

TARGET SPEC

<Specifications (Precautions and Prohibitions)>

●Precautions for Safety

1) The products are designed and produced for application in ordinary electronic equipment (AV equipment, OA equipment, telecommunication equipment, home appliances, amusement equipment, etc.). If the products are to be used in devices requiring extremely high reliability (medical equipment, transport equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or operational error may endanger human life and sufficient fail-safe measures, please consult with the ROHM sales staff in advance. If product malfunctions may result in serious damage, including that to human life, sufficient fail-safe measures must be taken, including the following:

- [a] Installation of protection circuits or other protective devices to improve system safety
- [b] Installation of redundant circuits in the case of single-circuit failure

2) The products are designed for use in a standard environment and not in any special environments. Application of the products in a special environment can deteriorate product performance. Accordingly, verification and confirmation of product performance, prior to use, is recommended if used under the following conditions:

- [a] Use in various types of liquid, including water, oils, chemicals, and organic solvents
- [b] Use outdoors where the products are exposed to direct sunlight, or in dusty places
- [c] Use in places where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
- [d] Use in places where the products are exposed to static electricity or electromagnetic waves
- [e] Use in environment subject to strong vibration and impact.
- [f] Use in proximity to heat-producing components, plastic cords, or other flammable items
- [g] Use involving sealing or coating the products with resin or other coating materials
- [h] Use of the products in places subject to dew condensation

3) The products might receive the radio wave interference from electronic devices such as Wireless LAN devices, Bluetooth device, digital cordless telephone, microwave oven and so on that radiate electromagnetic wave.

4) The products are not radiation resistant.

5) Verification and confirmation of performance characteristics of products, after on-board mounting, is advised.

6) Confirm that operation temperature is within the specified range described in product specification.

7) Failure induced under deviant condition from what defined in the product specification can not be guaranteed.

8) This product is a specification to radiate the radio wave. It is necessary to acquire the attestation of decided Radio Law of each region used to use the equipment that radiates the radio wave. Please inquire about the attestation of Radio Law that this product acquires.

9) When product safety related problems arises, please immediately inform to ROHM, and consider technical counter measure.

DESIGN	CHECK	APPROVAL	DATE: 11/JAN./2011	SPECIFICATION No. : Target Specification
<i>Yusaku Kawabata</i>	/	/	REV.A	ROHM Co., Ltd.

<Specifications (Precautions and Prohibitions)>

Precautions for Reference Circuits

- 1) If change is made to the constant of an external circuit, allow a sufficient margin due to variations of the characteristics of the products and external components, including transient characteristics, as well as static characteristics.
- 2) The reference circuit examples, their constants, and other types of information contained herein are applicable only when the products are used in accordance with standard methods. Therefore, if mass production is intended, sufficient consideration to external conditions must be made.

Precaution for Electrostatic

This product is Electrostatic sensitive product, which may be damaged due to Electrostatic discharge. Please take proper caution during manufacturing and storing so that voltage exceeding Product maximum rating won't be applied to products. Please take special care under dry condition (Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control etc.)

Precaution for Storage / Transportation

- 1) Product performance and connector mating may deteriorate if the products are stored in the following places:
 - [a] Where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - [b] Where the temperature or humidity exceeds those recommended by the Company
Temperature: 5 - 30 , Humidity 40% - 60%
 - [c] Storage in direct sunshine or condensation.
 - [d] Storage in high Electrostatic.
- 2) Even under ROHM recommended storage condition, connector mating of products over 1 year old may be degraded.
- 3) Store / transport cartons in the correct direction, which is indicated on a carton as a symbol, otherwise bent leads may occur due to excessive stress applied when dropping of a carton..

Precaution for Product Label

QR code printed on ROHM product label is only for internal use, and please do not use at customer site. It might contain a internal part number that is inconsistent with an product part number.

Precaution for Disposition

When disposing products please dispose them properly with a industry waste company.

Precaution for Foreign Exchange and Foreign Trade Act

Note: Since concerned goods are fallen under controlled goods prescribed by Foreign exchange and Foreign trade act, the permission based on the act is necessary in case of export. Please follow the necessary procedures based on relevant laws and regulations when end goods, which were manufactured by your company with the concerned goods, are brought to foreign countries or nonresident.



<Specifications (Precautions and Prohibitions)>

Prohibitions Regarding Industrial Property

- 1) These Specifications contain information related to the ROHM industrial property. Any use of them other than pertaining to the usage of appropriate products is not permitted. Duplication of these Specifications and its disclosure to a third party without the Company's permission is prohibited.
- 2) Information and data on products, including application examples, contained in these specifications are simply for reference; the Company does not guarantee any industrial property rights, intellectual property rights, or any other rights of a third party regarding this information or data. Accordingly, the Company does not bear any responsibility for:
 - [a] infringement of the intellectual property rights of a third party
 - [b] any problems incurred by the use of the products listed herein.
- 3) The Company prohibits the purchaser of its products to exercise or use the intellectual property rights, industrial property rights, or any other rights that either belong to or are controlled by the Company, other than the right to use, sell, or dispose of the products.

Other Matters

- 1) Please sign these Specifications and return one copy to the Company.
If a copy is not returned within three months after the issued date specified on the front page of these Specifications, the Company will consider the Specifications accepted.
- 2) If any matter related to these Specifications needs to be clarified, discussions shall be held promptly between the two parties concerned to determine the issue.

1. STRUCTURE

P.C.BOARD ASSEMBLY

2. PRODUCTS

HYBRID INTEGRATED CIRCUIT

3. TYPE

BP3591

4. APPLICATION

COMMUNICATION APPLIANCE

5. FUNCTION

WIRELESS LAN COMMUNICATION

6. ABSOLUTE MAXIMUM RATINGS

NO	PARAMETER	SYMBOL	LIMITS	UNIT	REMARKS
1	Supply Voltage	VDD	-0.3 ~ +3.6	V	DC
2	Operating temperature range	Topr	-40 ~ 85		
3	Storage temperature range	Tstg	-40 ~ 85		

Note) These are the values that must not be exceeded at any time under any application or any test conditions.
Please make design keeping enough margins accordingly.

7. RECOMMENDED OPERATING CONDITIONS

NO	PARAMETER	SYMBOL	SPEC			UNIT	REMARKS
			MIN.	TYP.	MAX.		
1	Supply Voltage	VCC	3.1	3.3	3.5	V	
2	Using temperature range	Ta	-40	25	85		

8. PRINCIPAL PERFORMANCE

NO.	PARAMETER	CHARACTERISTICS
1	Frequency Width	2,400MHz ~ 2,497MHz (ch1 ~ ch13,ch14)
2	Frequency Deviation	WITHIN ±25ppm
3	Sender Output Voltage*	IEEE802.11b : 15dBm±2dB IEEE802.11g : 13dBm±2dB IEEE802.11n : 12dBm±2dB
4	Corresponding Rate	IEEE802.11b : 1 ~ 11Mbps IEEE802.11g : 6 ~ 54Mbps IEEE802.11n : 6.5 ~ 72.2Mbps
5	Receiving Sensitivity*	IEEE802.11b : -94dBm @1Mbps, -87dBm @11Mbps IEEE802.11g : -92dBm @6Mbps, -71dBm @54Mbps IEEE802.11n : -90dBm @6.5Mbps, -68dBm @72.2Mbps
6	Security Function	64bit/128bit WEP, TKIP, AES
7	Host Interface	USB2.0, SDIO (INCLUDING SPI MODE), UART
8	SUPPLY VOLTAGE	SINGLE 3.3V

*sending output power and receiving sensitivity is performance that is in the end of coaxial connector.

9. BLOCK DIAGRAM

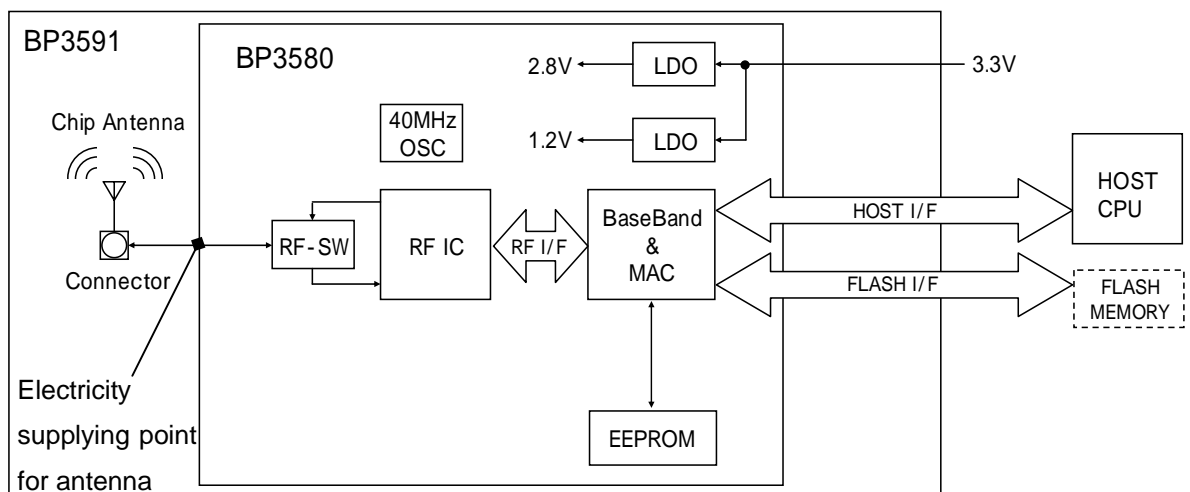


Fig 1. Block diagram

- A Flash memory (option) is necessary for use the flash boot function.
- There is a switch type coaxial connector (MS-156C made by Hirose electric Co., Ltd.) between BP3580 and chip antenna. Please connect an external antenna to this connector if it is necessary. (The chip antenna cannot use when an external antenna is used.)

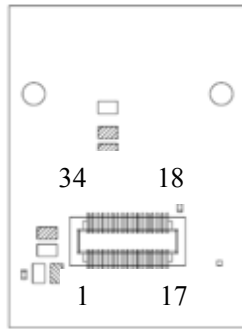
10. ELECTRICAL CHARACTERISTICS

CONDITIONS : Ta=25 , VCC=3.3V, GND=0.0V

PARAMETER	CONDITION	SPEC			UNIT	REMARKS
		MIN.	TYP.	MAX.		
Consumption Current	Send	-	300	-	mA	Continuous
		-	340	-	mA	Continuous (With USB)
	Receive	-	200	-	mA	
		-	240	-	mA	With USB
	Sleep	-	300	-	uA	
Center Frequency	-	2412	-	2484	MHz	
Frequency Deviation	-	-25	-	25	ppm	
Sending Power	11b : 11Mbps	13	15	17	dBm	At electricity supplying point for antenna
	11g : 54Mbps	11	13	15	dBm	At electricity supplying point for antenna
	11n : MCS7	10	12	14	dBm	At electricity supplying point for antenna
Unnecessary Radius Out of Width	-	-	-	2.5	uW/MHz	
Spectrum Mask	DSSS 11Mbps	-	-	-30	dBr	1 st Side-lobe
		-	-	-50	dBr	2 nd Side-lobe
	OFDM 54Mbps	-	-	-20	dBr	±11MHz
		-	-	-28	dBr	±20MHz
		-	-	-40	dBr	±30MHz
Receiving Sensitivity	11b : 11Mbps	-	-87	-74	dBm	PER<8% At electricity supplying point for antenna
	11g : 54Mbps		-71	-65	dBm	PER<10% At electricity supplying point for antenna
	11n : MCS7	-	-68	-64	dBm	PER<10% At electricity supplying point for antenna
Unnecessary Radius Out of Receiving	Fr<1GHz	-	-	4	nW	
	Fr 1GHz	-	-	20	nW	

11. TERMINAL FUNCTIONS

Back side



BP3591 Connector (Socket) Type

: AXK5F34347YG (Made by Panasonic Electric Works)

User-side Connector (header) Type

: AXK6F34347YG (Made by Panasonic Electric Works)

Table 1. Module Terminal Functions

NO.	TERMINAL NAME	I/O	FUNCTIONS	REMARKS
1	SDDATA1	I/O	SDIO DATA 1	GPIO11 or UART RTS
2	SDDATA0	I/O	SDIO DATA 0	GPIO10 or UART CTS
3	GND	-	GND	
4	GND	-	GND	
5	USB_DM	AI/O	USB DATA MINUS	
6	USB_DP	AI/O	USB DATA PLUS	
7	SDCLK	I	SDIO CLOCK	
8	VCC	I	POWER SUPPLY, 3.3V	MODULE POWER SUPPLY
9	NC	-	NOT USED	OPEN
10	SDCMD	I/O	SDIO COMMAND	GPIO9 or UART_DCD
11	SDDATA3	I/O	SDIO DATA3	GPIO13 or UART_DTR
12	SDDATA2	I/O	SDIO DATA2	GPIO12 or UART_DSR
13	UART_RXD	I	UART RECEIVING DATA	
14	UART_TXD	O	UART SENDING DATA	
15	BOOT_SEL1	I	ACTIVATION MODE CHOICE	BOOT_SEL [1:0]
16	BOOT_SEL0	I		00:USB, 01:SDIO, 10:FLASH, 11:UART
17	HOST_SEL	I	HOST I/F CHOICE	0:USB, 1:SDIO
18	FLASH_RXD	I	FLASH MEMORY RECEIVER DATA	TERMINAL FOR FLASH BOOT
19	FLASH_CSB	O	FLASH MEMORY CHOICE	TERMINAL FOR FLASH BOOT
20	FLASH_CLK	O	FLASH MEMORY CLOCK	TERMINAL FOR FLASH BOOT
21	FLASH_TXD	I/O	FLASH MEMOLY SENDING DATA	TERMINAL FOR FLASH BOOT
22	FLASH_SEL	I	FLASH AREA CHOICE	0:AREA0, 1:AREA1
23	GPIO0	I/O	MAINFLAME INPUT/OUTPUT 0	
24	GPIO1	I/O	MAINFLAME INPUT/OUTPUT 1	
25	M_ANA	AI/O	ANALOGUE MONITOR TERMINAL	TERMINAL FOR DEBUG
26	GPIO2	I/O	MAINFLAME INPUT/OUTPUT 2	
27	GPIO6	I/O	MAINFLAME INPUT/OUTPUT 6	
28	HRST	I	HOST RECET	0:RESET, 1:NORMAL
29	PRST	I	POWER ON RESET	0:RESET, 1:NORMAL
30	TMS	I	ARM JTAG TMS	FOR DEBUG
31	TCK	I	ARM JTAG TCK	FOR DEBUG
32	TDI	I	ARM JTAG TDI	FOR DEBUG
33	TDO	O	ARM JTAG TDO	FOR DEBUG
34	TRSTB	I	ARM JTAG TRSTB	FOR DEBUG

FLASH_SEL/HOST_SEL/BOOT_SEL0/BOOT_SEL1/ terminal hold the value when releasing the POWER ON RESET.

After releasing the POWER ON RESET, these terminals are used for another purpose in the module.

They have pull down resistance inside. Therefore, please pull up the voltage OPEN in case of setting for “0” and 3.3V(power supply voltage) with 3-5kΩ in case of setting for “1”

PRST terminal is POWER ON RESET terminal. It is connected 4.7kΩ+2.2uF for 3.3V inside the module. In case that need to watch the power supply voltage, please connect such as OPEN DRAIN RESET IC for this terminal.

Please OPEN the other terminal which is not used.

12. DIMENSIONS

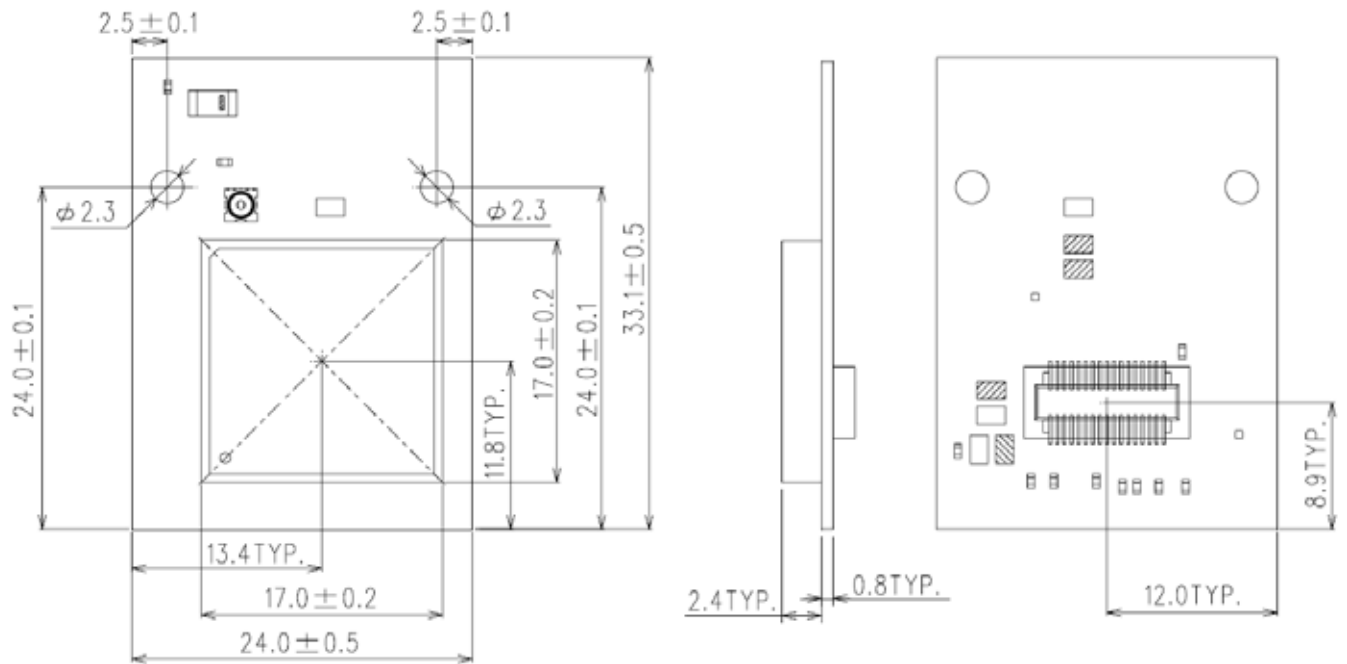


Fig.2 Dimensions (Unit: mm)

13. PRECAUTIONS FOR MOUNTING

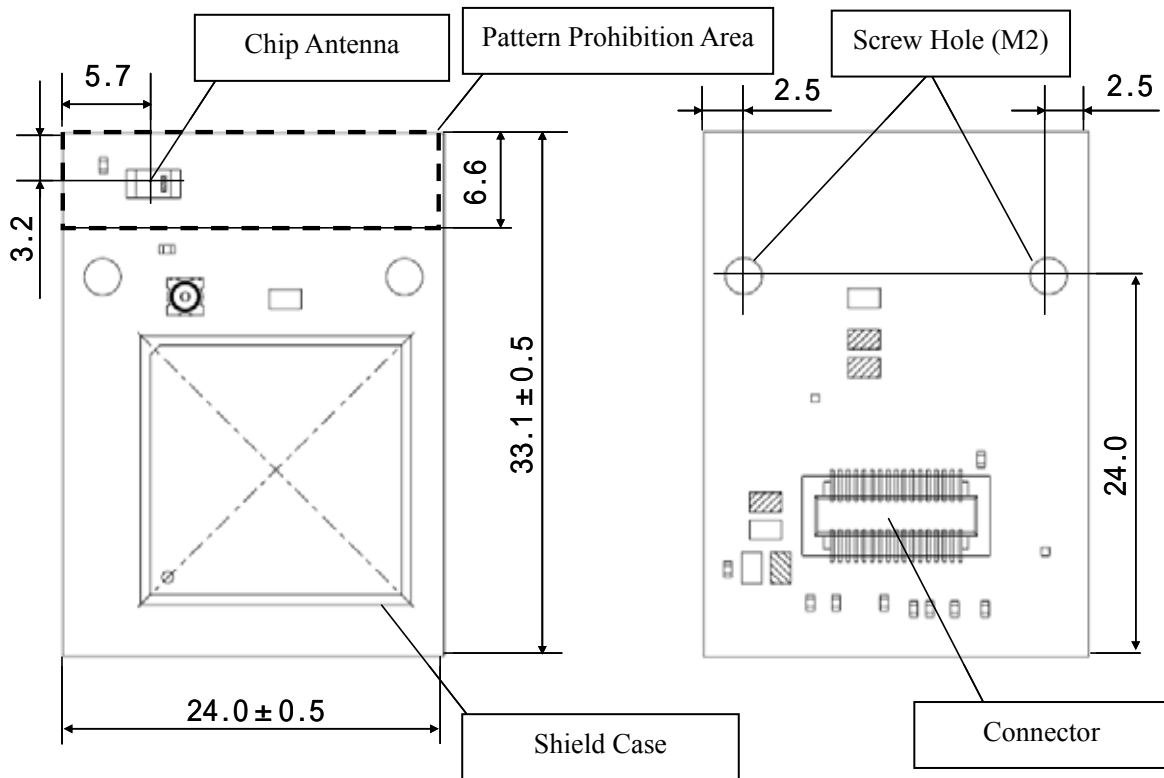


Fig.3 Precautions for Mounting

- (1) Please don't patterning the area under pattern prohibition area so that there is an adverse effect in a wireless characteristic.
- (2) Please do not set substrates except that will connect with the module or chassis within 1cm around of the chip antenna if possible.
- (3) Please do not use metals for a chassis setting this module.
- (4) Please do not mount parts except a specified connector under this module.

ABOUT THE FIXATION OF THE MODULE

Please use the M2 screw (metal-made). Please put a spacer (metal-made) of 1.5mm between your substrate and this module.

For more stable wireless characteristics, it is recommended that the M2 screw and the GND of user-side PCB become short circuit.

14. PRODUCTS LABEL SPEC

Below is a sample of the label at the front side of the product shield case.

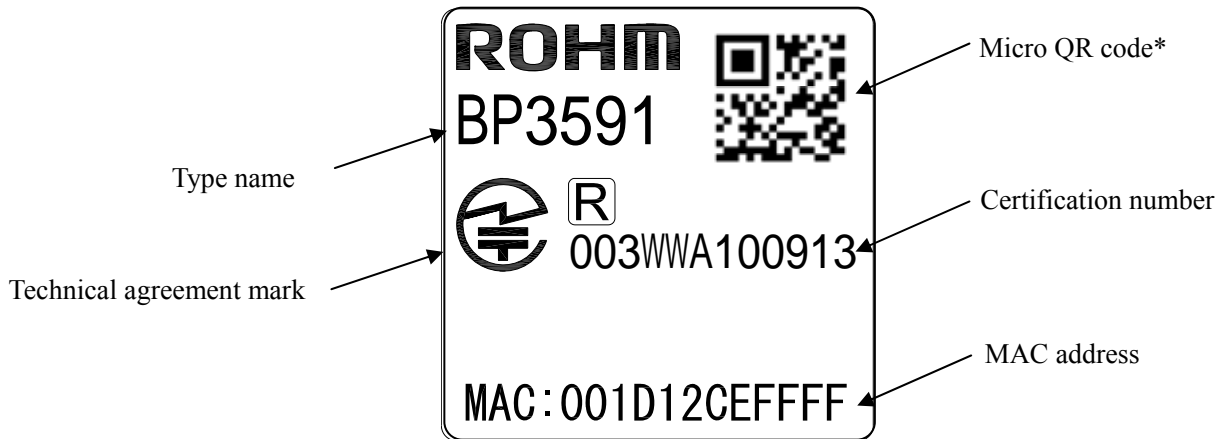


Fig.4 Products Label Spec

*Micro QR code has a product MAC address as information. Note)
The design of product label might change without previous notice.

15. REFERENCE CIRCUIT

15.1 USB HOST INTERFACE

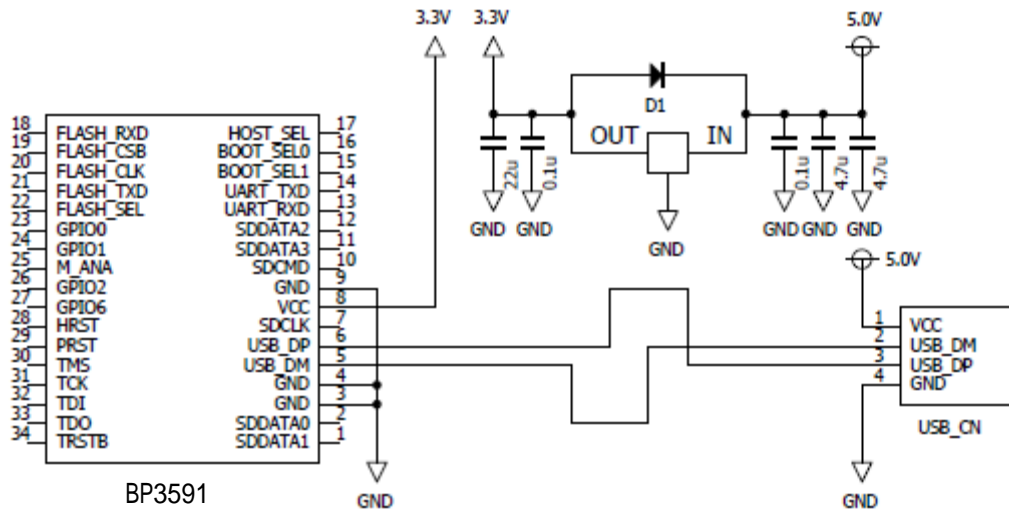


Fig.5 USB Host Interface Reference Circuit

15.2 SDIO HOST INTERFACE

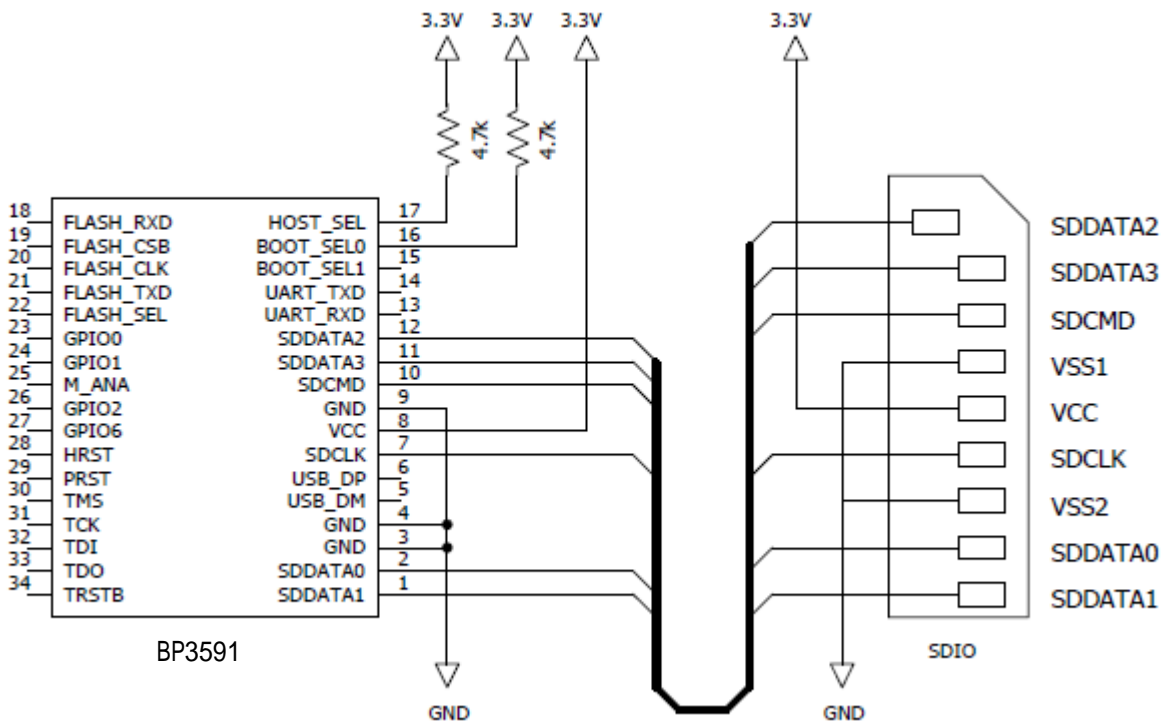


Fig.6 SDIO Host Interface Reference Circuit

15.3 UART INTERFACE

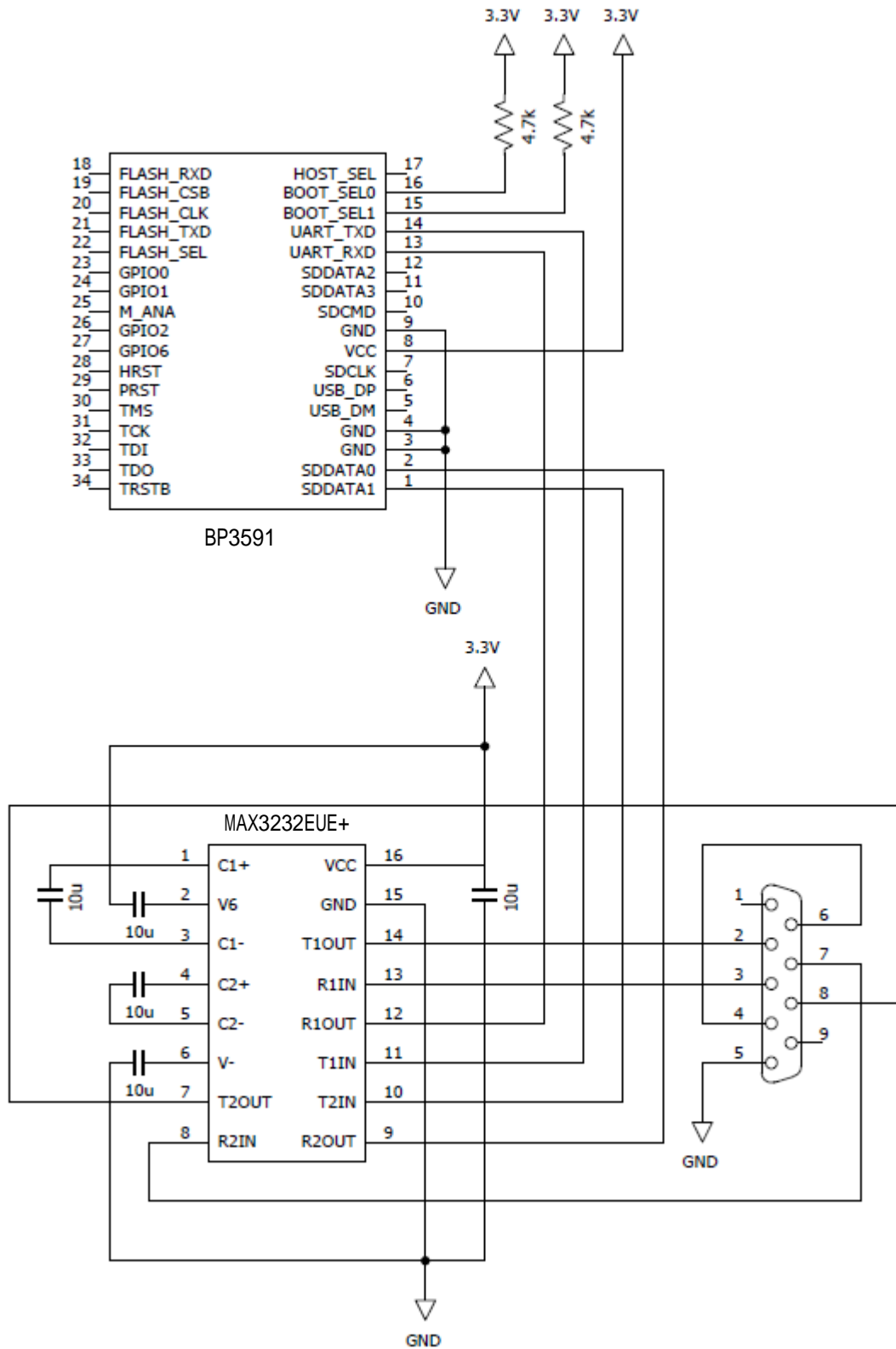


Fig.7 UART Interface Reference Circuit

15.4 FLASH MEMORY STARTING MODE

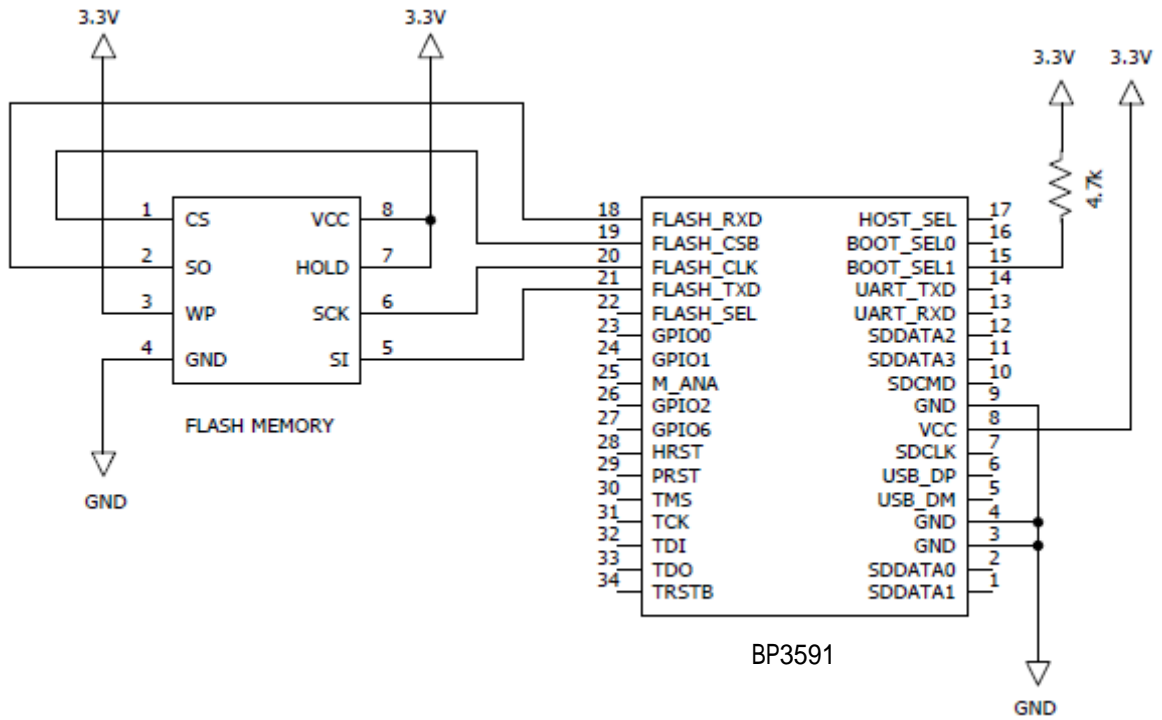


Fig.8 Flash Boot Reference Circuit

16. PACKING SPEC

16.1 Packing Method

In principle, 20 pieces of modules should be packaged in the packaging tray, and it should be piled up 5 steps to make 100 pieces, and with an empty pack on the top.
The number of piling might change according to the quantity of delivery without previous notice.

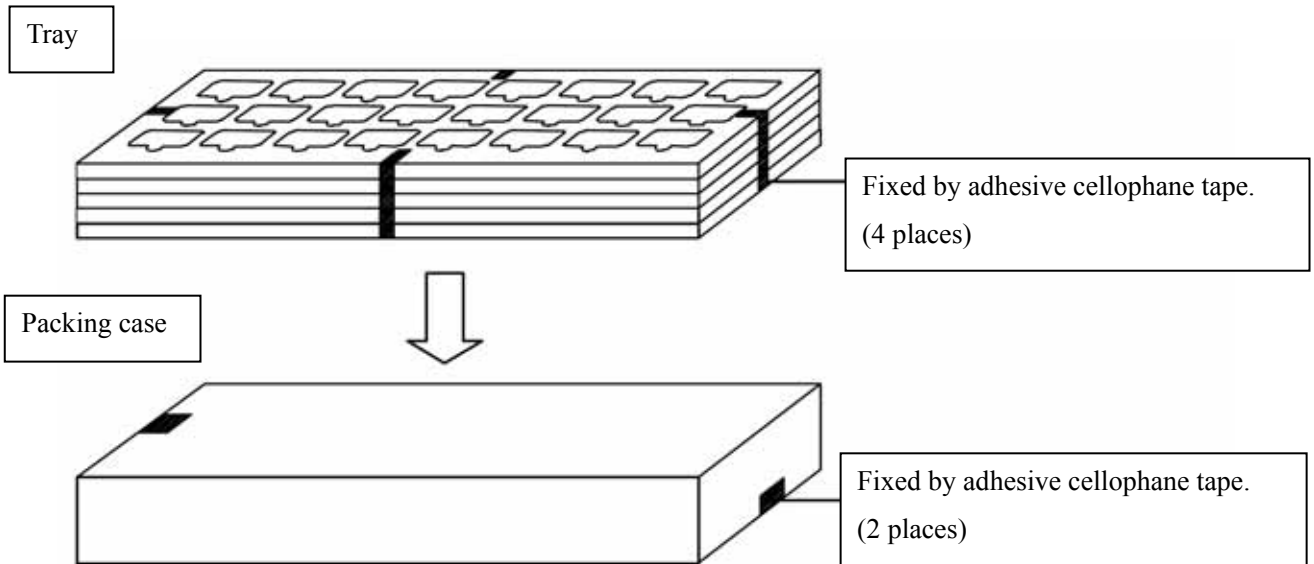


Fig.9 Packing Method

16.2 Label indication

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

- Type name (BP3591)
- Quantity
- Lot No.
- Shipment inspection stamp
- Country of origin
- Manufacturing company name (Trade mark)
- Logotype of lead free

Please refer to the following example of the label indication.



Fig.10 Label Indication

17. MANUFACTURING FACTORY

ROHM ELECTRONICS DALIAN CO., LTD. (CHINA)

18. OPERATING PRECAUTIONS

- 1) There is some case that the MAC address does not become sequential number in a same package.
- 2) About soldering parts of mounting on this product, presence of soldering fillet does not be asked.
- 3) About the products label, deflections does not be asked except coming off, lapping, or not to recognize the characters extremely.
- 4) A connector is possible to break by excessive swing or shock because of the structure of the product.
Efficient evaluation is necessary to use the module when there is a fear of swinging or shocking.
- 5) The connector of BP3591 does not have a specification assumed to do many times of extraction and insertion.
Please be sure that the frequency of extraction and insertion is within 10 times.
- 6) There are some cases that the spring elasticity of inside the connector is lost and built-in antenna cannot be used, if it connects an external antenna with the coaxial connector of BP3591 (external antenna connector) for a long time.
Please do not use external antenna together with built-in antenna.

19. PRECAUTIONS AS A WIRELESS EQUIPMENT

BP3591 acquired "Construction design attestation" (Article 38-24, Clause1 of Radio Law) of "Particular wireless equipment: Low power data communications system in the 2.4GHz band, which is a Wireless equipment in Article 2-1(19)"

Therefore, only in Japan, it is possible to use as wireless equipment without applying for wireless office.

· Construction design attestation No. : 003WWA100913

Be sure to keep following notes to use the module safely as wireless equipment.

- 1) The label on the module is a certification which shows it has " Certification of technical standard conformity. "
Please do not tear the label or put another label on it.
- 2) Please do not resolve or remodel strictly because there are some cases of receiving penalty based on Radio Law.
- 3) Please use the antenna of the certification settlement when you use an external antenna.

About a certification settlement antenna

BP3591 has following certification of external antenna.

- AA2402A-MS156CLP (Made by Antenna Technology Inc.)
- AA2402AU-MS156CLP (Made by Antenna Technology Inc.)

Please ask separately about attested external antennas other than the above.