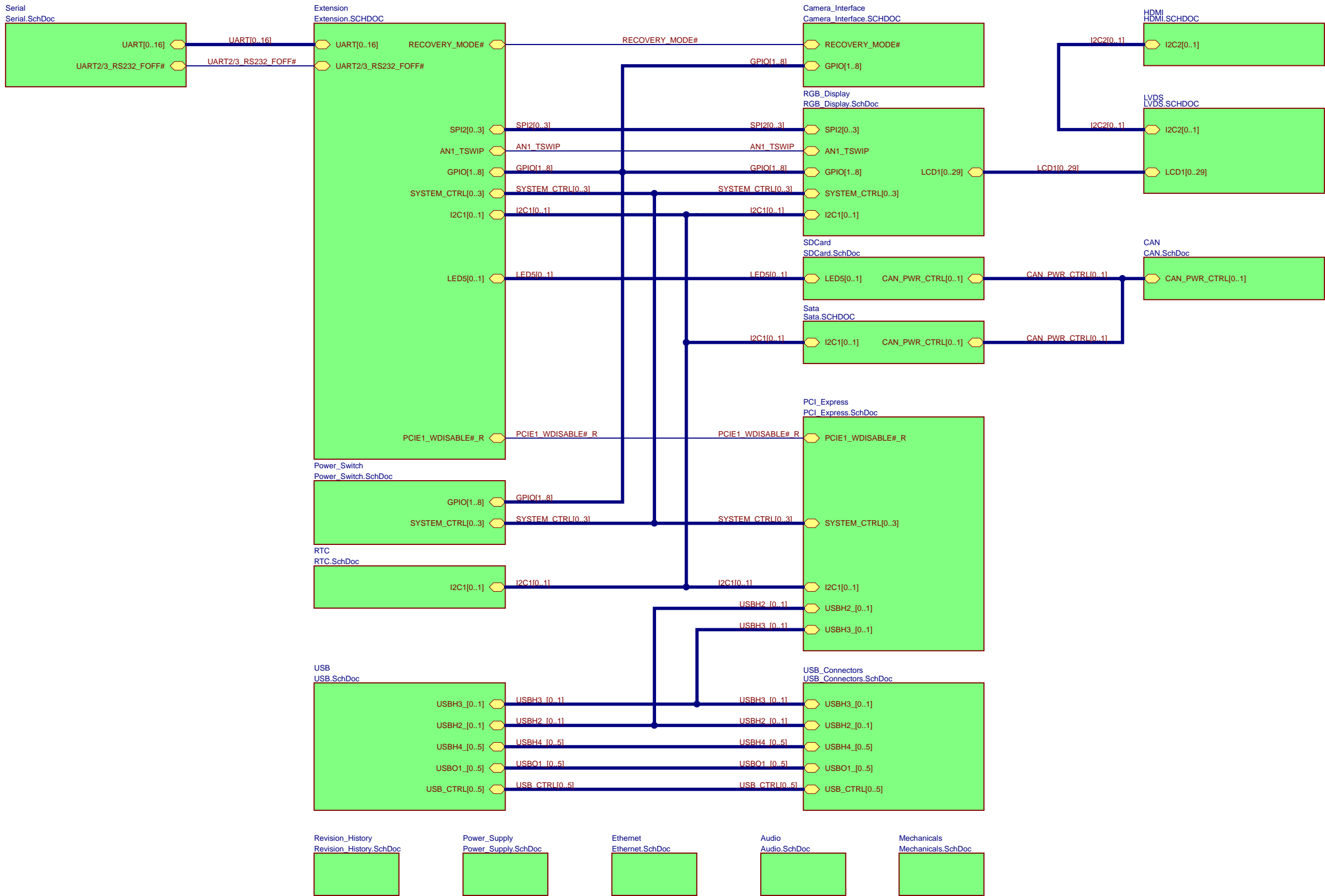
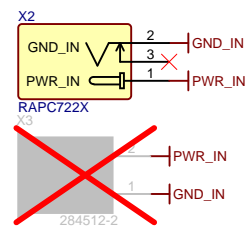


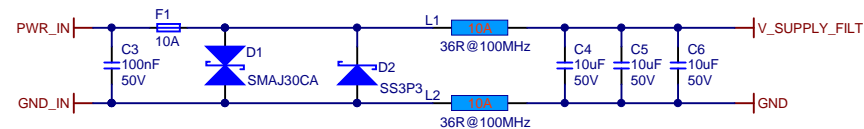
1	2	3	4	5	6	7	8																																						
<div>REVISION HISTORY</div> <div>IF IN DOUBT ASK</div> <div><div><div>31 October 2013</div><div>0. Initial Release</div></div><div><div>08 September 2014</div><div>1. Schematic library</div><div>- Micro SD card logo has been embedded to the component symbol in the schematic library.</div><div>- Ceramic capacitors "X7R 10nF 50V 10% 0402" and "X7R 100nF 50V 10% 0402" have been added to the schematic library.</div><div>2. All schematic pages</div><div>- Schematic page template has been updated.</div><div>- "Port Cross Reference" has been added to the project.</div><div>3. Power switch schematic page</div><div>- Capacitor C46 voltage rating has been updated from 25V to 50V.</div><div>4. LVDS schematic page</div><div>- Capacitor C101 voltage rating has been updated from 16V to 50V.</div><div>5. PCIe Express schematic page</div><div>- Net name has been updated from PCIe_WWLAN# to PCIe_WWAN#.</div><div>6. SD card schematic page</div><div>- Conenctor X10 has been updated with Micro SD card logo embedded component symbol in the schematic page.</div></div><div><div>07 April 2015</div><div>7. SATA schematic page</div><div>- The NOTE 1 has been added to the schematic page: "NOTE 1: Mini PCIe connector schematic symbol is used in the schematic for the mSATA connector (X23), as Mini PCIe and mSATA use the same physical connector. It is important to note that the mSATA interface specifies the RX+ signal on pin 23 and RX- signal on pin 25, whereas the Mini PCIe Card features the RX+ signal on pin 25 and RX- on pin 23. The PCIe interface supports polarity reversal, but not the SATA interface. Since the Mini PCIe connector pin names doesn't match with the mSATA signals, the situation might be confusing. Special attention must be paid while reading or connecting the mSATA signals. "</div><div>8. Power Supply schematic page</div><div>- Mechanical components part number have been made visible.</div></div><div><div>09 February 2016</div><div>9. Ixora schematic library</div><div>- Display name for pins 23, 25, 31, and 33 have been updated in the component "CON-Molex-67910-5700"</div><div>10. SATA and PCL_Express schematic pages</div><div>- Connector X23 and X25 schematic symbols have been updated.</div></div><div><div>23 September 2016</div><div>11. New Hardware Revision, Ixora Carrier Board V1.1</div><div>12. Hardware Architecture page</div><div>- Hardware architecture block diagram has been updated.</div><div>13. Power Supply schematic page</div><div>- Comments near capacitors C7 to C12 have been updated.</div><div>14. Power Switch schematic page</div><div>- MOSFET T8 and T10 have been replaced with new parts (Diodes Inc, Part Number: DMP4015SSS-13) having better Vgs rating.</div><div>- Zener diodes (On Semi, Part Number: MM3Z20VT1G) D14 and D16 have been added for MOSFETs gate protection.</div><div>- Inductor L4 and current sense resistor R9 have been changed to increase the output rating of the 3.3V power supply.</div><div>- WAKE1_MICO# signal has been pulled up to 3.3V (via R146) instead of 3.3V_SW.</div><div>15. RTC schematic page</div><div>- By default, EEPROM circuit (IC14, C97, R92, R93, R94, R95) are not assembled. 2x BAT54 diodes D3 and D4 have been replaced with single BAT54C diode D3.</div><div>16. USB Connectors and PCI Express schematic pages</div><div>- USB power switch (IC7) has been replaced with higher current rating USB switch (TI, Part Number:TPS2066CD, overcurrent limit 1A).</div><div>- USB2 and USB3 interface connections have been swapped to ensure compatibility with the Apalis TK1 module.</div><div>- As default assembly, USB2 has been connected to the PCIe connector and USB3 has been connected to the connector X7 (USB 1 connector).</div><div>17. SDCard schematic page</div><div>- Apalis MMC interface has been used (4 bit mode) in place of Apalis SD interface.</div><div>- Micro SD Card holder X10 has been replaced with new connector (Wurth, Part Number: 693071010811).</div><div>- The NOTE 2 has been added in the schematic page.</div><div>18. Audio schematic page</div><div>- Biasing circuit for the microphone input has been added.</div><div>19. Camera Interface schematic page</div><div>- MIPI CSI connector X28 has been added.</div><div>- Recovery mode jumper JP4 has been added.</div><div>20. RGB Display schematic page</div><div>- Capacitive touch connector X24 has been added.</div><div>21. LVDS schematic page</div><div>- I2C2 signals have been connected to the connector X19, pin 36 and 38.</div><div>22. CAN schematic page</div><div>- By default, CAN bus termination resistors R107, R108, R113, R114 and capacitors C112, C121 are not assembled.</div><div>23. Extension schematic page</div><div>- MXM3_180, MXM3_186 and MXM3_176 have been connected to UART2/3_RS232_FOFF#, FACTORY_DEFAULT# and PCIe_WDISABLE#_R signals respectively.</div><div>- MXM3_188 and MXM3_178 have been used to control LED_4 (LED_4_GREEN and LED_4_RED) respectively.</div></div><div><div>19 July 2017</div><div>24. HDMI schematic page</div><div>- The NOTE 3 has been added in the schematic page.</div></div><div><div>14 April 2018</div><div>25. Power switch schematic page</div><div>- The NOTE 4 has been added in the schematic page.</div></div></div> <div><div>08 October 2018</div><div>26. New Hardware Revision, Ixora Carrier Board V1.2</div><div>27. Hardware Architecture page</div><div>- Hardware architecture block diagram has been updated.</div><div>28. Power Supply schematic page</div><div>- To improve EMI/ESD performance of the board CHASSIS_GND has been implemented.</div><div>29. Power Switch schematic page</div><div>- New DC-DC Buck / Step-down regulators have been used, inorder to increase the output power of the 3.3V and 5V_SW power supply.</div><div>- SH1 and SH2 pins of the tactile switches (SW1, SW2) are connected to CHASSIS_GND.</div><div>- Note 4 has been updated.</div><div>30. RTC schematic page</div><div>- New EEPROM (AT34C02D-XHM-B, TSSOP-8 package) has been added.</div><div>31. USB Connector schematic page</div><div>- New microUSB connector has been used (Hirose, ZX62-AB-5PA(31)).</div><div>- USB connectors (X7, X8, X9) shield circuit has been updated to improve EMI/ESD performance.</div><div>32. SDCard schematic page</div><div>- SD card holder S1, S2 pins are now connected to GND.</div><div>- ESD protection diode (D4) has been added to MMC_CD1 and MMC_CD2 signals.</div><div>- SD card pull-up resistors (R60, R61, R62, R63, R64) are not assembled by default.</div><div>- Load switch (IC22; Microchip MIC94070YMT-TR) has been added to control SD card power.</div><div>- MXM3_148/MMC1_D4 pin is used enable/disable the load switch for SD Card power.</div><div>- MXM3_158/MMC1_D7 pin is used enable/disable the load switch for CAN1 interface power.</div><div>33. Ethernet schematic page</div><div>- New RJ45 connector (X11; BEL Fuse A829-1J1T-KM; -40C to 100C operating temperature range) has been used.</div><div>- Components L20, C72, C73, R73, R74, R74, R76 are not assembled by default. NOTE 5 has been added in the schematic page.</div><div>- RJ45 connector (X11) shield circuit has been updated to improve EMI/ESD performance.</div><div>34. Audio schematic page</div><div>- Capacitors C85 and C86 value has been changed to 4.7uF/10V.</div><div>35. HDMI schematic page</div><div>- New Voltage Level Shifter and ESD protection solution (IC9; Nexperia IP4786CZ32) has been used.</div><div>36. CAN schematic page</div><div>- Load switch ICs (IC18, IC19,IC20, IC21; Microchip MIC94070YMT-TR) have been added to control CAN1 and CAN2 interface power rails.</div><div>37. SATA schematic page</div><div>- Capacitors C164 (47uF) and C165 (47uF) have been added.</div><div>- MXM3_35/SATA1_ACT# pin has been used to enable/disable the load switch for CAN2 interface power.</div><div>38. PCI Express schematic page</div><div>- Capacitors C162 (47uF) and C163 (47uF) have been added.</div><div>39. Extension schematic page</div><div>- MXM3_190 pin has been connected to shared pads resistors (R154, R155), as it may detect undesirable SD card detect interrupts.</div><div>- SH1 and SH2 pins of the tactile switch (SW3) are connected to CHASSIS_GND.</div><div>40. Mechanicals schematic page</div><div>- New schematics page added for mechanical components.</div></div> <div><div><div><div><div></div><div>Toradex</div><div>Swiss. Embedded. Computing.</div></div></div><div><table><tr><td colspan="3">Title <i>Ixora</i></td><td colspan="2">Toradex AG</td></tr><tr><td colspan="3">Size: A3</td><td colspan="2">Altsagenstrasse 5</td></tr><tr><td colspan="3">Number:1</td><td colspan="2">Horw</td></tr><tr><td colspan="3">Revision:V1.2</td><td colspan="2">6048</td></tr><tr><td>Date: 08/08/2019</td><td>Time: 16:17:35</td><td>Sheet 1 of 20</td><td colspan="2" rowspan="2">Switzerland</td></tr><tr><td colspan="5">File: Revision_History.SchDoc</td></tr></table></div></div></div> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>								Title <i>Ixora</i>			Toradex AG		Size: A3			Altsagenstrasse 5		Number:1			Horw		Revision:V1.2			6048		Date: 08/08/2019	Time: 16:17:35	Sheet 1 of 20	Switzerland		File: Revision_History.SchDoc					1	2	3	4	5	6	7	8
Title <i>Ixora</i>			Toradex AG																																										
Size: A3			Altsagenstrasse 5																																										
Number:1			Horw																																										
Revision:V1.2			6048																																										
Date: 08/08/2019	Time: 16:17:35	Sheet 1 of 20	Switzerland																																										
File: Revision_History.SchDoc																																													
1	2	3	4	5	6	7	8																																						



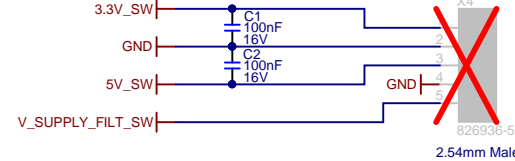
POWER INPUT (Vin = 7V to 28V)



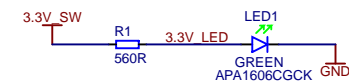
EMI INPUT FILTER



POWER OUTPUT HEADER



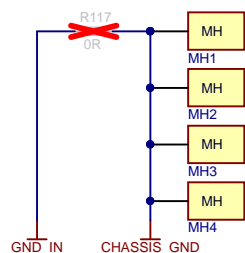
POWER SUPPLY INDICATION (3.3V_SW)



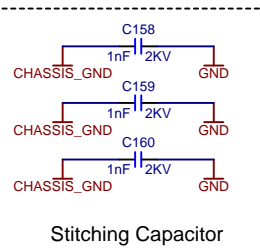
TEST POINTS



CHASSIS GROUND

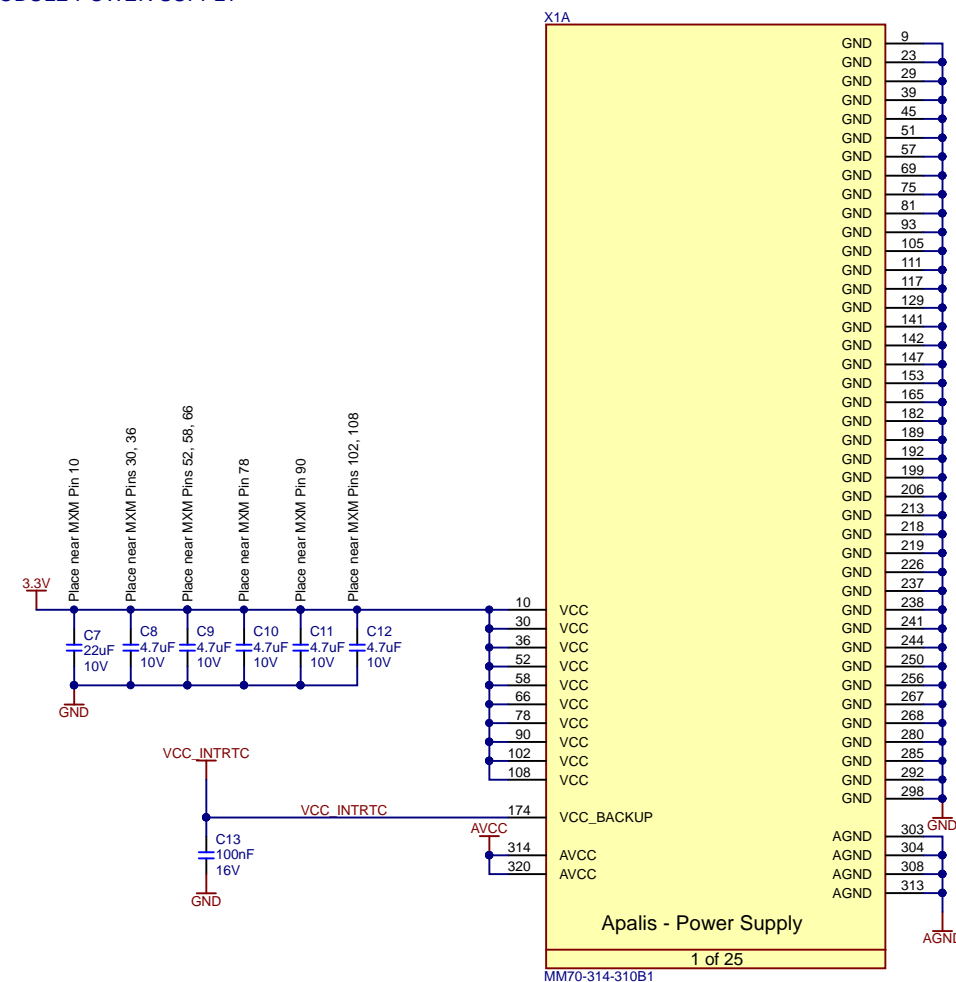


- CHASSIS_GND should be connected to GND_IN only at one point, near the input power connector.
- Don't create a closed loop for CHASSIS_GND on the PCB, to avoid any loop current.

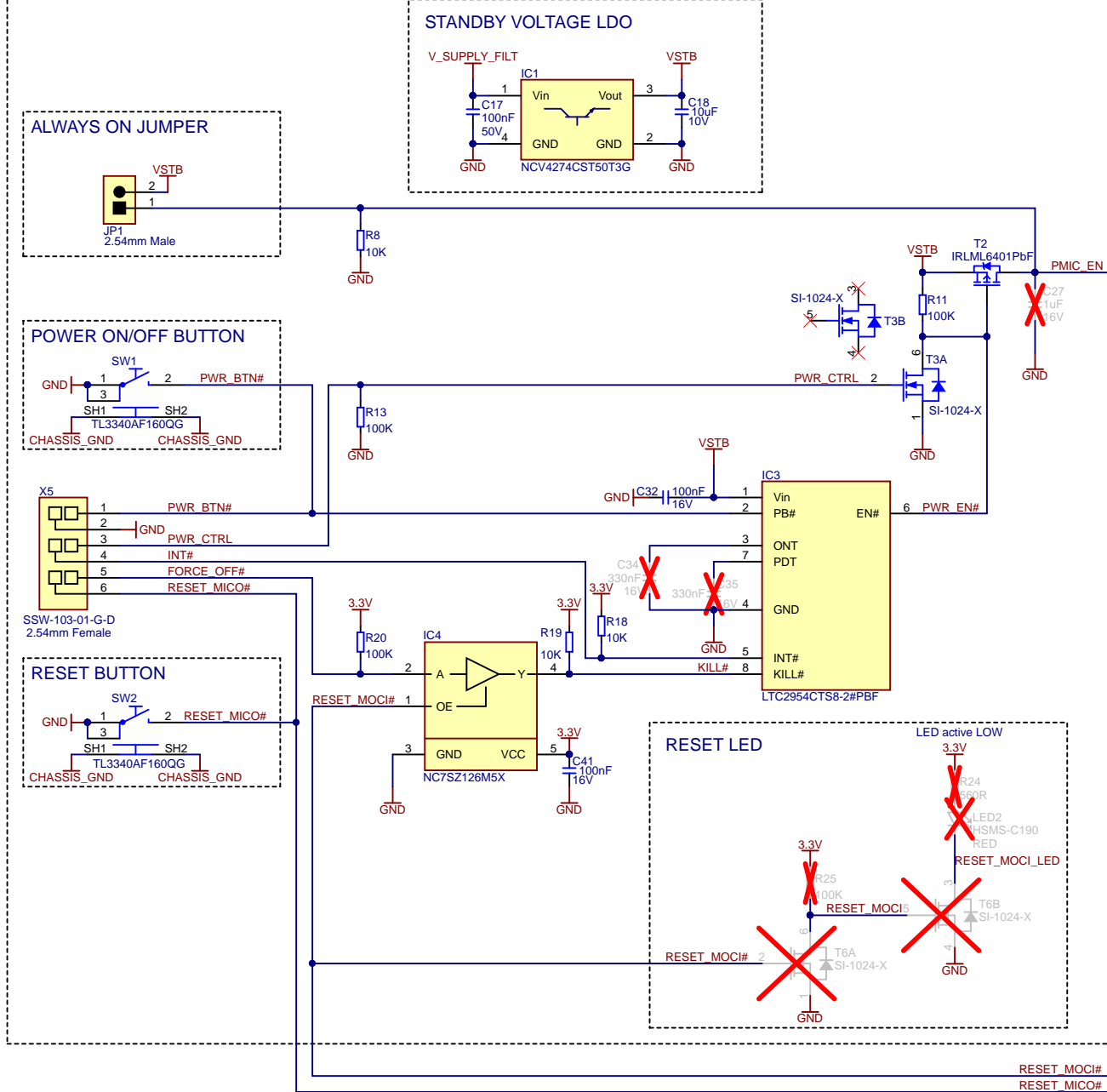


Stitching Capacitor

APALIS MODULE POWER SUPPLY



PUSH BUTTON CONTROLLER



POWER_ENABLE_MOCI	24	MXM3 24 M	RA6B	22R	POWER_ENABLE_MOCI
RESET_MOCI#	26	MXM3 26 M	RA6C	22R	RESET_MOCI#
RESET_MICO#	28	MXM3 28 M	RA6D	22R	RESET_MICO#
WAKE1_MICO#	37	MXM3 37 M	RA6A	22R	WAKE1_MICO#

Apalis - System Control

4 of 25

MM70-314-310B1

GPIO[1..8]
11, 12, 19

REVISION HISTORY NOTES

NOTE 4: Pinout for the AOZ226x for IC2 & IC15 used in this page is a modified pinout, combining multiple devices from Alpha and Omega family AOZ226x products. Please refer device respective device datasheets for details (look for pin 22, 23 details)

Assembly Options for 3.3V DC-DC step-down power supply:
AOZ2261: assemble R157, unassemble R4

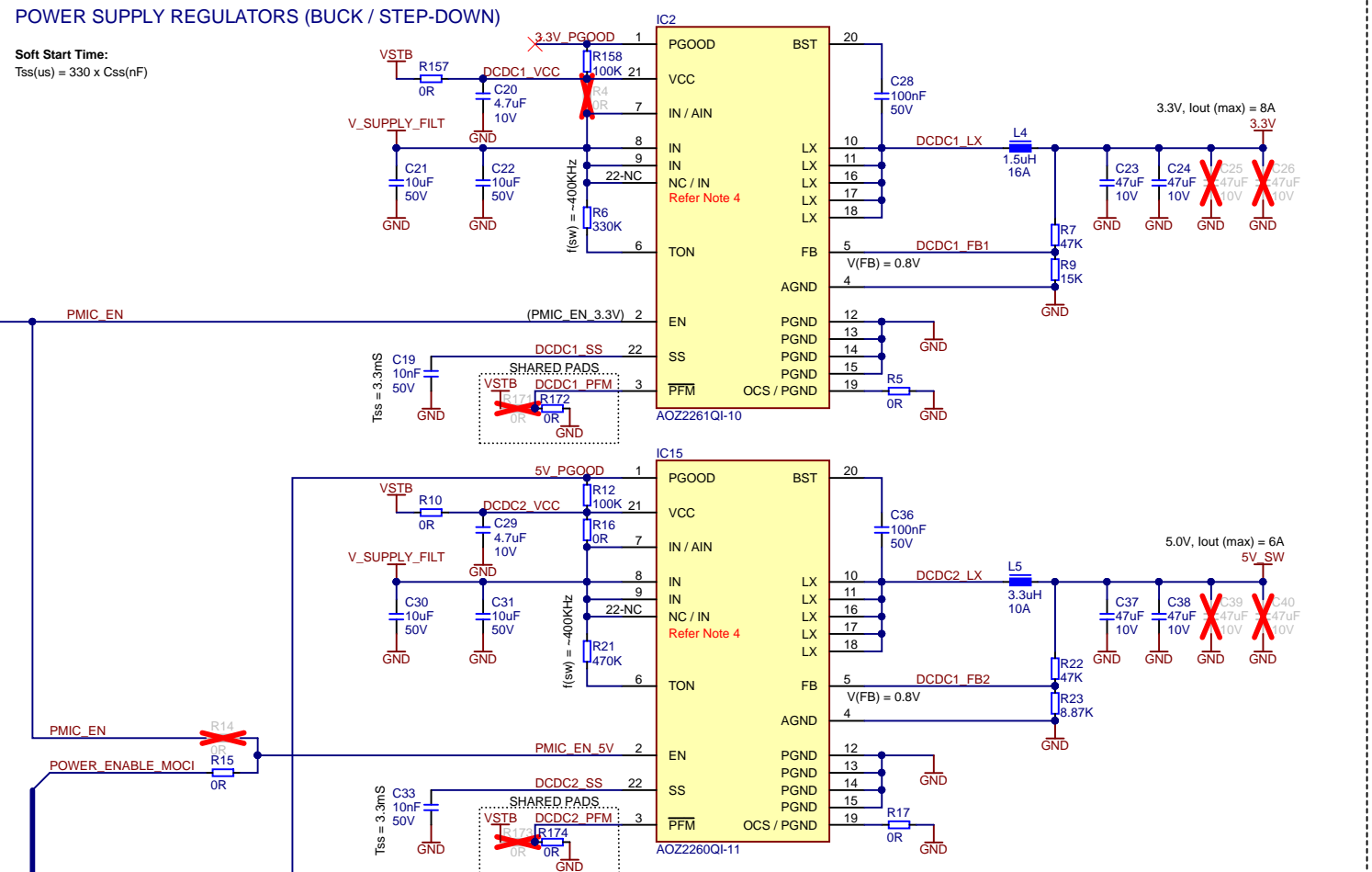
Assembly Options for 5V DC-DC step-down power supply:
AOZ2260: assemble R10, unassemble R16

Alternate parts for L4 and L5:

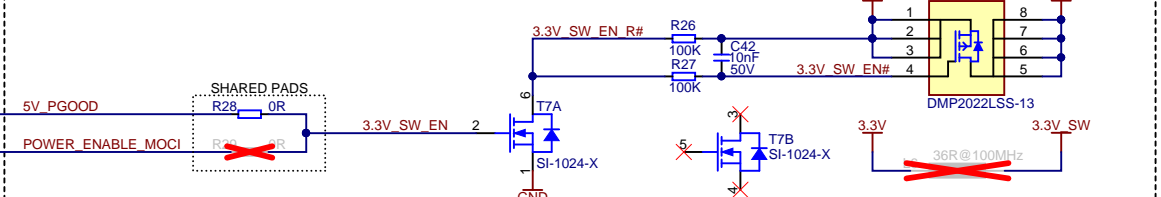
- Inductance (L) = 2.2uH: Abracon, ASPIAIG-F1040-2R2M-T; Pulse, PA4342.222NLT; Bourns, SRP1038A-2R2M; Würth, 7443330220
- Inductance (L) = 3.3uH: Abracon, ASPIAIG-F1040-3R3M-T; Pulse, PA4342.332NLT; Bourns, SRP1038A-3R3M; Würth, 7443330330
- Inductance (L) = 4.7uH: Abracon, ASPI-1040HI-4R7M-T05; Pulse, PA4342.472NLT; Bourns, SRP1038A-4R7M; Würth, 7443330470

POWER SUPPLY REGULATORS (BUCK / STEP-DOWN)

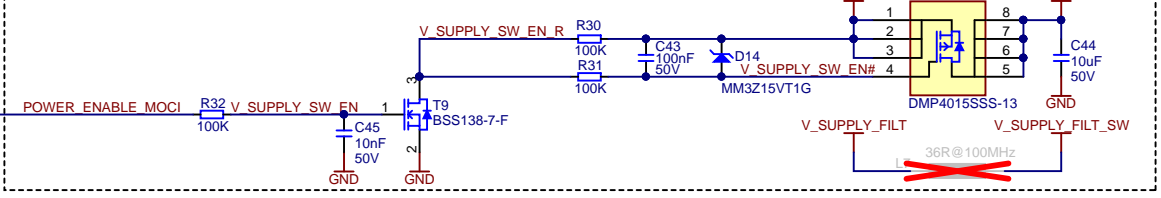
Soft Start Time:
Tss(us) = 330 x C_{ss}(nF)



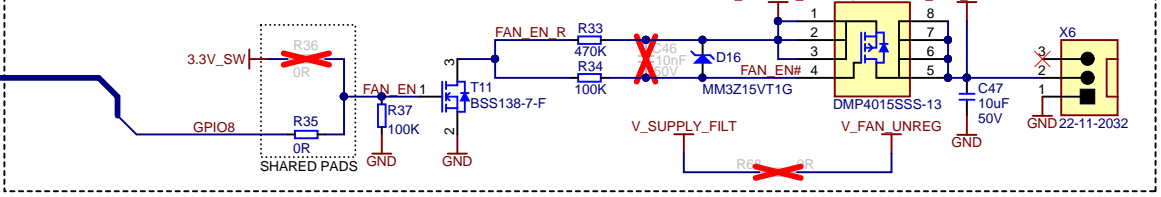
LOAD SWITCH: 3.3V_SW



LOAD SWITCH: V_SUPPLY_FILT_SW

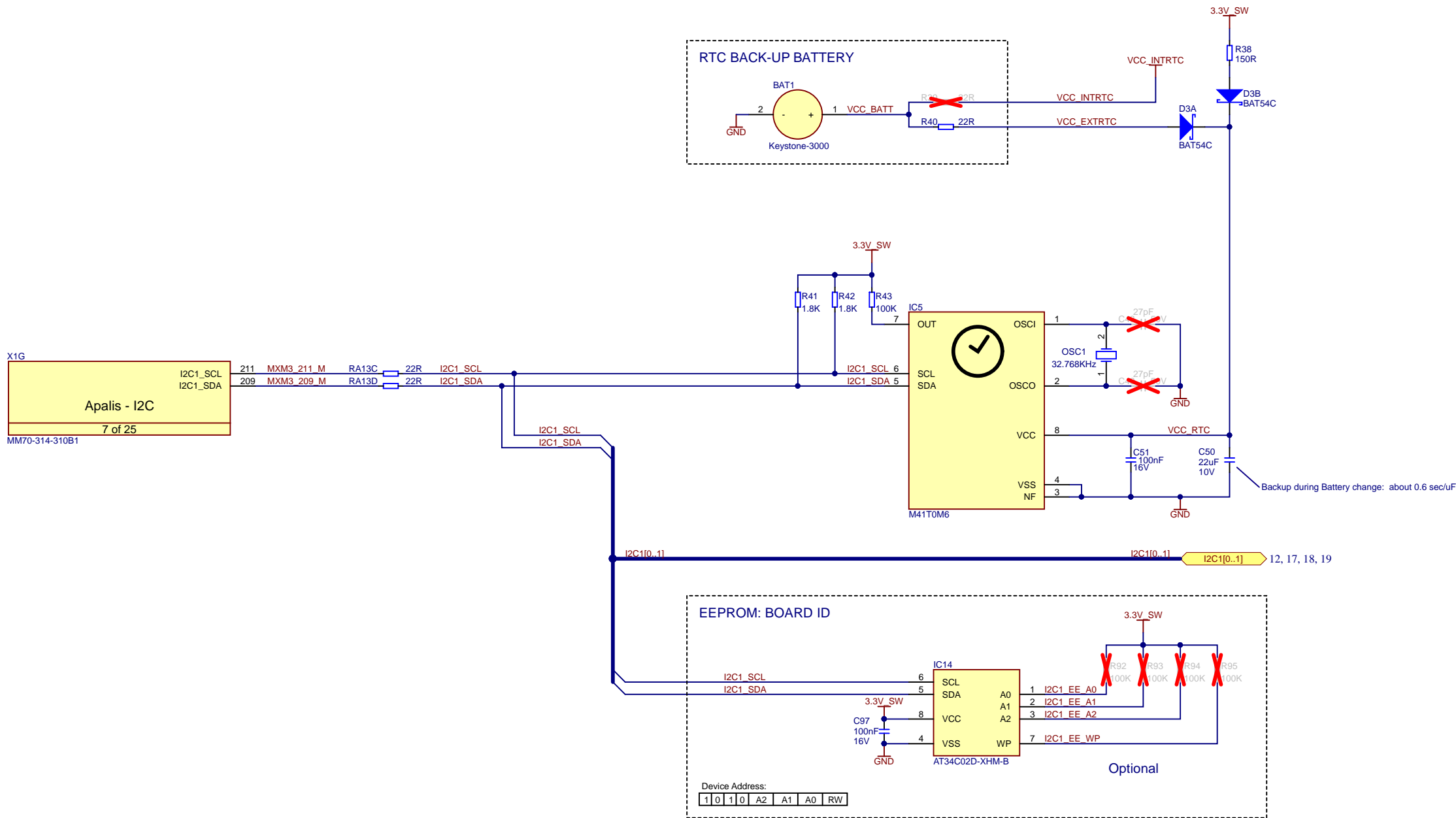


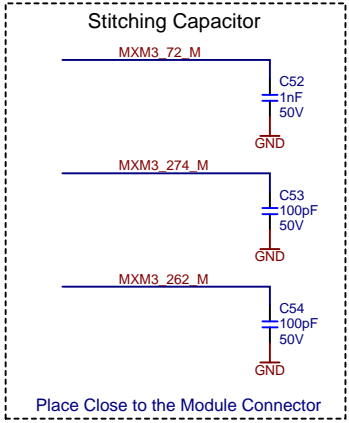
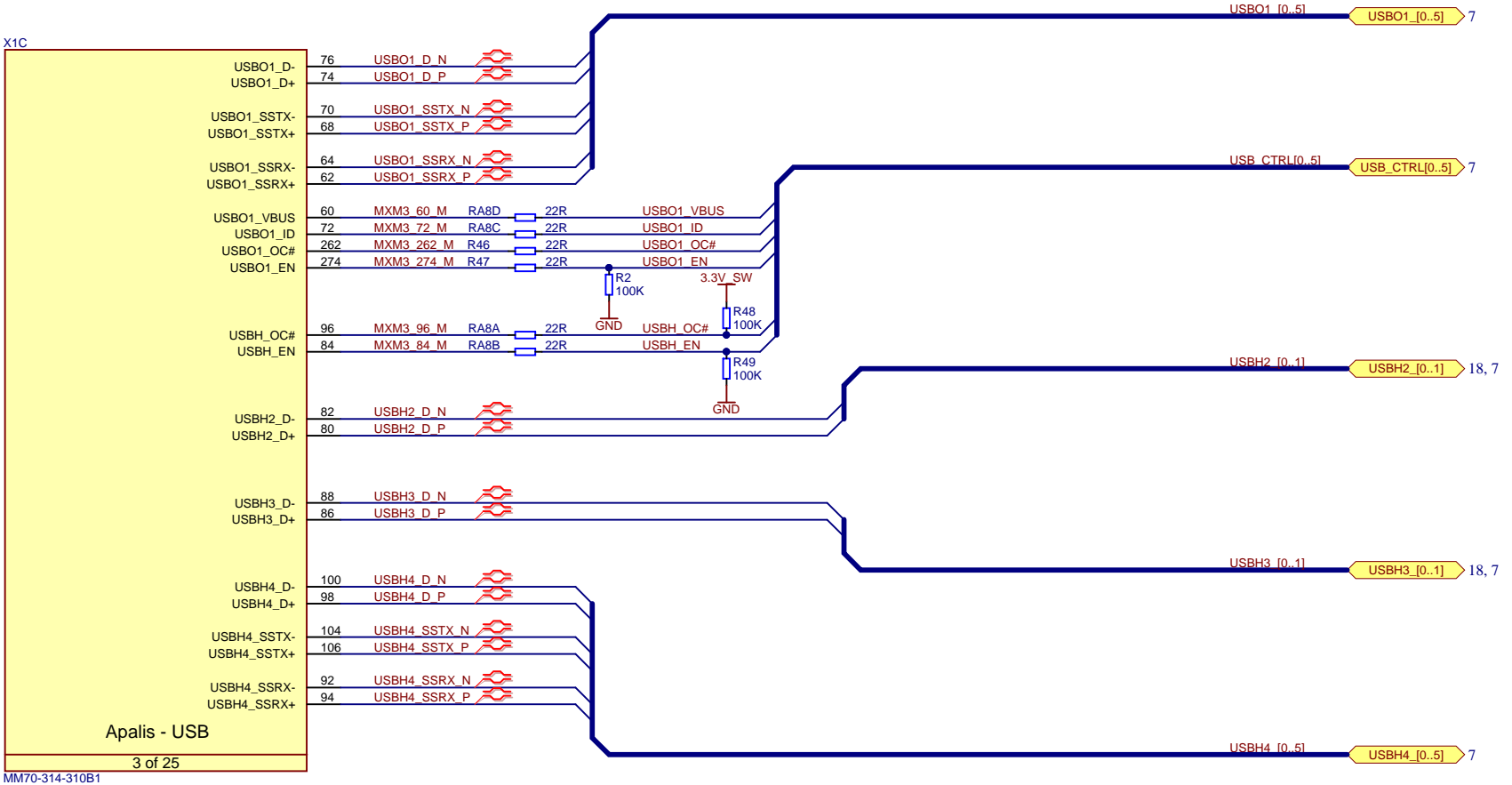
FAN CONTROL POWER SWITCH



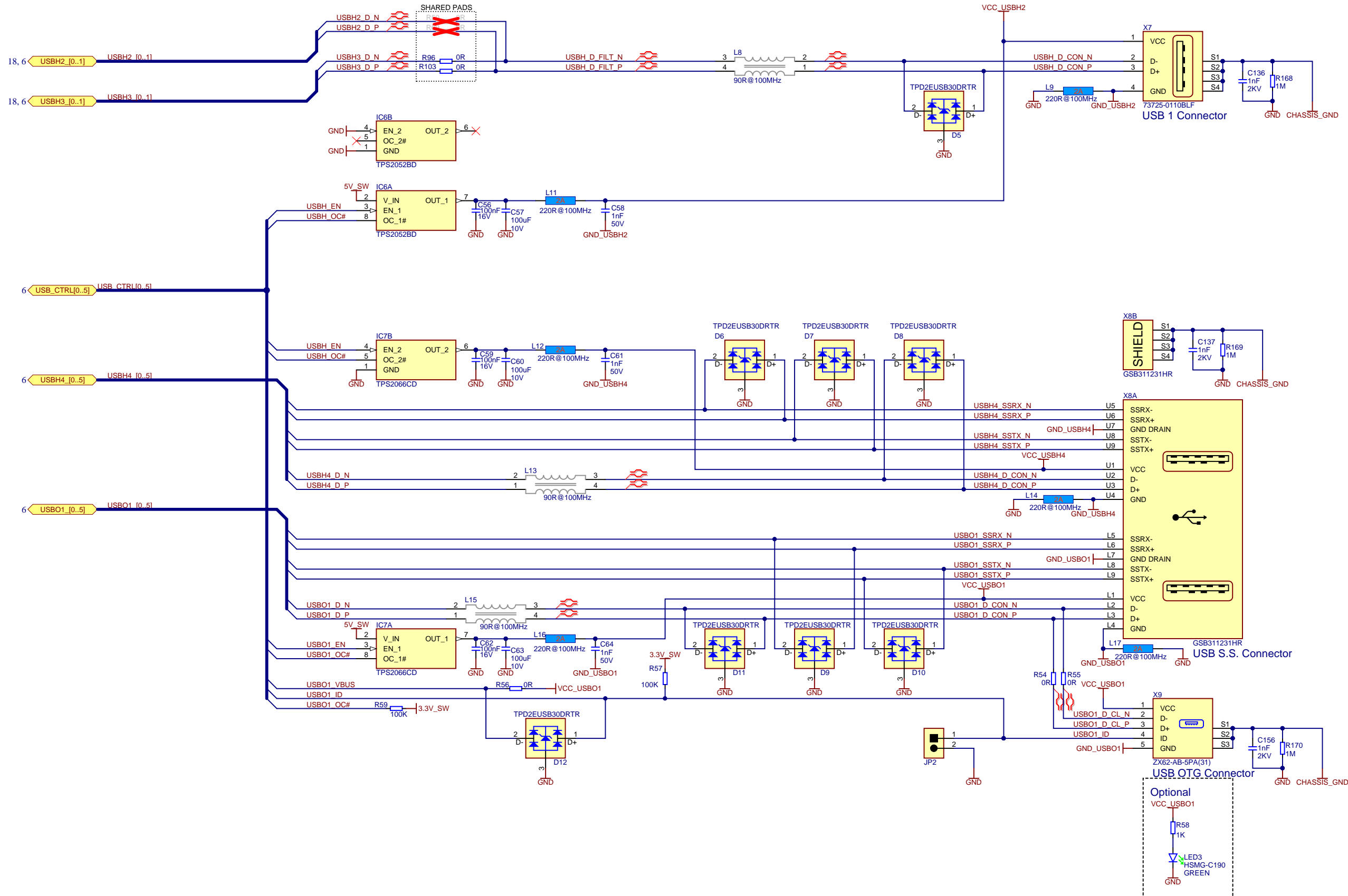
Toradex
Swiss. Embedded. Computing.

Title	Ixora	Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland	
Size:	A3	Number:	4
Date:	08/08/2019	Time:	16:17:35
File:	Power_Switch.SchDoc	Revision:	V1.2
		Sheet	4 of 20





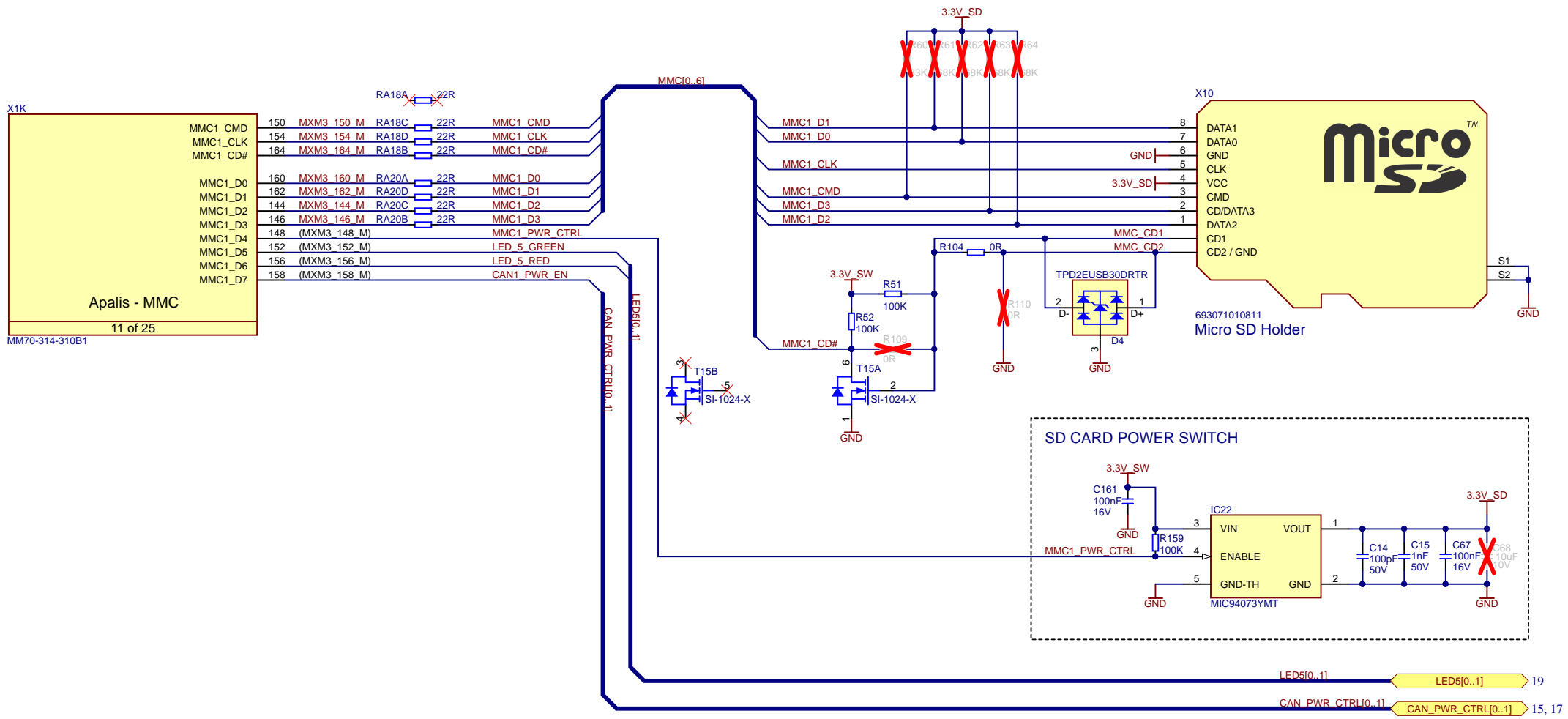
Title <i>Ixora</i>			Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland	
Size: A3	Number: 6	Revision: V1.2		
Date: 08/08/2019	Time: 16:17:36	Sheet 6 of 20		
File: USB.SchDoc				



Alternate parts for X7
- On Shore, USB-A1SSW6 (-55C to +85C)
- CNC Tech, 1002-014-01000 (-55C to +85C)



Title <i>Ixora</i>			<i>Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland</i>
Size: A3	Number: 7	Revision: V1.2	
Date: 08/08/2019	Time: 16:17:36	Sheet 7 of 20	
File: USB_Connectors.SchDoc			

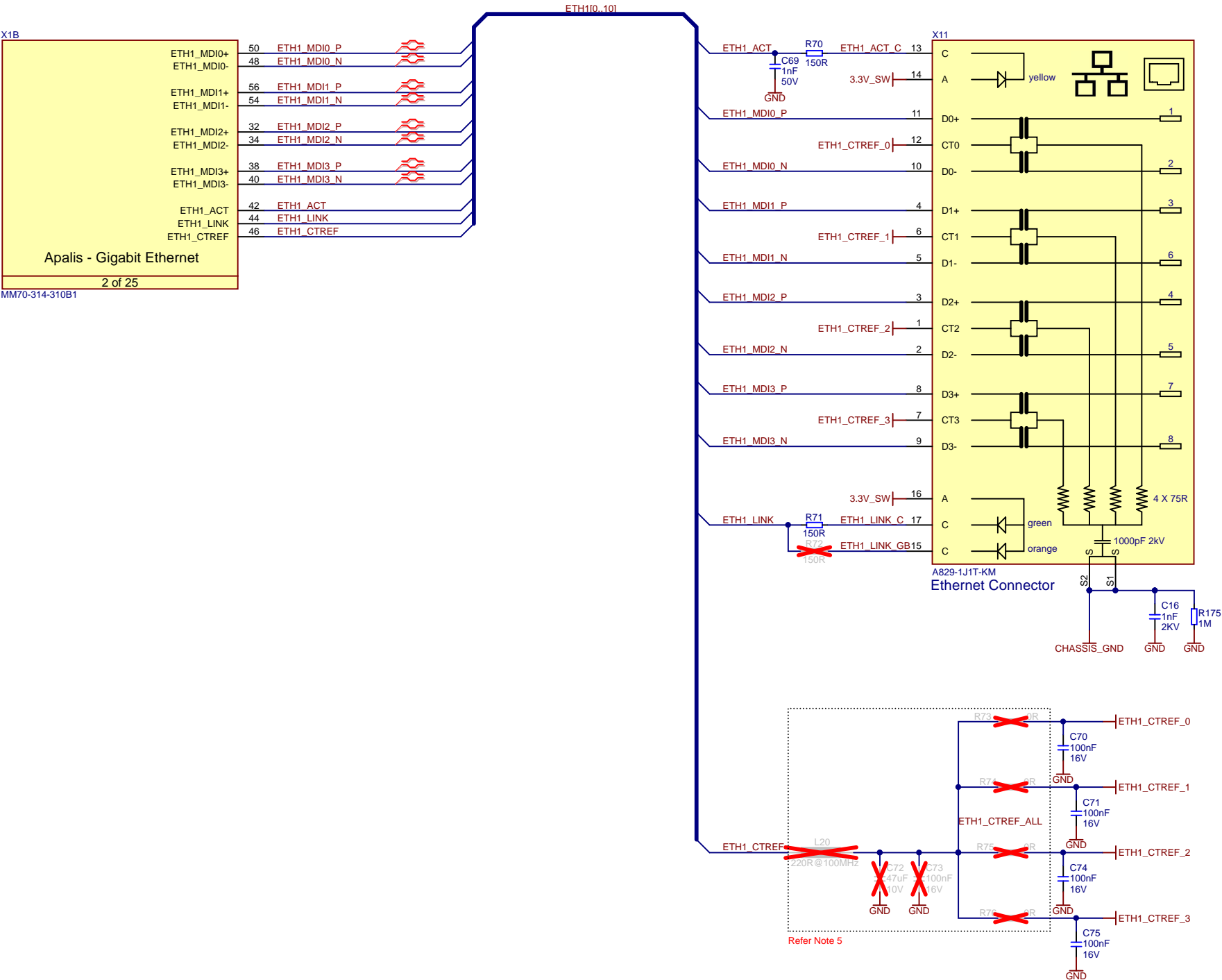


REVISION HISTORY NOTES


NOTE 2: Assembly options for the different MicroSD Card connectors:
Option 1 (default assembly): Wurth, 693071010811 ; GCT, MEM2061-01-188-00-A ; Amphenol, 101-00581-59
Assemble (R51, R52, R104, T5), Disassemble (R109, R110)
Option 2: Amphenol, 101-00660-68-6 (alternate assembly)
Assemble (R52, R109, R110), Disassemble (R51, R104, T5)



Title Ixora			Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland	
Size: A3	Number: 8	Revision: V1.2		
Date: 08/08/2019	Time: 16:17:36	Sheet 8	of 20	
File: SDCard.SchDoc				

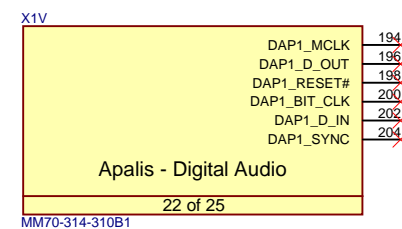
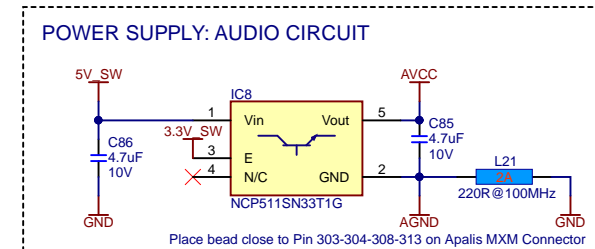
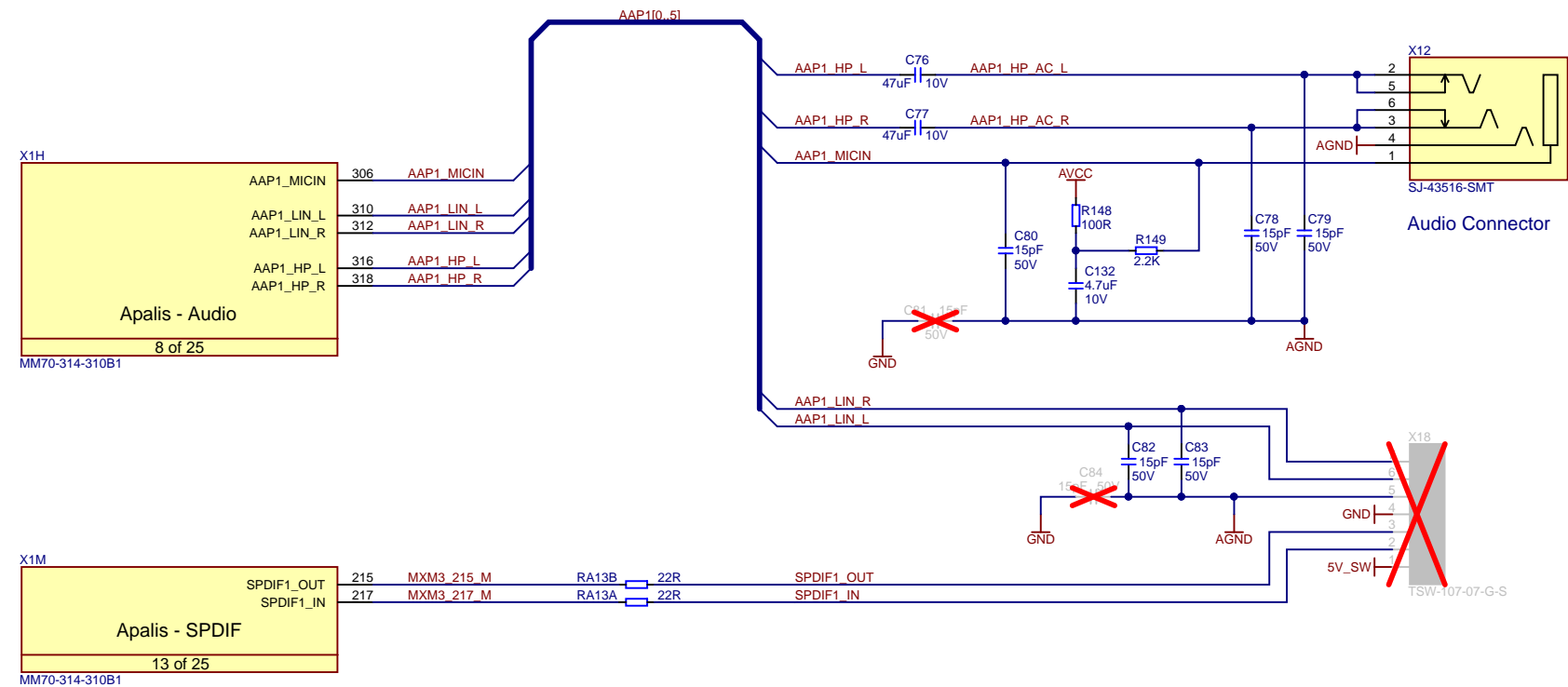


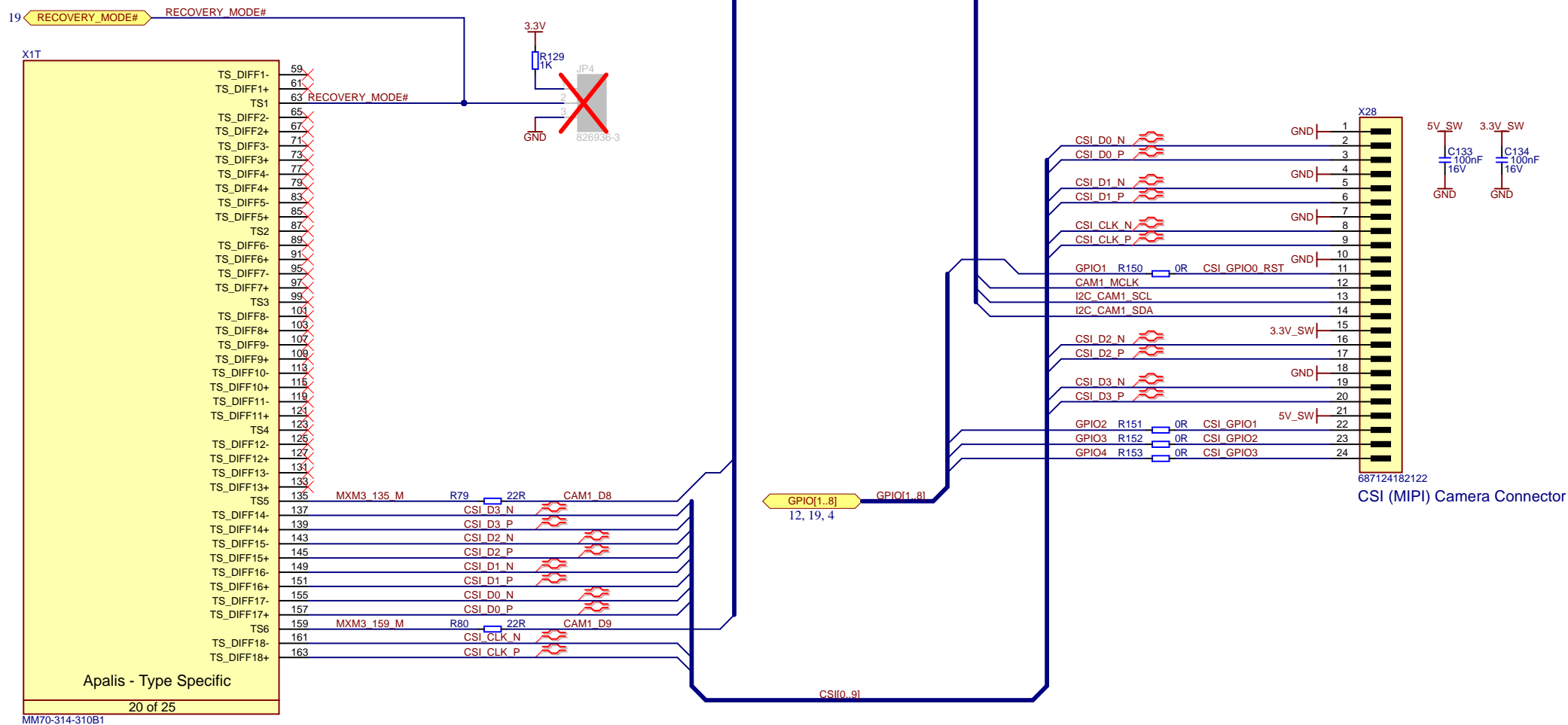
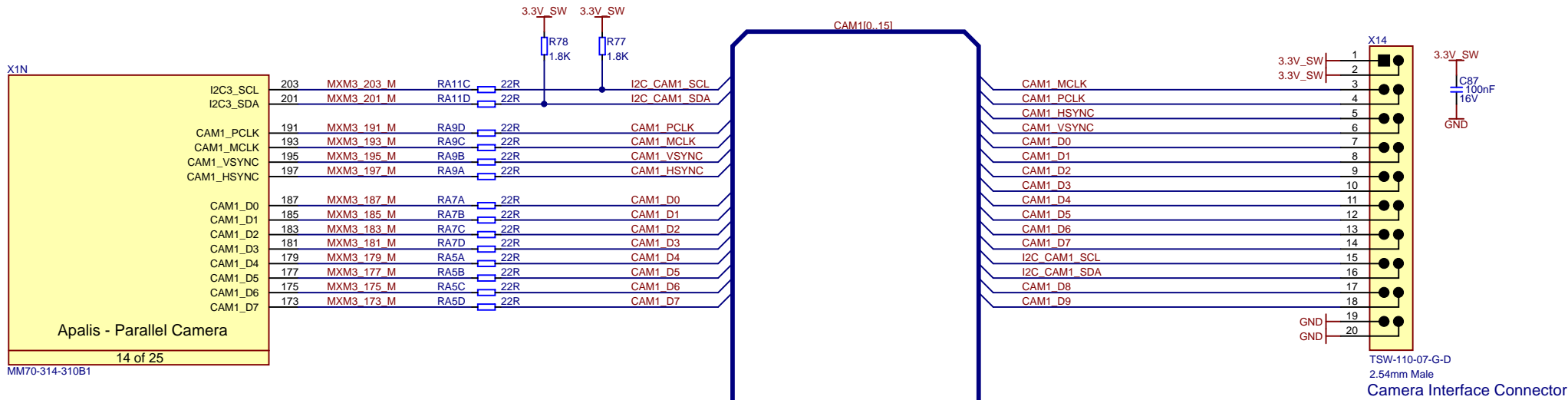
REVISION HISTORY NOTES
NOTE 5: For Ethernet to be compliant with 10Base-T, Ferrite Bead L20, Capacitors C72, C73 and Resistors R73, R74, R75 and R76 should not be assembled.
Please refer to the Ixora Errata for more details.
Alternate parts for X11
- TRP Connectors, 2250548-1 (-40 to 100C)

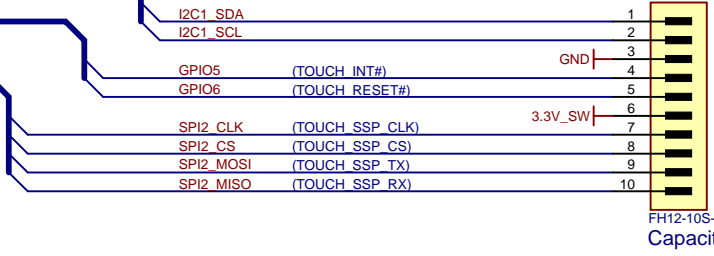
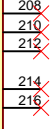
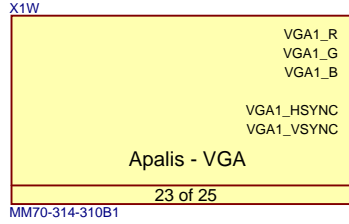
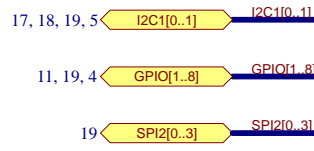
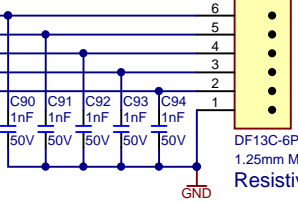
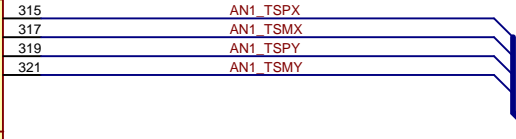
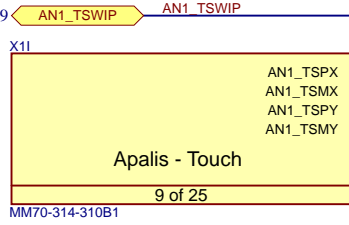
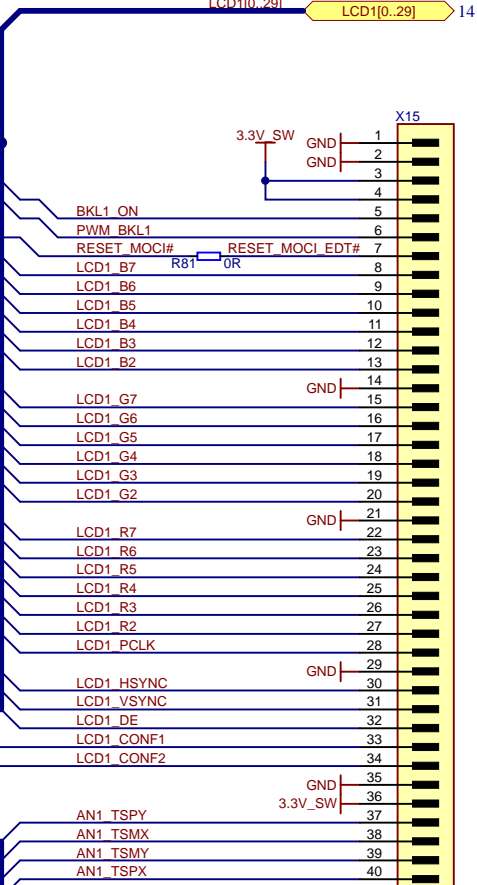
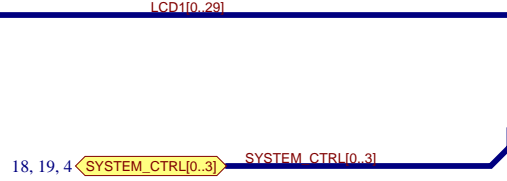
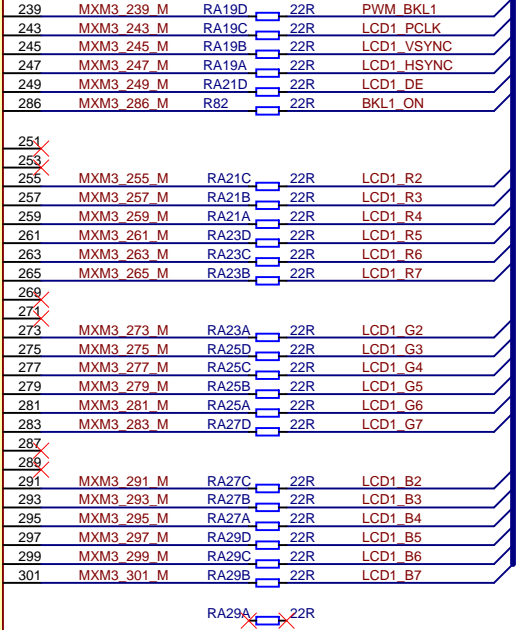
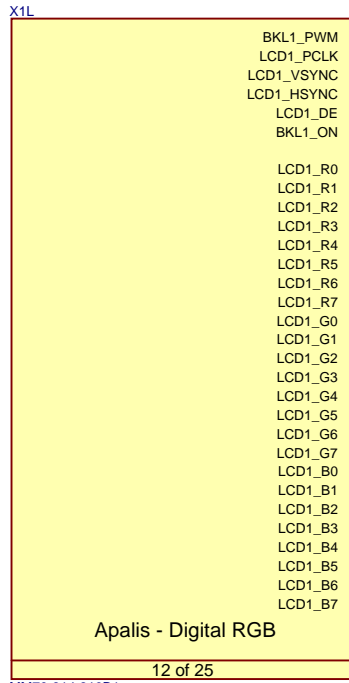
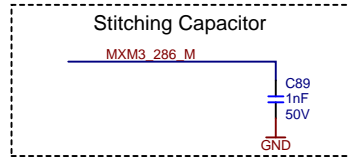


Swiss. Embedded. Computing.

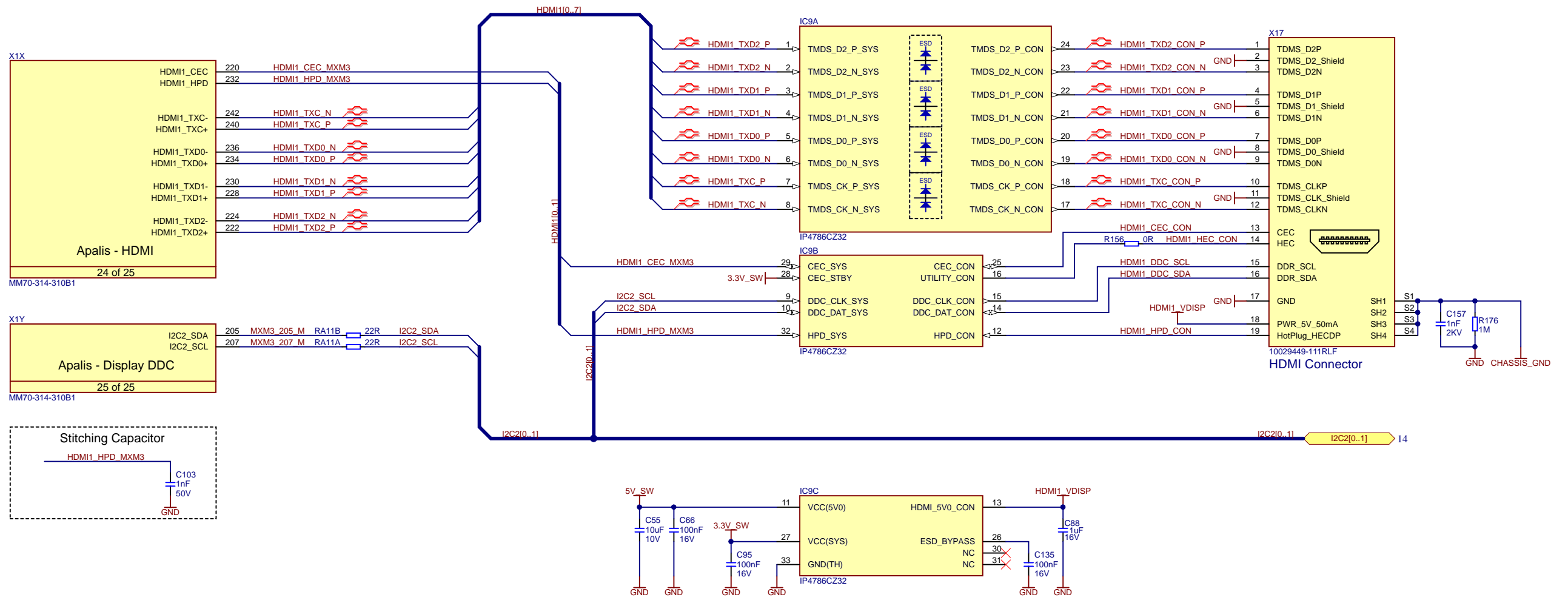
Title <i>Ixora</i>			Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland
Size: A3	Number: 9	Revision: V1.2	
Date: 08/08/2019	Time: 16:17:36	Sheet 9 of 20	
File: Ethernet.SchDoc			







Title Ixora			Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland
Size: A3	Number: 12	Revision: V1.2	
Date: 08/08/2019	Time: 16:17:37	Sheet 12 of 20	
File: RGB_Display.SchDoc			

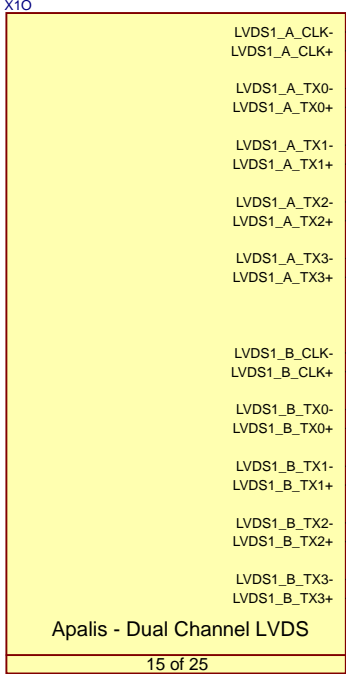


REVISION HISTORY NOTES

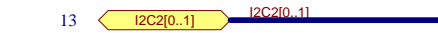
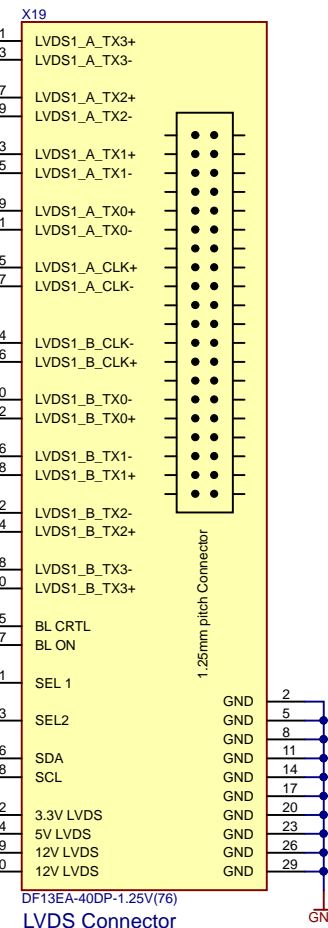
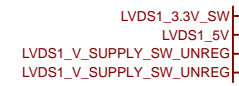
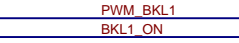
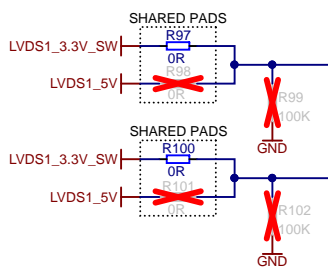
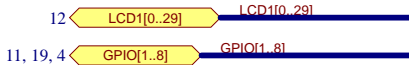
NOTE 3: Ixora carrier board in combination with the Apalis TK1 module shows issue with some HDMI monitors.
Please refer to the Ixora Carrier Board Errata "Errata #1, HDMI DDC issues with Apalis TK1" for more details.
The issue affects Ixora carrier board V1.0 and V1.1.



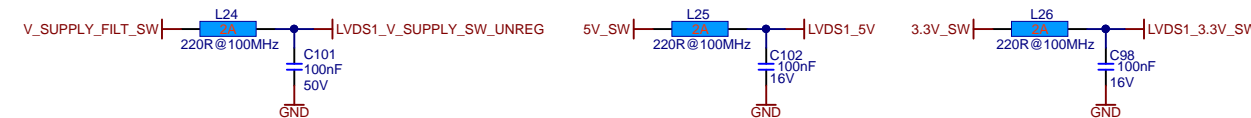
Title <i>Ixora</i>			<i>Toradex AG Altsagenstrasse 5</i>
Size: A3	Number: 13	Revision: V1.2	<i>Horw 6048</i>
Date: 08/08/2019	Time: 16:17:37	Sheet 13 of 20	<i>Switzerland</i>
File: HDMI.SchDoc			



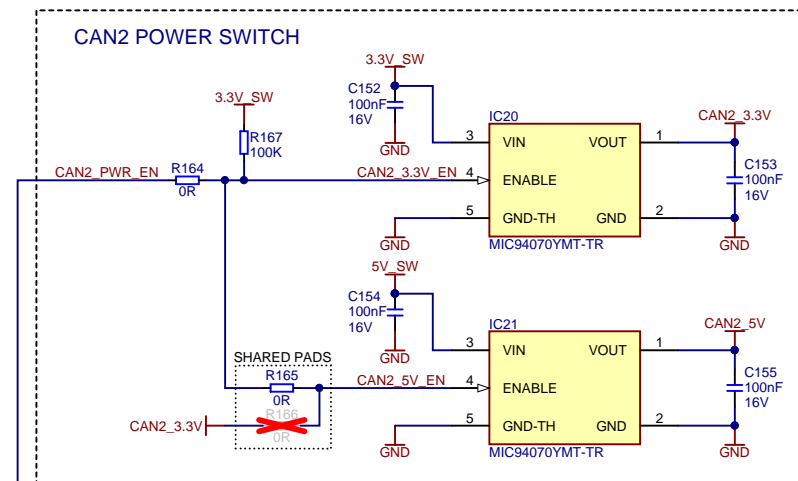
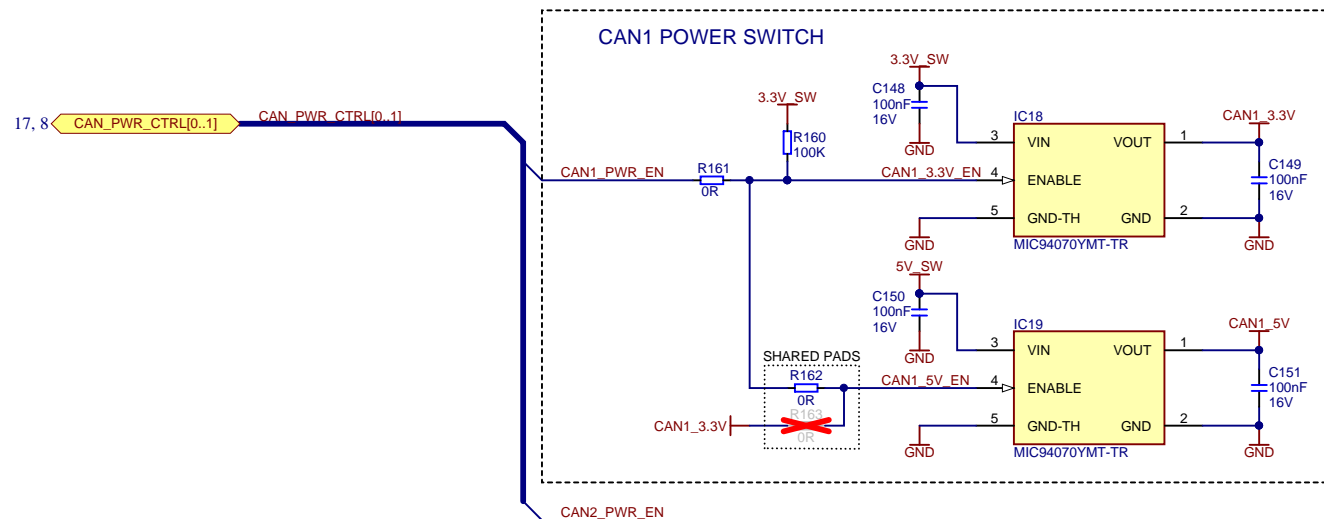
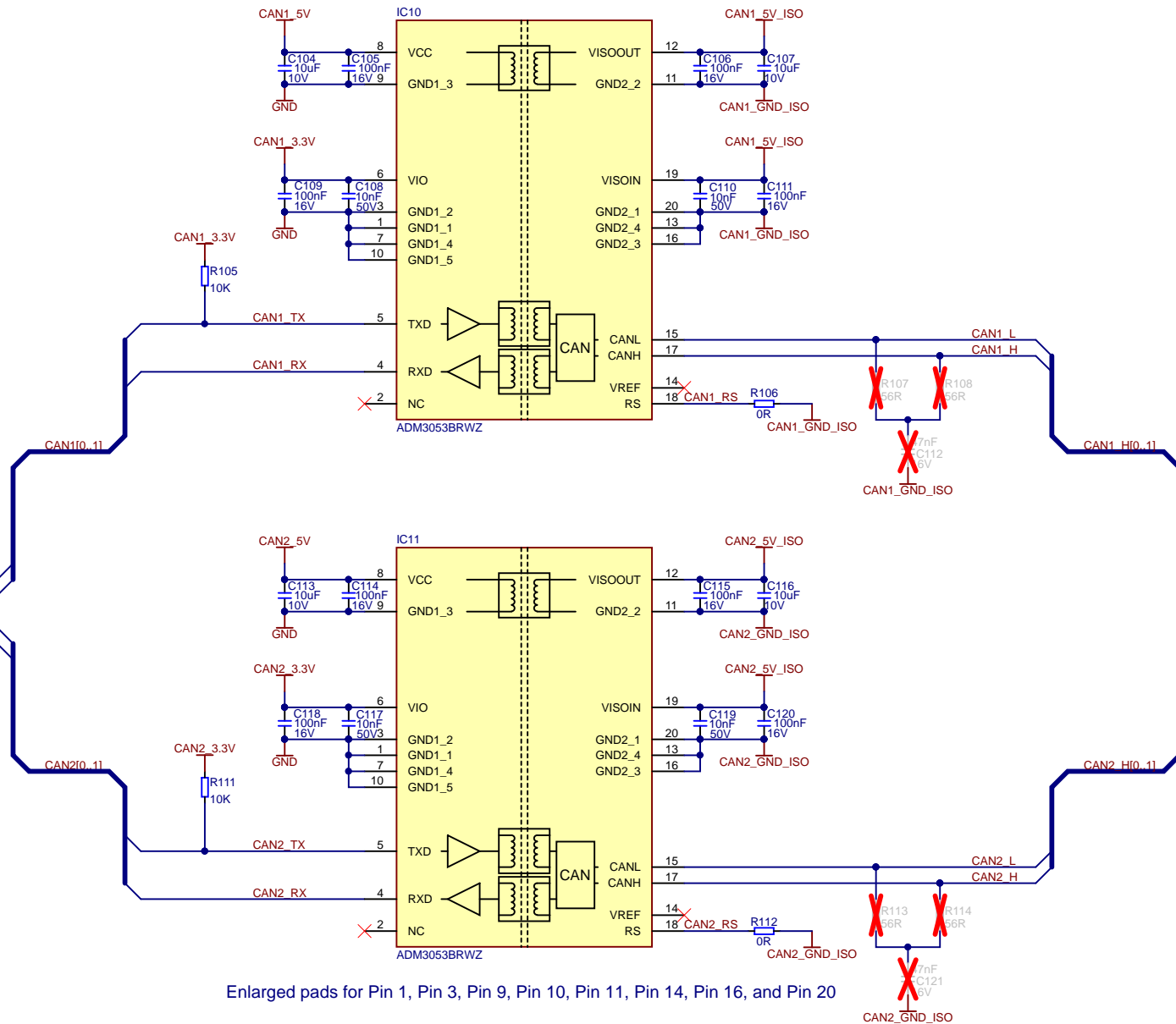
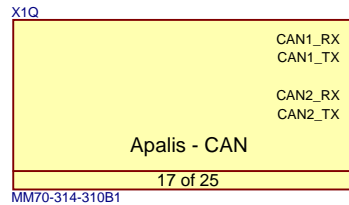
MM70-314-310B1



POWER SUPPLY: LVDS



Title <i>Ixora</i>			<i>Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland</i>
Size: <i>A3</i>	Number: <i>14</i>	Revision: <i>V1.2</i>	
Date: <i>08/08/2019</i>	Time: <i>16:17:37</i>	Sheet <i>14</i> of <i>20</i>	
File: <i>LVDS.SchDoc</i>			

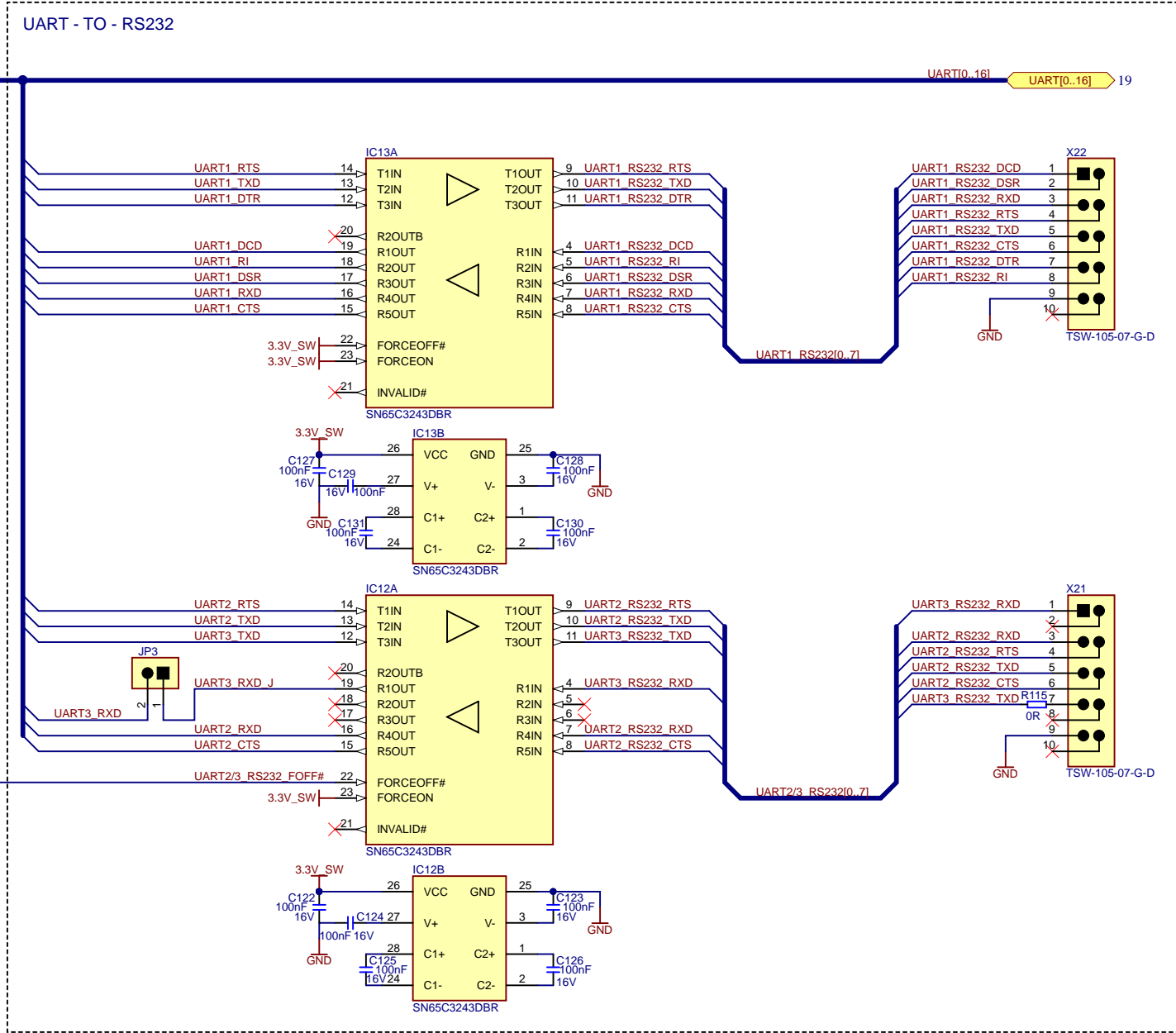
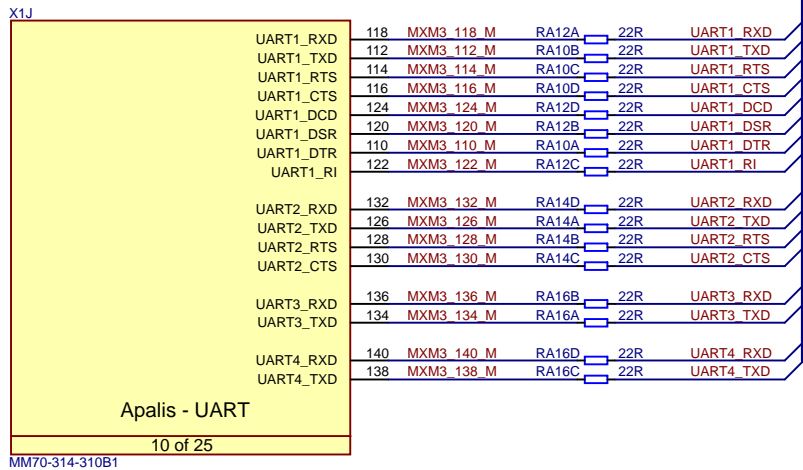


Alternate parts for IC18, IC19, IC20, IC21:

- Alpha & Omega, AOZ1321DI-06
- MPS, MP62040DQFU-LF-Z

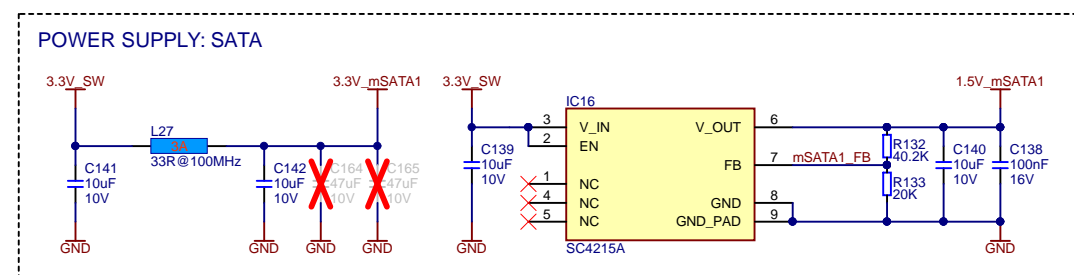
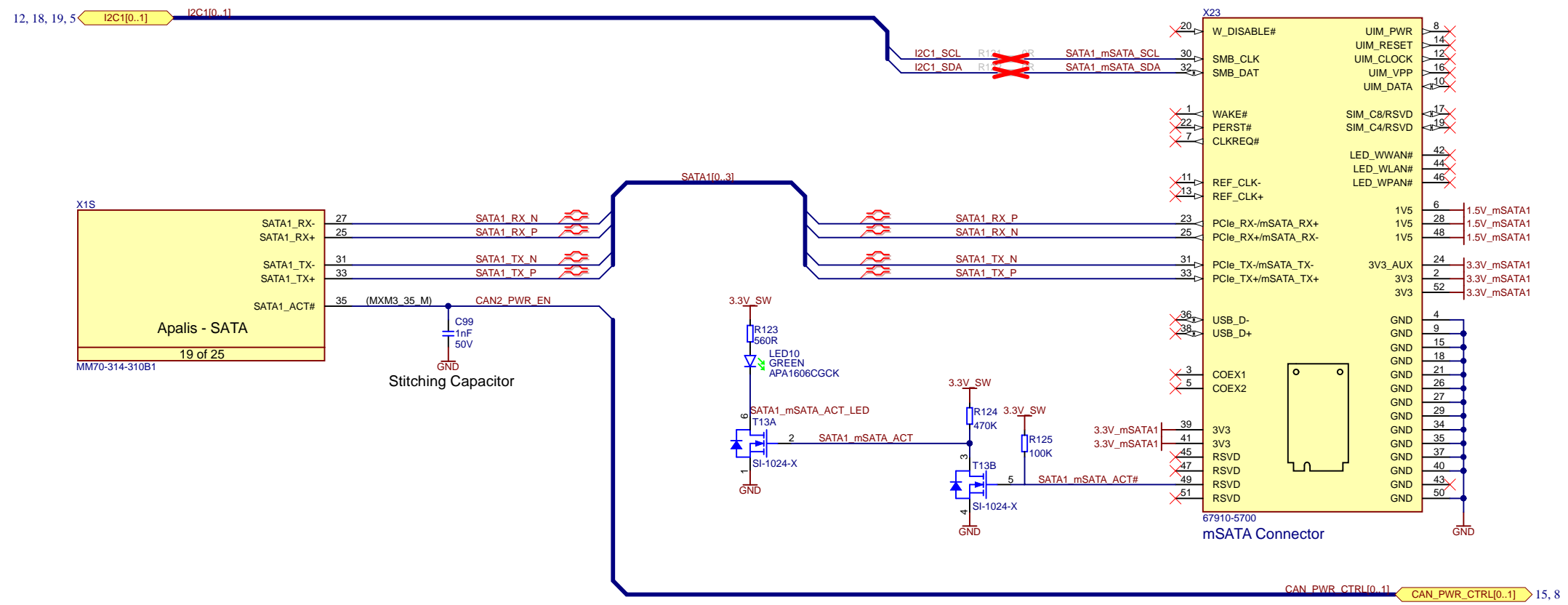


Title IXora			Toradex AG
Size: A3			Altsagenstrasse 5
Date: 08/08/2019			Horw
File: CAN.SchDoc			6048
Number: 15	Revision: V1.2	Sheet 15 of 20	
Time: 16:17:37		Switzerland	



Alternate parts for IC12 and IC13:

- TI, MAX3243EIDBR
- ST, ST3243EB, ST3241EBPR
- Intersil, ICL3244EIAZ-T
- Exar, ST3243E



REVISION HISTORY NOTES

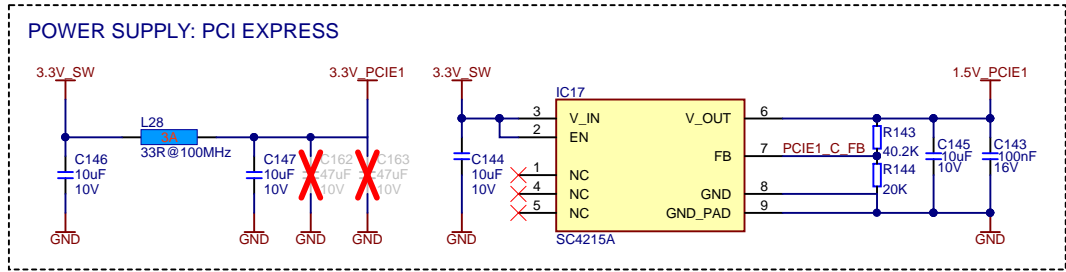
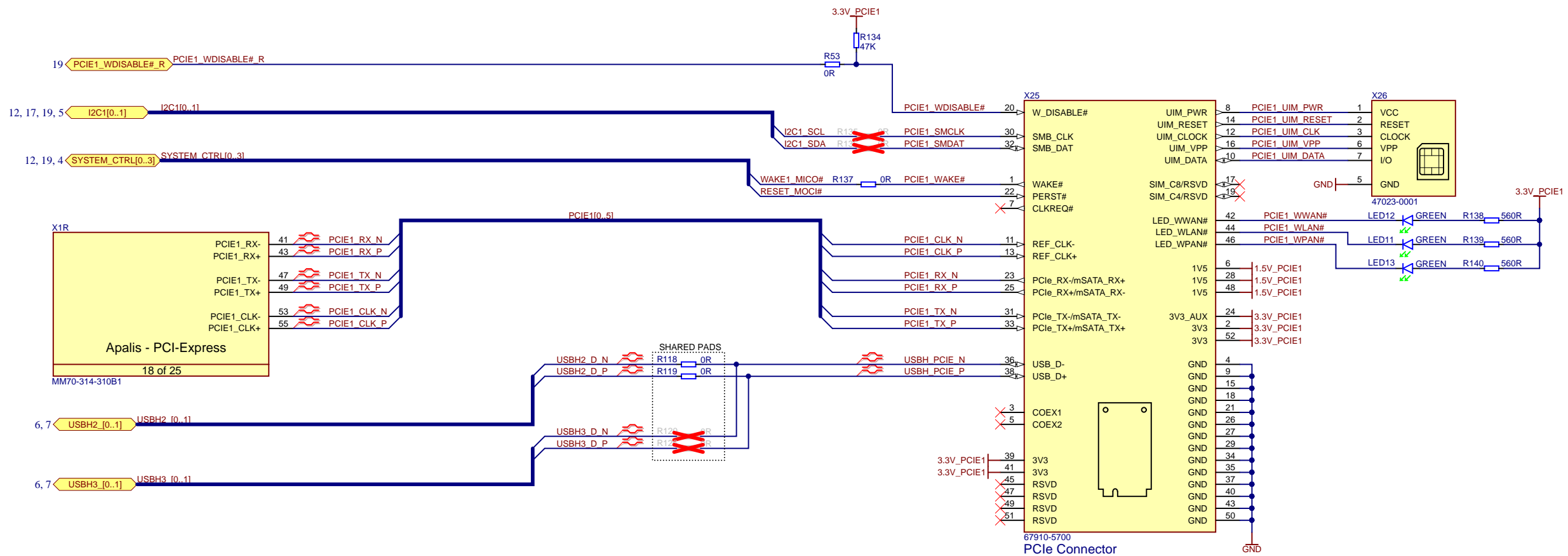
NOTE 1: Mini PCIe connector schematic symbol is used in the schematic for the mSATA connector (X23), as Mini PCIe and mSATA use the same physical connector. It is important to note that the mSATA interface specifies the RX+ signal on pin 23 and RX- signal on pin 25, whereas the Mini PCIe Card features the RX+ signal on pin 25 and RX- on pin 23. The PCIe interface supports polarity reversal, but not the SATA interface. Since the Mini PCIe connector pin names doesn't match with the mSATA signals, the situation might be confusing. Special attention must be paid while reading or connecting the mSATA signals.

Alternate parts for X23:
- Tyco, 1775838-2

Alternate parts for IC16:
- Richtek, RT9048



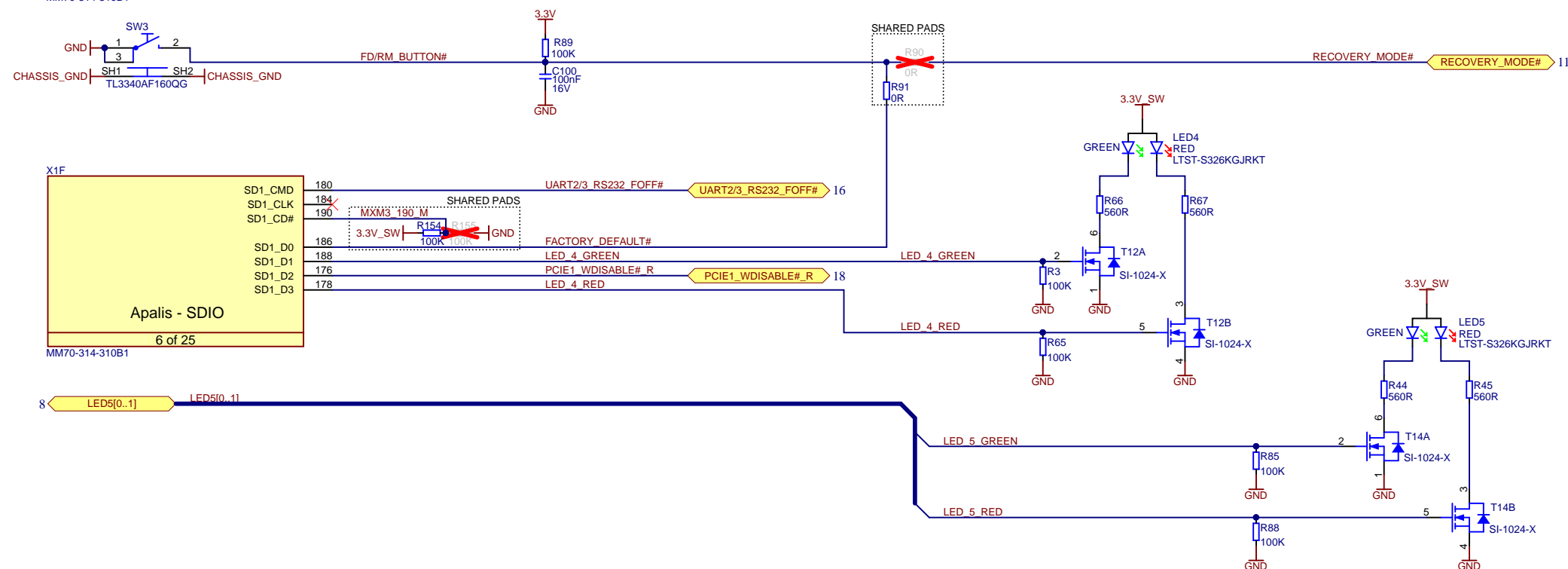
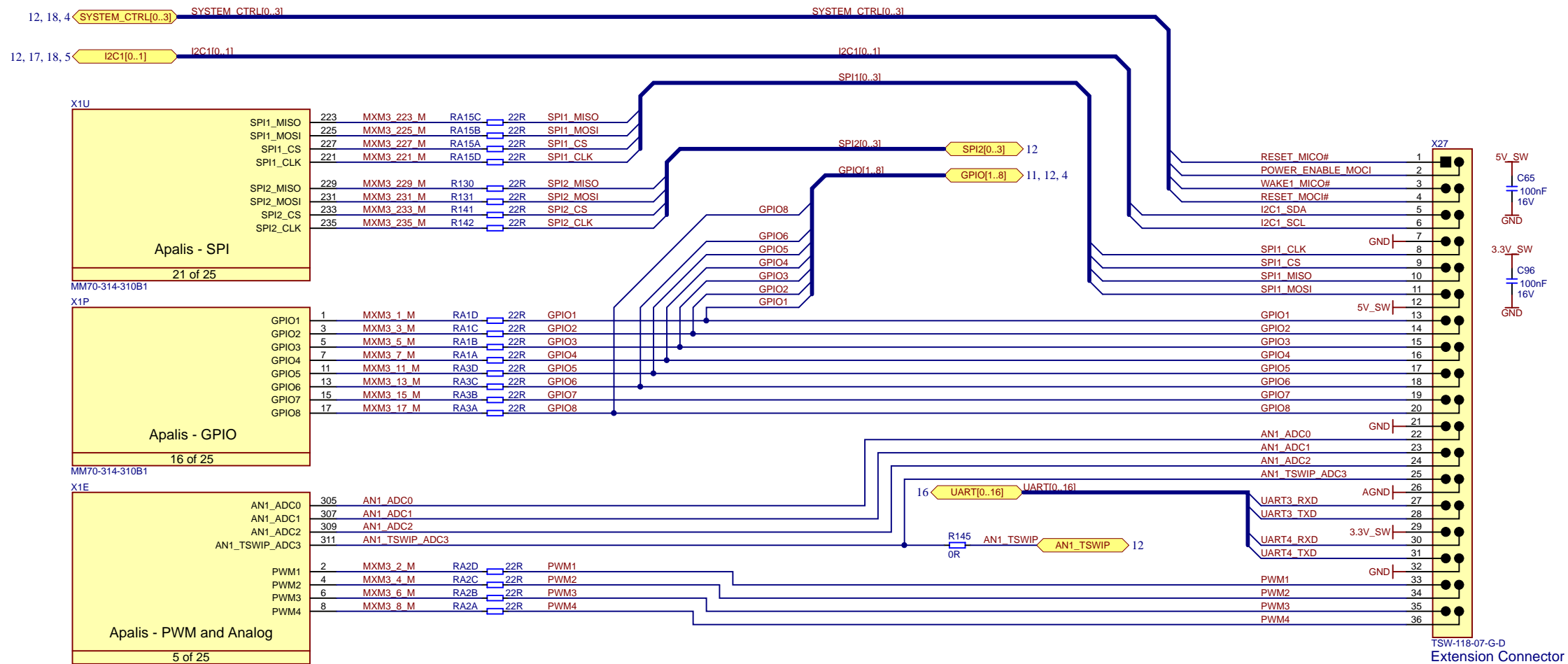
Title <i>Ixora</i>			<i>Toradex AG</i>
Size: A3	Number: 17	Revision: V1.2	<i>Altsagenstrasse 5</i>
Date: 08/08/2019	Time: 16:17:38	Sheet 17 of 20	<i>Horw</i>
File: Sata.SCHDOC			<i>Switzerland</i>



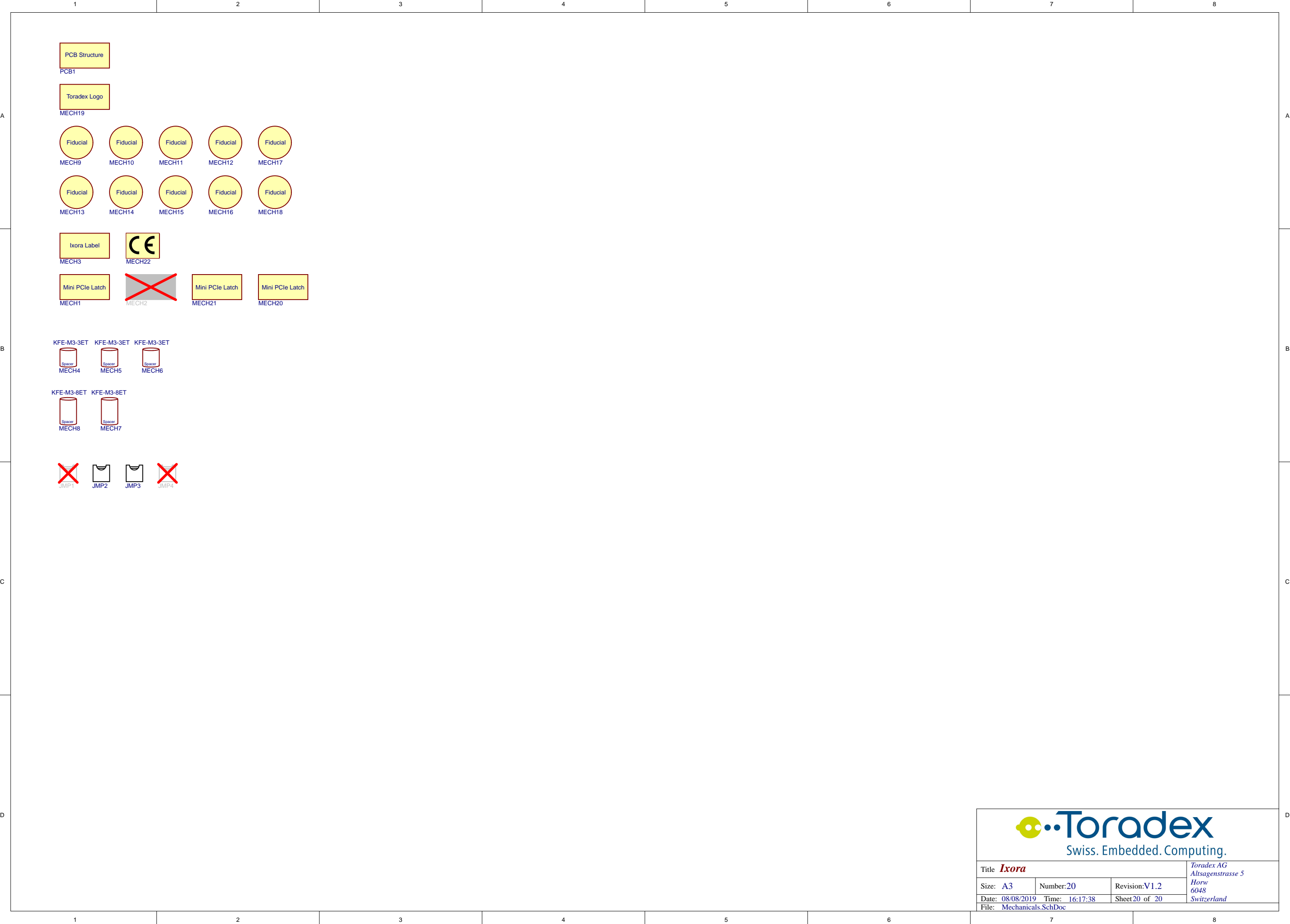
Alternate parts for X25:
- Tyco, 1775838-2
Alternate parts for IC17:
- Richtek, RT9048



Title Ixora			Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland
Size: A3	Number: 18	Revision: V1.2	
Date: 08/08/2019	Time: 16:17:38	Sheet 18 of 20	
File: PCI_Express.SchDoc			



Title <i>Ixora</i>			<i>Toradex AG Altsagenstrasse 5 Horw 6048 Switzerland</i>
Size: A3	Number: 19	Revision: V1.2	
Date: 08/08/2019	Time: 16:17:38	Sheet 19 of 20	
File: Extension.SchDoc			



1

2

3

4

5

6

7

8

1

2

3

4

5

6

7

8