

# Arrow iMX8M HMI Platform

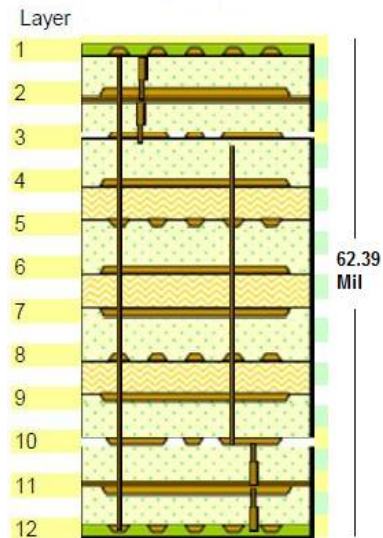
## MAJOR REVISION HISTORY :

PCB REV.	SCH. REV.	DESCRIPTION	DATE
	0.1	Initial schematic draft created	13-Aug-2018
	0.2	Draft version with incorporated review comments	25-Aug-2018
	0.3	Draft version with incorporated review comments	28-Sep-2018
	0.4	Draft version with incorporated review comments	03-Oct-2018
	0.5	Draft version with incorporated review comments	08-Oct-2018
	0.6	Draft version with back annotation	10-Oct-2018
	1.0	Released Version	11-Oct-2018
	1.1	Beta Draft Version	16-Jan-2019
	1.2	Draft version with incorporated review comments	18-Jan-2019
	2.0	Beta Released Version	8-Feb-2019
	3.0	Production Version Released	4-April-2019

## PAGE DESCRIPTION :

PAGE01 : COVER PAGE  
 PAGE02 : BLOCK DIAGRAM  
 PAGE03 : POWER SCHEME  
 PAGE04 : I2C TABLE  
 PAGE05 : PROCESSOR GPIO TABLE1  
 PAGE06 : PROCESSOR GPIO TABLE2  
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 PAGE31 : REVISION HISTORY2

## PCB LAYER STACK-UP DETAILS :




## PCB MECHANICAL DETAILS :

1. PCB SIZE: 85 mm X 100 mm X 1.57 mm
2. PCB MATERIAL: FR4
3. NUMBER OF LAYERS: 12
4. IMPEDANCE CONTROL: YES

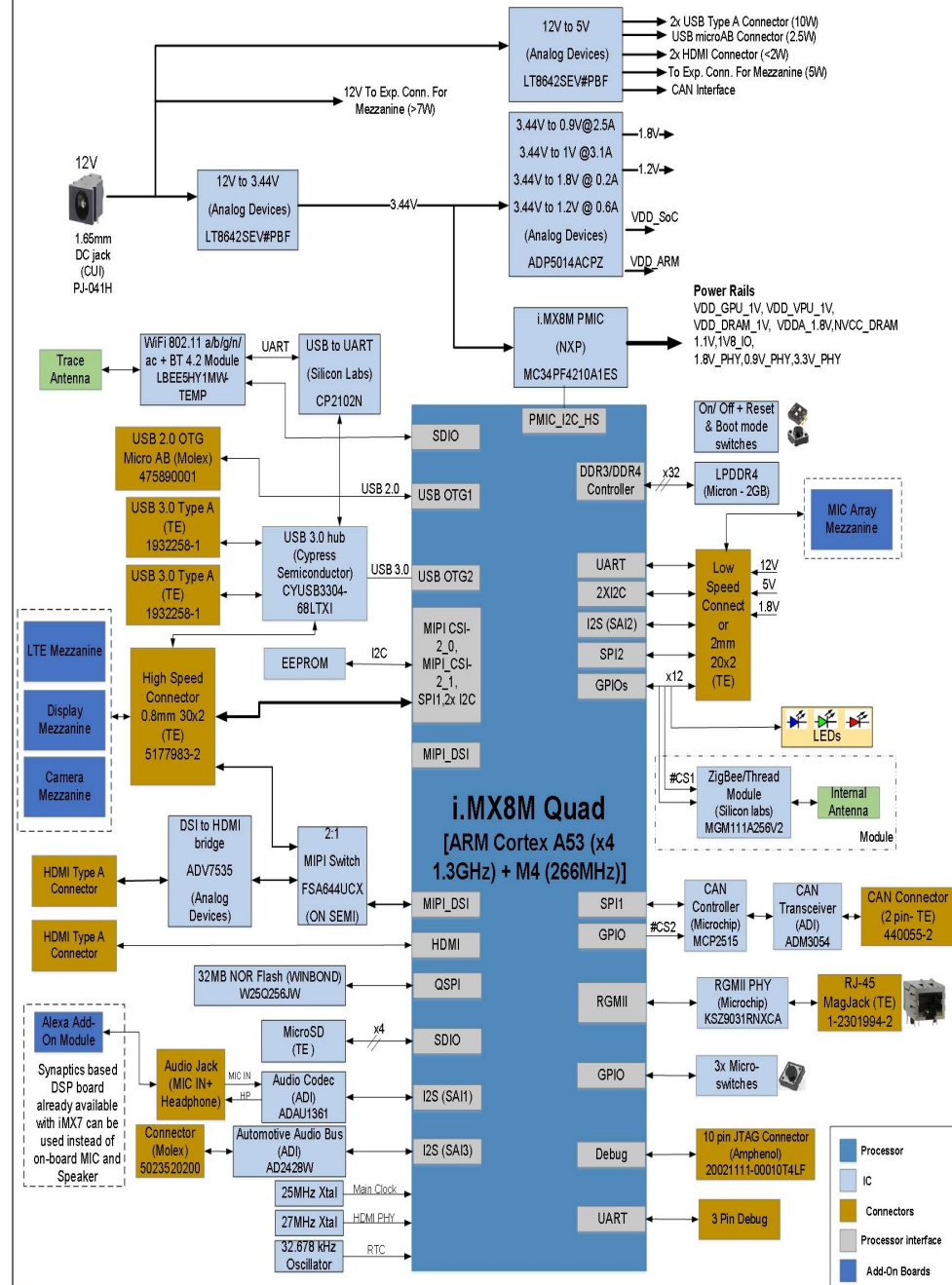
## NOTES, UNLESS OTHERWISE SPECIFIED :

1. RESISTANCE VALUES ARE IN OHM.
2. PARTS NOT INSTALLED ARE INDICATED WITH 'NU' or 'DNP'.

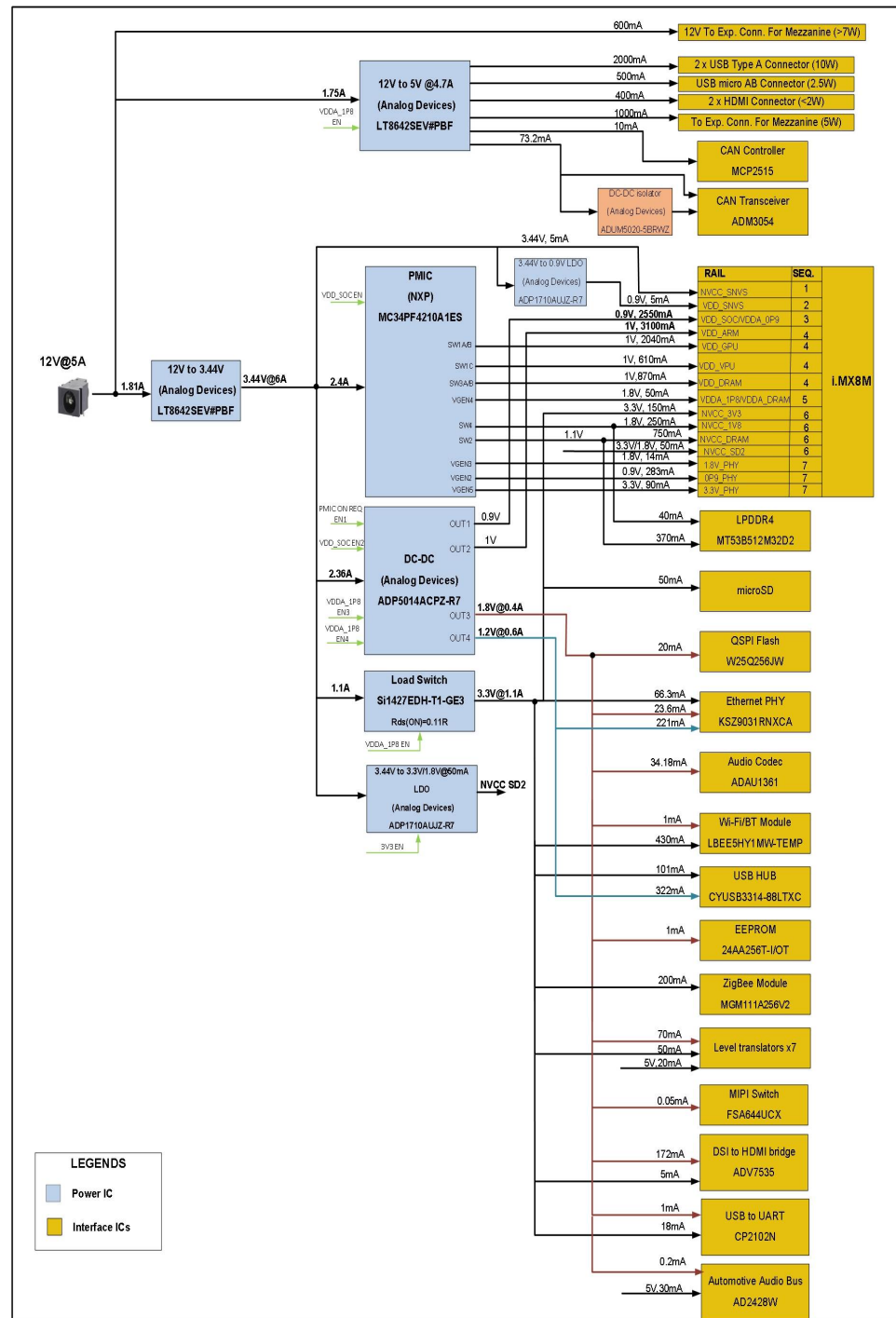
Project Arrow_iMX8M_HMI_Platform		Designed eInfochips	
Title COVER PAGE		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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# BLOCK DIAGRAM

## i.MX8M HMI Platform Block Diagram v2.1




# POWER SCHEME



# I2C ADDRESS TABLE

DEVICE	DEVICE ADDRESS	I2C Interface	IO LEVEL
PMIC PF4210	0x08	I2C 1	1.8V
LOW SPEED EXPANSION	NA	I2C 1	1.8V
LOW SPEED EXPANSION	NA	I2C 2	1.8V
HIGH SPEED EXPANSION	NA	I2C 3	1.8V
HIGH SPEED EXPANSION	NA	I2C 4	1.8V
EEPROM	0x50	I2C 2	1.8V
Audio Codec ADAU1361	0x38	I2C 2	1.8V
DSI to HDMI	0X72	I2C 1	1.8V
USB HUB CYUSB3304	0X60	I2C 4	3.3V
A71CH Security IC	0X49	I2C 3	1.8V
AD2428W (A2B)	0X68	I2C 2	1.8V

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Title I2C ADDRESS TABLE			
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# PROCESSOR GPIO TABLE1

## GPIO BANK1


GPIO1	ECSPi1_SS1	OUTPUT
GPIO2	nWDOG (WATCHDOG TIMER)	OUTPUT
GPIO3	LS_GPIO1_J	BIDIRECTIONAL
GPIO4	SD2_VSELECT (SD2 VOLTAGE SELECT)	OUTPUT
GPIO5	LS_GPIO1_L	BIDIRECTIONAL
GPIO6	GPIO_CAN_nINT (INTERRUPT FROM CAN)	INPUT
GPIO7	PMIC_nINT (INTERRUPT FROM PMIC)	INPUT
GPIO8	ECSPi2_SS1	OUTPUT
GPIO9	ENET_nRST (ETHERNET PHY nRESET)	OUTPUT
GPIO10	USB1_OTG_ID	INPUT
GPIO11	ENET_nINT (INTERRUPT FROM ETHERNET PHY)	INPUT
GPIO12	USB1_OTG_PWR	OUTPUT
GPIO13	USB1_OTG_OC	INPUT

## GPIO BANK2

GPIO6	GPIO_CAN_TX0RTS	OUTPUT
GPIO7	LS_GPIO2_E	BIDIRECTIONAL
GPIO8	LS_GPIO2_G	BIDIRECTIONAL
GPIO9	GPIO_CAN_RX0BF	INPUT
GPIO10	LS_GPIO2_A	BIDIRECTIONAL
GPIO11	LS_GPIO2_B	BIDIRECTIONAL

## GPIO BANK4

GPIO0	BT_LED	OUTPUT
GPIO1	WL_LED	OUTPUT
GPIO21	USER_LED1	OUTPUT
GPIO22	USER_LED2	OUTPUT
GPIO27	FAN ON	OUTPUT
GPIO28	USER_LED3	OUTPUT
GPIO29	USER_LED4	OUTPUT

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<b>Title</b> PROCESSOR GPIO TABLE1			
<b>Size C</b>	<b>eInfochips#:</b> 16_00666_02		<b>Rev</b> 2.0
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# PROCESSOR GPIO TABLE2


**GPIO BANK3**

GPIO2	LS_GPIO3_H	BIDIRECTIONAL
GPIO3	WL_REG_ON	OUTPUT
GPIO4	DSI_SW_SEL	OUTPUT
GPIO5	BT_REG_ON	OUTPUT
GPIO10	nWAKE_ZigBee	OUTPUT
GPIO11	nINT_ZigBee	INPUT
GPIO12	LS_GPIO3_I	BIDIRECTIONAL
GPIO13	LS_GPIO3_K	BIDIRECTIONAL
GPIO14	BT_HOST_WAKE	INPUT
GPIO15	DSI_INT_OUT	INPUT
GPIO16	mSW1	INPUT
GPIO17	mSW3	INPUT
GPIO18	mSW2	INPUT
GPIO20	LS_GPIO3_D	BIDIRECTIONAL
GPIO21	LS_GPIO3_F	BIDIRECTIONAL
GPIO22	BT_DEV_WAKE	OUTPUT
GPIO24	LS_GPIO3_C	BIDIRECTIONAL
GPIO25	CAN_RST#	OUTPUT

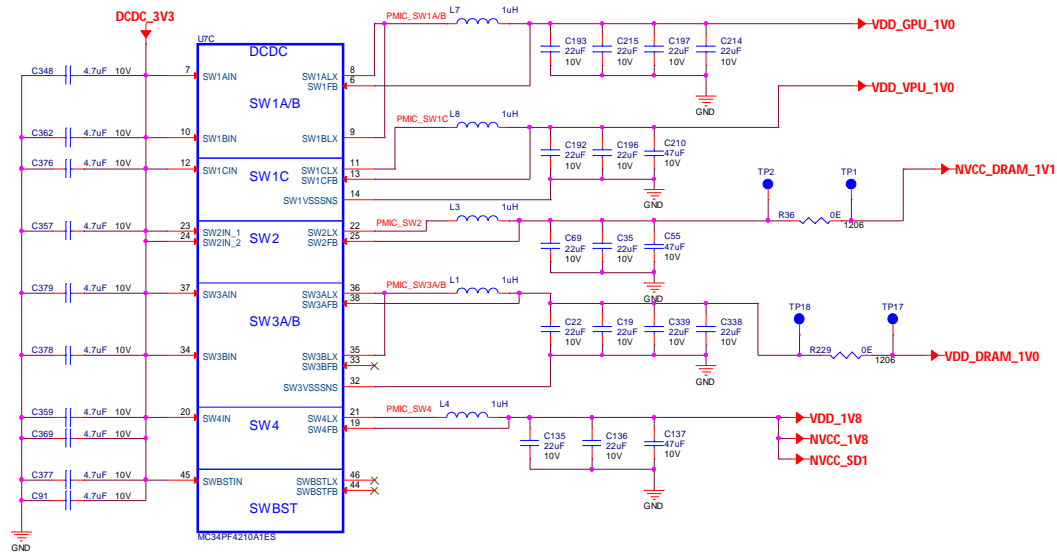
**GPIO BANK5**

GPIO2	HP_DET_B (HEADPHONE DETECT)	INPUT
GPIO4	nRESET_ZigBee	OUTPUT
GPIO5	USB_HUB_RST	OUTPUT

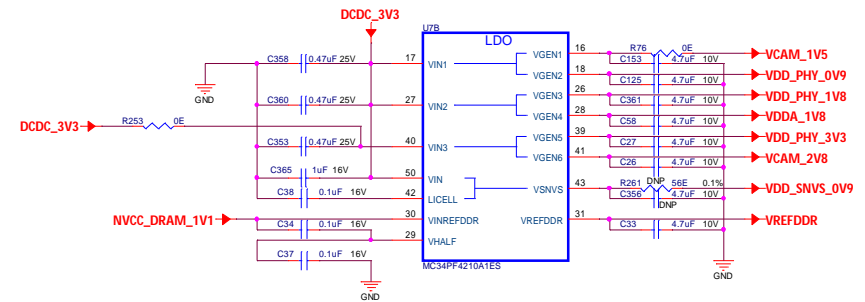
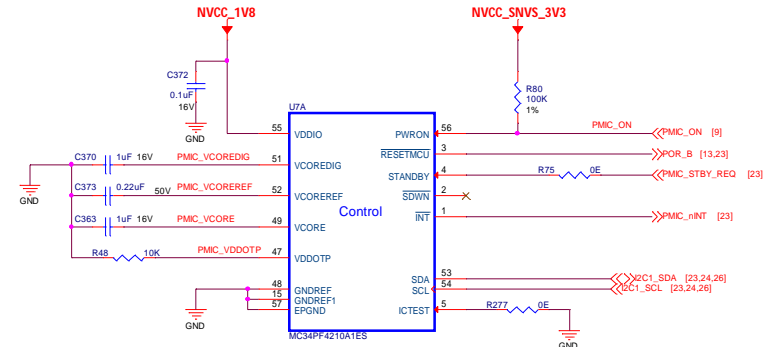
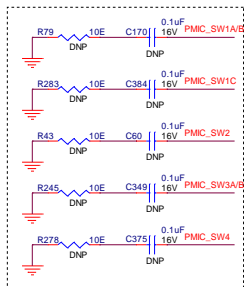
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<b>Title</b> PROCESSOR GPIO TABLE2		   The Solutions People	
<b>Size C</b>	<b>eInfochips#:</b> 16_00666_02		<b>Rev</b> 2.0
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<b>Project</b> Arrow_iMX8M_HMI_Platform		Designed eInfochips	
<b>Title</b> INPUT POWER SUPPLY		 The Solutions People	
<b>Size</b> C	eInfochips#: 16_00666_02		<b>Rev</b> 2.0
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# PMIC SECTION



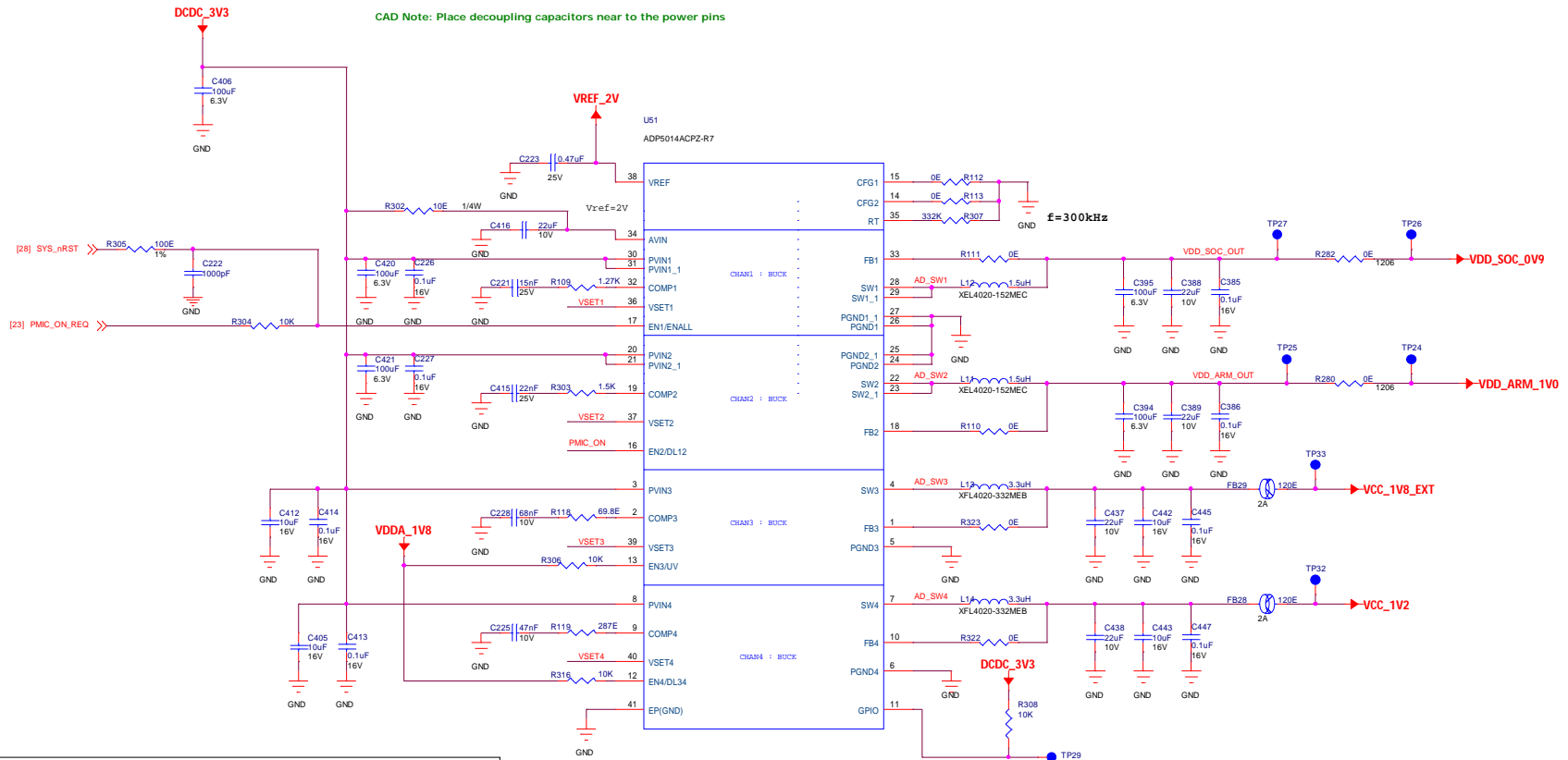
Snubber tuning provision



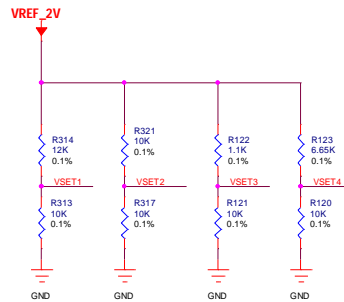
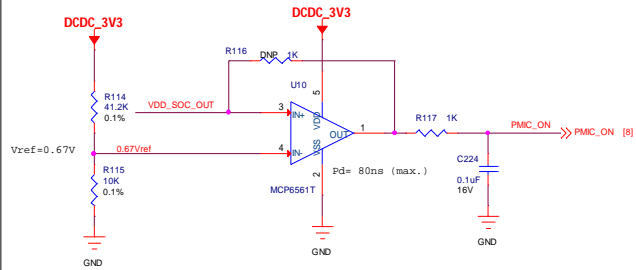
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Title PMIC SECTION		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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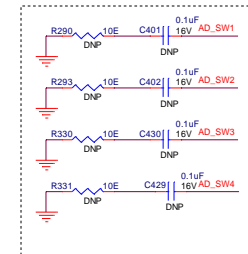
# POWER REGULATORS




### Push-Pull Comparator for Power Good signal of VDD\_SOC Supply

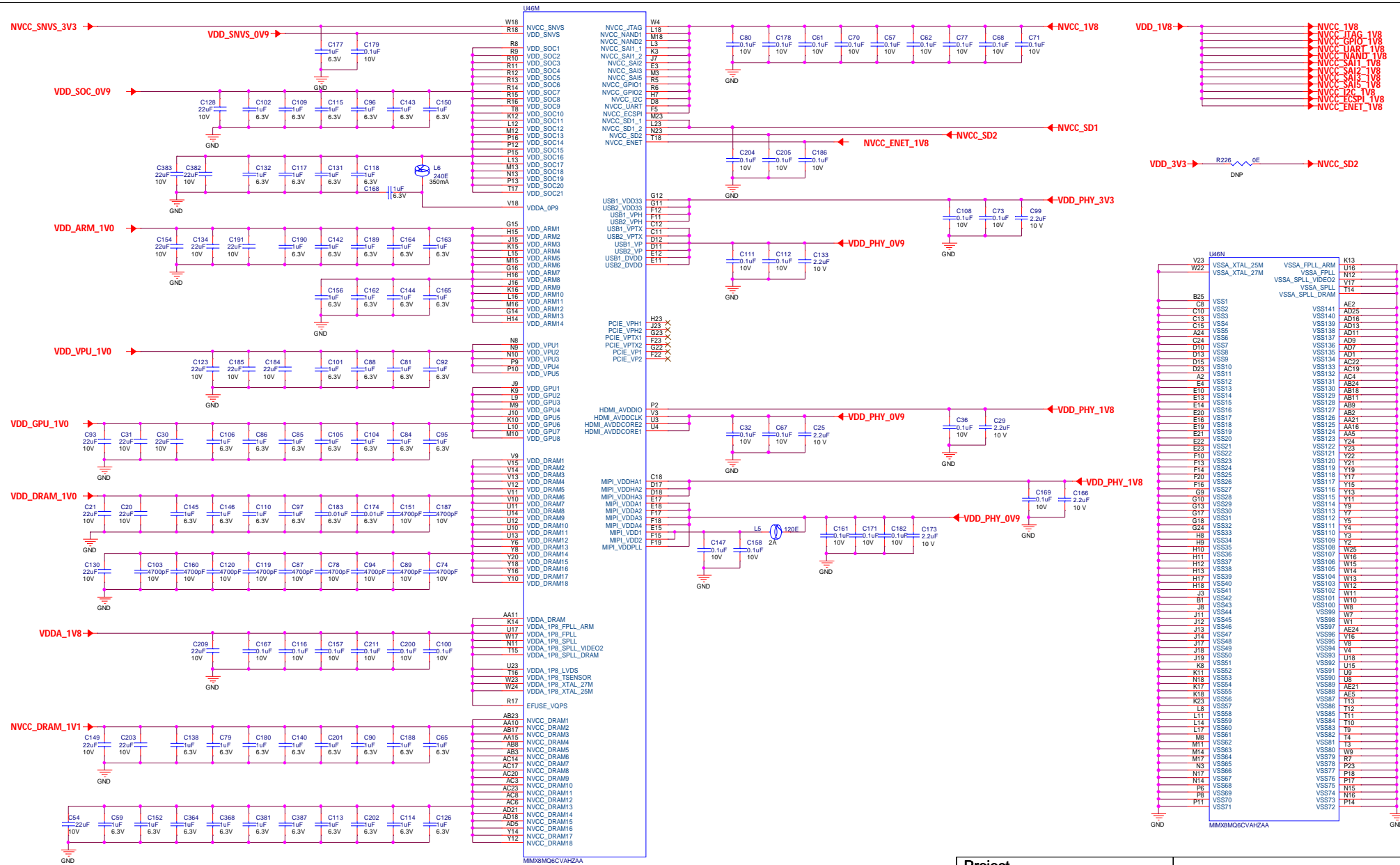



### Snubber tuning provision



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Title POWER REGULATORS		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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# PROCESSOR(iMX 8M) POWER AND GROUND

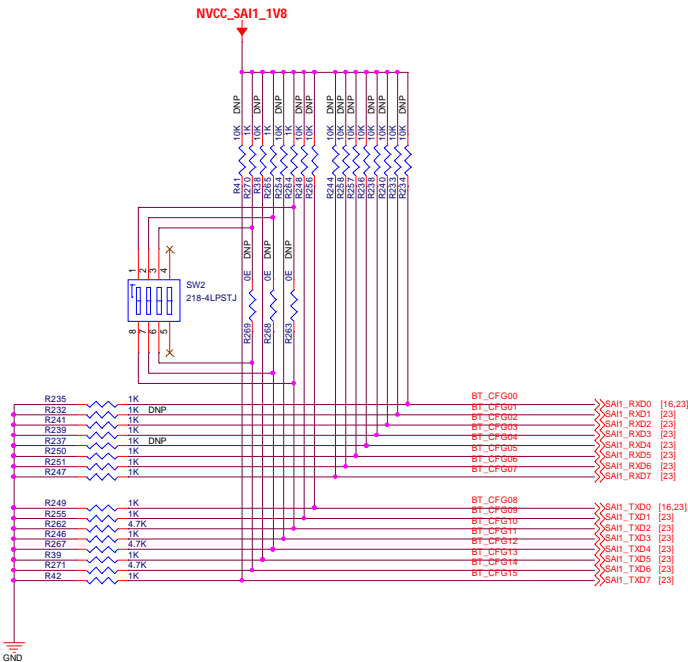


Project Arrow_iMX8M_HMI_Platform		Designed einfochips	
Title PROCESSOR POWER AND GROUND		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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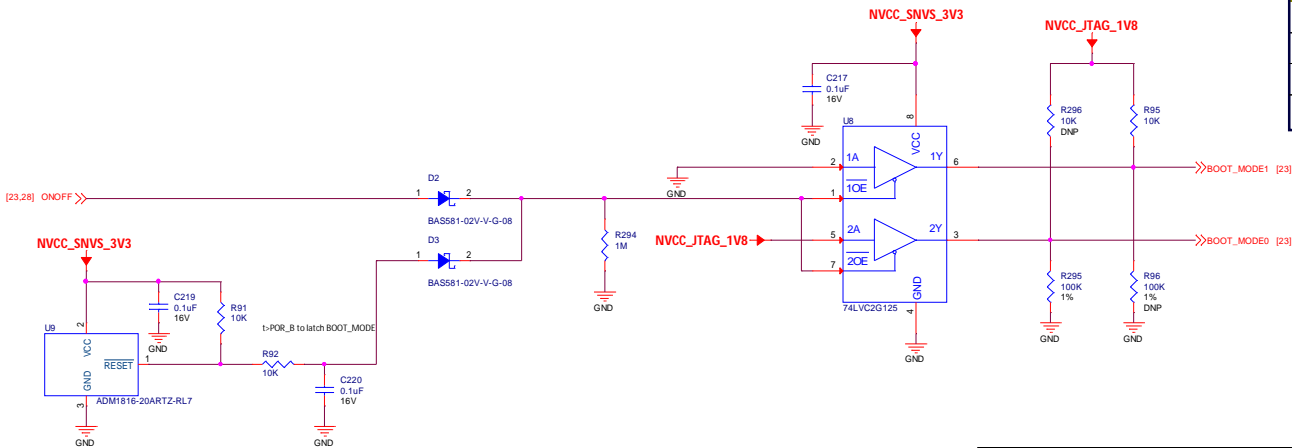
# PROCESSOR(iMX 8M QUAD) CONTROL

QSPI boot is not supported by ROM in current Silicon revision

BMODE[2:0]	BOOT Configuration
011	Boot from SD2
100	Boot from QSPI

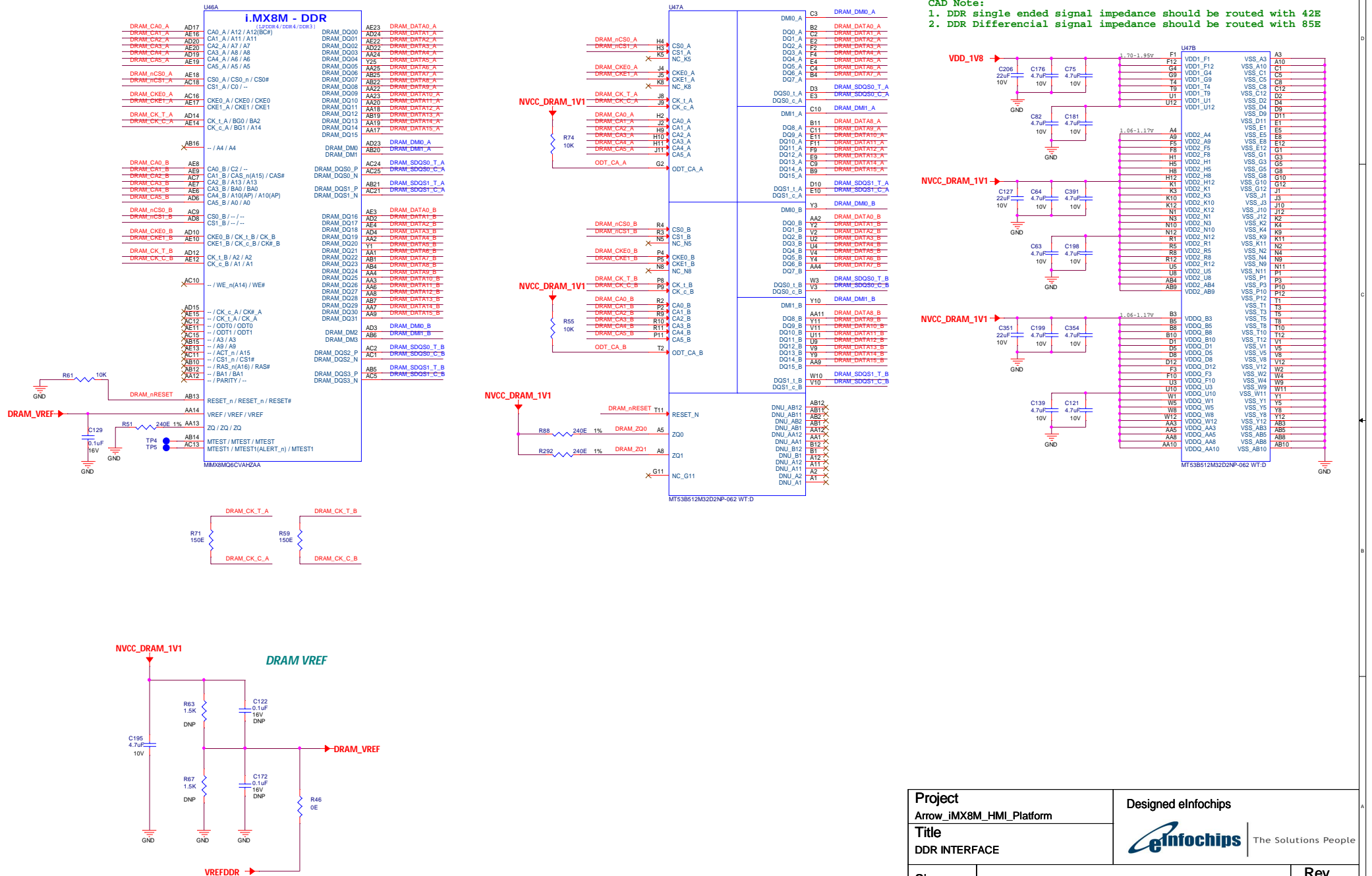


BMODE[1:0]	BOOT Source
00	Boot from fuses
01	Serial downloader
10	Internal boot
11	Reserved



Project Arrow_iMX8M_HMI_Platform		Designed eInfochips	
Title PROCESSOR CONTROL		eInfochips   The Solutions People	
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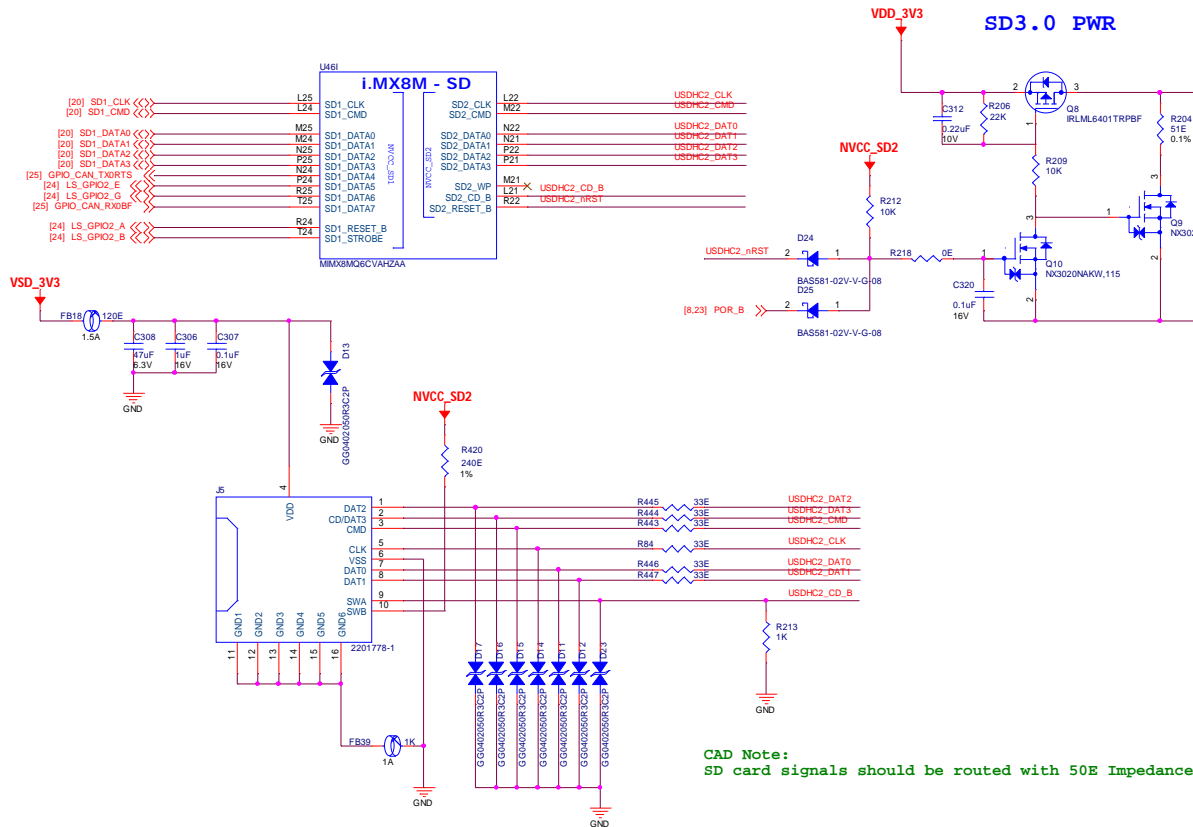
# DDR INTERFACE



Note : LPDDR4 4GB and 2GB parts are pin to pin compatible

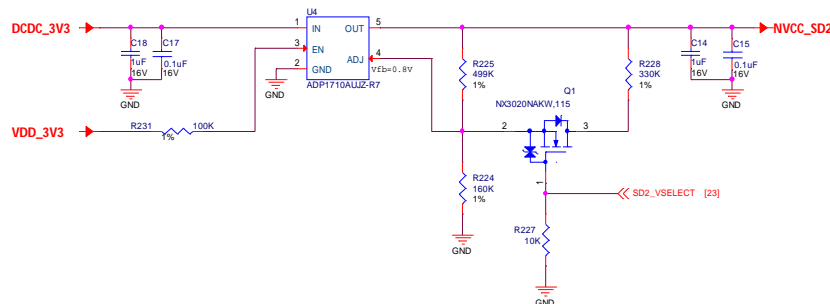
# FLASH MEMORY SD CARD, NOR and EEPROM

## SDIO INTERFACE



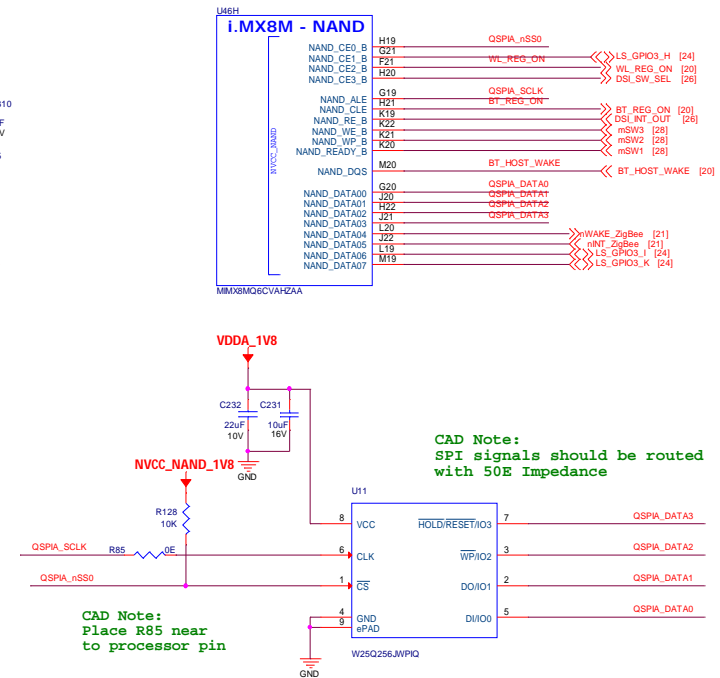
**CAD Note:**  
Keep one common ground for ESD grounds and connector ground

## SD3.0 IO PWR



## NOR MEMORY (QUAD SPI)

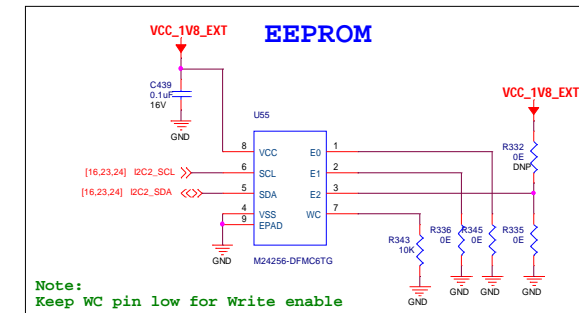
### MIMX8MQ6DVAJZAA




**CAD Note:**  
SPI signals should be routed with 50E Impedance

**CAD Note:**  
Place R85 near to processor pin

## EEPROM

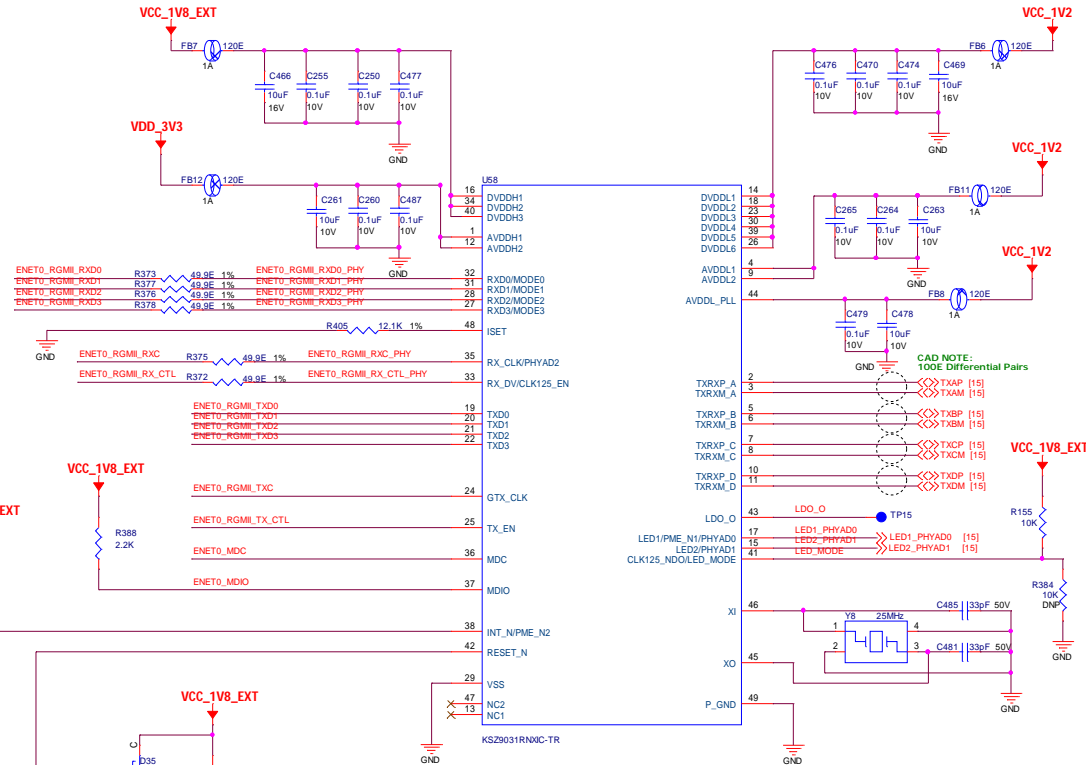
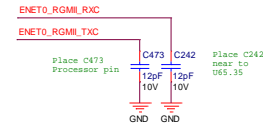
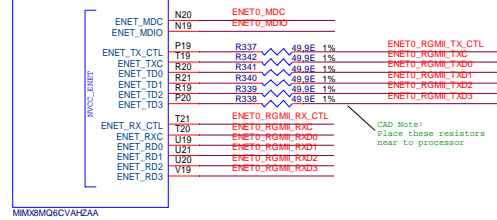


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Title FLASH MEMORY SD CARD, NOR, EEPROM		 The Solutions People	
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# ETHERNET SECTION

Note: 1.8Volt ENET0\_RGMII TX and RX

## i.MX8M - eNET



CAD Note:  
RGMII signals should be routed with 50E Impedance


### MODE2[3:0]

```
(Default assemble: 1111)
0100 NAND tree mode
0111 Chip power-down mode
1100 RGMII mode - Advertise 1000BASE-T full-duplex only
1101 RGMII mode - Advertise 1000BASE-T full- and halfduplex only
1110 RGMII mode - Advertise all capabilities (10/100/1000 speed half-/full-duplex),
      except 1000BASE-T halfduplex
1111 RGMII mode - Advertise all capabilities (10/100/1000 speed half-/full-duplex)

Others Reserved
```

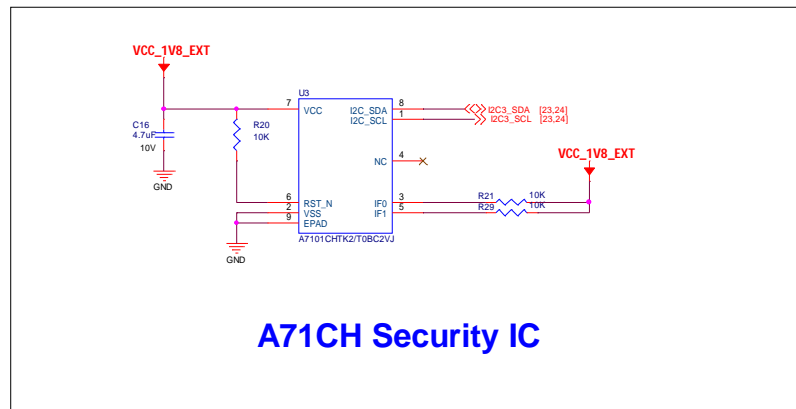
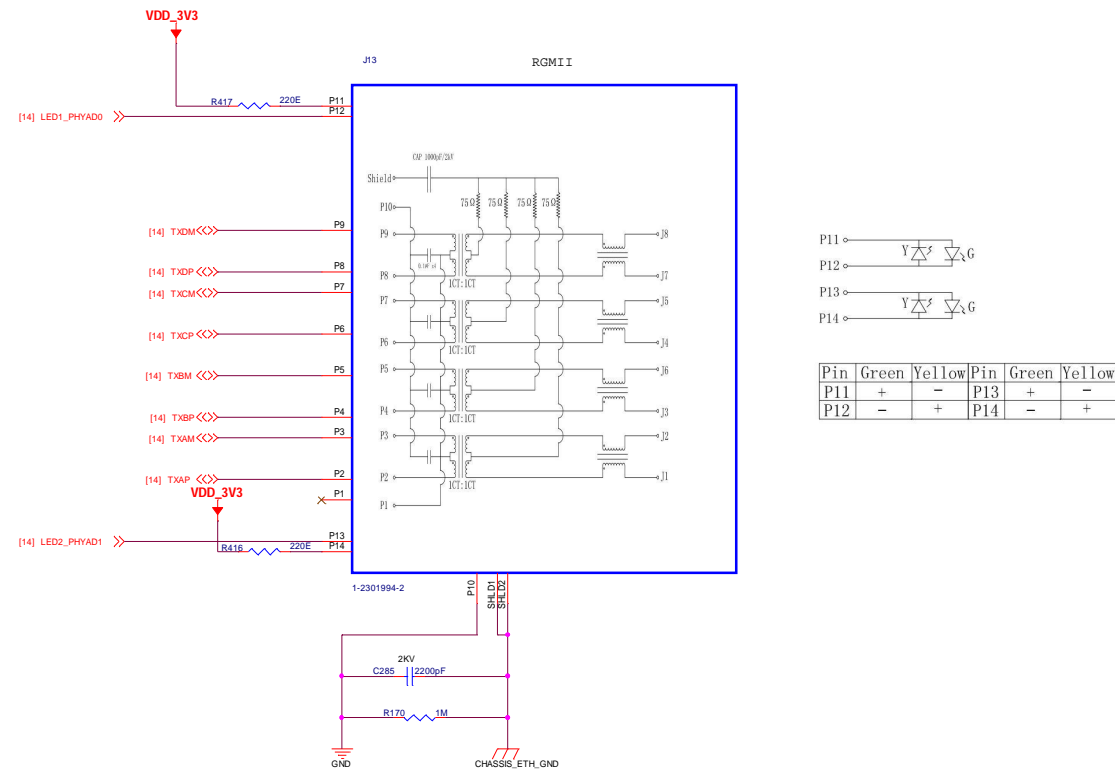
### Power-on Strapping Pins




Project Arrow_iMX8M_HMI_Platform		Designed eInfochips	
Title ETHERNET SECTION1		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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# ETHERNET CONNECTOR

## ETHERNET CONNECTOR INTERFACE ( RGMII MODE )

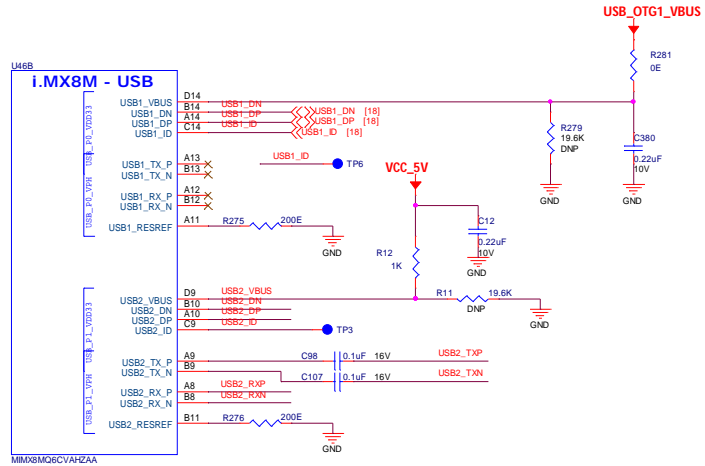


<b>Project</b> Arrow_iMX8M_HMI_Platform		Designed eInfochips	
<b>Title</b> ETHERNET SECTION2		 The Solutions People	
<b>Size</b> C	eInfochips#: 16_00666_02		<b>Rev</b> 2.0
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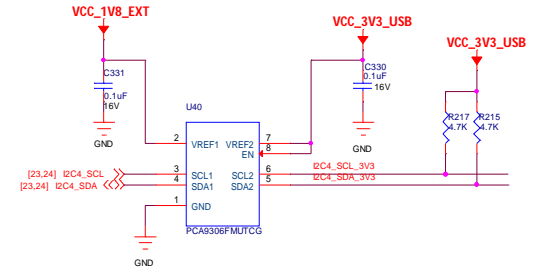




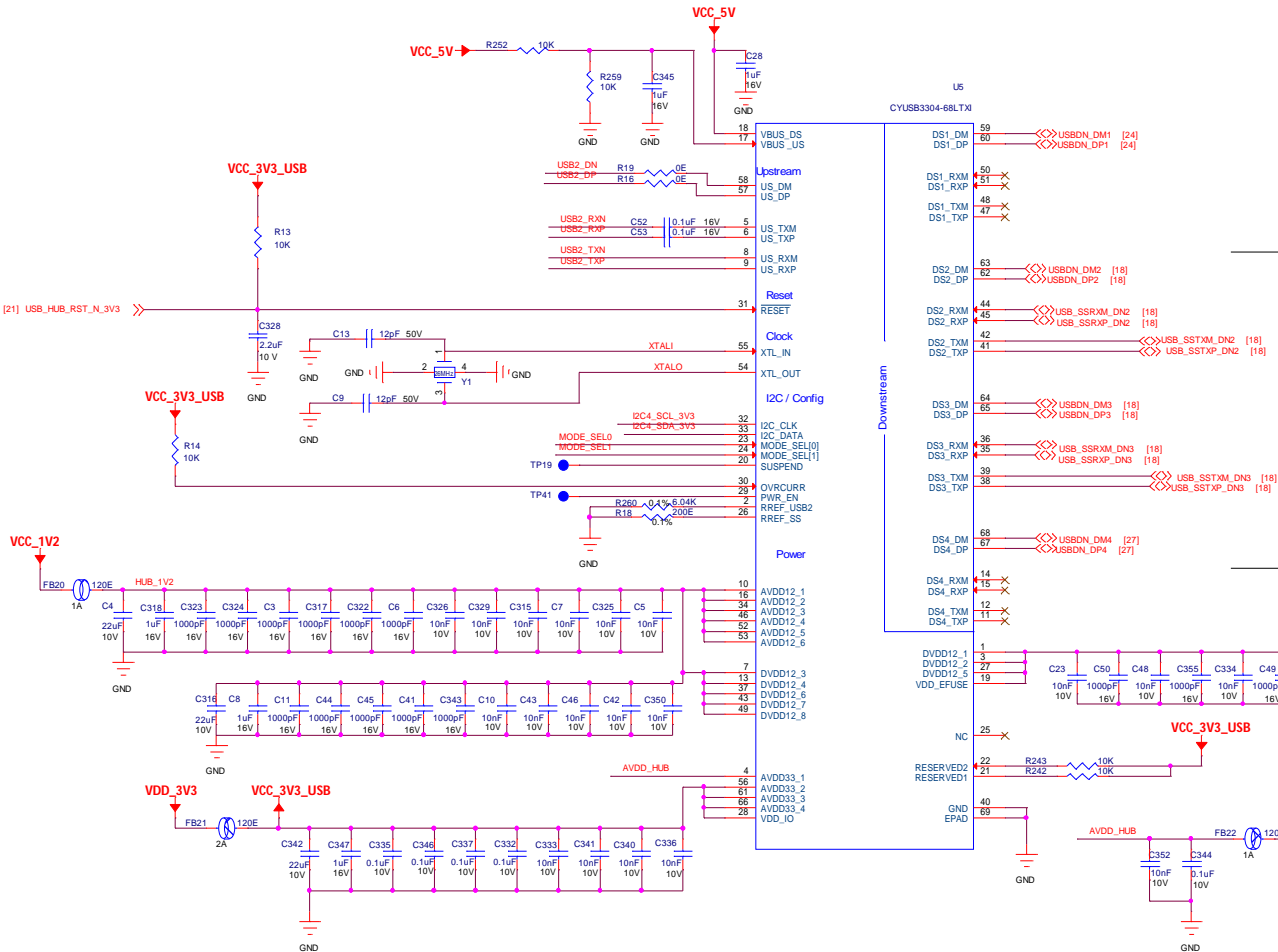
# USB HUB CONTROLLER




## VOLTAGE LEVEL TRANSLATOR



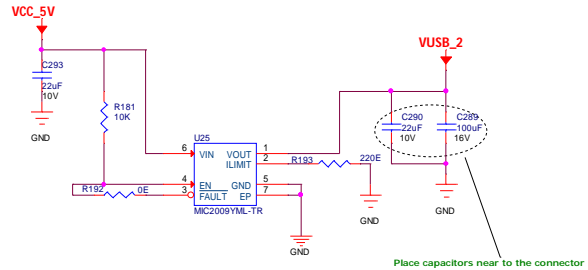
## USB 3.0 HUB (4 DOWN STREAM PORTS)



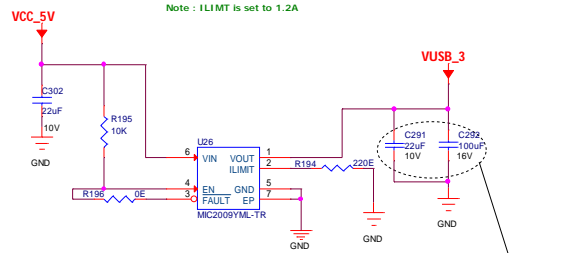
Project Arrow_iMX8M_HMI_Platform		Designed einfochips	
Title USB HUB CONTROLLER		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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# USB CONNECTORS

## USB 3.0 TYPE A HOST CONNECTORS

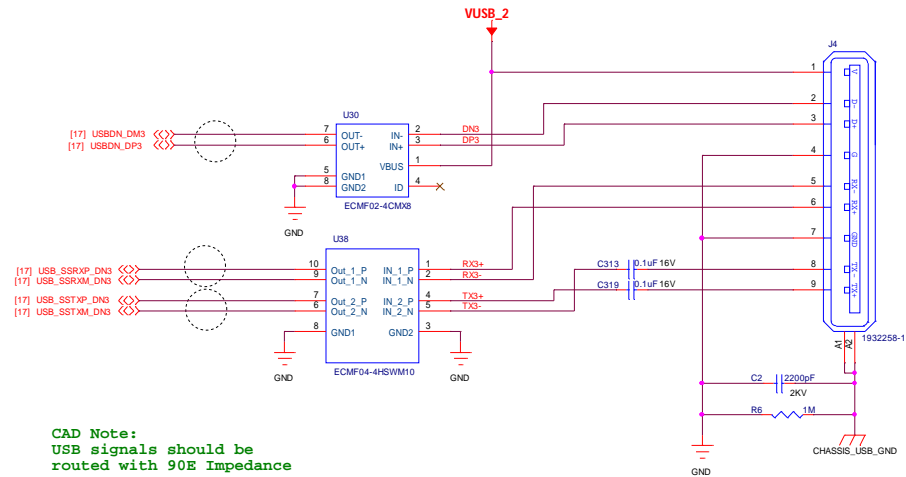


Place capacitors near to the connector



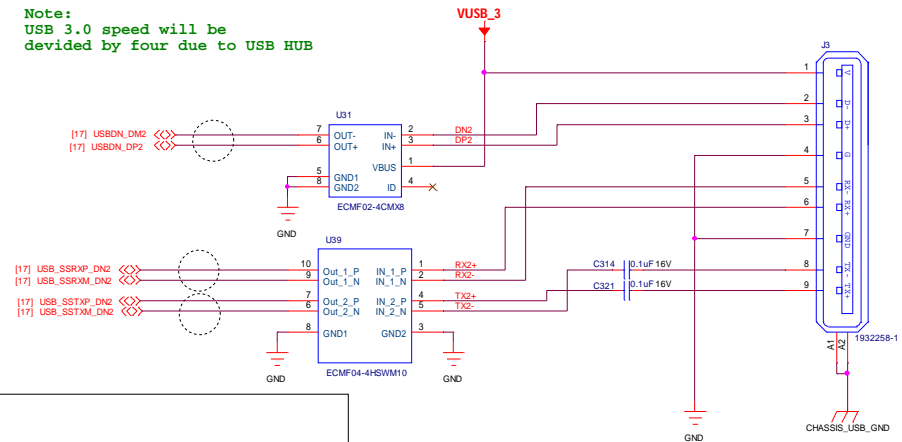
Note : ILIMIT is set to 1.2A

Place capacitors near to the connector

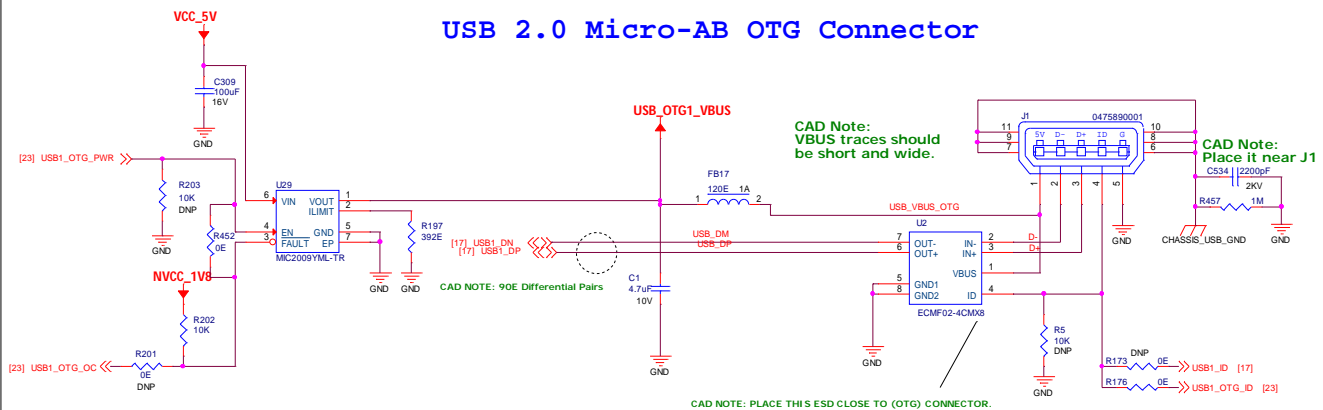


CAD Note:  
USB signals should be  
routed with 90E Impedance

Note:  
USB 3.0 speed will be  
divided by four due to USB HUB




## USB 2.0 Micro-AB OTG Connector

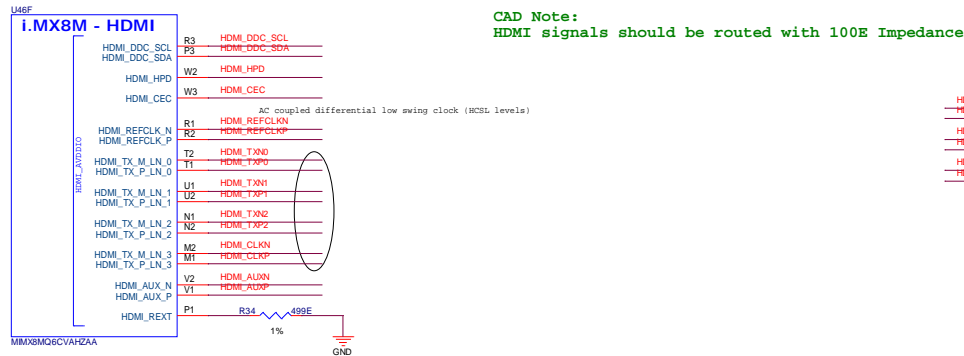


**CAD Note:**  
VBUS traces should  
be short and wide.

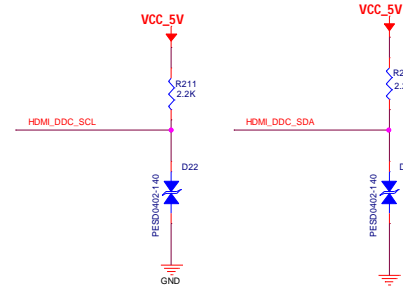
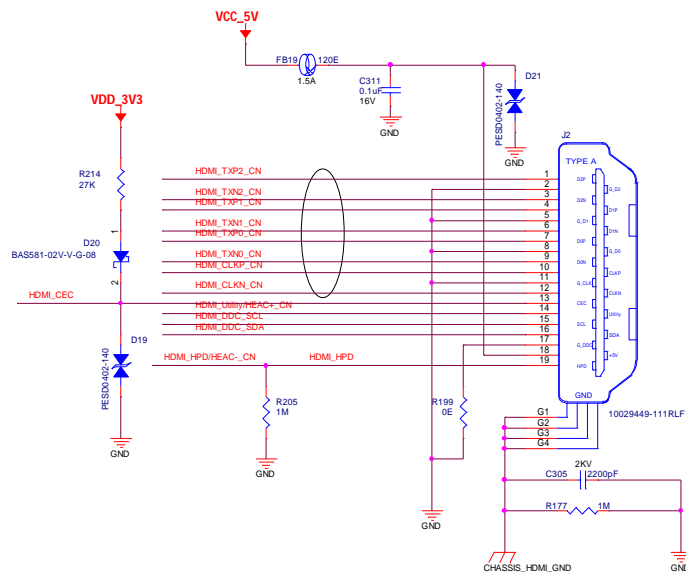
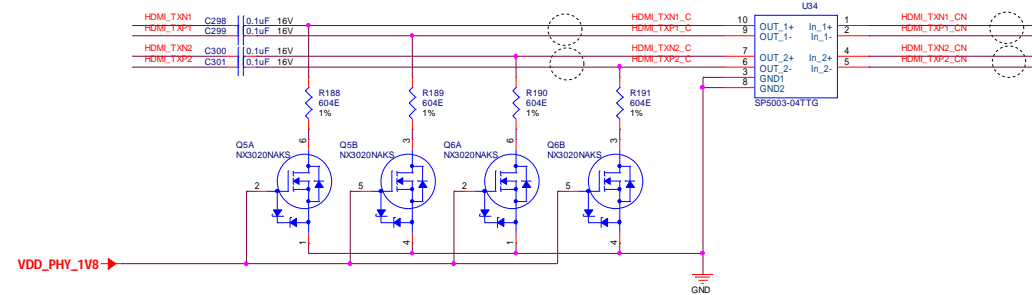
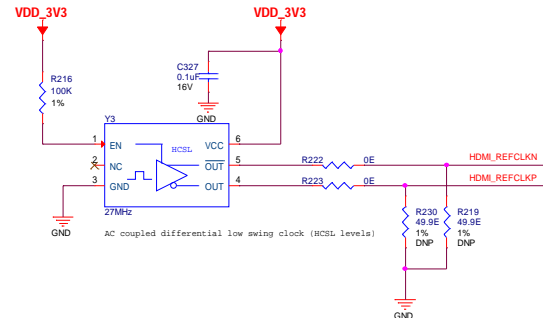
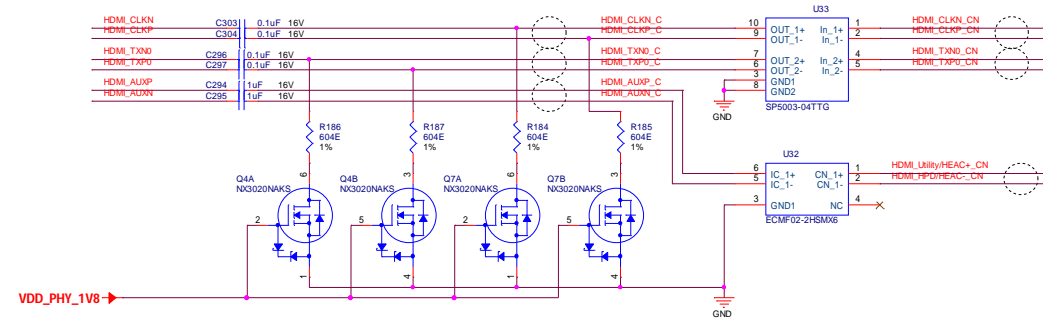
**CAD Note:**  
Place it near J1


<b>Project</b> Arrow_iMX8M_HMI_Platform		Designed eInfochips	
<b>Title</b> USB CONNECTORS		 The Solutions People	
<b>Size C</b>	<b>eInfochips#:</b> 16_00666_02		<b>Rev</b> 2.0
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# HDMI CONNECTOR

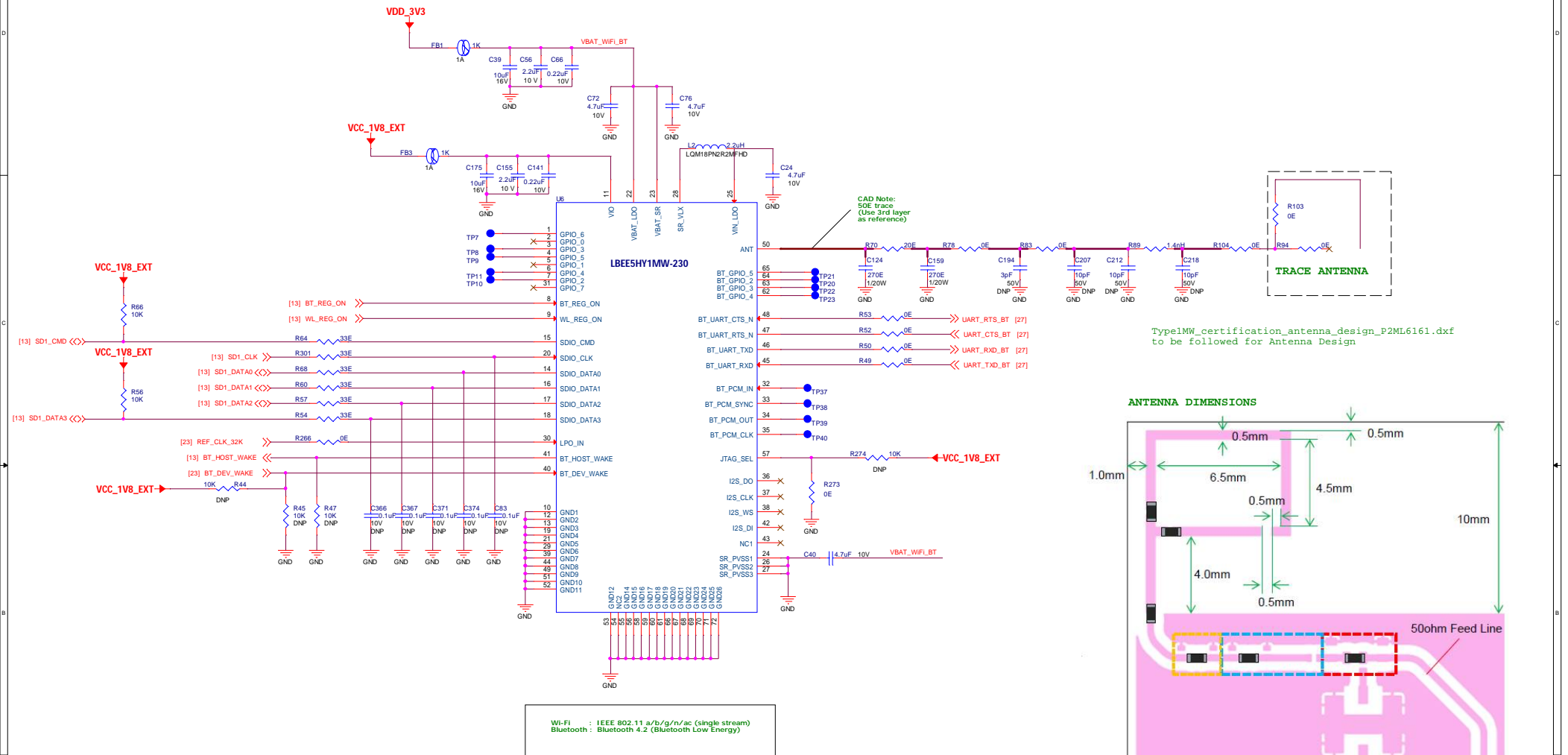



## HDMI data EMI/ESD



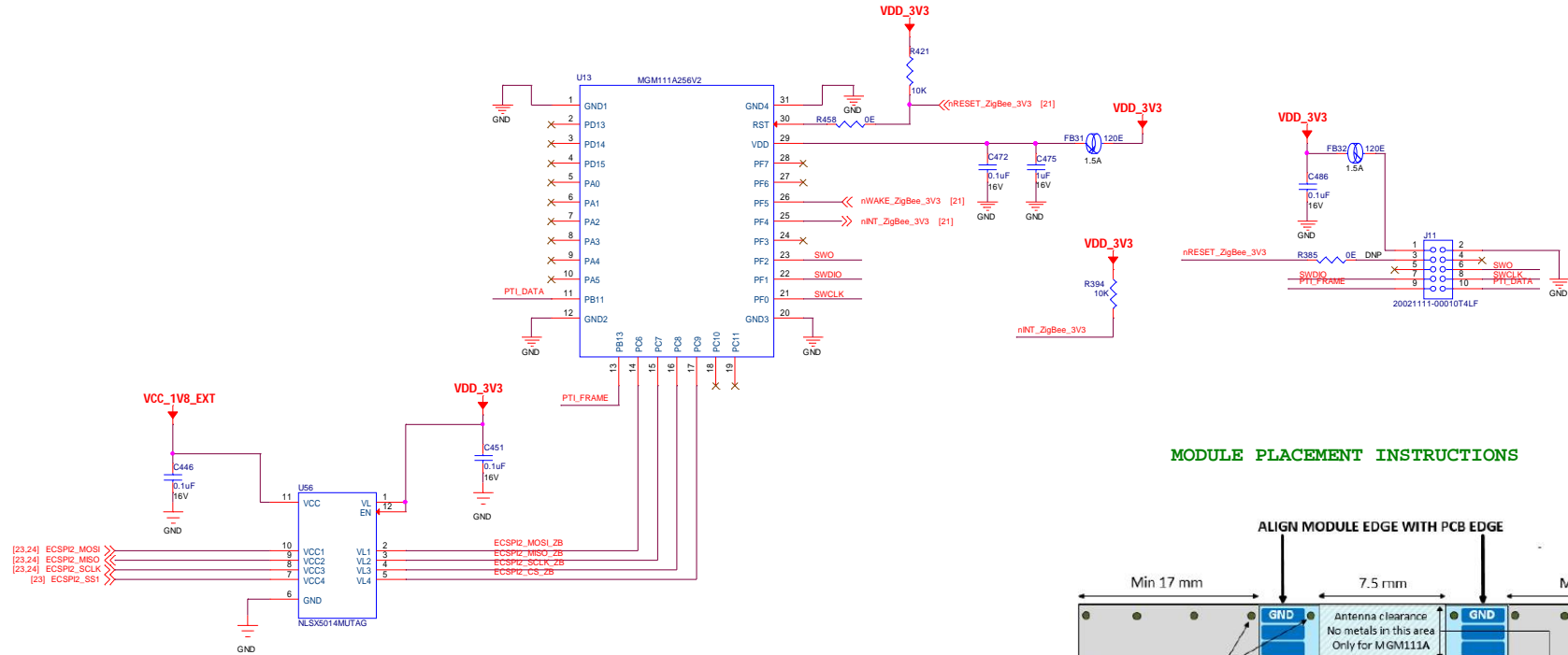
Project Arrow_iMX8M_HMI_Platform		Designed enInfochips	
Title HDMI CONNECTOR		 The Solutions People	
Size C	enInfochips#: 16_00666_02		Rev 2.0
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# Wi-Fi AND BLUETOOTH SECTION

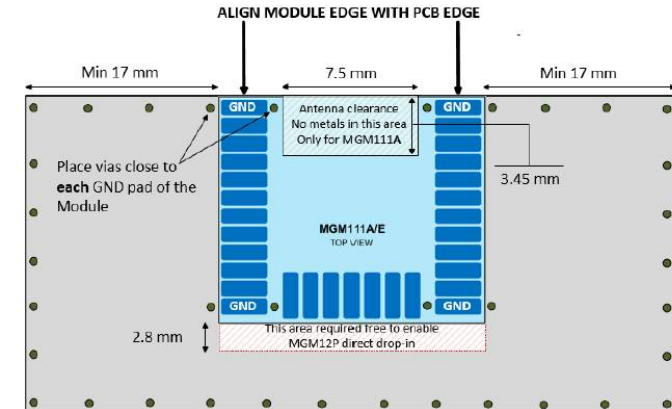


Project Arrow_iMX8M_HMI_Platform		Designed elnfochips	
Title Wi-Fi AND BLUETOOTH SECTION		 The Solutions People	
Size C	elnfochips#: 16_00666_02		Rev 2.0
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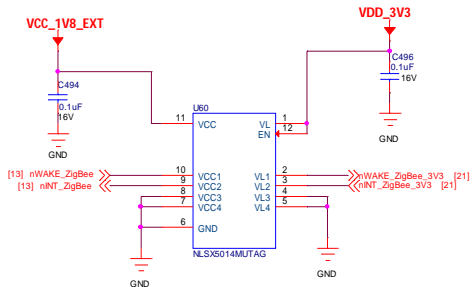
# ZIGBEE SECTION



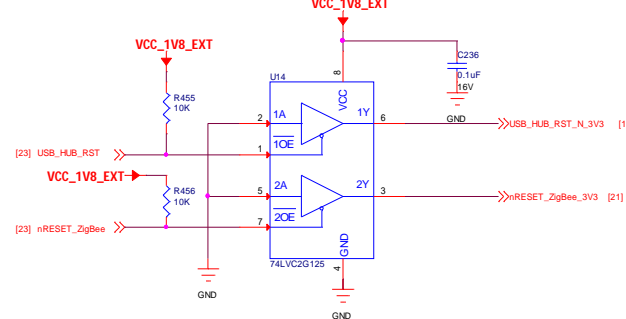
## MODULE PLACEMENT INSTRUCTIONS




## Level Translator

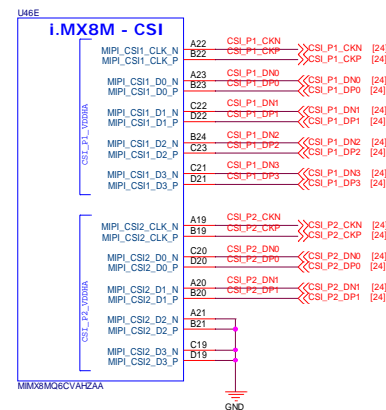


## Reset Buffer

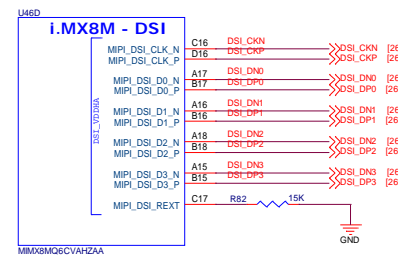
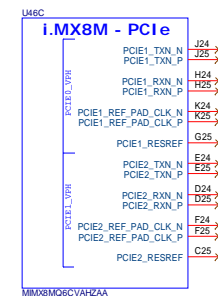


Project Arrow_iMX8M_HMI_Platform		Designed eInfochips	
Title ZIGBEE SECTION		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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# PROCESSOR OTHER INTERFACES1



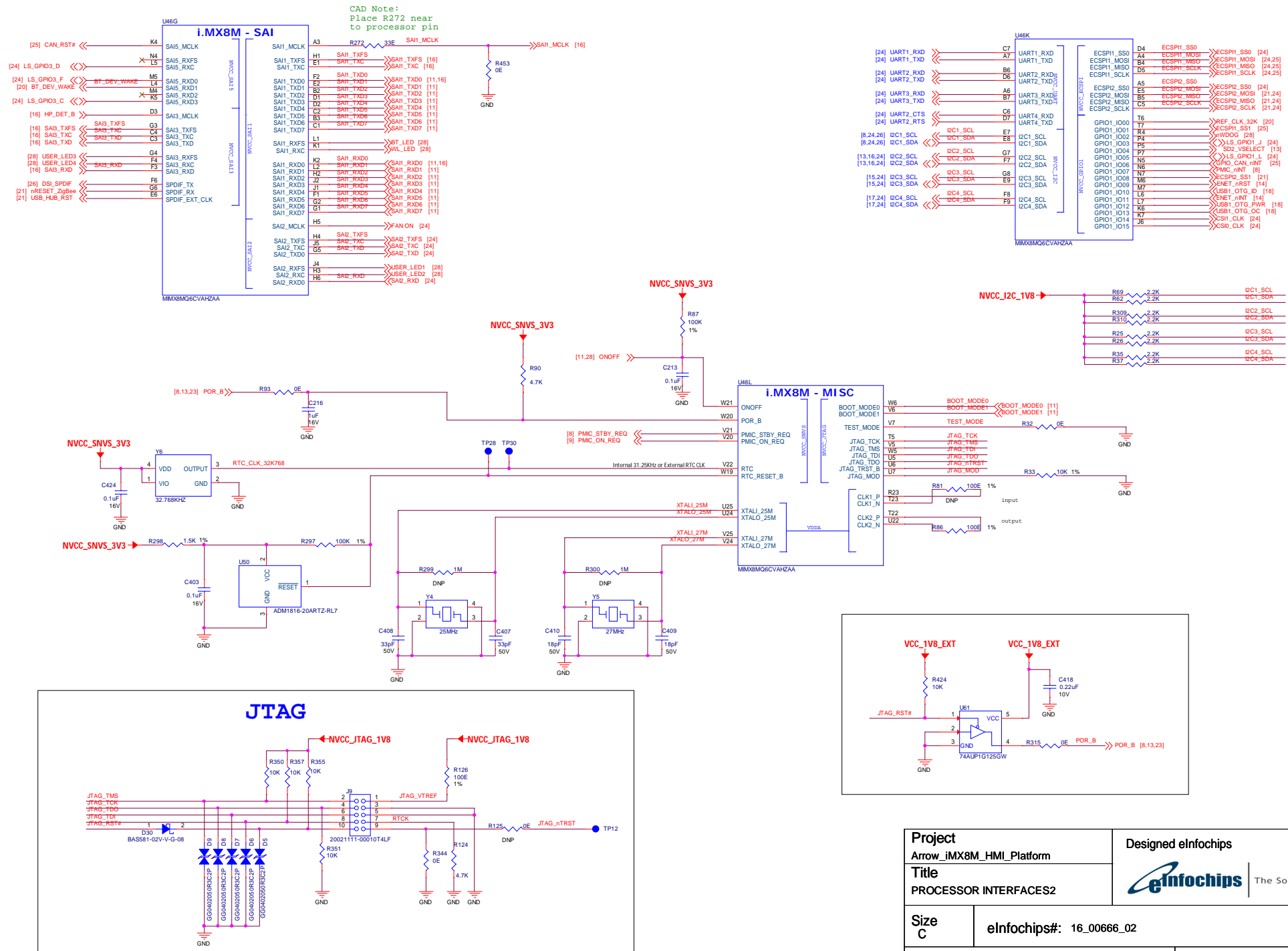
CAD Note:  
MIPI CSI signals should be  
routed with 100E Impedance




CAD Note:  
MIPI DSI signals should be  
routed with 100E Impedance

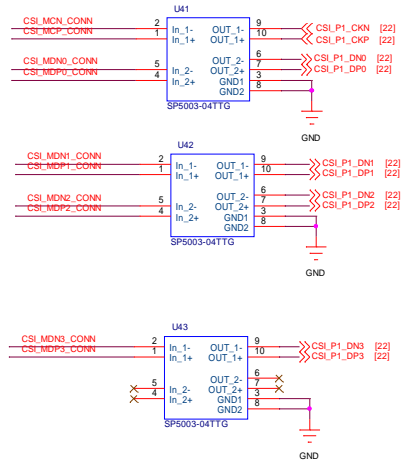
Project Arrow_iMX8M_HMI_Platform		Designed eInfochips	
Title PROCESSOR INTERFACES1		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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## PROCESSOR OTHER INTERFACES2

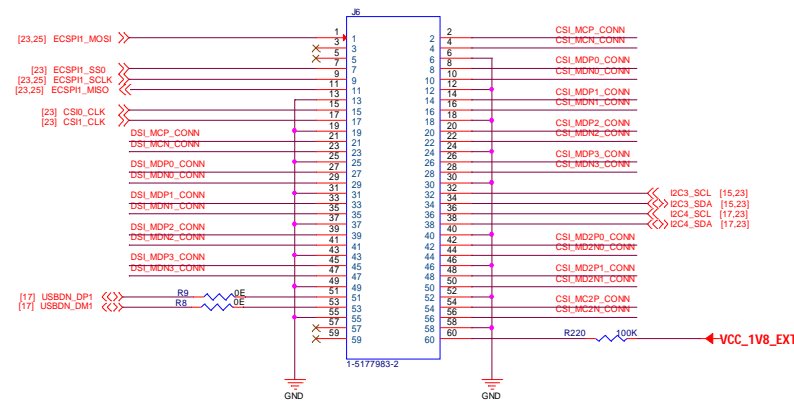


<b>Project</b> Arrow_iMX8M_HMI_Platform		Designed eInfochips	
<b>Title</b> PROCESSOR INTERFACES2		 The Solutions People	
<b>Size</b> C	<b>eInfochips#:</b> 16_00666_02		<b>Rev</b> 2.0
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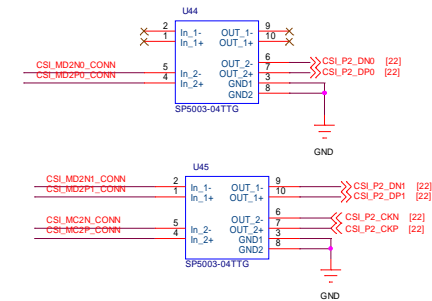
## CSI1 EMI FILTERS



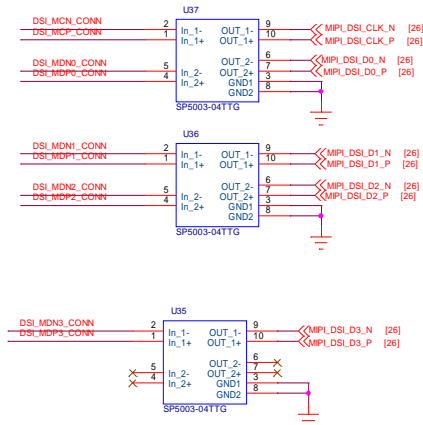
## HIGH SPEED EXPANSION CONNECTOR



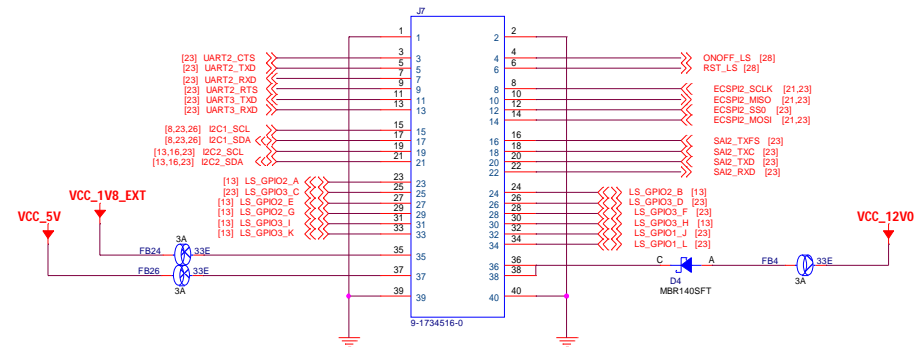
## CSI2 EMI FILTERS



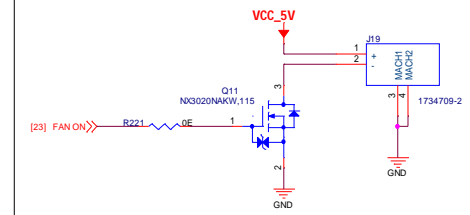
## DSI0 EMI FILTERS



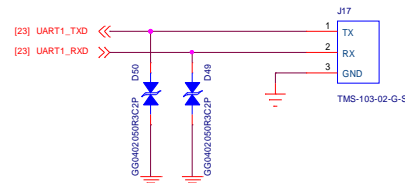
## LOW SPEED EXPANSION CONNECTOR




## FAN CONNECTOR



## DEBUG UART

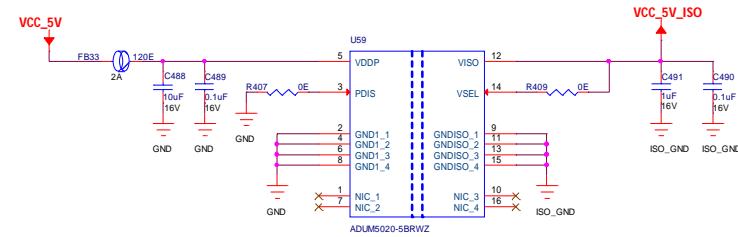


<b>Project</b> Arrow_iMX8M_HMI_Platform		Designed eInfochips	
<b>Title</b> HS / LS EXPANSION CONN		 The Solutions People	
<b>Size</b> C	<b>eInfochips#:</b> 16_00666_02		<b>Rev</b> 2.0
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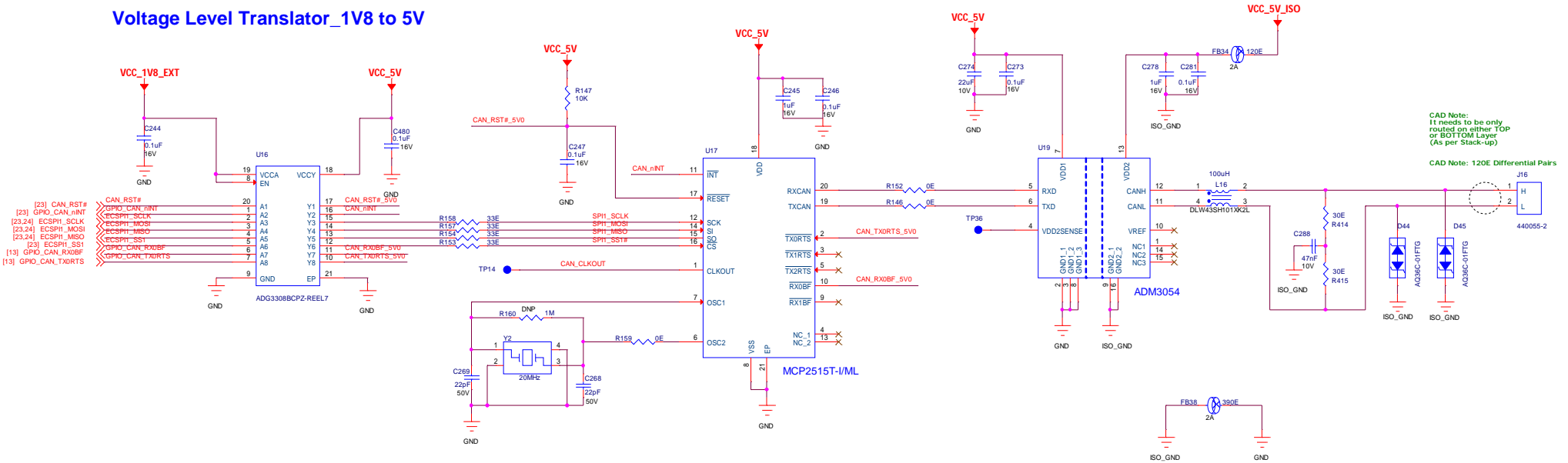



# CAN INTERFACE

## DC-DC ISOLATOR



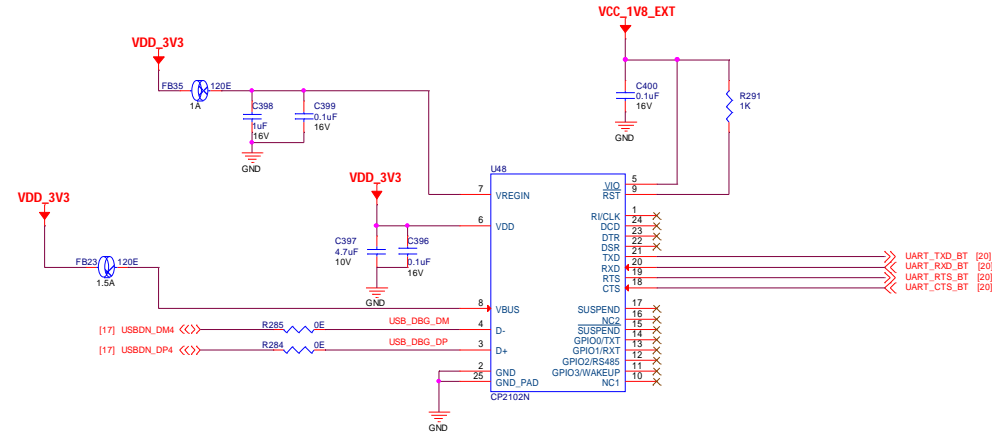
## Voltage Level Translator\_1V8 to 5V




Project Arrow_iMX8M_HMI_Platform		Designed eInfochips	
Title CAN INTERFACE		 The Solutions People	
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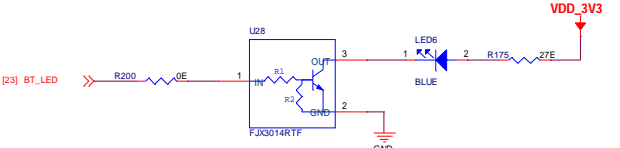
# USB TO UART FOR LS CONNECTOR



Project Arrow_iMX8M_HMI_Platform		Designed eInfochips	
Title USB to UART Bridge		 The Solutions People	
Size C	eInfochips#: 16_00666_02		Rev 2.0
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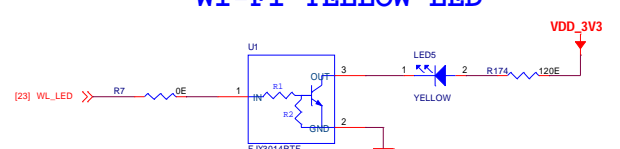
## RESET SCHEME AND LED

### BLUETOOTH BLUE LED



The diagram shows a Bluetooth module (U28, FJXG014R1TF) with a blue LED (LED6) connected to its output pin (pin 3). The LED's anode is connected to pin 3, and its cathode is connected to ground (pin 2). A resistor R175 (27E) is connected between the LED's anode and the VDD\_3V3 supply. The module's input pin (pin 1) is connected to a BT\_LED signal through a resistor R200 (OE).

### Wi-Fi YELLOW LED



The diagram shows a Wi-Fi module (U1, FJXG014R1TF) with a yellow LED (LED5) connected to its output pin (pin 3). The LED's anode is connected to pin 3, and its cathode is connected to ground (pin 2). A resistor R174 (120E) is connected between the LED's anode and the VDD\_3V3 supply. The module's input pin (pin 1) is connected to a WL\_LED signal through a resistor R7 (OE).

[illegible]

```
2.63V Threshold
210 ms delay
Open-Drain RST output
Internal 100k Pullup on MR input
Idd = 10 uA max
```

### 3 Microswitches


## 4X USER GREEN LEDs

The diagram illustrates a circuit for driving four green LEDs (LED1, LED2, LED3, LED4) using four FJX3014RTF MOSFETs (U24, U23, U22, U27). Each MOSFET is configured as a common-source amplifier. The input of each MOSFET is connected to a user LED signal (USER\_LED1 to USER\_LED4) through a 10kΩ resistor (R180, R179, R178, R188). The output of each MOSFET is connected to a green LED (LED1 to LED4) through a 120Ω resistor (R1, R2, R3, R4). The LEDs are connected to a common VDD\_3V3 supply. The MOSFETs are connected to ground through their source pins (pin 2).

# POWER ON-OFF SWITCH

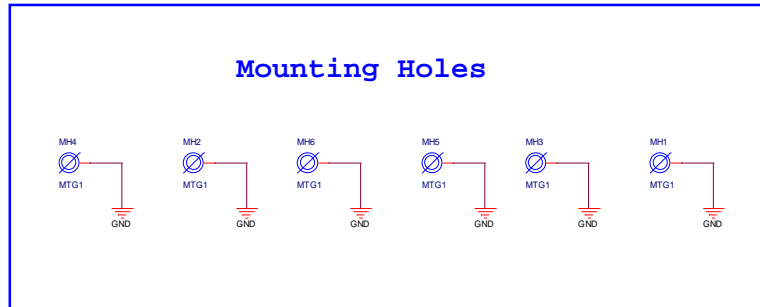
The top diagram illustrates a mechanical power on-off switch. It features a switch component labeled SW6. The control side of the switch is connected to pin A1, which is also connected to pin A2 and then to GND. The switch's other terminal is connected to pin B1, which is also connected to pin B2 and then to GND. A diode D48 (GG440205UR3C2P) is connected in parallel with the switch, with its cathode to B1 and its anode to GND. The output of the switch is labeled ONOFF [11,23,28].

The bottom diagram illustrates a solid-state power on-off switch. It uses a 74ALP1G125GW inverter. The input of the inverter (pin 1) is connected to VCC\_1V8\_EXT through a 10K resistor (R425). The input is also connected to a signal labeled [24] ONOFF\_LS, which is also labeled ONOFF\_LS. The output of the inverter (pin 5) is connected to VCC\_1V8\_EXT. The inverter's VCC (pin 2) is connected to VCC, and its GND (pin 3) is connected to GND. The output of the inverter (pin 4) is connected to GND through a 0E resistor (R426) and then to a signal labeled ONOFF [11,23,28]. A decoupling capacitor C497 (0.22uF, 10V) is connected between the VCC and GND pins of the inverter.

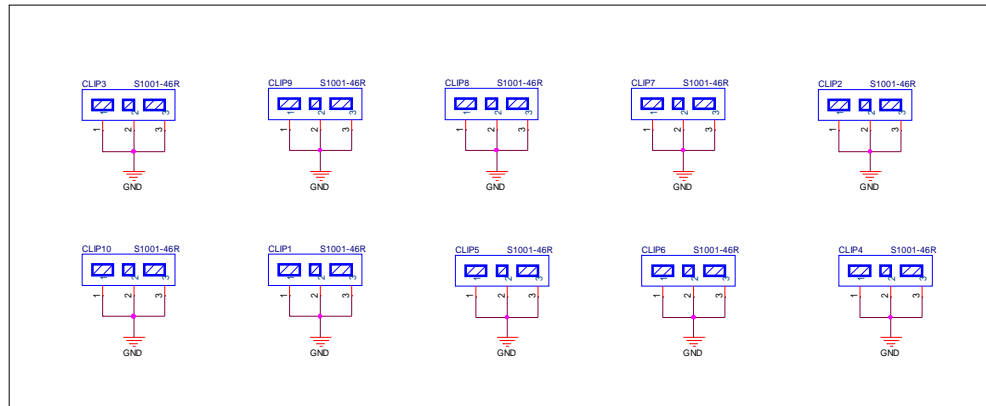
<b>Project</b> Arrow_iMX8M_HMI_Platform		Designed eInfochips	
<b>Title</b> RESET Scheme and LEDs		 The Solutions People	
<b>Size</b> C	eInfochips#: 16_00666_02		<b>Rev</b> 2.0
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# MISCELLANEOUS

## Mounting Holes




## SHIELD CLIPS FOR PROCESSOR AND DDR SECTION



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# REVISION HISTORY1

PCB REV	SCH REV	CHANGE DESCRIPTION	DATE	AUTHOR
	0.1	Initial draft version created for internal review	13/08/2018	eInfochips
	0.2	U7 part changed to MCP6561T, related circuitry changed and added N channel MOSFET SW1 and SW2:SW6 part changed for smaller footprints	25/08/2018	eInfochips
	0.3	ESD added on JTAG connector and R329, R330, R331 are mounted Net name updated for CSI signals on page 24 ; L2 part number changed Pull up provision removed for SD card signals ; R1764, R1765 pull down added at HPD pin of HDMI Reverse protection diode D803 for 12V mezzanine supply added Y502 changed to 20MHz ; C456 & C457 values changed to 16pF ; Removed U60 22uF and 220uF caps to be changed to smaller package ; L9,L10 parts changed for less height 1uF/16V changed to 0402 package ; 22uF/10V changed to 0603 package USB HUB Section power capacitors changed to small package Ethernet Section power capacitors changed to small package L3, L9, L10, L11, L12, L19, L20, L21, L104, L702, L703, L704, L705, L707 parts changed C1734, C1735, C1736, C1767 FPs changed to smaller ; Chassis ground changed U4 removed ; Q1603 added ; U603 value changed as per mfg part ; Y501 pin names modified Y3 part changed ; J9 & J20 part number changed ; U244 added ; C2118 added ; R11 removed GPIO table updated ; C2119 added USB to UART IC added ; A71CH Security IC added ; EEPROM part changed ADP2386 changed to LT8642S and respective passive components changed Murata review comments implemented ; Analog Devices review comments implemented J8, J9, J15, J16, J23 parts changed and footprints changed R1815, R1816, R1817 added ; C2138 added ; R510 & R511 changed to 22E ; R1764 & R1765 changed to 1M NXP review comments implemented ; Microchip Technology review comments implemented Changed C12 to 2.2uF ; R510, R511 mounted ; R512,R513 changed to DNP ; Deleted PCIe supplies to processor Removed C521,C526,C524 ; Changed C529, C530 to 33pF ; Added 10K pull-down on net ENET0_RGMII_RX_CTL Changed R455 to DNP ; Moved C562 after divider ; Y11 part changed same as Y401 USB HUB decaps added ; Switch symbol updated ; LED symbol updated ; CAD Notes added NXP review coments implemented ; C396 removed ; C2117 value changed to 100uF Implemented BOM review comments from Internal team U1603, C2141, C2142, R262, R265 removed ; R1824, R1825, R1826, R1827 added	28/09/2018	eInfochips
	0.4	Changed U7 related circuit Implemented SCH review comments from Internal team ESD Part number is changed on HDMI connector USB HUB port 1 and 4 connection swapped R1843, R1844 resistors added, Y2 part changed	03/10/2018	eInfochips

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# REVISION HISTORY2

PCB REV	SCH REV	CHANGE DESCRIPTION	DATE	AUTHOR
	0.5	Removed R149 ; Changed R460 to 10K ; Removed R455 ; Swapped connection of U24 & U27 Removed D812 ; Removed R217, R218 QSPI power net changed ; D820 Added ; R1846 & C2155 added D819 & R1845 added ; C2156 added ; R164 removed CLIP16, CLIP18, CLIP32, CLIP33, CLIP34, CLIP35, CLIP36, CLIP37, CLIP38 removed R391, R392, R393, R394 removed ; R1814, R1813, R172, R168 changed to 0E	08/10/2018	eInfochips
	0.6	Back annotation done R54, R57, R60, R68, R301 changed to 33E after SI simulation of WIFI Section Ethernet RGMII part changed to Industrial (KSZ9031RXIC-TR)	10/10/2018	eInfochips
	1.0	Alpha released version	11/10/2018	eInfochips
	1.1	SD Card Detect Pin Logic Swap ; USB Hub Mode Select change from external to internal ROM LED1 to LED6 symbol changed ; Changed J17 Debug connector to TMS-103-02-G-S Changed boot mode in BOM to internal boot ; Updated GPIO table in schematics ; R324 changed to 100K Added 0E reistor on MIC pin of Lineout jack to make it CTIA compatible ; U61, U62, U63 added Routed BT UART through USB to UART ; Changed USB to UART to CP2102N for 3M baud rate ADP5014 compensation network changed to C221=15nF, C415=22nF, C228=68nF, C225=47nF USB OTG Part Number changed to Molex-475890001 ; R166 changed to 0E USB_HUB_PWR_EN pull-up DNP for U25 & U26 for 5V; USB_HUB_PWR_EN pull-up added on 3.3V supply CAN SPI pull-up R389, R393, R397, R399 removed 0E removed in proven circuits: R58, R65, R368, R369, R207, R208, R72, R73, R24, R27, R28, R10, R98, R97, R105, R107, R106, R108, R100, R102, R101, R99, R162, R164, R320, R319 CAN Isolator part changed to ADM3054 U64 (AD2428W) and related componens added ; Removed R15, R17, R192, R196, R288 ADI review comments implemented	16/01/2019	eInfochips
	1.2	Internal review comments implemented ; R453 added ; R203, C422 changed to DNP ADI review comments implemented for A2B chassis ground changed ; Voltage level traslator changed to reset buffer C534,R457 and R458 are added,U14 VCC net name changed Murata module part number changed to LBEE5HY1MW-230- from LBEE5HY1MW-TEMP	18/01/2019	eInfochips
	2.0	Beta released version	08/02/2019	eInfochips
	3.0	R398, R403 changed from mounted to DNP ; R395, R404 changed from DNP to mounted LBEE5HY1MW Attenuator circuit modified: C124=270E, C159=270E, R70=20E, R89=1.4nH Production version released	04/04/2019	eInfochips

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