# ANNEX 1

Detalls tècnics TS-TPC-7990

| CPU | |
|---|---|
| Architecture | Arm |
| Part Number | i.MX6 |
| Vendor | NXP |
| CPU Speed | 1.1 GHz |
| Floating Point Unit | Yes |
| CPU Cores (Max) | 4x |

| CORE SPECS | |
|---|---|
| Base Memory Capacity | 1 GB |

| STORAGE | |
|---|---|
| Base Flash Capacity | 4 GB (2 GB SLC or 4 GB MLC) |
| Flash Type | eMMC |
| microSD Card Socket | 1x |
| SATA Ports | 1x (mSATA (Only with Quad Core)) |

| OTHER | |
|---|---|
| Battery-Backed Real Time Clock | 1x |
| Graphics Processing Unit | Yes |

| GENERAL I/O | |
|---|---|
| General-Purpose Input/Output (GPIO) Pins | 9x |

| SERIAL INTERFACES | |
|---|---|
| RS-232 Ports | 4x |
| RS-485 Ports | 3x |
| SPI Ports | 1x |
| I2C Ports | 1x |

| PERIPHERAL INTERFACES | |
|---|---|
| USB Host Ports | 2x |
| USB Device Ports | 1x |
| mini PCI Express Bus | 1x |

| INDUSTRIAL PROTOCOLS | |
|---|---|
| CAN Ports | 2x |

| NETWORKING | |
|---|---|
| Gigabit Ethernet Ports | 1x |
| 10/100 Ethernet Ports | 1x |
| Power-over-Ethernet | Yes |

| PHYSICAL | |
|---|---|
| Operating Supply Voltage | 5 VDC to 36 VDC (5 VDC or 8 - 36 VDC) |
| Fanless Temperature Range | -20 ° to 70 °C |

| GRAPHICS / HMI | |
|---|---|
| Screen Diagonal Size | 7" |
| Touchscreen | Yes |
| Screen Resolution | 1024x600 (Resistive screen: 800x600) |
| Speaker | Yes |
| Touchscreen Type | Capacitive |

| RADIO COMMS | |
|---|---|
| Bluetooth | Yes |
| WiFi Radio / Wireless LAN | Yes |

| SOLUTIONS | |
|---|---|
| TS-SILO Power Reserve (Super Capacitors) | Yes |

| SOLUTIONS | |
|---|---|
| TS-SILO Power Reserve (Super Capacitors) | Yes |

| SOFTWARE | |
|---|---|
| Linux Kernel Version | 4.1 |
| Debian Linux | Jessie (8.11) |
| Android OS | 7.1.1 Nougat |
| Yocto Linux | 2.2 Morty |

| SENSORS | |
|---|---|
| Accelerometer/Gyro | Yes |

# TS-7990 Standard Options

PCB_7990_C
NC
1
PCB_99

XOPP1
ASSEMBLY_OPTIONS

| | | |
|---|---|---|
| Option 1 | TS-TPC-7990-SMN2E | 800x480 800nit Resistive Touch display, Solo 800MHz i.MX6 CPU, 1G RAM, 4G eMMC, Extended Temp |
| | TS-TPC-7990-SMN3E | 1024x600 800nit Capacitive Touch display, Solo 800MHz i.MX6 CPU, 1G RAM, 4G eMMC, Extended Temp |
| Option 3 | TS-TPC-7990-QMW2E | 800x480 800nit Resistive Touch display, Quad 1GHz CPU, 1G RAM, 4G eMMC, NimbeLink Socket, WiFi, Accelerometer, Extended Temp |
| | TS-TPC-7990-QMW3E | 1024x600 800nit Capacitive Touch display, Quad 1GHz CPU, 1G RAM, 4G eMMC, NimbeLink Socket, WiFi, Accelerometer, Extended |

## LXD LCD Option

7", 1024x600, PCAP Touch, 800nit

Included on ALL Standard Options

Add: CN1, CN5, P4

## OKAYA LCD Option

7", 800x480, Resistive Touch, 800nit

Included on ALL Standard Options

Add: CN11, CN4, P3

## PCIe socket Option:

Included on ALL Standard Options

Add: U50, J3, U45, MT5, MT6

## SIM socket Option:

NOT Included on any Standard Options

Add: CN13

## Heat Sink for CPU

TSPN: HS-50x53x13

## Accelerometer Option:

Included Only on Qxxxx Standard Option

Add: U21

## NimbeLink Socket Option:

Included Only on Qxxxx Standard Option

Add: CN6 & CN6A

## WiFi/Bluetooth Option

w/ Chip Antenna

U.FL available on request

Included Only on Qxxxx Standard Option

Add: K2 (Chip antenna)

(alternate: U.FL antenna connector)

## Choke Option

Input power filter feature

NOT Included on any Standard Options

ADD: CH1 - Remove FB46, FB44

## MT LCD Option

NOT Included on any Standard Options

7", 800x480, Resistive Touch, 320nit

Remove: P4, CN1, CN5, CN11, CN4, and P3

Add: U59, CN8 and CN9

Web Schematic: Some proprietary information has been withheld.

| | | |
|---|---|---|
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# TS-7990 Rev.B --> Rev.C Changes

Correct several footprints

Correct Capacitive Touch Sense solution

Mini-PCIe socket uses DIO for reset (can not use CPU_RESET#

Added Optional SIM Socket (CN13)

Change WiFi to use SPI (SDIO does not work)

eMMC 3.3V has power input that can be switched

BOM scrubbing for REACH/RoHS2 Compliance

Added RESET# to CN6

Moved TOUCH_RESET to a CPU DIO pin

All 4 iMX6 UARTs MUXed thru FPGA
FPGA has some MAX3100 UARTs
Features that require UART:

3 RS-232 Ports

3 RS-485 Ports

1 UART for NimbeLink

1 UART for BlueTooth

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|---|---|---|
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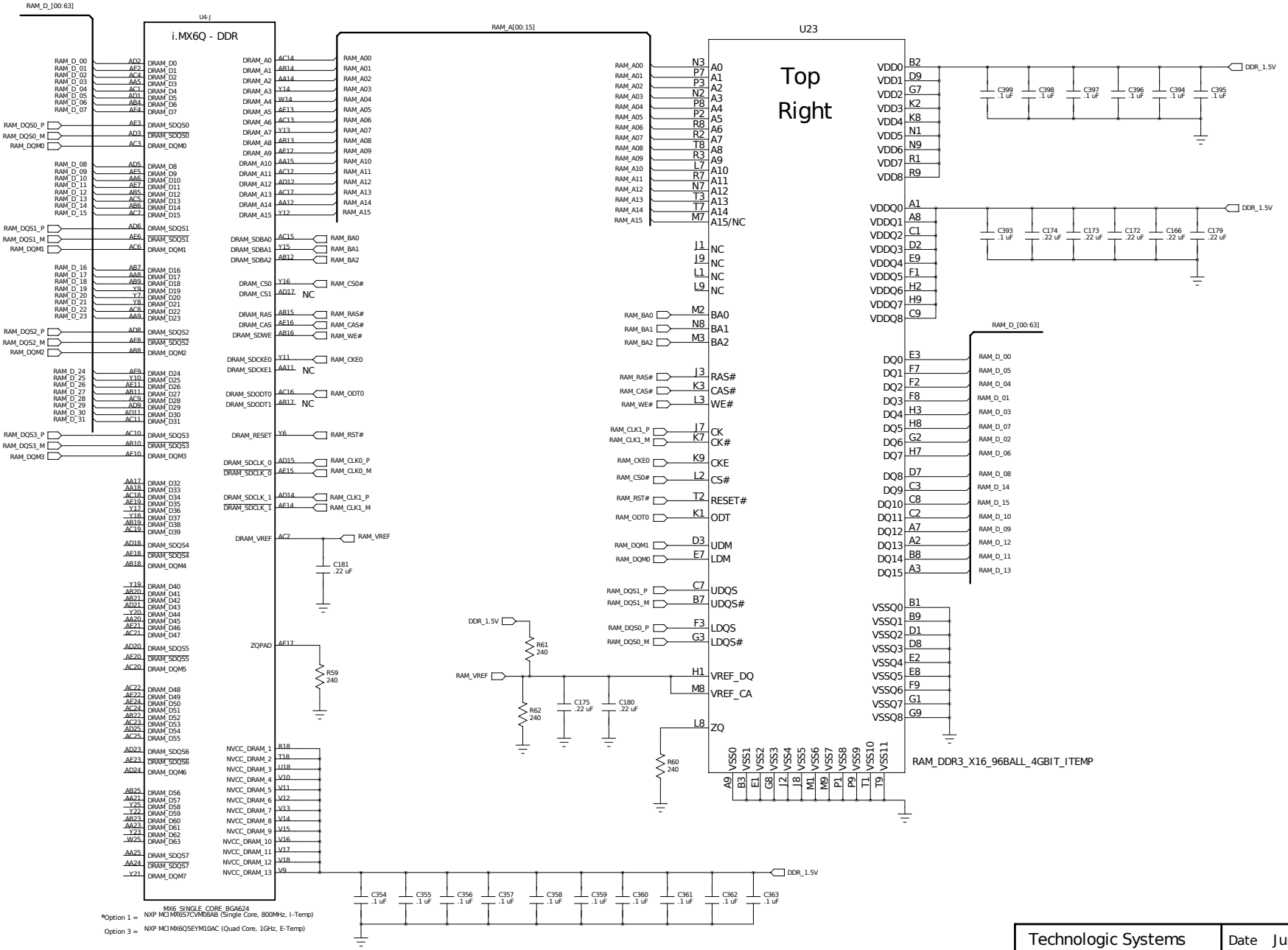


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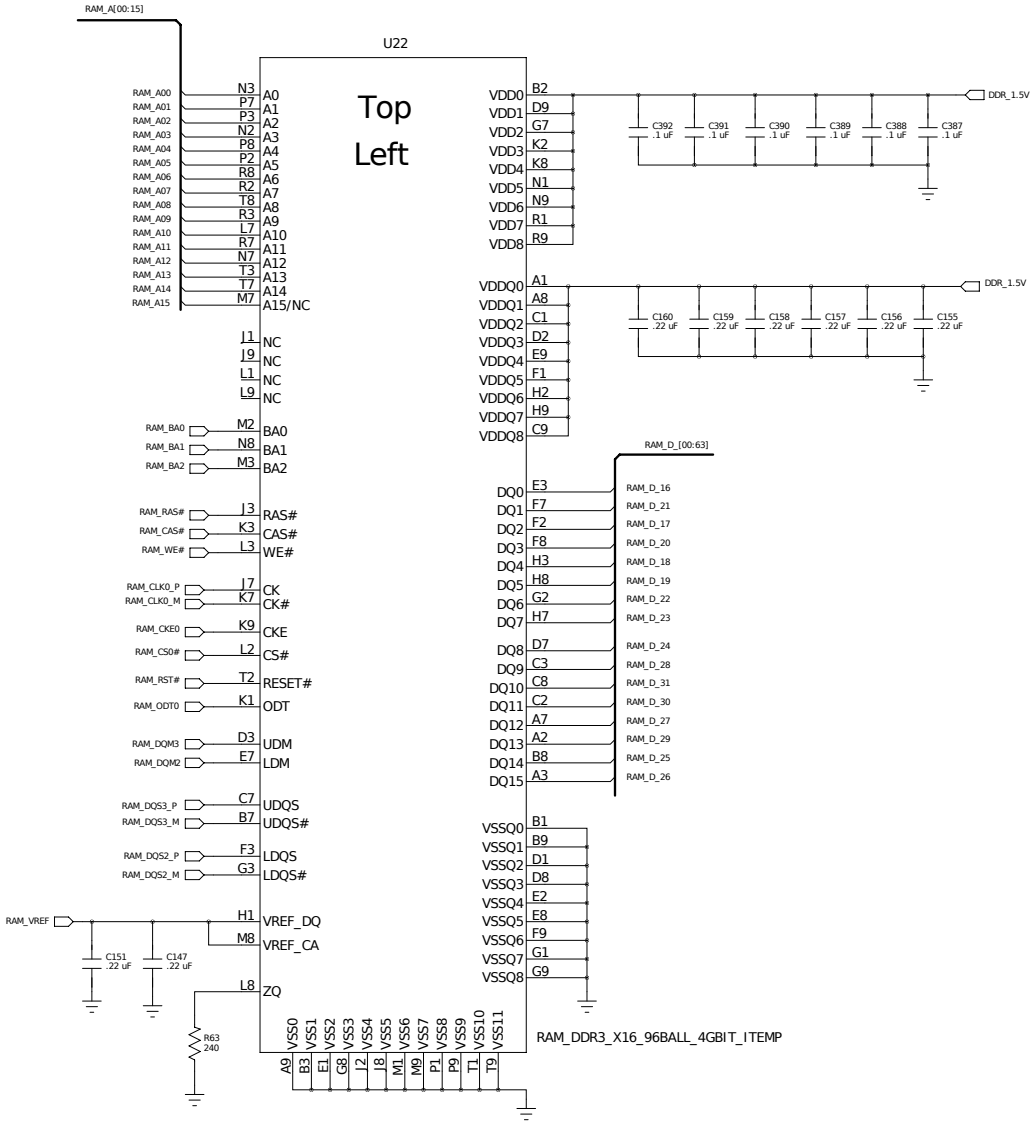
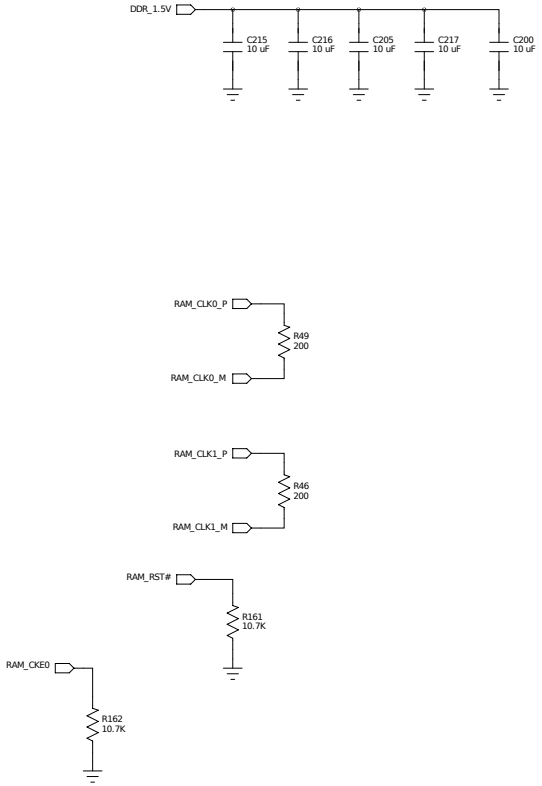
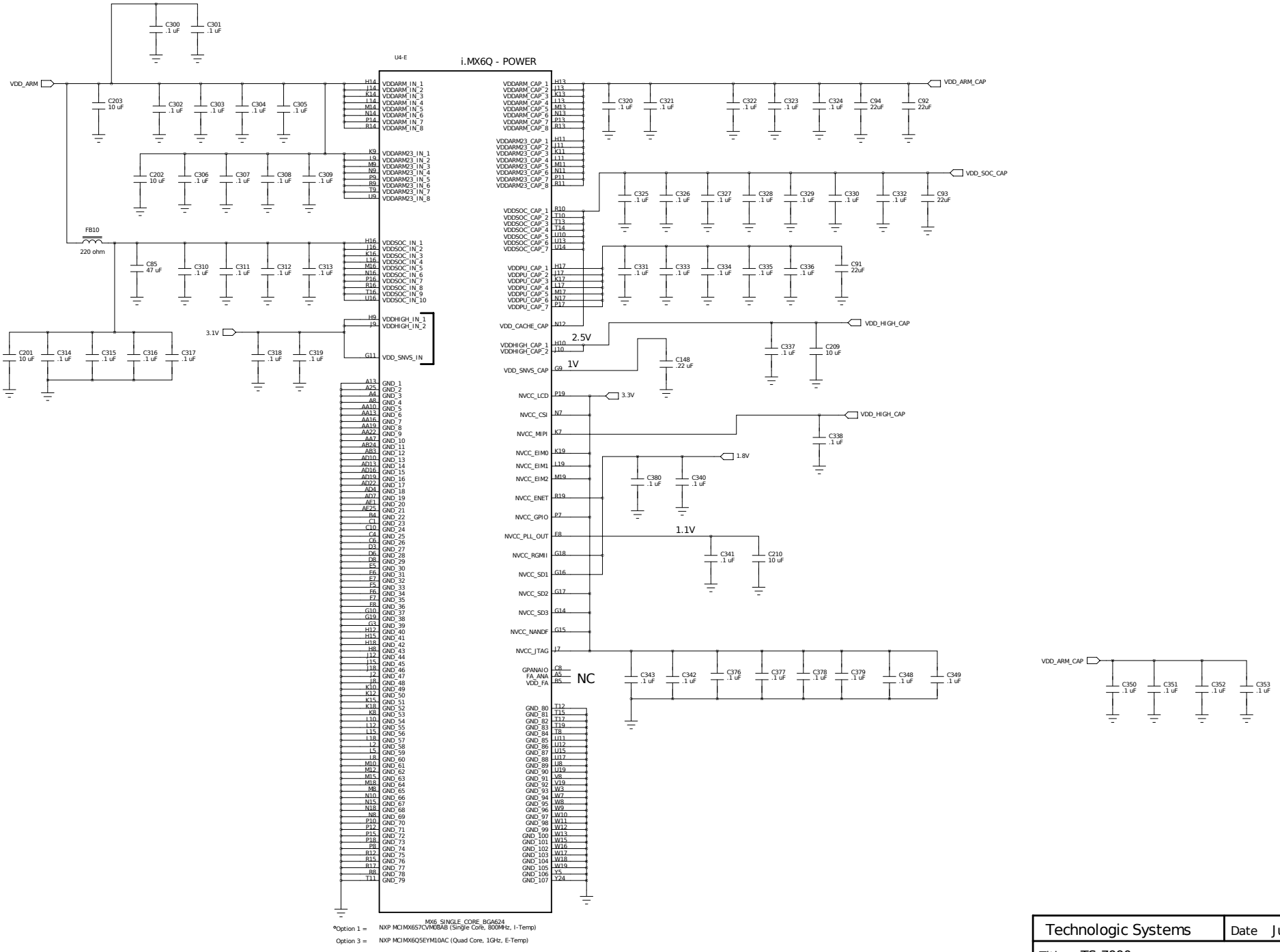
# RAM Data bits 16-31



# iMX6 Power Pins

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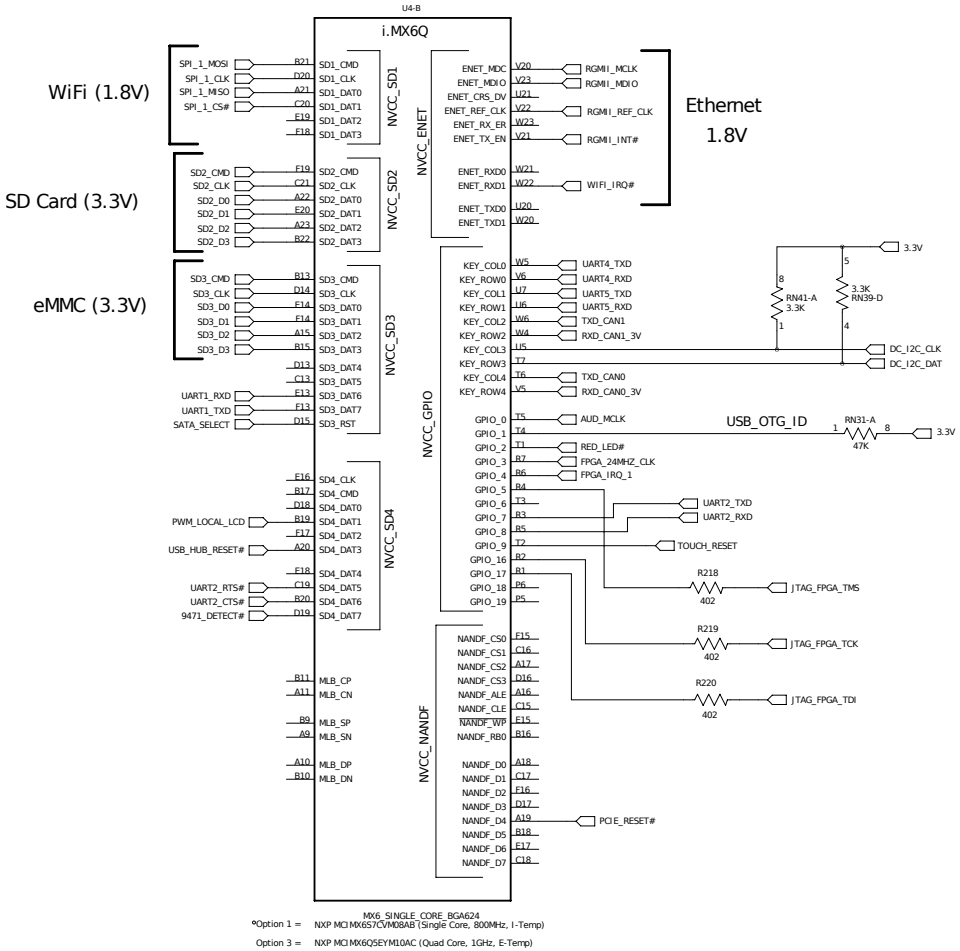
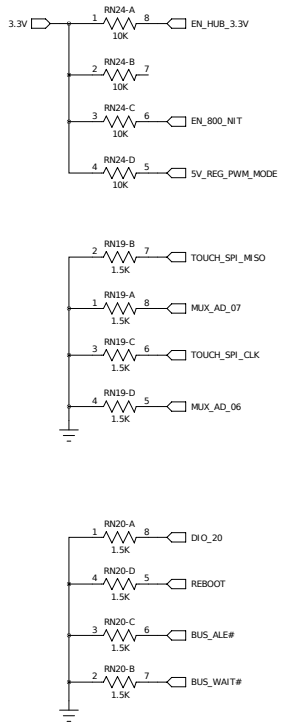
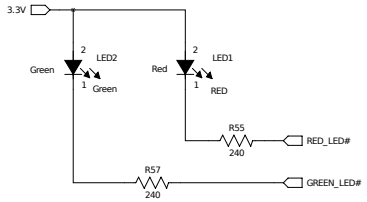
# SD, GPIO, NAND




# Bias Res.




# iMX6 LEDs




4 PWM total

PWM on SD4_DAT 1 or 2
GPIO_1 and GPIO_9

| | | |
|---|---|---|
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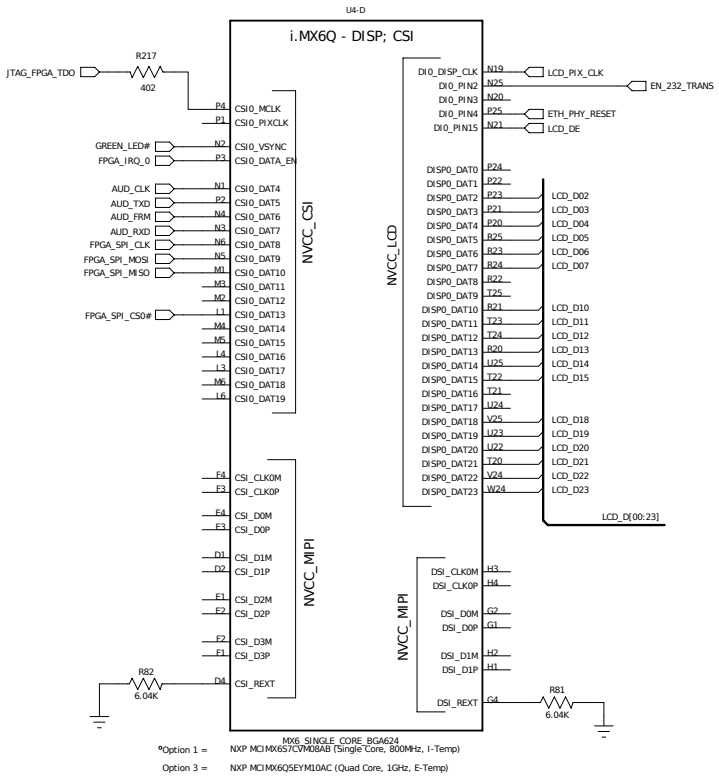
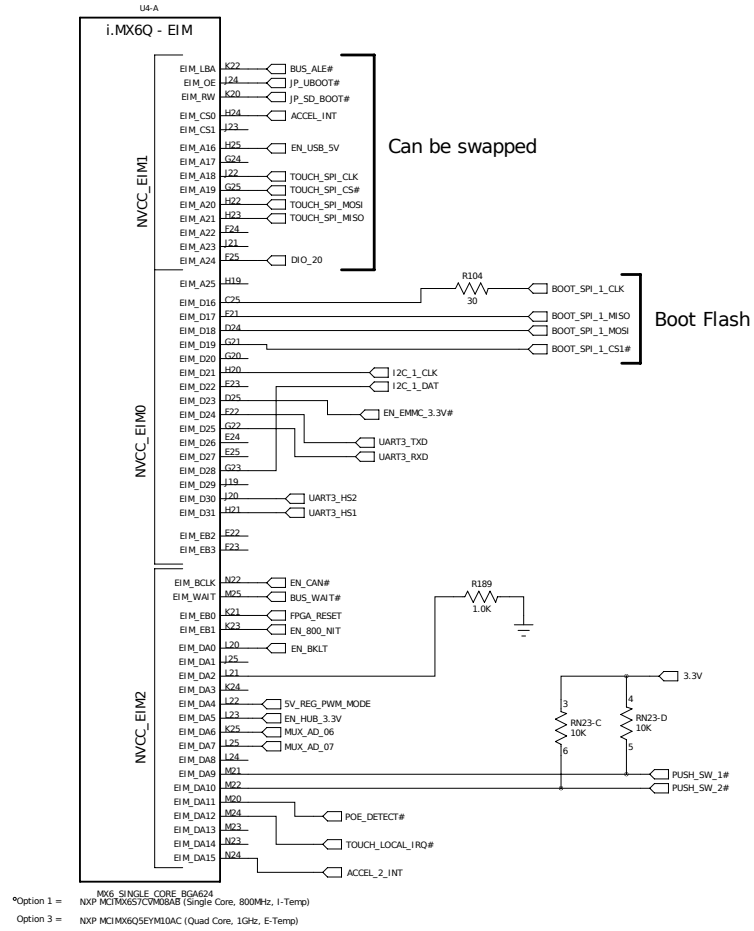
# LCD




# EIM

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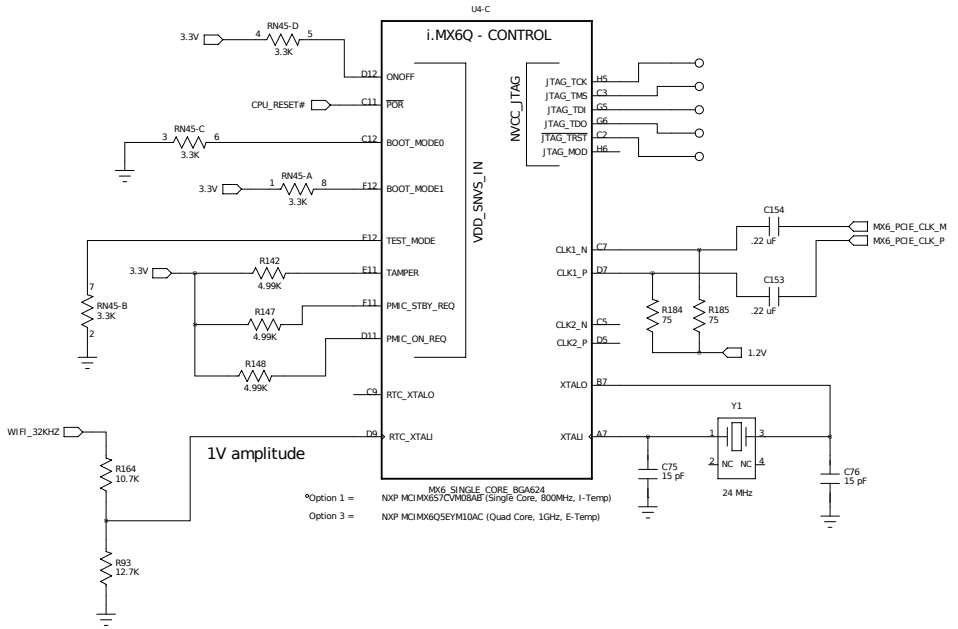
# CPU Control




## BOOT_MODE

| MSB | LSB | |
|---|---|---|
| 0 | 0 | = Fuses |
| 0 | 1 | = USB |
| 1 | 0 | = Internal Boot |

| | | |
|---|---|---|
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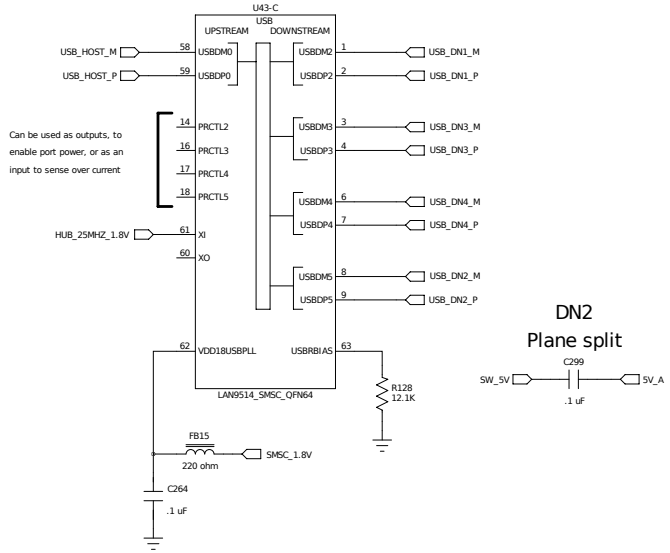
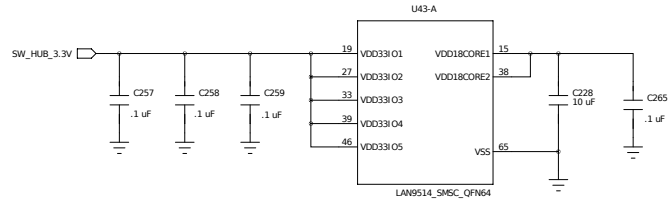
# 2nd Ethernet Port

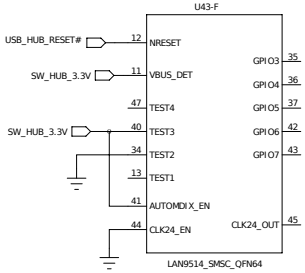
## SMSC USB Hub

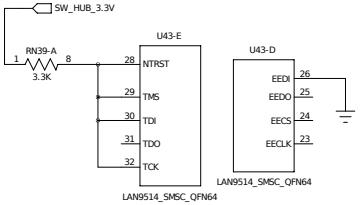



DN2
Plane split



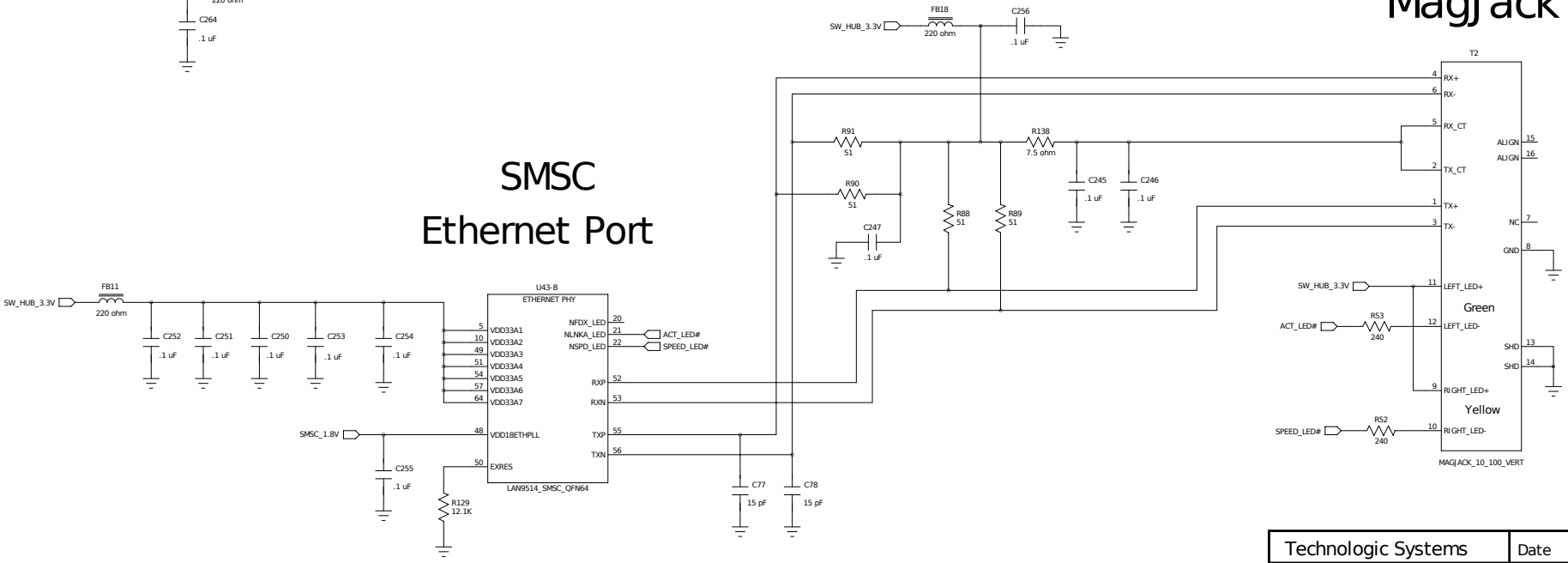




## Vert. MagJack

## SMSC Ethernet Port

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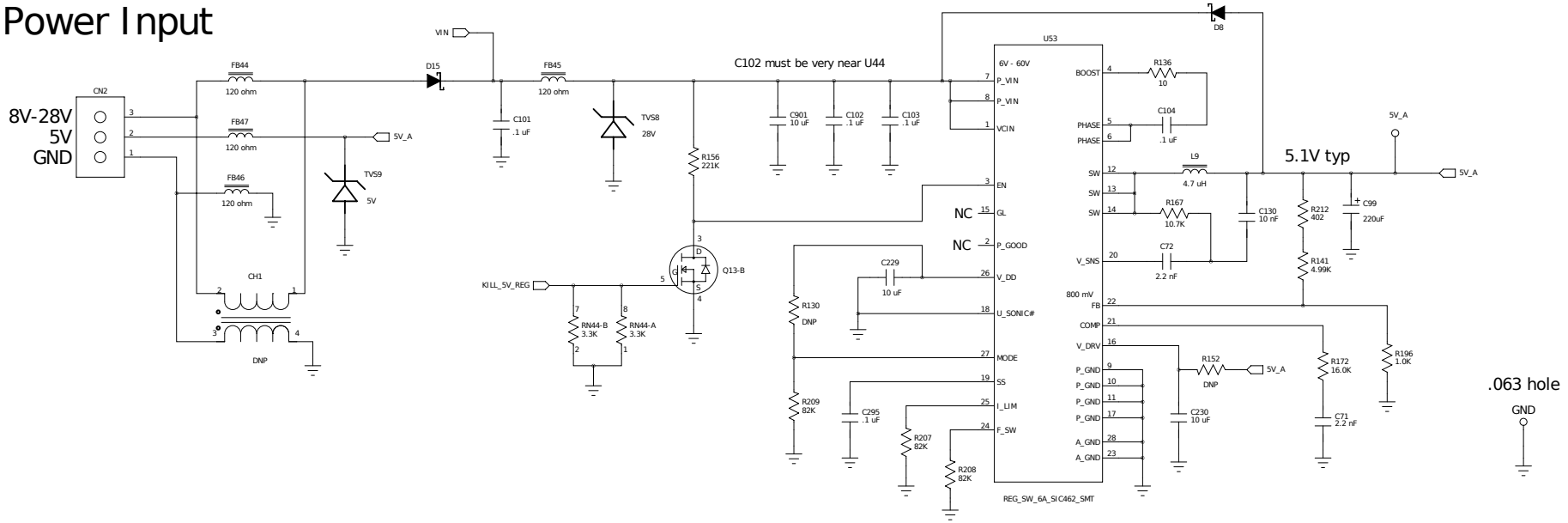
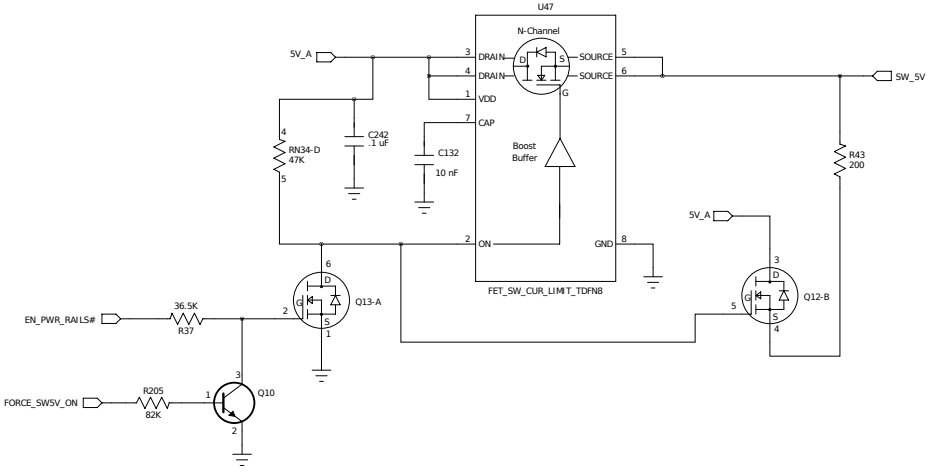
# 5V Regulator 5A

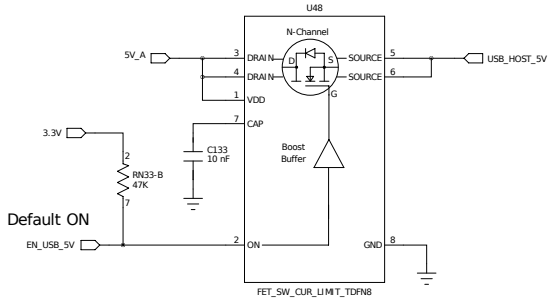
## Power Input




## Main 5V Power Sw.




## USB Sw. 5V




| | | | |
|---|---|---|---|
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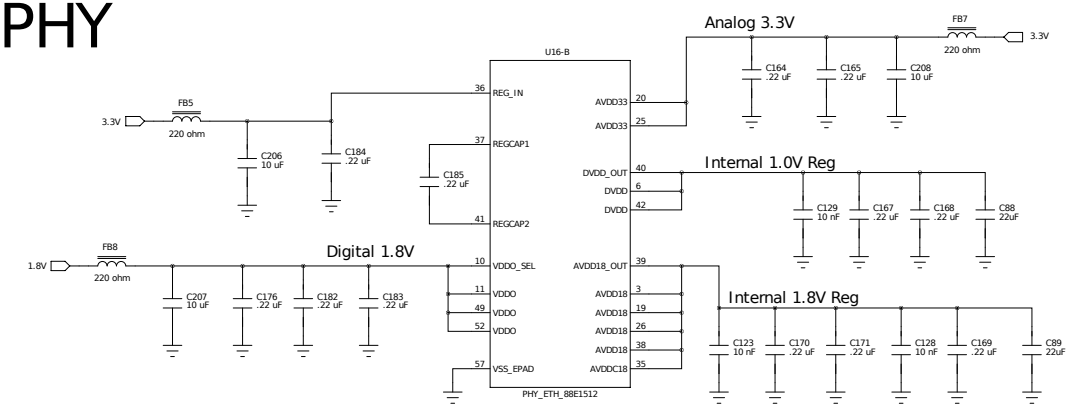
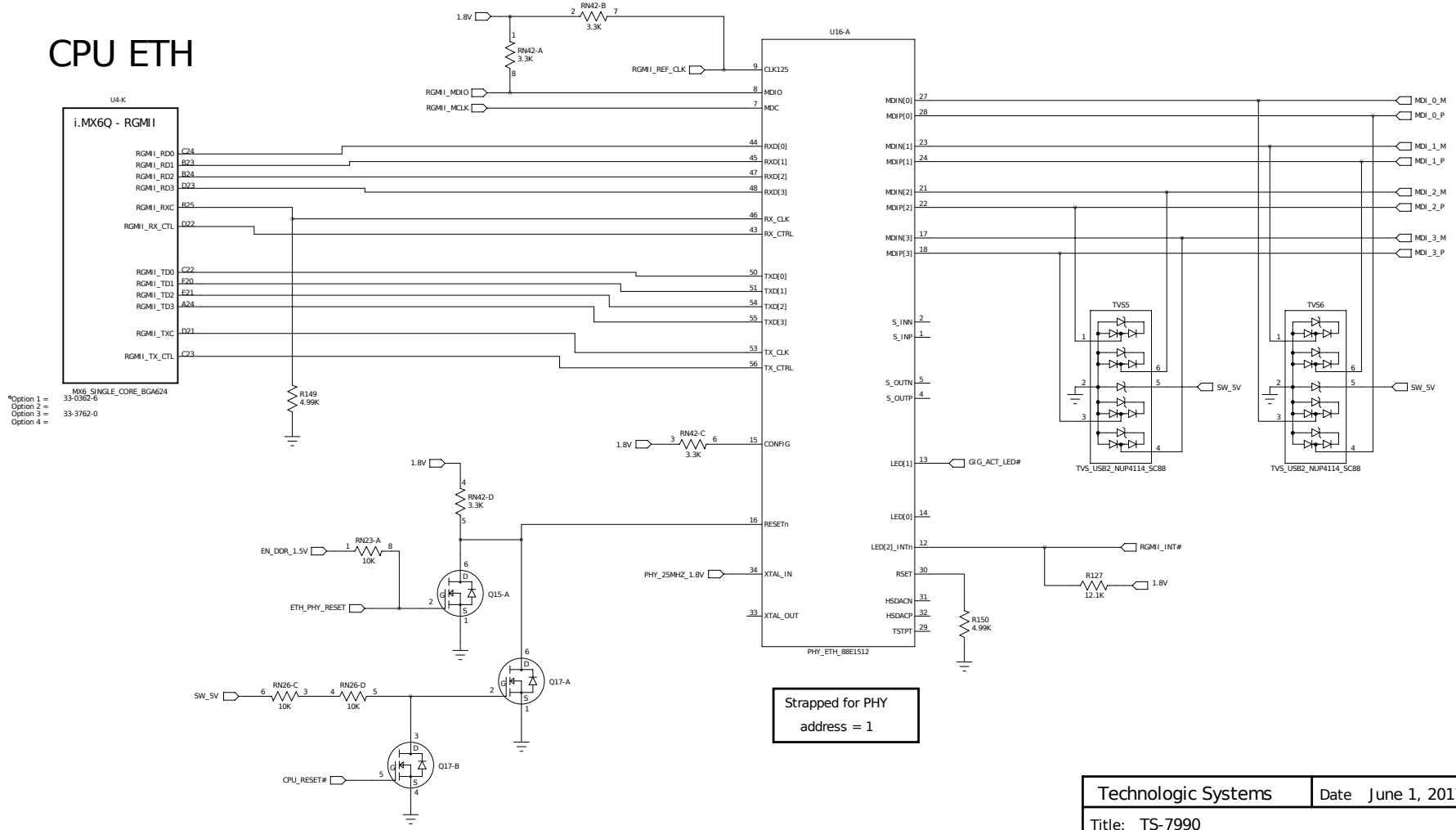
# 10/100/1000 Ethernet PHY




## CPU ETH

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| Technologic Systems | Date June 1, 2017 | |
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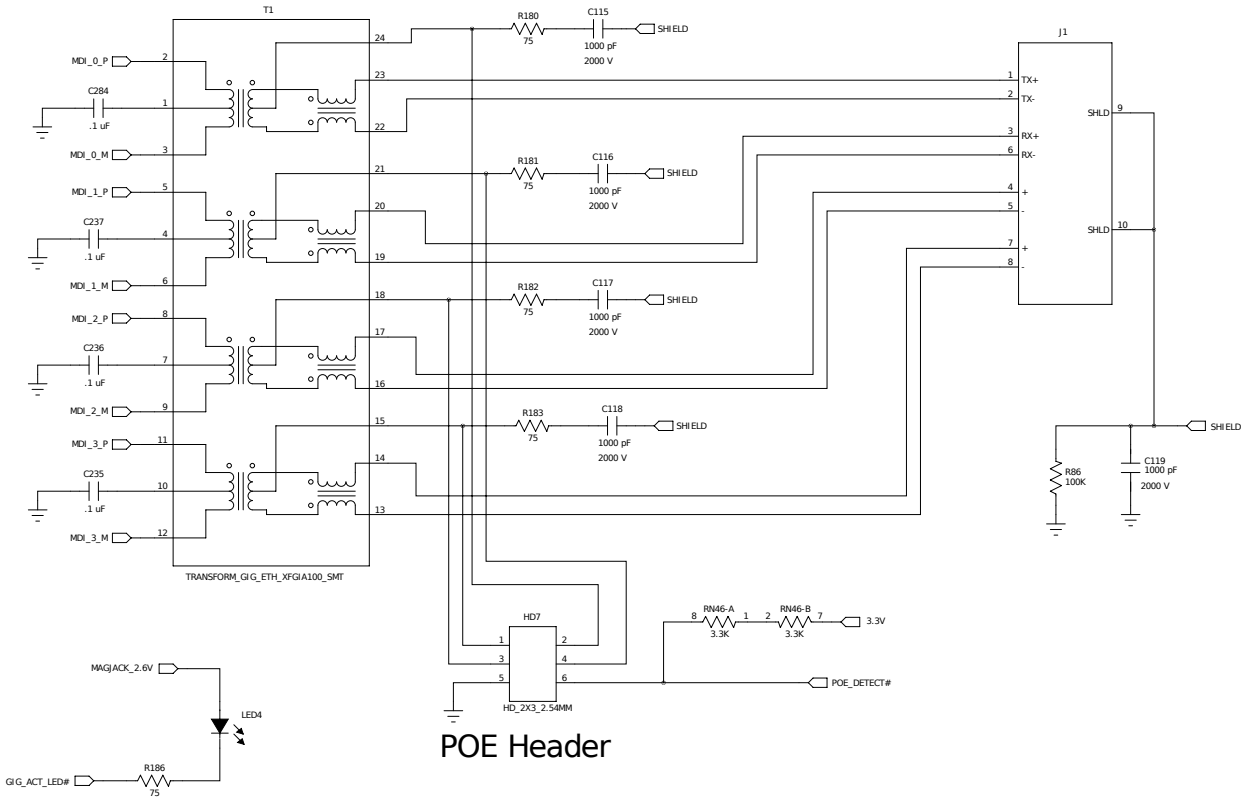
# Gig Eth Transformer

# Vertical RJ45




POE Header

| | | | |
|---|---|---|---|
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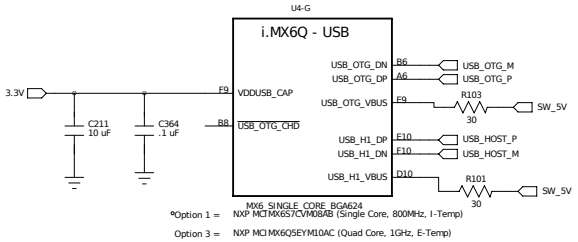
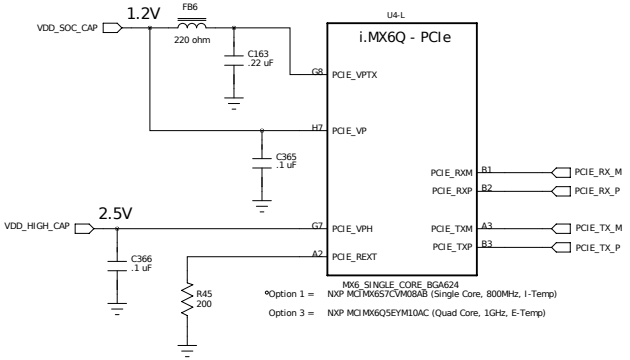
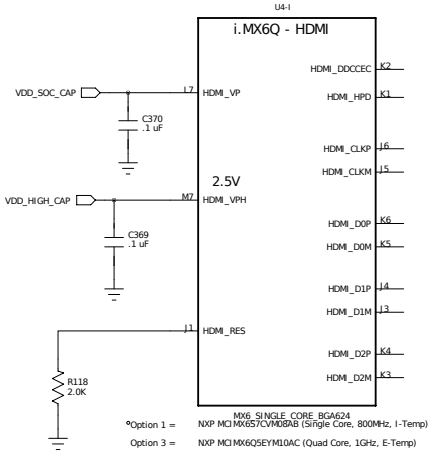
# CPU USB




# CPU PCIe




# CPU HDMI




| | | |
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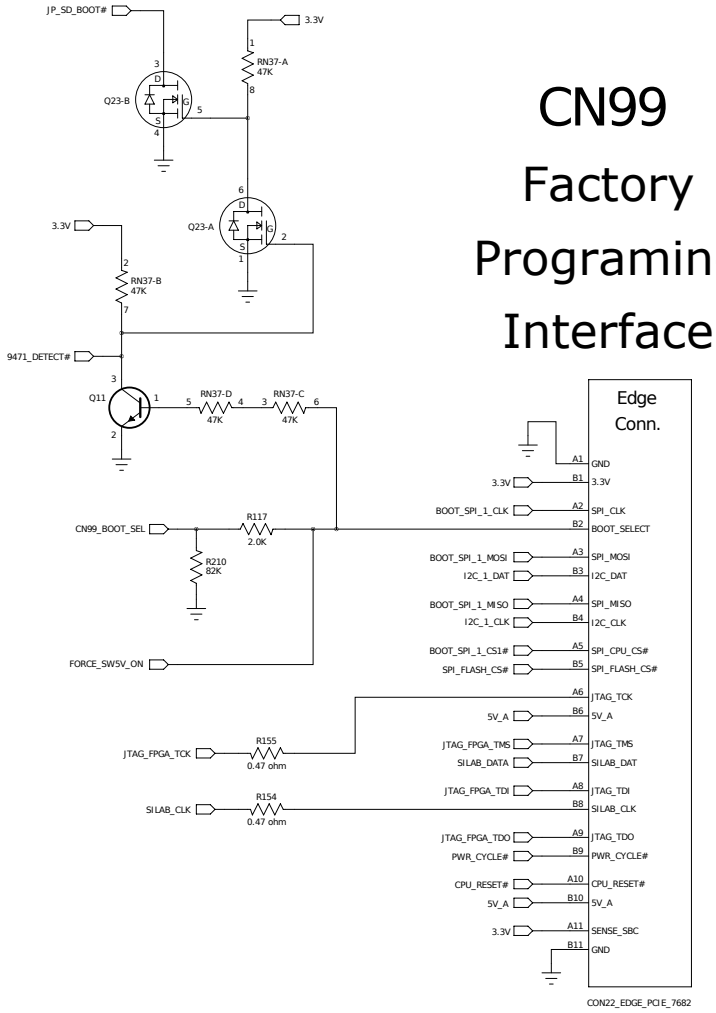
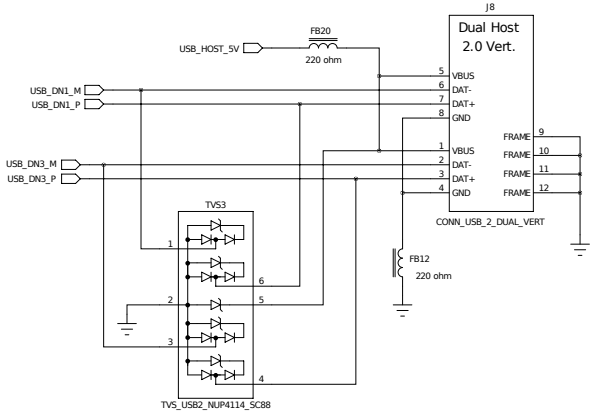
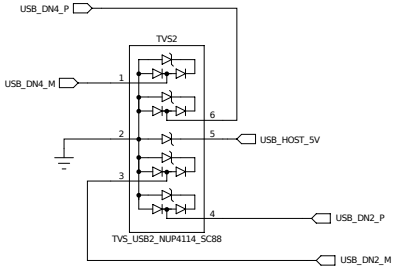
# CN99 Factory Programing Interface




# USB Host Vert. Ports




# Mini-PCIe and Modem USB TVS




| | | |
|---|---|---|
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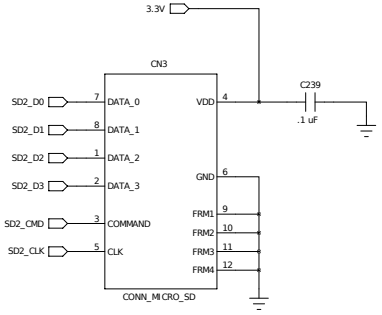
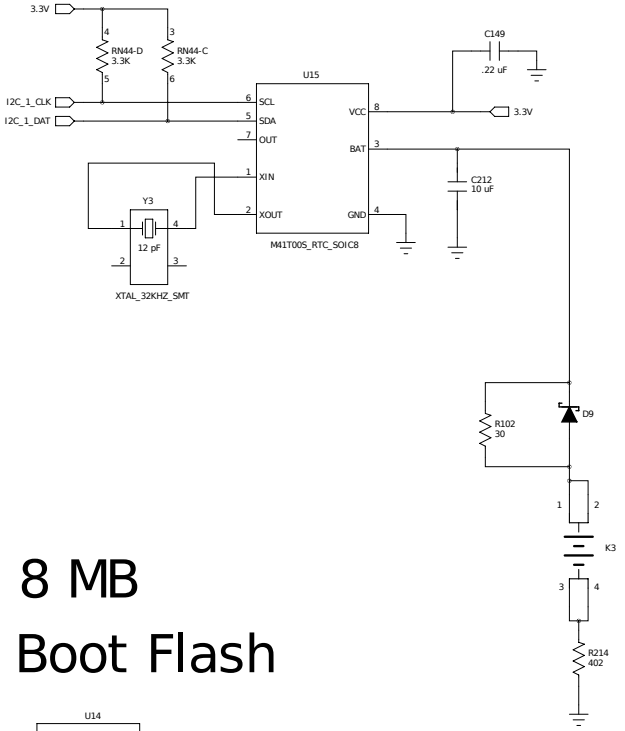
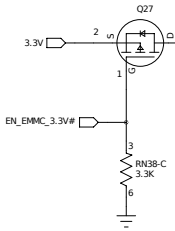
# Micro SD Card Socket



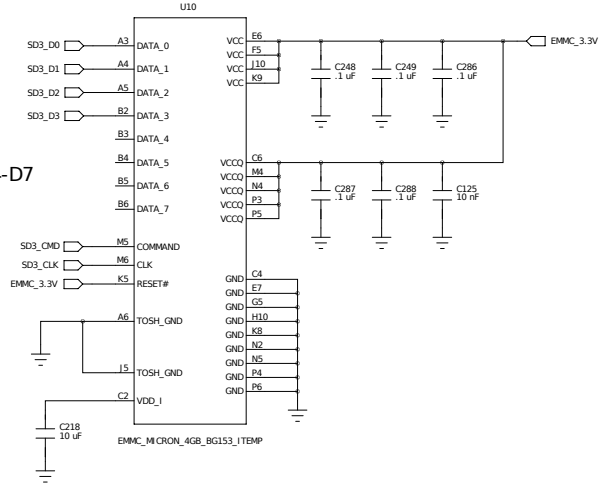

# ST Micro RTC



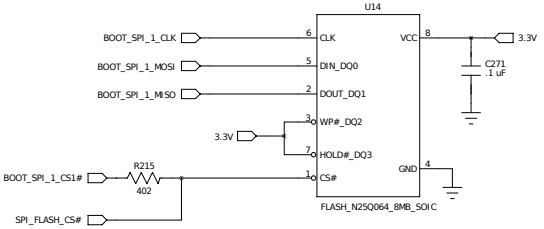




# eMMC 4GB

Internal PU on D4-D7




# 8 MB SPI Boot Flash




| | | |
|---|---|---|
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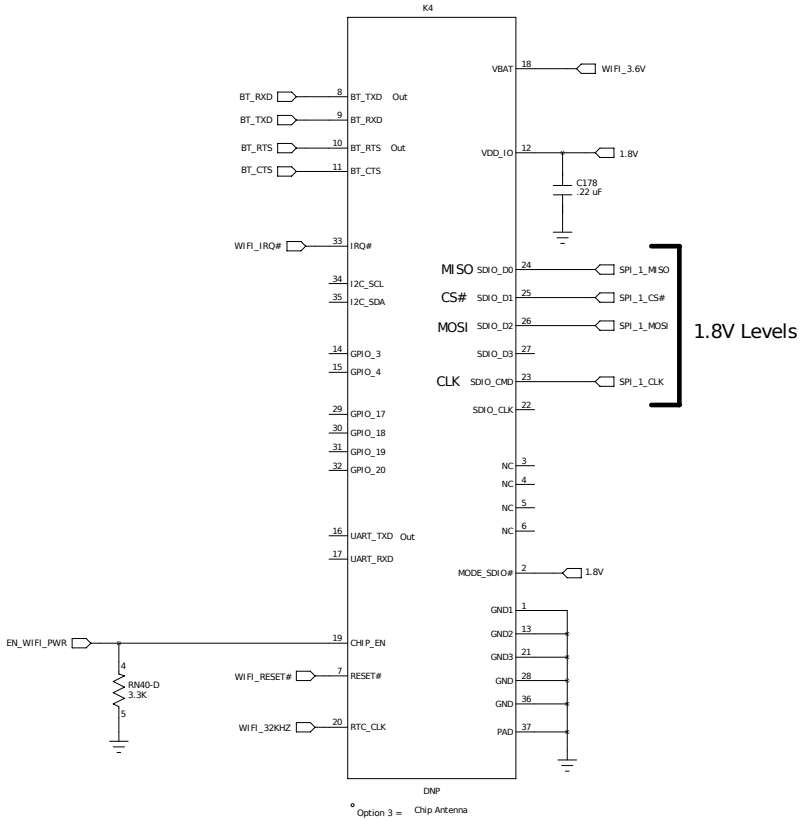
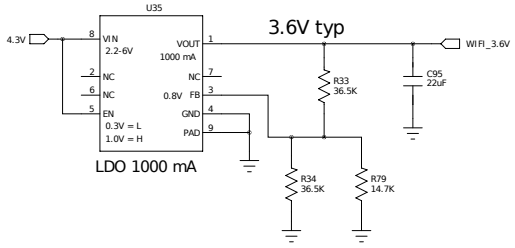
# WiFi / Blutooth Radio Module




# WiFi 3.6V Regulator




| | | |
|---|---|---|
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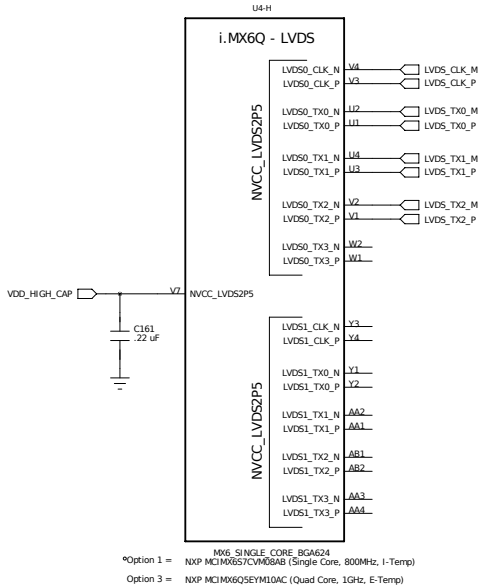
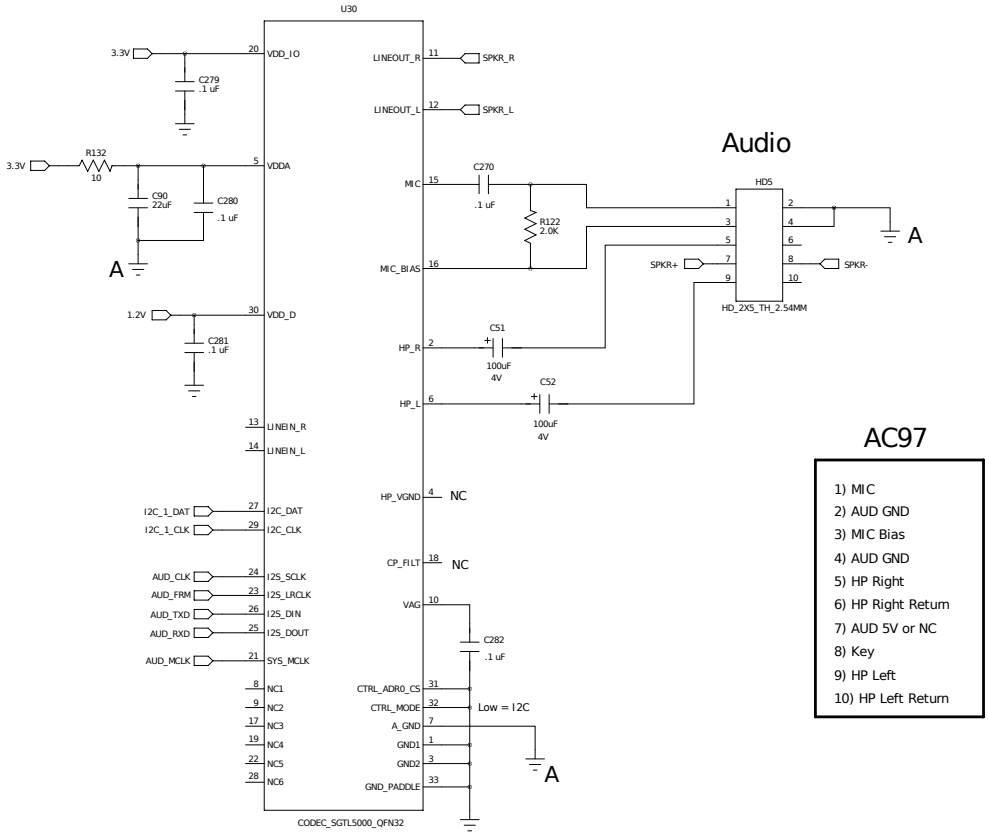
# LVDS



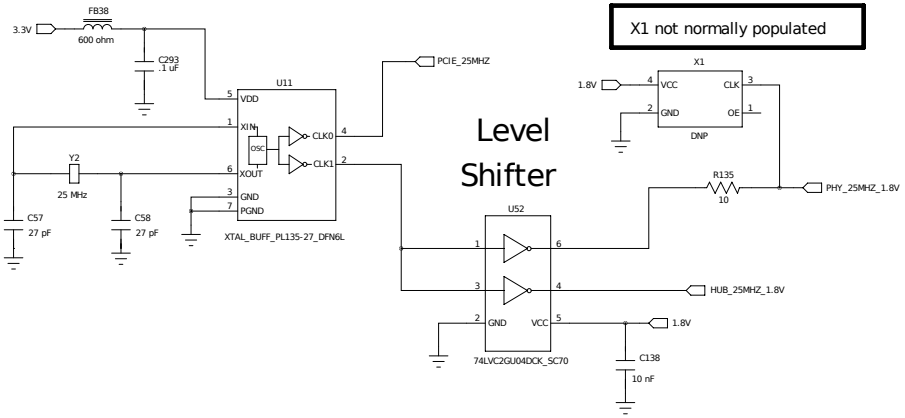

# Audio CODEC




## AC97

1) MIC
2) AUD GND
3) MIC Bias
4) AUD GND
5) HP Right
6) HP Right Return
7) AUD 5V or NC
8) Key
9) HP Left
10) HP Left Return

# 25 MHz Osc.




| | | |
|---|---|---|
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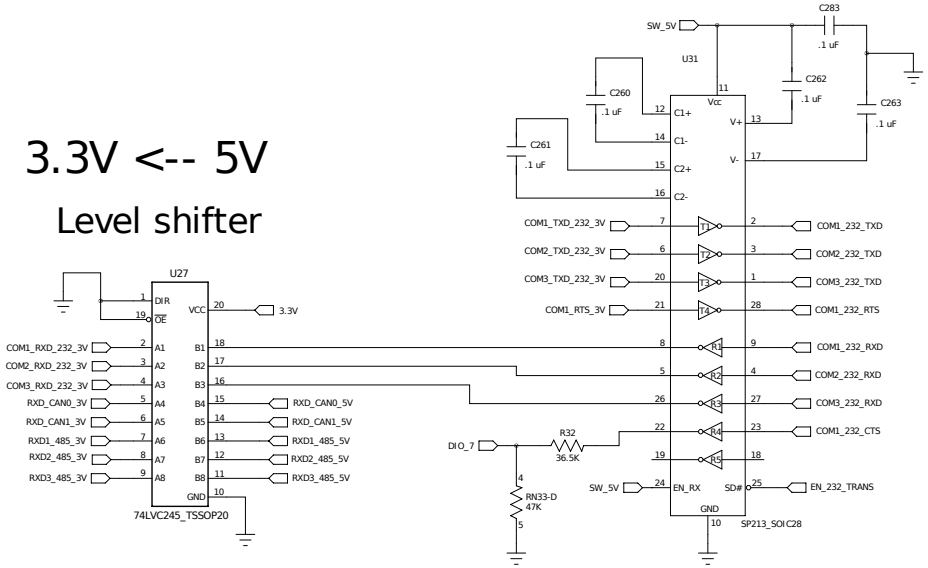
# RS-232 Transceiver and COM Headers

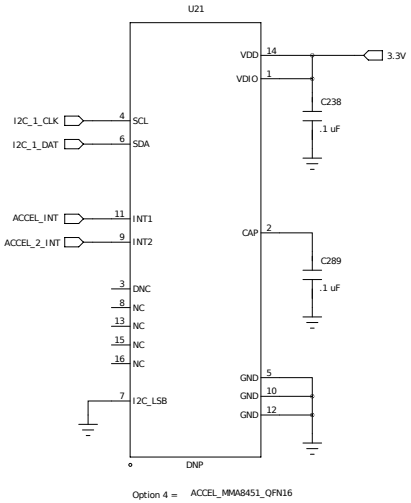
## RS-232 Transceiver

### 3.3V <-- 5V

Level shifter

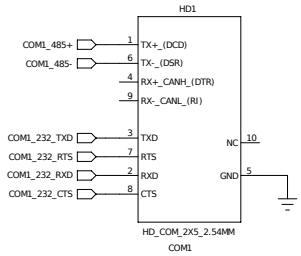



## Accelerometer



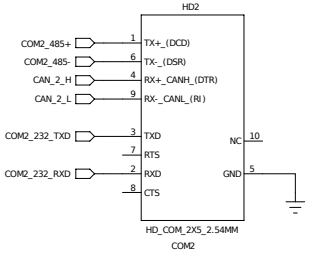

## COM1

### Header



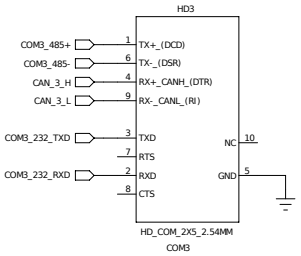

## COM2

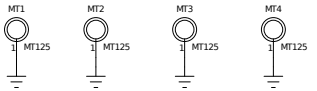
### Header




## COM3

### Header

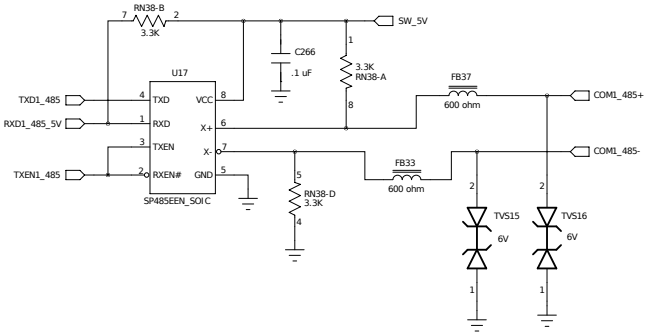


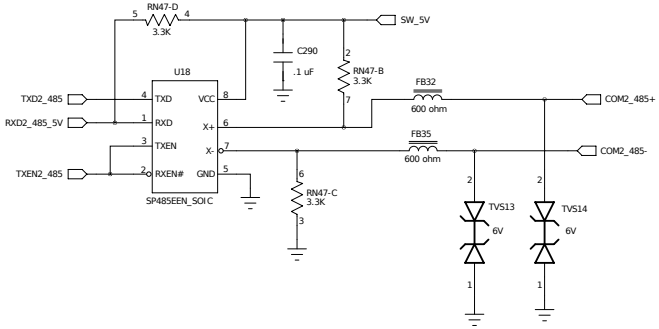

| | | |
|---|---|---|
| Technologic Systems | Date June 1, 2017 | |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 20 of 30 |

# RS-485 and CAN Transceivers

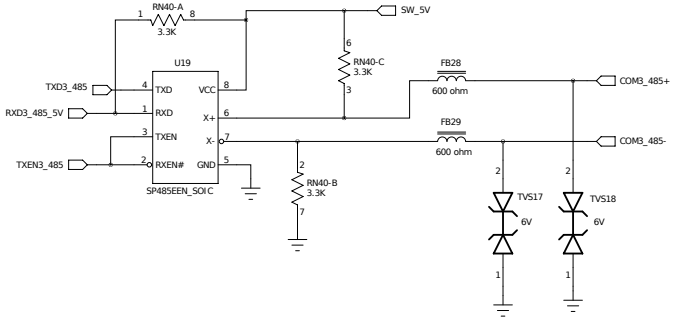
## COM1 RS-485 Driver



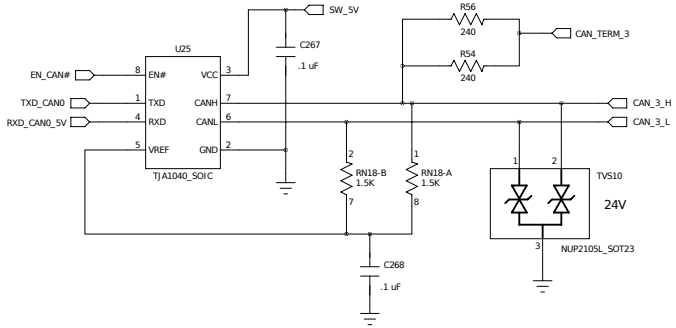

## COM2 RS-485 Driver



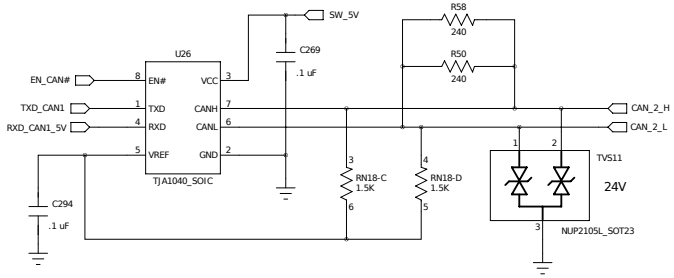

## COM3 RS-485 Driver




## COM3 CAN Tranceiver




## COM2 CAN Tranceiver

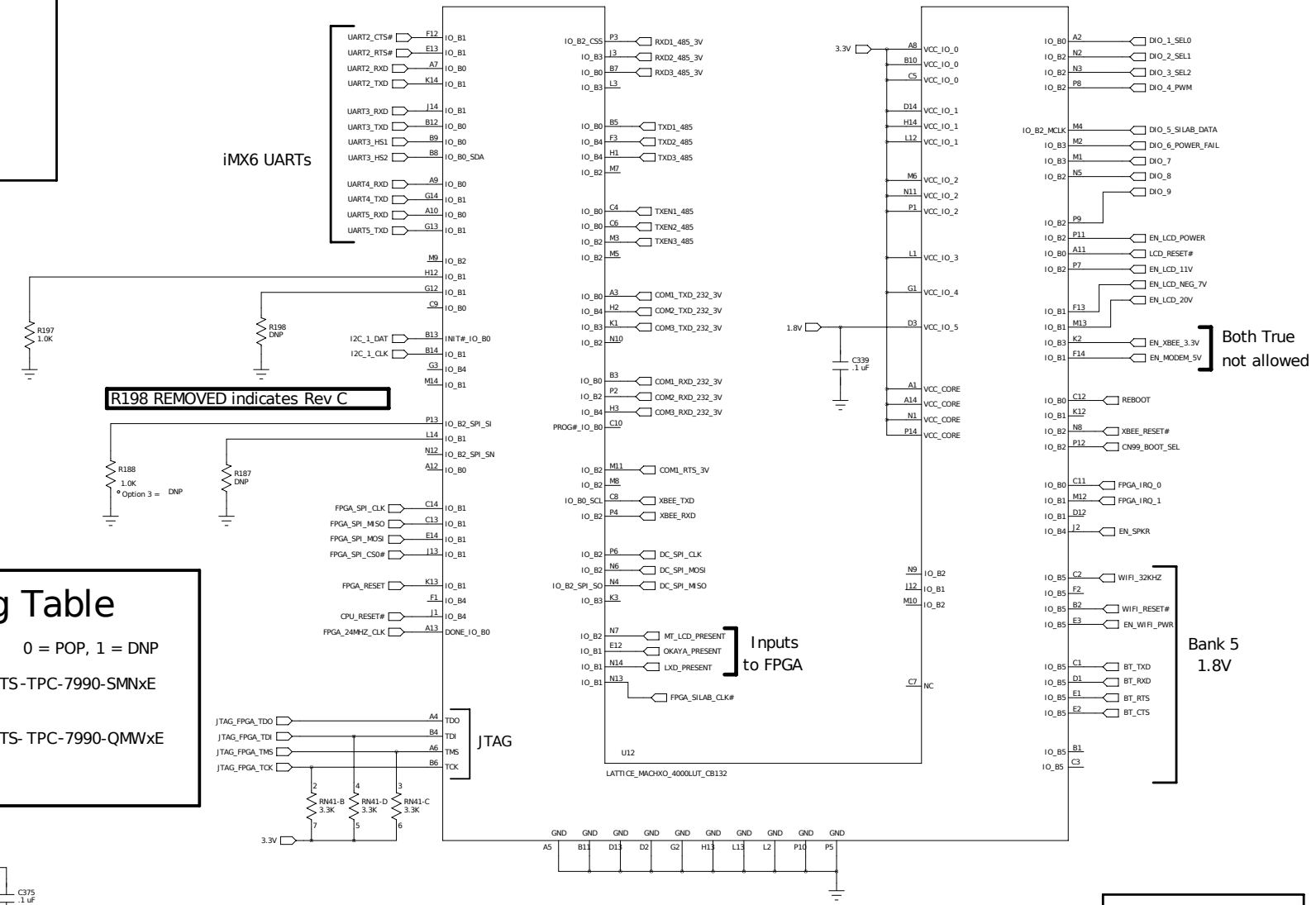



| | | |
|---|---|---|
| Technologic Systems | Date June 1, 2017 | |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 21 of 30 |

# MACH XO2 FPGA

## FPGA required for:

- Adds two MAX3100 UART via SPI
- Auto-485 for 3 UARTs
- Provides serial port MUXing
- Level shifting for Bluetooth
- Controls LCD power sequencing
- Option strap resistors
- DIO for DC

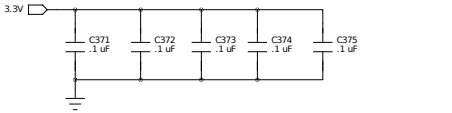


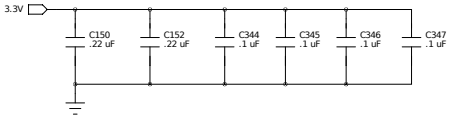

## Resistor Strapping Table

0 = POP, 1 = DNP

| R197 | R188 | R187 | | |
|---|---|---|---|---|
| 0 | 0 | 1 | Option 1 | TS-TPC-7990-SMNxE |
| 0 | 1 | 1 | Option 3 | TS-TPC-7990-QMWxE |

MSB LSB




## FPGA Features:

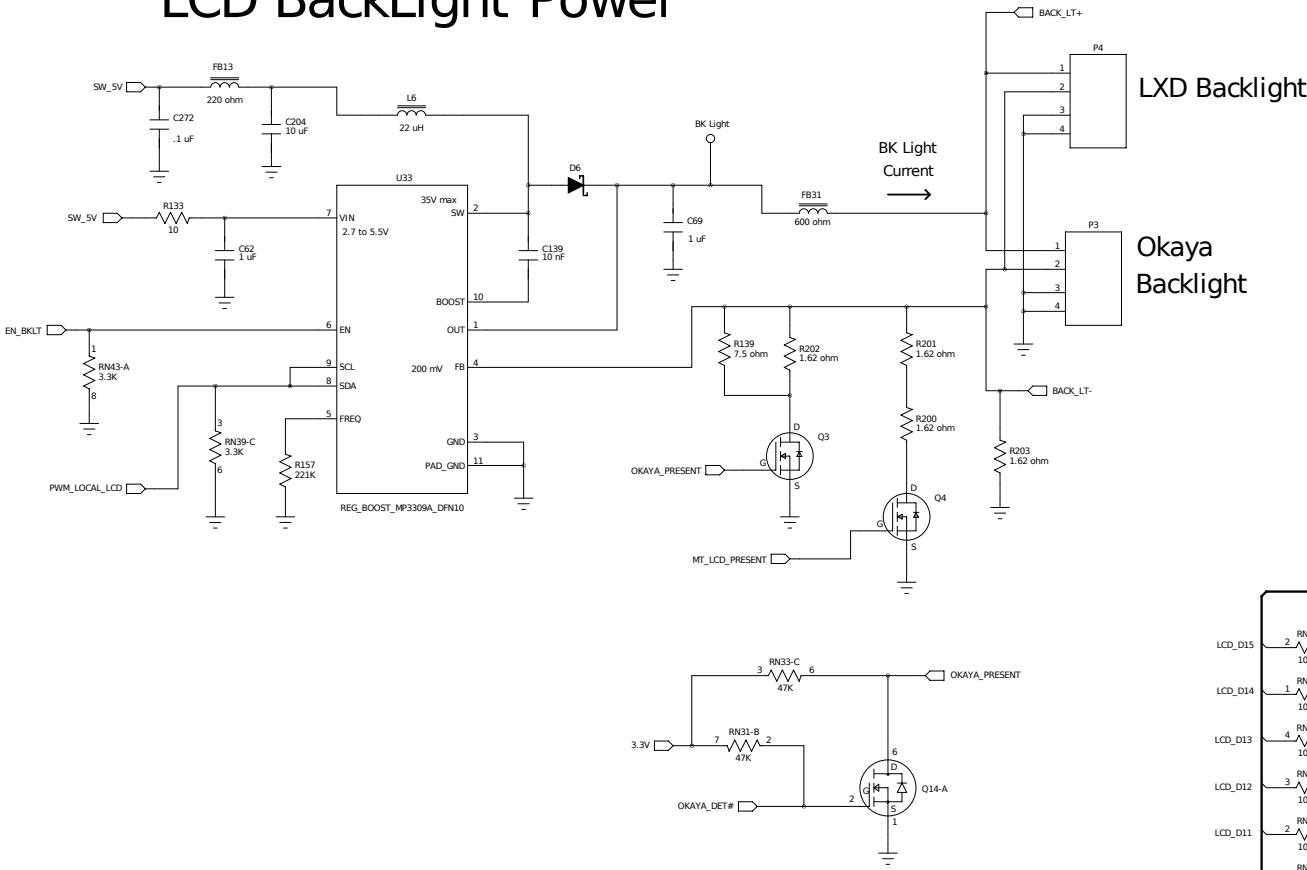
- Programmable PU or PD on each pin.
- Internal 2 MHz clock; 10 MHz min PLL clock
- special function pins are in unpredicatble states the 1st 1 ms
- All DIO have Hysteresis inputs

At power up, all DIO must be tri-stated

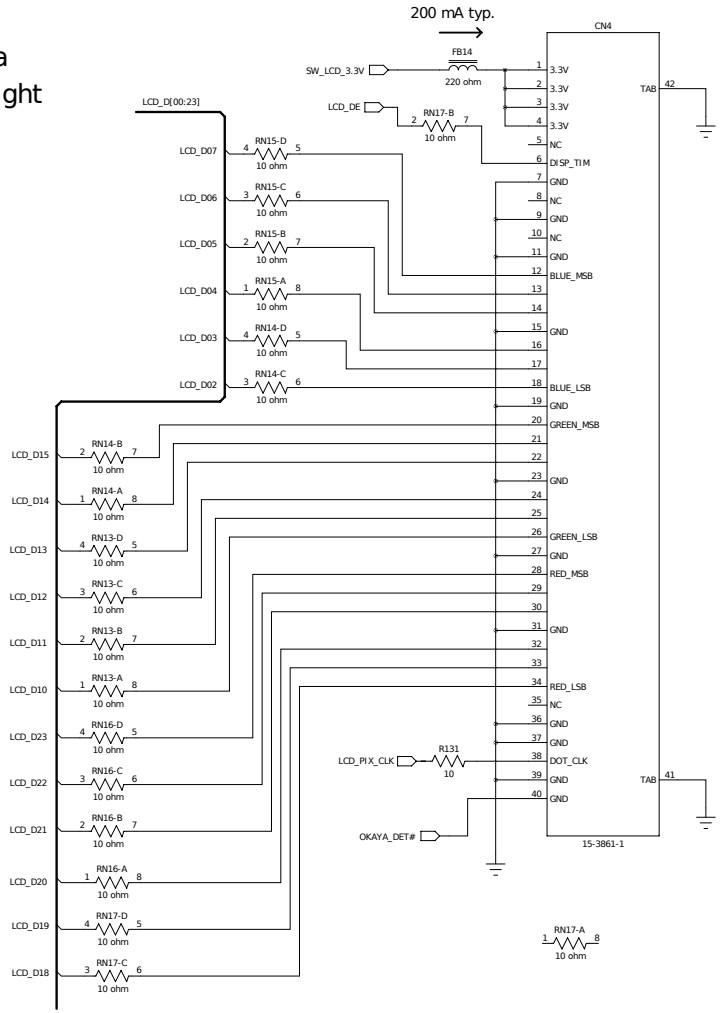
| | | |
|---|---|---|
| Technologic Systems | Date June 1, 2017 | |
| Title: TS-7990 FPGA | | |
| Rev: C | Designer | Sheet 22 of 30 |

# LCD BackLight Power

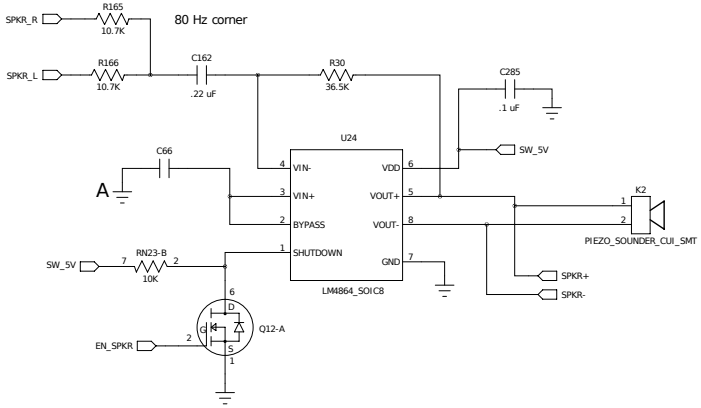
MT Backlight is on CN8




# Okaya LCD Conn.



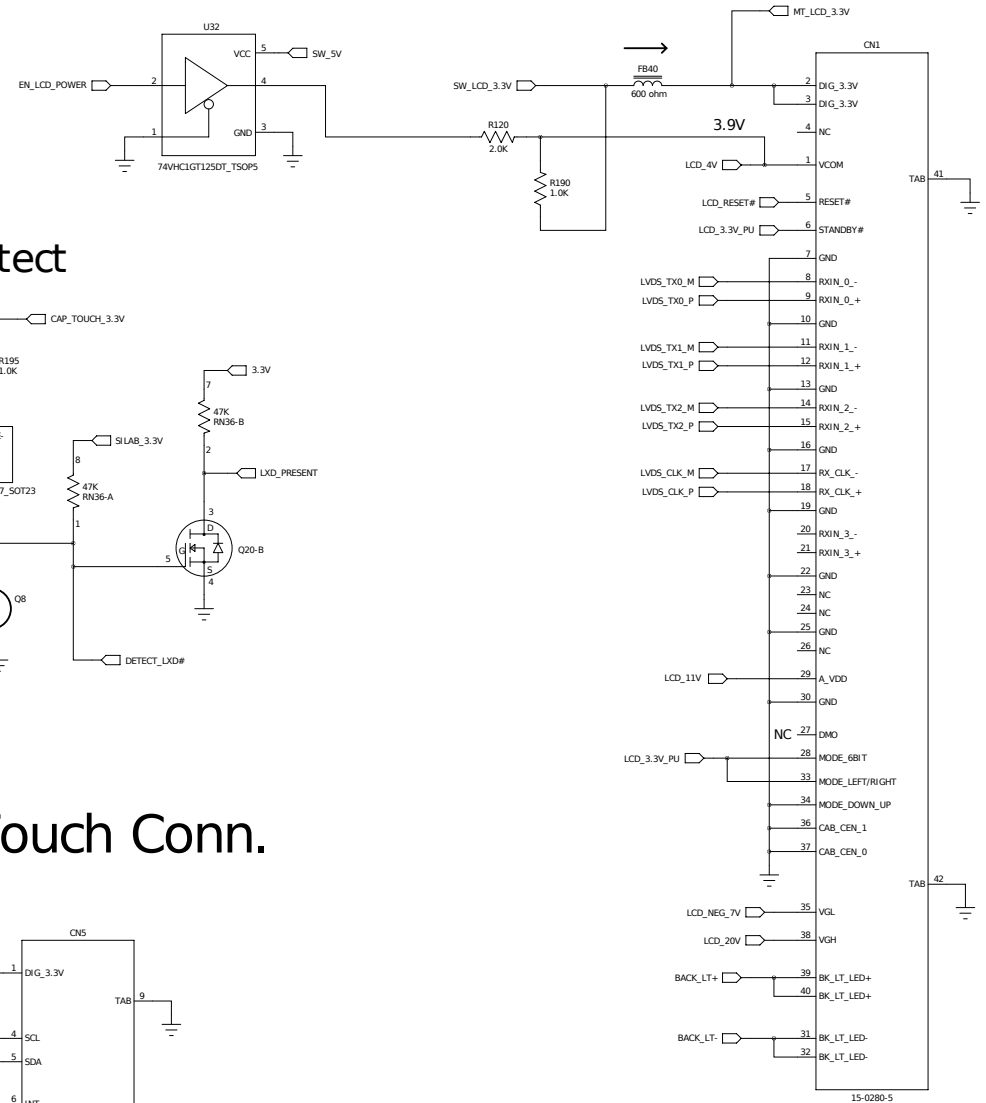

# Speaker Amp




| | | |
|---|---|---|
| Technologic Systems | | Date June 1, 2017 |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 23 of 30 |

# LVDS LCD Conn. LCD

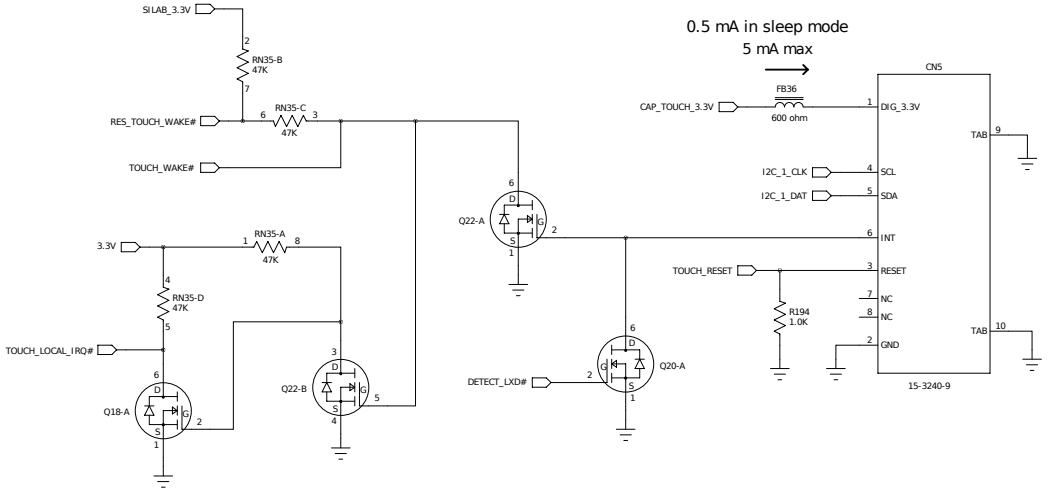
## LXD LCD Conn.




## Cap Touch Detect



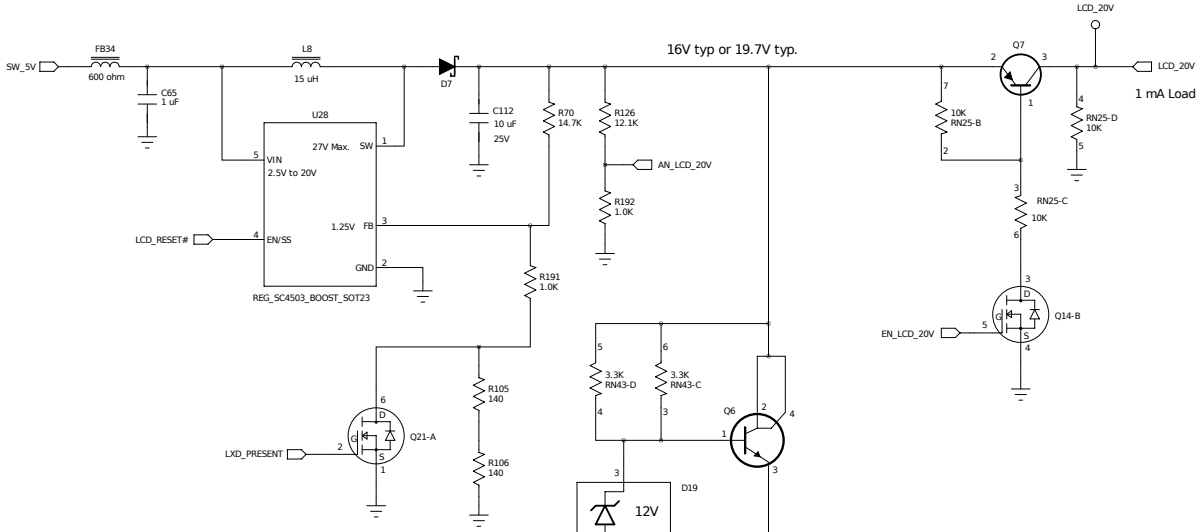

## LXD Cap. Touch Conn.



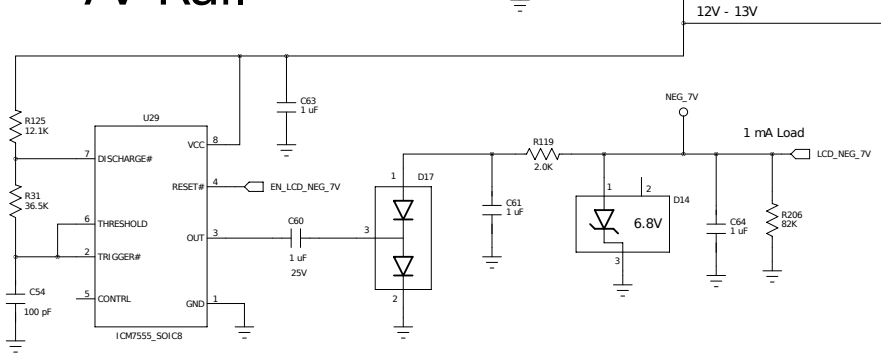

| | | |
|---|---|---|
| Technologic Systems | Date June 1, 2017 | |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 24 of 30 |

# LXD and MT LCD Power Rails

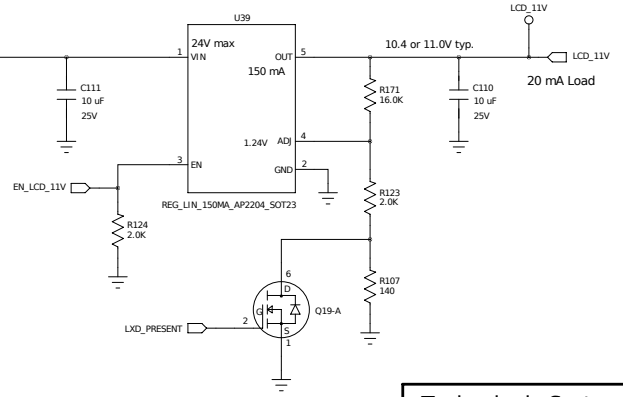
## LCD +20V/16V Power Supply




## LCD Negative -7V Rail



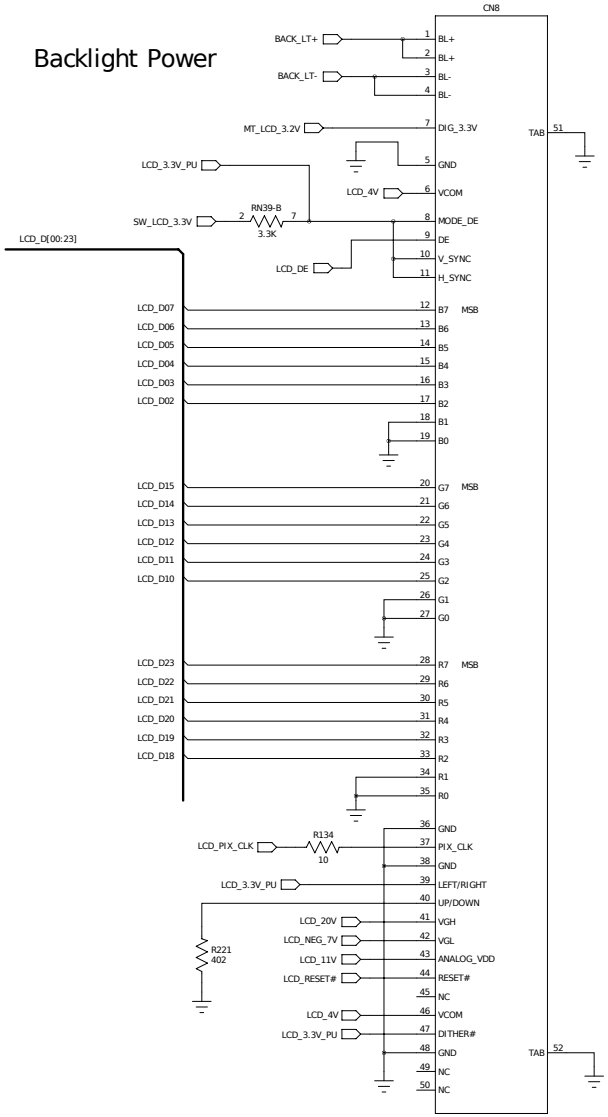

## LCD 11V/10.4V Power Supply




| | | | |
|---|---|---|---|
| Technologic Systems | | Date June 1, 2017 | |
| Title: TS-7990 | | | |
| Rev: C | Designer | | Sheet 25 of 30 |

# MicroTips
# LCD Conn.

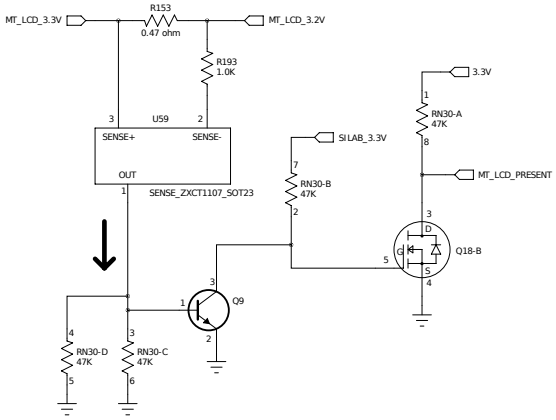
## Backlight Power




DNP

Top Contacts

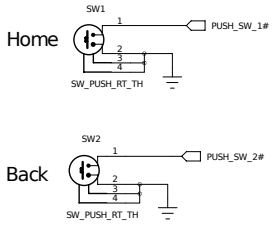
## MT LCD Detect



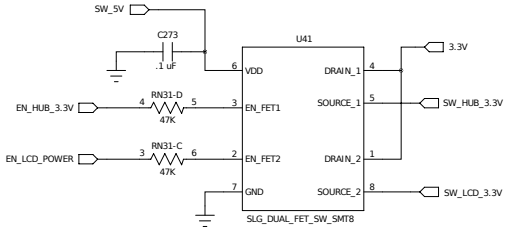

| | | |
|---|---|---|
| Technologic Systems | Date June 1, 2017 | |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 26 of 30 |

# LCD Res. Touch

## Android Push Switches

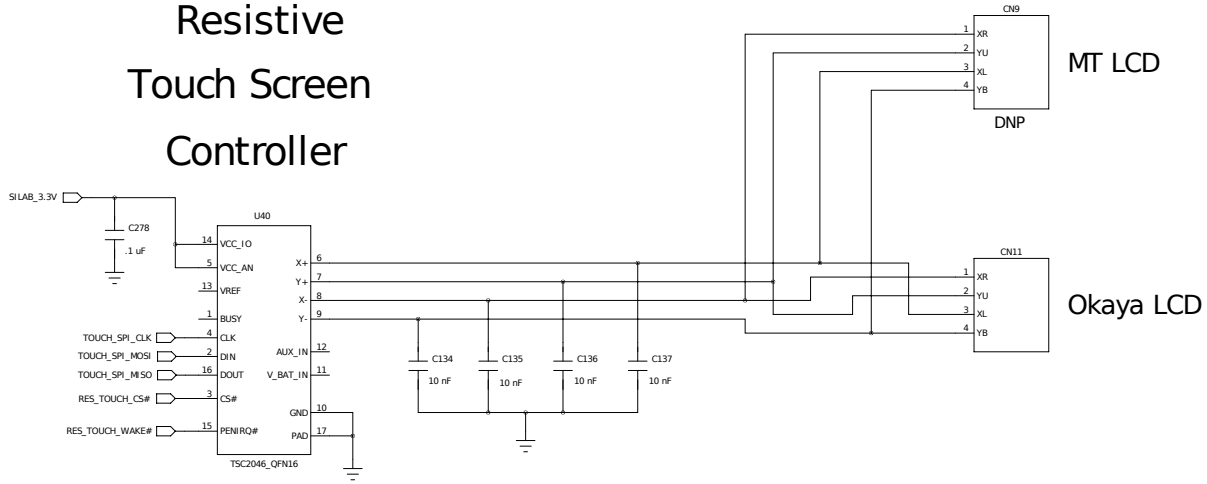



## Hub and LCD Power Switch



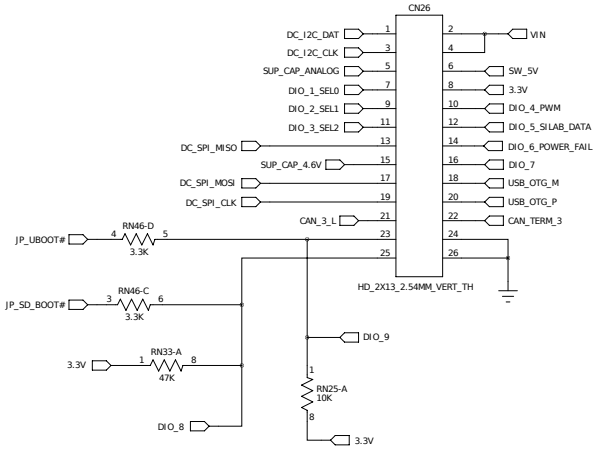

## Resistive Touch Screen Controller

## Touch Screen Connectors

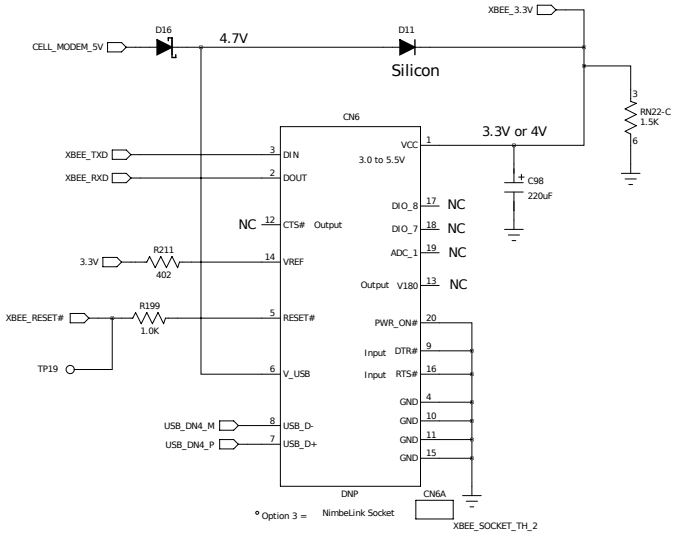



| | | |
|---|---|---|
| Technologic Systems | | Date June 1, 2017 |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 27 of 30 |

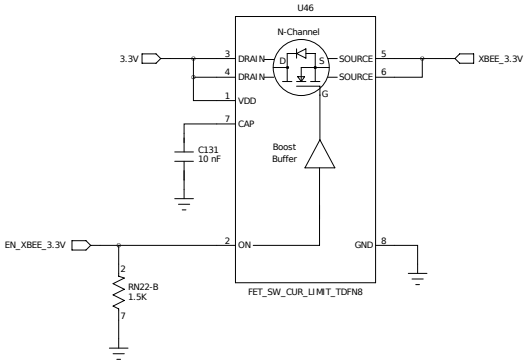
# DIO Port and Jumpers



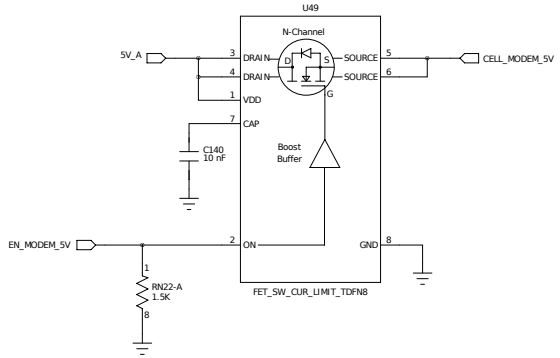

# NimbeLink Modem Socket




# 3.3V Sw.

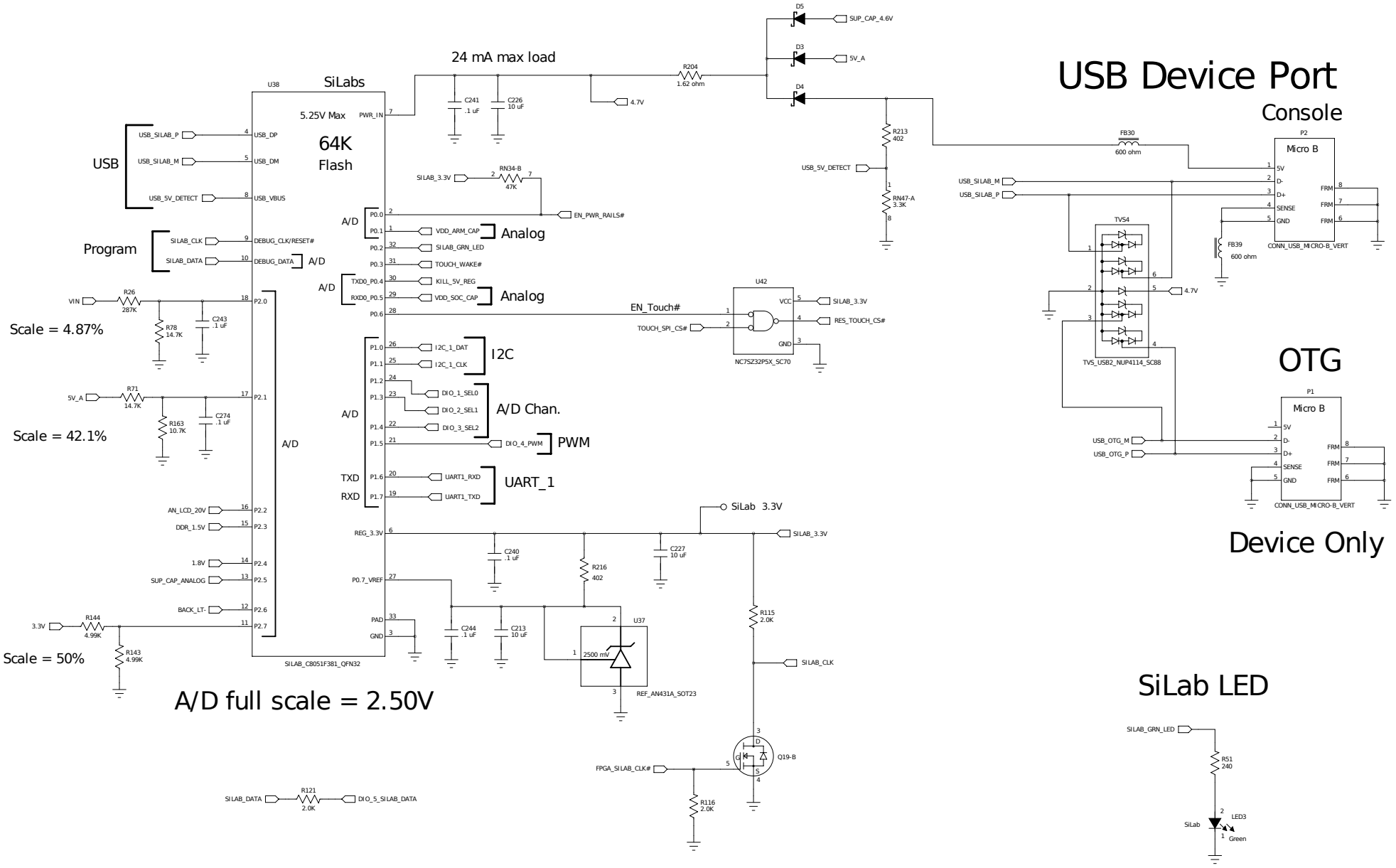



# NimbeLink 5V Sw.




| | | |
|---|---|---|
| Technologic Systems | | Date June 1, 2017 |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 28 of 30 |

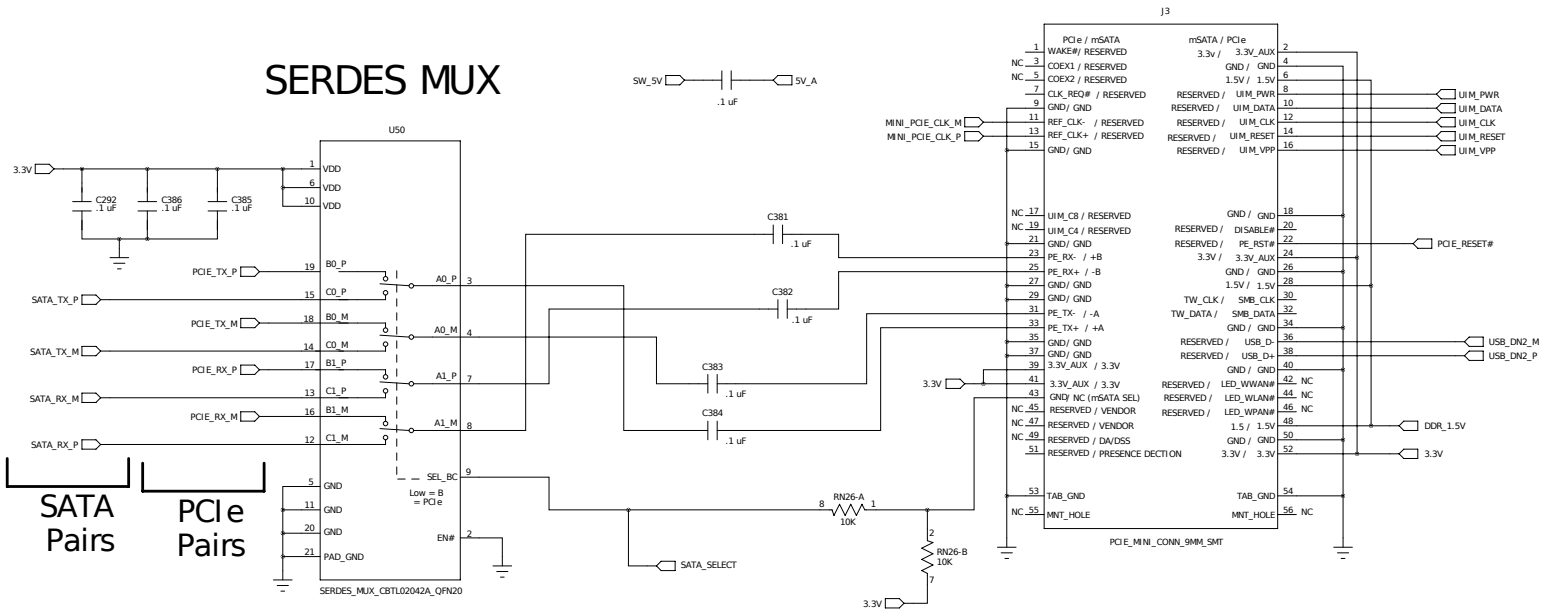
# USB Device Port and Silab uC



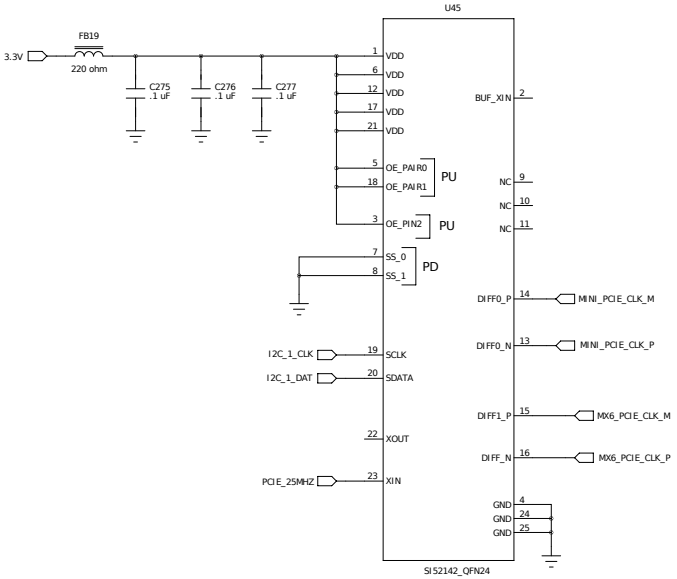

| | | |
|---|---|---|
| Technologic Systems | Date June 1, 2017 | |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 29 of 30 |

# 7mm Stack Height to bd. center

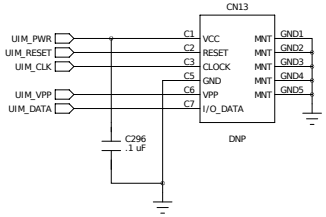
## SERDES MUX



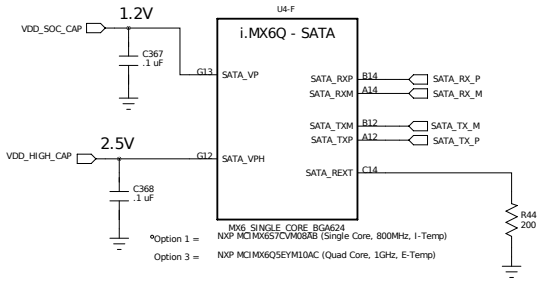

## PCIe 100 MHz Clock Gen.




## SIM Card Conn.




## SATA

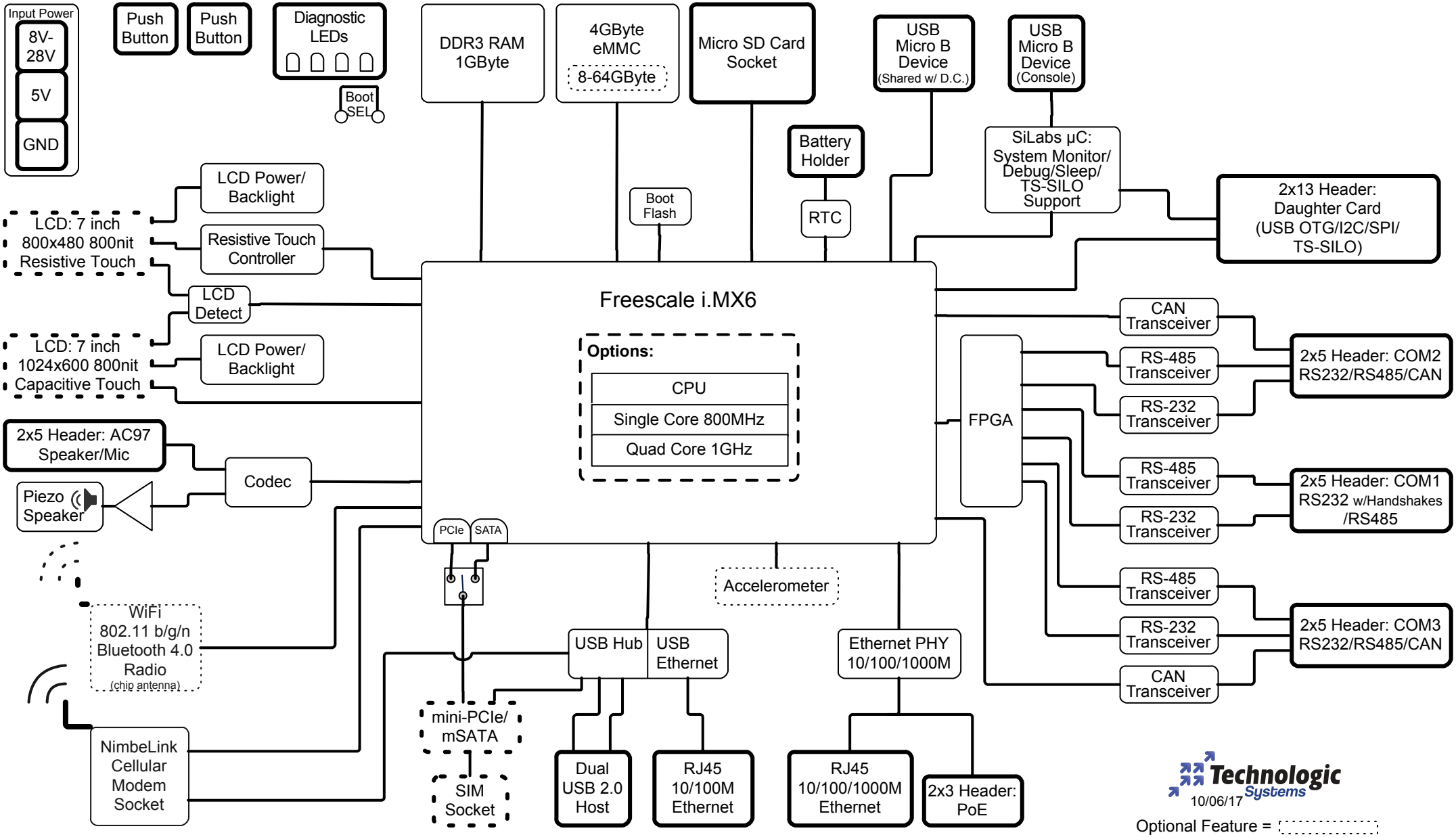



MT5 PEM_6MM_SMT

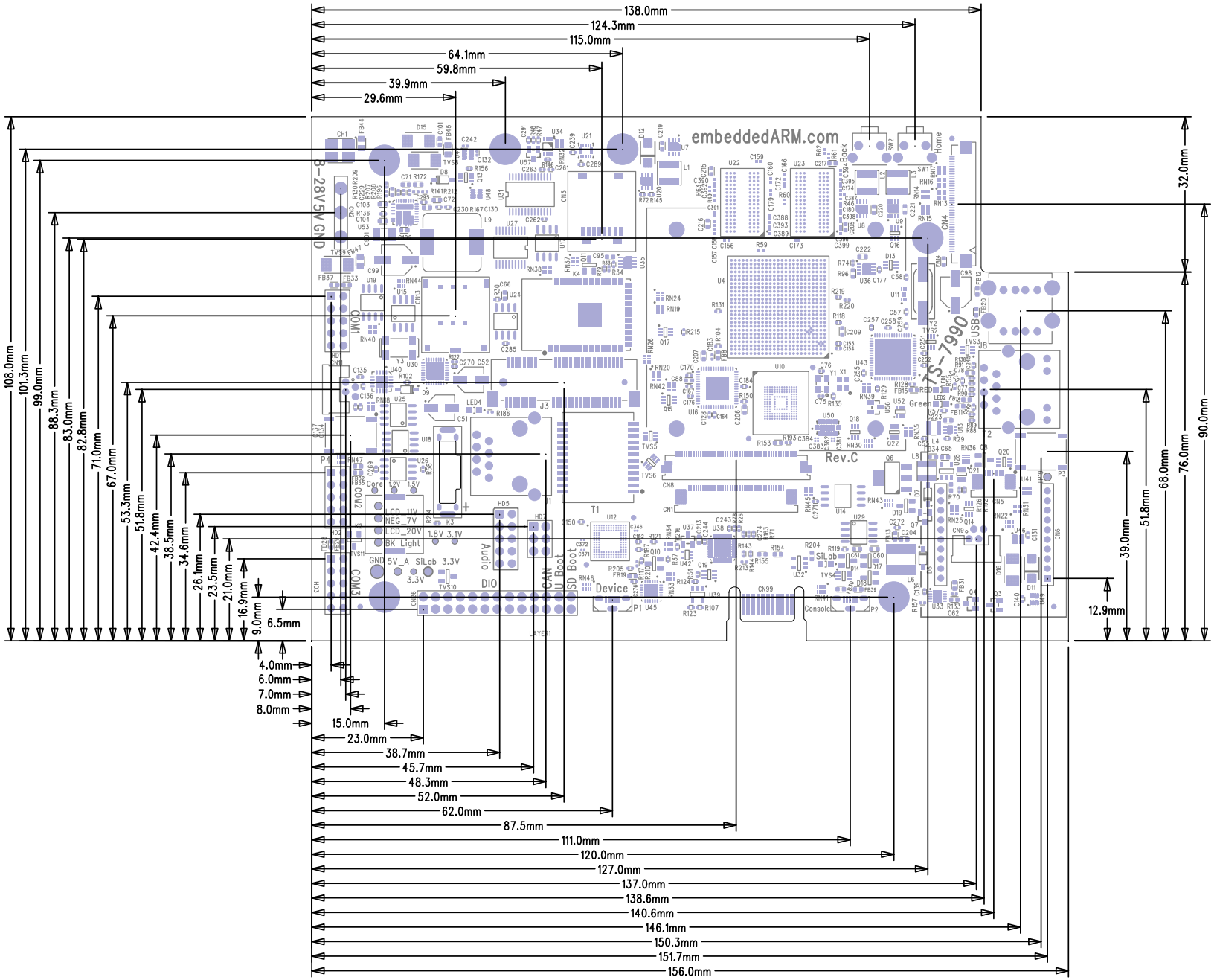
MT6 PEM_6MM_SMT

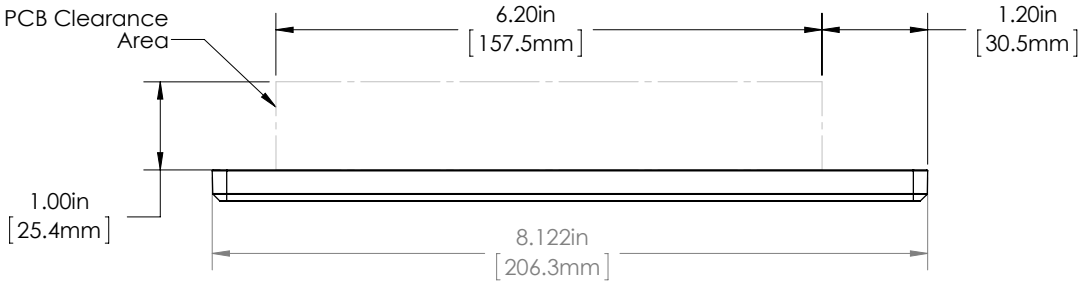
| | | |
|---|---|---|
| Technologic Systems | Date June 1, 2017 | |
| Title: TS-7990 | | |
| Rev: C | Designer | Sheet 30 of 30 |

# System Level Block Diagram
TS-TPC-7990 Rev C

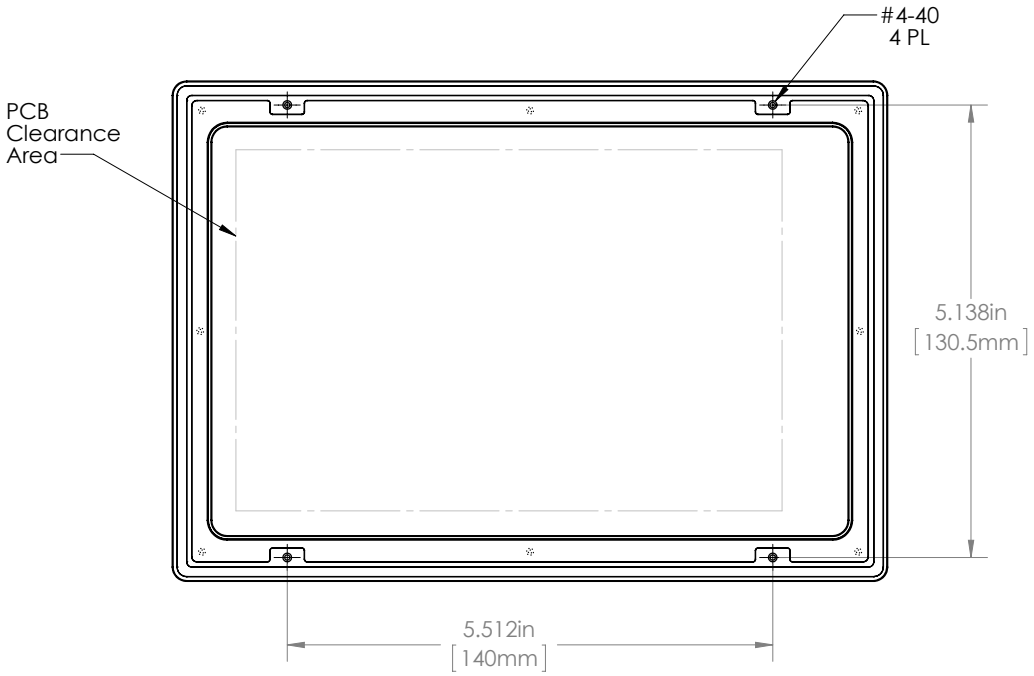


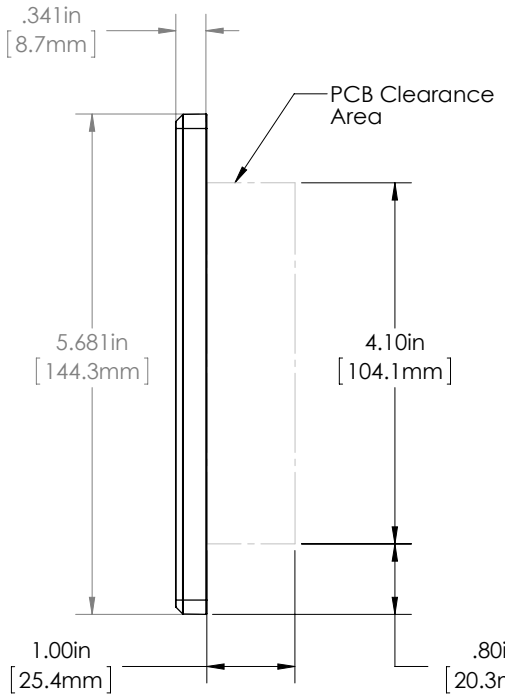
# MECHANICAL DRAWING
# TS-7990






| REVISIONS | | | | |
|---|---|---|---|---|
| ZONE | REV. | DESCRIPTION | DATE | APPROVED |
| | A0.0 | Original Release | 9/23/2016 | JRK |




GENERAL NOTES:

1. All dimensions in Inches and [Millimeters]



| | |
|---|---|
| NEXT ASSY | USED ON |
| APPLICATION | |

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/64
ANGULAR: MACH ± .25° BEND ±1°
x.xxx ± .005
x.xx ± .010
x.x ± .020
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL: None
FINISH: None
DO NOT SCALE DRAWING

| | NAME | DATE |
|---|---|---|
| DRAWN | JRK | 9/23/16 |
| CHECKED | JRK | 9/23/16 |
| ENG APPR. | | |
| MFG APPR. | | |
| Q.A. | | |

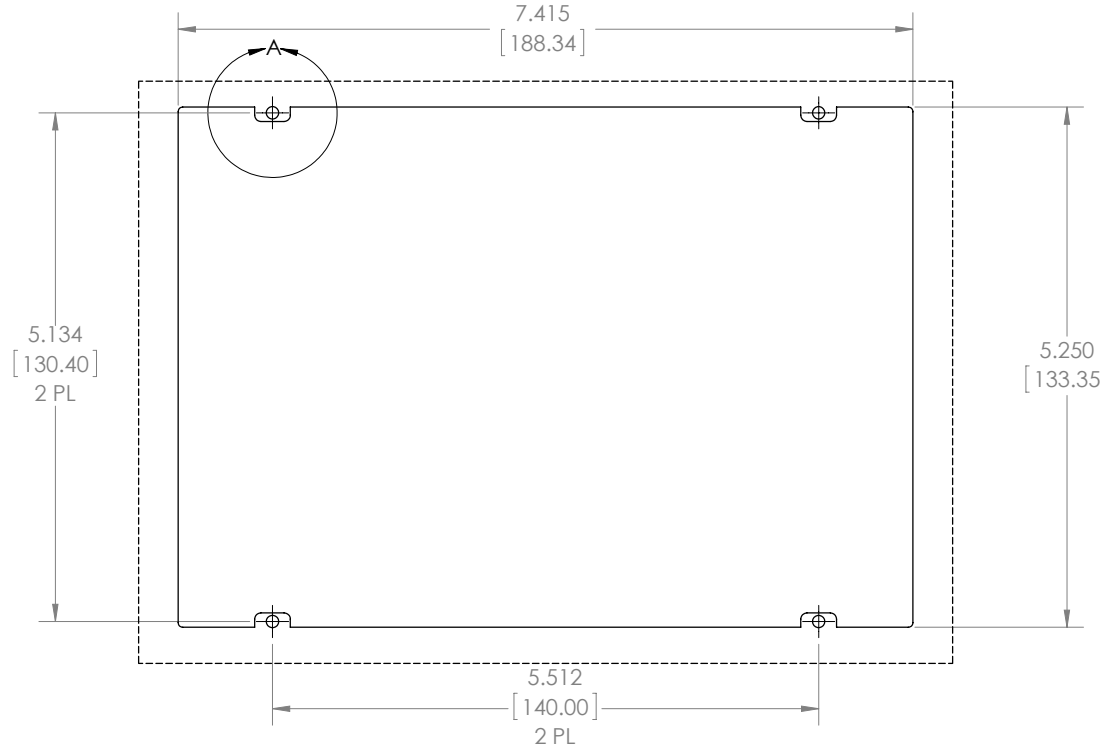
COMMENTS:

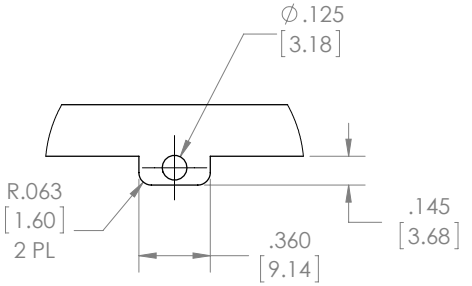
Technologic Systems

TITLE: TS-TPC-7990, Mounting & Clearance

| SIZE | DWG. NO. | |
|---|---|---|
| B | 02-7595-5 | A0.0 |
| SCALE: NONE | | SHEET 1 OF 1 |

| REVISIONS | | | | |
|---|---|---|---|---|
| ZONE | REV. | DESCRIPTION | DATE | APPROVED |
| | A0.0 | Original Release | 10/6/2017 | JRK |




DETAIL A
SCALE 6 : 4
4 PL

GENERAL NOTES:

1. All dimension in inches [millimeters]



| NEXT ASSY | USED ON |
|---|---|
| APPLICATION | |

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ± 1/64
ANGULAR: MACH ± .25° BEND ±1°
x.xxx ± .005
x.xx ± .010
x.x ± .020
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
DO NOT SCALE DRAWING

| | NAME | DATE |
|---|---|---|
| DRAWN | JRK | 10/6/17 |
| CHECKED | | |
| ENG APPR. | | |
| MFG APPR. | | |
| Q.A. | | |

COMMENTS:

Technologic Systems

TITLE: TS-7990 Mounting Cutout Pattern

| SIZE | DWG. NO. | |
|---|---|---|
| B | 02-0008-9 | A0.0 |
| SCALE: NONE | | SHEET 1 OF 1 |

Technologic Systems

16525 East Laser Drive Phone 480-837-5200
Fountain Hills, AZ 85268 Fax 480-837-5300

02/11/19

**Subject: Certificate of Cooperation with RoHS 2**

Dear Customer,

Technologic Systems Inc. is aware of the “Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)” referred to as RoHS 2 and is making an effort to ensure that all of the components used in our products are compliant with this standard.

Technologic Systems affirms that the listed part number(s) below and all customized derivatives of these part numbers, are comprised solely of components which have shown compliance with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 (RoHS 2)

TS-TPC-7990-QMW2E
TS-TPC-7990-QMW3E
TS-TPC-7990-SMN2E
TS-TPC-7990-SMN3E

Technologic Systems has access to reports showing that the components used in the above part do not contain any of the following except where covered by RoHS exemption 7c-I*:

1) Mercury (Hg)
2) Cadmium (Cd),
3) Hexavalent chromium (Cr (VI)),
4) Polybrominated biphenyls (PBB) and
5) Polybrominated diphenyl ethers (PBDE)
6) Lead (Pb)

The reports regarding the RoHS 2 status of each electrical component used in the above product can be provided within 45 days of a written request, if the requestor signs a BOM Sharing Agreement restricting the use of shared information to proving compliance to environmental standards.

Robert L. Miller
President

***Exemption 7(c)-I:** Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.