QSMP-23

QFN Style
Solder-Down
Computer On Module

- 27mm square
- 2.6mm total height
- QS family pin-compatible
- Solder-down version
- QFN type lead style
  - 1mm pitch
  - 100 pads
  - Thermal pad
- Visual solder joint inspection possible after soldering
- Single-sided assembly
- 3.3V power supply

Key Features

- STM32MP235 — Dual ARM® Cortex®-A35, 1.2 GHz; ARM® Cortex®-M33, 400 MHz; Vivante® NPU, 0.6 TOPS
- RAM — 1GB LPDDR4
- ROM — 4 GB eMMC
- Grade — Industrial
- Temperature — -40°C to 85°C
- Display support
  - LVDS Display Interface
  - 3D GPU: OpenGL® ES 3.1 - Vulkan 1.1, OpenCL™ 1.2, OpenVX™ 1.1, Up to 66 Mtriangle/s, 400 Mpixel/s
  - VPU: H264/VP8 up to FHD (1920×1080)@60 fps
- Connectivity
  - 2x USB 2.0
  - 2x Gb Ethernet, RGMII
  - 1x eMMC/SD
  - 2x FlexCAN
  - 3x UART, 3x I²C, 2x SPI, PWM, SAI
  - Up to 60x 3.3V General Purpose I/O
  - MIPI-CSI (2-lane)

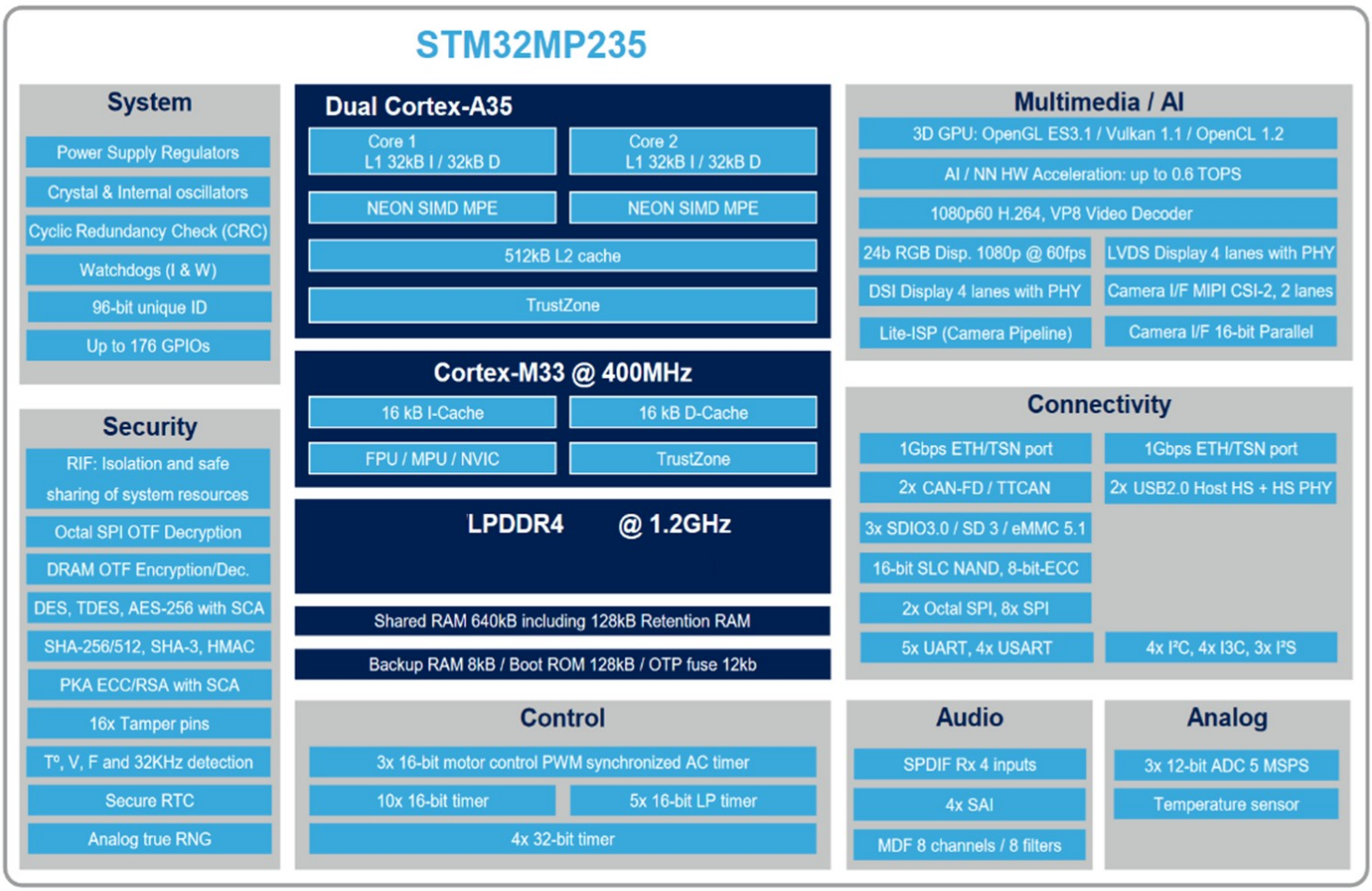
OS Support

- Linux

Dual Cortex®-A35 STM32MP2

Authorized Partner

Ka-Ro electronics GmbH - Pascalstr. 22, D-52076 Aachen, Germany - Tel.: +49 2408 1402-0 (FAX -10)
www.karo-electronics.de



QS93 | QSMP-23 | QSMP-25 | Differentiating Features

	QS93 i.MX 9352	**QSMP-23** STM32MP235	**QSMP-25** STM32MP255
Primary Arm® Core	2x Cortex®-A55 1.5 GHz	2x Cortex®-A35 1.2 GHz	2x Cortex®-A35 1.5 GHz
Secondary Arm® Core	Cortex-M33 250 MHz	Cortex-M33 400 MHz	Cortex-M33 400 MHz
RAM	1GB LPDDR4	1GB LPDDR4	1GB LPDDR4
ROM	4 GB eMMC	4 GB eMMC	4 GB eMMC
GPU	2D GFX	66 MTrg/s 400 MPix/s 12.8 GFlops	133 MTrg/s 800 MPix/s 25.6 GFlops
AI/ML/DSP	0.5 TOPS	0.6 TOPS	1.2 TOPS
VPU	-	Decode	De-/Encode
Connectivity	USB 2.0	USB 2.0	USB 2.0, USB 3.0 or PCIe
QS Size	100 pins 27mm square	100 pins 27mm square	108 pins 29mm square
Grade / Temperature	Industrial -40°C to 85°C	Industrial -40°C to 85°C	Industrial -40°C to 85°C

2025-03-04

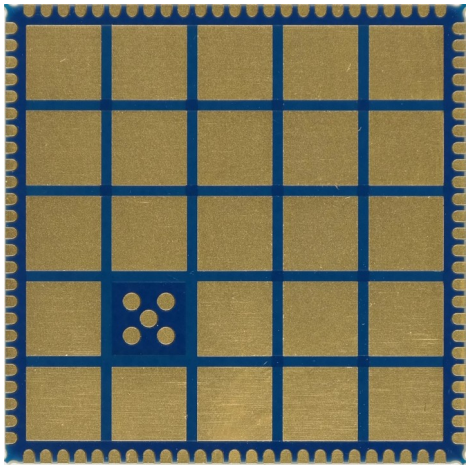
QFN Style Computer On Module Advantages

Defined Return Path

The reason PCB layout becomes more and more important is because of the trend to faster, higher integrated, smaller formfactors, and lower power electronic circuits. The higher the switching frequencies are, the more radiation may occur on a PCB. With good layout, many EMI problems can be minimized to meet the required specifications.

When a module or component is used in a design, the supplier specifies the basis for such a layout. It's not only the pinout which should lead to an easy wiring without the need for crossings. He also has to provide a proper solution for the signal path back to the module. If this return path, mostly the ground plane, cannot be connected near the signal pin, the return current has to take another way and this may result in a loop area. The larger the area, the more radiation and EMI problems may occur.

Ka-Ro QSCOM modules uses a large ground pad on the bottom side. With this a defined ground plane connection is available for all signals. In addition to have a good return path for all signals this large ground pad can be used for cooling.



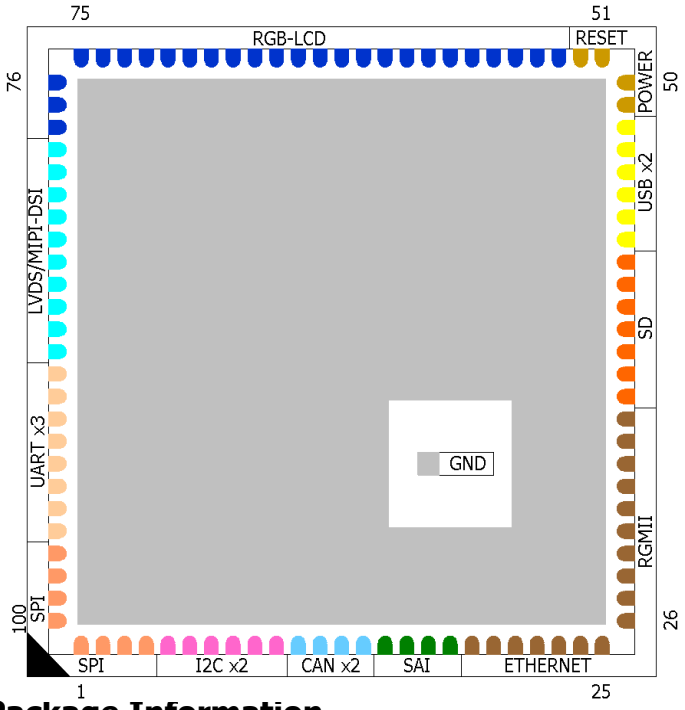
Easy Wiring - Even 2-layer printed circuit boards can be used.

With a solid ground plane on the bottom layer, high speed signals can be routed on the top layer at a defined impedance. However, this is only possible if a peripheral or plug can be connected directly without crossing other routes.

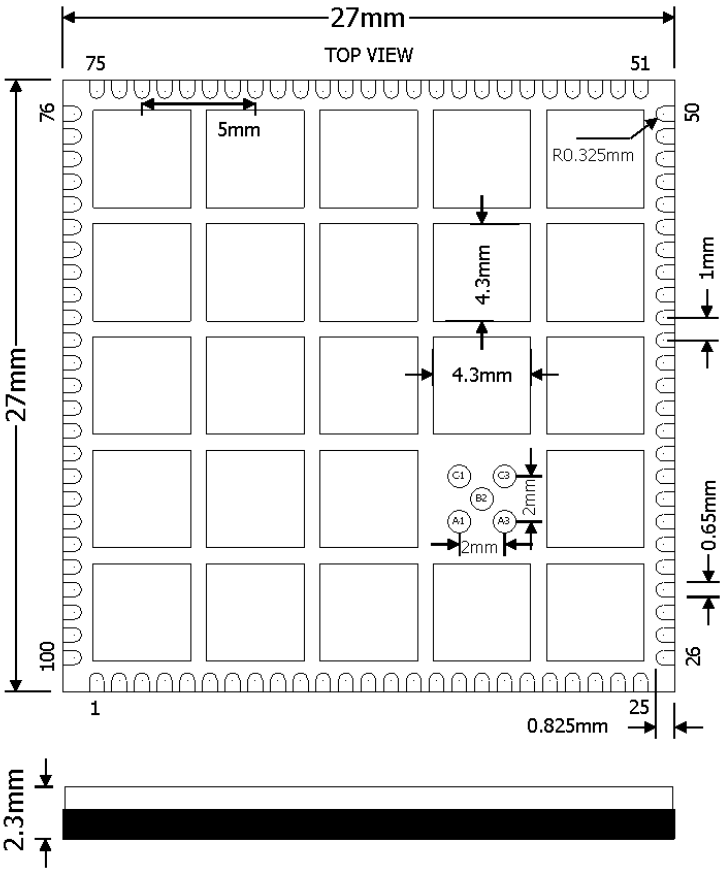
Advanced Soldering

Using a large solder pad underneath the component has not only electrical and thermal advantages. It is also used to hold the component at a defined height during soldering, without the solder being compressed by the weight of the components, which could result in short circuits.

Standard Contact Assignments

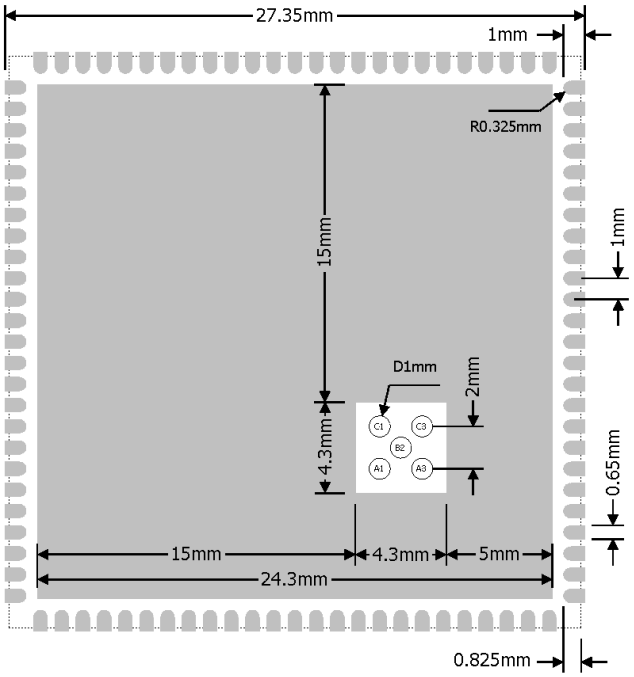


Package Information

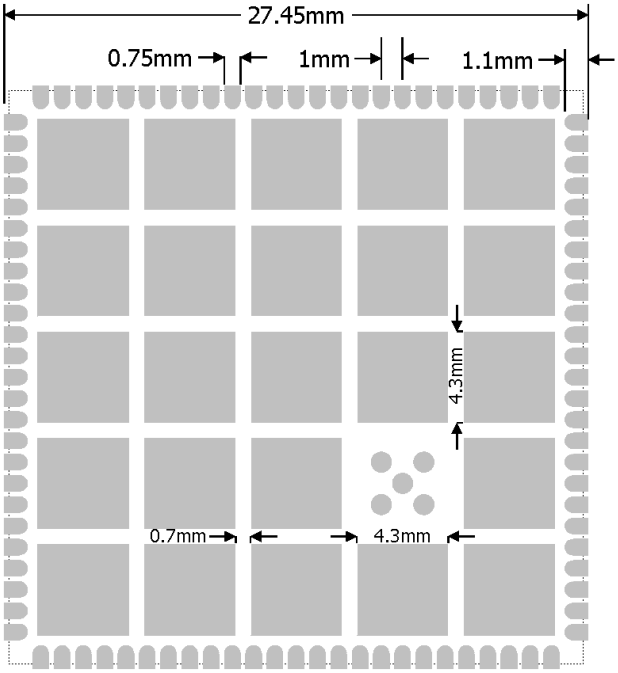


Layout Guidelines

Land pattern

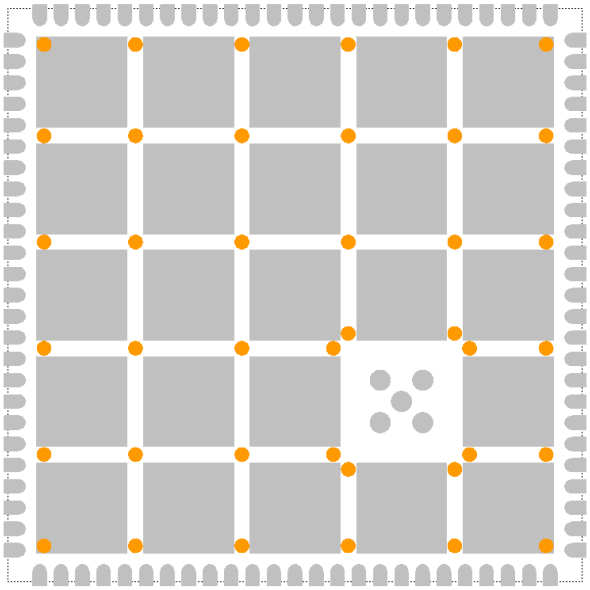


See figure above for the suggested module layout. The five 1mm pads in the square GND pad cutout can be omitted if no JTAG Boundary Scan test is used. The solder mask openings are shown below.



The ground pad solder mask on the bottom side of the QSCOM module is divided into sections for a better reliability of the solder joint and self-alignment of the component.

If the via holes used on the application board have a diameter larger than 0.3 mm, it is recommended to mask the via holes to prevent solder wicking through the via holes. Solders have a habit of filling holes and leaving voids in the thermal pad solder junction, as well as forming solder balls on the other side of the application board which can in some cases be problematic. The 0.7mm wide solder mask stripes can be used to arrange the vias as shown here:

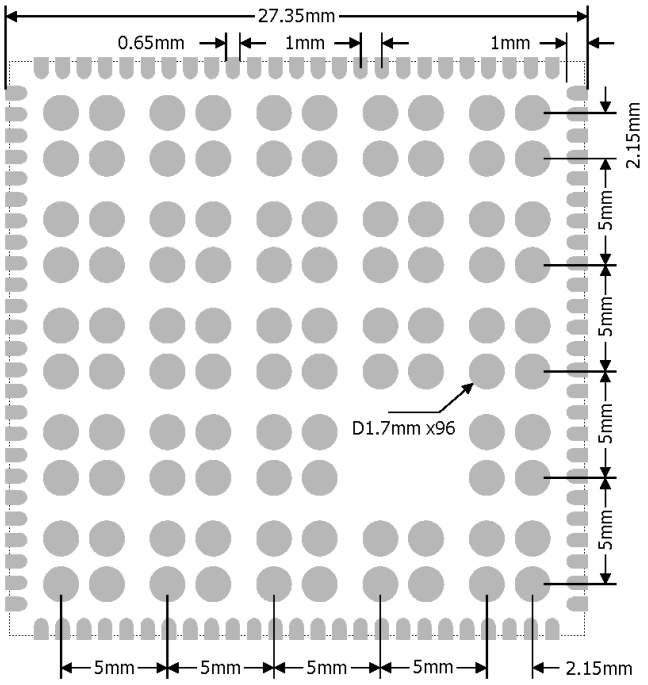


Soldering Recommendations

Ka-Ro QSCOM modules are compatible with industrial standard reflow profile for Pb-free solders. Ka-Ro will give following recommendations for soldering the module to ensure reliable solder joint and operation of the module after soldering. Since the profile used is process and layout dependent, the optimum profile should be studied case by case. Thus following recommendations should be taken as a starting point guide.

- Refer to technical documentations of particular solder paste for reflow profile configurations
- Avoid using more than one flow.
- A 150µm stencil thickness is recommended.
- Aperture size of the stencil should be 1:1 with the pad size.
- A low residue, "no clean" solder paste should be used due to low mounted height of the component.

Recommended stencil design

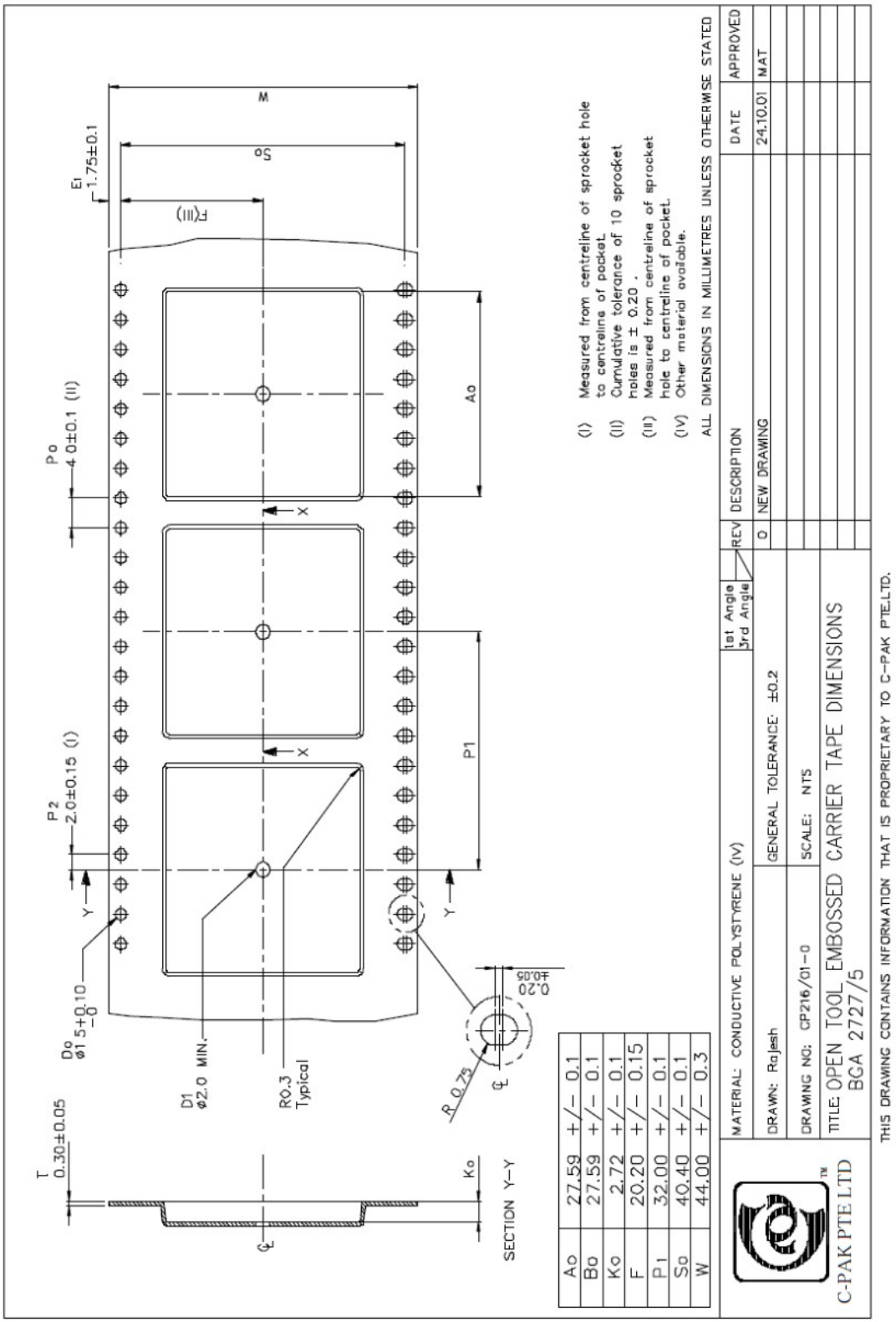


Aperture size of the stencil is 1:1 with the pad size. Four 1.7mm diameter bumps are used for each of the 4.3mm square GND pads sections giving a 50% solder paste padding. The lower component settling with this ensures that the pads at the edge are always soldered even at vertical misalignment by distortion or warping.

Thermal Considerations

A low residue, "no clean" solder paste should be used due to low mounted height of the component.The QSCOM module consume more than 1 W of DC power. In any application where high ambient temperatures for more than a few seconds can occur, it is important that a sufficient cooling surface is provided to dissipate the heat. The thermal pad at the bottom of the module must be connected to the application board ground planes by soldering. The application board should provide a number of vias under and around the pad to conduct the produced heat to the board ground planes, and preferably to a copper surface on the other side of the board in order to conduct and spread the heat. The module internal thermal resistance should in most cases be negligible compared to the thermal resistance from the module into air, and common equations for surface area required for cooling can be used to estimate the temperature rise of the module. Only copper planes on the circuit board surfaces with a solid thermal connection to the module ground pad will dissipate heat. For an application with high load the maximum allowed ambient temperature should be reduced due to inherent heating of the module, especially with small fully plastic enclosed applications where heat transfer to ambient air is low due to low thermal conductivity of plastic. The module measured on the evaluation board exhibits a temperature rise of about 20°C above ambient temperature. An insufficiently cooled module will rapidly heat beyond operating range in ambient room temperature.

Packaging


ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED
(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.
REV DESCRIPTION DATE APPROVED
0 NEW DRAWING 24.10.01 MAT
MATERIAL: CONDUCTIVE POLYSTYRENE (IV)
1st Angle 3rd Angle
DRAWN: Rajesh
GENERAL TOLERANCE: ±0.2
DRAWING NO: CP216/01-0
SCALE: NTS
TITLE: OPEN TOOL EMBOSSED CARRIER TAPE DIMENSIONS BGA 2727/5
C-PAK PTE LTD
THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO C-PAK PTE.LTD.
SECTION Y-Y
Ao 27.59 +/- 0.1
Bo 27.59 +/- 0.1
Ko 2.72 +/- 0.1
F 20.20 +/- 0.15
P1 32.00 +/- 0.1
So 40.40 +/- 0.1
W 44.00 +/- 0.3

PINOUT (STM32MP2 pads named PA, PB, etc. can be used as GPIO ports)

PIN	QSCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-15	Remarks Additional functions
1st SPI							
1	SPIA_NSS	PD5	TRACED1 **SPI4_NSS** HDP4 SAI1_D4	SAI1_FS_B - - -	TIM1_CH3N TIM4_CH2 OCTOSPIM_P1_IO1 -	- DCMI/PSSI/DCMIPP_D13 - EVENTOUT	
2	SPIA_MISO	PD4	DEBUG_TRACED0 **SPI4_MISO** HDP_HDP3 SAI1_D3	SAI1_SD_B - - -	TIM1_CH4N TIM4_CH1 OCTOSPIM_P1_IO0 -	- DCMIPP_D14/PSSI_D14 - EVENTOUT	
3	SPIA_MOSI	PD6	TRACED2 **SPI4_MOSI** HDP5 -	SAI1_SCK_B MDF1_SDI2 - -	TIM1_CH2N TIM4_CH3 OCTOSPIM_P1_IO2 -	- DCMI/PSSI/DCMIPP_D12 - EVENTOUT	
4	SPIA_SCK	PD7	TRACED3 **SPI4_SCK** SPI1_RDY -	SAI1_MCLK_B MDF1_CKI2 - -	TIM1_CH1N TIM4_CH4 OCTOSPIM_P1_IO3 -	- DCMI/PSSI/DCMIPP_D11 - EVENTOUT	
I2C							
5	I2CA_SCL	PB5	- - I2S2_MCK UART4_DE/UART4_RTS	SAI4_SD_B MDF1_CKI4 - -	TIM20_CH1 **I2C2_SCL** OCTOSPIM_P2_IO5 -	FMC_D8/FMC_DA8 I3C2_SCL SDMMC3_D123DIR EVENTOUT	
6	I2CA_SDA	PB4	- - SPI2_RDY UART4_CTS	SAI4_FS_B MDF1_SDI4 TIM14_CH1 -	TIM20_CH2 **I2C2_SDA** OCTOSPIM_P2_IO4 -	- I3C2_SDA - EVENTOUT	
7	INTA	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 - EVENTOUT	
8	I2CB_SCL	PG6	TRACED4 HDP4 SPI5_SCK SPI1_SCK/I2S1_CK	- - - TIM2_CH4	- **I2C6_SCL** - -	- LCD_R6 DCMI/PSSI/DCMIPP_DE EVENTOUT	
9	I2CB_SDA	PG5	TRACED3 HDP3 - USART6_RTS	- - - TIM2_CH3	- **I2C6_SDA** - -	- LCD_R5 DCMI/PSSI/DCMIPP_PCLK EVENTOUT	
10	INTB	PD14	- - I2S1_MCK -	- - - FDCAN1_RX	TIM11_CH1 - **I2C7_SDA** FMC_D4/FMC_DA4	SDMMC3_D3 DCMIPP_D1/PSSI_D1 - EVENTOUT	
CAN							
11	CANA_RX	PB11	- I2S3_MCK - -	- - USART1_CTS/USART1_NSS **FDCAN1_RX**	TIM20_BKIN2 TIM12_CH2 OCTOSPIM_P2_NCLK OCTOSPIM_P2_NCS2	FMC_AD14/FMC_D14 OCTOSPIM_P1_NCS2 - EVENTOUT	
12	CANA_TX	PB9	- SPI3_RDY - -	- - USART1_RTS **FDCAN1_TX**	TIM20_BKIN TIM10_CH1 OCTOSPIM_P2_DQS OCTOSPIM_P2_NCS2	FMC_D13/FMC_DA13 - - EVENTOUT	
13	CANB_RX	PI10	- SAI1_SCK_A SPI1_SCK/I2S1_CK SPDIFRX1_IN0	**FDCAN2_RX** MDF1_CCK0 - -	TIM4_CH1 SDVSEL1 - -	FMC_AD12/FMC_D12 DSI_TE - EVENTOUT	
14	CANB_TX	PI9	- SPI7_MOSI SPI2_MOSI/I2S2_SDO -	**FDCAN2_TX** - UART9_CTS -	TIM16_BKIN SDVSEL2 FMC_NWAIT -	- LCD_B0 - EVENTOUT	
SAI							
15	SAI_TX	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 - EVENTOUT	
16	SAI_RX	PI3	- - - LPTIM1_IN2	**SAI4_SD_B** - USART1_CTS -	TIM8_CH2 - - -	- LTDC_B6 DCMIPP_D14/PSSI_D14 EVENTOUT	
17	SAI_SCK	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 - EVENTOUT	

PIN	QSCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-15	Remarks Additional functions
18	SAI_FS	PD0	DEBUG_TRACECLK HDP_HDP0 SPI7_RDY SAI1_D2	- **SAI4_FS_A** UART7_RX TIM15_CH2	- - OCTOSPIM_P1_CLK -	- DCMIPP_PIXCLK/PSSI_PDCK - EVENTOUT	
ETHERNET 1							
19	ENET_RST	**PB2**	- - I2S2_SDO/SPI2_MOSI -	- MDF1_CKI3 TIM17_BKIN TIM16_BKIN	- TIM20_CH2N - OCTOSPIM_P2_IO2	- - -	
20	ENET_CK125	PH9	- - - SPI6_NSS	SAI3_MCLK_A - USART6_RX TIM15_CH1N	- - **ETH1_CLK125** ETH1_RX_ER	- - - EVENTOUT	
21	ENET_INT	PF5	- - SPI6_SCK -	SAI3_MCLK_A - USART6_TX TIM4_CH3	ETH1_MDIO ETH1_CLK ETH2_PHY_INTN **ETH1_PHY_INTN**	- LTDC_B6 -	
22	ENET_MDIO	PA10	- - - SPI4_MISO	SAI2_SD_B - USART2_RX LPTIM5_IN1	TIM2_CH2 - **ETH1_MDIO** -	LTDC_R6 DCMIPP_D15/PSSI_D15 ETH3_RXD1	
23	ENET_MDC	PF4	- RTC_OUT2 SPI6_NSS -	SAI3_SCK_A - USART6_RX TIM4_CH4	**ETH1_MDC** ETH2_CLK ETH2_PPS_OUT ETH1_PPS_OUT	- LTDC_B7 -	
24	ENET_RXC	PA14	- SPI8_NSS LPTIM2_CH2 -	SAI4_FS_B MDF1_CCK1 - -	- - **ETH1_RX_CLK**/REF_CLK -	- - - EVENTOUT	
25	ENET_RX_CTL	PA11	- SPI8_SCK LPTIM2_CH1 -	SAI4_SD_B MDF1_SDI4 - -	- - ETH1_RXDV/RXCTL/CRSDV -	- - - EVENTOUT	
26	ENET_RXD0	PF1	- SPI8_MISO LPTIM2_IN2 -	SAI4_SCK_B MDF1_CKI4 USART2_CK -	- - **ETH1_RXD0** -	- - - EVENTOUT	
27	ENET_RXD1	PC2	- SPI8_MOSI LPTIM2_IN1 -	SAI4_MCLK_B MDF1_SDI3 USART2_RTS -	- - **ETH1_RXD1** -	- - - EVENTOUT	
28	ENET_RXD2	PH12	- - SPI3_NSS/I2S3_WS SPI6_MISO	- - - -	TIM10_CH1 - **ETH1_RXD2** -	- - - EVENTOUT	
29	ENET_RXD3	PH13	- - SPI3_SCK/I2S3_CK SPI6_MOSI	- - - TIM15_BKIN	TIM11_CH1 - **ETH1_RXD3** -	- - - EVENTOUT	
30	ENET_TX_CTL	PA13	- SPI8_RDY I2S3_MCK LPTIM2_ETR	- MDF1_CKI3 USART2_CTS/USART2_NSS -	- I2C7_SMBA **ETH1**_TX_EN/**TX_CTL** -	- - - EVENTOUT	
31	ENET_TXC	PC0	- LPTIM1_CH1 - SPI6_SCK	SAI3_MCLK_B USART6_TX - -	- DCMI/PSSI/DCMIPP_D0 ETH2_RX_CLK/REF_CLK **ETH1_TX_CLK**	ETH1_GTX_CLK LCD_G7 - EVENTOUT	
32	ENET_TXD3	PH11	- - - SPI6_MISO	SAI3_FS_A - - TIM15_CH2	- ETH2_MDIO **ETH1_TXD3** -	- - - EVENTOUT	
33	ENET_TXD2	PH10	- - SPI1_SCK/I2S1_CK SPI6_MOSI	SAI3_SCK_A - - TIM15_CH1	- ETH2_MDC **ETH1_TXD2** -	- - - EVENTOUT	
34	ENET_TXD1	PC1	- - SPI3_MOSI/I2S3_SDO -	- - USART2_TX -	- I2C7_SCL **ETH1_TXD1** -	- - - EVENTOUT	
35	ENET_TXD0	PA15	- - SPI3_MISO/I2S3_SDI -	- - USART2_RX -	- I2C7_SDA **ETH1_TXD0** -	- - - EVENTOUT	
SD							
36	SD_CD	**PA4**	- - - -	- - USART2_TX FDCAN2_TX	TIM2_CH1 - LTDC_R1 -	- ETH1_PTP_AUX_TS ETH3_PPS_OUT	

PIN	QSCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-15	Remarks Additional functions
37	SD_D1	PE5	TRACED1 LPTIM2_IN2 SPI1_NSS/I2S1_WS SPI3_NSS/I2S3_WS	SAI1_FS_B - USART3_RTS FDCAN1_RX	- - **SDMMC1_D1** -	- - - EVENTOUT	
38	SD_D0	PE4	TRACED0 LPTIM2_IN1 SPI1_MOSI/I2S1_SDO SPI3_MISO/I2S3_SDI	SAI1_SD_B - USART3_CTS/USART3_NSS FDCAN1_TX	- - **SDMMC1_D0** -	- - - EVENTOUT	
39	SD_CLK	PE3	TRACECLK - SPI1_RDY SPI3_SCK/I2S3_CK	SAI1_MCLK_B - USART3_TX -	TIM11_CH1 - **SDMMC1_CK** -	- - - EVENTOUT	
40	SD_CMD	PE2	- LPTIM2_ETR SPI1_MISO/I2S1_SDI SPI3_MOSI/I2S3_SDO	SAI1_SCK_B - - -	TIM10_CH1 - **SDMMC1_CMD** -	- - - EVENTOUT	
41	SD_D3	PE1	TRACED3 LPTIM2_CH2 I2S1_MCK I2S3_MCK	- - USART3_RX -	- - **SDMMC1_D3** -	- - - EVENTOUT	
42	SD_D2	PE0	TRACED2 LPTIM2_CH1 SPI1_SCK/I2S1_CK SPI3_RDY	- - USART3_CK -	- - **SDMMC1_D2** -	- - - EVENTOUT	
USB							
43	USBA_VBUS	UCPD1_CC2					
44	USBA_DN	USBH_HS_DM					
45	USBA_DP	USBH_HS_DP					
46	USBB_VBUS	UCPD1_CC1					
47	USBB_DN	USB3DR_DM					
48	USBB_DP	USB3DR_DP					
POWER SUPPLY & RESET							
49 50	VIN	3.3V power supply input					
51	NRST	Open drain reset to reset of external devices, or to reset the device. Connected to STM32MP2 NRST and PCA9450 POR_B, 10K-PU					
52	BOOT_MODE	Connected to STM32MP2 BOOT1, 10K-PU. BOOT[0,2,3]=L					H: Boot from eMMC L: Boot from USB
MISC							
53		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 EVENTOUT	
54		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 EVENTOUT	
55		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 EVENTOUT	
56		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 - EVENTOUT	
MIPI-CSI							
57	CSI1_D1_P	CSI_D1P					
58	CSI1_D1_N	CSI_D1N					
59	CSI1_D0_P	CSI_D0P					
60	CSI1_D0_N	CSI_D0N					
61	CSI1_CLK_P	CSI_CKP					
62	CSI1_CLK_N	CSI_CKN					

PIN	QSCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-15	Remarks Additional functions
ETHERNET 2							
63	ENET2_TXC	PF7	- - SPDIFRX_IN1 SPI6_SCK	SAI3_SD_A - - TIM2_ETR	- - **ETH2_RGMII_GTX_CLK** ETH2_MII_TX_CLK	- LTDC_R1 - EVENTOUT	
64	ENET2_TD3	PC10	- - I2S3_SDO/SPI3_MOSI -	- - - LPTIM4_ETR	TIM8_CH4 USBH_HS_VBUSEN **ETH2_TXD3** USB3DR_VBUSEN	FMC_A23 LTDC_G3 DCMIPP_D6/DCMI_D6/PSSI_D6 EVENTOUT	
65	ENET2_TD2	PC9	- RCC_MCO_1 I2S3_SDI/SPI3_MISO -	SAI2_SCK_A - - TIM13_CH1	TIM8_CH4N USBH_HS_OVRCUR **ETH2_TXD2** USB3DR_OVRCUR	FMC_A22 LTDC_G2 DCMIPP_D7/DCMI_D7/PSSI_D7 EVENTOUT	
66	ENET2_TD1	PC8	- LPTIM1_ETR - SPI6_NSS	SAI3_SCK_B - USART6_CTS -	TIM8_CH2 - **ETH2_TXD1** ETH1_TXD3	- LTDC_B3 DCMIPP_D2/DCMI_D2/PSSI_D2 EVENTOUT	
67	ENET2_TD0	PC7	- - - SPI6_MOSI	SAI3_SD_B - - -	TIM8_CH2N - **ETH2_TXD0** ETH1_TXD2	- LTDC_B4 DCMIPP_D1/DCMI_D1/PSSI_D1 EVENTOUT	
68	ENET2_ TX_CTL	PC4	- - - SPI6_MISO	SAI3_FS_B - - -	- - ETH2_TX_EN/**ETH2_TX_CTL** -	ETH1_RGMII_CLK125 LTDC_R0 - EVENTOUT	
69	ENET2_ RX_CTL	PC3	- LPTIM1_IN2 I2S3_WS/SPI3_NSS SPI6_RDY	- - USART6_RTS FDCAN2_TX	- - **ETH2_RX_CTL**/ETH2_CRS_DV ETH1_MII_RX_ER	- LTDC_G6 DCMIPP_D3/DCMI_D3/PSSI_D3 EVENTOUT	
70	ENET2_RXC	PF6	- RTC_OUT2 - SAI3_MCLK_B	- - USART6_CK TIM12_CH1	- I2C3_SMBA **ETH2_RX_CLK**/ETH2_REF_CK -	- LTDC_B0 - EVENTOUT	
71	ENET2_RD3	PC11	- LPTIM1_CH1 SPI5_NSS -	SAI2_MCLK_A UART5_DE/UART5_RTS USART3_RTS TIM3_CH1	TIM5_ETR - **ETH2_RXD3** -	FMC_NBL1 LTDC_R2 DCMIPP_D10/PSSI_D10 EVENTOUT	
72	ENET2_RD2	PF9	- - - SAI3_SD_B	SAI2_SD_A MDF1_SDI5 UART8_DE/UART8_RTS TIM2_CH2	- - **ETH2_RXD2** ETH2_MDIO	- - - EVENTOUT	
73	ENET2_RD1	PC12	- LPTIM1_CH2 - I3C3_SCL	- MDF1_CKI2 - -	TIM8_CH3 I2C3_SCL **ETH2_RXD1** ETH1_RXD3	- LTDC_G1 DCMIPP_D5/DCMI_D5/PSSI_D5 EVENTOUT	
74	ENET2_RD0	PG0	- LPTIM1_IN1 - I3C3_SDA	- MDF1_SDI2 - -	TIM8_CH3N I2C3_SDA **ETH2_RXD0** ETH1_RXD2	- LTDC_G5 DCMIPP_D4/DCMI_D4/PSSI_D4 EVENTOUT	
75	ENET2_MDIO	PC5	- - SPDIFRX_IN1 -	- MDF1_SDI1 - -	TIM8_CH1N I2C4_SDA **ETH2_MDIO** ETH1_MII_COL	FMC_A25 ETH1_PPS_OUT LTDC_DE EVENTOUT	
76	ENET2_MDC	PG4	- - SPI5_MISO SAI3_FS_B	- - - LPTIM4_IN1	TIM8_BKIN - ETH2_PPS_OUT **ETH2_MDC**	FMC_A21 LTDC_R7 DCMIPP_VSYNC/PSSI_RDY EVENTOUT	
Display Control							
77	LCD_EN	**PH5**	- - - -	SAI2_FS_A - UART8_CTS TIM2_CH1	UART7_RX - LTDC_G1 USB3DR_VBUSEN	USBH_HS_VBUSEN ETH2_PTP_AUX_TS - EVENTOUT	
78	LCD_BL	PF13	DEBUG_TRACED0 HDP_HDP0 AUDIOCLK USART6_TX	I2S2_WS/SPI2_NSS MDF1_CKI7 USART3_CTS FDCAN3_TX	**TIM3_CH3** - - -	- LTDC_R2 - EVENTOUT	
LVDS DISPLAY							
79	CSI_CKP LVDS_TX3P	LVDS_D3P					
80	DSI_DP3 LVDS_TX3N	LVDS_D3N					
81	DSI_DN3 LVDS_TX2P	LVDS_D2P					
82	DSI_DN3 LVDS_TX2N	LVDS_D2N					
83	DSI_DP1 LVDS_TX1P	LVDS_D1P					
84	DSI_DN1 LVDS_TX1N	LVDS_D1N					

PIN	QSCOM STANDARD	MP2 PAD	Alternate Function 0-3	Alternate Function 4-7	Alternate Function 8-11	Alternate Function 12-15	Remarks Additional functions
85	DSI_DP0 LVDS_TX0P	LVDS_D0P					
86	DSI_DN0 LVDS_TX0N	LVDS_D0N					
87	DSI_CKP LVDS_CLKP	LVDS_D4P					
88	DSI_CKN LVDS_CLKN	LVDS_D4N					
UART							
89	UARTA_RXD	PB6	- - I2S2_SDI/SPI2_MISO **UART4_RX**	SAI4_SCK_B - - -	TIM20_CH1N - OCTOSPIM_P2_IO6 -	FMC_D9/FMC_DA9 - SDMMC3_D0DIR EVENTOUT	
90	UARTA_TXD	PB7	- I2S3_CK/SPI3_SCK - **UART4_TX**	SAI4_MCLK_B - - -	TIM20_ETR TIM12_CH1 OCTOSPIM_P2_IO7 -	FMC_D10/FMC_DA10 - SDMMC3_CDIR EVENTOUT	
91	UARTB_RXD	PI7	- - - -	- - **USART3_RX** TIM2_CH1	TIM3_CH2 - - -	- LTDC_HSYNC - EVENTOUT	
92	UARTB_TXD	PI6	- RCC_MCO_1 - -	- - **USART3_TX** TIM2_ETR	TIM3_CH1 - - -	- LTDC_VSYNC - EVENTOUT	
93	UARTC_RXD	PG10	DEBUG_TRACED8 HDP_HDP0 - -	- **UART5_RX** - -	TIM8_CH4N - - -	- LTDC_G4 DCMIPP_D4/PSSI_D4 EVENTOUT	
94	UARTC_TXD	PG9	DEBUG_TRACED7 - - -	- **UART5_TX** - -	TIM5_CH4 - - -	- LTDC_G3 DCMIPP_D3/PSSI_D3 EVENTOUT	
95	UARTC_CTS	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 EVENTOUT	CTS/RTS **input** signal
96	UARTC_RTS	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 EVENTOUT	RTS/CTS **output** signal
2nd SPI							
97	SPIB_NSS	PA8	- LPTIM2_CH2 **SPI7_NSS** -	SAI1_FS_B - USART1_CK -	USART2_RX I2C5_SCL - -	LTDC_B2 DCMIPP_D4/DCMI_D4/PSSI_D4 -	
98	SPIB_MISO	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 - -	
99	SPIB_MOSI	PG11	DEBUG_TRACED9 HDP_HDP1 **SPI7_MOSI** -	- - - FDCAN1_TX	TIM8_CH4 - - -	- LTDC_G5 DCMIPP_D5/PSSI_D5	
100	SPIB_SCK	PB13	- - **SPI7_SCK** -	SAI1_SD_B UART8_RX - -	- - SDMMC3_CK FMC_D5/FMC_DA5	FMC_D0/FMC_DA0 - -	

Pins used for manufacturing and debugging – leave unconnected					
PIN	(SPM32MP2 PAD NAME)	**PIN**	(SPM32MP2 PAD NAME)	**PIN**	(SPM32MP2 PAD NAME)
C1	**JTAG_TDI** (JTDI)			C3	**JTAG_TCK** (JTCK_SWCLK)
		B2	**JTAG_TDO** (JTDO_TRACESWO)		
A1	**JTAG_TRST_B** (NJTRST)			A3	**JTAG_TMS** (JTMS_SWDIO)

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_CKI6 - 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_CKI0 - -	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_CDIR -	
	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 PCA9450A	SDA	PI1	DEBUG_TRACED15 HDP_HDP7 SPI7_NSS -	- MDF1_SDI6 - -	TIM8_CH3N **I2C1_SDA** I3C1_SDA -	- LTDC_B4 DCMIPP_D8/PSSI_D8	1K-PU
	SCL	PG13	DEBUG_TRACED11 HDP_HDP3 SPI7_SCK -	- MDF1_CKI6 - -	TIM8_CH2N **I2C1_SCL** I3C1_SCL -	- LTDC_G7 DCMIPP_D7/PSSI_D7	10K-PU
	IRQ_B	PD11	DEBUG_TRACED7 - I2S1_CK/SPI1_SCK SAI1_MCLK_A	UART4_TX MDF1_CKI0 I2C4_SCL -	TIM1_CH1 - OCTOSPIM_P1_IO7 SDMMC1_D4	SDMMC1_CKIN DCMIPP_D7/DCMI_D7/PSSI_D7 -	10K-PU
	POR_B	NRST					10K-PU
	PMIC_ON_REQ	PWR_ON					
	PMIC_STBY_REQ	PWR_LP					
	WDOG_B	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 -	10K-PU