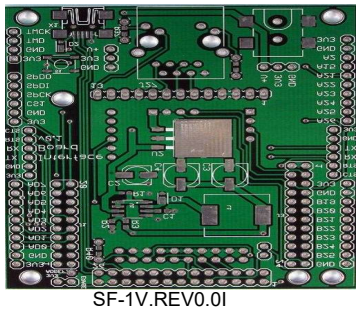
# SF-1V

FBO17



SF-1V.REV0.0I

| REV | Description | Date |
|---|---|---|
| 0.0 | Initial | 01/10/17 |
| 0.1 | Main Card<br>1. Fix wrong connectivity of MPP26, MPP36, MPP43,MPP47, MPP53, MPP58 & MPP59<br>2. Replace for SRD Lanes 2,4 between Rx and Tx pairs<br>3. Add SPI Piggi connector J17.<br>4. Add Terminals for POE & SER isolated GND.<br>5. Change assembly option for R8 & R263 to N.C. and R22 is ass always.<br>6. Improve routing of MDIO/MDC signal's and their derivatives to prevent crosstalks.<br>7. Replace connectors miniPCIe-1 by high 5.7mm and move it to PS. miniPCIe-2 moves to CS.<br>8. Replace Y3,Y4 crystals to smaller pkg.<br>9. Replace 3-x LED house and simpler connectivity<br>10. Add one GND terminal on each PCB side.<br>11. Opt JTAG Connector J15 replaced by other type.<br>12. Add micro-pushbutton SW3 for UBOOT recovery mode<br>13. Add test points for SPI bus, 3V3_SER and 3V3_POE<br>14. Remove MAC Part, since configuration is saved in EEPROM<br>15. Connect nWAKE to nBRST, add ext PU for CELL_RST signals<br>16. Set R217 PD instead of PU because BM3<br>17. Invert D9 and remove I2C PU R45 .<br>18. Use delayed Board Reset for mini-Card POR signals .<br>19. Add resistor 4.7K in parallel to Vbus bulk cap to speed the discharge when port is disable.<br>20. Use MPP32 for Console control nCON_EN<br>21. Move nRUN LED to MPP26.<br>22. Decrease size of R248 10k to 0402.<br>23. Fix polarity of SFP Tx SD5 from SOM<br>24. Incorrect U35 pinout. Fix it.<br>25. Add 2x USB HUB part U37 on USB Port 2.<br>26. TX_DIS func moved from MPP41 to MPP22.<br>27. Add serial resistors 10OHM for RS232 driver short protection.<br><br>PS Card<br>1. Replace 12V Delta PS 305 by Glary U3218033N10N-15APA<br>2. Replace 3-pin PowerIN Connector J1 to 5-pins.<br>3. Add TI ctrl for in-rush current & protection operation. | 31/08/18 |

Designer : Lev Dragilev

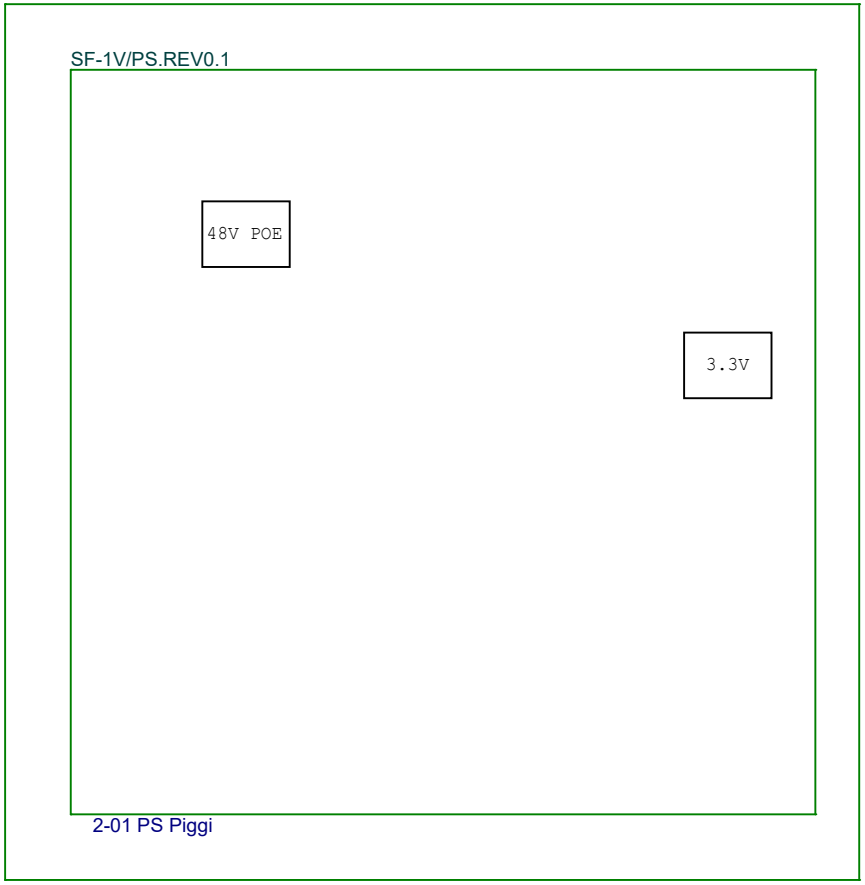
RAD data communications

Title: SF-1V Title

| Size | Design Name : | Rev |
|---|---|---|
| A | SF-1V | 0.1 |

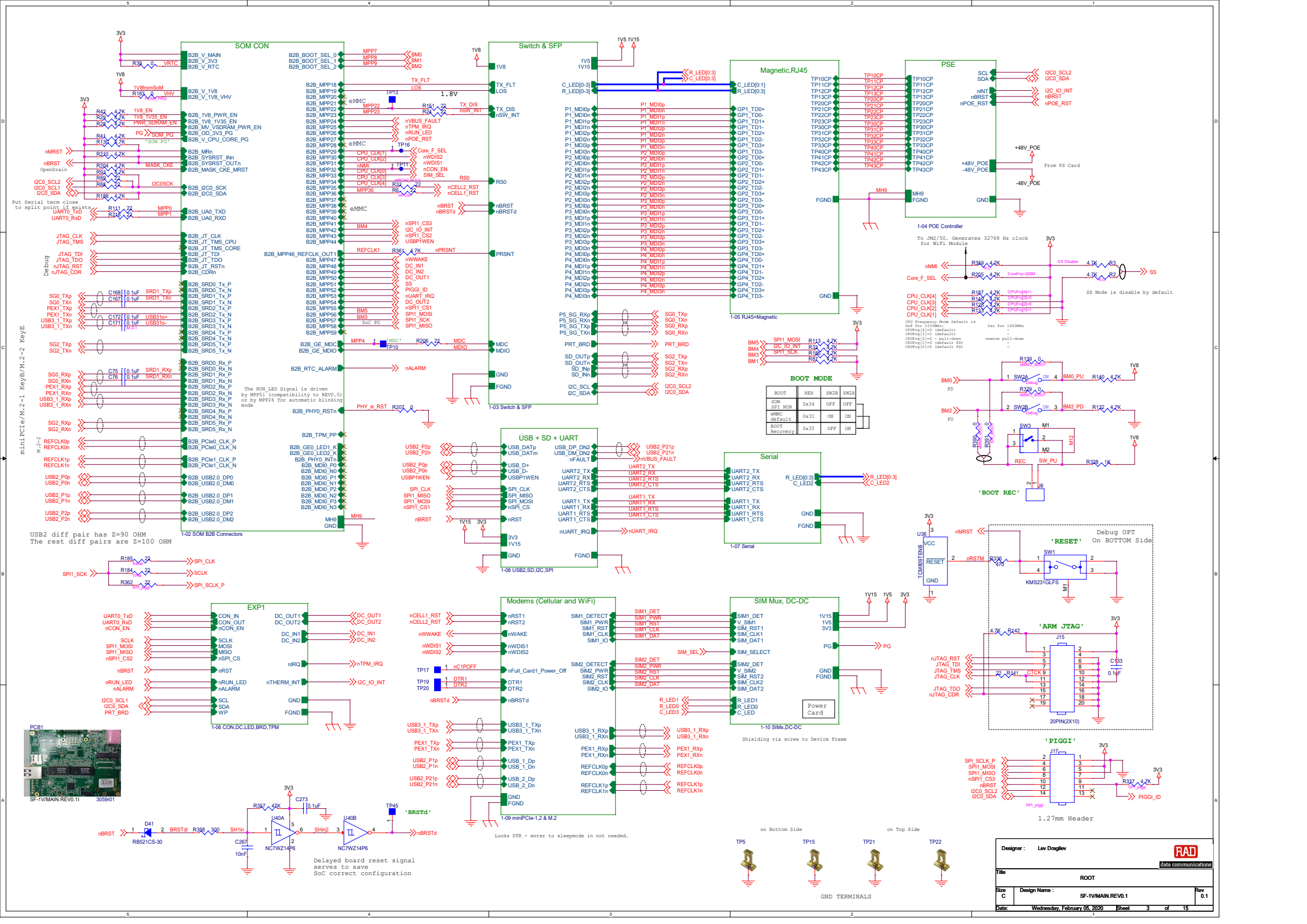
Date: Wednesday, February 05, 2020 Sheet 1 of 15

SF-1V/MAIN.REV0.1

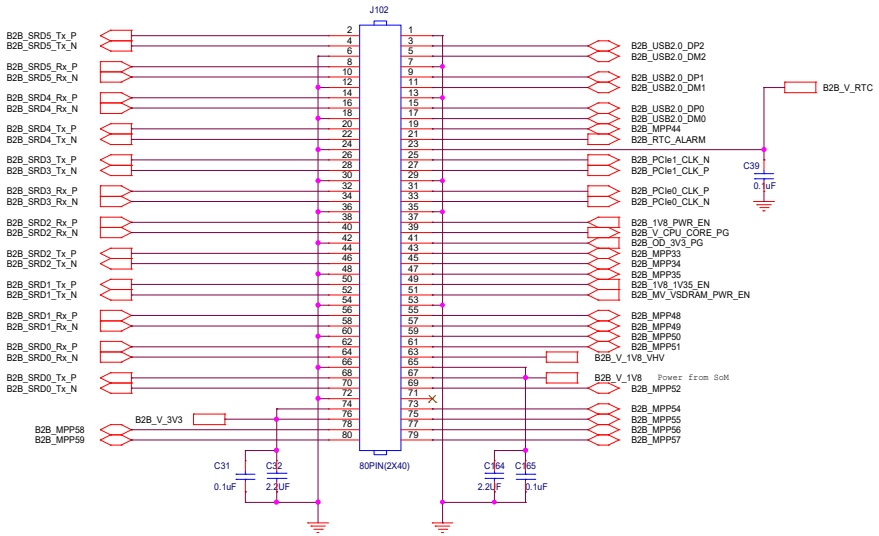


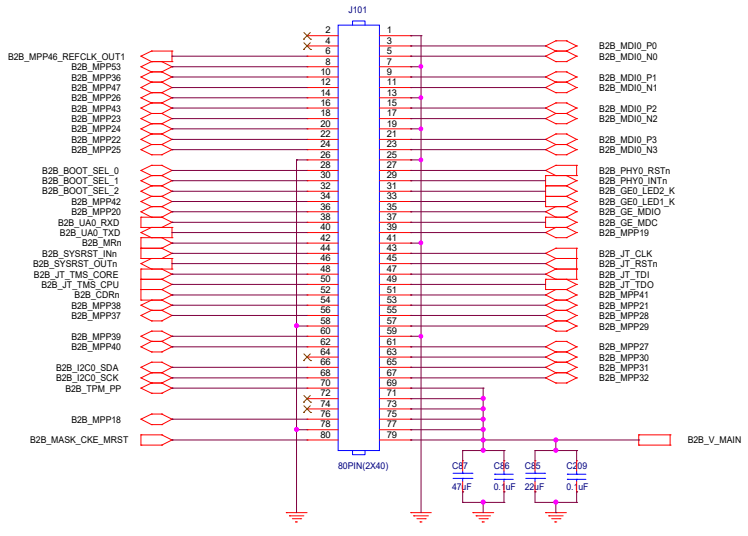

1-01 Carrier Card

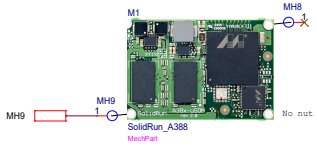
| | | | |
|---|---|---|---|
| Designer : Lev Dragilev | | | |
| Title: Device Overview | | | |
| Size: A | Design Name : SF-1V | | Rev: 0.1 |
| Date: Wednesday, February 05, 2020 | Sheet 2 of 15 | | |


SOM CON
Switch & SFP
Magnetic,RJ45
PSE
1-04 POE Controller
1-05 RJ45+Magnetic
1-03 Switch & SFP
1-02 SOM B2B Connectors
BOOT MODE
'BOOT REC'
USB + SD + UART
1-08 USB2,SD,I2C,SPI
Serial
1-07 Serial
EXP1
1-06 CON,DC,LED,BRD,TPM
Modems (Cellular and WiFi)
1-09 miniPCIe-1.2 & M.2
SIM Mux, DC-DC
1-10 SIMs,DC-DC
Power Card
Debug OPT
On BOTTOM Side
'RESET'
'ARM JTAG'
'PIGGI'
20PIN(2X10)
1.27mm Header
Delayed board reset signal serves to save SoC correct configuration
Looks DTR - enter to sleepmode in not needed.
Shielding via screw to Device Frame
GND TERMINALS
mini PCIe/M.2-1 Key B/M.2-2 Key B
M.2-2
USB2 diff pair has Z=90 OHM
The rest diff pairs are Z=100 OHM
Designer : Lev Dragilev
Title
ROOT
Design Name : SF-1V/MAIN.REV0.1
Size C
Rev 0.1
Date: Wednesday, February 05, 2020
Sheet 3 of 15

# SOM Connectors

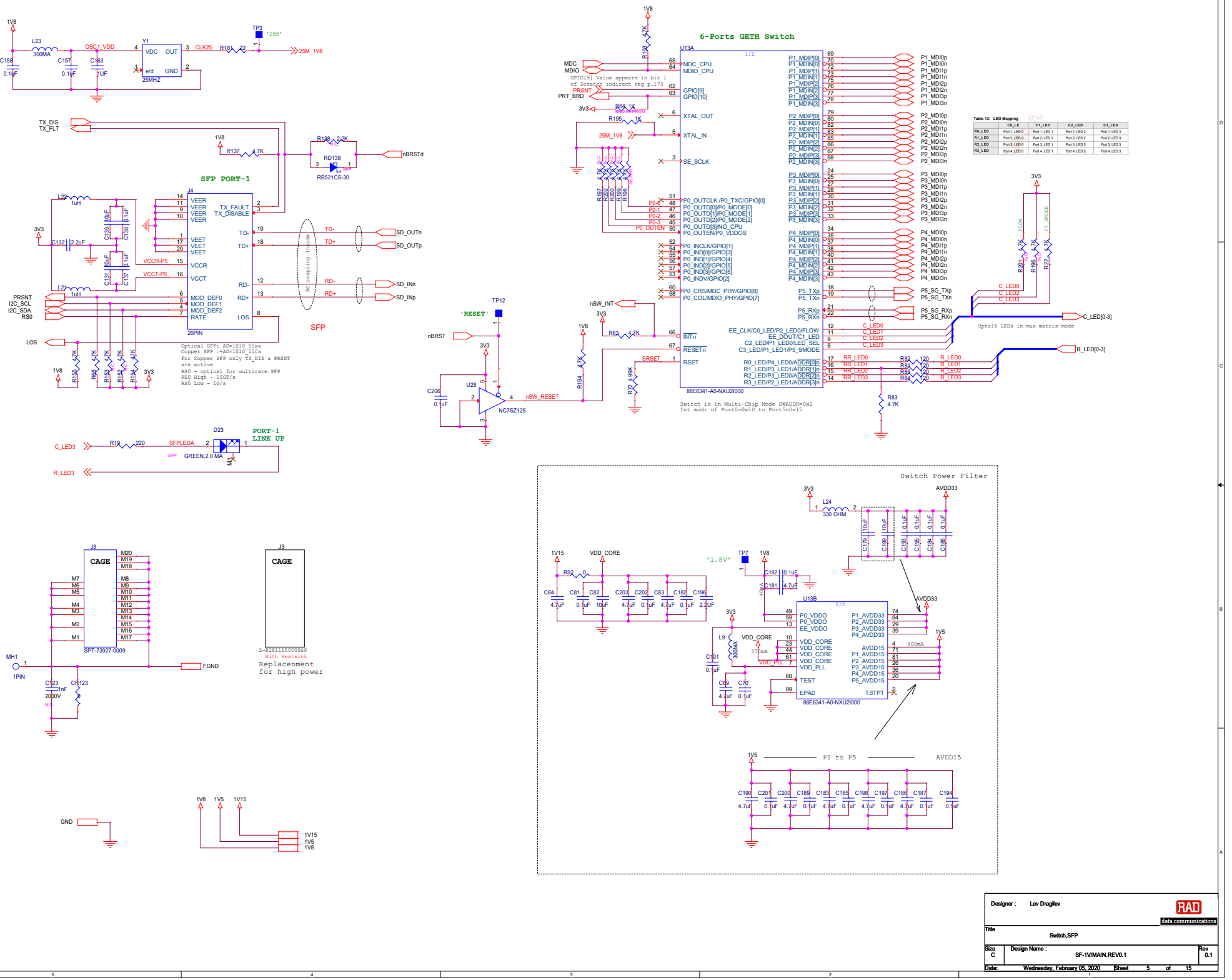


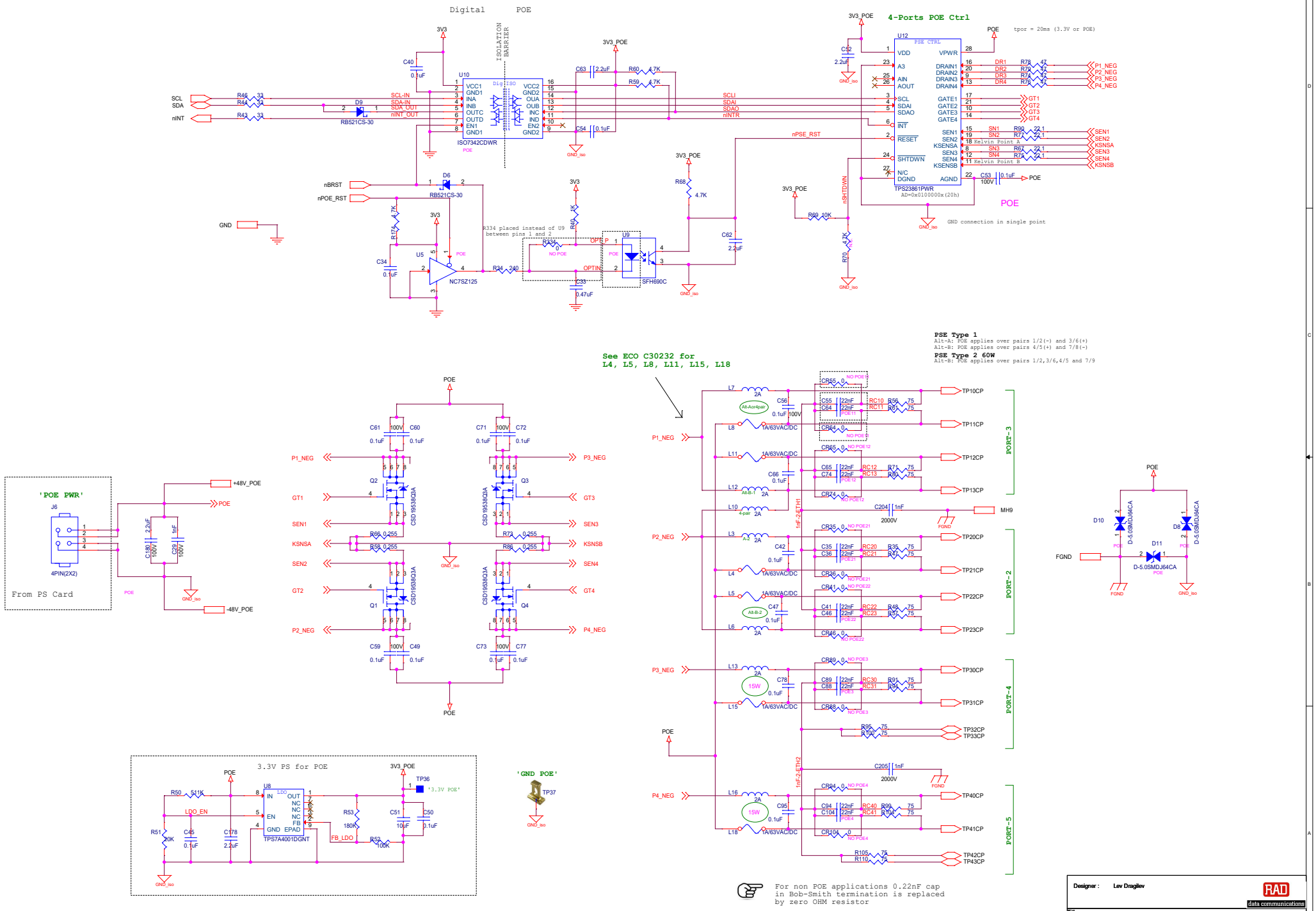



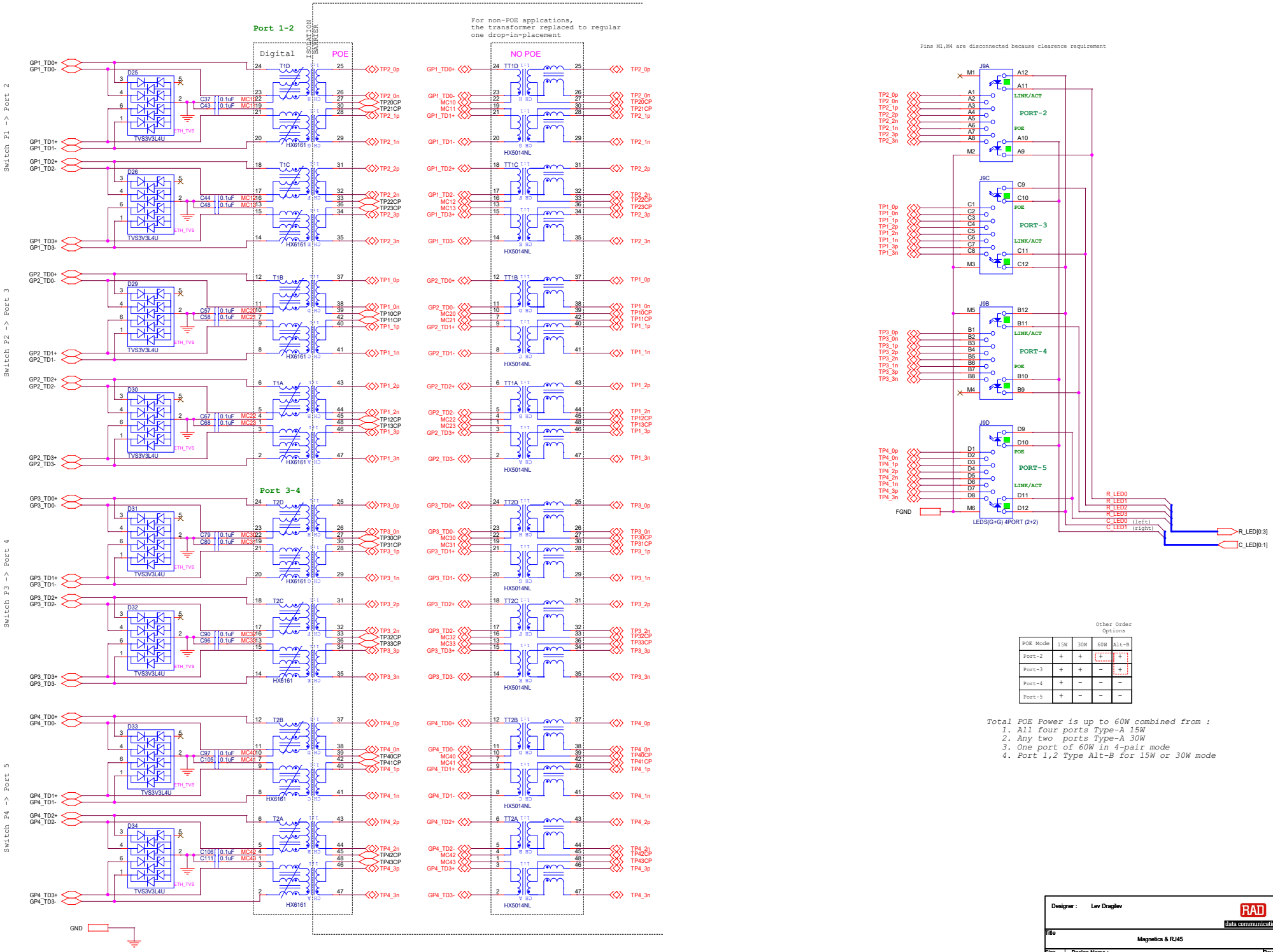





| | | |
|---|---|---|
| Designer : Lev Dragilev | | RAD data communications |
| Title: SOM Connectors | | |
| Size: C | Design Name : SF-1V/MAIN.REV0.1 | Rev: 0.1 |
| Date: Wednesday, February 05, 2020 | Sheet 4 of 15 | |


6-Ports GETH Switch
SFP PORT-1
SFP
PORT-1 LINK UP
Switch Power Filter
CAGE
Replacenment for high power
Switch,SFP
Designer : Lev Dragilev
Title
Size C
Design Name : SF-1V/MAIN.REV0.1
Rev 0.1
Date: Wednesday, February 05, 2020
Sheet 5 of 15


Digital POE
4-Ports POE Ctrl
ISOLATION BARRIER
ISO7342CDWR
TPS23861PWR
NC7SZ125
SFH690C
RB521CS-30
See ECO C30232 for
L4, L5, L8, L11, L15, L18
PSE Type 1
Alt-A: POE applies over pairs 1/2(-) and 3/6(+)
Alt-B: POE applies over pairs 4/5(+) and 7/8(-)
PSE Type 2 60W
Alt-B: POE applies over pairs 1/2,3/6,4/5 and 7/9
'POE PWR'
4PIN(2X2)
From PS Card
3.3V PS for POE
TPS7A4001DGNT
'GND POE'
PORT-3
PORT-2
PORT-4
PORT-5
For non POE applications 0.22nF cap
in Bob-Smith termination is replaced
by zero OHM resistor
Designer : Lev Dragilev
RAD
data communications
Title
PSE
Size C
Design Name : SF-1V/MAIN.REV0.1
Rev 0.1
Date: Wednesday, February 05, 2020
Sheet 6 of 15







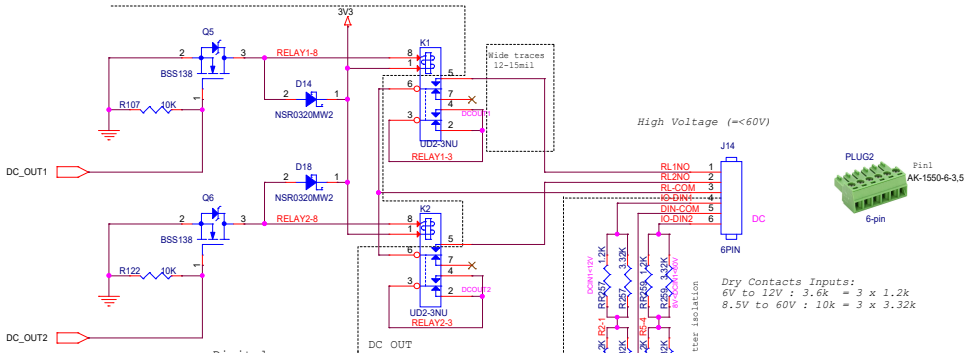
Other Order Options

| POE Mode | 15W | 30W | 60W | Alt-B |
|---|---|---|---|---|
| Port-2 | + | + | + | + |
| Port-3 | + | + | - | + |
| Port-4 | + | - | - | - |
| Port-5 | + | - | - | - |

*Total POE Power is up to 60W combined from :*
1. *All four ports Type-A 15W*
2. *Any two ports Type-A 30W*
3. *One port of 60W in 4-pair mode*
4. *Port 1,2 Type Alt-B for 15W or 30W mode*

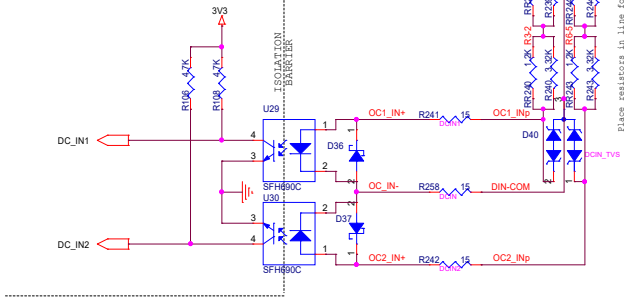
| | | | |
|---|---|---|---|
| Designer : Lev Dragilev | | | RAD data communications |
| Title: Magnetics & RJ45 | | | |
| Size: C | Design Name : SF-1V/MAIN.REV0.1 | | Rev: 0.1 |
| Date: Wednesday, February 05, 2020 | Sheet 7 of 15 | | |

## Dry Contacts - 2xOUT+2xIN

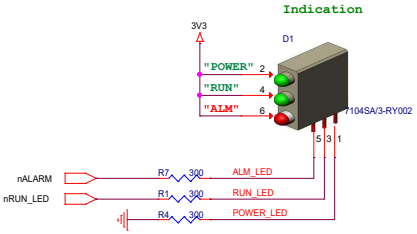


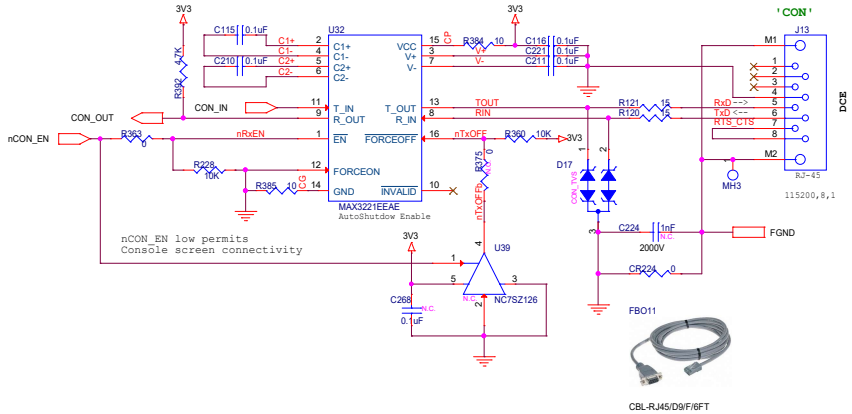

*Dry Contacts Inputs:*
*6V to 12V : 3.6k = 3 x 1.2k*
*8.5V to 60V : 10k = 3 x 3.32k*

## Digital

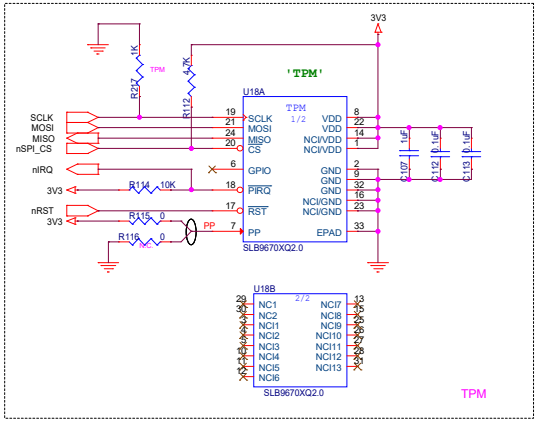



## Indication

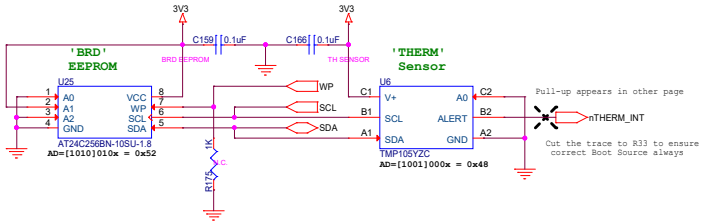



## TPM




## BRD EEPROM and TMP Sensor




GND

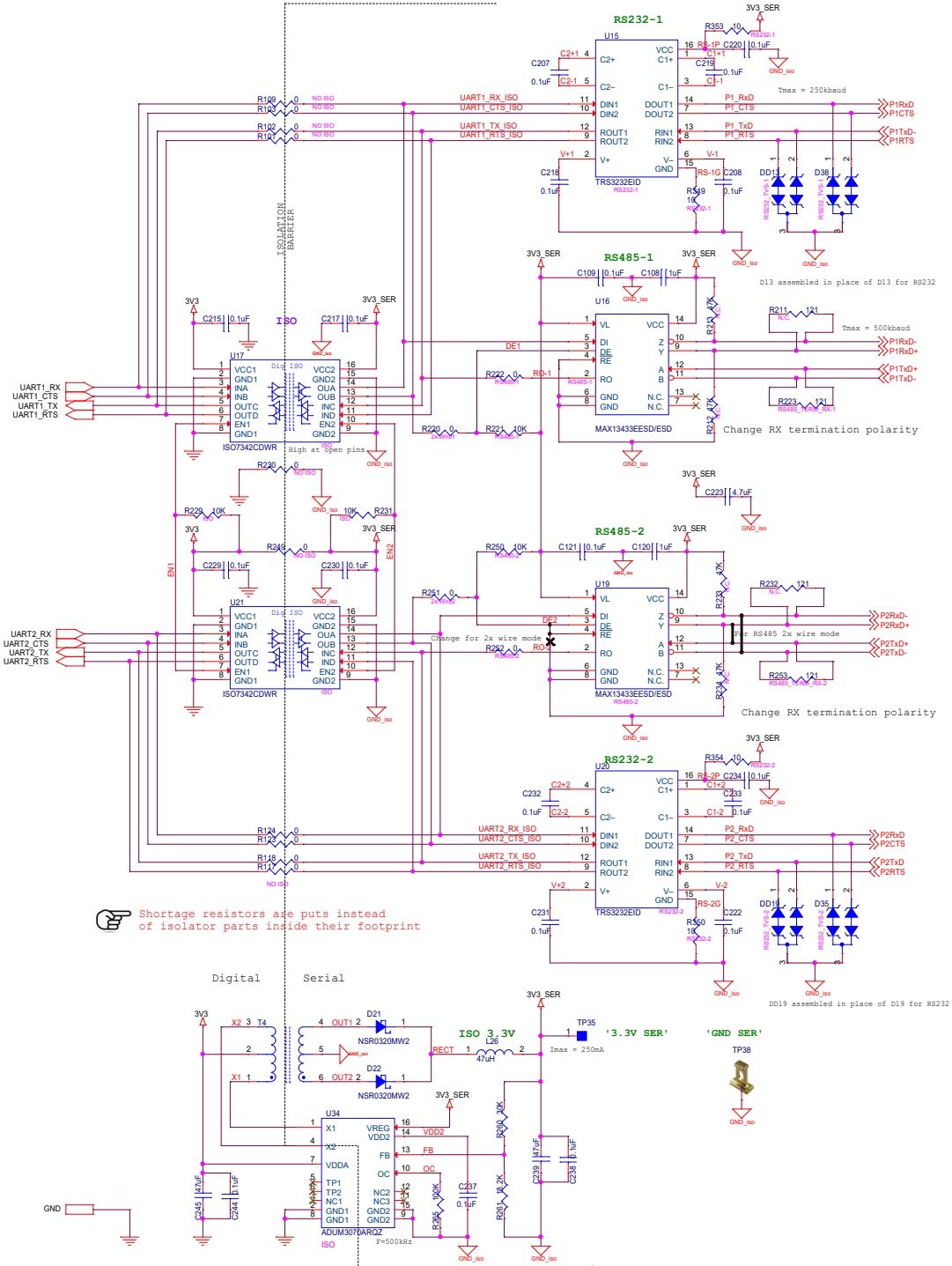
| | | | |
|---|---|---|---|
| Designer : Lev Dragilev | | | RAD data communications |
| Title: JTAG, Console, BRD,Dry Contact | | | |
| Size: C | Design Name : SF-1V/MAIN.REV0.1 | | Rev: 0.1 |
| Date: Wednesday, February 05, 2020 | Sheet 8 | of 15 | |

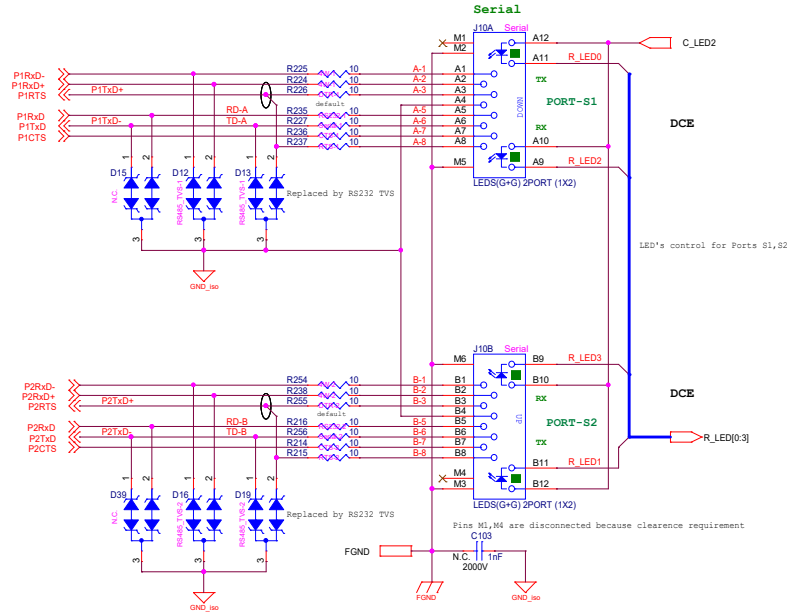
**2x Serial Ports with Options:**

1. ISO
2. NO-ISO

**and**

1. RS232
2. RS485




Serial port's TVS are assembled accordingly to I/F - RS232 or RS485.

RJ45 for RS232 I/F pinout is compliant to EIA-561

| Pin No. | Signal Description | Abbr. | DTE | DCE |
|---|---|---|---|---|
| 1 | DCE Ready, Ring Indicator | DSR/RI | DEVICE | |
| 2 | Received Line Signal Detector | DCD | | |
| 3 | DTE Ready | DTR | | |
| 4 | Signal Ground | SG | | |
| 5 | Received Data | RxD | | |
| 6 | Transmitted Data | TxD | | |
| 7 | Clear To Send | CTS | | |
| 8 | Request To Send | RTS | | |

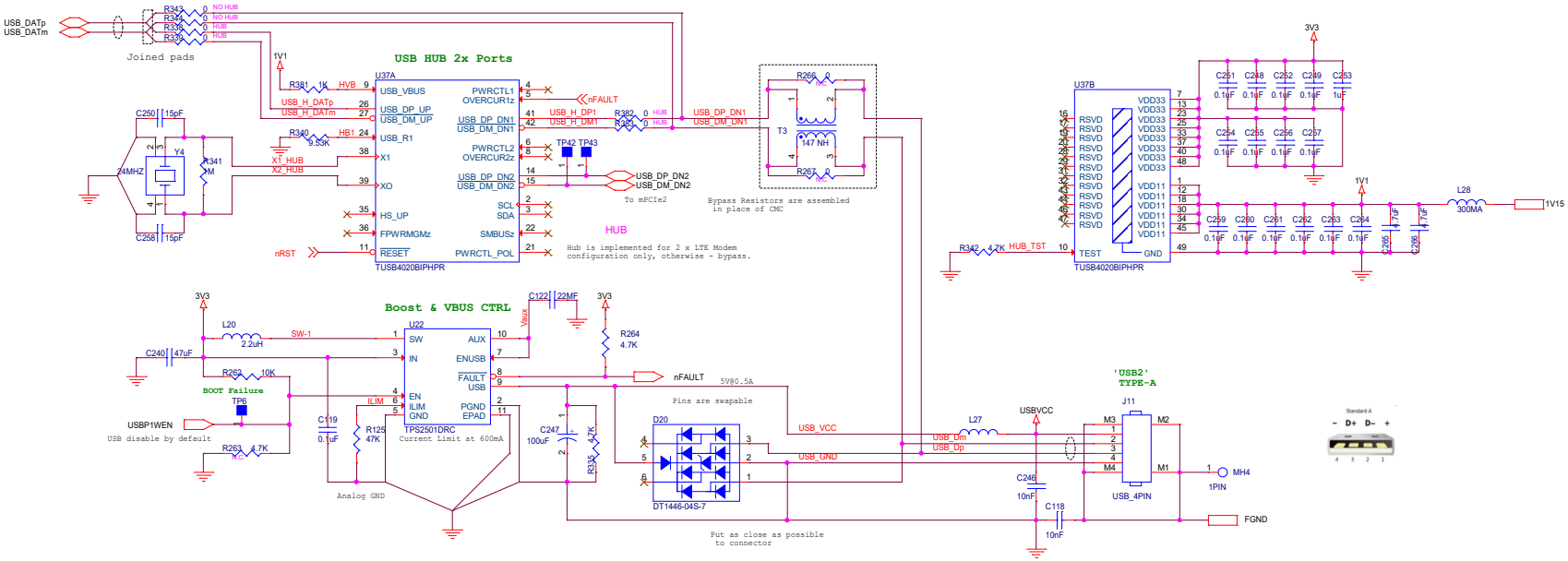
FBO12

CBL-RJ45/D9/F/6FT

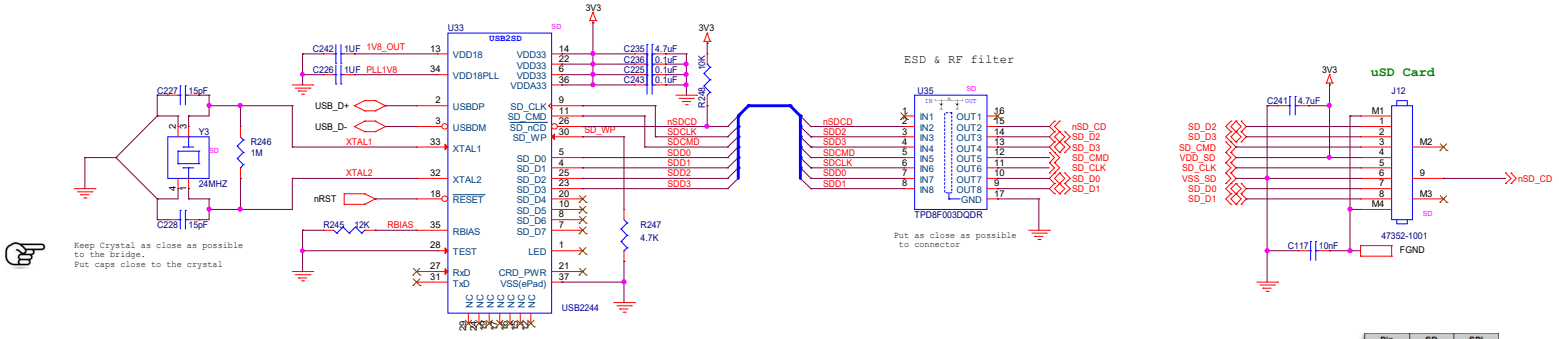
C496

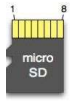
| | | | |
|---|---|---|---|
| Designer : Lev Dragilev | | | RAD data communications |
| Title: Serial: RS232/RS485 (ISO/NON-ISO) | | | |
| Size C | Design Name : SF-1V/MAIN.REV0.1 | | Rev 0.1 |
| Date: Wednesday, February 05, 2020 | Sheet 9 | of 15 | |

# USB HUB + Vbus CTRL



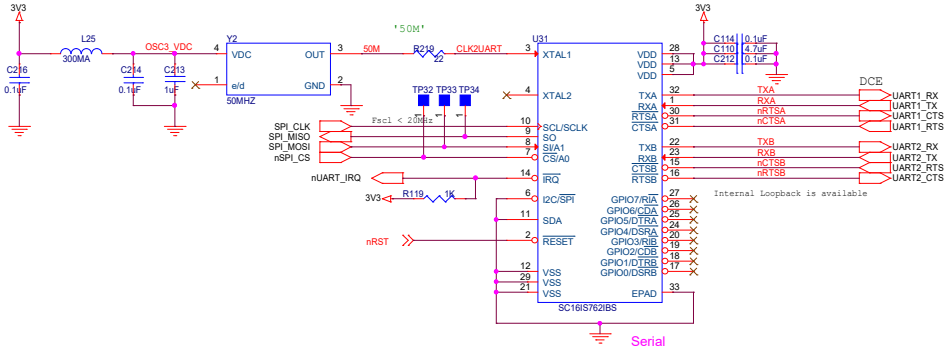

# USB to SD Card




| Pin | SD | SPI |
|---|---|---|
| 1 | DAT2 | X |
| 2 | CD/DAT3 | CS |
| 3 | CMD | DI |
| 4 | VDD | VDD |
| 5 | CLK | SCLK |
| 6 | VSS | VSS |
| 7 | DAT0 | DO |
| 8 | DAT1 | X |

# SPI to 2xUART Bridge




| | |
|---|---|
| Designer : | Lev Dragilev |
| Title | USB: HUB, SD Bridge, A-Port; SPI-to-2xUART |
| Size | C |
| Design Name : | SF-1V/MAIN.REV0.1 |
| Rev | 0.1 |
| Date: | Wednesday, February 05, 2020 |
| Sheet | 10 of 15 |

M.2 connector (module) replaces corresponding mPCIe

I = 800mA

'mPCIe1'
ON PS

'WWAN1'

mPCIe1 can accept LTE module only

'mPCIe2'
I = 800mA
ON CS

'WLAN2'

'WWAN2'

mPCIe2 can accept: LTE or WiFi modules

Insertion of mPCIe module shorts GND to Frame via ANT.

'M.2-1'
ON PS

M.2-1 can accept LTE module only

'M.2-2'
ON CS

M.2-2 can accept WiFi module only

Lora Modems

Lora AU
Lora KR
Lora EU
Lora US
Lora AS

Also available are LTE modules:
- EC25AFA-MINIPCIE
- EC25AUFA-MINIPCIE
- EC25EFA-MINIPCIE

or 3G module: UC20GD-MINIPCIE

mPCIe2(HMC):WiFi Card

HMC WiFi

MH10,MH11 are 1.5mm nuts on TOP (J2 side)

mPCIe1:LTE Card,Cables & ANT

EC25xxx-MINIPCIE

Quectel EC25

CBL-LTE-UFL-SMA/F/100

T-SAA31176AD

MH5,MH7 - Are 3.0mm Soldered Nuts
MMH5,MMH7 - Are 1.5.mm Soldered Nuts
For both cards setting only higher are placed

mPCIe2:LTE Card,Cables & ANT

CBL-LTE-UFL-SMA/F/200

M.2 AirPrime_EM7455

CBL-WIFI-MHF4-RP/SMA/F/150

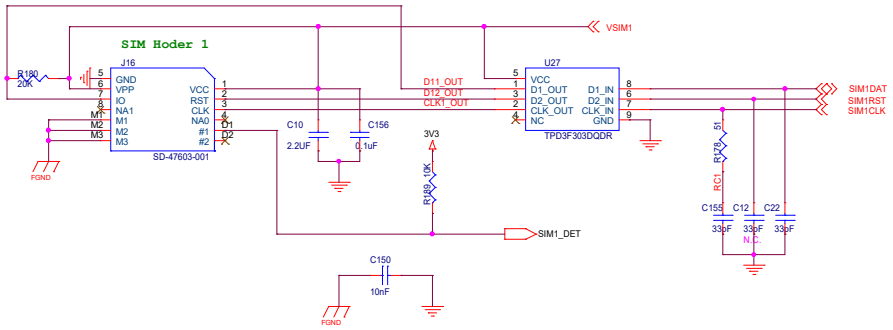
nW_DISABLE2 disable BT Entire Module disable for AzureWave)

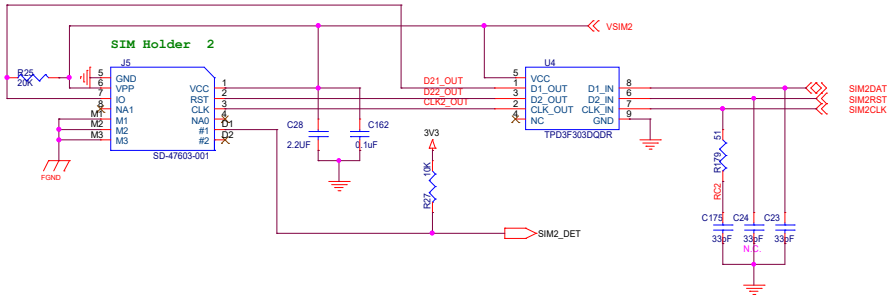
For M.2 card 42mm lenght

For M.2 card 30mm lenght

PCB Mount Hole

| | | | |
|---|---|---|---|
| Designer : | Lev Dragilev | | |
| Title | mPCIE-1,2 and M.2s | | |
| Size C | Design Name : SF-1V/MAIN.REV0.1 | | Rev 0.1 |
| Date: | Wednesday, February 05, 2020 | Sheet 11 of 15 | |



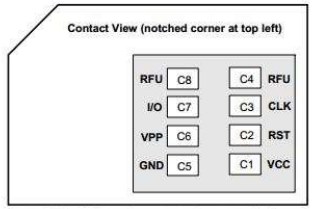
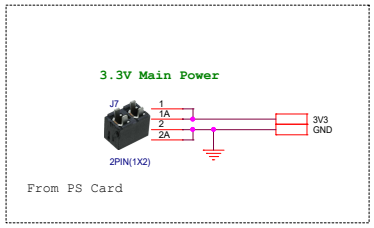
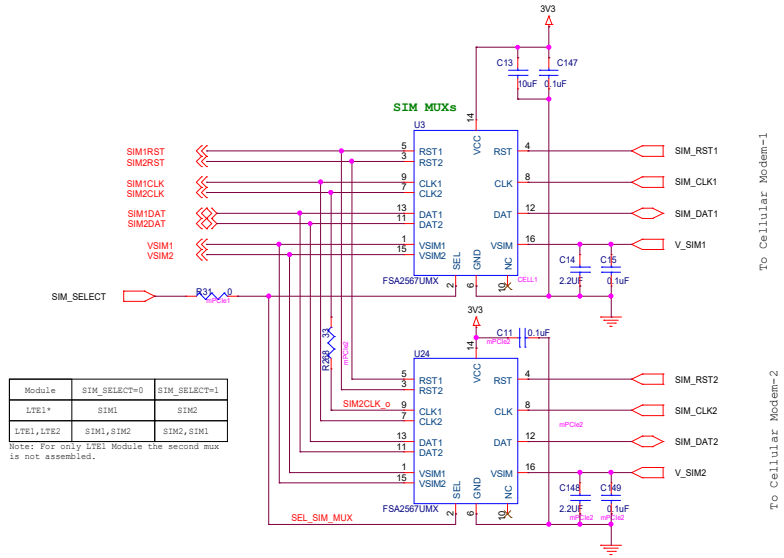



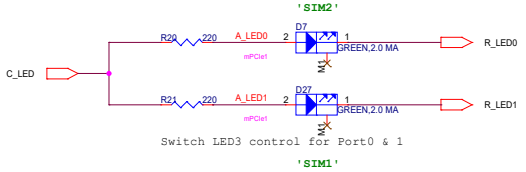

Figure 3-4: SIM card contacts (contact view)



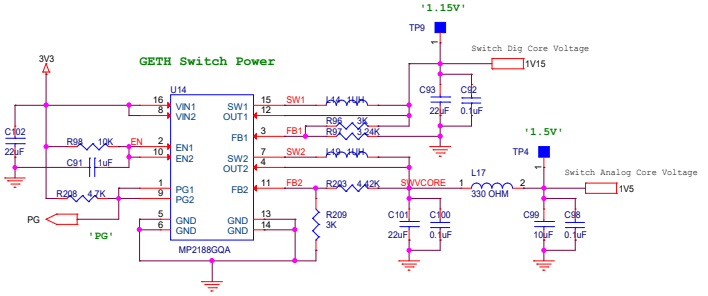




| Module | SIM_SELECT=0 | SIM_SELECT=1 |
|---|---|---|
| LTE1* | SIM1 | SIM2 |
| LTE1,LTE2 | SIM1,SIM2 | SIM2,SIM1 |

Note: For only LTE1 Module the second mux is not assembled.




Switch LED3 control for Port0 & 1




Shielding via screw to Device Frame

| | | | |
|---|---|---|---|
| Designer : | Lev Dragilev | RAD data communications | |
| Title | SIMs,Power | | |
| Size C | Design Name : SF-1V/MAIN.REV0.1 | | Rev 0.1 |
| Date: | Wednesday, February 05, 2020 | Sheet 12 of 15 | |