

Symphony-Board



CONTENT

PAGE NO.	SCHEMATIC PAGE
1	Cover
2	Block Diagram
3	SOM
4	VAR-SOM-MXxx Connector
5	Power, Reset, Boot, RTC, EEPROM
6	uSD, Audio,CAN
7	Camera, HDMI, DP
8	Ethernet
9	PCIe
10	Debug UART, LEDs, SWs
11	LVDS, DSI, Touch
12	USB2 Host
13	USB3, uSATA
14	Headers

Disclaimer:

Schematics are for reference only.
Variscite LTD provides no warranty for the use of these schematics.
Schematics are subject to change without notice.

Revision History

Document	Carrier
1.0	1.0 Initial
1.1	1.1 Released
1.2	<ul style="list-style-type: none"> 1.1 Updated Block Diagrams Added SH1 wire short symbol Updated Compatibility value for SOM pins 68,69,176 Updated SOM pin 22 net name Fixed U22_B1, C113.1 net name Fixed R1-R2,R35-R38 net name
1.3	<ul style="list-style-type: none"> 1.2 Removed SH1 wire short, J1_68 routed to capacitive touch Changed R22 to C185 Changed R123,R127 to N.C. Added resistors R130-132 Removed ADC, INxx alternate function from VAR-SOM-MX8 Symbol Updated PCIe resistor assembly note
1.4	<ul style="list-style-type: none"> 1.2 Updated Parallel Camera/HDMI/DP Note Fixed ETH pin names VAR-SOM-MX8x Symbol
1.5	1.2A Disconnected R129
1.6	1.2A Added VAR-SOM-MX8M-MINI Block Diagram and Symbol PRE-RELEASE VERSION !!!! Subject to change without notice
1.7	1.2B Fixed VAR-SOM-MX8M-MINI Symbol Changed U29_U30_U31 to P/N: FPF2193 Changed R60 to 47K
1.8	<ul style="list-style-type: none"> 1.2C Update VAR-SOM-MX8M-MINI Symbol to V1.1 with side notes for v1.0B(Early access customers) Update VAR-SOM-MX8M-MINI Block Diagram POR circuit fed by VCC, SOM: see U7 R60 R61 R40 R60 D5 Removed
1.9	1.2D Raise VCC_3V3 to Nominal 3.39V for VAR-SOM-MX8M-MINI/NANO power up threshold voltage requirement of >3.35V
1.10	<ul style="list-style-type: none"> 1.2E Reference for new designs: (changes not implemented in V1.2 BRD) <ul style="list-style-type: none"> * Added x2 footprint for U10 for POR support * Base R60 - 30Ω needed slew rate limit * U7 (Base POR circuit) added CB_WDOG resistor assembly options * U29_U30_U31 - Added assembly note * VAR-SOM-MX8M-NANO pages added with symbol pinout * VAR-SOM-MX8 Connector update - added NC on // assembly options * Power switch in OFF position discharge of Custom rails added * Ethernet PHY clock filter U9 replaced with 49.9 Ohm /0603 resistor * Base RJ45 LEDs matched to SOM behaviour
1.11	1.3 * Added VAR-SOM-MX8M-PLUS Preliminary Symbol and Block Diagram Symbol is Pre-Release Version Subject to change without notice! * All C1210 capacitor footprint updated to C1210_v0 * MS1 to MS6 not assembled
1.12	1.3A <ul style="list-style-type: none"> * ETH1 PHY clock filter U9 replaced with 49.9 Ohm /0603 resistor * Added design note for ETH1 switches U8 and U10.
1.13	1.4 <ul style="list-style-type: none"> * MSS and MS6 location adopted to heatplate design - Layout * Update J1 Manufacturer PN, NAME and footprint to represent the assembled part * Replace PCB AC caps on R2 lines with 0 ohm resistors * Updated R101 to R106 for RGMII signals. Swap control pins 1 58 80, swap pins 41 43 and 84 147 * U1 Modify Camera connector orientation * Remove U8 U10 analog switches on ETH1 * U9 revert to EMI filter on RGMII_RX clock line * Added RNI RN1 RN3 R151 R136 isolating stubs on ETH1 RGMII signals * U26 footprint updated to R149 * Y1 C66 C67 updated * Support for VAR-SOM-MX8M-GUI boot: - BOOT_MODE=1 - R117 assembled - BOOT_MODE=0 - Added PD R149 - USB# PWR to HOST_J23 always enabled * Remove R39 on pin J1..156 to support SOM-MX8MP 2nd MIPI-CSI Lane2 routing * J3 J30 pinout change
1.14	1.4A <ul style="list-style-type: none"> * Support for VAR-SOM-MX8MP USB OTG - Changed U5_P4 Pull for board identification, U21.9 connected to GPIO: - Changed R43,R130,R106 to N.C. - Changed R44,R132 to Assembled * Changed Q4 P/N from: TPS27082L (EOL) to ->TPS27081A * Updated VAR-SOM-MX8M-PLUS Block Diagram, Symbol pins 36,38 names * Added notes for SOM pins 29,79,84
1.15	1.4A <ul style="list-style-type: none"> Changes in v1.14/1.4A for R43,R44 were not implemented (part of board identification) and only appear in revision history: board identification implemented via EEPROM U3. Board identification required for QS to identify method of OTG ID used: PTN5150 or GPIO
1.16	1.5 <ul style="list-style-type: none"> * Modified VCC_3V3 to 3.35V nominal for all SOMs. For VAR-SOM-MX8M-MINI/NANO, power up threshold voltage requirement of >3.35V is implemented using Q10.R152 * Added note for VAR-SOM-MX8M-MINI/NANO pin 91
1.17	1.5 <ul style="list-style-type: none"> * Updated note for I2C#B pull up resistors
1.18	1.5 <ul style="list-style-type: none"> * Updated note for PTN36043BX/Y chip
1.19	1.5A <ul style="list-style-type: none"> * Q10 changed to 2N7002P_215 Transistor Q10 changed to 2N7002P to stabilize the SOM voltage in the OFF state. Old transistor leakage current (IDG) changed the feedback current and increased the SOM voltage. 2N7002P does not have SG diode that allowed IDSS to flow into the Gate * SOM Pin 84 Note changed
1.20	1.6 <ul style="list-style-type: none"> Ethernet PHY replaced to ADIN1300 R22,R23,R35,R36 assembled with Ferrite Bead C185 assembled with 10K resistor, R30 not assembled U2 changed to CBTL02043B USB3 crossover switch changed to CBTL02043B
1.21	1.6A <ul style="list-style-type: none"> Due to EOL: U35 changed to NFL18ZT207H1A3D Due to allocation problems: U13 changed to SN65HVD232QDR

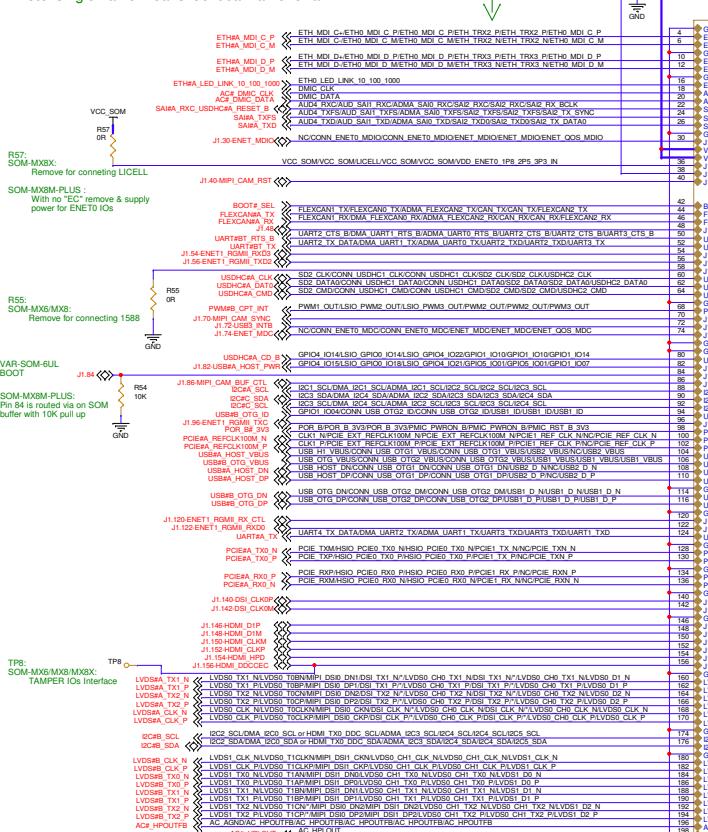
Variscite	
Rev	01_Cover
Customer Document Number	Symphony-Board
Project	Symphony-Board
Date	Monday, April 14, 2022
Document Rev	1.6
Sheet	1 of 24



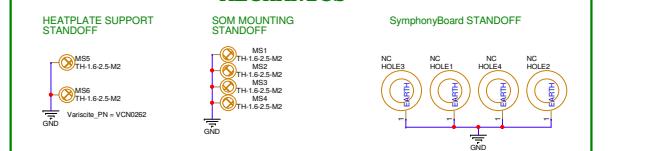
OFF PAGE CONNECTOR INDEX:

1. Function#	:Interface common to ALL SOMs
2. J1_xxx-Function	:Interface common to certains SOMs or Used for carrier board common function
3. J1_xxx	:No common interface

Compatibility list
Describes the ALT per SOM for compatibility.
Order of names: (MX6/MX8/MX8X/MX8MM/MX8MN/MX8MP)
Note: single name means identical name for all.



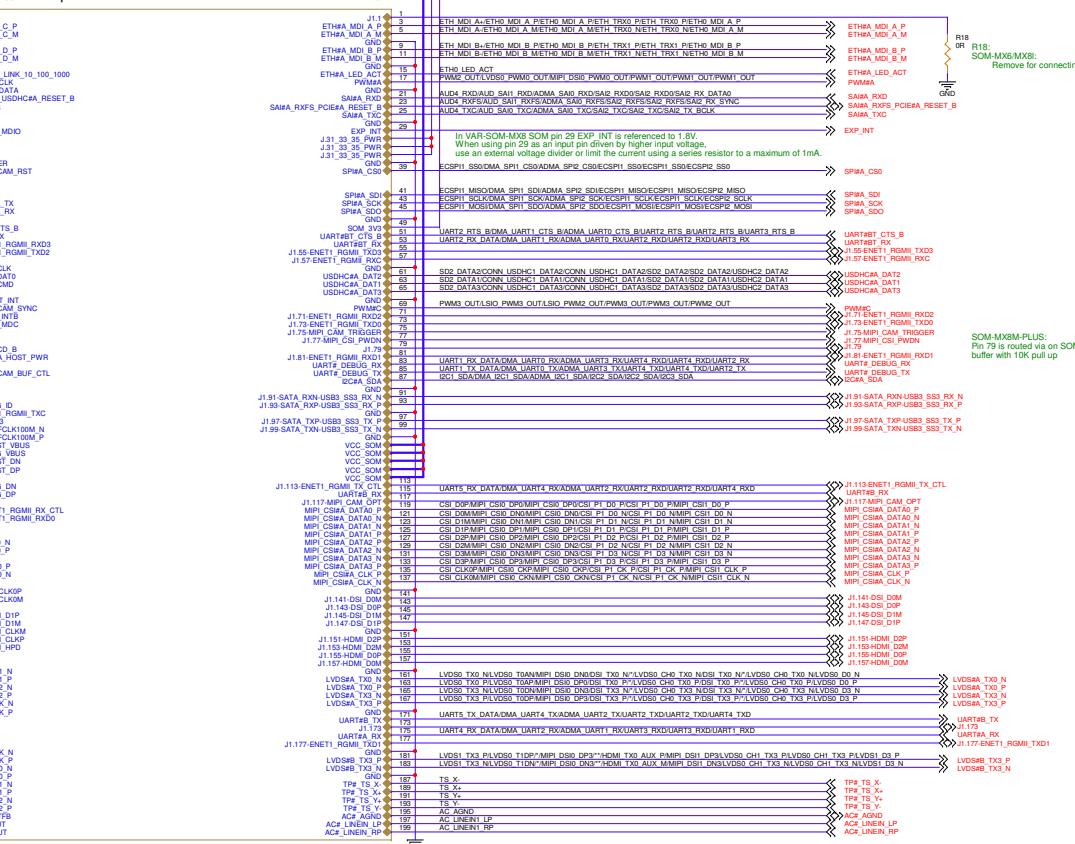
MECHANICS



For cross probing between SOM symbol and the specific SOM Connector used, set the "Implementation" property value in SOM port symbol to one of the following:

1. VAR-SOM-MX6
 2. VAR-SOM-MX8
 3. VAR-SOM-MX8X
 4. VAR-SOM-MX8M-MINI
 5. VAR-SOM-MX8M-NANO
 6. VAR-SOM-MX8M-PLUS

SOM Implementation = VAR-SOM-MX8X



B R10 R12 R13:
X8X SOM:



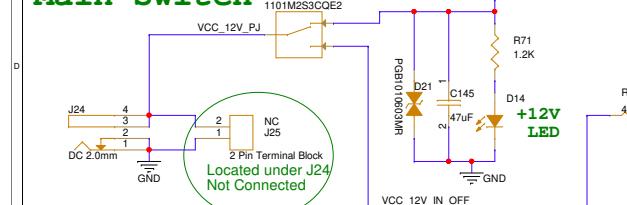
05. Power, Reset, Boot, RTC, EEPROM

POWER DISCHARGE

SOM BOOTSTRAP

12VDC INPUT

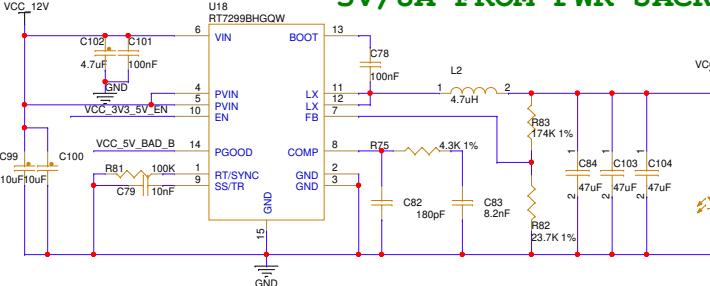
Main Switch



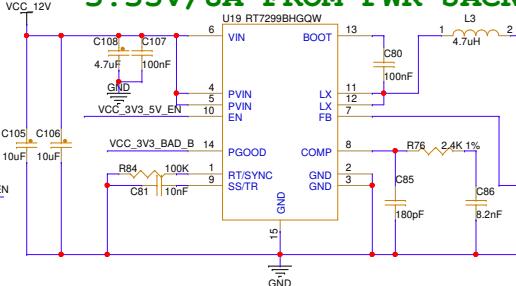
Boot Options:
OFF : INT
ON : SD
Internal boot is from eMMC
MX6 for eMMC boot see additional changes n

For supporting MX6 eMMC boot option:
Remove R9
Assemble R56,R11
Note: Normal configuration is with NAND

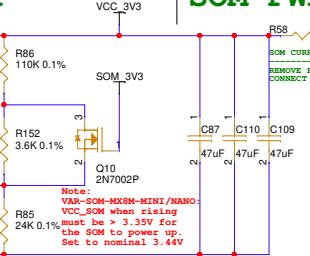
5V/8A FROM PWR JACK



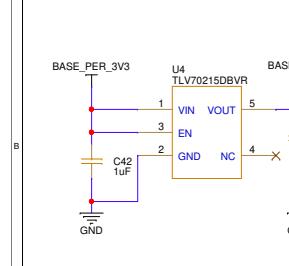
3.35V/8A FROM PWR JACK



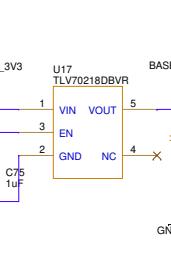
SOM PW



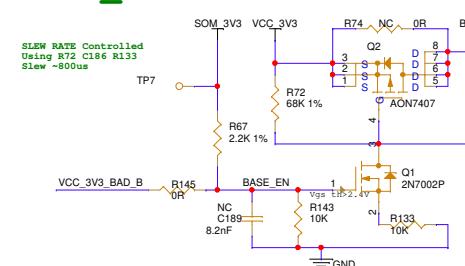
1.5V BASE



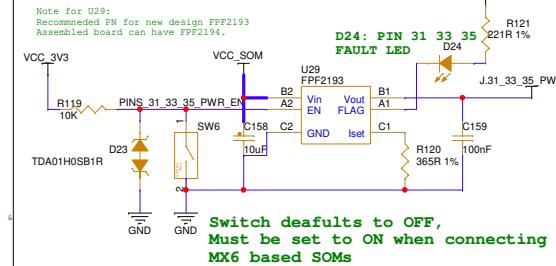
1.8V BASE



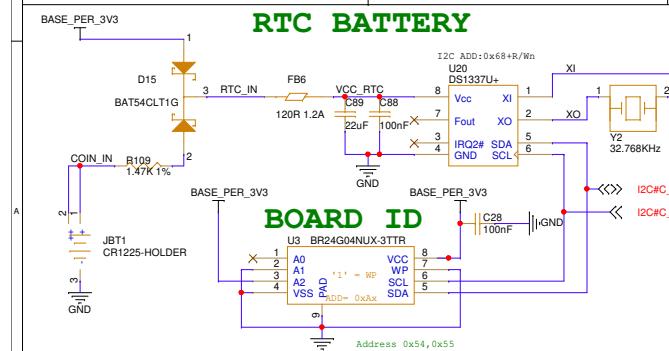
BASE 3V3



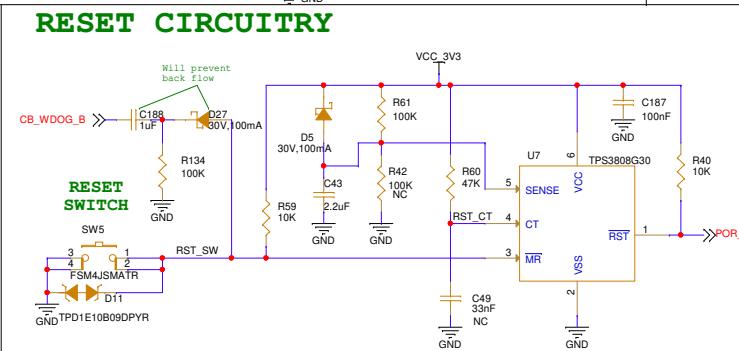
PINS 31 33 35 POWER



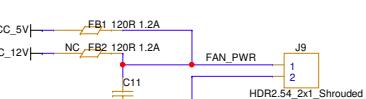
RTC BATTERY



RESET CIRCUITRY



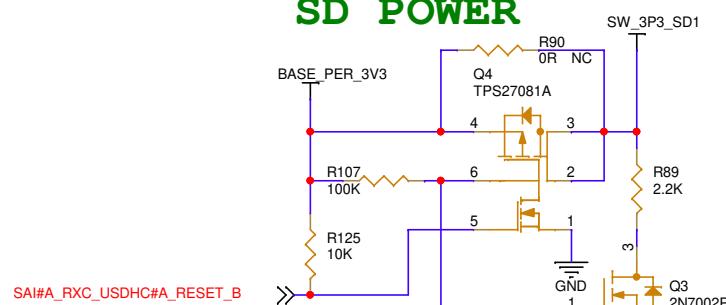
FAN PWR



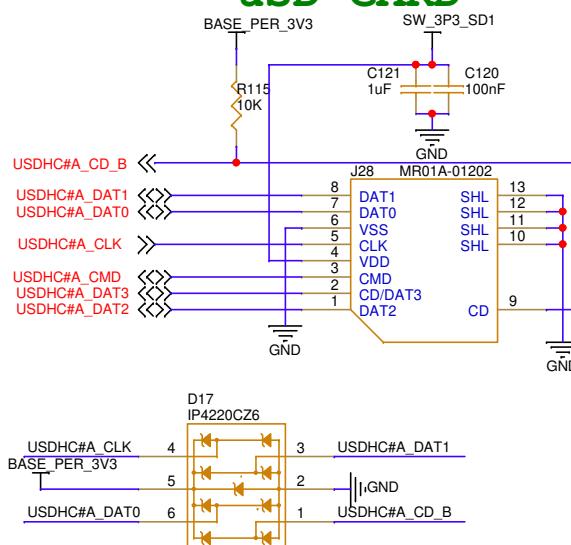
Variscite			
Title	05. Power,Reset,Boot,RTC,EEPROM		
Size	Document Number	Project	Rev
A3			1.6A
Designer:	Audat H.	Approved By:	
Date:	Monday, April 04, 2022	Sheet	3 of 24

06. uSD, Audio, CAN

SD POWER

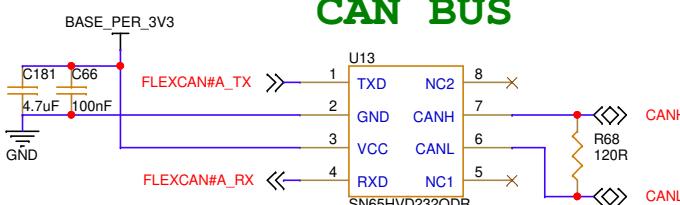


uSD CARD



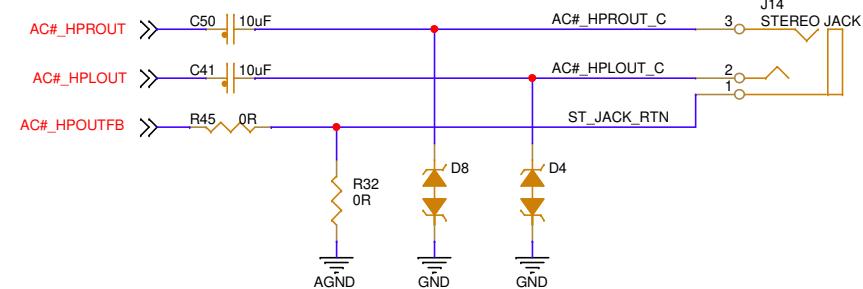
A
B
C
D

CAN BUS

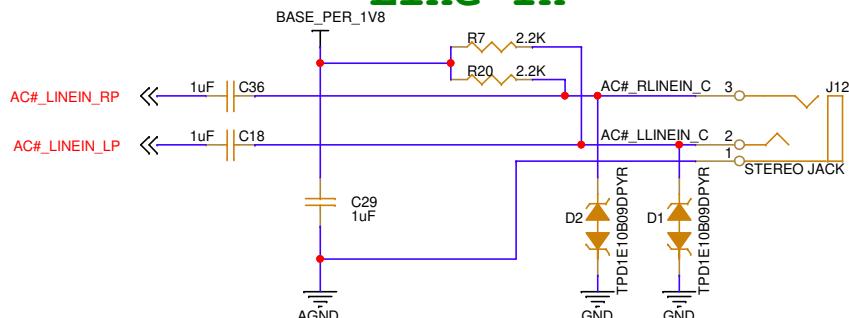


5
4
3
2
1

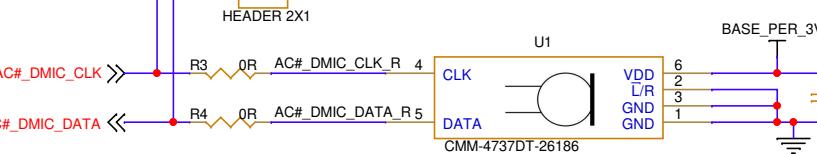
Headphones



Line In



DIGITAL MIC



Variscite

Title

06. uSD, Audio,CAN

Size

A4

Document Number

Symphony-Board

Project

Symphony-Board

Rev

1.6A

R1.2

Designer:

Aviad H.

Approved By:

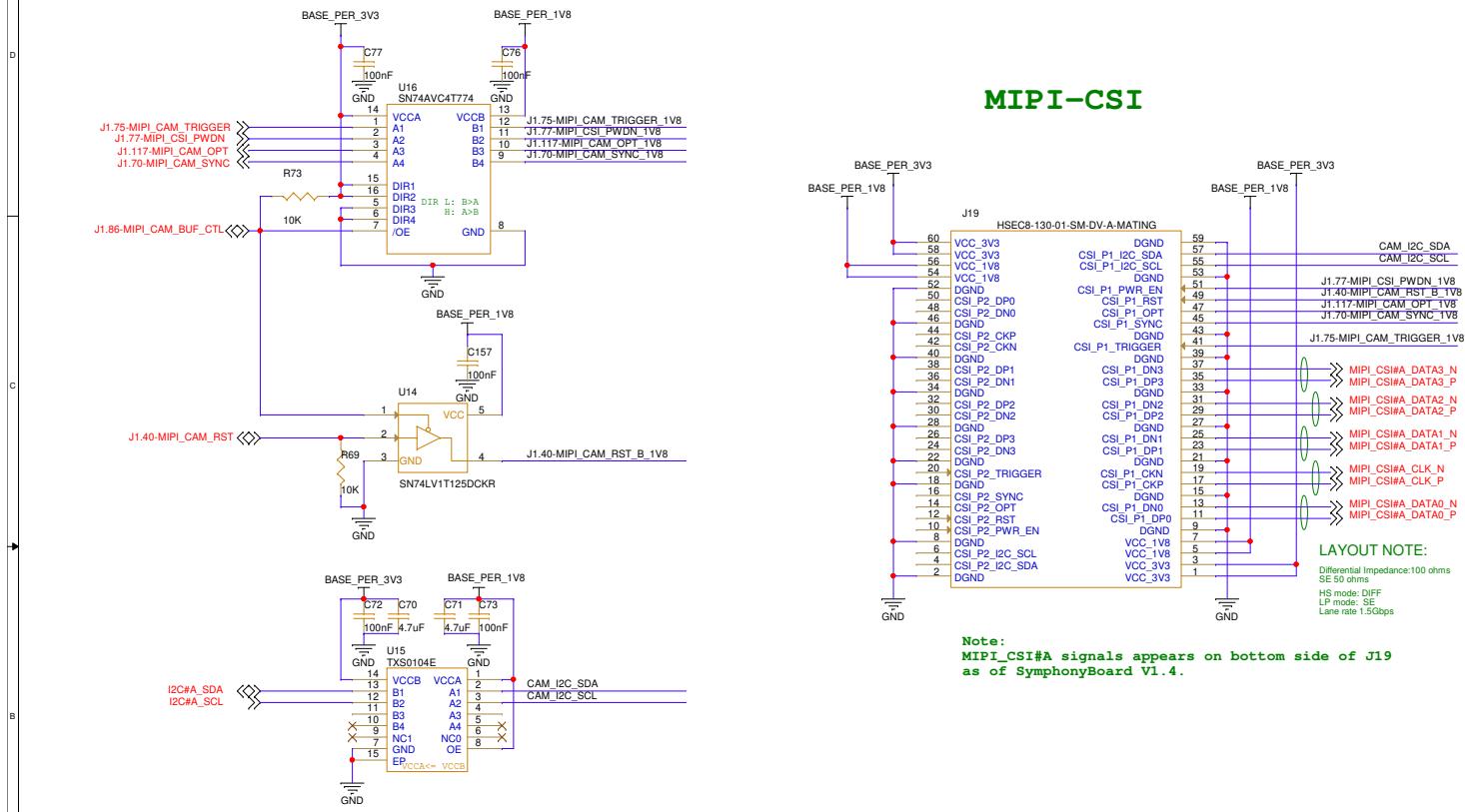
Date:

Monday, April 04, 2022

Sheet

1 of 24

07. Camera, HDMI, DP



Note for U32 (analog switch):
Switch is to enable support for the following adapters:
Parallel camera, HDMI, DisplayPort and second MIPI-CSI

Switch select controlled on adaptor will select between:

1) I2C#B which can export

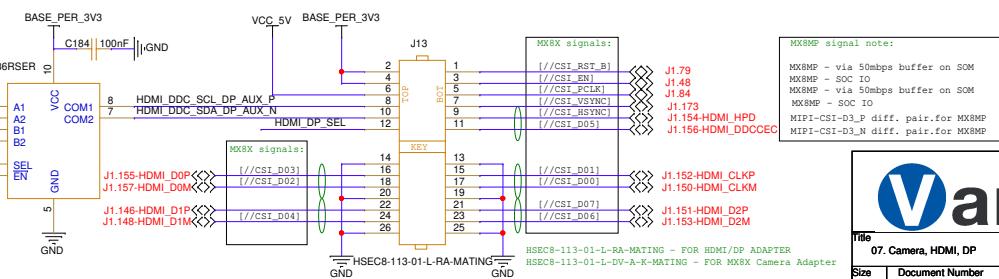
VAR-SOM-MX8X: I2C3 Used by parallel camera

VAR-SOM-MX8: HDMI DDC Used by HDMI (GPIO1_22 in should be set High in SW)

2) LVDS#B_TX3 which can export:
HDMI2.0/DP1.4/HDCP2.2/HDMI1.4/HDMI1.3

Switch can be omitted when designing for only one of the above interfaces.

J13: MX6/MX8-HDMI, MX8-DP, MX8X-CSI, MX8MP-2nd MIPI-CSI



variscite

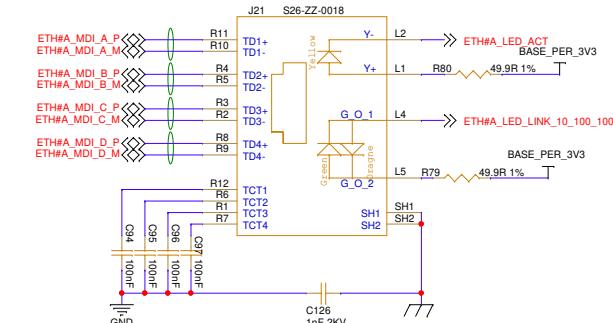
Title

07. Camera, HDMI, DP			
Size A3	Document Number Symphony-Board	Project Symphony-Board	Rev 1.6A_Pt.21
Designer:	Ariad H.	Approved By:	
Date:	Monday, April 04, 2022	Sheet	5 of 24

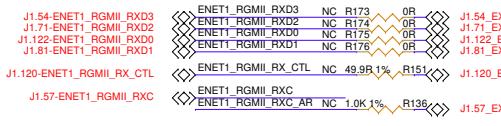
08. Ethernet

Gigabit Ethernet (Internal)

LAYOUT NOTE:
Giga Ethernet Differential Pair,
Follow Giga Ethernet routing
guidelines
Differential Impedance: 100 ohms



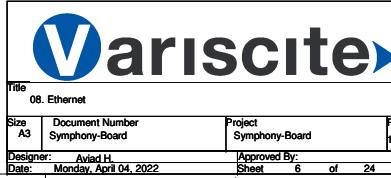
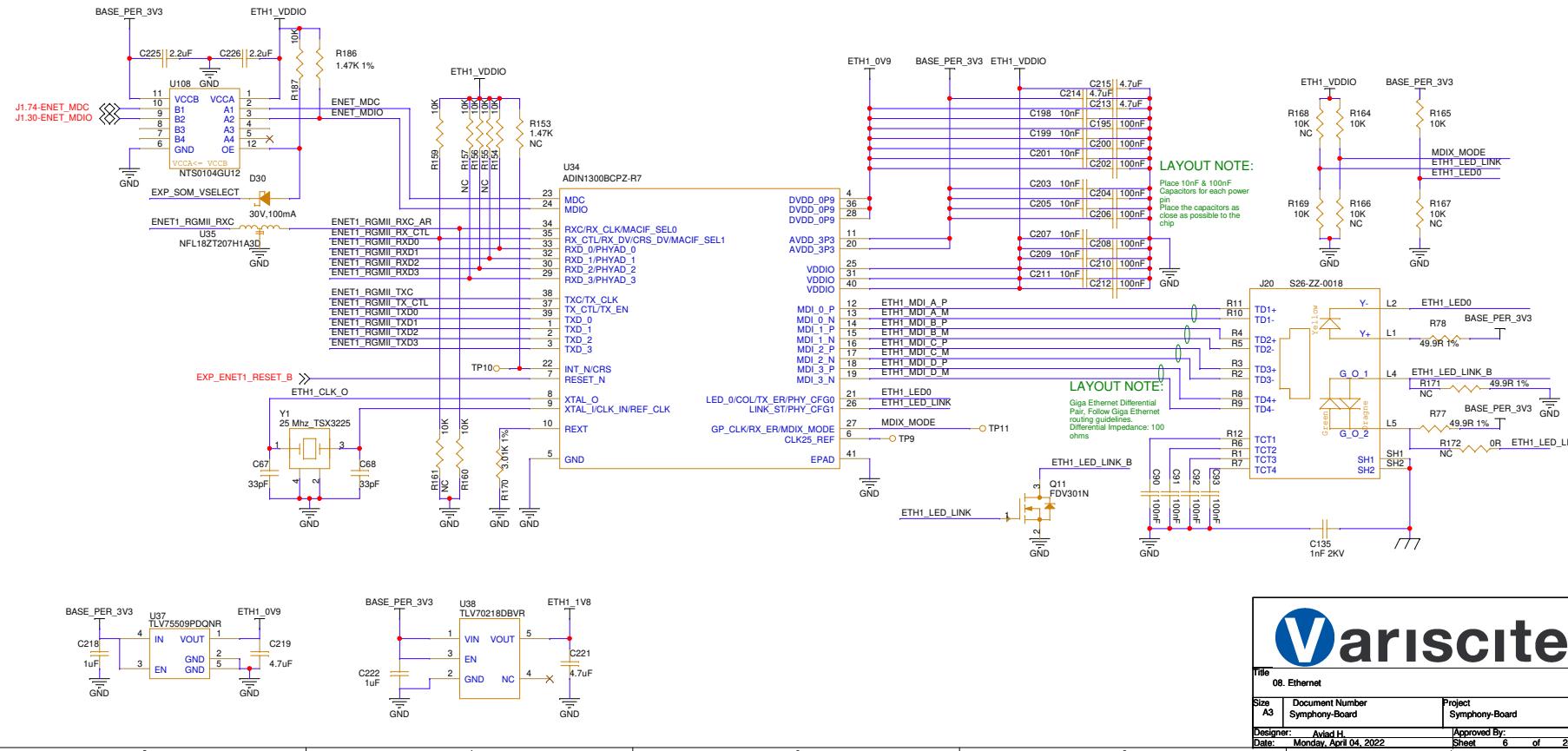
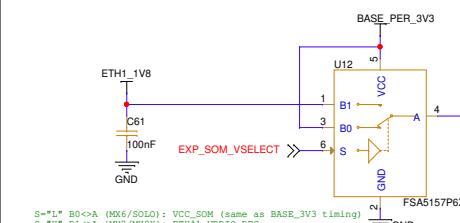
Header/Stub isolation resistors



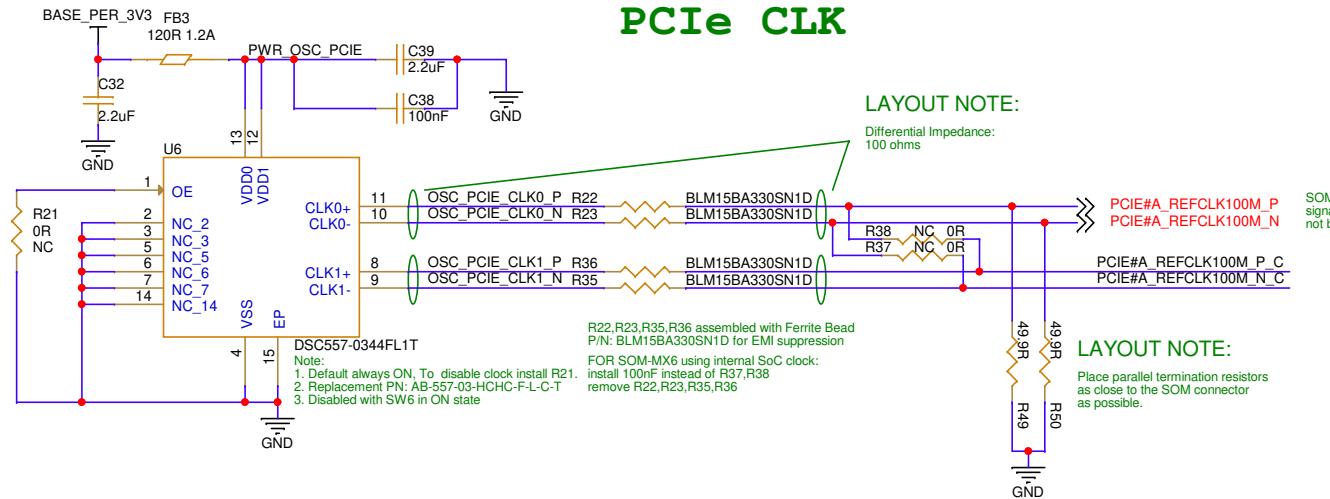
Note:
Customer requiring usage of J30 header (located on bottom side)
should assemble these resistors if not assembled by default

VDD_ENET for SOM-MX8/MX8X/MX8MP

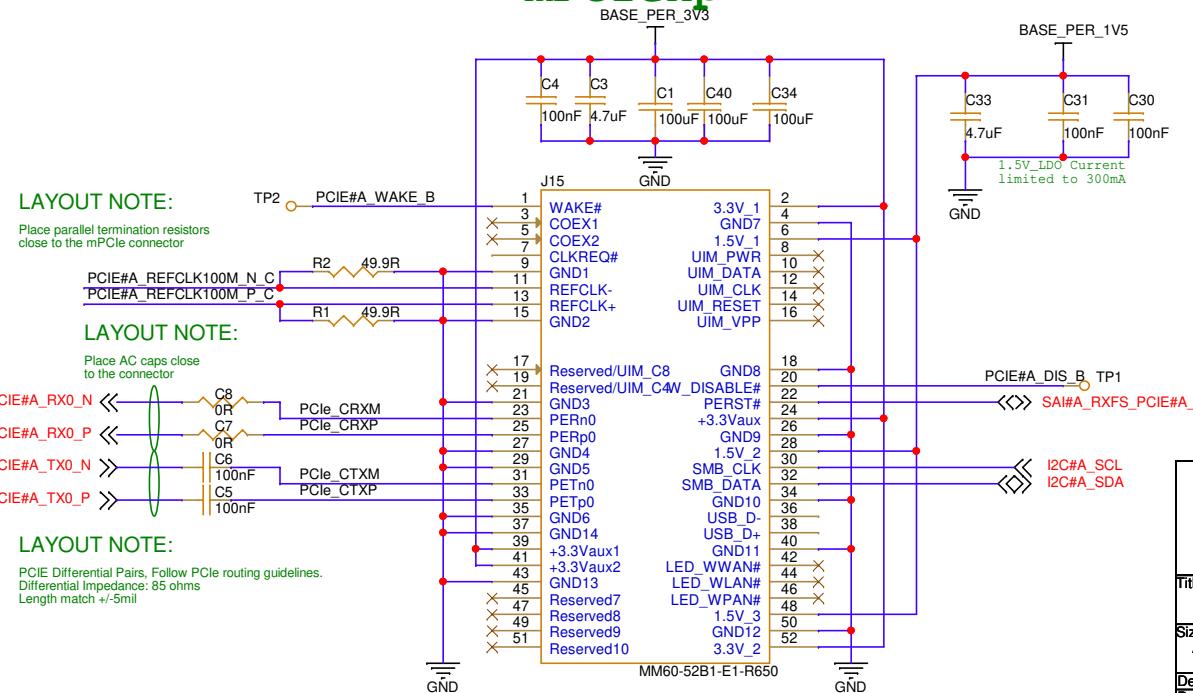
Power for ENET1_RGMII IOs on SOM power fed from pin J1.38
For specific SOM listed above, requiring second ETH port on ENET1 this power should
be set to 1.8V source from U11 PHY



09. PCIe



mPCIexp

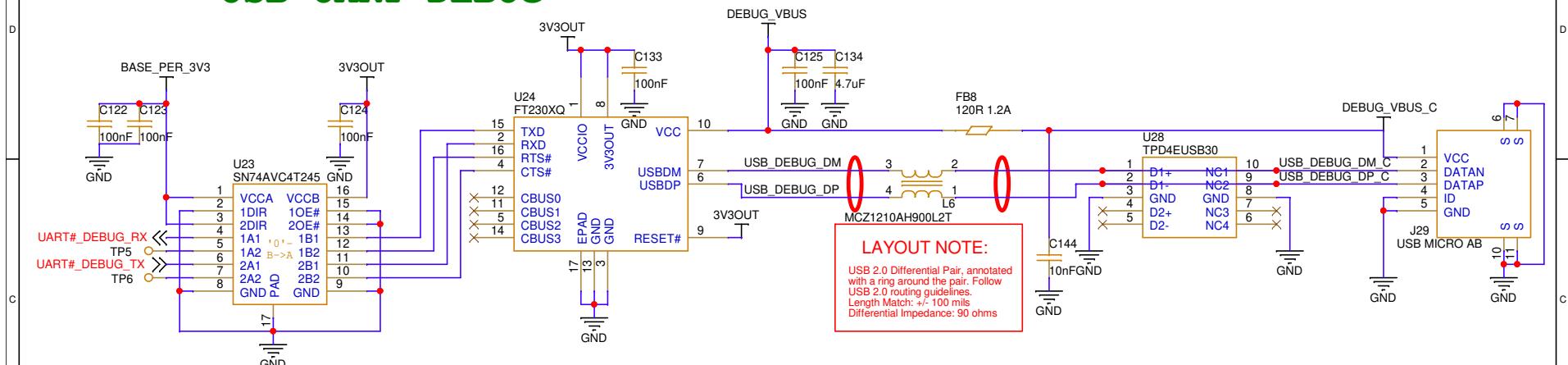


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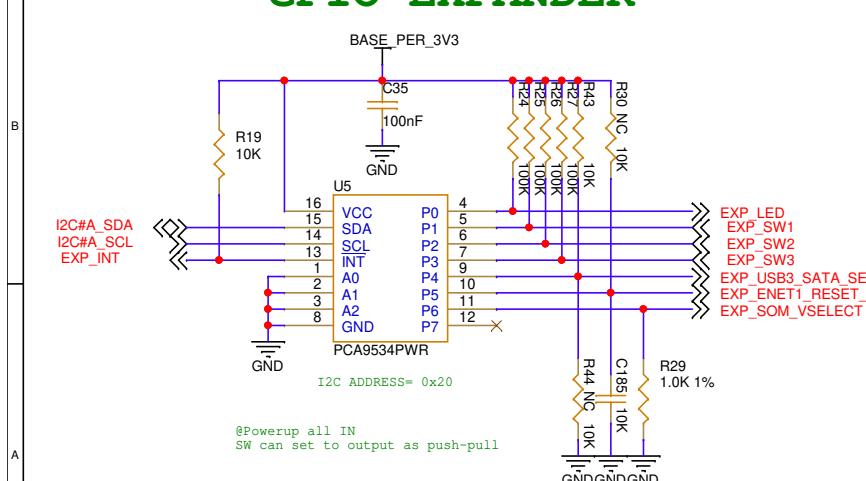
Title 09. PCIe			
Size A4	Document Number Symphony-Board	Project	Rev 1.6A_R1.21
Designer: Aviad H.		Approved By:	
Date: Monday, April 04, 2022		Sheet 7	of 24

10. Debug, GPIO Exp, Buttons, LED

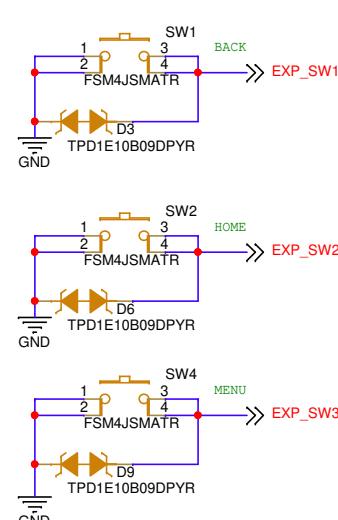
USB UART DEBUG



GPIO EXPANDER



GP BUTTON



GP LED

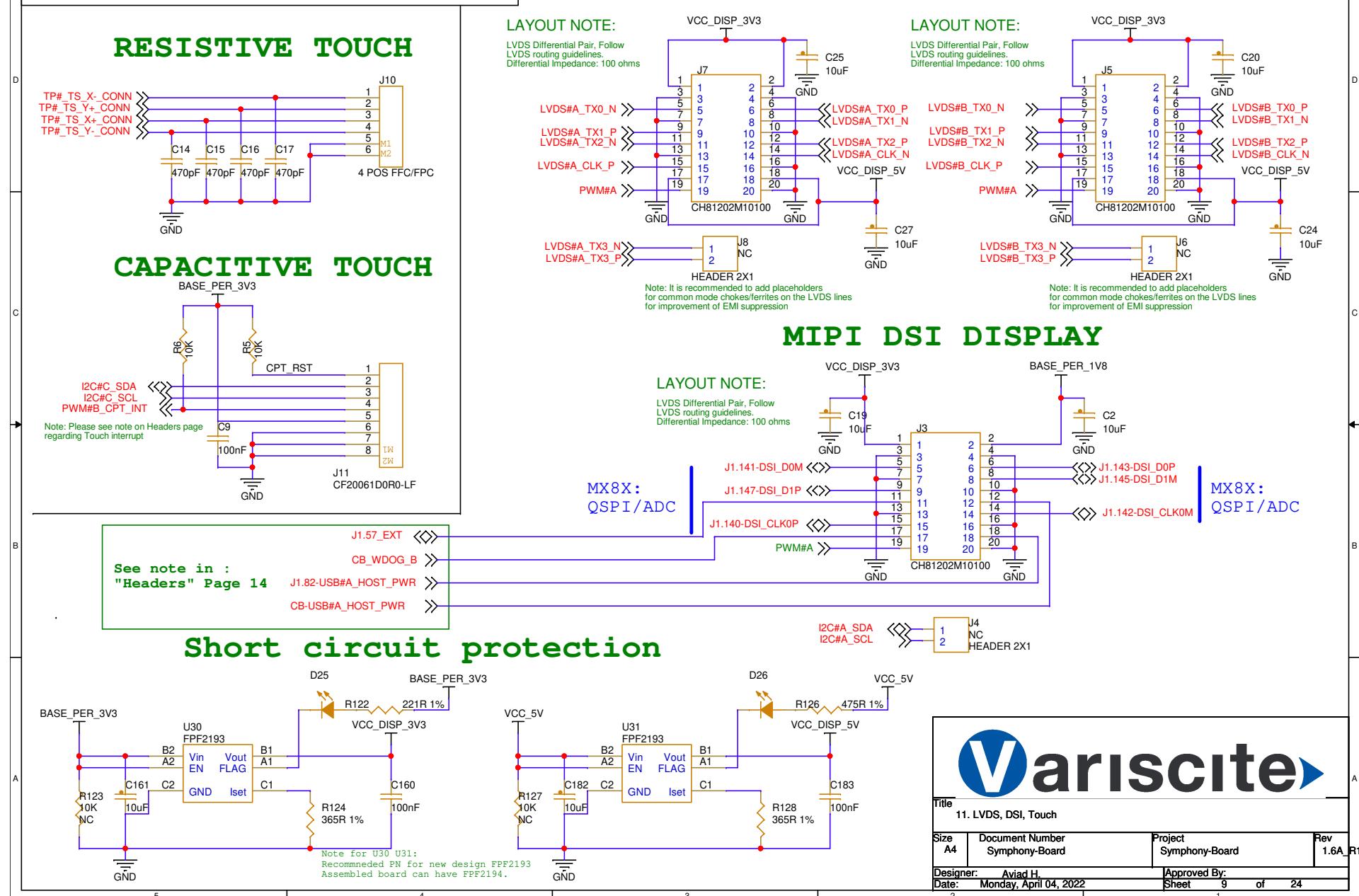


Variscite

Title: 10. Debug, GPIO Exp, Buttons, LED

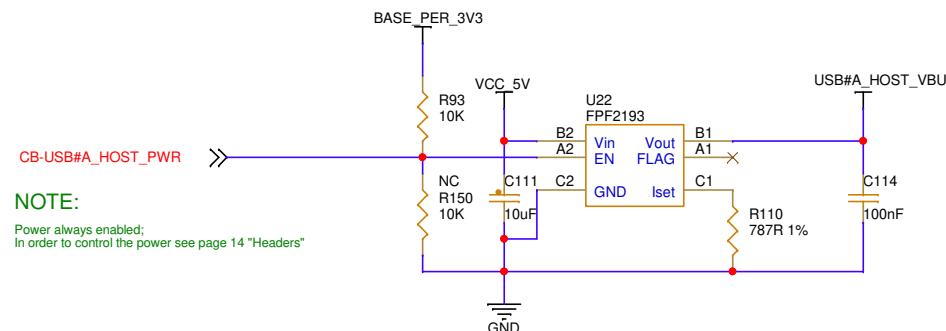
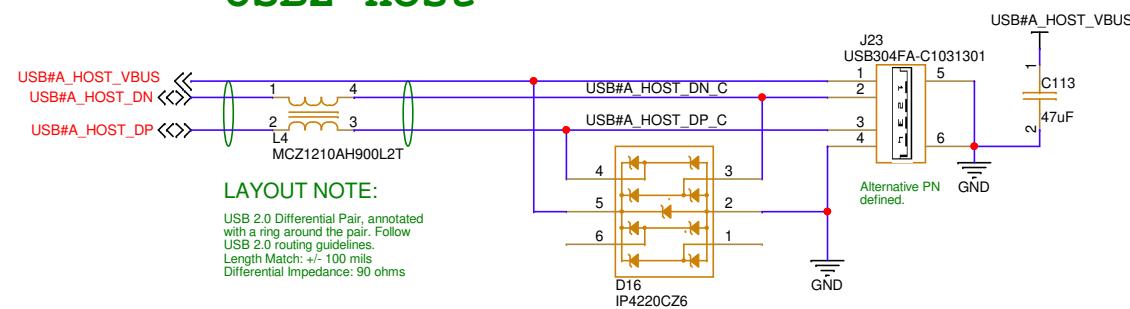
Size	Document Number	Project	Rev
A4	Symphony-Board		1.6A_R1.21
Designer:	Aviad H.	Approved By:	
Date:	Monday, April 04, 2022	Sheet	8 of 24

11. LVDS, DSI, Touch



12. USB2 Host

USB2 Host



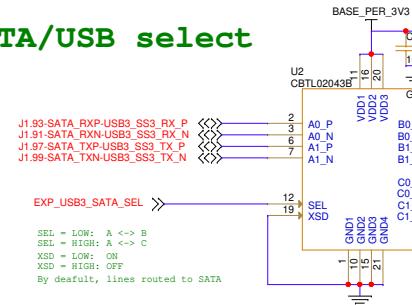
Variscite

Title
12. USB2 Host

Size A4	Document Number Symphony-Board	Project Symphony-Board	Rev 1.6A R1.2
Designer: Aviad H.	Approved By:		
Date: Monday, April 04, 2022	Sheet 10 of 24		

13. USB3, uSATA

SATA/USB select

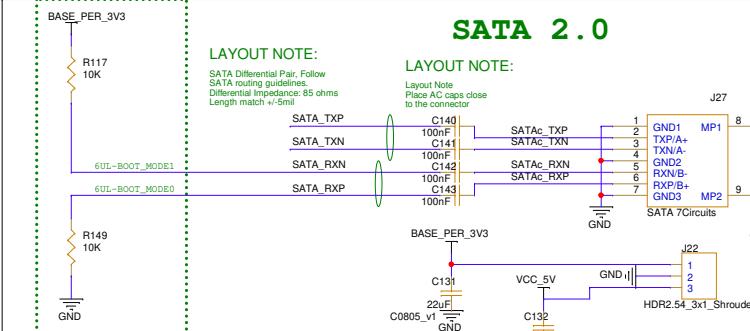


LAYOUT NOTE:
USB 3.0 Differential Pair, with a ring around the pair.
USB 3.0 routing guidelines.
Differential Impedance: 90 ohms

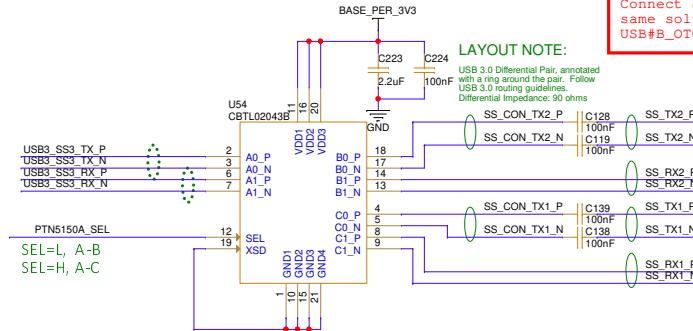
USB3_SS3_RX_P
USB3_SS3_RX_N
USB3_TS3_TX_P
USB3_TS3_TX_N

SATA_RXP
SATA_RXN
SATA_TXP
SATA_TXN

LAYOUT NOTE:
SATA Differential Pair, Follow
SATA routing guidelines.
Differential Impedance: 85 ohms

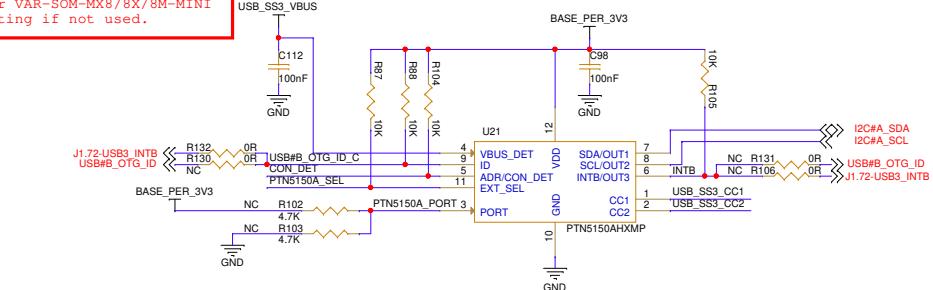


USB TYPE C Circuitry

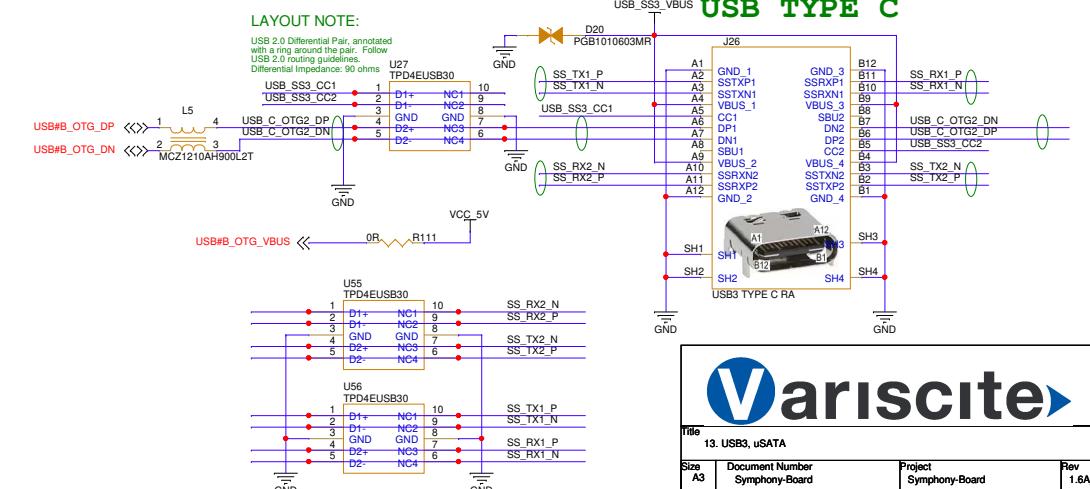
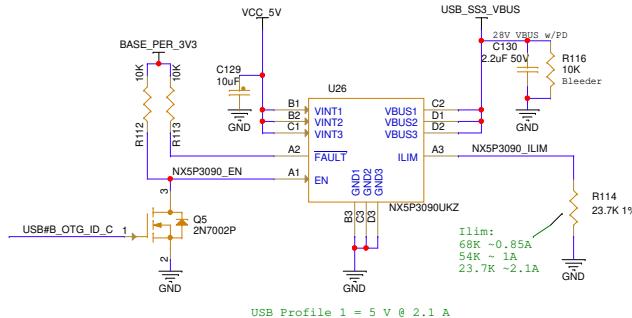


Usage of native USB_ID for iMX8MP requires patches not included in the formal release, pull up should be to 1.8V.
For simple OTG function for VAR-SOM-MX8M-PLUS Connect J1_72 GPIO to U22 PTN ID output - same solution applies also for VAR-SOM-MX8/MX8/8M-MINUSB#B_OTG_ID can be left floating if not used.

Config Channel Logic Detection & Indication of Plug Orientation



5V Source Load Switch

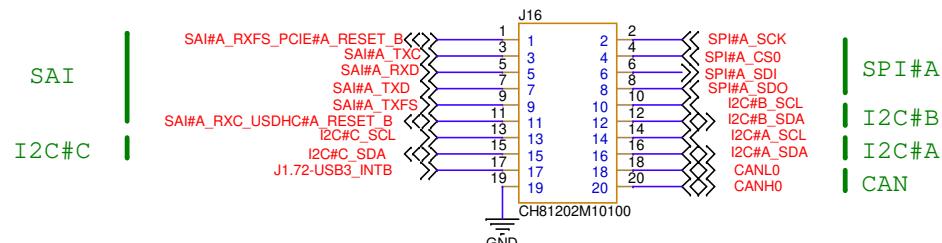
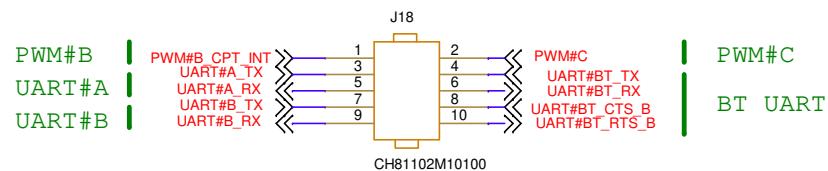


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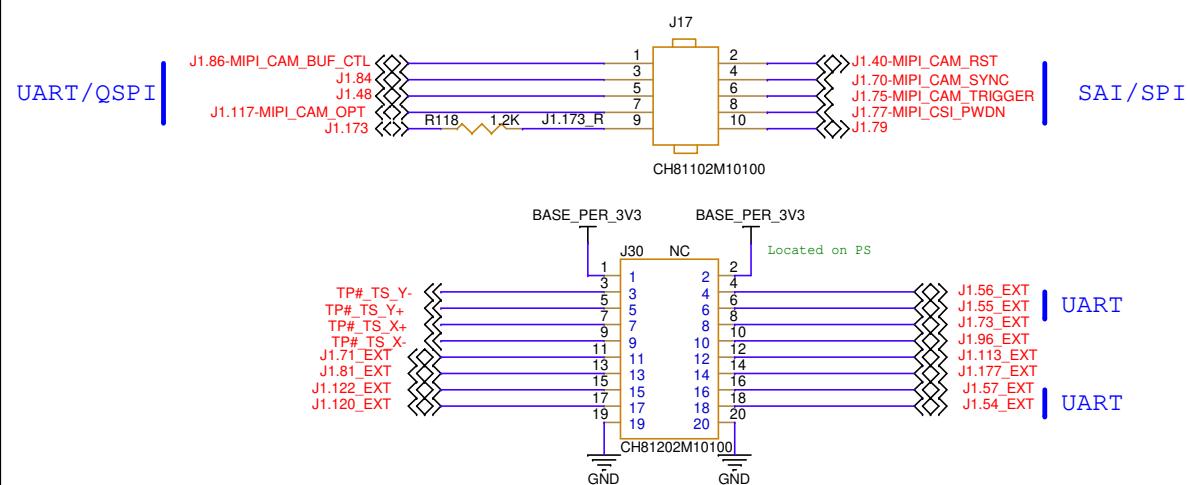
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13. USB3, uSATA			
Size A3	Document Number Symphony-Board	Project Symphony-Board	Rev 1.6A_R1.21
Designer:	Avidit H.	Approved:	
Date:	Monday, April 04, 2022	Sheet 11	of 24

14. Headers

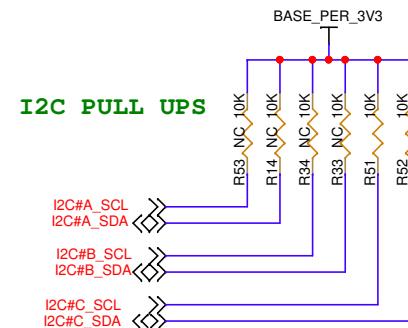
Headers arranged for compatible alternate function



Headers arranged for partial compatible alternate function



For complete header alternate function refer to "VAR-SOMs_Compatibility_and_Pinout.xls" located at:
[ftp://ftp.variscite.com/SOM_Compatibility](http://ftp.variscite.com/SOM_Compatibility)



I2C_A has internal pulls in Camera buffer

I2C_B has internal pulls in MX6/MX8/MX8X/MX8MP SOMs.
 For MX8MM/MX8MN/6UL SOMs - external pull ups should be added.

COLD RESET ON WDOG_B EVENT for MX6/SOLO and 6UL SOMs

Listed above SOMs require short on headers to get "reboot" to function.
 For all other watch dog looped on SOM

CB_WDOG_B	↳ Symphony Board reset circuitry watch dog input	See J3.17
J1.57_EXT	↳ SOM 6UL: PIN57_WDOG1_B	See J3.11
PWM#B_CPT_INT	↳ MX6/SOLO: PIN68_WDOG1_B	See J18.1

USB#A Host VBUS power control

In order to control the USB#A HOST VBUS power a short is required:

CB-USBA_HOST_PWR	↳ Symphony Board U22	See J3.12
J1.82-USBA_HOST_PWR	↳ control input	See J3.18



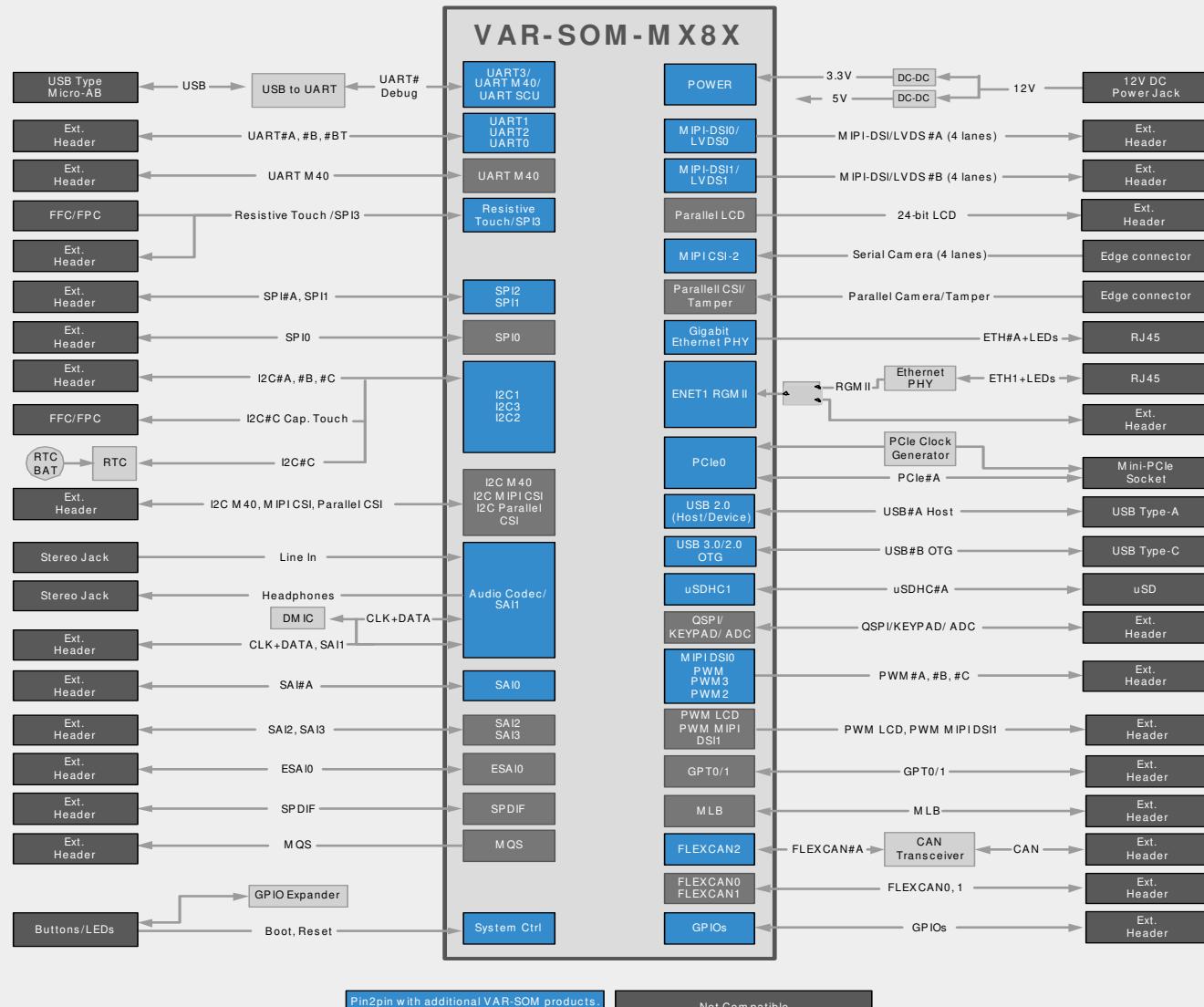
Title
14. Headers

Size A4	Document Number Symphony-Board	Project Symphony-Board	Rev 1.6A R1.2
Designer: Aviad H. Date: Monday, April 04, 2022	Approved By: Sheet 12 of 24		

02. Block Diagram VAR-SOM-MX8X

Symphony-Board

Doc rev 1.1



Title: 02. Block Diagram VAR-SOM-MX8X

Size	Document Number	Project	Rev
A3	Symphony-Board	Symphony-Board	1.0A Rev 1.21
Designer:	Aviad H.	Approved By:	
Date:	Monday, April 04, 2022	Sheet	23 of 24

04. VAR-SOM-MX8X Connector



Variscite	Var-SOM-MX04 Connector		
Part #	04-VAR-SOM-MX04		
Size	Document Number	Project	Rev.
4P	Symphony-Board	Symphony-Board	EA-FB
Designator	Assigned To	Approved By	
PCB	John Li	Sheet	
Date	Monday, April 04, 2022	24	of
		24	