

TX Family Computer On Module

- Processor 1.5GHz Dual ARM® Cortex®-A35 based STM32MP257
- RAM 1GB LPDDR4
- ROM 4GB eMMC
- Power supply 5V +/- 10%
- Size 26mm SO-DIMM
- Grade Industrial
- Temperature -40°C to 85°C

Key Features

- Dual ARM® Cortex®-A35
ARM® Cortex®-M33, 400 MHz
Vivante® NPU, 1.35 TOPS
- Display support:
 - RGB Display Interface
 - 3D GPU: OpenGL® ES 3.1 - Vulkan 1.1, OpenCL™ 1.2, OpenVX™ 1.1, Up to 149 Mtriangle/s, 900 Mpixel/s
 - 1080p60 video de-/encode

Connectivity

- 2x Ethernet
 - 10/100 Ethernet with PHY
 - Gb Ethernet, RGMII
- 2x USB 2.0, 1x PCIe or
1x USB 2.0, 1x USB 3.0
- up to 9x UART, 8x I²C, 8x SPI, 3x FlexCAN
- 1x eMMC/SD
- MIPI-CSI (2-lane)
- 3.3V I/O

OS Support

- Linux



**Dual
Cortex®-A35**



**Authorized
Partner**



STM32MP2

The STM32MP2 series is an industrial-grade 64-bit solution for secure Industry 4.0 and advanced edge computing applications that require high-end multimedia capabilities.

The STM32MP25 lines are the first of the STM32MP2 series.

Reaching up to 6,000 DMIPS, they support the growth of smart, connected applications thanks to robust features and a significant performance upgrade compared to previous generations.

Robustness

- 100% operating time for 10 years
- Extended temperature up to +125°C
- 10-year longevity program

Neural processing unit accelerator

- 1.35 TOPS (tera operations per second)

Strong security

- SESIP Level 3 certification
- TrustZone® on Cortex®-A and Cortex®-M
- Robust hardware encryption

TX Computer on Module

- STM32MP257
- 1GB LPDDR4 SDRAM
- 4GB eMMC
- DIMM200-module (67,6mm x 26 mm x 4mm)

Standard TXCOM pinout:

Highly scalable design options allow a single platform to cover multiple products. Pin-compatible TX modules allow a single PCB as a platform for different features as product needs dictate.

- 4-wire UARTs (x3)
- I2C / PWM
- Serial Audio Interface
- 4-wire SD-Card/SDIO

High-Speed communication interfaces incl. onboard Ethernet PHY / on-chip USB PHY allows direct use of connectors/magnetics on the baseboard without the need for additional logic:

- 10/100 Mbps Ethernet
- USB 2.0 OTG (Host or Device)
- USB 3.0 Host

Read more in our TX-Guide:

www.karo-electronics.com/tx-guide

STM32MP257F

System

Power Supply Regulators
Crystal & Internal oscillators
Cyclic Redundancy Check (CRC)
Watchdogs (I & W)
96-bit unique ID
Up to 176 GPIOs

Security

RIF: Isolation and safe sharing of system resources
Octal SPI OTF Decryption
DRAM OTF Encryption/Dec.
DES, TDES, AES-256 with SCA
SHA-256/512, SHA-3, HMAC
PKA ECC/RSA with SCA
16x Tamper pins
T ^o , V, F and 32KHz detection
Secure RTC
Analog true RNG

Dual Cortex-A35 @ 1.2GHz / up to 1.5GHz

Core 1 @ 1.5GHz L1 32kB I / 32kB D	Core 2 @ 1.5GHz L1 32kB I / 32kB D
NEON SIMD MPE	NEON SIMD MPE
512kB L2 cache	
TrustZone	

Cortex-M33 @ 400MHz

16 kB I-Cache	16 kB D-Cache
FPU / MPU / NVIC	TrustZone

DDR4/LPDDR4 32b @ 1.2GHz

DDR3(L) 32b @ 1066MHz

Shared RAM 640kB including 128kB Retention RAM
Backup RAM 8kB / Boot ROM 128kB / OTP fuse 12kB

Control

3x 16-bit motor control PWM synchronized AC timer	
10x 16-bit timer	5x 16-bit LP timer
4x 32-bit timer	

Multimedia / AI

3D GPU: OpenGL ES3.1 / Vulkan 1.1 / OpenCL 1.2	
AI / NN HW Acceleration: up to 1.35 TOPS	
1080p60 H.264, VP8 Video Decoder / Encoder	
24b RGB Disp. 1080p @ 60fps	LVDS Display 8 lanes with PHY
DSI Display 4 lanes with PHY	Camera I/F MIPI CSI-2, 2 lanes
Lite-ISP (Camera Pipeline)	Camera I/F 16-bit Parallel

Connectivity

1Gbps ETH/TSN port	1Gbps ETH/TSN port
3x CAN-FD / TTCAN	PCIe Gen2, 1 lane + USB2.0 Host/Device HS or USB3.0 DRD
3x SDIO3.0 / SD 3 / eMMC 5.1	USB2.0 Host HS + HS PHY
16-bit SLC NAND, 8-bit-ECC	USB Type-C connector support
2x Octal SPI, 8x SPI	4x I ² C, 4x I ³ C, 3x I ² S
5x UART, 4x USART	

Audio

SPDIF Rx 4 inputs
4x SAI
MDF 8 channels / 8 filters

Analog

3x 12-bit ADC 5 MSPS
Temperature sensor

Ordering Information

Order Number	CPU	SDRAM	Flash	
TXMP2/257F/1GS/4GF/I	1.5 GHz STM32MP257F	1 GB	4 GB	

PINOUT

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
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POWER SUPPLY & RESET

1-4	VIN						
5-7, 9-12	VOUT						
8	BOOTMODE	BOOT1					1K-PU
13	VBACKUP	VBAT					
14							STPMIC25 PONKEYn
15	#RESET_OUT	NRSTC1MS					10K-PU
16	#POR	NRST					
17	#RESET_IN	Not connected					
18	GND						

Ethernet

19	ETN_TXN		Transmit Data Negative: 100Base-TX or 10Base-T differential transmit output to magnetics.				
20	#ETN_LED2		Active low - output is driven active when the operating speed is 100Mbps. This LED will go inactive when the operating speed is 10Mbps or during line isolation.				
21	ETN_TXP		Transmit Data Positive: 100Base-TX or 10Base-T differential transmit output to magnetics.				
22	ETN_3V3		+3.3V analog power supply output to magnetics				
23	ETN_RXN		Receive Data Negative: 100Base-TX or 10Base-T differential receive input from magnetics.				
24	#ETN_LED1		Active low - output is driven active whenever the device detects a valid link, and blinks indicating activity.				
25	ETN_RXP		Receive Data Positive: 100Base-TX or 10Base-T differential receive input from magnetics.				
26	GND						

USB-HOST

27	USBH_VBUSEN	PC10	- I2S3_SDO/SPI3_MOSI -	- LPTIM4_ETR SAI2_SCK_A -	TIM8_CH4 USBH_HS_VBUSEN ETH2_TXD3 USB3DR_VBUSEN TIM8_CH4N	FMC_A23 LTDC_G3 DCMIPP_D6/DCMI_D6/PSSI_D6	
28	#USBH_OC	PC9	- RCC_MCO_1 I2S3_SDI/SPI3_MISO -	- SAI2_SCK_A - TIM13_CH1	USBH_HS_OVRCUR ETH2_TXD2 USB3DR_OVRCUR	FMC_A22 LTDC_G2 DCMIPP_D7/DCMI_D7/PSSI_D7	
29	USBH_DM	USBH_HS_DM					
30	USBH_VBUS						
31	USBH_DP	USBH_HS_DP					
32	GND						

USB-OTG

33	USBOTG_ID	P29	- RCC_MCO_2 - SPI8_RDY	MDF1_CK15 - LPUART1_TX LPTIM4_ETR	I2C8_SDA - LPTIM3_CH2 I3C4_SDA	- - -	
34	USBOTG_VBUSEN	PD2	- HDP_HDP2 I2S1_WS/SPI1_NSS SAI1_CK1	SAI4_SCK_A UART7_CTS TIM15_BKIN	TIM1_ETR FDCAN3_TX OCTOSPIM_P1_DQS OCTOSPIM_P1_NCS2	- DCMIPP_VSYNC/PSSI_RDY -	
35	USBOTG_DM	USB3DR_DM					
36	USBOTG_OC	PD1	- HDP_HDP1 I2S1_SDI/SPI1_MISO SAI1_CK2	- SAI4_SD_A UART7_DE/UART7_RTS TIM15_CH1	TIM1_BKIN FDCAN3_RX OCTOSPIM_P1_NCLK OCTOSPIM_P1_NCS2	OCTOSPIM_P2_NCS2 DCMIPP_HSYNC/PSSI_DE -	
37	USBOTG_DP	USB3DR_DP					
38	USBOTG_VBUS	Not connected					
39	GND						

I2C

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
40	I2C_DATA	PH2	- LPTIM2_CH1 SPI7_RDY SPDIFRX_IN3	SAI1_SCK_B I3C3_SDA - TIM16_CH1	I2C5_SDA I2C3_SDA - -	- - ETH3_RGMII_GTX_CLK	
41	I2C_CLK	PH6	- LPTIM2_IN2 - -	SAI1_MCLK_B I3C3_SCL - TIM16_CH1N	I2C5_SCL I2C3_SCL I2C1_SMBA -	- - ETH3_RGMII_TXD2	
PWM							
42	PWM	PD10	DEBUG_TRACED6 HDP_HDP7 - SAI1_SCK_A	UART4_RX MDF1_SDI0 I2C4_SDA -	TIM1_CH2 TIM14_CH1 OCTOSPIM_P1_IO6 SDMMC1_D5	SDMMC1_CDIR DCMIPP_D8/PSSI_D8 -	
1-WIRE							
43	Not connected						
SPI – Serial Peripheral Interface							
44	CSPI_SS	PB3	- I2S2_WS/ SPI2_NSS -	- MDF1_SDI3 -	TIM20_CH3 - OCTOSPIM_P2_IO3 -	FMC_NCE3 -	
45	CSPI_SS	PB1	- I2S3_WS/SPI3_NSS -	- - -	TIM16_CH1N TIM20_CH3N - OCTOSPIM_P2_IO1	- FMC_NCE4 -	
46	CSPI_MOSI	PB2	- I2S2_SDO/ SPI2_MOSI -	MDF1_CK13 TIM17_BKIN TIM16_BKIN	TIM20_CH2N - OCTOSPIM_P2_IO2	- - -	
47	CSPI_MISO	PB6	- I2S2_SDI/ SPI2_MISO UART4_RX	SAI4_SCK_B - -	TIM20_CH1N - OCTOSPIM_P2_IO6 -	FMC_D9/FMC_DA9 SDMMC3_D0DIR	
48	CSPI_SCLK	PB0	- I2S2_CK/ SPI2_SCK -	- USART1_CK TIM16_CH1	TIM20_CH4N - OCTOSPIM_P2_IO0	- - -	
49	CSPI_RDY	PB4	- - SPI2_RDY UART4_CTS	SAI4_FS_B MDF1_SDI4 TIM14_CH1 -	TIM20_CH2 I2C2_SDA OCTOSPIM_P2_IO4 -	- I3C2_SDA -	
50	GND						
SD – Secure Digital Interface 1							
51	SD1_CD	PB5	- - I2S2_MCK UART4_DE/UART4_RTS	SAI4_SD_B MDF1_CK14 -	TIM20_CH1 I2C2_SCL OCTOSPIM_P2_IO5 -	FMC_D8/FMC_DA8 I3C2_SCL SDMMC3_D123DIR	
52	SD1_D[0]	PE4	DEBUG_TRACED0 LPTIM2_IN1 I2S1_SDO/SPI1_MOSI I2S3_SDI/SPI3_MISO	SAI1_SD_B - USART3_CTS FDCAN1_TX	- - SDMMC1_D0 -	- - -	
53	SD1_D[1]	PE5	DEBUG_TRACED1 LPTIM2_IN2 I2S1_WS/SPI1_NSS I2S3_WS/SPI3_NSS	SAI1_FS_B - USART3_RTS FDCAN1_RX	- - SDMMC1_D1 -	- - -	
54	SD1_D[2]	PE0	DEBUG_TRACED2 LPTIM2_CH1 I2S1_CK/SPI1_SCK SPI3_RDY	- - USART3_CK -	- - SDMMC1_D2 -	- - -	
55	SD1_D[3]	PE1	DEBUG_TRACED3 LPTIM2_CH2 I2S1_MCK I2S3_MCK	- - USART3_RX -	- - SDMMC1_D3 -	- - -	
56	SD1_CMD	PE2	- LPTIM2_ETR I2S1_SDI/SPI1_MISO I2S3_SDO/SPI3_MOSI	SAI1_SCK_B - - -	TIM10_CH1 - SDMMC1_CMD -	- - -	
57	SD1_CLK	PE3	DEBUG_TRACECLK - SPI1_RDY I2S3_CK/SPI3_SCK	SAI1_MCLK_B - USART3_TX -	TIM11_CH1 - SDMMC1_CK -	- - -	
58	GND						
1 st UART (Debug)							

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
59	TXD	PA4	- - -	- USART2_TX FDCAN2_TX SAI1_FS_B	TIM2_CH1 LTDC_R1 -	- ETH1_PTP_AUX_TS ETH3_PPS_OUT	
60	RXD	PA8	LPTIM2_CH2 SPI7_NSS -	- USART1_CK -	USART2_RX I2C5_SCL -	LTDC_B2 DCMIPP_D4/DCMI_D4/PSSI_D4 -	
61	RTS/CTS IN	PA9	- - SPI4_NSS	SAI2_SCK_B - USART2_CTS LPTIM5_ETR	TIM2_CH3 - ETH1_MDC	LTDC_G7 DCMIPP_D14/PSSI_D14 ETH3_RXD0	
62	CTS/RTS OUT	PA5	- - SPI4_MOSI	SAI2_MCLK_B SAI2_SD_B USART2_RTS FDCAN2_RX	TIM2_CH4 - LTDC_G0 -	FMC_A0 DCMIPP_D13/PSSI_D13 ETH3_RX_CLK/ETH3_REF_CLK	
2nd UART							
63	TXD	PB8	- I2S3_SDO/SPI3_MOSI -	PCIE_CLKREQN - USART1_TX TIM17_CH1	TIM20_CH4 - OCTOSPIM_P2_NCS1 -	FMC_D12/FMC_DA12 - -	
64	RXD	PB10	- I2S3_SDI/SPI3_MISO -	- USART1_RX TIM17_CH1N SAI4_SD_B	- OCTOSPIM_P2_CLK -	FMC_D15/FMC_DA15 - -	
65	RTS/CTS IN	PI3	- - LPTIM1_IN2	- USART1_CTS -	TIM8_CH2 - -	- LTDC_B6 DCMIPP_D14/PSSI_D14	
66	CTS/RTS OUT	PB9	- SPI3_RDY -	- USART1_RTS FDCAN1_TX	TIM20_BKIN TIM10_CH1 OCTOSPIM_P2_DQS OCTOSPIM_P2_NCS2	FMC_D13/FMC_DA13 - -	
3rd UART							
67	TXD	PD3	- SAI1_MCLK_A I2S2_CK/SPI2_SCK SAI1_D1	- SAI4_MCLK_A UART7_TX TIM15_CH1N	TIM1_BKIN2 - OCTOSPIM_P1_NCS1 -	- DCMIPP_D15/PSSI_D15 -	
68	RXD	PD0	DEBUG_TRACECLK HDP_HDP0 SPI7_RDY SAI1_D2	- SAI4_FS_A UART7_RX TIM15_CH2 UART4_RX	- OCTOSPIM_P1_CLK -	DCMIPP_PIXCLK/PSSI_PDCK -	
69	RTS/CTS IN	PH8	- I2S1_SDI/SPI1_MISO SPDIFRX_IN3	- UART7_CTS -	TIM5_CH1 I2C3_SMBA I2C5_SMBA	- ETH3_RGMII_RXD3	
70	CTS/RTS OUT	PH7	- I2S1_SDO/SPI1_MOSI -	UART4_TX - UART7_DE/UART7_RTS TIM17_CH1	TIM5_CH4 I2C7_SDA -	- ETH3_RGMII_RXD2	
71	GND						
KEYPAD / CAN							
72	KP_COL[0]	PC12	- LPTIM1_CH2 I3C3_SCL	- MDF1_CK12 -	TIM8_CH3 I2C3_SCL ETH2_RXD1 ETH1_RXD3	- LTDC_G1 DCMIPP_D5/DCMI_D5/PSSI_D5	
73	KP_COL[1]	PC7	- - SPI6_MOSI	SAI3_SD_B - -	TIM8_CH2N - ETH2_TXD0 ETH1_TXD2	- LTDC_B4 DCMIPP_D1/DCMI_D1/PSSI_D1	
74	KP_COL[2]	PC4	- - SPI6_MISO	SAI3_FS_B - -	- ETH2_TX_EN/ETH2_TX_CTL -	ETH1_RGMII_CLK125 LTDC_R0 -	
75	KP_COL[3]	PZ8	- - LPTIM3_IN1 SPI8_MISO	MDF1_SDI5 ADF1_SDI0 LPUART1_RX LPTIM4_CH1	I2C8_SMBA LPTIM5_ETR -	- - -	
76	TXCAN	PD15	- SPI1_RDY -	- DSIHOST_TE I2C5_SDA FDCAN1_TX	TIM1_BKIN2 TIM5_ETR I2C7_SCL FMC_D3/FMC_DA3	SDMMC3_CKIN DCMIPP_D0/DCMI_D0/PSSI_D0 -	
77	KP_ROW[0]	PG0	- LPTIM1_IN1 I3C3_SDA	- MDF1_SDI2 -	TIM8_CH3N I2C3_SDA ETH2_RXD0 ETH1_RXD2	- LTDC_G5 DCMIPP_D4/DCMI_D4/PSSI_D4	

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
78	KP_ROW[1]	PC3	- LPTIM1_IN2 I2S3_WS/SPI3_NSS SPI6_RDY	- USART6_RTS FDCAN2_TX SAI3_SCK_B	- ETH2_RX_CTL/ETH2_CRD_DV ETH1_MII_RX_ER	- LTDC_G6 DCMIPP_D3/DCMI_D3/PSSI_D3	
79	KP_ROW[2]	PC8	- LPTIM1_ETR - SPI6_NSS	- USART6_CTS - SAI3_SCK_A	- TIM8_CH2 - ETH2_TXD1 ETH1_TXD3	- LTDC_B3 DCMIPP_D2/DCMI_D2/PSSI_D2	
80	KP_ROW[3]	PF4	- RTC_OUT2 SPI6_NSS -	- USART6_RX TIM4_CH4 -	- ETH1_MDC ETH2_CLK ETH2_PPS_OUT ETH1_PPS_OUT	- LTDC_B7 -	
81	RXCAN	PB11	- I2S3_MCK -	- USART1_CTS FDCAN1_RX	- TIM20_BKIN2 TIM12_CH2 OCTOSPIM_P2_NCLK OCTOSPIM_P2_NCS2	- FMC_D14/FMC_DA14 OCTOSPIM_P1_NCS2 -	
82	GND						

SSI 1 - Serial Audio Port 1

83	SSI1_INT	PD11	- DEBUG_TRACED7 - I2S1_CK/SPI1_SCK SAI1_MCLK_A	- UART4_TX MDF1_CK10 I2C4_SCL -	- TIM1_CH1 - OCTOSPIM_P1_IO7 SDMMC1_D4	- SDMMC1_CKIN DCMIPP_D7/DCMI_D7/PSSI_D7 -	
84	SSI1_RXD	PD4	- DEBUG_TRACED0 SPI4_MISO HDP_HDP3 SAI1_D3	- SAI1_SD_B - - -	- TIM1_CH4N TIM4_CH1 OCTOSPIM_P1_IO0 -	- DCMIPP_D14/PSSI_D14 -	
85	SSI1_TXD	PD9	- DEBUG_TRACED5 HDP_HDP6 I2S1_SDO/SPI1_MOSI SAI1_SD_A	- UART4_DE/UART4_RTS MDF1_CK11 -	- TIM1_CH3 - OCTOSPIM_P1_IO5 SDMMC1_D6	- SDMMC1_D0DIR DCMIPP_D9/DCMI_D9/PSSI_D9 -	
86	SSI1_CLK	PI10	- SAI1_SCK_A I2S1_CK/SPI1_SCK SPDIFRX_IN0	- FDCAN2_RX MDF1_CCK0 -	- TIM4_CH1 - -	- FMC_D12/FMC_DA12 DSIHOST_TE -	
87	SSI1_FS	PD8	- DEBUG_TRACED4 SPI4_RDY I2S1_MCK SAI1_FS_A	- UART4_CTS MDF1_SDI1 -	- TIM1_CH4 TIM4_ETR OCTOSPIM_P1_IO4 SDMMC1_D7	- SDMMC1_D123DIR DCMIPP_D10/PSSI_D10 -	
88	GND						

SSI 2 - Serial Audio Port 2

89	SSI2_INT	PF10	- RCC_MCO_2 SPI3_RDY -	- SAI2_MCLK_A MDF1_CK16 UART8_TX TIM2_CH3	- ETH2_MII_TXD2/ETH2_RG MII_TXD2 -	- -	
90	SSI2_RXD	PB15	- LPTIM1_IN2 SPI5_SCK UART8_DE/UART8_RTS	- SAI2_SD_B UART5_RX - TIM3_CH2	- TIM5_CH1 - ETH1_PPS_OUT -	- FMC_A18 LTDC_R4 DCMIPP_D8/PSSI_D8	
91	SSI2_TXD	PG1	- LPTIM1_IN1 I2S3_MCK I3C3_SCL	- SAI2_SD_A UART5_CTS USART3_CTS -	- TIM5_CH4 I2C3_SCL ETH2_MII_RX_ER ETH2_RXD3	- FMC_NBL0 LTDC_VSYNC DCMIPP_D11/PSSI_D11	
92	SSI2_CLK	PF11	- RCC_MCO_1 SPDIFRX_IN0 SPI6_RDY	- SAI2_SCK_A MDF1_SDI6 UART8_RX TIM2_CH4	- ETH2_TXD3 -	- -	
93	SSI2_FS	PG2	- RTC_REFIN I2S3_MCK I3C3_SDA	- SAI2_FS_A USART3_CK -	- TIM5_CH3 I2C3_SDA ETH2_MII_TX_CLK ETH2_RGMII_CLK125	- FMC_CLK LTDC_HSYNC -	
94	GND						

Secure Digital Interface 2

95	SD2_CD	PB7	- I2S3_CK/SPI3_SCK - UART4_TX	- SAI4_MCLK_B - -	- TIM20_ETR TIM12_CH1 OCTOSPIM_P2_IO7 -	- FMC_D10/FMC_DA10 SDMMC3_CDIN	
96	SD2_D[0]	PB14	- I2S2_CK/SPI2_SCK -	- MDF1_CK17 UART9_RX -	- TIM4_CH2 SDMMC3_D0 FMC_D7/FMC_DA7	- FMC_D2/FMC_DA2 -	
97	SD2_D[1]	PD13	- I2S2_WS/SPI2_NSS -	- MDF1_SDI7 UART9_TX -	- TIM4_CH4 SDMMC3_D1 FMC_D11/FMC_DA11	- FMC_NWE -	

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
98	SD2_D[2]	PB12	- - -	- UART8_CTS - TIM13_CH1	- DSIHOST_TE SDMMC3_D2 FMC_NWAIT	- DCMIPP_D12/PSSI_D12	
99	SD2_D[3]	PI11	- I2S2_MCK -	- UART8_TX UART9_DE/UART9_RTS -	- TIM4_CH3 SDMMC3_D3 FMC_D15/FMC_DA15	- -	
100	SD2_CMD	PD12	- SPI7_MISO I2S2_SDI/SPI2_MISO SPDIFRX_IN2	- UART8_DE/UART8_RTS -	- TIM4_ETR SDMMC3_CMD FMC_D6/FMC_DA6	- FMC_D1/FMC_DA1 -	
101	SD2_CLK	PB13	- SPI7_SCK -	- SAI1_SD_B UART8_RX -	- SDMMC3_CK FMC_D5/FMC_DA5	- FMC_D0/FMC_DA0 -	
102	GND						

CMOS Sensor Interface

103	CSIO_DAT12	PF12	DEBUG_TRACECLK - SPI5_MISO I2S1_SDI/SPI1_MISO	- - UART9_DE/UART9_RTS -	- TIM5_CH1 -	- LTDC_CLK DCMIPP_D0/PSSI_D0	
104	CSIO_DAT13	PI5	- SPI5_MOSI I2S1_SDO/SPI1_MOSI	- UART5_CTS UART9_RX -	- TIM5_CH2 -	- LTDC_DE DCMIPP_D1/PSSI_D1	
105	CSIO_DAT14	PA3	- LPTIM2_ETR SPI7_MOSI -	- MDF1_CK17 USART1_TX -	- I3C1_SCL I2C7_SMBA I2C1_SCL LTDC_B1 -	- DCMIPP_D2/PSSI_D2 ETH3_TX_CTL/ETH3_TX_EN	
106	CSIO_DAT15	PA2	- LPTIM2_IN1 SPI7_MISO -	- MDF1_SDI7 USART1_RX -	- I3C1_SDA -	- DCMIPP_D3/PSSI_D3 ETH3_RX_CTL/ETH3_CRS_DV	
107	CSIO_DAT16	PG10	DEBUG_TRACED8 HDP_HDP0 -	- UART5_RX -	- TIM8_CH4N -	- LTDC_G4 DCMIPP_D4/PSSI_D4	
108	CSIO_DAT17	PA1	- SPI6_MISO -	- SAI3_SD_A USART1_RTS USART6_CK TIM4_CH2 -	- I2C4_SDA I2C6_SDA -	- DCMIPP_D5/PSSI_D5 ETH3_PHY_INTN	
109	CSIO_DAT18	PA7	- AUDIOCLK SPI6_RDY -	- PCIE_CLKREQN MDF1_CCK0 USART1_CTS TIM4_ETR -	- I2C2_SMBA I2C6_SMBA LTDC_B5 I2C3_SMBA -	- I2C4_SMBA DCMIPP_D6/PSSI_D6 ETH3_TXD1	
110	CSIO_DAT19	PG13	DEBUG_TRACED11 HDP_HDP3 SPI7_SCK -	- MDF1_CK16 -	- TIM8_CH2N I2C1_SCL I3C1_SCL -	- LTDC_G7 DCMIPP_D7/PSSI_D7	

111 GND

112	CSIO_HSYNC	PG6	DEBUG_TRACED4 HDP_HDP4 SPI5_SCK I2S1_CK/SPI1_SCK	- - TIM2_CH4	- I2C6_SCL -	- LTDC_R6 DCMIPP_HSYNC/PSSI_DE	
113	CSIO_VSYNC	PG4	- SPI5_MISO SAI3_FS_B	- LPTIM4_IN1	- TIM8_BKIN ETH2_PPS_OUT ETH2_MDC	- FMC_A21 LTDC_R7 DCMIPP_VSYNC/PSSI_RDY	
114	CSIO_PIXCLK	PG5	DEBUG_TRACED3 HDP_HDP3 -	- -	- I2C6_SDA -	- LTDC_R5 DCMIPP_PIXCLK/PSSI_PDCK	
115	CSIO_MCLK	PZ5	RCC_MCO_1 LPTIM3_ETR SPI8_SCK	- ADF1_CCK0 LPUART1_DE/LPUART1_RTS LPTIM5_IN1	- LPTIM4_CH2 -	- -	

116 GND

LCD Controller

117	LD0	PF6	- RTC_OUT2 -	- USART6_CK TIM12_CH1	- I2C3_SMBA ETH2_RX_CLK/ETH2_REF_CLK	- LTDC_B0 -	
118	LD1	PG14	DEBUG_TRACED12 HDP_HDP4 SPI7_RDY -	- MDF1_CK15 USART1_TX -	- TIM8_BKIN2 -	- LTDC_B1 DCMIPP_D9/PSSI_D9	

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
119	LD2	PG15	DEBUG_TRACED13 HDP_HDP5 - LPTIM1_CH2	- MDF1_SDI5 USART1_RX -	TIM8_ETR - -	- LTDC_B2 DCMIPP_D10/PSSI_D10	
120	LD3	PI0	DEBUG_TRACED14 HDP_HDP6 - LPTIM1_IN1	SAI4_MCLK_B USART1_CK -	TIM8_BKIN - -	- LTDC_B3 DCMIPP_D11/PSSI_D11	
121	LD4	PI1	DEBUG_TRACED15 HDP_HDP7 SPI7_NSS -	MDF1_SDI6 - -	TIM8_CH3N I2C1_SDA I3C1_SDA	- LTDC_B4 DCMIPP_D8/PSSI_D8	
122	LD5	PI2	- - LPTIM1_ETR	SAI4_SCK_B - USART1_RTS -	TIM8_CH1 - -	- LTDC_B5 DCMIPP_D13/PSSI_D13	
123	LD6	PF5	- SPI6_SCK -	SAI3_MCLK_A USART6_TX TIM4_CH3 SAI4_FS_B	ETH1_MDIO ETH1_CLK ETH2_PHY_INTN ETH1_PHY_INTN TIM8_CH3	- LTDC_B6 -	
124	LD7	PI4	- - LPTIM1_CH1	- -	- -	- LTDC_B7 DCMIPP_D15/PSSI_D15	
125	LD8	PF8	RTC_REFIN - SAI3_SCK_B	- USART3_RX TIM12_CH2 SAI2_FS_A	ETH1_CLK ETH2_RGMII_CLK125 ETH2_MII_RX_ER UART7_RX	ETH2_RX_CTL/ETH2_CR5_DV LTDC_G0 -	
126	LD9	PH5	- -	UART8_CTS TIM2_CH1	- LTDC_G1 USB3DR_VBUSEN	USBH_HS_VBUSEN ETH2_PTP_AUX_TS -	
127	LD10	PG8	DEBUG_TRACED6 HDP_HDP6 SPI5_RDY SPI1_RDY	USART6_CK UART5_DE/UART5_RTS UART9_TX	TIM5_CH3 -	- LTDC_G2 DCMIPP_D2/PSSI_D2	
128	LD11	PG9	DEBUG_TRACED7 -	UART5_TX -	TIM5_CH4 -	- LTDC_G3 DCMIPP_D3/PSSI_D3	
129	GND						
130	LD12	PA6	- - SPI4_SCK	SAI2_FS_B MDF1_SDI6 USART2_CK TIM13_CH1	TIM2_ETR - LTDC_G4	FMC_NE1 DCMIPP_D12/PSSI_D12 ETH3_TXD0	
131	LD13	PG11	DEBUG_TRACED9 HDP_HDP1 SPI7_MOSI -	- - FDCAN1_TX	TIM8_CH4 -	- LTDC_G5 DCMIPP_D5/PSSI_D5	
132	LD14	PG12	DEBUG_TRACED10 HDP_HDP2 SPI7_MISO -	- FDCAN1_RX	TIM8_CH1N -	- LTDC_G6 DCMIPP_D6/PSSI_D6	
133	LD15	PC0	LPTIM1_CH1 - SPI6_SCK	SAI3_MCLK_B USART6_TX -	- DCMIPP_D0/PSSI_D0 ETH2_RX_CLK/ETH2_REF_CLK ETH1_MII_TX_CLK	ETH1_RGMII_GTX_CLK LTDC_G7 -	
134	LD16	PH4	- -	UART7_TX TIM17_BKIN SAI3_SD_A	TIM5_CH2 LTDC_R0 USB3DR_OVRCUR	USBH_HS_OVRCUR ETH1_PTP_AUX_TS ETH3_PPS_OUT	
135	LD17	PF7	- SPDIFRX_IN1 SPI6_SCK	- TIM2_ETR	- ETH2_RGMII_GTX_CLK ETH2_MII_TX_CLK	- LTDC_R1 -	
136	LD18	PF13	DEBUG_TRACED0 HDP_HDP0 AUDIOCLK USART6_TX	I2S2_WS/SPI2_NSS MDF1_CK17 USART3_CTS FDCAN3_TX	TIM3_CH3 -	- LTDC_R2 -	
137	LD19	PF14	DEBUG_TRACED1 HDP_HDP1 -	MDF1_SDI7 USART3_RTS FDCAN3_RX	TIM3_CH4 -	- LTDC_R3 -	
138	LD20	PF15	DEBUG_TRACED2 HDP_HDP2 SPI2_RDY USART6_CTS	I2S2_CK/SPI2_SCK - USART3_CK TIM2_CH2	TIM3_ETR I2C6_SMBA -	- LTDC_R4 -	
139	LD21	PG3	- LPTIM1_ETR SPI5_MOSI UART8_TX	SAI2_FS_B - TIM3_CH3	TIM8_ETR ETH2_CLK ETH2_PHY_INTN	FMC_A19 LTDC_R5 DCMIPP_PIXCLK/PSSI_PDCK	

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
140	LD22	PA10	- - - SPI4_MISO	SAI2_SD_B - USART2_RX LPTIM5_IN1	TIM2_CH2 - ETH1_MDIO -	LTDC_R6 DCMIPP_D15/PSSI_D15 ETH3_RXD1	
141	LD23	PG7	DEBUG_TRACED5 HDP_HDP5 SPI5_NSS I2S1_WS/SPI1_NSS	- - UART9_CTS -	TIM5_ETR - - -	- LTDC_R7 DCMIPP_VSYNC/PSSI_RDY	
142	GND						
143	HSYNC	PI7	- - -	- - USART3_RX TIM2_CH1	TIM3_CH2 - - -	LTDC_HSYNC -	
144	VSYSN	PI6	RCC_MCO_1 - -	- - USART3_TX TIM2_ETR	TIM3_CH1 - - -	- LTDC_VSYN -	
145	OE_ACD	PC5	- - SPDIFRX_IN1	- - MDF1_SDI1 -	TIM8_CH1N I2C4_SDA ETH2_MDIO ETH1_MII_COL	FMC_A25 ETH1_PPS_OUT LTDC_DE	
146	LSCLK	PC6	- - RTC_REFIN SPDIFRX_IN0 -	- - MDF1_CK11 -	TIM8_CH1 I2C4_SCL ETH2_MDC ETH1_MII_CRS	FMC_A24 ETH1_PHY_INTN LTDC_CLK	
147	GND						
General Purpose IOs / Module Specific Signals							
148		PH9	- - - SPI6_NSS	SAI3_MCLK_A - USART6_RX TIM15_CH1N	- - ETH1_RGMII_CLK125 ETH1_MII_RX_ER	- - -	
149		PH13	- - I2S3_CK/SPI3_SCK SPI6_MOSI	- - - TIM15_BKIN	TIM11_CH1 - ETH1_RXD3 -	- - -	
150		PH12	- - I2S3_WS/SPI3_NSS SPI6_MISO	- - - -	TIM10_CH1 - ETH1_RXD2 -	- - -	
151		PZ0	- - LPTIM3_IN1 SPI8_MOSI	TIM8_CH1 - LPUART1_TX LPTIM5_OUT	I2C8_SDA - LPTIM3_CH2 I3C4_SDA	- - -	TXMP2 v1: PK7
152		PZ1	- - LPTIM3_CH1 SPI8_MISO	TIM8_CH2 - LPUART1_RX LPTIM5_ETR	I2C8_SCL I2C8_SMB I3C4_SCL	- - -	TXMP2 v1: PK5
153		PZ2	- - LPTIM3_CH1 SPI8_SCK	- - ADF1_CCK0 LPUART1_DE/LPUART1_RTS LPTIM4_ETR	I2C8_SCL - - I3C4_SCL	- - -	TXMP2 v1: PK3
154		PZ3	DEBUG_DBTRGI DEBUG_DBTRGO LPTIM3_ETR SPI8_NSS	MDF1_SDI5 ADF1_SDI0 LPUART1_CTS LPTIM4_IN1	I2C8_SDA - LPTIM4_CH2 I3C4_SDA	- - -	TXMP2 v1: PI14
155		PZ4	DEBUG_DBTRGI DEBUG_DBTRGO RCC_MCO_2 SPI8_RDY	MDF1_CCK1 ADF1_CCK1 LPUART1_RX LPTIM4_CH1	I2C8_SCL - - I3C4_SCL	- - -	TXMP2 v1: PI15
156		PZ6	DEBUG_DBTRGI DEBUG_DBTRGO - SPI8_NSS	TIM8_CH3 ADF1_SDI0 LPUART1_CTS LPTIM5_OUT	- - LPTIM4_CH2 -	- - -	
157		PH10	- - I2S1_CK/SPI1_SCK SPI6_MOSI	SAI3_SCK_A - - TIM15_CH1	- - ETH2_MDC ETH1_TXD2	- - -	
158		PI9	- - SPI7_MOSI I2S2_SDO/SPI2_MOSI	FDCAN2_TX - UART9_CTS -	TIM16_BKIN - FMC_NWAIT -	DSIHOST_TE LTDC_B0 -	
159		PD7	DEBUG_TRACED3 SPI4_SCK SPI1_RDY -	SAI1_MCLK_B MDF1_CK12 - -	TIM1_CH1N TIM4_CH4 OCTOSPIM_P1_IO3 -	- DCMIPP_D11/PSSI_D11 -	
160	GND						

PIN	TXCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks Additional functions
161		PZ7	- - - SPI8_MOSI	MDF1_CCK1 ADF1_CCK1 LPUART1_TX LPTIM5_IN1	- - LPTIM3_CH2 -	- - -	TXMP2 v1: PK6
162		PI8	- - -	- - -	- - -	- - -	TXMP2 v1: PK2
163		PD5	DEBUG_TRACED1 SPI4_NSS HDP_HDP4 SAI1_D4	SAI1_FS_B - - -	TIM1_CH3N TIM4_CH2 OCTOSPIM_P1_IO1 -	DCMIPP_D13/PSSI_D13 -	
164		PD6	DEBUG_TRACED2 SPI4_MOSI HDP_HDP5 -	SAI1_SCK_B MDF1_SD12 - -	TIM1_CH2N TIM4_CH3 OCTOSPIM_P1_IO2 -	DCMIPP_D12/PSSI_D12 -	
165		PC11	- LPTIM1_CH1 SPI5_NSS -	SAI2_MCLK_A UART5_DE/UART5_RTS USART3_RTS TIM3_CH1	TIM5_ETR - ETH2_MII_RXD3/ETH2_RG MII_RXD3 -	FMC_NBL1 LTDC_R2 DCMIPP_D10/PSSI_D10	TXMP2 v1: PK1

MIPI-DSI

166		PCIE_CLKINP					49R9-GND term.
167		COMBOPHY_RX1N					
168		PCIE_CLKINN					49R9-GND term.
169		COMBOPHY_RX1P					
170		COMBOPHY_TX1N					
171	GND						
172		COMBOPHY_TX1P					

Module Specific Signals

173				Not connected			
174				Not connected			
175				Not connected			
176				Not connected			
177				Not connected			
178				Not connected			
179				Not connected			
180				Not connected			
181				Not connected			
182				Not connected			
183	GND						
184				Not connected			
185		CSI_CKP					
186				Not connected			
187		CSI_CKN					
188				Not connected			
189		CSI_D1P					
190				Not connected			
191		CSI_D1N					
192				Not connected			
193		CSI_D0P					
194				Not connected			
195		CSI_D0N					
196				Not connected			
197				Not connected			
198		PH11	- - - SPI6_MISO	SAI3_FS_A - - TIM15_CH2	- ETH2_MDIO ETH1_TXD3 -	- - -	
199		PF9	- - - SAI3_SD_B	SAI2_SD_A MDF1_SD15 UART8_DE/UART8_RTS TIM2_CH2	- - ETH2_RXD2 ETH2_MDIO	- - -	
200	GND						

Onboard peripherals wiring

USED FOR		MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks
eMMC	CMD	PE15	- SPI7_MOSI	SAI1_SCK_A MDF1_SDI6 - TIM15_CH1N	TIM1_CH1N - FMC_NOE	SDMMC2_CMD - -	10K-PU
	CLK	PE14	- SPI7_NSS	SAI1_MCLK_A MDF1_CK16 - TIM15_BKIN	TIM1_BKIN - FMC_NWE	SDMMC2_CK - -	10K-PU
	DAT0	PE13	- SPI7_MISO	SAI1_SD_A - TIM15_CH1	TIM1_CH2N - FMC_RNB	SDMMC2_D0 - -	10K-PU
	DAT1	PE11	- SPI7_SCK SAI4_D3	SAI1_FS_A - TIM15_CH2	TIM1_CH3N - FMC_A16/FMC_CLE	SDMMC2_D1 - -	
	DAT2	PE8	- SPI4_MOSI SAI4_CK1	SAI4_MCLK_A MDF1_CK10 - -	TIM1_CH1 - FMC_A17/FMC_ALE	SDMMC2_D2 - -	
	DAT3	PE12	- SPI4_NSS SAI4_CK2	SAI4_SCK_A MDF1_SDI0 USART1_RTS -	TIM1_CH2 - FMC_NE2 FMC_NCE1	SDMMC2_D3 - -	
	DAT4	PE10	- SPI4_SCK SAI4_D1	SAI4_SD_A - USART1_CTS -	TIM1_CH3 - FMC_NE3 FMC_NCE2	SDMMC2_D4 SDMMC2_CKIN -	
	DAT5	PE9	- SPI4_MISO SAI4_D2	SAI4_FS_A - USART1_CK -	TIM1_CH4 - FMC_D0/FMC_DA0	SDMMC2_D5 SDMMC2_CD1R -	
	DAT6	PE6	- SPI4_RDY -	SPDIFRX_IN2 - USART1_TX -	TIM1_ETR - FMC_D1/FMC_DA1	SDMMC2_D6 SDMMC2_D0DIR -	
	DAT7	PE7	- - SAI4_D4	SPDIFRX_IN3 - USART1_RX -	TIM1_CH4N - TIM14_CH1 FMC_D2/FMC_DA2	SDMMC2_D7 SDMMC2_D123DIR -	
PMIC	SDA	PD14	- I2S1_MCK	- FDCAN1_RX	TIM11_CH1 I2C7_SDA FMC_D4/FMC_DA4	SDMMC3_D3 DCMIPP_D1/PSSI_D1 -	1K-PU
	SCL	PH3	- I2S1_WS/SPI1_NSS	- UART7_RX TIM17_CH1N	TIM5_CH3 I2C7_SCL -	- ETH3_RGMII_TXD3	10K-PU
	INTn	PA0	- LPTIM1_CH2 SPI5_RDY UART8_CTS	SAI2_MCLK_B UART5_TX USART3_TX TIM3_ETR	TIM5_CH2 - ETH2_RXD2 -	FMC_NL - DCMIPP_D9/PSSI_D9	
	RSTn	NRST					
	PWRCTRL1	PWR_ON					
	PWRCTRL2	PWR_CPU_ON					
	PWRCTRL3	NRSTC1MS					
ETHERNET LAN8710 RMII	WAKEUPn	PC13	- - -				
	CLKIN	PF3	- - UART8_RX	SAI2_SCK_B MDF1_CCK0 - TIM3_CH4	TIM8_BKIN2 ETH1_CLK ETH2_PPS_OUT -	FMC_A20 LTDC_R6 DCMIPP_HSYNC/PSSI_DE	
	MDC	PF0	- I2S3_CK/SPI3_SCK	- FDCAN2_RX	TIM12_CH2 I2C2_SDA ETH1_MDC ETH2_MII_CRS	- I3C2_SDA -	
	MDIO	PF2	- SPI3_RDY	- I2C4_SMBA	TIM12_CH1 I2C2_SCL ETH1_MDIO ETH2_MII_COL	FMC_NE4 I3C2_SCL -	1K-PU
	RXD0	PF1	- SPI8_MISO LPTIM2_IN2	SAI4_SCK_B MDF1_CK14 USART2_CK -	- ETH1_RXD0 -	- -	

Onboard peripherals wiring

USED FOR		MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-14	Remarks
	RXD1	PC2	- SPI8_MOSI LPTIM2_IN1 -	SAI4_MCLK_B MDF1_SDI3 USART2_RTS -	- - ETH1_RXD1 -	- - -	
	COL/CRS_DV	PA11	- SPI8_SCK LPTIM2_CH1 -	SAI4_SD_B MDF1_SDI4 - -	- - ETH1_RX_DV/RX_CTL/CRS_DV -	- - -	10K-PU
	TXEN	PA13	- SPI8_RDY I2S3_MCK LPTIM2_ETR -	- MDF1_CK13 USART2_CTS -	- I2C7_SMBA ETH1_TX_EN/TX_CTL/TX_EN -	- - -	
	TXD0	PA15	- I2S3_SDI/SPI3_MISO -	- USART2_RX -	- I2C7_SDA ETH1_TXD0 -	- - -	
	TXD1	PC1	- I2S3_SDO/SPI3_MOSI -	- USART2_TX -	- I2C7_SCL ETH1_TXD1 -	- - -	
	nINT	PA12	- SPI6_MOSI -	SAI3_FS_A - TIM4_CH1 -	I2C4_SCL I2C6_SCL ETH1_PHY_INTN -	- - -	10K-PU
	nRST	PA14	- SPI8_NSS LPTIM2_CH2 -	SAI4_FS_B MDF1_CCK1 - -	- - ETH1_RX_CLK/REF_CLK -	- - -	10K-PU

PIN's	UART	PIN's	I2C	PIN's	SPI		
154,156	LPUART1_CTS	105,110	I2C1_SCL	36,56,69,103	SPI1_MISO		
115,153	LPUART1_DE/ LPUART1_RTS	106,121	I2C1_SDA	104,70,52,85	SPI1_MOSI		
152,75,155	LPUART1_RX	41	I2C1_SMBA	34,53,141	SPI1_NSS		
151,161,33	LPUART1_TX	51	I2C2_SCL	76,57,159,127	SPI1_RDY		
49,87	UART4_CTS	49	I2C2_SDA	157,86,54,112,83	SPI1_SCK		
51,85	UART4_DE/ UART4_RTS	109	I2C2_SMBA	100,47	SPI2_MISO		
47,69,42	UART4_RX	41,72,91	I2C3_SCL	158,46	SPI2_MOSI		
70,95,83	UART4_TX	40,77,93	I2C3_SDA	44,97,136	SPI2_NSS		
104,91	UART5_CTS	109,117,69	I2C3_SMBA	49,138	SPI2_RDY		
165,127	UART5_DE/ UART5_RTS	146,83	I2C4_SCL	48,67,96,138	SPI2_SCK		
90,107	UART5_RX	108,145,42	I2C4_SDA	28,64,52	SPI3_MISO		
128	UART5_TX	109	I2C4_SMBA	27,56,63	SPI3_MOSI		
34,69	UART7_CTS	41,60	I2C5_SCL	150,45,78,53	SPI3_NSS		
36,70	UART7_DE/ UART7_RTS	40,76	I2C5_SDA	66,89,54	SPI3_RDY		
126,68	UART7_RX	69	I2C5_SMBA	149,95,57	SPI3_SCK		
134,67	UART7_TX	112	I2C6_SCL	140,84	SPI4_MISO		
126,98	UART8_CTS	108,114	I2C6_SDA	62,164	SPI4_MOSI		
100,199,90	UART8_DE/ UART8_RTS	109,138	I2C6_SMBA	61,163	SPI4_NSS		
101,92	UART8_RX	76	I2C7_SCL	87	SPI4_RDY		
139,89,99	UART8_TX	70	I2C7_SDA	130,159	SPI4_SCK		
158,141	UART9_CTS	105	I2C7_SMBA	113,103	SPI5_MISO		
99,103	UART9_DE/ UART9_RTS	152,153,155	I2C8_SCL	104,139	SPI5_MOSI		
104,96	UART9_RX	151,33,154	I2C8_SDA	165,141	SPI5_NSS		
97,127	UART9_TX	152,75	I2C8_SMBA	127	SPI5_RDY		
48,60,120	USART1_CK			90,112	SPI5_SCK		
109,65,81	USART1_CTS/ USART1_NSS			108,150,198,74	SPI6_MISO		
108,122,66	USART1_DE/ USART1_RTS			149,157,73	SPI6_MOSI		
106,64,119	USART1_RX			148,79,80	SPI6_NSS		
105,63,118	USART1_TX			109,78,92	SPI6_RDY		
130	USART2_CK			78,92	SPI6_RDY		
61	USART2_CTS/ USART2_NSS			123,133,135	SPI6_SCK		
62	USART2_DE/ USART2_RTS			100,106,132	SPI7_MISO		
140,60	USART2_RX			105,158,131	SPI7_MOSI		
59	USART2_TX			60,121	SPI7_NSS		
93,138,54	USART3_CK			40,68,118	SPI7_RDY		
91,136,52	USART3_CTS/ USART3_NSS			101,110	SPI7_SCK		
165,137,53	USART3_DE/ USART3_RTS			152,75	SPI8_MISO		
125,143,55	USART3_RX			151,161	SPI8_MOSI		
144,57	USART3_TX			154,156	SPI8_NSS		
108,117,127	USART6_CK			33,155	SPI8_RDY		
79,138	USART6_CTS/ USART6_NSS			115,153	SPI8_SCK		
78,114	USART6_DE/ USART6_RTS						
148,80,137	USART6_RX						
123,133,136	USART6_TX						