# ASTRIAL

**The following schematic of Astrial is the reduced version.**
**The full version will be released only to customers upon explicit request to EBV Elektronik or System Electronics.**

System Electronics
Via Ghiarola Vecchia, 73
41042 Fiorano Modenese (MO)

## ASTRIAL v.1.0

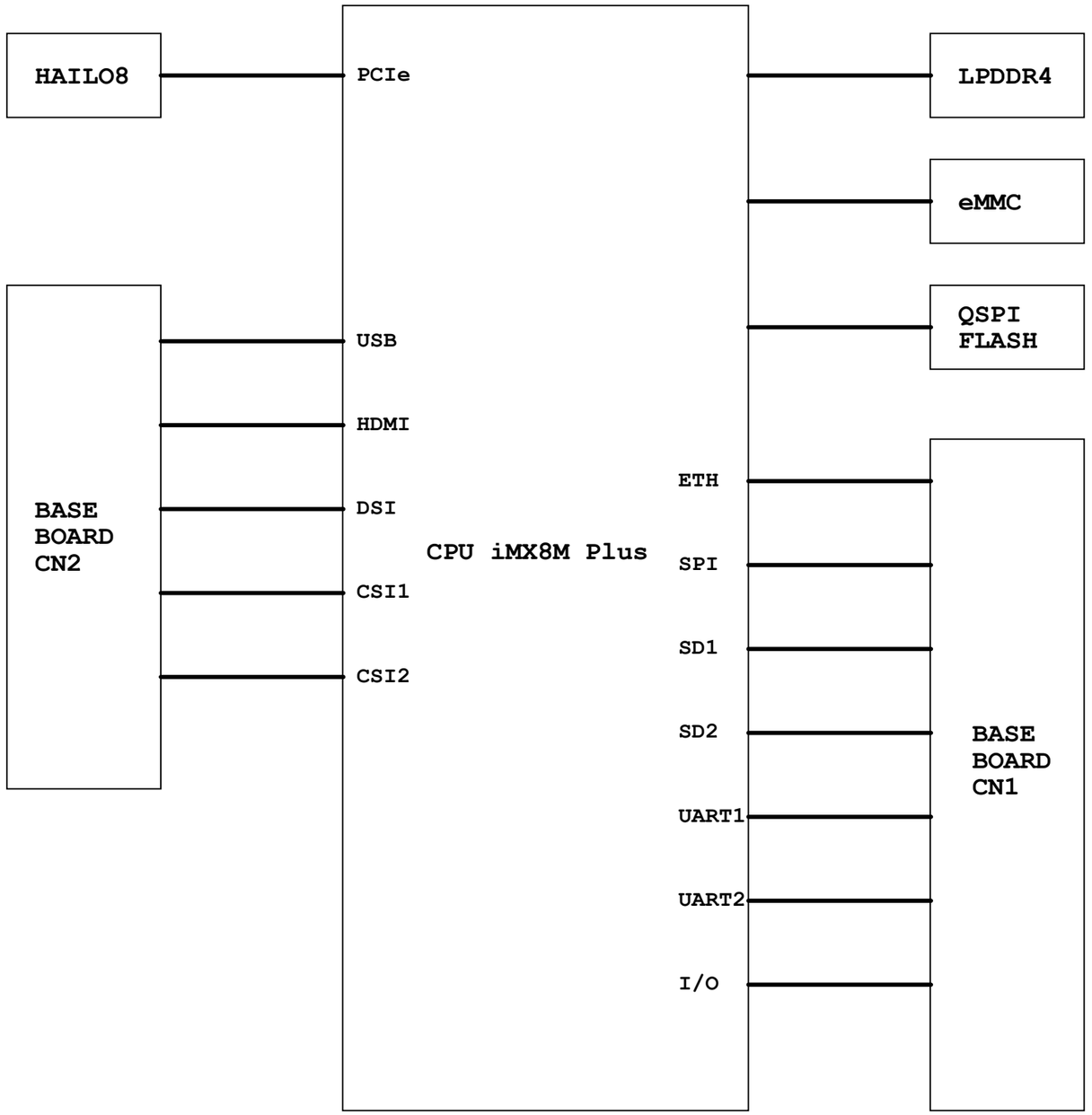
| Size | DWG NO | Rev |
|---|---|---|
| A3 | PCB03 | 3.0 |

| Scale | Sheet |
|---|---|
| | 1 of 17 |

09/09/2024

**POWER SUPPLY:**
**- 5Vcc from Base Board**
**- 5Vcc..16Vcc from VEXT**

**HAILO8 needs an external 5V to be properly supplied**

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| Size | | DWG NO | Rev |
|---|---|---|---|
| A3 | | PCB03 | 3.0 |
| Scale | | Sheet 2 of 17 | |

# ASTRIAL POWER TREE

**Base Board** → VSYS *5V*

**PMIC: PCA9450C**

| SEQ | REG | TYP | Max Capability(mA) |
|---|---|---|---|
| 1 | LDO1 | 1.8 | 10 |
| 2 | RTC_CLK | -- | -- |
| 3 | BUCK1/3 | 0.85/0.95 | 6000 |
| 4 | BUCK2 | 0.85/0.95/1.0 | 3000 |
| 5 | LDO3 | 1.8 | 300 |
| 6 | BUCK5 | 1.8 | 2000 |
| 7 | BUCK6 | 1.1 | 2000 |
| 8 | BUCK4 | 3.3 | 3000 |
| 8 | MUXSW | 3.3 | 400 |
| 9 | LDO5 | 3.3/1.8 | 150 |
| 10 | POR_B | -- | -- |

**CPU: i.MX8M Plus**

| SEQ | PWR/Signal | TYP | Required(mA) |
|---|---|---|---|
| 1 | NVCC_SNVS_1V8 | 1.8 | 10 |
| 2 | 32K_INTERNAL | -- | -- |
| 3 | VDD_SOC | 0.85/0.95 | 5000 |
| 4 | VDD_ARM | 0.85/0.95/1.0 | 2200 |
| 5 | VDDA_1V8 | 1.8 | 300 |
| 6 | VDD_1V8/NVCC_xxx | 1.8 | NxCxVx(0.5xF) |
| 7 | NVCC_DRAM_1V1 | 1.1 | NxCxVx(0.5xF) |
| 8 | VDD_3V3/NVCC_xxx | 3.3 | NxCxVx(0.5xF) |
| 8 | VSD_3V3 | 3.3 | 300 |
| 9 | NVCC_SD2 | 3.3/1.8 | 10 |
| 10 | POR_B | -- | -- |

**LPDDR4**
VDD1
VDD2/VDDQ

**QSPI**
VCC

**eMMC**
VCCQ
VCC

**Transceiver ETH**
VCC

**Base Board Peripherals**

**J3 CONNECTOR**

**VEXT 5V**

**MP8869S OUT -> 0.8V**

**MPM3610A OUT -> 1.8V**

**HAILO8**

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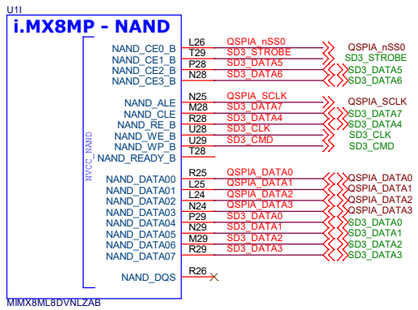
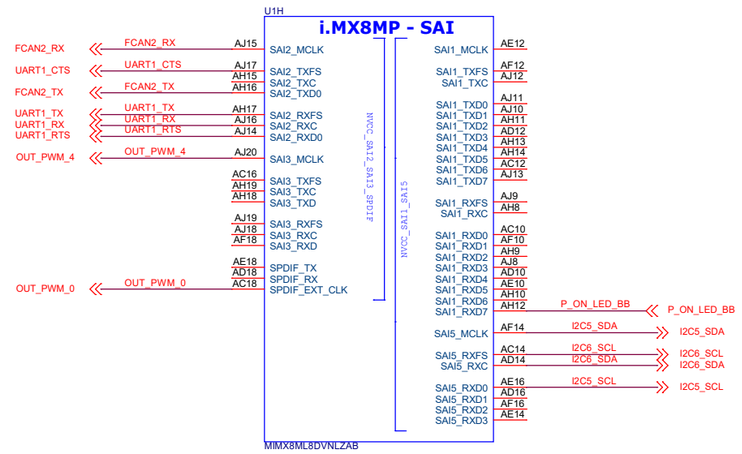
| Size | DWG NO | Rev |
|---|---|---|
| A2 | PCB03 | 3.0 |

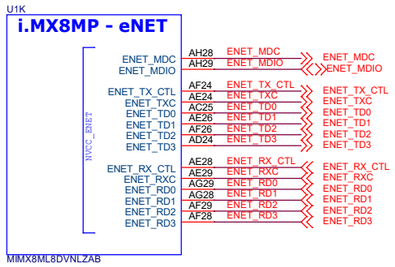
09/09/2024

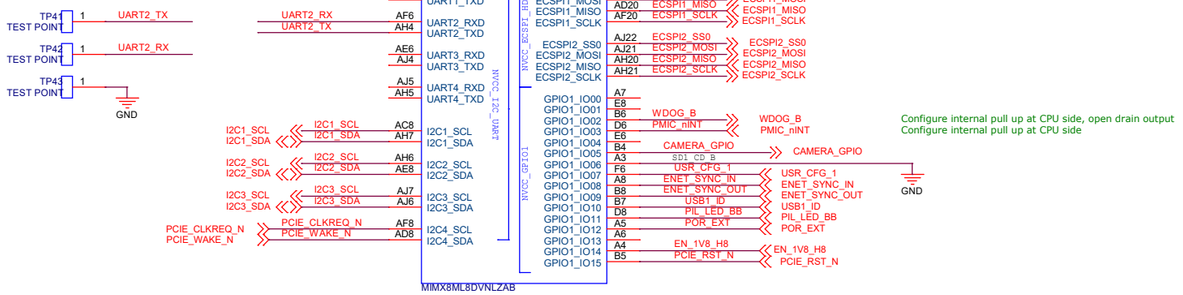
Sheet 3 of 17

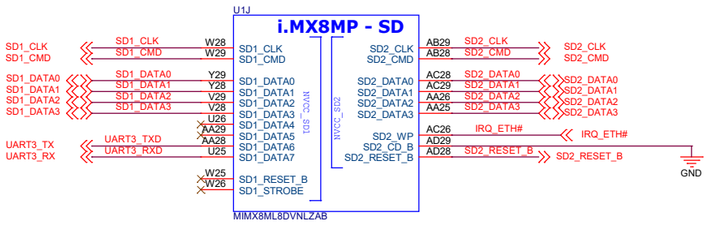
# i.MX8M Plus IO Interface

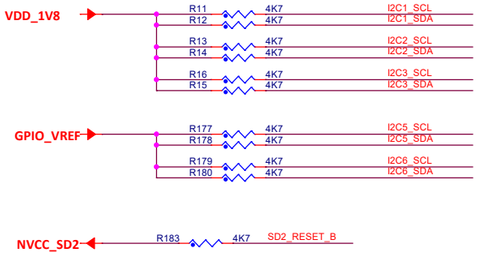


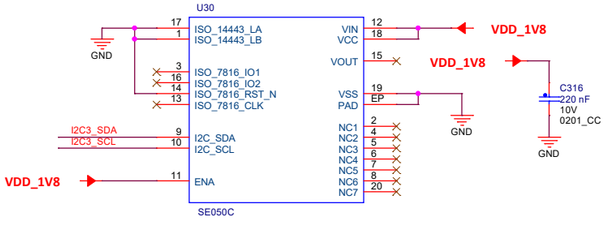

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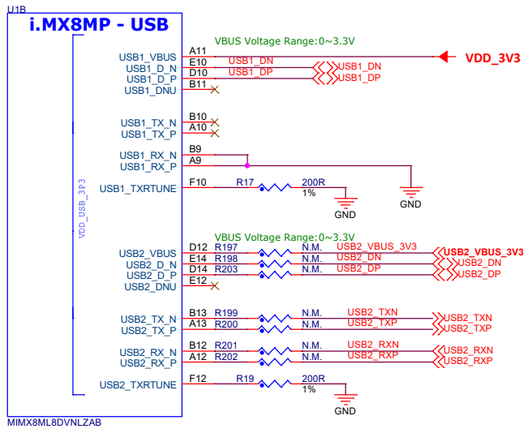
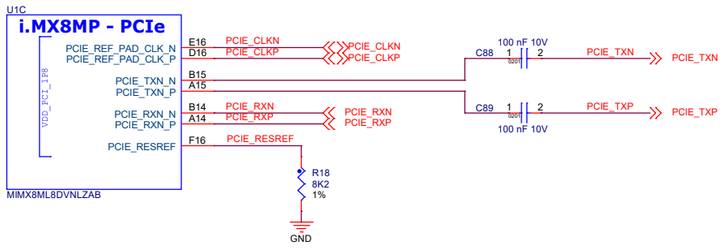
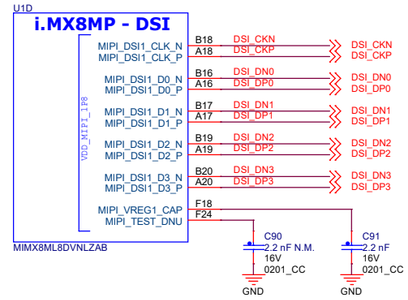
| Size | | DWG NO | Rev |
|---|---|---|---|
| A2 | | PCB03 | 3.0 |
| | | Sheet 6 of 17 | |

09/09/2024

# i.MX8M Plus PHYs

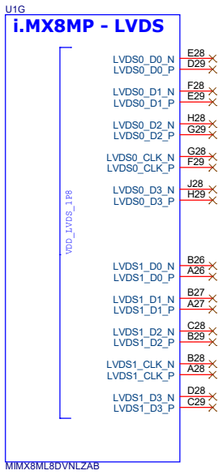


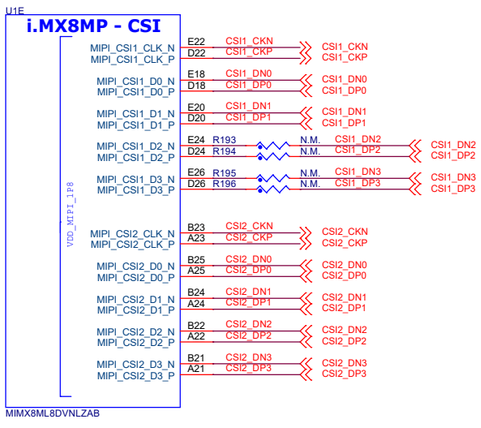



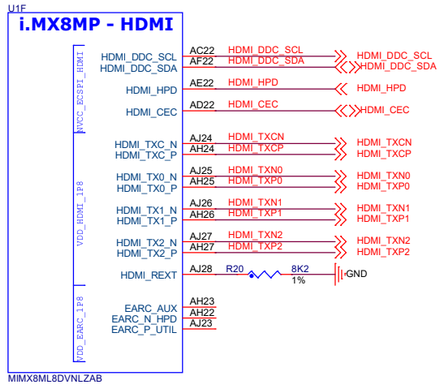




Note:

MIPI_TEST_DNU is for internal test, can be floating for normal use.




| | | |
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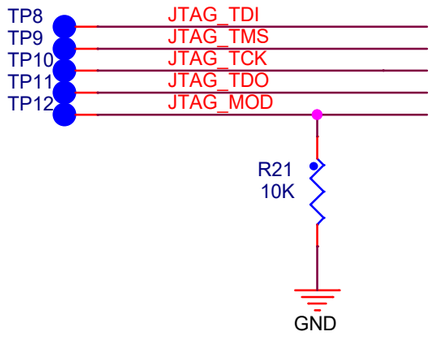
| | ASTRIAL v.1.0 | |
| 09/09/2024 | Size: | DWG NO: PCB03 — Rev: 3.0 |
| | | Sheet: 7 of 17 |

# Boot Mode, CFG Switch and JTAG debug

## JTAG Debug




**Note**

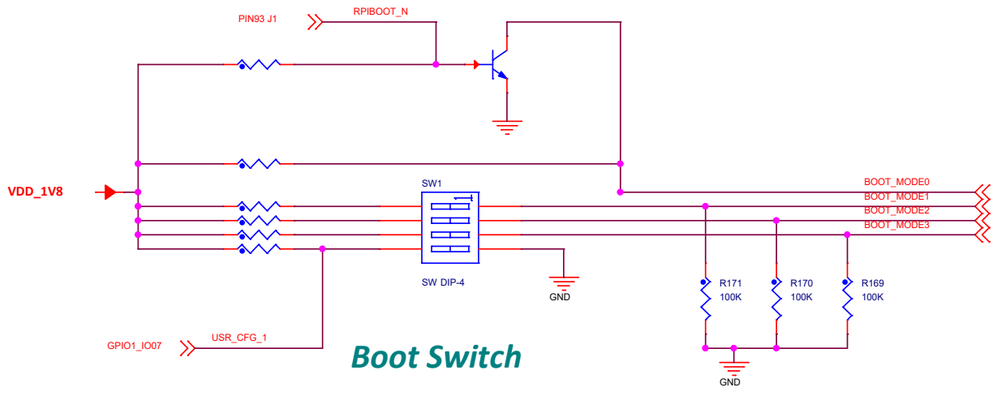
The only allowed configurations are the following:

*i.MX8M Plus Boot Mode*

| BOOT_MODE3 | BOOT_MODE2 | BOOT_MODE1 | RPIBOOT_N (PIN93) DEFAULT=1 | Boot Modes |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | Boot From Internal i.MX8M Fuses |
| 0 | 0 | 0 | 1 | USB Serial Download |
| ***0*** | ***0*** | ***1*** | ***0*** | ***USDHC3 (eMMC boot only, SD3 8-bit) Default*** |
| 0 | 0 | 1 | 1 | USDHC2 (SD boot only, SD2) |
| 0 | 1 | 1 | 0 | QSPI 3B Read |
| 0 | 1 | 1 | 1 | QSPI Hyperflash 3.3V |
| 1 | 0 | 0 | 0 | ecSPI Boot |

**Caution:**

BOOT_MODE0, BOOT_MODE1, BOOT_MODE2, BOOT_MODE3, JTAG_MOD and POR_B must be pulled to "111111" for i.MX8M Plus to enter Boundary Scan mode.




Boot Switch

**Note**

For i.MX8M Plus ROM fuse, please refer to NXP technical manual: IMX8MPRM.

RPIBOOT_N is compliant to CM4 form factor carriers and is connected to BOOT_MODE0.

| | | | |
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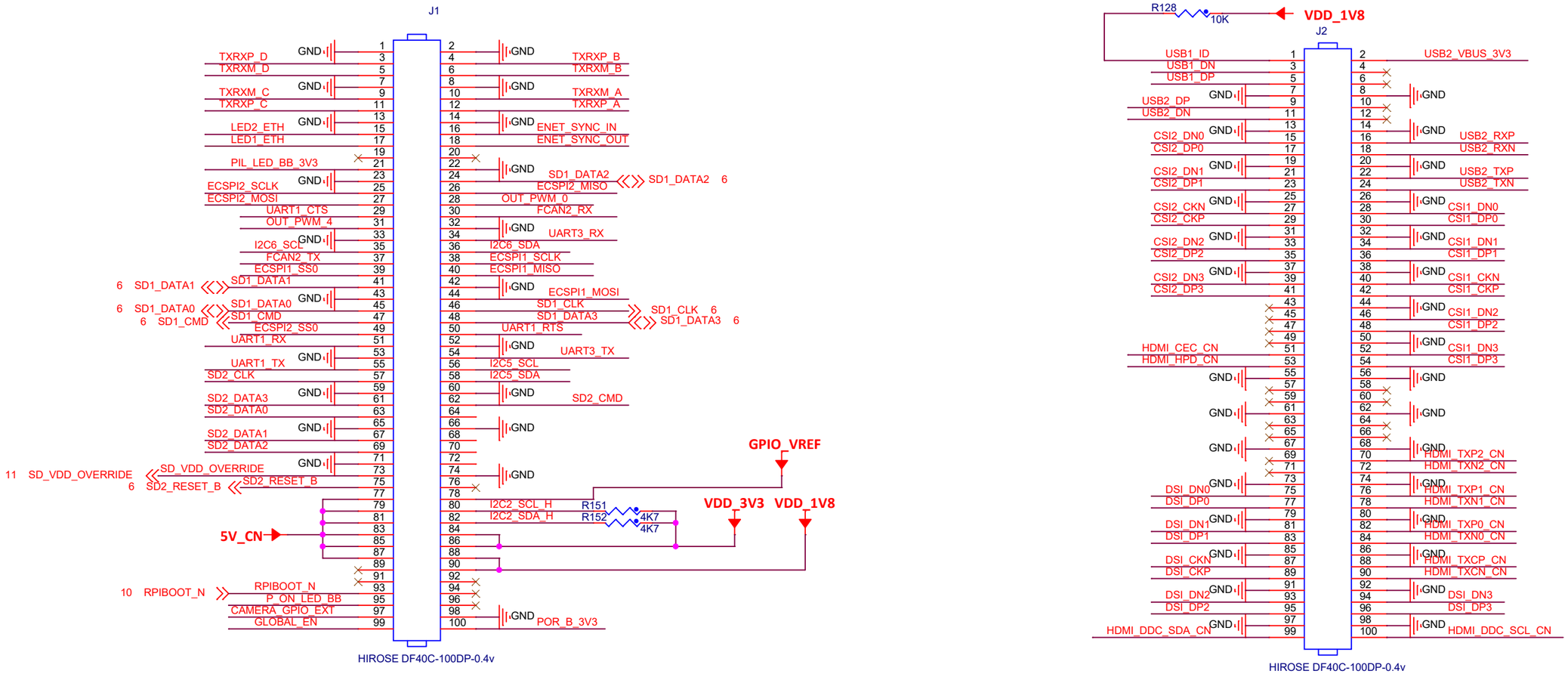
| | ASTRIAL v.1.0 | | |
| | Size A2 | DWG NO PCB03 | Rev 3.0 |
| 09/09/2024 | | Sheet 10 of 17 | |

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| Size | DWG NO | Rev |
|---|---|---|
| A3 | PCB03 | 3.0 |

Sheet 13 of 17

| Pin Number | J1 Connector Pin | J2 Connector Pin | Pin Description |
|---|---|---|---|
| 1 | 1 | - | GND |
| 2 | 2 | - | GND |
| 3 | 3 | - | TXRXP_D |
| 4 | 4 | - | TXRXP_B |
| 5 | 5 | - | TXRXM_D |
| 6 | 6 | - | TXRXM_B |
| 7 | 7 | - | GND |
| 8 | 8 | - | GND |
| 9 | 9 | - | TXRXM_C |
| 10 | 10 | - | TXRXM_A |
| 11 | 11 | - | TXRXP_C |
| 12 | 12 | - | TXRXP_A |
| 13 | 13 | - | GND |
| 14 | 14 | - | GND |
| 15 | 15 | - | LED2_ETH |
| 16 | 16 | - | ENET_SYNC_IN |
| 17 | 17 | - | LED1_ETH |
| 18 | 18 | - | ENET_SYNC_OUT |
| 19 | 19 | - | NC |
| 20 | 20 | - | NC |
| 21 | 21 | - | PIL_LED_BB_3V3 |
| 22 | 22 | - | GND |
| 23 | 23 | - | GND |
| 24 | 24 | - | SD1_DATA2 |
| 25 | 25 | - | ECSPI2_SCLK |
| 26 | 26 | - | ECSPI2_MISO |
| 27 | 27 | - | ECSPI2_MOSI |
| 28 | 28 | - | OUT_PWM_0 |
| 29 | 29 | - | UART1_CTS |
| 30 | 30 | - | FCAN2_RX |
| 31 | 31 | - | OUT_PWM_4 |
| 32 | 32 | - | GND |
| 33 | 33 | - | GND |
| 34 | 34 | - | UART3_RX |
| 35 | 35 | - | I2C6_SCL |
| 36 | 36 | - | I2C6_SDA |
| 37 | 37 | - | FCAN2_TX |
| 38 | 38 | - | ECSPI1_SCLK |
| 39 | 39 | - | ECSPI1_SS0 |
| 40 | 40 | - | ECSPI1_MISO |
| 41 | 41 | - | SD1_DATA1 |
| 42 | 42 | - | GND |
| 43 | 43 | - | GND |
| 44 | 44 | - | ECSPI1_MOSI |
| 45 | 45 | - | SD1_DATA0 |
| 46 | 46 | - | SD1_CLK |
| 47 | 47 | - | SD1_CMD |
| 48 | 48 | - | SD1_DATA3 |
| 49 | 49 | - | ECSPI2_SS0 |
| 50 | 50 | - | UART1_RTS |
| 51 | 51 | - | UART1_RX |
| 52 | 52 | - | GND |
| 53 | 53 | - | GND |
| 54 | 54 | - | UART3_TX |
| 55 | 55 | - | UART1_TX |
| 56 | 56 | - | I2C5_SCL |
| 57 | 57 | - | SD2_CLK |
| 58 | 58 | - | I2C5_SDA |
| 59 | 59 | - | GND |
| 60 | 60 | - | GND |
| 61 | 61 | - | SD2_DATA3 |
| 62 | 62 | - | SD2_CMD |
| 63 | 63 | - | SD2_DATA0 |
| 64 | 64 | - | NC |
| 65 | 65 | - | GND |
| 66 | 66 | - | GND |
| 67 | 67 | - | SD2_DATA1 |
| 68 | 68 | - | NC |
| 69 | 69 | - | SD2_DATA2 |
| 70 | 70 | - | NC |
| 71 | 71 | - | GND |
| 72 | 72 | - | NC |
| 73 | 73 | - | SD_VDD_OVERRIDE |
| 74 | 74 | - | GND |
| 75 | 75 | - | SD2_RESET_B |
| 76 | 76 | - | RESERVED |
| 77 | 77 | - | + 5V |
| 78 | 78 | - | GPIO_VREF |
| 79 | 79 | - | + 5V |
| 80 | 80 | - | I2C2_SCL_H (Internal 4.7K pull up to 3.3V) |
| 81 | 81 | - | + 5V |
| 82 | 82 | - | I2C2_SDA_H (Internal 4.7K pull up to 3.3V) |
| 83 | 83 | - | + 5V |
| 84 | 84 | - | VDD_3V3 |
| 85 | 85 | - | + 5V |
| 86 | 86 | - | VDD_3V3 |
| 87 | 87 | - | + 5V |
| 88 | 88 | - | VDD_1V8 |
| 89 | 89 | - | NC |
| 90 | 90 | - | VDD_1V8 |
| 91 | 91 | - | NC |
| 92 | 92 | - | NC |
| 93 | 93 | - | RPIBOOT_N |
| 94 | 94 | - | NC |
| 95 | 95 | - | P_ON_LED_BB |
| 96 | 96 | - | NC |
| 97 | 97 | - | CAMERA_GPIO_EXT |
| 98 | 98 | - | GND |
| 99 | 99 | - | GLOBAL_EN |
| 100 | 100 | - | POR_B_3V3 |

| Pin Number | J1 Connector Pin | J2 Connector Pin | Pin Description |
|---|---|---|---|
| 101 | - | 1 | USB1_ID |
| 102 | - | 2 | USB2_VBUS_3V3 |
| 103 | - | 3 | USB1_DN |
| 104 | - | 4 | NC |
| 105 | - | 5 | USB1_DP |
| 106 | - | 6 | NC |
| 107 | - | 7 | GND |
| 108 | - | 8 | GND |
| 109 | - | 9 | USB2_DP |
| 110 | - | 10 | NC |
| 111 | - | 11 | USB2_DN |
| 112 | - | 12 | NC |
| 113 | - | 13 | GND |
| 114 | - | 14 | GND |
| 115 | - | 15 | CSI2_DN0 |
| 116 | - | 16 | USB2_RXP |
| 117 | - | 17 | CSI2_DP0 |
| 118 | - | 18 | USB2_RXN |
| 119 | - | 19 | GND |
| 120 | - | 20 | GND |
| 121 | - | 21 | CSI2_DN1 |
| 122 | - | 22 | USB2_TXP |
| 123 | - | 23 | CSI2_DP1 |
| 124 | - | 24 | USB2_TXN |
| 125 | - | 25 | GND |
| 126 | - | 26 | GND |
| 127 | - | 27 | CSI2_CKN |
| 128 | - | 28 | CSI1_DN0 |
| 129 | - | 29 | CSI2_CKP |
| 130 | - | 30 | CSI1_DP0 |
| 131 | - | 31 | GND |
| 132 | - | 32 | GND |
| 133 | - | 33 | CSI2_DN2 |
| 134 | - | 34 | CSI1_DN1 |
| 135 | - | 35 | CSI2_DP2 |
| 136 | - | 36 | CSI1_DP1 |
| 137 | - | 37 | GND |
| 138 | - | 38 | GND |
| 139 | - | 39 | CSI2_DN3 |
| 140 | - | 40 | CSI1_CKN |
| 141 | - | 41 | CSI2_DP3 |
| 142 | - | 42 | CSI1_CKP |
| 143 | - | 43 | NC |
| 144 | - | 44 | GND |
| 145 | - | 45 | NC |
| 146 | - | 46 | CSI1_DN2 |
| 147 | - | 47 | NC |
| 148 | - | 48 | CSI1_DP2 |
| 149 | - | 49 | NC |
| 150 | - | 50 | GND |
| 151 | - | 51 | HDMI_CEC_CN |
| 152 | - | 52 | CSI1_DN3 |
| 153 | - | 53 | HDMI_HPD_CN |
| 154 | - | 54 | CSI1_DP3 |
| 155 | - | 55 | GND |
| 156 | - | 56 | GND |
| 157 | - | 57 | NC |
| 158 | - | 58 | NC |
| 159 | - | 59 | NC |
| 160 | - | 60 | NC |
| 161 | - | 61 | GND |
| 162 | - | 62 | GND |
| 163 | - | 63 | NC |
| 164 | - | 64 | NC |
| 165 | - | 65 | NC |
| 166 | - | 66 | NC |
| 167 | - | 67 | GND |
| 168 | - | 68 | GND |
| 169 | - | 69 | NC |
| 170 | - | 70 | HDMI_TXP2_CN |
| 171 | - | 71 | NC |
| 172 | - | 72 | HDMI_TXN2_CN |
| 173 | - | 73 | GND |
| 174 | - | 74 | GND |
| 175 | - | 75 | DSI_DN0 |
| 176 | - | 76 | HDMI_TXP1_CN |
| 177 | - | 77 | DSI_DP0 |
| 178 | - | 78 | HDMI_TXN1_CN |
| 179 | - | 79 | GND |
| 180 | - | 80 | GND |
| 181 | - | 81 | DSI_DN1 |
| 182 | - | 82 | HDMI_TXP0_CN |
| 183 | - | 83 | DSI_DP1 |
| 184 | - | 84 | HDMI_TXN0_CN |
| 185 | - | 85 | GND |
| 186 | - | 86 | GND |
| 187 | - | 87 | DSI_CKN |
| 188 | - | 88 | HDMI_TXCP_CN |
| 189 | - | 89 | DSI_CKP |
| 190 | - | 90 | HDMI_TXCN_CN |
| 191 | - | 91 | GND |
| 192 | - | 92 | GND |
| 193 | - | 93 | DSI_DN2 |
| 194 | - | 94 | DSI_DN3 |
| 195 | - | 95 | DSI_DP2 |
| 196 | - | 96 | DSI_DP3 |
| 197 | - | 97 | GND |
| 198 | - | 98 | GND |
| 199 | - | 99 | HDMI_DDC_SDA_CN |
| 200 | - | 100 | HDMI_DDC_SCL_CN |