

IT Controller (used 4G/ 3G/ GSM Communication) JRN-430K User Manual

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Locator Products Groupe
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History

Date	Number	The contents of change
Dec. 07, 2020	1.00	
Jan. 25, 2021	1.01	1.1 Overview 4.4 4G/3G/GSM module Specification addition The following bands of LTE are not used in the United States : Bd1, Bd7.

Index

1	Introduction	4
2	Composition	5
3	Function.....	6
4	Product specification	8
5	Block Diagram	13
6	External Interface	14
7	Outline	17
8	Option.....	18
9	Compliance with FCC and IC Rules and Regulations	21

1 Introduction

IT Controller (used 4G/3G/GSM Communication) JRN-430K is a vehicle small terminal to have the GPS measurement function and the 4G/3G/GSM communication function, and to use it for management and positional information track / theft pursuit etc. of the vehicle. (JRN-430K is a device dedicated to specific customers and will not be sold to the general public.)

As a communications protocol TCP/IP are mounted.

The terminal made by the Gemalto product's PLS62-W is installed.

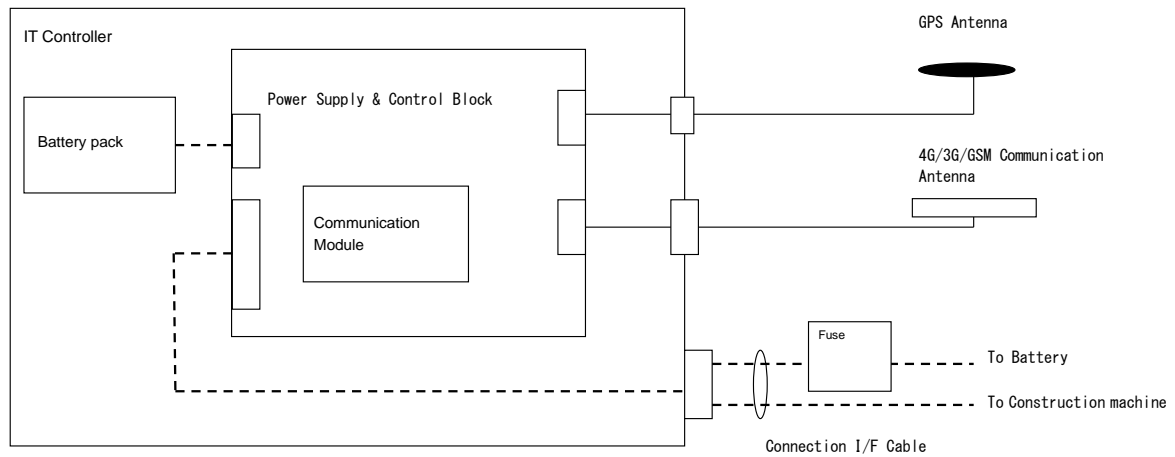
1.1 Overview

The main specification is presented as follows.

No.	Items	Specification	Remarks
1	Communication module	<p>4G/3G/GSM Communication module (PLS62-W Gemalto Product)</p> <p>LTE: Twelve band, 700 (Bd12 <MFBI Bd17>, Bd28) 800 (Bd18, Bd19, Bd20) 850 (Bd5) / 900 (Bd8) / AWS (Bd4) / 1800 (Bd3) / 1900 (Bd2) / 2100 (Bd1) / 2600 (Bd7)</p> <p>UMTS/HSPA+: Seven band, 800 (Bd19) / 850 (Bd5) / 900 (Bd8) / AWS (Bd4) / 1800 (Bd9) / 1900 (Bd2) / 2100MHz (Bd1)</p> <p>GSM/GPRS/EDGE: Quad band, 850/900/1800/1900 MHz</p>	The following bands of LTE are not used in the United States : Bd1, Bd7.
2	Data transfer rate	GPRS: Multislot Class 12 EGPRS: Multislot Class 12	
3	Communication Antenna	7ABLE0009 (FAKRA) (Nippon Antenna)	
4	GPS Antenna	NAY-3930G	
5	Internal Battery	NBB-1300 (1300mAh/6.0V)	
6	Current and Voltage	DC+20V to +32V 400mA max or less /24V Waiting mode: 17mA or less /24V	

2 Composition

NO.	Equipment	Model	Quantity
1	IT Controller	JRN-430K	1
1-1	Communication Module	PLS62-W Gemalto Product	1
1-2	Battery pack	NBB-1300	1
2	GPS Antenna	NAY-3930G	1
3	4G/3G/GSM Communication antenna	7ABLE0009(FAKRA) (Nippon Antenna)	1



(Note#1)

Please prepare IF cable by the visitor side.

(Note#2)

A connection I/F cable requires a fuse because of over-current protection.
Please insert the fuse in three places of a battery, GND, and ACC.

(Note#3)

Please do not take a power supply from DC cigar socket.
It becomes the cause that operation is poor, according to bad connection.

3 Function

- (1) Operation in ACC OFF executes the following.
 - 1. Send data at regular intervals.
 - 2. Respond to calling from the server.
 - 3. Acquisition of information on the actual location by GPS, and Generation of warning outside area.
- (2) Storage of operation data
- (3) Timer
Even if the main source of power is cut, the date and time are maintained.
- (4) Backup
The re-charge battery is installed.
Even if it disconnects a power supply, the operational mode and network transmission setting of IT controller are held.
- (5) Serial communication ports
Connection I/F (CAN), 115200bps(monitor)
- (6) GPS function
Present location is acquired. (WGS84)
- (7) 4G/3G/GSM communication
- (8) Software rewriting function
A software rewriting is done by using the Ethernet.
- (9) Serial communications with the external equipment are done by the serial commands.
 - 1) Key ON
 - 2) Engine ON
 - 3) Key OFF
 - 4) Alarm
 - 5) Fuel residual quantity
 - 6) Engine amount of water
 - 7) Engine oil level
 - 8) Hydraulic oil level
 - 9) Engine oil pressure
 - 10) Engine water temperature
 - 11) Air cleaner
 - 12) Charge
 - 13) DS (compulsive key OFF)
 - 14) RT (the present state inquiry)
 - 15) HS (foxtail millet meter change)
 - 16) CO (command)
 - 17) Automatic key-off judging processing
- (10) Communication protocol
It transmits to the mail server by the e-mail.
- (11) Time Zone
Setting UTC+ α , and operating.
- (12) WiFi communication
Enables communication at 2.4 / 5GHz by IEEE802.11g / n. WiFi supports AP mode.
The maximum number of devices that can connect to WiFi at the same time is two.
Connect a network camera or smartphone to WiFi for use.
- (13) Bluetooth communication
Communication by Bluetooth 4.2 is possible. Only one device can be connected to Bluetooth at the same time. HFP is installed as a voice profile and GATT is installed as a data communication profile. Connect a smartphone (BLE compatible) and a microphone to Bluetooth for use.
- (14) Ethernet communication (100Base-T)
Enables full-duplex communication using CAT5e Ethernet cable.

(15) SD card interface

Allow SDHC cards (class 10) of 4GB or more to be used. The SDHC card stores network camera images, microphone audio, CAN communication LOG, etc.

(16) USB interface

It supports USB2.0 and supports USB Host and Device functions. USB is used by connecting to a webcam, USB microphone, USB memory, and PC (serial communication). It supports OTG. No USB authentication required.

(17) Camera connection

It is possible to connect to a network camera using the Ethernet port and WiFi.
It is possible to connect to a webcam using the USB port.

4 Product specification

4.1 Common Specification

NO.	Items	Specification performance
1	Power supply voltage	DC+20V to +32V
2	Battery pack	NiMH rechargeable battery NBB-1300 (1300mAh/6.0V)
3	SIM Interface	1.8V / 3.0V
4	Current	Communication state : max current Less than 400mA / 24V (+25°C) Standby state: max current Less than 17mA (+25°C) (When not charging the battery)
5	Circumference environment	Operation: -30°C to +70°C Preservation: -40°C to +80°C Humidity of operation: 0% to 90% (don't dew) At use in battery,+ Operation: -20°C to +70°C 0°C to +70°C of the charge operates.
6	Dimension	W 166.4mm x L 220.0mm x H 43.6mm
7	Weight	1,500g or less
8	Case material	SPCC

4.2 Serial Interface Specification

4.2.1 A. DTE CAN (Standard)

NO.	Items	Specification performance
1	Data transmission	SAE J1939
2	Speed	125 / 250 / 500 kbps For excavators: Depends on terminal settings. For cranes: Depends on software settings.
3	Communication format	Extension 29 bit
4	Switch to the RS-232C	By the chip jumper change

4.2.2 B. DTE RS-232C (Standard)

NO.	Items	Specification performance
1	Data transmission	Half duplex start-stop synchronization
2	Signal level	RS-232C
3	Speed	4800 bps
4	Frame length	Variable-length
5	Data length	8 bit
6	Start bit	1 bit
7	Parity bit	None
8	Stop bit	1 bit
9	Character code	EUC

4.2.3 C. DTE CAN (2nd system)

NO.	Items	Specification performance
1	Data transmission	SAE J1939
2	Speed	125 / 250 / 500 kbps For excavators: Depends on terminal settings. For cranes: Depends on software settings.
3	Communication format	Extension 29 bit

4.2.4 D. DTE RS-232C (2nd system, shared with test mode control)

NO.	Items	Specification performance
1	Data transmission	Half duplex start-stop synchronization
2	Signal level	RS-232C
3	Speed	4800 bps
4	Frame length	Variable-length
5	Data length	8 bit
6	Start bit	1 bit
7	Parity bit	None
8	Stop bit	1 bit
9	Character code	EUC

4.2.5 Console (Debug)

NO.	Items	Specification performance
1	Data transmission	Half duplex start-stop synchronization
2	Signal level	RS-232C
3	Speed	115200 bps
4	Frame length	Variable-length
5	Data length	8 bit
6	Start bit	1 bit
7	Parity bit	None
8	Stop bit	1 bit
9	Character	EUC

4.3 GPS Receiver Specification

NO.	Items	Specification performance
1	Model	7DLTS0104 (GPS10) (JRC product)
2	Receiving system	Max 23hannel (high-speed search channel)
3	Received frequency	1575.42MHz (L1), C/A code
4	Land survey system	WGS-84 (Default)
5	Time system	UTC
6	Positioning accuracy	
	Position	5.3m 2DRMS
	Speed	0.04m/sec. RMS
	Direction	Less than 0.14° RMS (Speed 60km/h)
7	Speed	1 sec typ.
8	T.T.F.F (Without signal discontinuation) Open skies	Hot start: 3s typ. / 15s max. Warm start: 33s typ./ 55s max. Cold start: 35s typ./ 60s max.

4.4 4G/3G/GSM module Specification

NO.	Items	Specification performance
1	Model	Cinterion PLS62-W (Gemalto product)
2	Frequency Band	GSM/GPRS/EDGE: Quad band, 850/900/1800/1900 MHz UMTS/HSPA+: Seven band, 800 (BdXIX) / 850 (BdV) / 900 (BdVIII) / AWS (BdIV) / 1800 (BdIX) / 1900 (BdII) / 2100MHz (BdI) LTE (*): Twelve band, 700 (Bd12 <MFBI Bd17>, Bd28) 800 (Bd18, Bd19, Bd20) 850 (Bd5) / 900 (Bd8) / AWS (Bd4) / 1800 (Bd3) / 1900 (Bd2) / 2100 (Bd1) / 2600 (Bd7) (*) The following bands of LTE are not used in the United States : Bd1, Bd7.
3	GSM Class	Small MS
4	Output power (according to Release 99)	Class 4 (+33dBm ±2dB) for EGSM850 Class 4 (+33dBm ±2dB) for EGSM900 Class 1 (+30dBm ±2dB) for GSM1800 Class 1 (+30dBm ±2dB) for GSM1900 Class E2 (+27dBm ± 3dB) for GSM 850 8-PSK Class E2 (+27dBm ± 3dB) for GSM 900 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1800 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1900 8-PSK Class 3 (+24dBm +1/-3dB) for UMTS 800, WCDMA FDD BdXIX Class 3 (+24dBm +1/-3dB) for UMTS 850, WCDMA FDD BdV Class 3 (+24dBm +1/-3dB) for UMTS 900, WCDMA FDD BdVIII Class 3 (+24dBm +1/-3dB) for UMTS AWS, WCDMA FDD BdIV Class 3 (+24dBm +1/-3dB) for UMTS 1800, WCDMA FDD BdIX Class 3 (+24dBm +1/-3dB) for UMTS 1900, WCDMA FDD BdII Class 3 (+24dBm +1/-3dB) for UMTS 2100, WCDMA FDD BdI
5	Output power (according to Release 8)	Class 3 (+23dBm ±2dB) for LTE 700, LTE FDD Bd12 <MFBI Bd17> Class 3 (+23dBm ±2dB) for LTE 700, LTE FDD Bd28 Class 3 (+23dBm ±2dB) for LTE 800, LTE FDD Bd18 Class 3 (+23dBm ±2dB) for LTE 800, LTE FDD Bd19 Class 3 (+23dBm ±2dB) for LTE 800, LTE FDD Bd20 Class 3 (+23dBm ±2dB) for LTE 850, LTE FDD Bd5 Class 3 (+23dBm ±2dB) for LTE 900, LTE FDD Bd8 Class 3 (+23dBm ±2dB) for LTE AWS, LTE FDD Bd4 Class 3 (+23dBm ±2dB) for LTE 1800, LTE FDD Bd3 Class 3 (+23dBm ±2dB) for LTE 1900, LTE FDD Bd2 Class 3 (+23dBm ±2dB) for LTE 2100, LTE FDD Bd1 Class 3 (+23dBm ±2dB) for LTE 2600, LTE FDD Bd7 The following bands of LTE are not used in the United States : Bd1, Bd7.
6	Power supply	3.0V < V _{BATT+} < 4.5V
7	Operating temperature (board temperature)	Normal operation: -30°C to +85°C Extended operation: -40°C to +90°C
8	Physical	Dimensions: 33mm x 29mm x 3.06mm Weight: approximately. 5g
9	RoHS	All hardware components fully compliant with EU RoHS Directive
10	LTE features	3GPP Release 9 UE CAT 1 supported DL 10.2Mbps, UL 5.2Mbps
11	HSPA features	3GPP Release 8 DDL 7.2Mbps, UL 5.7Mbps HSDPA Cat.8 / HSUPA Cat.6 data rates Compressed mode (CM) supported according to 3GPP TS25.212

12	UMTS features	3GPP Release 4 PS data rate – 384 kbps DL / 384 kbps UL CS data rate – 64 kbps DL / 64 kbps UL
13	GSM / GPRS / EGPRS features	GPS: Multislot Class 12 Full PBCCH support Mobile Station Class B Coding Scheme 1 – 4 EGPRS: Multislot Class 12 EDGE E2 power class for 8 PSK Downlink coding schemes – CS 1-4, MCS 1-9 Uplink coding schemes – CS 1-4, MCS 1-9 SRB loopback and test mode B 8-bit, 11-bit RACH PBCCH support 1 phase/2 phase access procedures Link adaptation and IR NACC, extended UL TBF Mobile Station Class B
14	SMS	Point-to-point MT and MO Cell broadcast Text and PDU mode

By PLS62-W 4G/3G/GSM communication module specification.

4.5 External connector specification

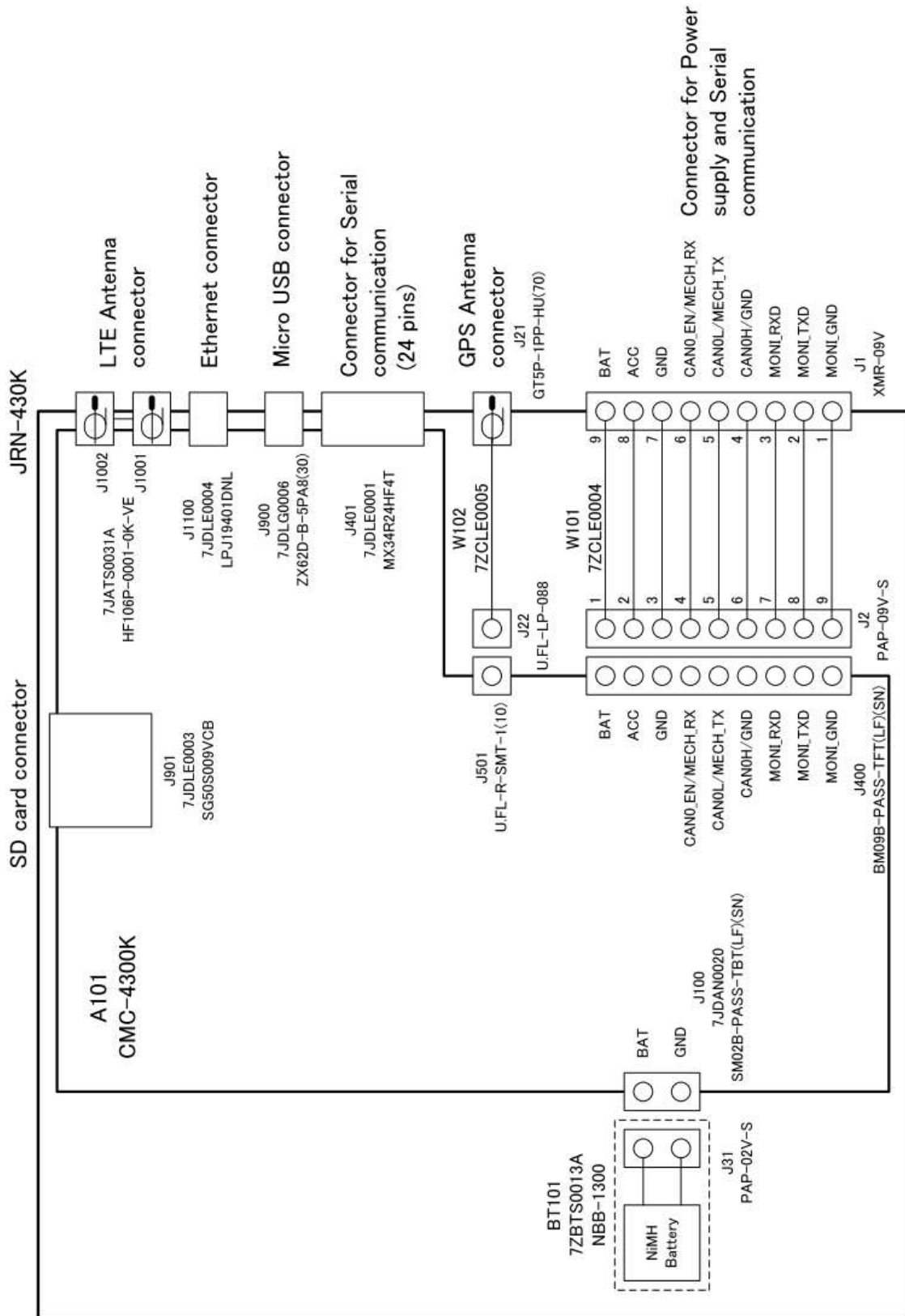
NO.	Items	Specification performance
1	Power/Serial connector	XMR connector (JST product) Model : XMR-09V [Cable side connector model : XMP-09V(JST product)]
2	Interface connector	(JAE product) Model: MX34R24HF4T
3	GPS antenna connector	GT5 connector (HIROSE product) Model: GT5P-1PP-HU(70)
4	Communication antenna connector	FAKRA connector (Yamaichi Denki product) Model: HF106P-0001
5	USB connector	(HIROSE product) Model: ZX62D-B-5PA8(30)
6	Ethernet connector	(LINK-PP product) Model: LPJ19401DNL
7	SD Card connector	(JAE product) Model: SG50S009VCB

4.6 Software

JRN-430K application software external I/F specifications is prescribed about the command list and block structure about software.

Implement the software that customers have created.

5 Block Diagram

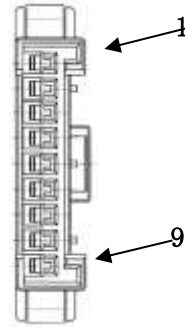


6 External Interface

6.1 External Interface Specification

Pin Assign

NO	Terminal name	Remarks
1	GND	GND
2	Moni-Tx	Monitor → IT controller
3	Moni-Rx	IT controller → Monitor
4	CAN H	CAN Low-Level Voltage I/O
5	CAN L	CAN High-Level Voltage I/O
6	CAN_EN	CAN Enable
7	GND	GND
8	ACC	ACC signal
9	BAT	Main battery



6.2 Interface Connector

Pin Assign

NO.	Terminal name	Remarks
1	CAN1_EN	CAN1 enable signal
2	CAN1_H	CAN1 High-Level input / output
3	CAN1_L	CAN1 Low-Level input / output
4	CAN1_GND	GND
5	SOFT_RX(O)	Serial output for Linux Kernel
6	SOFT_TX(I)	Serial input for Linux Kernel
7	SOFT_GND	GND
8	GPI0	GPI0
9	GPI0_GND	GND
10	GPI1	GPI1
11	GPI1_GND	GND
12	GPI2	GPI2
13	GPI2_GND	GND
14	GPO0	GPO0
15	GPO0_GND	GND
16	GPO1	GPO1
17	GPO1_GND	GND
18	GPO2	GPO2
19	GPO2_GND	GND
20	GPO3	GPO3
21	GPO3_GND	GND
22	MECH_RX(O)	Serial output for DTE
23	MECH_TX(I)	Serial Input for DTE
24	GND	GND

6.3 GPS Antenna Connector

Pin Assign

NO.	Terminal name	Remarks
1	RF	Receive
2	GND	GND

6.4 Communication Antenna Connector

Pin Assign

NO.	Terminal name	Remarks
1	RF	TX / RX
2	GND	GND

6.5 USB Connector

Pin Assign

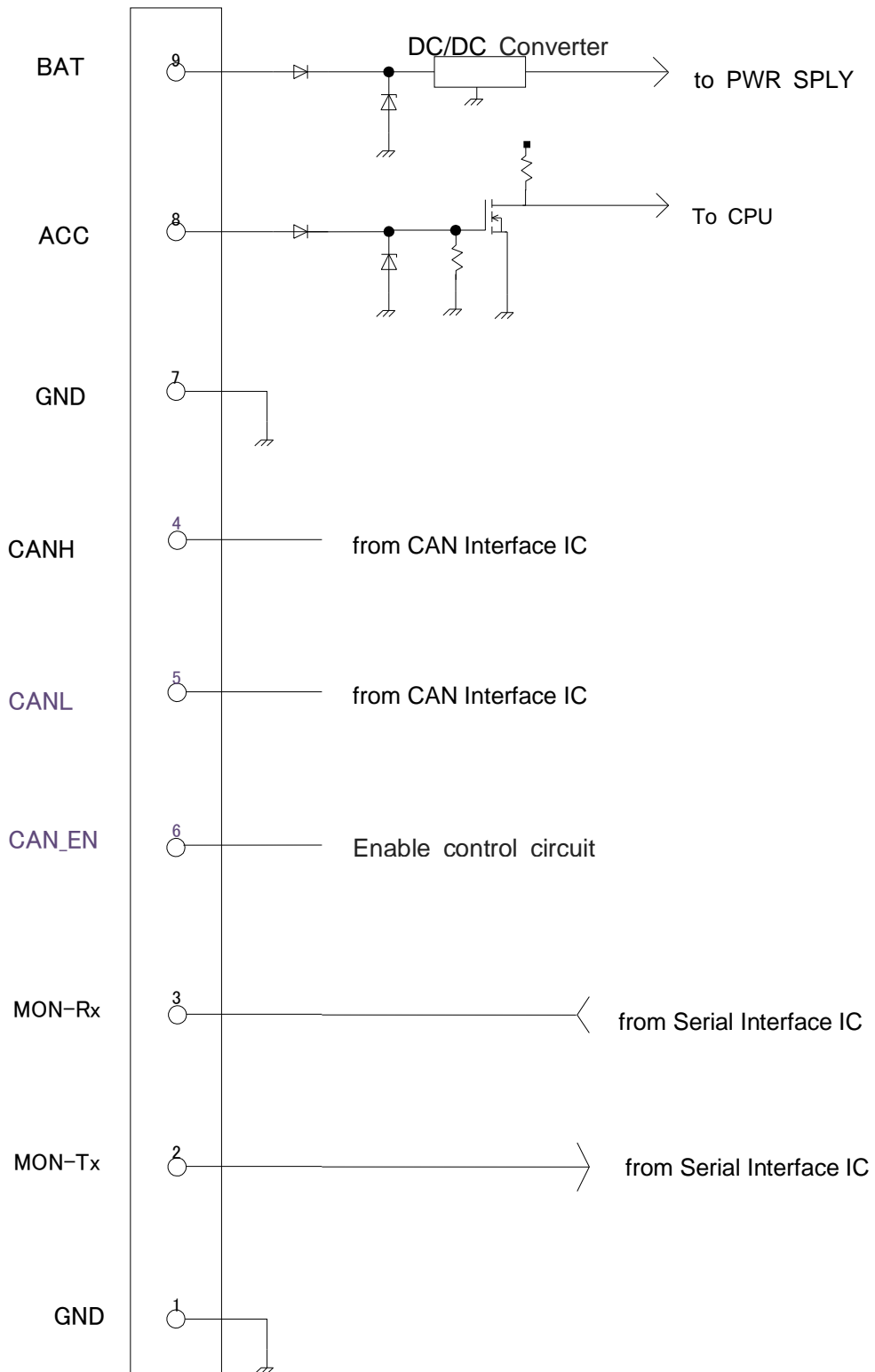
NO.	Terminal name	Remarks
1	+5V	For power supply +
2	D-	For data transmission -
3	D+	For data transmission +
4	ID	For identification
5	GND	For power supply -

6.6 Ethernet Connector

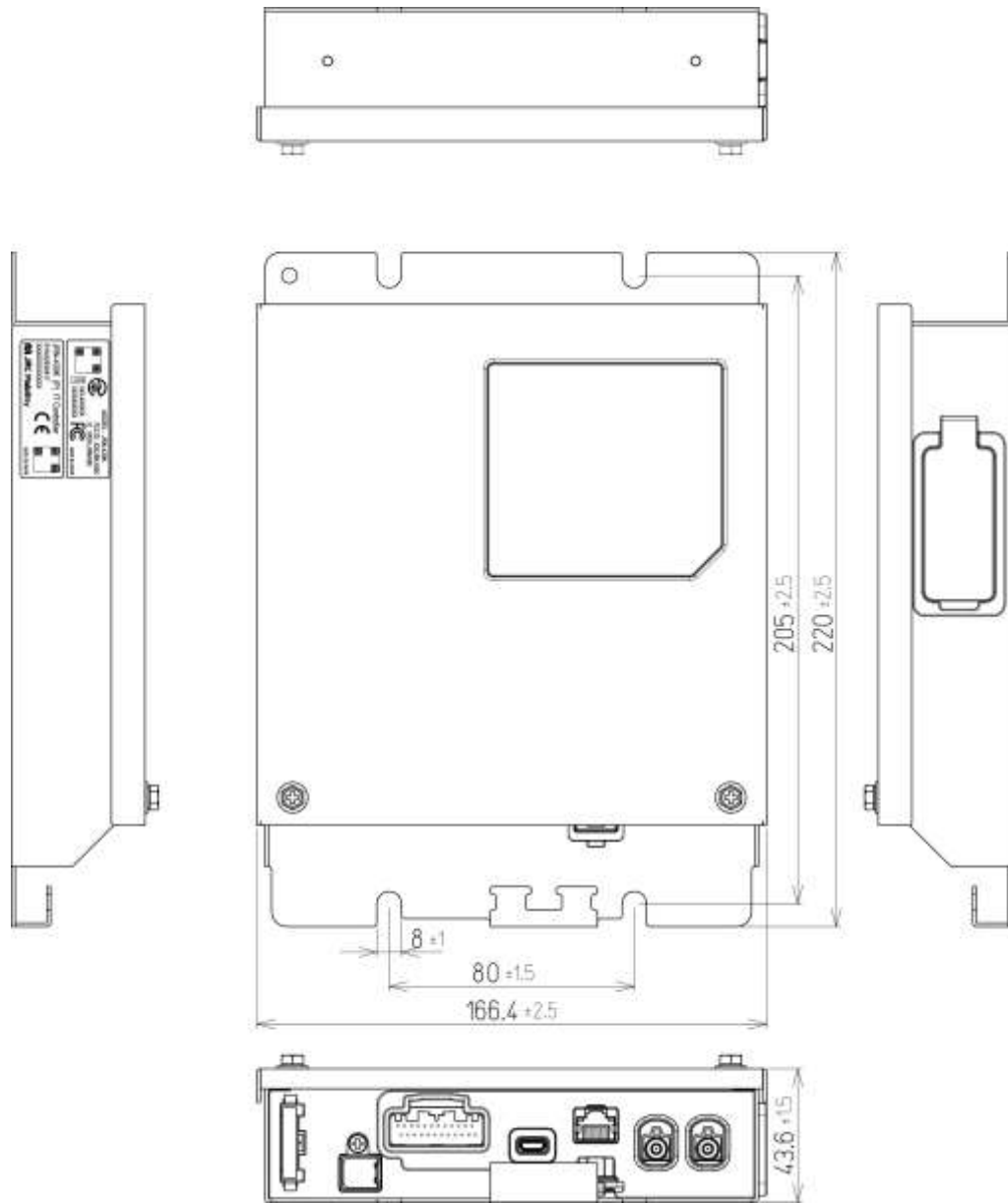
Pin Assign

NO.	Terminal name	Remarks
1	RD+	For data reception +
2	RD-	For data reception -
3	TD+	For data transmission +
4	NC	NC
5	NC	NC
6	TD-	For data transmission -
7	NC	NC
8	NC	NC

6.7 Equivalent circuit



7 Outline



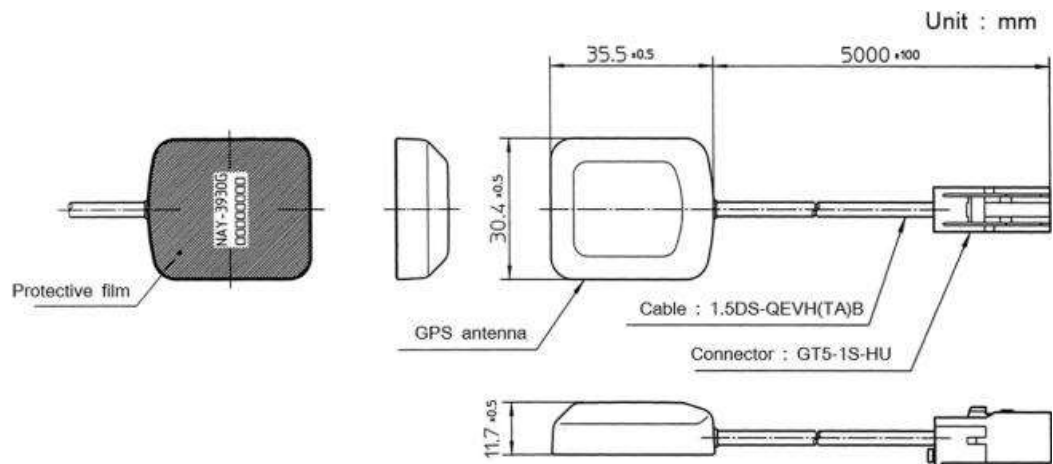
8 Option

8.1 GPS antenna NAY-3930G

8.1.1 Specification

NO.	Items	Specification performance
1	Model	NAY-3930G
2	Power supply voltage	2.7V to 3.3V
3	Consumption current	12mA to 30mA
4	Cable	1.5D Cable and 5M (Black)
5	Temperature range of operation	-30°C to +85°C
6	Storage temperature range	-40°C to +100°C
7	Humidity	20% to 95% (relativity, however thing without dew condensation)
8	Received frequency range	1575.42 ± 1.023MHz
9	Polarized wave	Right-handed circular polarization
10	Profit	25±6dBi (ascending vertical angle = 90 degrees)
11	Output impedance	50 ohms
12	OUTPUT VSWR	2.0, or less
13	Connector	GT5-1P-HU (HIROSE product)

8.1.2 Outline

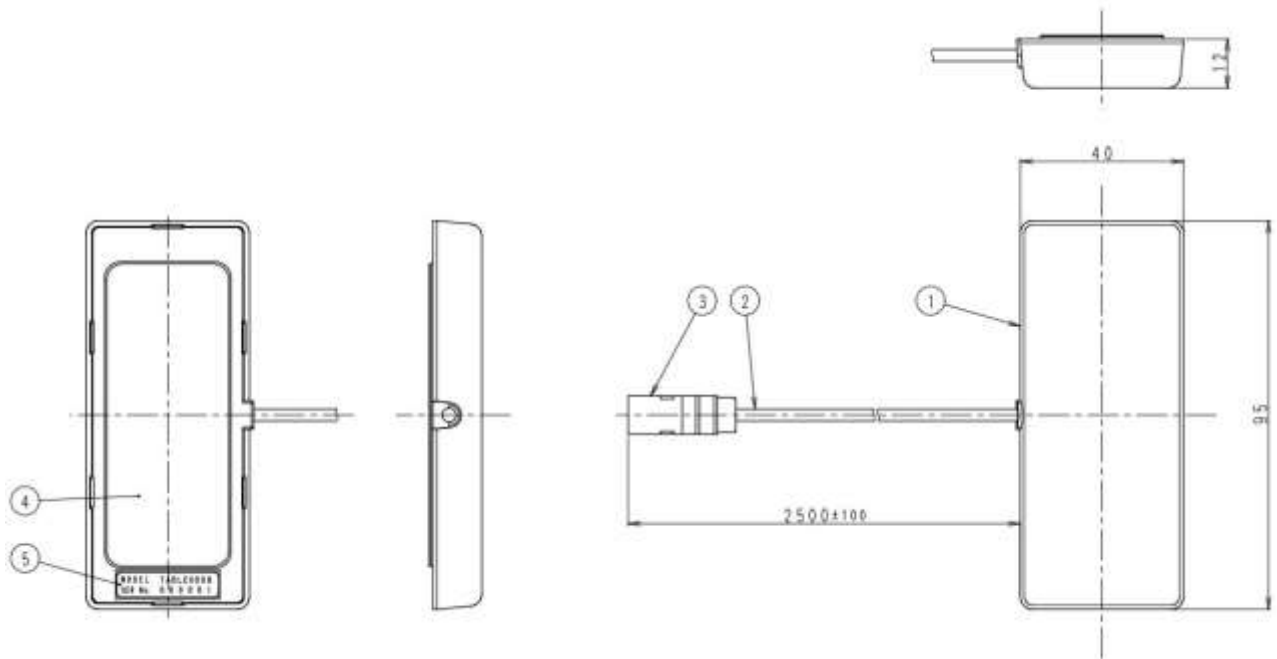


8.2 Communication antenna

8.2.1 Specification

No.	Items	Specification performance
1	Model	7ABLE0009 (FAKRA) (Nippon Antenna)
2	Antenna type	Half-wave length dipole antenna
3	Purpose	For the indoor antenna, double-sided tape attachment
4	Weight	approximately 70g
5	Environmental Regulation	Compliant with RoHS and ELV
6	Frequency	① 699 – 803 MHz ② 814 – 960 MHz ③ 1427 – 1511 MHz ④ 1710 – 2170 MHz ⑤ 2496 – 2690 MHz
7	Nominal impedance	50Ω
8	VSWR	① 4.0 at the end of the cable. ②③④ 2.5 at the end of the cable. ⑤ 3.0 at the end of the cable. It is measured in free space.
9	Peak gain	① -1.0 dBi at the end of the cable. ②③ +1.0 dBi at the end of the cable. ④ +1.6 dBi at the end of the cable. ⑤ -2.5 dBi at the end of the cable. It is measured in free space.
10	Polarization	Vertical
11	Directivity	Horizontal plane omni-directional
12	Input power	Not exceeding 2W
13	Cable loss (Reference)	900MHz 1.58dB / 2.5m 2000MHz 2.45dB / 2.5m
14	Operating temperature range	-30°C to +80°C
15	Storage temperature range	-40°C to +85°C
16	Operating humidity limits	0% to 95%
17	Connector	FAKRA

8.2.2 Outline



NO.	Items	Specification performance
1	Radome material	AES plastic
2	1.5D Coaxial cable	2.5m ± 10cm
3	FAKARA Rosenberger K	PBT-GF20 other
4	Double-sided tape	518TF
5	Label	Tetoron® film

9 Compliance with FCC and IC Rules and Regulations

• FCC

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, including interference that may cause undesired operation.

CAUTION:

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

NOTE: 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 or more 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.

• IC

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Antenna type/Model name	: Half length dipole antenna/7ABLE0009(FAKRA)
Maximum Antenna gain :	699 - 803MHz -1.0dBi 814 - 960MHz +1.0dBi 1427 - 1511MHz +1.0dBi 1710 - 2170MHz +1.6dBi 2496 - 2690MHz -2.5dBi
Nominal impedance	: 50Ω

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Type d'antenne /Nom du modèle	: Antenne dipôle demi-longueur/7ABLE0009(FAKRA)
Le gain maximal de l'antenne:	699 - 803MHz -1.0dBi
	814 - 960MHz +1.0dBi
	1427 - 1511MHz +1.0dBi
	1710 - 2170MHz +1.6dBi
	2496 - 2690MHz -2.5dBi
Impédance nominale	: 50Ω

• FCC/IC

RF exposure compliance

1) To comply with FCC/IC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

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

Normes d'exposition RF

1) Afin de se conformer aux normes FCC / IC RF exigences de conformité de l'exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de l'appareil et les personnes.

2) Cet émetteur ne doit pas être co-localisées ou opérant en conjonction avec une autre antenne ou émetteur.