

***DENSO***

**Square / Rectangle type transceiver  
for 1732 series**

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**User's Manual**

DENSO WAVE INCORPORATED

# Federal Communication Commission Interference

## NOTICE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- \* Reorient or relocate the receiving antenna.
- \* Increase the separation between the equipment and receiver.
- \* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- \* Consult the dealer or an experienced radio/TV technician for help.

Properly shielded and grounded cables with ferrite core must be used for connection to host computer and / or peripherals in order to meet FCC emission limits.

Cables with ferrite core must be used for RF interference suppression.

## **FCC WARNING:**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## **FCC CAUTION:**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Declaration of Conformity (For European Union)

English: Here by, DENSO WAVE INCORPORATED declare that this equipment (Transceiver for RFID-Tag), model Square/Rectangle is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Česky: DENSO WAVE INCORPORATED tímto prohlašuje, že tento Square/Rectangle je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.

Dansk: Undertegnede DENSO WAVE INCORPORATED erklærer herved, at følgende udstyr Square/Rectangle overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.

Deutsch: Hiermit erklärt DENSO WAVE INCORPORATED, dass sich das Gerät Square/Rectangle in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.

Eesti: Käesolevaga kinnitab DENSO WAVE INCORPORATED seadme Square/Rectangle vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

Español: Por medio de la presente DENSO WAVE INCORPORATED declara que el Square/Rectangle cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.

Ελληνική: ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ DENSO WAVE INCORPORATED ΔΗΛΩΝΕΙ ΟΤΙ Square/Rectangle ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/EK.

Français: Par la présente DENSO WAVE INCORPORATED déclare que l'appareil Square/Rectangle est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

Italiano: Con la presente DENSO WAVE INCORPORATED dichiara che questo Square/Rectangle è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

Latviski: Ar šo DENSO WAVE INCORPORATED deklarē, ka Square/Rectangle atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.

Lietuvių: Šiuo DENSO WAVE INCORPORATED deklaruoja, kad šis Square/Rectangle atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

Nederlands: Hierbij verklaart DENSO WAVE INCORPORATED dat het toestel Square/Rectangle in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.

Malti : Hawnhekk, DENSO WAVE INCORPORATED, jiddikjara li dan Square/Rectangle jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.

Magyar: Alulírott, DENSO WAVE INCORPORATED nyilatkozom, hogy a Square/Rectangle megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.

Polski: Niniejszym DENSO WAVE INCORPORATED oświadcza, że Square/Rectangle jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.

Português: DENSO WAVE INCORPORATED declara que este Square/Rectangle está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

Slovensko: DENSO WAVE INCORPORATED izjavlja, da je ta Square/Rectangle v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.

Slovensky: DENSO WAVE INCORPORATED týmto vyhlasuje, že Square/Rectangle spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.

Suomi: DENSO WAVE INCORPORATED vakuuttaa täten että Square/Rectangle tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Svenska: Härmed intygar DENSO WAVE INCORPORATED att denna Square/Rectangle står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Íslenska: Hér með lýsir DENSO WAVE INCORPORATED yfir því að Square/Rectangle er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 1999/5/EC.

Norsk: DENSO WAVE INCORPORATED erklærer herved at utstyret Square/Rectangle er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.

CE marking



NOTICE:

Properly shielded and grounded cables with ferrite core must be used for connection to host computer and / or peripherals in order to meet FCC emission limits.

Cables with ferrite core must be used for RF interference suppression.

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# Preface

Read this manual thoroughly before using the product to ensure the proper use of the product and its functions. Keep the manual in a convenient location for quick reference.

## Liability Limitations

- DENSO WAVE INCORPORATED does not assume any product liability (including damages for lost profits, interruption of operations, or the loss of business-related information) arising out of, or in connection with, the use of, or inability to use the product.
- DENSO WAVE INCORPORATED ("DENSO WAVE") takes appropriate precautions to ensure its products do not infringe upon any patents or other intellectual property rights of other(s). However, DENSO WAVE cannot be responsible for any patent or other intellectual property right infringement(s) or violation(s) arising from any of the following.
  - 1) The use of DENSO WAVE's products in connection or in combination with other components, products, devices, data processing systems or software not supplied by DENSO WAVE.
  - 2) The use of DENSO WAVE's products in a manner for which they were not intended nor designed.
  - 3) The modification of DENSO WAVE's products by parties other than DENSO WAVE.
- The warranty period is one (1) year from the date of delivery.

If it is determined by DENSO WAVE INCORPORATED that malfunction of the product is due to the product having been dropped or subjected to impact, repairs will be made at a reasonable charge even within the warranty period.

# Applicable Standards and Regulations

## Standards and Regulations in Other countries

|                    | Standards                   | Applicability | Remarks  |
|--------------------|-----------------------------|---------------|--|
| Radio Regulations  | FCC (USA)                   | ✓ *1          | FCC Part 15 Subpart C<br>Square FCC ID : PZWAN20R01<br>Rectangle FCC ID : PZWAN21R01 |
|                    | R&TTE (Europe)              | ✓ *1          | EN 302 291-1, -2   |
|                    | RSS-Gen (Canada)            | n/a           |  |
| EMC Regulations    | FCC (USA)                   | ✓ *1          | FCC Part 15 Subpart B  |
|                    | EC/R&TTE Directive (Europe) | ✓ *1          | EN 301 489-1, -3   |
|                    | RSS-Gen (Canada)            | n/a           |  |
| Safety Regulations | UL (USA)                    | ✓             | UL508(Type4X Indoor Use Only)  |
|                    | c-UL (Canada)               | ✓             | CAN/CSA C22.2 No.14  |
|                    | R&TTE (Europe)              | ✓             | EN 61010-1   |

✓: Applicable      n/a: Not applicable

### \*1 NOTICE:

Properly shielded and grounded cables with ferrite core must be used for connection to host computer and / or peripherals in order to meet FCC emission limits.

Cables with ferrite core must be used for RF interference suppression.

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# About this Manual

- The content of this manual may be subject to change for specification improvement without prior notice.
- The reproduction or duplication of the whole or part of this manual is strictly prohibited without prior consent.
- Every attempt has been made to ensure that the content of this manual is thorough and up to date, however, we kindly ask that any questionable content, mistakes, or omissions be reported to DENSO WAVE.
- The copyright for this User's Manual belongs to DENSO WAVE INCORPORATED.

## Manual Composition

This manual consists of the following 7 chapters.

### **Safety Precautions**

Explains the safety precautions for preventing accidents that could result in bodily injury and property damage..

### **Chapter 1      Outline**

Explains the hardware and system configuration.

### **Chapter 2      Basic Specifications**

Explains the basic specifications.

### **Chapter 3      Power Supply Specifications**

Explains the power supply specifications.

### **Chapter 4      Upper Communication Specifications**

Explains the interface specifications.

### **Chapter 5      Tag Communication Specifications**

Explains the RF interface specifications and communication distance.

### **Chapter 6      Installation**

Explains the environmental conditions and setups.

### **Chapter 7      Troubleshooting**

Explains possible causes and appropriate countermeasures of troubles.



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# SAFETY PRECAUTIONS

## Be sure to observe the safety precautions.

- Read through this manual carefully. It will enable you to use the product correctly.
- Always keep this manual in a handy place for easy reference.

Strict observance of these warnings and cautions is a **MUST** for preventing accidents that could result in bodily injury and property damage. Make sure you fully understand all definitions of these terms and symbols given below before you proceed to the text itself.



### **WARNING**

Indicates a potentially hazardous situation which could result in death or serious injury, if the instructions are not followed correctly.



### **CAUTION**

Indicates a potentially hazardous situation which may result in injury, if the instructions are not followed correctly.

## Meaning of Symbols



Indicates a warning of danger.  
The example indicates the warning for electrical shock.



Indicates what you are prohibited to do.  
The example indicates that you are not allowed to disassemble.



Indicates what you **MUST** do without fail.  
The example indicates that you **MUST** unplug the power cord.

---

## **WARNING**

### **Implantable Medical Devices**



- Avoid using the product near persons with implantable medical device, such as a cardiac pacemaker.  
A survey conducted on wireless card systems has reported the possibility of affecting or giving unfavorable impact on implantable medical devices.  
  
This is a general characteristic of those systems using radio waves, and not a unique feature of DENSO WAVE's products or this product itself.  
More information is available from the website by Ministry of Internal Affairs and Communications at: [http://www.soumu.go.jp/s-news/2003/030620\\_1.html](http://www.soumu.go.jp/s-news/2003/030620_1.html).

### **Radio Frequency Interference**



- Do not use the product in places where the use of radio frequency is restricted, such as in an airplane or hospital.  
Failure to comply could cause a malfunction in electronic or medical devices.

### **Operating Environments**



- Do not use the product in places where any inflammable gases may be emitted.  
Failure to comply could cause a fire.
- Do not use the product in places where an ambient temperature exceeds the specified operating temperature.  
Failure to comply could cause a fire.
- Do not use the product where it is subject to substantial vibration or shock.  
Failure to comply could cause a malfunction or a fire.
- Do not use the product where it is subject to oil or chemical contact.  
Failure to comply could cause a malfunction or a fire.

### **Precautions when Handling**





- Do not use a power supply and voltage other than the specified power supply and voltage.  
Failure to comply could cause a malfunction or a fire.
- Do not pull on the cable.  
A loose cable could cause a fire or electrical shock.
- Keep the product away from water or steam.  
If the connector gets wet, this could cause a fire, electrical shock, or a faulty connection.
- Do not damage, over bend, twist, pull, or heat the connection cable and device cable.  
Do not place heavy material on the cables or allow them to be damaged under heavy material.  
Failure to comply could cause the cables to break, and cause a fire or electrical shock.

---



 **WARNING**

**Precautions when Handling**





|   |   |
|---|---|
|  | <ul style="list-style-type: none"><li>• Connect the cable to the connector firmly with a clamp.<br/>A loose cable could cause a fire or electrical shock.</li><li>• Replace the damaged cable to a new one, when a connection cable or a device cable are damaged (e.g., exposed or broken lead wires).<br/>Failure to comply could cause a fire or electrical shock.</li><li>• Wiring to the power supply and the upper device must be done correctly in accordance with this manual.<br/>Incorrect wiring could cause amalfunction, a fire, or electrical shock</li></ul> |
|  | <ul style="list-style-type: none"><li>• If smoke, abnormal odors or noises come from the product, immediately turn the product off.<br/>Failure to comply could cause fire or electrical shock.</li><li>• If foreign material or water gets into the product, immediately disconnect the connection cable.<br/>Failure to comply could cause fire or electrical shock.</li><li>• If the product is dropped or damaged, immediately disconnect the connection cable.<br/>Failure to comply could cause fire or electrical shock.</li></ul>                                   |

 **CAUTION**

**Operating Environments**

|   |  |
|---|--|
|  | <ul style="list-style-type: none"> <li>• Never leave the product in places where there are excessively high temperatures, radiant heat, or in places exposed to direct sunlight.<br/>Failure to comply could affect the parts, and cause a fire.</li> <li>• Do not use the product in places where there are drastic temperature changes.<br/>Failure to comply could cause a malfunction, a fire or electrical shock.</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>• Do not install the product near a motor, an inverter, or a switching power supply.<br/>Noise from these devices could interfere with the wireless communication between the product and the tag.<br/>Examine these noises carefully before the product is installed.</li> <li>• Keep the product or the connection cable away from high voltage and high current wiring.<br/>Failure to comply could cause a wireless communication error between the transceiver and tag, or between the transceiver and the upper device.</li> <li>• Keep the appropriate distance specified in this manual between the transceiver and tag to avoid any interference.<br/>Failure to comply could cause a wireless communication error between the transceiver and tag.</li> </ul> |

**Precautions when Handling**

|   |   |
|---|---|
|  | <ul style="list-style-type: none"> <li>• Never touch the connector terminals with wet hands, and avoid any vapor.<br/>Failure to comply could cause malfunction or electrical shock.</li> <li>• Do not apply static electricity to the connector terminals and product itself when installing or wiring the product.<br/>Failure to comply could cause a fire or electrical shock.</li> <li>• Do not pull the connector cable.<br/>Failure to comply could disconnect the cable, damage the product inner part, burn the product, or cause a fire, or electrical shock.</li> <li>• Do not use chemicals or oil which may affect the material of the product.<br/>Failure to comply could damage the product.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>• Never disassemble or modify the product.<br/>Failure to comply could cause a fire or electrical shock.</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>• When plugging/unplugging the connector, always turn the product off.<br/>Failure to comply could cause malfunction, electrical shock or breakdown.</li> <li>• Do not touch the product with bare hands when operating or right after operation.<br/>Failure to comply could cause a burn.</li> <li>• Install the product making sure it is not loose by tightening the screw within the torque specified in this manual.<br/>Failure to comply could cause a damage or malfunction.</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>• If you are not using the product for a long time, be sure to unplug the connection cable for safety.<br/>Failure to comply could cause a fire.</li> <li>• When maintaining the product, unplug the connection cable for safety.<br/>Failure to comply could cause electrical shock.</li> </ul>   |

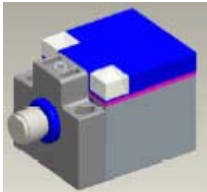

if used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

# Chapter 1 Outline

## 1.1 Hardware Configuration

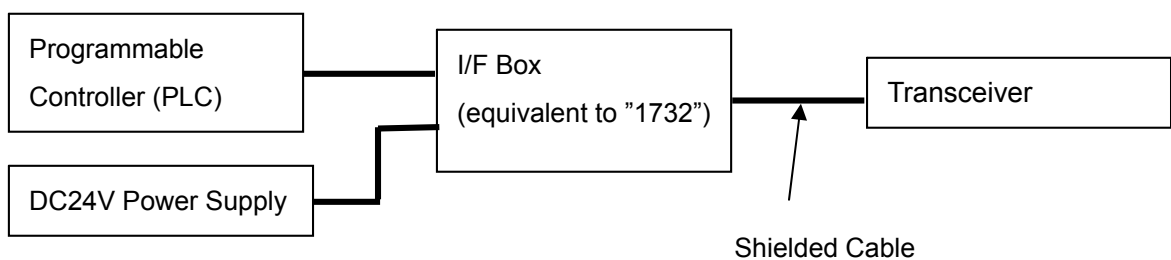
This product line (hereinafter referred to as the Transceiver) is developed for the Rockwell Automation "1732 series" products to read and write the HF (High Frequency) RFID tag.

There are two versions of the transceivers as listed below.

| type                       | model        | appearance   |
|----------------------------|--------------|--|
| Square type transceiver    | 56RF-TR-4040 |   |
| Rectangle type transceiver | 56RF-TR-8090 |  |

## 1.2 System Configuration

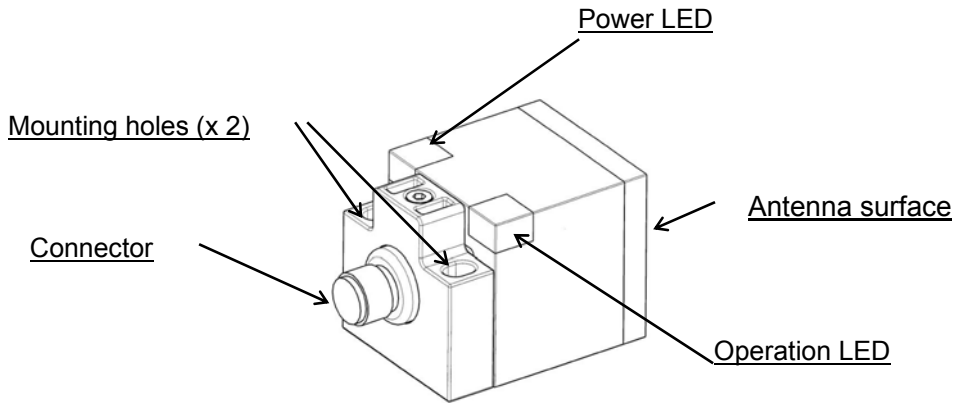
The transceiver is intended to operate in the following system configuration.



# Chapter 2 Hardware Specifications

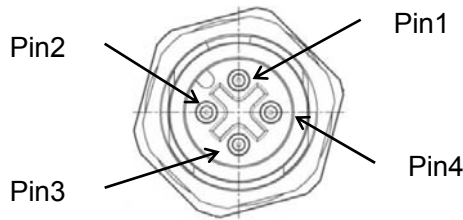
## 2.1 Square Type Transceiver

### 2.1.1 Components and Functions



- Connector (PhoenixContact, SACC-DSI-MS-4CON-M12SCO)

| Pin No. | Signal |
|---------|--------|
| Pin1    | DC24V  |
| Pin2    | S +    |
| Pin3    | GND    |
| Pin4    | S -    |

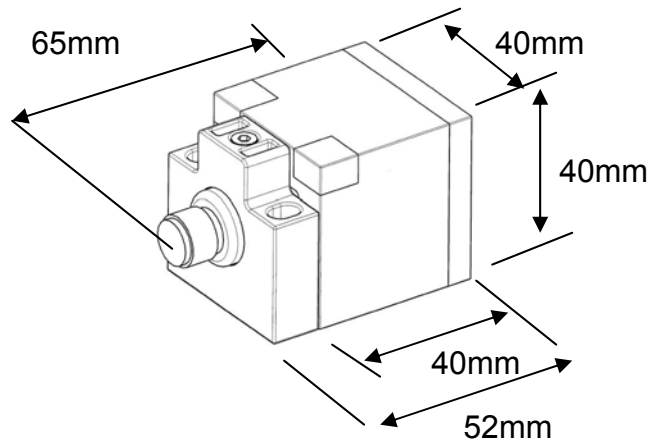


- LED light patterns

| LED           | Light                             | Explanation                     |
|---------------|-----------------------------------|---------------------------------|
| Power LED     | Solid Green                       | Power ON                        |
|               | No light                          | Power OFF                       |
| Operation LED | Solid Green                       | Normal Operation                |
|               | Blinking Green (short intervals)  | Communicating with the RFID tag |
|               | Blinking Orange (short intervals) | Sensing the RFID tag            |
|               | Blinking Red (long intervals)     | Communication Error             |
|               | Blinking Orange (long intervals)  | No RFID tag                     |

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## 2.1.2 External Dimensions

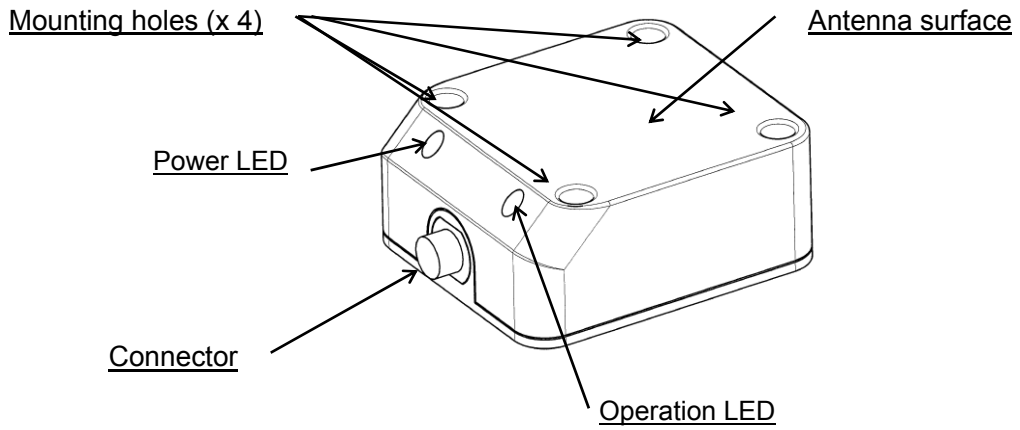


## 2.1.3 Environmental specifications

| Item                  | Specification   |
|-----------------------|---|
| Operating Temperature | -25°C to +70°C (With no icing or condensation)  |
| Operating Humidity    | 35 to 95%RH (With no icing or condensation)   |
| Storage Temperature   | -40°C to +85°C (With no icing or condensation)  |
| Storage Humidity      | 25 to 85%RH (With no icing or condensation)   |
| Insulation Resistance | 20MΩ Min. (DC500V Mega)<br>Between connector terminals and case   |
| Vibration Resistance  | 10 to 500Hz, 1.5mm double amplitude, acceleration: 100m/s <sup>2</sup> ,<br>10 sweeps in each of 3 axis directions<br>(up/down, left/right, and forward/backward) for 11 minutes each |
| Shock Resistance      | 500 m/s <sup>2</sup> in 6 directions 3 times each (18 times in total)   |
| Protective Structure  | IP67 (Excluding connector area)<br>UL508 Type4X Indoor Use Only   |
| Altitude              | Less than 2000m   |
| Degree of pollution   | Level 2   |
| Material              | Case: PBT   |
| Weight                | 85g   |

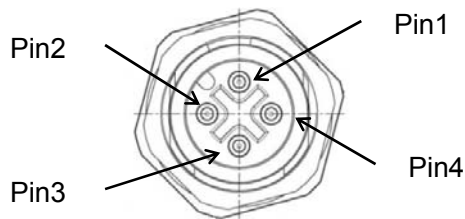
## 2.2 Rectangle Type Transceiver

### 2.2.1 Components and Functions



- Connector (PhoenixContact, SACC-DSI-MS-4CON-M12SCO)

| Pin No. | Signal |
|---------|--------|
| Pin1    | DC24V  |
| Pin2    | S +    |
| Pin3    | GND    |
| Pin4    | S -    |

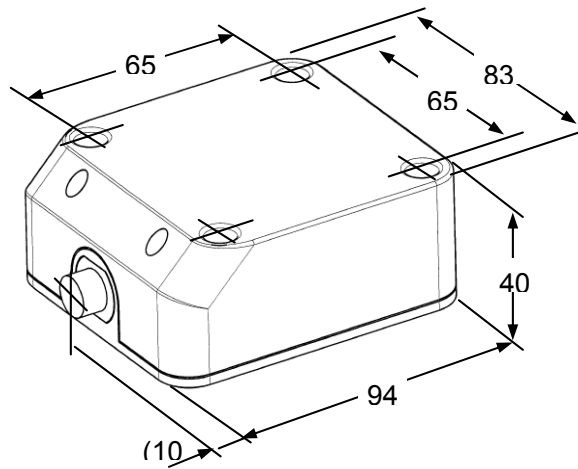


- LED light patterns

| LED           | Light                             | Explanation                     |
|---------------|-----------------------------------|---------------------------------|
| Power LED     | Solid Green                       | Power ON                        |
|               | No light                          | Power OFF                       |
| Operation LED | Solid Green                       | Normal Operation                |
|               | Blinking Green (short intervals)  | Communicating with the RFID tag |
|               | Blinking Orange (short intervals) | Sensing the RFID tag            |
|               | Blinking Red (long intervals)     | Communication Error             |
|               | Blinking Orange (long intervals)  | No RFID tag                     |



## 2.2.2 External Dimensions



Unit: mm

## 2.2.3 Environmental specifications

| Item                  | Specification   |
|-----------------------|---|
| Operating Temperature | -25°C to +70°C (With no icing or condensation)  |
| Operating Humidity    | 35 to 95%RH (With no icing or condensation)   |
| Storage Temperature   | -40°C to +85°C (With no icing or condensation)  |
| Storage Humidity      | 25 to 85%RH (With no icing or condensation)   |
| Insulation Resistance | 20MΩ Min. (DC500V Mega)<br>Between connector terminals and case   |
| Vibration Resistance  | 10 to 500Hz, 1.5mm double amplitude, acceleration: 100m/s <sup>2</sup> ,<br>10 sweeps in each of 3 axis directions<br>(up/down, left/right, and forward/backward) for 11 minutes each |
| Shock Resistance      | 500 m/s <sup>2</sup> in 6 directions 3 times each (18 times in total)   |
| Protective Structure  | IP67 (Excluding connector area)<br>UL508 Type4X Indoor Use Only   |
| Altitude              | Less than 2000m   |
| Degree of pollution   | Level 2   |
| Material              | Case: PBT   |
| Weight                | 175g  |

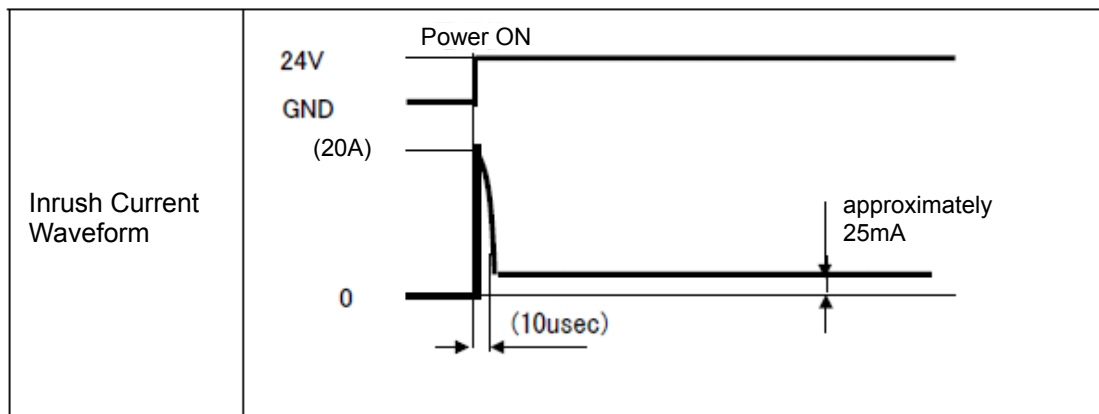
# Chapter 3 Power Supply Specifications

## 3.1 Supply Voltage and Current Consumption

| Item                | Specification                                  |                                  |                              |
|---------------------|--|----------------------------------|------------------------------|
| Supply Voltage      | DC24V<br>(DC10 to 30V, Ripple is less than 1%) |                                  |                              |
| Current Consumption | Carrier off                                    | 25mA at DC24V (Excluding inrush) |                              |
|                     | Carrier on                                     | Square type                      | 60mA (Max. 0.2A)<br>at DC24V |
|                     |  | Rectangle type                   | 80mA (Max. 0.2A)<br>at DC24V |

\* Power Supply : UL1310 Class2

## 3.2 Inrush Current (reference value)



\*The waveform and values in the above figure are reference values at room temperature.

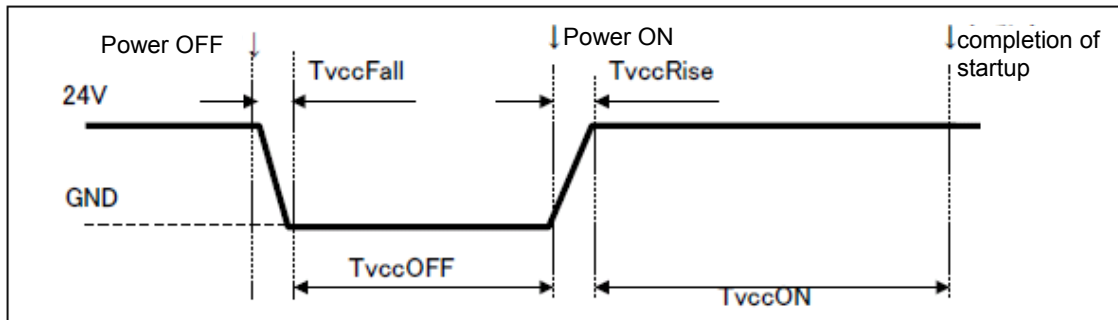
### 3.3 Power OFF Duration

OFF duration (referred to as “TvccOFF” in the figure) is required to re-power ON.

“TvccOFF” must be (1 second) or more.

ON duration (referred to as “TvccON” in the figure) is required before sending any command to the transceiver.

“TvccON” must be (0.5 second) or more.



| Item    | Description  | Condition       | Time     |
|---------|--|-----------------|----------|
| TvccOFF | Required OFF duration to re-power ON   | TvccFall=0ms    | (1 sec)  |
| TvccON  | Required ON duration to complete start up after completion of power-on (TvccRise). | TvccRise ≤ 10ms | (0.5sec) |

### 3.4 Power Supply Protection Circuit

The transceiver does not have any power supply protection circuits. Add the following protection circuits to the host device as necessary.

- Over current protection circuit
- Over voltage protection circuit

Add appropriate countermeasures for noise as necessary.

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## Chapter 4 Upper Communication Specifications

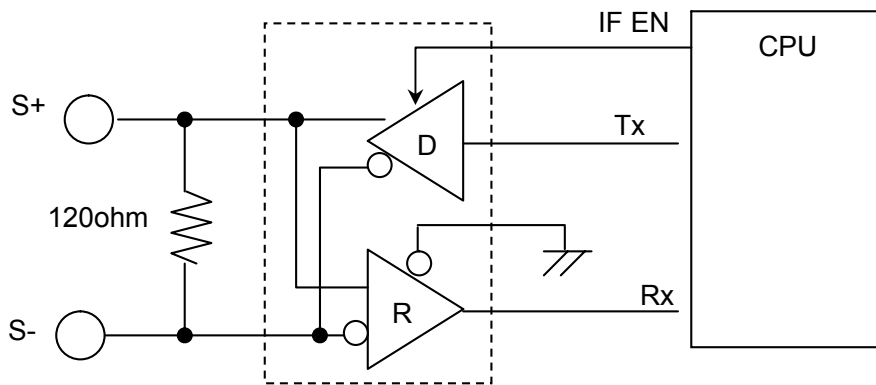
### 4.1 Specifications to communicate with the host device

| Item                 | Specification  |
|----------------------|--|
| Connector            | M12, 4-pin male connector                                    |
| Communication System | Half Duplex (RS-485)   |
| Baud Rates           | 9600/19200/38400/115200bps selectable<br>(Default: 38400bps) |
| Data Length          | 8bit   |
| Stop Bit Length      | 1bit   |
| Error Detection      | Parity bit even  |
| Cable Length         | Max. 100m (It varies in the cable)                           |

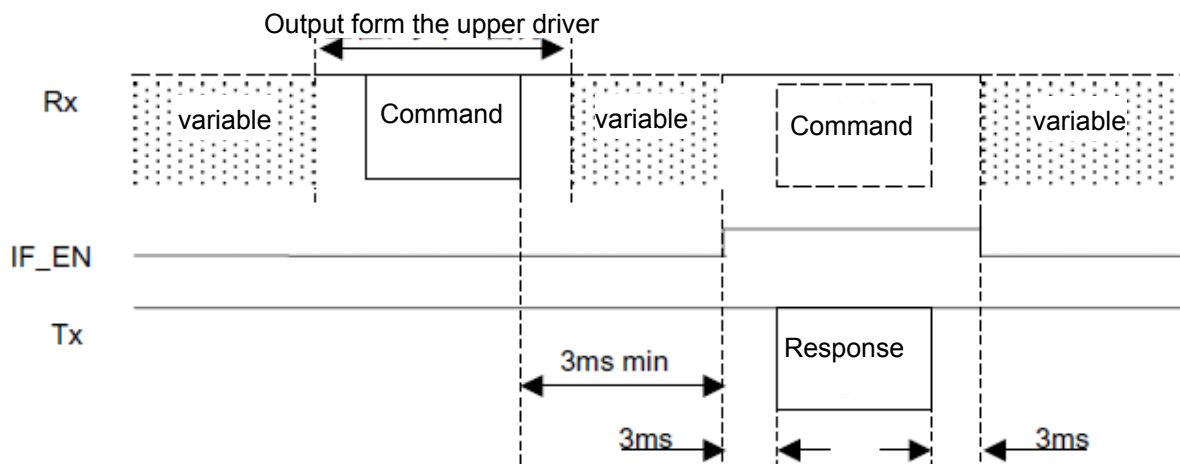
Note:

- RS485 Protocol: Switch the command-response mechanism to avoid signal conflict/
  - For more information, see the communication and interface specification.
  - For changing the transmission speed, see the programming manual.
- Important-
- (When Flash-ROM is rewritten,) Do not change the transmission speed more than 100 times.

## 4.2 I/F Circuit



## 4.3 Response Timing



# Chapter 5 Tag Communication Specifications

## 5.1 Specifications to communicate with the RF tag

The following is the communication specifications between the transceiver and the RFID tag.

| Item                    |                   | Specification                  |
|-------------------------|-------------------|--------------------------------|
| Tag Type                |                   | ISO/IEC 15693                  |
| Communication System    |                   | Half Duplex                    |
| Synchronization scheme  |                   | Bit Synchronization            |
| Transceiver<br>↓<br>Tag | Baud Rate         | 26.48kbit/s (Carrier:13.56MHz) |
|                         | Modulation Scheme | ASK 10 to 30%                  |
| Tag                     |                   | Modulation code                |
| Tag                     |                   | Baud Rate                      |
| Tag                     |                   | Modulation Scheme              |
| Transceiver             | Modulation code   | OOK Manchester                 |

Note:

For details of the command and communication period, see the programming manual.

## 5.2 Communication Distance

| Transceiver    | Tag     | communication distance (at room temperature) |         |         |        |
|----------------|---------|--|---------|---------|--------|
|                |         | Gain 4                                       | Gain 3  | Gain 2  | Gain 1 |
| Square type    | φ50 tag | 90mm   | (80mm)  | (70mm)  | (50mm) |
| Rectangle type | φ50 tag | 170mm  | (160mm) | (120mm) | (90mm) |

- Noise Interference, metals, and other transceivers are not allowed around the transceiver.
- Communication distance may be shorter than the above value due to the tag deviation.
- Must not be any slant between the transceiver and the antenna center of the tag.
- For the gain setup, see the programming manual.

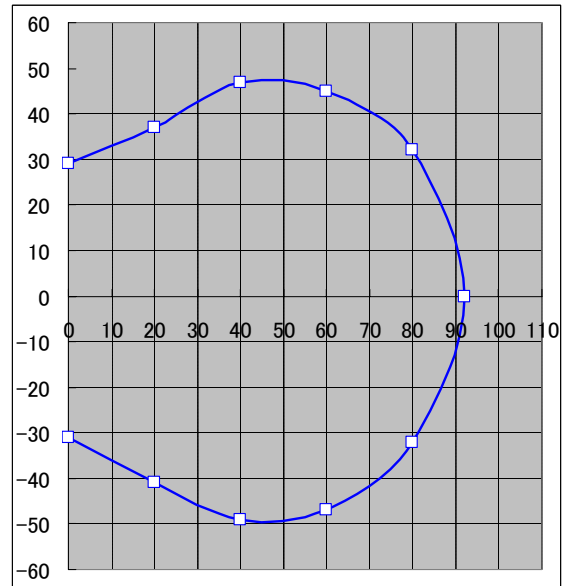
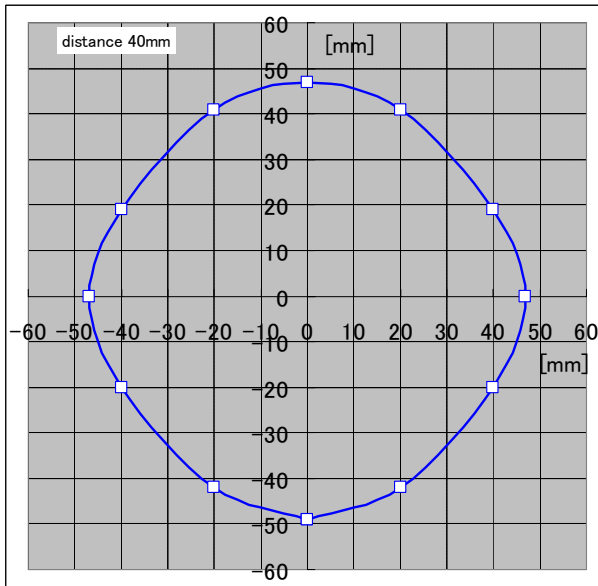
-important-

(When Flash-ROM is rewritten,) Do not change the gain value more than 100 times.

## 5.3 Communication Area (reference)

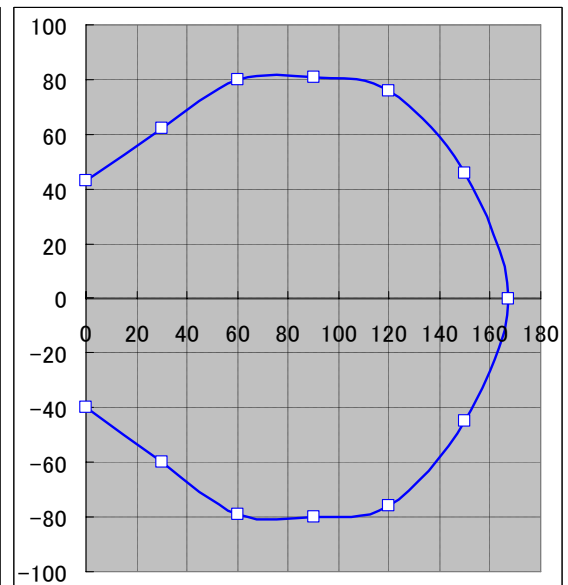
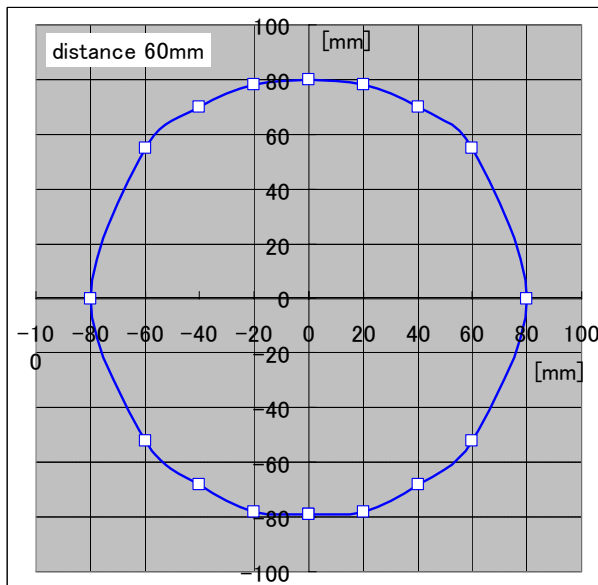
Square

\* Gain = 3,  $\phi 50$  tag



Rectangle

\* Gain = 3,  $\phi 50$  tag

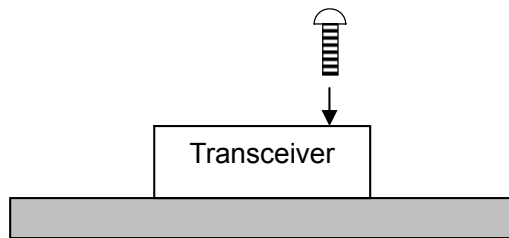


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## Chapter 6 Installation

### 6.1 Tightening Torque

Attach the transceiver to the flat plate with M5 screws.  
The tightening torque must be  $1.5\text{N}\cdot\text{m}$  for the M5 screw.

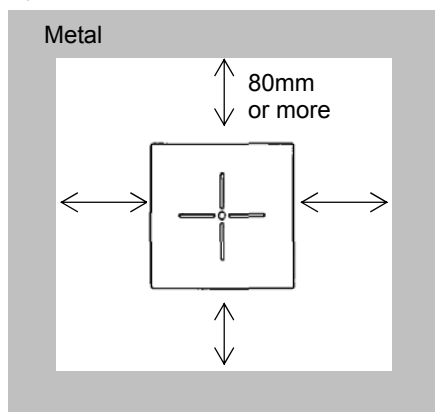


### 6.2 Surrounding Metal

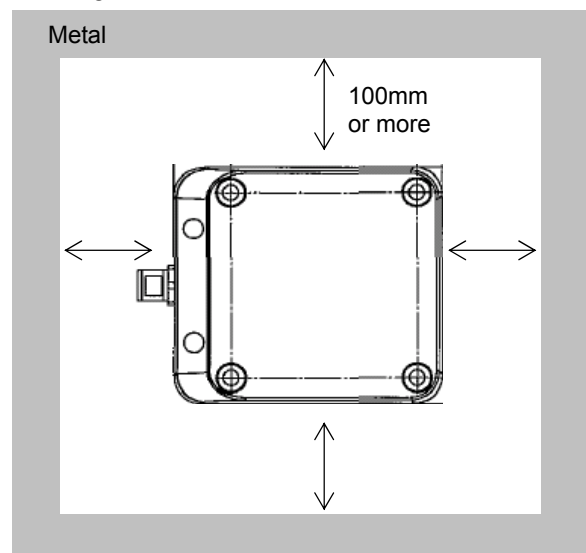
Square: Communication distance will drop significantly when the distance between the transceiver and any surrounding metal is 80mm or less.

Rectangle: Communication distance will drop significantly when the distance between the transceiver and any surrounding metal is 100mm or less.

Square



Rectangle





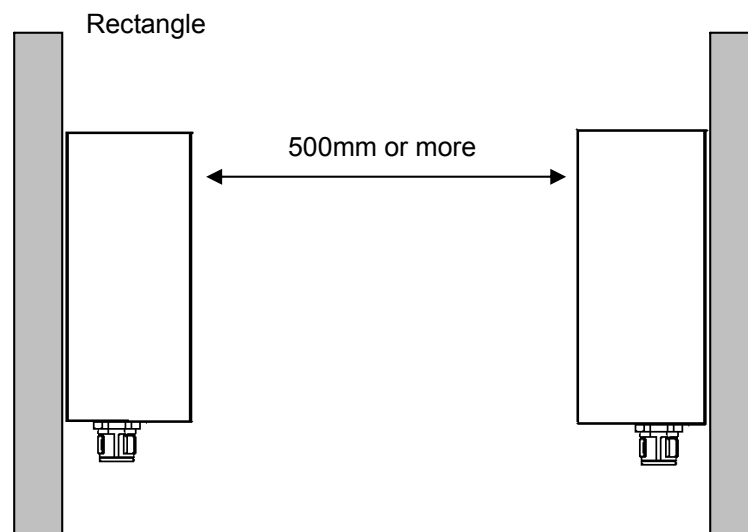
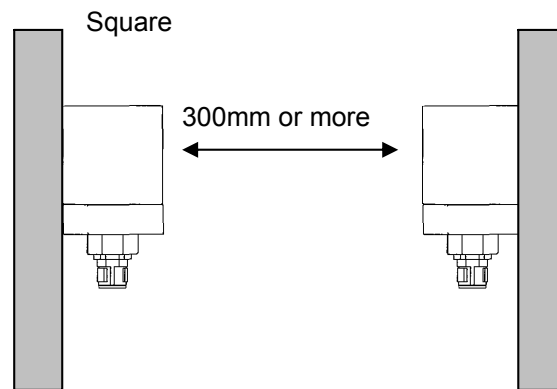
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## 6.3 Interference between the transceivers

Installing more than one transceiver causes radio frequency interference and may result in the difficulty of the tag communication.

Keep a sufficient distance between the transceivers as shown in the figure below.

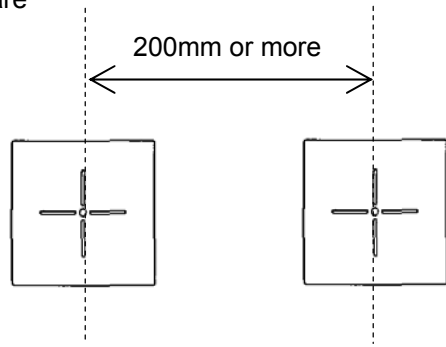
- face to face



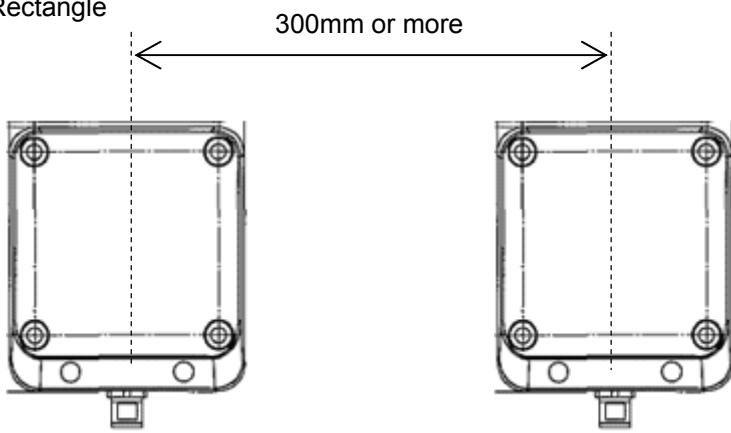
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• side by side

Square

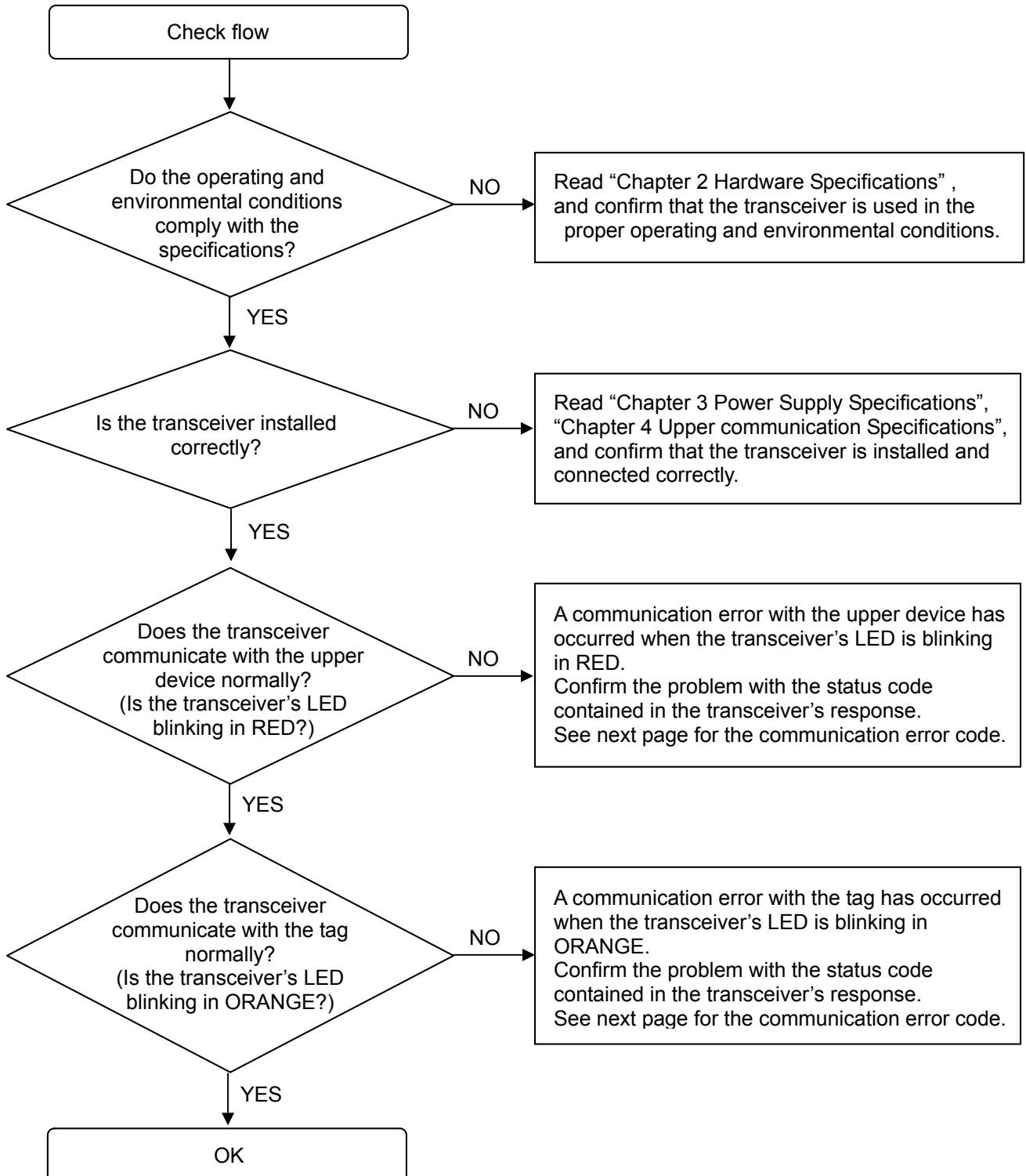


Rectangle



# Chapter 7 Troubleshooting

Examine the cause of the problem by using the flowchart below and take appropriate countermeasures when any problems occur.



Square type transceiver (56RF-TR-4040)  
Rectangle type transceiver (56RF-TR-8090)  
for 1732 series

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User's Manual

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