

TMRF-1-U001-KM

User's Manual



TAMURA CORPORATION

1.Scope

This document is the user's manual of Radio Frequency Identification [RFID] Reader /Writer with Universal Serial Bus [USB] for Konica Minolta Business Technologies, Inc.

2.Product Name

TMRF-1-U001-KM (Product reference code in TAMURA corporation: N-22200066-00)

3.Outlines of product

- This product is a compact RFID reader / writer with USB interface.
- This product can read and write data for RFID tag by 13.56MHz radio frequency with RFID wireless interface.
- The USB interface is capable of communicating by low speed [1.5Mbps].

4.Safety Information

Read the following safety information and handling information before using TMRF-1-U001-KM to avoid injury.

4-1 . Important safety information

Warning

Failure to follow these safety instructions could result in fire, electric shock, or other injury or damage.

- DO NOT use this product in hospitals and health care facilities, especially near of sensitive equipments such as heart pacer to external radio frequency emissions.
- This product assumes the activity to a general electronic instrument.(AV equipments, OA equipments, amusement equipments, etc.)
A very advanced reliability is required and the activity to the equipment and units (medical equipment, an aerospace plane machine, a nuclear equipment, various safety devices, etc.) with which a trouble and malfunction of a product are directly concerned with a human life cannot be performed.

Caution

Failure to follow these handling instructions could result in damage to TMRF-1-U001-KM or other property.

- Since this product consists of precision electronic parts, please do not give a strong impact.
If an impact is given to a product or it is made to fall, it will become a cause of a crash or a trouble.
- DO NOT put into a micro wave oven or a high-pressure container.
It becomes a cause of a trouble.
- DO NOT use TMRF-1-U001-KM in rain or any wet location.
- Please do not install in an unstable location.
If it is installed in a shaky stand top, a leaning place, etc., it will fall and will become a cause of a crash or an injury.
- Please do not pull a moving part and an attachment (especially connector) strongly, or do not bend them.
They become a cause of a crash or a trouble.
- Keep this product out of the direct rays of the sun.
It becomes a cause of a trouble.
- DO NOT use window cleaners, aerosol sprays, solvents, alcohol or abrasion to clean.
- This product is CMOS product.
Please do not keep it in the place easily charged with electricity.
It becomes a cause of a trouble.
- When you discard this product, please process as an industrial waste.

4-2 .Operating condition

TAMURA Corporation will grant a nonexclusive license of this product to user on condition of the following.

- DO NOT perform program analysis, reverse engineering, copy, change, re-distribution, etc.
- This product is a product approved by Wireless Telegraph Law of each country. You will be punished by violation of Wireless Telegraph Law if a transmitting output is raised by use of an external antenna, or reconstruction.
- The specification of this product and the contents of related data may be changed without a preliminary.
- This product is based on regulation of the following countries.
Japan , the United States of America , Canada, Australia and New Zealand
When it is in used except the countries which indicated, TAMURA Corporation cannot take responsibility.
- This equipment complies with FCC/IC radiation exposure limits set forth for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65 and RSS-102 of the IC radio frequency (RF) Exposure rules.
This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE). But it is desirable that it should be installed and operated with at least 20cm and more between the radiator and person's body (excluding extremities :hands, wrists, feet and ankles).
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment
- 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.
- This device complies with Part 15 of FCC Rules and RSS-Gen of IC Rules.
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 this device.

4-3. Notes of use

- DO NOT move adjustment parts of this product.
- When a metal thing is near this product or this product is covered by a metal thing, the characteristic may deteriorate remarkably.
- DO NOT insert a USB connector by force (even if it does not put in strong power, it can insert smoothly).
It is NOT connectable unless it inserts at the right direction and the right angle.
When you cannot insert, please check direction of a connector once again, without inserting by force.
- DO NOT use it in the environment where this product dews.

5.Product structure



USB connector

RF CAP (The jack for external antennas) Prohibition of use

The hole for a strap

USB CAP

6.USB Control commands

6-1 . USB communications protocol (host -> RFID R/W -> tag)

Calling device request	
bmRequestType = 0x43,0xC3	
bRequest = 100+No.	(The following table)
wValue = not used	
wIndex = not used	
wLength = byte count	
data = parameter data	

1~3	4 ~ n	n+1	n+3
command	parameter	CRC16	EOT
The following table	The following table	2bytes	0x04
CRC16 calculation		value	

parameter = From command to EOT considers it as 1 text.

No	command	function	parameter1	parameter2	parameter3	
00	"U00"	ROM Version Read XX,XX YMD	Nothing			○
01	"U01"	Inventory	Nothing			○
02	"U02"	Stay Quiet	UID(8)			○
03	"U03"	N Block Read(All data) (Max=9Blocks)	UID(8)	SBlock#(1)	Block count(1)	○
04	"U04"	N Block Write(All data)				×
05	"U05"	Read Single Block	UID(8)*1	Block#(1)		○
06	"U06"	Write Single Block	UID(8)*1	Block#(1)	data(4)	○
07	"U07"	Lock Block	UID(8)*1	Block#(1)		○
08	"U08"	Read Multi Blocks (Max=9Blocks)	UID(8)*1	SBlock#(1)	Block count(1)	○
09	"U09"	Write Multi Blocks				×
10	"U10"	Select Tag	UID(8)			○
11	"U11"	Reset to Ready	UID(8)*1			○
12	"U12"	Write AFI	UID(8)*1	AFI(1)		○
13	"U13"	Lock AFI	UID(8)*1			○
14	"U14"	Write DSFID	UID(8)*1	DSFID(1)		○
15	"U15"	Lock DSFID	UID(8)*1			○
16	"U16"	Get System Information	UID(8)*1			○
17	"U17"	Get Multi Block Security Status	UID(8)*1	Sdata(1), data count(1)		○
18	"U18"	Write 2 Blocks	UID(8)*1	Block#(1), 2(1)	data1(4), data2(4)	○
19	"U19"	Lock 2 Blocks	UID(8)*1	Block#1(1)		○
20	"U20"					×
21	"U21"	Special process1 (Buzzer etc)	command	data		○
22	"U22"					×

notes : S=start, Block#=01 ~ 64

Block count : Serial line max = 9 /USB max=9

"U03" is the same as "U08"

Special process1(command) : 0x80= Buzzer function(ON),0x40= Buzzer function(OFF),0x01= Buzzer(ON)

"U18 [Write 2 Blocks]" and "U19 [Lock 2 Blocks]" are Tag-it. It is original command.

Configuration of UID : There are 2 ways that all 8 bytes are assigned and an implementation-supplier code is assigned.

(*1) E0 MM XX XX XX XX XX XX -> 00 MM XX XX XX XX XX XX

[MM : an implementation-supplier code assigned = 04(Philips),05(My-D),07(TD)]

No	command	function	parameter1	parameter2	parameter3	
23	"U23"					
24	"U24"					
25	"U25"					
26	"U26"					
27	"U27"					
28	"U28"					
29	"U29"					
30						
31	"U31"*	Inventory	Nothing			○
32	"U32"*	Stay Quiet	UID(8)			○
33	"U33"*	N Block Read(All data) (Max=9Blocks)	UID(8)*1	SBlock#(1), Block count(1)		○
34						
35	"U35"*	Read Single Block	UID(8)*1	Block#(1)		○
36	"U36"*	Write Single Block	UID(8)*1	Block#(1)	data(4)	○
37	"U37"*	Lock Block	UID(8)*1	Block#(1)		○
38	"U38"*	Read Multi Blocks	UID(8)*1	SBlock#(1)	Block count(1)	○
39						
40	"U40"*	Select Tag	UID(8)			○
41	"U41"*	Reset to Ready	UID(8)*1			○
42	"U42"*	Write AFI	UID(8)*1	AFI(1)		×
43	"U43"*	Lock AFI	UID(8)*1			×
44	"U44"*	Write DSFID	UID(8)*1	DSFID(1)		×
45	"U45"*	Lock DSFID	UID(8)*1			×
46	"U46"*	Get System Information	UID(8)*1			×
47	"U47"*	Get Multi Block Security Status	UID(8)*1	Sdata(1), data count(1)		×
48	"U48"*					
49	"U49"*					
50						
51						
52						

- * is command of a My-D card.
- My-D assumes 124Page (248Block) with the architecture of 4 bytes/Block now.
- Since the write-in result of My-D has returned transmission data as it is, read is required for it again.

6-2. USB communications protocol (tag -> RFID R/W -> host)

1	2~4	5~n	n+1	n+3
ENQ	command	parameter	CRC16	EOT
0x05	The following table	The following table	2bytes	0x04
	CRC16 calculation		Value	

From ENQ to EOT considers it as 1 text

CRC16 : JIS X 6323-3(Part III: Refer to Collision Prevention and Transmission Protocol) ISO/IEC 13239

No	command	function	parameter1	parameter2	parameter3	
00	"R00"	ROM Version XX,XX YMD	Version(2)	YY(1),MM(1)	DD(1)	○
01	"R01"	Inventory	DSFID(1)	UID(8)		○
02	"R02"	Stay Quiet	UID(8)			○
03	"R03"	N Block Read(All data) (Max=9Blocks)	UID(8)*1	SBlock#(1), Block count(1)	The part of the number of 9Blocks(45)	○
04	"R04"	N Block Write(All data)				×
05	"R05"	Read Single Block	UID(8)*1	Block#(1)	Security(1), data(4)	○
06	"R06"	Write Single Block	UID(8)*1	Block#(1)	Dummy(1), data(4)	○
07	"R07"	Lock Block	UID(8)*1	Block#(1)	Security(1), data(4)	○
08	"R08"	Read Multi Blocks (Max=9Blocks)	UID(8)*1	SBlock#(1), Block count(1)	The part of the number of 9Block(45)	○
09	"R09"	Write Multi Blocks				×
10	"R10"	Select Tag	UID(8)			○
11	"R11"	Reset to Ready	UID(8)*1			○
12	"R12"	Write AFI	Flag(1), UID(8)*1	DSFID(1), AFI(1)	VICC(2), IC(1)	○
13	"R13"	Lock AFI	UID(8)*1			○
14	"R14"	Write DSFID	Flag(1), UID(8)*1	DSFID(1), AFI(1)	VICC(2), IC(1)	○
15	"R15"	Lock DSFID	UID(8)*1			○
16	"R16"	Get System Information	Flag(1), UID(8)*1	DSFID(1), AFI(1)	VICC(2), IC(1)	○
17	"R17"	Get Multi Block Security Status	UID(8)*1	Sdata(1), data count(1)	The part of the number of 32Block(32)	○
18	"R18"	Write 2 Blocks	UID(8)*1	Block#(1), 2(1)		○
19	"R19"	Lock 2 Blocks	UID(8)*1	Block#1(1)		○
20	"R99"	Error return	Error flag(1)	Error code(1)		○

notes : S=start, Block#=01 ~ 64

(byte count) : The number in a parenthesis

It is related with an error return and is a reference of error handling.

"R03" is the same as "R08"

The segment which is less than the Block number of "R03", "R08", and "R17" is filled up with 0.

YY = A.D. (2000+YY)

"R18 [Write 2 Blocks]" and "R19 [Lock 2 Blocks]" are Tag-it. It is original command.

No	command	function	parameter1	parameter2	parameter3	
21						
22						
23	"R23"					
24	"R24"					
25	"R25"					
26	"R26"					
27	"R27"					
28	"R28"					
29	"R29"					
30						
31	"R31"*	Inventory	DSFID(1)	UID(8)		○
32	"R32"*	Stay Quiet	UID(8)			○
33	"R33"*	N Block Read(All data) (Max=9Blocks)	UID(8)*1	SBlock#(1), Block count(1)	The part of the number of 9Blocks(45)	○
34						
35	"R35"*	Read Single Block	UID(8)*1	Block#(1)	Security(1) data(4)	○
36	"R36"*	Write Single Block	UID(8)*1	Block#(1)	Dummy(1), data(4)	○
37	"R37"*	Lock Block	UID(8)*1	Block#(1)	Security(1), data(4)	○
38	"R38"*	Read Multi Blocks (Max=9Blocks)	UID(8)*1	SBlock#(1), Block count(1)	The part of the number of 9Blocks(45)	○
39						
40	"R40"*	Select Tag	UID(8)			○
41	"R41"*	Reset to Ready	UID(8)*1			○
42	"R42"*	Write AFI	Flag(1), UID(8)*1	DSFID(1), AFI(1)	VICC(2), IC(1)	×
43	"R43"*	Lock AFI	UID(8)*1			×
44	"R44"*	Write DSFID	Flag(1), UID(8)*1	DSFID(1), AFI(1)	VICC(2), IC(1)	×
45	"R45"*	Lock DSFID	UID(8)*1			×
46	"R46"*	Get System Information	Flag(1), UID(8)*1	DSFID(1), AFI(1)	VICC(2), IC(1)	×
47	"R47"*					
48	"R48"*					
49	"R49"*					
50						

- * is command of a My-D card.
- My-D assumes 124Page (248Block) with the architecture of 4 bytes/Block now.
- Since the write-in result of My-D has returned transmission data as it is, read is required for it again.

6-3 . Error handling

It consists of 2bytes of the error flag/error code.

The 1st byte : =0 → It is an error flag on a processing. The 2nd byte is an error code.

The 1st byte : ≠0 → It is an error flag on a standards. The 2nd byte is an error code.

receive data

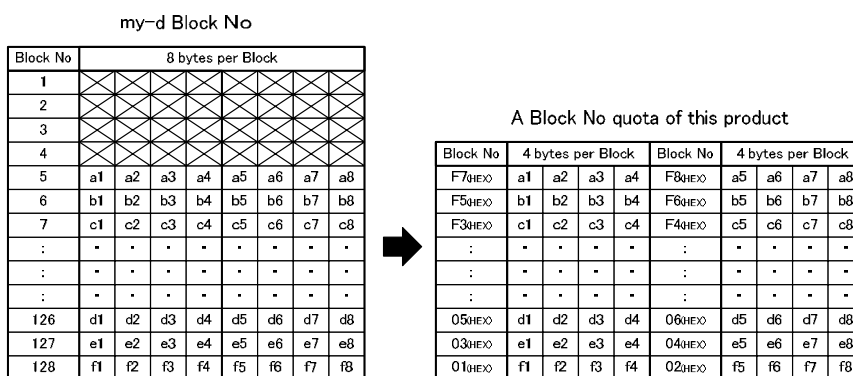
1	2	3	4	5	6	7	8	9
ENQ	R	9	9	Error flag	Error code	CRC16(L)	CRC16(H)	EOT

flag=0 → code = 1 : The error under processing of Tag-it
 → code = 2 : A processing of Tag-it times out.

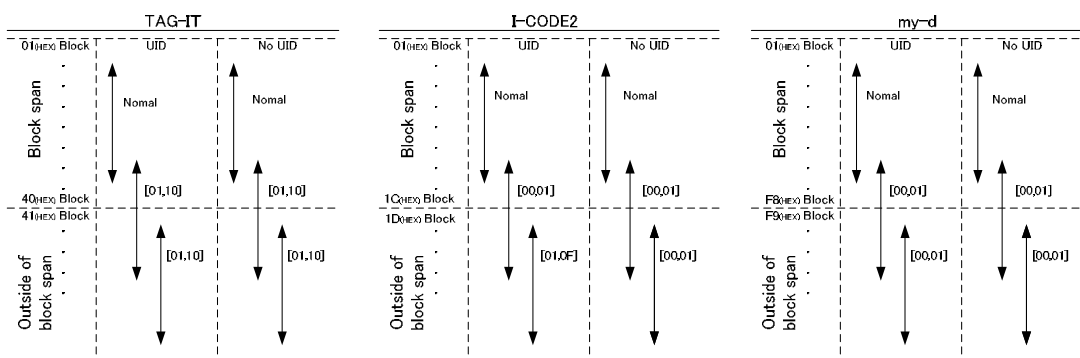
flag≠0 → : JIS X 6323-3
 Refer to (ISO/IEC 15693-3)
 : Tag-it HF-I Transponder Inlay
 Extended Commands and Options

7. Attention

- (1) After a command transmission, please put "WAIT" and read a response.
- (2) Since an error may return depend on PC (personal computer) used, please add a retry processing.
- (3) This product assumes 1 block to be 4 bytes.
my-d corresponds as follows, although 1 block has 8-byte composition.
The 1-4 blocks of my-d cannot be read and written.



- (4) The error flag and error code at the time of setting the parameter which exceeded the block span by [N Block Read] [Read Multi Block] [Get Multi Block Security Status] are variable depend on the category of tag and parameter.



※1 The numerical characters in a parenthesis show an error flag and an error code in order.
 ※2 UID shows a set of all 8 bytes.
 ※3 No UID shows a set of the single byte of an implementation-supplier cord.

- (5) When a command is sent to tag in "Select status", the first byte "E0" in the UID parameter should be changed to "10"

- (6) Any error code is not returned if it performs the [Write AFI] processing to the I-CODE2 tag AFI locked.
- (7) Any error code is not returned if it performs the [Lock AFI] processing to the I-CODE2 tag AFI locked.
- (8) Any error code is not returned if it performs the [Write DSFID] processing to the I-CODE2 tag DSFID locked.
- (9) Any error code is not returned if it performs the [Lock DSFID] processing to the I-CODE2 tag DSFID locked.
- (10) When you perform "Read" and "Write", without setting up UID in particular, please perform a single byte set of an implementation-supplier code.
- (11) An error occurs when 29 or more blocks are set to I-CODE2 with single byte setting as an implementation-supplier code.
- (12) This product performs with to the following tag or the tag in which IC was used.

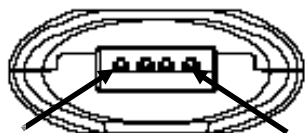
TAG-IT HFI			[TEXAS INSTRUMENTS]
I-CODE2	SL2	ICS20	[PHILIPS]
my-d	SRF	55V10P	[Infineon Technologies]

8. Product specification

8-1 . Interface specification

(1)USB interface

(1-1)Connector



Pin No.	function	Signal
1	Vbus	+5V
2	D-	Serial data(-)
3	D+	Serial data(+)
4	GND	GND

(1-2) Standard

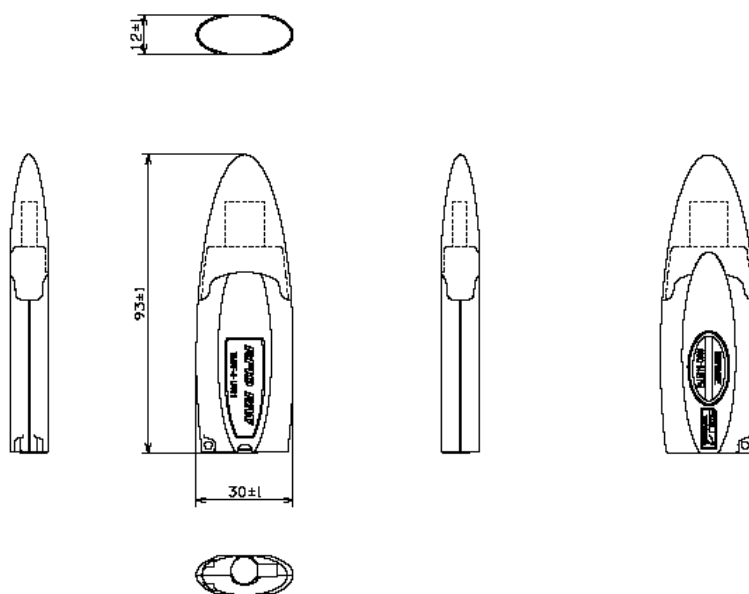
USB1.1 Low Speed

(2)External antenna interface



The miniaturized antenna is built in this product.
It is prohibition to connect an external antenna.

8-2 . Mechanical specification



Weight : 20g or less

8-3.General specification

Radio Frequency	: 13.56MHz
Correspondence standard	: ISO15693
Voltage of operation	: +4.75V ~ +5.25V
Consumption current	: 100mA or less
LED(green)	: Power-up lighting
LED(red)	: Blink at the time of a datacomm with a tag.
Operating temperature	: 0°C~+40°C (+32°F~+104°F)
Operating humidity	: 20~80%RH (non-condensation)
Storage temperature	: -20°C~60°C (-4°F~+140°F)
Storage humidity	: 10~90%RH (non-condensation)

9. Guarantee

[About guarantee]

This guarantee promises a gratis repair, when the product I was allowed to supply should be broken down by the normal activity according to this product specification.

[Term of a guarantee]

Three months after the delivery.

[Inapplicable guarantee]

Even if it is within the term of a guarantee, when it corresponds to the following list item, it becomes inapplicable gratis repair .

- (1) The damage or the trouble by the handling from which it deviated by the written content of the " attention ."
- (2) Damage by the natural disaster of a thunderbolt, a Fire, storm and flood damages, an earthquake, and others and pollution, damage from salt water, a static electricity, etc.
- (3) The trouble resulting from other connected units and other external factors.
- (4) Externally caused injury of the main frame after a Delivery.
- (5) When an event is NOT reproduced at TAMURA Corporation.

[Other attention]

- (1) When the damage which is contrary to the "attention" written content of this product, and originates in a user's intentionally and negligence occurs, TAMURA Corporation DOES NOT take the responsibility.
- (2) When the damage concerning direct and the indirect target resulting from an activity of this product occurs, the responsibility is NOT taken except for the case where there is negligence in which TAMURA Corporation is serious.
- (3) Guarantee is effective only in an application country.

10 . Model specification

10-1 . Specification number (Japan)

The model specification of TMRF-1-U001-KM is as follows.

Model name	Attestation number
TM-RFRW-U001	AC-04097

10-2. Wireless Telegraph Law

Since the following acts serve as a fault of Wireless Telegraph Law, please do not perform them by any means.

- (1) Use an external antenna.
- (2) Convert this product.

11. Reference

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Broadcom B.U.
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URL:<http://www.tamura-ss.co.jp>