

KA36 Hardware User Guide

Document History

		Change Details		
Revision	Date	Chapter	Section	Description
1.0	2015/7/7	-	-	First edition

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1. Scope

This document is applied to wireless module of KA36 for North America.

2. Environmental condition

(1) Withstand voltage	: MAINVCC	5.0V (Not be destructed)
	: USBV	7.0V (Not be destructed)

3. Electrical specifications

3.1 Absolute maximum ratings

Table3-1. Absolute maximum ratings

Parameter	Rating		Units	Note
	Min	Max		
MAINVCC withstand voltage	-0.3	5.0	V	Applicable within the Operating temperature
USBV withstand voltage	-0.3	7.0	V	Applicable within the Operating temperature Do not supply votage to USB+/USB- pin when USBV is absent.
Digital interface input voltage	-0.3	$V_{IOVCC}+0.3$	V	Applicable within the Operating temperature
Storage Temperature	-40	+85	°C	Tstg

3.2 Recommend operating condition

Table3-2. Recommend operating condition

Parameter	Rating		Unit	Note
	Min	Max		
Operation voltage	3.6	4.2	V	Applicable within the Operating temperature includes momentary fluctuations such as ripple and under/over shoot.
USBV input	4.5	5.25	V	Applicable within the Operating temperature

3.3 Radio Specifications

3.3.1 Cellular Specifications

Unless otherwise specified, values in tables below are determined defined in performance temperature range.

<UMTS/HSPA+>

- Frequency band: B2/B5
- Output Power : Power Class 3

Also, the transmitter/receiver performance conform to 3GPP TS 34.121.

<LTE>

- Frequency band: B2/B4/B5/B12
- Output Power : Power Class 3
- Category : 3

Also, the transmitter/receiver performance conform to 3GPP TS36.101, TS36.521-1.

3.3.2 GPS Receiver Specifications

Unless otherwise specified, values in tables below are determined defined in performance temperature range.

Table3-4-2. GPS Receiver Specifications

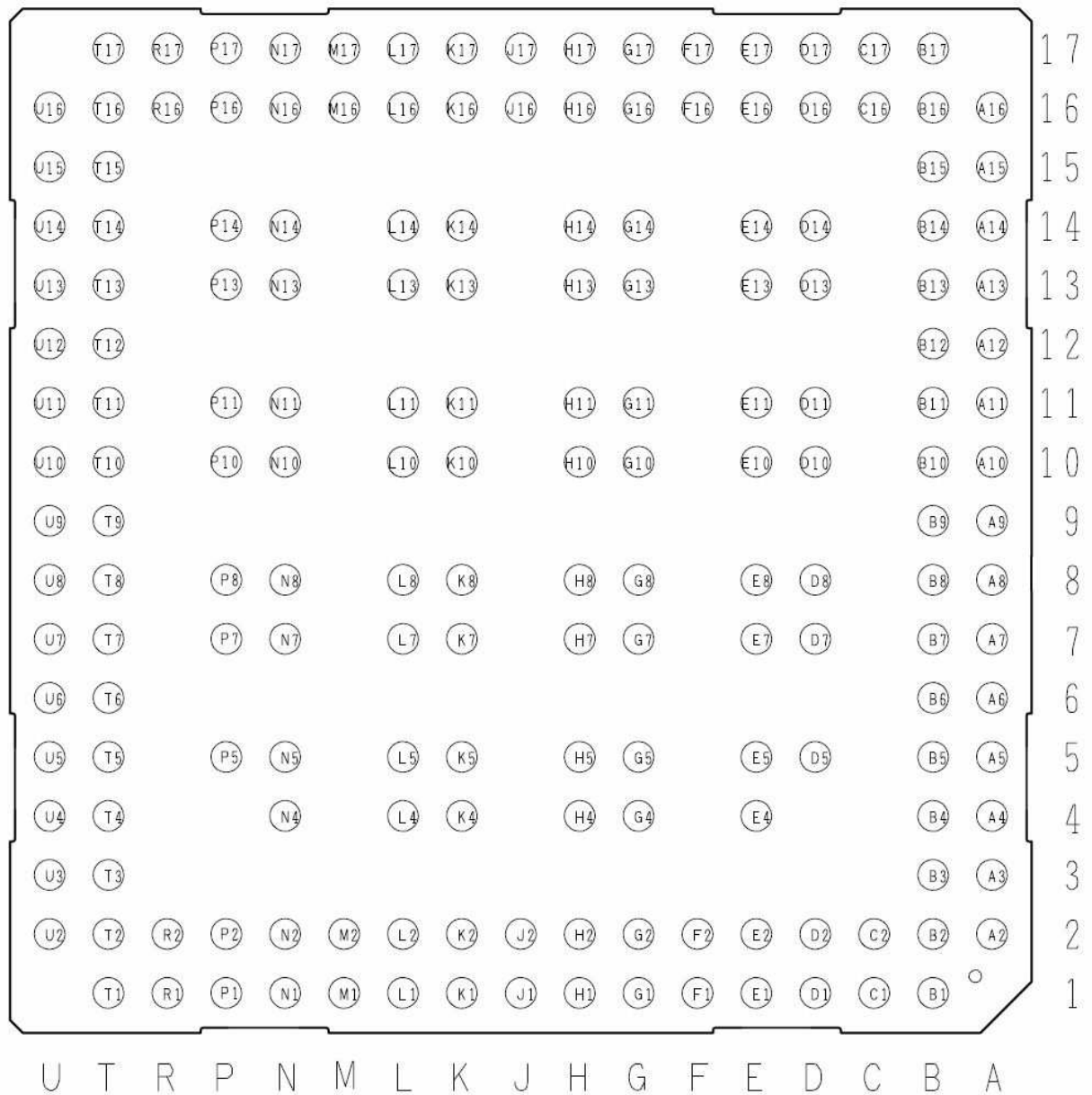
Item	Rating	Note
Receiver sensitivity (Sensitivity of capture)	-145 dBm or less	Receiver sensitivity is defined by the input power when the device can acquire the satellite at a rate of 60%.
Receiver sensitivity (Tracking Sensitivity)	-152 dBm or less	Receiver sensitivity is defined by the input power when the device can acquire the satellite at a rate of 60%.

4 Interface Descriptions

4.1 Pad Assignment

Figure 4-1-4 shows Pad assignments.

Figure 4-1-4 (Bottom View) Pad assignments



5 Input output signal specifications

5.1 Antenna Port

The module has main antenna for transmission and reception, second antenna for reception and GPS antenna in the interface.

Shows antenna port Specification.

5.1.1 Main antenna port

Table5-1-1 Main antenna characteristic

Characteristic	Value	Remarks
Frequency range	B2: TX 1850-1910MHz / RX 1930-1990MHz B4: TX 1710-1755MHz / RX 2110-2155MHz B5: TX 824-849MHz / RX 869-894MHz B12: TX 699-716MHz / RX 729-746MHz	
Impedance	50Ω	Nominal value

5.1.2 Second antenna port

Table5-1-2 Second antenna characteristic

Characteristic	Value	Remarks
Frequency range	B2: RX 1930-1990MHz B4: RX 2110-2155MHz B5: RX 869-894MHz B12: RX 729-746MHz	
Impedance	50Ω	Nominal value

5.1.3 GPS antenna port

Table5-1-3 GPS antenna port characteristic

Characteristic	Value	Remarks
Frequency Range	1575.42±2MHz	
Impedance	50Ω	Nominal value

5.2 Pad Description

The table below shows the Logic characteristics for the digital IO's under operation voltage and operation temperature.

Table 5-2 PAD Description

IO voltage	Parameter	Min.	Max.	Unit
1.8V digital input	High-level input voltage (VIH)	1.2	2.1	V
	Low-level input voltage (VIL)	-0.3	0.6	V
	Pull up/down resistance (RPA)	55	391	kΩ
	Pull up/down resistance (RPB)	10	101	kΩ
1.8V digital output	High-level output voltage (VOH)	1.3	1.9	V
	Low-level output voltage (VOL)	0	0.5	V
	Output high drive strength	–	2.0	mA
	Output low drive strength	-2.0	–	mA
USB signal (full-speed) [※]	High-level input voltage (VIH)	1.27	–	V
	Low-level input voltage (VIL)	–	0.85	V
	High-level output voltage (VOH)	2.8	3.6	V
	Low-level output voltage (VOL)	–	0.3	V
RESETX signal	High-level input voltage (VIH)	1.2	2.1	V
	Low-level input voltage (VIL)	-0.3	0.6	V
	Input high leakage current with pull-down (IIHPD)	–	35	uA
	Input low leakage current with pull-up (IILPU)	-200	–	uA

※ USB High-speed is conforming to Universal Serial Bus Specification, rev. 2.0 (April 27, 2000 or later).

※ 1.8V digital input (RPB) is applied for UIM_RST/UIM_CLK/UIM_DATA.

※ 2.85V digital interface signals (UIM_RST/UIM_CLK/UIM_DATA) are conforming to ISO/IEC7816-3 CLASS B specification.

※ VIH/VIL and VOH/VOL for 1.8V digital input/output signal are specified under IOVCC=1.8V.

※ VOH/VOL is specified at IOH=1mA/IOL=-1mA for 1.8V Digital output signal.

6. Module Control

6.1 Power off and reset limitations

There is no limitations to power off and reset.

6.2 Power supply interrupt

If MAINVCC drops out of range(<3.05V 1usec typ) then the module is completely shut down. In this case, please execute power-on sequence.

6.3 Over-temperature Protection

PM8018 provides over-temperature protection. If PM8018 die temperature greater than 150 °C, the module is completely shut down. Temperature hysteresis is incorporated such that the die temperature must cool significantly (<110°C typ) before the module can be powered on again. When the module become under 110°C(typ) and a PWR_N signal is enabled, the module will power up.

Please execute power-on sequence.

6.4 Over-temperature Protection (restricted RF operation).

The thermistor built into the module (around Power Amplifier) detects the temperature around it. Based on the detected limited temperature, the module starts or terminates temperature protection and stop transmit/receive functions to prevent devices to be destructed.

7. UART/USB

The module has USB and UART2 interface.

7.1 UART

The module has a UART interface.

7.1.1 UART2

UART2 function can be enabled/disabled by CONT1.

(CONT1=Open(High)→UART2 disabled, CONT1=Low→UART2 enabled)

Communication speed : 115,200 bps

Hard flow control : No

Parity bit : No

Start bit : 1

Stop bit : 1

Data bit : 8

Table7-1-1 UART2

Signal name	I/O	Outline
C-UART Up	I	Module receiving data
C-UART Dwn	O	Module sending data
CONT1	I	UART2 enabled/disabled control

7.1.2 RI

The module has RI in the interface. RI is used to Ring indication (Incoming call).

Table7-1-2 RI

Signal name	I/O	Outline
RI	O	Ring (Incoming call) indication

7.2 USB

The module has USB 2.0 interface. USB 2.0 operates at 480Mbps called high speed.

USBV terminal controls USB operation such as operating/non-operating.

Table7-2 USB

Signal name	I/O	Outline
USBV	I	Power supply for USB
USB+	Both	positive USB positive signal
USB-	Both	negative USB negative signal

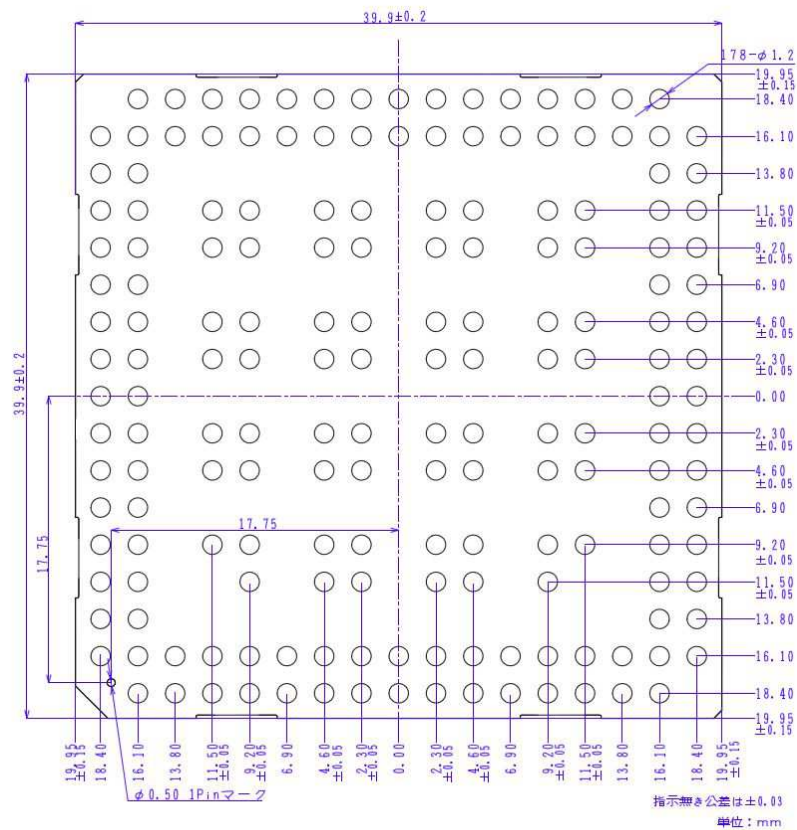
8. Mechanical Information

Table8. Mechanical Information

Parameter	Specifications	Definition
Dimensions	approx. 40×40×4.3	
Flatness	0.1mm or less	
Weight	approx. 11g	

9. Mechanical Drawings

Figure. 9-1 Bottom view with dimensions



10. Related Documents

- Product Specifications
- AT Commands Function Specifications

11. Warnings

11.1 Handling Precautions

The product is neither intended nor warranted for use in equipment or systems that require a malfunction or failure of which may cause loss of human life, bodily injury.

- 1) Take care of static electricity when handling the product. Failure to do so may cause malfunction.
- 2) Do not expose the product to strong impacts such as by dropping.

Do not expose the product to wet.

Do not use the product under stresses beyond absolute maximum ratings, operating voltage and operating temperature.

It is not the scope of our guarantee and repairs for unsatisfactory results due to installation structure, misuse or inadequate usage of products in the catalog.

Do not disassembly, modifications or repairs. Doing so may cause the product to rupture, catch fire, generate-heat or electric shock. Disassembly or modifications constitutes a violation of the Radio Act.

- 3) Storage temp: $25\pm 10^{\circ}\text{C}$, Storage humidity: 60%RH, Storage period: 3 months or less at a dry packaging.

After opening, you should mount the products while keeping them on the condition of 5 to $25\pm 10^{\circ}\text{C}$ and 60%RH or less in humidity within 7 days.

- 4) When the above-mentioned storage method could not be executed, please process the baking treatment before mounting the products.

Recommended condition : $90^{\circ}\text{C} +8/-0^{\circ}\text{C}$, $\leq 5\%$ RH , 33 hours

- 5) The module is classified as MSL3.

12. FCC/IC Regulatory notices

12.1 Modification statement

The user is cautioned that changes or modifications not expressly approved by the manufacture could void the user's authority to operate the equipment.

12.2 Interference statement

This device complies with Part 15 of the FCC Rules and Industry Canada license-exempt RSS standards. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

12.3 RF Exposure Information

Requirement to end product.

This Modular Approval is limited to OEM installation for module and fixed applications only. The antenna installation and operating configurations of this transmitter, including any applicable source-based time-averaging duty factor, antenna gain and cable loss must satisfy MPE categorical Exclusion Requirements of §2.1091.

1. Antenna

The antennas used for this transmitter must be installed to provide a separation distance of least 20cm from all persons.

2. Co-location

This module must not be collocated or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

3. Caution to user for modification

The end user has no manual instructions to remove or install the device and a separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.

According to the MPE RF explore report, maximum antenna gain allowed for use with this device is

FDD XII	: 2.4 dBi
FDD V	: 3.8 dBi
FDD II	: 4.9 dBi
FDD IV	: 4.0 dBi

4. Markings

When the module is installed in a customer's product, the FCC ID label on the module will not be visible. To avoid this case, an exterior label must be stuck on the surface of

the customer's product to indicate the FCC ID of the enclosed module. This label can use wording such as the following:

Contains Transmitter module FCC ID: JOYKA36

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily removed. Otherwise, a second label must be placed on the outside of the final device.

12.4 IC Regulations

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for uncontrolled environment.

1. Antenna

This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

2. Co-location

This device and its antennas must not be co-located or operating in conjunction with any other antenna or transmitter.

3. Compliance statement to IC

This Class B digital apparatus complies with Canadian ICES-003. Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equipment isotropically radiated power (e.i.r.p) is not more than necessary for successful communication.

4. Labeling Requirements for the Host Device (from Section 3.2.1, RSS-Gen, Issue 3, December 2010)

The host device shall not be properly labeled to identify the module within the host device. The Industry Canada certification must be labeled to display the Industry Canada certification number of the module, preceded by the words – Contains transmitter module, or the word – Contains, or similar wording expressing the same meaning, as follows:

Contains transmitter module IC: 574B-KA36

5. Caution to user for modification

This radio transmitter (IC: 574B-KA36) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

12.5 FCC Class B digital device notice

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 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 interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on circuit different from that to witch the receiver is connect.
4. Consult the dealer or an experienced radio/TV technician for additional suggestions.