

# RYRR20D

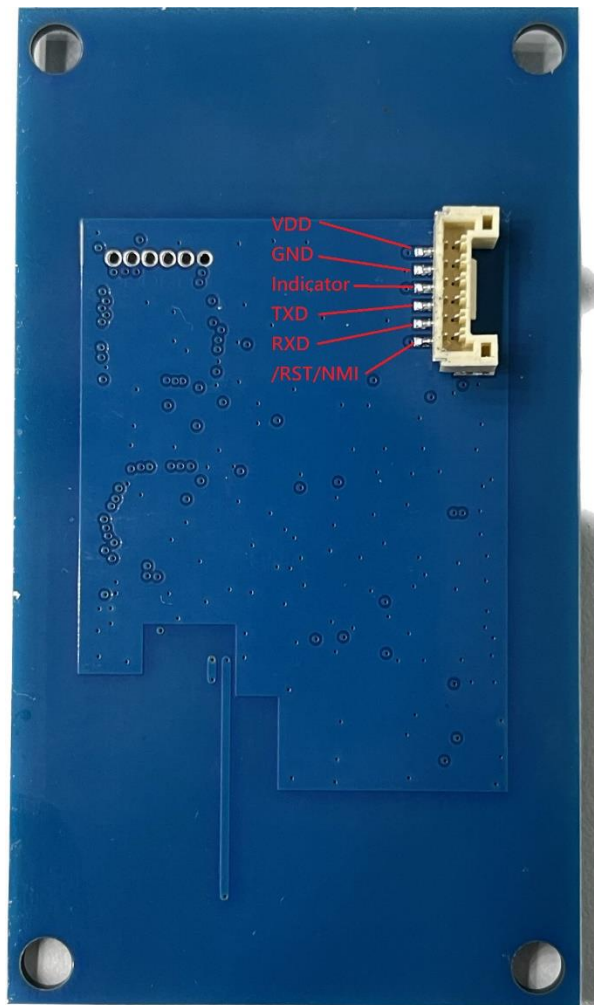
## User Manual



## SPECIFICATION

Item	Min.	Typical	Max.	Unit	Condition
Operation Voltage	4.7	5	6	V	VDD
Interface level		RS-232			TXD, RXD
Interface level		3.3V			Indicator, /RTS/NMI
RF Output Power		20		dBm	
RF transmit current		90		mA	
Communication Range		4		cm	Standard card
RESET_N low duration		60		ms	
Baud Rate		19200		bps	8,N,1
RF Frequency Range	13.553	13.56	13.567	MHz	
Storage temperature	-40	25	+85	°C	
Operating Temperature	-40	25	+85	°C	
Humidity			90	%	
Antenna					On board PCB antenna

## PIN DESCRIPTION



Pin	Name	I/O	Condition
1	VCC	P	+5V Power Supply
2	GND	P	Ground
3	Indicator	O	When read RFID card the pin will output Hi. Fixed +3.3V level
4	TXD	O	UART Data Output RS-232 level
5	RXD	I	UART Data Input RS-232 level
6	/RTS/NMI	I	Low reset Fixed +3.3V level

## Command Manual apply to REYAX

The following are displayed in ASCII string, Baud rate 19200, 8, N, 1 Red word for command, green word for response.

### 1. ISO14443A Read/ Write TAG memory

0108000304FF0000	'Entry command mode, need to be released after booting REYAX
REYAX RYRR20I	
010C00030410008001210000	'Parameter setup
Register write request.	
010C00030410002001090000	'Parameter setup
Register write request.	
0109000304F0000000	'Parameter setup
AGC Toggle	
0109000304F1FF0000	'Parameter setup
AM PM Toggle	
0109000304A0000000	'Read the card number of ISO14443A Mifare Ultralight,
	write twice if it could not read.
14443AREQA.	'042E41E3425F1D8080 is the card number, 7F is the signal strength.
[042E41E3425F1D8080,7F]	

Example: Write single block	
010F000304180021<Block number> <Data> 0000	
Block number	07
Data	AAAABBBB
Send:	010E00030418A207AAAABBBB0000
Receive:	Request mode. []

Example: Read 4 blocks	
010B000304180020<Block number> 0000	
Block number	07
Send:	010A0003041830070000
Receive:	Request mode. [AAAABBBB0000000000000000000000000000FA42]

## 2. ISO15693 Read Inventory and Read/Write Block

0108000304FF0000 REYAX RYRR20I	'Entry command mode, need to be released after booting REYAX RYRR20I
010C00030410008001210000 Register write request.	'Parameter setup
010C00030410002001000000 Register write request.	'Parameter setup
0109000304F0000000 AGC Toggle	'Parameter setup
0109000304F1FF0000 AM PM Toggle	'Parameter setup
010B000304140401000000 ISO 15693 Inventory request. [17C7BA76500104E0,7F]	'Read ISO15693 card number, '17C7BA76500104E0 is the card number, 7F is the signal strength.

Example: Write single block	
010F000304180021 <Block number> <Data> 0000	
Block number	01
Data	44332211
Send:	010F00030418002101443322110000
Receive:	Successful: Request mode. [00] Failure: Request mode. []

Example: Read single block	
010B000304180020 <Block number> 0000	
Block number	01
Send:	010B000304180020010000
Receive:	Successful: Request mode. [00AAAAAAAA] Failure: Request mode. []

Example: Read single block	
010C000304180023 <First Block> <Number of Blocks> 0000	
First Block	01
Number of Blocks	03
Send:	010C00030418002301030000
Receive:	Request mode. [00000000001111111222222233333333]
Block01 to 04 Data:	00000000001111111222222233333333

### 3. Felica Read TAG UID

0108000304FF0000 REYAX RYRR20I	'Entry command mode, need to be released after booting REYAX RYRR20I
010C00030410008001210000 Register write request.	'Parameter setup
010C000304100020011A0000 Register write request.	'Parameter setup
0109000304F0000000 AGC Toggle	'Parameter setup
0109000304F1FF0000 AM PM Toggle	'Parameter setup
010900030444000000 FeliCa polling. [012E5508F8569941,7F]	'Read Felica card number, '012E5508F8569941 is the card number, 7F is the signal strength.

### 4. other

0108000304000000 RESET	'Reset module
0108000304FE0000 REYAX RYRR20I V1.4	'Ask about FW version

# Command Manual apply to EWT

## Protocol Format

Baud rate=19200bps

### Data sent format

Length	Command	Data	Checksum
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- Length: 1 byte, number of bytes from Length byte to the last byte of Data.
- Command: 1 byte, Application-layer command.
- Data: length depends on the command type, from 0x00 to 0xFC bytes.
- Checksum: 1 byte, Exclusive OR (XOR) results from length byte to the last byte of data.

### Data returned format

- Success:

Length	Command	Data	Checksum
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- Failure:

Length	Invert Command	Checksum
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NOTE: "Failure" means that the communication between module and card failed.

## 1. ISO14443A TYPE A Request

Function: ISO14443A request cards, cards include MIFARE and other ISO14443A cards. In the returned results, user could judge the length of serial number via the returned data package length, and judge the card type by ATQA, also judge whether the card supports ISO14443-4 by SAK.

Host sends:

Frame	0x20	Mode	Checksum
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Mode: 1 byte, 0:WUPA; 1:REQA;

Success

Frame	0x20	Data	Checksum
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Data: 4, 7 or 10 bytes card serial number + 2bytes ATQA + 1byte SAK.

Failure:

Frame	0xDF	Checksum
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Example: (ATQA and SAK here are example values, not necessarily correct)	
Send:	0x03 0x20 0x00 0x23
Receive:	0x0C 0x20 0x12 0x4B 0xCC 0xD3 0x81 0x3A 0x77 0x11 0x12 0x01 0xA4
UID:	124BCCD3813A77

## 2. MIFARE Ultralight/Ultralight C/Ultralight EV1 Card Read

Function: Read the data from MIFARE UltraLight/UltraLight C cards. A read command will read 4 blocks data from the card. If read start block is the last block (0x0F), then these 4 blocks data are the 15th, 0th, 1st and 2nd block.

Host sends:

Frame	0x41	Start Block	Checksum
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Start Block: 1 byte, the start block number to be read.

Success

Frame	0x41	Data	Checksum
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Data: 16 bytes card data of 4 blocks, a read operation read 4 blocks from the start block.

Failure:

Frame	0xBE	Checksum
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Example: (Read block number data= 0x08)	
Send:	0x03 0x41 0x08 0x4A
Receive:	0x12 0x41 0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88 0x99 0xAA 0xBB 0x12 0x34 0x45 0x6C 0xDE 0x82
Read block08 Data:	0x11 0x22 0x33 0x44 0x55 0x66 0x77 0x88 0x99 0xAA 0xBB 0x12 0x34 0x45 0x6C 0xDE

## 3. Felica Read TAG UID

Function: Use this command to acquire and identify a card. Acquisition of Manufacture ID (Im) and Manufacture Parameter (PMm) is possible with this command.

Host sends:

Frame	0x2F	APDU command	Checksum
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APDU: 0x06 00 FF FF 01 00

Success

Frame	0x2F	Response	Checksum
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Response: Felica card answers.

Failure:

Frame	0xD0	Checksum
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Example: (issue APDU command= 06 00 FF FF 01 01)	
Send:	0x08 0x2F 0x06 0x00 0xFF 0xFF 0x01 0x01 0x21
Receive:	0x16 0x2F 0x14 0x01 0x01 0x2E 0x3D 0x23 0xBA 0x07 0x5C 0x45 0x00 0xF1 0x00 0x00 0x00 0x01 0x43 0x00 0x88 0xB4 0x36
IDm:	012E3D23BA075C45
PMm:	00F1000000014300
System code:	88B4



#### 4. Felica Read Without Encryption

Function: Use this command to read Block Data.

Host sends:

Frame	0x2F	APDU command	Checksum
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APDU: 0x10 06 01 2E 3D 23 BA 07 5C 45 01 09 00 01 80 00

Success

Frame	0x2F	Response	Checksum
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Response: Felica card answers.

Failure:

Frame	0xD0	Checksum
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Example: (UID: 012E3D23BA075C45 Read block 08 data)	
Send:	0x12 0x2F 0x10 0x06 0x01 0x2E 0x3D 0x23 0xBA 0x07 0x5C 0x45 0x01 0x09 0x00 0x01 0x80 0x08 0x3F
Receive:	0x1F 0x2F 0x1D 0x07 0x01 0x2E 0x3D 0x23 0xBA 0x07 0x5C 0x45 0x00 0x00 0x01 0x00 0x00 0x11 0x22 0x33 0x44 0x55 0x66 0x66 0x66 0x66 0x66 0x66 0x66 0x66 0x66 0xC9
Read Block08 Data:	0x00 0x00 0x11 0x22 0x33 0x44 0x55 0x66 0x66 0x66 0x66 0x66 0x66 0x66 0x66

#### 5. ISO15693 Inventory

Function: Find a card in RF effective field. If success, to set the tag as CURRENT TAG.

Host sends:

Frame	0x5C	AFI	Checksum
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AFI: 1byte AFI,detect card equal to AFI only.

If not use AFI, then host sends:

Frame	0x5C	Checksum
-------	------	----------

Success

Frame	0x5C	UID	Chechsum
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UID: 8bytes(LSB in first), UID of CURRENT TAG.

Failure:

Frame	0xD0	Checksum
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Example: Use AFI	
Send:	0x03 0x5C 0x00 0x5F
Receive:	0x0A 0x5C 0x17 0xC7 0xBA 0x76 0x50 0x01 0x04 0xE0 0xFF
UID:	17 C7 BA 76 50 01 04 E0

## 6. ISO15693 Read Single Block

Function: Read data block of CURRENT TAG.

Host sends:

Frame	0x54	BlockNumber	Checksum
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BlockNumber: 1byte, the block number to be read.

Success

Frame	0x54	Data	Checksum
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Failure:

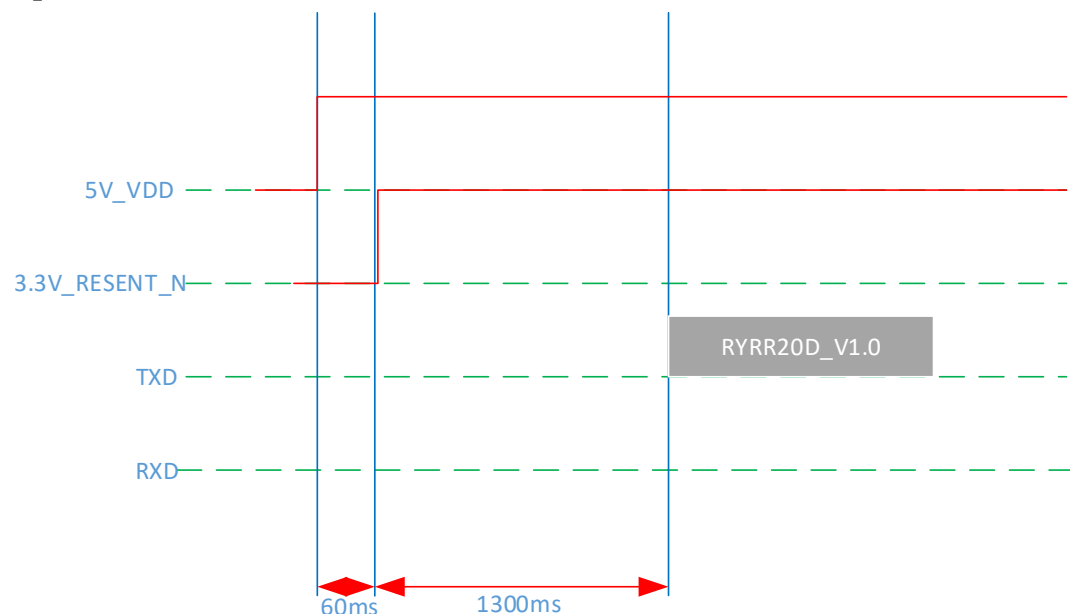
Frame	0xD0	Checksum
-------	------	----------

Example: Read block 01 data	
Send:	0x03 0x54 0x01 0x56
Receive:	0x06 0x54 0xAA 0xAA 0xAA 0xAA 0x52
Read Block01	0xAA 0xAA 0xAA 0xAA
Data:	

Notice:

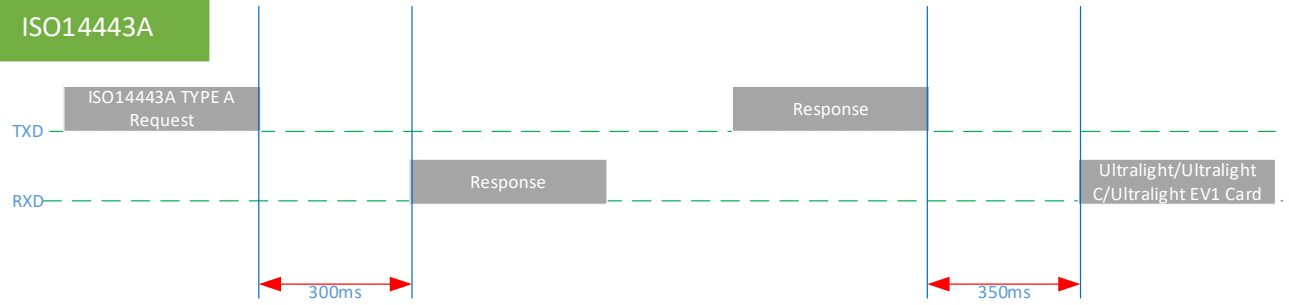
1. Please refer to page 8~9 for the boot sequence and command response sequence. The module issue the next command after responding with ACK.
2. After the RYRR20D is bootup, it will self-calibrate every 1 hour, and the time is about 5 seconds.
3. When module is no response to the message due to the usage exceeding the module specifications, signal interference or strong electric field (for example: HBM  $\pm 2\text{KV}$ , MM  $\pm 200\text{V}$ ), it is recommended to RESET the module through HW Reset.

## 7. Power Sequence

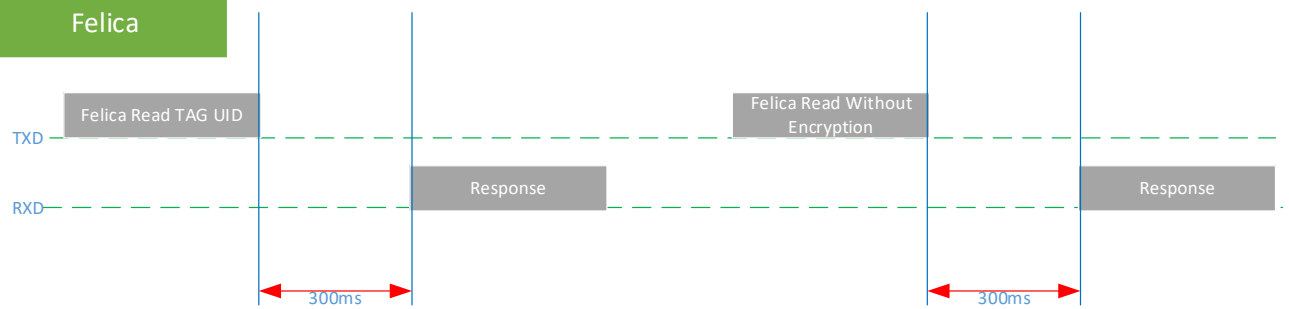


## 8. Command Sequence

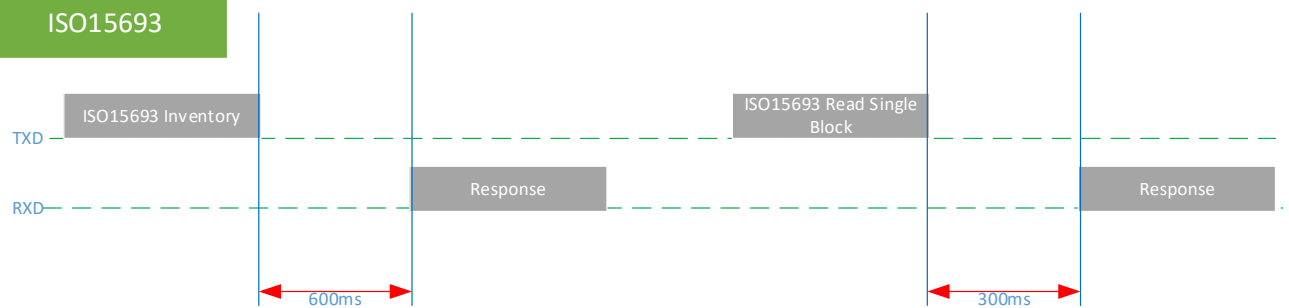
### ISO14443A



### Felica



### ISO15693



## CERTIFICATION INFORMATION

### • FCC compliance

#### Notice:

Any changes or modifications not expressly approved by the party responsible for compliance could void your 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.

#### Notice:

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

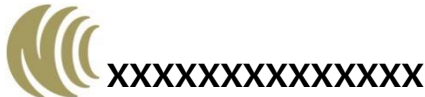
(1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

For a host using a certified modular with a standard fixed label, if (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: "Contains Transmitter Module FCC ID: QLYRYRR20D" or "Contains FCC ID: QLYRYRR20D" must be used. The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

## • NCC compliance

「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」



## HISTORY

Updated data	changes	FW version	Redactor
20220627	1. Add Felica command 2. add EWT command	V0.95-1	
20221207	1. add Protocol Format(EWT) 2. add MIFARE Ultralight/Ultralight C/Ultralight EV1 Card Read(EWT) 3. add Felica Read Without Encryption(EWT)	V1.0	
20221214	1. add ISO15693 Inventory (EWT) 2. add ISO15693 read single Block(EWT) 3. add notice 4. add Power and command Sequence 5. modify RYRR20D command (REYAX)	V1.0	
20221219	1. add SPECIFICATION 2. add PIN DESCRIPTION 3. add CERTIFICATION INFORMATION	V1.0	

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