

Wireless Charger Module

13.56 MHz Wireless Charger Module

BP3621

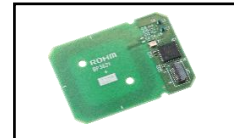
General Description

BP3621 is a compact wireless charger module with integrated antenna board.

Features

- Wireless power transmitter
- Optimized for wireless charging with BP3622
- 212 kbps wireless communication

Package



W (Typ.) × D (Typ.) × H (Typ.)
35.0 mm × 26.0 mm × 1.5 mm

Major Performance

Parameter	Description
Antenna size	24.0 mm × 24.0 mm
Board	FR-4, t = 0.4 mm Parts are mounted on one side
Host interface	0.5 mm pitch / 8 pin FPC connector
Weight	0.80 g

Block Diagram

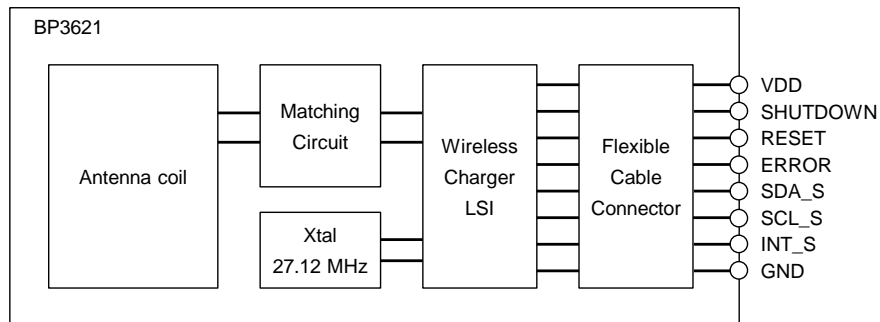


Figure 1. Block Diagram

1. Absolute Maximum Ratings

No.	Parameter	Symbol	Rating	Unit	Condition
1	Input Voltage	V_{DD}	-0.3 to +6.5	V	Ta=25 °C
2	Input Voltage (Digital IO *1)	V_{DIN}	-0.3 to $V_{DD} + 0.3$	V	Ta=25 °C
3	Input Current (Digital IO *1)	Ii	-10 to +10	mA	Ta=25 °C
4	Output Voltage (Digital IO *1)	V_{DO}	-0.3 to $V_{DD} + 0.3$	V	Ta=25 °C
5	Operating temperature range	T_{opr}	-10 to +50	°C	Humidity: 35 % to 85 %RH No dew condensation
6	Storage temperature range	T_{stg}	-20 to +50	°C	Humidity: 35 % to 85 %RH No dew condensation

(*1) Digital IO: RESET, INT_S, SCL_S, SDA_S, ERROR, SHUTDOWN

(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.

(Note) This module can be operated only in combination with BP3622. Operation with other systems is not guaranteed.

2. Recommended Operating Conditions

No.	Parameter	Symbol	Specification			Unit	Condition
			Min.	Typ.	Max.		
1	Operating voltage	V_{DD}	4.5	5.0	5.5	V	*1
2	Operating temperature range	T_{opr}	-10	+25	+50	°C	
3	Distance between Antennas	D_{ant}	-	10.0	-	mm	*2

(*1) See Figure 2 and Figure 3 for the relationship between the output of BP3622 and the load resistance with respect to the operating voltage.

(*2) The power feeding antenna and the power receiving antenna should face each other horizontally.
See Figure 5 and Figure 6 for reference.

3. Electrical Characteristics

DC Function

(Ta=25 °C)

No.	Parameter	Symbol	Specification			Unit	Condition
			Min.	Typ.	Max.		
1	Output Voltage (INT_S, SDA_S, ERROR, SHUTDOWN)	V _{OH}	V _{DD} - 0.5	-	-	V	
		V _{OL}	-	-	0.4	V	
2	Input Voltage (SCL_S, SDA_S, RESET)	V _{IH1}	0.7 ×V _{DD}	-	V _{DD}	V	
		V _{IL1}	0	-	0.3 × V _{DD}	V	

Reset Function

(Ta=25 °C)

No.	Parameter	Symbol	Specification			Unit	Condition
			Min.	Typ.	Max.		
1	RESET_N pulse width	P _{RST}	200	-	-	μs	
2	RESET_N Noise removal pulse width	P _{NRST}	-	-	0.3	μs	

Current Consumption

(Ta=25 °C)

No.	Parameter	Symbol	Specification			Unit	Condition
			Min.	Typ.	Max.		
1	Current consumption	IDD	-	160	-	mA	- TX mode - Distance between antennas = 10 mm

(Note) The characteristics of this module are ensured when using a BP3622 with a matching capacitor (optimized matching constant) as the power feeding system.

4. Typical Performance Curves

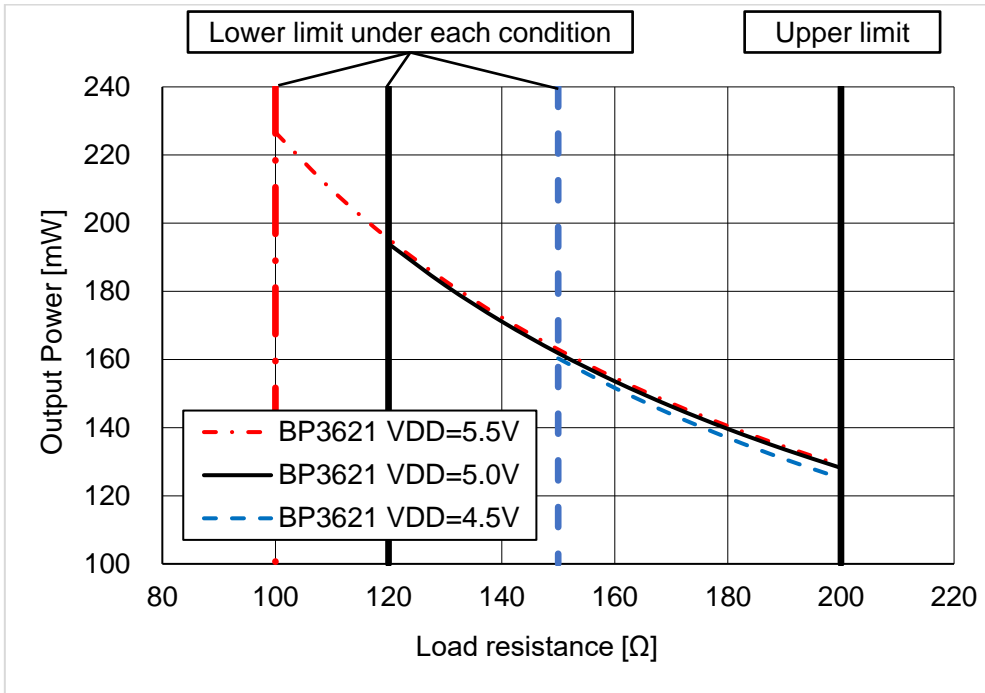


Figure 2. Output Power vs Load resistance

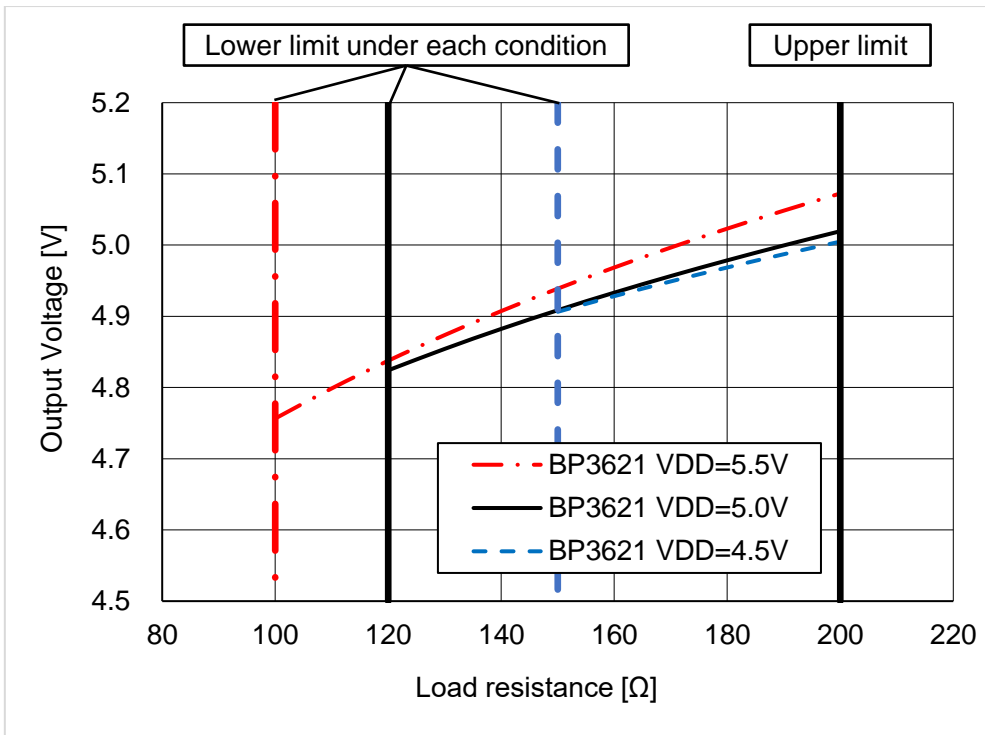


Figure 3. Output Voltage vs Load resistance

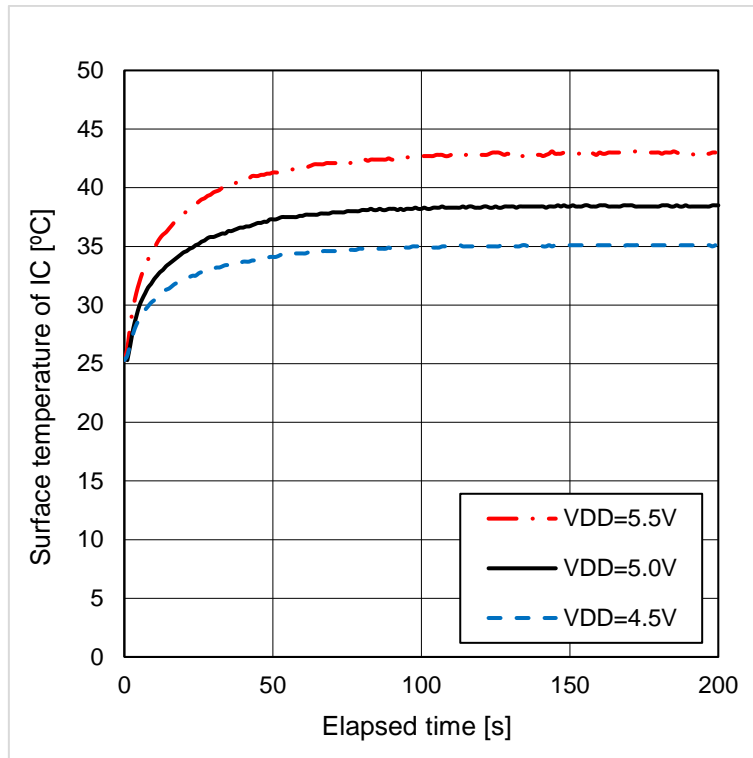


Figure 4. Surface temperature of IC vs Elapsed time

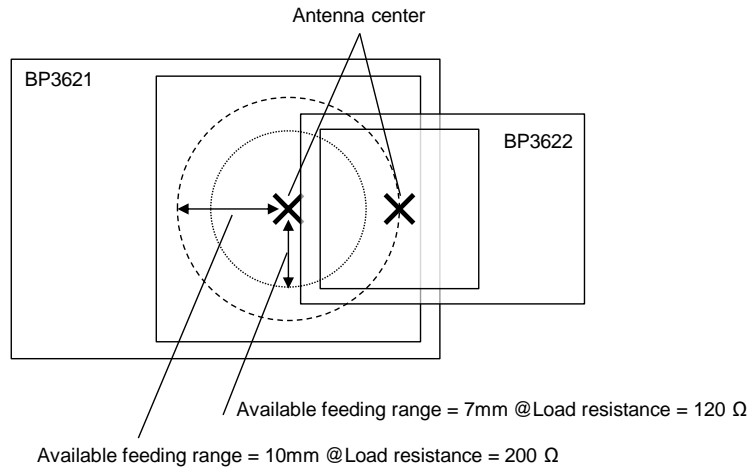


Figure 5. Available feeding range (Top view)

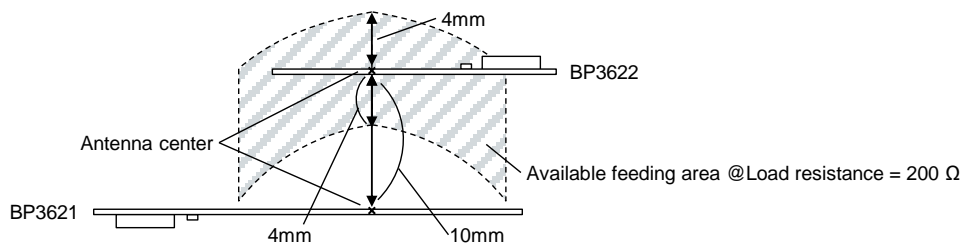


Figure 6. Available feeding area (Side view)

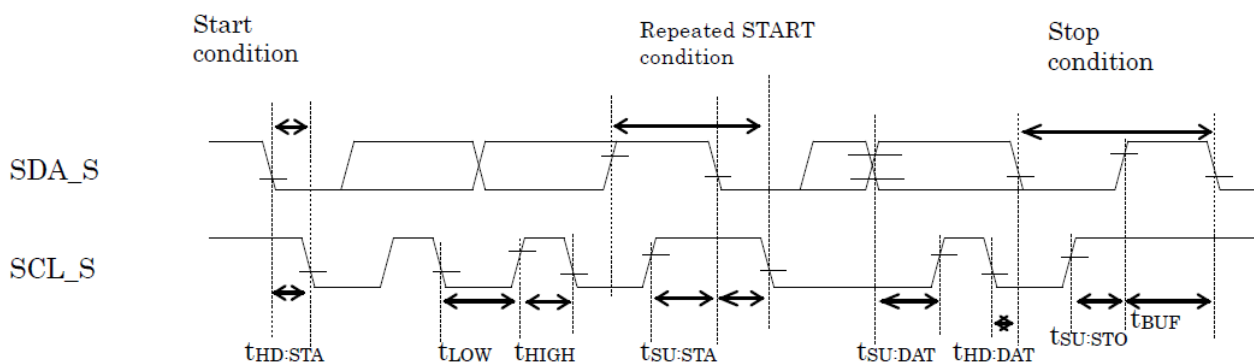
5. I2C AC Function

(Standard mode: 100 kHz, Ta=25 °C)

No.	Parameter	Symbol	Specification			Unit	Condition
			Min.	Typ.	Max.		
1	SCL_S clock frequency	f_{SCL}	-	-	100	kHz	
2	SCL_S hold time (start/repeated start condition)	$t_{HD:STA}$	4.0	-	-	μ s	
3	SCL_S "L" level time	t_{LOW}	4.7	-	-	μ s	
4	SCL_S "H" level time	t_{HIGH}	4.0	-	-	μ s	
5	SCL_S setup time (repeated start condition)	$t_{SU:STA}$	4.7	-	-	μ s	
6	SDA_S hold time	$t_{HD:DAT}$	0	-	-	μ s	
7	SDA_S setup time	$t_{SU:DAT}$	0.25	-	-	μ s	
8	SDA_S setup time (P: Stop condition)	$t_{SU:STO}$	4.0	-	-	μ s	
9	Bus free time	t_{BUF}	4.7	-	-	μ s	

(Fast mode: 400 kHz, Ta=25 °C)

No.	Parameter	Symbol	Specification			Unit	Condition
			Min.	Typ.	Max.		
1	SCL_S clock frequency	f_{SCL}	-	-	400	kHz	
2	SCL_S hold time (start/repeated start condition)	$t_{HD:STA}$	0.6	-	-	μ s	
3	SCL_S "L" level time	t_{LOW}	1.3	-	-	μ s	
4	SCL_S "H" level time	t_{HIGH}	0.6	-	-	μ s	
5	SCL_S setup time (repeated start condition)	$t_{SU:STA}$	0.6	-	-	μ s	
6	SDA_S hold time	$t_{HD:DAT}$	0	-	-	μ s	
7	SDA_S setup time	$t_{SU:DAT}$	0.1	-	-	μ s	
8	SDA_S setup time (P: Stop condition)	$t_{SU:STO}$	0.6	-	-	μ s	
9	Bus free time	t_{BUF}	1.3	-	-	μ s	



6. Operation Flow

When BP3621 detects BP3622, it starts pre-charge operation and charge operation.

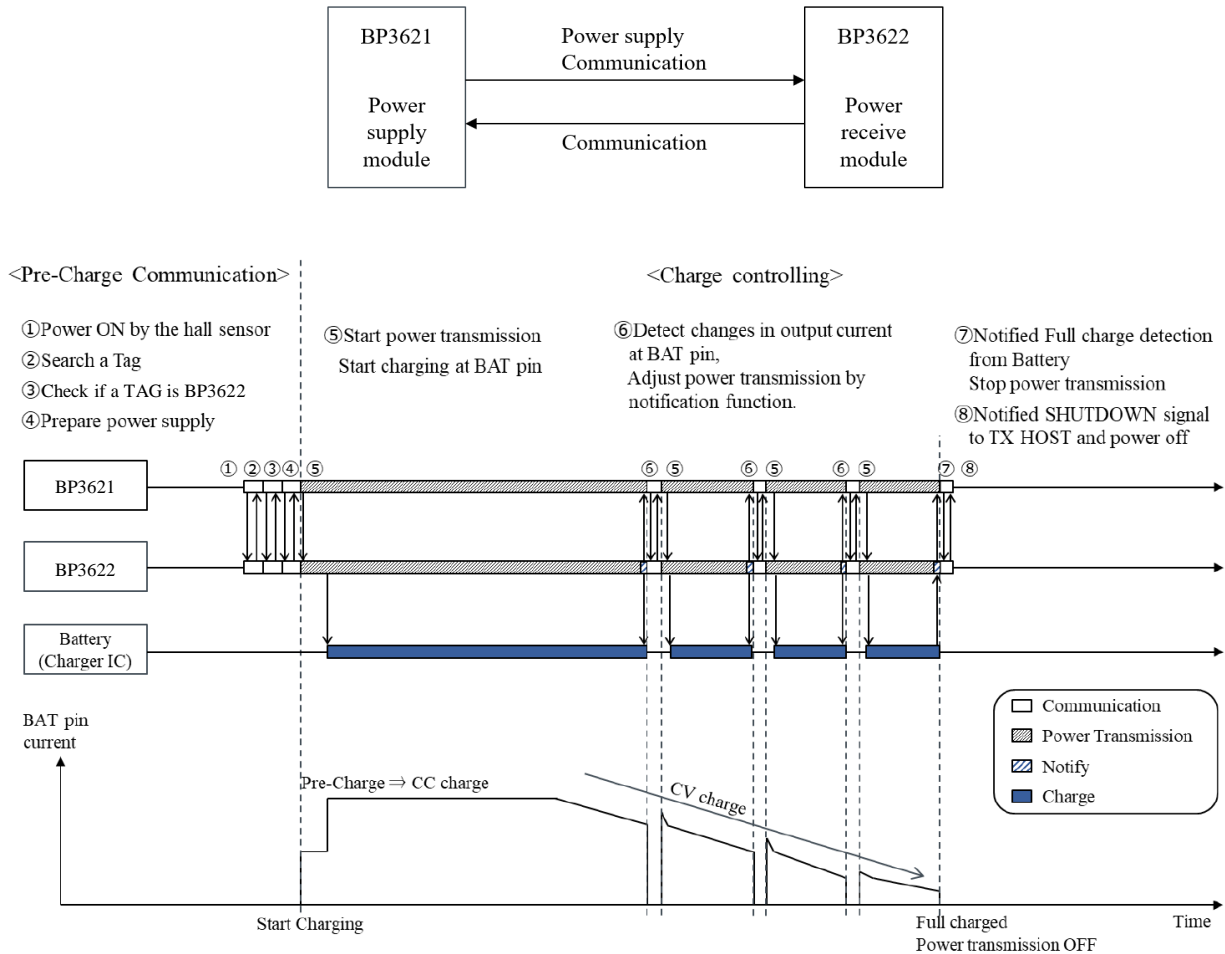


Figure 7. Operation Flow

BP3621/BP3622 has three functions for controlling the power supply.

1. Communication function (Communication) BP3621 checks the response from BP3622 to determine whether the power is supplied. Then, BP3621 receives the state of BP3622 and checks the power supply change request and full charge status.
2. Power Supply Function (Power Transfer) BP3621 transfers power to BP3622.
3. Notification function (Notify) BP3622 requests to communicate with BP3621 to notify a power supply change request or abnormal condition detection during power supply.

7. Physical Dimension

The antenna pattern is drawn on the back of the component mounting side.

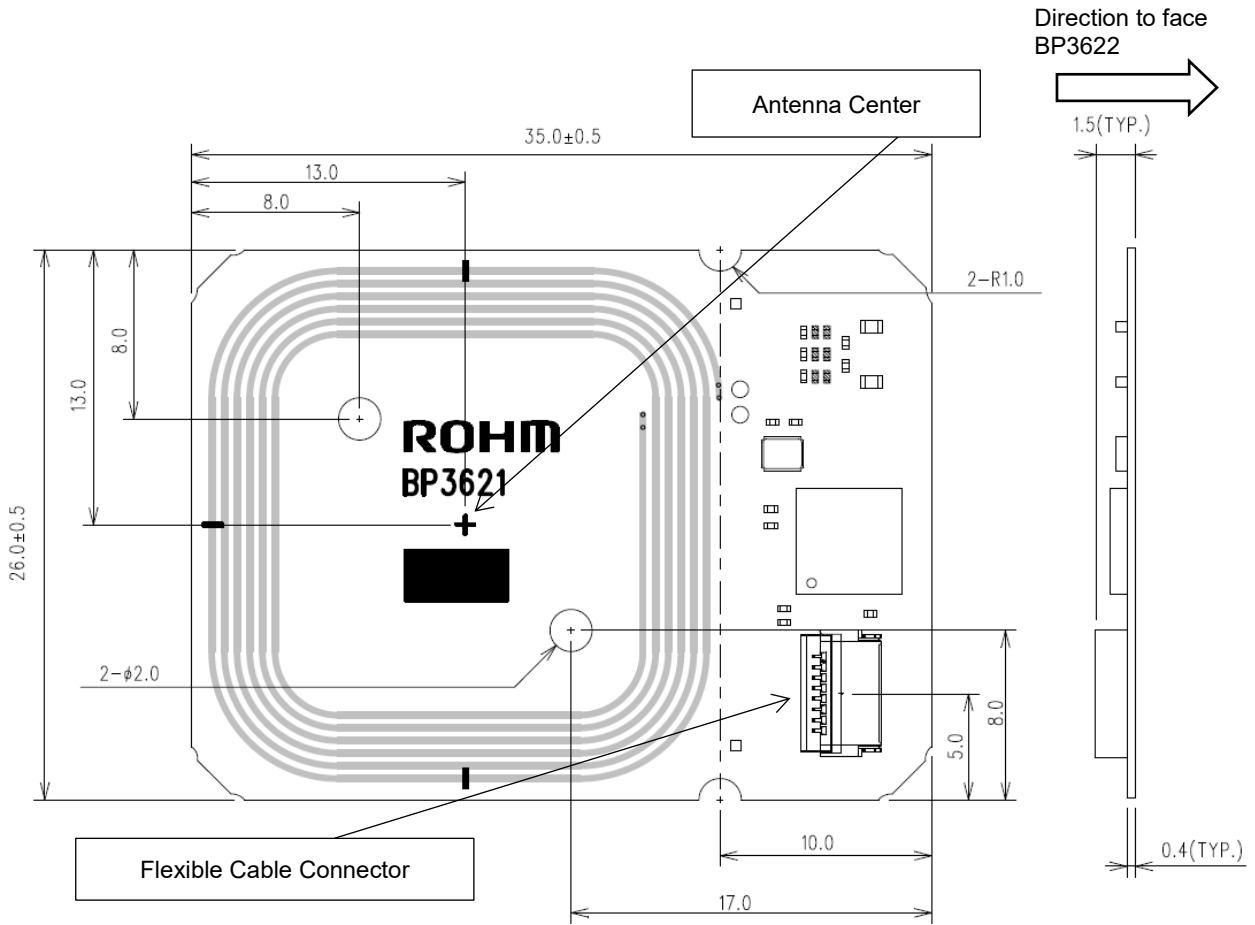


Figure 8. Physical Dimension

Unit: mm

(Note) Dimensions without tolerances are for reference only.

(Note) When the product is shipped, the actuator of the connector is open. The height dimension is when the actuator is closed.

8. Precautions for Installation

1. This module has an antenna on the side opposite to the component mounting side.
2. Use the power feeding side antenna facing the antenna side of this module.
3. Align the center of the antenna of this module with the center of the power feeding antenna.
4. Attach double-sided tape to the antenna side and attach it to any position.
(Double-sided tape is not included with this product.)
5. Do not block the magnetic flux between the antennas.
6. This module is equipped with Hirose FH34SRJ-8S-0.5SH(50) as a flexible cable connector.
(Flexible cable is not included with this product.)

9. Pin Descriptions

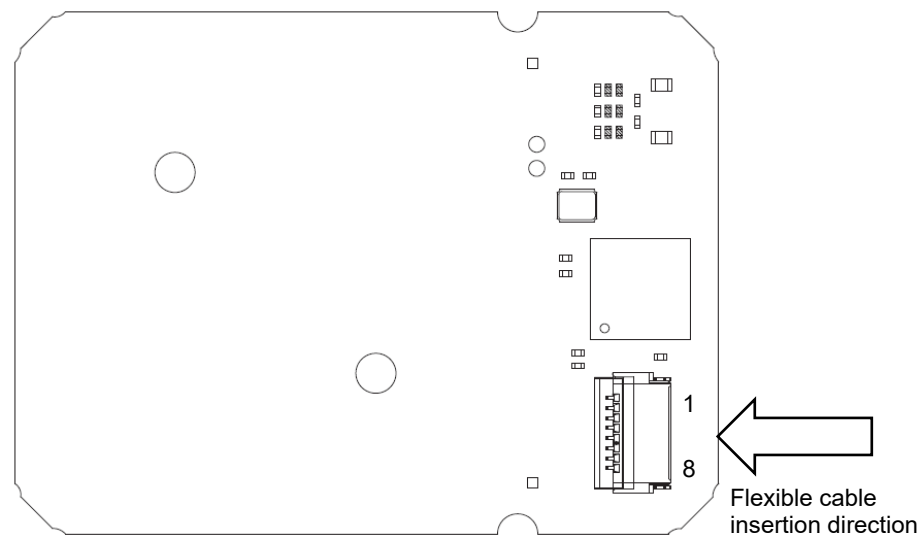


Figure 9. Pin Number (flexible cable connector)

Pin No.	Pin Name	I/O	Function	Connections for unused pins
1	VDD	I	Power supply (5.0V input)	-
2	SHUTDOWN	O	Shutdown request output - High: Active when BP3622 detects full charge - Low: No Active	Open
3	RESET	I	Hardware reset input - High: No Active (Internal Pull-Up) - Low: Active	Open
4	ERROR	O	Error information output - Hi-Z: No Active - Low: Active when an error (Internal Temperature, TX current is abnormal) is detected	Open
5	SDA_S	I/O	I2C serial data access	Open
6	SCL_S	I	I2C clock	Open
7	INT_S	O	Interrupt information output - High: No Active - Low: Active when an interrupt occurs	Open
8	GND	-	Ground	-

10. PCB Marking Specification

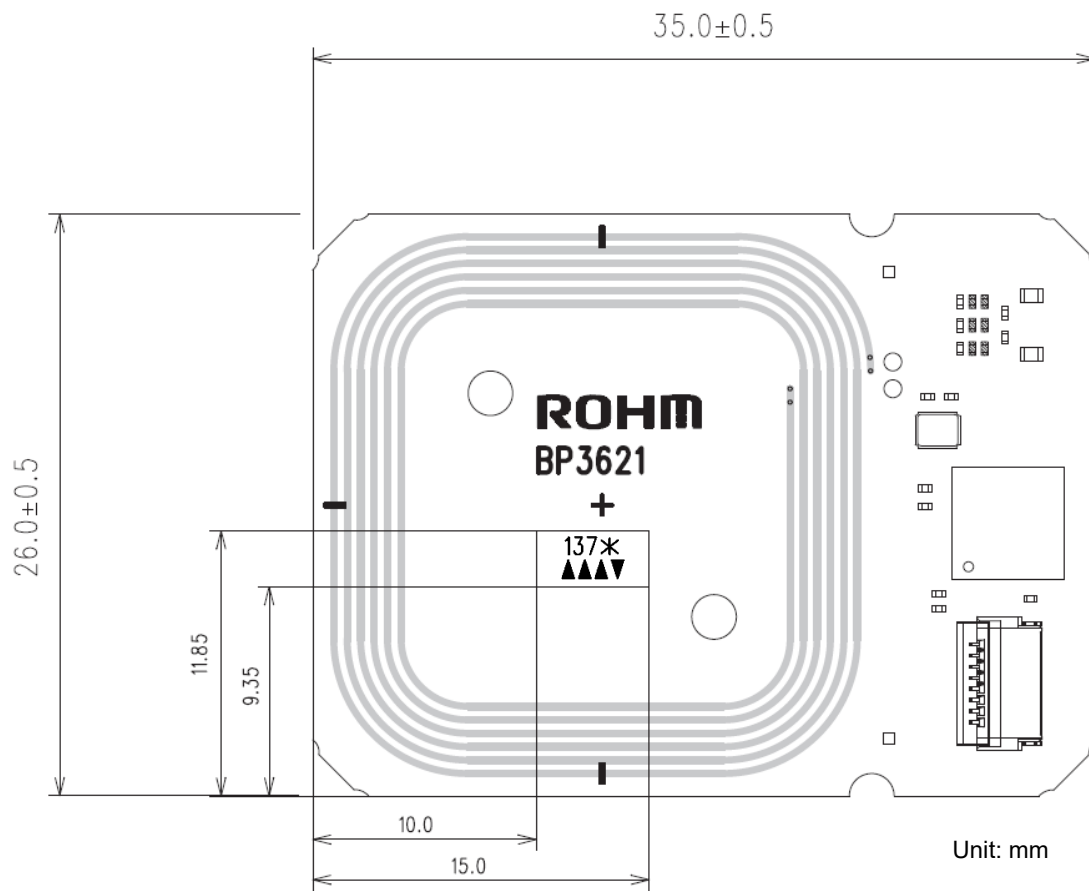


Figure 10. PCB Marking Specification

Marking

137*▲▲▲▼: Production Lot Number (8 digits)

↓

(Example) 137 → Year 2021, Week 37, *▲▲▲▼ (internal serial number)

11. Reference Circuit

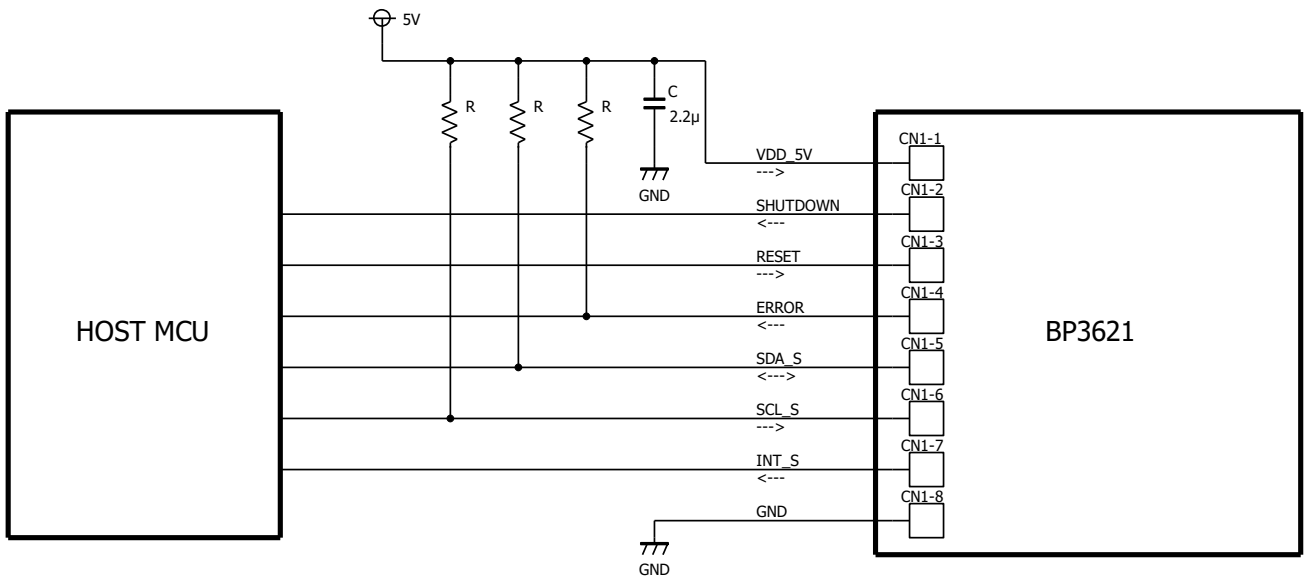


Figure 11. Reference Circuit Diagram

12. Packing Specification

12.1 Packing Method

15 pieces of products are packaged in the packaging tray, and it is piled up 10 steps to make 150 pieces with an empty tray on the top, and it is packed into the packaging case.

The number of piling might change according to the quantity of delivery without previous notice.

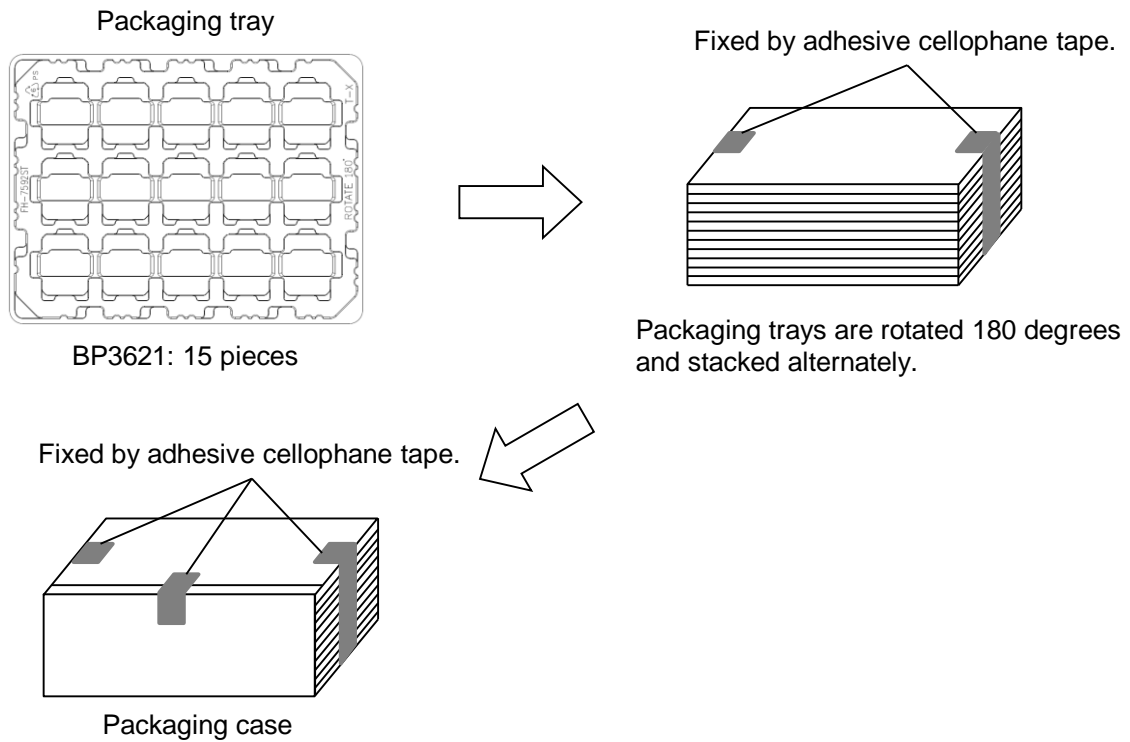


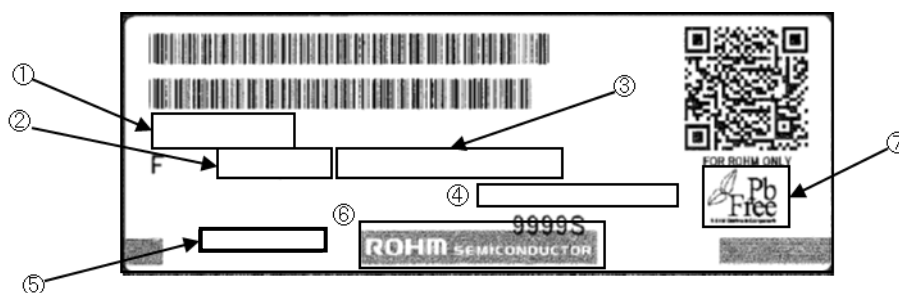
Figure 12. Packing Method

12.2 Label Indication

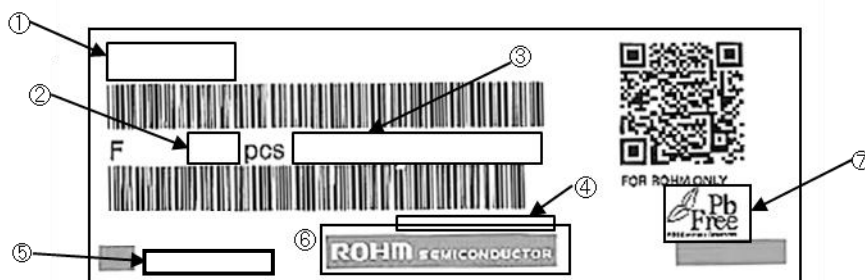
The label with following things is stuck at the packing case.

- 1 Type name (BP3621)
- 2 Quantity
- 3 Lot No.
- 4 Shipment inspection stamp
- 5 Country of origin
- 6 Manufacturing company name (Trade mark)
- 7 Logotype of lead free

Please refer to the following example of the label indication.



(a) For products of ROHM APOLLO



(b) For products of ROHM INTEGRATED SYSTEMS (THAILAND)

Figure 13. Label Indication

13. Product Weight

0.80 g (Typ.)

14. Manufacturing Country

JAPAN

THAILAND

15. Notice**● Precaution on using this Product**

- 1) This Product may be subjected to radio wave interference from other equipment emitting radio waves.
- 2) 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.

16. Revision History

Rev.	Date	Contents
001	15.Sep.2021	New Issue

Notice

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- Our Products are designed and manufactured for application in ordinary electronic equipment (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment ^(Note 1), 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 ("Specific 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.

(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASS III	CLASS III	CLASS II b	CLASS III
CLASS IV		CLASS III	

- 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:
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 - Installation of redundant circuits to reduce the impact of single or multiple circuit failure
- 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:
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 - Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
 - Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
 - Sealing or coating our Products with resin or other coating materials
 - Use of our Products without cleaning residue of flux (Exclude cases where no-clean type fluxes is used. However, recommend sufficiently about the residue.) ; or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
 - Use of the Products in places subject to dew condensation
- The Products are not subject to radiation-proof design.
- Please verify and confirm characteristics of the final or mounted products in using the Products.
- In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse, is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- De-rate Power Dissipation depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction temperature.
- Confirm that operation temperature is within the specified range described in the product specification.
- ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

- When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
- In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

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.
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Precaution for Electrostatic

This Product is 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 Products maximum rating will not be applied to Products. Please take special care under dry condition (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
 - [c] the Products are exposed to direct sunshine or condensation
 - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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A two-dimensional barcode printed on ROHM Products label is for ROHM's internal use only.

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

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