

Wireless Module BP35A1
Hardware Specification

Revision 1.0.0

Revision record

| Rev. | Rev. Date | Items | Remarks |
|-------|------------|-------|---------|
| 1.0.0 | 2018/10/29 | Issue | ROHM |
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Notice**● Precaution on using ROHM Products**

- 1) Our Products are designed and manufactured for application in ordinary electronic equipment (such as AV equipment, OA equipment, telecommunication equipment, home electronics appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment, transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property (“Special Applications”), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM’s Products for Specific Applications.
- 2) ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures.
 - [a] Installation of protection circuits or other protective devices to improve system safety.
 - [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure.
- 3) Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM’s Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
 - [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
 - [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
 - [c] Use of our Products in places where the Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - [f] Sealing or coating our Products with resin or other coating materials
 - [g] Use of the Products in places subject to dew condensation
- 4) The Products are not subject to radiation-proof design.
- 5) Please verify and confirm characteristics of the final or mounted products in using the Products.
- 6) Confirm that operation temperature is within the specified range described in the product specification.
- 7) ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.
- 8) This Product may be subjected to radio wave interference from other equipment emitting radio waves.
- 9) This Product emits radio waves due to the specification. To use equipment emitting radio waves, certification under the Radio Act should be obtained by region in which the Product is used. For the standards for certification under the Radio Act to be obtained for the use of this Product, separately contact your ROHM representative.

Notice

● **Precautions Regarding Application Examples and External Circuits**

- 1) If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
- 2) You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for damages, expenses or losses incurred by you or third parties arising from the use of such information.

● **Precaution for Electrostatic**

This Product is an electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Product's maximum rating will not be applied to the Products. Please take special care under dry conditions (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

● **Precaution for Storage / Transportation**

- 1) Product performance and soldered connections may deteriorate if the Products are stored in the places where:
 - [a] The Products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] The temperature or humidity exceeds those recommended by ROHM
Temperature: 5 °C – 40 °C, Humidity: 40 %RH - 60 %RH
 - [c] The Products are exposed to direct sunshine or condensation
 - [d] The Products are exposed to high Electrostatic
- 2) ROHM shall assure the performance of this Product such as connector fitting performance for a period of one (1) year after the shipment from ROHM; provided, however, that this shall be limited to the cases where the foregoing conditions for storage are observed.
- 3) Store / transport cartons in the correct direction, which is indicated on a carton as a symbol. Otherwise bent leads, causing the shield case to deform or come off, or other troubles may occur due to excessive stress applied when dropping of a carton.

Notice

● **Precaution for product label**

QR code printed on ROHM product label is for ROHM's internal use only, and please do not use at customer site.

● **Precaution for disposition**

When disposing Products please dispose them properly using an authorized industry waste company.

● **Precautions Regarding Intellectual Property Rights**

- 1) All information and data including but not limited to application example contained in this document is for reference only. ROHM does not warrant that foregoing information or data will not infringe any intellectual property rights or any other rights of any third party regarding such information or data.
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- 3) No license, expressly or implied, is granted hereby under any intellectual property rights or other rights of ROHM or any third parties with respect to the Products or the information contained in this document. Provided, however, that ROHM will not assert its intellectual property rights or other rights against you or your customers to the extent necessary to manufacture or sell products containing the Products, subject to the terms and conditions herein.

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- 1) This document may not be reprinted or reproduced, in whole or in part, without prior written consent of ROHM.
- 2) The Products may not be disassembled, converted, modified, reproduced or otherwise changed without prior written consent of ROHM.
- 3) In no event shall you use in any way whatsoever the Products and the related technical information contained in the Products or this document for any military purposes, including but not limited to, the development of mass-destruction weapons.
- 4) The proper names of companies or products described in this document are trademarks of registered trademarks of ROHM, its affiliated companies or third parties.

1. Structure

Assembly using a printed circuit board

2. Product Name

Hybrid IC

3. Model Name

BP35A1

4. Application

Telecommunication equipment

5. Function

Specified low power radio module (920 MHz band)

6. Absolute Maximum Ratings

| No. | Parameter | Symbol | Rating | Unit | Condition |
|-----|-----------------------------|------------------|-----------------|------|-----------|
| 1 | Supply voltage | VDD | -0.3 to +3.6 | V | DC |
| 2 | Digital input voltage | V _{DIN} | -0.3 to VDD+0.3 | V | |
| 3 | Digital output voltage | V _{DO} | -0.3 to VDD+0.3 | V | |
| 5 | Digital output current | I _{DO} | -8 to +8 | mA | |
| 6 | Operating temperature range | T _{opr} | -20 to +80 | °C | |
| 7 | Storage temperature range | T _{stg} | -20 to +80 | °C | |

(Note) The absolute maximum ratings represent values that shall not be exceeded for even an instant on all operating or testing conditions.
Design systems with a margin for the ratings listed above.

7. Recommended Operating Conditions

| No. | Parameter | Symbol | Specification | | | Unit | Condition |
|-----|-----------------------------|----------------|---------------|------|------|------|-----------|
| | | | Min. | Typ. | Max. | | |
| 1 | Supply voltage | VDD | 2.7 | 3.3 | 3.6 | V | |
| 2 | Operating temperature range | T _a | -20 | +25 | +80 | °C | |

8. Major Performance

| Parameter | Description |
|--|--|
| Radio standards | Compliant with ARIB STD-T108 |
| Radio frequency | 920 MHz band |
| Modulation method | Binary GFSK |
| Data rate | 100 kbps |
| Transmission power | 20 mW output |
| Receiving sensitivity | -103 dBm (Typ.) (100 kbps, BER<0.1 %) |
| Frequency deviation | ±20 ppm or less |
| Current consumption (VDD=3.3 V) (Data rate=100 kbps) | 46 mA (Typ.) [Transmission: 20 mW output] 30 mA (Typ.) [Reception] 9 μA (Typ.) [Sleep state] |
| Host interface | UART (115,200 bps) |

9. Block Diagram

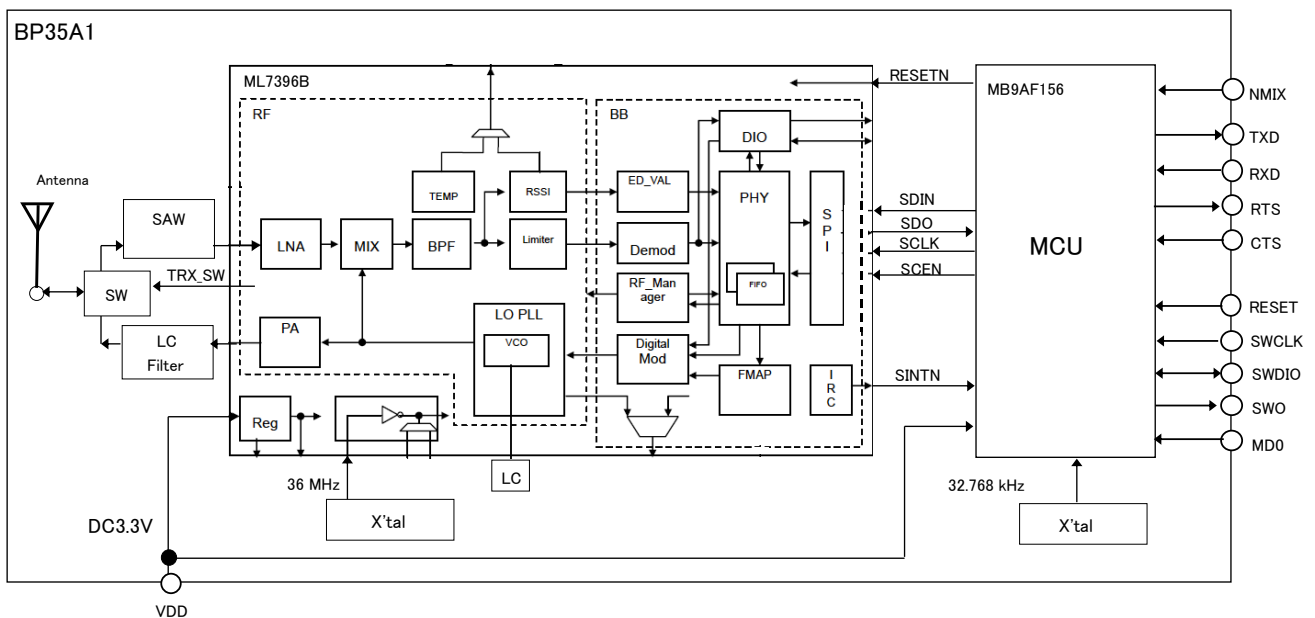


Fig. 1. Block Diagram

10. Electrical Characteristics

Input current characteristics

(Ta=25 °C, VDD=3.3 V)

| No. | Parameter | Condition | Specification | | | Unit |
|-----|--|--------------------------------------|---------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| 1 | Current consumption (Data rate: 100 kbps) | Transmission state (set to 20 mW) | - | 46 | 52 | mA |
| 2 | | Reception state | - | 30 | 35 | mA |
| 3 | | Sleep state* (Held by register)*1 | - | 9 | - | μA |

Measurement was made with the terminal of 50-ohm measuring instrument connected with the antenna connector terminal of the module using RF cable.

Be noted that the parameter marked with “*” represents a design guaranteed value.

*1: Shifted to sleep mode when the “SKDSLEEP” command is executed. No. 5 pin (WKUP pin) is in a High state.

RF characteristics

Measurement conditions: Ta=25 °C and VDD=3.3 V

Modulation rate: 100 kbps

Modulation method: Binary GFSK

Channel spacing: 400 kHz

Measurement made at the antenna connector terminal of the module

Transmission characteristics

(Ta=25 °C, VDD=3.3 V)

| No. | Parameter | Condition | Specification | | | Unit |
|-----|---------------------------------------|--|---------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| 1 | Transmission output power | 20 mW mode | 12.2 | 12.7 | 13.4 | dBm |
| 2 | Occupied bandwidth | n=2 | - | 176 | 400 | kHz |
| 3 | Adjacent channel leakage power [ACPR] | 20 mW mode±1 channel Bandwidth: 200 kHz | - | -40 | -15 | dBm |
| 4 | Frequency shift [Fdev]* | - | 35 | 50 | 65 | kHz |

Be noted that the parameter marked with “*” represents a design guaranteed value.

Transmission characteristics (continued)

(Ta=25 °C, VDD=3.3 V)

| No. | Parameter | Condition | Specification | | | Unit |
|-----|---|--|---------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| 5 | Spurious emission levels for transmission (in 20 mW mode) | 100 kHz bandwidth below 710 MHz* | - | -76 | -36 | dBm |
| 6 | | 1 MHz bandwidth between 710 MHz and 900 MHz* | | -68 | -55 | dBm |
| 7 | | 100 kHz bandwidth between 900 MHz and 915 MHz* | - | -75 | -55 | dBm |
| 8 | | 100 kHz bandwidth between 915 MHz and 930 MHz (except levels detuned by 400 kHz or less from the center of radio channels (n=2); provided that levels ranging from 920.5 MHz to 922.3 MHz and detuned by 300 kHz or less shall be excluded)* | - | -47 | -36 | dBm |
| 9 | | 100 kHz bandwidth between 930 MHz and 1 GHz* | - | -66 | -55 | dBm |
| 10 | | 1 MHz bandwidth between 1 GHz and 1.215 GHz* | - | -69 | -45 | dBm |
| 11 | | 1 MHz bandwidth over 1.215 GHz (over second harmonic) | - | -38 | -30 | dBm |

Be noted that the parameter marked with “*” represents a design guaranteed value.

Reception characteristics

(Ta=25 °C, VDD=3.3 V)

| No. | Parameter | Condition | Specification | | | Unit |
|-----|---|---------------|---------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| 12 | Minimum receiving sensitivity BER<0.1 % | 100 kbps mode | - | -103 | -95 | dBm |
| 13 | Maximum receiving input level* | 100 kbps mode | 0 | - | - | dBm |
| 14 | Adjacent interference of C/I performance in a reception circuit* | 100 kbps mode | 20 | 35 | - | dB |
| 15 | Next-adjacent interference of C/I performance in a reception circuit* | 100 kbps mode | 30 | 45 | - | dB |
| 16 | Minimum power detection (ED value) level* | - | - | - | -95 | dBm |
| 17 | Power detection range* | Dynamic range | 60 | 70 | - | dB |
| 18 | Power detection accuracy* | - | -6 | - | +6 | dB |

Be noted that the parameter marked with “*” represents a design guaranteed value.

Reception characteristics (continued)

(Ta=25 °C, VDD=3.3 V)

| No. | Parameter | Condition | Specification | | | Unit |
|-----|----------------------------|--|---------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| 19 | Subsidiary emission levels | 100 kHz bandwidth below 710 MHz* | - | -77 | -54 | dBm |
| 20 | | 1 MHz bandwidth between 710 MHz and 900 MHz* | - | -71 | -55 | dBm |
| 21 | | 100 kHz bandwidth between 900 MHz and 915 MHz* | - | -83 | -55 | dBm |
| 22 | | 100 kHz bandwidth between 915 MHz and 930 MHz | - | -61 | -54 | dBm |
| 23 | | 100 kHz bandwidth between 930 MHz and 1 GHz* | - | -81 | -55 | dBm |
| 24 | | 1 MHz bandwidth over 1 GHz * | - | -67 | -47 | dBm |

Be noted that the parameter marked with “*” represents a design guaranteed value.

11. Interface Characteristics

Terminal characteristics (design guarantee values)

(Operating supply voltage: VDD=2.7 V to 3.6 V, Ta=-20 °C to +80 °C)

| No. | Parameter | Symbol | Condition | Specification | | | Unit |
|-----|---------------------------|--------|----------------|---------------|------|-----------|------|
| | | | | Min. | Typ. | Max. | |
| 1 | High-level input voltage | VIH1 | (*1) | VDD x 0.8 | - | VDD+0.3 | V |
| 2 | Low-level input voltage | VIL1 | (*1) | -0.3 | - | VDD x 0.2 | V |
| 3 | Input leak current | IIL | - | -5 | - | 5 | mA |
| 4 | High-level output voltage | VOH | IOH=-4 mA (*2) | VDD-0.5 | - | VDD | V |
| 5 | Low-level output voltage | VOL | IOL=4 mA (*2) | 0 | - | 0.4 | V |
| 6 | Input capacitance | CIN | (*1) | - | 5 | 15 | pF |

(*1) Pin shown as “I” in the “I/O” column in “Pin Description” table.

(*2) Pin shown as “O” in the “I/O” column in “Pin Description” table.

UART specification

| Parameter | Specification |
|-----------------|------------------------|
| Baud rate | 115,200 bps |
| Data | 8 bits |
| Parity | Not provided |
| Stop bit | 1 bit |
| HW flow control | Disabled (Default)(*3) |

(*3) UART flow control is disabled (defaulted) when the “WUART 00” is executed.

UART flow control is enabled when the “WUART 80” command is executed.

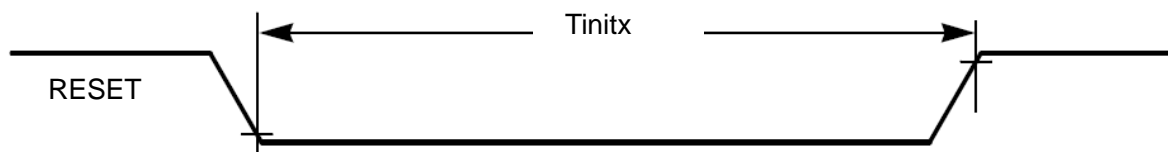
Every time this command is executed, the setting of the flow control is written and saved to the internal flash memory. The setting remains saved in the memory even if the power supply is turned ON again. There is a limit to the number of times to writing data to the flash memory (not more than 10,000 times). This limit to the number of times should be noted. It is recommended to execute the command just once to make setting of the UART flow control.

You should verify and determine whether to disable or enable the HW flow control.

Reset characteristics (design guarantee value)

(Operating supply voltage: VDD=2.7 V to 3.6 V, Ta=-20 °C to +80 °C)

| Parameter | Symbol | Condition | Specification | | | Unit |
|------------------|--------|-----------|---------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Reset input time | Tinitx | - | 500 | - | - | ns |



Startup time

Insert “WAIT” period of three seconds or more before the first command is issued after turning ON the power supply or resetting.

12. Channel Setting

n=2 (Bandwidth: 400 kHz, Data rate: 100 kbps)

| Unit Channel Number | Center Frequency (MHz) | Unit Channel Number | Center Frequency (MHz) |
|---------------------|------------------------|---------------------|------------------------|
| | | 43, 44 | 924.5 |
| | | 44, 45 | 924.7 |
| | | 45, 46 | 924.9 |
| | | 46, 47 | 925.1 |
| | | 47, 48 | 925.3 |
| | | 48, 49 | 925.5 |
| | | 49, 50 | 925.7 |
| | | 50, 51 | 925.9 |
| 33, 34 | 922.5 | 51, 52 | 926.1 |
| 34, 35 | 922.7 | 52, 53 | 926.3 |
| 35, 36 | 922.9 | 53, 54 | 926.5 |
| 36, 37 | 923.1 | 54, 55 | 926.7 |
| 37, 38 | 923.3 | 55, 56 | 926.9 |
| 38, 39 | 923.5 | 56, 57 | 927.1 |
| 39, 40 | 923.7 | 57, 58 | 927.3 |
| 40, 41 | 923.9 | 58, 59 | 927.5 |
| 41, 42 | 924.1 | 59, 60 | 927.7 |
| 42, 43 | 924.3 | 60, 61 | 927.9 |

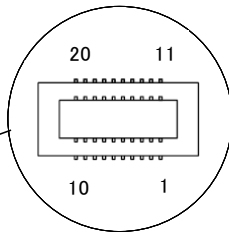
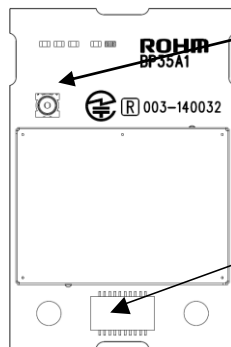
This Product is available for use in the range of 33, 34CH (922.5 MHz) to 60, 61CH (927.9 MHz).

13. Setting of Communication Time Limit and Carrier Sensing Time

This Product has acquired the Technical Regulations Conformity Certification with the settings listed in the table below. The Products are not allowed to be used with any setting outside the setting range listed below.

| Unit Channel Number | Data rate setting (Number of channels to use at a time) | Carrier sensing time | Transmission time limit | Pause time | Total of transmission time per hour |
|---------------------|--|---|---------------------------------|--------------|-------------------------------------|
| 33-61 | 100 kbps (n=2) | 148 μ s or more (Sensing at all times) | 200 ms or less per transmission | 2 ms or more | 360 s or less |

14. List of Pins



Connector for connection of dedicated external antenna

Part Number: MS-156C (Hirose Electric)

Built-in connector of BP35A1 (Receptacle)

Part Number: 20R-JMCS-G-TF(NSA) (JST)

Built-in connector of your equipment (Plug)

Part Number: 20P3.0-JMCS-G-TF(N) (JST)

| Pin No. | Pin Name | I/O | Function |
|---------|----------------|-----|--|
| 1 | VDD | - | Power supply pin |
| 2 | GND | - | Ground pin |
| 3 | TXD | O | UART data output |
| 4 | RXD | I | UART data input |
| 5 | WKUP (NMIX) | I | Wake-up pin*1 H: Normal operation L: Sleep mode cancel |
| 6 | RESET | I | Reset pin |
| 7 | Reserve | - | Reserve (Ground connection) |
| 8 | Reserve | - | Reserve (Ground connection) |
| 9 | Reserve | - | Reserve (Ground connection) |
| 10 | Reserve | - | Reserve (Ground connection) |
| 11 | VDD | - | Power supply pin |
| 12 | GND | - | Ground pin |
| 13 | Reserve | - | Reserve (Ground connection) |
| 14 | Reserve | I | Reserve (Ground connection)*2 |
| | CTS | I | UART notification input*3 |
| 15 | Reserve | O | Reserve (Open)*2 |
| | RTS | O | UART notification output*3 |
| 16 | SWCLK | I | Debug clock input |
| 17 | SWDIO | I/O | Debug data input/output |
| 18 | SWO | O | Debug monitor |
| 19 | Reserve | - | Reserve (Ground connection or Open) |
| 20 | MD0 | I | Debug setting (Normally set to GND) |

*I/O definition - I: Digital input pin, O: Digital output pin

*1: Shifted to sleep mode when the "SKDSLEEP" command is executed.

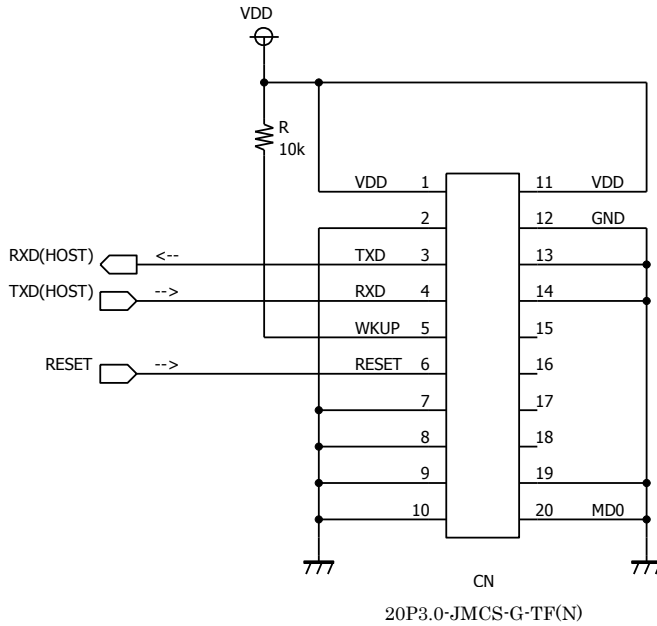
Reset to reception mode when Pin No. 5 (WKUP pin) is set to "L."

*2: When UART flow control is disabled (defaulted) with "WUART 00" command.

*3: When UART flow control is enabled with "WUART 80" command.

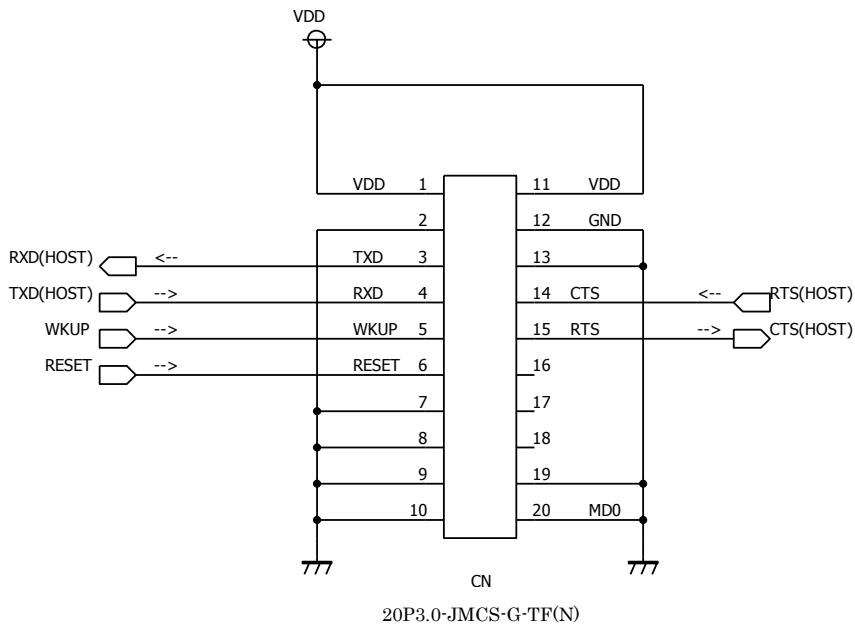
15. Reference Peripheral Circuit Diagrams

(1) Circuit to disable UART flow control and not to use sleep mode



- *Pin No. 5 (NMIX/WKUP) can be fixed to High or Low.
- *Pin No. 6 (RESET) has a pullup resistor connected internally.
- *Pin No. 19 can be open.

(2) Circuit to enable UART flow control and use sleep mode



- *Pin No. 6 (RESET) has a pullup resistor connected internally.
- *Pin No. 19 can be open.

Fig. 6. Reference Peripheral Circuit Diagrams

16. Outline Dimensions

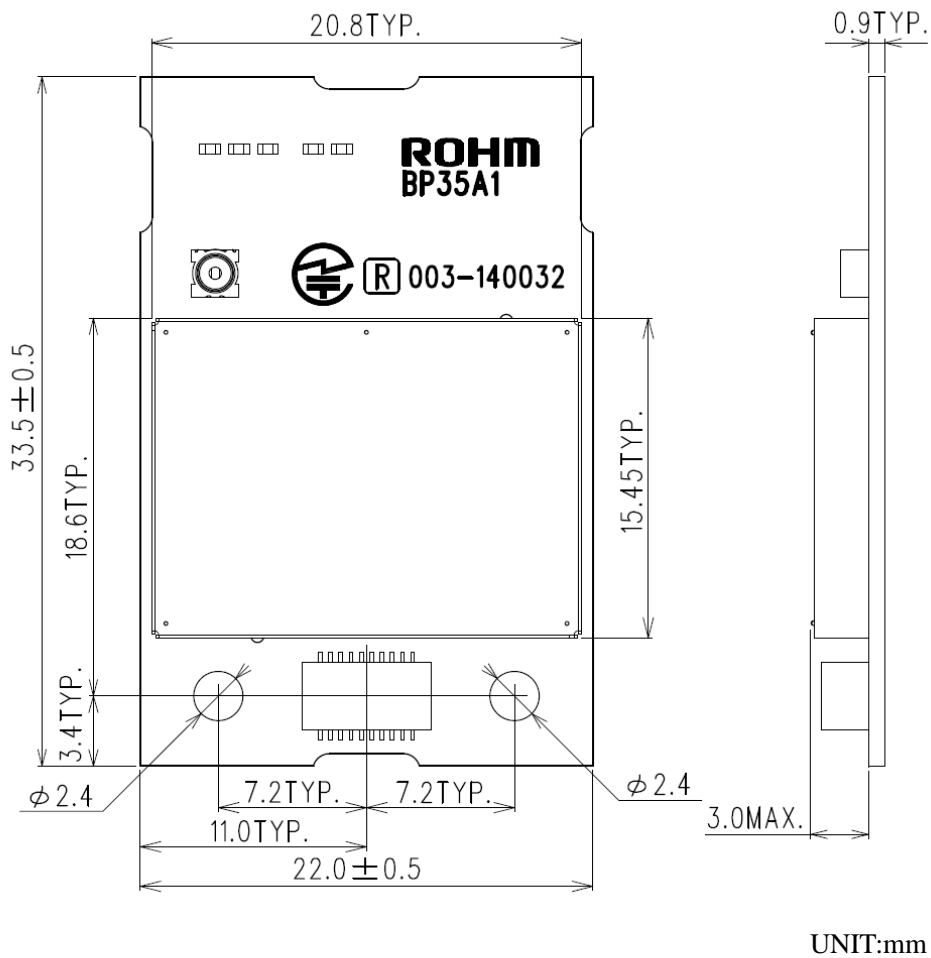


Fig. 7. Outline Dimensions Diagram

*Any defects in the appearance other than scratches and dents harmful to the practical use of this Product are overlooked.

17. Product Marking and Labeling Specification

The following items are indicated on the product.

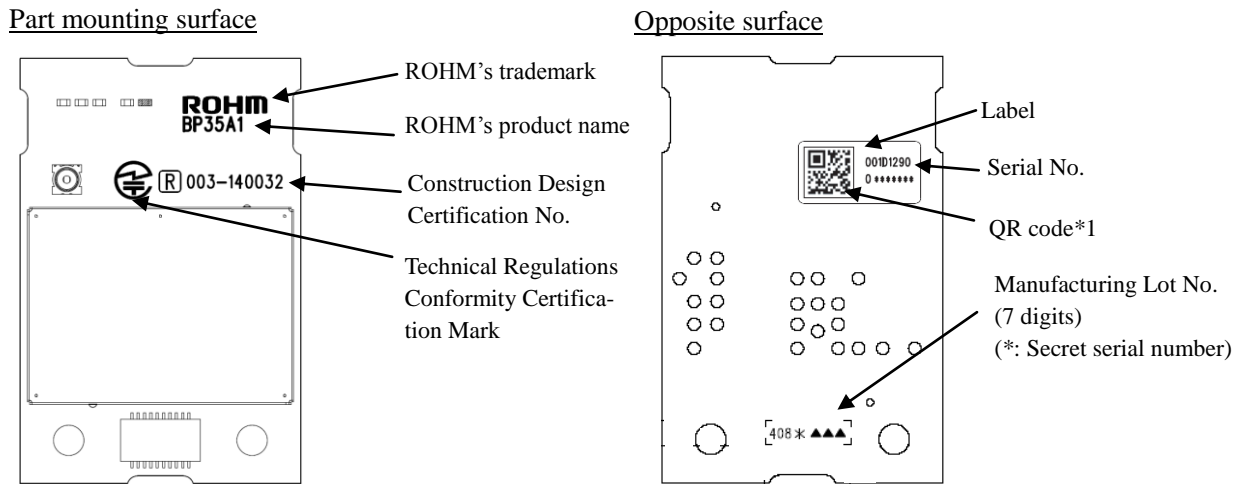


Fig. 8. Marking Specification

*1 QR code has a product serial number as information.
The design of marking is subject to change without prior notice.

Marking items

ROHM

BP35A1

408*▲▲▲

: ROHM's trademark
: ROHM's product name
: Manufacturing Lot No. (3 digits)
(Example) 408*▲▲▲ → 2014_08th week*▲▲▲ Manufactured
(*: Secret serial number)
(▲▲▲: Secret serial number)

003-140032

: Construction Design Certification No.



: Technical Regulations Conformity Certification Mark

Labeling items

001D12*****

: Individual address
001D12 (OUI (Vendor ID): ROHM)

18. Precautions for Mounting

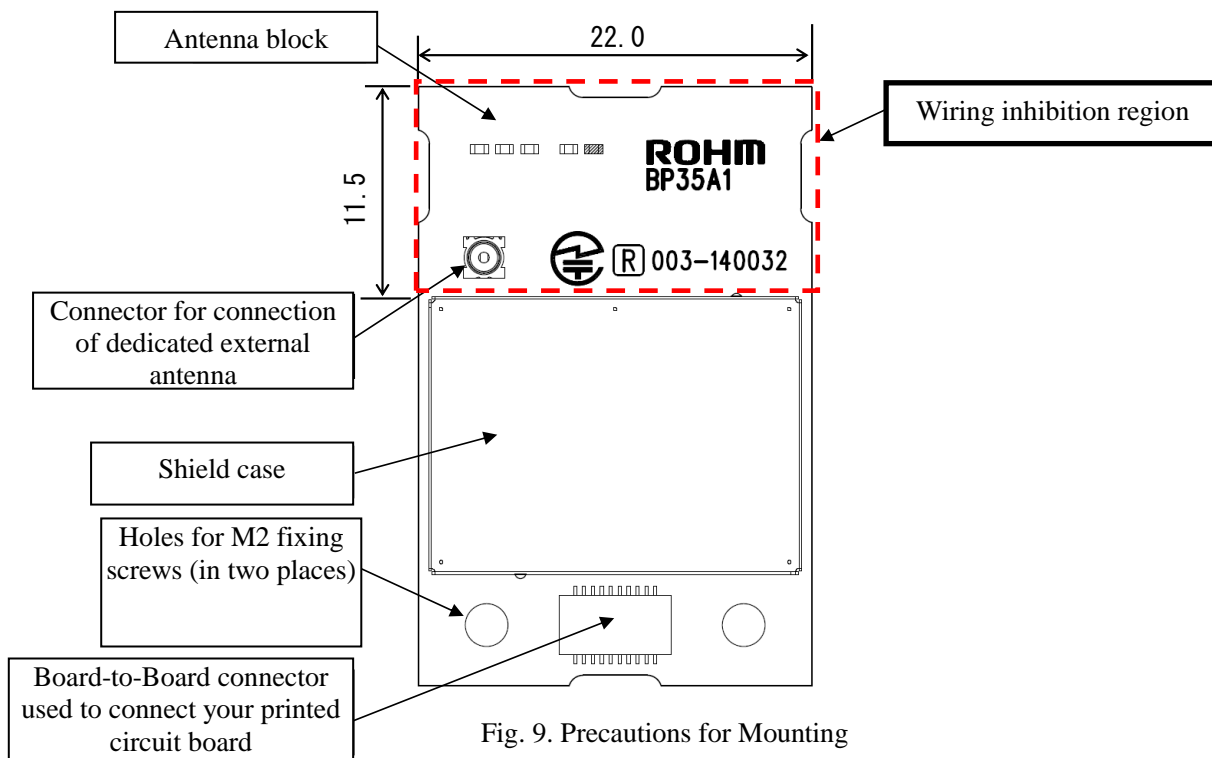


Fig. 9. Precautions for Mounting

- (1) Do not install formed plain grounding and wiring in any regions overlapping the wiring inhibition area on your printed circuit board.
- (2) Do not install any printed circuit board other than that used to connect BP35A1 and housing in places within 1 cm away from the circumference of the wiring inhibition area, wherever possible.
- (3) Do not use any metallic materials for the housing that contains BP35A1.
- (4) Do not install any parts other than the designated connector on the bottom of BP35A1.
- (5) Be note that the shield case has been connected to the ground potential.

Fixing of this Product

Fix BP35A1 with M2 screw.

Insert a spacer of 3.0 mm in height in a space between your printed circuit board and this module.

Torque the M2 screw to 1 kgf-cm or more while paying careful attention not to excessively fasten the screw.

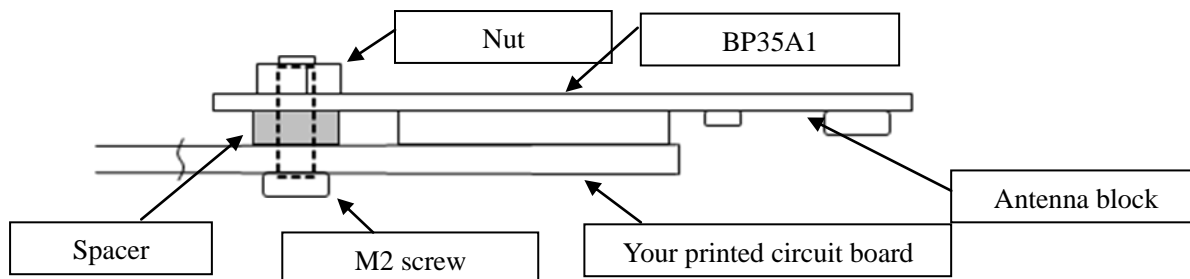


Fig. 10. Example of Module Fixing Diagram (Side View)

19. Product Mass

2.5 g

20. Precautions for Use

- 1) There are cases where serial numbers are not in sequence in the same package.
- 2) With respect to the soldered portion of a part mounted to this Product, solder fillets are overlooked.
- 3) With respect to a label affixed to this Product, defects other than “peeling”, “sticking-out”, and “extreme defect in character recognition” are overlooked.
- 4) BP35A1 may cause the connector or shield case to come off due to its structure when it receives excessive vibration or impact. To use this Product in places where the Product can receive vibration or impact, conduct thorough evaluation in advance.
- 5) BP35A1 is not designed on the assumption that the connector is connected and disconnected a number of times. Do not connect and disconnect the connector over 10 times.
- 6) Mounting the dedicated external antenna to the coaxial connector (used to connect the dedicated external antenna) of BP35A1 over an extended period of time may cause the internal spring of the connector to lose its elastic force, thus making the built-in antenna unusable. Do not use the built-in antenna and dedicated external antenna in combination.
- 7) Use this Product without cleaning residue of flux.
- 8) About wireless communication
 1. Wireless communication may be unstable due to radio wave environment and communication environment, does not guarantee 100% data transfer, ROHM shall not be in any way responsible or liable for data is missing.
 2. UDP does not provide for the arrival of consecutive packets and data arrival is not guaranteed.
 3. Please fully verify with customers before installing this Product in customer's set and doing full-scale operation.
 4. ROHM shall not be in any way responsible or liable for any damage or malfunction caused by data interception, loss, theft, leakage to a third party.
 5. For customers who are verifying points relating to specific communication, please introduce SK Catcher, of Skyley Networks Inc. As a rule, support of the contents related to communication is prerequisite to notify Catcher log and SK Catcher product ID number.

21. Precautions as Radio Equipment

BP35A1 has acquired the “Construction design certification” (Article 38-24 (1) of the Radio Act) for “Radio Equipment: Specified low power equipment of less than 13 GHz prescribed in Article 2-1 (8) Type of Specified Radio Equipment.”

Consequently, BP35A1 is available for use as radio equipment only in Japan without making an application for radio station license.

- Construction Design Certification Number: 003-140032

To safely use BP35A1 as radio equipment, be sure to observe the following.

- 1) The marking of this Product indicates that it has acquired the “Technical Regulations Conformity Certification”. Do not erase the marking or affix any label on the marking.
It is also recommended to display the above mark on the part where your product containing BP35C0 is easy to see.
- 2) Never disassembly or modify this Product. Doing so may be subject to punishment under the Radio Act.
- 3) To use the dedicated external antenna, contact your ROHM representative in advance.

22. Firmware

22.1 Firmware licensing

With respect to the built-in firmware of this Product, agree to the following licensing prior to use.

- 1) This software is firmware dedicated to BP35A1. Do not use the firmware for any product other than BP35A1.
- 2) ROHM has the copyright (including the rights prescribed in Articles 27 and 28 of the Copyright Act) and any and all other intellectual property rights of this Software. This Software shall be licensed only for the use of BP35A1.
- 3) Do not assign, transfer, sub-license, or lend this Software to any third parties.
- 4) Reverse engineering, decompilation, disassembly, reproduction, and change of this Software are prohibited.
- 5) ROHM shall not guarantee any and all operations performed by using this Software.
- 6) Since this software will be updated, be sure to implement the update function of this software on the customer's set main unit. Please inquire about the update method separately.
- 7) In the event of a defect or the like to be attributed to ROHM under normal use for the Software during the first six (6) months from (1) Initial delivery date of BP35A1 or (2) Date of this specification change, customer must notify ROHM immediately.
- 8) Please note that ROHM does not pay any costs (including but not limited to outsourcing expenses, repair expenses, product collection expenses, alternative procurement costs, etc.) paid by customers from third parties due to defects etc. without prior consent of ROHM.
- 9) In any case, the amount borne by ROHM due to defects etc. of the software shall be no more than the last six (6) months of the total sales value of BP35A1 from ROHM to the customer.
- 10) If the provisions of Article 22.1 of this specification, the provisions of the basic contract to be concluded, any contracts and memoranda, incidental thereto, and other specifications of this specification between customer and ROHM contradict or conflict, the provisions of this section shall prevail.

22.2 Firmware version

- 1) The version of firmware written to this Product is the latest version at the time when it is manufactured.
- 2) Firmware may not be the latest version depending on the shipment timing.
- 3) The version of firmware is subject to change without prior notice. ROHM shall not be in any way responsible or liable for damages of customers caused by such changes.
- 4) The version of firmware written to this Product cannot be distinguished by the appearance of the Product.
- 5) The same firmware is written to products contained in the same package.

22.3 Method for checking firmware version

Firmware version can be checked using the following commands.

- Use "SKVER" command to check stack version.
- Use "SKAPPVER" command to check application version.

For details, refer to information in "BP35A1_command reference."

22.4 Number of rewritable firmware

The maximum number of times that the firmware of this Product can be rewritten is 1000 times. If you rewrite the firmware beyond this number, ROHM will not guarantee the operation of this Product.