# HB Wireless Communication Technology

# HB300N USER MANUAL

FCC ID: 2AJIC-HB300N

Model Name: HB300N

Product Name: NFC module

Description: NFC reader/writer module compatible

Version: V1.0



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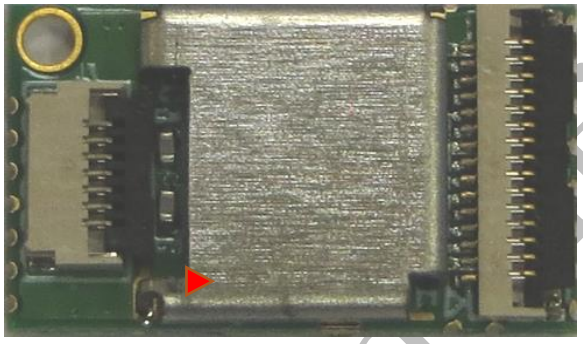
## Contents

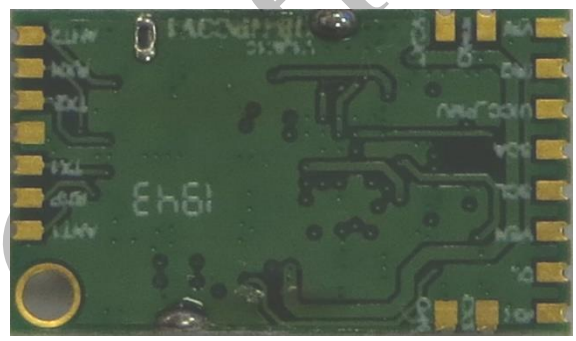
# 1. Introduction

HB300N is a kind of NFC module that could be embedded in one IT system by simply connecting the module through I2C interface and start developing his application soft.

Top Side



Bottom Side



## 2. Hardware Block Diagram

HB300N is a full feature NFC module and compliant with NFC standards (NFC Forum, EMVCo, ETSI/SCP). HB300N has an optimized architecture for low-power consumption in different operation modes. The RF contactless front-end is supporting various transmission modes according to NFCIP-1, NFCIP-2, ISO/IEC1444e, ISO/IEC 15693, ISO-14443, MIFARE, and FeliCa specifications. The major internal components are illustrated in Figure 1-1

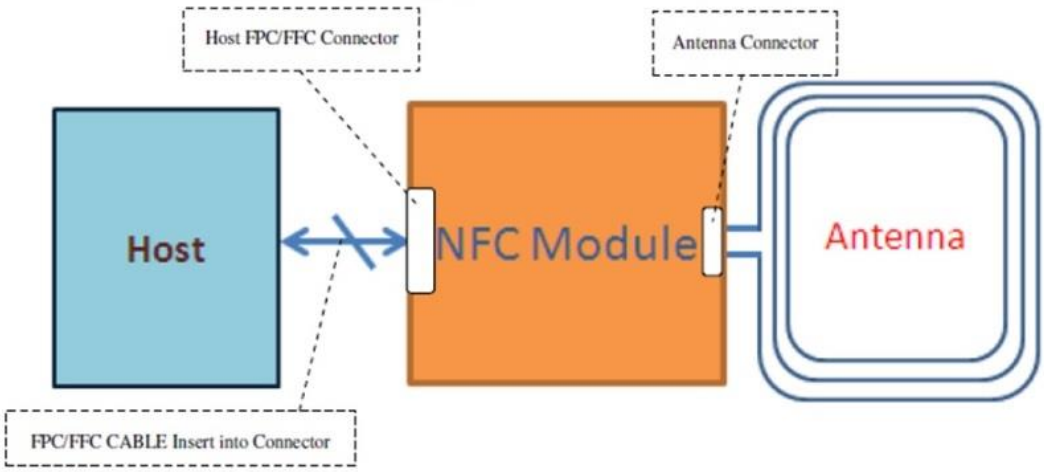



Figure 1-1 NFC module Major Component and System Interface (Assembly Guide)



Note:

*Host FPC/FFC Connector:

Allow user to connect the HB300N module to the host board via FPC/FFC connector.

*Antenna Connector

Connected to FPC antenna, please note that matching circuitry should be design on antenna.

# 3. Pin Definition

3.1 Host Interface

| Pin number | Name | Configuration | Description |
|---|---|---|---|
| 1 | MOD_VDD | Power Supply Input | Module power supply |
| 2 | MOD_GND | Power Supply Ground | Module ground |
| 3 | SWP | Input/ Output | Single Wire Protocol line to UICC/ SIM |
| 4 | MOD_VUP | Power Supply Input | Power supply for RF Front-end |
| 5 | IRQ | Output | Interrupt request from module to platform |
| 6 | VDD_SIM (PMUVCC) | Power supply input | The power rail used to power UICC/SIM. Applicable in a system where NFC module used SWP to communicate with an UICC/SIM in the platform |
| 7 | $I^2C$_SDA | Input/ Output | $I^2C$ data |
| 8 | $I^2C$_SCL | Input | $I^2C$ clock |
| 9 | MOD_GND | Input | Used for extra GND for signal integrity |
| 10 | Reset/ WakeUp | Input | Reset pin input from the host to wake up the device from standby and also to reset the device |
| 11 | DWL_REQ | Input | Control pin to set the NPC300 in firmware download mode |
| 12 | SWP_PWR (SIM_VCC) | Power Supply Output | Power supply to UICC/SIM or power supply "request" to PMIC. Applicable in a system where NFC module uses SWP to communicate with an UICC/SIM in the platform |
| 13 | MOD_VDD | Power supply input | Additional pin for module power supply to support higher current capacity |
| 14 | VDD_IO | Power supply input | Host IO reference voltage |
| 15 | MOD_GND | Power Supply Ground | Module ground |

3.2 Antenna Interface

| Pin number | Name | Configuration | Description |
|---|---|---|---|
| 1 | ANT1 | Output | Antenna connection for Card emulation |
| 2 | RXP | Input | Contactless receiver input |
| 3 | TX1 | Output | Contactless receiver output 1 |
| 4 | GND | Ground | Transmitter ground |
| 5 | TX2 | Output | Contactless receiver output 2 |
| 6 | RXN | Input | Contactless receiver input |
| 7 | ANT2 | Output | Antenna connection for Card emulation |

# 4. Power & Current Consumption

## 4.1 Power modes & Power Reset

### 4.1.1 Power modes

| Mode | Description |
|---|---|
| **Full Power mode** | The battery supply ($V_{BAT}$) as well as the pad supply (VDD_IO) is available; VEN voltage is high. all use cases can be executed |
| **Standby mode** | Minimum part of IC is kept supplied to enable configured wake-up source which allow to switch to active state. |
| **Hard Power Down mode** | The system is supplied by VBAT. VEN voltage is kept low by host or SW programing to have min. power consumption. |

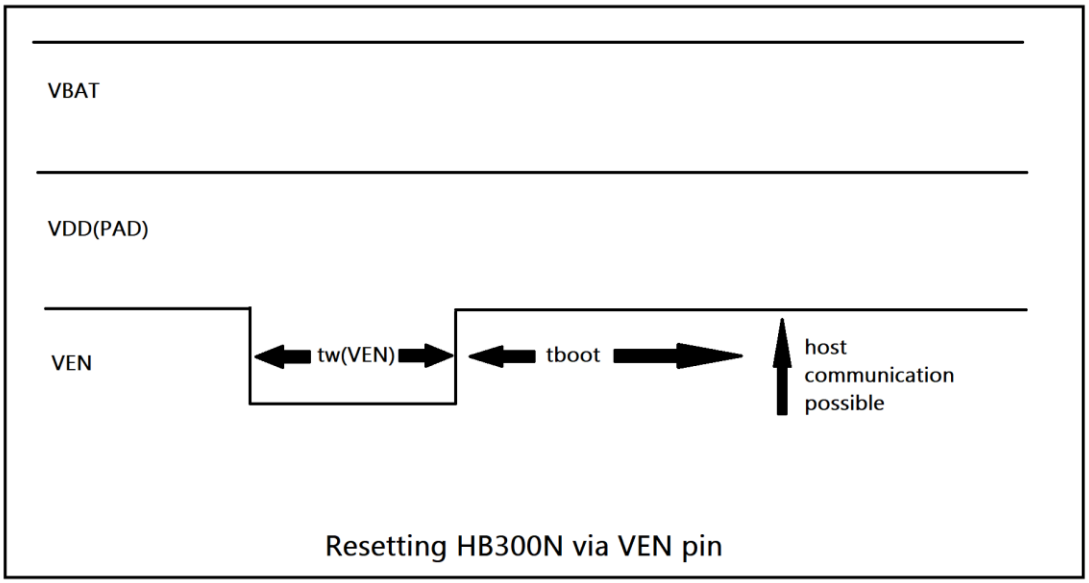
### 4.1.2 Reset and download concept

To enter reset there are 2 ways:

- Pulling VEN voltage low (Hard Power Down state)
- if VBAT monitor is enabled: lowering VBAT below the monitor threshold (Monitor state, if VEN voltage is kept above 1.1 V)

To get out of reset:

- Pulling VEN voltage high with VBAT above VBAT monitor threshold if enabled




Resetting HB300N via VEN pin

4.2 3.3V Condition

Test Condition: MOD_VDD = 3.3V, VDD_IO= 3.3V, MOD_VUP=5V

Impedance of Antenna Matching: 35 ohm

| 3.3V Power Rail Current (mA), Booster "**OFF**" (MOD_VDD + VDD_IO + VDD_SIM)*1 | | | | | |
|---|---|---|---|---|---|
| Standby (RF OFF, VEN Pull Low) | AVG | 0.083 | | | |
| | Peak | N/A | | | |
| Polling Mode *2 | AVG | 1.99 | | | |
| | Peak | 10.2 | | | |
| Detected Test Tag type | | Type 1 Topaz | Type 2 Mifare | Type 3 Felica | Type 4 Mifare Desfire |
| Communicating | AVG | 7.5 | 7.5 | 7.6 | 7.7 |
| | Peak | 9.4 | 9.8 | 9.8 | 9.8 |

*1: Means NFC module "Digital part" power consumption

*2: Means "Normal" polling mode.

| 3.3V Power Rail Current (mA), Booster "**ON**" (MOD_VDD + VDD_IO + VDD_SIM) | | | | | |
|---|---|---|---|---|---|
| Standby (RF OFF, VEN Pull Low) | AVG | 0.083 | | | |
| | Peak | N/A | | | |
| Polling Mode | AVG | 2.1 | | | |
| | Peak | 10.6 | | | |
| Detected Test Tag type | | Type 1 Topaz | Type 2 Mifare | Type 3 Felica | Type 4 Mifare Desfire |
| Communicating | AVG | 7.3 | 7.2 | 7.2 | 7.2 |
| | Peak | 8.6 | 9.2 | 9.4 | 9.6 |

4.3 5V Condition

| 5V Power Rail Current (mA), Booster "**OFF**" (MOD_VUP) *3 | | | | | |
|---|---|---|---|---|---|
| Standby (RF OFF, VEN Pull Low) | AVG | 0 | | | |
| | Peak | N/A | | | |
| Polling Mode | AVG | 75.4 | | | |
| | Peak | 75.6 | | | |
| Detected Test Tag type | | Type 1 Topaz | Type 2 Mifare | Type 3 Felica | Type 4 Mifare Desfire |
| Communicating | AVG | 12 | 50.4 | 59.4 | 55.79 |
| | Peak | 48 | 53.6 | 72.8 | 73.7 |

*3: Means NFC module "RF part" power consumption

| 5V Power Rail Current (mA), Booster "**ON**" (MOD_VUP) | | | | | |
|---|---|---|---|---|---|
| Standby (RF OFF, VEN Pull Low) | AVG | 0 | | | |
| | Peak | N/A | | | |
| Polling Mode | AVG | 140.8 | | | |
| | Peak | 194 | | | |
| Detected Test Tag type | | Type 1 Topaz | Type 2 Mifare | Type 3 Felica | Type 4 Mifare Desfire |
| Communicating | AVG | 25.6 | 63.5 | 72 | 57.7 |
| | Peak | 138 | 116 | 100 | 104 |

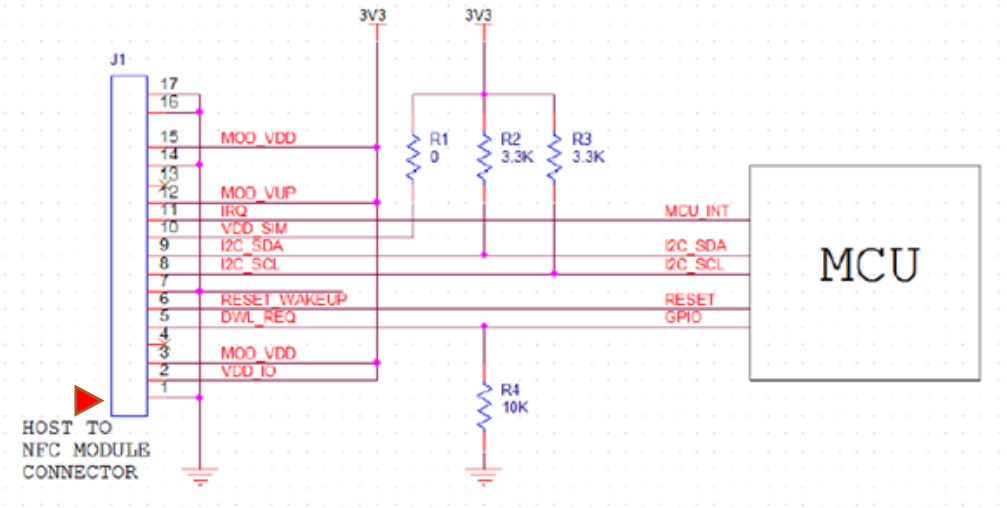
4.4 Total Condition

| Total power consumption (mW), Booster "**OFF**" | | | | | |
|---|---|---|---|---|---|
| Standby (RF OFF, VEN Pull Low) | AVG | 0.274 | | | |
| | Peak | N/A | | | |
| Polling Mode | AVG | 383.57 | | | |
| | Peak | 411.66 | | | |
| Detected Test Tag type | | Type 1 Topaz | Type 2 Mifare | Type 3 Felica | Type 4 Mifare Desfire |
| Communicating | AVG | 84.75 | 276.75 | 322.08 | 304.36 |
| | Peak | 271.02 | 300.34 | 396.34 | 400.84 |

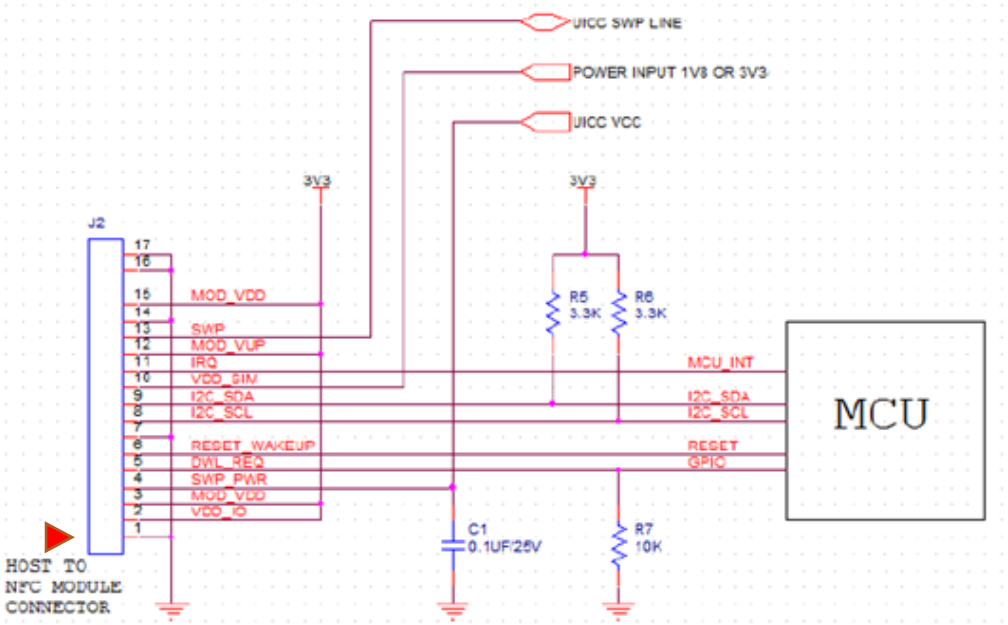
| Total power consumption (mW), Booster "**ON**" | | | | | |
|---|---|---|---|---|---|
| Standby (RF OFF, VEN Pull Low) | AVG | 0.274 | | | |
| | Peak | N/A | | | |
| Polling Mode | AVG | 710.93 | | | |
| | Peak | 1004.98 | | | |
| Detected Test Tag type | | Type 1 Topaz | Type 2 Mifare | Type 3 Felica | Type 4 Mifare Desfire |
| Communicating | AVG | 152.09 | 341.26 | 383.76 | 312.26 |
| | Peak | 718.38 | 610.36 | 531..02 | 551.68 |

# 5. Reference Circuit

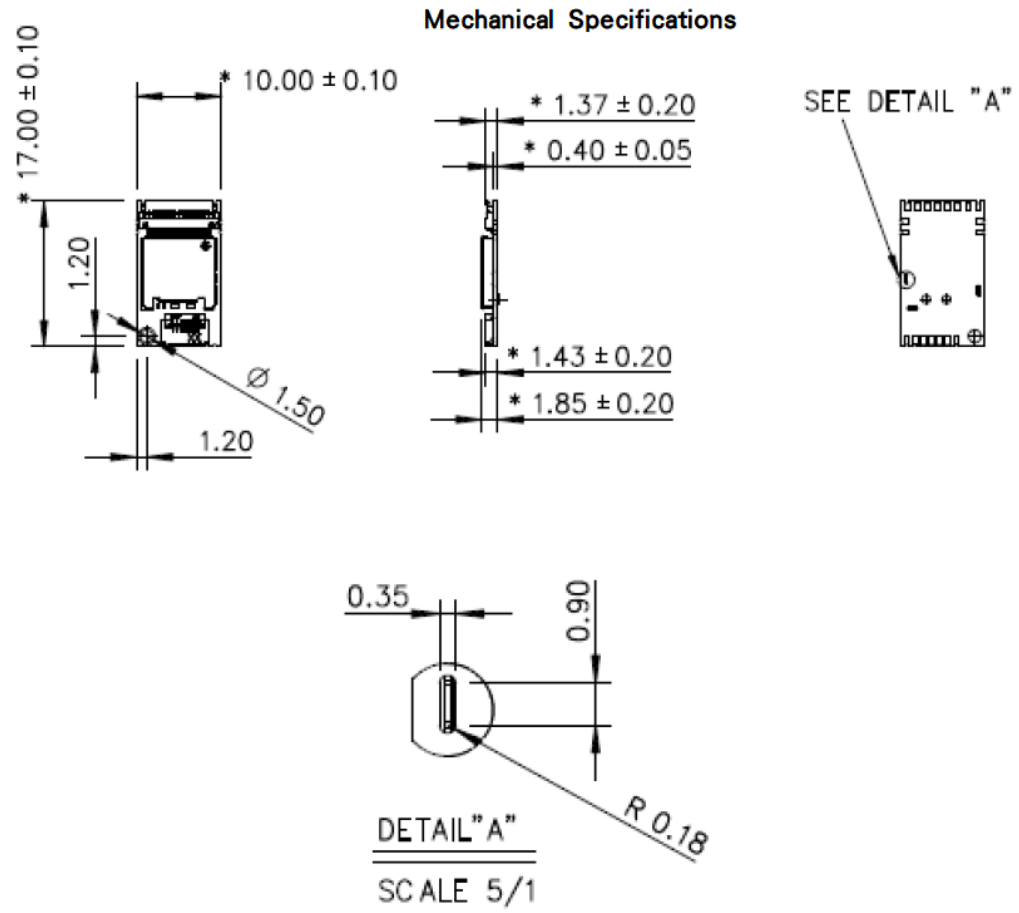
4.1 No SIM Card



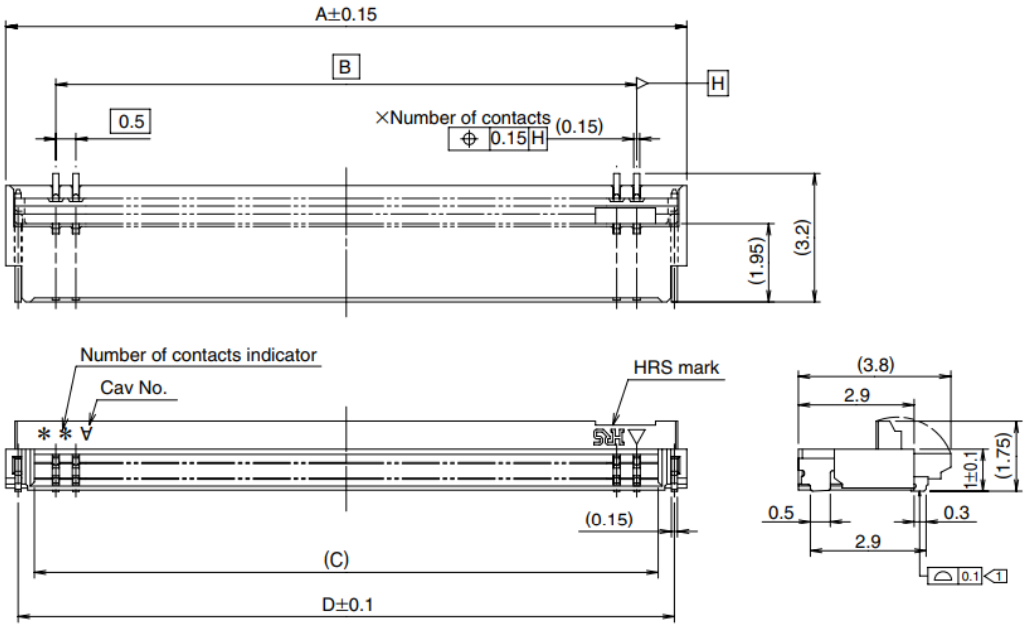

5.2 SIM Card used



# 6. Dimension & FPC Connector Mechanical

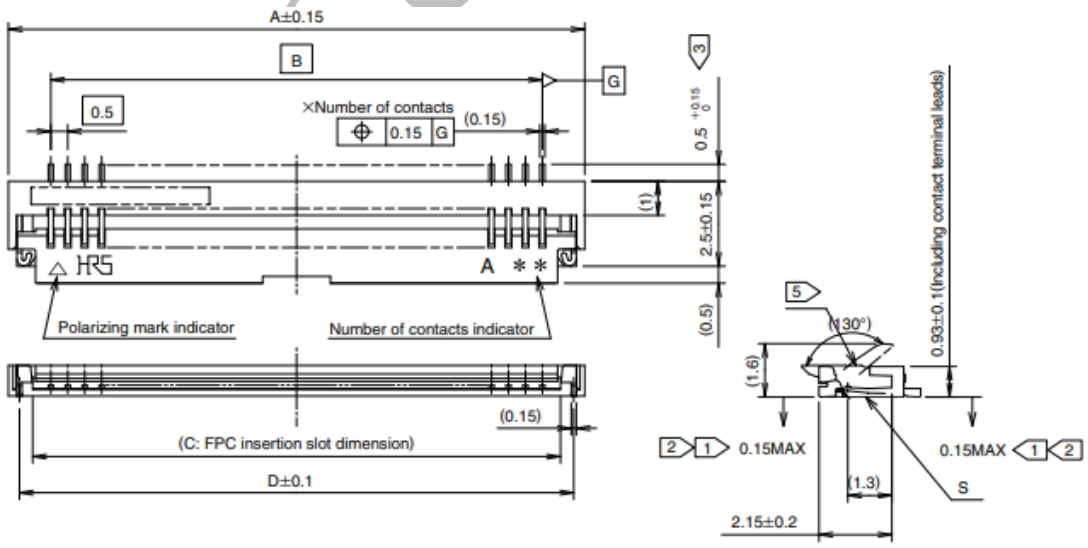


Antenna FPC Connector 7pin




| Number of Contacts | A | B | C | D |
|---|---|---|---|---|
| **7** | 5.5 | 3 | 4.03 | 4.88 |

Host Interface 15Pin




| Number of Contacts | A | B | C | D |
|---|---|---|---|---|
| **15** | 9.5 | 7 | 8.07 | 8.85 |

# 7. Certifications and Regulatory

| Item | Feature | Description |
|---|---|---|
| 1.1 | FCC | FCC PART 15C<br>FCC PART 15B |
| 1.2 | CE | CE EN 300 330<br>CE EN 301 489-3<br>CE EN62311 MPE REPORT<br>CE EN62368-1 |
| 1.3 | IC | IC RSS-247 |
| 1.4 | RCM | RCM SDoC |
| 1.5 | MIC | VCCI-32 |
| 1.6 | NCC | LP0002<br>CNS13438 |
| 1.7 | AS/NZS | AS/NZS4268<br>CISPR 32<br>AN/NZS 62368-1 |
| 1.8 | KNRF | KN301489 |

**General:**

This modular approval is limited to OEM/Integrators installation only.

OEM integrators are responsible for ensuring that the end-user has no manual instructions to remove or install module.

The end user manual shall include all required regulatory information/warning as show in this manual.

## Federal Communication Commission Interference 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 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 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.

**FCC Caution:**

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

**Radiation Exposure Statement:**

The product is a low power device and its output power is lower than FCC SAR exemption level.

**This device is intended only for OEM integrators under the following conditions:**

The transmitter module may not be co-located with any other transmitter or antenna.
The co-transmitting with other radio will need a separate evaluation.
As long as this condition is met, further transmitter test will not be required. However,

the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

**IMPORTANT NOTE:** In the event that this condition 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.

**End Product Labeling**
The final end product must be labeled in a visible area with the following: "**Contains FCC ID: 2AJIC-HB300N**". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

**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.

**********

**This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:**
**KDB 996369 D03 OEM Manual v01 rule sections:**
2.2 List of applicable FCC rules
This module has been tested for compliance to FCC Part C (Section 15.225) as an End User Device.

2.3 Summarize the specific operational use conditions
The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change ap-

plication or new certification.

2.4 Limited module procedures
Not applicable.

2.5 Trace antenna designs
Not applicable.

2.6 RF exposure considerations
The product is a low power device and its output power is lower than FCC SAR exemption level.

2.7 Antennas
The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module.
• Antenna type: Loop

2.8 Label and compliance information
The final end product must be labeled in a visible area with the following:
"Contains FCC ID: **2AJIC-HB300N**". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.10 Additional testing, Part 15 Subpart B disclaimer
This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.
As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance
requirements required with this module installed.

**IMPORTANT NOTE:** 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.

# OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

**This device complies with *Directive 2014/53/EU* issued by the Commission of the European Community.**

The product is a low power device and its output power is lower than comply with the RF exposure requirements in Europe.

**Frequency bands and Powers**

| | |
|---|---|
| **Operating Frequency** | 13.56 MHz |
| **Number of Channel** | 1 |
| **H-field Strength** | 7.82 dBμA/m |

In all cases assessment of the final product must be mass against the Essential requirements of the ***Directive 2014/53/EU*** Articles 3.1(a) and (b), safety and EMC respectively, as well as any relevant Article 3.2 requirements.

## Industry Canada statement:

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d' ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

**Radiation Exposure Statement:**

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

**Déclaration d'exposition aux radiations:**

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à plus de 20 cm entre le radiateur et votre corps.

**IMPORTANT NOTE:**

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not 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 Canada authorization.

**NOTE IMPORTANTE:**

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

**End Product Labeling**

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains IC:25868-HB300N”.

**Plaque signalétique du produit final**

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l’antenne peut être installée et utilisée à plus de 20 cm entre l’antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 25868-HB300N".

**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.

**Manuel d'information à l'utilisateur final**

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

低功率電波輻射性電機管理辦法

第十二條：

經型式認證合格之低功率射頻電機，非經許可，公司□商號或使用者均不得擅自變更頻率□加大功率或變更原設計之特性及功能。

第十四條：

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。

低功率射頻電機須忍受合法通信或工業□科學及醫療用電波輻射性電機設備之干擾。

# 8. Marking