RFID Reader Specification

[CTS-RFID-LM2X]

Revision 1.5
08/MAY./2023

Approval Signatures :	☐ Name (Job Position) Date:	☐ Name (Job Position) Date:	☐ Name (Job Position) Date:

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Revision History:

Rev.	Date/Initials	Location	Description of Change
1.0	02/APL./2020 KM. JO	All	Initially prepared
1.3a	28/JUNE./2021 ydryu	Pahse. 3	Added descriptions
1.3b	06/JULY./2021 ydryu	Pahse. 3	Added C1 option
1.4b	23/AUG./2021 ydryu	Phase. 4	Changed operation temp ragne Add antenna option comments
	14/SEP./2021 ydryu	Phase. 4	Added max power spec.
	24/SEP./2021 ydryu	Phase. 9	Updated certification
1.5	29/DEC./2021 JH.CHA	Phase 6	Added drawing sheet
	29/APR/2022 ydryu	Phase 10	Exchanged ce documents DOC->COC
	12/MAY/2022 ydryu	Phase 10	Add phase about ordering code for setting parmeters of serial commnucation
	18/MAY/2022 ydryu	-	Chaned ordering code and position of pahse
	23/JAN/2023 ydryu	- Phase5	Added FCC warning Correct current information 0.41A => 0.4A
	10/APR./2023 ydryu	Phase7	Add example of RFID Reader install
	08/MAY./2023 ydryu	Phashe	Changed max strength to 53.55

FCC Compliance Statement

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.

FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

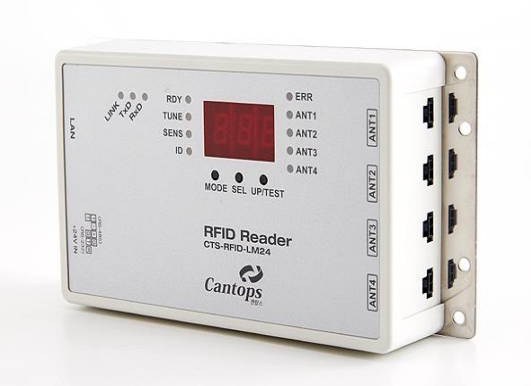
FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

1. INTRODUCTION OF THE PRODUCT

As a 134.2KHz band frequency RFID Reader, this product is manufactured to be able to communicate with ISO11784 & ISO11785 conforming Transponders. In the meantime, this product is designed to be operated in various noise environments, and also, is optimized for the use of management of the logistics of the semiconductor lines. This product is consisted of the Reader main body and RFID antenna.

RFID Reader



< LM24>

< LM21>

ANT. Type

< TYPE 1>

< TYPE 2>

< TYPE 3>

< TYPE 4>

< TYPE 5>

2. CHARACTERISTICS OF THE PRODUCT

- This is Tag (Transponder) reader for the management of the logistics of semiconductors
- This product can be operated stably even under the circumstances of electromagnetic noises such as HID, OHT etc.
- Preset status can be verified by using product swtich
- This product is selected as the standard item of major semiconductor companies in domestic and foreign countries.

※ **Matters need attention**

Precautions

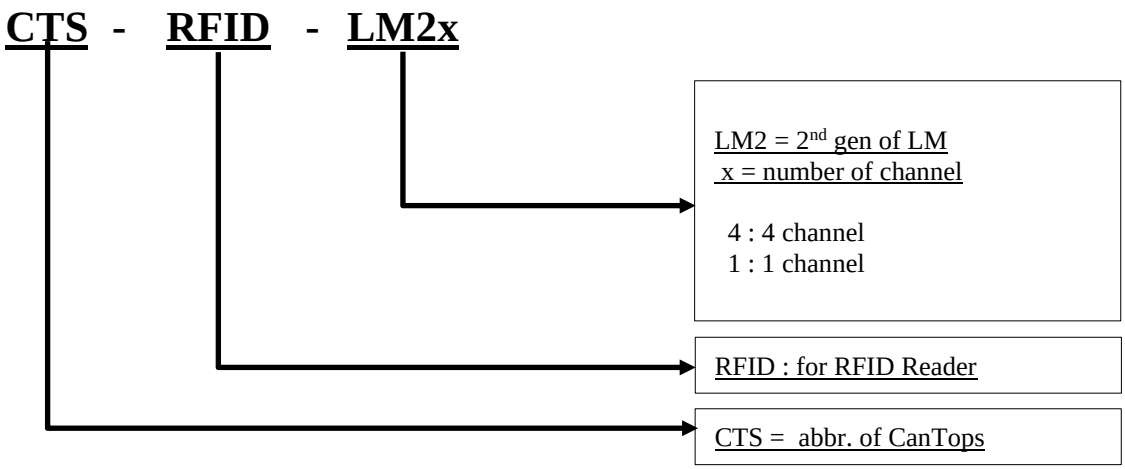
☞ Watch out for the electric shock when contacting with the antenna cable or inside components.
: Over 200V of high voltage is energized during the operation of the reader.

☞ It can be the cause of the functional error or damages of the components if the items other than the designated one is used..
: Reader and antenna are adjusted each other optimally.

☞ Check the specification of the antenna before use,
: Preset value of the reader differs from each other depending on the type of antenna.
: Do not cut or modify the antenna cable arbitrarily.

☞ Minimize the influences and interferences of surrounding noises.
: In order for the optimized quality of the product, install it in the places of no existance of 120~140KHz band frequency.

3. PRODUCT CODE



- Refer to phanse "4. Ordering code" for ordering reader
- Refer to document " LF RFID Antenna Specification" for ordering Antenna

Classification	Product Name	Product Code
Reader	RFID Reader (1channel)	CTS-RFID-LM21
	RFID Reader (4channels)	CTS-RFID-LM24
Antenna	Type # 1 Stick (62x13mm)	CTS-RFID-Axxx*-xxxx
	Square (43x30.5x12mm)	CTS-STBA-EC-0-xxxx*
	Square (43x30.5x12mm)	CTS-STBA-EC-1-xxxx*

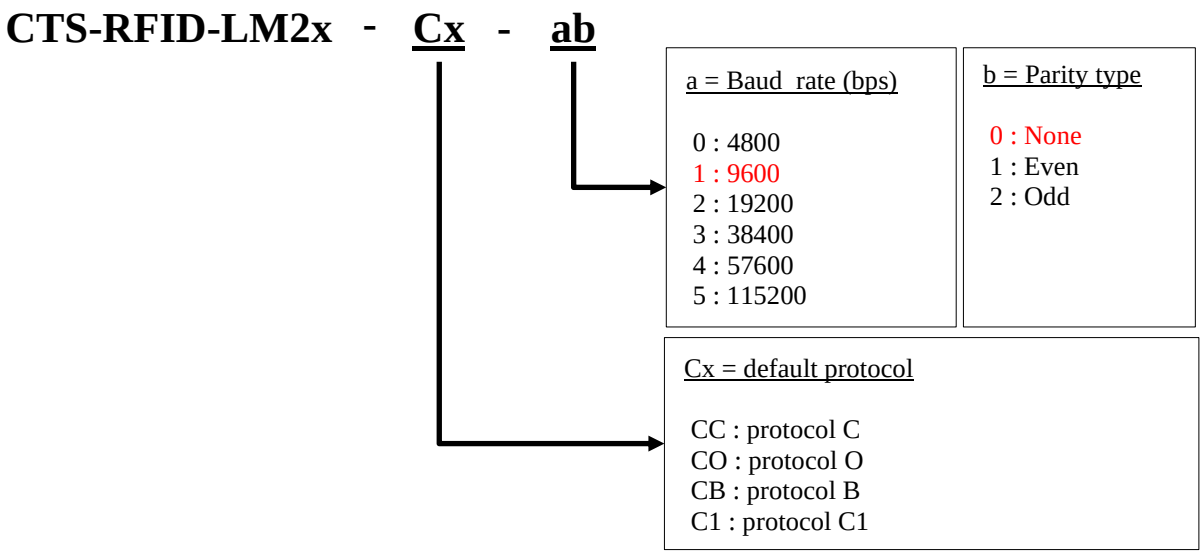
*) * xx, xxx : Antenna cable length (provided by meter only, MAX. 10M)

❖ Example of the product code) xxxx : Cable length 2M

- Stick antenna : Type # 1 CTS-RFID-A*C01*-*0200*
- Square antenna : CTS-STBA-EC-0-*0200*

4. ORDERING CODE

- Orderring code for changing parmeters of communicaions



- Example of ordering code

: IF Cx-ab of ordering code is "null", code ab will be "10"

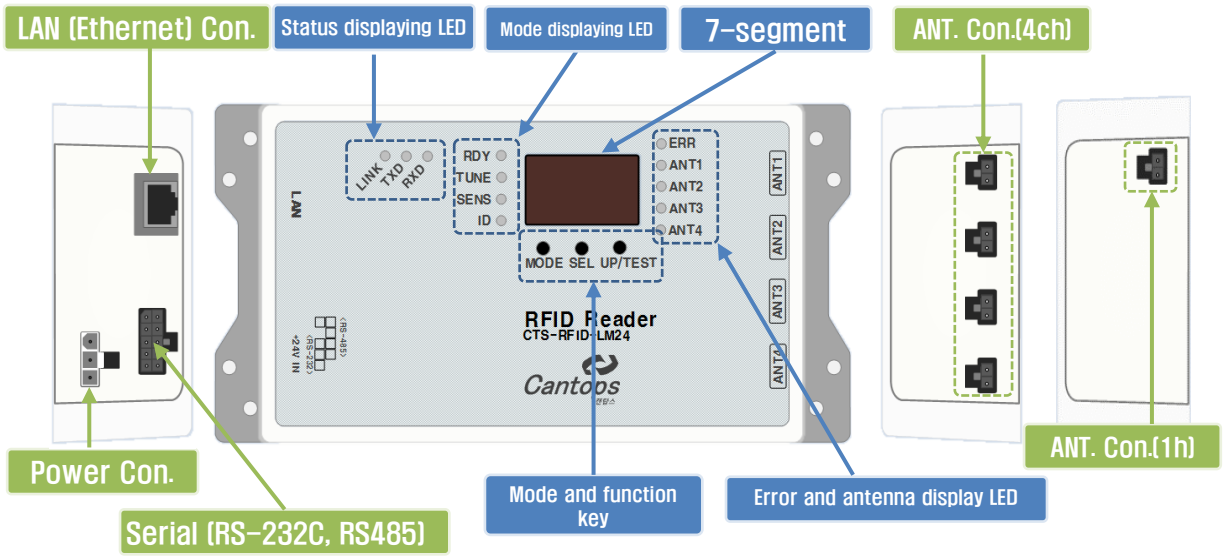
protocol	Baud Rate [bps]	Parity	Example of ordering code
CC	9,600	None	CTS-RFID-LM24-CC-10 CTS-RFID-LM21-CC-10
CO	9,600	None	CTS-RFID-LM24-CO-10 CTS-RFID-LM21-CO-10
CO	9,600	Even	CTS-RFID-LM21-CO-11
CB	19,200	Even	CTS-RFID-LM21-CB-21

5. IMPORTANT SPECIFICATION OF THE PRODUCT

Classification	Items		Contents
RFID TAG reading capability	Frequency		134.2KHz
	Maximum H-Field Strength		53.55dBuA/m@3m
	Reading time *		Min. : 130ms / Page, Max.: 500ms,
	Writing time*		Min.: 390ms / Page, Max.: 1500ms
	Max. Reading Distance		110 ~ 160mm (varies depending on the type of antenna)
	Max. Writing Distance		70 ~110mm (varies depending on the type of antenna)
	Bending diameter		45mm
	Length		1M ~ 5M (optional, provided by meter only)
	Material		PVC
Antenna (option)	CTS	Stick	CTS-RFID-ACzz/AOzz/ABzz-xxyy * refer to document "HF RFID Specification"
		Square	CTS-STBA-ECO/1-xxx CTS-STBA-MCO/1-xxx * refer to document "HF RFID Specification
	Material		PC, Black
	Connector		43650-0200 (Molex)
Types of Tags	Supports 3 types of MPT, SPT, RO		Ex) RI-TRP-DR2B : 17Page ´ 64bit, Read/Write
Communication specification	RS-232C		1ea, 1:1, Full Duplex
	RS-485		1ea, 1:N (Max. 32), Half Duplex
	LAN		1ea, 100/10 Full Duplex
	Communication protocol		Cantops Protocol I / II
	Communication speed (bps)		4800, 9600, 19200, 38400, 57600, 115200
Manual operation panel	Status displaying LED		3 LEDs, Displays the status of Serial transmission and Ethernet link
	Mode displaying LED		4 LEDs, Displays the functions of each mode
	7 Segment display		3 LEDs, Displays each of the function value, ID setup, success or error of communication, and error code
	Error and antenna displaying LED		LEDs for the display of occurrence of error and antenna port
	Manual operation switch		3 LEDs, This is for the manual installation without PC
Environment	Storage		Temperature: -25 ~ 70° C, Humidity: 5~95 %RH (however, no condensation is allowed)
	Operation		Temperature: 0 ~ 50° C, Humidity: 35~85 %RH (however, no condensation is allowed)
Power	Input power		DC 24V, when reading - 0.4A, stanby - 0.1A
Size (W ´ H ´ D)			185*97*41.2mm (extruded part of the connector excluded)
Case material			ABS, SUS (Steel)
Weight			Approx. 540g (weight of the main body)

6. NAME AND FUNCTION OF EACH PART

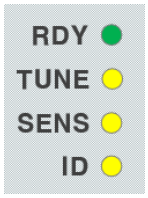
Appearance (front)



Status displaying LED (displays the communication status)

- LINK : Turned on when LAN is connected
- TxD : Turned on when transmitting the data to LAN and serial port
- RxD : Turned on when correct format command is transferred to LAN and serial port

Mode displaying LED (displays the mode of opeation)



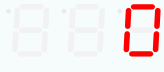
- RDY : LED will be turned on continuously in normal mode. LED will be turned on in TAG Reading & Writing state
- TUNE : LED will be turned on in antenna tunning mode
- SENS : LED will be turned on in noise measuring mode
- ID : LED will be turned on in ID setup mode

Mode and function key

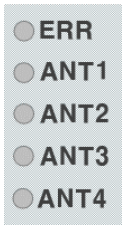
Key	기능
MODE	You can select RDY, TUNE, SENS and ID mode
SEL	• You can select ANT1, ANT2, ANT3 and ANT4 •) This key has an Enter Key function in ID setup mode
UP/TEST	• System will start selected operation from corresponding Mode – RDY mode : System reads the selected TAG page through the selected antenna – TUNE mode: System performs the TX TUNE of selected antenna – ID mode : System will enter into the ID change mode (preset ID will be flickering) ✓ ID will be increased up to 32 with increment of 1 if clicked in ID change mode (ID change) ✓ Click SEL key when desired ID # is displayed. ✓ IF click and hold longer than 3 seconds in ID change mode : ID will be initialized to 0

❖ 7-Segment display (displays each of the status information)

- to be used to display the information such as the reading status and its unique # (ID) of RFID, noise level, antenna tunning value etc.

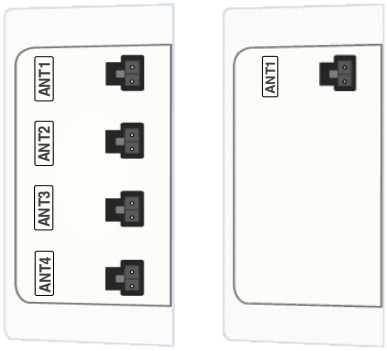
Classif ication	Stauts	Display	Details
READ/ WRITE	Sc (success)		• Description of the display during Read/Write operation – Displays whether the Tag (Transponder) Read/Write operation is successful or not – Sc0 : Initial Reading is successful – Sc1 : Successful after the 1st retry – Er5 : Error code
	Er (error)		
RDY	ID = 1		• Displays the ready status information – Displays the standard accessing status during booting mode – Displays the IDs allocated to the antenna port 1 ~ 4 in a sequencial order
	ID = 32		
TUNE	Tune = 7		• Displays the TUNE status information – Displays the TX TUNE setup value of the selected antenna port – Displays using 0~15 of value – Values will be renewed in manual or auto mode.
	Tune = 12		
SENS	Noise = 0		• Displays the Sens status information – Displays the noise interference value of the selected antenna port – Displays with 0~99 of number (bigger number means more severe noise interference)
	Noise = 50		
ID	When ID=0 is selected		• Displays the ID setup information – Displays the preset ID value of the selected antenna port (displays in number) – Corresponding antenna will not be used if ID is set to 0.
	When ID=12, is selected		
dot	Continuous mode		• Displays the continuous operation setup : Upper left dot will be flickering if mode key is pressed and held for extended period of time. – RDY ⇒ Continuous reading, TUNE,SEN ⇒ Continuous mode, ID ⇒ System is in changeable state – Return to RDY mode if mode key is clicked once or standby for approx. 8 seconds.

Antenna and error displaying LED (displays activated antenna and occurrence of error)



- ERR : LED will be turned on when error occurred on the selected antenna. Turning on state will be maintained until the next performance is successful.
- ANT 1~4 : Port can be selected in a sequencial order by clicking the SEL key.

Antenna connector



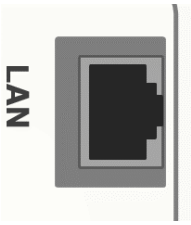
-4CH

You can connect up to 4 antennas
reader is consisted of 4 ports and you can communicate with up to 4 TAGs
Reading will be done in a sequencial order (simultaneous reading is not available

-1CH

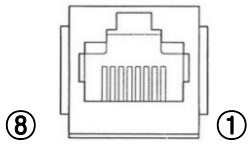
You can connect up to 1 antennas

LAN (Ethernet) connector (Ethernet cable pin map)

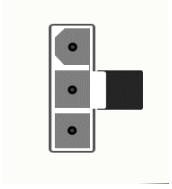


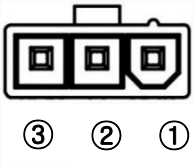
- Cross Cable is recommended for the Ethernet

Pin #	⑧	⑦	⑥	⑤	④	③	②	①
Function	N.C	N.C	RX-	N.C	N.C	RX+	TX-	TX+

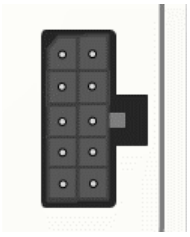


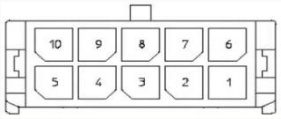
Power connector (DC24V input power connector)



Name	Product name
RFID side connector	39-30-3035 , Molex
Wire side housing	• Housing: 39-01-4031, Molex • Terminal: 5556 series, Molex
Board side connector pin arrangement	 ① Earth ② GND ③ +24V

Serial (RS-232C, RS485) connector



Name	Product name
RFID side connector	43045-1000 , Molex
Wire side housing	• Housing: 43025-1000 or 43025-1008, 43025-1010 , Molex • 43030 series , Molex
Board side connector pin arrangement	

Example of RS-232C wire

RFID			Computer (D-SUB 9 pin)	
Function	Number		Function	Number
RxD	1	←	3	TxD
TxD	2	→	2	RxD
GND	3	—	5	GND

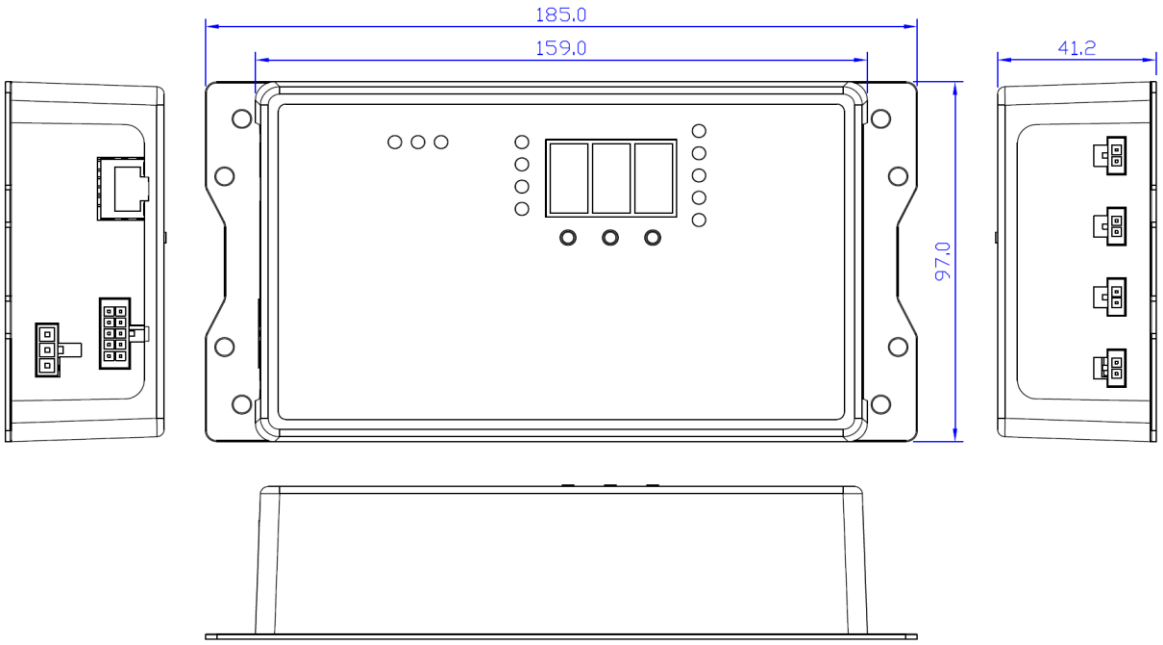
Example of RS-485 wire

RFID			Computer (D-SUB 9 pin)
Function	Number		Function
D+	8	↔	D+
D-	9	↔	D-
GND	7	—	GND
Terminating resistance	5	⌐	
Terminating resistance	10	⌙	

※
Terminating resistance No. 5 and 10 pin need to be connected to the end of RS-485 wire.

7. SPECIFICATION OF THE DEVICE

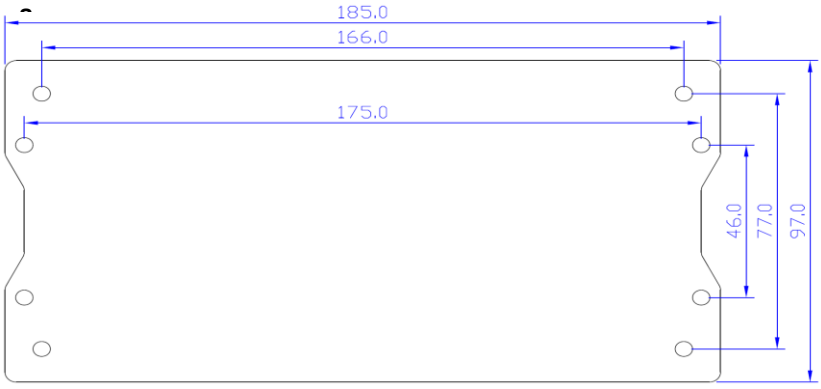
Case of RFID Reader



Unit: mm

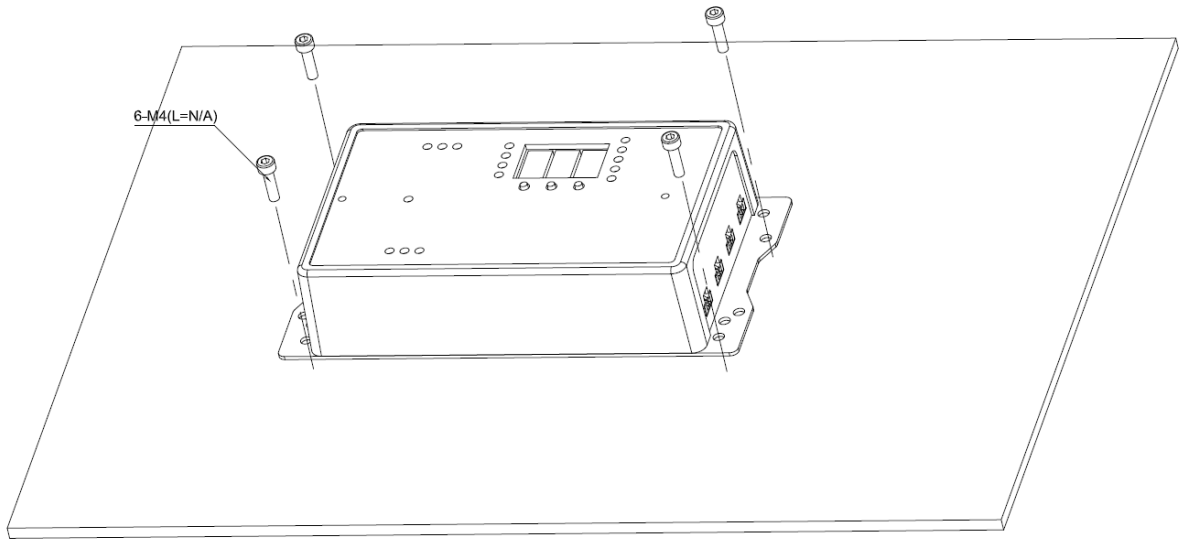
Bracket of RFID Reader

Fixing hole : ∅4.5 ⋆

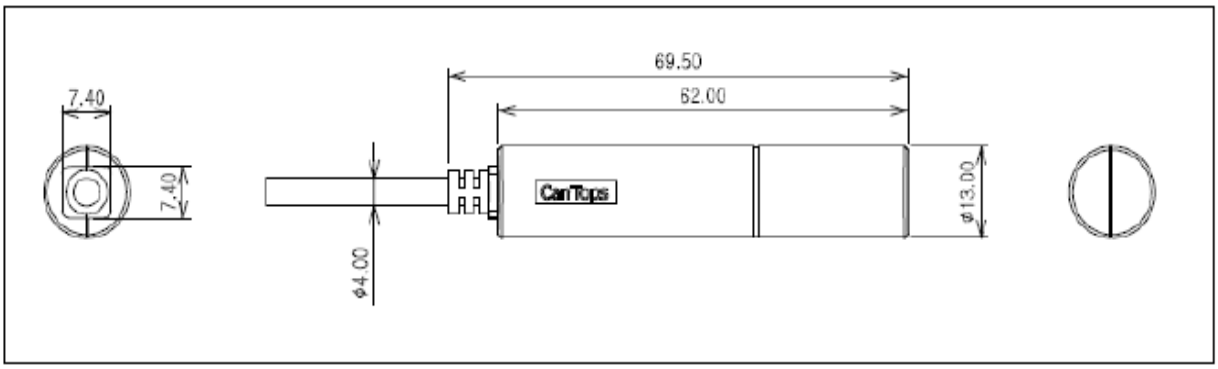


Unit: mm

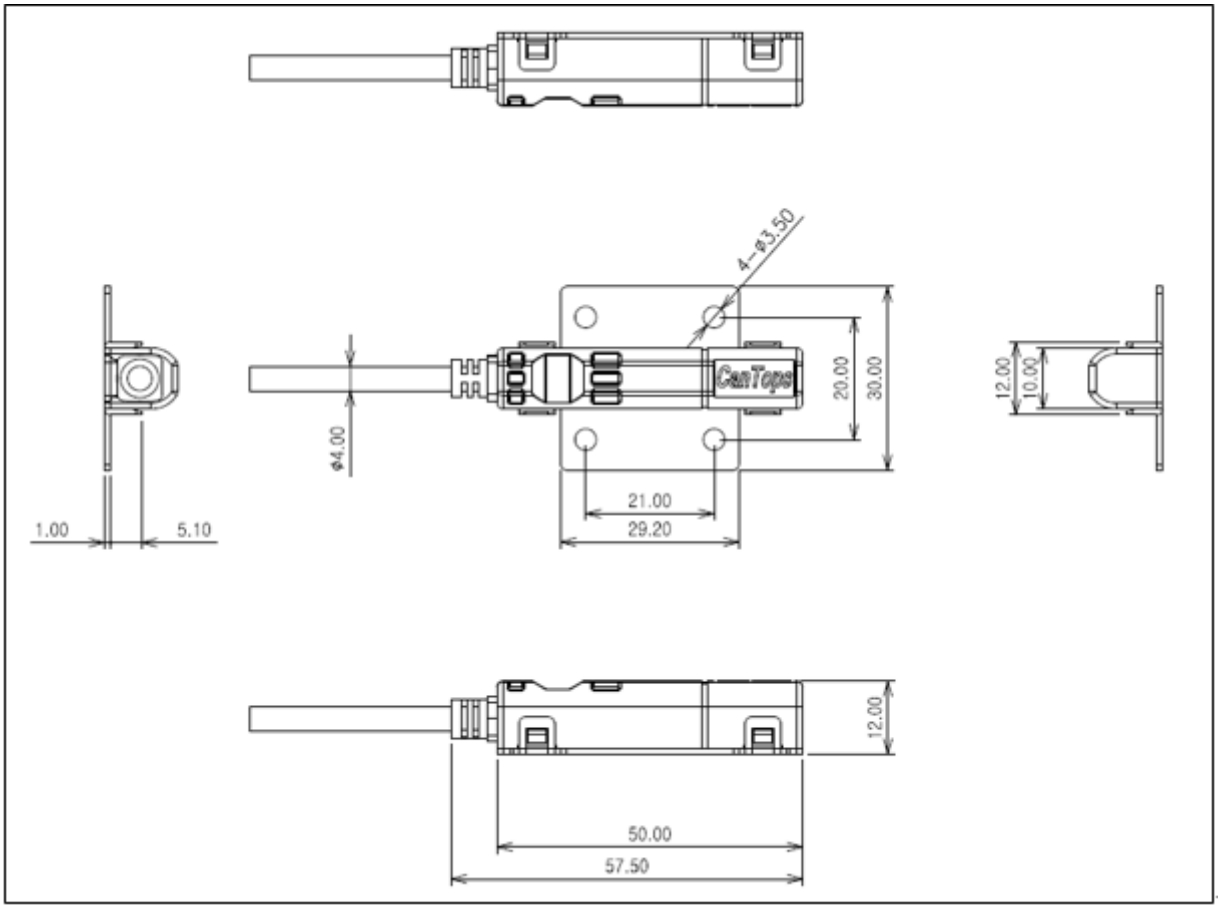
Example of RFID Reader install



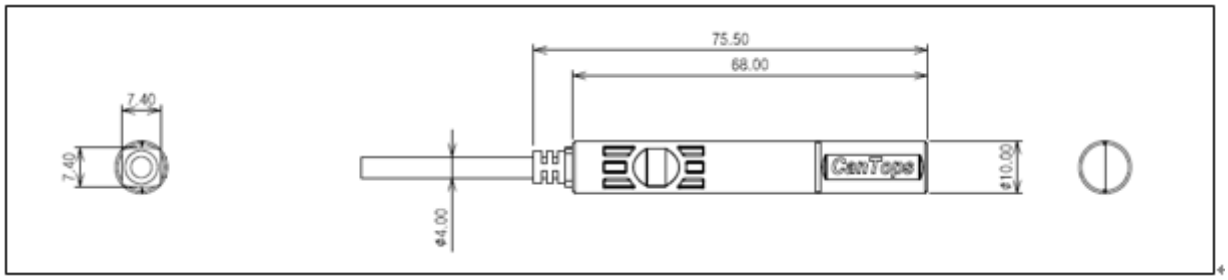
Type 1,2 _ Stick Antenna



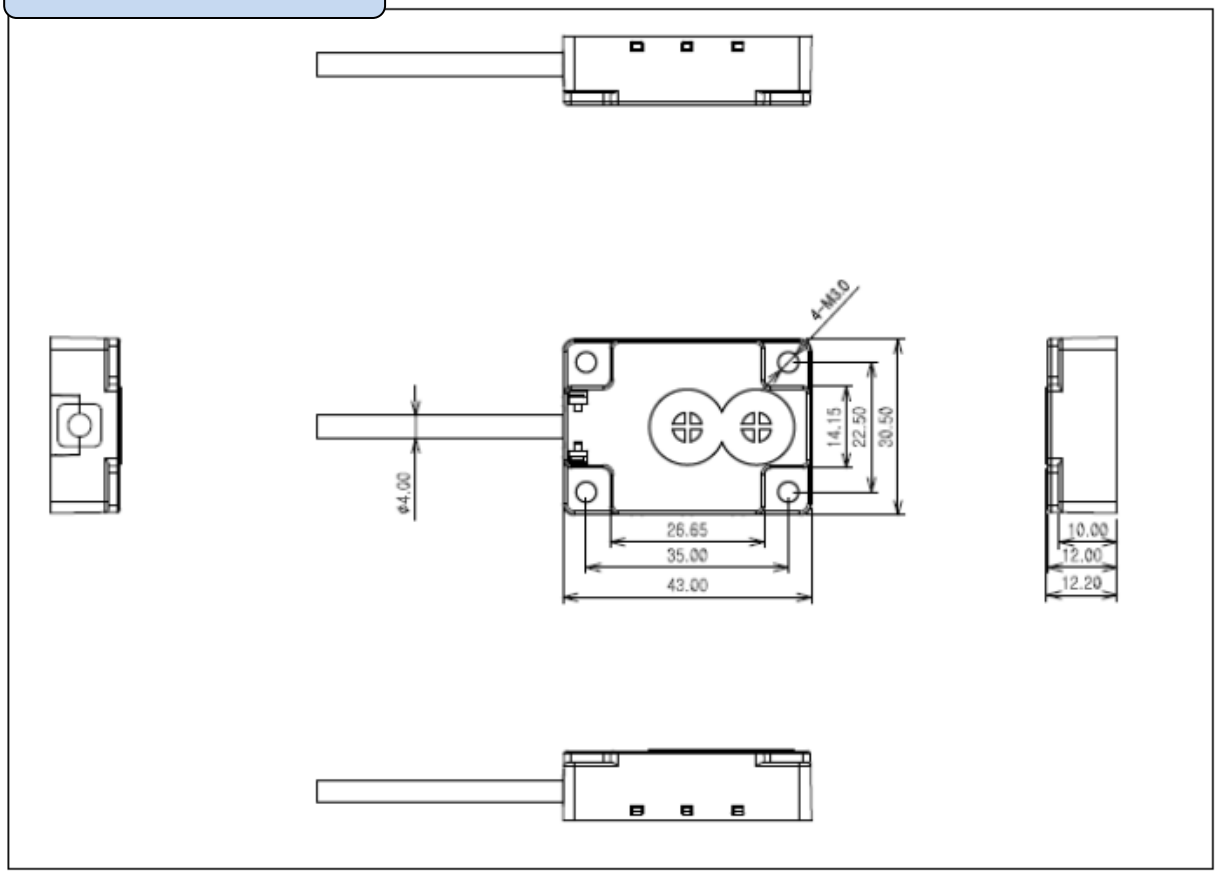
Type 3 _ Stick Antenna



Type 4 _ Stick Antenna

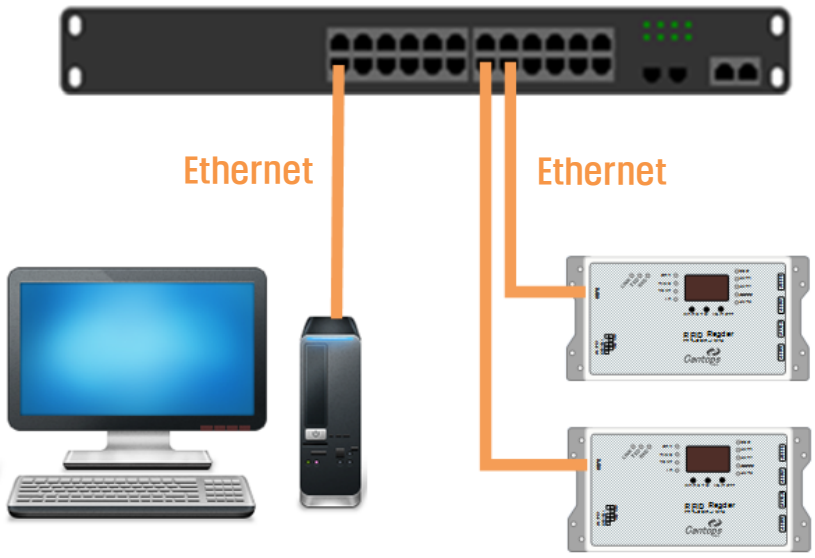


Type 5 _ Stick Antenna

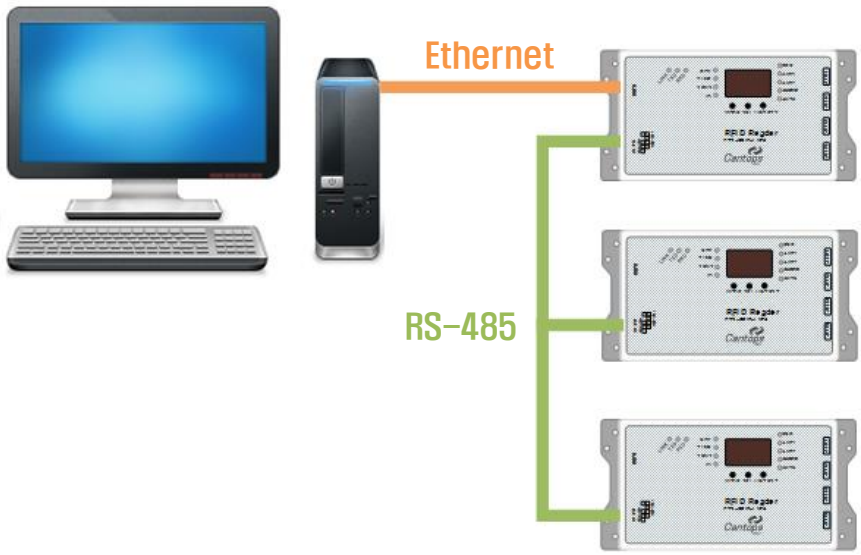


8. OPTIONS OF THE COMMUNICATION CONFIGURATION

Ethernet : HSMS / GEM, Cantops Protocol, Others

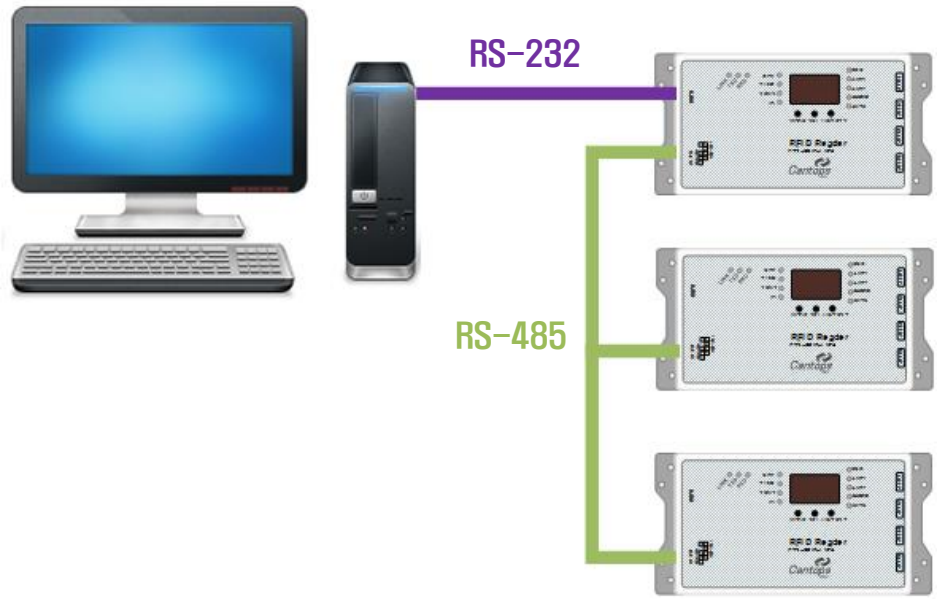


Ethernet + RS485 Expansion : HSMS / GEM



RS-232 : Communication protocol SECS-I / GEM, Cantops Protocol, Others

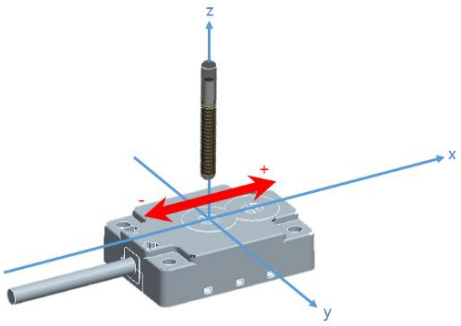
RS232 + RS485 Expansion : SECS-I / GEM



9. COMMUNICATION READING AREA

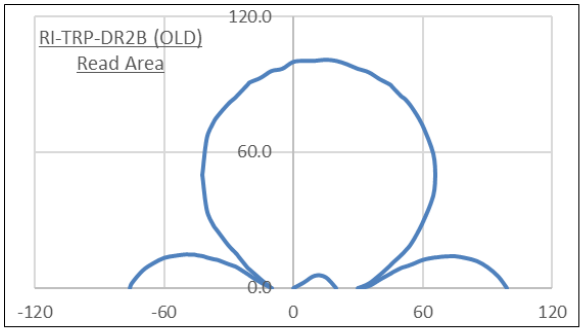
- Reading area of the antenna was figured out based on the square and stick antennas to be provided with the Reader of our company.
- For TAG, reading area for 3 kinds of RI-TRP-DR2B-(OLD)/30/40 will be provided.
- Data listed below is the one tested under the ideal circumstances without no external influences. Read & write distance in the actual operating circumstances will be reduced than below data.

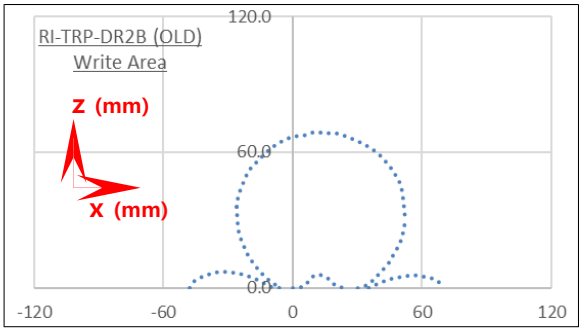
Square antenna and Tag configuration

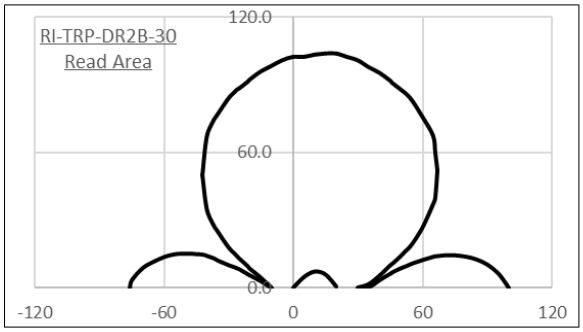


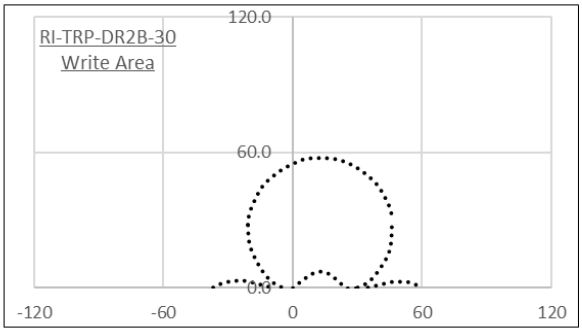
- Origin point of measurement : X=0, Y=0, Z=0 (mm)

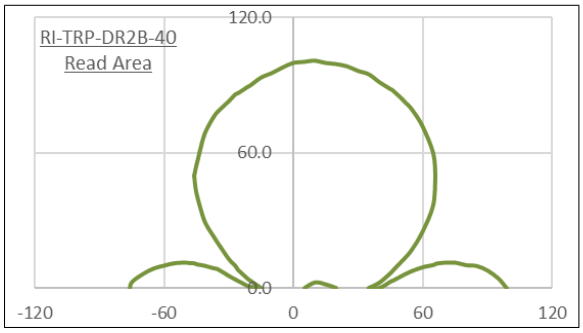
Reading & Writing area

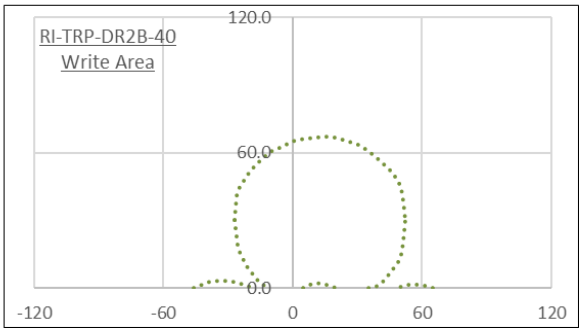




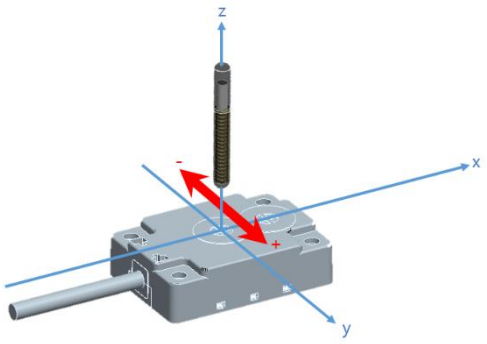






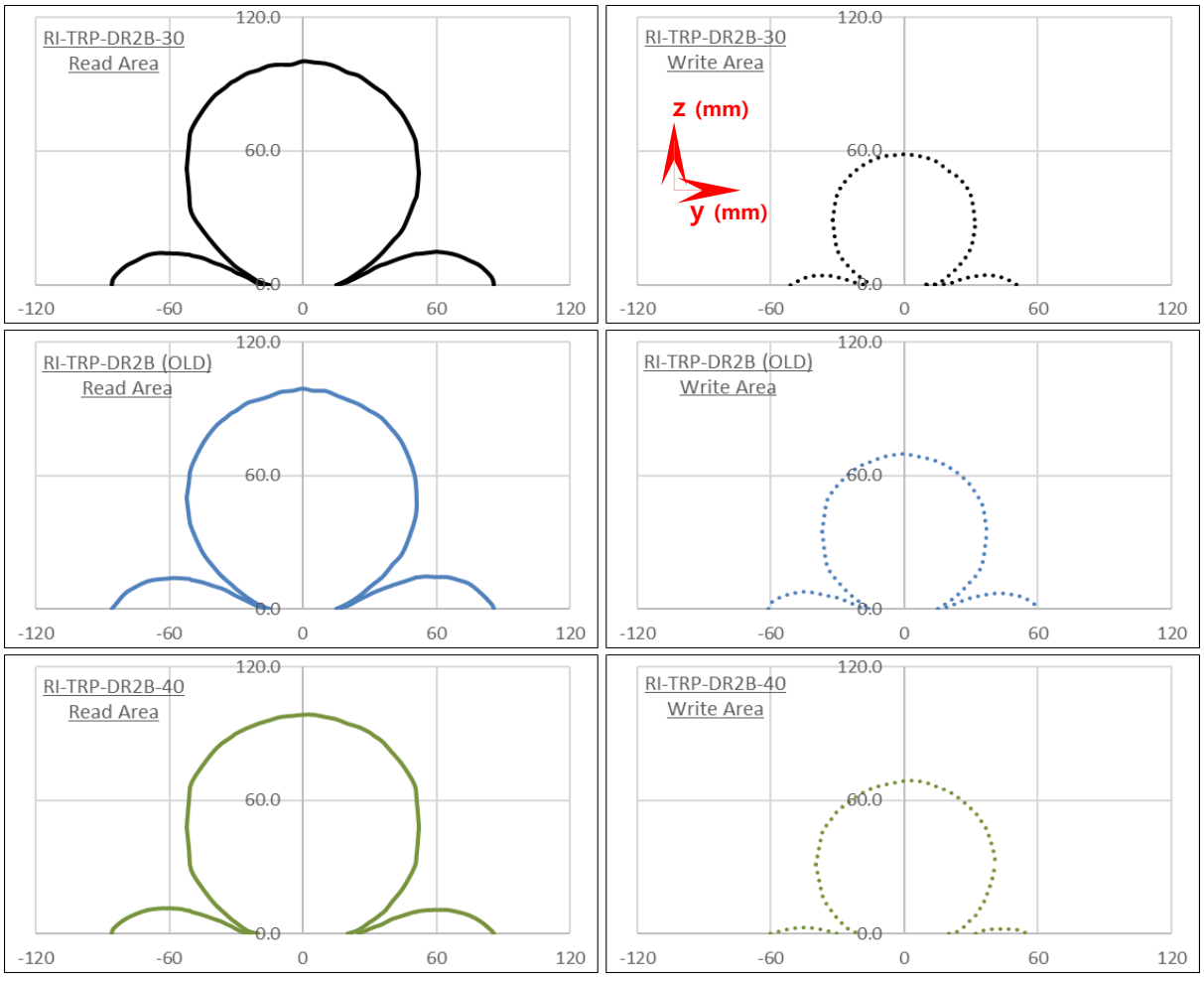


Square antenna and Tag configuration

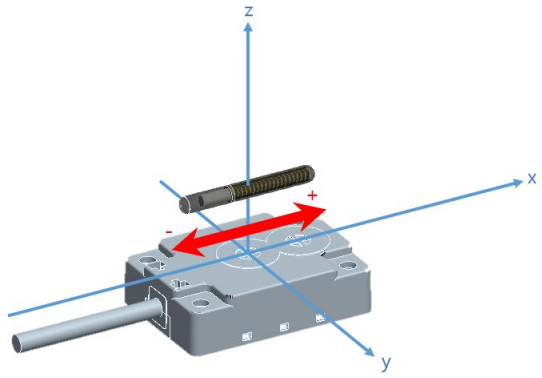


- Origin point of measurement : X=0, Y=0, Z=0 (mm)

Reading & Writing area

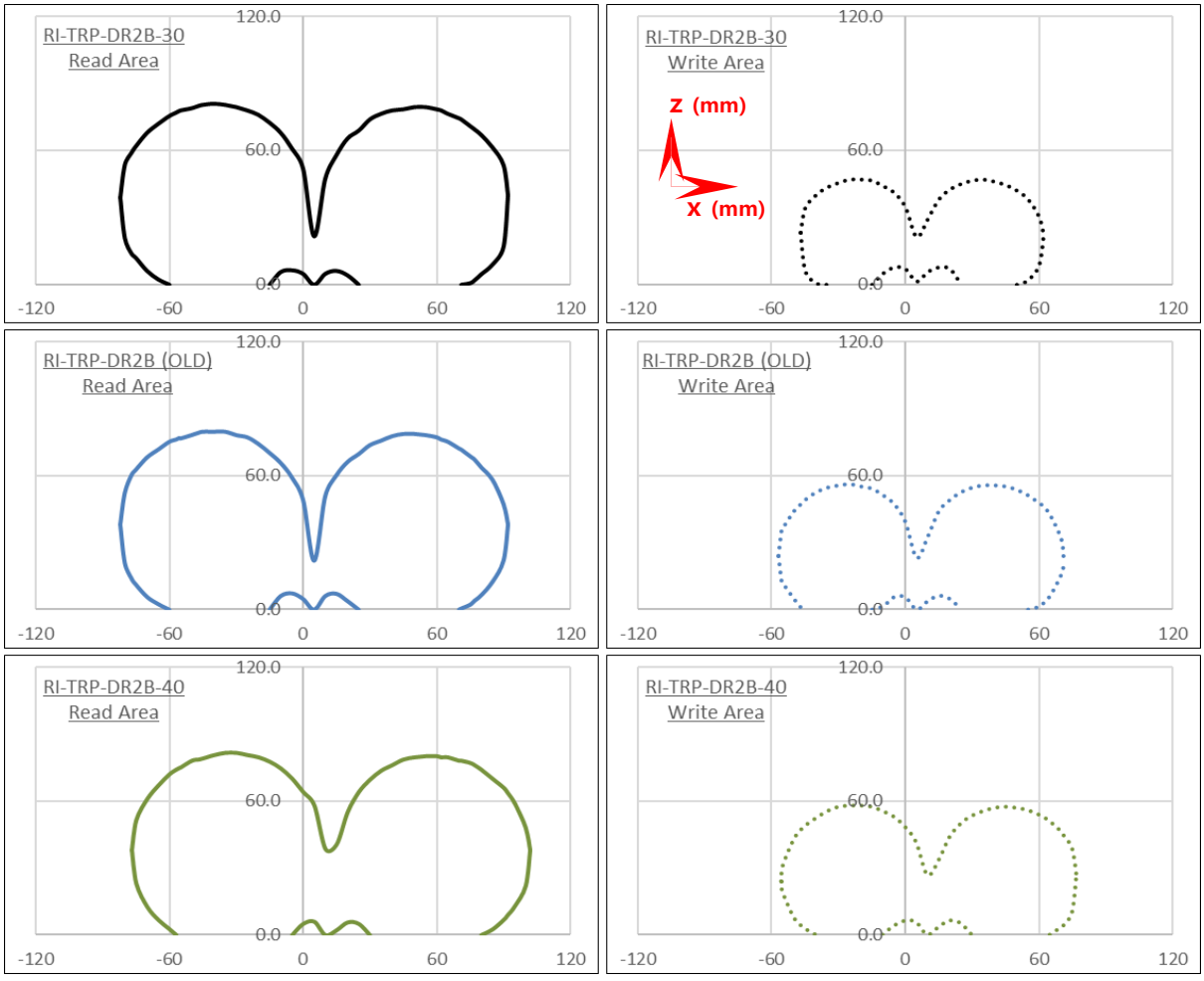


Square antenna and Tag configuration

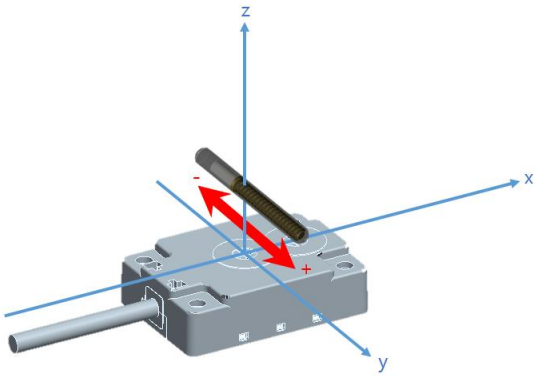


- Origin point of measurement : X=0, Y=0, Z=0 (mm)

Reading & Writing area

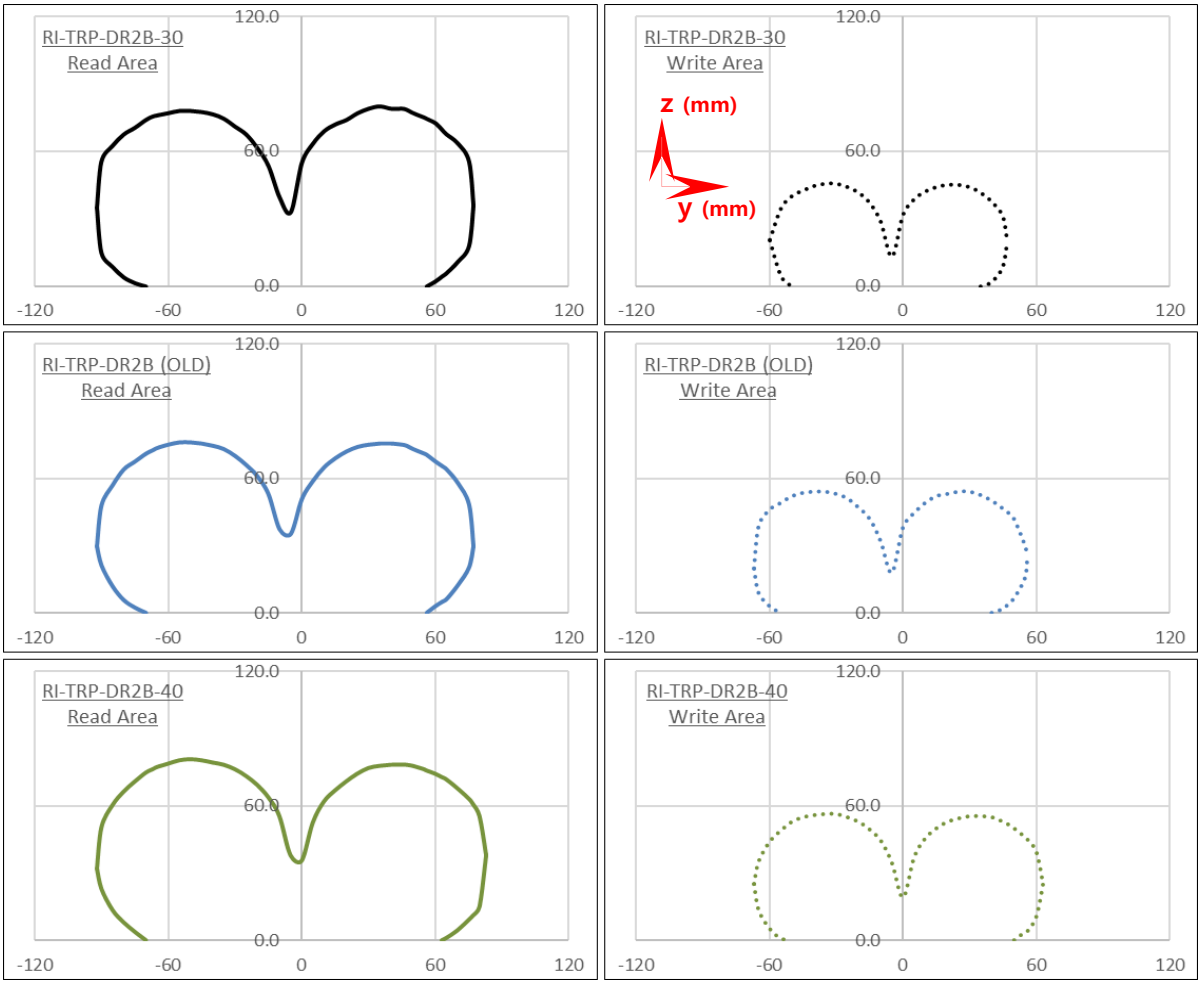


Square antenna and Tag configuration

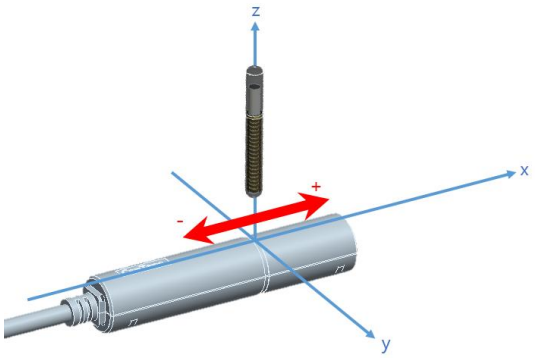


- Origin point of measurement : X=0, Y=0, Z=0 (mm)

Reading & Writing area

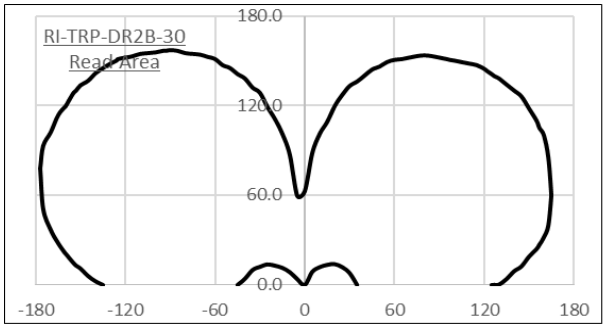


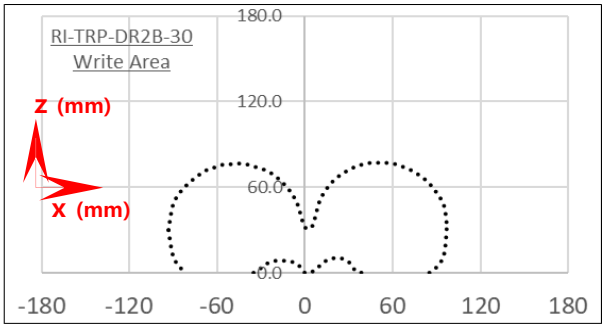
Stick antenna and Tag configuration

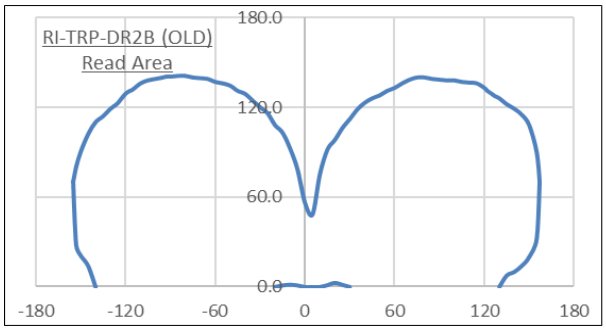


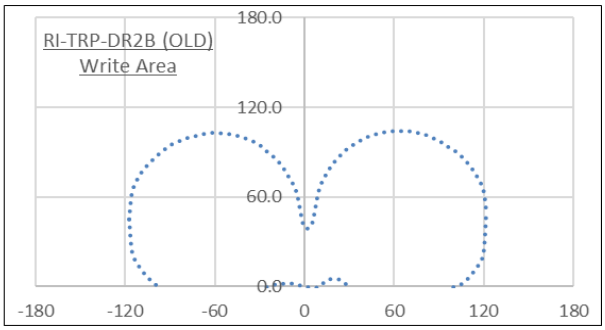
- Origin point of measurement : X=0, Y=0, Z=0 (mm)

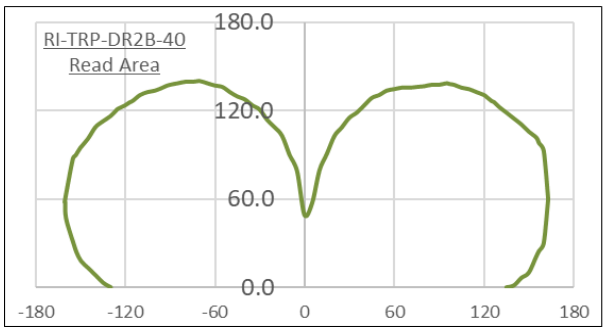
Reading & Writing area

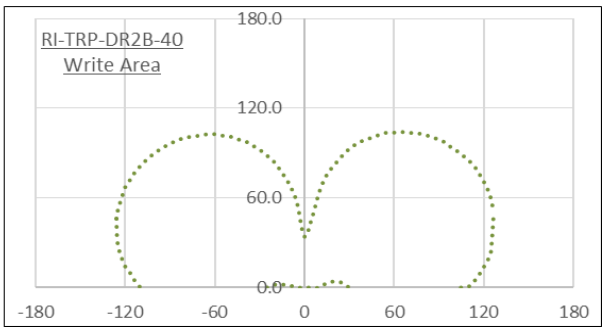




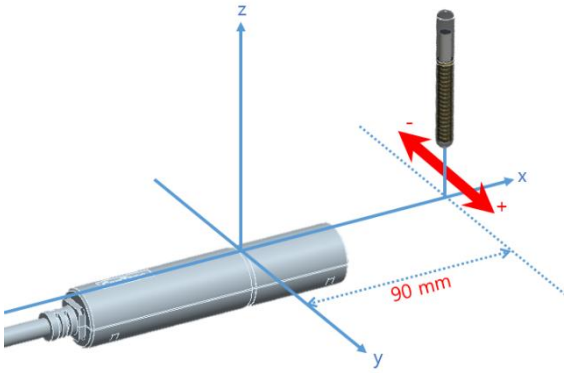






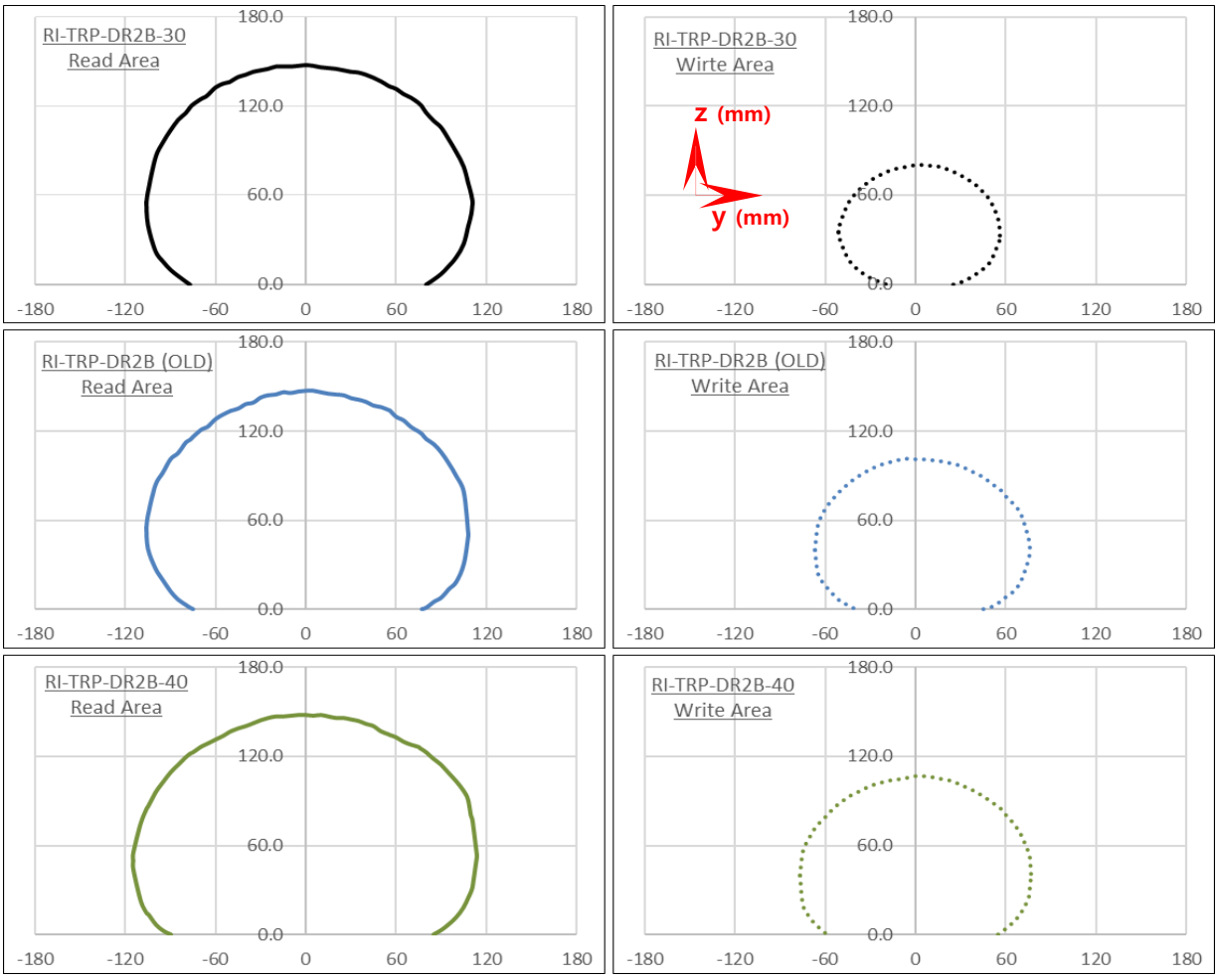


Stick antenna and Tag configuration

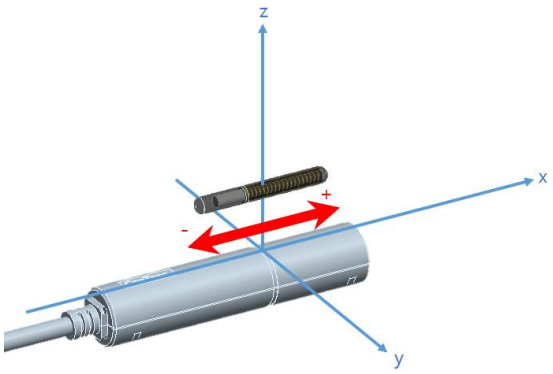


- Origin point of measurement : X=90, Y=0, Z=0 (mm)
  Select the peak point of x axis

Reading & Writing area

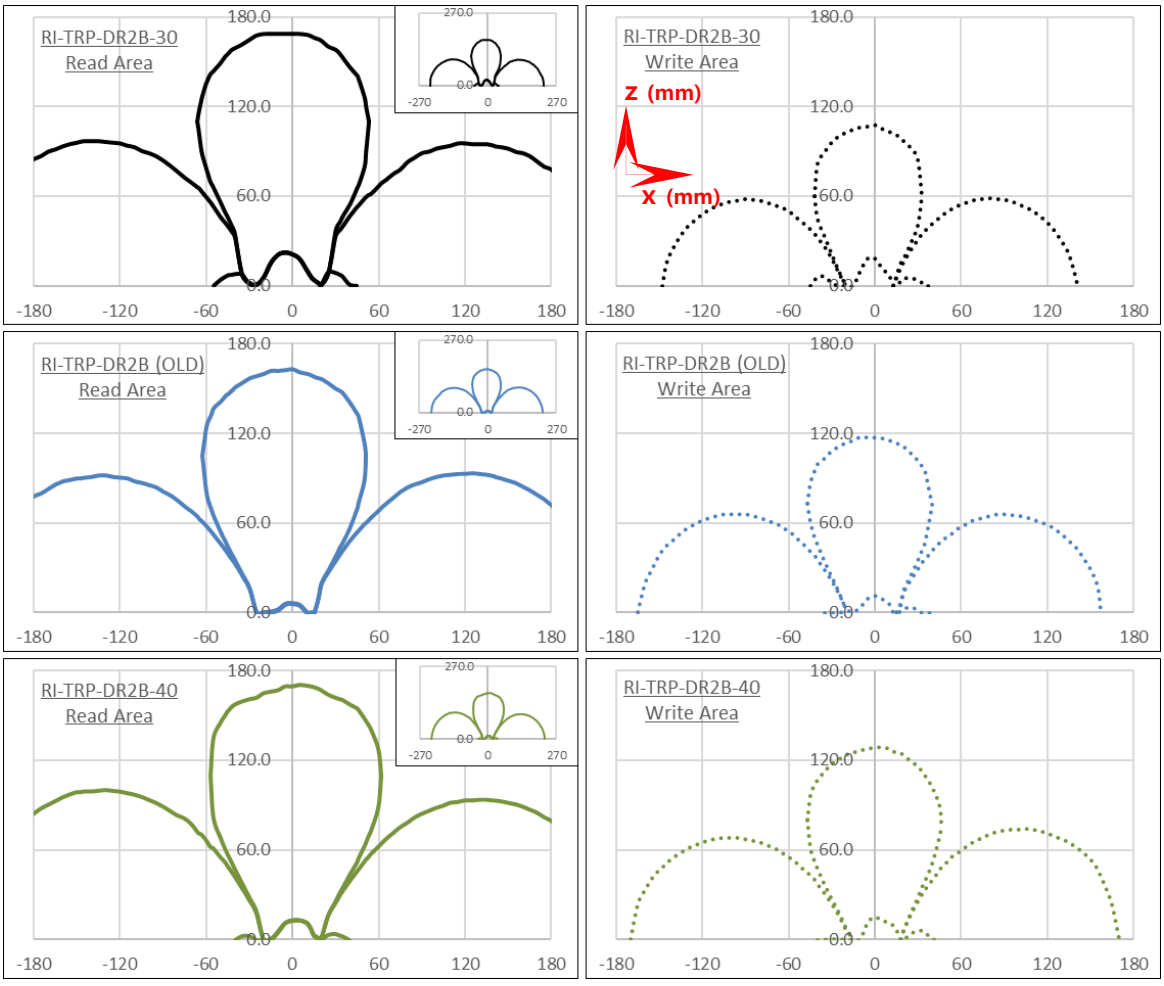


Stick antenna and Tag configuration

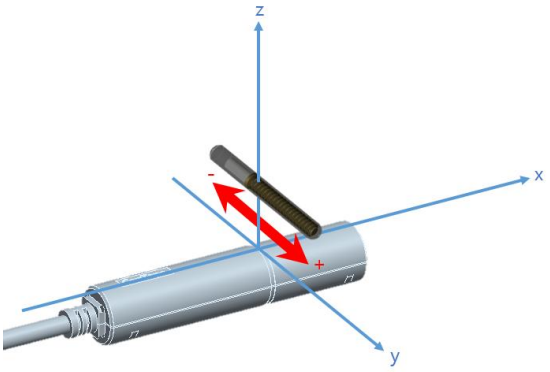


- Origin point of measurement : X=0, Y=0, Z=0 (mm)

Reading & Writing area



Stick antenna and Tag configuration



- Origin point of measurement : X=0, Y=0, Z=0 (mm)

Reading & Writing area