ 1 LSB resolution                                                                       |
| DO specs:                        | Relay output: 2A max, 30V DC or 250V AC max,<br>60 Watt max, 125V AC max.<br><br>Open FET: 500 mA max, 30V DC max       |
| AO specs:                        | 0-5V DC or 4-20 mA. 8 bit $\pm$ 1 LSB resolution                                                                        |

### Communications

|                  |                                                                            |
|------------------|----------------------------------------------------------------------------|
| Wireline Modems: | Supports external modem via Port 1B, up to 57.6<br>kb/s.                   |
| Two-Way radio:   | Internal: UHF 4 watt data radio, 1200 b/s, DPSK<br>modulation, 403-470 MHz |

## SPECIFICATIONS

### General

|                   |                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------|
|                   | External: 9600 b/s duo-binary modulation.                                                                       |
| Power:            | External 9-30V DC @ 70 mA nominal, 150 mA peak (w/o radio), <5 mA sleep mode.                                   |
| Battery Backup:   | Three "C" cells keep real-time clock and RAM operating.                                                         |
| Power Management: | Sleep mode may control DI and AI wetting voltage plus power to external radio.                                  |
| Wake Up Triggers: | Either of: 3 assigned DIs, data received at ports, manual push-button, real-time clock.                         |
| Physical size:    | Plastic enclosure: 8.5"w x 7.75"h x 3.3"d (21.3mm x 19.4mm x 8.3mm).<br>Add 1.5"(3.75mm) for antenna connector. |
| Environmental:    | -30 to +60°C; 90% RH @ +50°C                                                                                    |

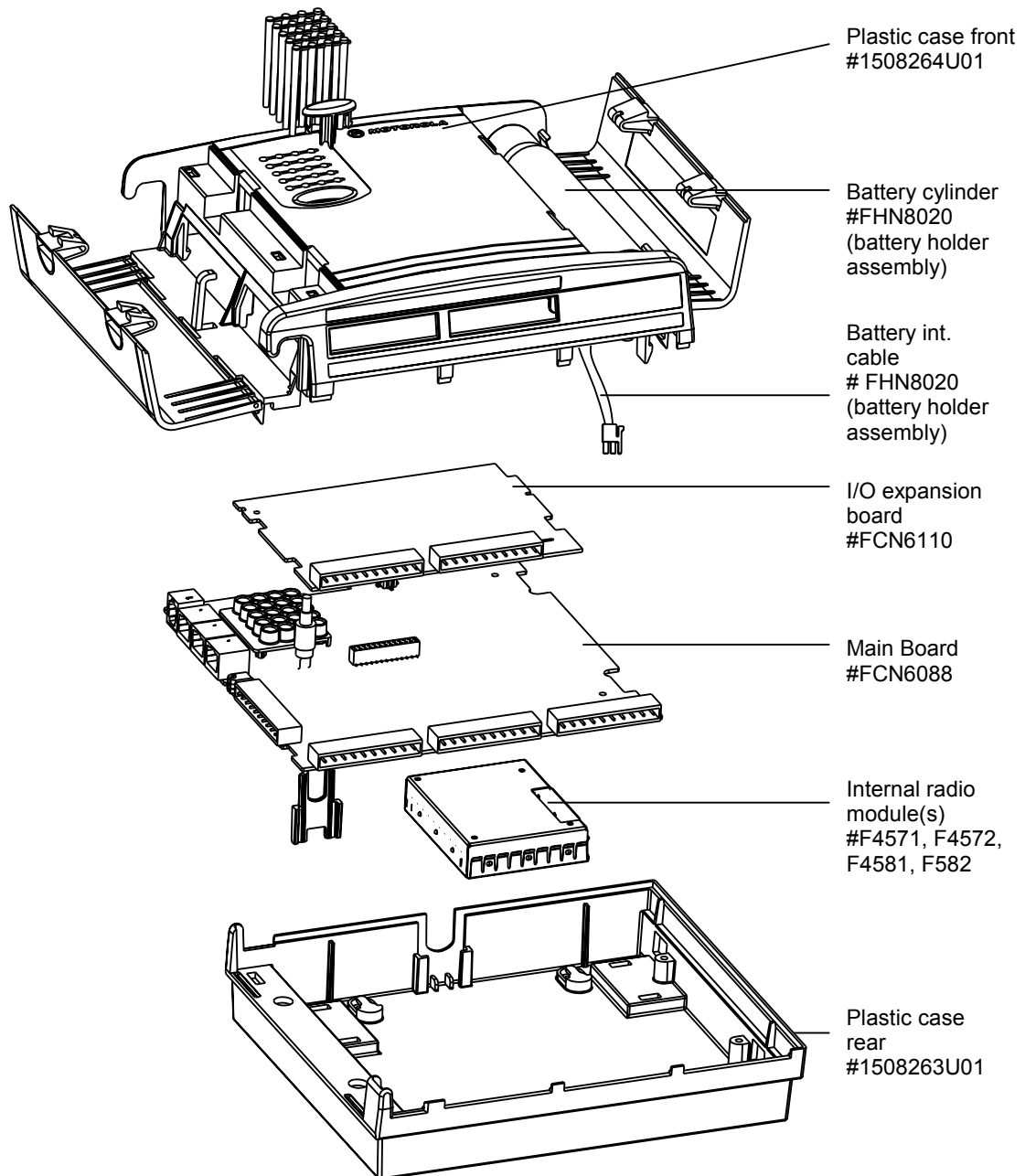
Specifications subject to change without notice.

# MOSCAD-M REMOTE TERMINAL UNIT

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## Enclosure

The figure below depicts the exploded view of the MOSCAD-M RTU. For instructions on assembly and disassembly, see the MOSCAD-M RTU Owner's Manual.



## MOSCAD-M Models, Options, and Accessories

For details of the MOSCAD-M RTU Models, Options, and Accessories, see the MOSCAD-M RTU Owner's Manual 68P02961C50/98-08901C55.

## MOSCAD-M Debug Board

A special MOSCAD-M board can be ordered for debugging user 'C' language applications. This board (catalog # FCN6089 DESIGN: 8486418T01) is identical to the standard Main board except for the following:

- Components U36, U55 (RAM memory) are expanded to 1MB each instead of 256KB.
- An interface to connectors P12, P13, and P14 for connection to the logic analyzer.

The parts list for FCN6089 is provided after that of FCN6088 under the description of the Main Board below.

## Radio Kits

The following list of Radio Kits can be ordered with the MOSCAD-M RTU.

### **F4571 MOSCAD-M 4W 403-433 INTERNAL RADIO**

|         |                          |
|---------|--------------------------|
| FKN4918 | MTR440 ANTENNA CABLE KIT |
| FUE1139 | MTR440 438-470MH 4W      |

### **F4572 MOSCAD-M 4W 438-470 INTERNAL RADIO**

|         |                          |
|---------|--------------------------|
| FKN4918 | MTR440 ANTENNA CABLE KIT |
| FUE1138 | MTR440 438-470MH 4W      |

### **F4573 MOSCAD-M 5W 136-174M RADIO**

|          |                               |
|----------|-------------------------------|
| FCN5516  | RADIO DC ADAPTER              |
| FKN4465  | CABLE, PS TO HT/MTS & NFM RTU |
| FKN8023  | RADIO AUD CABLE               |
| HLN9716  | AUDIO ACCESSORY ADAPTER       |
| HLN9756  | BNC ADAPTER                   |
| PMUD1480 | P XCVR 136-174M 5W CONV POP   |

### **F4574 MOSCAD-M 4W 403-470M RADIO**

|          |                               |
|----------|-------------------------------|
| FCN5516  | RADIO DC ADAPTER              |
| FKN4465  | CABLE, PS TO HT/MTS & NFM RTU |
| FKN8023  | RADIO AUD CABLE               |
| HLN9716  | AUDIO ACCESSORY ADAPTER       |
| HLN9756  | BNC ADAPTER                   |
| PMUE1434 | P XCVR 403-470M 4W CONV POP   |

### **F4575 MOSCAD-M 4W 470-512M RADIO**

|         |                  |
|---------|------------------|
| FCN5516 | RADIO DC ADAPTER |
|---------|------------------|

|          |                               |
|----------|-------------------------------|
| FKN4465  | CABLE, PS TO HT/MTS & NFM RTU |
| FKN8023  | RADIO AUD CABLE               |
| HLN9716  | AUDIO ACCESSORY ADAPTER       |
| HLN9756  | BNC ADAPTER                   |
| PMUE1477 | P XCVR 450-527M 4W CONV POP   |

**F4581 MOSCAD-M PLUS 4W 403-433 INTERNAL RADIO**

|         |                          |
|---------|--------------------------|
| FKN4918 | MTR440 ANTENNA CABLE KIT |
| FUE1139 | MTR440 438-470MH 4W      |

**F4582 MOSCAD-M PLUS 4W 438-470 INTERNAL RADIO**

|         |                          |
|---------|--------------------------|
| FKN4918 | MTR440 ANTENNA CABLE KIT |
| FUE1138 | MTR440 438-470MH 4W      |

**F4583 MOSCAD-M PLUS 5W 136-174M RADIO**

|          |                               |
|----------|-------------------------------|
| FCN5516  | RADIO DC ADAPTER              |
| FKN4465  | CABLE, PS TO HT/MTS & NFM RTU |
| FKN8023  | RADIO AUD CABLE               |
| HLN9716  | AUDIO ACCESSORY ADAPTER       |
| HLN9756  | BNC ADAPTER                   |
| PMUD1480 | P XCVR 136-174M 5W CONV POP   |

**F4584 MOSCAD-M PLUS 4W 403-470M RADIO**

|          |                               |
|----------|-------------------------------|
| FCN5516  | RADIO DC ADAPTER              |
| FKN4465  | CABLE, PS TO HT/MTS & NFM RTU |
| FKN8023  | RADIO AUD CABLE               |
| HLN9716  | AUDIO ACCESSORY ADAPTER       |
| HLN9756  | BNC ADAPTER                   |
| PMUE1434 | P XCVR 403-470M 4W CONV POP   |

**F4585 MOSCAD-M PLUS 4W 470-512M RADIO**

|          |                               |
|----------|-------------------------------|
| FCN5516  | RADIO DC ADAPTER              |
| FKN4465  | CABLE, PS TO HT/MTS & NFM RTU |
| FKN8023  | RADIO AUD CABLE               |
| HLN9716  | AUDIO ACCESSORY ADAPTER       |
| HLN9756  | BNC ADAPTER                   |
| PMUE1477 | P XCVR 450-527M 4W CONV POP   |

The external radio can be one of a range of GP/HT/PRO radios.

For specific information on servicing the internal radios, see MOBAT Radio Service Manual, Motorola publication, 68P02963C10/9808901C60.

# CABLES AND ADAPTERS

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## General

This appendix provides supplementary data on cables and adapters used in various MOSCAD-M systems. The following applications are covered:

- RTU-to-Computer/Terminal Connections
- RTU-to-Modem Connections
- RTU-to-RTU Connections

## RTU-to-Computer/Terminal Connections

For a 25-pin or 9-pin D-type connector, use the FLN6457 cable kit, in order to connect one of the RTU RS-232 ports to a computer or terminal. The kit includes a cable with RJ45 modular jacks on both ends, an RJ45 to 25-pin female D-Type adapter, and an RJ45 to 9-pin D-Type adapter.

The RTU port configuration is as follows:

| Port No. Configurator Definition |        |                            |
|----------------------------------|--------|----------------------------|
| 1B                               | RS-232 | UART Local Computer (MDLC) |
| 2                                | RS-232 | UART Local Computer (MDLC) |



### Note

When a User Port is defined as Computer/Terminal with DTR support:

1. The RTU will not transmit unless it receives a DTR=on signal from the computer/terminal.
2. The RTU will not receive unless it receives a DTR=on signal from the computer/terminal.



When the connector is facing upwards, the left-hand pin is Pin No. 1, and the right-hand pin is Pin No. 8.

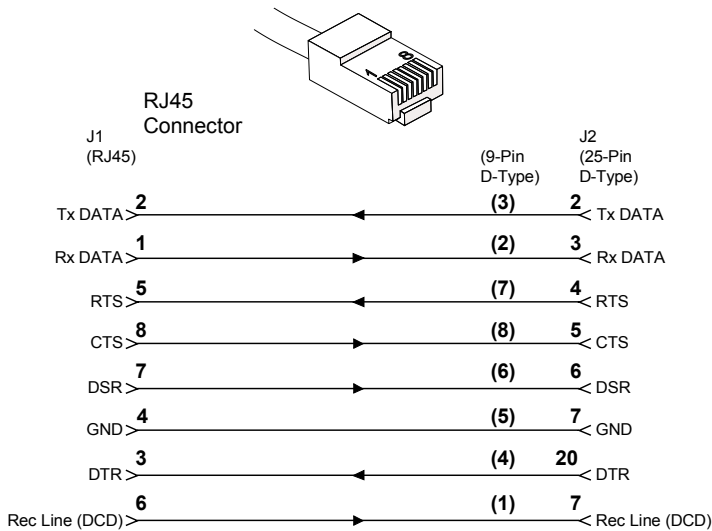


**Figure 1**  
RJ45-to-D-Type Female Connector Adapter

**RTU-to-Modem Connections**



Only R&TTE approved modems should be used to connect the RTU to the PSTN.

**RTU-to-Modem Asynchronous Connection**

For a 9-pin or 25-pin connection, use the FLN6458 cable kit to connect one of the MOSCAD-M RTU RS-232 ports asynchronously to a modem. (The RTU serves as DTE.) The kit includes a cable with RJ45 modular jacks on both ends and an RJ45 to 9-pin and 25-pin male D-Type adapter (see Figure 2). The possible RTU configurations are detailed below:

| Port No. | Configurator Definition                  |
|----------|------------------------------------------|
| 1        | RS-232 UART External Dialup Modem (MDLC) |



1. Before transmitting, the RTU sends an RTS=on signal to the modem, and will not transmit unless it receives a feedback CTS=on signal from the modem.

2. The RTU will not receive unless it receives a DCD=on signal from the modem.
3. When using a modem in auto-answer mode (connected to a computer port) for remote service, the RTU does not support the RTS/CTS protocol, as the port is designed to operate with a local computer as well as with a modem.

**Note**

When the connector is facing upwards, the left-hand pin is Pin No. 1, and the right-hand pin is Pin No. 8.

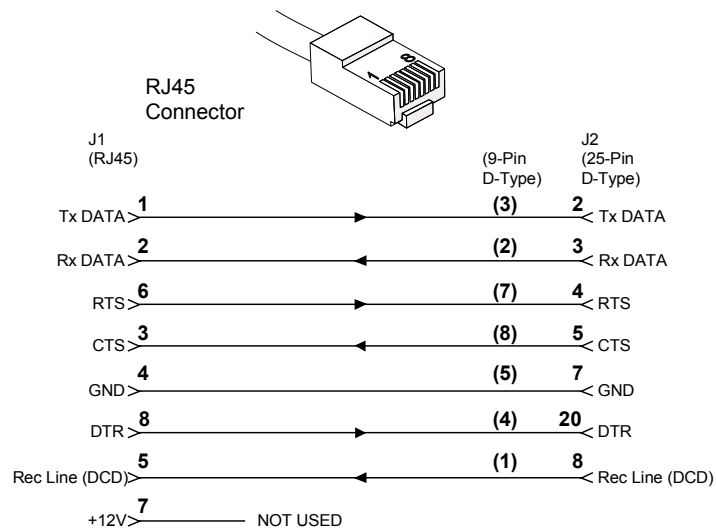


**Figure 2**  
RJ45-to-D-Type Male Connector Adapter

# RTU-to-RTU Connection

## RTU-to-RTU Asynchronous Communications Connection

This section provides data on the cable (not supplied) recommended for the RTU- to-RTU RS-232 asynchronous interconnection (refer to Figure 3). The following table defines the RTU port for this connection type.

| Port No. | Configurator Definition       |
|----------|-------------------------------|
| 1B       | RS-232 UART RTU-to-RTU (MDLC) |
| 2        | RS-232 UART RTU-to-RTU (MDLC) |



When the connector is facing upwards, the left-hand pin is Pin No. 1, and the right-hand pin is Pin No. 8.

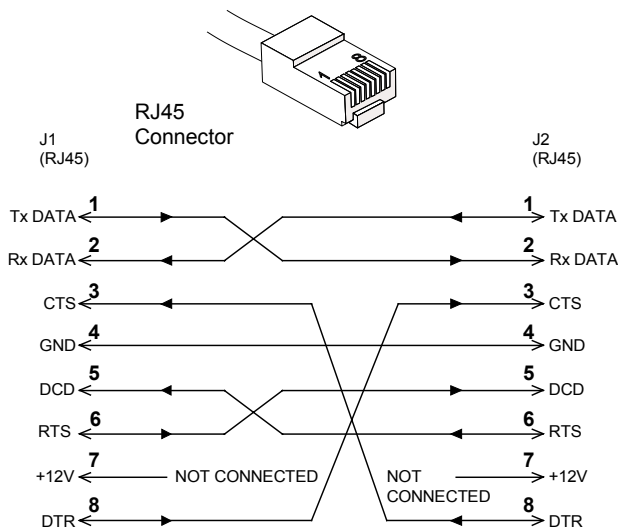


**Figure 3**  
RTU-to-RTU RS-232 Asynchronous Communications Cable

# MOSCAD-M MAIN BOARD

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## General/Index

The schematics, layout and parts list of the Main board of the MOSCAD-M RTU (Board catalog # FCN6088A DESIGN: 8486418T01) is provided below. Large schematics have also been provided in separate format, divided for letter size printing. Click on the links below to jump to the desired page.

### *Layout*

- *Side 1*
- *Side 2*

### *Parts List*

- *FCN6088A – Standard Board*
- *FCN6089A – Debug Board*

### *Schematics*

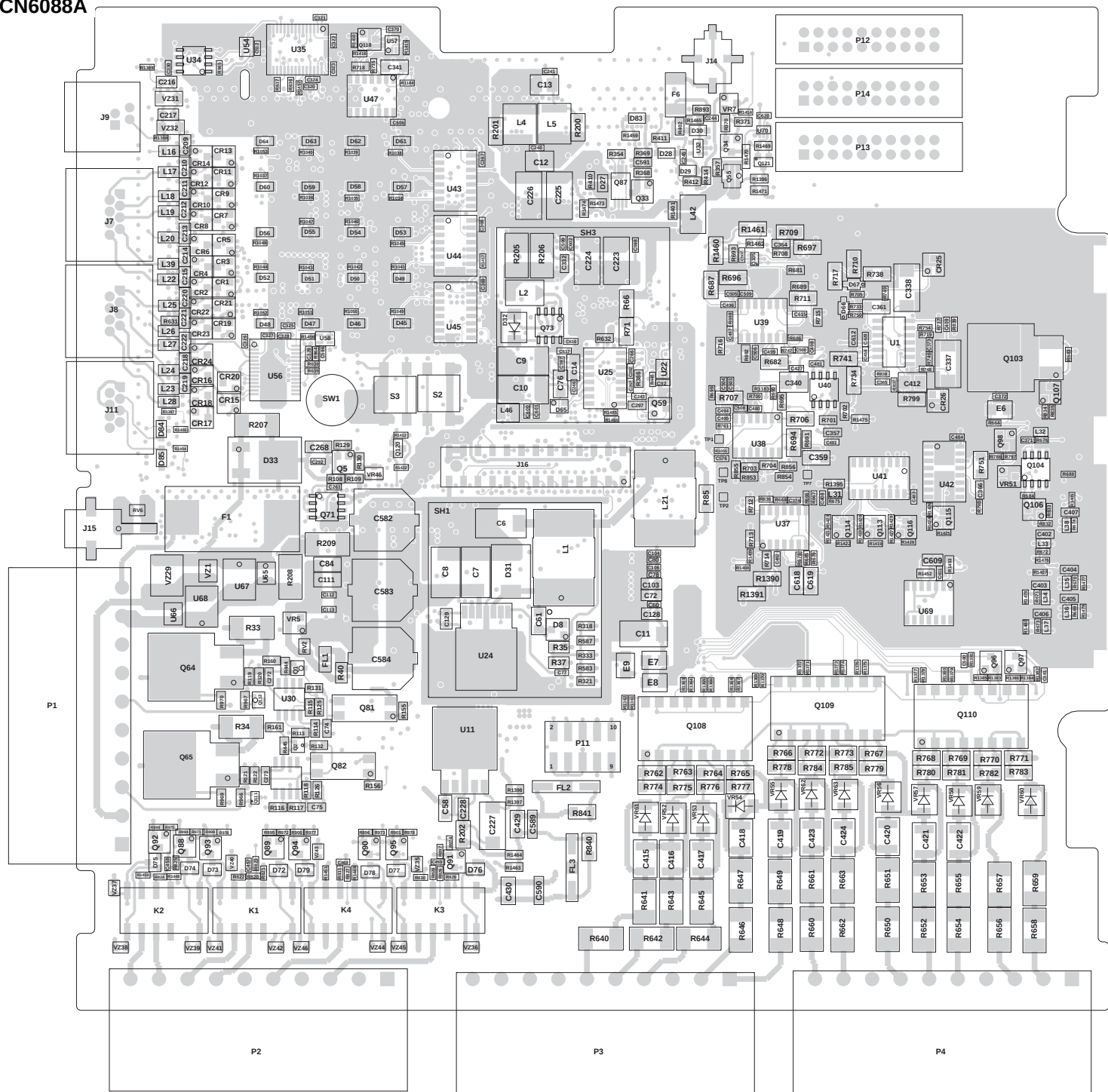
- |                                                |                                                |
|------------------------------------------------|------------------------------------------------|
| • <i>Sheet 1- Main Board</i>                   |                                                |
| • <i>Sheet 2- CPU</i>                          |                                                |
| • <i>Sheet 3- Memory</i>                       | <i>Divided format for letter size printing</i> |
| • <i>Sheet 4- Logic Analyzer Connectors</i>    |                                                |
| • <i>Sheet 5- FPGA+Radio</i>                   | <i>Divided format for letter size printing</i> |
| • <i>Sheet 6- FPGA</i>                         | <i>Divided format for letter size printing</i> |
| • <i>Sheet 7- Filters</i>                      | <i>Divided format for letter size printing</i> |
| • <i>Sheet 8- Radio Interface</i>              | <i>Divided format for letter size printing</i> |
| • <i>Sheet 9- Radio TX Filters/COS Filters</i> | <i>Divided format for letter size printing</i> |
| • <i>Sheet 10- RX AGC</i>                      | <i>Divided format for letter size printing</i> |
| • <i>Sheet 11- General Radio Interface</i>     | <i>Divided format for letter size printing</i> |
| • <i>Sheet 12- DO &amp; DI Filters</i>         | <i>Divided format for letter size printing</i> |
| • <i>Sheet 13- Digital Output</i>              | <i>Divided format for letter size printing</i> |
| • <i>Sheet 14- Digital Output 1-4</i>          | <i>Divided format for letter size printing</i> |
| • <i>Sheet 15- Digital Inputs</i>              | <i>Divided format for letter size printing</i> |
| • <i>Sheet 16- Solid State Output</i>          | <i>Divided format for letter size printing</i> |

- *Sheet 17- UART Drivers*
- *Sheet 18- RS-232/RS-485 Connectors/RS-232 Toolbox*
- *Sheet 19- UARTs: Port 1, Port 2*      *Divided format for letter size printing*
- *Sheet 20- Main Power Supply*      *Divided format for letter size printing*
- *Sheet 21- Power Supply for Radio*      *Divided format for letter size printing*
- *Sheet 22- Power Supply of 3.3V*      *Divided format for letter size printing*
- *Sheet 23- Shift Register + LEDs*      *Divided format for letter size printing*

# MOSCAD-M Main Board

## FCN6088A

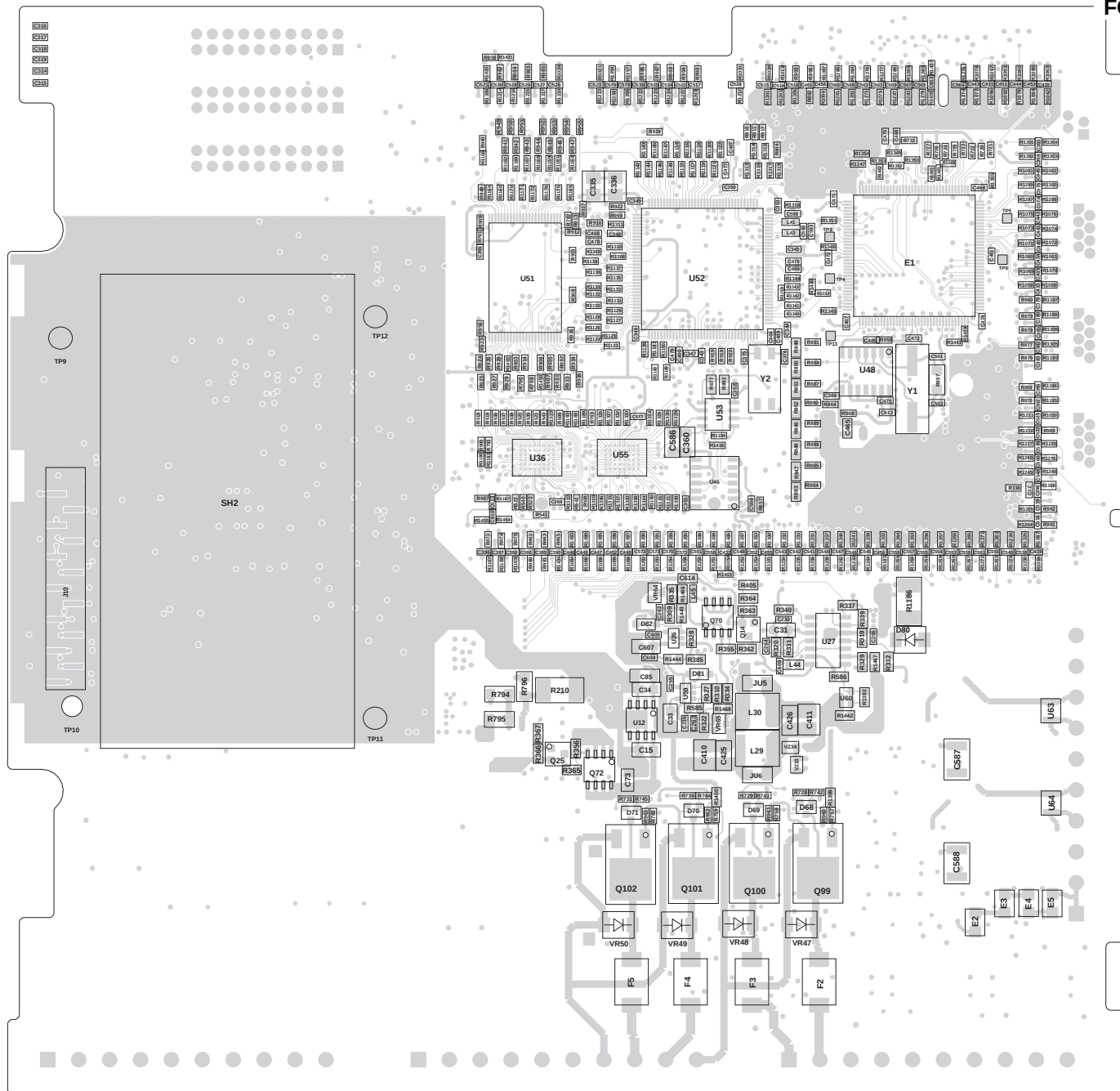
B06441ST01 P4



SHOWN FROM SIDE 1

O1 ○ 79B02963C16-O

O8 ○ 79B02963C18-O



SHOWN FROM SIDE 2

L1 ○ 79B02963C17-O

L8 ○ 79B02963C19-O

Parts List – Main Board - DESIGN: 8486418t01 FILE: fcn6088a

| Reference Symbol | Motorola Part No. | Description  |
|------------------|-------------------|--------------|
| C6               | 2311049C11        | CAPP 100u    |
| C7-8             | 2311049C06        | CAPP 22u     |
| C9-10            | 2311049C09        | CAPP 10u     |
| C11              | 2360567A04        | CAPP 220u    |
| C12-13           | 2311049A63        | CAPP 10.000u |
| C14              | 2311049A62        | CAPP 4.7u    |
| C15              | 2311049A34        | CAPP 0.33u   |
| C31              | 2311049A07        | CAPP 1u      |
| C32              | 2113928A01        | CAP 1u       |
| C33-34           | 2311049A07        | CAPP 1u      |
| C60              | 2113928A01        | CAP 1u       |
| C61              | 2113743B23        | CAP 330n     |
| C72-73           | 2113743A19        | CAP 100n     |
| C74-75           | 2113741M69        | CAP 100n     |
| C76              | 2113741T69        | CAP 100n     |
| C77              | 2113741F29        | CAP 1.5n     |
| C78              | 2113741F25        | CAP 1n       |
| C80              | 2113741F17        | CAP 470p     |
| C84-85           | 2113741B69        | CAP 100n     |
| C92              | 2113743E20        | CAP 100n     |
| C103             | 2113741A45        | CAP 10n      |
| C104             | 2113740F53        | CAP 120p     |
| C106             | 2113740F41        | CAP 39p      |
| C111             | 2113740B73        | CAP 1n       |
| C112             | 2113740F67        | CAP 470p     |
| C113             | 2113740F53        | CAP 120p     |
| C128-129         | 2113740R55        | CAP 100p     |
| C204             | 2113743E20        | CAP 100n     |
| C209-222         | 2113740A77        | CAP 820PF    |
| C223-226         | 2360567A06        | CAPP 100u    |
| C230             | 2113743E20        | CAP 100n     |
| C239-241         | 2113743E20        | CAP 100n     |
| C243-246         | 2113743E20        | CAP 100n     |
| C255             | 2113741F49        | CAP 10n      |
| C261-266         | 2113741F25        | CAP 1n       |
| C267             | 2113740F47        | CAP 68p      |
| C268             | 2113741B69        | CAP 100n     |
| C272-273         | 2113741A45        | CAP 10n      |
| C282             | 2113740F51        | CAP 100p     |
| C292             | 2113740F51        | CAP 100p     |
| C296             | 2113741F01        | CAP 100p     |
| C297             | 2113740A44        | CAP 43p      |
| C316             | 2113740F51        | CAP 100p     |
| C320-330         | 2113743E20        | CAP 100n     |
| C332             | 2109720D01        | CAP 10n      |
| C335-336         | 2311049A63        | CAPP 10.000u |
| C337-338         | 2360567A06        | CAPP 100u    |
| C341             | 2113928K09        | CAP 10u      |
| C343-353         | 2113743E20        | CAP 100n     |

|          |            |           |
|----------|------------|-----------|
| C355     | 2113743E20 | CAP_100n  |
| C357     | 2113743A31 | CAP_1U    |
| C359     | 2113743B29 | CAP_1u    |
| C360-361 | 2113743B23 | CAP_330n  |
| C364     | 2113743A23 | CAP_220n  |
| C365     | 2113743K16 | CAP_220n  |
| C366     | 2113743A23 | CAP_220n  |
| C367-370 | 2113743E20 | CAP_100n  |
| C371-373 | 2113741F49 | CAP_10n   |
| C374     | 2113740F44 | CAP_51p   |
| C375-376 | 2113740F34 | CAP_20p   |
| C379-380 | 2113740F51 | CAP_100p  |
| C381-382 | 2113740F34 | CAP_20p   |
| C383-386 | 2113740F51 | CAP_100p  |
| C390     | 2113740F51 | CAP_100p  |
| C392     | 2113740F51 | CAP_100p  |
| C393-394 | 2113740F34 | CAP_20p   |
| C395     | 2113740F51 | CAP_100p  |
| C396-398 | 2113740F34 | CAP_20p   |
| C401     | 2113740F51 | CAP_100p  |
| C402-407 | 2113740R55 | CAP_100p  |
| C408-409 | 2113740F51 | CAP_100p  |
| C410-412 | 2311049A08 | ECAP_1UF  |
| C414     | 2113740F51 | CAP_100p  |
| C415-424 | 2113741D28 | CAP_220NF |
| C425-426 | 2113741B69 | CAP_100NF |
| C428     | 2113743E20 | CAP_100n  |
| C429-430 | 2113741B69 | CAP_100NF |
| C431-435 | 2113740F51 | CAP_100PF |
| C438-449 | 2113740F51 | CAP_100PF |
| C451-456 | 2113740F51 | CAP_100PF |
| C457-460 | 2113740F44 | CAP_51PF  |
| C461     | 2113928P04 | CAP_1u    |
| C464     | 2113743K16 | CAP_220n  |
| C465     | 2113743F17 | CAP_1.5u  |
| C467-475 | 2113743E20 | CAP_100n  |
| C476-484 | 2113741F49 | CAP_10n   |
| C485     | 2113741F33 | CAP_2.2n  |
| C486-490 | 2113741F01 | CAP_100p  |
| C491     | 2113743E20 | CAP_100n  |
| C494-500 | 2113741F41 | CAP_4.7n  |
| C501-502 | 2113740F37 | CAP_27p   |
| C503-504 | 2113741F29 | CAP_1.5n  |
| C505-507 | 2113741F25 | CAP_1n    |
| C508     | 2113740F61 | CAP_270p  |
| C509     | 2113741F11 | CAP_270p  |
| C512     | 2113743E20 | CAP_100n  |
| C513     | 2113928A01 | CAP_1u    |
| C514-519 | 2113740F51 | CAP_100p  |
| C521-530 | 2113740F51 | CAP_100p  |
| C532     | 2113740F51 | CAP_100p  |
| C534-536 | 2113740F51 | CAP_100p  |
| C538-576 | 2113740F51 | CAP_100p  |

|          |            |                 |
|----------|------------|-----------------|
| C577     | 2113743E20 | CAP_100n        |
| C578-579 | 2113740F34 | CAP_20p         |
| C580-581 | 2113740F51 | CAP_100p        |
| C582-584 | 2380090M35 | CAPP_100u       |
| C586     | 2113743B23 | CAP_330n        |
| C587-588 | 2113741D32 | CAP_330n        |
| C589-590 | 2311049A72 | CAPP_10u        |
| C591     | 2113928C04 | CAP_4.700u      |
| C592-593 | 2113740F51 | CAP_100p        |
| C594-598 | 2113743E20 | CAP_100n        |
| C599-600 | 2113741F29 | CAP_1.5n        |
| C601-602 | 2113740F55 | CAP_150p        |
| C603     | 2113740F51 | CAP_100p        |
| C604     | 2113743E20 | CAP_100n        |
| C605     | 2113741F49 | CAP_10n         |
| C606     | 2113743E20 | CAP_100n        |
| C607     | 2311049A07 | CAPP_1u         |
| C608     | 2113928A01 | CAP_1u          |
| C609     | 2113741A43 | NO_DESC         |
| C610     | 2113740F51 | CAP_100PF       |
| C611     | 2113741F49 | CAP_10n         |
| C612     | 2113743A31 | CAP_1U          |
| C613     | 2113740F51 | CAP_100p        |
| C614     | 2113740A43 | CAP_39p         |
| C615     | 2113740F43 | CAP_47p         |
| C616     | 2113743E20 | CAP_100n        |
| C617     | 2113741F29 | CAP_1.5n        |
| C618-619 | 2113743B27 | CAP_680n        |
| C620     | 2113743E20 | CAP_100n        |
| CR1-24   | 4813830A37 | ZENER_MMBZ5254L |
| CR25-26  | 4813833C09 | DIODE_MMBD914T  |
| D8       | 4813833C09 | MMBD914         |
| D30      | 4813833B16 | MBR0520LT1      |
| D31      | 4813833B02 | MBRS340T        |
| D32      | 4813833B01 | MBRS140         |
| D33      | 4813833A02 | MBRD640         |
| D45-64   | 4886980J01 | KPL-3015LSRC    |
| D65      | 4805129M90 | BAT54           |
| D66-67   | 4805218N66 | 1SS315TPH3      |
| D68-79   | 4813833C09 | MMBD914         |
| D80      | 4813833B07 | MURS120         |
| D83-85   | 4813833B16 | MBR0520LT1      |
| E1       | 5182427Y04 | XCS20XL3TQ14I   |
| E2-9     | 2484657R01 | 57R01           |
| F1       | 0904923K01 | SMD_FUSE_HOLD   |
| F2-5     | 6586604U02 | FUSE            |
| F6       | 6586604U01 | FUSE            |
| FL1      | 9108445S04 | FM60R           |
| FL2-3    | 9108445S03 | NFM61R          |
| J7-8     | 0986164U01 | CONN_J          |
| J9       | 0986995J02 | CONN_J          |
| J10      | 2880429L02 | CONN_P          |
| J11      | 0986164U01 | CONN_J          |

|          |            |              |
|----------|------------|--------------|
| J14      | 2880374L02 | CONN_P       |
| J15      | 2880374L11 | CONN_P       |
| J16      | 0980387L04 | CONN_J       |
| K1-4     | 8086238J03 | EE2_3TNU_L   |
| L1       | 2486275J02 | IDCTR_10u    |
| L2       | 2486085A02 | IDCTR_15u    |
| L4-5     | 2409646B17 | IDCTR_22u    |
| L16-20   | 2402601S05 | IND_BLM21A05 |
| L21      | 2486275J02 | IDCTR_10u    |
| L22-28   | 2402601S05 | IND_BLM21A05 |
| L29-30   | 2409646B29 | IND_220UH    |
| L31-38   | 2402601S06 | IND_BLM11A12 |
| L39      | 2402601S05 | IND_BLM21A05 |
| L41      | 2413926G02 | IDCTR_3.9n   |
| L42      | 2486085A02 | IDCTR_15u    |
| L43      | 2413926G02 | IDCTR_3.9n   |
| L44      | 2462587Q51 | IDCTR_2.2u   |
| L45      | 2413926G02 | IDCTR_3.9n   |
| L46      | 2462587N69 | IDCTR_1.2u   |
| P1-4     | 2886105U01 | NO_DESC      |
| P11      | 2802935S07 | CONN_P       |
| Q1-2     | 4813824A73 | MMBT2907A    |
| Q5       | 4813824A17 | MMBT3906     |
| Q14      | 4813824A10 | MMBT3904     |
| Q25      | 4813824A10 | MMBT3904     |
| Q33-34   | 4813824A10 | MMBT3904     |
| Q55      | 4813823A29 | MGSF3441VT1  |
| Q59      | 4813823A07 | 2N7002       |
| Q64-65   | 4813821A28 | MTB23P06V    |
| Q70-71   | 4802393L32 | SI9407AEY    |
| Q72      | 4802393L27 | SI9424DY     |
| Q73      | 4802393L31 | SI9945AEY    |
| Q81-82   | 5102806C08 | SFH61865     |
| Q87      | 4809807C37 | SI6969DQ     |
| Q88-95   | 4813824A11 | MMBT2222A    |
| Q96-97   | 4813824A10 | MMBT3904     |
| Q98      | 4813823A07 | 2N7002       |
| Q99-102  | 4813821A36 | MTD3055VLT4  |
| Q103     | 4813821A28 | MTB23P06V    |
| Q104     | 4813821A17 | MMDF2P02H    |
| Q105     | 4809579E35 | FDG6301N     |
| Q106-107 | 4813824A10 | NPN_3904L    |
| Q108-110 | 5102806C02 | TIL196B      |
| Q111-112 | 4813824A65 | MMBT3904WT1  |
| Q113-116 | 4813824A10 | MMBT3904     |
| Q118     | 4802393L73 | SI2302DS     |
| Q120-121 | 4802393L69 | SI2312DS     |
| R33-34   | 0683962T01 | RES_1        |
| R35      | 0662057R78 | RES_27.4K    |
| R37      | 0662057D02 | RES_12K      |
| R40      | 0662057C01 | RES_0        |
| R66      | 0611077G76 | RES_75K      |
| R71      | 0611077G55 | RES_45.3K    |

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| R108-109 | 0662057D24 | RES_100K  |
| R113-118 | 0662057D17 | RES_51K   |
| R119-122 | 0662057D11 | RES_30K   |
| R125-126 | 0662057D07 | RES_20K   |
| R129-132 | 0662057C99 | RES_10K   |
| R155-156 | 0662057C62 | RES_300   |
| R160-161 | 0662057C75 | RES_1K    |
| R202     | 0611077A01 | RES_0     |
| R205-206 | 0604965K06 | RES_0.04  |
| R208-210 | 0604965K06 | RES_0.04  |
| R309     | 0662057R89 | RES_40.2K |
| R310     | 0662057R95 | RES_51.1K |
| R318     | 0662057R93 | RES_49.9K |
| R319     | 0662057R92 | RES_47.5K |
| R320-321 | 0662057R89 | RES_40.2K |
| R322     | 0662057R76 | RES_26.1K |
| R327-328 | 0662057G64 | RES_1M    |
| R329     | 0662057G13 | RES_100K  |
| R331-332 | 0662057G46 | RES_392K  |
| R333     | 0662057G39 | RES_324K  |
| R334-335 | 0662057G13 | RES_100K  |
| R337     | 0662057G13 | RES_100K  |
| R338     | 0662057A97 | RES_100K  |
| R339-340 | 0662057G13 | RES_100K  |
| R354     | 0662057D41 | RES_510K  |
| R355-357 | 0662057D24 | RES_100K  |
| R362-368 | 0662057D17 | RES_51K   |
| R369     | 0662057D24 | RES_100K  |
| R370-371 | 0662057D17 | RES_51K   |
| R386     | 0662057C99 | RES_10K   |
| R402     | 0662057C99 | RES_10K   |
| R405     | 0662057C01 | RES_0     |
| R411-412 | 0662057C01 | RES_0     |
| R414     | 0662057C01 | RES_0     |
| R440     | 0662057B22 | RES_1M    |
| R444-445 | 0662057C81 | RES_1.8K  |
| R508-509 | 0662057A17 | RES_47    |
| R518-523 | 0662057A17 | RES_47    |
| R536-543 | 0662057A17 | RES_47    |
| R583     | 0611079G77 | RES_61.9K |
| R586     | 0662057D07 | RES_20K   |
| R587     | 0604132K01 | RES_76.8K |
| R632     | 0662057C01 | RES_0     |
| R637-638 | 0662057B47 | RES_0     |
| R640-663 | 0683962T72 | RES_910   |
| R664     | 0662057B47 | RES_0     |
| R666     | 0662057B14 | RES_470K  |
| R667     | 0662057B47 | RES_0     |
| R668     | 0662057B22 | RES_1M    |
| R669-676 | 0662057A49 | RES_1K    |
| R677     | 0662057D48 | RES_1M    |
| R678-679 | 0662057P97 | RES_150K  |
| R681     | 0611079E30 | RES_200K  |

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| R682     | 0611077H08 | RES_158K  |
| R683-684 | 0662057P95 | RES_100K  |
| R685     | 0662057P10 | RES_10K   |
| R686     | 0662057P95 | RES_100K  |
| R687     | 0611077G73 | RES_69.8K |
| R688     | 0662057A93 | RES_68K   |
| R689     | 0662057G01 | RES_60.4K |
| R690     | 0662057P97 | RES_150K  |
| R691-693 | 0662057R88 | RES_39.2K |
| R694     | 0611077G36 | RES_28.7K |
| R695     | 0662057R74 | RES_23.7K |
| R696     | 0611077G13 | RES_16.5K |
| R697     | 0611077F52 | RES_3.92K |
| R698     | 0662057P14 | RES_12.1K |
| R699     | 0662057P13 | RES_11K   |
| R700     | 0662057P10 | RES_10K   |
| R701     | 0662057R74 | RES_23.7K |
| R703-704 | 0662057R44 | RES_3.32K |
| R705     | 0662057P10 | RES_10K   |
| R706     | 0611077F88 | RES_9.31K |
| R707     | 0611077F86 | RES_8.87K |
| R708     | 0662057R56 | RES_7.87K |
| R709     | 0611077F66 | RES_5.49K |
| R710     | 0611077F65 | RES_5.36K |
| R711     | 0611077G76 | RES_75K   |
| R712-714 | 0662057C82 | RES_2K    |
| R715     | 0662057R60 | RES_10K   |
| R716     | 0662057R30 | RES_1K    |
| R717     | 0611077E66 | RES_511   |
| R718     | 0662057D41 | RES_510K  |
| R719     | 0662057B14 | RES_470K  |
| R720     | 0662057A97 | RES_100K  |
| R723     | 0662057A97 | RES_100K  |
| R725     | 0662057A97 | RES_100K  |
| R727-733 | 0662057A97 | RES_100K  |
| R734     | 0611077B20 | RES_75K   |
| R735     | 0662057A90 | RES_51K   |
| R737     | 0662057A89 | RES_47K   |
| R738     | 0611077B14 | RES_43K   |
| R741     | 0611077B16 | RES_51K   |
| R742-745 | 0662057A73 | RES_10K   |
| R746     | 0662057P95 | RES_100K  |
| R747-750 | 0662057A65 | RES_4.7K  |
| R751     | 0611077A88 | RES_3.9K  |
| R754     | 0662057A60 | RES_3K    |
| R757-760 | 0662057A36 | RES_300   |
| R761     | 0662057A49 | RES_1K    |
| R762-773 | 0611077A69 | RES_620   |
| R774-785 | 0611077A65 | RES_430   |
| R786     | 0662057A19 | RES_56    |
| R787-791 | 0662057B47 | RES_0     |
| R793     | 0662057B47 | RES_0     |
| R797-798 | 0662057B47 | RES_0     |

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| R820-821   | 0662057A97 | RES 100K  |
| R822       | 0662057A73 | RES 10K   |
| R823-829   | 0662057A97 | RES 100K  |
| R830       | 0662057A73 | RES 10K   |
| R831       | 0662057A97 | RES 100K  |
| R832-833   | 0662057P10 | RES 10K   |
| R834-836   | 0662057A73 | RES 10K   |
| R837       | 0662057P10 | RES 10K   |
| R838       | 0662057P95 | RES 100K  |
| R839       | 0662057P10 | RES 10K   |
| R846-852   | 0662057R93 | RES 49.9K |
| R853-854   | 0662057R60 | RES 10K   |
| R855-856   | 0662057R55 | RES 7.5K  |
| R857       | 0662057P95 | RES 100K  |
| R860       | 0662057A49 | RES 1K    |
| R862-865   | 0662057A49 | RES 1K    |
| R869-870   | 0662057A49 | RES 1K    |
| R873-875   | 0662057A27 | RES 120   |
| R876       | 0662057A49 | RES 1K    |
| R877-878   | 0662057A27 | RES 120   |
| R879       | 0662057A49 | RES 1K    |
| R882       | 0662057A49 | RES 1K    |
| R883       | 0662057G13 | RES 100K  |
| R884-891   | 0662057P95 | RES 100K  |
| R892       | 0662057D51 | RES 1.3M  |
| R893       | 0662057C99 | RES 10K   |
| R894-901   | 0662057A55 | RES 1.8K  |
| R957       | 0611077B47 | RES 1M    |
| R958       | 0662057B14 | RES 470K  |
| R959       | 0662057A97 | RES 100K  |
| R960-963   | 0662057B14 | RES 470K  |
| R964-965   | 0662057A97 | RES 100K  |
| R966-967   | 0662057C99 | RES 10K   |
| R968       | 0662057A71 | RES 8.2K  |
| R969-970   | 0662057C91 | RES 4.7K  |
| R971-978   | 0662057A36 | RES 300   |
| R980-990   | 0662057A49 | RES 1K    |
| R991-992   | 0662057A36 | RES 300   |
| R993-994   | 0662057A49 | RES 1K    |
| R996-997   | 0662057A49 | RES 1K    |
| R1010      | 0662057A49 | RES 1K    |
| R1013      | 0662057A49 | RES 1K    |
| R1020      | 0662057A25 | RES 100   |
| R1021      | 0662057A49 | RES 1K    |
| R1028-1031 | 0662057A49 | RES 1K    |
| R1034-1053 | 0662057A47 | RES 820   |
| R1054-1063 | 0662057A33 | RES 220   |
| R1067-1090 | 0662057A33 | RES 220   |
| R1092-1103 | 0662057A33 | RES 220   |
| R1106      | 0662057A49 | RES 1K    |
| R1107-1109 | 0662057A27 | RES 120   |
| R1114-1150 | 0662057A17 | RES 47    |
| R1159-1172 | 0662057A17 | RES 47    |

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| R1175-1176 | 0662057A17 | RES_47      |
| R1183      | 0662057P10 | RES_10K     |
| R1186      | 0683962T01 | RES_1       |
| R1187      | 0662057A90 | RES_51K     |
| R1195-1199 | 0662057A49 | RES_1K      |
| R1201-1203 | 0662057A49 | RES_1K      |
| R1204-1205 | 0662057A36 | RES_300     |
| R1206-1207 | 0662057A49 | RES_1K      |
| R1208      | 0662057A25 | RES_100     |
| R1210-1219 | 0662057A49 | RES_1K      |
| R1222-1300 | 0662057A49 | RES_1K      |
| R1301-1306 | 0662057A27 | RES_120     |
| R1308-1311 | 0662057A17 | RES_47      |
| R1313-1319 | 0662057A17 | RES_47      |
| R1324-1339 | 0662057A17 | RES_47      |
| R1340-1355 | 0662057A49 | RES_1K      |
| R1356-1359 | 0662057A27 | RES_120     |
| R1361      | 0662057A84 | RES_30K     |
| R1362      | 0662057A73 | RES_10K     |
| R1363      | 0662057A84 | RES_30K     |
| R1364      | 0662057A73 | RES_10K     |
| R1365      | 0662057A84 | RES_30K     |
| R1366-1367 | 0662057A73 | RES_10K     |
| R1368      | 0662057A97 | RES_100K    |
| R1369      | 0662057A73 | RES_10K     |
| R1370      | 0662057A97 | RES_100K    |
| R1371      | 0662057A73 | RES_10K     |
| R1372      | 0662057A97 | RES_100K    |
| R1373      | 0662057A73 | RES_10K     |
| R1374      | 0662057A97 | RES_100K    |
| R1375      | 0662057A73 | RES_10K     |
| R1376      | 0662057A97 | RES_100K    |
| R1377      | 0662057A73 | RES_10K     |
| R1378      | 0662057A97 | RES_100K    |
| R1379      | 0662057A73 | RES_10K     |
| R1380      | 0662057A97 | RES_100K    |
| R1381-1382 | 0662057A80 | RES_20K     |
| R1383-1384 | 0662057A60 | RES_3K      |
| R1385-1386 | 0662057A49 | RES_1K      |
| R1387-1389 | 0662057B47 | RES_0       |
| R1390      | 0611077A01 | RES_0       |
| R1392      | 0662057G08 | RES_82.5K   |
| R1396      | 0662057C62 | RES_300     |
| R1398-1401 | 0662057C01 | RES_0       |
| R1402      | 0662057B47 | RES_0       |
| R1409      | 0662057B47 | RES_0       |
| R1410      | 0662057A73 | NO_DESC_10K |
| R1412      | 0662057B22 | RES_1M      |
| R1414      | 0662057B09 | RES_300K    |
| R1415      | 0662057A97 | RES_100K    |
| R1416-1429 | 0662057A90 | RES_51K     |
| R1431      | 0662057A73 | RES_10K     |
| R1432      | 0662057T61 | RES_7.5K    |

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| R1434      | 0662057A49 | RES 1K         |
| R1436-1438 | 0662057A49 | RES 1K         |
| R1439-1441 | 0662057A17 | RES 47         |
| R1442      | 0662057G18 | RES 127K       |
| R1443      | 0662057R95 | RES 51.1K      |
| R1446      | 0662057A33 | RES 220        |
| R1448-1449 | 0662057A97 | RES 100K       |
| R1450-1451 | 0662057A73 | RES 10K        |
| R1452      | 0662057D24 | NO DESC 100K   |
| R1453      | 0662057C82 | RES 2K         |
| R1454-1455 | 0662057A33 | RES 220        |
| R1456-1457 | 0662057B47 | RES 0          |
| R1458      | 0662057B14 | RES 470K       |
| R1459      | 0662057C67 | RES 470        |
| R1460-1461 | 0611077G76 | RES 75K        |
| R1462      | 0662057R88 | RES 39.2K      |
| R1463      | 0662057C01 | RES 0          |
| R1466      | 0662057R93 | RES 49.9K      |
| R1467      | 0662057G64 | RES 1M         |
| R1468      | 0662057G01 | RES 60.4K      |
| R1469      | 0662057D17 | RES 51K        |
| R1470      | 0662057C75 | RES 1K         |
| R1474      | 0662057C01 | RES 0          |
| R1475      | 0662057R74 | RES 23.7K      |
| R1476-1480 | 0662057P10 | RES 10K        |
| R1481      | 0662057B47 | RES 0          |
| R1483      | 0662057A97 | RES 100K       |
| R1484      | 0662057A73 | NO DESC 10K    |
| RV2        | 4804645P04 | VC080526C580   |
| RV6        | 4804645P06 | VC080518C400   |
| SH1        | 2686668J01 | SHIELD         |
| SH3        | 2686668J01 | SHIELD         |
| SW1        | 4086161U01 | SWITCH         |
| U1         | 5113819A02 | LM2902         |
| U12        | 5113816A03 | MC78L05AB      |
| U22        | 5104944K04 | TC7S14F        |
| U24        | 5104187K45 | LT13741HVIR    |
| U25        | 5104187K29 | LTC1435IS      |
| U26        | 5186214J37 | MAX917EUK      |
| U27        | 5186214J48 | LP2901D        |
| U30-31     | 5113817A03 | MC33171D       |
| U32        | 5113816A47 | MC78LC30NTR    |
| U34        | 5108428S89 | MAX3483EESA    |
| U35        | 5108428S65 | MAX3243EEAI    |
| U36        | 5185145C01 | KM616FU2010AZI |
| U37        | 5113820A03 | LM2901         |
| U38-39     | 5113819A07 | MC33174        |
| U40        | 5113818A02 | MC33272        |
| U41-42     | 5113806A20 | MC14053B       |
| U43-45     | 5113805A75 | MC74HC595A     |
| U46        | 5113805A09 | MC74HC14A      |
| U47        | 5113805A02 | MC74HC02A      |
| U48        | 5113805A01 | MC74HC00A      |

|         |            |                 |
|---------|------------|-----------------|
| U51     | 5186249J54 | TE28F800C3T     |
| U52     | 5113802B34 | MC68VZ328CPV33V |
| U53     | 5108408S57 | MAX6303ESA      |
| U54     | 5104944K04 | TC7S14F         |
| U55     | 5185145C01 | KM616FU2010AZI  |
| U56     | 5108428S65 | MAX3243EEAI     |
| U57     | 5105492X04 | TC7SH08F        |
| U58     | 5104944K04 | TC7S14F         |
| U59     | 5186214J37 | MAX917EUK       |
| U60     | 5104646P02 | LM4041CIM3      |
| U63-66  | 4804645P08 | VARIS_60        |
| U67-68  | 0608303Y01 | VARIS_85        |
| U69     | 5113820A03 | LM2901          |
| U70     | 5104931K05 | TCTSZ32FU       |
| VR5     | 4813830A40 | MMBZ5257B       |
| VR7     | 4813830A22 | MMBZ5239B       |
| VR46    | 4813830A39 | MMBZ5256B       |
| VR47-50 | 4813831A39 | 1SMB5936B       |
| VR51    | 4813830A23 | MMBZ5240B       |
| VR52-63 | 4813831A14 | ZENER_SMB5918   |
| VR64-65 | 4813830A25 | MMBZ5242B       |
| VZ1     | 4804645P08 | VARIS_60        |
| VZ29    | 0608303Y01 | VARIS_85        |
| VZ31-32 | 0602811C01 | VARIS_14V       |
| VZ33-34 | 4804645P02 | VARIS_5.6       |
| VZ35-46 | 0686391J02 | VARISTOR        |
| Y1      | 4802582S09 | XTAL            |
| Y2      | 4802582S10 | CRYSTAL_32.768K |

Parts List – Main Board - DESIGN: 8486418t01      FILE: fcn6089a

| Reference Symbol | Motorola Part No. | Description  |
|------------------|-------------------|--------------|
| C6               | 2311049C11        | CAPP 100u    |
| C7-8             | 2311049C06        | CAPP 22u     |
| C9-10            | 2311049C09        | CAPP 10u     |
| C11              | 2360567A04        | CAPP 220u    |
| C12-13           | 2311049A63        | CAPP 10.000u |
| C14              | 2311049A62        | CAPP 4.7u    |
| C15              | 2311049A34        | CAPP 0.33u   |
| C31              | 2311049A07        | CAPP 1u      |
| C32              | 2113928A01        | CAP 1u       |
| C33-34           | 2311049A07        | CAPP 1u      |
| C60              | 2113928A01        | CAP 1u       |
| C61              | 2113743B23        | CAP 330n     |
| C72-73           | 2113743A19        | CAP 100n     |
| C74-75           | 2113741M69        | CAP 100n     |
| C76              | 2113741T69        | CAP 100n     |
| C77              | 2113741F29        | CAP 1.5n     |
| C78              | 2113741F25        | CAP 1n       |
| C80              | 2113741F17        | CAP 470p     |
| C84-85           | 2113741B69        | CAP 100n     |
| C92              | 2113743E20        | CAP 100n     |
| C103             | 2113741A45        | CAP 10n      |
| C104             | 2113740F53        | CAP 120p     |
| C106             | 2113740F41        | CAP 39p      |
| C111             | 2113740B73        | CAP 1n       |
| C112             | 2113740F67        | CAP 470p     |
| C113             | 2113740F53        | CAP 120p     |
| C128-129         | 2113740R55        | CAP 100p     |
| C204             | 2113743E20        | CAP 100n     |
| C209-222         | 2113740A77        | CAP 820PF    |
| C223-226         | 2360567A06        | CAPP 100u    |
| C230             | 2113743E20        | CAP 100n     |
| C239-241         | 2113743E20        | CAP 100n     |
| C243-246         | 2113743E20        | CAP 100n     |
| C255             | 2113741F49        | CAP 10n      |
| C261-266         | 2113741F25        | CAP 1n       |
| C267             | 2113740F47        | CAP 68p      |
| C268             | 2113741B69        | CAP 100n     |
| C272-273         | 2113741A45        | CAP 10n      |
| C282             | 2113740F51        | CAP 100p     |
| C292             | 2113740F51        | CAP 100p     |
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| C320-330         | 2113743E20        | CAP 100n     |
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| C335-336         | 2311049A63        | CAPP 10.000u |
| C337-338         | 2360567A06        | CAPP 100u    |
| C341             | 2113928K09        | CAP 10u      |
| C343-353         | 2113743E20        | CAP 100n     |

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| C357     | 2113743A31 | CAP_1U    |
| C359     | 2113743B29 | CAP_1u    |
| C360-361 | 2113743B23 | CAP_330n  |
| C364     | 2113743A23 | CAP_220n  |
| C365     | 2113743K16 | CAP_220n  |
| C366     | 2113743A23 | CAP_220n  |
| C367-370 | 2113743E20 | CAP_100n  |
| C371-373 | 2113741F49 | CAP_10n   |
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| C375-376 | 2113740F34 | CAP_20p   |
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| C381-382 | 2113740F34 | CAP_20p   |
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| C402-407 | 2113740R55 | CAP_100p  |
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| C410-412 | 2311049A08 | ECAP_1UF  |
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| C415-424 | 2113741D28 | CAP_220NF |
| C425-426 | 2113741B69 | CAP_100NF |
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| C429-430 | 2113741B69 | CAP_100NF |
| C431-435 | 2113740F51 | CAP_100PF |
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| C501-502 | 2113740F37 | CAP_27p   |
| C503-504 | 2113741F29 | CAP_1.5n  |
| C505-507 | 2113741F25 | CAP_1n    |
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| C509     | 2113741F11 | CAP_270p  |
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| C514-519 | 2113740F51 | CAP_100p  |
| C521-530 | 2113740F51 | CAP_100p  |
| C532     | 2113740F51 | CAP_100p  |
| C534-536 | 2113740F51 | CAP_100p  |
| C538-576 | 2113740F51 | CAP_100p  |

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| C578-579 | 2113740F34 | CAP_20p         |
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| C587-588 | 2113741D32 | CAP_330n        |
| C589-590 | 2311049A72 | CAPP_10u        |
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| C601-602 | 2113740F55 | CAP_150p        |
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| FL2-3    | 9108445S03 | NFM61R          |
| J7-8     | 0986164U01 | CONN_J          |
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| J10      | 2880429L02 | CONN_P          |
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| Q120-121 | 4802393L69 | SI2312DS     |
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| R37      | 0662057D02 | RES_12K      |
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| R66      | 0611077G76 | RES_75K      |

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| R125-126 | 0662057D07 | RES 20K   |
| R129-132 | 0662057C99 | RES 10K   |
| R155-156 | 0662057C62 | RES 300   |
| R160-161 | 0662057C75 | RES 1K    |
| R202     | 0611077A01 | RES 0     |
| R205-206 | 0604965K06 | RES 0.04  |
| R208-210 | 0604965K06 | RES 0.04  |
| R309     | 0662057R89 | RES 40.2K |
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| R318     | 0662057R93 | RES 49.9K |
| R319     | 0662057R92 | RES 47.5K |
| R320-321 | 0662057R89 | RES 40.2K |
| R322     | 0662057R76 | RES 26.1K |
| R327-328 | 0662057G64 | RES 1M    |
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| R444-445 | 0662057C81 | RES 1.8K  |
| R508-509 | 0662057A17 | RES 47    |
| R518-523 | 0662057A17 | RES 47    |
| R536-543 | 0662057A17 | RES 47    |
| R583     | 0611079G77 | RES 61.9K |
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| R587     | 0604132K01 | RES 76.8K |
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| R668     | 0662057B22 | RES 1M    |
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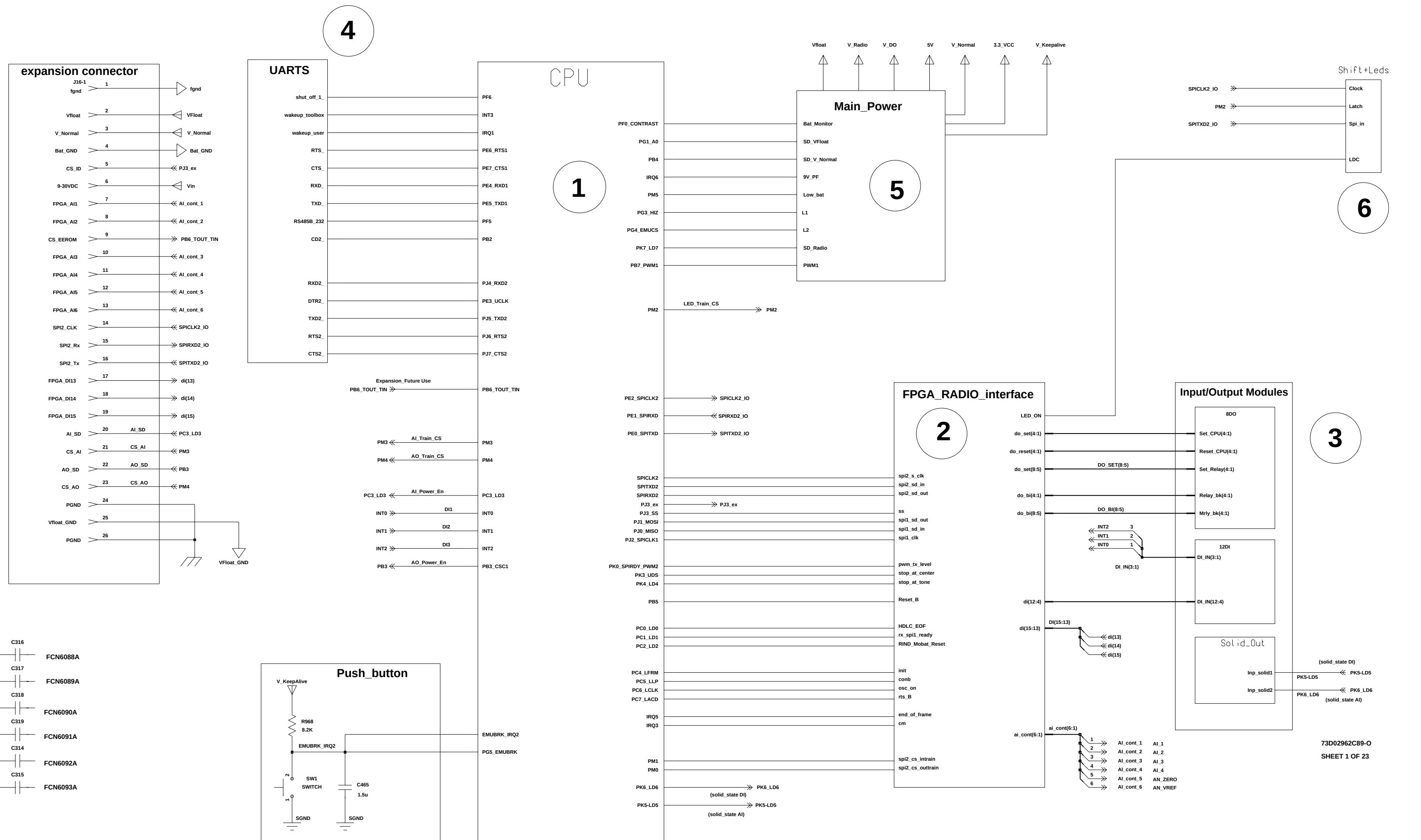
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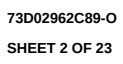
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| R1313-1339 | 0662057A17 | RES_47      |
| R1340-1355 | 0662057A49 | RES_1K      |
| R1356-1359 | 0662057A27 | RES_120     |
| R1361      | 0662057A84 | RES_30K     |
| R1362      | 0662057A73 | RES_10K     |
| R1363      | 0662057A84 | RES_30K     |
| R1364      | 0662057A73 | RES_10K     |
| R1365      | 0662057A84 | RES_30K     |
| R1366-1367 | 0662057A73 | RES_10K     |
| R1368      | 0662057A97 | RES_100K    |
| R1369      | 0662057A73 | RES_10K     |
| R1370      | 0662057A97 | RES_100K    |
| R1371      | 0662057A73 | RES_10K     |
| R1372      | 0662057A97 | RES_100K    |
| R1373      | 0662057A73 | RES_10K     |
| R1374      | 0662057A97 | RES_100K    |
| R1375      | 0662057A73 | RES_10K     |
| R1376      | 0662057A97 | RES_100K    |
| R1377      | 0662057A73 | RES_10K     |
| R1378      | 0662057A97 | RES_100K    |
| R1379      | 0662057A73 | RES_10K     |
| R1380      | 0662057A97 | RES_100K    |
| R1381-1382 | 0662057A80 | RES_20K     |
| R1383-1384 | 0662057A60 | RES_3K      |
| R1385-1386 | 0662057A49 | RES_1K      |
| R1387-1389 | 0662057B47 | RES_0       |
| R1390      | 0611077A01 | RES_0       |
| R1392      | 0662057G08 | RES_82.5K   |
| R1396      | 0662057C62 | RES_300     |
| R1398-1401 | 0662057C01 | RES_0       |
| R1402      | 0662057B47 | RES_0       |
| R1409      | 0662057B47 | RES_0       |
| R1410      | 0662057A73 | NO_DESC_10K |
| R1412      | 0662057B22 | RES_1M      |

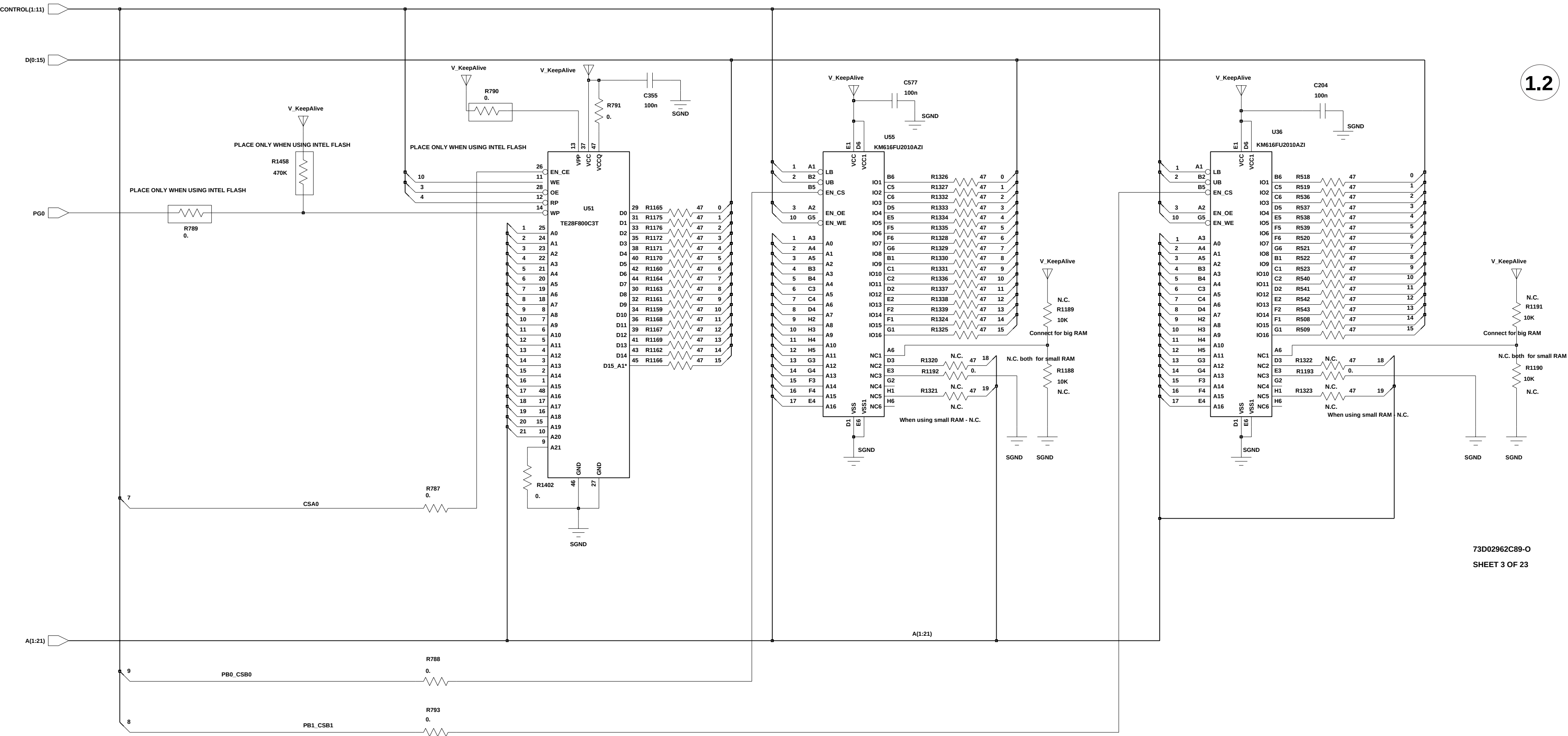
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| R1414      | 0662057B09 | RES 300K     |
| R1415      | 0662057A97 | RES 100K     |
| R1416-1429 | 0662057A90 | RES 51K      |
| R1431      | 0662057A73 | RES 10K      |
| R1432      | 0662057T61 | RES 7.5K     |
| R1434      | 0662057A49 | RES 1K       |
| R1436-1438 | 0662057A49 | RES 1K       |
| R1439-1441 | 0662057A17 | RES 47       |
| R1442      | 0662057G18 | RES 127K     |
| R1443      | 0662057R95 | RES 51.1K    |
| R1446      | 0662057A33 | RES 220      |
| R1448-1449 | 0662057A97 | RES 100K     |
| R1450-1451 | 0662057A73 | RES 10K      |
| R1452      | 0662057D24 | NO_DESC_100K |
| R1453      | 0662057C82 | RES 2K       |
| R1454-1455 | 0662057A33 | RES 220      |
| R1456-1457 | 0662057B47 | RES 0        |
| R1458      | 0662057B14 | RES 470K     |
| R1459      | 0662057C67 | RES 470      |
| R1460-1461 | 0611077G76 | RES 75K      |
| R1462      | 0662057R88 | RES 39.2K    |
| R1463      | 0662057C01 | RES 0        |
| R1466      | 0662057R93 | RES 49.9K    |
| R1467      | 0662057G64 | RES 1M       |
| R1468      | 0662057G01 | RES 60.4K    |
| R1469      | 0662057D17 | RES 51K      |
| R1470      | 0662057C75 | RES 1K       |
| R1474      | 0662057C01 | RES 0        |
| R1475      | 0662057R74 | RES 23.7K    |
| R1476-1480 | 0662057P10 | RES 10K      |
| R1481      | 0662057B47 | RES 0        |
| R1483      | 0662057A97 | RES 100K     |
| R1484      | 0662057A73 | NO_DESC_10K  |
| RV2        | 4804645P04 | VC080526C580 |
| RV6        | 4804645P06 | VC080518C400 |
| S2-3       | 4004929K01 | SWITCH       |
| SH1        | 2686668J01 | SHIELD       |
| SH3        | 2686668J01 | SHIELD       |
| SW1        | 4086161U01 | SWITCH       |
| U1         | 5113819A02 | LM2902       |
| U12        | 5113816A03 | MC78L05AB    |
| U22        | 5104944K04 | TC7S14F      |
| U24        | 5104187K45 | LT13741HVIR  |
| U25        | 5104187K29 | LTC1435IS    |
| U26        | 5186214J37 | MAX917EUK    |
| U27        | 5186214J48 | LP2901D      |
| U30-31     | 5113817A03 | MC33171D     |
| U32        | 5113816A47 | MC78LC30NTR  |
| U34        | 5108428S89 | MAX3483EESA  |
| U35        | 5108428S65 | MAX3243EEAI  |
| U36        | 5186249J60 | NO_DESC      |
| U37        | 5113820A03 | LM2901       |
| U38-39     | 5113819A07 | MC33174      |

|         |            |                 |
|---------|------------|-----------------|
| U40     | 5113818A02 | MC33272         |
| U41-42  | 5113806A20 | MC14053B        |
| U43-45  | 5113805A75 | MC74HC595A      |
| U46     | 5113805A09 | MC74HC14A       |
| U47     | 5113805A02 | MC74HC02A       |
| U48     | 5113805A01 | MC74HC00A       |
| U51     | 5186249J54 | TE28F800C3T     |
| U52     | 5113802B34 | MC68VZ328CPV33V |
| U53     | 5108408S57 | MAX6303ESA      |
| U54     | 5104944K04 | TC7S14F         |
| U55     | 5186249J60 | NO_DESC         |
| U56     | 5108428S65 | MAX3243EEAI     |
| U57     | 5105492X04 | TC7SH08F        |
| U58     | 5104944K04 | TC7S14F         |
| U59     | 5186214J37 | MAX917EUK       |
| U60     | 5104646P02 | LM4041CIM3      |
| U63-66  | 4804645P08 | VARIS_60        |
| U67-68  | 0608303Y01 | VARIS_85        |
| U69     | 5113820A03 | LM2901          |
| U70     | 5104931K05 | TCTSZ32FU       |
| VR5     | 4813830A40 | MMBZ5257B       |
| VR7     | 4813830A22 | MMBZ5239B       |
| VR46    | 4813830A39 | MMBZ5256B       |
| VR47-50 | 4813831A39 | 1SMB5936B       |
| VR51    | 4813830A23 | MMBZ5240B       |
| VR52-63 | 4813831A14 | ZENER_SMB5918   |
| VR64-65 | 4813830A25 | MMBZ5242B       |
| VZ1     | 4804645P08 | VARIS_60        |
| VZ29    | 0608303Y01 | VARIS_85        |
| VZ31-32 | 0602811C01 | VARIS_14V       |
| VZ33-34 | 4804645P02 | VARIS_5.6       |
| VZ35-46 | 0686391J02 | VARISTOR        |
| Y1      | 4802582S09 | XTAL            |
| Y2      | 4802582S10 | CRYSTAL_32.768K |



**1**

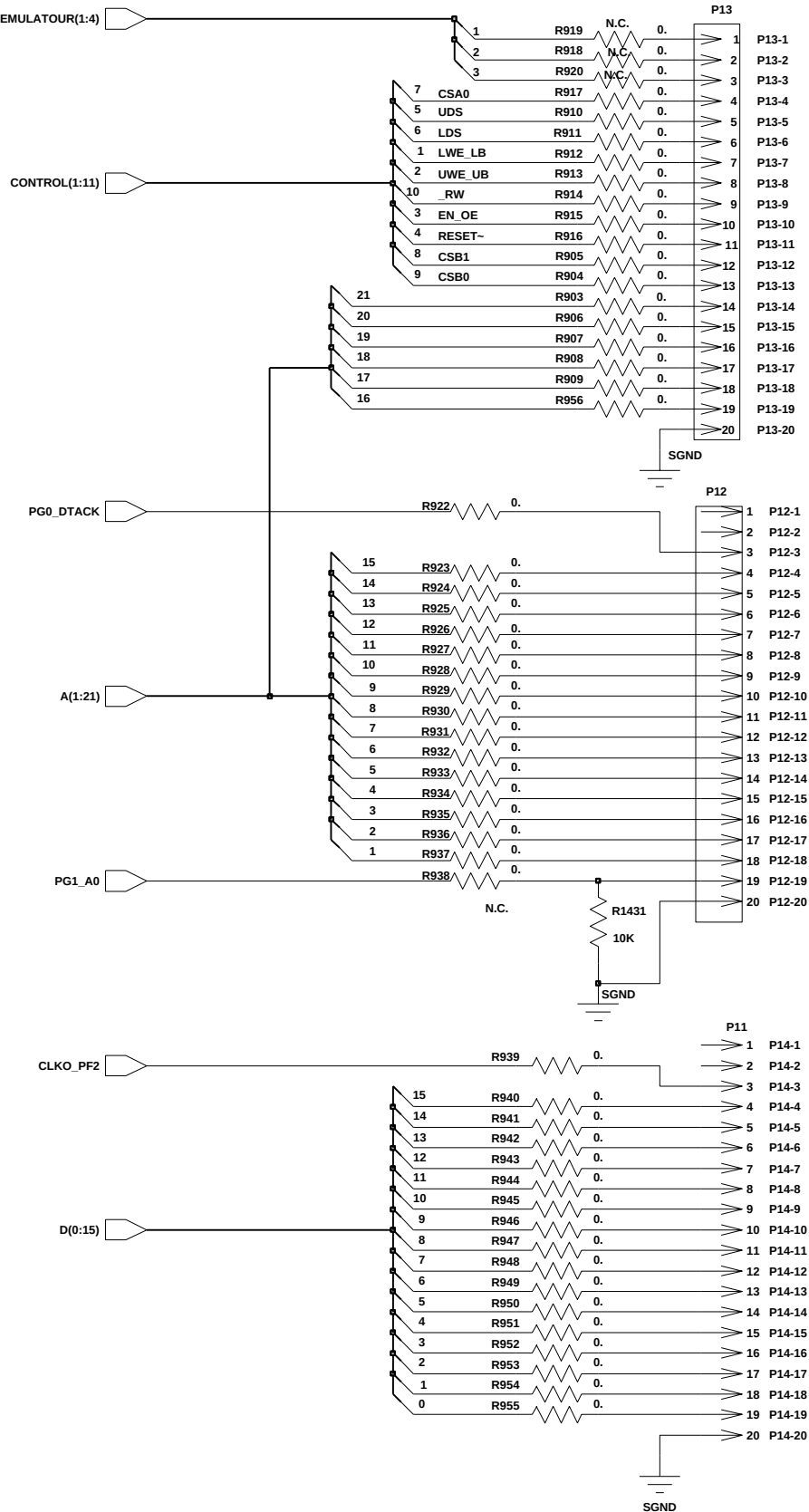




## CONNECTORS

# MOSCAD-M Main Board

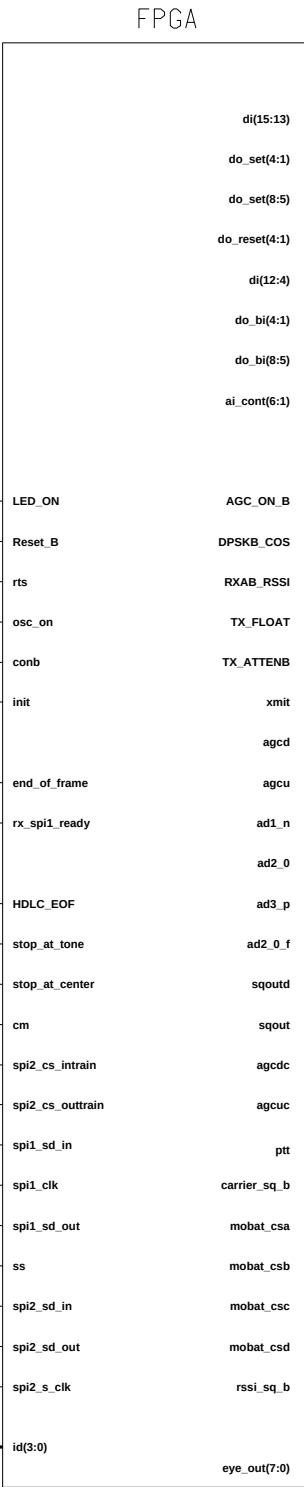
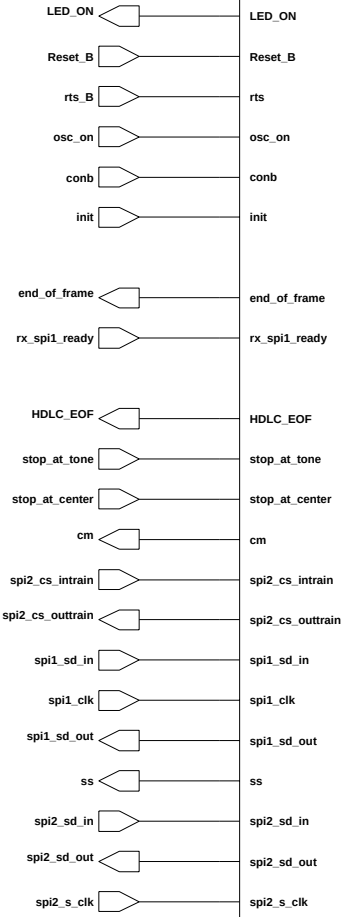
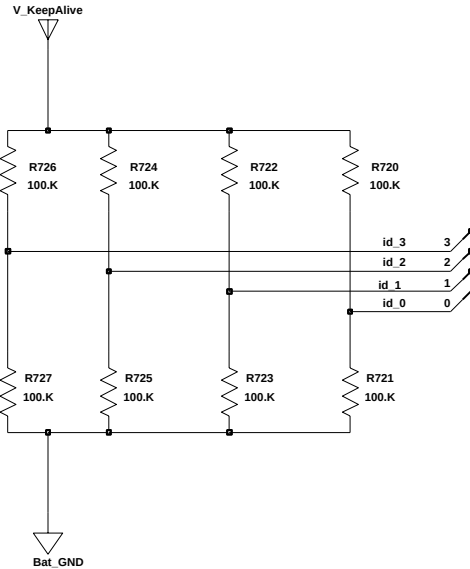
FCN6088A



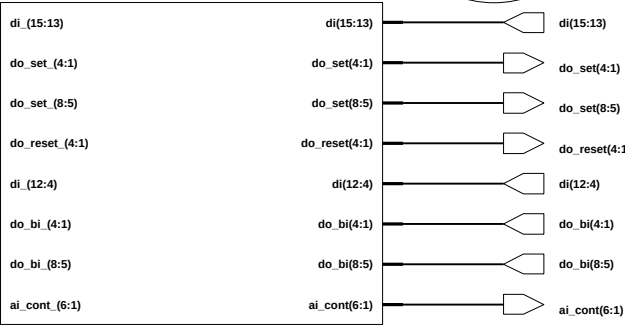
73D02962C89-O

2.1

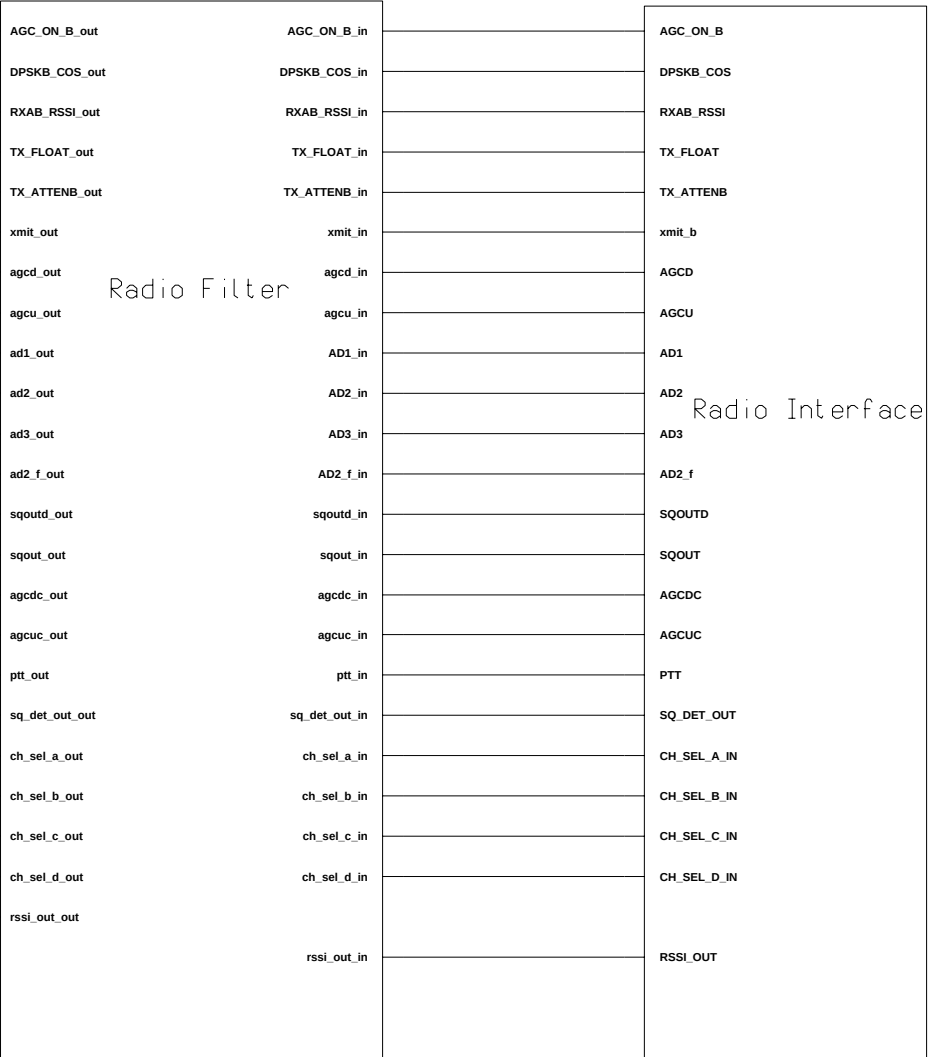
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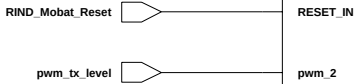
DO\_DI\_Filters



Radio Filter



Radio Interface



2.2

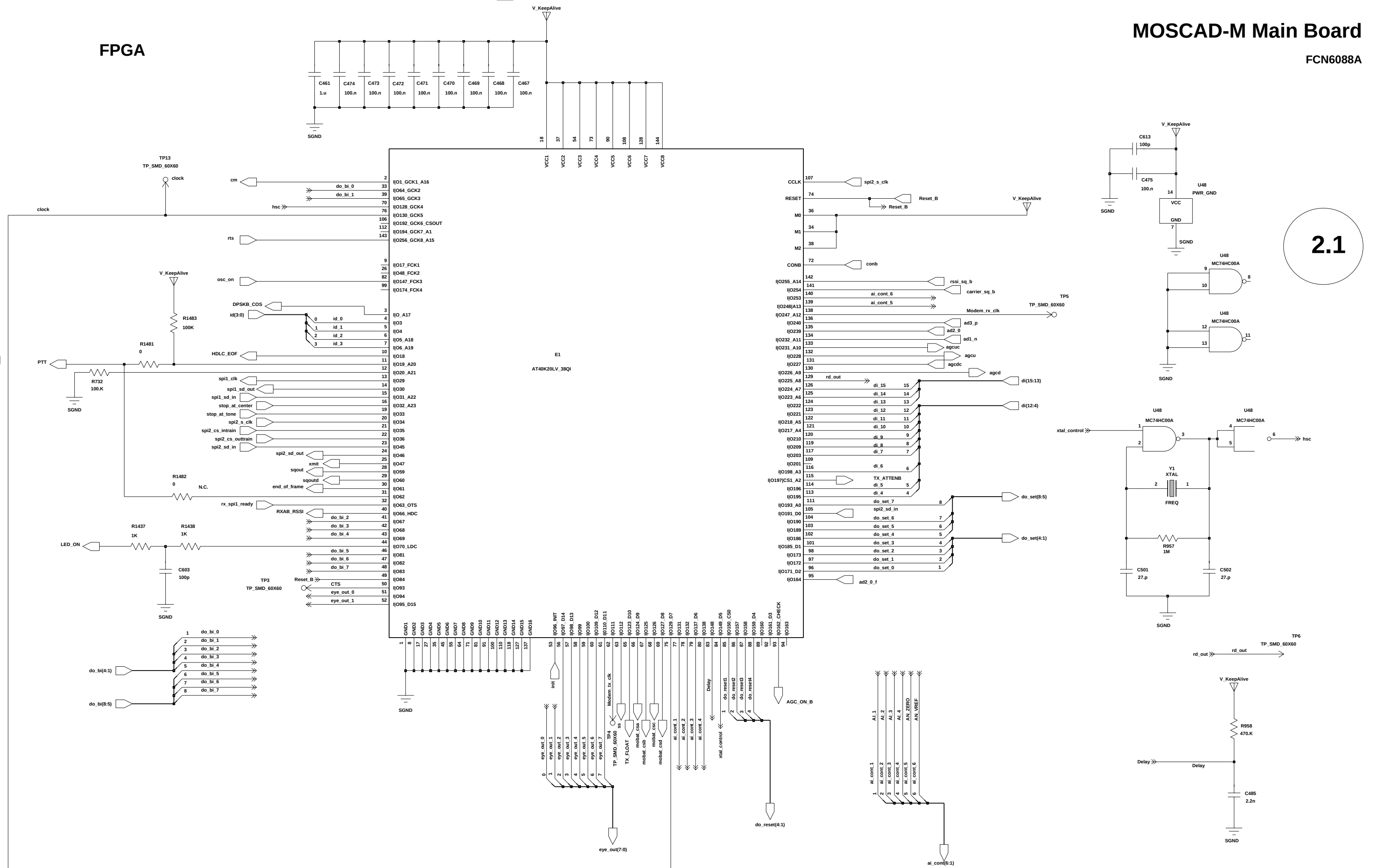
2.3

## FPGA

## MOSCAD-M Main Board

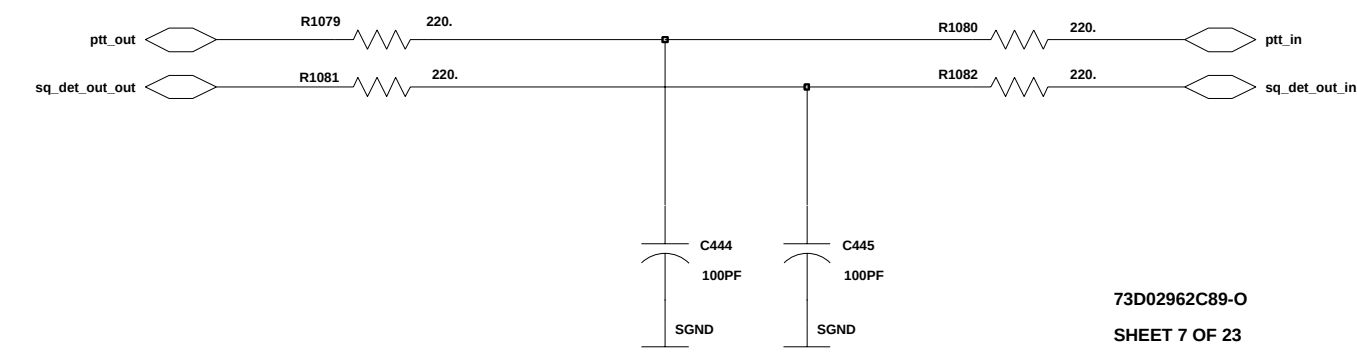
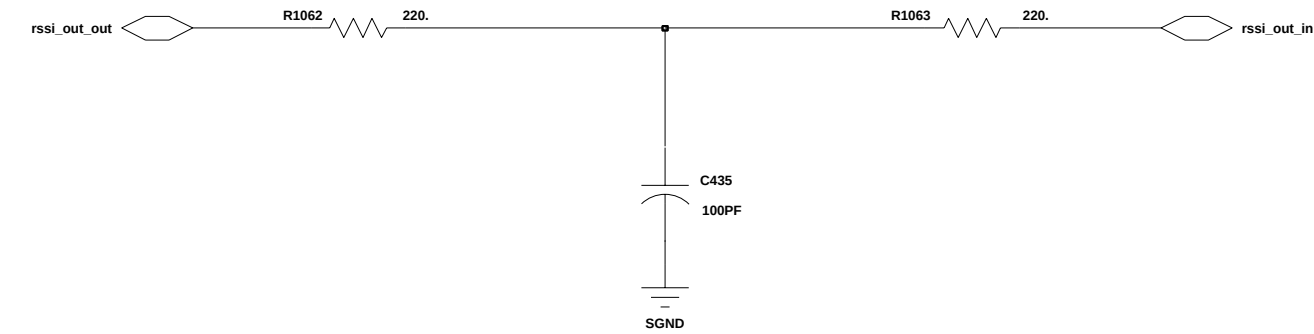
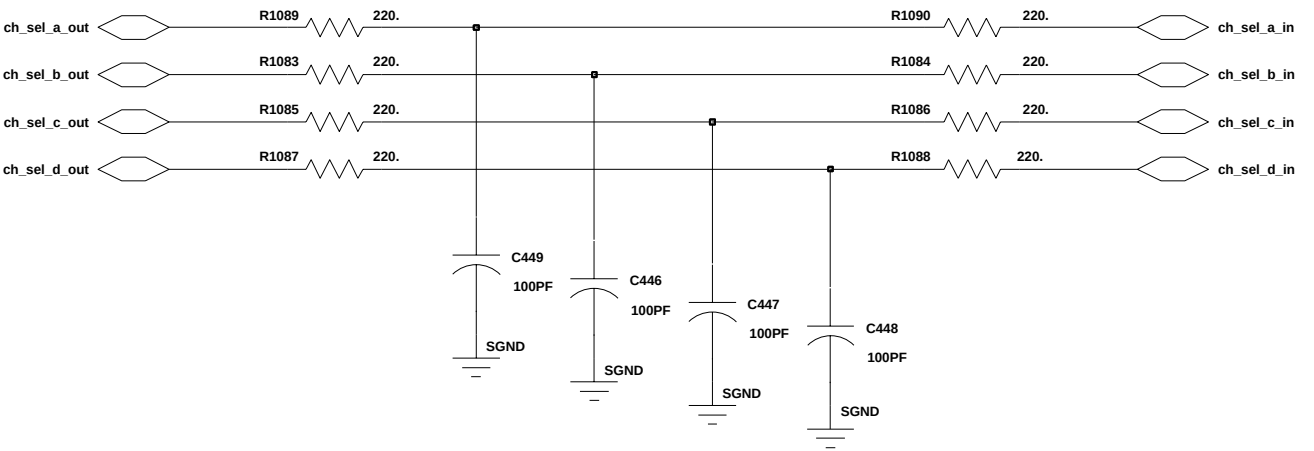
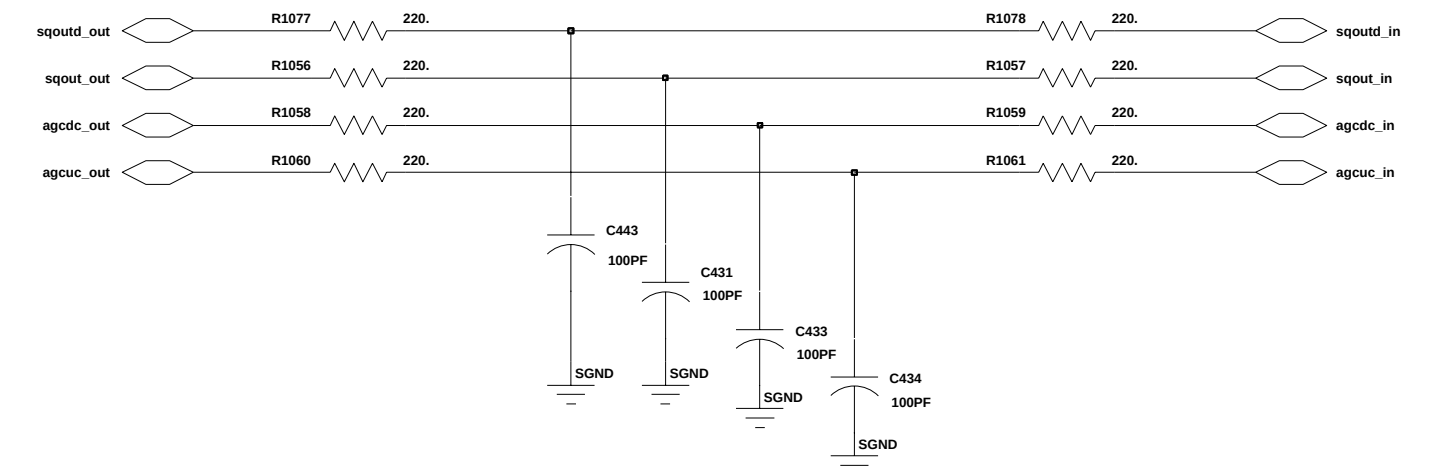
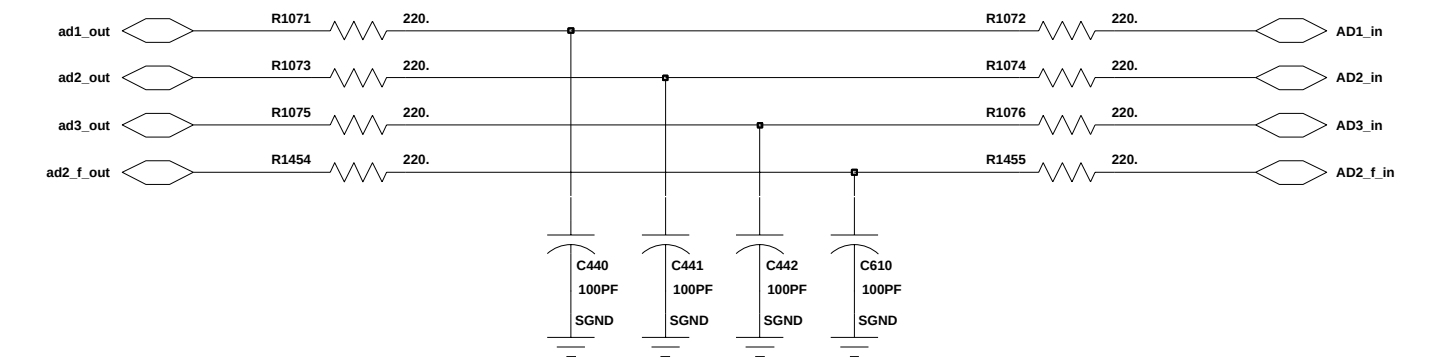
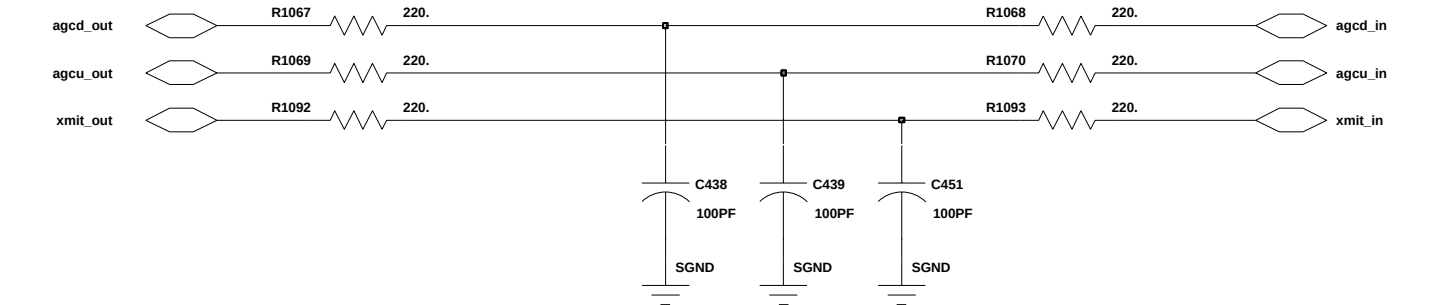
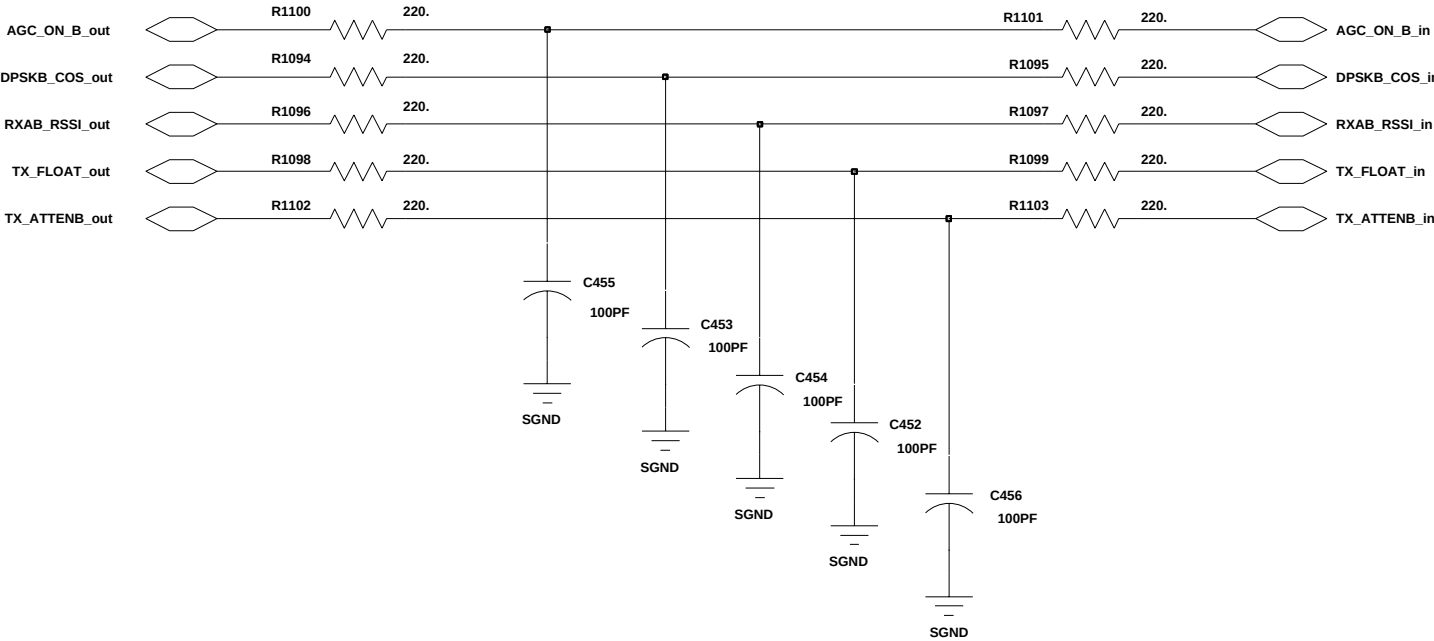
FCN6088A

**2.1**



Filters

2.2





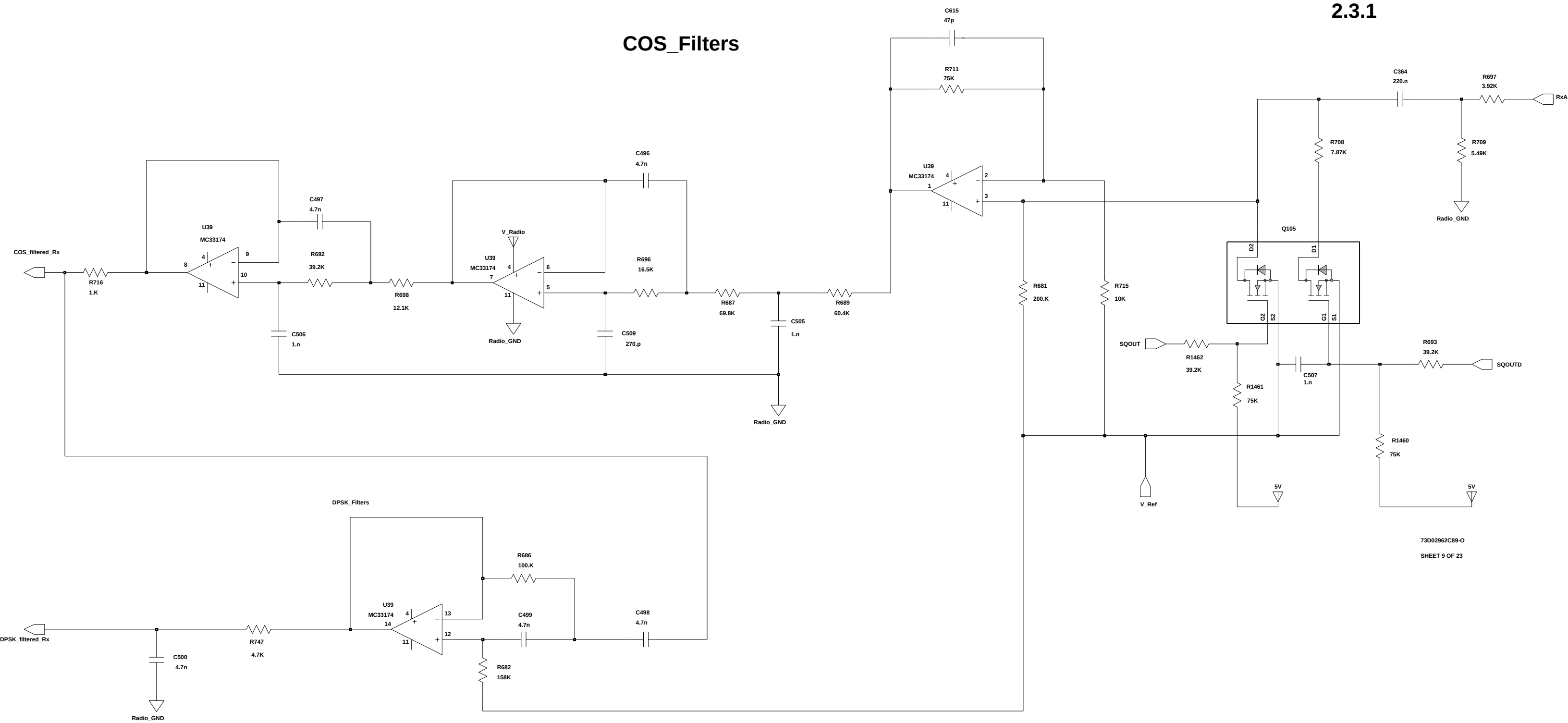
# MOSCAD-M Main Board

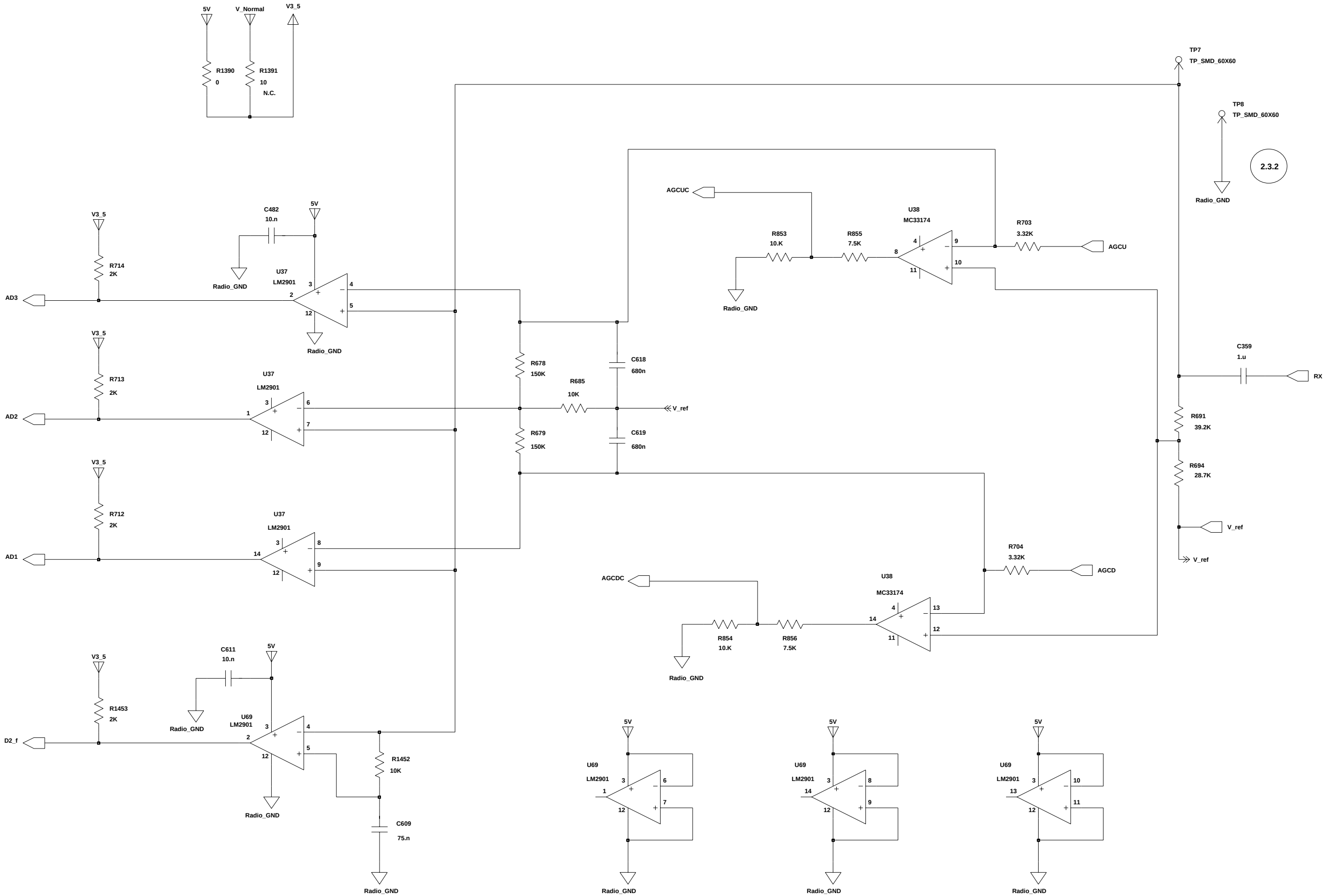
## FCN6088A

### RADIO\_Rx\_Filters

2.3.1

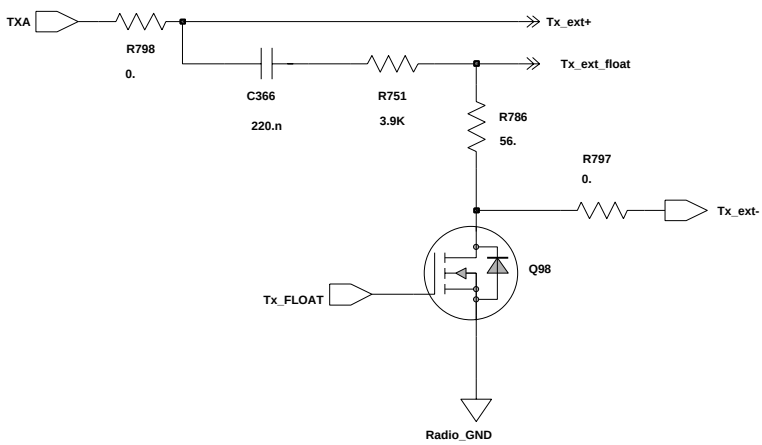
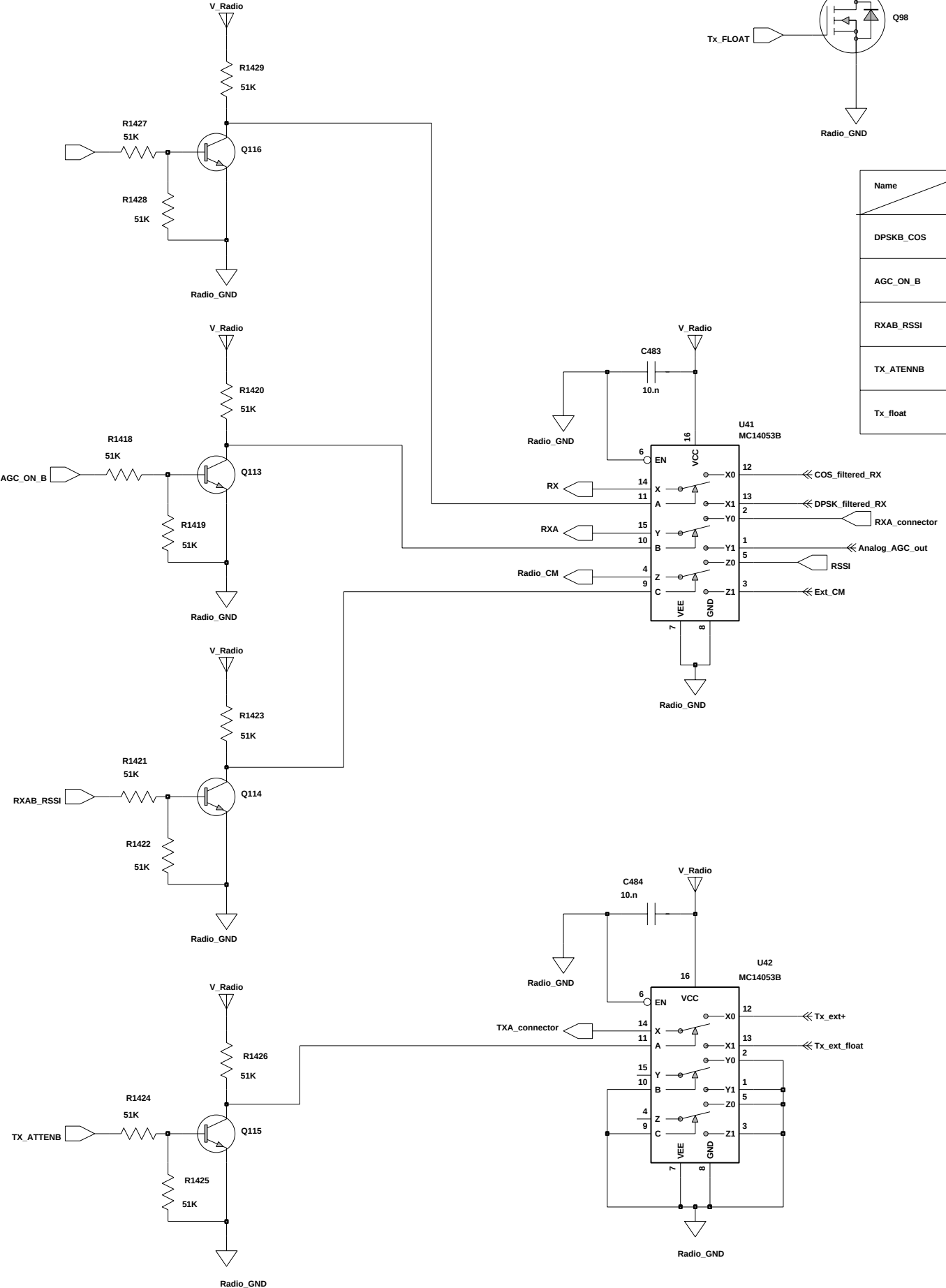
### COS\_Filters



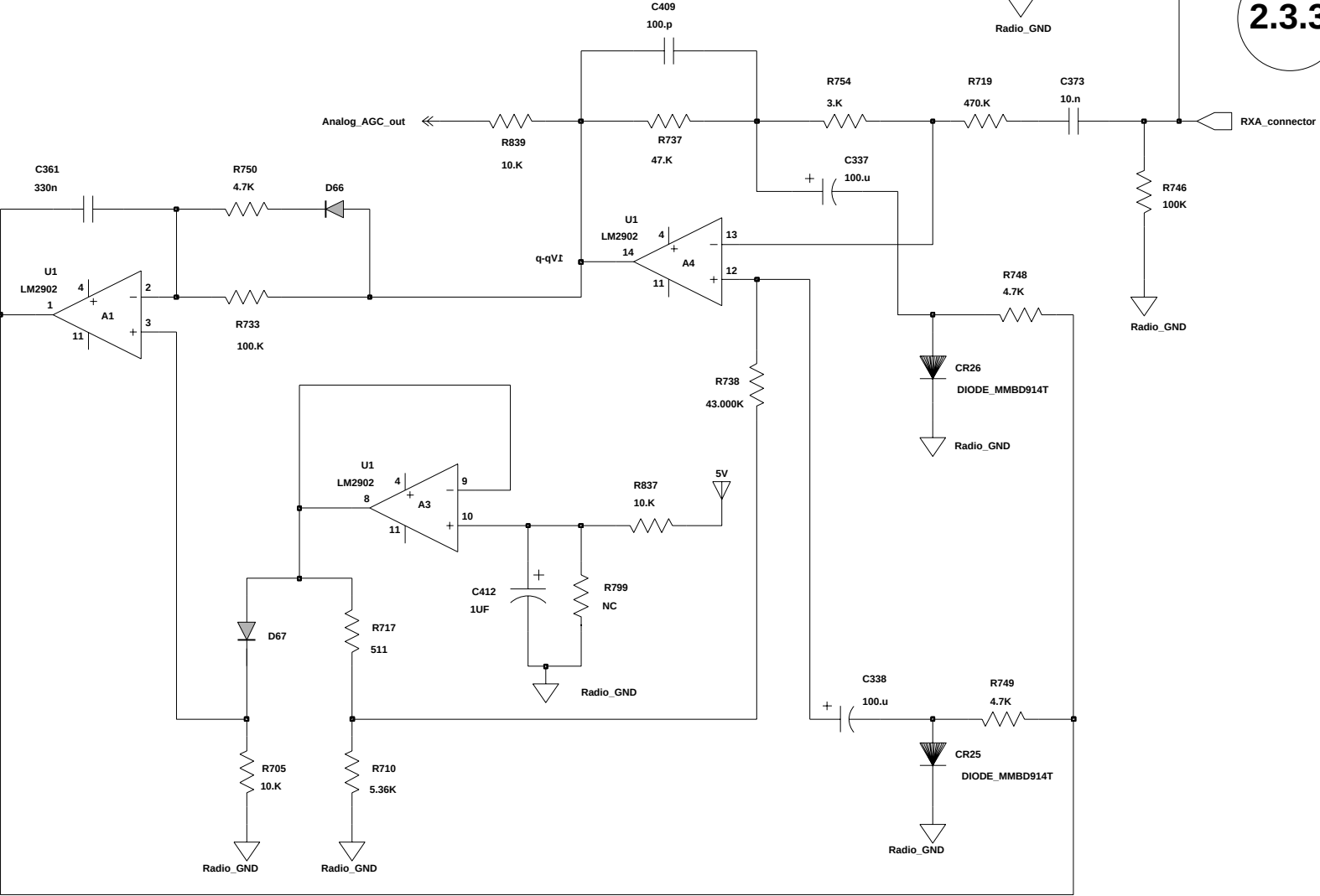
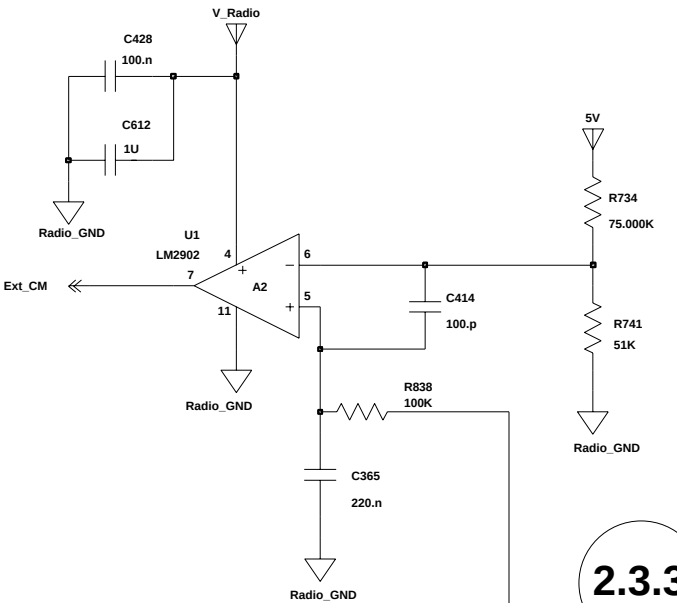


MOSCAD-M Main Board  
FCN6088A

gen\_radio\_interface



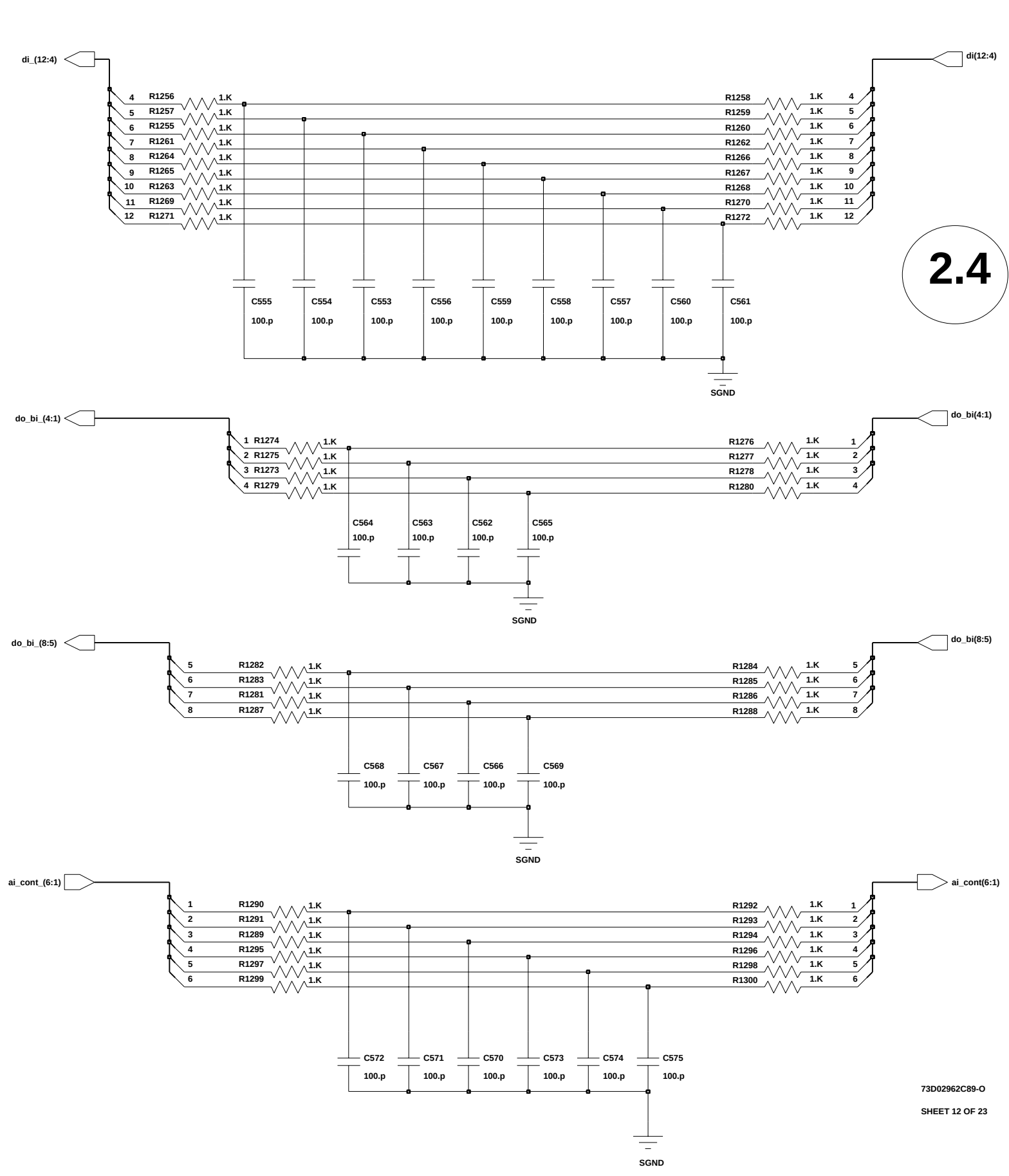
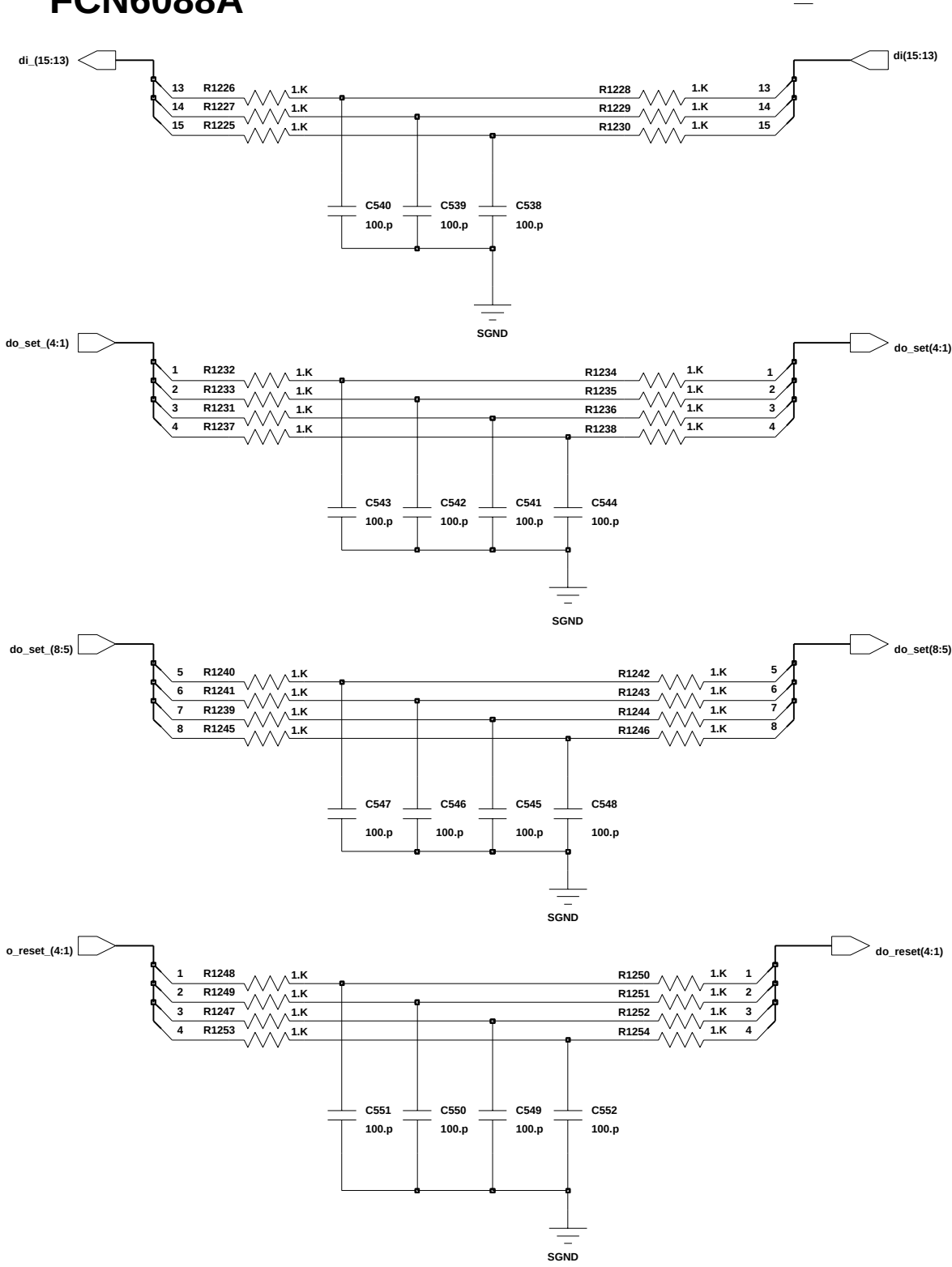
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|-----------|---------------------|--------------------------|
| DPSKB_COS | DPSK                | COS                      |
| AGC_ON_B  | AGC_EN              | AGC_DIS                  |
| RXAB_RSSI | RX line to CM       | RSSI to CM               |
| TX_ATTENB | ATTEN ON for GP320  | ATTEN OFF Tx ext for PTT |
| Tx_float  | GND discon PTTon Tx | RX mode                  |



# MOSCAD-M Main Board

## FCN6088A

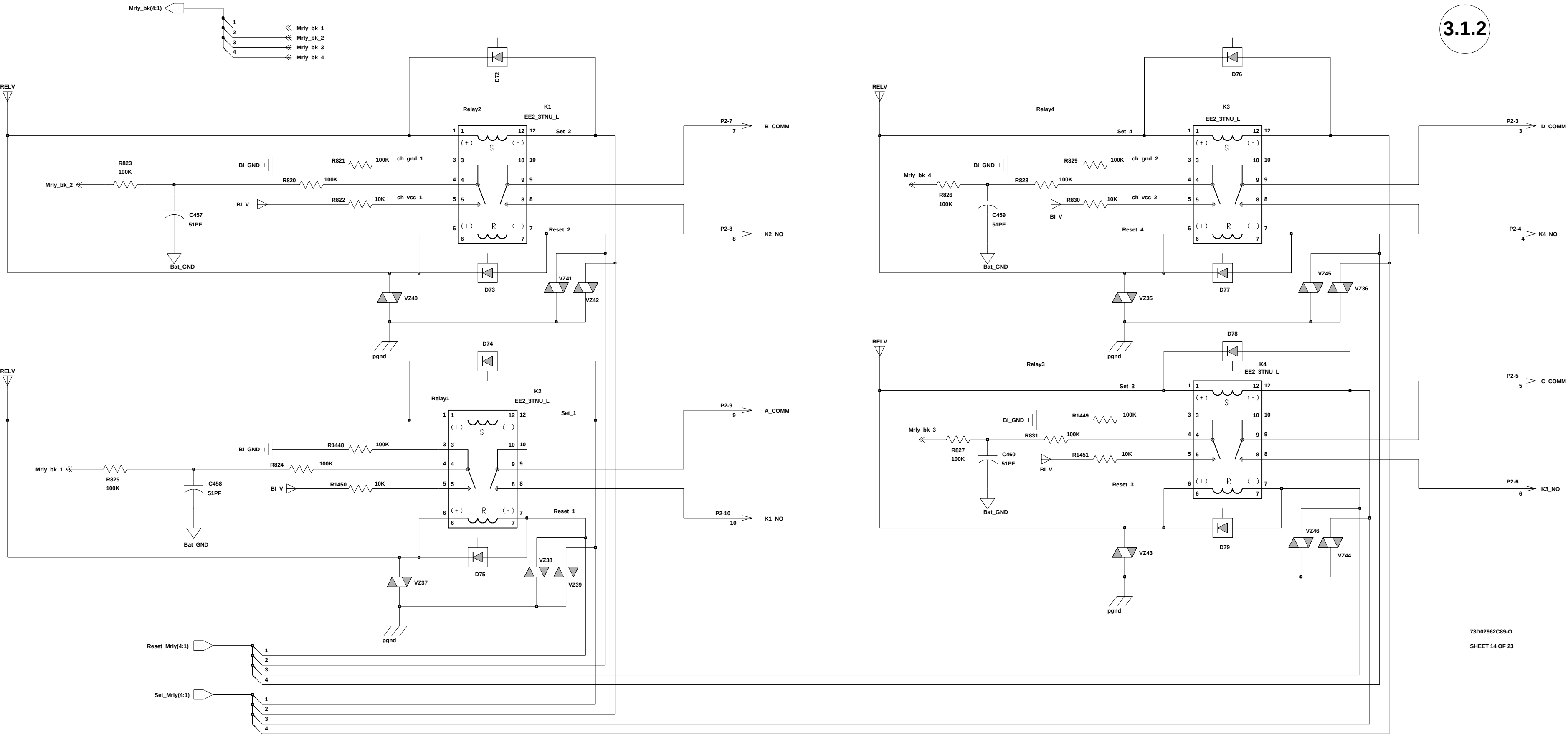
# DO & DI Filters



2.4

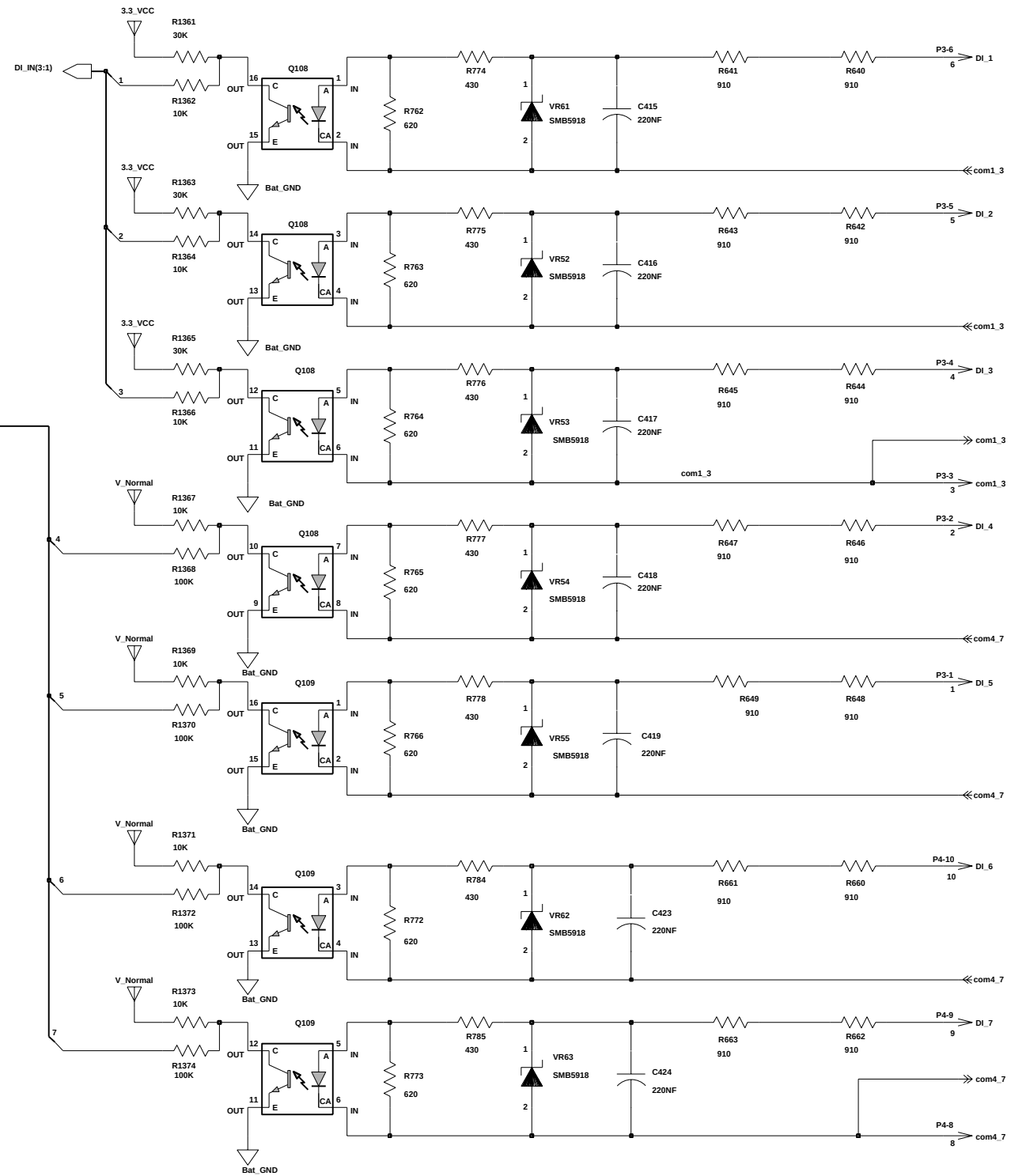
**digital output**





# FCN6088A

**3.2**

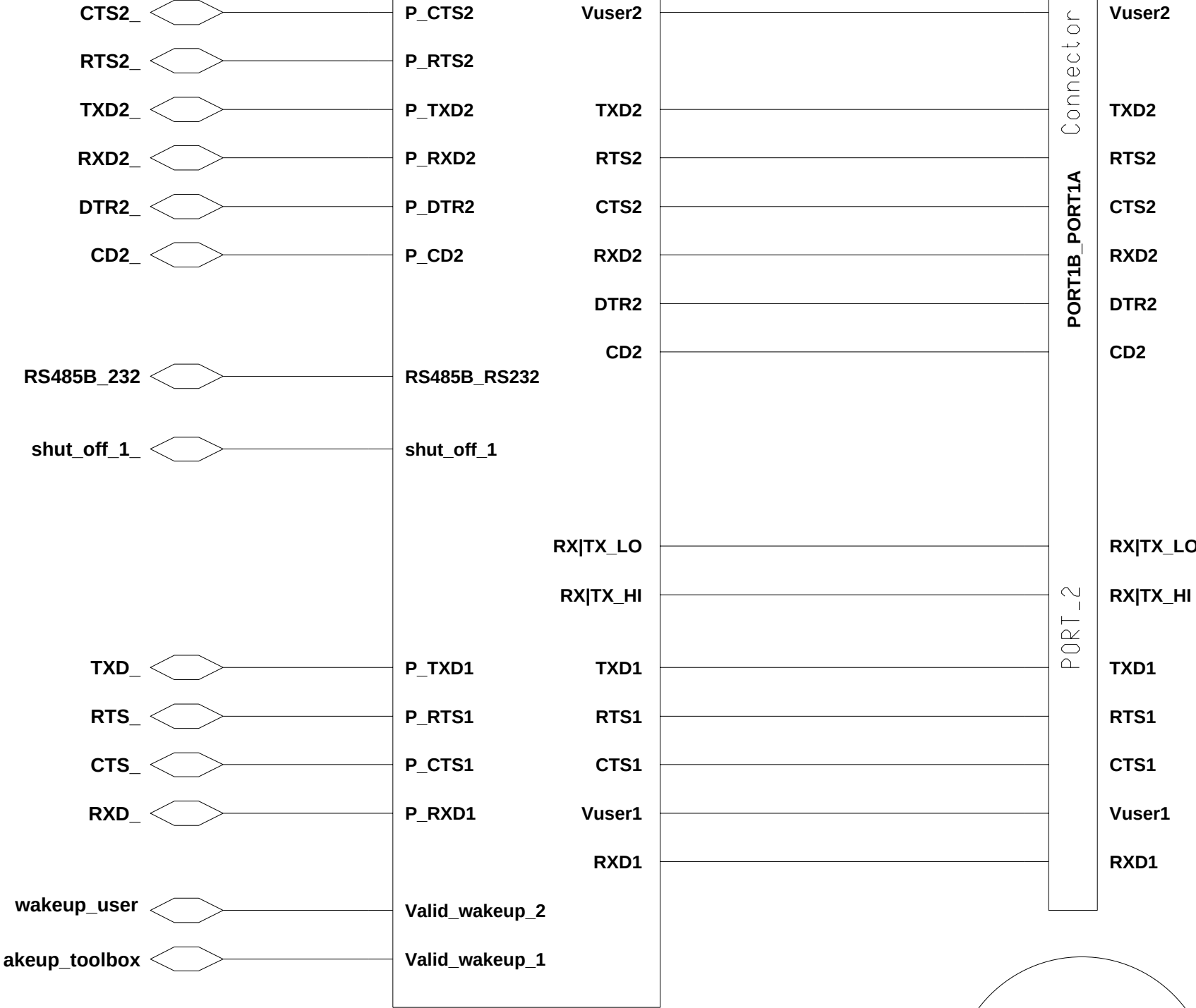


73D02962C89-O  
SHEET 15 OF 23



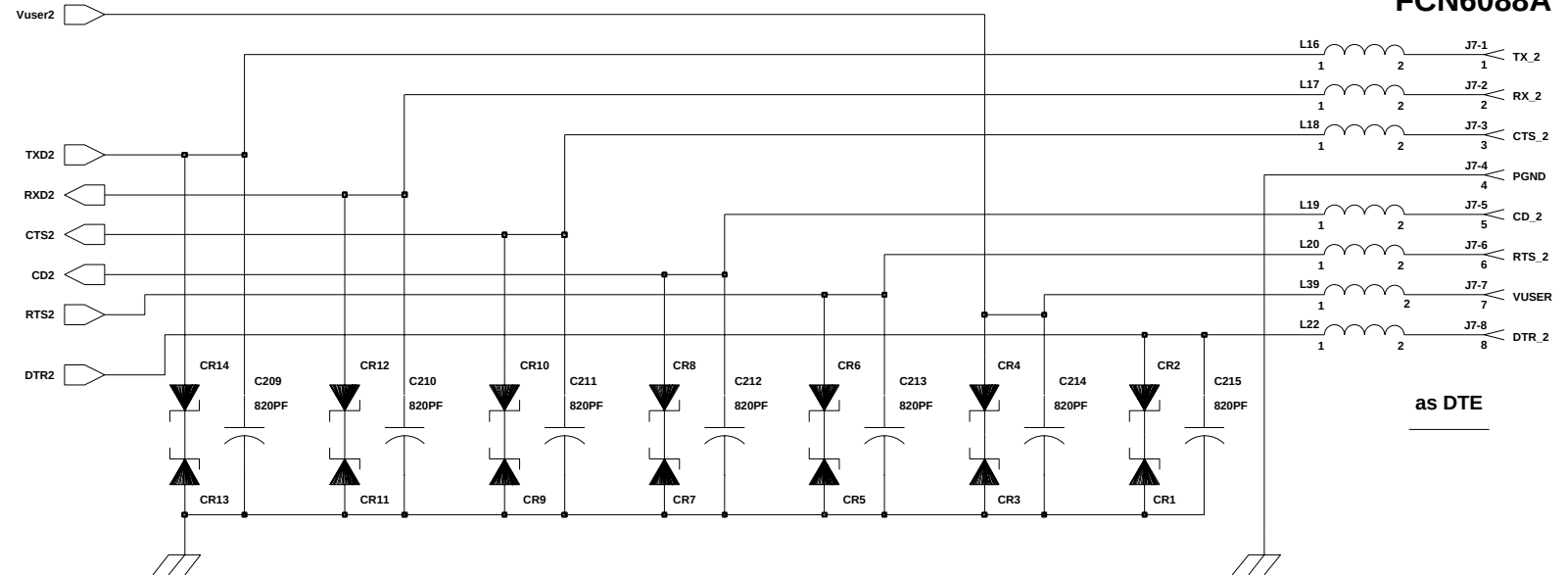
MOSCAD-M Main Board

FCN6088A

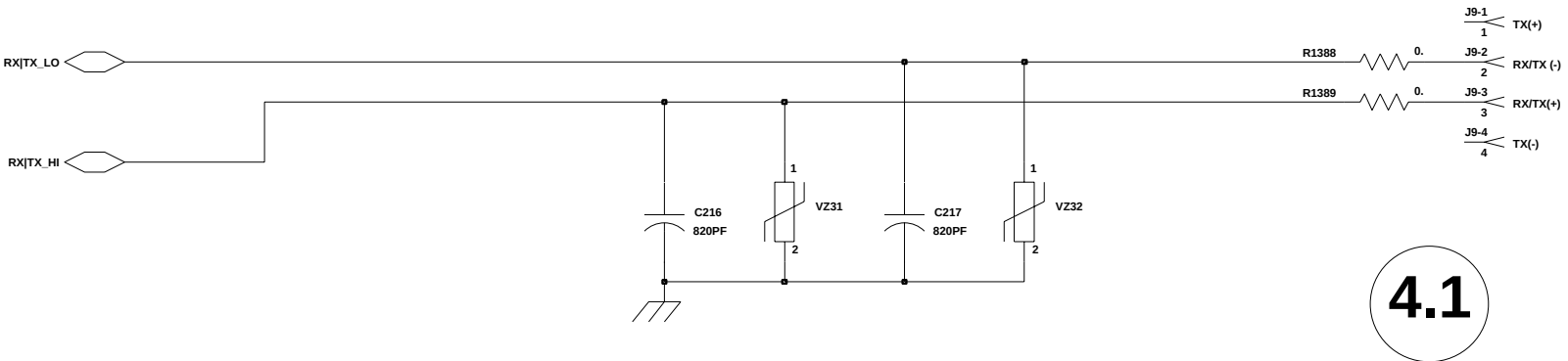


4.2

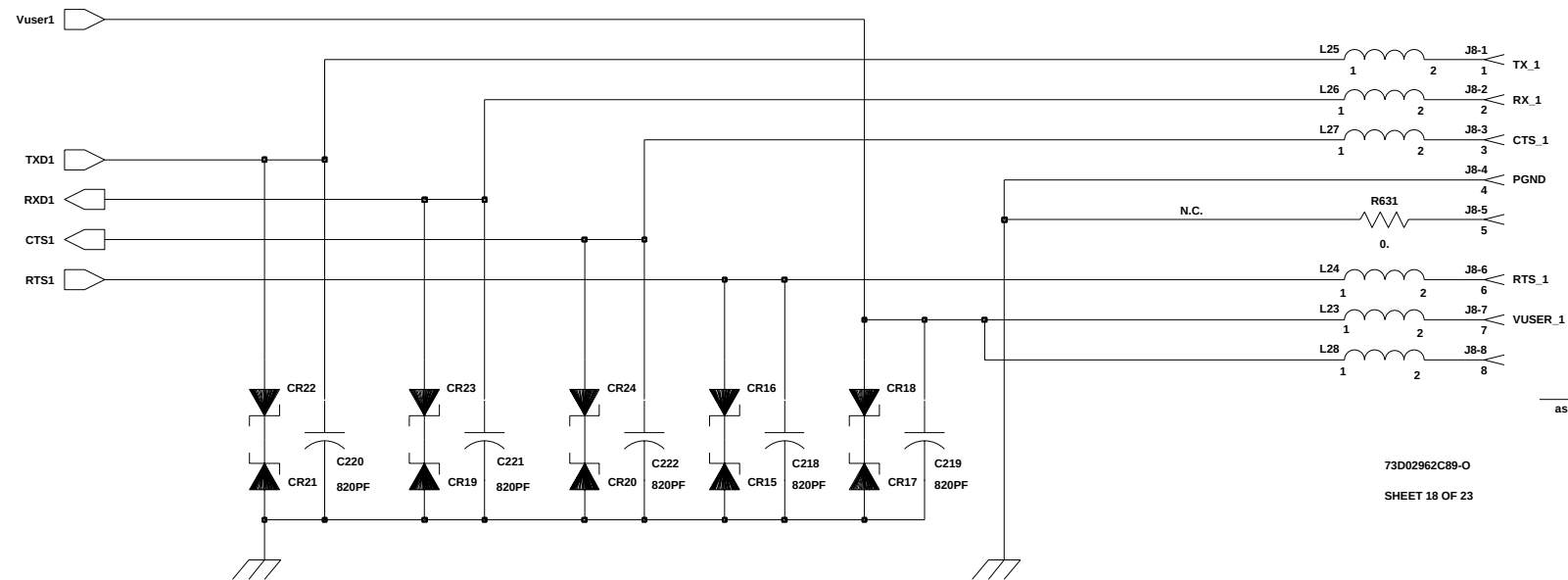
4.1



RS-485 connector

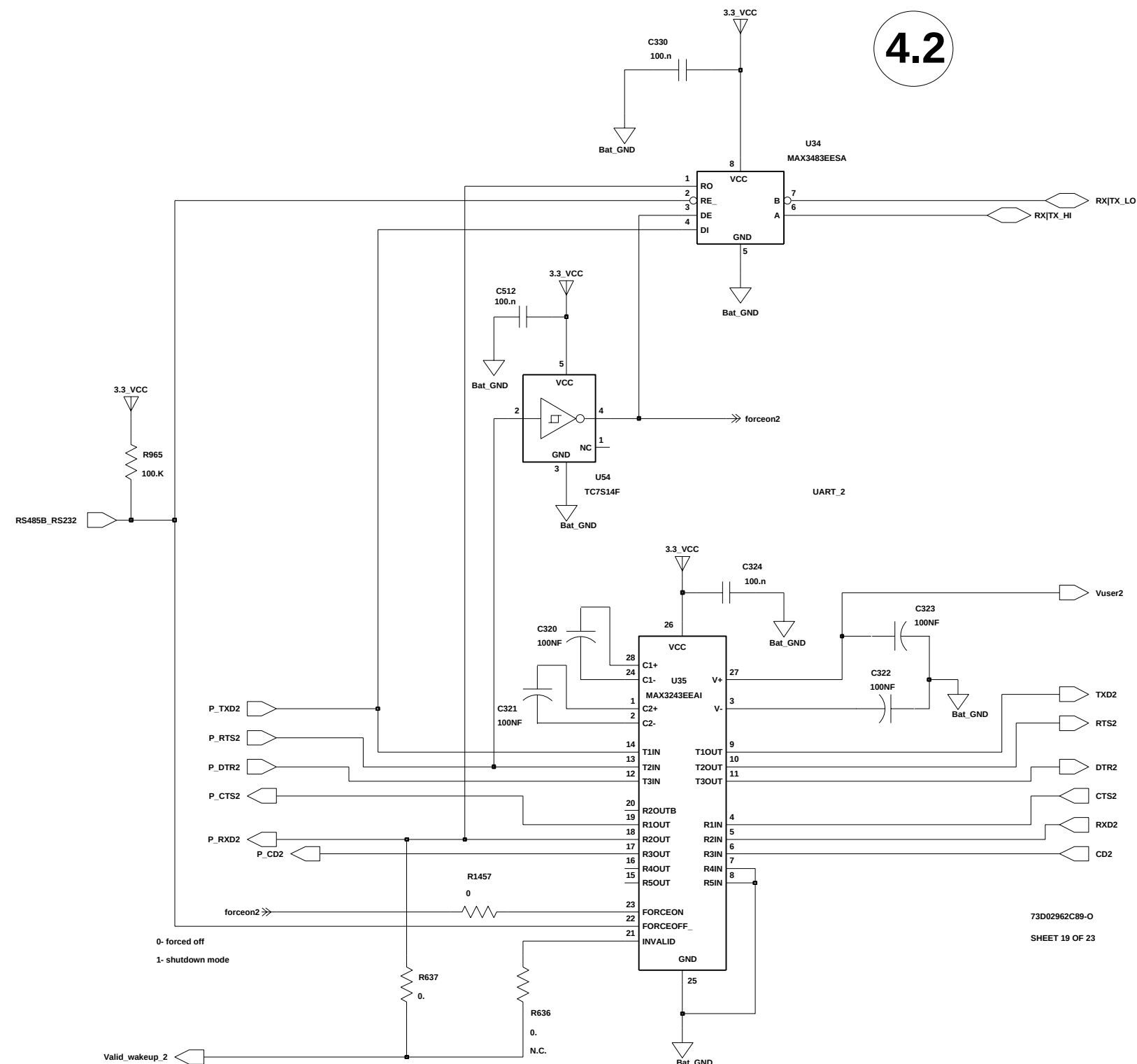
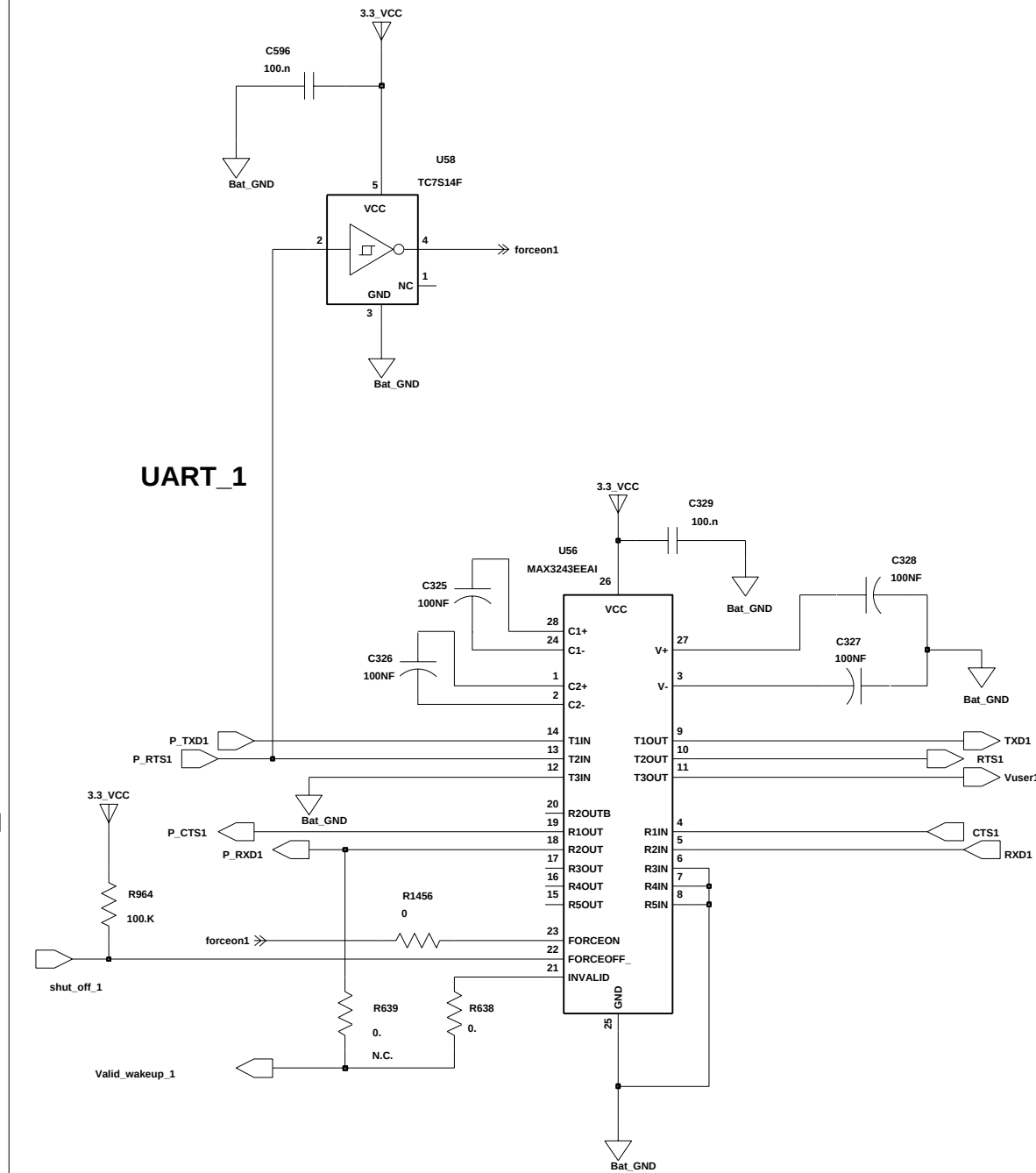


RS-232\_TOOLBOX



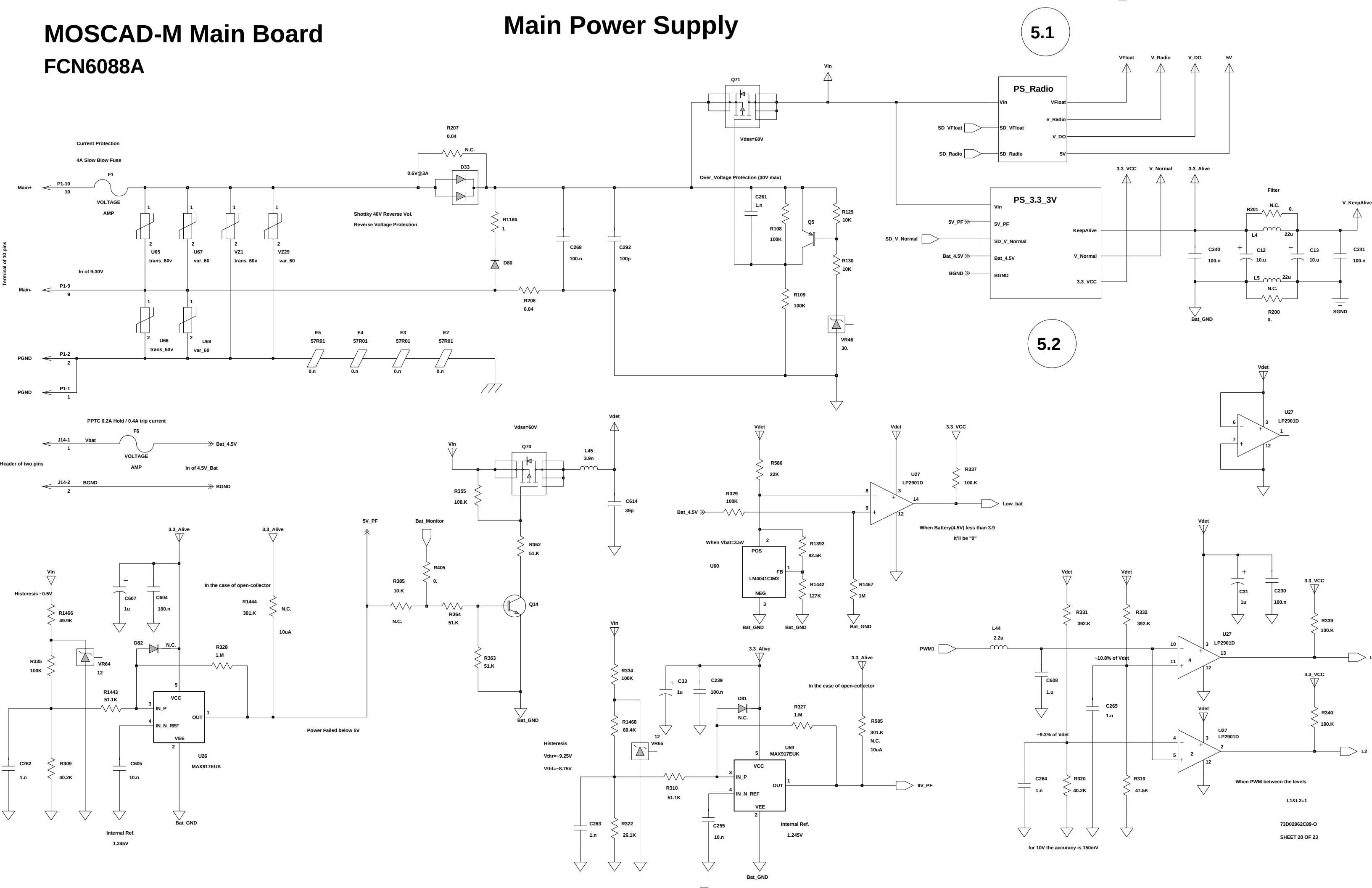
## PORT\_2-User Port

## 4.2)



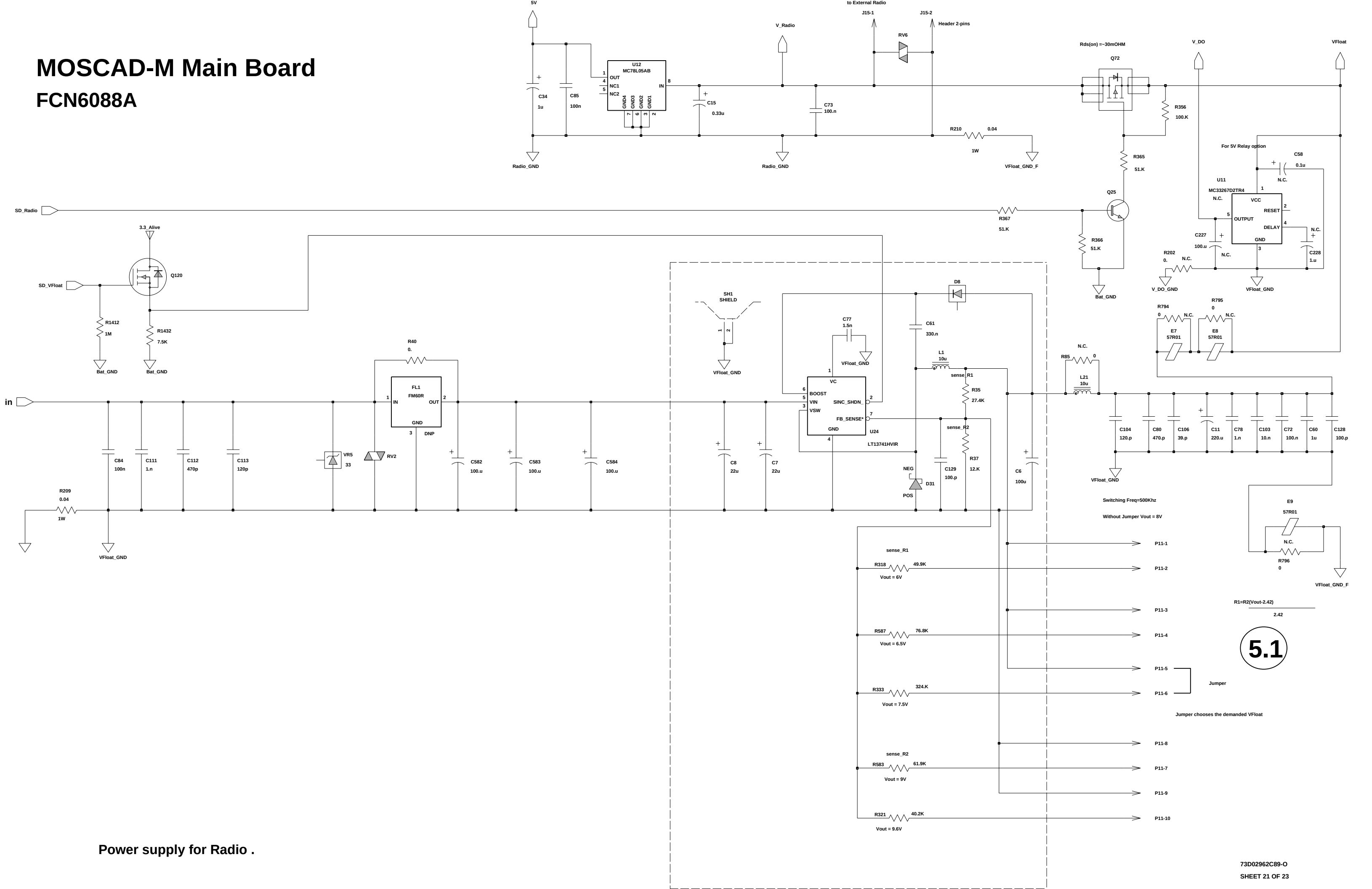
MOSCAD-M Main Board  
FCN6088A

Main Power Supply



# MOSCAD-M Main Board

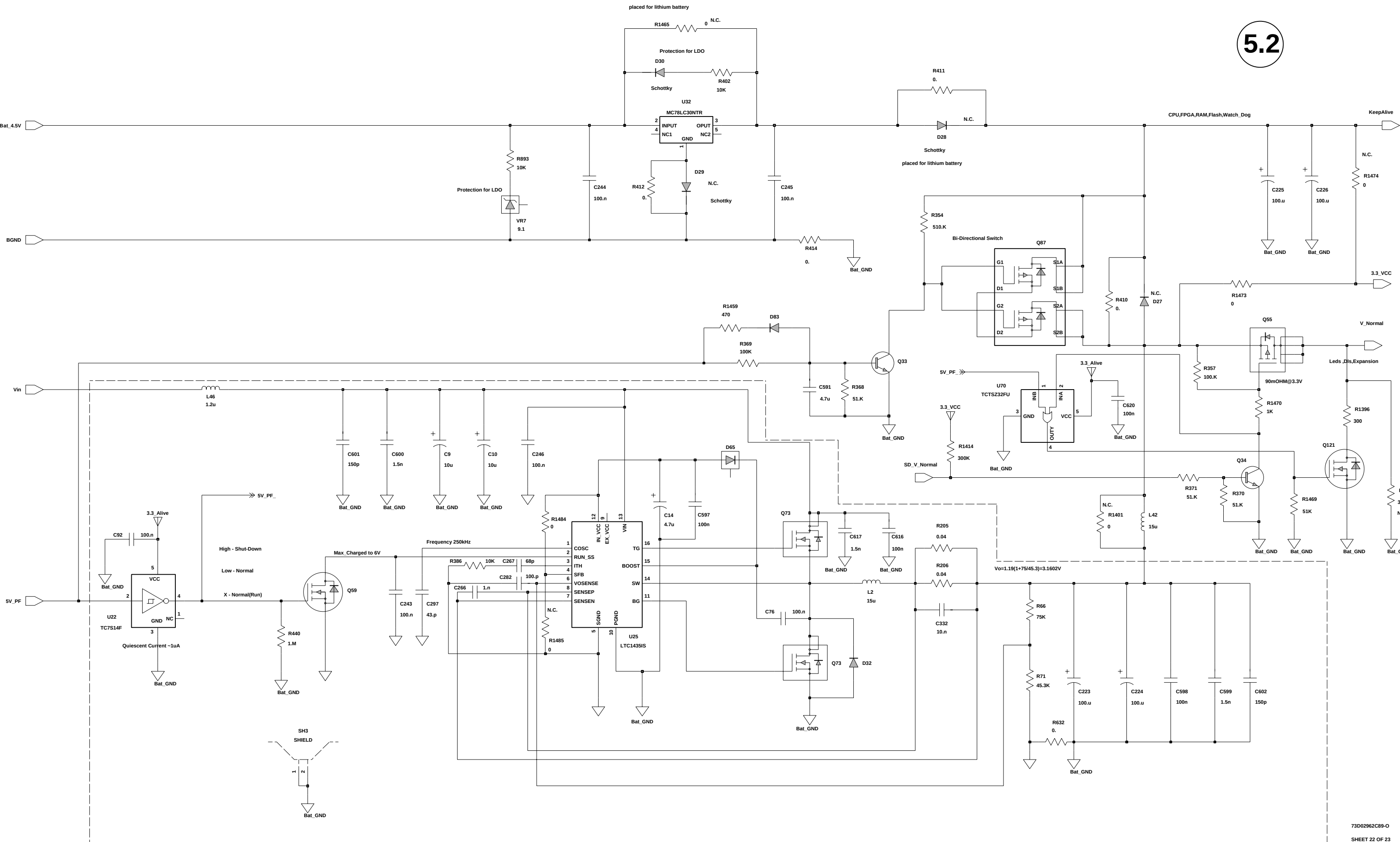
## FCN6088A



## Power Supply of 3.3V

73D02962C89-O

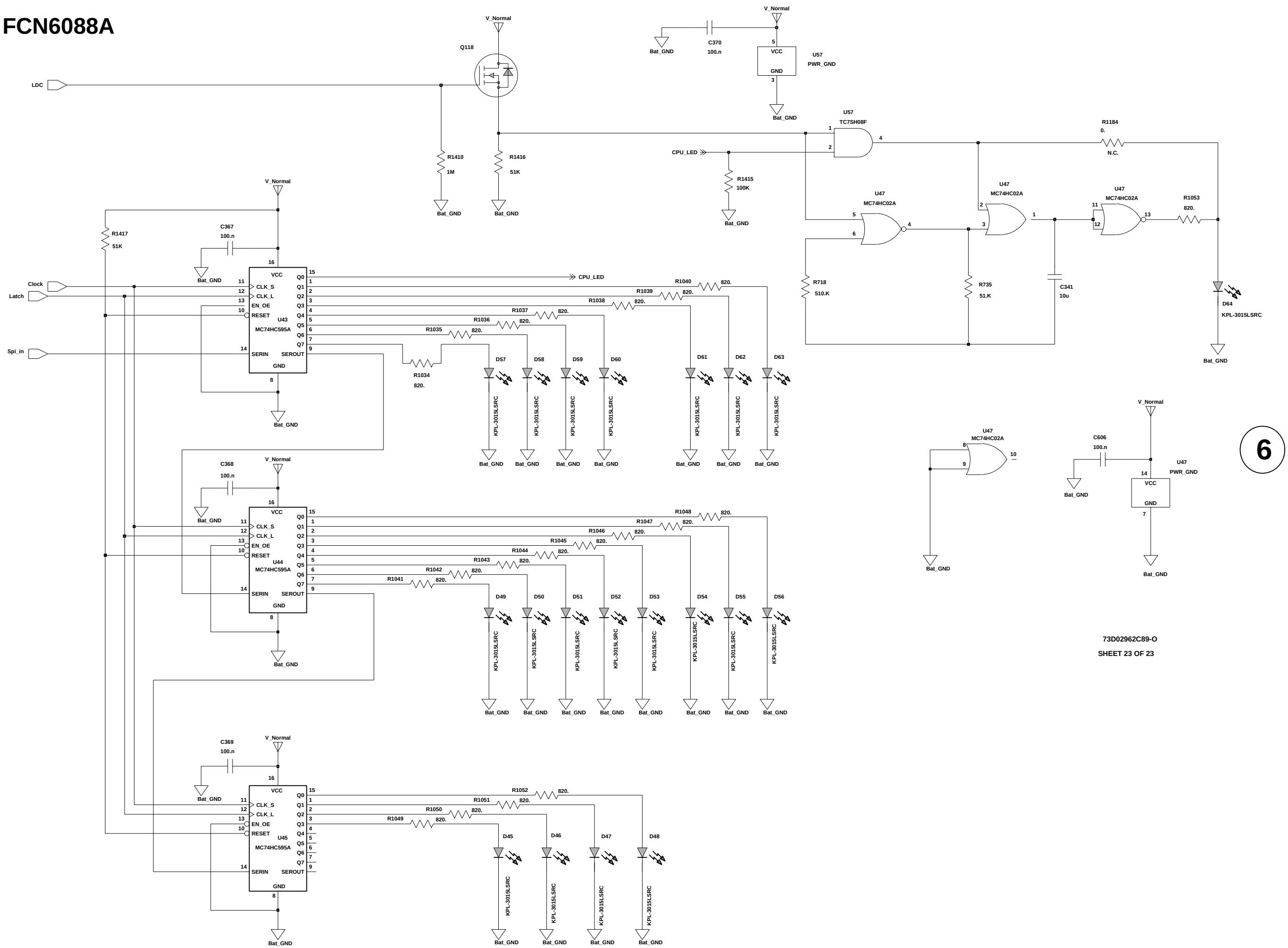
SHEET 22 OF 23

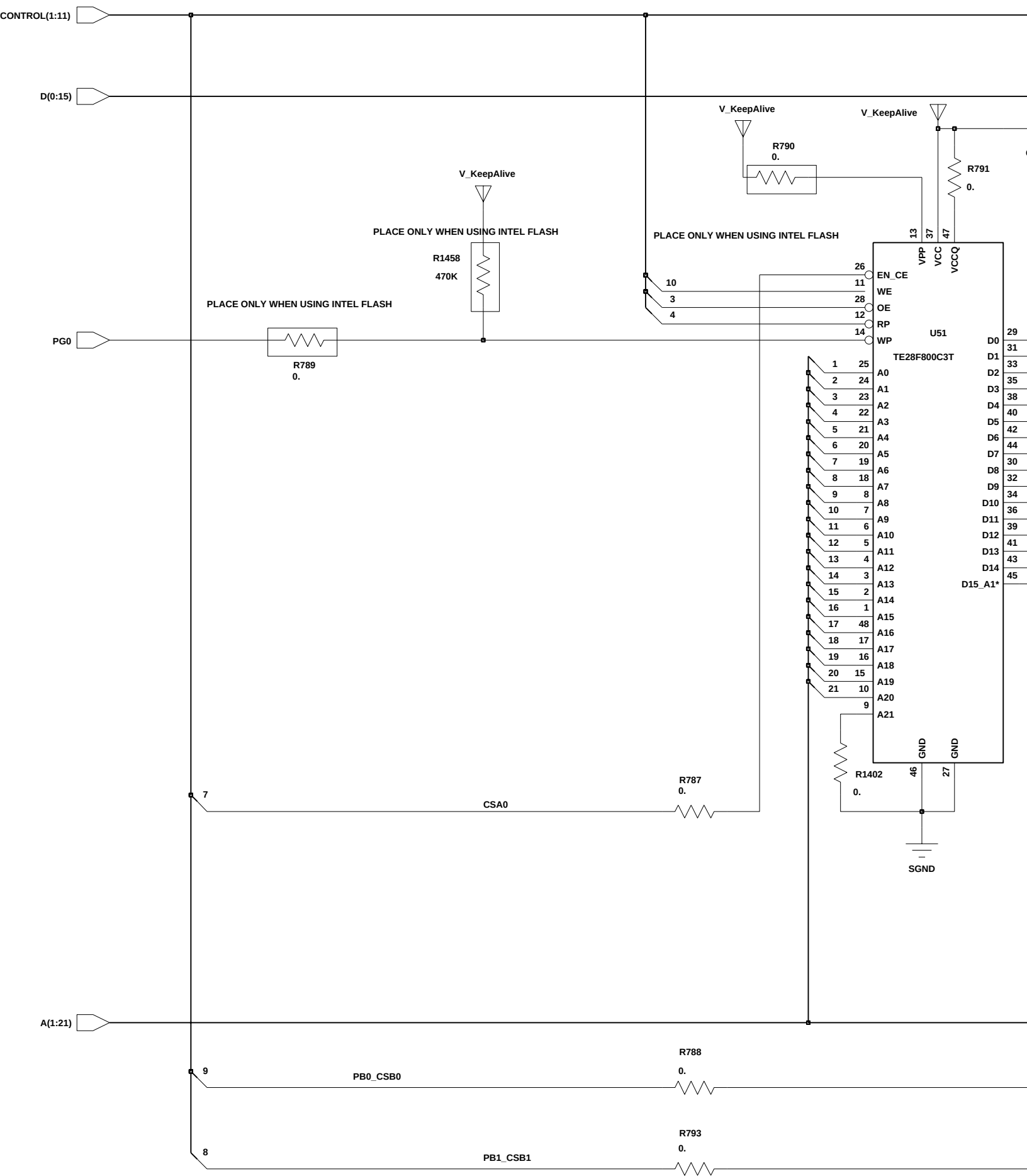


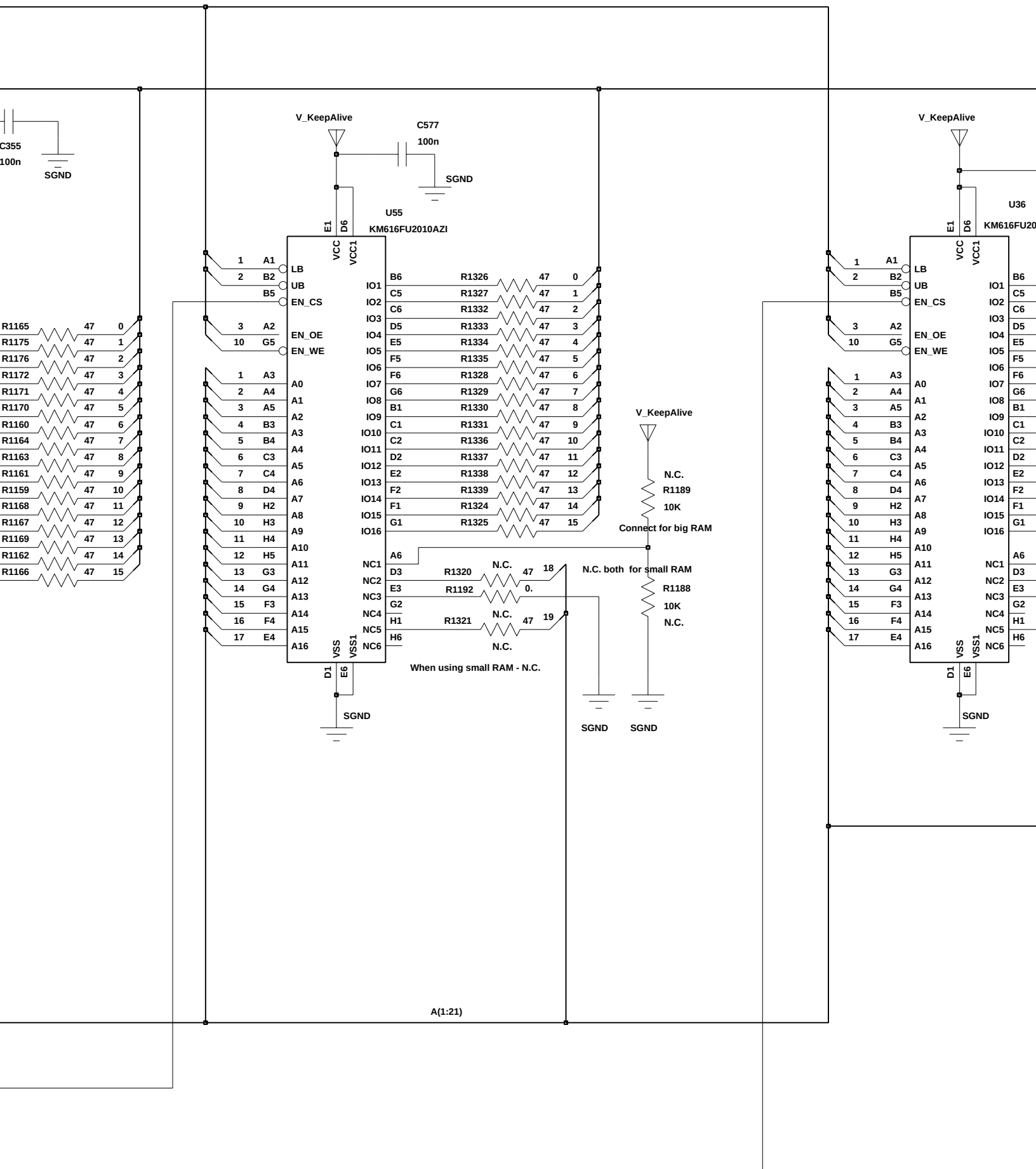
# MOSCAD-M Main Board

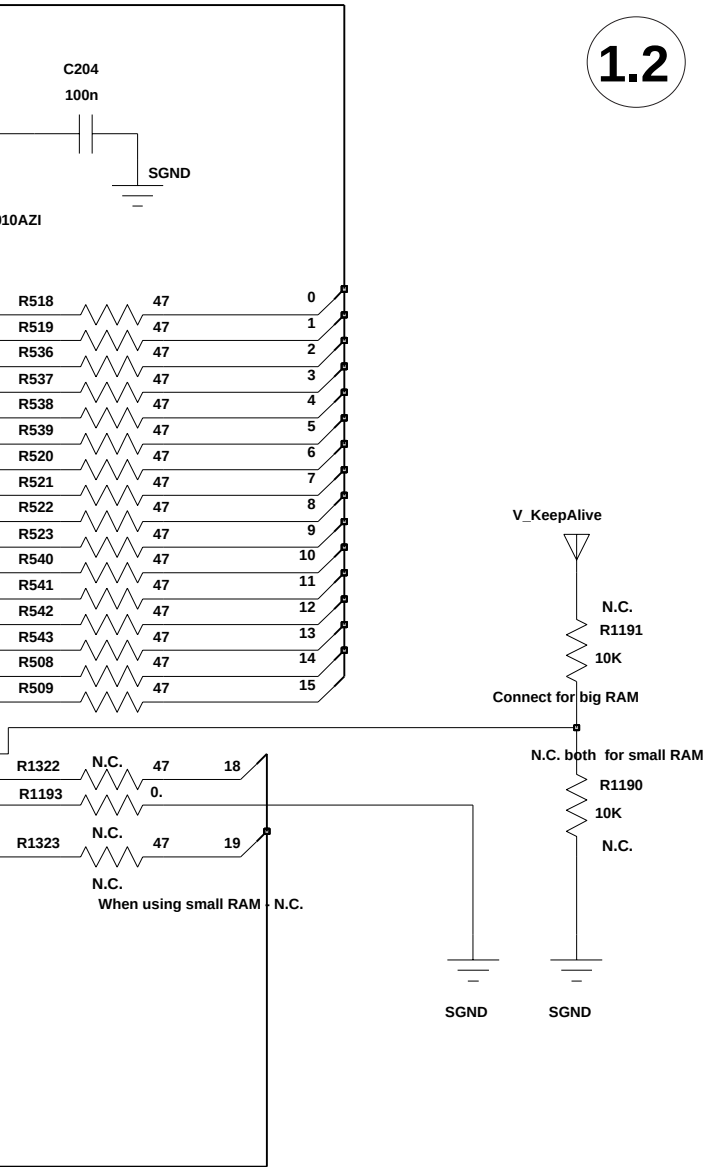
## FCN6088A

SHIFT\_REGISTER + LED'S





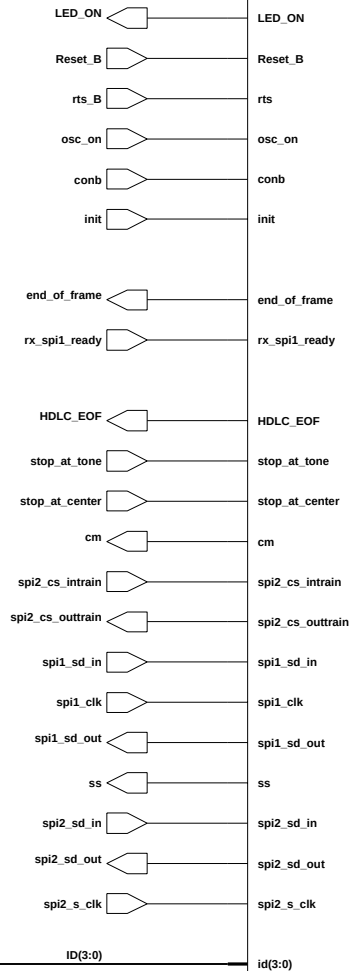
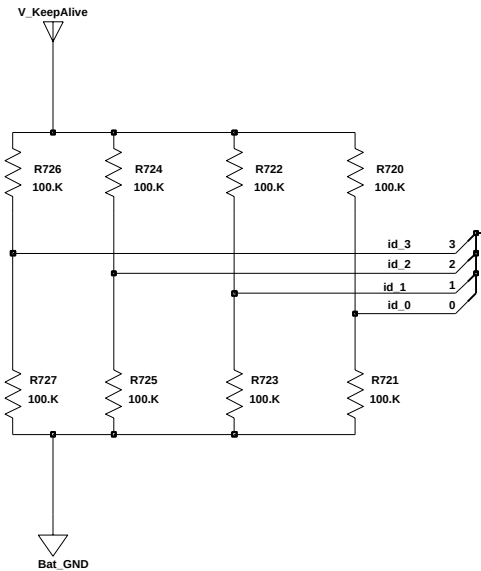




# FPGA+RADIO

2.1

FPGA



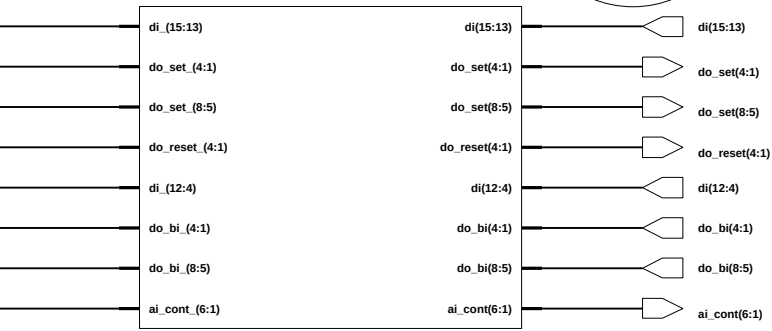
2

# MOSCAD-M Main Board

FCN6088A

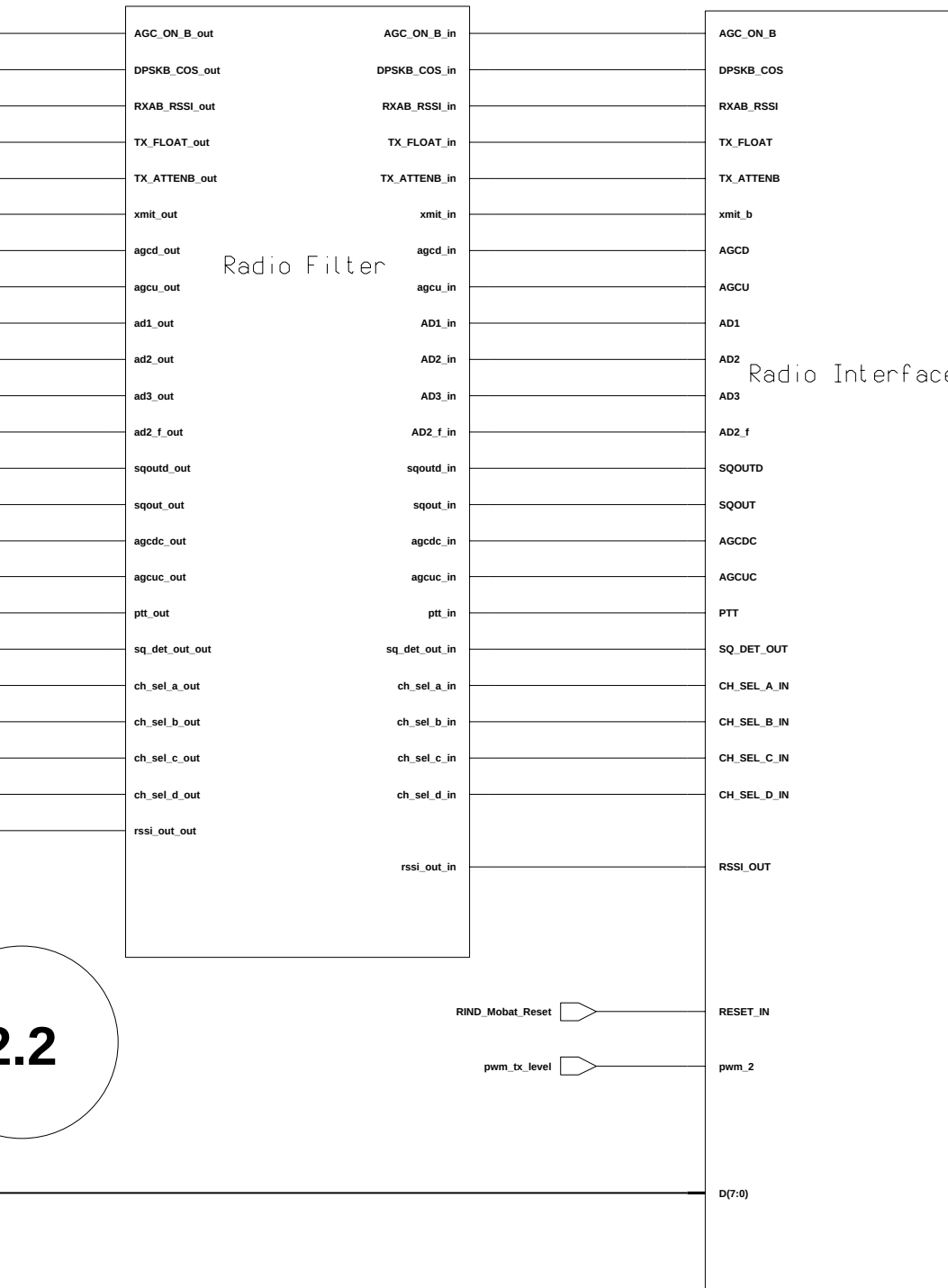
## 2.4

## DO\_DI\_Filters



## Radio Filter

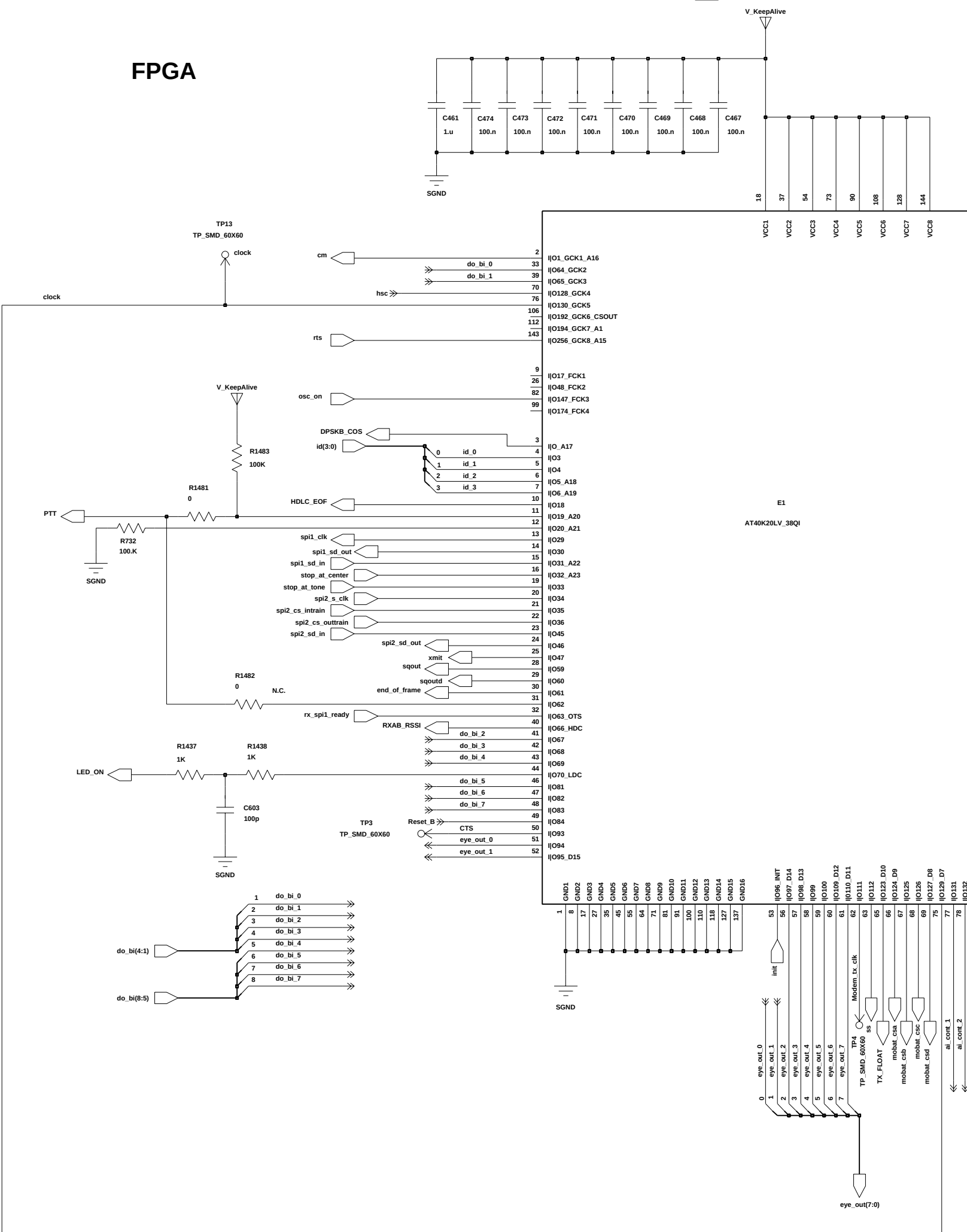
## Radio Interface



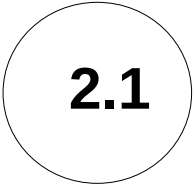
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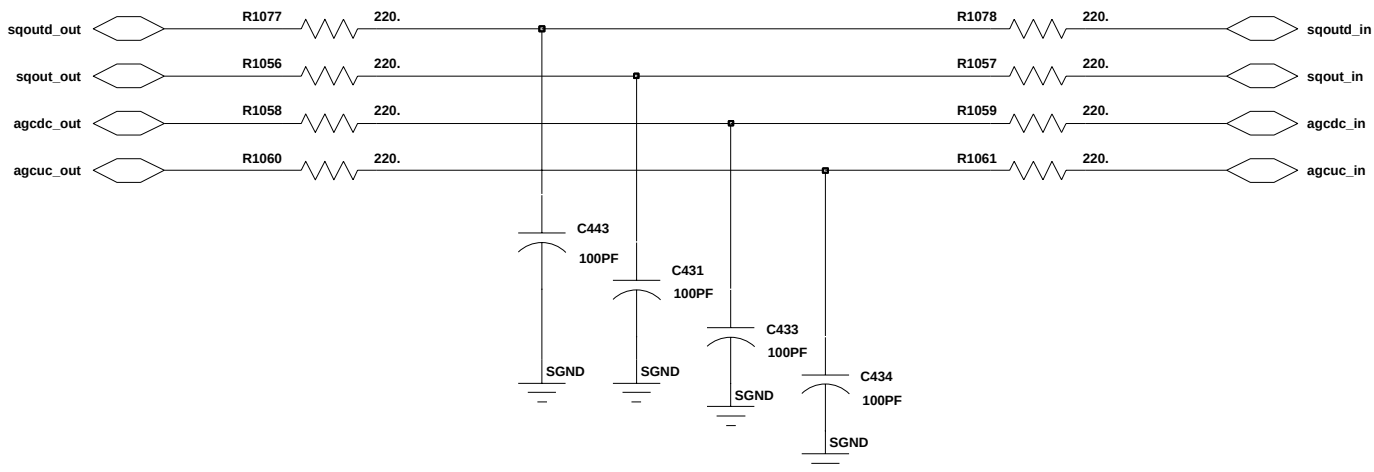
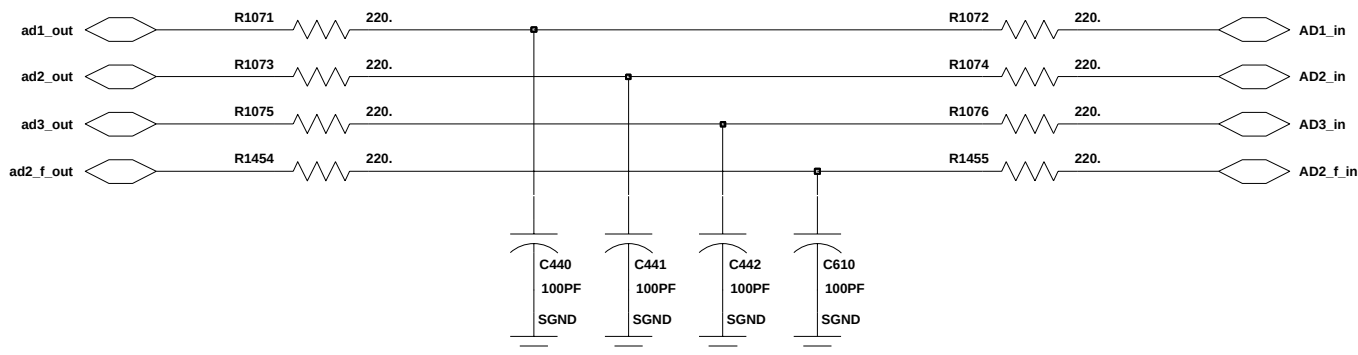
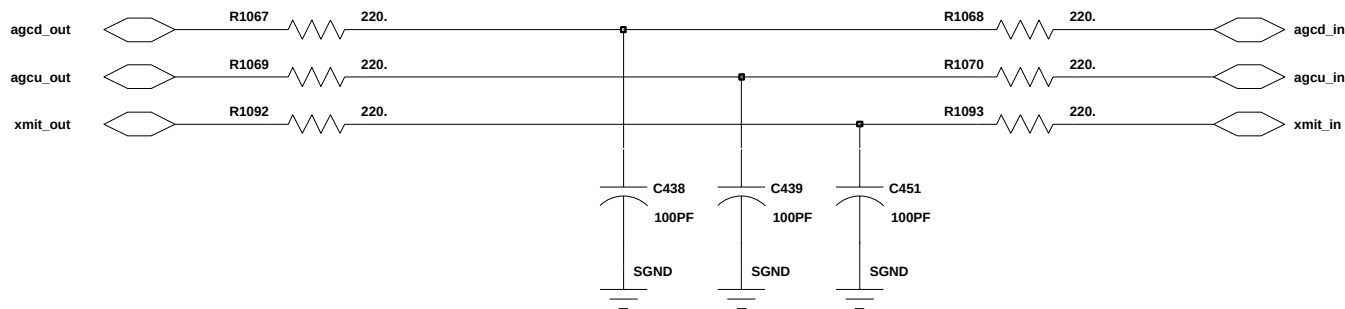
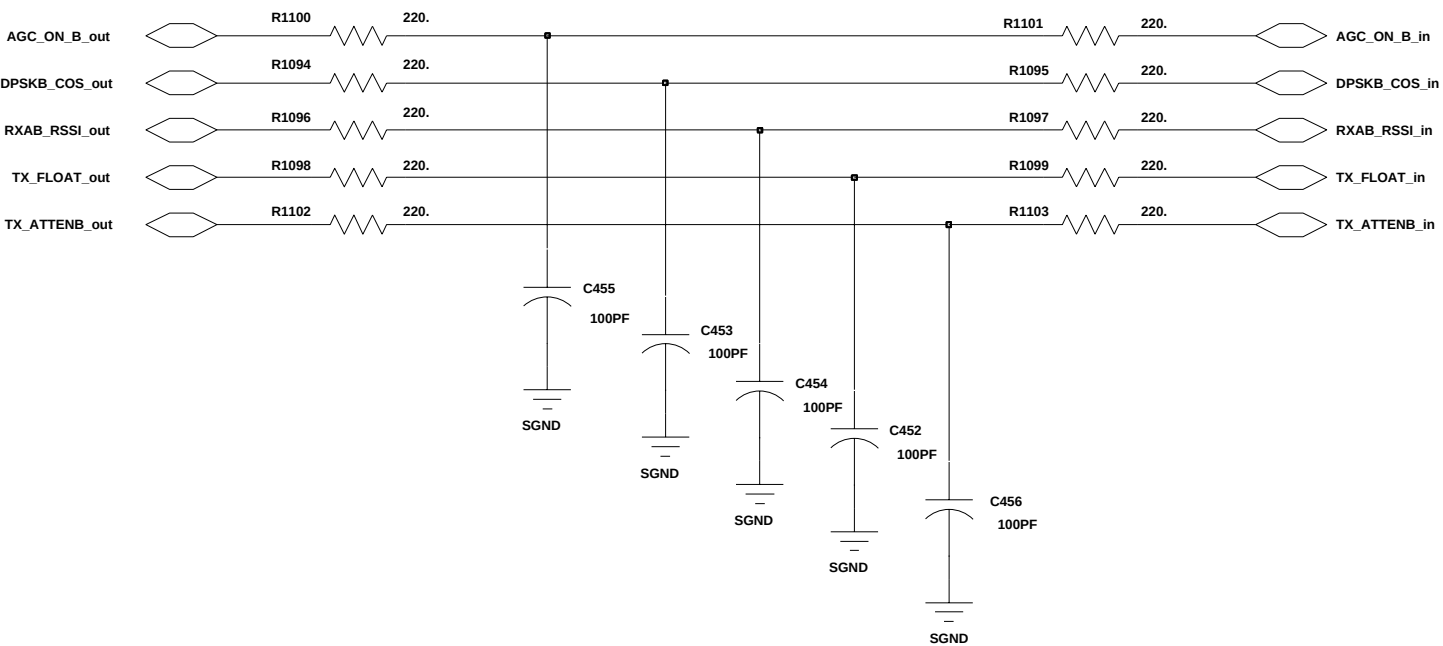
## 2.3

FPGA



## FCN6088A

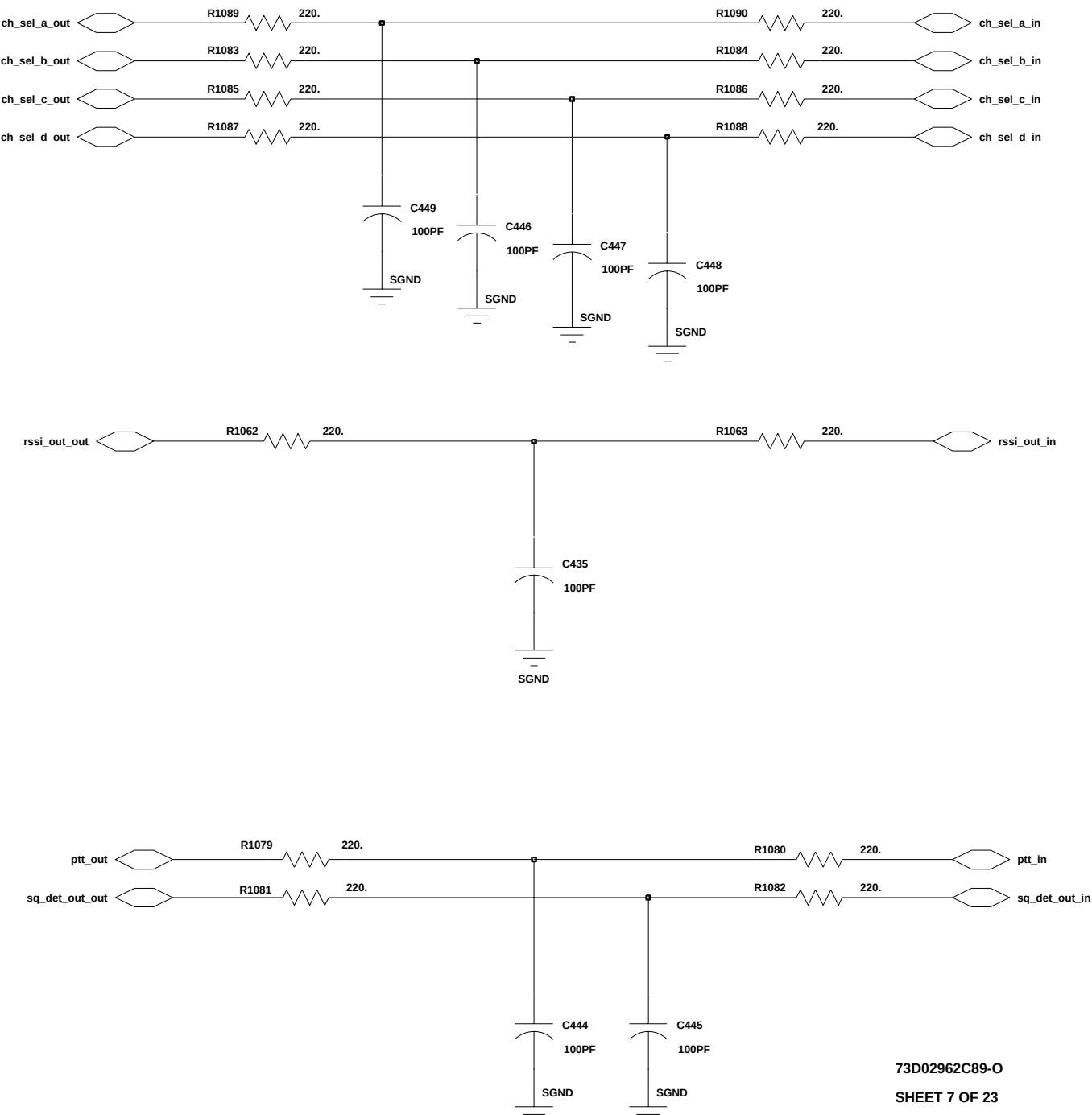




# MOSCAD-M Main Board Filters

FCN6088A

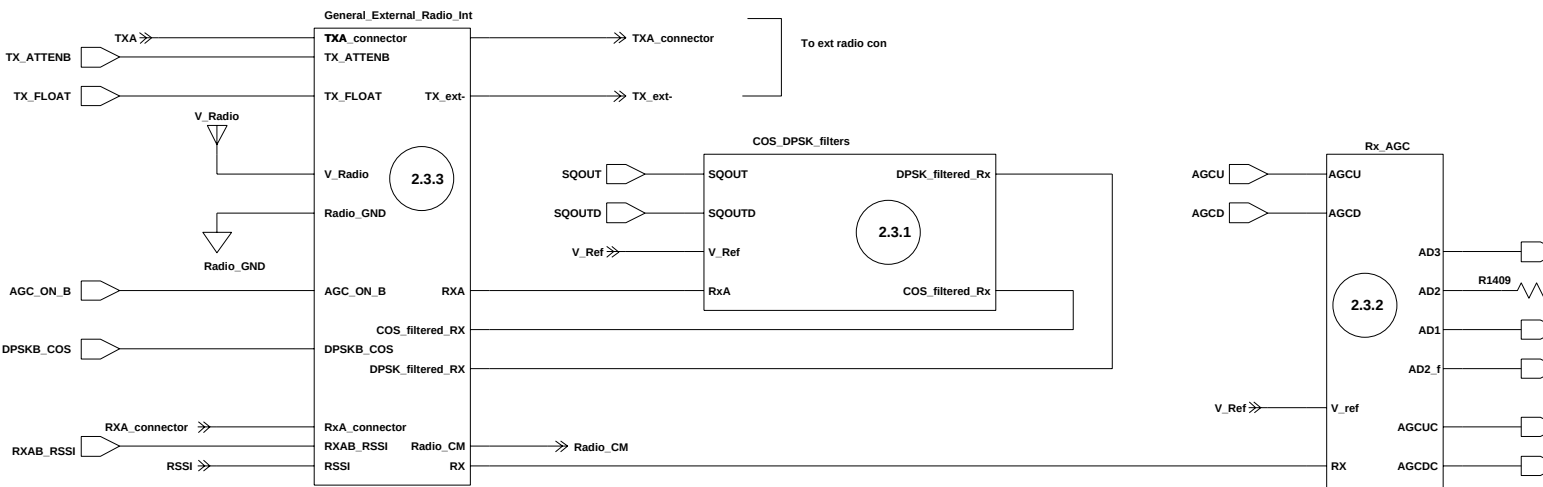
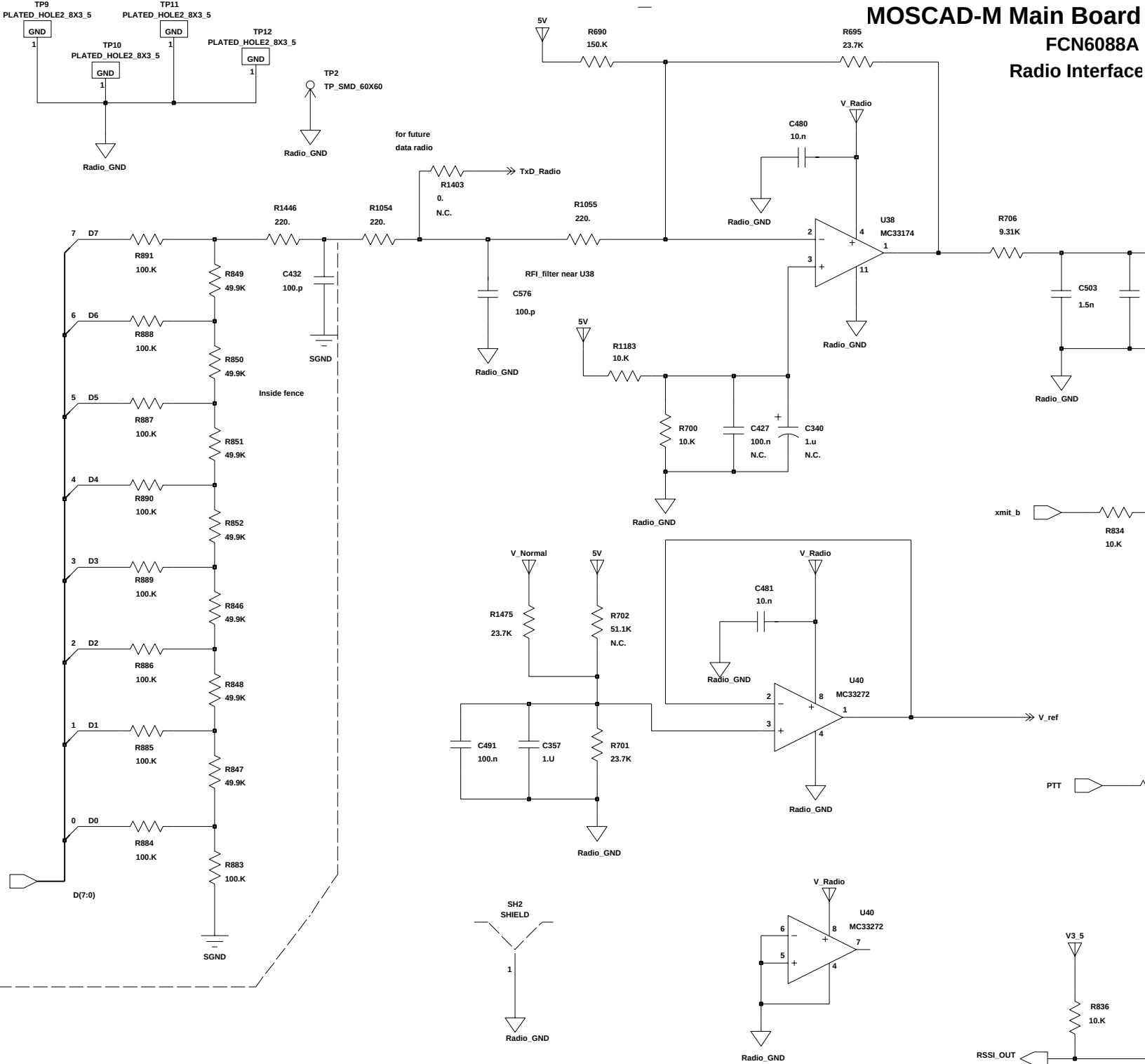
2.2



# MOSCAD-M Main Board

## FCN6088A

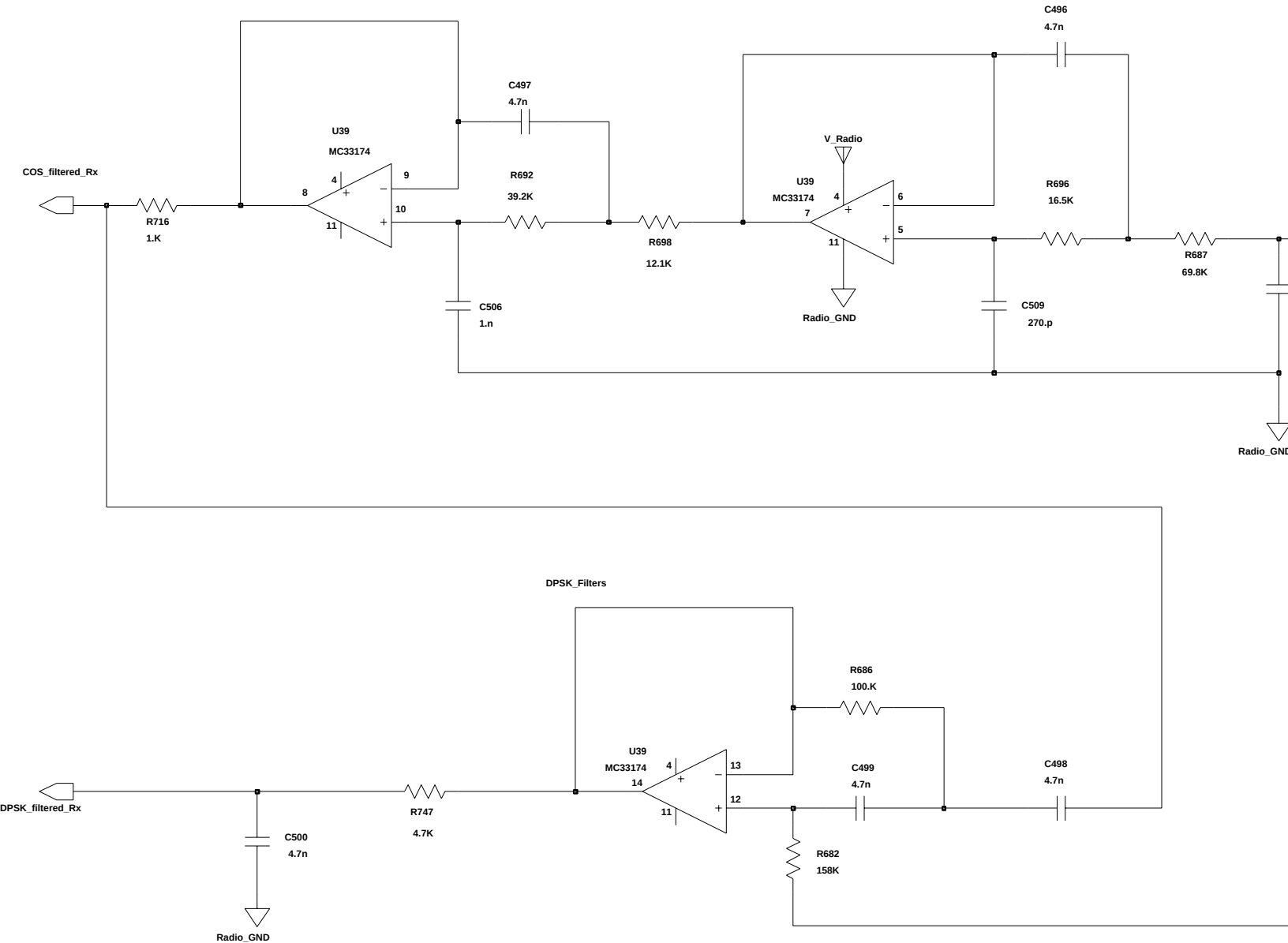
### Radio Interface



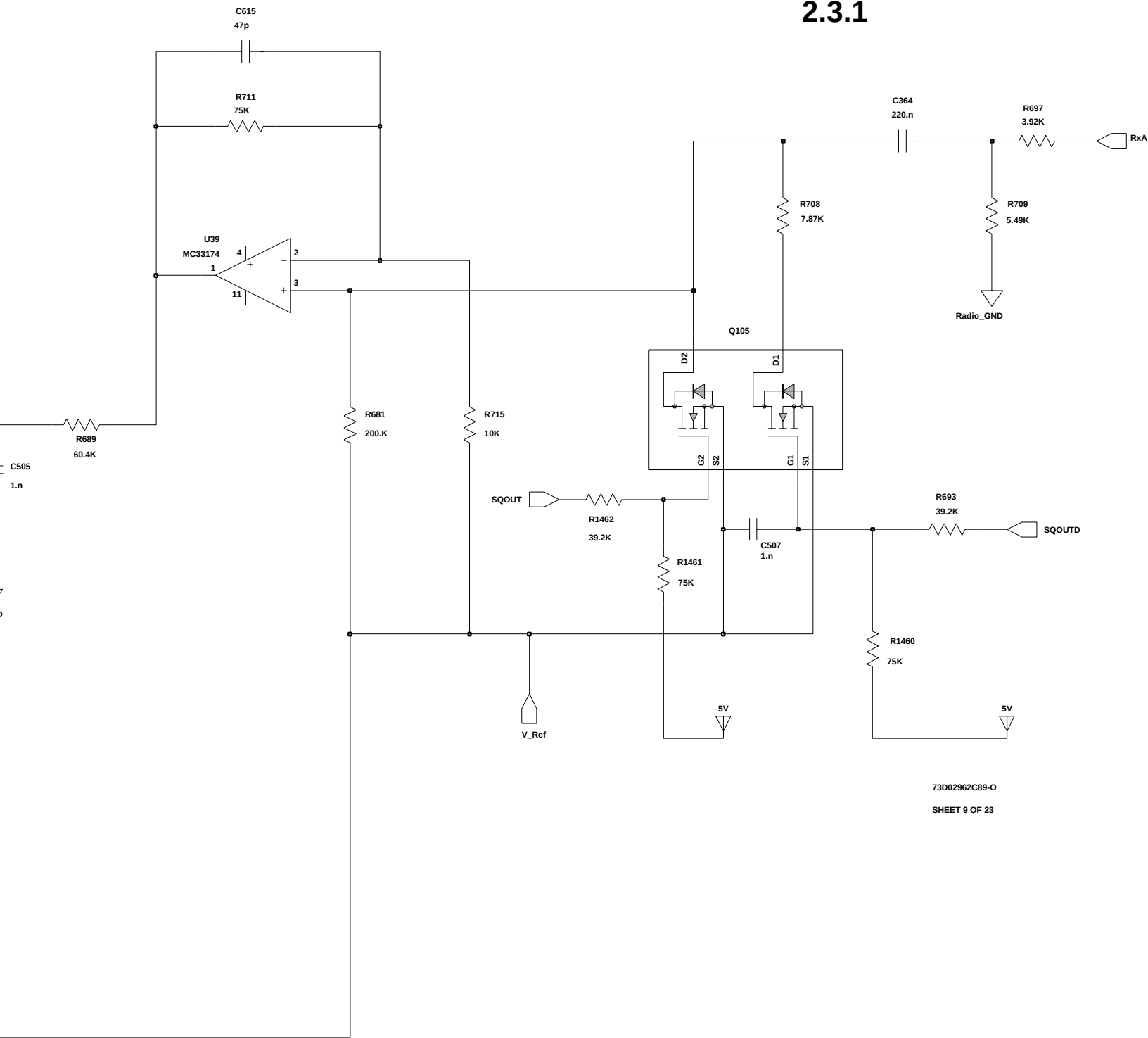


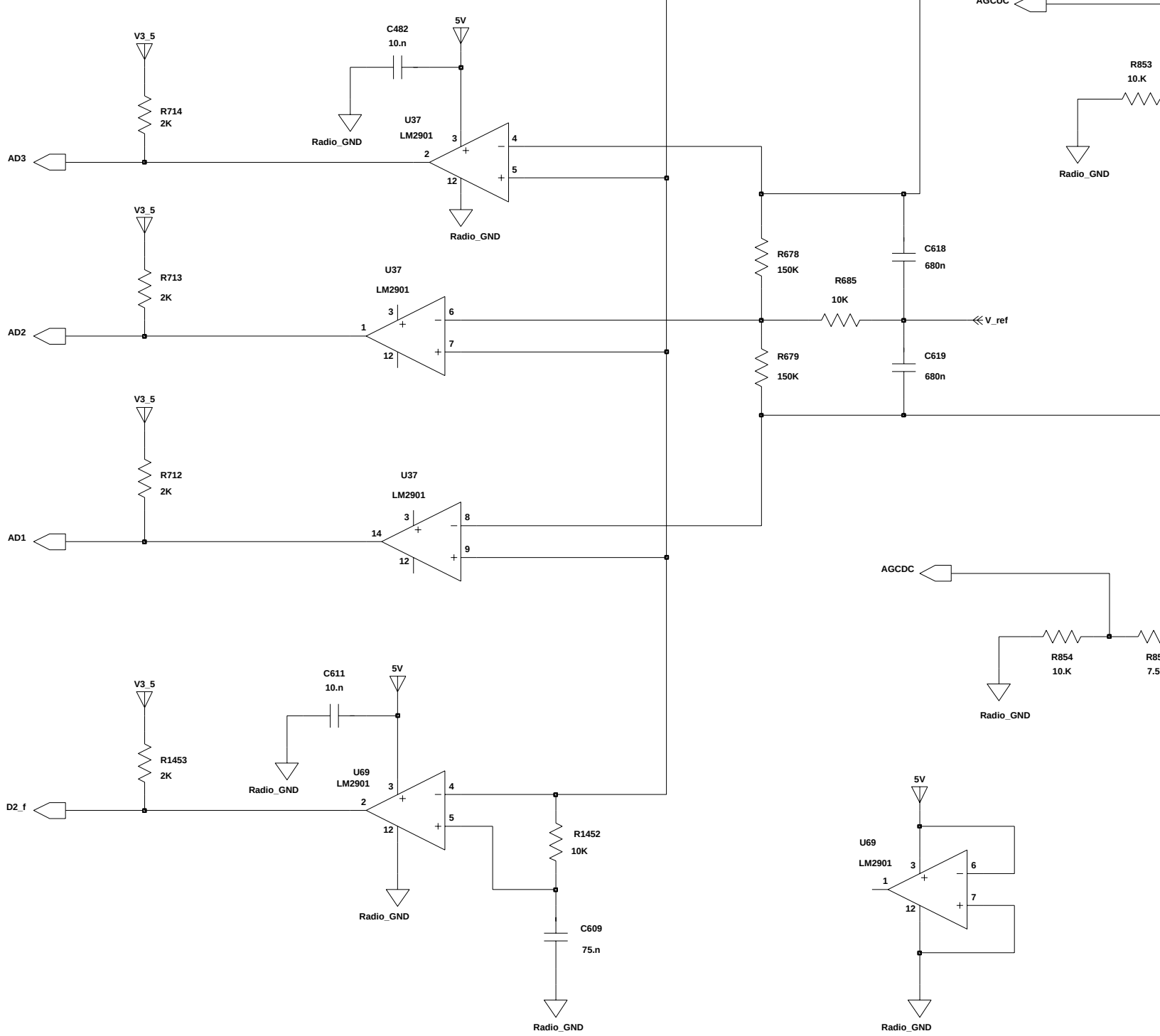
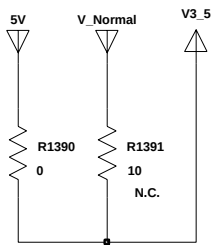
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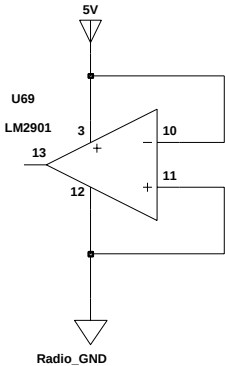
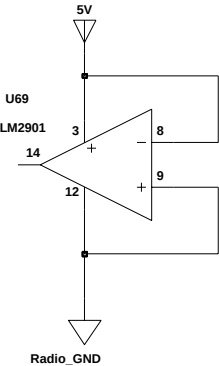
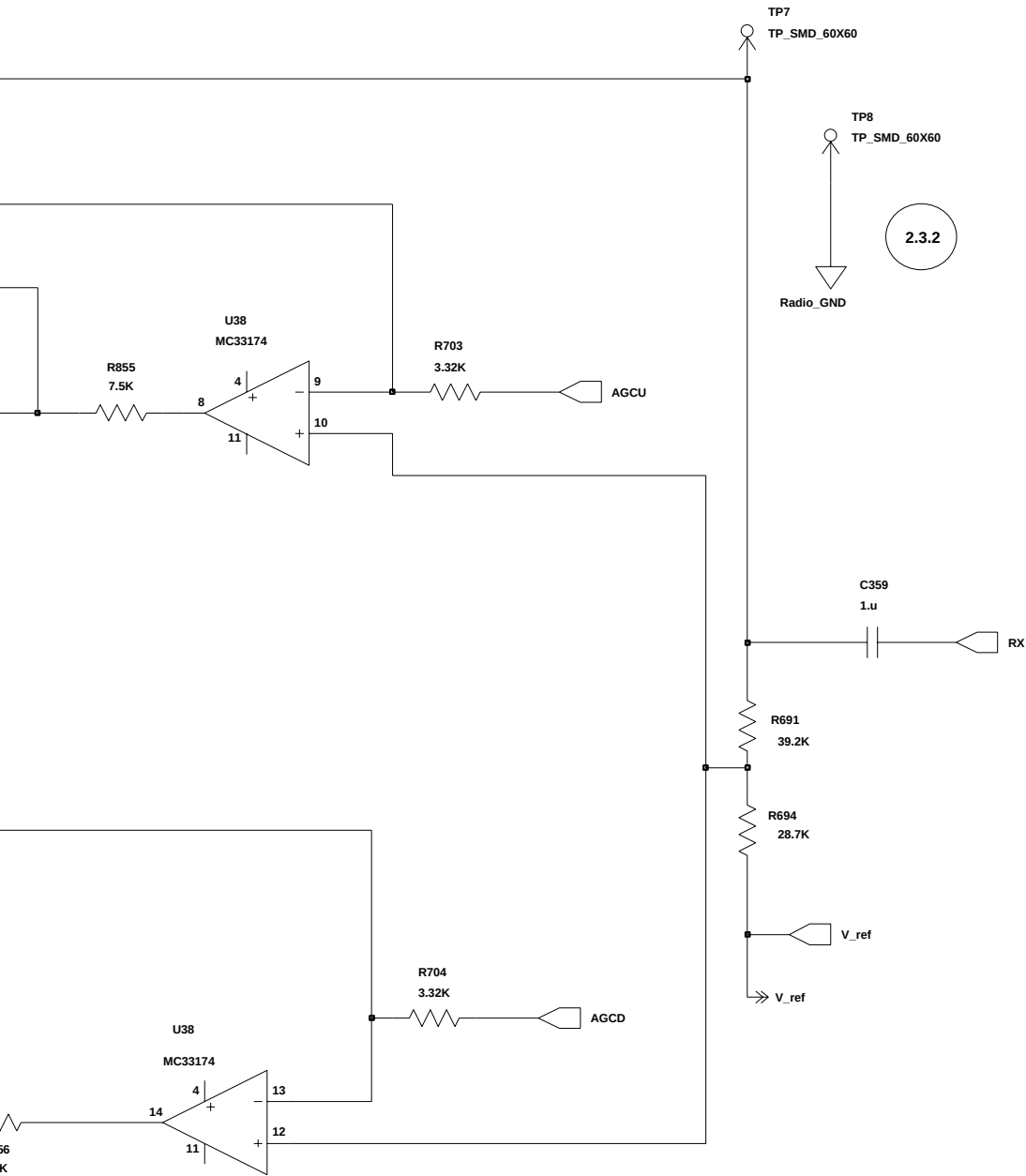
## COS\_Filters



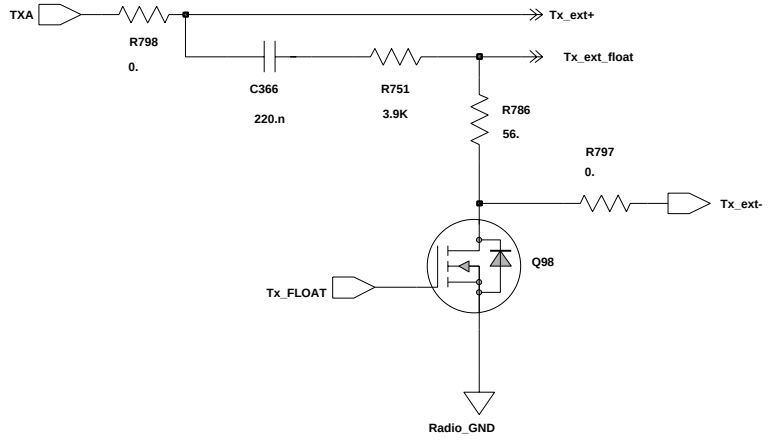
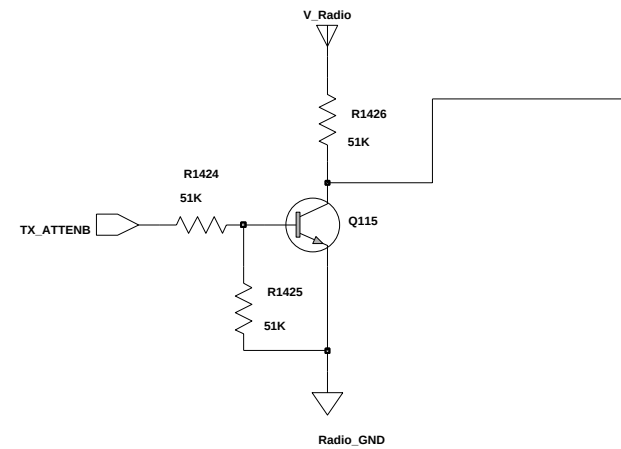
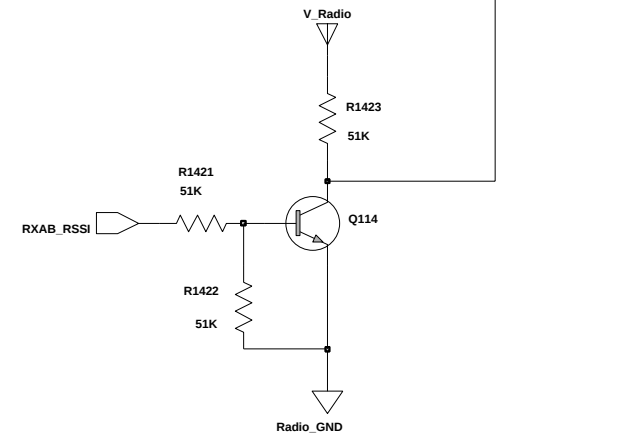
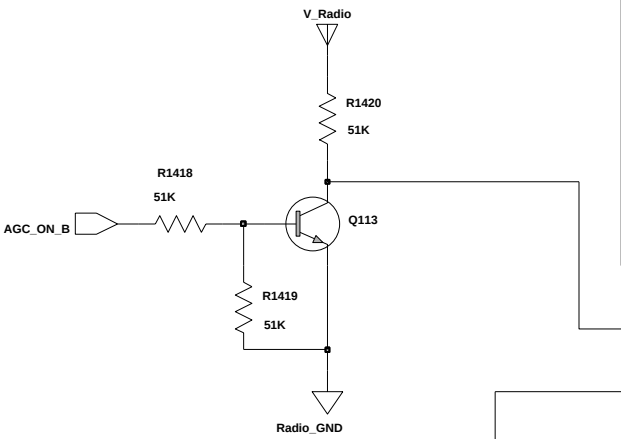
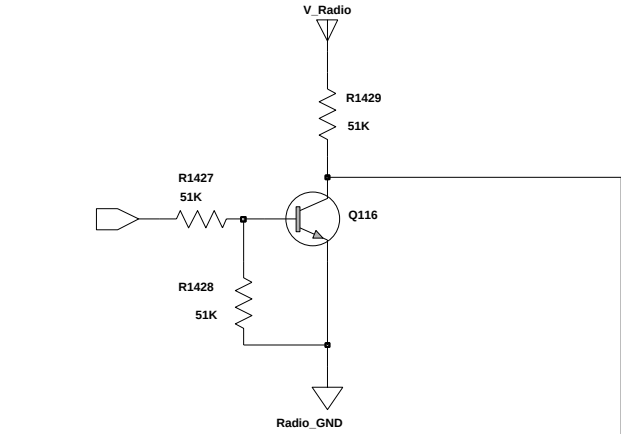
2.3.1



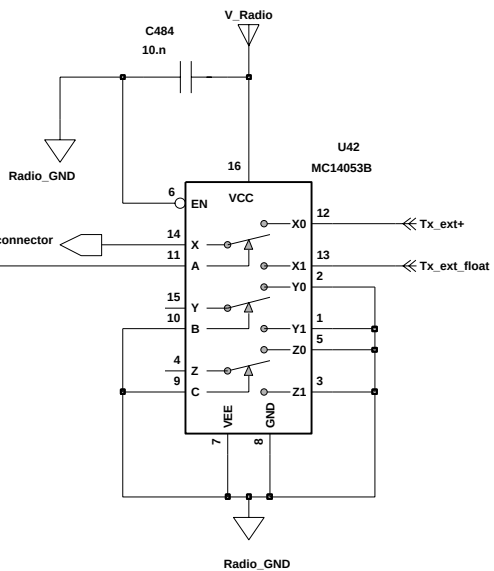
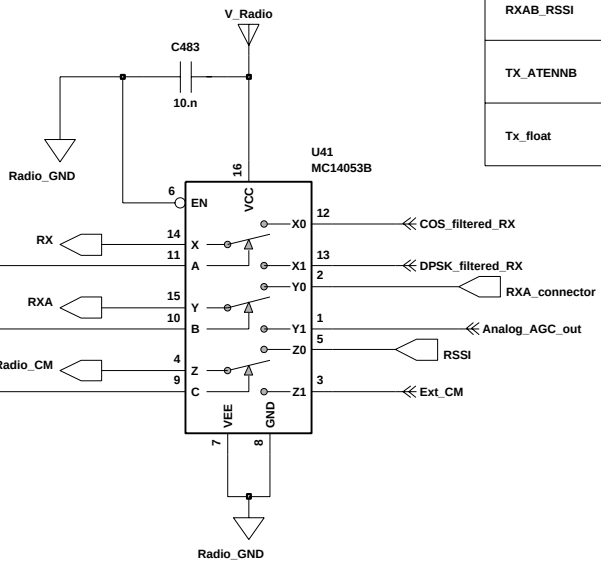




# FCN6088A

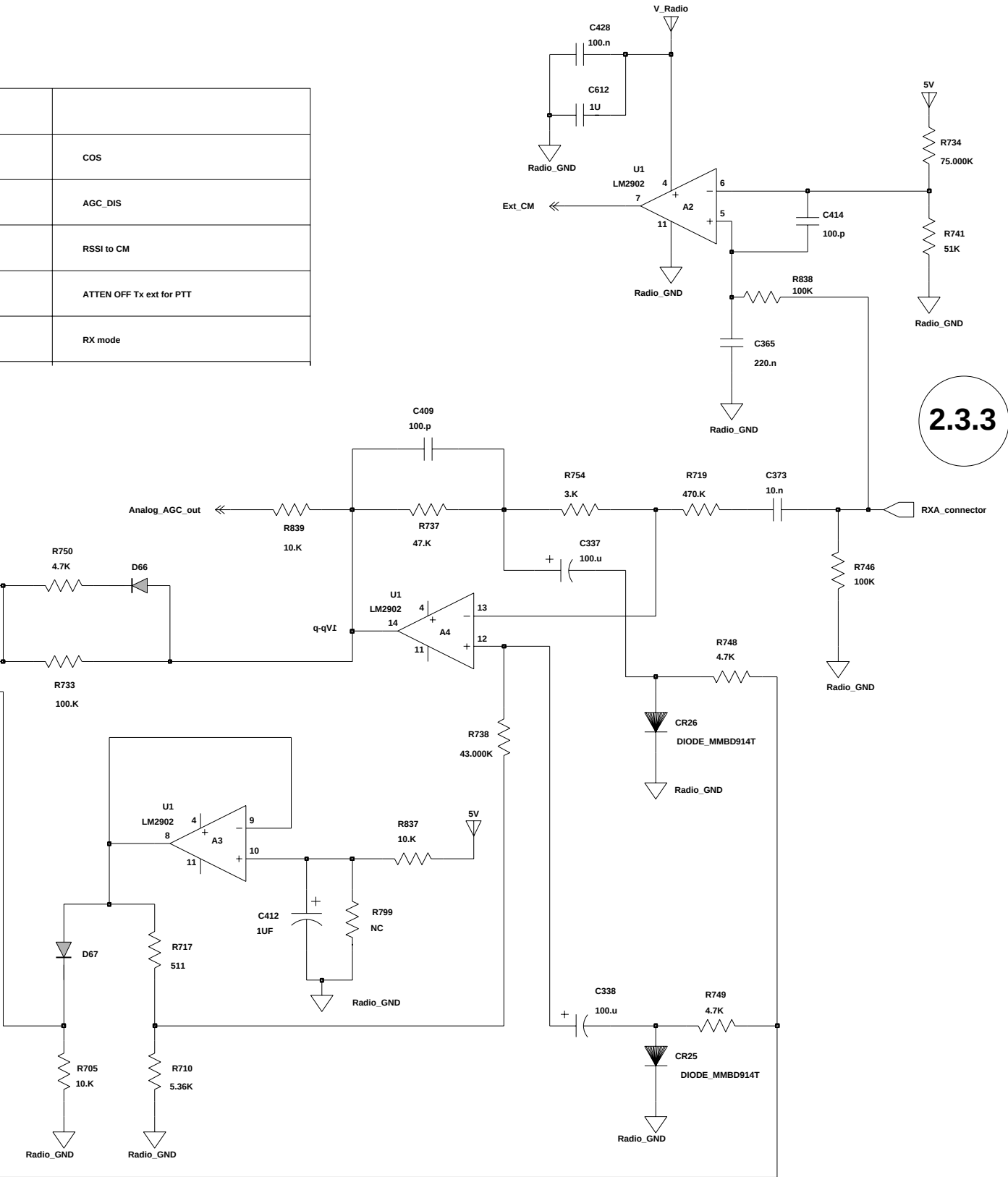


| Name       | 0                   | 1 |
|------------|---------------------|---|
| DPSKB_COS  | DPSK                |   |
| AGC_ON_B   | AGC_EN              |   |
| RXAB_RSSI  | RX line to CM       |   |
| TX_ATTENNB | ATTEN ON for GP320  |   |
| Tx_float   | GND discon PTTon Tx |   |



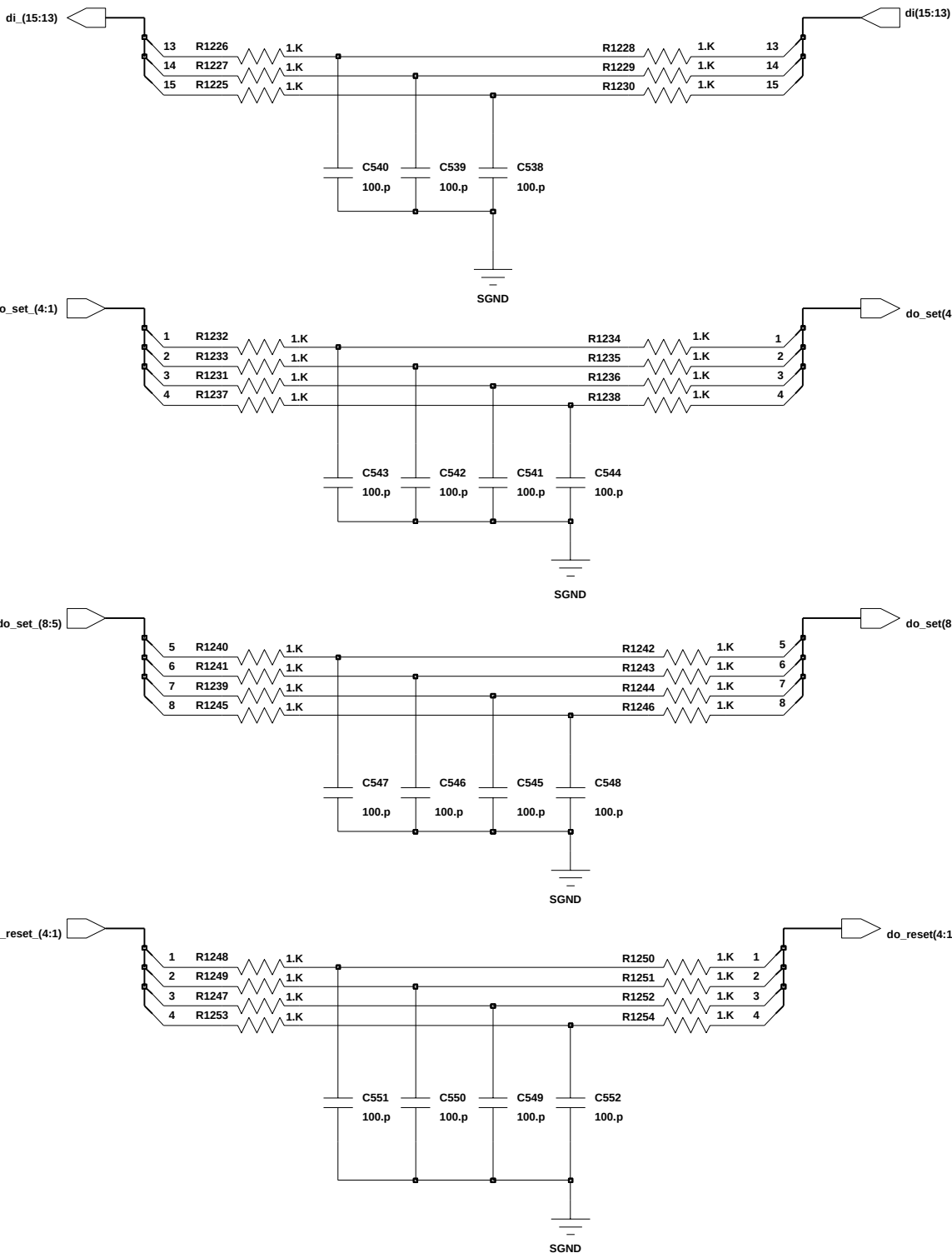
gen\_radio\_interface

|  |                          |
|--|--------------------------|
|  |                          |
|  | COS                      |
|  | AGC_DIS                  |
|  | RSSI to CM               |
|  | ATTEN OFF Tx ext for PTT |
|  | RX mode                  |

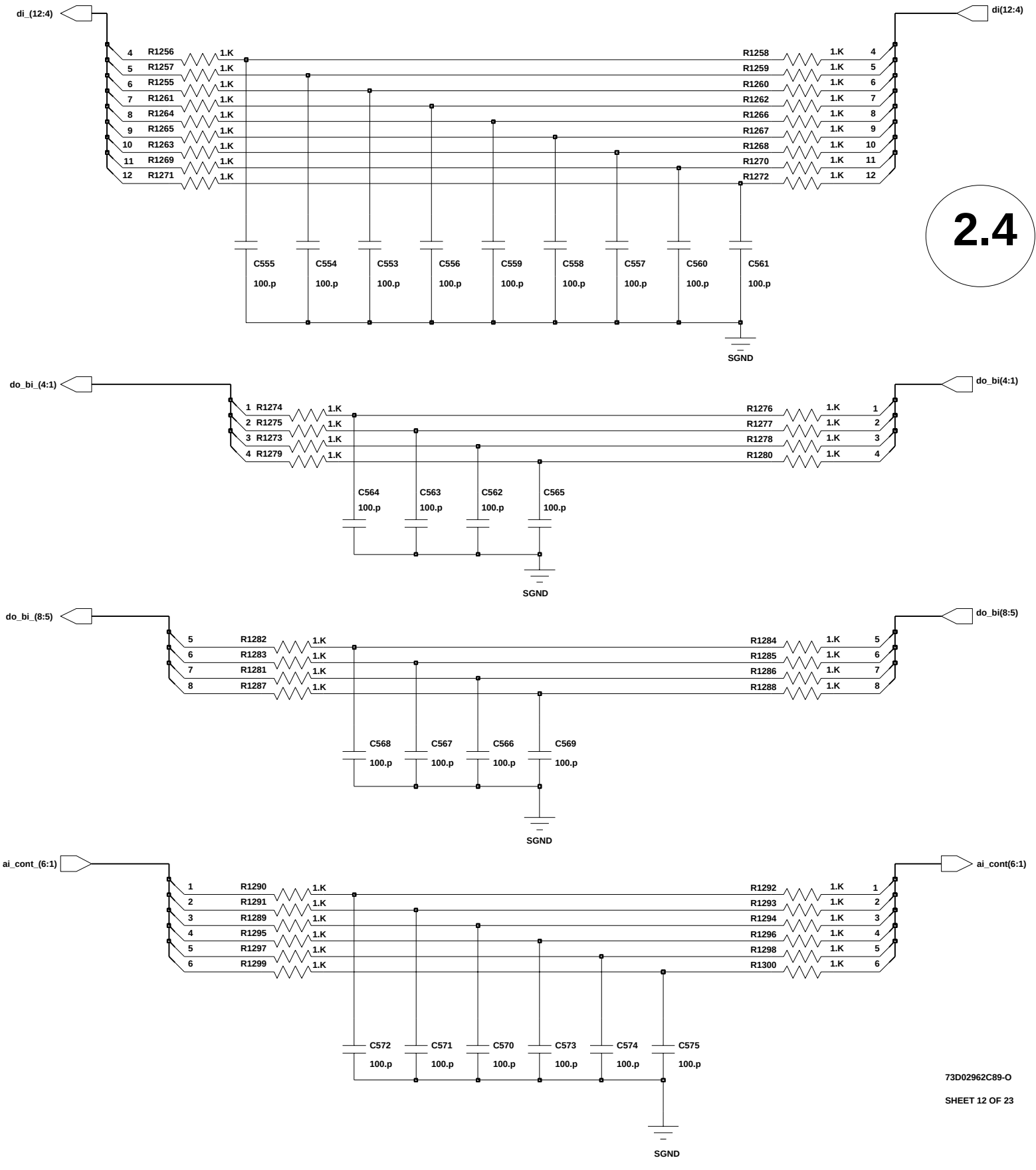


# MOSCAD-M Main Board

## FCN6088A



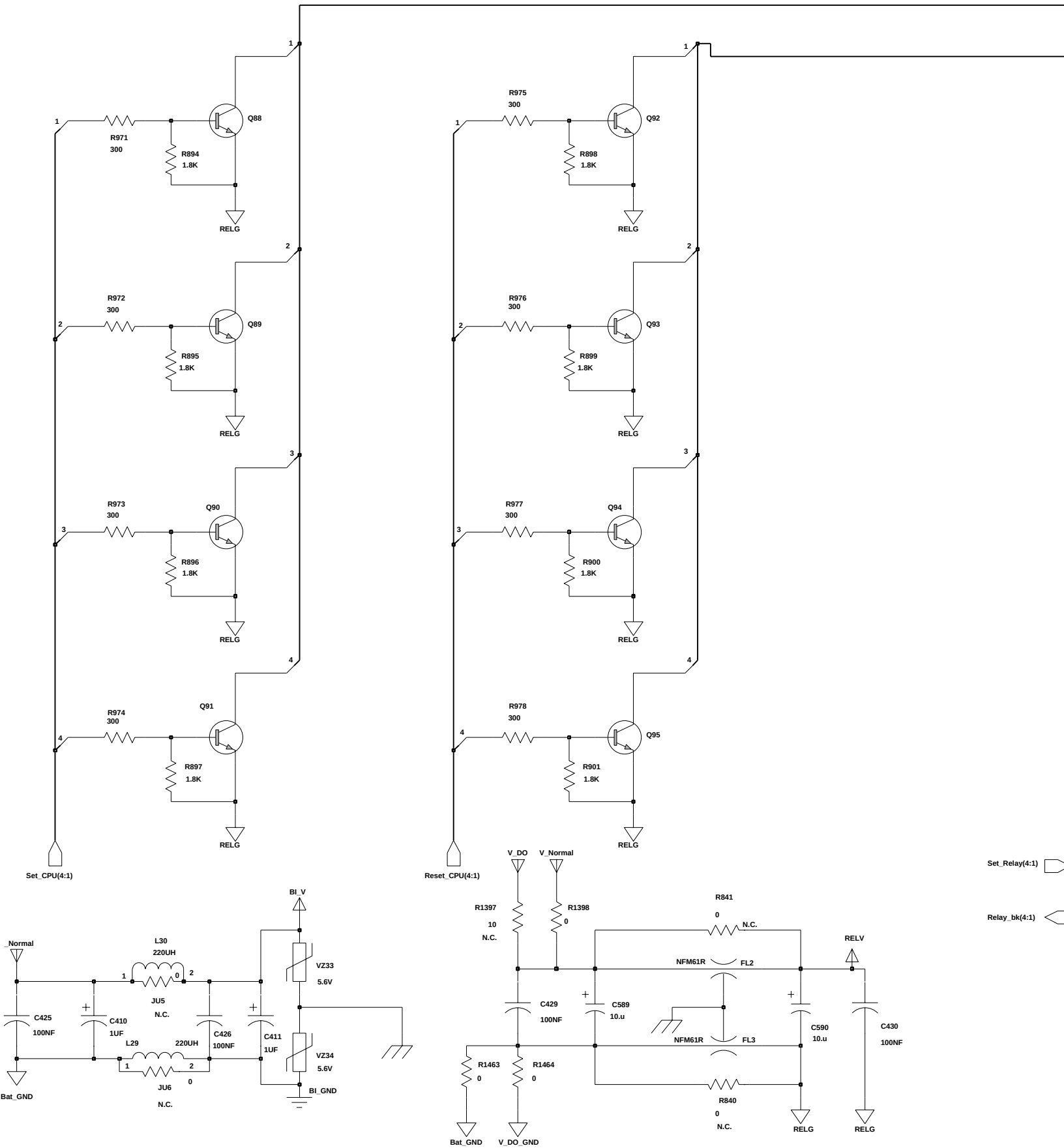
2.4



Moscad-M

8486418T01\_P1

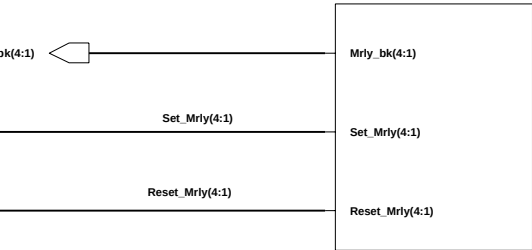
4 DO + 4 DO OC



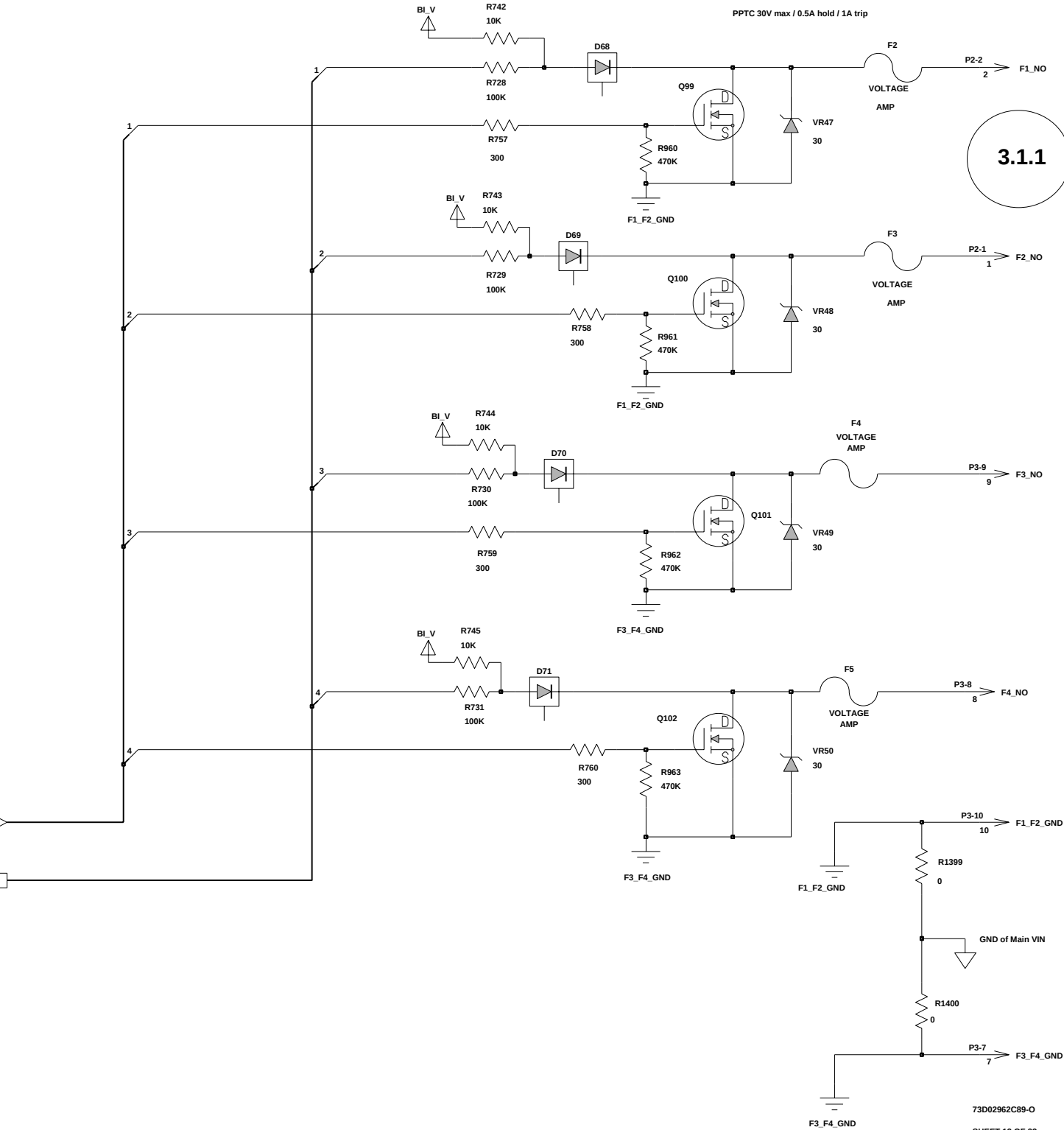
digital output

# MOSCAD-M Main Board

FCN6088A

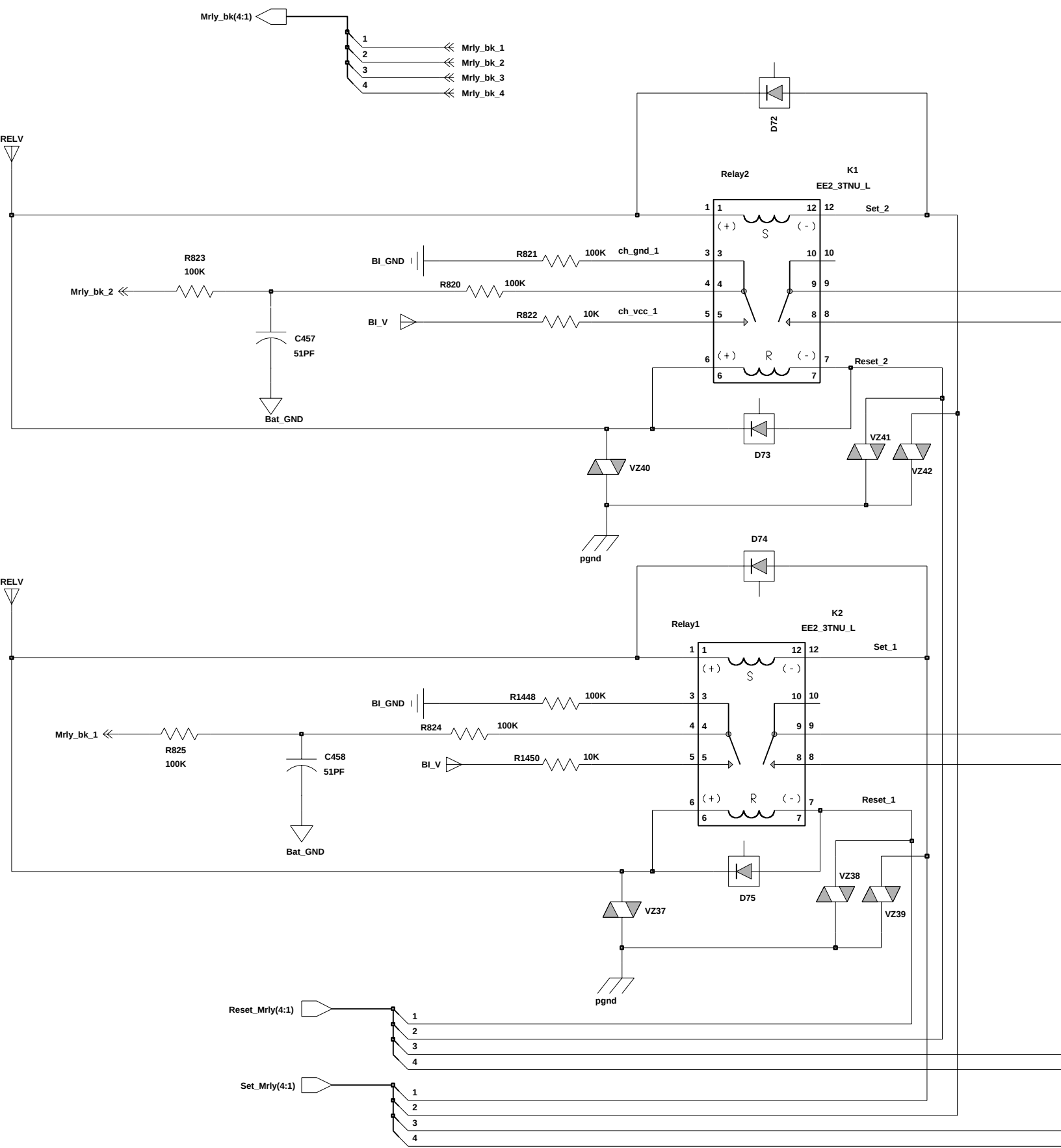


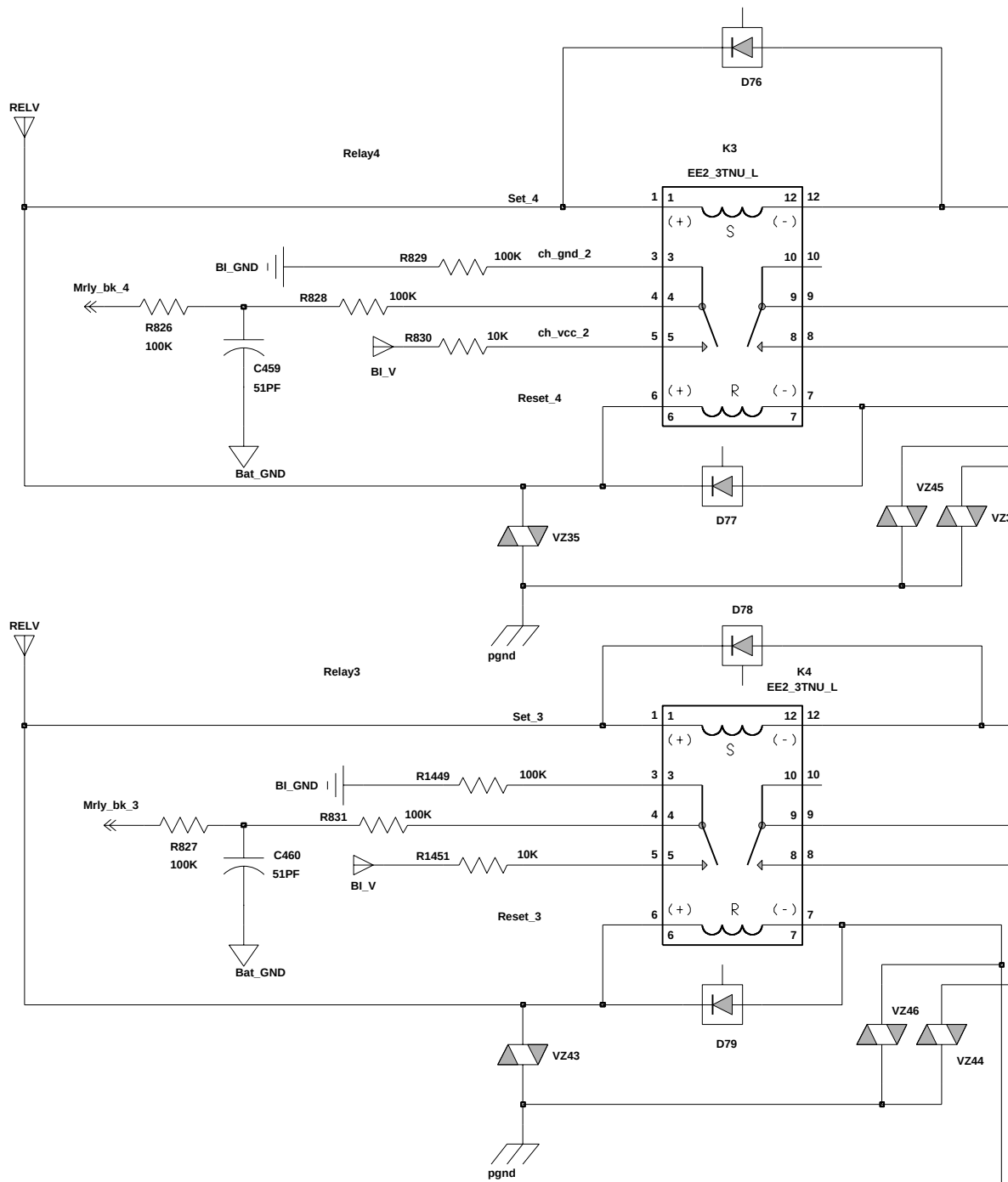
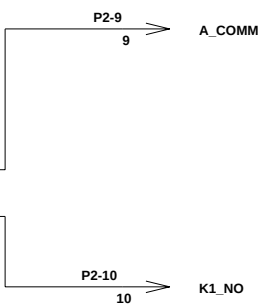
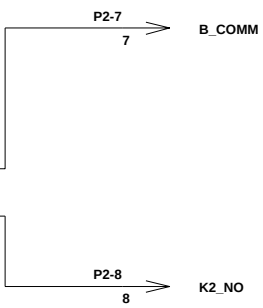
3.1.2



3.1.1

# Digital\_output 1-4

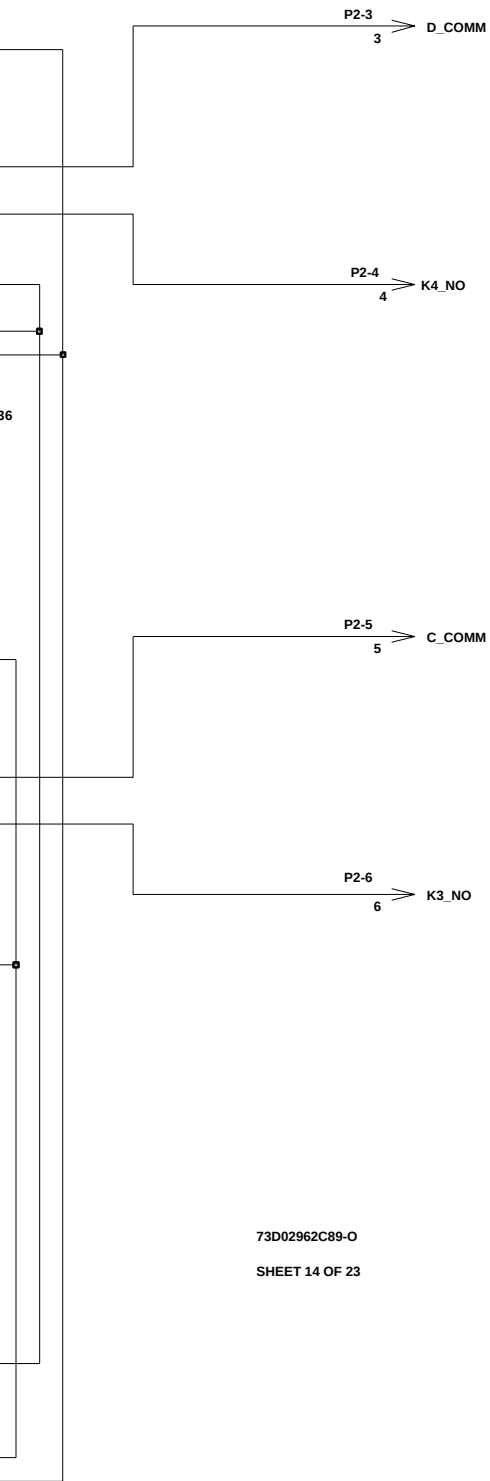




# MOSCAD-M Main Board

## FCN6088A

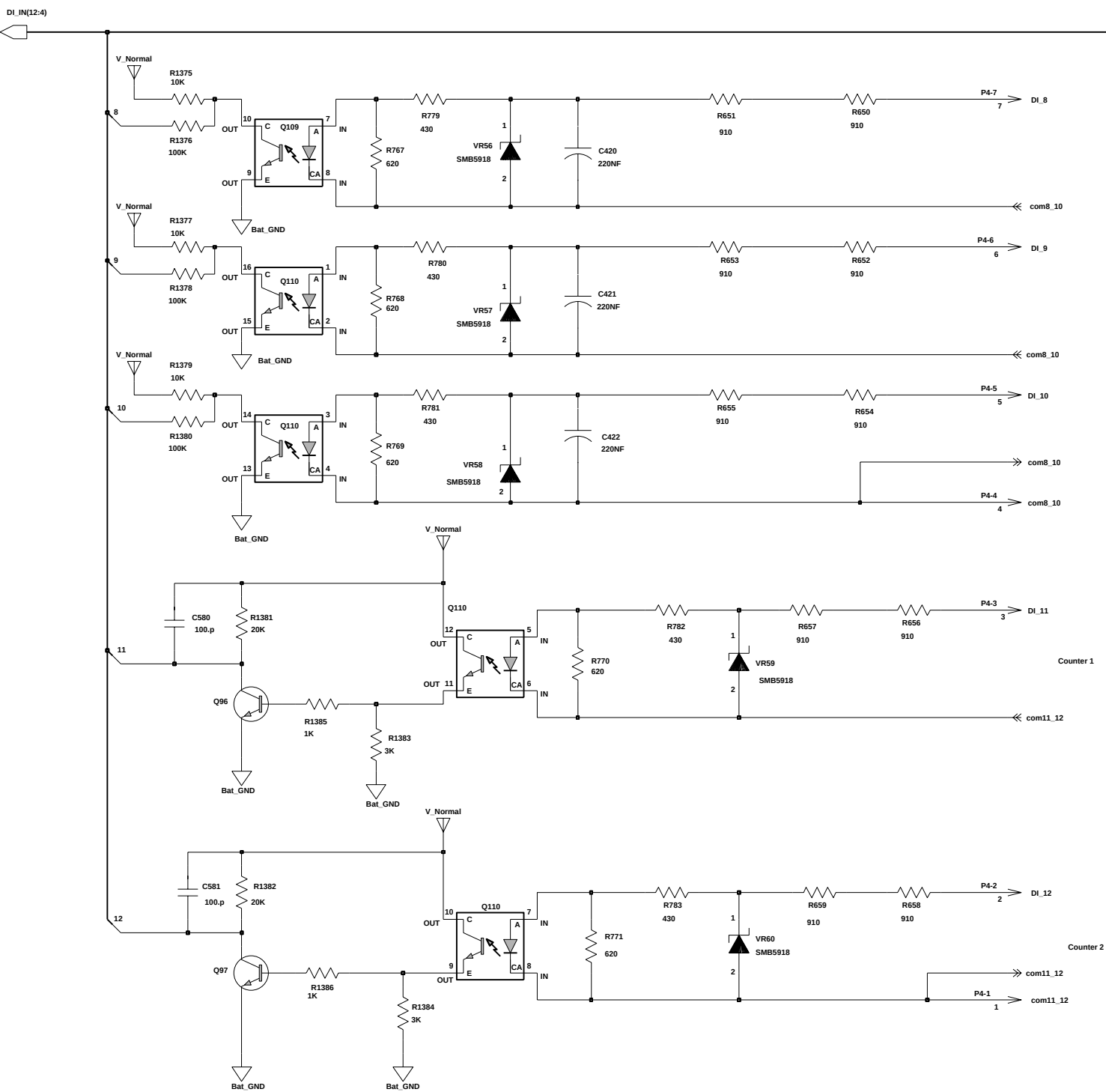
3.1.2

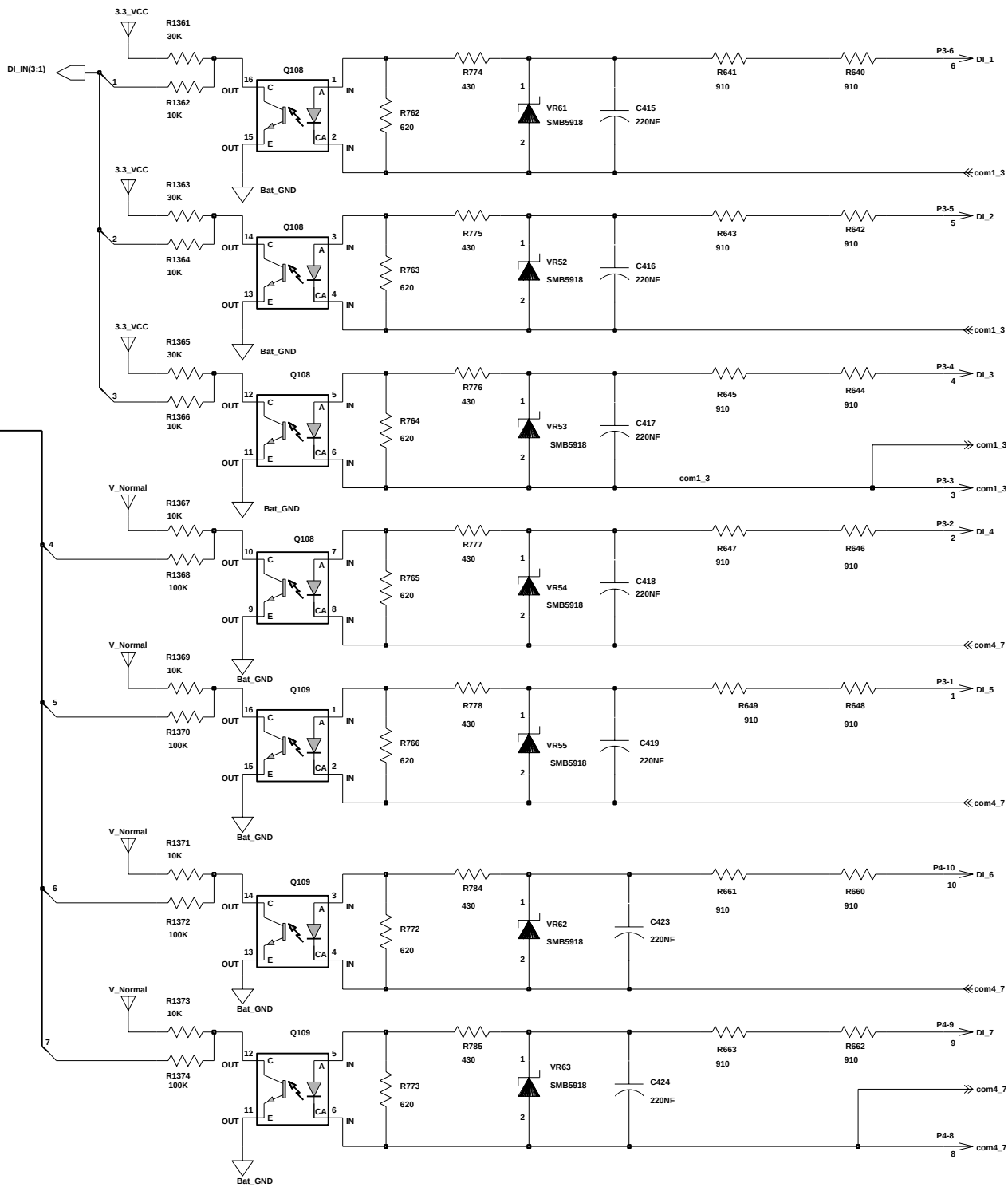


# MOSCAD-M Main Board

## FCN6088A

### Digital Inputs

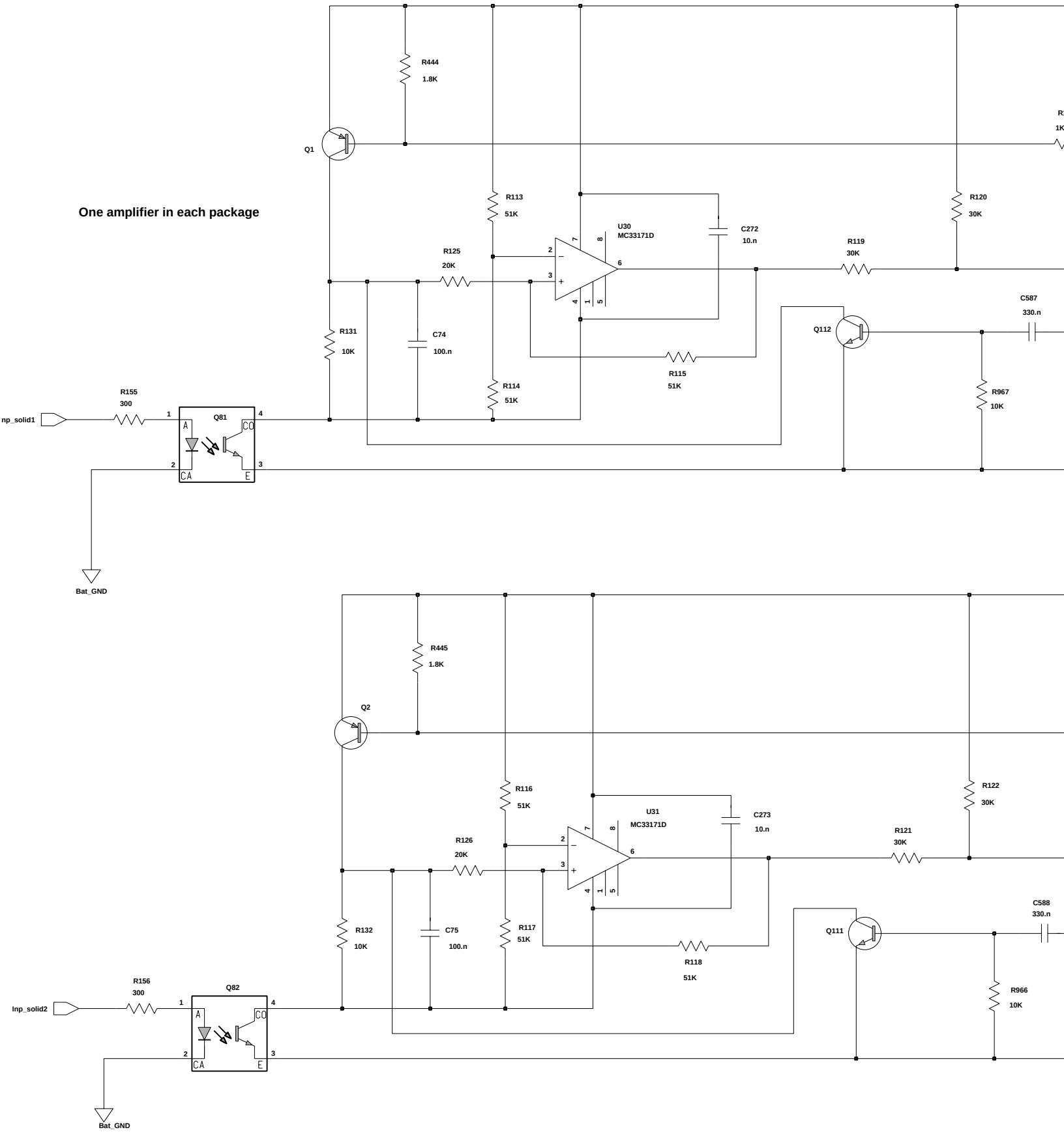




# SOLID\_STATE

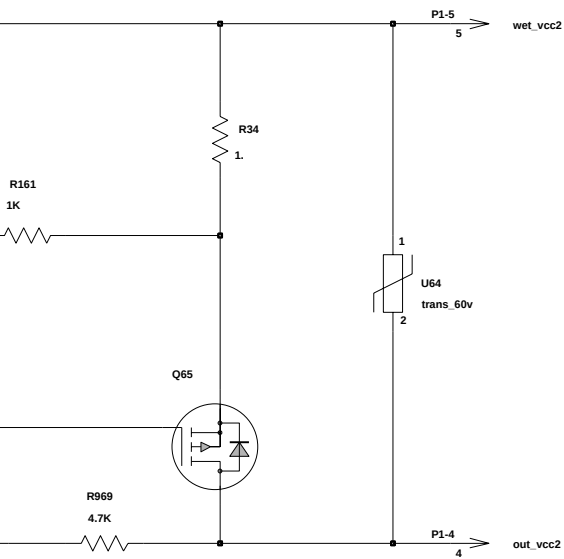
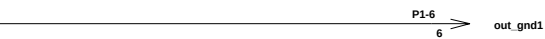
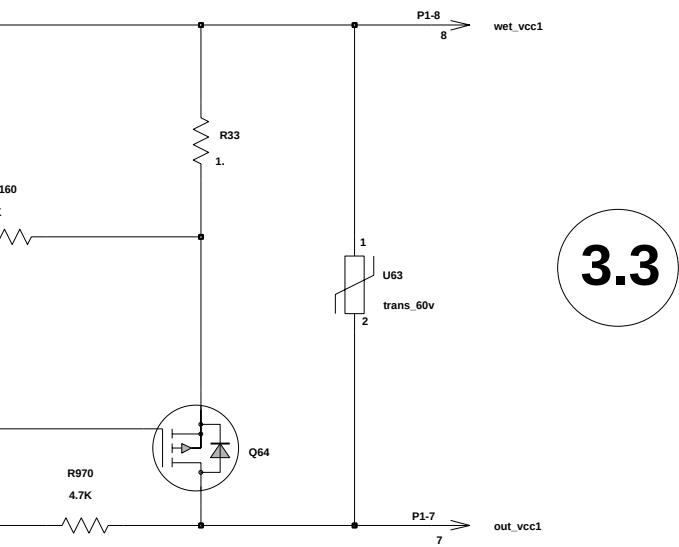
## OUTPUT

One amplifier in each package

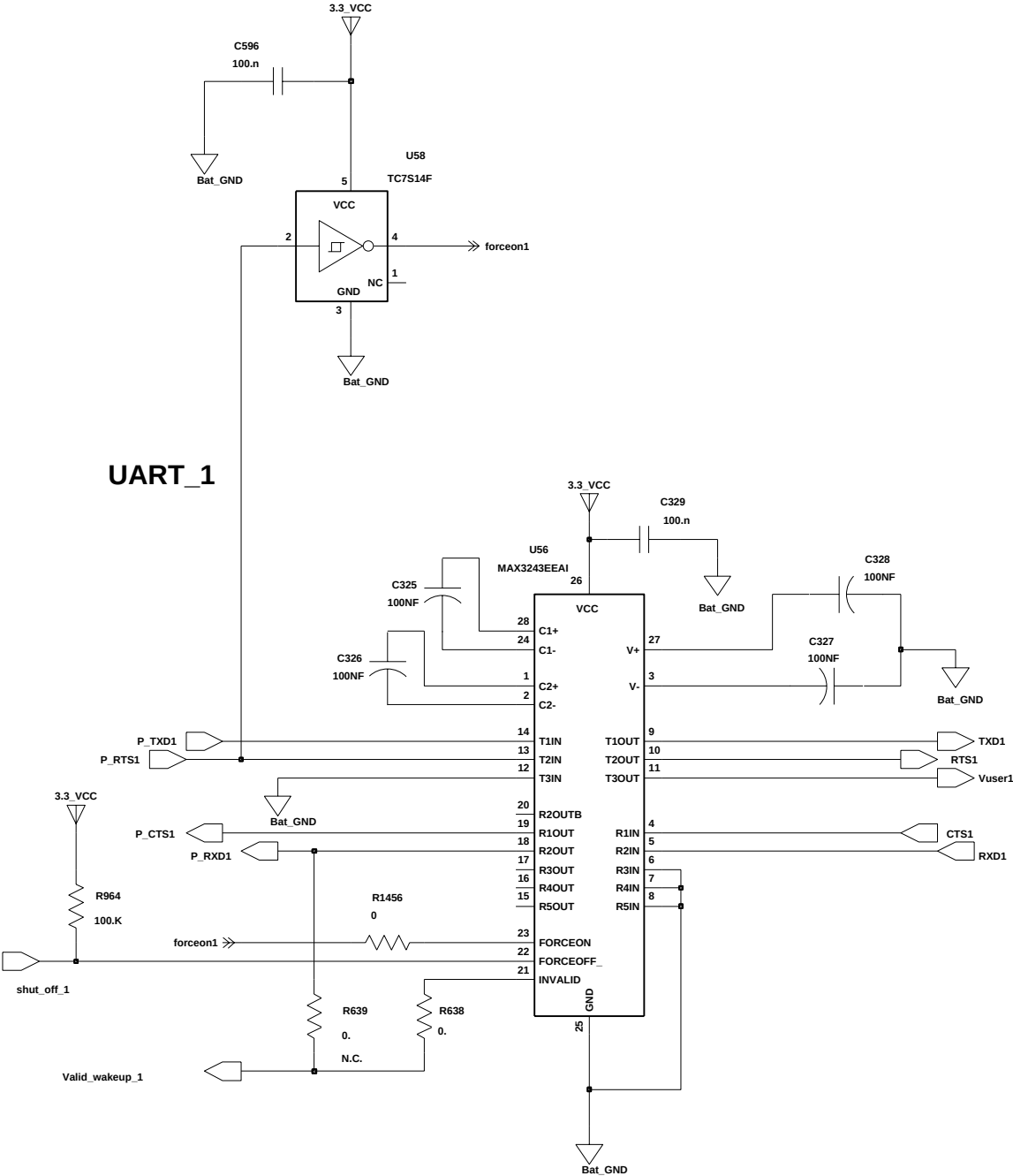


# MOSCAD-M Main Board

FCN6088A

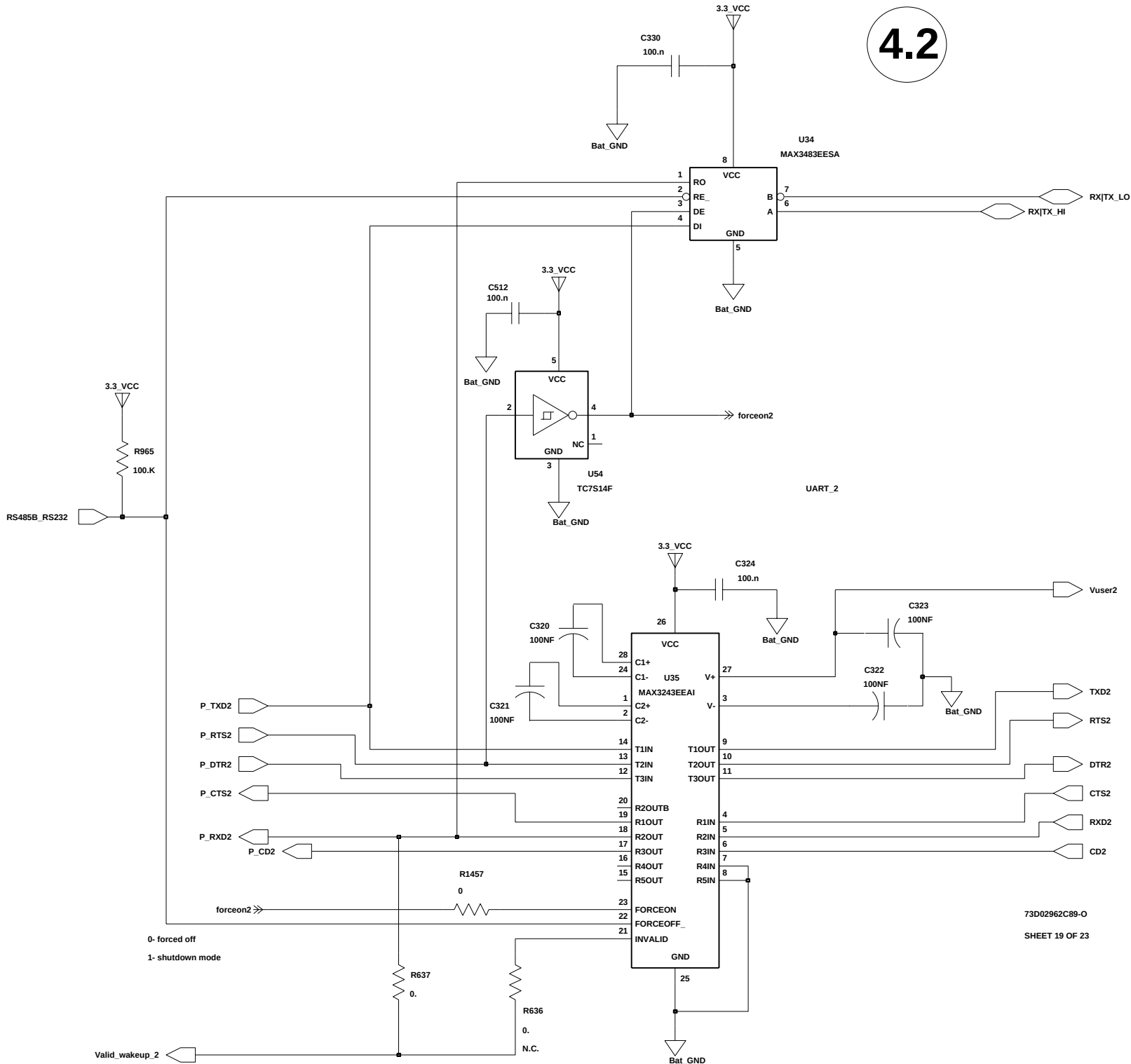


PORT\_1-ToolBox



## PORT\_2-User Port

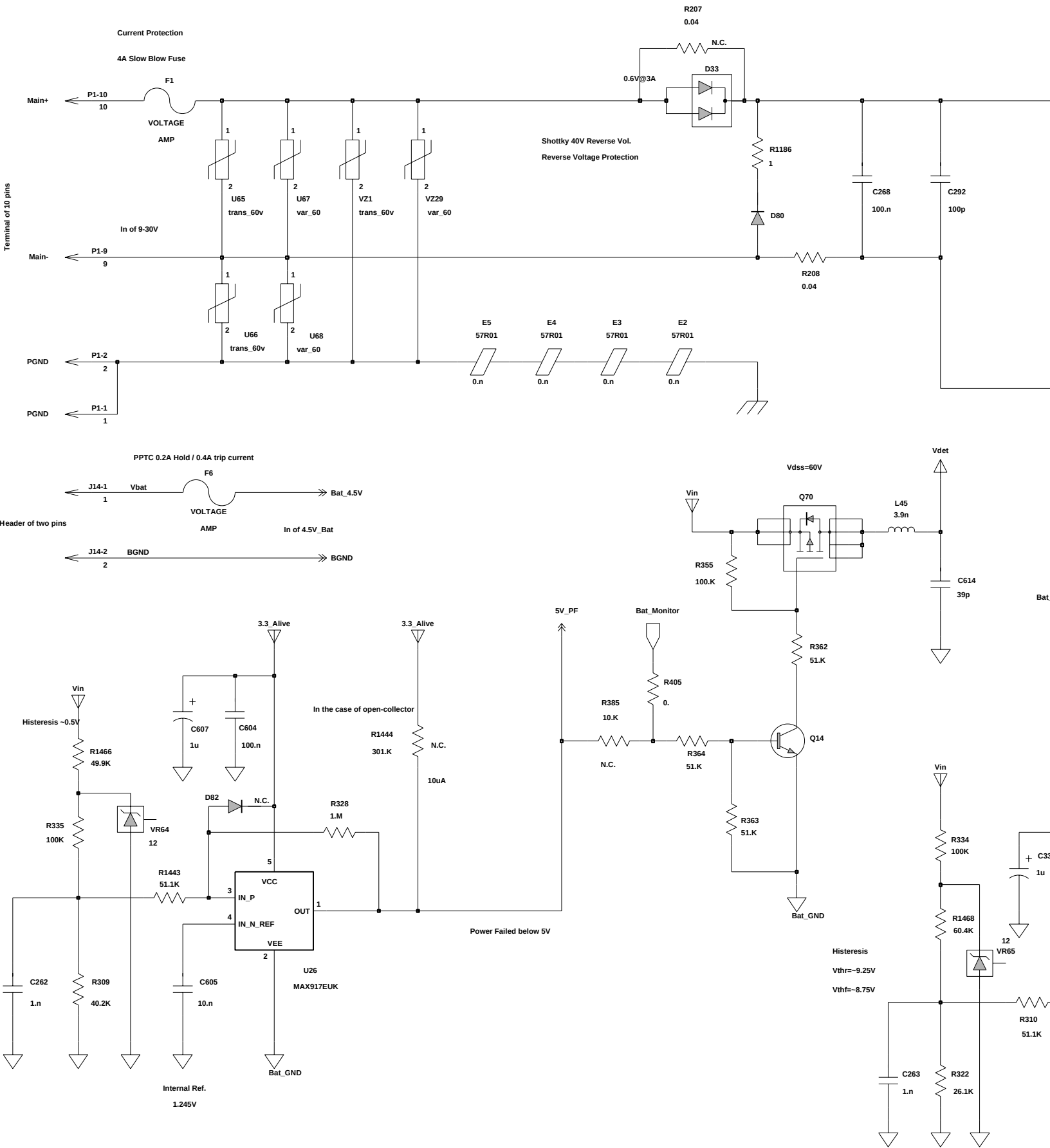
4.2



# MOSCAD-M Main Board

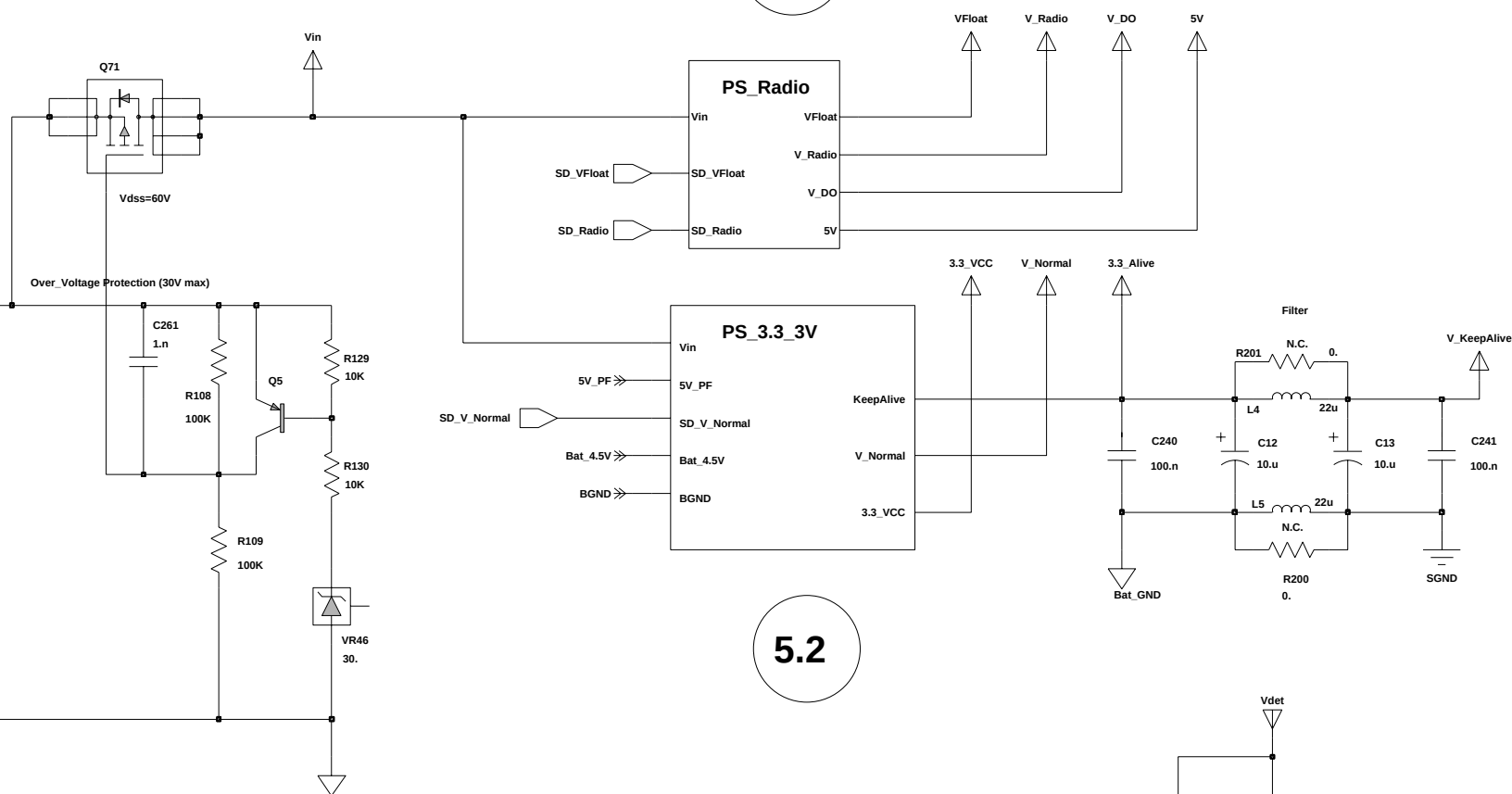
## FCN6088A

# Main Power Su

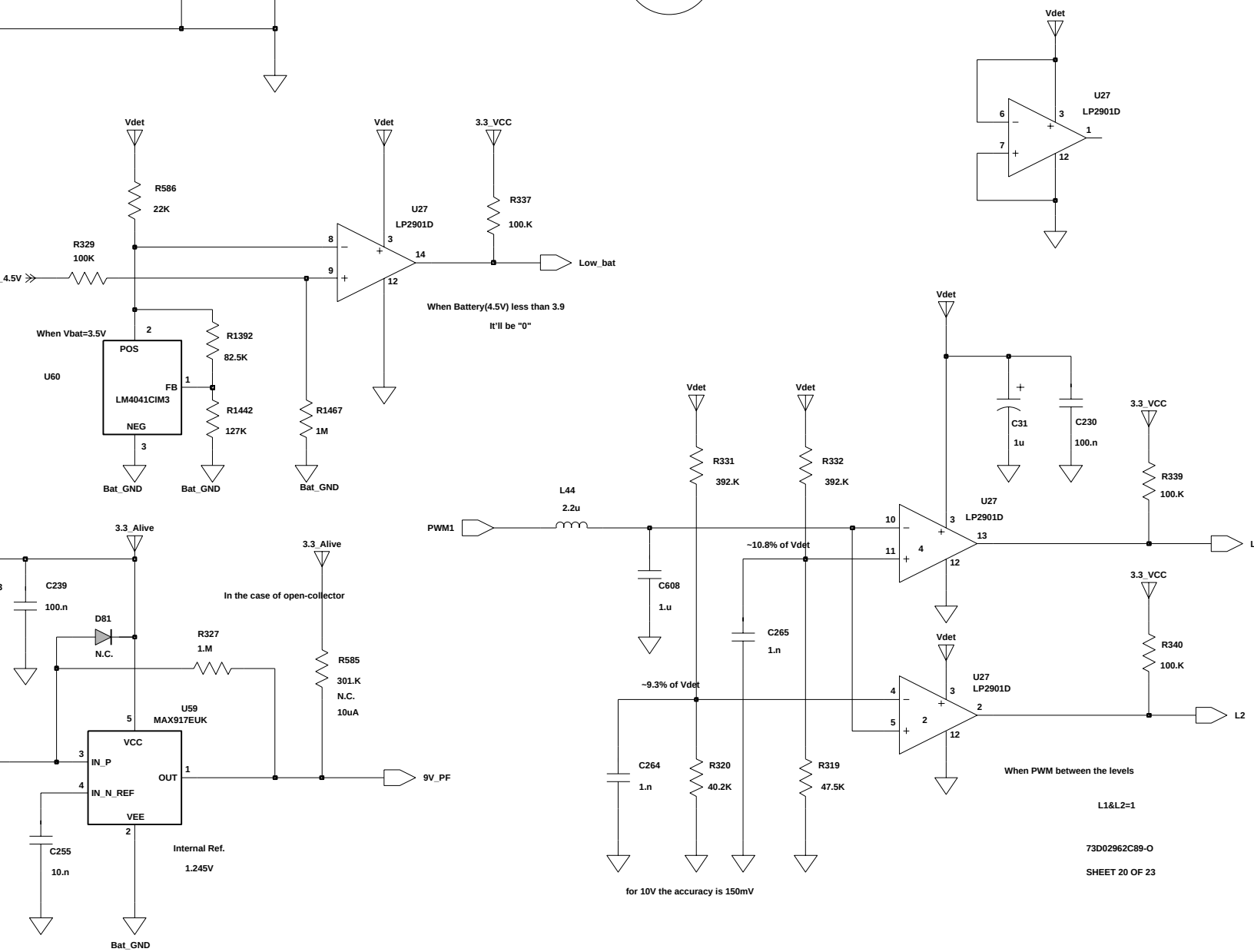


**pply**

## 5.1

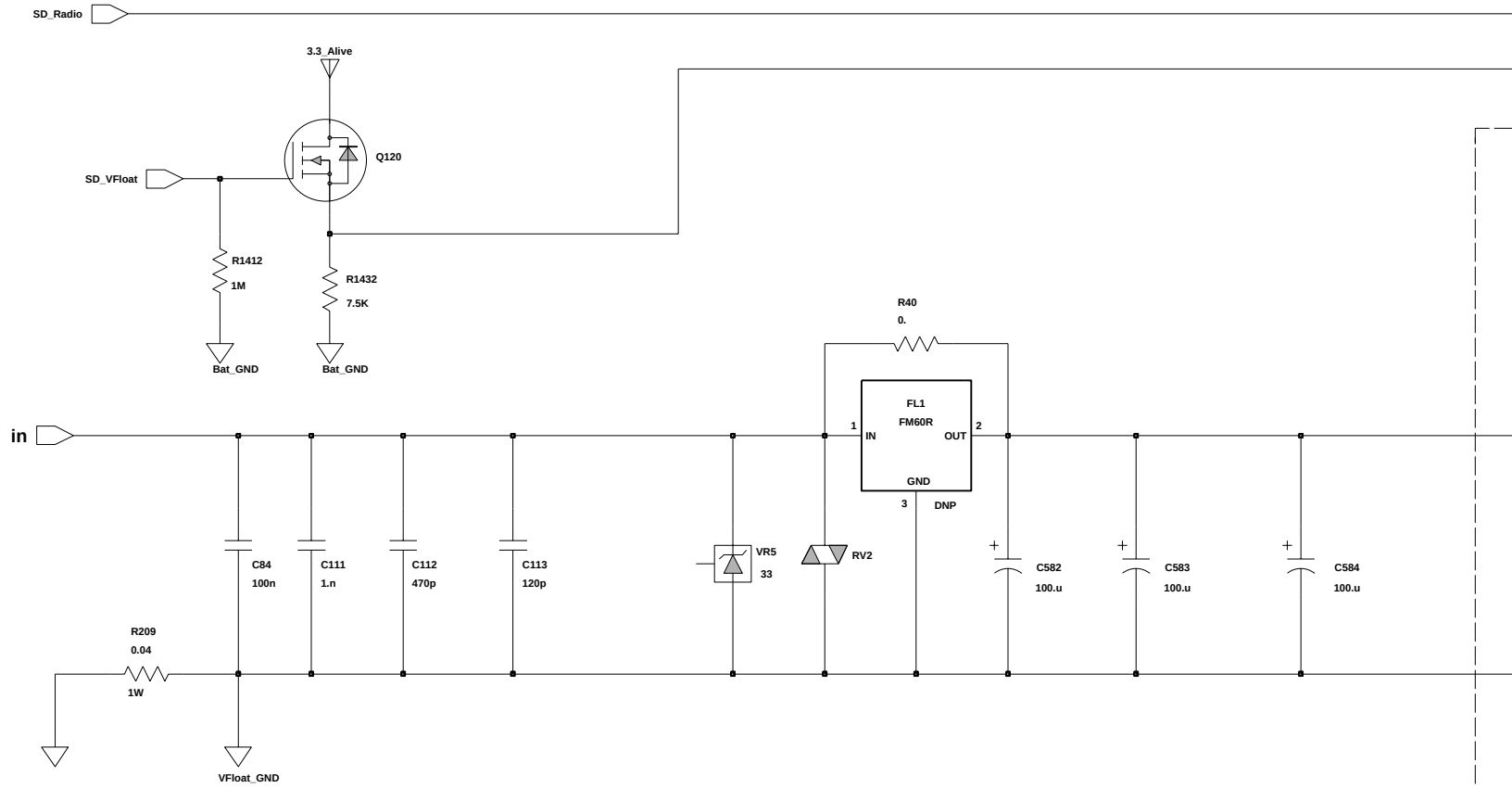
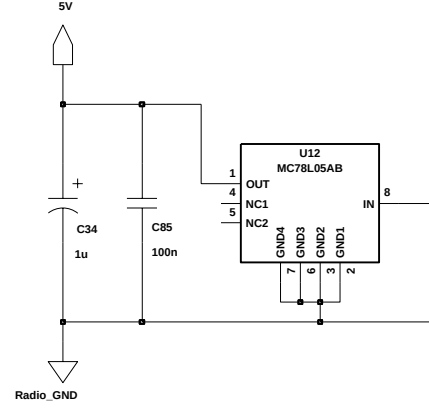


## 5.2

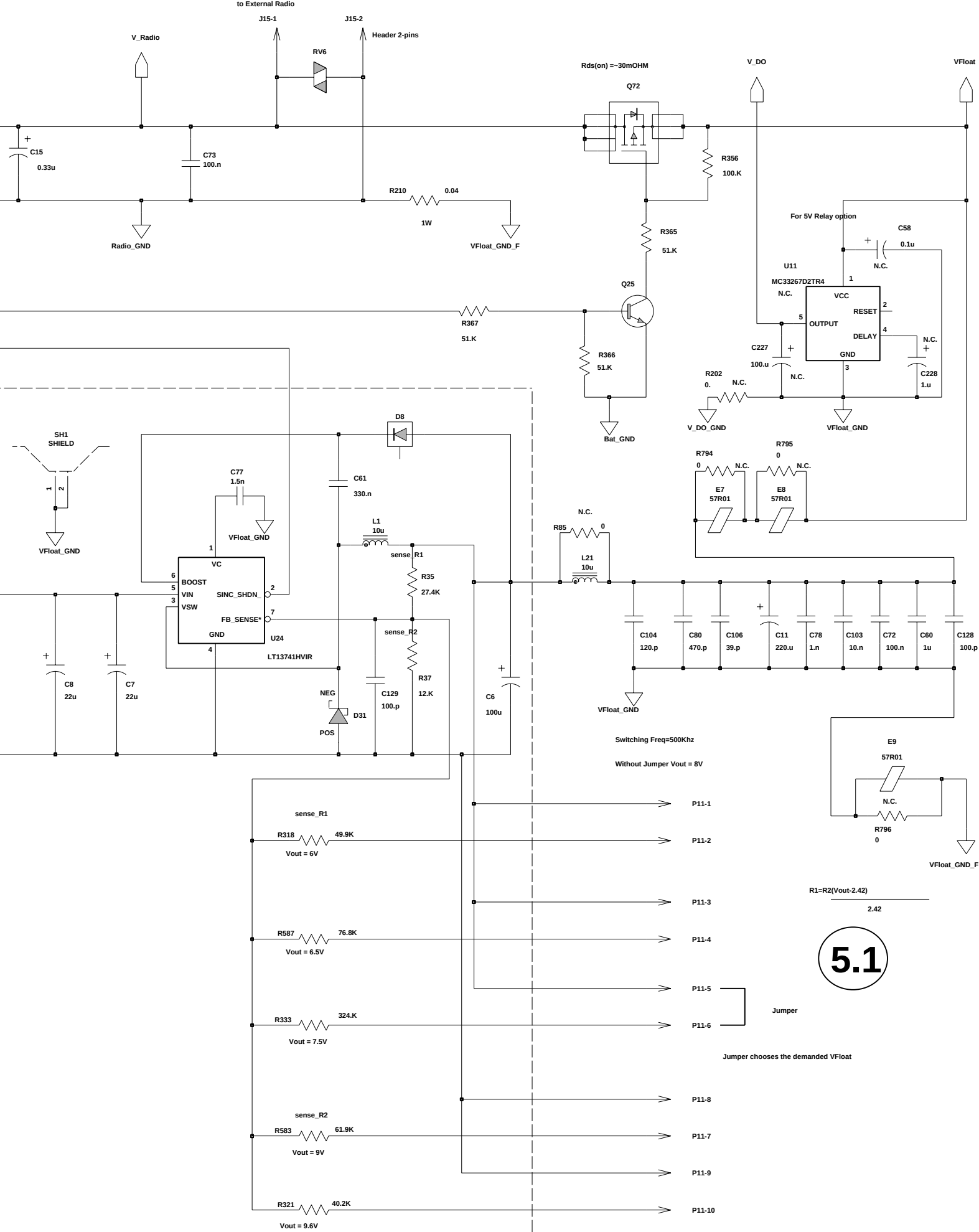


# MOSCAD-M Main Board

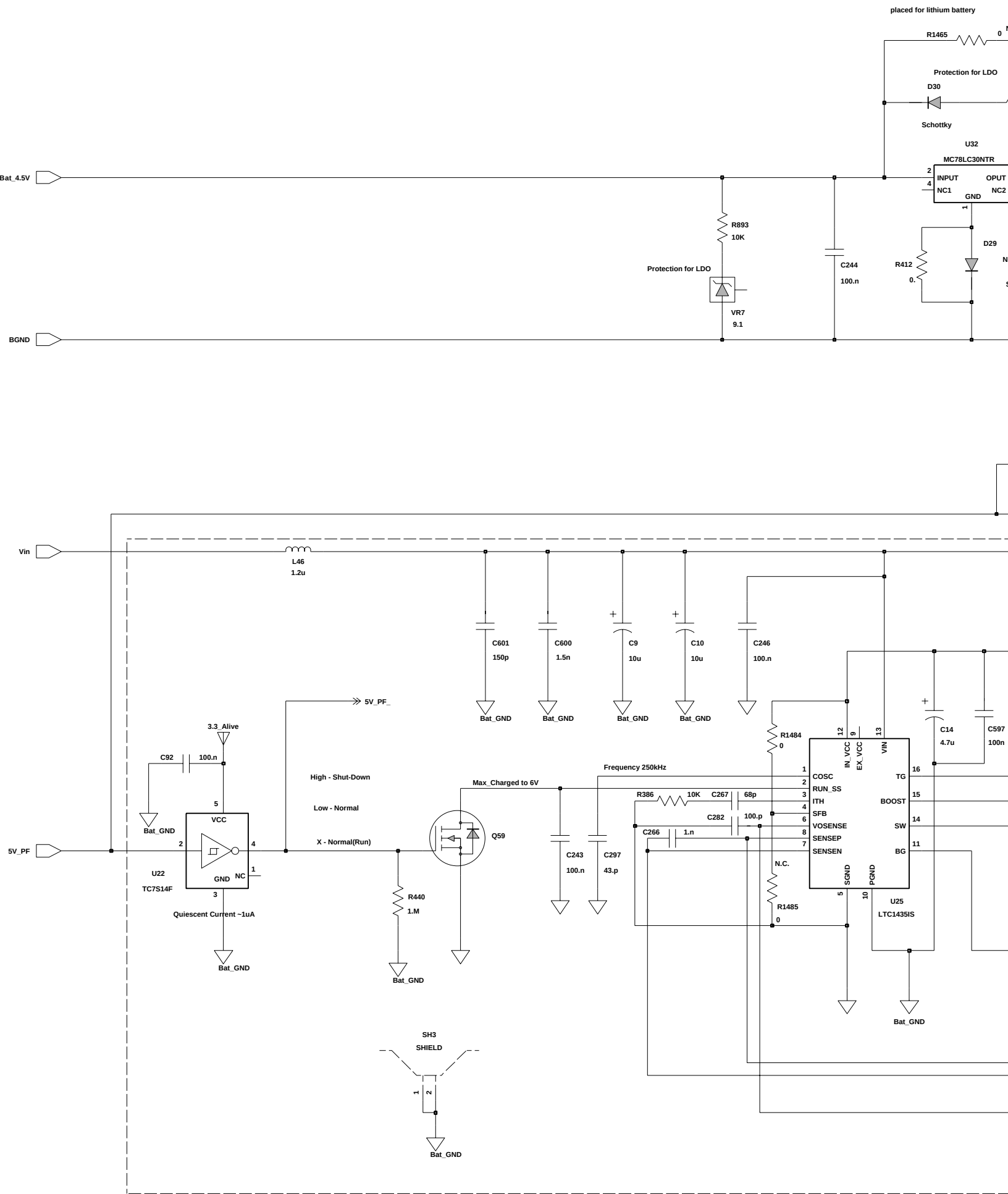
## FCN6088A



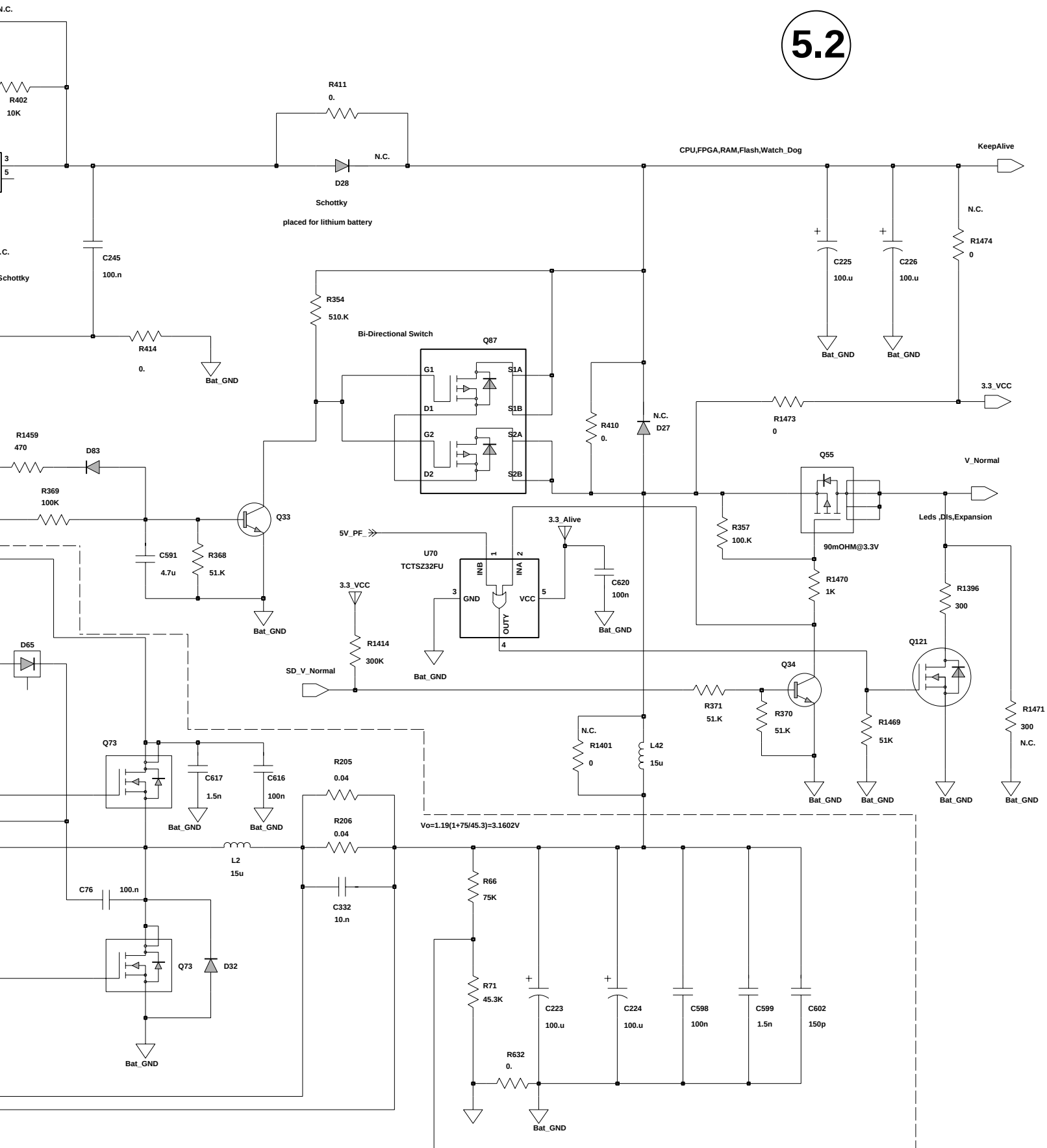
Power supply for Radio .



## Power Supply

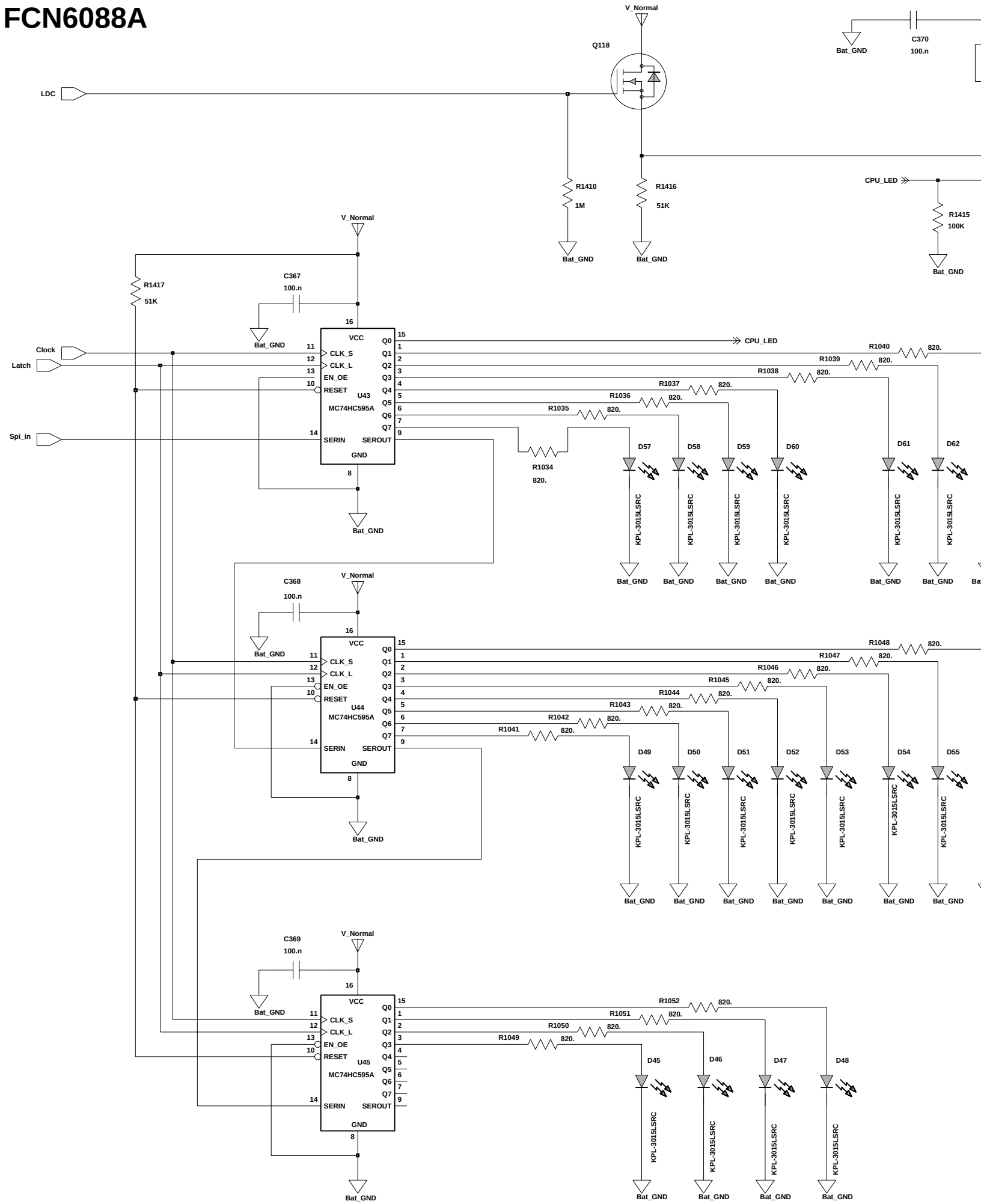


5.2

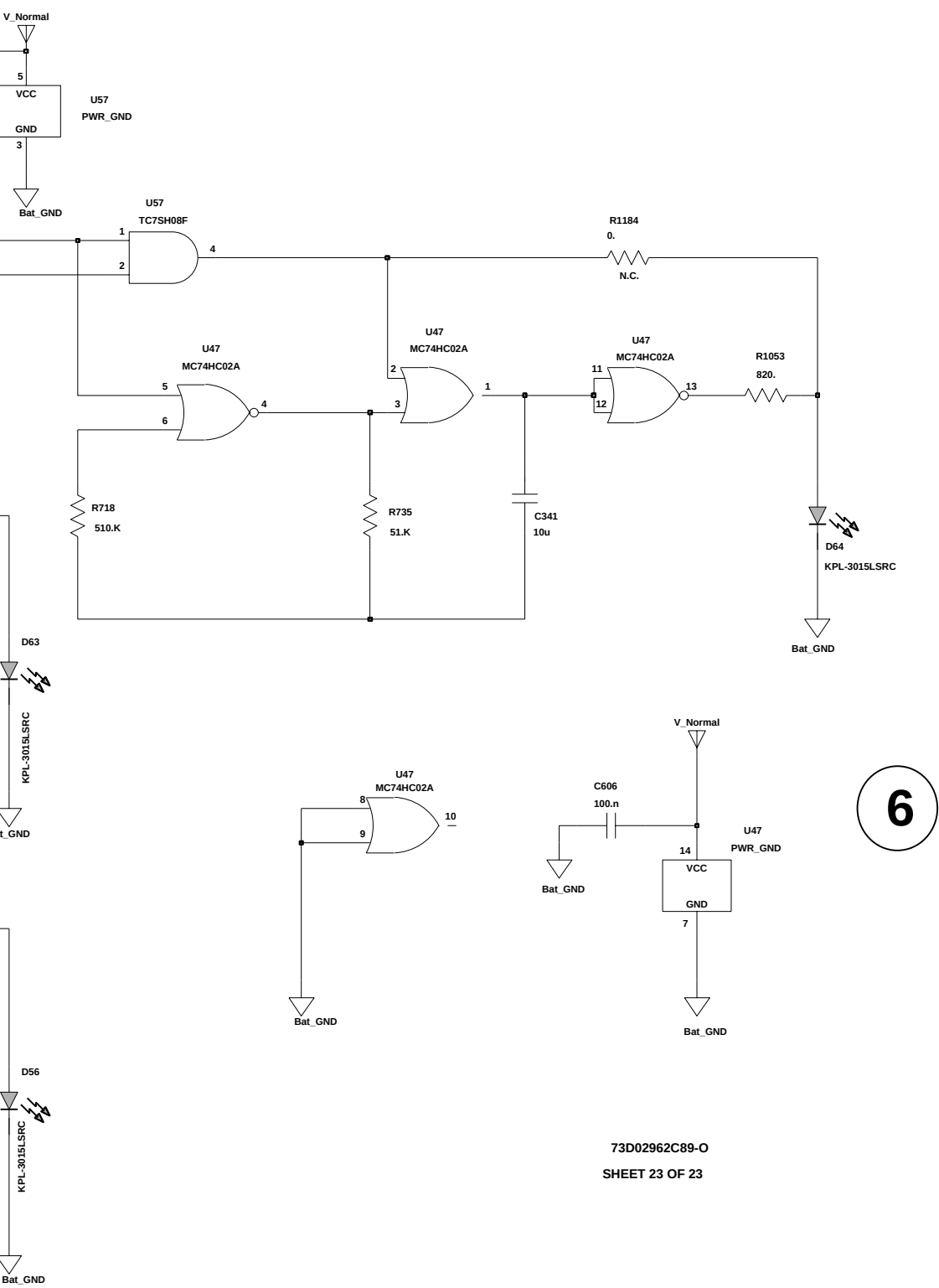


# MOSCAD-M Main Board

## FCN6088A



# SHIFT\_REGISTER + LED'S



## Printing Layout, Schematic, and Parts List

The PDF file for the RTU component includes the following views:

- layout
- schematic
- divided schematic for any page of the schematic which is too big for printing on a letter size desktop printer
- parts list

To print part of the PDF file:

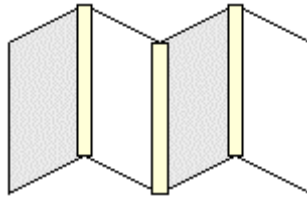
1. Go to the desired view by clicking once on the appropriate bookmark (e.g. Parts List) on the left side of the screen. If the item has a minus  sign to its left, click on the sign to see further items below.
2. The diagram or list you want to print may more cover than one page. To identify which pages should be printed, note the page numbers (e.g. 4 of 11) at the bottom of the screen. Use the scroll bar or the Page Down button on the keyboard to advance. If the bookmark on the left side of the screen changes, then you have advanced too far and displayed the next sheet or view.
3. Press on the  icon on the toolbar above the diagram to open the Print dialog box.
4. Select the current page or range of page numbers to be printed (e.g. 4-5) and click on OK.

**Warning:** Printing the entire PDF file is NOT recommended, as some pages will probably not fit your printer size.

## Reconnecting a Divided Schematic

Pieces of a divided schematic can be reconnected as follows:

1. Line up the pages. If necessary, consult the schematic in the PDF.
2. Use tape to join of all parts of diagram as shown below.



# MOSCAD-M I/O EXPANSION BOARD

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## General/Index

The schematics, layout and parts list of the I/O Expansion board of the MOSCAD-M RTU (Board catalog # FCN6110A DESIGN: 8486067U01) is provided below. Large schematics have also been provided in separate format, divided for letter size printing. Click on the links below to jump to the desired page.

### *Layout*

- *Side 1*
- *Side 2*

### *Parts List*

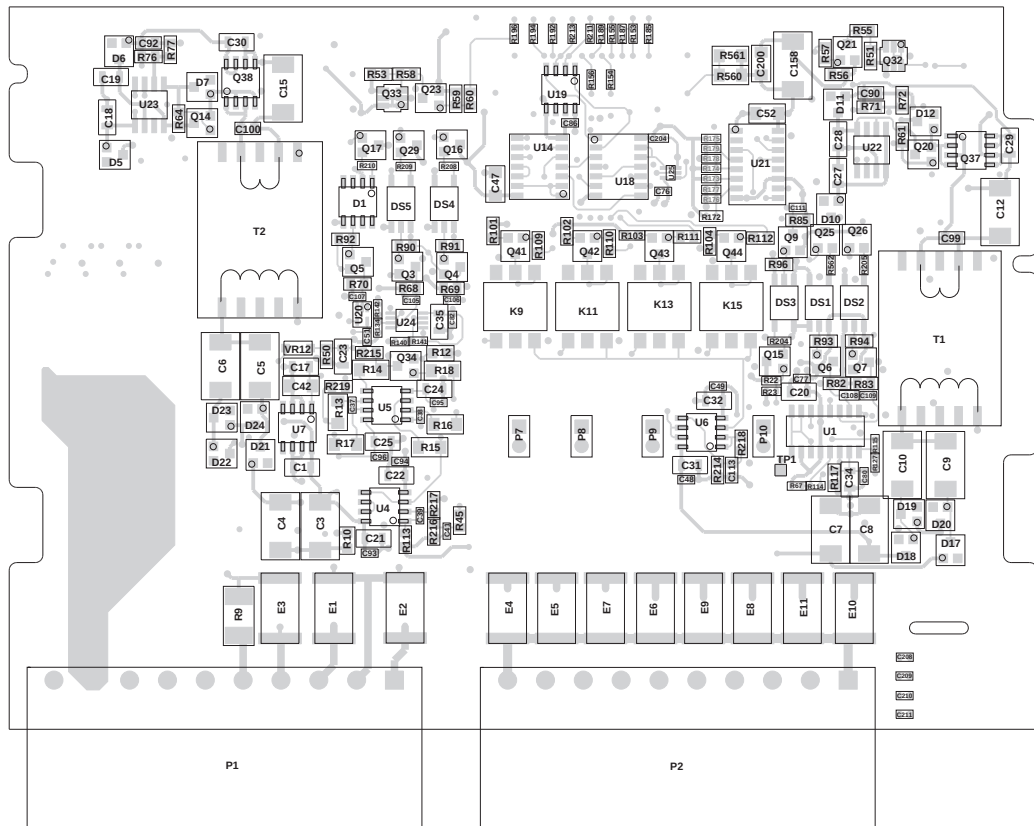
- *FCN6110A*

### *Schematics*

- |                                                |                                                |
|------------------------------------------------|------------------------------------------------|
| • <i>Sheet 1- Main Expansion Board</i>         | <i>Divided format for letter size printing</i> |
| • <i>Sheet 2- Analog Inputs</i>                | <i>Divided format for letter size printing</i> |
| • <i>Sheet 3- AI Input Stage</i>               | <i>Divided format for letter size printing</i> |
| • <i>Sheet 4- Analog Output</i>                | <i>Divided format for letter size printing</i> |
| • <i>Sheet 5- Digital Inputs</i>               | <i>Divided format for letter size printing</i> |
| • <i>Sheet 6- Isolated Power Supply for AI</i> | <i>Divided format for letter size printing</i> |
| • <i>Sheet 7- Isolated Power Supply for AO</i> | <i>Divided format for letter size printing</i> |
| • <i>Sheet 8- SPI Interface</i>                | <i>Divided format for letter size printing</i> |

# MOSCAD-M Expansion Board

## FCN6110A





L6 ○ 79B02963C14-O

Parts List – Expansion Board - DESIGN: 8486067u01      FILE: fcn6110a

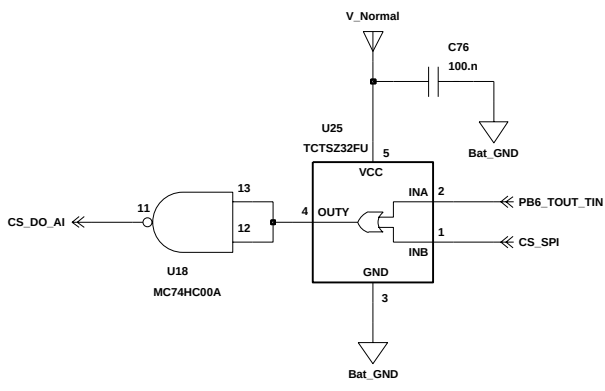
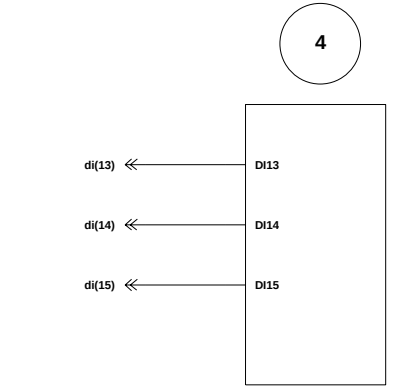
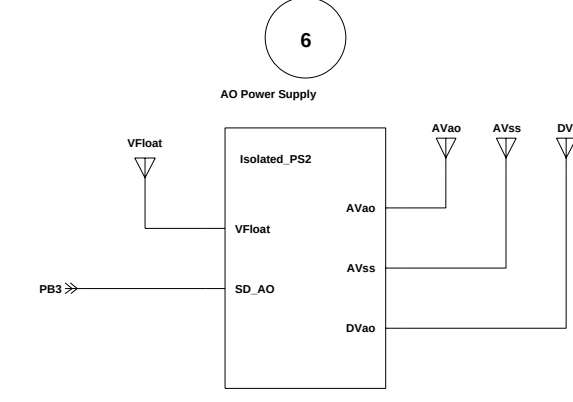
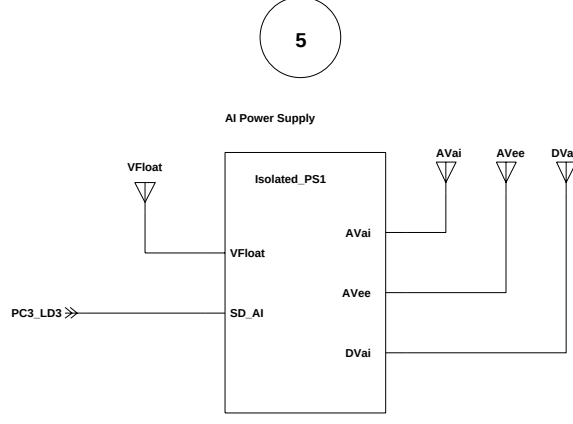
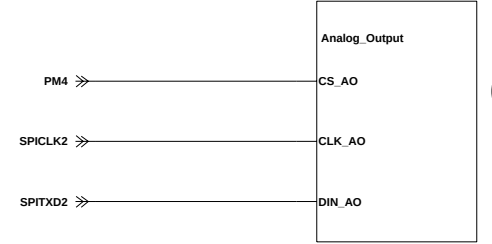
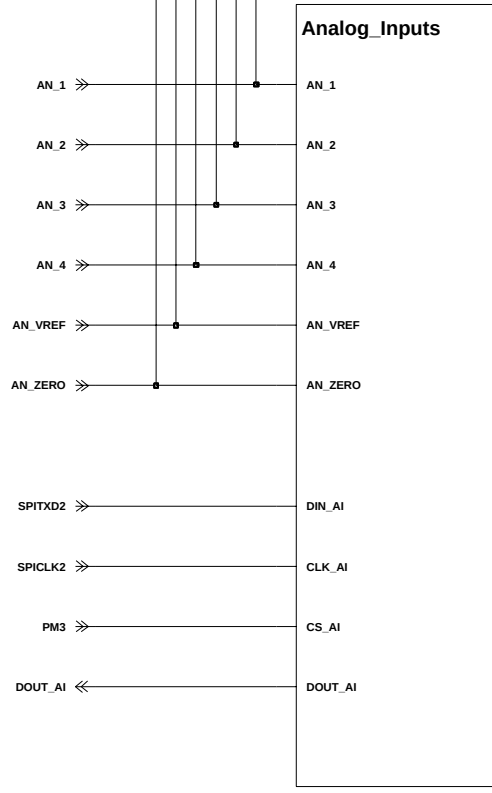
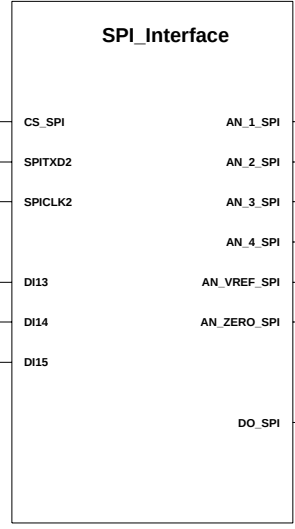
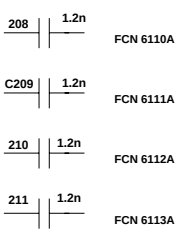
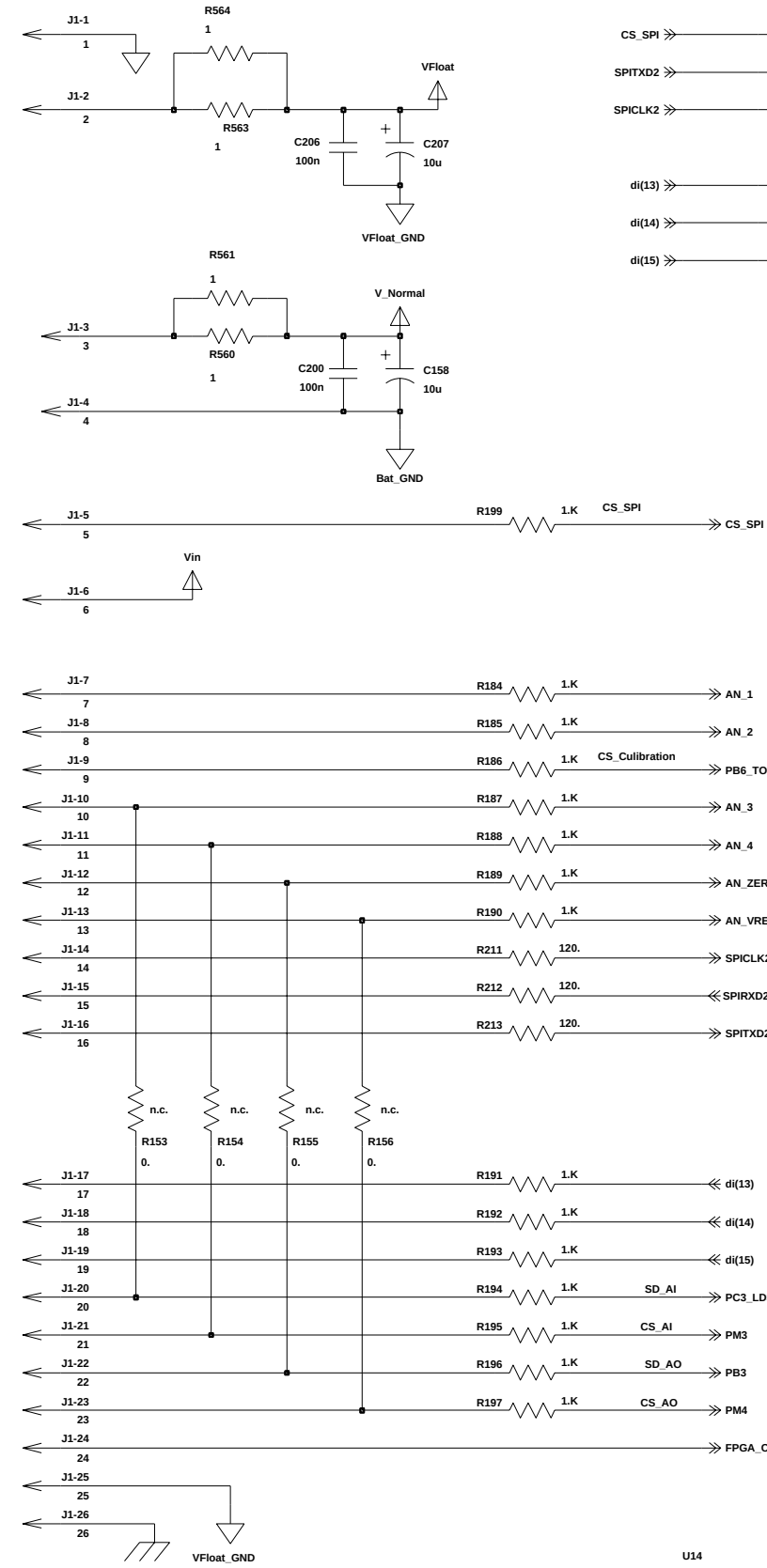
| Reference<br>Symbol | Motorola<br>Part      No. | Description |
|---------------------|---------------------------|-------------|
| C1-2                | 2311049A34                | CAPP 0.33u  |
| C3-16               | 2311049A19                | CAPP 10u    |
| C17-36              | 2311049A07                | CAPP 1u     |
| C37-39              | 2113743E20                | CAP 100n    |
| C40                 | 2113743B21                | CAP 220n    |
| C41                 | 2113741F25                | CAP 1n      |
| C42                 | 2113741B69                | CAP 100n    |
| C46-47              | 2113741B69                | CAP 100n    |
| C48-49              | 2113743E20                | CAP 100n    |
| C51                 | 2113743E20                | CAP 100n    |
| C52                 | 2113741B69                | CAP 100n    |
| C53-64              | 2113743G25                | CAP 3.3UF   |
| C65-68              | 2113741D32                | CAP 0.33UF  |
| C69-71              | 2113741D28                | CAP 220NF   |
| C73-74              | 2113741B69                | CAP 100NF   |
| C76-80              | 2113743E20                | CAP 100n    |
| C82-84              | 2113743E20                | CAP 100n    |
| C86                 | 2113743E20                | CAP 100n    |
| C88                 | 2113743A23                | CAP 220n    |
| C89-92              | 2113743A19                | CAP 100n    |
| C93-96              | 2113743E20                | CAP 100n    |
| C97-98              | 2113741A25                | CAP 1.5n    |
| C99-100             | 2113741A21                | CAP 1n      |
| C105-111            | 2113740F44                | CAP 51p     |
| C113                | 2113740A79                | CAP 1n      |
| C114-115            | 2113740B37                | CAP 33p     |
| C158                | 2311049A19                | CAPP 10u    |
| C200                | 2113741B69                | CAP 100n    |
| C201-203            | 2113741F49                | CAP 10n     |
| C204-205            | 2113743E20                | CAP 100n    |
| C206                | 2113741B69                | CAP 100n    |
| C207                | 2311049A19                | CAPP 10u    |
| C208-211            | 2113741F27                | CAP 1.2n    |
| D1                  | 5102806C06                | IL205AT     |
| D3                  | 5102806C06                | IL205AT     |
| D4-16               | 4813833C09                | MMBD914     |
| D17-26              | 4808115L03                | BAR43       |
| DS1-5               | 5102806C10                | TLP112      |
| E1-11               | 8086971J01                | SPARK GAP   |
| J1                  | 2880491L11                | CONN P      |
| K9-18               | 8080372L02                | LCA110STR   |
| L1                  | 2462587V38                | IDCTR 220n  |
| P1-2                | 2886105U01                | NO DESC     |
| P7-10               | 2880001R02                | CONN P      |
| Q1-2                | 4813824A21                | MMBT2907A   |
| Q3-9                | 4813824A17                | MMBT3906    |
| Q11                 | 4813824A17                | MMBT3906    |
| Q12-27              | 4813824A10                | MMBT3904    |
| Q29                 | 4813824A10                | MMBT3904    |

|          |            |             |
|----------|------------|-------------|
| Q30-31   | 4813824A06 | MMBTA13     |
| Q32-33   | 4813823A29 | MGSF3441VT1 |
| Q34      | 4813823A07 | 2N7002      |
| Q35-36   | 4813821A49 | MTD2955VT4  |
| Q37-38   | 4802393L39 | SI4542DY    |
| Q39-44   | 4813824A10 | NPN_3904L   |
| Q45      | 5102806C02 | TIL196B     |
| R1-6     | 0683962T72 | RES_910     |
| R9       | 0683962T25 | RES_10      |
| R10-11   | 0662057C01 | RES_0       |
| R12      | 0611079K15 | RES_14K     |
| R13-16   | 0611077G09 | RES_15K     |
| R17-18   | 0611077B03 | RES_15K     |
| R23      | 0662057A73 | RES_10K     |
| R24-25   | 0611077A98 | RES_10K     |
| R26-27   | 0611077A90 | RES_4.7K    |
| R28-30   | 0611077A69 | RES_620     |
| R32-34   | 0611077A65 | RES_430     |
| R36      | 0611077A38 | RES_33      |
| R37-44   | 0683962T42 | RES_51      |
| R45      | 0662057G64 | RES_1M      |
| R46-49   | 0662057D48 | RES_1M      |
| R50-54   | 0662057D24 | RES_100K    |
| R55-60   | 0662057D17 | RES_51K     |
| R61-66   | 0662057D07 | RES_20K     |
| R67      | 0662057A73 | RES_10K     |
| R68-85   | 0662057C99 | RES_10K     |
| R87-89   | 0662057C99 | RES_10K     |
| R90-96   | 0662057C86 | RES_3K      |
| R98      | 0662057C75 | RES_1K      |
| R99-104  | 0662057C65 | RES_390     |
| R105-112 | 0662057C58 | RES_200     |
| R113     | 0662057C27 | RES_10      |
| R115-116 | 0662057B47 | RES_0       |
| R117-126 | 0662057C01 | RES_0       |
| R135-139 | 0662057C01 | RES_0       |
| R141-142 | 0662057B47 | RES_0       |
| R164-169 | 0662057A97 | RES_100K    |
| R172     | 0662057A97 | RES_100K    |
| R177-179 | 0662057A97 | RES_100K    |
| R184-197 | 0662057A49 | RES_1K      |
| R199     | 0662057A49 | RES_1K      |
| R204-206 | 0662057A36 | RES_300     |
| R208-210 | 0662057A36 | RES_300     |
| R211-213 | 0662057A27 | RES_120     |
| R214     | 0611079K15 | RES_14K     |
| R215-216 | 0611079K17 | RES_14.7K   |
| R217-218 | 0611079K15 | RES_14K     |
| R219-227 | 0611079H10 | RES_124     |
| R228-239 | 0611079A97 | RES_9.1K    |
| R560-561 | 0611077A02 | RES_1       |
| R562     | 0662057A36 | RES_300     |
| R563-564 | 0611077A02 | RES_1       |

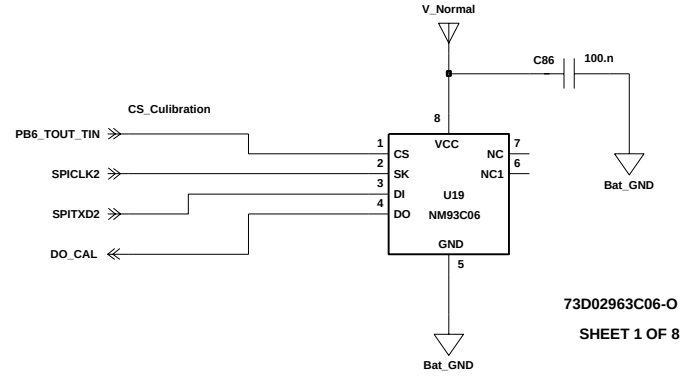
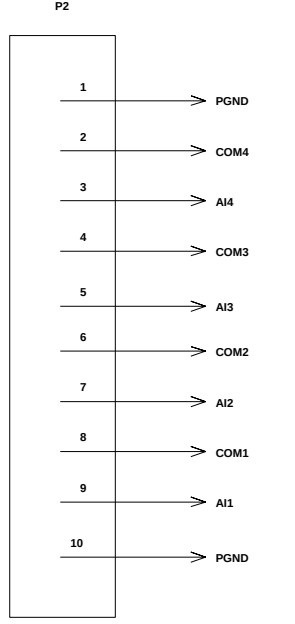
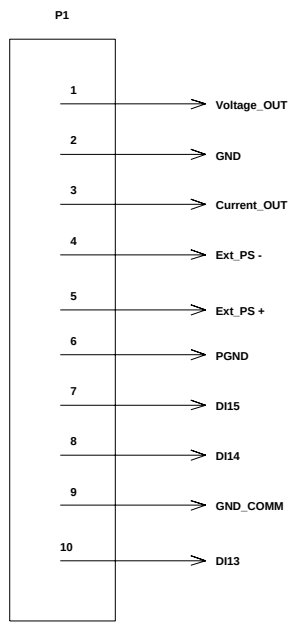
|        |            |                |
|--------|------------|----------------|
| RV1    | 4804645P05 | VC121018J390   |
| RV2    | 4804645P04 | VC080526C580   |
| RV3-4  | 0602811C01 | VARIS          |
| T1-2   | 2580323L01 | XFMR           |
| U1     | 5102807C35 | TLV2544IDR     |
| U2-3   | 5186214J13 | REF192GS       |
| U4-6   | 5113818A02 | MC33272        |
| U7-8   | 5113816A03 | MC78L05AB      |
| U9-10  | 5113806A23 | MC14069UB      |
| U14    | 5113805A07 | MC74HC10       |
| U18    | 5113805A01 | MC74HC00A      |
| U19    | 5108444S03 | NM93C06        |
| U20    | 5104944K04 | TC7S14F        |
| U21    | 5113806A09 | 4021 MC14021   |
| U22-23 | 5113820A02 | LM2903         |
| U24    | 5102807C34 | MAX550AEUA     |
| U25    | 5104931K05 | TCTS32FU       |
| U26    | 5104944K04 | TC7S14F        |
| VR1    | 4813831A39 | 1SMB5936B      |
| VR2    | 4813831A23 | 1SMB5925B      |
| VR3    | 4813830A37 | MMBZ5254B      |
| VR4-6  | 4813831A14 | ZENER SMB5918  |
| VR8-11 | 4813830A19 | ZENER MMBZ5236 |
| VR12   | 4813830G01 | MMSZ4678T      |

MOSCAD-M Expansion Board

FCN6110A



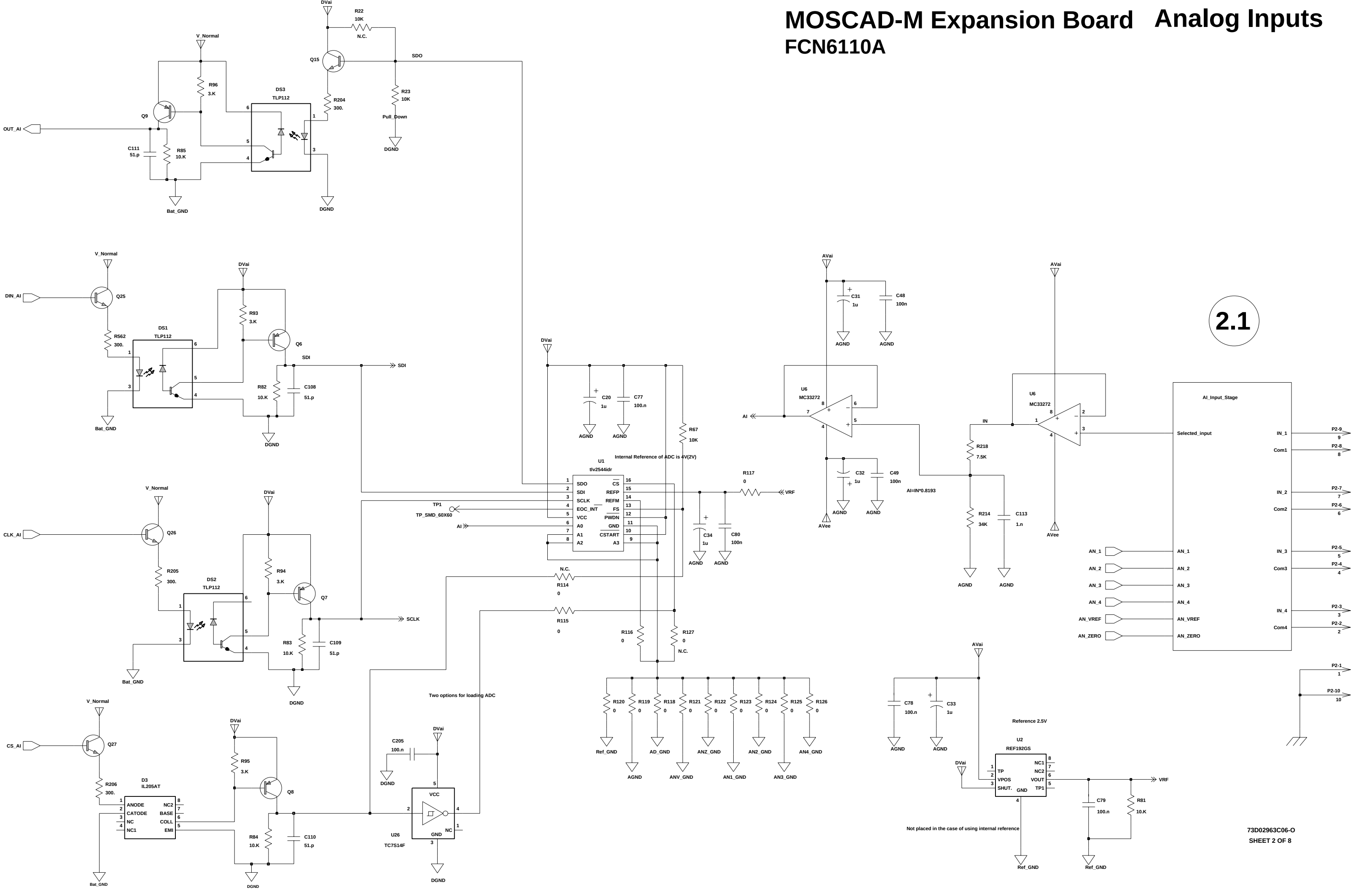
Main\_Expansion\_Board



# MOSCAD-M Expansion Board

## Analog Inputs

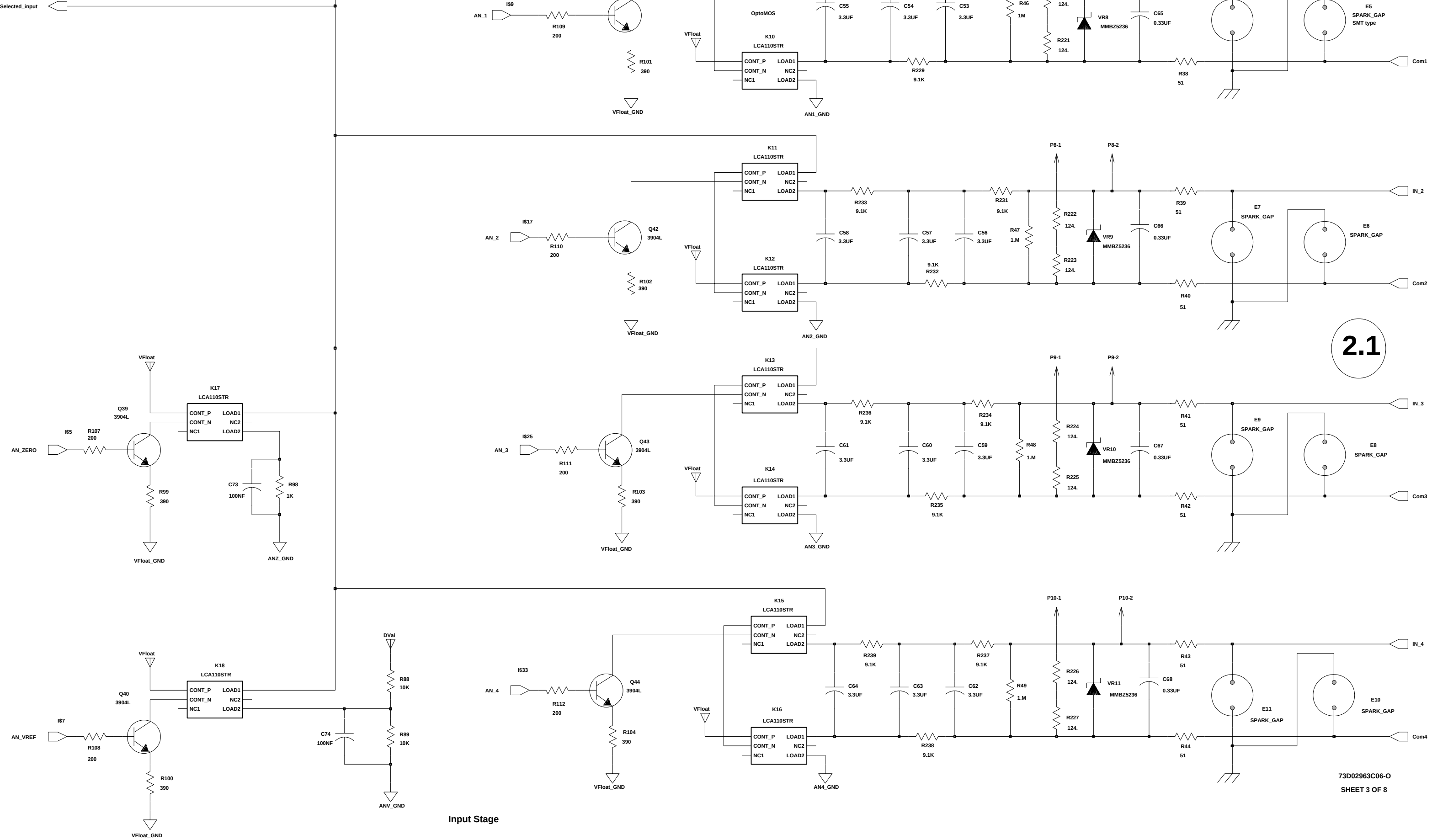
### FCN6110A



# MOSCAD-M Expansion

## FCN6110A

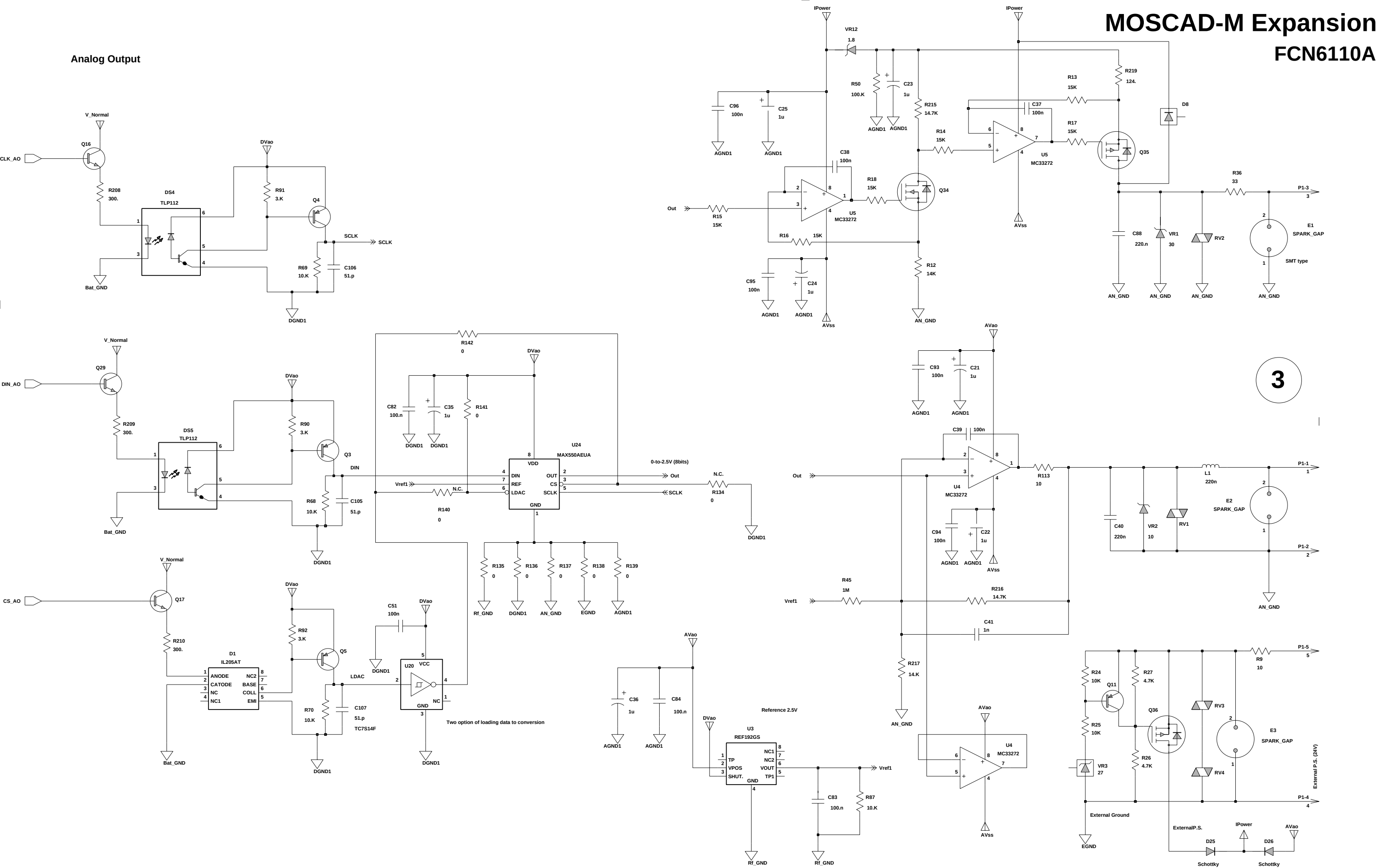
### AI Input Stage



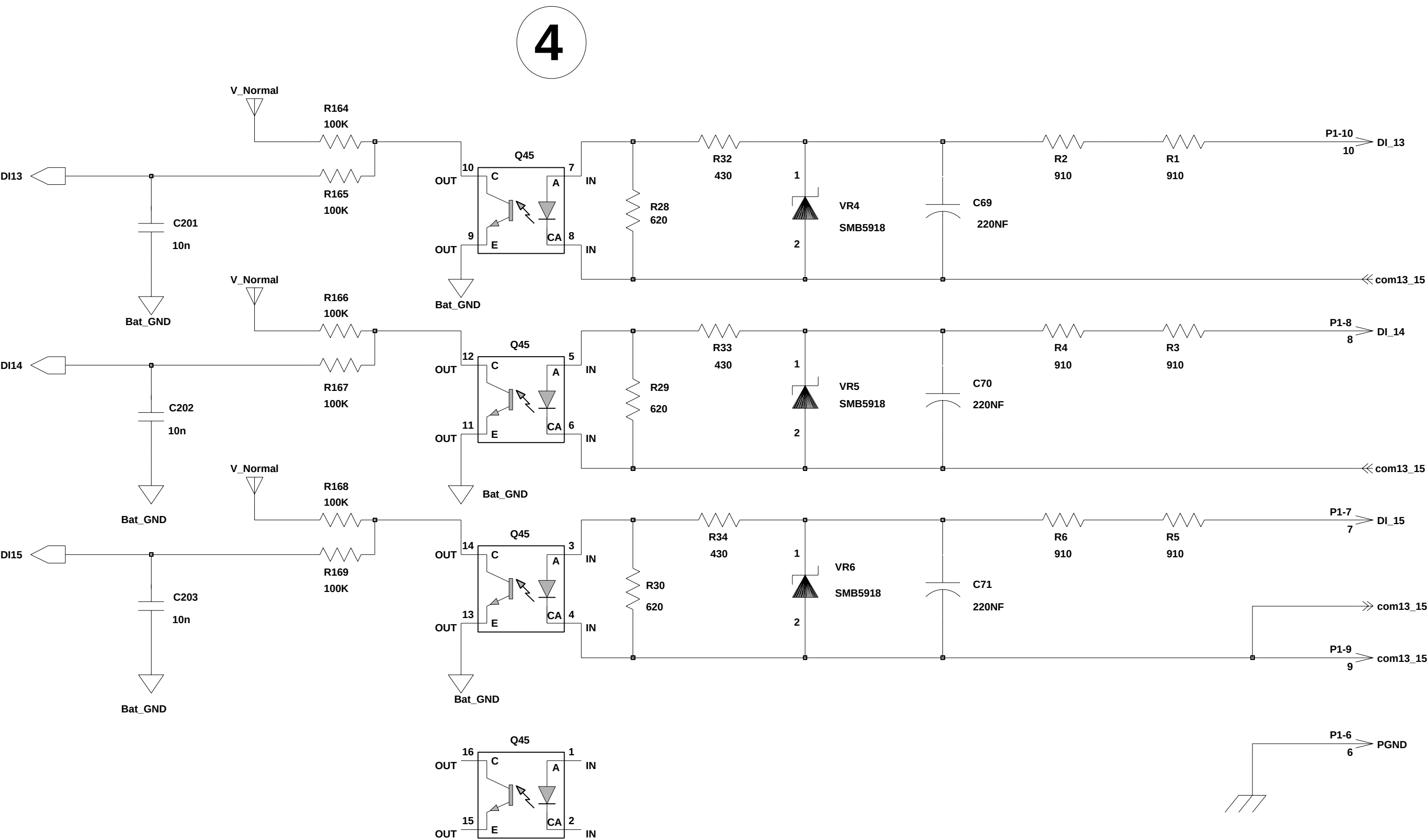
2.1

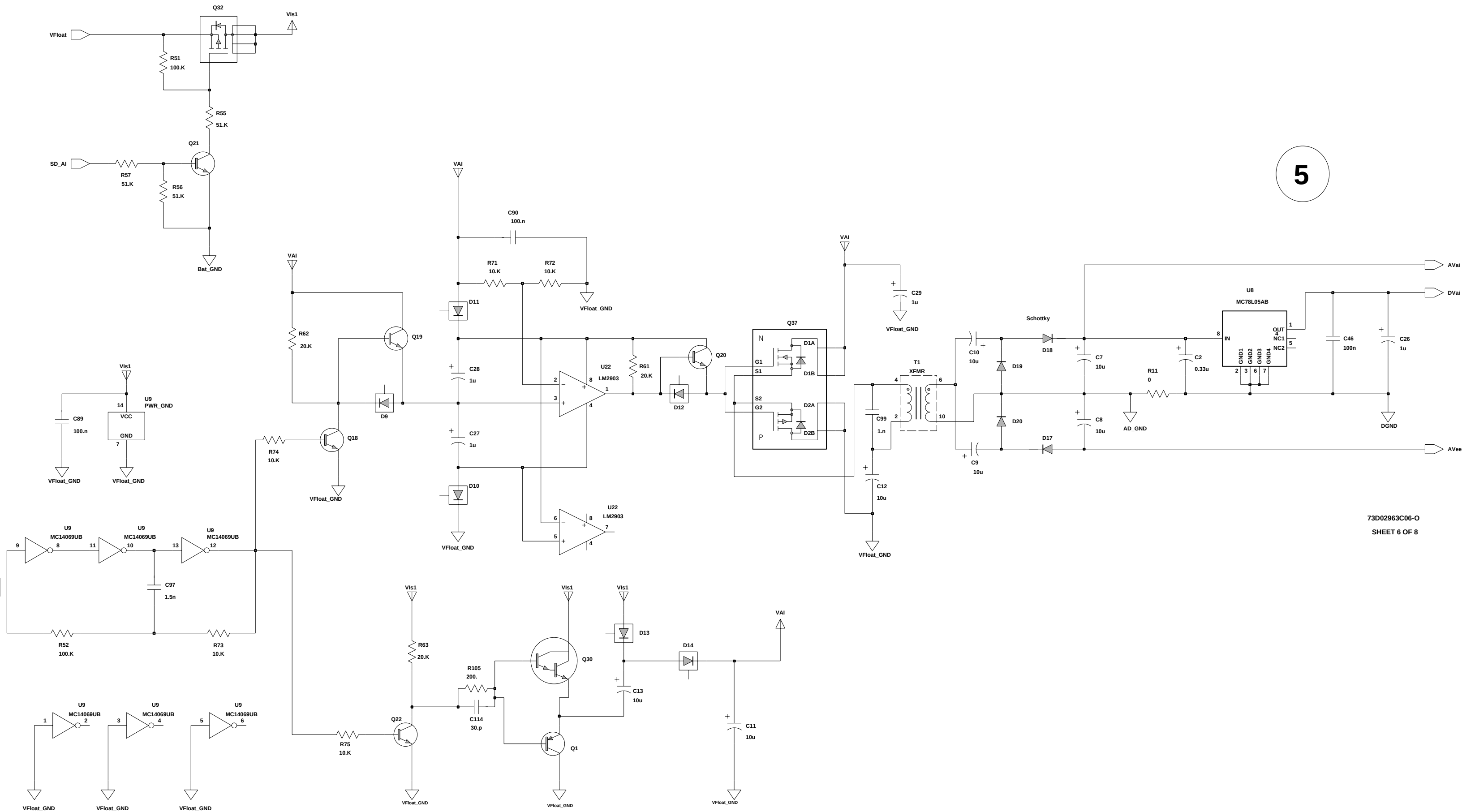
# MOSCAD-M Expansion

## FCN6110A



3

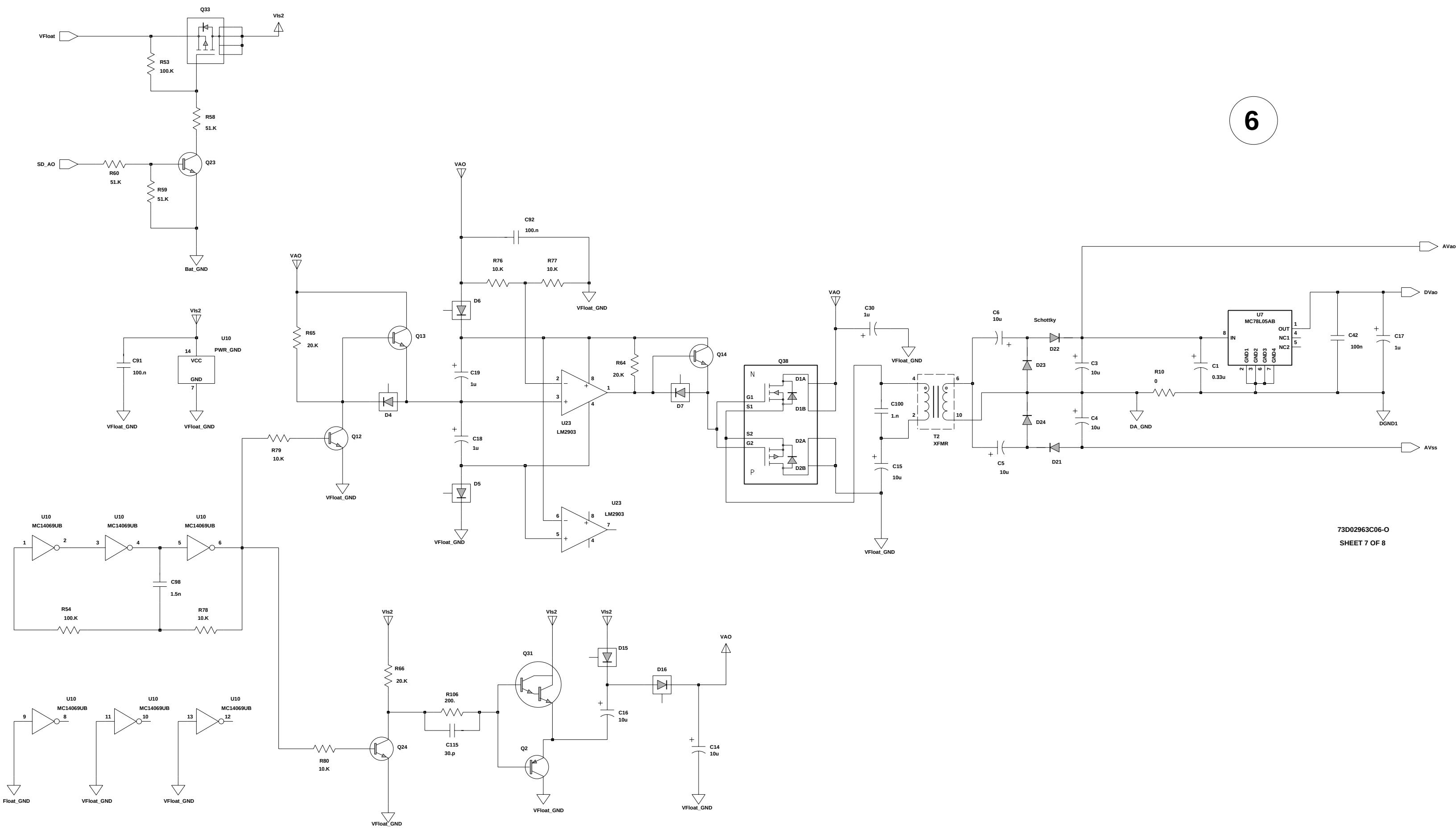




5

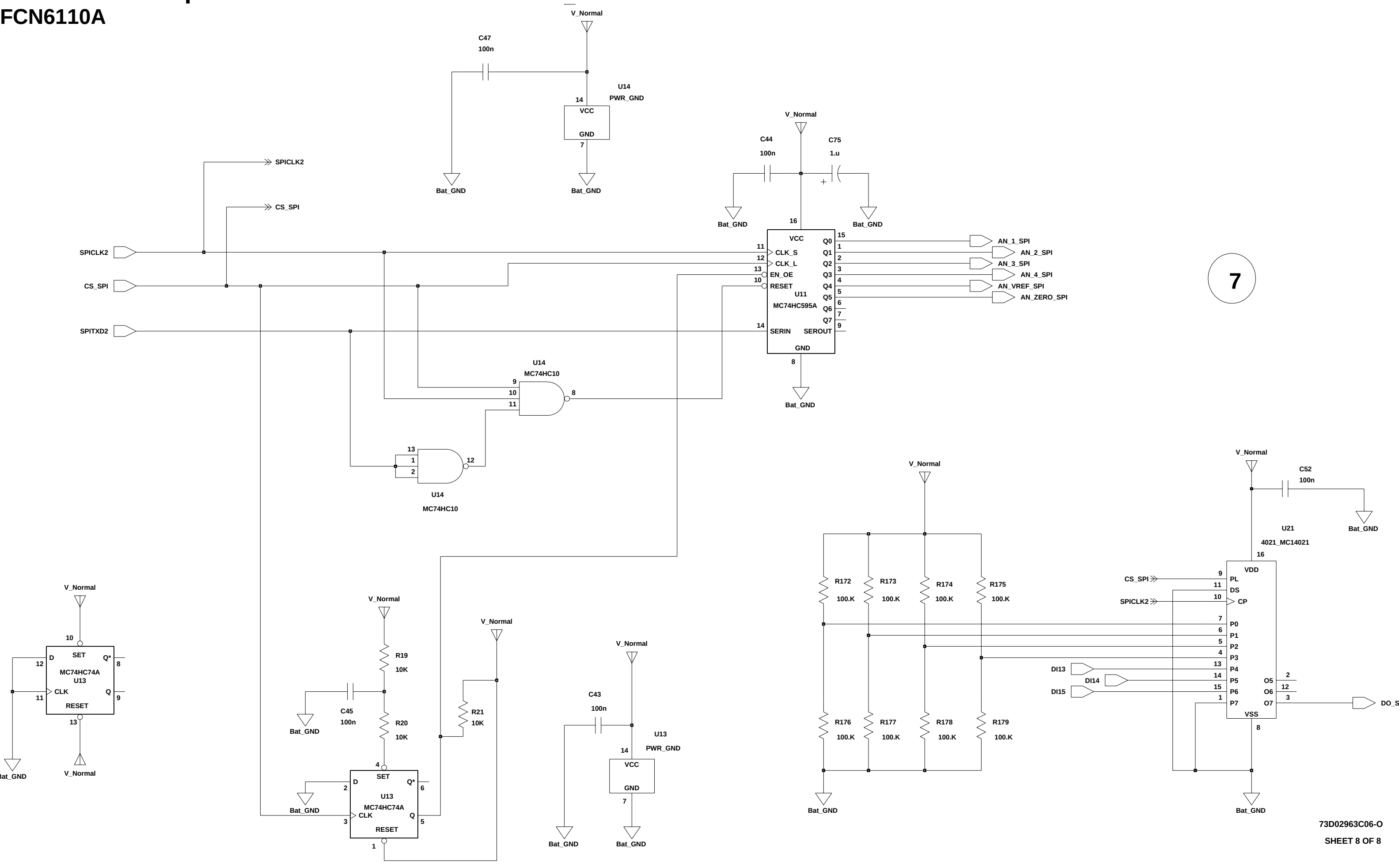
Isolated Power Supply for AO

MOSCAD-M Expansion Board  
FCN6110A



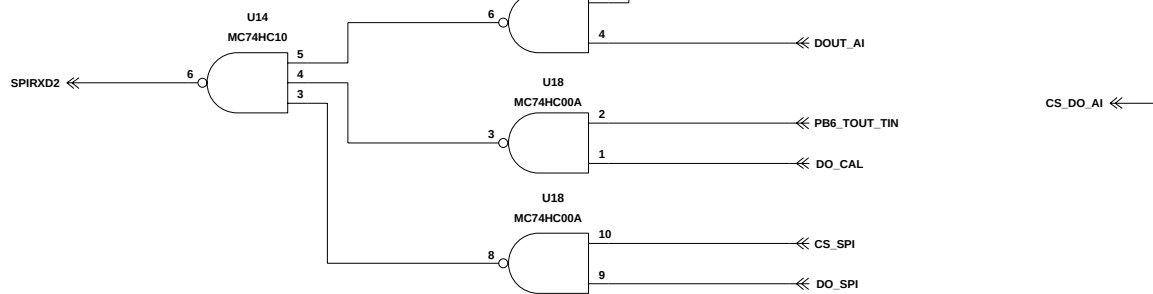
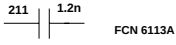
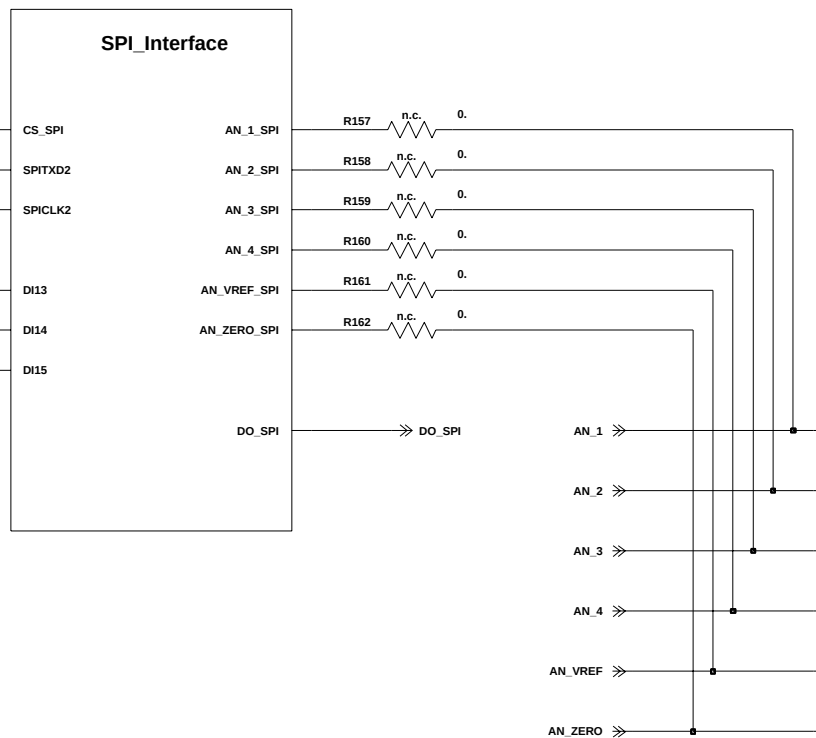
MOSCAD-M Expansion Board  
FCN6110A

SPI\_Interface

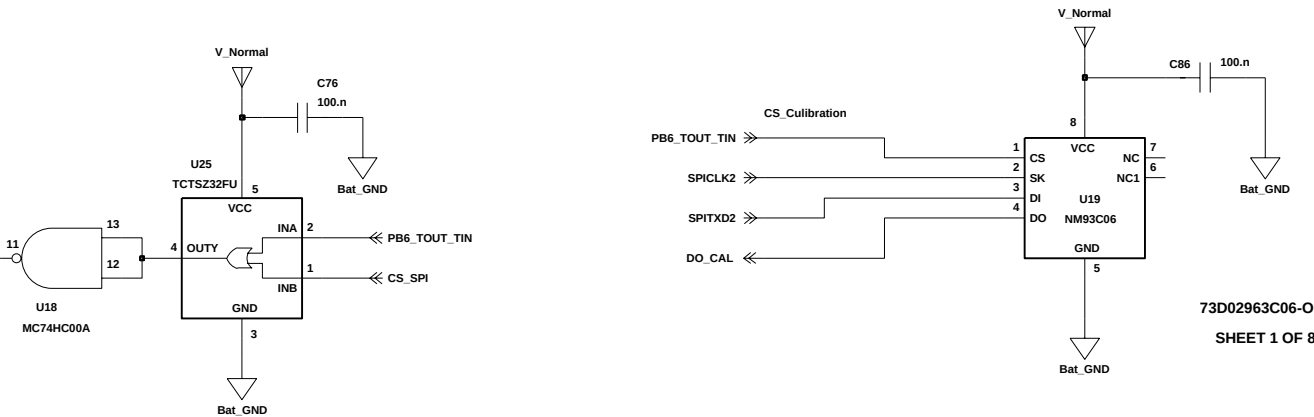
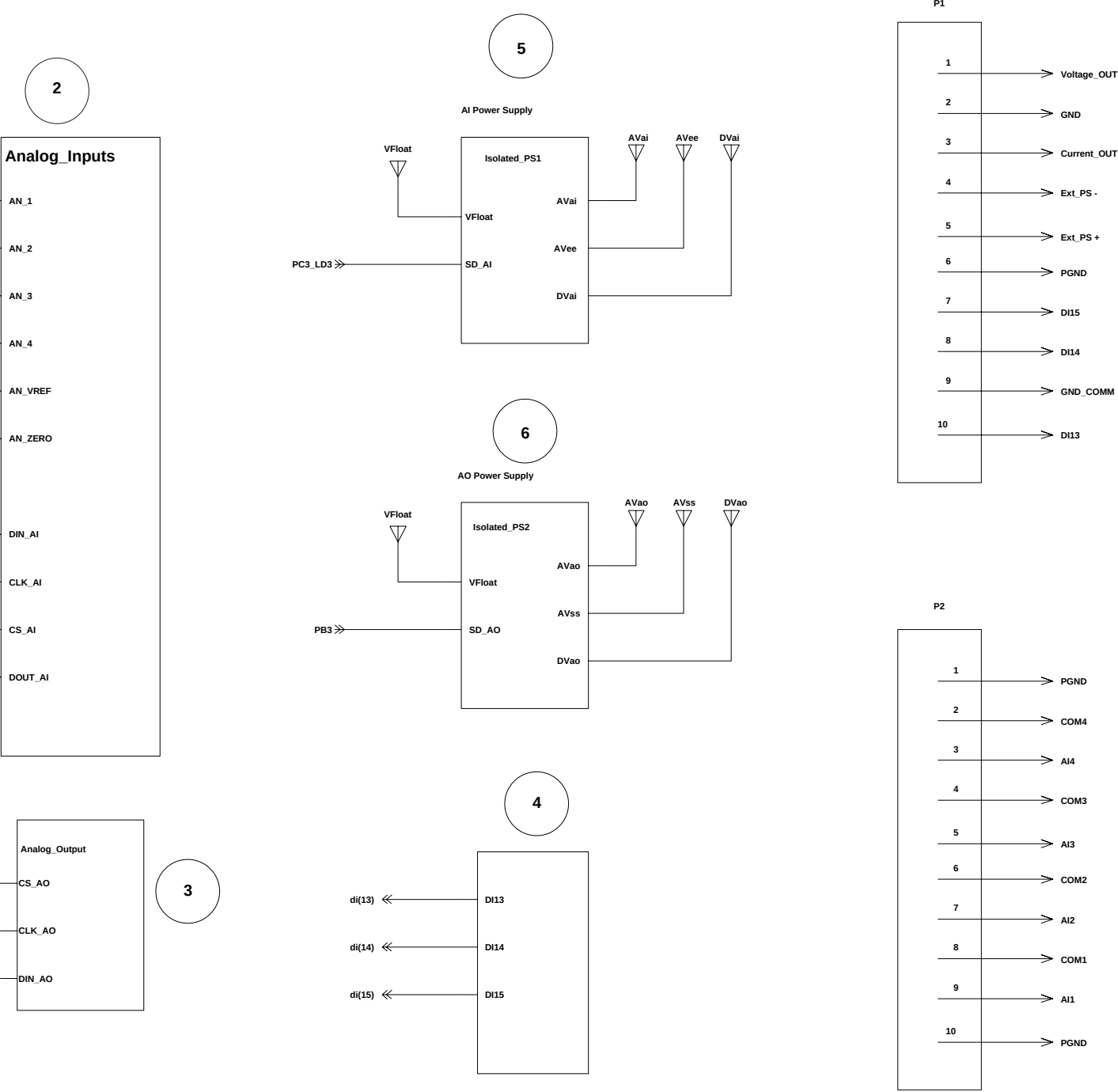


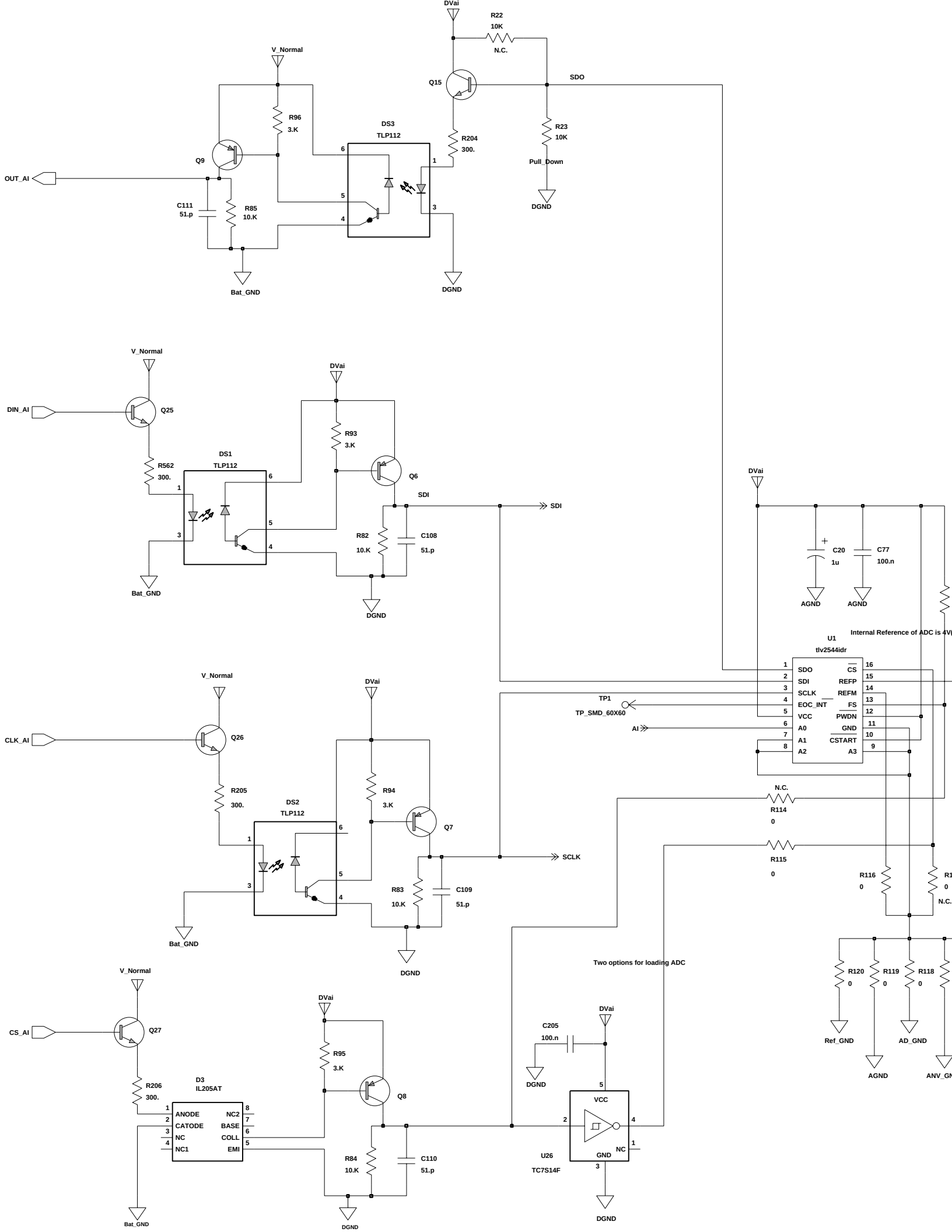
## 7

## SPI Interface

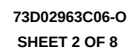


Main\_Expansion\_Board





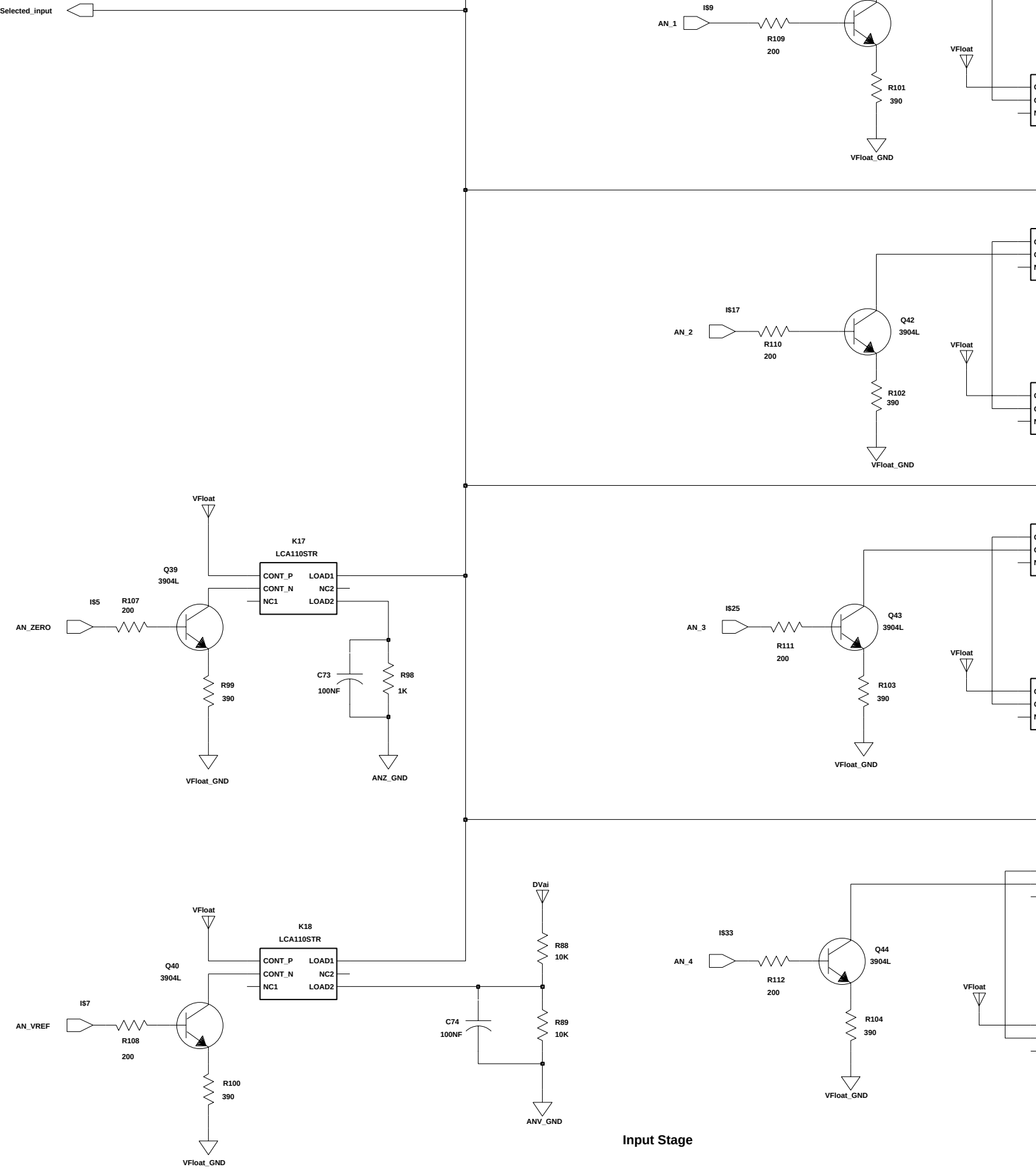
**2.1**



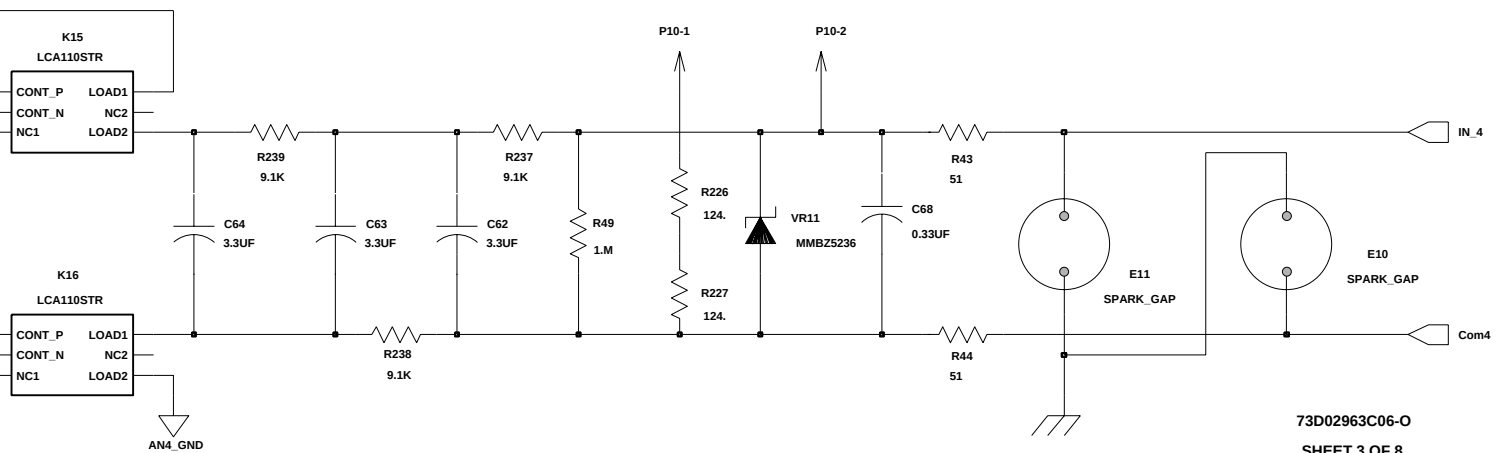
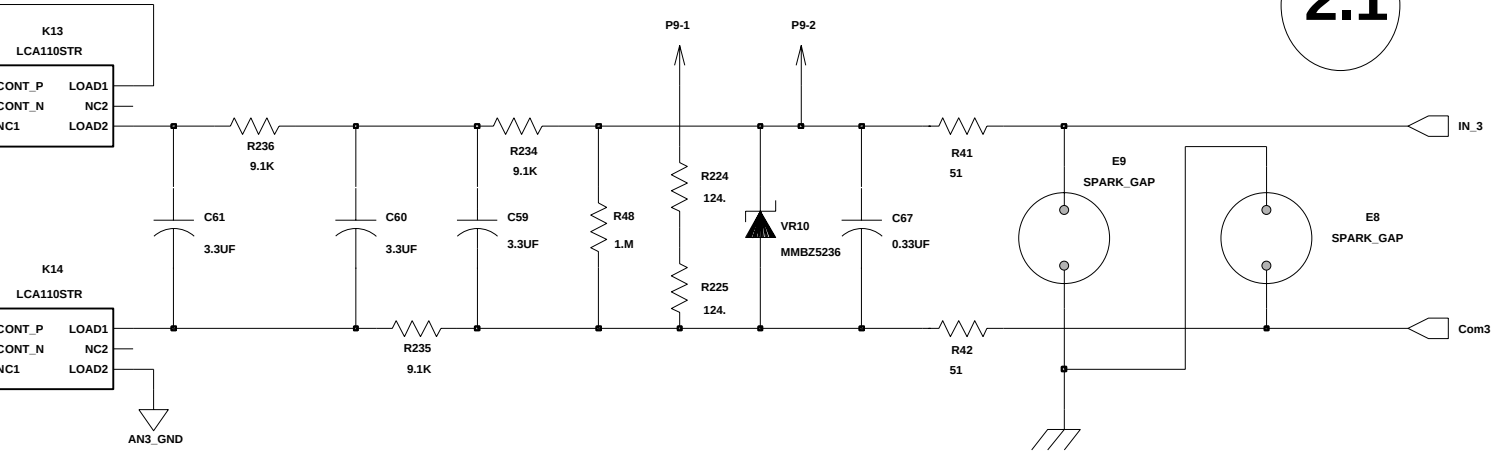
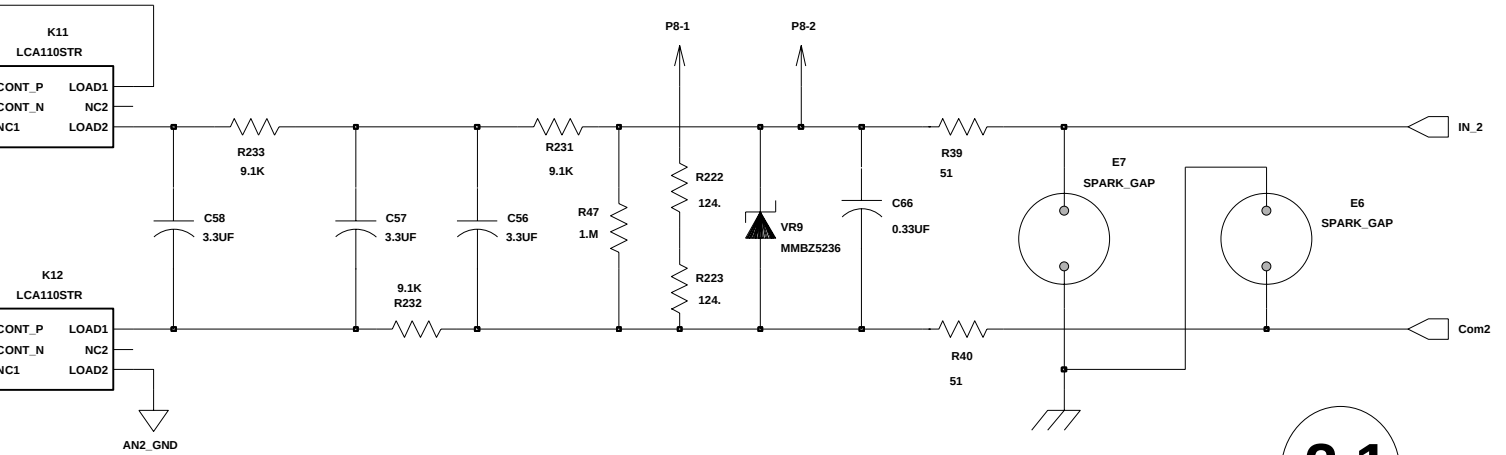
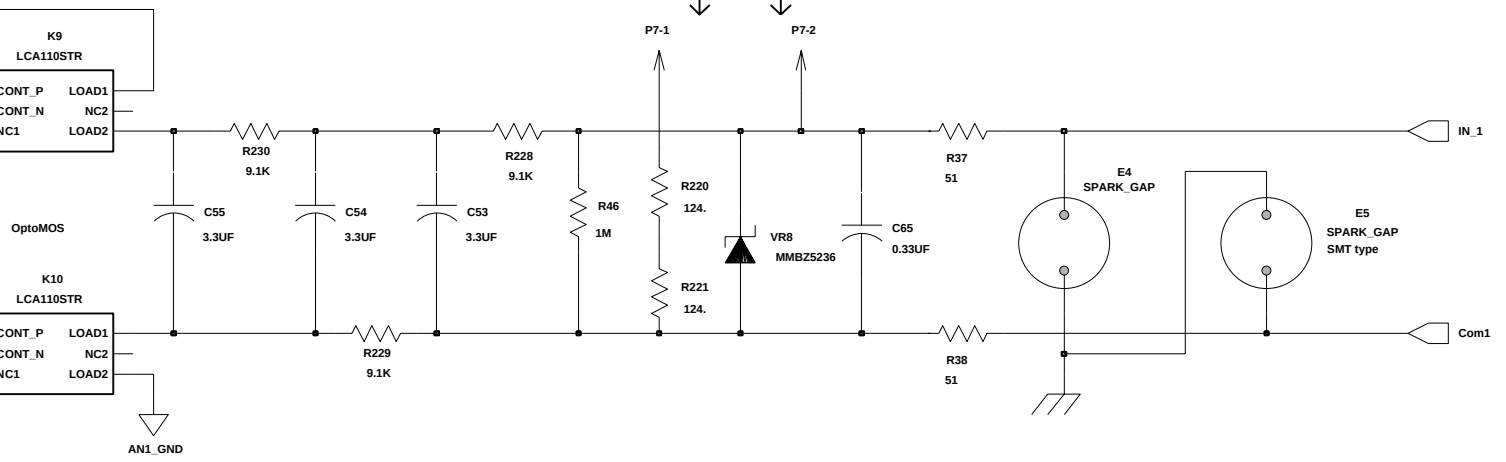
# MOSCAD-M Expansion

## FCN6110A

### AI Input Stage

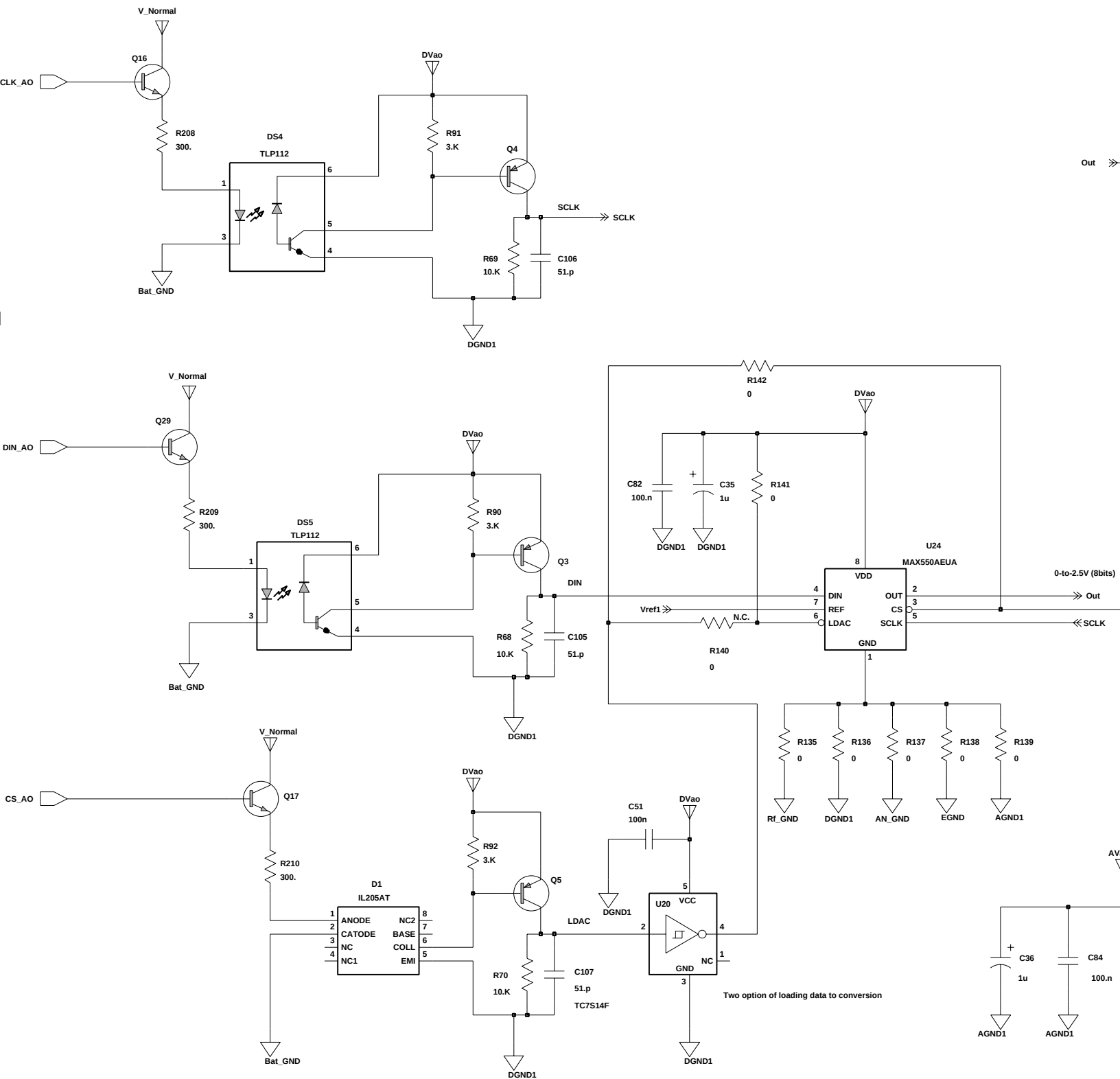


# For Current Input



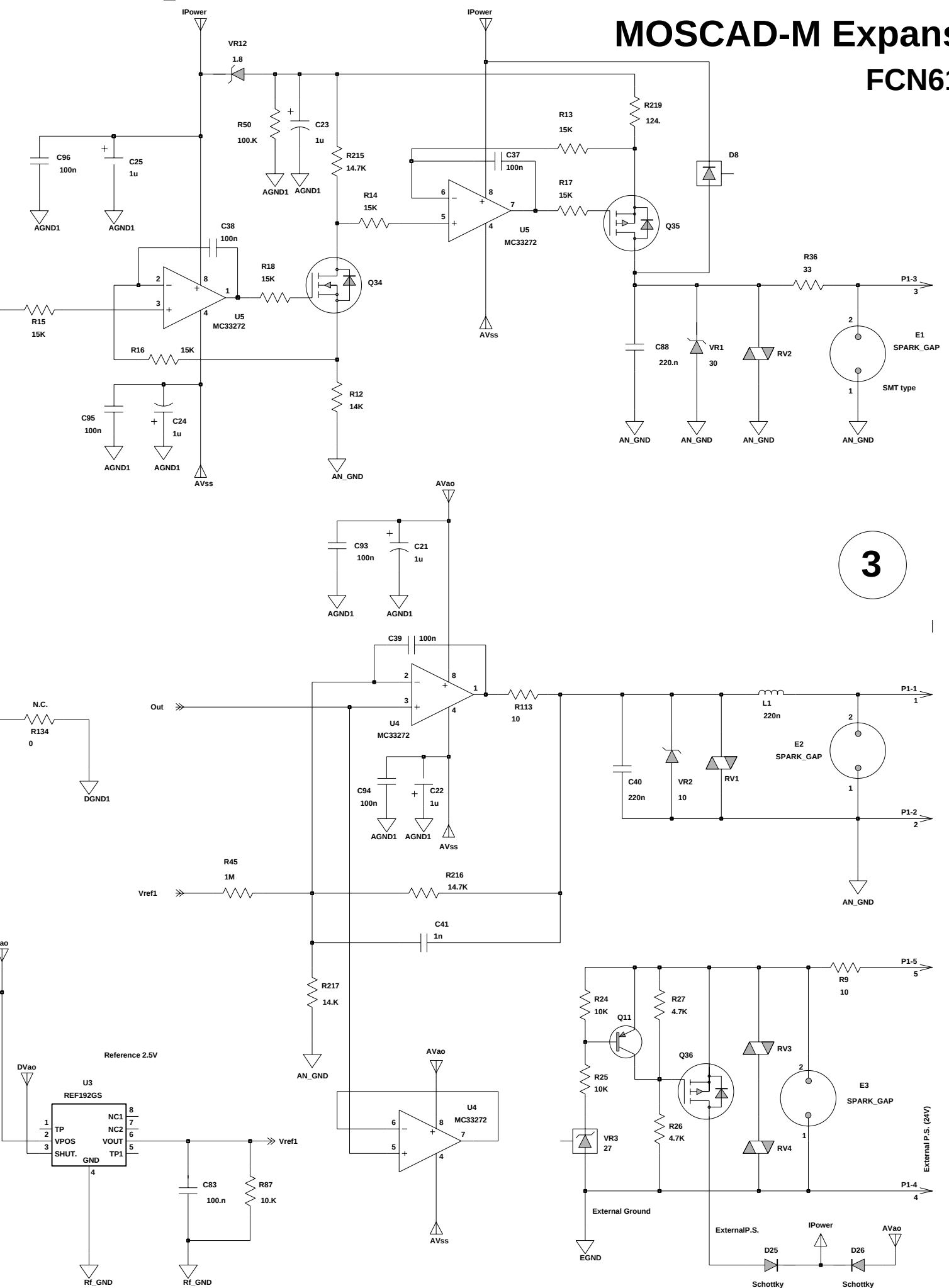
2.1

Analog Output



# MOSCAD-M Expansion

## FCN6110A

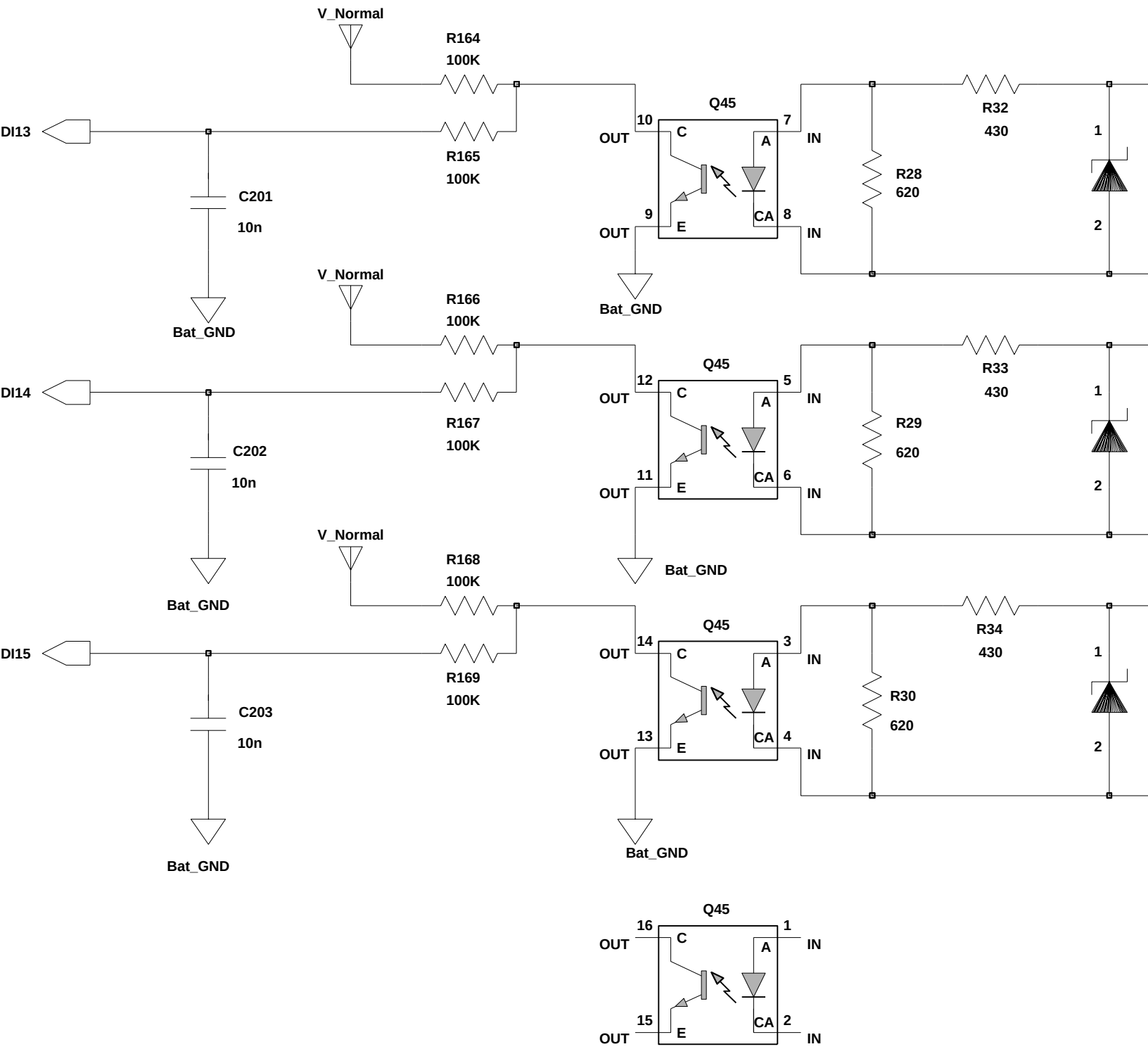


3

# MOSCAD-M Expansion Board

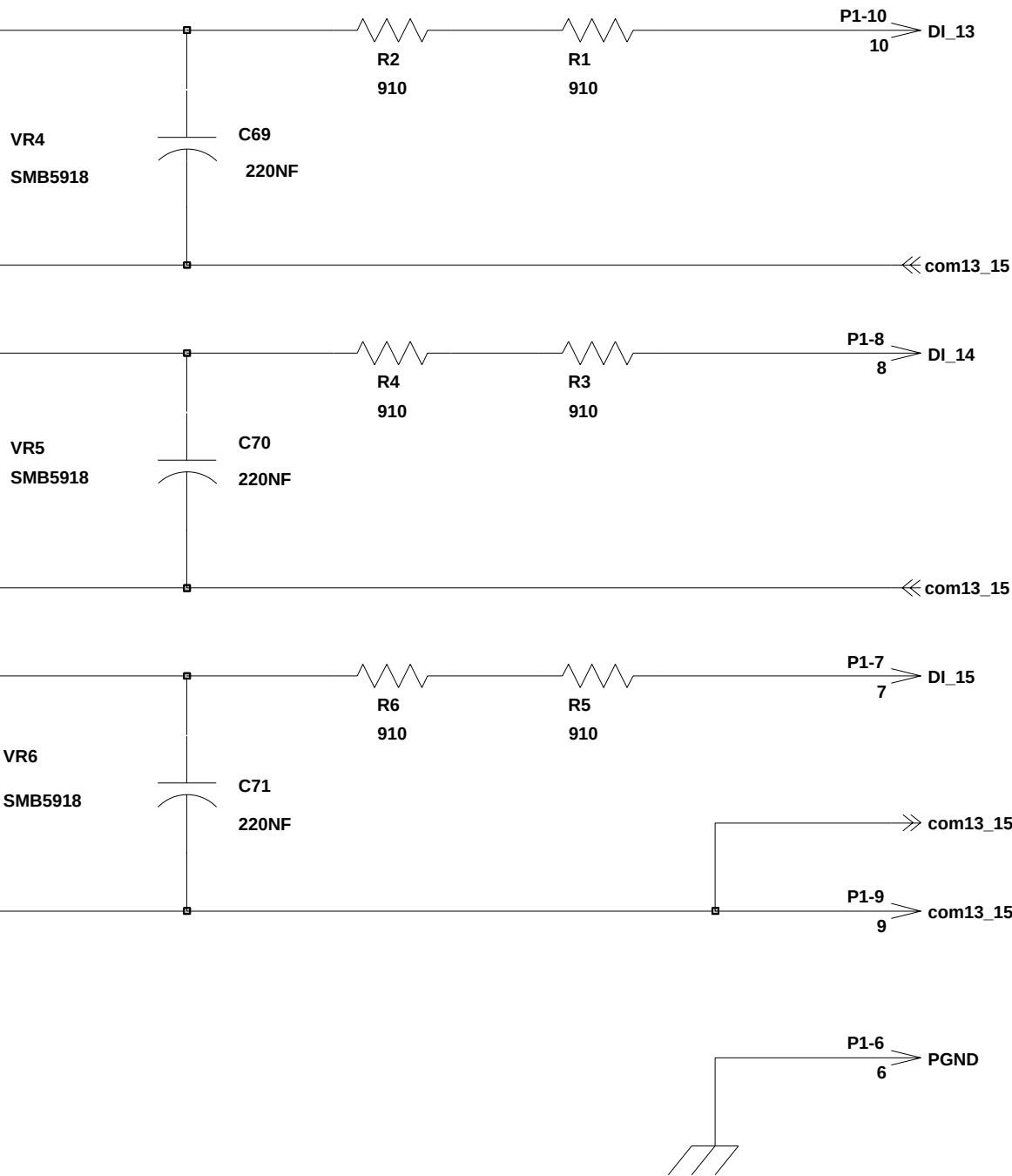
## FCN6110A

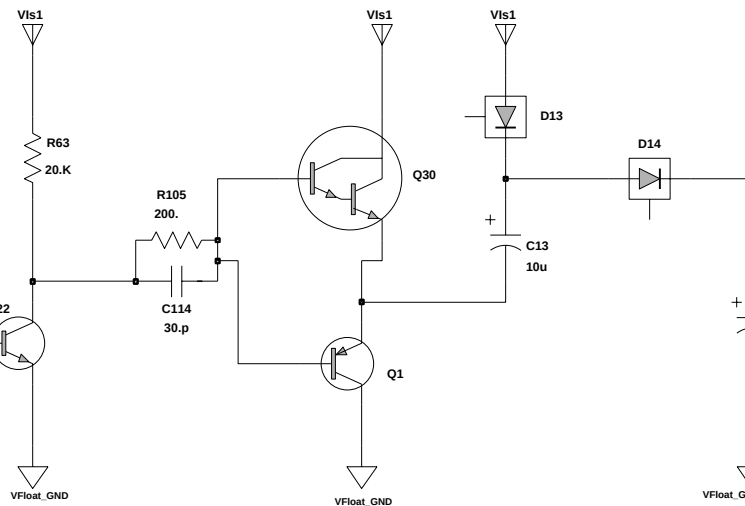
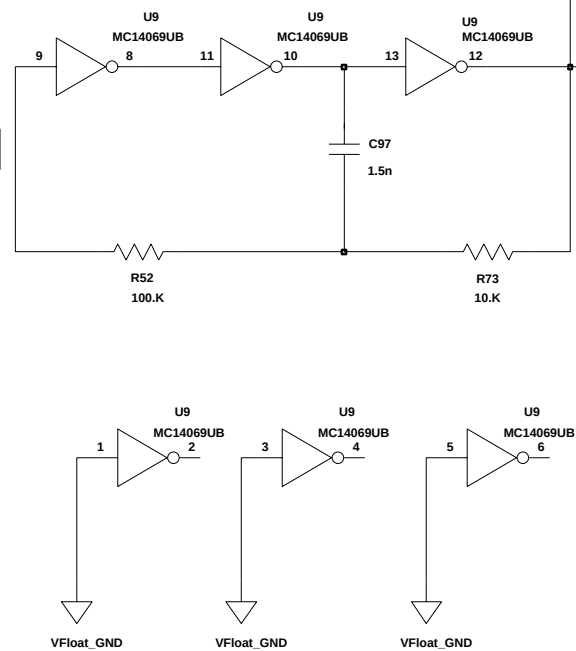
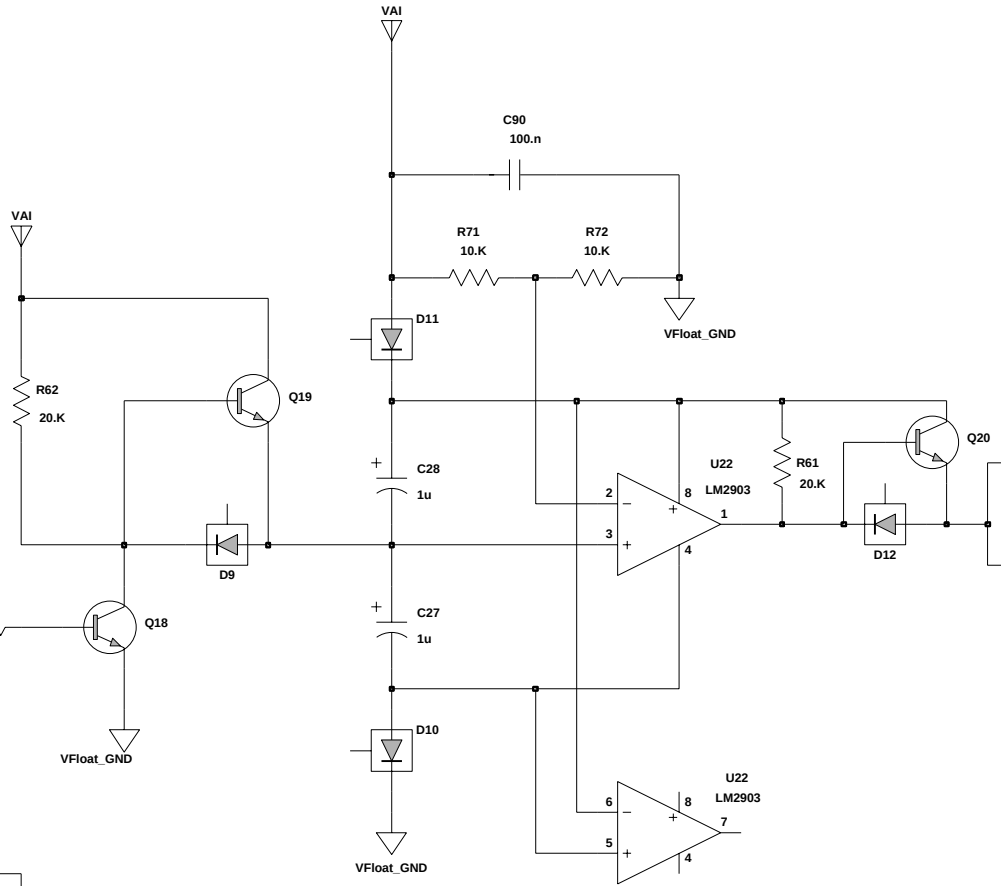
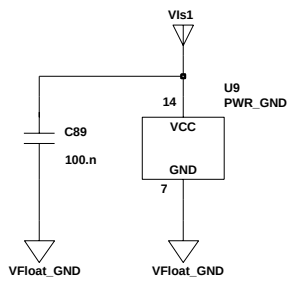
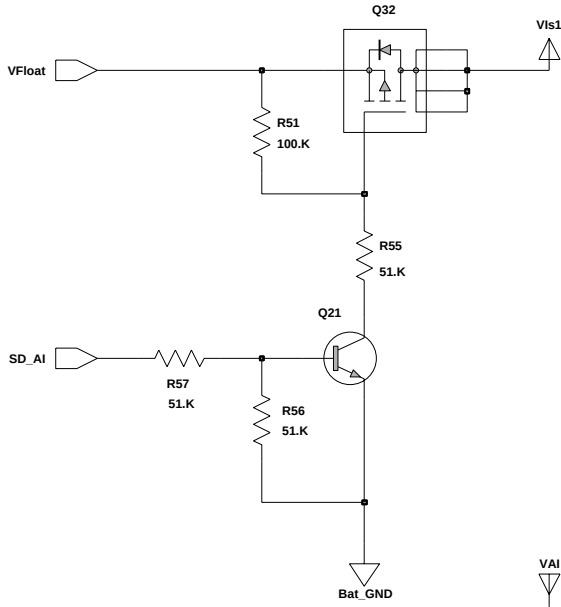
4



# Expansion Board

## Digital Inputs

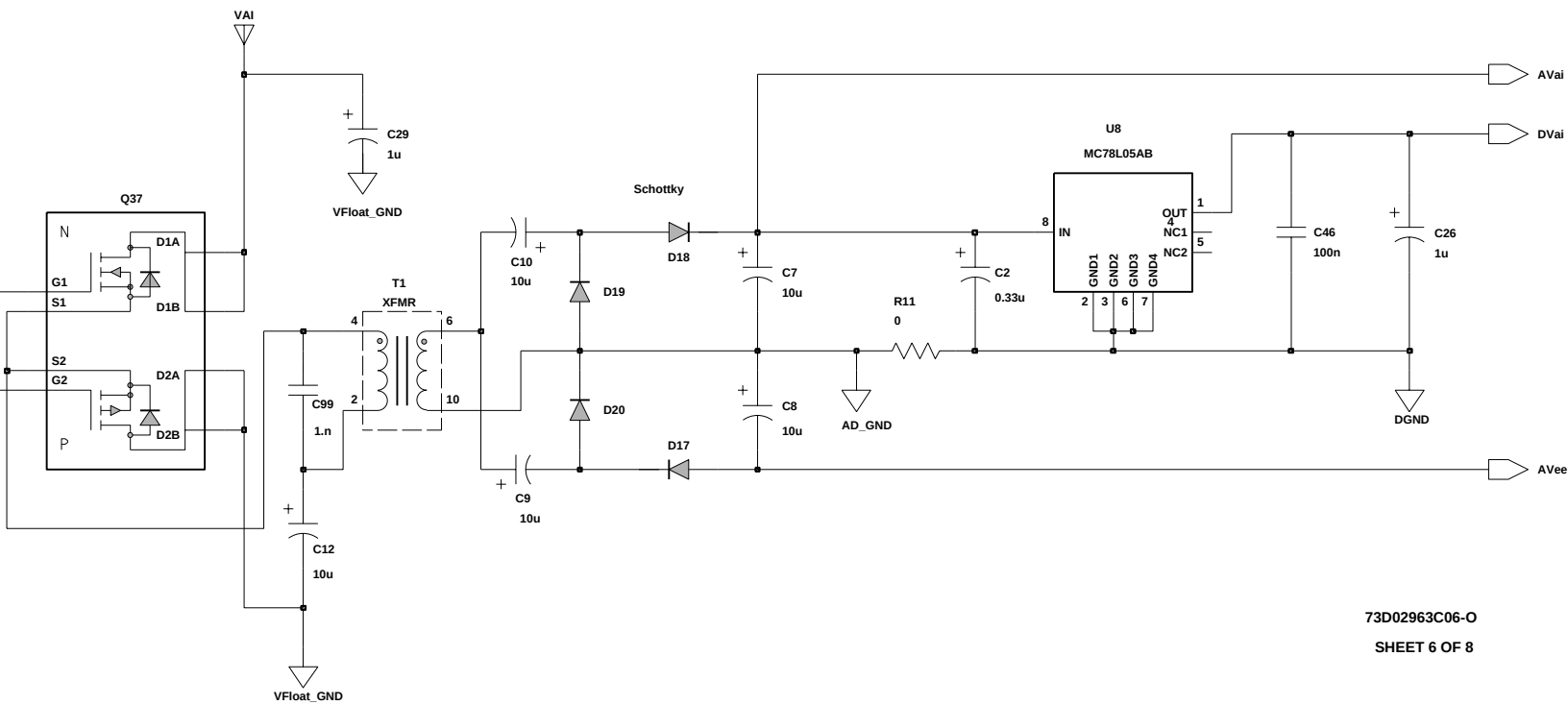




# MOSCAD-M Expansion Board

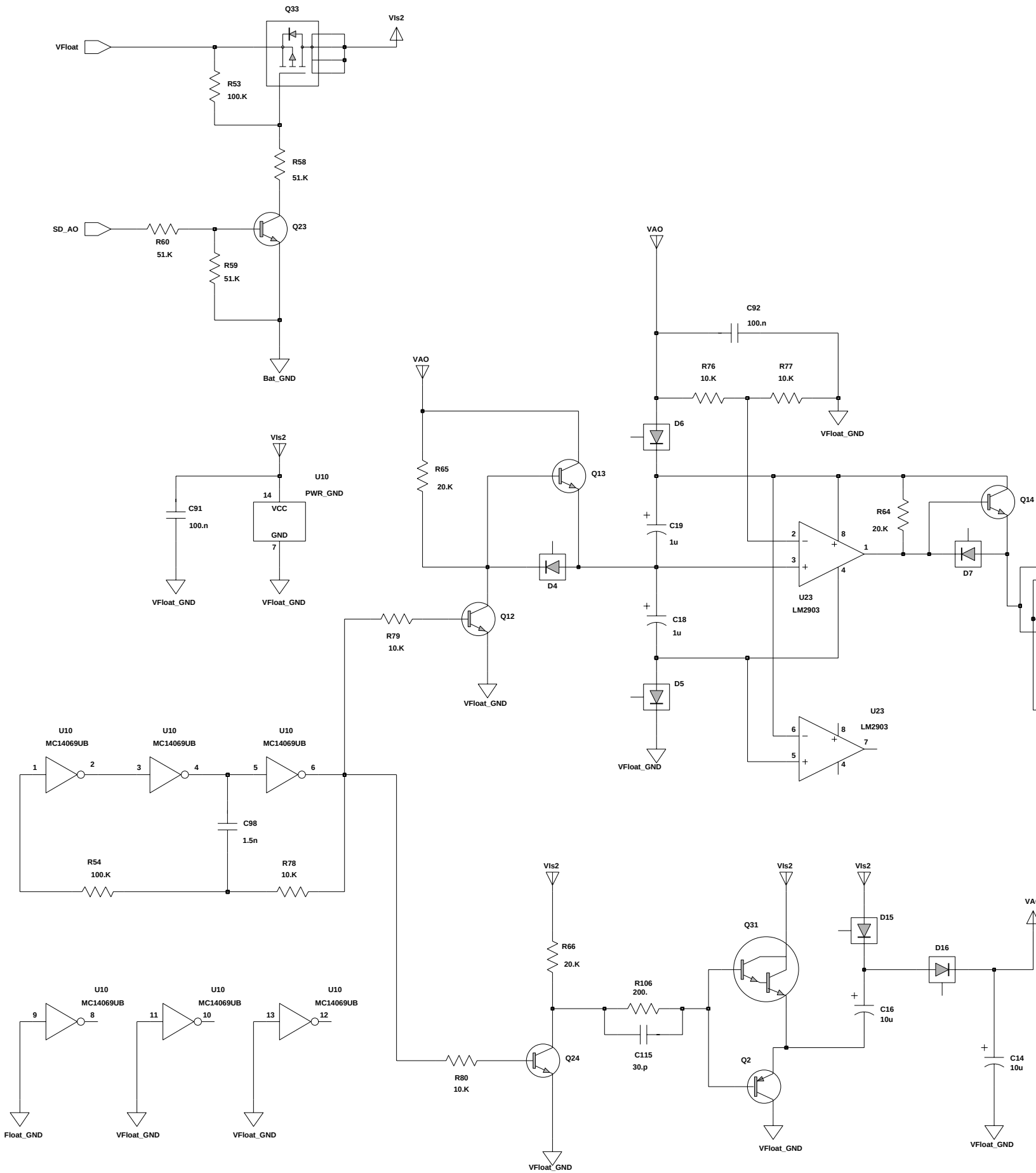
## FCN6110A

5



73D02963C06-O  
SHEET 6 OF 8

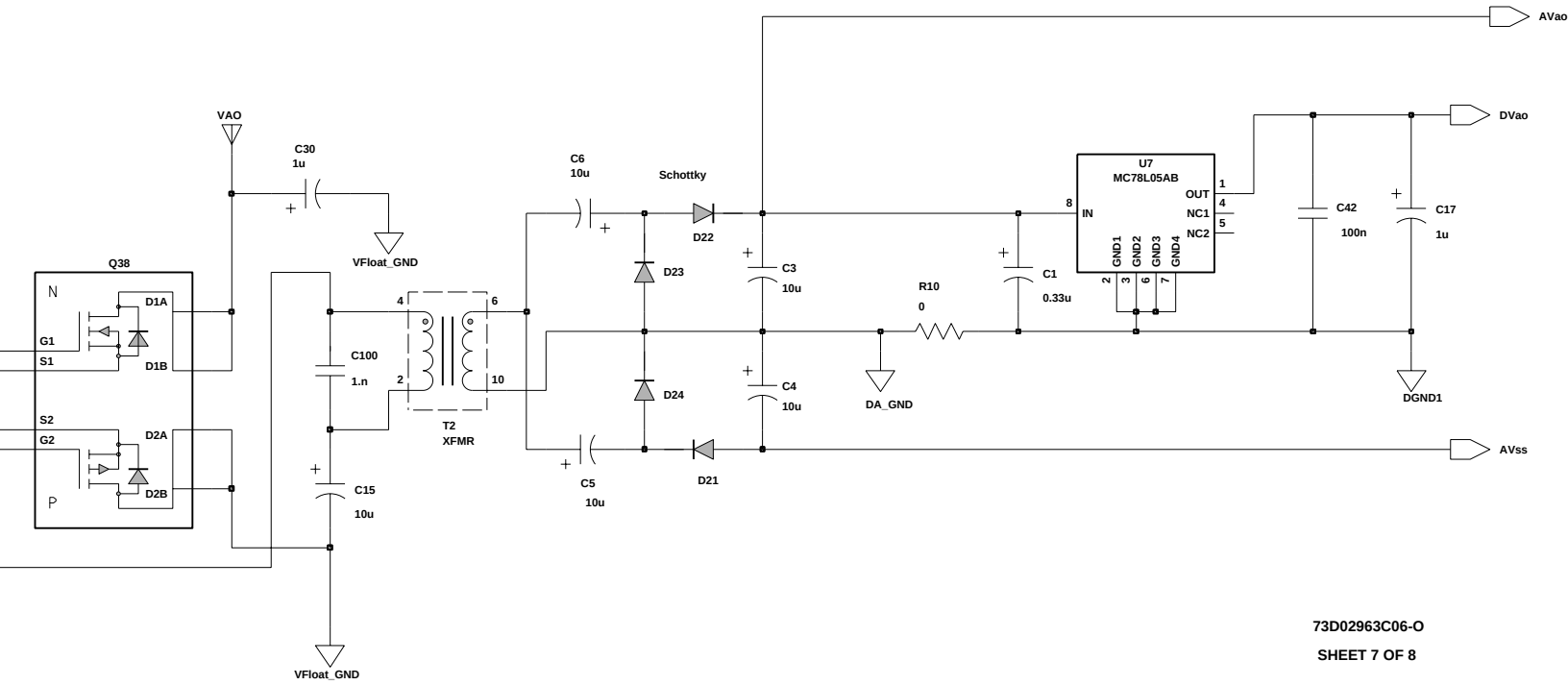
# Isolated Power Supply for AO



# MOSCAD-M Expansion Board

## FCN6110A

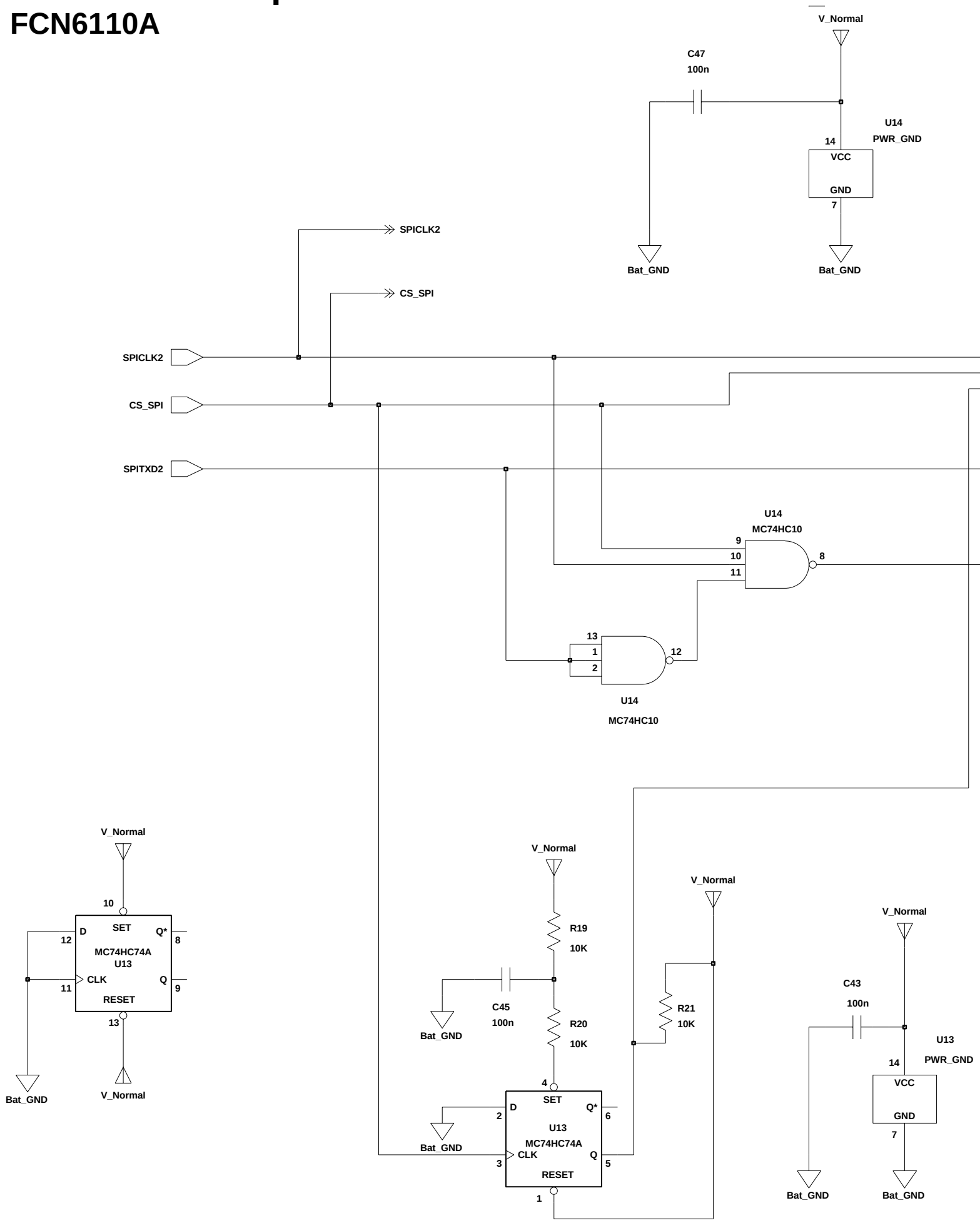
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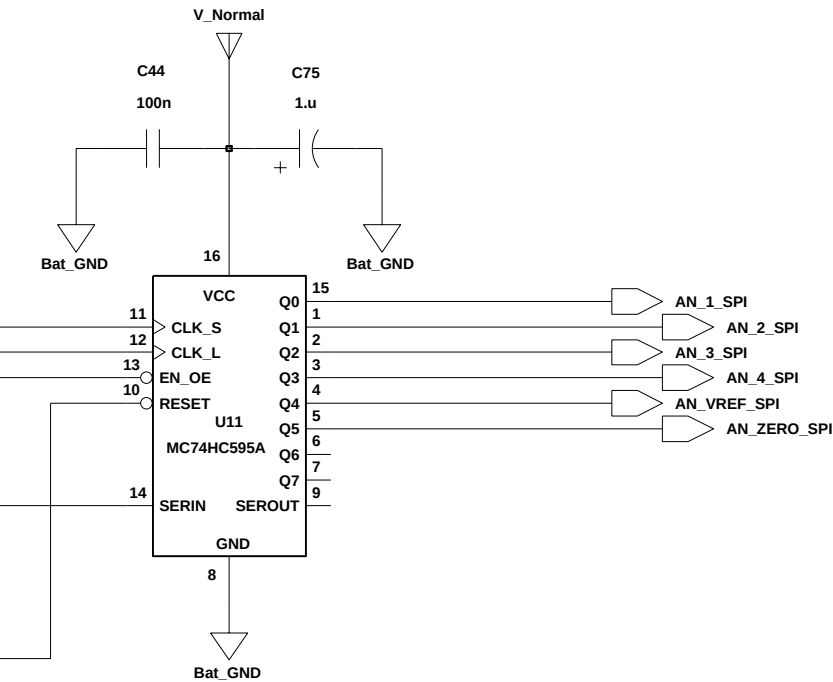
73D02963C06-O  
SHEET 7 OF 8

# MOSCAD-M Expansion Board

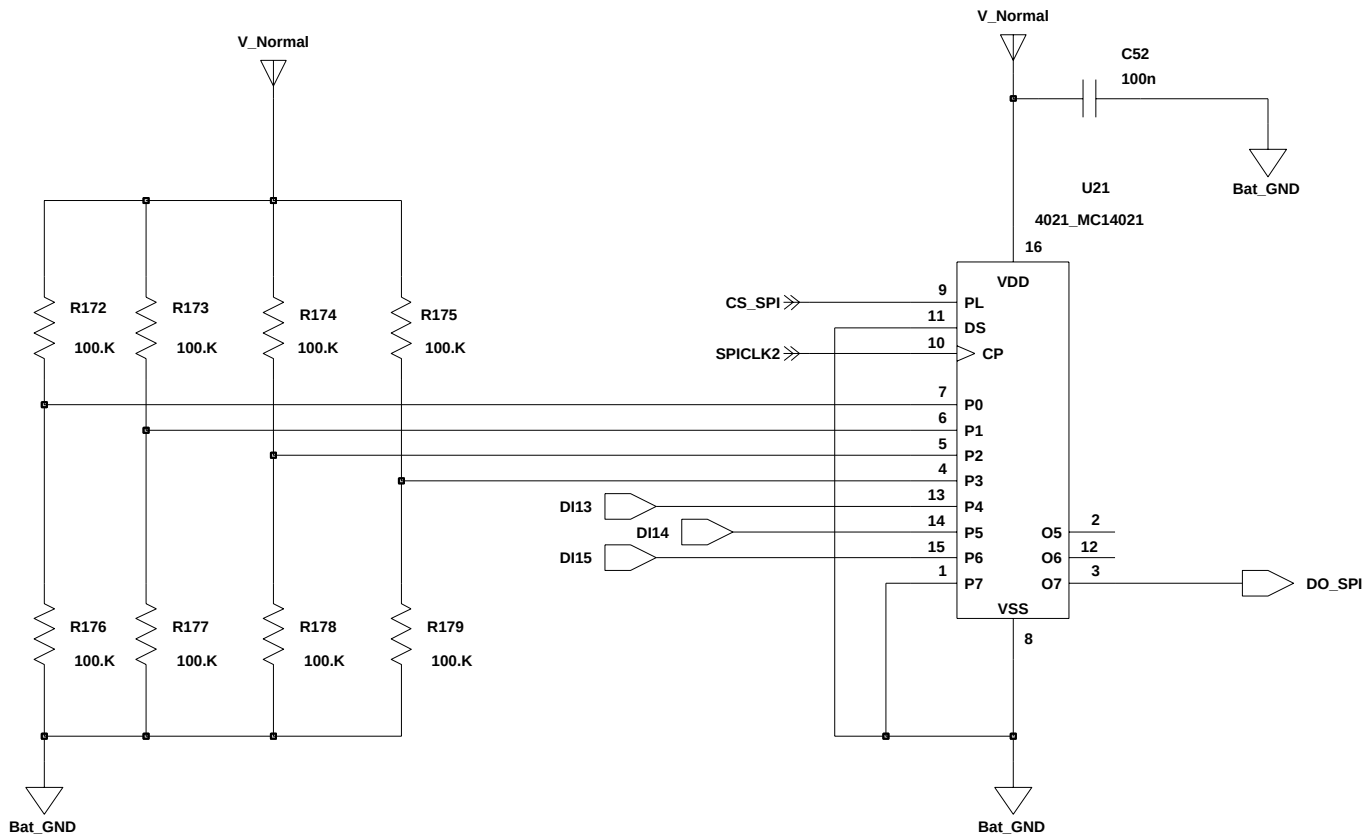
## FCN6110A



SPI\_Interface



7



|        |            |                |
|--------|------------|----------------|
| RV1    | 4804645P05 | VC121018J390   |
| RV2    | 4804645P04 | VC080526C580   |
| RV3-4  | 0602811C01 | VARIS          |
| T1-2   | 2580323L01 | XFMR           |
| U1     | 5102807C35 | TLV2544IDR     |
| U2-3   | 5186214J13 | REF192GS       |
| U4-6   | 5113818A02 | MC33272        |
| U7-8   | 5113816A03 | MC78L05AB      |
| U9-10  | 5113806A23 | MC14069UB      |
| U14    | 5113805A07 | MC74HC10       |
| U18    | 5113805A01 | MC74HC00A      |
| U19    | 5108444S03 | NM93C06        |
| U20    | 5104944K04 | TC7S14F        |
| U21    | 5113806A09 | 4021 MC14021   |
| U22-23 | 5113820A02 | LM2903         |
| U24    | 5102807C34 | MAX550AEUA     |
| U25    | 5104931K05 | TCTS32FU       |
| U26    | 5104944K04 | TC7S14F        |
| VR1    | 4813831A39 | 1SMB5936B      |
| VR2    | 4813831A23 | 1SMB5925B      |
| VR3    | 4813830A37 | MMBZ5254B      |
| VR4-6  | 4813831A14 | ZENER SMB5918  |
| VR8-11 | 4813830A19 | ZENER MMBZ5236 |
| VR12   | 4813830G01 | MMSZ4678T      |

## Printing Layout, Schematic, and Parts List

The PDF file for the RTU component includes the following views:

- layout
- schematic
- divided schematic for any page of the schematic which is too big for printing on a letter size desktop printer
- parts list

To print part of the PDF file:

1. Go to the desired view by clicking once on the appropriate bookmark (e.g. Parts List) on the left side of the screen. If the item has a minus  sign to its left, click on the sign to see further items below.
2. The diagram or list you want to print may more cover than one page. To identify which pages should be printed, note the page numbers (e.g. 4 of 11) at the bottom of the screen. Use the scroll bar or the Page Down button on the keyboard to advance. If the bookmark on the left side of the screen changes, then you have advanced too far and displayed the next sheet or view.
3. Press on the  icon on the toolbar above the diagram to open the Print dialog box.
4. Select the current page or range of page numbers to be printed (e.g. 4-5) and click on OK.

**Warning:** Printing the entire PDF file is NOT recommended, as some pages will probably not fit your printer size.

## Reconnecting a Divided Schematic

Pieces of a divided schematic can be reconnected as follows:

1. Line up the pages. If necessary, consult the schematic in the PDF.
2. Use tape to join of all parts of diagram as shown below.

