ZETA wireless communication module
TZM902DP
Instruction manual

The 1.1 version

Toppan Printing Co., Ltd.

Update history

Update date	Classification	Description	Version
2021/5/12	First edition	Newly issued	1.0
2021/10/26	Revised	3.5 Terminal arrangement 31Pin Added STATUS Modified the descriptions of some terminals 7.2 Reel Updated reel dimensional drawing	1.1

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1. Summary

ZETA is an IoT network technology based on the concept of LPWAN (Low Power Wide Area Network) that supports a wide range and low power consumption. Ultra Narrow Band (UNB) mesh network enables distributed access over a wide area and bidirectional communication. TZM902DP adopts the ZETA-P protocol and is suitable mainly for local area network applications with low latency and low traffic.

1.1. Feature

- Ultra Narrow Band (UNB)
- Wide area distributed access by mesh network
- Bidirectional communication
- Low power consumption
- Long distance communication
- High sensitivity
- Low latency
- UART interface mounted

1.2. Applications

- Smart office solution
- Building maintenance solution
- Environmental monitoring system for farm/culture farm management, etc.

2. Precautions

2.1. Before using this product

- Please read "Safety Precautions" in this manual before using this product.
- Please note in advance that Toppan shall not be responsible for any damage caused by the use or inability to use this product.
- To export this product or any product in which this product is incorporated, please be sure to take necessary procedures by confirming the relevant regulations and rules, such as Foreign Exchange and Foreign Trade Act.

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Please read "Safety Precautions" carefully before use to ensure correct use. Please be sure to follow the precautions given here as they are intended to prevent harm to the user, other people, and damage to property.

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⚠Caution	• Do not disassemble or modify this product. • Do not allow foreign matters such as metal to get inside this product. It may cause an accident, fire or electric shock. • If you feel any abnormality such as heat generation or offensive odor, please discontinue use and do not use the product if it is damaged. • Use the power supply voltage within the specified range. It may cause a malfunction. • Do not use, store or leave the product in a place with high temperature, high humidity or direct sunlight for a long time. • Do not subject it to strong impact or vibration such as dropping. It may cause a malfunction. • This product uses parts that are sensitive to static electricity. Please handle with care. • Keep out of reach of children.

2.3. Precautions for use

- This product is for general consumer use, and should not be used for applications that require high reliability and safety, such as automotive equipment, aerospace equipment, nuclear control equipment, or life-sustaining medical equipment.
- Please note that Toppan is not responsible for any malfunction caused by using the product under conditions other than those described in this manual.
- Please note that Toppan is not responsible for any problems related to rights such as intellectual property rights of third parties due to the use of this product.
- This product is not designed to be radiation resistant. Do not use under radiation stress.
- Please note that Toppan cannot guarantee the functions and characteristics that depend on the customer's firmware.
- Please note that this product may be affected by other wireless communication devices.
- Do not use near wireless devices, electromagnetic cookers, etc.
- This product is an electronic device that transmits radio waves. Do not use near medical equipment (including pacemakers, etc.), its surroundings, or in airplanes.
- This is wireless equipment that has gained a technical regulation conformity certification with a combination of a specific antenna. Please display the following certification mark on a system on which this product is mounted.

- The information such as application circuit examples and their constants described in this manual is for explaining the standard operation and usage of this product, and does not guarantee the operation with the equipment actually used. Therefore, when using circuits, their constants, and related information in the design of your equipment, consider external conditions and make your own judgment and responsibility.

3. Product outline

3.1. System configuration

An example of a system using this product is shown below. TZM902DP connects directly to the AP (base station) or via Mote (relay device). It uses UART to interface with the user's MCU. UART provides a simple command set for developers

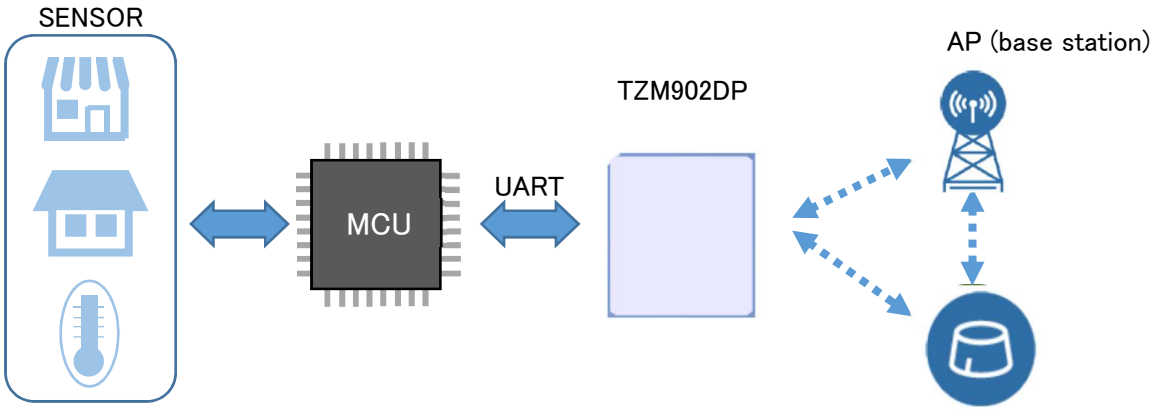


Fig.1 System configuration example

3.2. Each part names

The names of each part of this product are shown in Fig. 2.

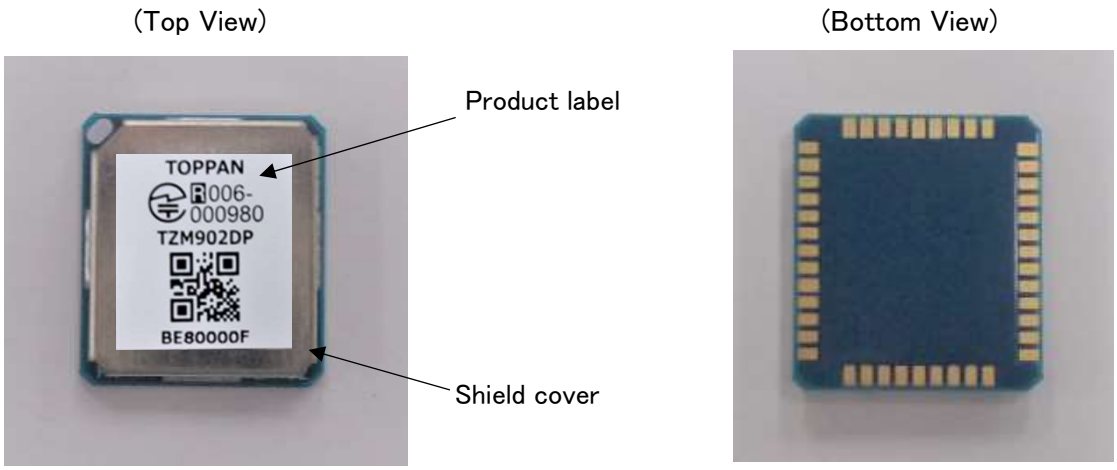
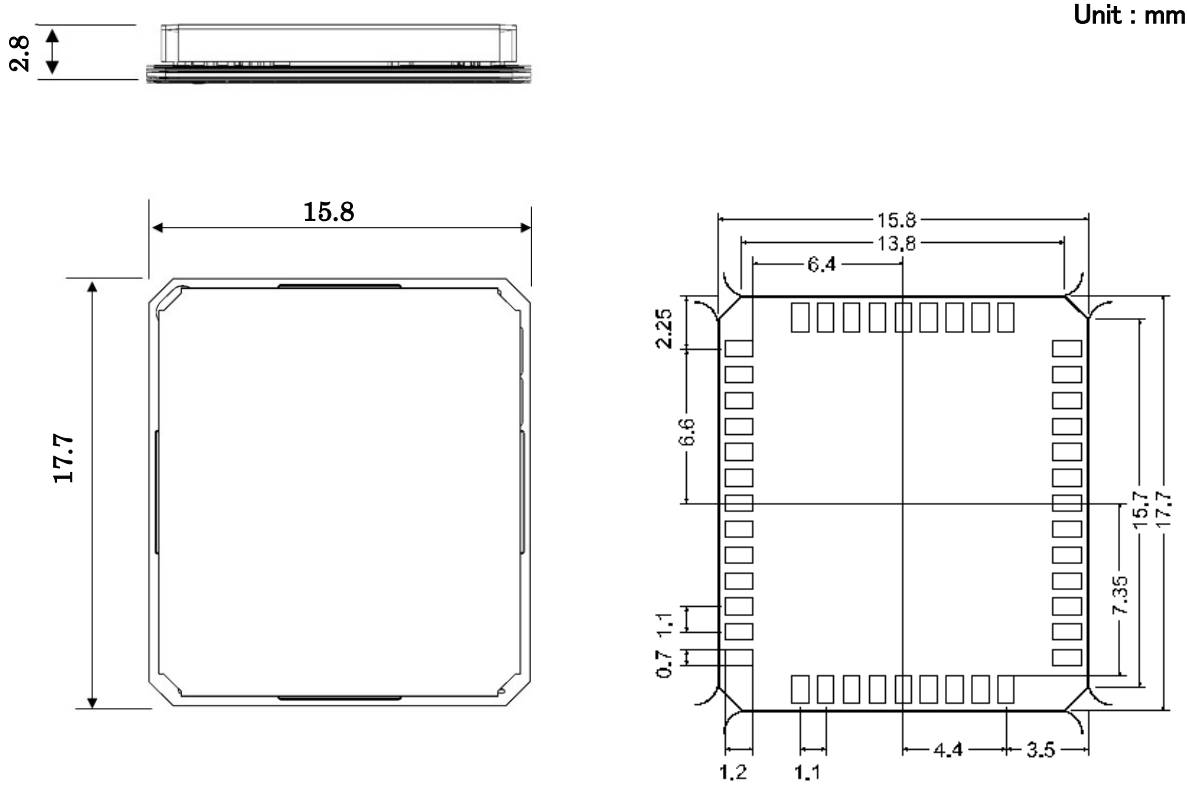


Fig. 2 Names of each part

3.3. Outer dimension

Unit : mm



External dimension tolerance is external dimension (excluding height):±0.3mm, height: 2.8±0.2mm, Pad dimensions:±0.05mm

Fig. 3 Dimensional outline drawing

3.4. Product label

The product label is affixed to the shield cover of this product. The QR code represents the device ID.

Fig.4 Product label

3.5. Terminal arrangement

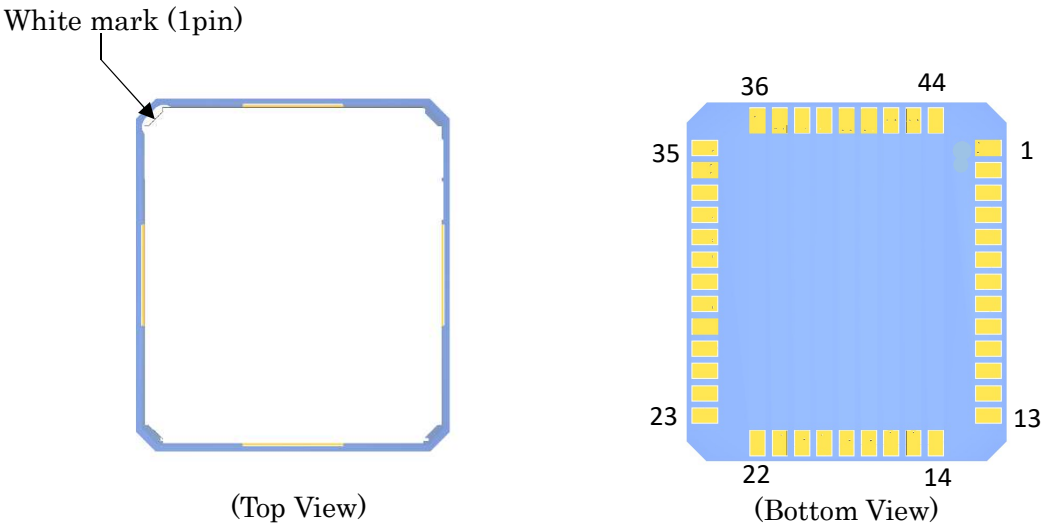


Fig.5 Terminal arrangement

Pin #	Pin name	Category	Description
1	VSS	Ground	Ground
2	Reserved	Digital input/output	Open
3	Reserved	Digital input/output	Open
4	Reserved	Digital input/output	Open
5	Reserved	Digital input/output	Open
6	Reserved	Digital input/output	Open
7	Reserved	Digital input/output	Open
8	Reserved	Digital input/output	Open
9	Reserved	Digital input/output	Open
10	Reserved	Digital input/output	Open
11	Reserved	Digital input/output	Open
12	Reserved	Digital input/output	Open
13	Reserved	Digital input/output	Open
14	Reserved	Digital input/output	Open
15	RESETn	Input	Active Low
16	GPIO1	Digital input/output	Open
17	US0_RX	Digital input	UART RX
18	US0_TX	Digital output	UART TX
19	SWCLK	Digital input	Rewrite terminal
20	INT	Digital output	High at downlink reception
21	SWDIO	Digital input/output	Rewrite terminal
22	Reserved	Digital input/output	Open
23	Reserved	Digital input/output	Open
24	Reserved	Digital input/output	Open
25	Reserved	Digital input/output	Open
26	Reserved	Digital input/output	Open
27	VSS	Ground	Ground
28	GPIO2	Digital input/output	Open

29	Reserved	Digital input/output	Open
30	GPIO	Digital input/output	Open
31	STATUS	Digital output	Open
32	WAKEUP	Digital input	Active Low
33	Reserved	Digital input/output	Open
34	VSS	Ground	Ground
35	ANT	Antenna	50 ohms
36	VSS	Ground	Ground
37	VSS	Ground	Ground
38	US1_RX	Digital input	*Used at testing
39	US1_TX	Digital output	*Used at testing
40	VSS	Ground	Ground
41	VSS	Ground	Ground
42	VCC	Power source	Power source
43	VCC	Power source	Power source
44	Reserved	Digital input/output	Open

4. Motion control

This product is ready for communication when the connection to the AP (base station) or Mote (relay device) is completed. Communication is controlled by the UART interface from the user's MCU. Fig.6 shows an image of the connection between this product and the MCU.

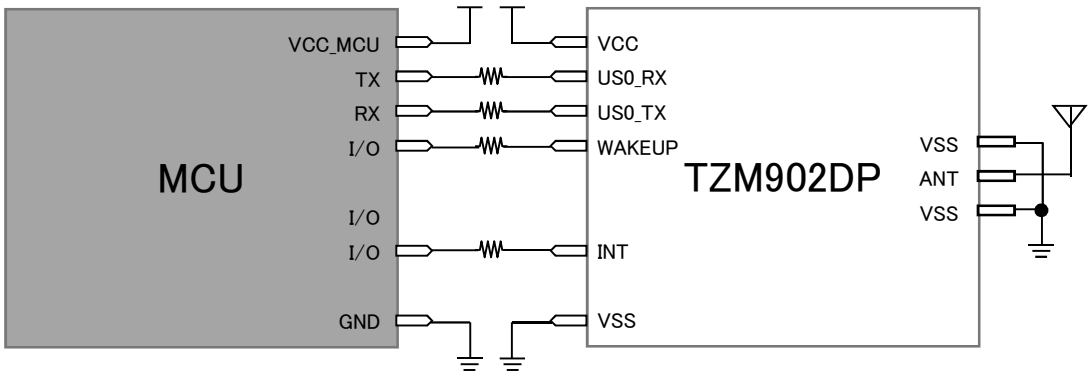


Fig.6 Connection image with MCU

The precautions when connecting this product to the user circuit are shown below.

- Add power supply, bypass capacitor, and protection circuit according to the application.
- Pay attention to the layout of this product and how to connect the power supply/GND to ensure the communication characteristics.
- Be careful of operation outside the operating power supply voltage range as it may cause malfunction or failure.

4.1. Data format

The data format of UART is shown below.

Baud rate [bps]	Start bit [bit]	Data bit [bit]	Stop bit [bit]	Parity bit [bit]	Flow control
115200	1(L)	8	1(H)	None	None

4.2. CRC function

UART communication of this product uses CRC data. Referring to the program below, perform UART communication by adding 2 bytes of CRC data to the end of the data. The data targeted for CRC is Length, Type, and Payload that does not include Preamble.

<Send data example>

FA F5 08 01 11 22 33 44 55 F5 8D /*Send 5 bytes of data*/

Preamble Length, Type Payload CRC

< Reference program >

```
#define CRC16_POLY          0x1021
/*
 * @brief algorithm parameters :
 *          width 16
 *          poly 0x1021
 *          init 0x0000
 *          xorout   0x0000
 *          refin disable
 *          refout disable
 */
uint16 Crc16_CCITT_Xmodem(uint8 *pmsg, uint16 msg_size)
{
    uint16 i = 0, j = 0;
    uint16 msg = 0;
    uint16 crc = 0x0000;

    for(i = 0 ; i < msg_size ; i ++)
    {
        msg = *pmsg;
        msg <<= 8;
        pmsg++;
        //msg= (*pmsg++ << 8);

        for(j = 0 ; j < 8 ; j++)
        {
            if((msg ^ crc) >> 15)
            {
                //crc = (crc << 1) ^ CRC16_POLY;
                crc <<= 1;
                crc ^= CRC16_POLY;
            }
            else
                crc <<= 1;
            msg <<= 1;
        }
    }

    reply(crc);
}
```

4.3. Uplink (MCU→This product)

This product starts by receiving the WAKE UP signal transmitted from the MCU and receives data.
After switching from WAKEUP = H to L, please send data 10ms or more later.
Data reception is completed at the stop bit of the final data.

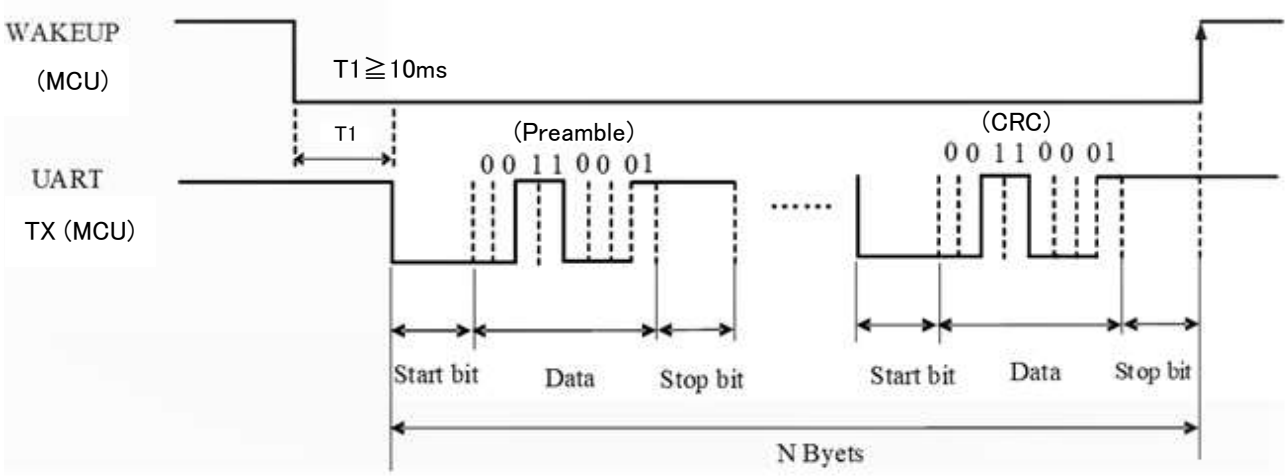


Fig.7 Example of uplink signal

4.4. Downlink (This product→MCU)

When downlink data is received from AP (base station) or Mote (relay device), this product sets the INT signal to High and sends the data to the MCU after 50msec. When the stop bit is transmitted, the INT signal becomes Low. There are two types of downlinks, real-time downlinks and ACK downlinks, and the default is set to ACK downlinks. Switching is done from the ZETA server.

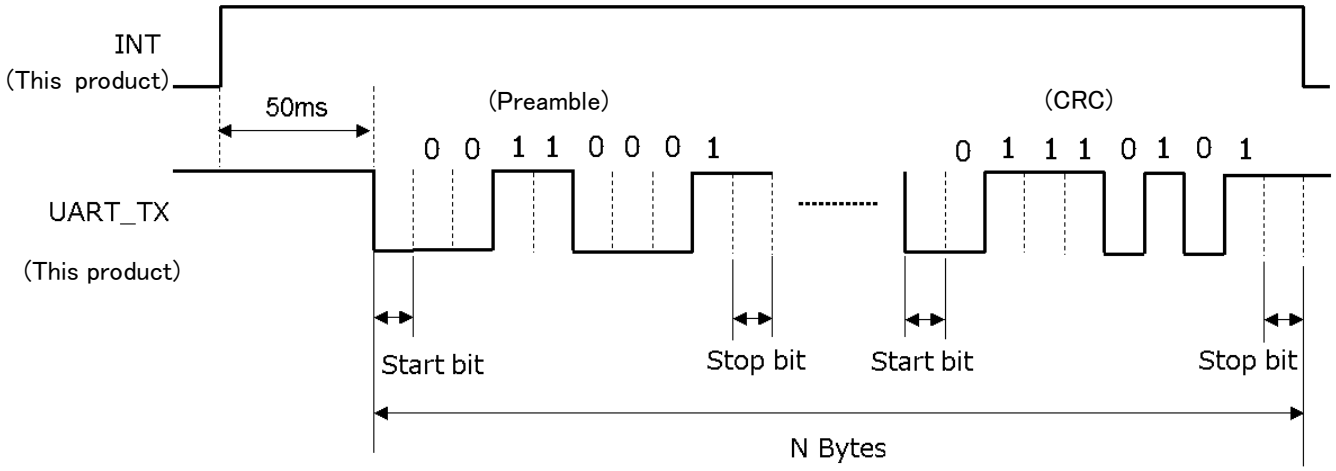


Fig.8 Downlink signal example

4.5. UART interface

The command set is indicated, provided on the UART interface.

MCU→This product

User's MCU to TZM902DP UART Frame						
Frame Type		Preamble	Length	Type	Payload	CRC
Send	Variable Length data	0xFAF5	0x03+n	0x01	n ≦ 50byte	CRC16[2]
Inquire	Version	0xFAF5	0x03	0x00	None	55 53
	MAC	0xFAF5	0x03	0x10	None	47 62
	Network Time	0xFAF5	0x03	0x11	None	57 43
	Network Quality	0xFAF5	0x03	0x13	None	77 01
	Module Status	0xFAF5	0x03	0x14	None	07 E6
Set	Test mode	0xFAF5	0x04	0x22	0x00 : Normal Mode 0x01 : Test Mode	Normal : BC 44 Test : AC 65

This product→MCU

TZM902DP to User's MCU UART Frame						
Frame Type		Preamble	Length	Type	Payload	CRC
Receive	Data Frame's ACK	0xFAF5	0x03	0x01	None	45 72
	Buffer Full	0xFAF5	0x03	0x02	None	75 11
	Length Error	0xFAF5	0x03	0x03	None	65 30
	CRC Error	0xFAF5	0x03	0x04	None	15 D7
Inquire Answer	Version	0xFAF5	0x07	0x00	Version[4]	CRC16[2]
	MAC	0xFAF5	0x07	0x10	mac[4]	CRC16[2]
	Time	0xFAF5	0x0A	0x11	time[7]	CRC16[2]
	Network Quality	0xFAF5	0x04	0x13	RSSI	CRC16[2]
Command's ACK	Set Succeed	0xFAF5	0x03	0x20	None	71 31
	Set Failed	0xFAF5	0x03	0x21	None	61 10
Wakeup Reason	Downlink Data	0xFAF5	0x03+n	0x30	n ≦ 50byte	CRC16[2]
Module Status	Unregistered	0xFAF5	0x03	0x43	None	2D F4
	Registered	0xFAF5	0x03	0x44	None	5D 13
	Long Sleep	0xFAF5	0x05	0x45	Remaining Sleep Time[2]	CRC16[2]
	Short Sleep	0xFAF5	0x05	0x46	Remaining Sleep Time[2]	CRC16[2]

Notes:

1. "Preamble" represents the start of one frame of data.
2. "Length" represents the data length of Type, + Payload + CRC.
3. [4] of "Version [4]" indicates that the data length representing Version is 4 bytes.

4.6. Command setting example

An example of setting the UART command is shown below.

4.6.1. Send Variable Length Data

This is a data transmission command.
This product can send data from 1 byte to 50 bytes, and the command changes depending on the data length.
In the example below, 5 bytes are being sent.

SEND----------
FA F5 08 01 11 22 33 44 55 F5 8D / *11 22 33 44 55 is 5 bytes of send data* /
RECEIVE ----------
FA F5 03 01 45 72 /* Successful data transmission */
FA F5 03 02 75 11 /* Buffer full; transmission failed */
FA F5 03 03 65 30 /* Data length error */

4.6.2. Inquire Version

This command gets the protocol type and version.

SEND----------
FA F5 03 00 55 53 / *Get version information* /
RECEIVE ----------
FA F5 07 00 XX YY 01 02 ZZ ZZ /* XX YY shows the protocol version*/
/* CRC data is added to ZZ ZZ */

4.6.3. Inquire MAC

This command gets a MAC address. It has a unique 4-byte MAC address.

SEND----------
FA F5 03 10 47 62 /* Get MAC address */
RECEIVE ----------
FA F5 07 10 XX XX XX XX YY YY
/ * XX XX XX XX shows the MAC address of each module * /
/ * CRC data is added to YY YY * /

4.6.4. Inquire Network Time

This command acquires the standard time of APs (base stations) on the network, which gets the standard time with 7 bytes of data.

SEND----------
FA F5 03 11 57 43 /* Get time */
RECEIVE ----------
FA F5 0A 11 07 E5 06 0F 10 1E 00 3E F6 / * 07 E0 0A 0F 10 1E 00 is standard time * /

Get 7 bytes of time:
[07E5] Year [06] Month [0F] Day [10] Hour [1E] Minute [00] Second
16:30:00, June 15, 2021

4.6.5. Inquire Network Quality

Signal strength: A command to acquire RSSI (Received signal strength indicator).
In the example, the signal strength is RSSI = −72dBm.

SEND----------
FA F5 03 13 77 01 /* RSSI confirmation */
RECEIVE ----------
FA F5 04 13 48 43 2C /* 48 is RSSI */

4.6.6. Inquire Module Status

This command confirms the status of the communication module.

SEND----------
FA F5 03 14 07 E6 /* module Status confirmation */
RECEIVE ----------
FA F5 03 43 2D F4 /* 43 indicates the status of communication unconnected (unregistered)*/
FA F5 03 44 5D 13 /* 44 indicates the status of communication completed (registered)*/
FA F5 05 45 XX XX YY YY
/* 45 indicates the Long Sleep state, and Sleep remaining time is XX XX [minutes]*/
/* CRC data is added to YY YY*/
FA F5 05 46 XX XX YY YY
/* 46 indicates the Short Sleep state, and the remaining sleep time is XX XX [seconds].*/
/* CRC data is added to YY YY */

4.6.7. Set Test mode

A command that shortens the heartbeat packet interval for communication testing. Sends heartbeat packets at set intervals. The default is set to 6 hours.

SEND----------

FA F5 04 22 00 BC 44 /* Set heartbeat interval to 6 hours */

RECEIVE ----------

FF F5 03 20 71 31 /* Setting successful */

FF F5 03 21 61 10 /* Setting failure */

SEND----------

FA F5 04 22 01 AC 65 /* Set heartbeat interval to 10 seconds */

RECEIVE ----------

FF F5 03 20 71 31 /* Setting successful */

FF F5 03 21 61 10 /* Setting failure */

4.6.8. Receive Data Frame's Ack

This product will reply when the data from the MCU is successfully received.

SEND----------

FA F5 08 01 11 22 33 44 55 F5 8D / *11 22 33 44 55 is 5 bytes of transmission data* /

RECEIVE ----------

FA F5 03 01 45 72 /* Successful data transmission */

4.6.9. Receive Buffer Full

This product will reply when the data received from the MCU exceeds the upper limit of the buffer.

SEND----------

FF 00 35 02 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F 30 31 BE C6

/*01 to 31 are send data. Repeatedly execute transmission*/

RECEIVE ----------

FA F5 03 02 75 11 /* The buffer is over the limit*/

4.6.10. Receive Length Error

For the data received from the MCU, this product will reply when the specified value of the data length and the actual received data length do not match. In the example, the received data length is 6 bytes for the payload data length specification of 5 bytes.

SEND----------
FA F5 08 01 01 02 03 04 05 06 7F B7 /* 01 to 06 are send data */
RECEIVE ----------
FA F5 03 03 65 30 /* Data length error */

4.6.11. CRC Error

The data received from the MCU will be sent from this product if an error occurs in CRC.

SEND----------
FA F5 09 01 01 02 03 04 05 06 38 64 /* 01～06 are send data */
RECEIVE ----------
FA F5 03 04 15 D7 /* CRC error */

4.6.12. Inquire Answer Version

This product will reply when a command to acquire version information is received from the MCU.

SEND----------
FA F5 03 00 55 53 / *Get version information* /
RECEIVE ----------
FA F5 07 00 XX YY 01 02 ZZ ZZ /* XX YY shows the protocol version*/
/* CRC data is added to ZZ ZZ */

4.6.13. Inquire Answer MAC

This product will reply when a command to acquire the MAC address is received from the MCU.

SEND----------
FA F5 03 10 47 62 /* Get MAC address */
RECEIVE ----------
FA F5 07 10 XX XX XX XX YY YY
/* XX XX XX XX shows the MAC address of each module */
/* CRC data is added to YY YY */

4.6.14. Inquire Answer Time

This product will reply when a command to acquire the standard time of the AP (base station) on the network is received from the MCU. You can check the standard time with 7 bytes of data.

SEND----------
FA F5 03 11 57 43 /* Get time */
RECEIVE ----------
FA F5 0A 11 07 E5 06 0F 10 1E 00 3E F6 /* 07 E0 0A 0F 10 1E 00 is standard time */

/* [07E5] Year [06] Month [0F] Day [10] Hour [1E] Minute [00] Second
June 15, 2021 16:30:00 */

4.6.15. Inquire Answer Network Quality

This product will reply when a command to acquire the signal strength is received from the MCU.

SEND----------
FA F5 03 13 77 01 /* RSSI confirmation */
RECEIVE ----------
FA F5 04 13 48 43 2C /* 48 is RSSI */

4.6.16. Command's ACK Set Succeed

A command to set the test mode is received from the MCU, and the product will reply when the setting is successful.

SEND----------
FA F5 04 22 00 BC 44 /* Set heartbeat interval to 6 hours */
RECEIVE ----------
FF F5 03 20 71 31 /* Setting successful */

4.6.17. Command's ACK Set Failed

A command to set the test mode is received from the MCU, and this product will reply when the setting fails.

SEND----------
FA F5 04 22 01 AC 65 /* Set heartbeat interval to 10 seconds */
RECEIVE ----------
FF F5 03 21 61 10 /* Setting failure */

4.6.18. Wakeup Reason Downlink Data

This is the data sent from this product to the MCU when data is received from the AP (base station) or Mote (relay device). In the example below, the downlink data of 01 02 03 04 05 is received.

/* Downlink Data 0102030405 */
RECEIVE ----------
FA F5 08 30 01 02 03 04 05 3E 29 / * 01 02 03 04 05 is downlink data * /

4.6.19. Module Status Unregistered

This product will reply when it receives a message that data transmission is not possible, because the power of the AP (base station) or Mote (relay device) is turned off, etc.

(1)When the AP power is turned off when sending data

SEND----------
FA F5 08 01 11 22 33 44 55 F5 8D / *11 22 33 44 55 is 5 bytes of send data* /
RECEIVE ----------
FA F5 03 43 2D F4 /* Module has not been registered */

(2)If you check the status while the AP power is off

SEND----------
FA F5 03 14 07 E6 /* Module Status check */
RECEIVE ----------
FA F5 03 43 2D F4 /* Module has not been registered*/

4.6.20. Module Status Registered

If you check the status while the module is communicating normally, this product will reply.

SEND----------
FA F5 03 14 07 E6 /* module Status check */
RECEIVE ----------
FA F5 03 44 5D 13 /* Module has been registered*/

4.6.21. Module Status Long Sleep

If you check the status while the module is in the Long Sleep state, this product will reply.

SEND----------

FA F5 03 14 07 E6 /* module Status check */

RECEIVE ----------

FA F5 05 45 XX XX YY YY

/* 45 indicates the Long Sleep state, and Sleep remaining time is XX XX [minutes]*/

/* CRC data is added to YY YY*/

4.6.22. Module Status Short Sleep

If you check the status while the module is in the Short Sleep state, this product will reply.

SEND----------

FA F5 03 14 07 E6 /* module Status check */

RECEIVE ----------

FA F5 05 46 XX XX YY YY

/ * 46 indicates the Short Sleep state, and the remaining Sleep time is XX XX [seconds] * /

/* CRC data is added to YY YY*/

5. Product specification

5.1. Absolute maximum rating

Item	Rating	Unit
Supply Voltage	−0.2～3.8	V

5.2. Recommended operating conditions

No.	Item	Symbol	Standard value			Unit
			min.	std.	max.	
1	Supply voltage	VCC	2.0	3.0	3.3	V
2	GND	VSS	−	0	−	V
3	Operating temperature	−	−20	−	+75	℃
4	Storage temperature	−	−30	−	+85	℃

5.3. Electrical properties

The electrical characteristics of the external I/F of this product are as follows.

No.	Item	Symbol	Measurement condition	Standard value			Unit
				min.	std.	max.	
1	High level output voltage	VOH	IOH=−1.2mA VCC≧2.0V	0.6*VCC	−	−	V
2	Low level output voltage	VOL	IOL=1.2mA VCC≧2.0V	−	−	0.4*VCC	V
3	High level input voltage	VIH		0.7*VCC	−	−	V
4	Low level input voltage	VIL			−	0.3*VCC	V

The communication properties of this product are as follows.

(Supply voltage VCC=3.0V, temp=25℃)

No.	Item	Measurement condition	Standard value			Unit
			min.	std.	max.	
1	Frequency range		920.6	–	928.0	MHz
2	Frequency error		-2	–	+2	ppm
3	Transmission rate		–	0.3	–	kbps
4	Transmission output		–	13	–	dBm
5	Reception sensitivity		–	-130	–	dBm
6	Consumption current in transmission		–	50	60	mA
7	Consumption current in reception		–	20	25	mA
8	Standby current	ACK downlink	–	–	5	uA
		Real-time downlink	–	2.0	2.5	mA

5.4. Security function

The ZETA communication network enhances network security by encrypting data during communication and installing an authentication function and affiliation restriction function (white list) when accessing devices.

5.5. FOTA function

This product has a protocol update function by FOTA (Firmware On The Air).
Please refer to the server setting manual for details.

6. Implementation

6.1. Precautions

The precautions when implementing this product are shown below.

- The Moisture Sensitivity Level of this product is MSL3.
- When storing in the moisture-proof packaging state at the time of shipment from Toppan, store in an environment of 40℃/90%RH or less.
  The storage period is one year from the date of manufacture.
- Control the environmental conditions of the process to 30℃/60% RH or less.
- Immediately after opening, check the humidity indicator to confirm that the environment inside the package is 10%RH or less. If the humidity indicator shows more than 10%RH, please bake.
- Complete all implementing work within 168 hours after opening. If it exceeds 168 hours, please carry out baking.
- The baking condition is 85℃ for 72 hours.
- Reel bobbins are not heat resistant. It cannot be used for baking.
- Please note that mechanical vibration, dropping, impact, etc. may damage the product.
- When handling this product, use a wrist strap, electrostatic shoes, ionizer, etc., and be careful of electrostatic damage.

6.2. Example of implementing pattern

An example of implementing pattern is shown in Fig. 9. The recommended land dimensions are 1.2mm x 0.7mm for PAD, and the distance between facing PADs is 12.8mm in length and 14.7mm in width.

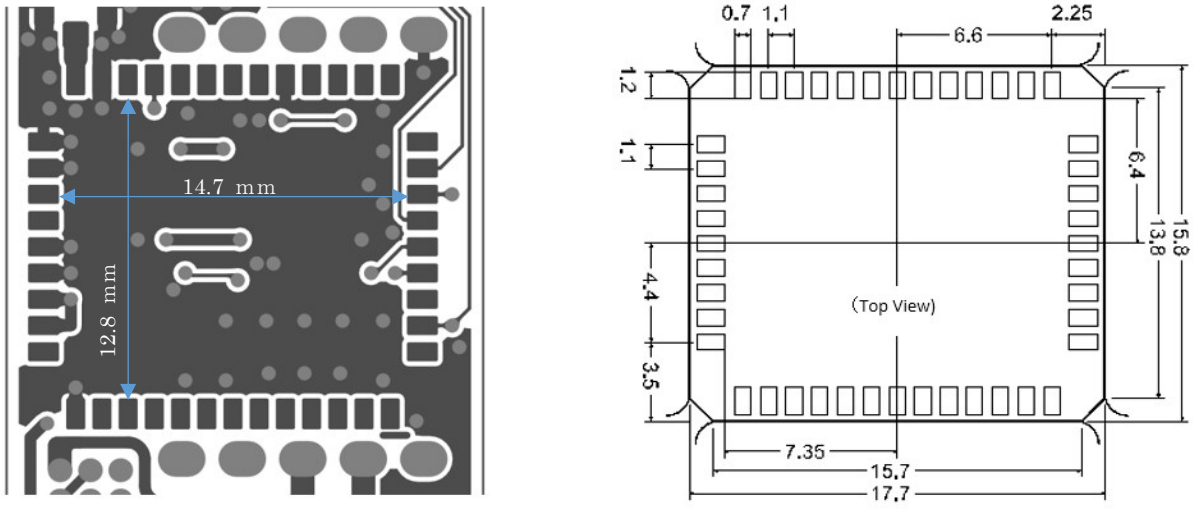


Fig.9 Example of implementing pattern

6.3. Reflow conditions

The points to note when reflowing this product are shown below. See Fig.10 for the temperature profile.

・Please limit the number of reflows to 2

・The temperature rise from preheating to main heating should be 3℃/sec or less.

・The cooling time after the main heating should be 60sec or more.

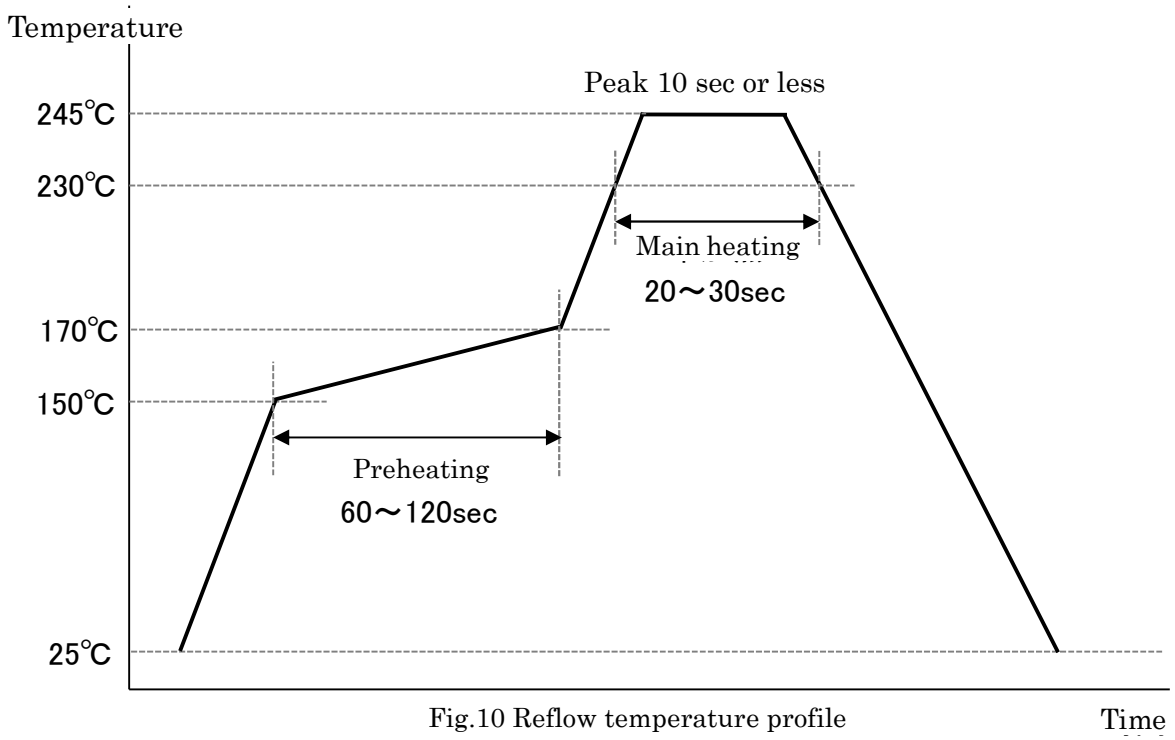


Fig.10 Reflow temperature profile

7. Packaging

Fig.11 shows the packaging of this product. This product of 1 reel (250pcs) is moisture-proof packed in an aluminum bag.

7.1. Packaging form

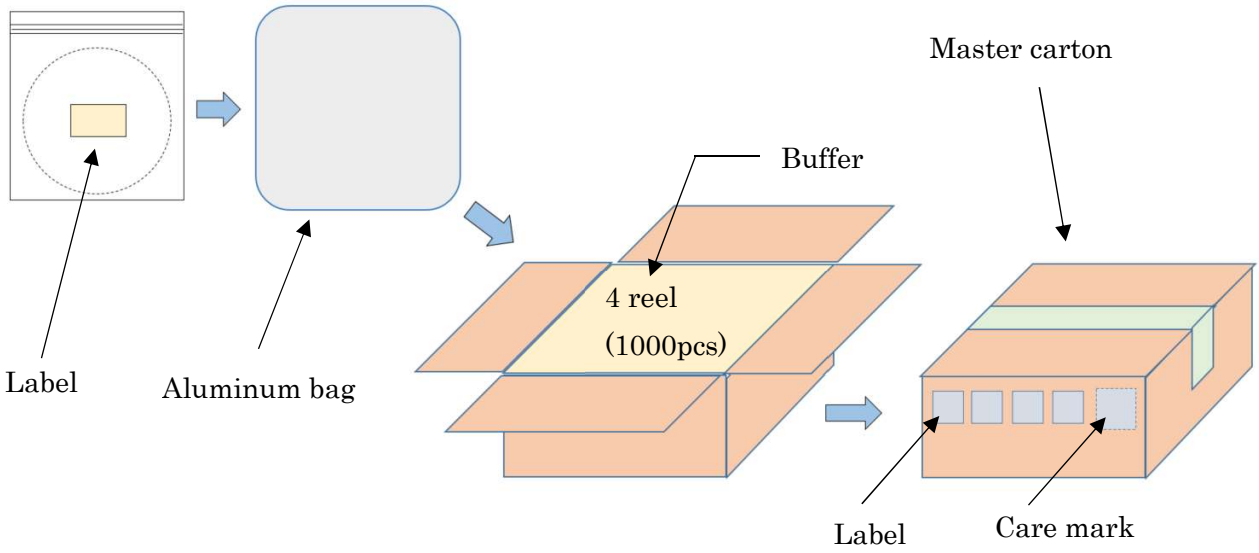


Fig.11 Packaging form

7.2. Reel

The aluminum bag contains a reel (250pcs of this product), a desiccant, and an indicator.
The first 10cm of reel tape is an empty cell.

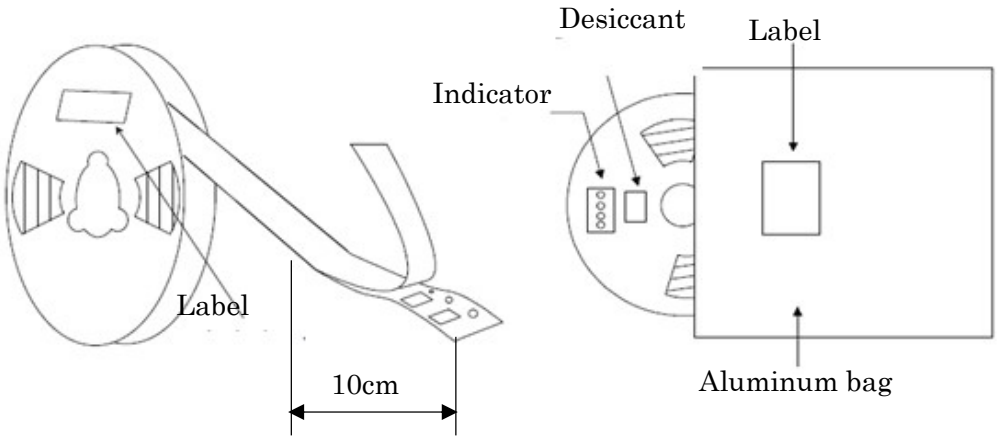


Fig.12 Reel packaging

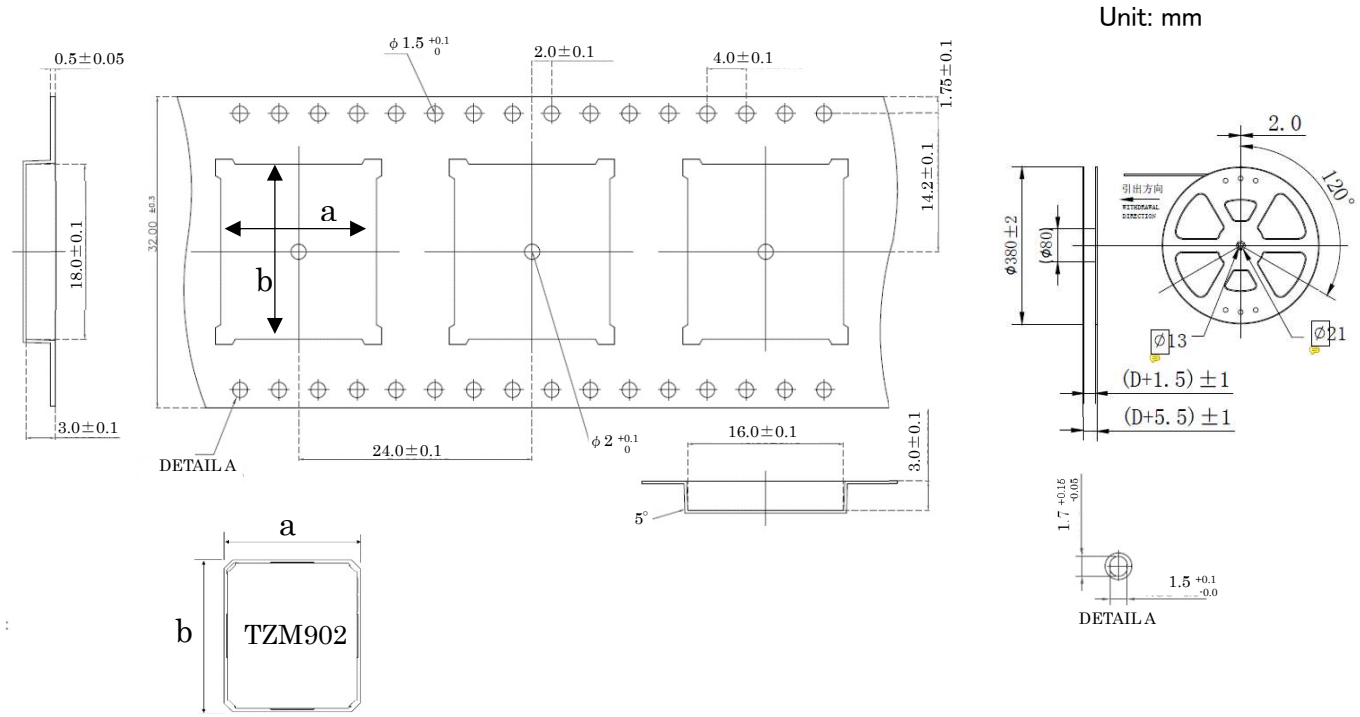


Fig.13 Reel dimensions

7.3. Packaging label

Product labels are affixed to the aluminum bag and master carton in which the product is packed. Fig.14 shows the information on the product label.

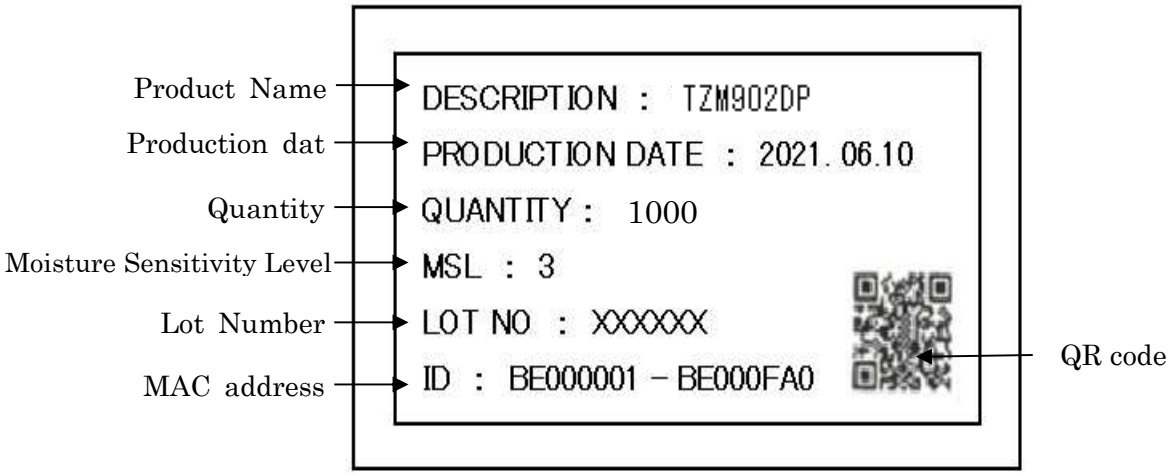


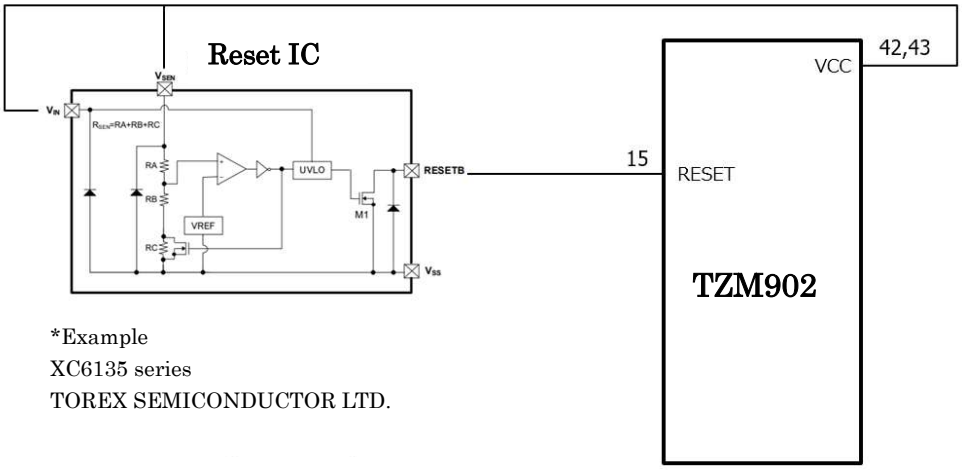
Fig.14 Product label

8. Application circuit example

Below are application circuit examples.

8.1. Application circuit example 1 （Reset IC）

This product may malfunction, defect, or failure if it is operated outside the operating power supply voltage range.
It is recommended to reset this product when it is out of the operating voltage range.
Figure 15 shows that the product is reset by monitoring the power supply with the reset IC.



*Example
XC6135 series
TOREX SEMICONDUCTOR LTD.

Fig.15 Application circuit example 1

8.2. Application circuit example 2 （Power monitoring on MCU）

This product may malfunction, defect, or failure if it is operated outside the operating power supply voltage range.
It is recommended to reset this product when it is out of the operating voltage range.
Figure 16 shows that the product is reset by monitoring the power supply with the software of the MCU for the sensor.

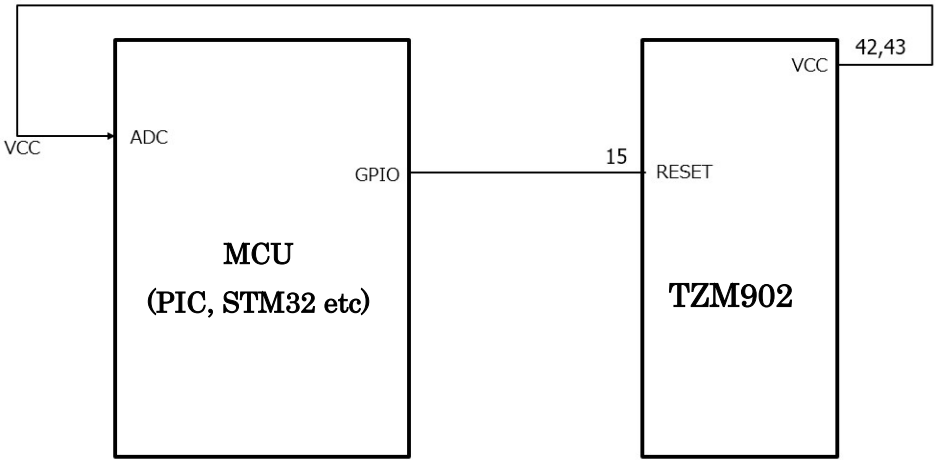


Fig.16 Application circuit example 2

9. Inquiry contact

For inquiries about this product, please contact the following.

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