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Fujian LANDI Commercial Equipment Co., Ltd.

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**AC01116**

Version :           V1.02

## Evolution follow-up

| Date       | Version | Author    | Audit | Comment |
|------------|---------|-----------|-------|---------|
| 2016-12-21 | V1.00   | Zhijun Wu |       |         |
| 2016-12-22 | V1.01   | Zhijun Wu |       |         |
| 2017-1-15  | V1.02   | Zhijun Wu |       |         |
|            |         |           |       |         |
|            |         |           |       |         |

# 1. General Description

AC01116 is a 4G module which is based on Qualcomm MSM8909-2 platform with built-in Android OS. It integrates variety of wireless communication mode, 165 PIN LCC, Dimension: 41mm \*41 mm \*2.8mm.

- ARM Cortex-A7, 1.1 GHz, 512KB L2 cache, 28nm
- Adreno 304 Graphics Processor
- 1GB LPDDR3 RAM+ 8GB eMMC Flash, External memory via SDC2, up to 32GB
- Support GSM/GPRS/EDGE, WCDMA/HSPA+ (42Mbps), LTE Cat 4
- Support WiFi 802.11b/g/n, BT2.1+EDR/3.0/4.0
- Support GPS/GLONASS/BEIDOU
- Android 5.x
- MIPI-DSI Interface, Support up to 720p
- MIPI-CSI Camera Interface, The main camera supports up to 8MP pixels, The secondary camera supports up to 3MP pixels
- Multi Audio Interface
- A rich set of interface, Support USB2.0 High Speed, SD 3.0 , 10bit ADC, UART、SPI、I2C、PWM、GPIO、Charge manage.

## 2. Summary of Features

| CPU Specifications    |                                                                        |
|-----------------------|------------------------------------------------------------------------|
| Application Processor | Quad ARM Cortex-A7 Processor, frequency up to 1.1 GHz ; 512KB L2 cache |
| Multimedia processor  | QDSP6 v5, frequency up to 691MHz ; 768KB L2 cache                      |
| RAM Memory            | 1GB LPDDR3 RAM ; 32bits , Up to 533MHz                                 |
| Flash Memory          | 8 GB eMMC Flash ;<br>External memory via SDC2, up to 32GB              |
| Modem Specifications  |                                                                        |

|                     |                                                                                                                                                                    |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AC01116             | GSM B2/5/8                                                                                                                                                         |
|                     | WCDMA B1/2/4/5/8                                                                                                                                                   |
|                     | LTE-FDD B2/4/5/7/12/13/17/25/26, LTE-TDD B41                                                                                                                       |
| Sensitivity         | GSM B5/8< -109dBm;<br>GSM B2< -107dBm;<br>WCDMA B1/2/4/5/8< -109dBm;<br>LTE: B4<-100dBm;<br>B12/13/17<-97dBm;<br>B2/5/7/26<-98dBm;<br>B25<-96.5dBm;<br>B41<-97dBm; |
| Output Power Class  | GSM/GPRS B5/8: Power Class 4<br>GSM/GPRS B2: Power Class 1<br>EDGE B2/5/8: Power Class E2<br>WCDMA/HSPA+: Power Class 3<br>LTE: Power Class 3                      |
| <b>Connectivity</b> |                                                                                                                                                                    |
| WLAN                | 2.4G, Support 802.11b/g/n, Up to150Mbps<br>Support Wake-on-WLAN (WoWLAN)<br>Support ad-hoc mode<br>Support WAPI SMS4<br>Support AP mode<br>Support Wi-Fi Direct    |
| Bluetooth           | BT2.1+EDR/3.0/4.0 LE                                                                                                                                               |
| <b>GNSS</b>         |                                                                                                                                                                    |
| GNSS                | GPS/GLONASS/BeiDou<br>GPS One                                                                                                                                      |

## 2.1 2G/3G/4G Frequency

| Frequency | Uplink       | Downlink     |
|-----------|--------------|--------------|
| GSM B2    | 1850-1910MHz | 1930-1990MHz |
| GSM B5    | 824-849MHz   | 869-894MHz   |
| GSM B8    | 880-915MHz   | 925-960MHz   |
| WCDMA B1  | 1920-1980MHz | 2110-2170MHz |
| WCDMA B2  | 1850-1910MHz | 1930-1990MHz |
| WCDMA B4  | 1710-1755MHz | 2110-2155MHz |
| WCDMA B5  | 824-849MHz   | 869-894MHz   |

| Frequency                   | Uplink                | Downlink     |
|-----------------------------|-----------------------|--------------|
| WCDMA B8                    | 880-915MHz            | 925-960MHz   |
| LTE-FDD B2                  | 1850-1910MHz          | 1930-1990MHz |
| LTE-FDD B4                  | 1710-1755MHz          | 2110-2155MHz |
| LTE-FDD B5                  | 824-849MHz            | 869-894MHz   |
| LTE-FDD B7                  | 2500-2570MHz          | 2620-2690MHz |
| LTE-FDD B12                 | 699-716MHz            | 729-746MHz   |
| LTE-FDD B13                 | 777-787MHz            | 746-756MHz   |
| LTE-FDD B17                 | 704-716MHz            | 734-746MHz   |
| LTE-FDD B25                 | 1850-1915MHz          | 1930-1995MHz |
| LTE-FDD B26 <sub>note</sub> | 814-849MHz            | 859-894MHz   |
| LTE-TDD B41                 | 2496-2690MHz ( FCC )  |              |
|                             | 2570-2620MHz ( ISED ) |              |

Note1 : Band26 for FCC only

## 2.2 2G/3G/4G Specifications

Compliance with 3GPP

## 2.3 WIFI/BT Frequency

|                   |              |
|-------------------|--------------|
| 802.11b/g/n       | 2412-2462MHz |
| BT2.1+EDR/3.0/4.0 | 2402-2480MHz |

## 2.4 WIFI/BT Specifications

Compliance with IEEE Std 802.11™-2012

Compliance with BT2.1+EDR/3.0/4.0

## 2.5 GPS/GLONASS/BeiDou Specifications

|                             |          |
|-----------------------------|----------|
| Acquisition Sensitivity     | ≤-144dBm |
| Signal Tracking Sensitivity | ≤-159dBm |
| RF C/No                     | C/No≥40  |

## 2.6 Absolute Maximum Ratings

| Parameter | Min  | Typ. | Max |
|-----------|------|------|-----|
| Operating | -25℃ | 25℃  | 75℃ |
| Storage   | -45℃ |      | 90℃ |

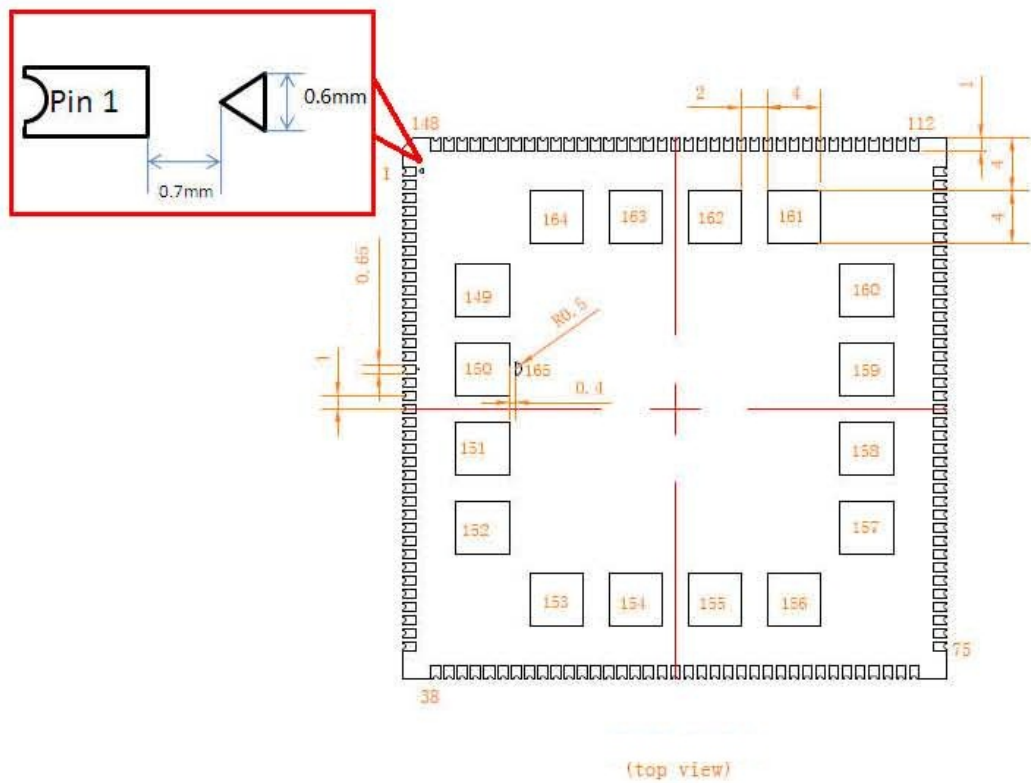
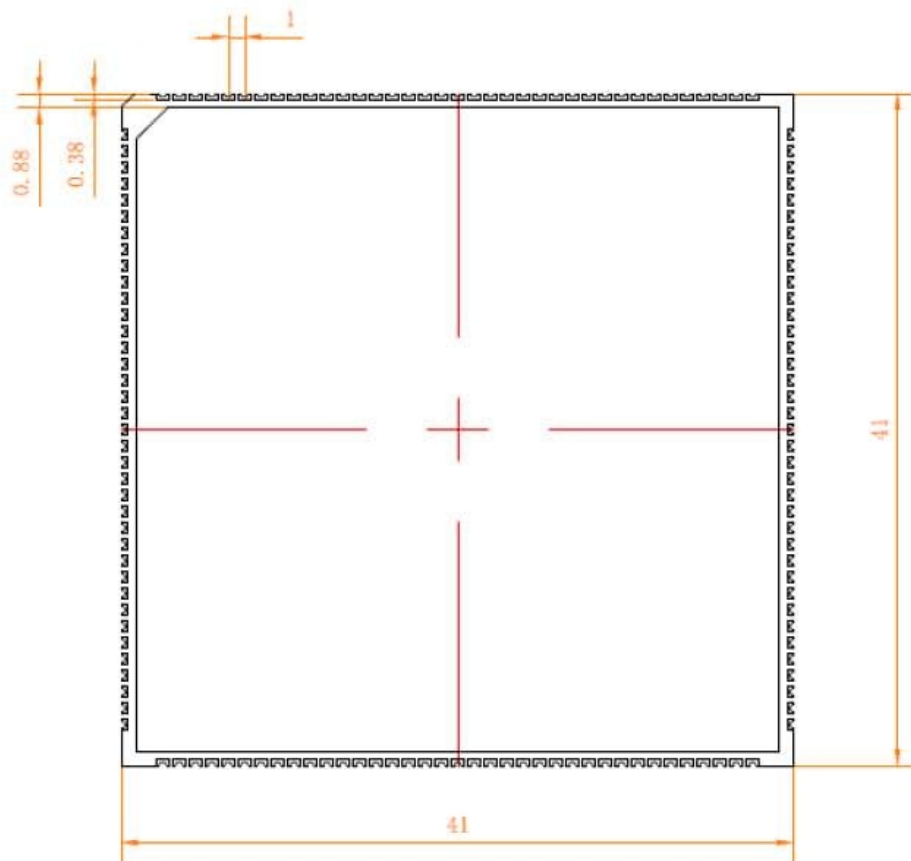
## 2.7 ESD

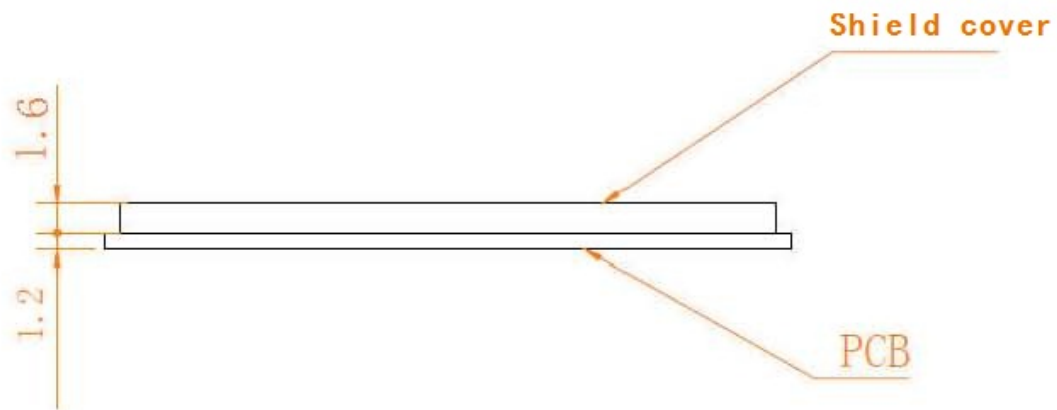
| JEDEC JESD22-A114D (Human Body Model, Test conditions: 1.5K, 100 pF) |        |
|----------------------------------------------------------------------|--------|
| M_VBAT                                                               | ±2000V |
| GPIO                                                                 | ±2000V |
| Antenna Interface                                                    | ±2000V |
| Others                                                               | ±2000V |

# 3. Mechanical Information

## 3.1 Dimension

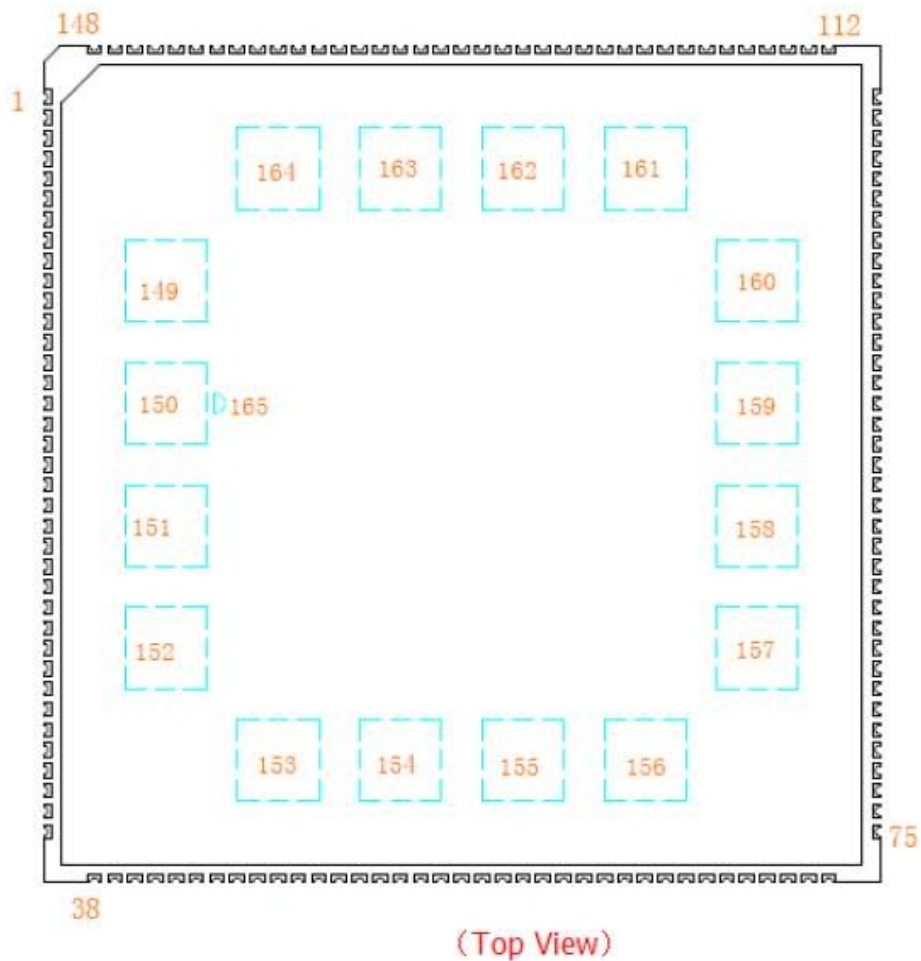
|           |                 |
|-----------|-----------------|
| Dimension | 41mm*41mm*2.8mm |
| Footprint | 165 Pin LCC     |





### 3.2 Pin Assignment

The following figure shows the pin assignment of the AC01116 module.



### 3.3 Pin Description

The following tables show the AC01116's pin definition.

| Pin No. | Pin Name                | Pin No. | Pin Name             | Pin No. | Pin Name              | Pin No. | Pin Name          |
|---------|-------------------------|---------|----------------------|---------|-----------------------|---------|-------------------|
| 1       | M_FORCE_USB_BOOT        | 38      | M_GPIO_14            | 75      | M_CAM0_MCLK           | 112     | M_GPIO_95         |
| 2       | NC                      | 39      | M_GPIO_23            | 76      | M_CAM1_MCLK           | 113     | M_GPIO_11         |
| 3       | M_GND                   | 40      | M_GPIO_31            | 77      | M_GND                 | 114     | M_GPIO_10         |
| 4       | M_VBAT                  | 41      | M_TS_I2C_SCL         | 78      | M_ANT-WIFI/BT         | 115     | M_GPIO_9          |
| 5       | M_VBAT                  | 42      | M_TS_INT_N           | 79      | M_GND                 | 116     | M_GPIO_8          |
| 6       | M_VBAT                  | 43      | M_TS_RST_N           | 80      | M_CAM0_RST_N          | 117     | M_GPIO_16         |
| 7       | M_GND                   | 44      | M_WLED_PWM           | 81      | M_CAM0_PWDN           | 118     | M_GPIO_17         |
| 8       | M_VBUS_USB_IN           | 45      | M_GPIO_20/UART2_TX   | 82      | M_CAM1_RST_N          | 119     | M_GND             |
| 9       | M_VBUS_USB_IN           | 46      | M_GPIO_21/UART2_RX   | 83      | M_CAM1_PWDN           | 120     | M_ANT_GPS         |
| 10      | M_GND                   | 47      | M_GPIO_111/UART2_CTS | 84      | M_CAM_I2C_SCL         | 121     | M_GND             |
| 11      | M_USB_DM                | 48      | M_GPIO_112/UART2_RTS | 85      | M_CAM_I2C_SDA         | 122     | M_VREG_L6_1P8     |
| 12      | M_USB_DP                | 49      | M_LCD_RST_N          | 86      | M_GPIO_32             | 123     | M_KEY_PWR_N       |
| 13      | M_GND                   | 50      | M_LCD_TE             | 87      | M_SENSORS_I2C_SCL     | 124     | M_PWR_CHARGE_SEL  |
| 14      | M_TC                    | 51      | M_GND                | 88      | M_SENSORS_I2C_SDA     | 125     | M_VBAT_SNS        |
| 15      | M_GND                   | 52      | M_MIPI_DSI0_CLK_M    | 89      | M_GPIO_5/UART1_RX     | 126     | M_VRTC            |
| 16      | M_USB_HS_ID             | 53      | M_MIPI_DSI0_CLK_P    | 90      | M_GPIO_4/UART1_TX     | 127     | M_VBAT_THERM      |
| 17      | M_UIM2_DETECT/GPIO_52   | 54      | M_MIPI_DSI0_LANE0_M  | 91      | M_KEY_VOL_UP_N        | 128     | M_ADC_IN/PM_MPP_4 |
| 18      | M_UIM2_RESET            | 55      | M_MIPI_DSI0_LANE0_P  | 92      | M_KEY_VOL_DOWN_N      | 129     | M_VREG_L5_1P8     |
| 19      | M_UIM2_CLK              | 56      | M_MIPI_DSI0_LANE1_M  | 93      | M_GND                 | 130     | M_VREG_17_2P85    |
| 20      | M_UIM2_DATA             | 57      | M_MIPI_DSI0_LANE1_P  | 94      | M_ANT_TRX             | 131     | M_GND             |
| 21      | M_VREG_UIM2             | 58      | M_MIPI_DSI0_LANE2_M  | 95      | M_GND                 | 132     | M_ANT_DRX         |
| 22      | M_UIM1_DETECT/GPIO_56   | 59      | M_MIPI_DSI0_LANE2_P  | 96      | M_GPIO_93             | 133     | M_GND             |
| 23      | M_UIM1_RESET            | 60      | M_MIPI_DSI0_LANE3_M  | 97      | M_GPIO_92             | 134     | M_CDC_EAR_P       |
| 24      | M_UIM1_CLK              | 61      | M_MIPI_DSI0_LANE3_P  | 98      | M_GPIO_88             | 135     | M_CDC_EAR_M       |
| 25      | M_UIM1_DATA             | 62      | M_GND                | 99      | M_GPIO_89             | 136     | M_GND             |
| 26      | M_VREG_UIM1             | 63      | M_MIPI_CSI0_CLK_M    | 100     | M_GPIO_0              | 137     | M_CDC_HPH_R       |
| 27      | M_GND                   | 64      | M_MIPI_CSI0_CLK_P    | 101     | M_GPIO_98             | 138     | M_CDC_HPH_REF     |
| 28      | M_VREG_SDC_PWR          | 65      | M_MIPI_CSI0_LANE0_M  | 102     | M_GPIO_72             | 139     | M_CDC_HPH_L       |
| 29      | M_SDC2_CLK              | 66      | M_MIPI_CSI0_LANE0_P  | 103     | M_GPIO_70             | 140     | M_CDC_HS_DET      |
| 30      | M_SDC2_CMD              | 67      | M_MIPI_CSI0_LANE1_M  | 104     | M_GPIO_97             | 141     | M_GND_MIC         |
| 31      | M_SDC2_DATA0            | 68      | M_MIPI_CSI0_LANE1_P  | 105     | M_GPIO_110            | 142     | M_MIC2_P          |
| 32      | M_SDC2_DATA1            | 69      | M_GND                | 106     | M_ALSP_INT_N/GPIO_94  | 143     | M_GND             |
| 33      | M_SDC2_DATA2            | 70      | M_MIPI_CSI1_CLK_M    | 107     | M_MAG_INT_N/GPIO_36   | 144     | M_MIC1_N          |
| 34      | M_SDC2_DATA3            | 71      | M_MIPI_CSI1_CLK_P    | 108     | M_ACCL_INT2_N/GPIO_65 | 145     | M_MIC1_P          |
| 35      | M_SD_CARD_DET_N/GPIO_38 | 72      | M_MIPI_CSI1_LANE0_M  | 109     | M_ACCL_INT1_N/GPIO_96 | 146     | M_GND             |
| 36      | M_GND                   | 73      | M_MIPI_CSI1_LANE0_P  | 110     | M_GPIO_58             | 147     | M_SPKR_DRV_M      |
| 37      | M_VIB_DRV_N             | 74      | M_GND                | 111     | M_GPIO_99             | 148     | M_SPKR_DRV_P      |

| Pin No. | Pin Name     |
|---------|--------------|
| 149     | M_GND        |
| 150     | M_TS_I2C_SDA |
| 151     | M_CONN       |
| 152     | M_GND        |
| 153     | M_GND        |
| 154     | M_GND        |
| 155     | M_GND        |
| 156     | M_GND        |
| 157     | M_GND        |
| 158     | M_TS_I2C_SDA |
| 159     | M_CONN       |
| 160     | M_GND        |
| 161     | M_GND        |
| 162     | M_GND        |
| 163     | M_GND        |
| 164     | M_GND        |
| 165     | M_TC         |

| Pin No.                                                                                                                                                 | Pin Name       | Type | Description                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------|-----------------------------------------------------|
| RF Interface                                                                                                                                            |                |      |                                                     |
| 94                                                                                                                                                      | M_ANT_TRX      | I/O  | 2G/3G/4G antenna interface                          |
| 132                                                                                                                                                     | M_ANT_DRX      | I    | 4G diversity antenna interface                      |
| 120                                                                                                                                                     | M_ANT_GPS      | I    | GPS antenna interface                               |
| 78                                                                                                                                                      | M_ANT-WIFI/BT  | I/O  | WIFI/BT antenna interface                           |
| Power Supply                                                                                                                                            |                |      |                                                     |
| 4, 5, 6                                                                                                                                                 | M_VBAT         | P    | Main power supply, supply by battery                |
| 126                                                                                                                                                     | M_VRTC         | P    | 3V backup power supply                              |
| 122                                                                                                                                                     | M_VREG_L6_1P8  | P    | Provide 1.8V for external circuit                   |
| 130                                                                                                                                                     | M_VREG_17_2P85 | P    | Provide 1.8V for external circuit, Controlled by SW |
| 129                                                                                                                                                     | M_VREG_L5_1P8  | P    | Provide 1.8V output, not for external circuit       |
| GND                                                                                                                                                     |                |      |                                                     |
| 3, 7, 10, 13, 15, 27, 36, 51, 62, 69, 74, 77, 79, 93, 95, 119, 121, 131, 133, 136, 143, 146, 149, 152, 153, 154, 155, 156, 157, 160, 161, 162, 163, 164 | M_GND          | P    | GND                                                 |
| USB Interface                                                                                                                                           |                |      |                                                     |
| 8, 9                                                                                                                                                    | M_VBUS_USB_IN  | P    | USB5V input                                         |
| 11                                                                                                                                                      | M_USB_DM       | I/O  | USB differential data bus.                          |
| 12                                                                                                                                                      | M_USB_DP       | I/O  | USB differential data bus.                          |
| 16                                                                                                                                                      | M_USB_HS_ID    | I    | USB ID detection                                    |

| Pin No.                | Pin Name                | Type | Description                                          |
|------------------------|-------------------------|------|------------------------------------------------------|
| SIM Interface          |                         |      |                                                      |
| 17                     | M_UIM2_DETECT/GPIO_52   | I    | SIM 2 Detection                                      |
| 18                     | M_UIM2_RESET            | O    | SIM2 Reset signal                                    |
| 19                     | M_UIM2_CLK              | O    | SIM 2 Clock signal                                   |
| 20                     | M_UIM2_DATA             | I/O  | SIM 2 Data signal                                    |
| 22                     | M_VREG_UIM2             | P    | Power supply for SIM 2 , 1.8V/2.95V                  |
| 22                     | M_UIM1_DETECT/GPIO_56   | I    | SIM 1 Detection                                      |
| 23                     | M_UIM1_RESET            | O    | SIM1 Reset signal                                    |
| 24                     | M_UIM1_CLK              | O    | SIM1 Clock signal                                    |
| 25                     | M_UIM1_DATA             | I/O  | SIM1 Data signal                                     |
| 26                     | M_VREG_UIM1             | P    | Power supply for SIM 1 , 1.8V/2.95V                  |
| SDIO/SD Interface      |                         |      |                                                      |
| 28                     | M_VREG_SDC_PWR          | P    | Power supply for SD card                             |
| 29                     | M_SDC2_CLK              | O    | SDIO Clock signal                                    |
| 30                     | M_SDC2_CMD              | I/O  | SDIO cmd                                             |
| 31                     | M_SDC2_DATA0            | I/O  | SDIO data0                                           |
| 32                     | M_SDC2_DATA1            | I/O  | SDIO data1                                           |
| 33                     | M_SDC2_DATA2            | I/O  | SDIO data2                                           |
| 34                     | M_SDC2_DATA3            | I/O  | SDIO data3                                           |
| 35                     | M_SD_CARD_DET_N/GPIO_38 | I    | SD Card Detection                                    |
| Touch screen interface |                         |      |                                                      |
| 150,158                | M_TS_I2C_SDA            | I/O  | I2C data of touch screen                             |
| 41                     | M_TS_I2C_SCL            | O    | I2C clock of touch screen                            |
| 42                     | M_TS_INT_N              | I    | Touch screen interrupt signal                        |
| 43                     | M_TS_RST_N              | O    | Touch screen reset signal                            |
| LCD Interface          |                         |      |                                                      |
| 44                     | M_WLED_PWM              | O    | Backlight brightness adjustment , PWM control signal |
| 49                     | M_LCD_RST_N             | O    | LCD reset                                            |
| 50                     | M_LCD_TE                | I    | LCD Tearing Effect signal                            |
| 52                     | M_MIPI_DSI0_CLK_M       | O    | LCD MIPI signal                                      |
| 53                     | M_MIPI_DSI0_CLK_P       | O    |                                                      |
| 54                     | M_MIPI_DSI0_LANE0_M     | O    |                                                      |
| 55                     | M_MIPI_DSI0_LANE0_P     | O    |                                                      |
| 56                     | M_MIPI_DSI0_LANE1_M     | O    |                                                      |
| 57                     | M_MIPI_DSI0_LANE1_P     | O    |                                                      |
| 58                     | M_MIPI_DSI0_LANE2_M     | O    |                                                      |
| 59                     | M_MIPI_DSI0_LANE2_P     | O    |                                                      |
| 60                     | M_MIPI_DSI0_LANE3_M     | O    |                                                      |
| 61                     | M_MIPI_DSI0_LANE3_P     | O    |                                                      |
| Camera Interface       |                         |      |                                                      |
| 63                     | M_MIPI_CSI0_CLK_M       | I    | MIPI signal of main camera                           |
| 64                     | M_MIPI_CSI0_CLK_P       | I    |                                                      |

| Pin No.          | Pin Name              | Type | Description                                          |
|------------------|-----------------------|------|------------------------------------------------------|
| 65               | M_MIPI_CSIO_LANE0_M   | I    | MIPI signal of deputy camera                         |
| 66               | M_MIPI_CSIO_LANE0_P   | I    |                                                      |
| 67               | M_MIPI_CSIO_LANE1_M   | I    |                                                      |
| 68               | M_MIPI_CSIO_LANE1_P   | I    |                                                      |
| 70               | M_MIPI_CSI1_CLK_M     | I    |                                                      |
| 71               | M_MIPI_CSI1_CLK_P     | I    |                                                      |
| 72               | M_MIPI_CSI1_LANE0_M   | I    |                                                      |
| 73               | M_MIPI_CSI1_LANE0_P   | I    |                                                      |
| 75               | M_CAM0_MCLK           | O    | Clock signal of main camera                          |
| 76               | M_CAM1_MCLK           | O    | Clock signal of deputy camera                        |
| 80               | M_CAM0_RST_N          | O    | Reset signal of main camera                          |
| 81               | M_CAM0_PWDN           | O    | Power down signal of main camera                     |
| 82               | M_CAM1_RST_N          | O    | Reset signal of deputy camera                        |
| 83               | M_CAM1_PWDN           | O    | Power down signal of deputy camera                   |
| 84               | M_CAM_I2C_SCL         | O    | I2C clock of camera                                  |
| 85               | M_CAM_I2C_SDA         | I/O  | I2C data of camera                                   |
| Key Interface    |                       |      |                                                      |
| 91               | M_KEY_VOL_UP_N        | I    | Volume "+"                                           |
| 92               | M_KEY_VOL_DOWN_N      | I    | Volume "-"                                           |
| 123              | M_KEY_PWR_N           | I    | Power ON/OFF                                         |
| Sensor Interface |                       |      |                                                      |
| 87               | M_SENSORS_I2C_SCL     | O    | I2C clock of sensor                                  |
| 88               | M_SENSORS_I2C_SDA     | I/O  | I2C data of sensor                                   |
| 106              | M_ALSP_INT_N/GPIO_94  | I    | Optical and proximity sensor interrupts input. /GPIO |
| 107              | M_MAG_INT_N/GPIO_36   | I    | Geomagnetic sensor interrupts input. /GPIO           |
| 108              | M_ACCL_INT2_N/GPIO_65 | I    | Acceleration sensor interrupts input 2. /GPIO        |
| 109              | M_ACCL_INT1_N/GPIO_96 | I    | Acceleration sensor interrupts input 1. /GPIO        |
| ADC Interface    |                       |      |                                                      |
| 125              | M_VBAT_SNS            | I    | Battery voltage detection , maximum 4.5V             |
| 128              | M_ADC_IN/PM_MPP_4     | I    | Universal ADC detection , maximum input 1.7V.        |
| 127              | M_VBAT_THERM          | I    | Battery temperature detection                        |
| Audio Interface  |                       |      |                                                      |
| 134              | M_CDC_EAR_P           | O    | Receiver output, positive pole                       |
| 135              | M_CDC_EAR_M           | O    | Receiver output, negative pole                       |
| 137              | M_CDC_HPH_R           | O    | Right channel of Headset                             |
| 138              | M_CDC_HPH_REF         | I    | Virtual GND of Headset                               |
| 139              | M_CDC_HPH_L           | O    | Left channel of Headset                              |
| 140              | M_CDC_HS_DET          | I    | Headset detection                                    |
| 141              | M_GND_MIC             | P    | GND of MIC                                           |
| 142              | M_MIC2_P              | I    | Input of headset MIC                                 |
| 144              | M_MIC1_N              | I    | Main microphone inputs, negative pole                |

| Pin No.             | Pin Name             | Type | Description                           |
|---------------------|----------------------|------|---------------------------------------|
| 145                 | M_MIC1_P             | I    | Main microphone inputs, positive pole |
| 147                 | M_SPKR_DRV_M         | O    | Speaker output, negative pole         |
| 148                 | M_SPKR_DRV_P         | O    | Speaker output, positive pole         |
| Motor Interface     |                      |      |                                       |
| 37                  | M_VIB_DRV_N          | P,O  | motor drive, motor negative           |
| Others              |                      |      |                                       |
| 1                   | M_FORCE_USB_BOOT     | I    | Force USB boot signal                 |
| 38                  | M_GPIO_14            | I/O  | GPIO                                  |
| 39                  | M_GPIO_23            | I/O  | GPIO                                  |
| 40                  | M_GPIO_31            | I/O  | GPIO                                  |
| 45                  | M_GPIO_20/UART2_TX   | I/O  | UART2_TX/GPIO                         |
| 46                  | M_GPIO_21/UART2_RX   | I/O  | UART2_RX/GPIO                         |
| 47                  | M_GPIO_111/UART2_CTS | I/O  | UART2_CTS/GPIO                        |
| 48                  | M_GPIO_112/UART2_RTS | I/O  | UART2_RTS/GPIO                        |
| 86                  | M_GPIO_32            | I/O  | GPIO                                  |
| 89                  | M_GPIO_5/UART1_RX    | I/O  | UART1_RX/GPIO                         |
| 90                  | M_GPIO_4/UART1_TX    | I/O  | UART1_TX/GPIO                         |
| 96                  | M_GPIO_93            | I/O  | GPIO                                  |
| 97                  | M_GPIO_92            | I/O  | GPIO                                  |
| 98                  | M_GPIO_88            | I/O  | GPIO                                  |
| 99                  | M_GPIO_89            | I/O  | GPIO                                  |
| 100                 | M_GPIO_0             | I/O  | GPIO                                  |
| 101                 | M_GPIO_98            | I/O  | GPIO                                  |
| 102                 | M_GPIO_72            | I/O  | GPIO                                  |
| 103                 | M_GPIO_70            | I/O  | GPIO                                  |
| 104                 | M_GPIO_97            | I/O  | GPIO                                  |
| 105                 | M_GPIO_110           | I/O  | GPIO                                  |
| 110                 | M_GPIO_58            | I/O  | GPIO                                  |
| 111                 | M_GPIO_99            | I/O  | GPIO                                  |
| 112                 | M_GPIO_95            | I/O  | GPIO                                  |
| 113                 | M_GPIO_11            | I/O  | GPIO                                  |
| 114                 | M_GPIO_10            | I/O  | GPIO                                  |
| 115                 | M_GPIO_9             | I/O  | GPIO                                  |
| 116                 | M_GPIO_8             | I/O  | GPIO                                  |
| 117                 | M_GPIO_16            | I/O  | GPIO                                  |
| 118                 | M_GPIO_17            | I/O  | GPIO                                  |
| 124                 | M_PWR CHARGE SEL     | I    | Connect to PMU for charge select      |
| 151、 159            | M_CON                |      | Two M_CON                             |
| 14、 165             | M_TC                 |      | Two M_TC                              |
| Reserved pin ( NC ) |                      |      |                                       |
| 2                   | NC                   |      |                                       |

| Pin No. | Pin name                    | Pin electrical properties | Voltage level | Homologous GPIO | Remark |
|---------|-----------------------------|---------------------------|---------------|-----------------|--------|
| 1       | M_FORCE_USB_BOOT            | D,I                       | 1.8V          | GPIO_37         |        |
| 2       | NC                          |                           |               |                 |        |
| 3       | M_GND                       | GND                       |               |                 |        |
| 4       | M_VBAT                      | P,I                       | 3.5~4.2V      |                 |        |
| 5       | M_VBAT                      | P,I                       | 3.5~4.2V      |                 |        |
| 6       | M_VBAT                      | P,I                       | 3.5~4.2V      |                 |        |
| 7       | M_GND                       | GND                       |               |                 |        |
| 8       | M_VBUS_USB_IN               | P,I                       | 5V            |                 |        |
| 9       | M_VBUS_USB_IN               | P,I                       | 5V            |                 |        |
| 10      | M_GND                       | GND                       |               |                 |        |
| 11      | M_USB_DM                    | A,I/O                     |               |                 |        |
| 12      | M_USB_DP                    | A,I/O                     |               |                 |        |
| 13      | M_GND                       | GND                       |               |                 |        |
| 14      | M_TC                        |                           |               |                 |        |
| 15      | M_GND                       | GND                       |               |                 |        |
| 16      | M_USB_HS_ID                 | A,I                       |               |                 |        |
| 17      | M_UIM2_DETECT<br>/GPIO_52   | D,I<br>D,I/O              | 1.8V          | GPIO_52         |        |
| 18      | M_UIM2_RESET                | D,O                       | 1.8/2.95V     | GPIO_51         |        |
| 19      | M_UIM2_CLK                  | D,O                       | 1.8/2.95V     | GPIO_50         |        |
| 20      | M_UIM2_DATA                 | D,I/O                     | 1.8/2.95V     | GPIO_49         |        |
| 21      | M_VREG_UIM2                 | P,O                       | 1.8/2.95V     |                 |        |
| 22      | M_UIM1_DETECT<br>/GPIO_56   | D,I<br>D,I/O              | 1.8V          | GPIO_56         |        |
| 23      | M_UIM1_RESET                | D,O                       | 1.8/2.95V     | GPIO_55         |        |
| 24      | M_UIM1_CLK                  | D,O                       | 1.8/2.95V     | GPIO_54         |        |
| 25      | M_UIM1_DATA                 | D,I/O                     | 1.8/2.95V     | GPIO_53         |        |
| 26      | M_VREG_UIM1                 | P,O                       | 1.8/2.95V     |                 |        |
| 27      | M_GND                       | GND                       |               |                 |        |
| 28      | M_VREG_SDC_PWR              | P,O                       | 2.95V         |                 |        |
| 29      | M_SDC2_CLK                  | D,O                       | 1.8/2.95V     |                 |        |
| 30      | M_SDC2_CMD                  | D,I/O                     | 1.8/2.95V     |                 |        |
| 31      | M_SDC2_DATA0                | D,I/O                     | 1.8/2.95V     |                 |        |
| 32      | M_SDC2_DATA1                | D,I/O                     | 1.8/2.95V     |                 |        |
| 33      | M_SDC2_DATA2                | D,I/O                     | 1.8/2.95V     |                 |        |
| 34      | M_SDC2_DATA3                | D,I/O                     | 1.8/2.95V     |                 |        |
| 35      | M_SD_CARD_DET_N<br>/GPIO_38 | D,I<br>D,I/O              | 1.8V          | GPIO_38         |        |

| Pin No. | Pin name                 | Pin electrical properties | Voltage level | Homologous GPIO | Remark |
|---------|--------------------------|---------------------------|---------------|-----------------|--------|
| 36      | M_GND                    | GND                       |               |                 |        |
| 37      | M_VIB_DRV_N              | P,O                       |               |                 |        |
| 38      | M_GPIO_14                | D,I/O                     | 1.8V          | GPIO_14         |        |
| 39      | M_GPIO_23                | D,I/O                     | 1.8V          | GPIO_23         |        |
| 40      | M_GPIO_31                | D,I/O                     | 1.8V          | GPIO_31         |        |
| 41      | M_TS_I2C_SCL             | D,O                       | 1.8V          | GPIO_19         |        |
| 42      | M_TS_INT_N               | D,I                       | 1.8V          | GPIO_13         |        |
| 43      | M_TS_RST_N               | D,O                       | 1.8V          | GPIO_12         |        |
| 44      | M_WLED_PWM               | D,O                       | V_MPP_2       | PM_MPP_2        |        |
| 45      | M_GPIO_20<br>/UART2_TX   | D,I/O<br>D,O              | 1.8V          | GPIO_20         |        |
| 46      | M_GPIO_21<br>/UART2_RX   | D,I/O<br>D,I              | 1.8V          | GPIO_21         |        |
| 47      | M_GPIO_111<br>/UART2_CTS | D,I/O<br>D,I              | 1.8V          | GPIO_111        |        |
| 48      | M_GPIO_112<br>/UART2_RTS | D,I/O<br>D,O              | 1.8V          | GPIO_112        |        |
| 49      | M_LCD_RST_N              | D,O                       | 1.8V          | GPIO_25         |        |
| 50      | M_LCD_TE                 | D,I                       | 1.8V          | GPIO_24         |        |
| 51      | M_GND                    | GND                       |               |                 |        |
| 52      | M_MIPI_DSI0_CLK_M        | A,O                       |               |                 |        |
| 53      | M_MIPI_DSI0_CLK_P        | A,O                       |               |                 |        |
| 54      | M_MIPI_DSI0_LANE0_M      | A,O                       |               |                 |        |
| 55      | M_MIPI_DSI0_LANE0_P      | A,O                       |               |                 |        |
| 56      | M_MIPI_DSI0_LANE1_M      | A,O                       |               |                 |        |
| 57      | M_MIPI_DSI0_LANE1_P      | A,O                       |               |                 |        |
| 58      | M_MIPI_DSI0_LANE2_M      | A,O                       |               |                 |        |
| 59      | M_MIPI_DSI0_LANE2_P      | A,O                       |               |                 |        |
| 60      | M_MIPI_DSI0_LANE3_M      | A,O                       |               |                 |        |
| 61      | M_MIPI_DSI0_LANE3_P      | A,O                       |               |                 |        |
| 62      | M_GND                    | GND                       |               |                 |        |
| 63      | M_MIPI_CSI0_CLK_M        | A,I                       |               |                 |        |
| 64      | M_MIPI_CSI0_CLK_P        | A,I                       |               |                 |        |
| 65      | M_MIPI_CSI0_LANE0_M      | A,I                       |               |                 |        |
| 66      | M_MIPI_CSI0_LANE0_P      | A,I                       |               |                 |        |
| 67      | M_MIPI_CSI0_LANE1_M      | A,I                       |               |                 |        |
| 68      | M_MIPI_CSI0_LANE1_P      | A,I                       |               |                 |        |
| 69      | M_GND                    | GND                       |               |                 |        |
| 70      | M_MIPI_CSI1_CLK_M        | A,I                       |               |                 |        |
| 71      | M_MIPI_CSI1_CLK_P        | A,I                       |               |                 |        |

| Pin No. | Pin name                 | Pin electrical properties | Voltage level | Homologous GPIO | Remark |
|---------|--------------------------|---------------------------|---------------|-----------------|--------|
| 72      | M_MIPI_CSI1_LANE0_M      | A,I                       |               |                 |        |
| 73      | M_MIPI_CSI1_LANE0_P      | A,I                       |               |                 |        |
| 74      | M_GND                    | GND                       |               |                 |        |
| 75      | M_CAM0_MCLK              | D,O                       | 1.8V          | GPIO_26         |        |
| 76      | M_CAM1_MCLK              | D,O                       | 1.8V          | GPIO_27         |        |
| 77      | M_GND                    | GND                       |               |                 |        |
| 78      | M_ANT-WIFI/BT            | A,I/O                     |               |                 |        |
| 79      | M_GND                    | GND                       |               |                 |        |
| 80      | M_CAM0_RST_N             | D,O                       | 1.8V          | GPIO_35         |        |
| 81      | M_CAM0_PWDN              | D,O                       | 1.8V          | GPIO_34         |        |
| 82      | M_CAM1_RST_N             | D,O                       | 1.8V          | GPIO_28         |        |
| 83      | M_CAM1_PWDN              | D,O                       | 1.8V          | GPIO_33         |        |
| 84      | M_CAM_I2C_SCL            | D,O                       | 1.8V          | GPIO_30         |        |
| 85      | M_CAM_I2C_SDA            | D,I/O                     | 1.8V          | GPIO_29         |        |
| 86      | M_GPIO_32                | D,I/O                     | 1.8V          | GPIO_32         |        |
| 87      | M_SENSORS_I2C_SCL        | D,I/O                     | 1.8V          | GPIO_7          |        |
| 88      | M_SENSORS_I2C_SDA        | D,I/O                     | 1.8V          | GPIO_6          |        |
| 89      | M_GPIO_5<br>/UART1_RX    | D,I/O<br>D,I              | 1.8V          | GPIO_5          |        |
| 90      | M_GPIO_4<br>/UART1_TX    | D,I/O<br>D,O              | 1.8V          | GPIO_4          |        |
| 91      | M_KEY_VOL_UP_N           | D,I                       | 1.8V          | GPIO_90         |        |
| 92      | M_KEY_VOL_DOWN_N         | D,I                       | 1.8V          | GPIO_91         |        |
| 93      | M_GND                    | GND                       |               |                 |        |
| 94      | M_ANT_TRX                | A,I/O                     |               |                 |        |
| 95      | M_GND                    | GND                       |               |                 |        |
| 96      | M_GPIO_93                | D,I/O                     | 1.8V          | GPIO_93         |        |
| 97      | M_GPIO_92                | D,I/O                     | 1.8V          | GPIO_92         |        |
| 98      | M_GPIO_88                | D,I/O                     | 1.8V          | GPIO_88         |        |
| 99      | M_GPIO_89                | D,I/O                     | 1.8V          | GPIO_89         |        |
| 100     | M_GPIO_0                 | D,I/O                     | 1.8V          | GPIO_0          |        |
| 101     | M_GPIO_98                | D,I/O                     | 1.8V          | GPIO_98         |        |
| 102     | M_GPIO_72                | D,I/O                     | 1.8V          | GPIO_72         |        |
| 103     | M_GPIO_70                | D,I/O                     | 1.8V          | GPIO_70         |        |
| 104     | M_GPIO_97                | D,I/O                     | 1.8V          | GPIO_97         |        |
| 105     | M_GPIO_110               | D,I/O                     | 1.8V          | GPIO_110        |        |
| 106     | M_ALSP_INT_N<br>/GPIO_94 | D,I<br>D,I/O              | 1.8V          | GPIO_94         |        |
| 107     | M_MAG_INT_N<br>/GPIO_36  | D,I<br>D,I/O              | 1.8V          | GPIO_36         |        |

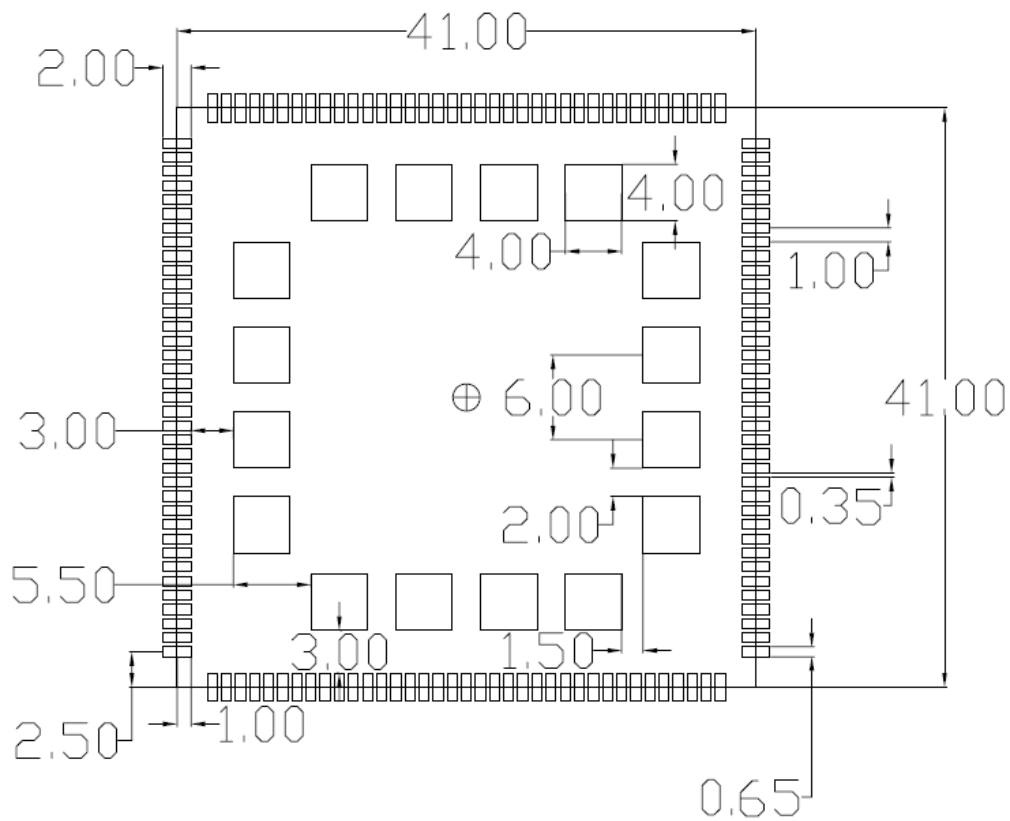
| Pin No. | Pin name                  | Pin electrical properties | Voltage level | Homologous GPIO | Remark |
|---------|---------------------------|---------------------------|---------------|-----------------|--------|
| 108     | M_ACCL_INT2_N<br>/GPIO_65 | D,I<br>D,I/O              | 1.8V          | GPIO_65         |        |
| 109     | M_ACCL_INT1_N<br>/GPIO_96 | D,I<br>D,I/O              | 1.8V          | GPIO_96         |        |
| 110     | M_GPIO_58                 | D,I/O                     | 1.8V          | GPIO_58         |        |
| 111     | M_GPIO_99                 | D,I/O                     | 1.8V          | GPIO_99         |        |
| 112     | M_GPIO_95                 | D,I/O                     | 1.8V          | GPIO_95         |        |
| 113     | M_GPIO_11                 | D,I/O                     | 1.8V          | GPIO_11         |        |
| 114     | M_GPIO_10                 | D,I/O                     | 1.8V          | GPIO_10         |        |
| 115     | M_GPIO_9                  | D,I/O                     | 1.8V          | GPIO_9          |        |
| 116     | M_GPIO_8                  | D,I/O                     | 1.8V          | GPIO_8          |        |
| 117     | M_GPIO_16                 | D,I/O                     | 1.8V          | GPIO_16         |        |
| 118     | M_GPIO_17                 | D,I/O                     | 1.8V          | GPIO_17         |        |
| 119     | M_GND                     | GND                       |               |                 |        |
| 120     | M_ANT_GPS                 | A,I                       |               |                 |        |
| 121     | M_GND                     | GND                       |               |                 |        |
| 122     | M_VREG_L6_1P8             | P,O                       | 1.8V          |                 |        |
| 123     | M_KEY_PWR_N               | D,I                       | 1.8V          |                 |        |
| 124     | M_PWR CHARGE SEL          | D,I                       | 1.8V          | PM_OPT_1        |        |
| 125     | M_VBAT_SNS                | A,I                       |               |                 |        |
| 126     | M_VRTC                    | P,I                       | 3V            |                 |        |
| 127     | M_VBAT_THERM              | A,I                       |               |                 |        |
| 128     | M_ADC_IN/PM_MPP_4         | A,I                       | 1.8V          | PM_MPP_4        |        |
| 129     | M_VREG_L5_1P8             | P,O                       | 1.8V          |                 |        |
| 130     | M_VREG_17_2P85            | P,O                       | 2.85V         |                 |        |
| 131     | M_GND                     | GND                       |               |                 |        |
| 132     | M_ANT_DRX                 | A,I                       |               |                 |        |
| 133     | M_GND                     | GND                       |               |                 |        |
| 134     | M_CDC_EAR_P               | A,O                       |               |                 |        |
| 135     | M_CDC_EAR_M               | A,O                       |               |                 |        |
| 136     | M_GND                     | GND                       |               |                 |        |
| 137     | M_CDC_HPH_R               | A,O                       |               |                 |        |
| 138     | M_CDC_HPH_REF             | A,I                       |               |                 |        |
| 139     | M_CDC_HPH_L               | A,O                       |               |                 |        |
| 140     | M_CDC_HS_DET              | A,I                       |               |                 |        |
| 141     | M_GND_MIC                 | GND                       |               |                 |        |
| 142     | M_MIC2_P                  | A,I                       |               |                 |        |
| 143     | M_GND                     | GND                       |               |                 |        |
| 144     | M_MIC1_N                  | A,I                       |               |                 |        |
| 145     | M_MIC1_P                  | A,I                       |               |                 |        |

| Pin No. | Pin name     | Pin electrical properties | Voltage level | Homologous GPIO | Remark |
|---------|--------------|---------------------------|---------------|-----------------|--------|
| 146     | M_GND        | GND                       |               |                 |        |
| 147     | M_SPKR_DRV_M | A,O                       |               |                 |        |
| 148     | M_SPKR_DRV_P | A,O                       |               |                 |        |
| 149     | M_GND        | GND                       |               |                 |        |
| 150     | M_TS_I2C_SDA | D,I/O                     | 1.8V          | GPIO_18         |        |
| 151     | M_CONN       |                           |               |                 |        |
| 152     | M_GND        | GND                       |               |                 |        |
| 153     | M_GND        | GND                       |               |                 |        |
| 154     | M_GND        | GND                       |               |                 |        |
| 155     | M_GND        | GND                       |               |                 |        |
| 156     | M_GND        | GND                       |               |                 |        |
| 157     | M_GND        | GND                       |               |                 |        |
| 158     | M_TS_I2C_SDA | D,I/O                     | 1.8V          | GPIO_18         |        |
| 159     | M_CONN       |                           |               |                 |        |
| 160     | M_GND        | GND                       |               |                 |        |
| 161     | M_GND        | GND                       |               |                 |        |
| 162     | M_GND        | GND                       |               |                 |        |
| 163     | M_GND        | GND                       |               |                 |        |
| 164     | M_GND        | GND                       |               |                 |        |
| 165     | M_TC         |                           |               |                 |        |

### 3.4 Label



### 4. Footprint



## 5. Directives and Standards

The AC01116 module is designed to comply with the FCC/ISED statements

FCC ID: 2AG6NAC01116/IC:23725-AC01116,

The host system using AC01116, should have label indicated

FCC ID: 2AG6NAC01116/IC:23725-AC01116

### FCC/ISED Radiation Exposure Statement

This equipment complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

If using a permanently affixed label, the modular transmitter must be labeled with its own FCC/ISED identification number, and, if the FCC/ISED identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

“Contains Transmitter Module FCC ID: 2AG6NAC01116/IC:23725-AC01116 or Contains FCC ID: 2AG6NAC01116/IC:23725-AC01116. Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization or must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization.

This device is to be used in mobile or fixed applications only. Antenna gain including cable loss must not exceed 1.43 dBi of frequency band 814-849 MHz, 3.0 dBi of frequency band 1850-1915MHz, 6.0 dBi of frequency band 1710-1755 MHz, 5.93 dBi of frequency band 699-716 MHz, 6.24 dBi of frequency band 777-787 MHz, 9.0 dBi of frequency band 2496-2690 MHz. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any antenna or transmitter not described under this FCC/ISED number. The final product operating with this transmitter must include operating instructions and antenna installation instructions, for end-users and installers to satisfy RF exposure compliance requirements.

Cet appareil est Conforme aux limites d'exposition de rayonnement RF ISED établies pour un environnement non contrôlé. Cet émetteur ne doit pas être co - implanté ou fonctionner en conjonction avec toute autre antenne ou transmetteur. Cet équipement doit être installé et utilisé avec une distance minimale de 20cm entre le radiateur & votre corps.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Tous les changements ou modifications non expressément approuvée par le responsable de la conformité pourrait vider l'utilisateur est habilité à exploiter l'équipement.

## **FCC WARNING:**

Any Changes expressly or modifications not approved by the party responsible for compliance

could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference

received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device,

pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## **ISED WARNING:**

This device complies with ISED licence - exempt RSS standard (s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'ISED licables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Innovation, Science and Economic Development Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Innovation, Science and Economic Development Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that, the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Innovation, la science et le développement économique, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Innovation, la science et le développement économique. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.