

2.4 GHz wireless remote control system

Input unit **KST2.4S**



Operation Guide

Version 2.0 (Oct. 2021)

- This product requires electrical and radio knowledge for setup and operation.
- To ensure proper and safe operation, please read this operation guide thoroughly prior to use.
- Please keep this operation guide for future reference.

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1. Outline

KST2.4S is an input unit with 6 input contacts for wireless remote control system which can be realized by combining with the output unit KSR2.4 or telecommand module NK-2.4Y.

The communication mode is 1:1 only and neither 1:N nor N:1 is possible.

Frequency hopping scheme enables simultaneous use of multiple systems within one area. Also, you can always check the communication status with the Link LED.

2. Features and applications

Features

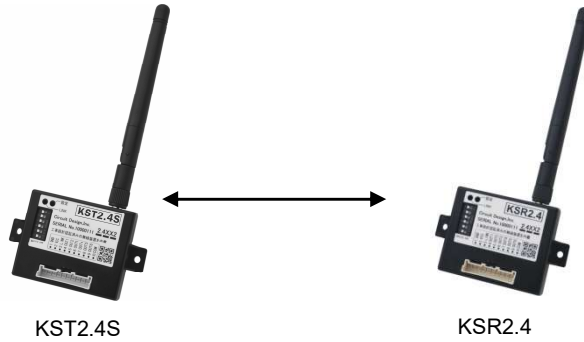
- Contains ARIB STD-T66 & FCC Part 15 compliant telecommand module NK-2.4Y
- 6 input contacts
- Frequency hopping scheme enabling simultaneous use of multiple systems within one area
- Communication status monitor via Link LED
- CRC-16 and Hamming distance of 6 to minimize malfunction
- Both high-level and low-level input available (cannot be selected for each contact).
- 1 : 1 communication with KSR2.4 or NK-2.4Y
- Communication range 100 m LOS (depends on the operation circumstances and the equipment to be controlled.)

Applications

- Control of construction, civil engineering, forestry machinery
- Control of traffic light for road construction
- Operation of agricultural machinery
- Electric shutter, electric blind, garage door
- Rotary lights, alarm devices
- Calling device

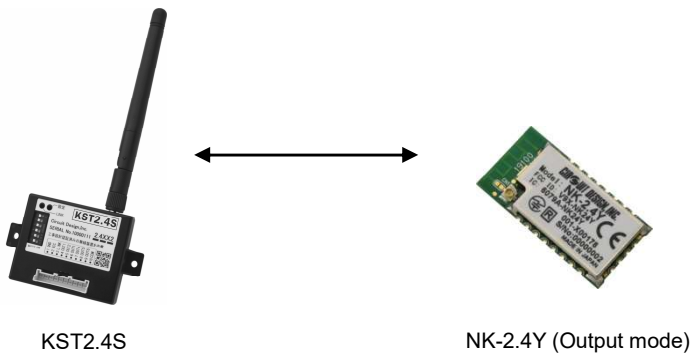
3. System example

3.1 Using KSR2.4 on the output side



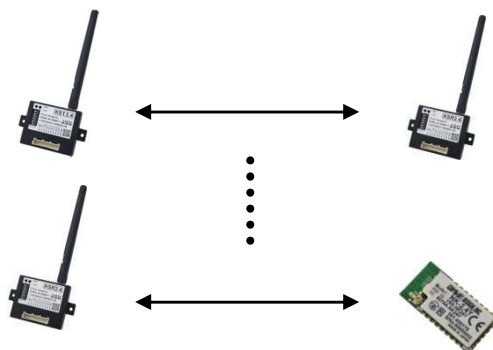
* Up to 6 control contacts

3.2 Using NK-2.4Y on the output side



* Up to 6 control contacts

3.3 Operation of multiple systems in one area

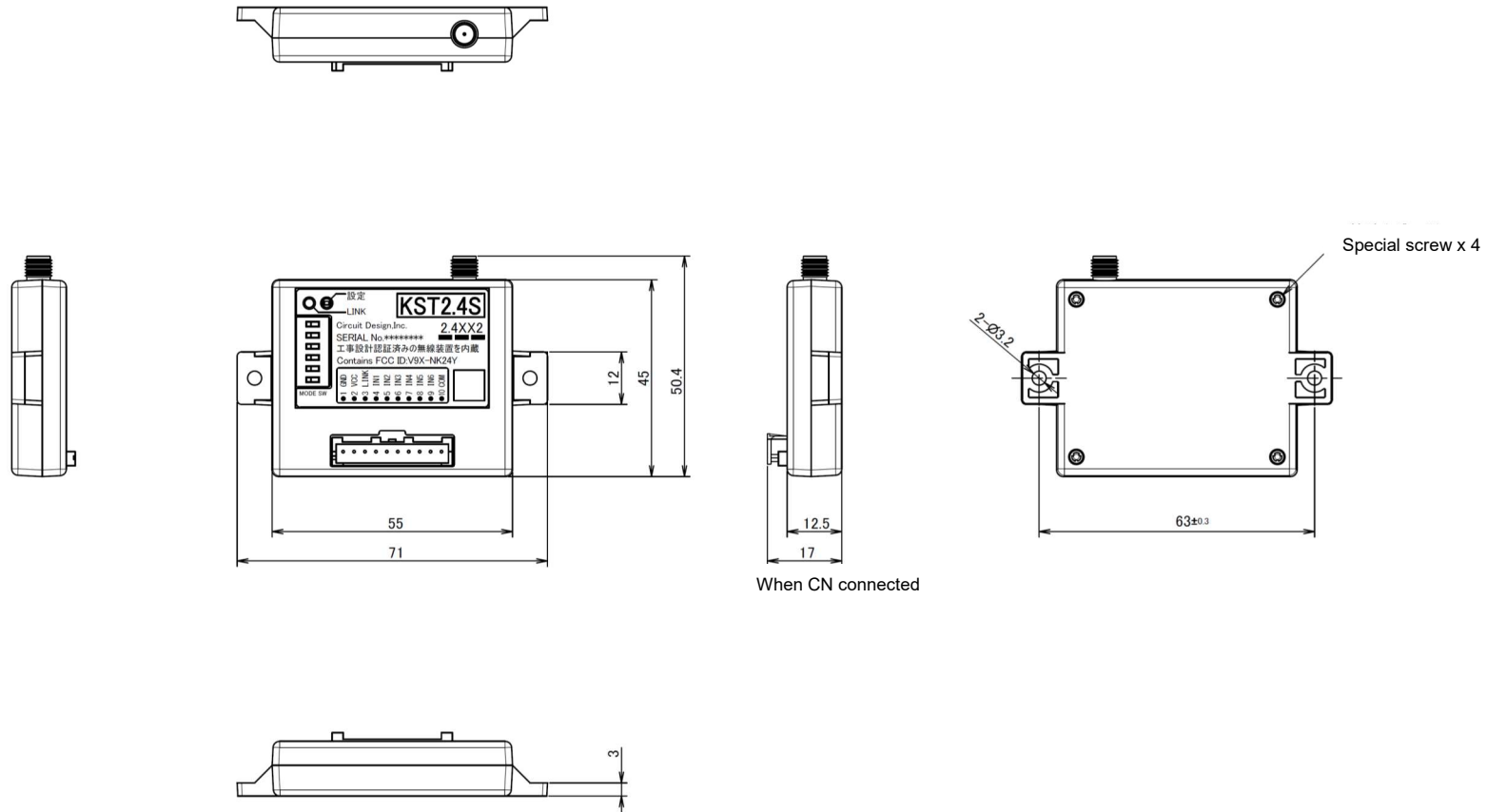


* Up to 10 systems are feasible for simultaneous operation in one area.

4. Main specifications

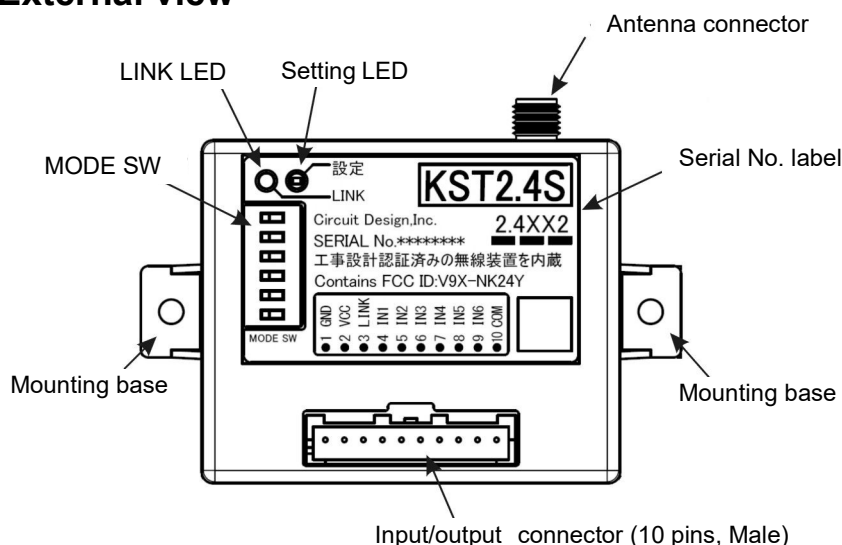
Item	Specification	Remarks
Compatible standards	ARIB STD-T66 FCC Part 15	Contains FCC / MIC certified NK-2.4Y.
Frequency range	2403 to 2479 MHz	
Communication method	Frequency hopping, two-way	
Modulation method	GFSK	
Communication bit rate	250 kbps	
Error check method	Payload CRC16 + Packet CRC16	
Hamming distance	6	
RF output power	1.6 mW or less	
Number of inputs and outputs	Contact inputs 6 + LINK output 1	
Input circuit	Applied to the Light-emitting side of the photocoupler (TLP182 or equivalent). Input ON voltage: DC 6 V to 35 V Refer to "7. Input/Output circuit".	
Power supply	DC 6 to 24 V (Absolute maximum voltage 36V)	
Current consumption	30 mA or less	Excluding the current input to the contact.
Operating temperature range	-20 °C to +60 °C	
External dimensions	55 x 45 x 12.5 mm	Excluding protrusion and mounting base
Weight	26 g	Excluding antenna and cable harness
Accessories	Dedicated cable harness x 1 (500 mm, 10 pins)	
Specified antennas	Sold separately. Using antennas other than specified may invalidate compliance with radio laws.	ANT-2400-SF ANT-2400-SFW ANT-2400-SMW

5. External dimensions



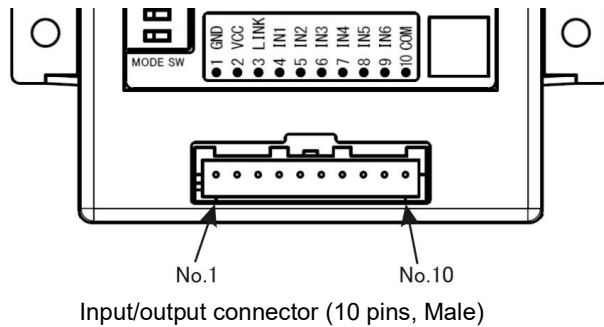
6. Part names and functions

6.1 External view



Antenna connector	Reverse SMA connector (male). The specified antenna should be used. Turn only the nut to install the antenna.
LINK LED	LED (green) to check the communication status. Lit: Communication is normal and stable use is possible. Blinking: Communication has been lost. Off: The power of the KST2.4S is not turned on.
Setting LED	LED (orange) to indicate the operating status in the pairing mode. Please refer to "8.1 Pairing with the output unit " for details. .
MODE SW	Sets the KST2.4S to the pairing mode.
Input / Output connector	10-pin connector for the dedicated cable harness. Insert the connector securely until it is locked. For details, refer to "6.2 Connector specification".
Mounting base	When fixing KST 2.4S with screws, use 3 mm screws (M3 screw etc.) and washers. (Tightening torque reference value when attached to an iron plate: 6 kgf·cm or less)
Serial No. label	Do not remove.
Cable harness (accessory)	The connector is XAP-10V-1 (JST) and the cable is a wiring harness CAVUS 0.5 used for automobiles. The cable length is 500 mm.
Protection sheet (accessory)	Protective sheet for the MODE SW and LEDs. To prevent incorrect operation and to protect against static electricity, always cover the MODE SW and LEDs with this sheet when installing the KST2.4S to the equipment.

6.2 Connector specification

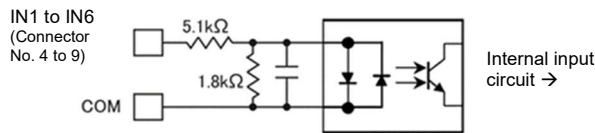


Pin No.	Name	I/O	Cable color	Terminal description
1	GND for power supply	I	Black	Connect to the GND of the power supply.
2	VCC	I	Red	Power supply terminal. Connect to a regulated power supply within DC 6 to 24 V range. If it is used at a voltage other than the specified voltage, the output becomes unstable. Supply the power via an overcurrent protection fuse.
3	LINK	O	Brown	Output for monitoring communication status. Linked: GND Link search: GND /OPEN repeating (200 ms/1300 ms) Connect the cathode side of the LED to the LINK terminal when using an external communication status monitor LED. Adjust the current value of the LED by connecting an external resistor in series. The internal circuit of the LINK terminal is an open collector output of a transistor (RN 1707 or equivalent), and a current limiting resistor (330 Ω) is used in series.
4	IN1	I	Orange	Contact inputs. High-level or low-level input is selectable (cannot be selected for each contact). Input is applied to the light-emitting side of the photocoupler and up to DC 35 V can be input. IN1 to IN6 are insulated (floating) from the internal circuit of the KST2.4S.
5	IN2	I	Yellow	
6	IN3	I	Green	
7	IN4	I	Blue	
8	IN5	I	Purple	
9	IN6	I	Gray	
10	COM	O	White	Common terminal for IN 1 to IN6. Connect to the power supply for inputs or GND according to the specification of the contact inputs. Between the COM and the GND, an electrostatic protection element with a varistor voltage of 100 V is used.

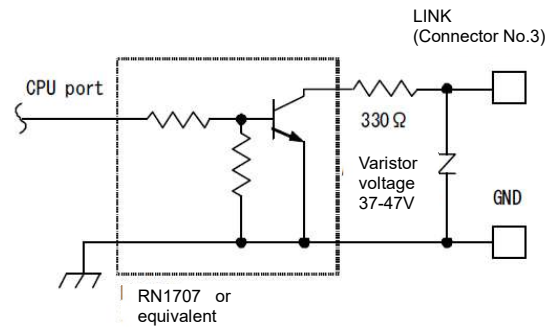
7. Input/Output circuit

7.1 Internal equivalent circuit

IN1 to IN6 input circuit



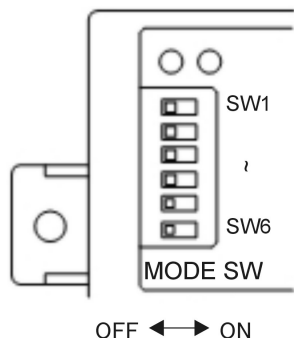
LINK output circuit



7.2 Cautions

- * Ensure that the KST2.4S is turned off when wiring to each terminal and confirm there is no misconnection before turning on the power again.
- * The outputs of the KST2.4S are not surge protected. If surge may be possibly applied to them, use surge protection components externally.

8. MODE SW setting



The MODE SW is used to set the pairing mode
Please use a small screwdriver or tweezers for MODE SW setting.

* SW 4, 5 and 6 are not used and should be set to OFF.

8.1 Pairing with the output unit

Before using the KST2.4S, it needs to be paired with the output unit. The KST2.4S communicates on a 1: 1 basis.

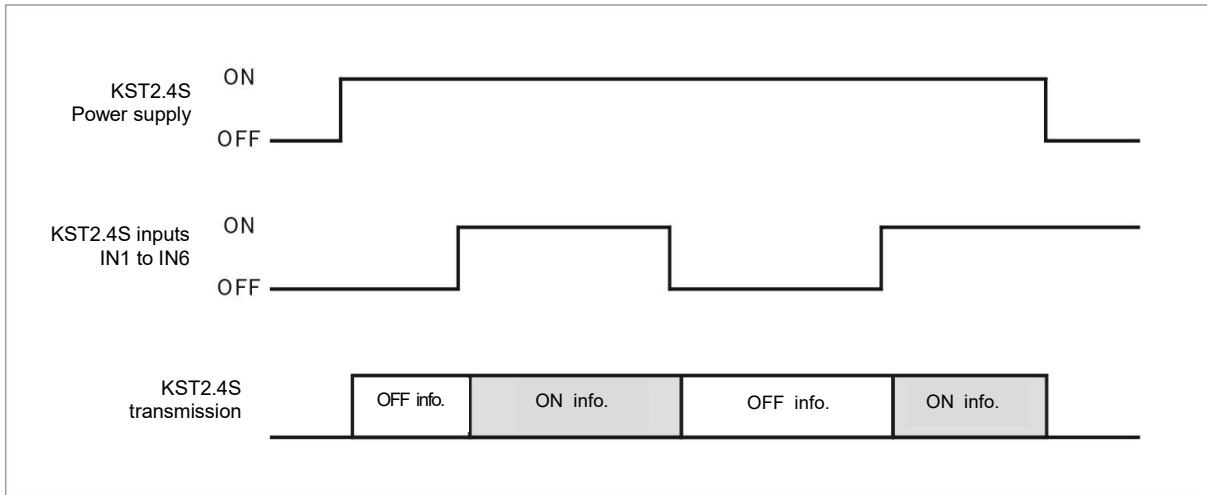
- The KST2.4S is shipped from the factory without pairing.
- When pairing is newly performed with another output unit, the previous pairing will be overwritten.

ID code registration procedure		LEDs
Preparation	Turn on the corresponding output unit with the pairing mode set to ON. *Refer to the operation guide of the output unit.	
Preparation	Turn off the power of the KST2.4S. Set the MODE SW1 to ON.	
Step 1	Turn on the power of the KST2.4S.	Setting LED: On
Step 2	Set the MODE SW1 of the KST2.4S to OFF.	Setting LED: On
Step 3	Set the MODE SW2 of the KST2.4S to ON to perform "Transmission to start pairing". * The LED of the output unit also changes.	Setting LED: Off LINK LED: On
Step 4	Set the MODE SW2 of the KST2.4S to OFF.	
Step 5	Set the MODE SW3 of the KST2.4S to ON to perform "Transmission of pairing complete information". * The LED of the output unit also changes.	Setting LED: On LINK LED: On
Step 6	Set the MODE SW3 of the KST2.4S to OFF.	
End	To start operation, turn off the KST2.4S once and turn it on again.	LINK LED: Blink → becomes On when linked successfully

9. Input state and ON/OFF information

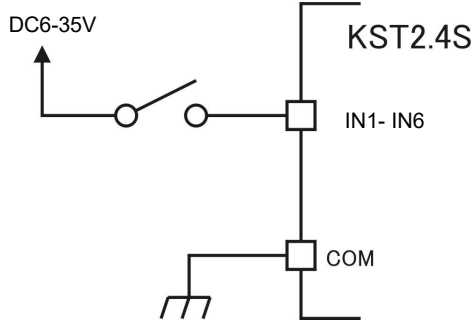
The KST2.4S starts transmission when the power is turned on and transmits ON signal when the input state is on and OFF signal when the input state is off.

*The KST2.4S does not start transmission when the power is turned on while its input state is on.

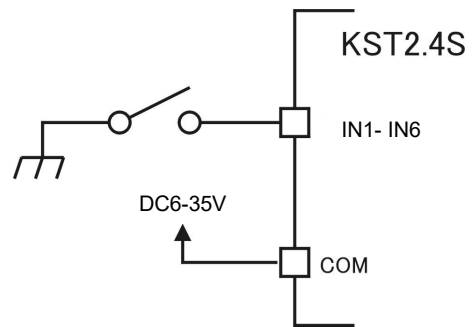


For signal input, high-level or low-level input is selectable.

High-level input



Low-level input



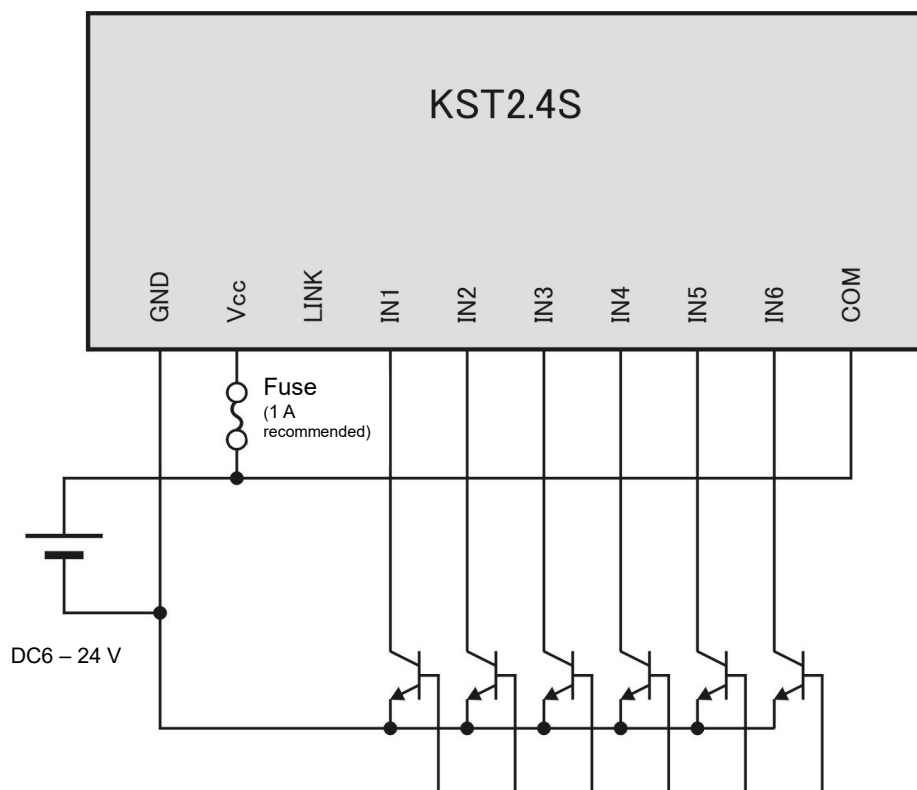
10. Connection example

Connection examples for the KST2.4S.

10.1 Connection example 1

In this connection example, the power supply of the KST2.4S and the power supply of the input circuit are common.

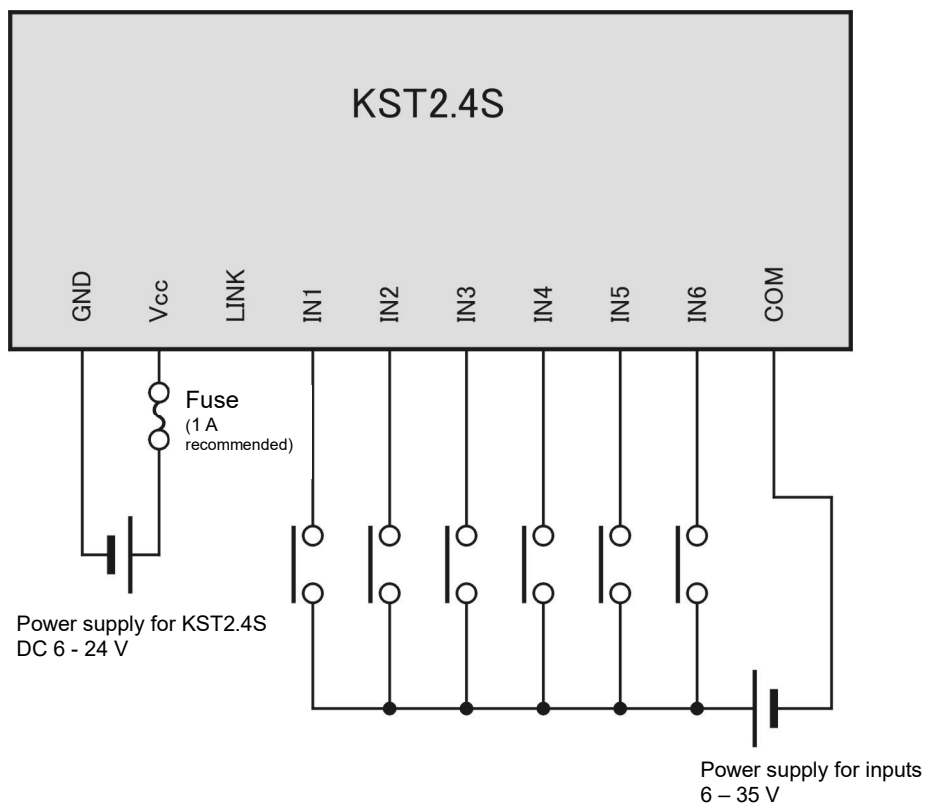
To prevent overcurrent, ensure to insert a fuse in the KST2.4S power supply line.



* The above figure is an example when the COM terminal is connected to the positive.

10.2 Connection example 2

If it is necessary to isolate the KST2.4S from the input circuit, please use separate power supply as shown below.



* The above figure is an example when the COM terminal is connected to the GND.

Regulatory compliance information

Regulatory Statement for FCC

The KST2.4S contains an FCC certified module NK-2.4Y (FCC ID: V9X-NK24Y).

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.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

Caution: Any changes or modifications not expressly approved by the party responsible for product compliance could void the user's authority to operate the equipment.

Caution: Exposure to radio frequency radiation

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate (SAR)

Important notice

- Customers are advised to consult with Circuit Design sales representatives before ordering. Circuit Design believes the provided information is accurate and reliable. However, Circuit Design reserves the right to make changes to this product without notice.
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- As the radio product communicates using electronic radio waves, there are cases where transmission will be temporarily cut off due to the surrounding environment and method of usage. The manufacturer is exempt from all responsibility relating to resulting harm to personnel or equipment and other secondary damage.
- The manufacturer is exempt from all responsibility relating to secondary damage resulting from the operation, performance and reliability of the customer system using this product.

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Cautions

- Communication performance will be affected by the surrounding environment, so communication tests should be carried out before actual use.
- Do not use this equipment in vehicles with the windows closed, in locations where it is subject to direct sunlight, or in locations with extremely high humidity.
- Do not subject the equipment to condensation (including moving it from cold locations to locations with a significant increase in temperature.)
- Do not use the equipment in locations where it is likely to be affected by acid, alkalis, organic agents or corrosive gas.

Warnings

- Do not take apart or modify the equipment.
- Do not remove the product label.

Revision History

Version	Date	Description	Remark
2.0	Oct. 2021	First release of English version	