

# M100 Datasheet

Version 0.1

Release Date 2017-07-05

The document only for following list module:

M100-QVCX-2G16G, M100-OVCX-1G8G, M100-OVCX-2G16G, M100-OVWX-1G8G,  
M100-OVWX-2G16G, M100-OVTX-1G8G, M100-OVTX-2G16G,M100-QVCX-1G8G,  
M100-QVCX-2G16G, M100-QVWX-1G8G, M100-QVWX-2G16G, M100-QVTX-1G8G,  
M100-QVTX-2G16G, M100-OWNX-1G8G, M100-OWNX-2G16G, M100-QWNX-1G8G,  
M100-QWNX-2G16G

## Revision History

DocumentVersion	Date	Chapter	Descriptions
01	2017-07-05		Creation

# 1 Product Application Overview

M100 is a Android inside All wireless mode module. Now it Integrate with LTE//HSDPA/HSUPA/WCDMA/EVDO/CDMA2000/GSM, Bluetooth, WIFI, GPS on board.

This document defines the M100 module and describes its air interface and hardware interface within your application.

This document can help you to quickly understand module interface specifications, electrical and mechanical details as well as other related information of M100 module. Associated with application notes and user guide, you can use M100 module to design and set up devices applications easily.

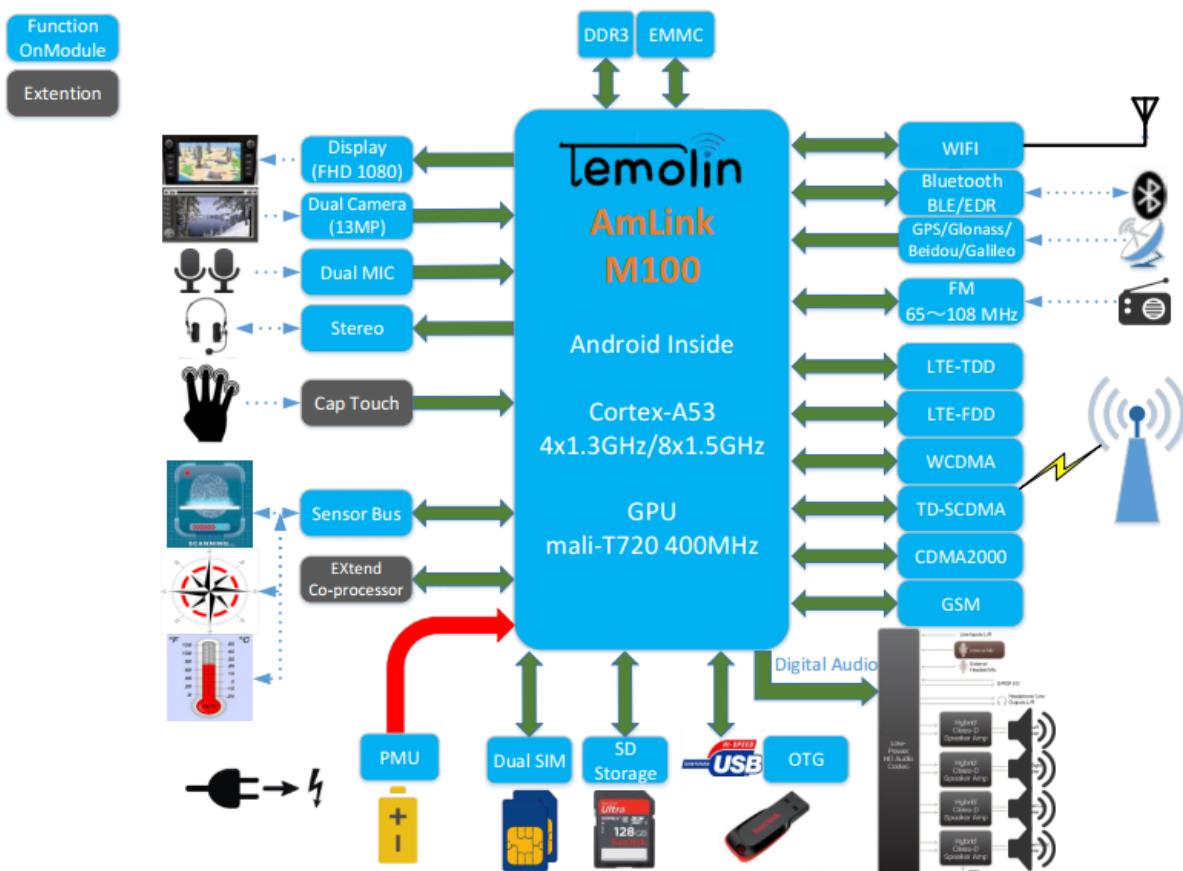


Figure: Framework of M100 Application

## 2 Brief description

### M100 Android world mode communication module

General Info	Description
<b>Features</b>	
<b>Dimension</b>	41x52.7x3.2mm
<b>Weight</b>	16g
<b>Total Pins</b>	162
<b>Processors</b>	Quad-core ARM® 1.3Ghz/Octa-core ARM® 1.5Ghz Cortex-A53 32KB L1 I-cache and 32KB L1 D-cache 512KB unified L2 cache
<b>DRAM Memory Inside</b>	2GB LPDDR-3 Up to 667Mhz
<b>Flash Memory Inside</b>	8/16GB eMMC
<b>Graphics</b>	mali-T720 @ 450 MHz OpenGL ES 1.1/2.0/3.0 OpenCL 1.0/1.1/1.2 DirectX9
<b>Mobile</b>	Dual SIM Dual Standby(DSDS)
<b>Power supply</b>	3.3 V to 4.2V (typical: 3.8V)
<b>Temperature range</b>	-40°C to 85°C
<b>Humidity</b>	5%~ 95%
<b>Drop Height</b>	1.5 meters, 6 free fall
<b>RF Support</b>	
<b>RF Band</b>	LTE FDD -B1/B2/B3/B4/B5/B7/B8/B20 LTE TDD -B41 WCDMA -B1/B2/B5/B8 TD-SCDMA -B34/B39 GSM -800/900/1800/1900 CDMA -BC0/BC1

<b>Air Symbol Rate</b>	LTE FDD -Cat4 DL 150Mbps/UL 50Mbps LTE TDD -Cat4 DL 150Mbps/UL 50Mbps WCDMA -HSDPA,HSUPA -DL 42.2Mbps/UL 11.5Mbps TD-SCDMA -DL 2.8Mbps/UL 2.2Mbps GSM -GPRS DL 85.6kbps/UL 85.6kbps -EDGE Classs12 DL 236.8kbps/UL 236.8kbps CDMA/EVDO BC0/BC1 -DL 3.1Mbps/UL 1.8Mbps
<b>Multimedia</b>	<b>Description</b>
<b>Resolution</b>	Portrait panel resolution up to FHD (1,920*1,080)
<b>Displays</b>	MIPI DSI interface (4 data lanes) Extended support ( HDMI/LVDS ) by used external chip
<b>Primary Camera</b>	MIPI CSI interface (4 data lanes) 13MP@30fps
<b>Secondary Camera</b>	MIPI CSI interface (4 data lanes) 13MP@30fps
<b>Video</b>	Decoder: H.264 BP/MP/HP-1080p@30fps/40Mbps MPEG-4 SP/ASP -1080p@30fps/40Mbps H.263 -1080p@30fps/40Mbps DivX 4x/5x/6x -1080p@30fps/40Mbps DivX HD/XVID -1080p@30fps/40Mbps Encoder: H.264 High profile 1080p @30fps
<b>Audio</b>	Audio content sampling rates supported:8kHz to 192kHz Audio content sample formats supported: 8-bit/16-bit/24-bit, Support Mono/Stereo output External CODEC I2S interface supports 16-bit/24-bit, Audio encoding: AMR-NB, AMR-WB, AAC, OGG, ADPCM Audio decoding: WAV, MP3, MP2, AAC,AMR-NB, AMR-WB, IDI, Vorbis, APE,AAC-plus v1, AAC-plus v2, FLAC, WMA,ADPCM

<b>Connectivity</b>	<b>Description</b>
<b>WLAN</b>	802.11 /b/g/n Security: WFA WPA/WPA2 personal,WPS2.0, WAPI (hardware) Max data Rates 802.11n 40Mhz/150Mbps
<b>Bluetooth</b>	Bluetooth v4.0 Low Energy (LE) Compatible 2.1+EDR/3.0+HS
<b>GPS</b>	GPS/Glonass/Beidou/Galileo dual-band reception concurrently Supports SBAS (Satellite-Based Augmentation Systems)-WAAS/MSAS/EGNOS/GAGAN
<b>NFC</b>	By add on another module to support
<b>FM</b>	65-108MHz with 50kHz step RDS/RBDS
<b>Other Input/Output</b>	<b>Description</b>
<b>Extensional I/O</b>	Low speed: I2C/SPI/SPI/SD/ UART/I2S/SIM/Keypad/GPIO High speed: MIPI LCD/MIPI Camera/USB Analog: MIC/Speaker/Receiver/Headset/ADC
<b>Other Input/Output</b>	<b>Description</b>
<b>Power down</b>	105uA
<b>Standby Without SIM</b>	2.6mA
<b>Standby with SIM</b>	4.6mA
<b>Mp3 play on back</b>	98 mA
<b>H . 264 play</b>	253mA
<b>LTE video play</b>	385mA

## 3 Interface Overview

M100 Module show as the picture:

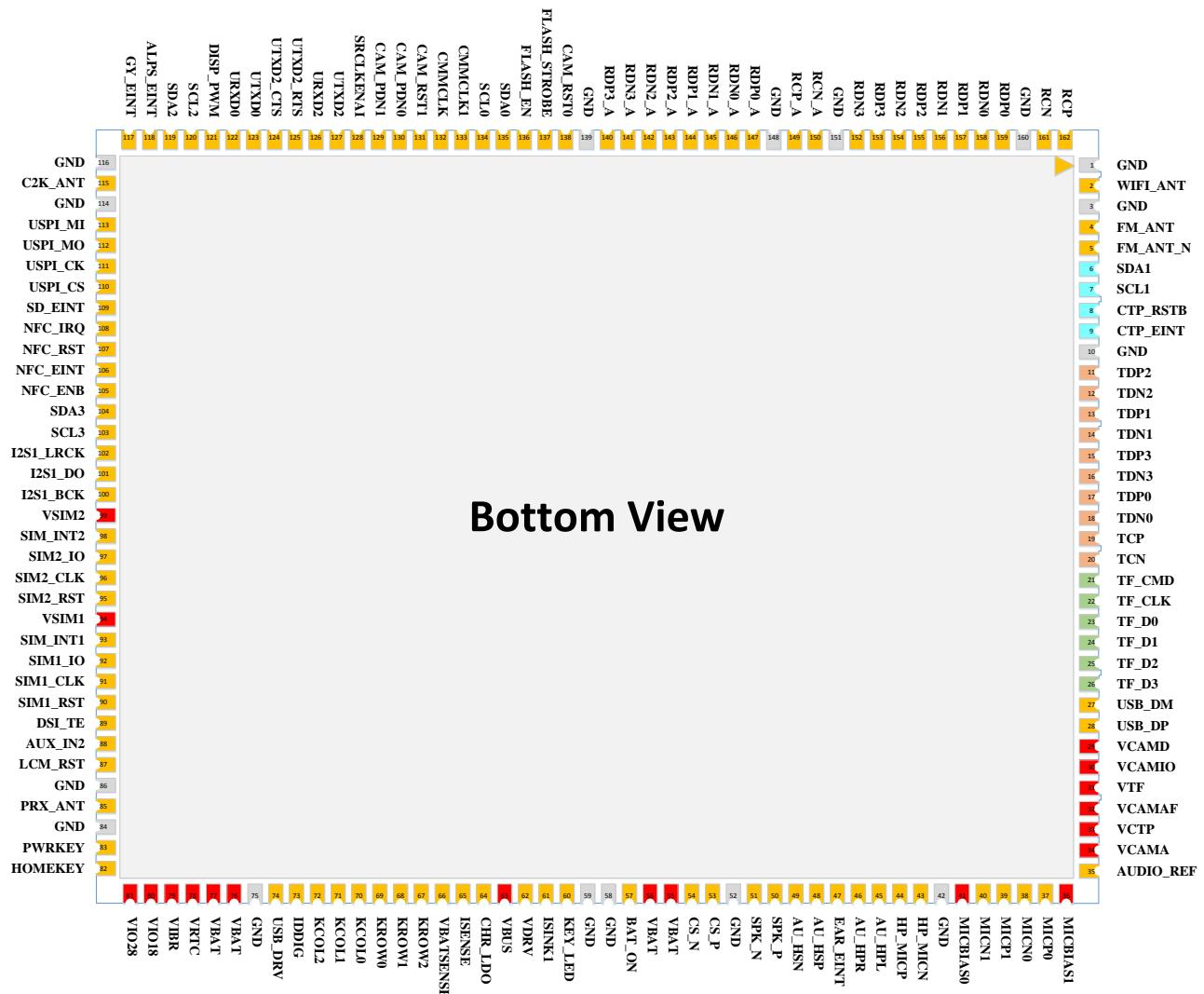


Figure: Pin Bottom view of M100 module

The following figure shows a block diagram of M100 and illustrates the major functional parts.

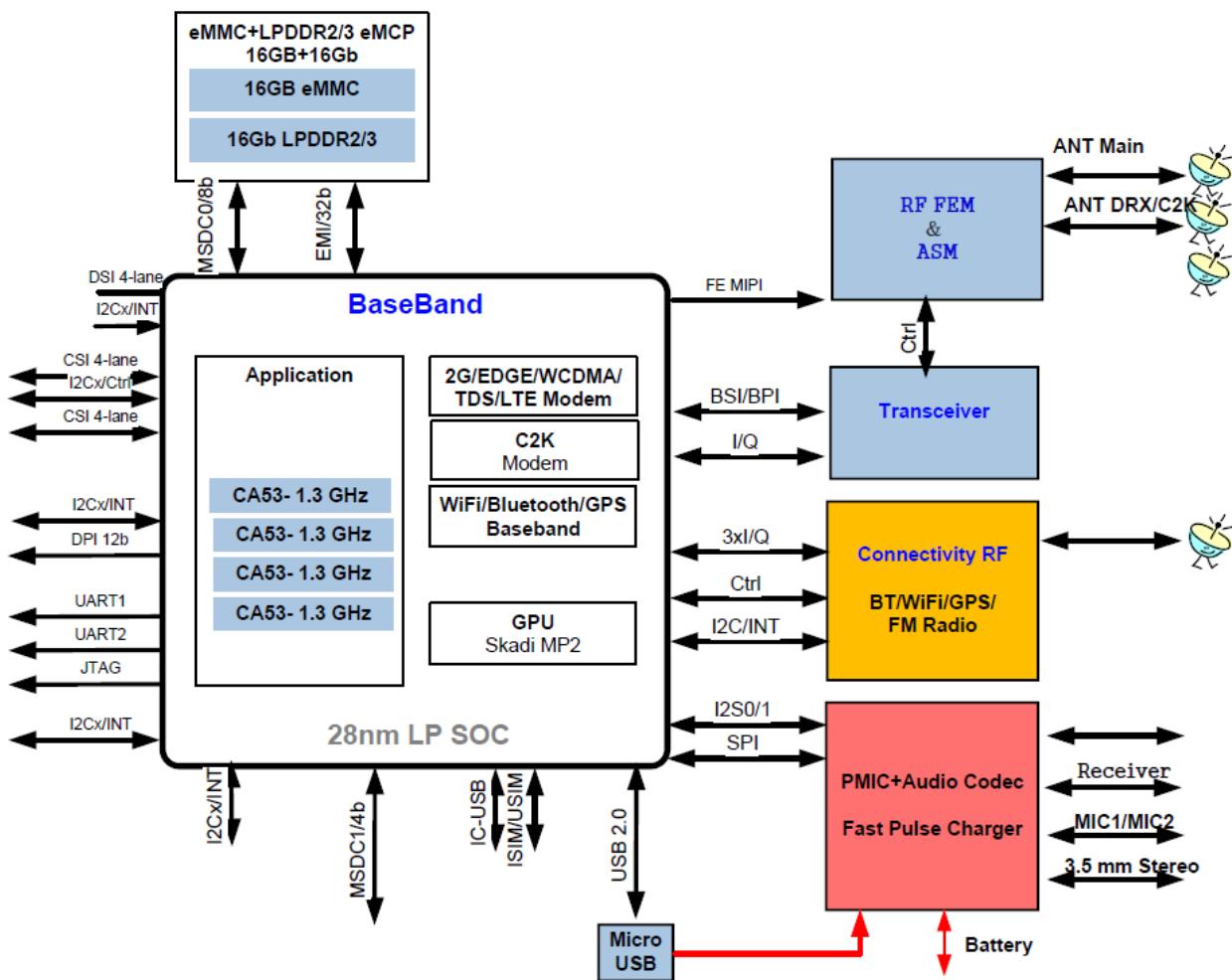


Figure: Functional Diagram

All Interface for user application detail show as following:

Table 1 : M100 hardware interface total view

◊ Storage		
1	<b>ROM (EMMC)</b>	<b>16GB</b>
2	<b>RAM (LPDDR3)</b>	<b>2GB</b>
◊ Wireless		
1	<b>Bluetooth</b>	<b>BT4.0 with A2DP / BLE</b>
2	<b>Wi-Fi</b>	<b>802.11</b>
3	<b>GPS</b>	<b>Global Position System</b>
4	<b>NFC</b>	<b>Support by external NFC module</b>
5	<b>FM</b>	<b>FM onboard</b>
◊ Interface		

<b>1</b>	<b>USB with OTG</b>	<b>USB high speed 2.0</b>
<b>2</b>	<b>Storage Card</b>	<b>UHS SD3.0</b>
<b>3</b>	<b>I2C</b>	<b>x4</b>
<b>4</b>	<b>UART</b>	<b>x3</b>
<b>5</b>	<b>I2S</b>	<b>x1</b>
<b>6</b>	<b>SPI</b>	<b>x1</b>
<b>7</b>	<b>DPI(RGB LCD)</b>	<b>x1</b>
<b>8</b>	<b>DSI(MIPI LCD)</b>	<b>x1</b>
<b>9</b>	<b>CSI(CAMERA)</b>	<b>x2</b>
<b>10</b>	<b>GPIO</b>	
<b>11</b>	<b>SIM</b>	<b>x2</b>
<b>12</b>	<b>MIC</b>	<b>x2</b>
<b>13</b>	<b>Headset</b>	<b>x1</b>
<b>14</b>	<b>Receiver</b>	<b>x1</b>
<b>15</b>	<b>Speaker</b>	<b>x1</b>
<b>16</b>	<b>Keypad</b>	<b>3x3x2</b>
<b>17</b>	<b>LED</b>	<b>x2</b>
<b>18</b>	<b>ADC</b>	<b>x1</b>
<b>19</b>	<b>RTC</b>	<b>x1</b>
<b>20</b>	<b>ANT</b>	<b>x3</b>
<b>21</b>	<b>FM ANT</b>	<b>x2</b>

## 4 Interface description

Table 2: M100 pin description

No.	PinName	Type	Description
1	<b>GND</b>	<b>VSS</b>	Ground
2	<b>WIFI_ANT</b>	<b>Antenna</b>	WIFI Antenna
3	<b>GND</b>	<b>VSS</b>	Ground
4	<b>FM_ANT</b>	<b>Antenna</b>	FM Antenna Positive
5	<b>FM_ANT_N</b>	<b>Antenna</b>	FM Antenna negative
6	<b>SDA1</b>	<b>Open drain</b>	I2C1 data
7	<b>SCL1</b>	<b>Open drain</b>	I2C1 clock
8	<b>CTP_RSTB</b>	<b>Bi-Directional</b>	GPIO
9	<b>CTP_EINT</b>	<b>Bi-Directional</b>	GPIO
10	<b>GND</b>	<b>VSS</b>	Ground
11	<b>TDP2</b>	<b>LVDS ouput</b>	Display LCD MIPI output DP2
12	<b>TDN2</b>	<b>LVDS ouput</b>	Display LCD MIPI output DN2
13	<b>TDP1</b>	<b>LVDS ouput</b>	Display LCD MIPI output DP1
14	<b>TDN1</b>	<b>LVDS ouput</b>	Display LCD MIPI output DN1
15	<b>TDP3</b>	<b>LVDS ouput</b>	Display LCD MIPI output DP3
16	<b>TDN3</b>	<b>LVDS ouput</b>	Display LCD MIPI output DN3
17	<b>TDP0</b>	<b>LVDS ouput</b>	Display LCD MIPI output DP0
18	<b>TDN0</b>	<b>LVDS ouput</b>	Display LCD MIPI output DN0
19	<b>TCP</b>	<b>LVDS ouput</b>	Display LCD MIPI output clock P
20	<b>TCN</b>	<b>LVDS ouput</b>	Display LCD MIPI output clock N
21	<b>TF_CMD</b>	<b>CMOS input/output</b>	Storage card command
22	<b>TF_CLK</b>	<b>CMOS input/output</b>	Storage card clock
23	<b>TF_D0</b>	<b>CMOS input/output</b>	Storage card data 0
24	<b>TF_D1</b>	<b>CMOS input/output</b>	Storage card data 1
25	<b>TF_D2</b>	<b>CMOS input/output</b>	Storage card data 2
26	<b>TF_D3</b>	<b>CMOS input/output</b>	Storage card data 3
27	<b>USB_DM</b>	<b>LVDS input/ouput</b>	USB 2.0 DM
28	<b>USB_DP</b>	<b>LVDS input/ouput</b>	USB 2.0 DP
29	<b>VCAMD</b>	<b>Power output</b>	Camera Digital Power

No.	PinName	Type	Description
30	VCAMIO	<b>Power output</b>	Camera IO Power
31	VTF	<b>Power output</b>	SD Card Power
32	VCAMAF	<b>Power output</b>	Camera Auto Focus Power
33	VTP	<b>Power output</b>	Touch IC Power
34	VCAMA	<b>Power output</b>	Camera Analog Power
35	AUDIO_REF	<b>Analog input</b>	Audio Reference Ground
36	MICBIAS1	<b>Power output</b>	Headset MIC bias
37	MICP0	<b>Analog input</b>	MIC input 1+
38	MICN0	<b>Analog input</b>	MIC input 1-
39	MICP1	<b>Analog input</b>	MIC input 2+
40	MICN1	<b>Analog input</b>	MIC input 2-
41	MICBIAS0	<b>Power output</b>	Main MIC bias
42	GND	<b>VSS</b>	Ground
43	HP_MICN	<b>Analog input</b>	Headset MIC Input -
44	HP_MICP	<b>Analog input</b>	Headset MIC Input +
45	AU_HPL	<b>Analog output</b>	Headset Audio Left Output -
46	AU_HPR	<b>Analog output</b>	Headset Audio Right Output -
47	EAR_EINT	<b>CMOS input/output</b>	Headset Insert Interrupt Input
48	AU_HSP	<b>Analog output</b>	Audio Receiver +
49	AU_HSN	<b>Analog output</b>	Audio Receiver -
50	SPK_P	<b>Analog output</b>	Audio Speaker +
51	SPK_N	<b>Analog output</b>	Audio Speaker -
52	GND	<b>VSS</b>	Ground
53	CS_P	<b>Analog input</b>	Coulomb Counter +
54	CS_N	<b>Analog input</b>	Coulomb Counter -
55	VBAT	<b>Power intput</b>	Battery Input Power 3.4~4.2V
56	VBAT	<b>Power intput</b>	Battery Input Power 3.4~4.2V
57	BAT_ON	<b>Analog input</b>	Battery Temperature Detection
58	GND	<b>VSS</b>	Ground
59	GND	<b>VSS</b>	Ground
60	KEY_LED	<b>LED Sink</b>	Keypad Backlight Sink
61	ISINK1	<b>LED Sink</b>	LED Sink
62	VDRV	<b>Analog output</b>	Charger Drive
63	VBUS	<b>Analog input</b>	USB VBUS
64	CHR_LDO	<b>Analog output</b>	Charger LDO For Detect
65	ISENSE	<b>Analog input</b>	Charger Current Sensor-
66	VBATSENSE	<b>Analog input</b>	Charger Current Sensor+

No.	PinName	Type	Description
67	KROW2	Digital input/output	Matrix Keypad Row2
68	KROW1	Digital input/output	Matrix Keypad Row1
69	KROW0	Digital input/output	Matrix Keypad Row0
70	KCOL0	Digital input/output	Matrix Keypad Col0
71	KCOL1	Digital input/output	Matrix Keypad Col1
72	KCOL2	Digital input/output	Matrix Keypad Col2
73	IDDIG	Digital input/output	OTG ID
74	USB_DRV	Analog output	Charge Drive
75	GND	VSS	
76	VBAT	Power intput	Battery Input Power 3.4~4.2V
77	VBAT	Power intput	Battery Input Power 3.4~4.2V
78	VRTC	Power output	Real Time Clock Power
79	VIBR	Power output	Vibrator Power
80	VIO18	Power output	1.8V IO Power
81	VIO28	Power output	2.8V IO Power
82	HOMEKEY	Digital input	Home Key
83	PWRKEY	Digital input	Power On/Off Key
84	GND	VSS	Ground
85	PRX_ANT	Antenna	LTE/3G/2G Main Anatenna
86	GND	VSS	
87	LCM_RST	Digital input/output	LCM Reset
88	AUX_IN2	Analog input	Aux Adc Input
89	DSI_TE	Digital input/output	Display Enable
90	SIM1_RST	Digital input/output	SIM Card 1 Reset
91	SIM1_CLK	Digital input/output	SIM Card 1 Clock
92	SIM1_IO	Digital input/output	SIM Card 1 I/O
93	SIM_INT1	Digital input/output	SIM Card 1 Interrupt
94	VSIM1	Power output	SIM Card 1 Power
95	SIM2_RST	Digital input/output	SIM Card 2 Reset
96	SIM2_CLK	Digital input/output	SIM Card 2 Clock
97	SIM2_IO	Digital input/output	SIM Card 2 I/O
98	SIM_INT2	Digital input/output	SIM Card 2 Interrupt
99	VSIM2	Power output	SIM Card 2 Power
100	I2S1_BCK	Digital input/output	I2S1 BCK
101	I2S1_DO	Digital input/output	I2S1 DO
102	I2S1_LRCK	Digital input/output	I2S1 LRCK
103	SCL3	Open drain	I2C3

No.	PinName	Type	Description
104	SDA3	Open drain	I2C3
105	NFC_ENB	Digital input/output	General GPIO
106	NFC_EINT	Digital input/output	General GPIO
107	NFC_RST	Digital input/output	General GPIO
108	NFC_IRQ	Digital input/output	General GPIO
109	SD_EINT	Digital input/output	General GPIO
110	USPI_CS	Digital input/output	General GPIO
111	USPI_CK	Digital input/output	General GPIO
112	USPI_MO	Digital input/output	General GPIO
113	USPI_MI	Digital input/output	General GPIO
114	GND	VSS	Ground
115	C2K_ANT	Antenna	LTE/3G Aux Antenna, CDMA Main Antenna
116	GND	VSS	Ground
117	GY_EINT	Digital input/output	General GPIO
118	ALPS_EINT	Digital input/output	General GPIO
119	SDA2	Open drain	I2C2
120	SCL2	Open drain	I2C2
121	DISP_PWM	Digital input/output	General GPIO
122	URXD0	Digital input/output	UART 0 RXD
123	UTXD0	Digital input/output	UART 0 TXD
124	UTXD2_CTS	Digital input/output	UART 2 CTS
125	UTXD2_RTS	Digital input/output	UART 2 RTS
126	URXD2	Digital input/output	UART 2 RXD
127	UTXD2	Digital input/output	UART 2 TXD
128	SRCLKENAI	Digital input	NFC Clock Request
129	CAM_PDN1	Digital input/output	Camera Power Down 0/GPIO
130	CAM_PDN0	Digital input/output	Camera Power Down 1/GPIO
131	CAM_RST1	Digital input/output	Camera Power Reset 1/GPIO
132	CMMCLK	Digital clock output	Camera 0 Main Clock Output
133	CMMCLK1	Digital clock output	Camera 1 Main Clock Output
134	SCL0	Open drain	I2C0
135	SDA0	Open drain	I2C0
136	FLASH_EN	Digital input/output	Camera 0 Main Flash LED Enable
137	FLASH_STROBE	Digital input/output	Camera 0 Main Flash Strobe Enable
138	CAM_RST0	Digital input/output	Camera Power Reset 0/GPIO

No.	PinName	Type	Description
139	<b>GND</b>	<b>VSS</b>	Ground
140	<b>RDP3_A</b>	<b>LVDS input</b>	Camera1 MIPI IN3+
141	<b>RDN3_A</b>	<b>LVDS input</b>	Camera1 MIPI IN3-
142	<b>RDN2_A</b>	<b>LVDS input</b>	Camera1 MIPI IN2+
143	<b>RDP2_A</b>	<b>LVDS input</b>	Camera1 MIPI IN2-
144	<b>RDP1_A</b>	<b>LVDS input</b>	Camera1 MIPI IN1+
145	<b>RDN1_A</b>	<b>LVDS input</b>	Camera1 MIPI IN1-
146	<b>RDN0_A</b>	<b>LVDS input</b>	Camera1 MIPI IN0+
147	<b>RDP0_A</b>	<b>LVDS input</b>	Camera1 MIPI IN0-
148	<b>GND</b>	<b>VSS</b>	Ground
149	<b>RCP_A</b>	<b>LVDS ouput</b>	Camera2 MIPI Clock+
150	<b>RCN_A</b>	<b>LVDS ouput</b>	Camera2 MIPI Clock-
151	<b>GND</b>	<b>VSS</b>	Ground
152	<b>RDN3</b>	<b>LVDS input</b>	Camera0 MIPI IN3+
153	<b>RDP3</b>	<b>LVDS input</b>	Camera0 MIPI IN3-
154	<b>RDN2</b>	<b>LVDS input</b>	Camera0 MIPI IN2+
155	<b>RDP2</b>	<b>LVDS input</b>	Camera0 MIPI IN2-
156	<b>RDN1</b>	<b>LVDS input</b>	Camera0 MIPI IN1+
157	<b>RDP1</b>	<b>LVDS input</b>	Camera0 MIPI IN1-
158	<b>RDN0</b>	<b>LVDS input</b>	Camera0 MIPI IN0+
159	<b>RDP0</b>	<b>LVDS input</b>	Camera0 MIPI IN0-
160	<b>GND</b>	<b>VSS</b>	Ground
161	<b>RCN</b>	<b>LVDS ouput</b>	Camera0 MIPI Clock+
162	<b>RCP</b>	<b>LVDS ouput</b>	Camera0 MIPI Clock-

## 5 Mechanical Dimensions

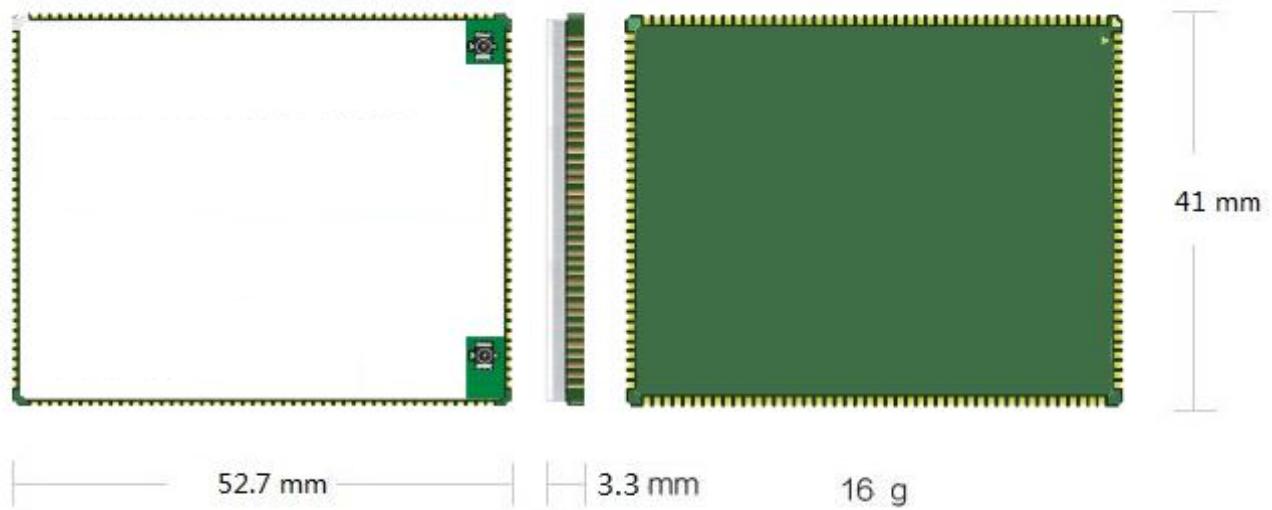


Figure :Module Top and Side Dimensions

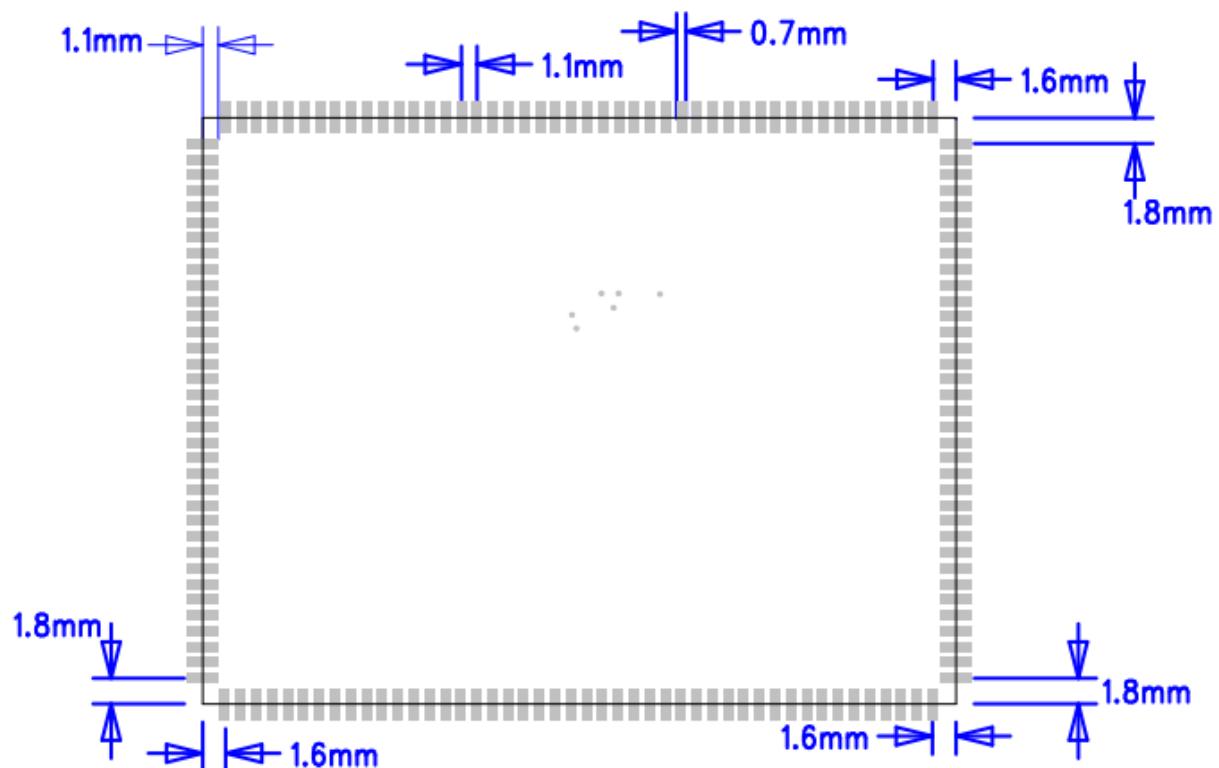


Figure : Layout PCB footprint example

## 5 Device Installation and User Manual

The M100 module is a proprietary product designed and manufactured by Temolin Technologies Co., Ltd.. For integration into telematics control units manufactured by Temolin Technologies Co., Ltd, Inc. for automotive OEMs.

The module is limited to installation ONLY in an integrated device design review by Temolin Technologies Co., Ltd.

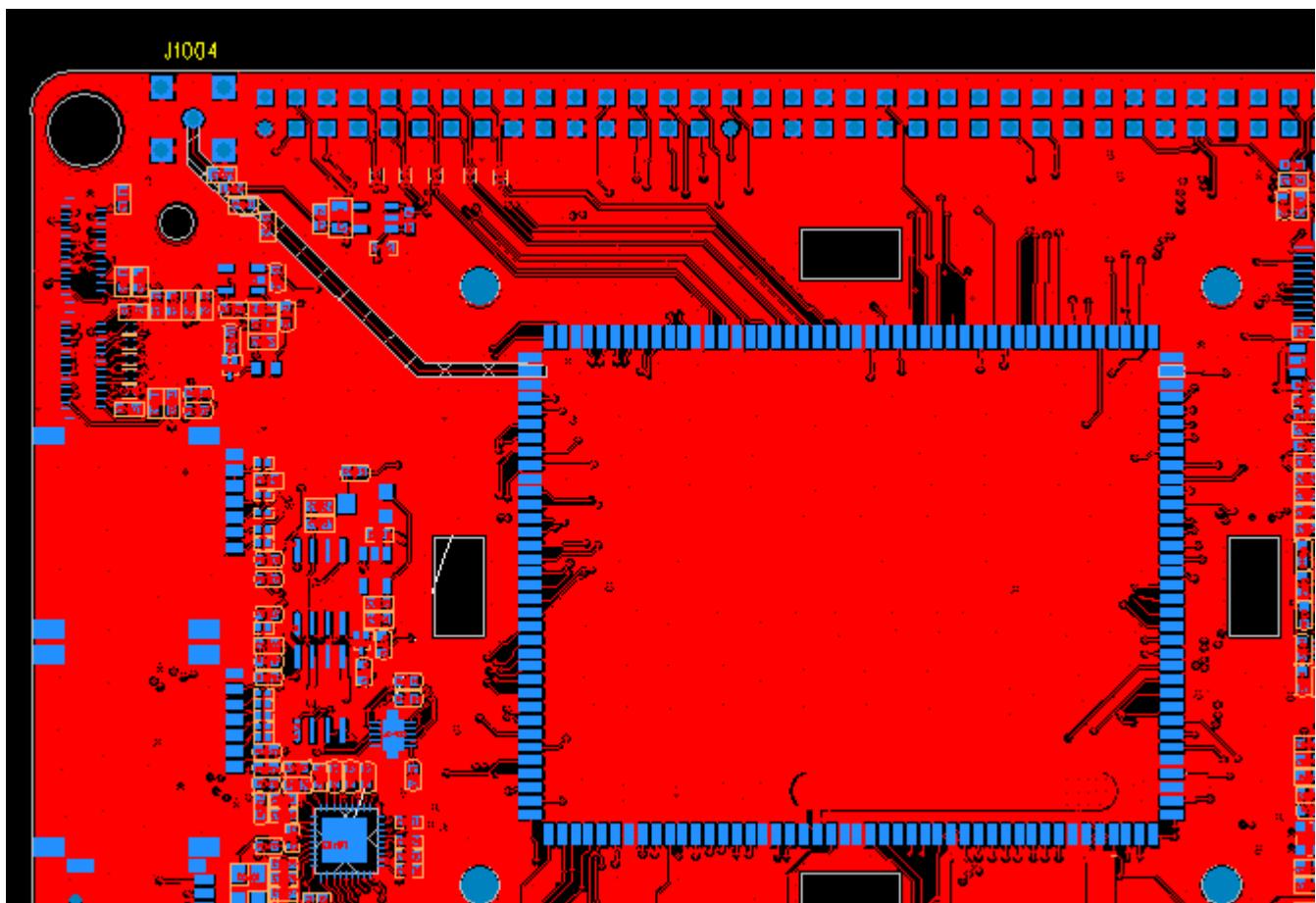
During design process of the integrated device, the module is soldered onto the pcb of the integrated device.

The integrated device must provide RF connectors to external antennas or RF traces to connect the M100 modules to antennas inside the integrated device.

The typical reference design for the trace layout, including PCB stack-up and trace length is as described and shown in a Figure 3 below:

Typical RF trace layout between the M100 module and RF Connector for WIFI/BT/GPS antenna:

- Recommended RF Connector Type: Fakra
- Recommended RF trace length is less than 50 mm and width less than 2mm.
- WIFI/BT/GPS antenna connector is J1004.



**Fig. 3. Typical trace routing recommended for use with the M100 module**

- PCB Material: FR 4
- PCB design information:
  - Microstrip on layer 1 with ground on layer 2 / 50 ohm Single Ended Line

### LAYER STACK-UP

Copper thickness definition as finished copper after processing

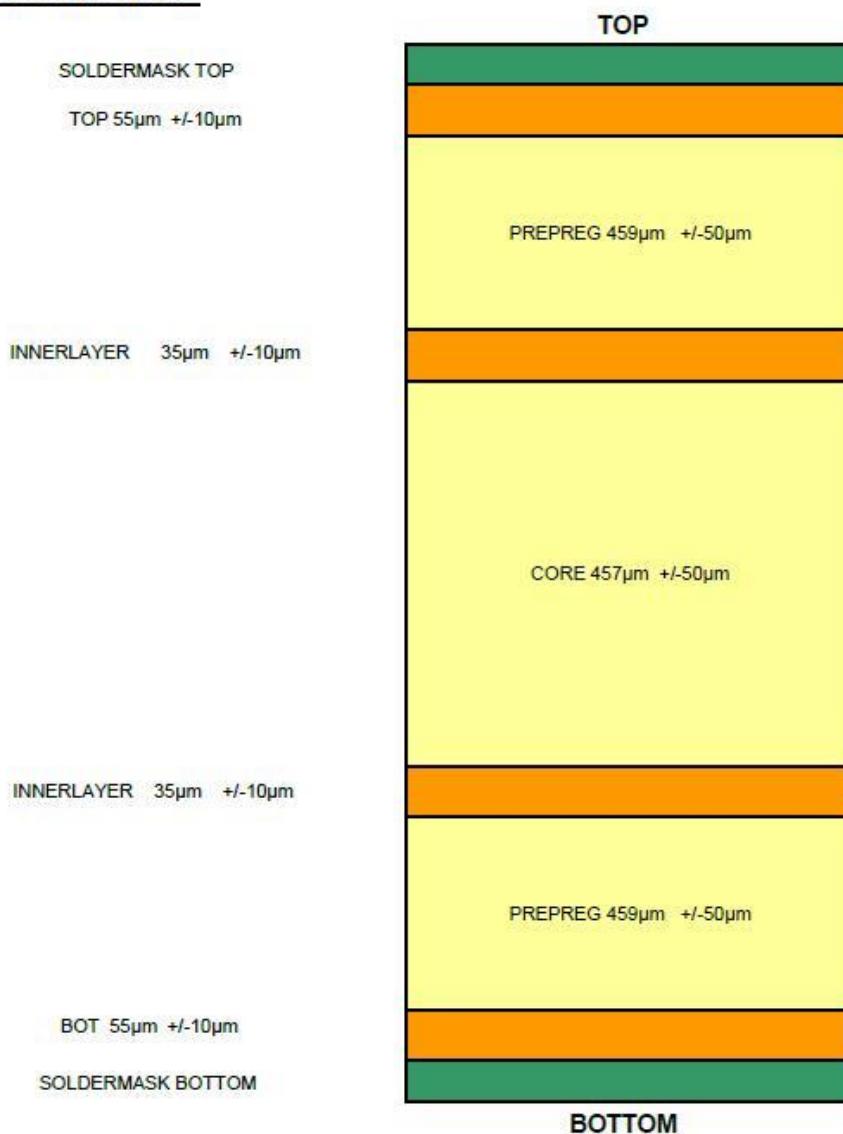


Fig. 4. Recommended PCB stack-up information for use while integrating M100 module.

Antenna information (only below approved antennas can be used with modular) :

Type	Model	manufacture
GAM/WCDMA/CDMA/LTE antenna	SG1106Z-1R23B-100-A	Shenzhen SWARD Communication Technology Co., Ltd
LTE Diversity antenna	SG1106Z-1R23B-100-A	Shenzhen SWARD Communication Technology Co., Ltd
WIFI/BT/GPS antenna	SS901S-6D10G-130-A	Shenzhen SWARD Communication Technology Co., Ltd

## FCC Statement

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

## FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device must operate with a minimum distance of 20 cm between the radiator and user body.

Attention: Limited Single Modular Approval - this RF Module may not be sold to the generic public and requires professional installation. Due to the fact that this RF Module is equipped with an own shielding, the end-product incl. this RF Module has to show compliance to the FCC rules (15C / radiated emissions).

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. Additional measurements (15C) and/or equipment authorizations

(e.g either a complete new certification or a Class II Permissive Change) may need to be addressed depending on co-location or simultaneous transmission issues if applicable.

Integrator is reminded to assure that these installation instructions will not be made available to the end-user of the final host device.

The Integrator will be responsible to satisfy SAR/ RF Exposure requirements, when the module integrated into any (portable, mobile, fixed) host device.

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID: 2AM5I-TML-M100".