

MSR213U SERIES

Magnetic Stripe Card Reader

USB Interface

Programmer's Manual

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AGENCY APPROVED

- Specifications for FCC Class B, CE Class B
- BSMI (Bureau of Standards, Metrology and Inspection, Taiwan)



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.

You are cautioned that any change or modifications to the equipment not expressly approve by the party responsible for compliance could void your authority to operate such equipment.

BSMI 甲類 Class A 警語

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

WARRANTY

This product is served under one-year warranty to the original purchaser. Within the warranty period, merchandise found to be defective would be repaired or replaced. This warranty applies to the products only under the normal use of the original purchaser, and in no circumstances covers incidental or consequential damages through consumers' misuse or modification of the products.

PREFACE

This manual provides detailed information relating to the overall operational, electrical, mechanical, environmental and functional aspects of the MSR213U. This document should be read and understood prior to initial operation of the product.

For ease of installation and programming use, we have addressed everything from its attractive features to its various configurations.

When designing the MSR213U, we selected what we feel are the most useful features and functions. If in some cases you find that your specific needs differ from our existing products, we welcome your comments and suggestions. Custom-designed models are also available.

If further questions do arise, please call for technical support, our FAE will assist you in any way we can.

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Section 1. General Description

This section presents general information about the basic characters of the MSR213U.

Features

The MSR213U provides the following features:

1	USB interface, no external power supply required
2	Keyboard and MSR(M/I Mode) modes supported
3	Read magnetic stripe cards conform to ISO 7811
4	Read high and low coercivity magnetic stripes
5	Bi-directional card swipe and read capability
6	No third-party driver is needed
7	Single, dual, or triple track versions allow reading ISO, AAMVA and DMV cards
8	LED and Buzzer indicators indicate the status of reader
9	Firmware upgradeable

Application

This Magnetic Stripe Reader, MSR213U is designed to read high or low coercive magnetic cards. It can simultaneously decode/verify up to 3 tracks of data. This product communicates with a host computer using USB interface. The reader can read magnetic data from any available track encoded per ISO 7810/7811, AAMVA and DMV.

Function

Self Test

Whenever the reader experiences a reset cycle, a self-test on the resources is performed.

Indication			Cause
LED	Buzzer	SW1	
Green	1 beep		Test Success
Amber flash	1 beep	Pin1 & Pin2 short	In Download Mode
Green	2 beeps	Pin3 & Pin4 short	Default Configuration Working
Note: If LED status is Off, possible causes of this problem are Internal ROM Failed or EEPROM Failed .			

Default interface Configuration Working

1. Detach the device from USB port.
2. Short Pin3 & Pin4 and attach the device to a USB port.
3. The device will beep twice and the green LED will turn on.
4. The device will work under default setting condition as below:
 - a). **HID Keyboard**
 - b). **Keyboard country is U.S.**

As soon as open the Pin3 & Pin4 and re-attach the USB connector, the device will work as user's previous settings.

Solution for Firmware Corrupting

1. Detach the device from USB port.
2. Short Pin1 & Pin2 and attach the device into a USB port.
3. The LED will turn amber indicating that the device is into firmware download mode.
4. Execute MSR213U Download Application Program to download proper file into the device.
5. When the download process has accomplished, open the Pin1 & Pin2 and re-attach the USB connector.
6. The LED will turn green if download process is success.

For firmware download applications, please contact UIC local representative or sales office.

Transmitting Data Block of Tracks

Each track could be divided into 1 to 3 blocks for transmission and each block can be set as different card types and character numbers. If the set data is different from the data after swiping, the reader will transmit completed data without limitation. The section 7 Memory Map contains an explanation of setting blocks.

Part Number Description

The brief configuration of MSR213U part number are shown as below:

MSR213U-12 Dual track 1&2

MSR213U-23 Dual track 2&3

MSR213U-33 Triple track 1&2&3

Note: Optional configuration is available.

Section 2. Configurations

This section shows the dimensions and setup for the MSR213U.

Dimensions of MSR213U

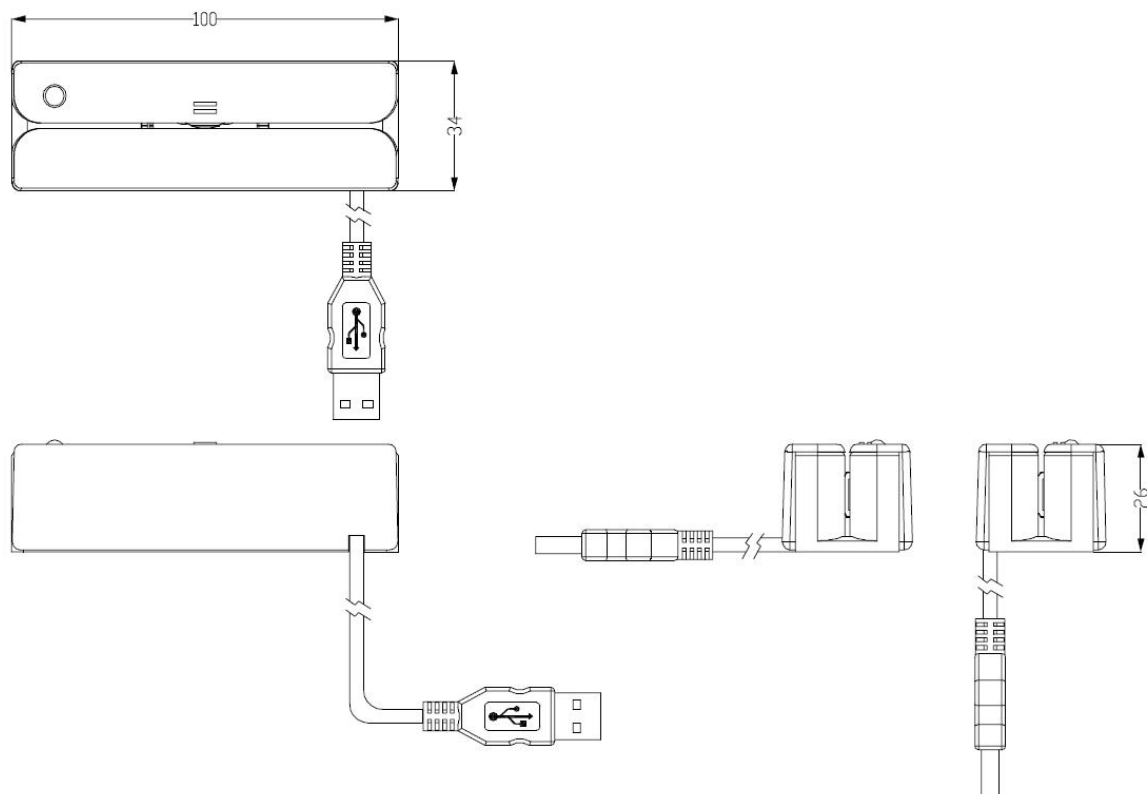


Figure 2-1 Dimensions of MSR213U

Installation

- 1) Insert USB connector to a free USB port on the PC system.
- 2) The LED of MSR213U will turn green indicating that the device is ready for use.

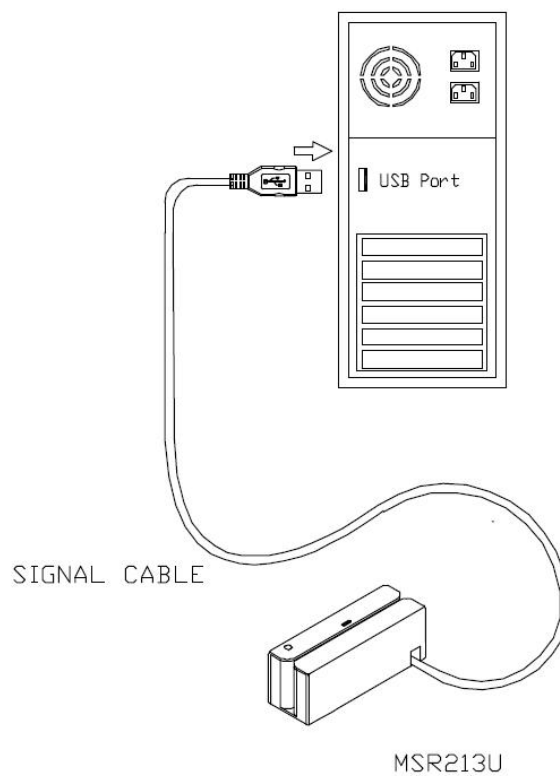


Figure 2-2 Installing MSR213U

Section 3. Technical Specifications

Magnetic Card Specifications

Card Type

ISO standard card (ISO 7810 and 7811)

CA old DMV

AAMVA

Read high or low coercivity magnetic stripes (300-4000oe)

Thickness

0.76mm \pm 0.08mm

Card Format

Track 1 & 3: 210 bpi

Track 2: 75/210 bpi

Card Operation Speed

Test Card	Speed (IPS)
ISO standard card	5-55
*Jitter	5-50
**Low Amplitude	5-50

Notes

*Jitter card: Reliable reading of magnetic stripes encoded with bit cell length variations within $\pm 15\%$ of normal as defined by ISO 7811.

**Low amplitude: Reliable reading of magnetic stripes encoded at 60% or more of the encoding amplitude as defined by ISO 7811.

Mechanical Specifications

Body Material

ABS 94V-0

Cover and Cable Color

IBM 43-4208 pearl white

Dimension

Length: 100mm

Width: 34mm

Height: 26mm

Weight

Approx. 120g

Interface Cable Length

1.7 m

Magnetic Head Life

Min. 1M swipes

Electrical Specifications

Power Required

+5VDC, +/-5%

Power Consumption

35mA Max in normal operation

Communication

Compatible with USB specification Revision 2.0

Ripple

50mVp-p Max

Dielectric Strength

250VDC for 1 minute

Insulation Resistance

10M Ω min. at 250VDC

Environmental Specifications

Temperature

Operating: -10 ~ 55°C

Storage: -40 ~ 70°C

Humidity

Operating: 5 ~ 95% RH

Storage: 5 ~ 95% RH

Section 4. Reader Operation

This section describes the LED indication and card reading.

LED Indication

The LED indicator will be either off, amber, red and green in the normal mode. When the device is not powered, the LED will be off. The LED will turn green and buzzer beeps one only if the device is attached and enumerated.

When a card is being swiped, the LED will turn off awhile or until the swipe is accomplished. If there is no error occurred, the LED will turn green and buzzer beeps once. If the LED turns amber and buzzer beeps twice, there is probability some data unrecognizable or it is not a triple track card. If no data is recognized, the LED will turn red and buzzer beeps three times. When the LED becomes green from red, the device will be ready to read the next card.

Card Reading

To exhibit the card reading capabilities, any text editor program that accepts keyboard input can be used such as Microsoft Notepad and Word.

Note that reader working in the M Mode or I Mode is not applicable in this case.

Section 5. USB Communication Specifications

This section describes the information for connecting to USB HID devices.

Identification Information

Vendor ID: [6352h](#)

Product ID: [213Ah](#)(Keyboard) / [213Bh](#)(M Mode) / [213Ch](#)(I Mode)

USB Connector Termination Assignment

Contact Number	Signal Name	Typical Wiring Assignment
1	VBUS	Red
2	D-	White
3	D+	Green
4	GND	Black
Shell	Shield	Drain Wire

Data Output Format

Keyboard & I Mode

Preamble	Card Data			Postamble
	TK1 Prefix	TK1 Data	TK1 Suffix	
	TK2 Prefix	TK2 Data	TK2 Suffix	
	TK3 Prefix	TK3 Data	TK3 Suffix	

M Mode

TK1 Data
TK2 Data
TK3 Data

Device Descriptor

Field	Value		
	Keyboard	M Mode	I Mode
Length	12	12	12
DescriptorType	01	01	01
USB	0200	0200	0200
DeviceClass	00	00	00
DeviceSubClass	00	00	00
DeviceProtocol	00	00	00
MaxPacketSize	08	08	08
Vendor	6352	6352	6352
Product	213A	213B	213C
Device	0103	0103	0103
Manufacturer	01	01	01
Product	02	02	02
SerialNumber	00	00	00
NumConfigurations	01	01	01

Report Descriptor, I Mode Setting

Field	Value	Description
	06 00 FF	Usage Page (MSR)
	09 01	Usage(Decoding Reader)
	A1 01	Collection (Application)
	15 00	Logical Minimum
	26 FF 00	Logical Maximum
	75 08	Report Size
	09 20	Usage (Tk1 Decode Status)
	09 21	Usage (Tk2 Decode Status)
	09 22	Usage (Tk3 Decode Status)
	09 28	Usage (Tk1 Data Length)
	09 29	Usage (Tk2 Data Length)
	09 2A	Usage (Tk3 Data Length)
	09 38	Usage (Card Encode Type)

	95 07	Report Count
	81 02	Input (Data, Var, Abs, Bit Field)
	09 30	Usage (Total Sending Length)
	95 02	Report Count (2)
	82 02 01	Input (Data, Var, Abs, Bit Field)
	09 31	Usage (Output Data)
	96 10 02	Report Count (328*)
	82 02 01	Input (Data, Var, Abs, Bit Field)
	09 20	Usage (Command Message)
	96 50 03	Report Count
	B2 02 01	Feature (Data, Var, Abs, Buffered Bytes)
	A4 B4	
	C0	End Collection

Report Descriptor, M Mode Setting

Field	Value	Description
	06 00 FF	Usage Page (MSR)
	09 01	Usage (Decoding Reader)
	A1 01	Collection (Application)
	15 00	Logical Minimum
	26 FF 00	Logical Maximum
	75 08	Report Size
	09 20	Usage (Tk1 Decode Status)
	09 21	Usage (Tk2 Decode Status)
	09 22	Usage (Tk3 Decode Status)
	09 28	Usage (Tk1 Data Length)
	09 29	Usage (Tk2 Data Length)
	09 2A	Usage (Tk3 Data Length)
	09 38	Usage (Card Encode Type)
	95 07	Report Count
	81 02	Input (Data, Var, Abs, Bit Field)
	09 30	Usage (Total Sending Length)

	95 6E	Report Count (2)
	82 02 01	Input (Data, Var, Abs, Bit Field)
	09 31	Usage (Output Data)
	95 6E	Report Count (328*)
	09 32	Input (Data, Var, Abs, Bit Field)
	95 6E	Usage (Command Message)
	82 02 01	Report Count
	09 20	Feature (Data, Var, Abs, Buffered Bytes)
	96 50 03	
	C0	End Collection

CARD DATA

Card data is only sent to the host on the Interrupt In pipe using an Input Report. The device will send only one Input Report per card swipe. If the host requests data from the device when no data is available, the device will send a Nak to the host to indicate that it has nothing to send. When a card is swiped, the Input Report will be sent even if the data is not decodable. The following table shows how the input report is structured.

I Mode

Offset	Usage Name
0	T1 decode status
1	T2 decode status
2	T3 decode status
3	T1 data length
4	T2 data length
5	T3 data length
6	Card encode type
7, 8	Total Output Length
9-508	Output Data

M Mode

Offset	Usage Name
0	Track 1 decode status
1	Track 2 decode status
2	Track 3 decode status
3	Track 1 data length
4	Track 2 data length
5	Track 3 data length
6	Card encode type
7 – 116	Track 1 data
117 – 226	Track 2 data
227 - 336	Track 3 data

TRACK 1 DECODE STATUS

Bits	7-1	0
Value	Reserved	Error

This is a one-byte value, which indicates the status of decoding track 1. Bit position zero indicates if there was an error decoding track 1 if the bit is set to one. If it is zero, then no error occurred. If a track has data on it that is not noise, and it is not decodable, then a decode error is indicated. If a decode error is indicated, the corresponding track data length value for the track that has the error will be set to zero and no valid track data will be supplied.

TRACK 2 DECODE STATUS

Bits	7-1	0
Value	Reserved	Error

This is a one-byte value, which indicates the status of decoding track 2. Bit position zero indicates if there was an error decoding track 2 if this bit is set to one. If it is zero, then no error occurred. If a track has data on it that is not noise, and it is not decodable, then a decode error is indicated. If a decode error is indicated, the corresponding track data length value for the track that has the error will be set to zero and no valid track data will be supplied.

TRACK 3 DECODE STATUS

Bits	7-1	0
Value	Reserved	Error

This is a one-byte value, which indicates the status of decoding track 3. Bit position zero indicates if there was an error decoding track 3 if this bit is set to one. If it is zero, then no error occurred. If a track has data on it that is not noise, and it is not decodable, then a decode error is indicated. If a decode error is indicated, the corresponding track data length value for the track that has the error will be set to zero and no valid track data will be supplied.

TRACK 1 DATA LENGTH

This one-byte value indicates how many bytes of decoded card data are in the track 1 data field. This value will be zero if there was no data on the track or if there was an error decoding the track.

TRACK 2 DATA LENGTH

This one-byte value indicates how many bytes of decoded card data are in the track 2 data field. This value will be zero if there was no data on the track or if there was an error decoding the track.

TRACK 3 DATA LENGTH

This one-byte value indicates how many bytes of decoded card data are in the track 3 data

field. This value will be zero if there was no data on the track or if there was an error decoding the track.

Total Output Length

In this approach, the reader will keep all of the I Mode data editing and other features like preamble, postamble, etc. The output data is always 500 bytes; the "Total Output Length" field indicates the valid data length in the output data.

Card Encode Type

- 0 ISO/ABA: ISO/ABA encode format
- 1 AAMVA: AAMVA encode format
- 2 CADL: California Driver License
- 3 Blank: The card is blank
- 4 Other: The card has a non-standard format. For example, ISO/ABA track 1 format on track 2.

Section 6. Command and Response

Following are the commands and responses available for the reader. Besides, the MagTek reader(USB HID) COMMANDS are fully compatible when the MSR213U operates in M_Mode.

Command Format

C2	XX	XX	Command	Data
----	----	----	---------	------

C2: HEADER

XX XX: Length, including Command and Data

Command list:

COMMAND	Description
39h	Get firmware version
44h	Default
44h 41h	Default all
45h	Write EEPROM
52H	Read EEPROM
53h	Set serial number
62h	Set device mode
73h	Get serial number
7Fh	Reset
Note The new setting will not take effect until the device is reset.	

Response Format

C2	XX	XX	Response
----	----	----	----------

C2: HEADER

XX XX: Length

Response: VALUE or RETURN CODE

RETURN CODE	Description
06h	ACK
15h	NAK

39h - Get firmware version

This command is used to get MSR213U firmware version.

EXAMPLE

Host request	Reader response
C2 00 01 39	
	C2 00 08 32 31 33 30 31 36 31 41

44h - Set default settings for current mode

This command is used to set MSR213U default settings for current mode.

EXAMPLE

Host request	Reader response
C2 00 01 44	
	C2 00 01 06

44h 41h - Set default settings for all modes

This command is used to set MSR213U default settings for all modes.

EXAMPLE

Host request	Reader response
C2 00 02 44 41	
	C2 00 01 06

45h - Write EEPROM

Changes the values of parameters in the EEPROM.(see next section for EEPROM description)

EXAMPLE

Host request	Reader response
C2 02 01 45 EEPROM value(512 bytes)	
	C2 00 01 06

52H - Read EEPROM

Displays the values of all EEPROM parameters.(see next section for EEPROM description)

EXAMPLE

Host request	Reader response
C2 00 01 52	
	C2 02 00 EEPROM value(512 bytes)

53h - Set Serial Number

This command is used to set reader serial number, 15 bytes max.

EXAMPLE

Host request	Reader response
C2 00 0A 53 30 31 32 33 34 35 36 37 38	
	C2 00 01 06
C2 00 02 53 FF	
	C2 00 01 06
FFh means zero length.	

62h x – Set Device Mode

This command is used to set the MSR213U operation mode.

Byte x							
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
*	*	*	*	*	*	00 Keyboard	
						01 M Mode	
						10 I Mode	

* means don't care value

EXAMPLE

Host request	Reader response
C2 00 02 62 01	
	C2 00 01 06
After device reset, the reader will work in the M Mode.	

73h - Get Serial Number

This command is used to get reader serial number.

EXAMPLE

Host request	Reader response
C2 00 01 73	
	C2 00 09 30 31 32 33 34 35 36 37 38

7Fh – Device reset**EXAMPLE**

Host request	Reader response
C2 00 01 7F	
	C2 00 01 06

Section 7. Memory Map of the System EEPROM

This section provides the memory map for EEPROM:

Bytes 1 ~ 180: Keyboard interface memory map

Bytes 201 ~ 320: M Mode memory map

Bytes 321 ~ 440: I Mode memory map

EEPROM Data Summary

BYTE	DESCRIPTION	DEFAULT (hex)
0	Reader Mode	00
1	Polling Interval	01
2	Max Packet Size	08(fixed)
3	MSR Basic Editing	8F
4	MSR Advanced Editing(1)	A8
5	MSR Advanced Editing(2)	39
6	Keyboard language	00
7	Credit card option	00
8~19*	Track1 prefix	
20~31*	Track2 prefix	
32~43*	Track3 prefix	
44~55*	Track1 suffix	
56~67*	Track2 suffix	
68~79*	Track3 suffix	
80~97*	Preamble	
98~115*	Postamble	
116~117*	Expiry date separator	
118~119*	Carriage Return	
120~128	TK1 Block Output function	06 00 00 06 00 00 06 00 00
129~137	TK2 Block Output function	06 00 00

		06 00 00 06 00 00
138~146	TK3 Block Output function	06 00 00 06 00 00 06 00 00
147~148*	Read error indicator	
149~150	Reserved	
151~152*	TK1 SS for ISO	
153~154*	TK1 SS for AAMVA	
155~156*	TK1 SS for DMV	
157~158*	TK1 SS for Tradeshow	
159~160	Reserved	
161~162*	TK2 SS for ISO	
163~164*	TK2 SS for AAMVA	
165~166*	TK2 SS for DMV	
167~168*	TK2 SS for Tradeshow	
169~170*	TK3 SS for ISO	
171~172*	TK3 SS for AAMVA	
173~174*	TK3 SS for DMV	
175~176*	TK3 SS for Tradeshow	
177~179	Reserved	
180	Checksum Byte	17
181~200	Reserved	
201	Polling Interval	01
202	Max Packet Size	08
203	MSR Basic Editing	0F
204	MSR Advanced Editing(1)	A0
205	MSR Advanced Editing(2)	39
206	Credit card option	00
207~260	Reserved	
261	Expiry date separator	

262	Carriage Return	
263~271	TK1 Block Output function	06 00 00 06 00 00 06 00 00
272~280	TK2 Block Output function	06 00 00 06 00 00 06 00 00
281~289	TK3 Block Output function	06 00 00 06 00 00 06 00 00
290	Read error indicator	
291	Reserved	
292	TK1 SS for ISO	
293	TK1 SS for AAMVA	
294	TK1 SS for DMV	
295	TK1 SS for Tradeshow	
296	Reserved	
297	TK2 SS for IOS	
298	TK2 SS for AAMVA	
299	TK2 SS for DMV	
300	TK2 SS for Tradeshow	
301	TK3 SS for ISO	
302	TK3 SS for AAMVA	
303	TK3 SS for DMV	
304	TK3 SS for Tradeshow	
305~319	Reserved	
320	Checksum Byte	9F
321	Polling Interval	01
322	Max Packet Size	08(fixed)
323	MSR Basic Editing	07
324	MSR Advanced Editing(1)	A0
325	MSR Advanced Editing(2)	39

326	Credit card option	00
327~332	Track1 prefix	
333~338	Track2 prefix	
339~344	Track3 prefix	
345~350	Track1 suffix	
351~356	Track2 suffix	
357~362	Track3 suffix	
363~371	Preamble	
372~380	Postamble	
381	Expiry date separator	
382	Carriage Return	
383~391	TK1 Block Output function	06 00 00 06 00 00 06 00 00
392~400	TK2 Block Output function	06 00 00 06 00 00 06 00 00
401~409	TK3 Block Output function	06 00 00 06 00 00 06 00 00
410	Read error indicator	
411	Reserved	
412	TK1 SS for ISO	
413	TK1 SS for AAMVA	
414	TK1 SS for DMV	
415	TK1 SS for Tradeshow	
416	Reserved	
417	TK2 SS for ISO	
418	TK2 SS for AAMVA	
419	TK2 SS for DMV	
420	TK2 SS for Tradeshow	
421	TK3 SS for ISO	

422	TK3 SS for AAMVA	
423	TK3 SS for DMV	
424	TK3 SS for Tradeshow	
425~439	Reserved	
440	Checksum Byte	97
441~489	Reserved	
490~504	Reader serial number, up to 15 chars	
505~511	Reserved	

***Please note**

1) In these cases, each character consists of two bytes:

Modifier_Key 1byte

Key_Code 1byte

For example: "%" = 02(LEFT SHIFT) 22("5")

 "5" = 00 22("5")

2) The USB Key_Code and Modifier_Key are transmitted to the host via USB to represent the ASCII character, please refer to **Appendix** for conversion information.

EEPROM Data Description

Byte 0

Value	Set Reader Mode
00h	HID Keyboard
01h	M Mode
02h	I Mode
Note Value other than 00h, 01h or 02h will reset all EEPROM to default.	

Byte 1

The **Polling Interval** is to set up the period of time between consecutive requests to the reader if it has any data to transmit.

This value must be from 1 to 255 milliseconds. A value of 255ms indicates the longest time for data transfers.

Byte 2

Maximum packet size(fixed value).

Byte 3

	7	6	5	4	3	2	1	0	Meaning	Default
Enable Track								0/1	Tk1 1:enable 0:disable	1
								0/1	Tk2 1:enable 0:disable	1
								0/1	Tk3 1:enable 0:disable	1
Break code					0/1				1:send 0:no send	1
RAW data				0/1					1:send 0:no send	0
RFU			0							0
Send SS/ES		0/1							1:no send 0:send	0
Caps Lock	0/1								1:On 0:Off	1

Byte 4

	7	6	5	4	3	2	1	0	Meaning	Default
Required Track								0/1	Tk1 1:enable 0:disable	0
								0/1	Tk2 1:enable 0:disable	0
								0/1	Tk3 1:enable 0:disable	0
RFU					1					1
RFU				0						0
Control CR			0/1						00:after all data	01

		0/1								01:each track 10:after all track 11:no CR	
Beeper	0/1									1:On 0:Off	1

Byte 5

	7	6	5	4	3	2	1	0	Meaning	Default
Track Output Order								0/1	First output	01
							0/1		00:no send 01:TK1 10:TK2 11:TK3	
						0/1			Second output	10
					0/1				00:no send 01:TK1 10:TK2 11:TK3	
				0/1					Third output	11
			0/1						00:no send 01:TK1 10:TK2 11:TK3	
Error indicator		0/1							0:no send 1:send	0
RFU	0									0

Byte 6

Value	Keyboard Country
00h	US
01h	German
02h	French
03h	UK English
04h	Spanish
05h	Italy
06h	Dutch
07h	Portuguese
08h	Swedish
09h	Danish

Byte 7

	7	6	5	4	3	2	1	0	Meaning	Default
Field Output Order								0/1	First output	00
							0/1		00:no send 01:Name 10:Account 11:Date	

					0/1			Second output	00
				0/1				00:no send 01:Name 10:Account 11:Date	
			0/1					Third output	00
		0/1						00:no send 01:Name 10:Account 11:Date	
Field Output		0/1						1:enable 0:disable	0
Date format	0/1							0:YY/MM 1:MM/YY	0

Bytes 8~19(2*6)

Set TK1 prefix, 6 chars max.

Bytes 20~31(2*6)

Set TK2 prefix, 6 chars max.

Bytes 32~43(2*6)

Set TK3 prefix, 6 chars max.

Bytes 44~55(2*6)

Set TK1 suffix, 6 chars max.

Bytes 56~67(2*6)

Set TK2 suffix, 6 chars max.

Bytes 68~79(2*6)

Set TK3 suffix, 6 chars max.

Bytes 80~97(2*9)

Set Preamble, 9 chars max.

Bytes 98~115(2*9)

Set Postamble, 9 chars max.

Bytes 116~117(2*1)

Replace the default Expiry date separator("/", 2Fh) with specified character.

Note: 00h means default value is used.

Bytes 118~119(2*1)

Replace the default Carriage Return("CR", 0Dh) with specified character.

Note: 00h means default value is used.

Bytes 120~128(3*3)

TK1 Block Output function A

TK1 Block Output function B

TK1 Block Output function C

Bytes 129~137(3*3)

TK2 Block Output function A

TK2 Block Output function B

TK2 Block Output function C

Bytes 138~146(3*3)

TK3 Block Output function A

TK3 Block Output function B

TK3 Block Output function C

Block Output format:Card type 1byte(refer to section 5 **Card Encode Type** description)

Start char 1byte

End char 1byte

Note: If both Start and End set to 00h this function will be disabled.**Bytes 147~148(2*1)**

Replace the default Error indicator("E", 45h) with specified character.

Note: 00h means default value is used.**Bytes 151~152(2*1)****Bytes 153~154(2*1)****Bytes 155~156(2*1)****Bytes 157~158(2*1)****Bytes 161~162(2*1)****Bytes 163~164(2*1)****Bytes 165~166(2*1)****Bytes 167~168(2*1)****Bytes 169~170(2*1)****Bytes 171~172(2*1)****Bytes 173~174(2*1)****Bytes 175~176(2*1)**

Use these functions to program the SS character you wish to use for Track1/2/3 of a specific card. If value=00h the original Start Sentinel is used instead.

Byte 180

Checksum for Keyboard memory map, XOR byte 1 to byte 7.

Byte 201Same as **Byte 1**.

Byte 202

Specify the maximum packet size(bytes), 1~64.

Byte 203

	7	6	5	4	3	2	1	0	Meaning	Default
Enable Track								0/1	Tk1 1:enable 0:disable	1
							0/1		Tk2 1:enable 0:disable	1
						0/1			Tk3 1:enable 0:disable	1
Read ISO only					0/1				0:enable 1:disable	1
RFU				0						0
RFU			0							0
Send SS/ES		0/1							1:no send 0:send	0
RFU	0									0

Byte 204

	7	6	5	4	3	2	1	0	Meaning	Default
Required Track								0/1	Tk1 1:enable 0:disable	0
							0/1		Tk2 1:enable 0:disable	0
						0/1			Tk3 1:enable 0:disable	0
RFU					0					0
RFU				0						0
Control CR			0/1						01:each track 11:no CR	01
		0/1								
Beeper	0/1								1:On 0:Off	1

Byte 205

	7	6	5	4	3	2	1	0	Meaning	Default
Track Output Order								0/1	First output	01
							0/1		00:no send 01:TK1 10:TK2 11:TK3	
						0/1			Second output	10
					0/1				00:no send 01:TK1 10:TK2 11:TK3	
				0/1					Third output	11

			0/1						00:no send 01:TK1 10:TK2 11:TK3	
Error indicator		0/1							0:no send 1:send	0
RFU	0									0

Byte 206

	7	6	5	4	3	2	1	0	Meaning	Default
Field Output Order								0/1	First output	00
							0/1		00:no send 01:Name 10:Account 11:Date	
						0/1			Second output	00
					0/1				00:no send 01:Name 10:Account 11:Date	
				0/1					Third output	00
			0/1						00:no send 01:Name 10:Account 11:Date	
Field Output		0/1							1:enable 0:disable	0
Date format	0/1								0:YY/MM 1:MM/YY	0

Byte 261

Replace the default Expiry date separator("/", 2Fh) with specified character.

Note: 00h means default value is used.

Byte 262

Replace the default Carriage Return("CR", 0Dh) with specified character.

Note: 00h means default value is used.

Bytes 263~271

TK1 Block Output function A

TK1 Block Output function B

TK1 Block Output function C

Bytes 272~280

TK2 Block Output function A

TK2 Block Output function B

TK2 Block Output function C

Bytes 281~289

TK3 Block Output function A

TK3 Block Output function B

TK3 Block Output function C

Block Output format:

Card type 1byte(refer to section 5 **Card Encode Type** description)

Start char 1byte

End char 1byte

Note: If both Start and End set to 00h this function will be disabled.

Byte 290

Replace the default Error indicator("E", 45h) with specified character.

Note: 00h means default value is used.

Byte 292**Byte 293****Byte 294****Byte 295****Byte 297****Byte 298****Byte 299****Byte 300****Byte 301****Byte 302****Byte 303****Byte 304**

Use these functions to program the SS character you wish to use on Track1/2/3 for different card types. If value=00h the original Start Sentinel is used instead.

Byte 320

Checksum for M Mode memory map, XOR byte 201 to byte 207.

Byte 321

Same as [Byte 1](#).

Byte 322

Maximum packet size(fixed value).

Byte 323

	7	6	5	4	3	2	1	0	Meaning	Default
Enable								0/1	Tk1 1:enable 0:disable	1
Track							0/1		Tk2 1:enable 0:disable	1
						0/1			Tk3 1:enable 0:disable	1
RFU					0					0
RFU				0						0
RFU			0							0
Send SS/ES		0/1							1:no send 0:send	0
RFU	0									0

Byte 324

	7	6	5	4	3	2	1	0	Meaning	Default
Required								0/1	Tk1 1:enable 0:disable	0
Track							0/1		Tk2 1:enable 0:disable	0
						0/1			Tk3 1:enable 0:disable	0
RFU					0					0
RFU				0						0
Control CR			0/1						00:after all data 01:each track 10:after all track 11:no CR	01
		0/1								
Beeper	0/1								1:On 0:Off	1

Byte 325

	7	6	5	4	3	2	1	0	Meaning	Default
Track Output								0/1	First output	01
Order							0/1		00:no send 01:TK1 10:TK2 11:TK3	
						0/1			Second output	10
					0/1				00:no send 01:TK1 10:TK2 11:TK3	
			0/1						Third output	11
		0/1							00:no send 01:TK1 10:TK2 11:TK3	
Error indicator		0/1							0:no send 1:send	0
RFU	0									0

Byte 326

	7	6	5	4	3	2	1	0	Meaning	Default
Field Output Order								0/1	First output	00
							0/1		00:no send 01:Name 10:Account 11:Date	
						0/1			Second output	00
					0/1				00:no send 01:Name 10:Account 11:Date	
				0/1					Third output	00
			0/1						00:no send 01:Name 10:Account 11:Date	
Field Output		0/1							1:enable 0:disable	0
Date format	0/1								0:YY/MM 1:MM/YY	0

Bytes 327~332

Set TK1 prefix, 6 chars max. Note: 00h means disable.

Bytes 333~338

Set TK2 prefix, 6 chars max. Note: 00h means disable.

Bytes 339~344

Set TK3 prefix, 6 chars max. Note: 00h means disable.

Bytes 345~350

Set TK1 suffix, 6 chars max. Note: 00h means disable.

Bytes 351~356

Set TK2 suffix, 6 chars max. Note: 00h means disable.

Bytes 357~362

Set TK3 suffix, 6 chars max. Note: 00h means disable.

Bytes 363~371

Set Preamble, 9 chars max. Note: 00h means disable.

Bytes 372~380

Set Postamble, 9 chars max. Note: 00h means disable.

Byte 381

Replace the default Expiry date separator("/", 2Fh) with specified character.

Note: 00h means default value is used.

Byte 382

Replace the default Carriage Return("CR", 0Dh) with specified character.

Note: 00h means default value is used.

Bytes 383~391

TK1 Block Output function A

TK1 Block Output function B

TK1 Block Output function C

Bytes 392~400

TK2 Block Output function A

TK2 Block Output function B

TK2 Block Output function C

Bytes 401~409

TK3 Block Output function A

TK3 Block Output function B

TK3 Block Output function C

Block Output format:

Card type 1byte(refer to section 5 **Card Encode Type** description)

Start char 1byte

End char 1byte

Note: If both Start and End set to 00h this function will be disabled.

Byte 410

Replace the default Error indicator("E", 45h) with specified character.

Note: 00h means default value is used.

Byte 412

Byte 413

Byte 414

Byte 415

Byte 417

Byte 418

Byte 419

Byte 420

Byte 421

Byte 422

Byte 423

Byte 424

Use these functions to program the SS character you wish to use on Track1/2/3 for different card types. If value=00h the original Start Sentinel is used instead.

Byte 440

Checksum for I Mode memory map, XOR byte 321 to byte 327.

Section 8. Appendix - USB key map

About a mapping from the HID keyboard/multimedia usages to PS/2, you could refer to these documents **USB HID to PS/2 Scan Code Translation Table** and **Universal Serial Bus HID Usage Tables**.

The **modifier byte** is defined as follows.

Bit	Key
0	LEFT CTRL
1	LEFT SHIFT
2	LEFT ALT
3	LEFT GUI
4	RIGHT CTRL
5	RIGHT SHIFT
6	RIGHT ALT
7	RIGHT GUI

Reference:

USB HID to PS/2 Scan Code Translation Table:

<http://download.microsoft.com/download/1/6/1/161ba512-40e2-4cc9-843a-923143f3456c/translate.pdf>

Universal Serial Bus HID Usage Tables:

http://www.usb.org/developers/devclass_docs/Hut1_12.pdf

Device Class Definition HID:

http://www.usb.org/developers/devclass_docs/HID1_11.pdf