

# Core CPU module (A9) User Manual

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powered by



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# Overview

Core CPU (called "A9") is Qualcomm based SDM 450 running Google Android™ platform that use to be embedded into several products to allow basic operation system.

Based on the A9 module that combined with more peripherals system, can build full final range of products for any purpose in fleet management environment.

A9 platform support the following features:

WiFi, Blue tooth, Cellular capability, NFC, GPS, variant communications and variant sensors.

## Key Features

Device Key Features	Details
<b>Platform Core</b>	
<b>Operating System</b>	Google Android™ 9
<b>Application Development Environment</b>	Google Android™ ADT
<b>Processor</b>	Qualcomm, SDM450 – 2 GHz (8 x ARM® Cortex™ A53)
<b>RAM</b>	Up 3GB
<b>Flash</b>	Up 32GB
<b>Memory Card Support</b>	Micro SD card slot - up to 128 GB (internal)
<b>Watchdog</b>	<ul style="list-style-type: none"> <li>- SW based for application recovery</li> <li>- HW based for system recovery</li> </ul>
<b>User Interface</b>	
<b>Vol keys</b>	Up, Down
<b>Power key</b>	
<b>Optional interfaces:</b>	
<b>Display</b>	7" Color TFT LCD, WVGA (800 X 480)
<b>Display Backlight</b>	Multi-level backlight (white LED)
<b>Touch Screen</b>	Analog Resistive, 4 wire
<b>Keypad</b>	Rubber tactile, multi-level backlight
<b>Light Sensor</b>	Configurable for device backlight adjustment
<b>Microphone</b>	<ul style="list-style-type: none"> <li>- High sensitivity</li> <li>- Noise filtered</li> </ul>
<b>Speaker</b>	<ul style="list-style-type: none"> <li>- Mono, 1 x 3W 90 dB nominal @ 0.1m</li> <li>- Multi-level volume control</li> </ul>
<b>Communication Interfaces Options</b>	
<b>RS232 Ports</b>	<ul style="list-style-type: none"> <li>- 1 X 5 Wire (TX, RX, RTS, CTS, GND), 300 - 115200 bps</li> <li>- 1 X 3 Wire (TX, RX, GND) 300 - 115200 bps</li> </ul>
<b>USB OTG Port</b>	USB 2.0 – low, full and high speed
<b>USB Host Port1 &amp; Port2</b> (on device connector)	USB 2.0 - low, full and high speed, 500mA maximum
<b>Wireless Interfaces</b>	
<b>Wireless LAN</b>	<ul style="list-style-type: none"> <li>- 802.11 b/g/n</li> <li>- Internal on-board antenna</li> </ul>
<b>Bluetooth</b> (combined with Wireless LAN option above)	<ul style="list-style-type: none"> <li>- Class 2</li> <li>- Data transport support only</li> <li>- Internal on-board antenna</li> </ul>
<b>Peripherals Control</b>	
<b>Digital I/O</b>	Automotive inputs, Open collector outputs
<b>Analog Input</b>	0V – 30V
<b>Motion Sensors</b>	Compass , Gyroscope , Accelerometer
<b>Power</b>	
<b>Input Power</b>	8-32 VDC
<b>Integrated Cameras (When applicable)</b>	
<b>Rear Facing</b>	13 MP + Flash
<b>Front Facing</b>	5 MP + Flash

## Module visibility



# Operation

1. Connect power source to the A9 module (power supply or battery according the rating defined above).
2. Connect the peripherals items according the application. (Speakers, Antennas, Screen, etc.).
3. Burn the relevant operation system image (by USB device port) using Google "fast boot" tool via ADB interface.
4. Push the power key, after system loads, the basic Android™ screen will appear on the screen if connected to the module. (See fig 1 as sample basic screen).

Note: When screen did not connect – can use every Android remote desk top application (like "Vysor") in order to see the basic screen.

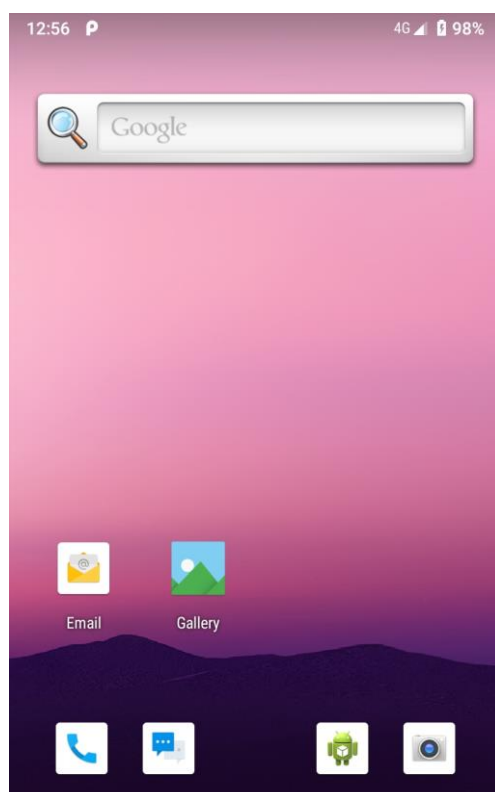


Fig 1

# Compliance Information

## FCC Compliance:

FCC Compliance 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. This device must accept any interference received, including interference that may cause undesired operation. Product that is a radio transmitter is labeled with FCC ID.

### FCC Caution:

(1) Exposure to Radio Frequency Radiation. This equipment must be installed and operated in accordance with provided instructions and 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 collocated or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

(2) Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

(3) This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

(4) Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

(5) The module's FCC ID is not visible when installed in the host, or

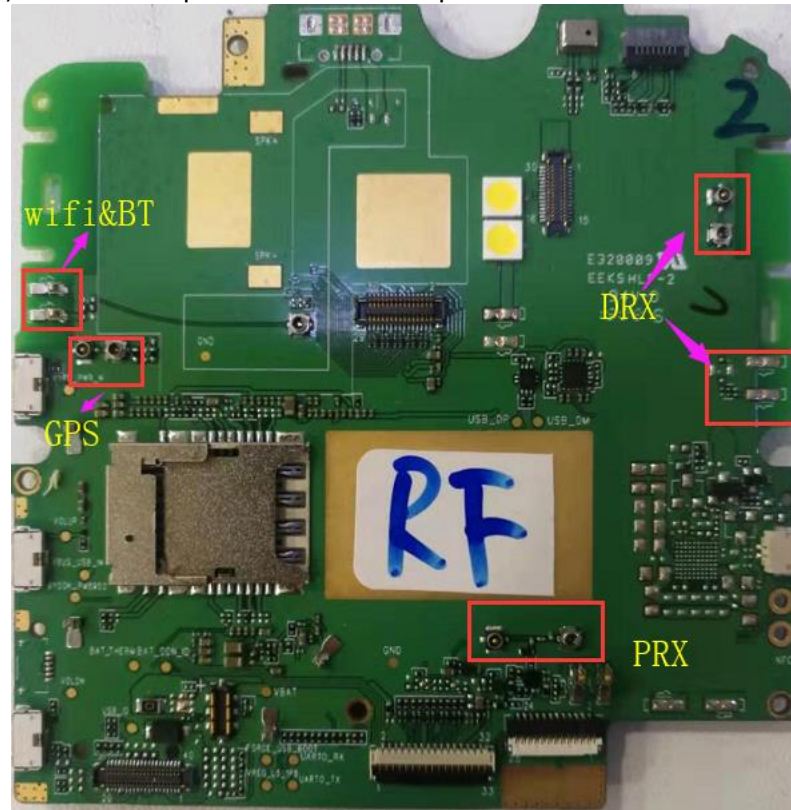
(6) if the host is marketed so that end users do not have straight forward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: Contains Transmitter Module FCC ID: U80-A9 or Contains FCC ID: U80-A9

## Important Notice to OEM integrators

1. This module is limited to OEM installation ONLY.
2. This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).
3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations
4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are compliant with the transmitter(s) rule(s).

## Antenna Installation

A9 has 4 antenna port: PRX antenna、DRX antenna、GPS antenna、wifi&BT antenna, as below picture , all antenna ports have 50 $\Omega$  impedance.



### 1.PRX antenna reference design

A9 kept a kind circuit in board for antenna , it can adjust impedance automatically according to actual antenna tune status , so that it could get best output performance. Main antenna will be cable type, as above picture, cable loss suggestion less than 1dbm, antenna input impedance 50 ( $\Omega$ ), Voltage Standing Wave Ratio  $\leq 2$ , gain can't be more than below target

#### Standalone Condition:

- 6 dBi in LTE B7
- 3 dBi in GSM 850/1900, WCDMA BAND 5, LTE B5/12/13/17
- 5 dBi in WCDMA BAND 2/4, LTE B2/4

### 2.DRX antenna reference design

A9 kept a kind circuit in board for diversity antenna , it can adjust impedance automatically according to actual antenna tune status , so that it could get best output performance. Antenna can be either cable type or spring type, as above picture, cable loss suggestion less than 1dbm, antenna input impedance 50 ( $\Omega$ ), Voltage Standing Wave Ratio  $\leq 2$ , gain can't be more than below target

#### Standalone Condition:

- 6 dBi in LTE B7
- 3 dBi in GSM 850/1900, WCDMA BAND 5, LTE B5/12/13/17
- 5 dBi in WCDMA BAND 2/4, LTE B2/4

### 3.Wifi&BT antenna reference design

A9 kept a kind circuit in board for Wifi&BT antenna, it can adjust impedance automatically according to actual antenna tune status , so that it could get best output performance. Antenna will be spring type. as above spring picture, antenna input impedance 50 ( $\Omega$ ),



Voltage Standing Wave Ratio  $\leq 2$ , gain can't be more than below target

**Standalone Condition:**

6 dBi in BT, 2.4G WIFI, 5G WIFI

#### 4. GPS antenna reference design

A9 kept a kind circuit in board for GPS antenna, it can adjust impedance automatically according to actual antenna tune status, so that it could get best output performance. antenna will be cable type, as above picture, cable loss suggestion less than 1dbm, antenna input impedance 50 ( $\Omega$ ), Voltage Standing Wave Ratio  $\leq 2$ , gain  $> 0$ dbi

#### In addition

- (1) The antenna must be installed such that 20 cm is maintained between the antenna and users.
- (2) The transmitter module may not be co-located with any other transmitter or antenna.
- (3) To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile exposure condition must not exceed:

**Standalone Condition:**

6 dBi in LTE B7, BT, 2.4G WIFI, 5G WIFI

3 dBi in GSM 850/1900, WCDMA BAND 5, LTE B5/12/13/17

5 dBi in WCDMA BAND 2/4, LTE B2/4

In the event that these conditions cannot be met (for example certain laptop configurations or co-location) with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

## Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.



## IC Canada Compliance:

### Notes(IC)

(EN)This device complies with the applicable industry Canada) License exempt radio apparatus, the operation is authorized under the conditions as follows: (1) this device may not cause interference, and (2) the user of this device must accept any interference caused, even if the interference is likely to affect its performance.

(FR)Le présent appareil est conforme aux CNR d'Industrie Canada applicables 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.

(EN)Radio frequency (RF) Exposure Information The radiated output power of the Wireless Device is below the industry Canada(IC) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized. The device has also been evaluated and shown compliant with the IC RF Exposure limits under mobile exposure conditions.(antennas at least 20cm from a person's body)

(FR) informations sur l'exposition de radiofréquences (rf) la puissance de rayonnement de l'appareil sans fil est inférieure à la fréquence radio d'industrie canada (ic) limites d'exposition.l'appareil sans fil devrait être utilisé de façon telle que le potentiel de contact pendant le fonctionnement normal est réduit au minimum. le dispositif a été évalué et qui semble conforme à l'ic des limites d'exposition aux rf sous des conditions d'exposition mobile. (antennes d'au moins 20 cm du corps d'une personne)

(EN)The following statement must be included with all versions of this document supplied to an

OEM or integrator, but should not be distributed to the end user. This device is intended for OEM integrators only.

Please See the full Grant of Equipment document for other restrictions

(FR) l'énoncé suivant la déclaration suivante doit être incluse dans toutes les versions de ce document fourni à un oem ou intégrateur, mais ne devrait pas être distribuées à l'utilisateur final. ce dispositif est destiné aux intégrateurs de oem. voir le document de subvention d'équipement d'autres restrictions

(EN) The Innovation, Science and Economic Development Canada certification label of a module shall be clearly visible at all times when installed in the host product; otherwise, the host product must be labelled to display the Innovation, Science and Economic Development Canada certification number for the module, preceded by the word "Contains" or similar wording expressing the same meaning, as follows: Contains IC: 12186A-A9

where 12186A-A9 is the module's certification number

(FR)L'étiquette de certification d'un module d'Innovation, Sciences et Développement économique Canada doit être clairement visible en tout temps, une fois installée dans le produit hôte. sinon, le produit hôte doit porter une étiquette indiquant le numéro de certification d'Innovation, Sciences et Développement économique Canada du module, précédé du mot "contient" ou d'un libellé similaire exprimant le même sens, comme suit:

Contient IC: 12186A-A9 où 12186A-A9 est le numéro de certification du module

## EU Regulatory Conformance:

The manufacturer hereby declares that this device is in compliance with the essential requirements and other relevant provisions of Radio Equipment Directive 2014/53/EU.

The device is restricted to indoor use only when operating in the 5150 to 5350 MHz frequency range.

	AT	BE	BG	HR	CY	CZ	DK
	EE	FI	FR	DE	EL	HU	IE
	IT	LV	LT	LU	MT	NL	PL
	PT	RO	SK	SI	ES	SE	UK

WWAN	Supports Bands(MHz)	Max Power
	GSM850:TX 824-849,RX 869-894	32 dBm
	PCS1900:TX 1850-1910, RX 1930-1990	32 dBm
	WCDMA BAND II:TX 1850-1980,RX 1930-1990	23 dBm
	WCDMA BAND IV: TX 1710-1755, RX 2110-2155	24 dBm
	WCDMA BAND V:TX 824-849,RX 869-894	24 dBm
	LTE Band 2:TX 1850-1910,RX 1930-1990	24 dBm
	LTE Band 4:TX 1710-1755,RX 2110-2155	23 dBm
	LTE Band 5:TX 824-849,RX 869-894	25 dBm
	LTE Band 7:TX 2500-2570,RX 2620-2690	23 dBm
	LTE Band 12: TX 698-716,RX 728-746	23 dBm
LTE Band 13: TX 777-787,RX 746-756	24 dBm	
LTE Band 17: TX 704-716,RX 734-746	24 dBm	
WLAN	Frequency(MHz):	Max Power
	2400-2462,	19 dBm
	5150-5250;	14 dBm
	5725-5850	14 dBm
BT	Frequency(MHz):2402-2480	Max Power 8 dBm