

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	1 OF 45	2014. 07. 29.

Ticket Account Machine

with Mifare Contactless & Thermal Printer

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Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	2 OF 45	2014. 07. 29.

REVISION HISTORY

No	DATE	DESCRIPTION	REV	PAGE
1	2012.07.09	First Edition	A	44
2	2014.07.29	C40 command is added	B	48

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	3 OF 45	2014. 07. 29.

MODEL NAME INFORMATION

T A M - 3 X X X X

Interface	Function I	Function II	Option I	Option II
RS232	0 : without RF 1 : with RF	0 : without Printer 1 : with Printer	0 : without Bezel 1 : with Bezel	0 : without Case 1 : with Case

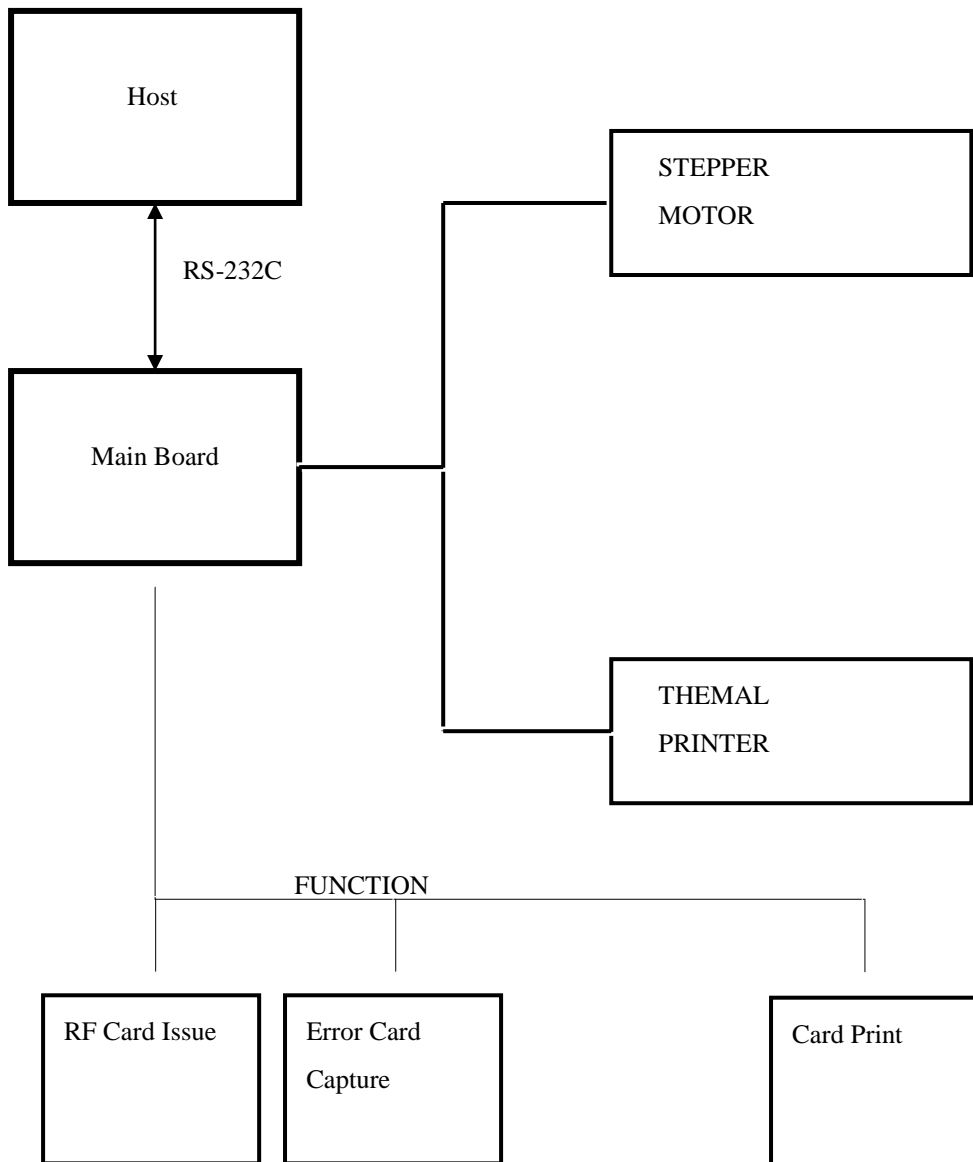
Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	4 OF 45	2014. 07. 29.

C O N T E N T S

System Block Diagram -----	5
Specification -----	8
Baud Rate & Font Size Set-----	9
RF Card Process -----	10
Communication Interface -----	11
Technical Drawing -----	16
Command Detail -----	18
Error Detail -----	36

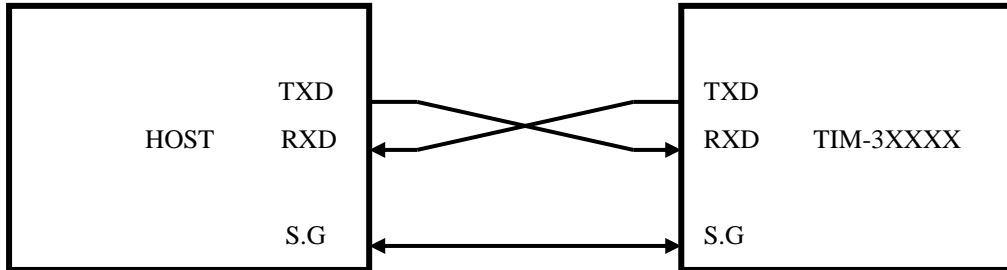
Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	5 OF 45	2014. 07. 29.

SYSTEM BLOCK DIAGRAM



Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	6 OF 45	2014. 07. 29.

◆ *RS – 232 Connection*



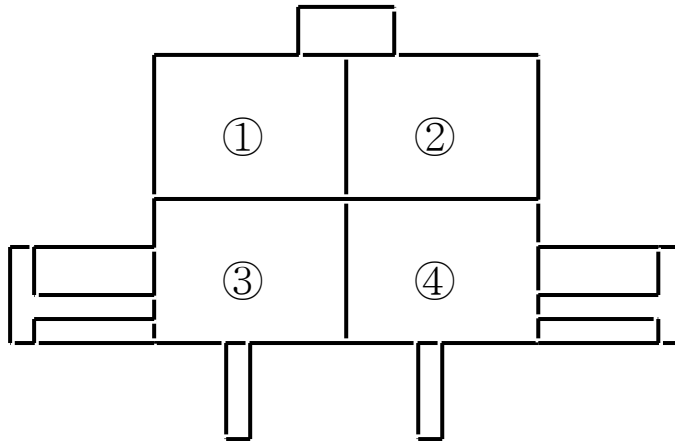
CASE 1) Part Number : 5504F1-09S-02A-01(NELTRON)

Pin No	INDEX	Remark
2	RXD	Receive
3	TXD	Transmit
5	S.G	Signal Ground

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	7 OF 45	2014. 07. 29.

◆ *Power Connection*

Front View (male)



Part Number : 5566-04A1 (MOLEX)

<TAM-3000>

Pin No	Signal Name	Direction
1		INPUT
2	DC +24V	
3		
4	GND	

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	8 OF 45	2014. 07. 29.

SPECIFICATIONS

◆ *basic functions*

Item	Sub Item	Spec
Print	Print Method	Thermal Dye Sublimation
	Print Speed	50 mS /1Line
	TPH	Resolution : 200 dpi(8 dpm)
		Abrasion: 50Km
	Card Thickness	0.2mm to 0.4mm
	Card Format	ISO CR-80 - ISO 7810(53.98mm(W) x 85.60mm(L))
Type	Paper ticket with Thermal Writable Film	
Encoding	RFID Type	Mifare/Ultra Mifare 13.56Mhz
Feeding Method	Motor	Step Motor Driven
	Card Feeding Speed	300mm/Sec
Temperature	Operating Temp.	5℃ ~ 50℃, 20% ~ 90% RH
	Storage Temp.	-25℃ ~ 70℃
Interface		RS-232C
Dimension		Refer to page 16.
Power Supply		DC 24V 5A

◆ *Power Consumption*

Steady state	:	Less than 70mA
Motor Starting or Reversing	:	Less than 1.8A
Character Print	:	Less than 2A

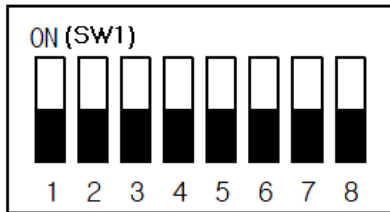
Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	9 OF 45	2014. 07. 29.

◆ *Controller Environment*

Communication

- : RS232C Interface
- : Baud Rate – 19200 BPS
 - 38400 BPS(Default)
 - 57600BPS
 - 115200BPS
- : 8Data bit, 1 Start bit, None Parity bit, 1 Stop Bit

◆ *Dip Switch setting*



Operation Part

-SW2 SETTING

Baud Rate Setting

Pin No. 1	Pin No. 2	Baud Rate	Note
OFF	OFF	19200 BPS	
ON	OFF	38400 BPS	Default
OFF	ON	57600 BPS	
ON	ON	115200 BPS	

Communication Type Setting

Pin No. 6	Communication Type	Note
OFF	UART	Default
ON	RFU	

Boot Mode Setting

Pin No. 7	Pin No. 8	Mode	Note
OFF	OFF	-	
ON	OFF	Execution Mode	Default
OFF	ON	Download Mode	
ON	ON	-	

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	10 OF 45	2014. 07. 29.

RF CARD PROCESS

The RF module supports most of RF cards conforming with the ISO14443-3 Type A(Mifare Card) with 1 Kbits memory.

◆ *Processing time*: Once Block

Command	Parameter	Time (mSec)		Note
		Type	Max	
Card Read	1 Block	100		Without card moving
Card Write	1 Block	150		Without card moving, With Verify
Card Decrement	1 Block	120		Without card moving With Verify
Card Increment	1 Block	120		Without Card moving With Verify

◆ *Operating Frequency*

Operating Frequency: 13.56 MHz

Data Transfer Baud: Baud rate 106Kbaud

◆ *Operating range of the Antenna*

Guar. Operating range: All distances in the range of 0 ... 50 mm from the antenna board.

Typical operating range: 0 ... 65 mm

◆ *Power Consumption*

Supply Voltage	Operating Voltage	Operating Current	
		Type	Max
+ 5 V	+5V +10% -5%	165mA	255mA

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	11 OF 45	2014. 07. 29.

COMMUNICATION INTERFACE

◆ *Communication Method*

Asynchronous, Half duplex

Baud Rate: 19200 – 57600Bps, Default: 38400Bps

Start Bit: 1Bit

Data Length: 8Bit

Parity: None

Stop Bit: 1Bit

◆ *Communication Protocol Format*

1 Command Frame Format

SOH	Null	Length	STX	CMD	DATA	ETX	BCC
1 byte	1 byte	2 byte	1 byte	3 byte	N byte	1 byte	1 byte

2 Positive Response Frame Format

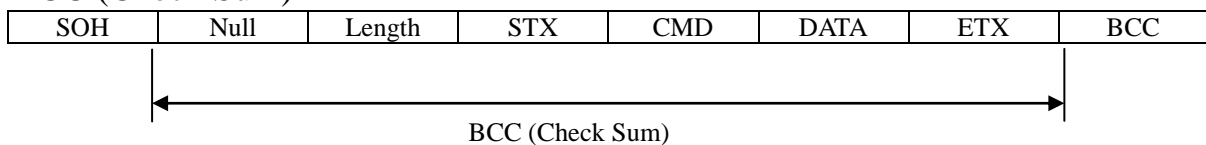
SOH	Null	Length	STX	CMD	GOOD	0x01	DATA	ETX	BCC
1 byte	1 byte	2 byte	1 byte	3 byte	2 byte	1 byte	1 byte	1 byte	1 byte

(N byte: variable length)

3 Negative Response Frame Format

SOH	Null	Length	STX	CMD	E-Code	0x00	ETX	BCC
1 byte	1 byte	2 byte	1 byte	3 byte	2 byte	1 byte	1 byte	1 byte

4 BCC (Check Sum)



Command Frame BCC = Null ^ Length ^ STX ^ CMD ^ DATA ^ ETX.

Positive Response BCC = Null ^ Length ^ STX ^ CMD ^ GOOD ^ 0x01 ^ DATA ^ ETX.

Negative Response BCC = Null ^ Length ^ STX ^ CMD ^ E-Code ^ ETX.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	12 OF 45	2014. 07. 29.

5. Explanatory note of technical words

Name	Detail
Null	Reserved. Always 0x00.
Length	Data Length from the CMD to DATA.
CMD	Instruction Code (3 Bytes)
GOOD	Normal Execution : 0x0000 (2 Bytes)
E-Code	Command Failed: Refer to "Error Code" (2 Bytes)
BCC	Check Sum.

<Length>, <E-Code>

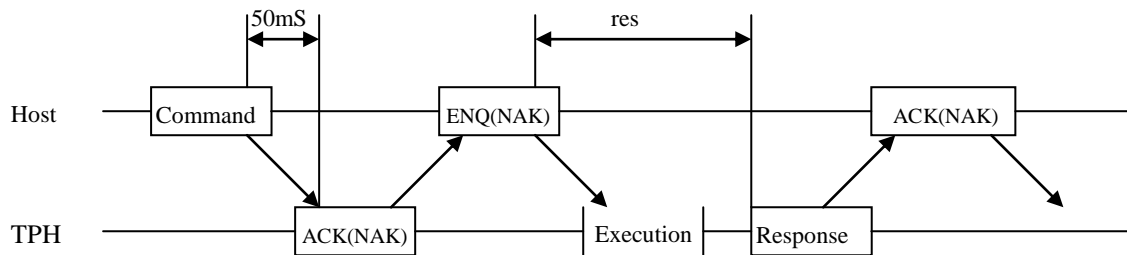
High Byte	Low Byte
-----------	----------

6. Control Characters

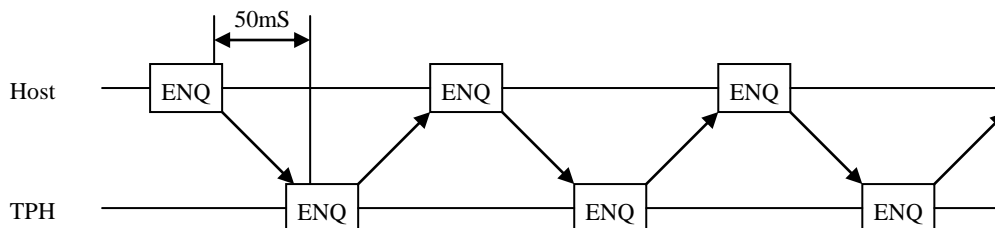
Name	Hex Value	Detail
SOH	0x01	Start of Header
STX	0x02	Start of Text
ETX	0x03	End of Text
ENQ	0x05	Enquiry
ACK	0x06	Positive Acknowledge
NAK	0x15	Negative Acknowledge
CAN	0x18	Cancel

7 COMMUNICATION SEQUENCE / TIMING

7.1 Command



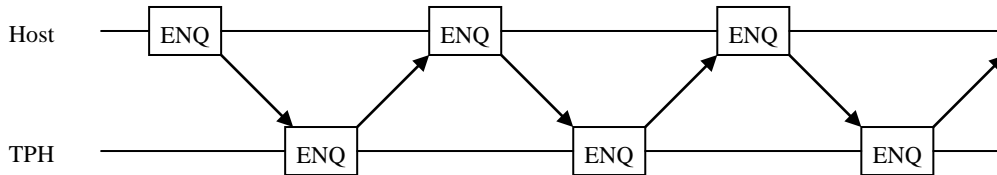
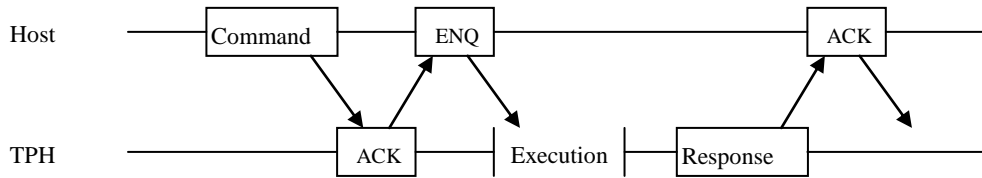
7.2 Inquiry



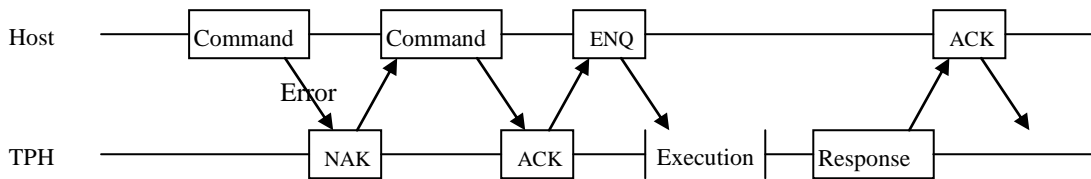
Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	13 OF 45	2014. 07. 29.

7.3 Sequence

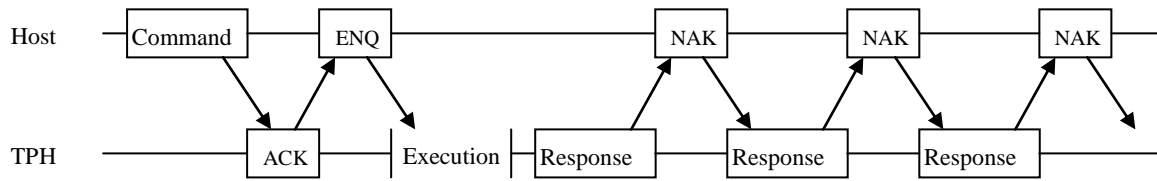
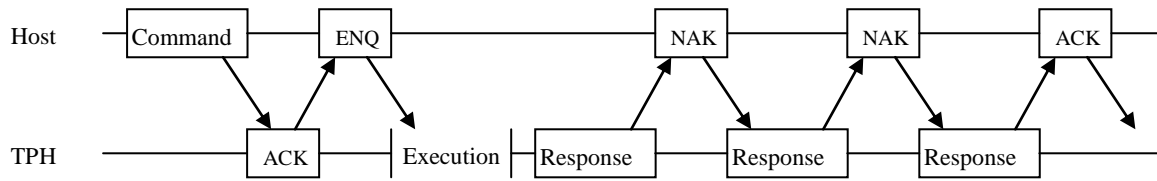
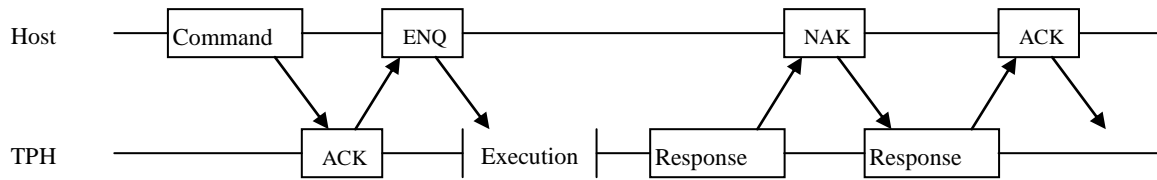
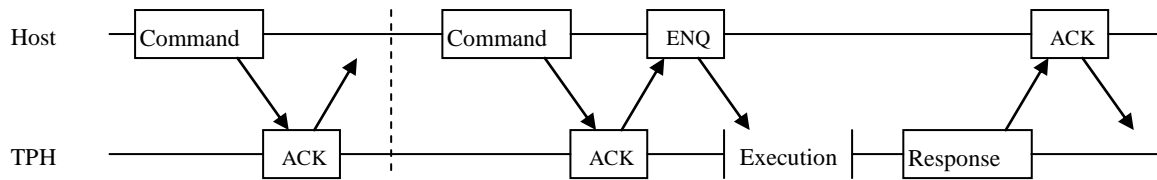
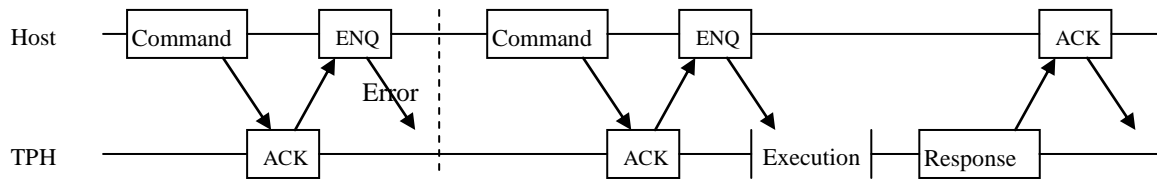
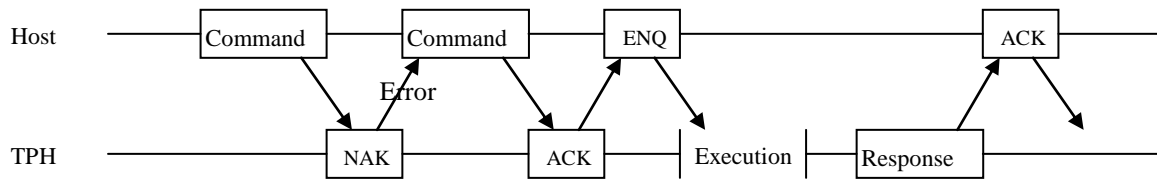
7.3.1 General



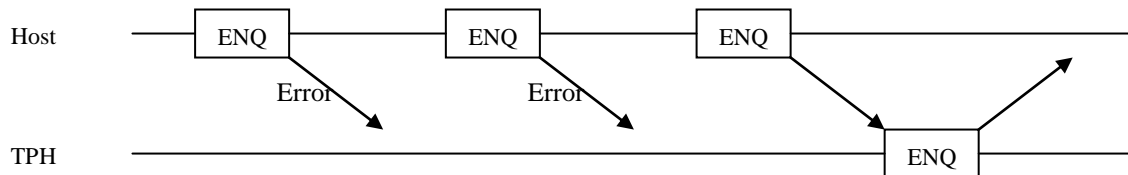
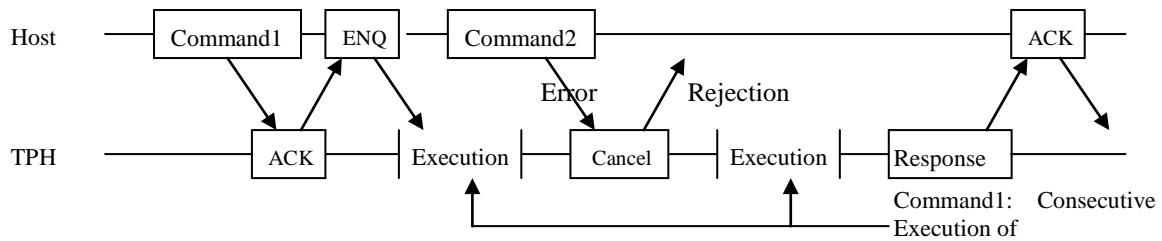
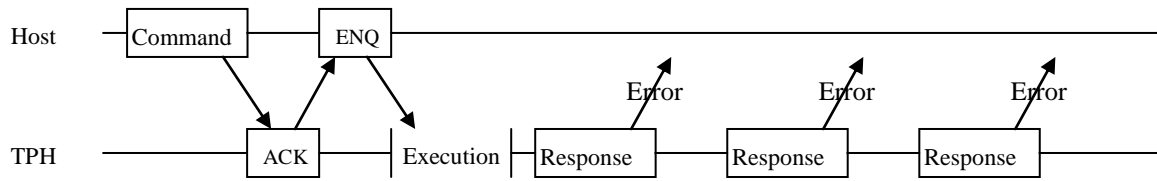
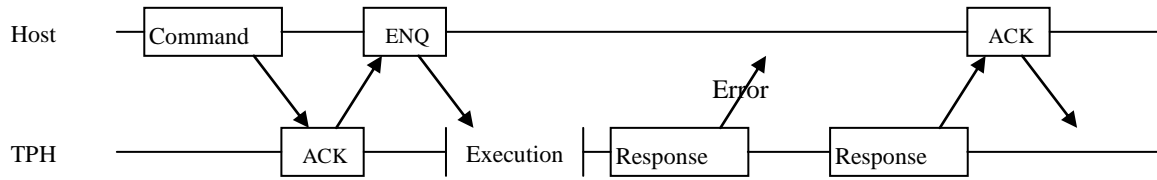
7.3.2 Event



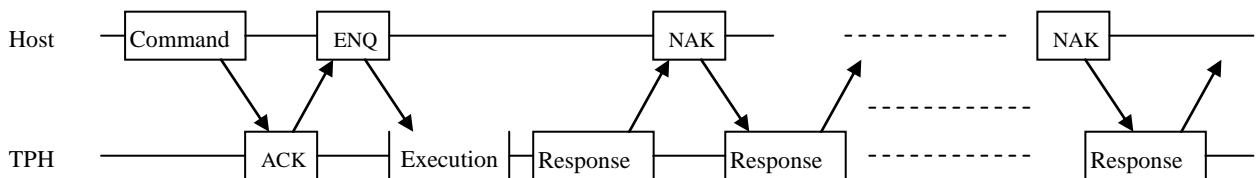
Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	14 OF 45	2014. 07. 29.



Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	15 OF 45	2014. 07. 29.



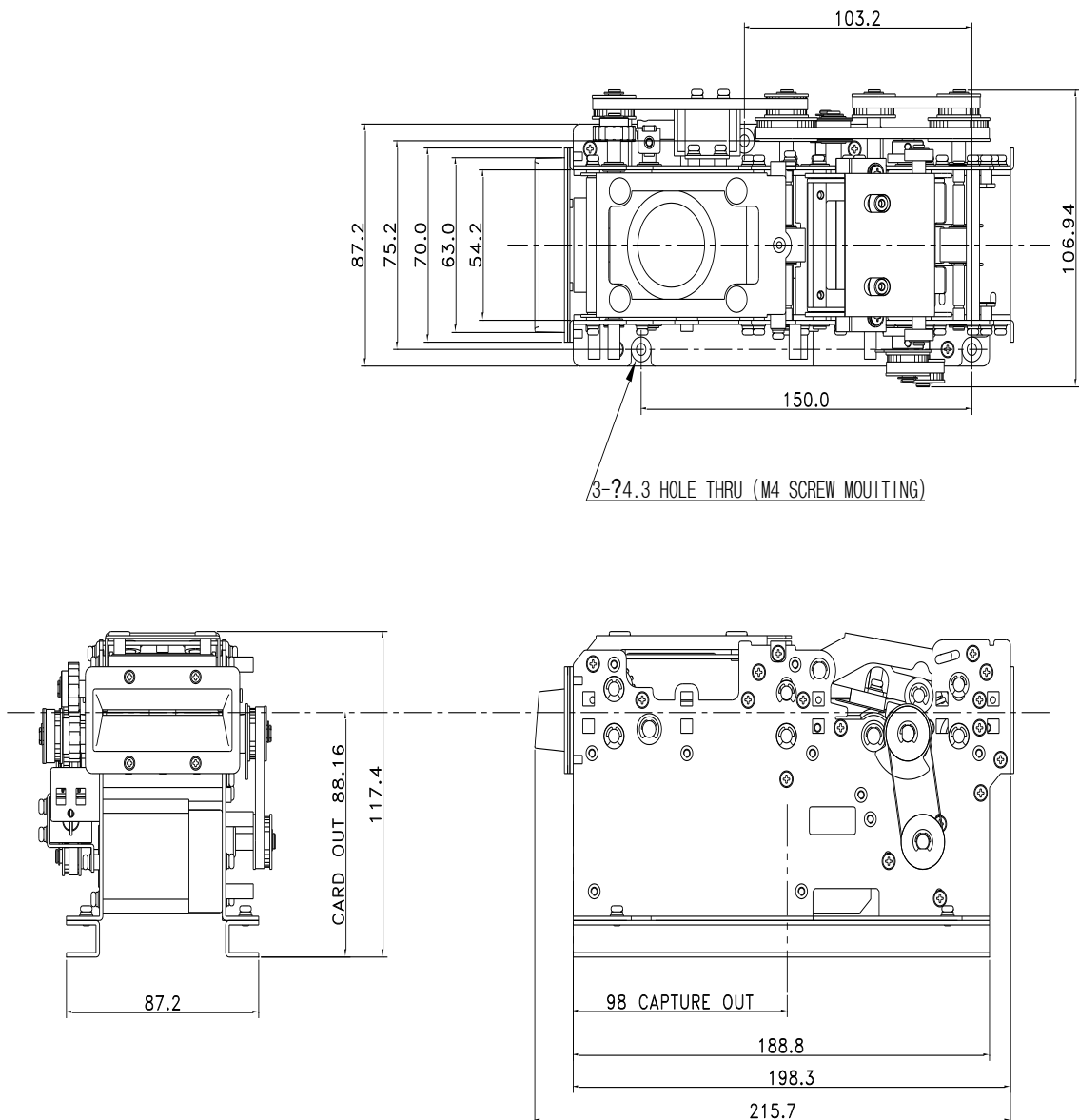
- When received the NAK packet consecutively.



Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	16 OF 45	2014. 07. 29.

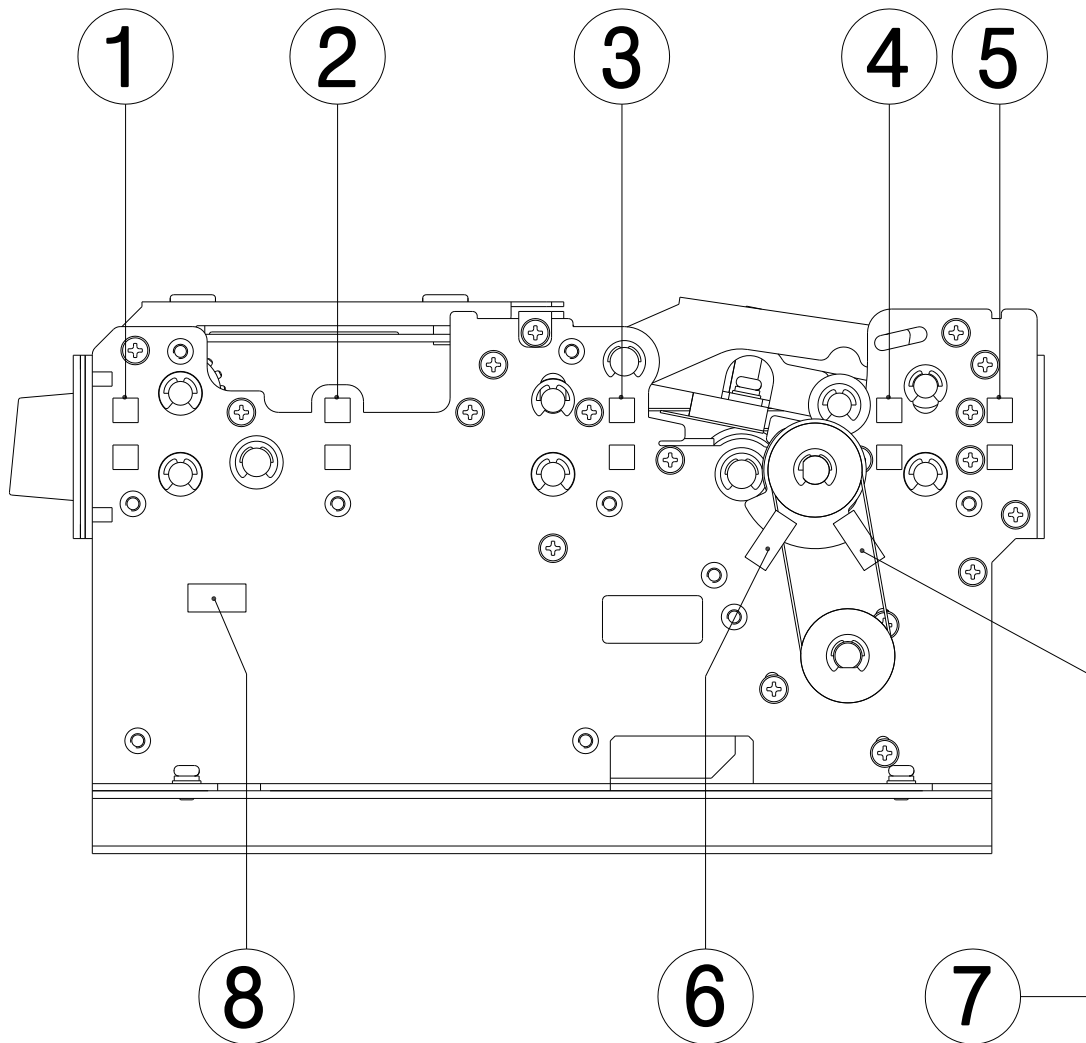
TECHNICAL DRAWING

<TAM-3XXX>



Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	17 OF 45	2014. 07. 29.

< Sensor Position >



NO.	NAME("C16")	Detail
1	SEN_1	Feeder 1 sensor
2	SEN_2	Feeder 2 sensor
3	SEN_3	Feeder 3 sensor
4	SEN_4	Feeder 4 sensor
5	SEN_5	Feeder 5 sensor
6	SEN_6	Printer shutter sensor Left
7	SEN_7	Printer shutter sensor Right
8	SEN_8	Capture sensor

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	18 OF 45	2014. 07. 29.

COMMAND DETAIL

◆ *Command List*

	Item	Cm0	Cm1	Cm2	Detail	Note
COMMON	STATUS	'C'	'1'	'1'	Get Model	
		'C'	'1'	'2'	Get Firmware Version	
		'C'	'5'	'5'	Get All Sensor status	
	SETTING	'C'	'2'	'4'	Set Retry Count	
		'C'	'4'	'0'	Set User Buzzer	
	MOVE	'C'	'3'	'2'	Card Stand By	
'C'		'3'	'7'	Card Front Eject(Hold Mode)		
PRINTER	CARD PRINT	'P'	'2'	'3'	Print Card.	
	SETTING	'P'	'3'	'7'	Setting the Bar-Code Data to the SRAM	
	CLEANING	'P'	'3'	'2'	Thermal Header Cleaning	
RF CARD	RF CARD READ / WRITE	'R'	'3'	'1'	RF Card Read in Block Range	
		'R'	'3'	'2'	RF Card Write in Block Range	
		'R'	'3'	'6'	RF Card Read in Sector Range	
		'R'	'3'	'7'	RF Card Write in Sector Range	
	BALANCE	'R'	'4'	'1'	Balance Increment	
		'R'	'4'	'2'	Balance Decrement	
	SECRET KEY CHANGE	'R'	'5'	'1'	Change 'Secret Key' to other Key	
		'R'	'5'	'2'	Change 'Secret Key' to all the same Key value	
		'R'	'5'	'3'	Select 'Secret Key Index'	
		'R'	'5'	'4'	Change 'RF Card Secret Key' to other Key	
		'R'	'5'	'5'	Key Set and Change 'Secret Key' to other Key	
		'R'	'5'	'6'	Key Set and Change 'Secret Key' to all the same Key value	
	RF DETECT	'R'	'6'	'1'	Check RF card in antenna area	
ULTRA MIFARE	READ	'U'	'3'	'1'	Ultra RF Card Read	
	WRITE	'U'	'3'	'2'	Ultra RF Card Read	
	RF DETECT	'U'	'4'	'1'	Ultra Check RF card in antenna area	

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	19 OF 45	2014. 07. 29.

1 STATUS / SETTING

1.1 “C11” : It is to check out Model number of TAM-3XXXX.

☞ Command Format

SOH	Null	Length	STX	“C11”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Length	STX	“C11”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C11”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Model No.
30Byte (ASCII)

1.2 “C12” : It is to check out Firmware Version of TAM-3XXXX

☞ Command Format

SOH	Null	Length	STX	“C12”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Length	STX	“C12”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C12”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Firmware Version
30Byte (ASCII)

1.3 “C55” : Check out all the sensors of TAM-3XXXX

☞ Command Format

SOH	Null	Node	Length	STX	“C55”	ETX	Bcc
-----	------	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Node	Length	STX	“C55”	GOOD	0x01	DATA	ETX	Bcc
-----	------	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Node	Length	STX	“C55”	E-Code	0x00	ETX	Bcc
-----	------	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Status of all the sensors		
First Byte (Hex)	Second Byte (Hex)	Third Byte (Hex)

<Card Position> Refer to page 17.

First Byte	Sensor
0x01	RFU
0x02	RFU
0x04	RFU
0x08	RFU
0x10	RFU
0x20	RFU
0x40	RFU
0x80	RFU

Second Byte	Sensor
0x01	SEN_A
0x02	SEN_B
0x04	SEN_C
0x08	RFU
0x10	SEN_9
0x20	RFU
0x40	RFU
0x80	RFU

Third Byte	Sensor
0x01	SEN_1
0x02	SEN_2
0x04	SEN_3
0x08	SEN_4
0x10	SEN_5
0x20	SEN_6
0x40	SEN_7
0x80	SEN_8

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	20 OF 45	2014. 07. 29.

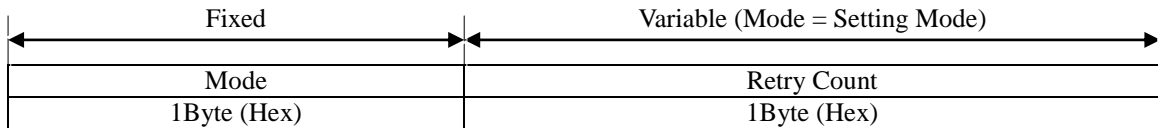
2.SETTING

2.1 “C24” : It is to set or to check ‘Retry Count’.

☞ Command Format

SOH	Null	Length	STX	“C24”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure



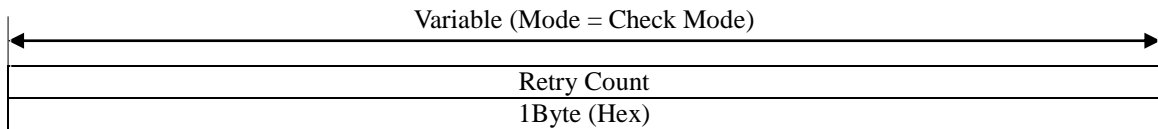
☞ Positive Response Format

SOH	Null	Length	STX	“C24”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C24”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure



☞ Data Variable

<Mode>

Code	Mode	Detail
0x01	‘Setting Mode’	Set ‘Retry Count’
0x02	‘Check Mode’	Check ‘Retry Count’

<Retry Count>

Code	Setting	Detail	Note
0x00	NON	Do not retry	
0x01	Once	Execute the instruction again.	
0x02	Twice	Retry it twice	
0x03	Three times	Retry it three times	Default

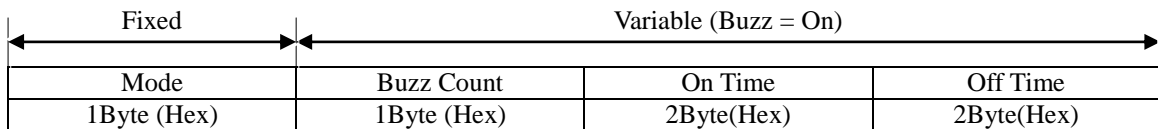
Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	21 OF 45	2014. 07. 29.

2.2 “C40” : The BUZZ is operate by internal terminal.

☞ Command Format

SOH	Null	Length	STX	“C40”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure



☞ Positive Response Format

SOH	Null	Length	STX	“C40”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C40”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Data Variable

<Mode>

Code	Buzz	Detail
0x01	On	Set Buzz ON
0x02	Off	Set Buzz OFF

<Buzz Count>

Code	Buzz Count	Detail	Note
0x00	Continuous	Buzz continuous occur.	Default
0x01	1	Buzz one time occur.	Note
0x02	2	Buzz two times occur.	Note
---	---	---	---
0x64	100	Buzz hundred times occur.	Note

<On Time/Off Time>

Code	Range	Detail	Note
On Time	100 – 10000	Buzz sound active time	mSec
Off Time	100 – 10000	Buzz sound nonactive time.	mSec

<On Time>, <Off Time>

High Byte	Low Byte
-----------	----------

☞ Note

If set ‘Buzz one time occur’, after the terminal is Buzz one time occur, return to ‘Buzz Off’ state.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	22 OF 45	2014. 07. 29.

3 MOVE

3.1 “C32” : It is take card to RF Module or Print module

☞ Command Format

SOH	Null	Length	STX	“C32”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Module
1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“C32”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“C32”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Data Variable

<Module>

Code	Setting	Detail
0x01	RFU	-
0x02	RFU	-
0x03	RF	Card transport to RF Module
0x04	RFU	-
0x05	PRINTER	Card transport to Printer Module.

3.2 “C37” : Dispense the card to front and hold it at the exit roller of the unit.

☞ Command Format

SOH	Null	Length	STX	“C37”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Length	STX	“C37”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

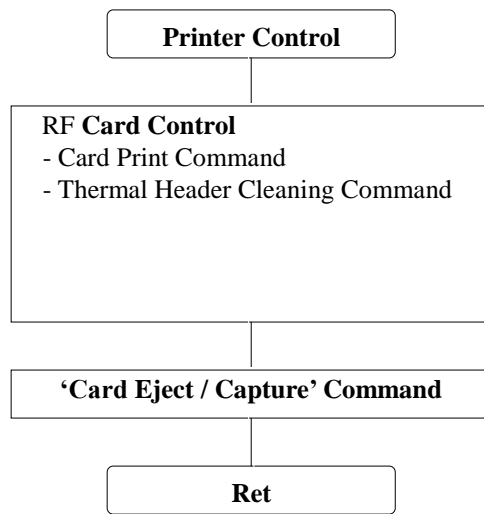
☞ Negative Response Format

SOH	Null	Length	STX	“C37”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	23 OF 45	2014. 07. 29.

◆ *THERMAL PRINT*

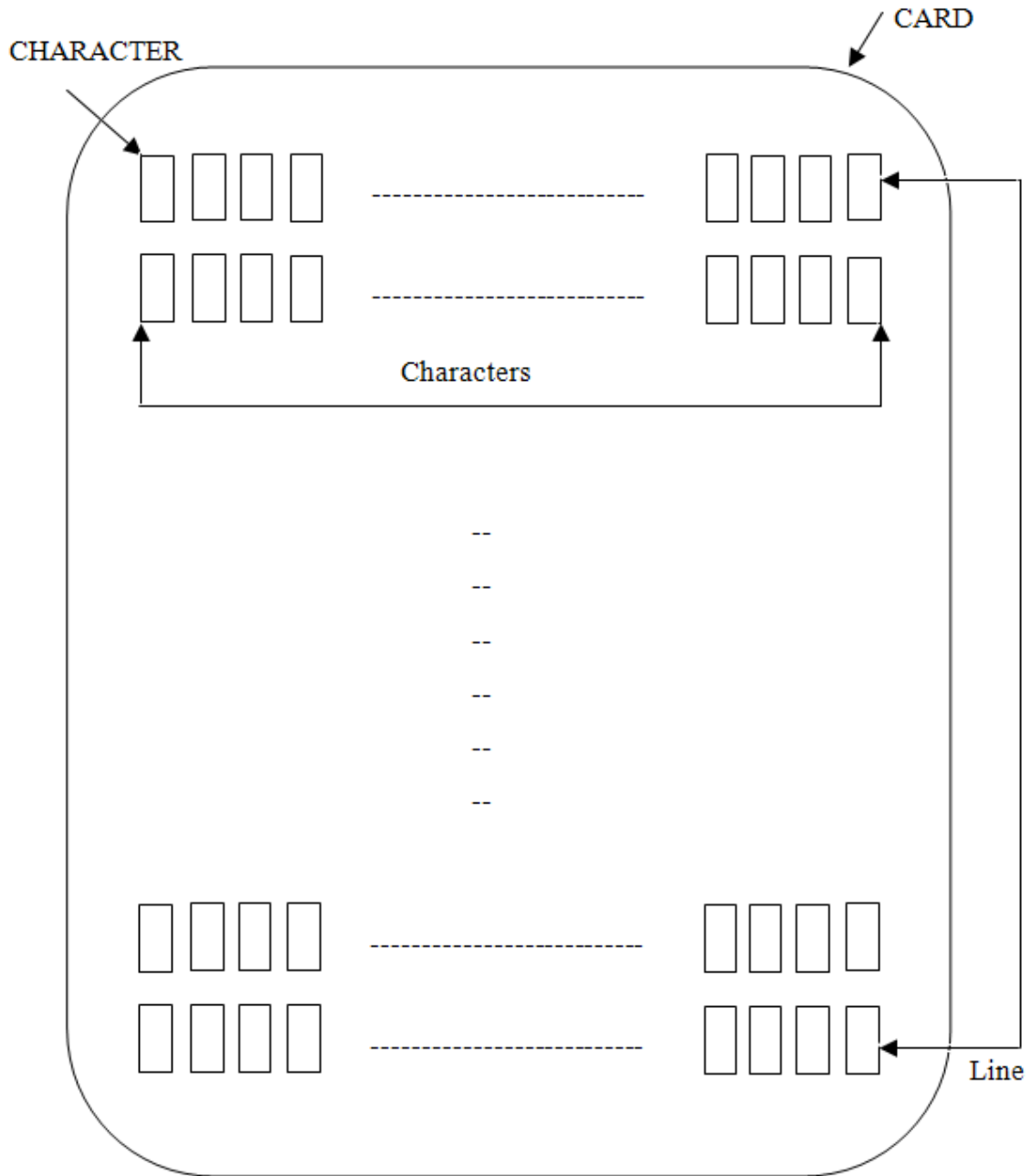
Basic Printer Operations:



Printer Operations in the terminal

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	24 OF 45	2014. 07. 29.

1. Character



Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	25 OF 45	2014. 07. 29.

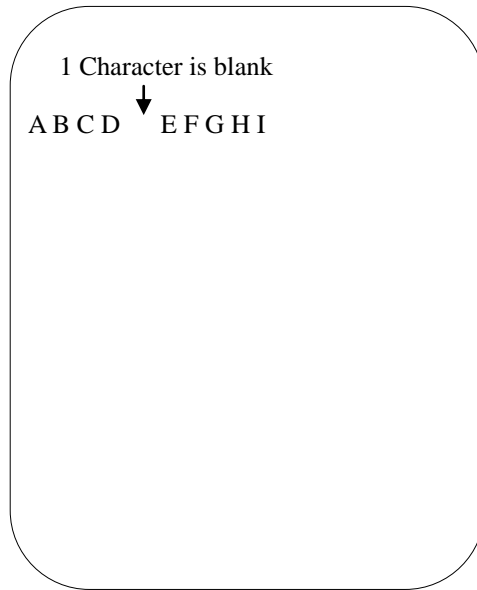
␣(ASCII CODE 0x20) : 1 character fills blank.

␣(ASCII CODE 0x0D): Next Line moving.

Ex1)

INPUT DATA: ABCD␣EFGHI

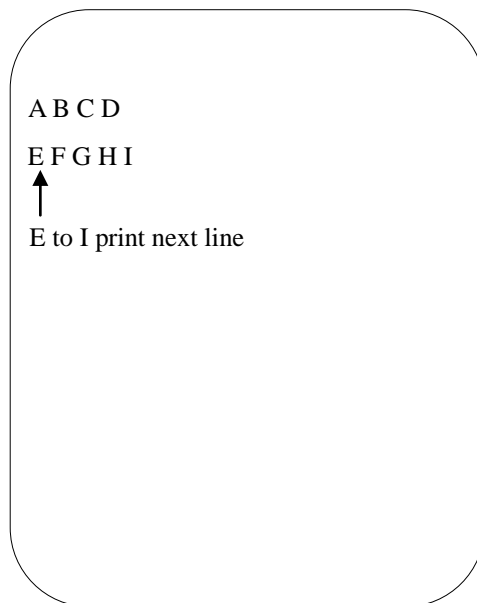
TICKET PRINT:



Ex2)

INPUT DATA: ABCD␣EFGHI

TICKET PRINT:



Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	26 OF 45	2014. 07. 29.

1. THERMAL PRINTER

1.1 “P23” : Moves card to Stand-by position, and start printing .

☞ Command Format

SOH	Null	Node	Length	STX	“P23”	DATA	ETX	Bcc
-----	------	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Optional Flag	Ticket Line Number	Data to be printed on Ticket surface. (Variable length)
1Byte (HEX)	2Byte (ASCII Number: ”01”~”99”)	ASCII CODE 0x21(!) to 0x7E(~) (500Byte Max)

☞ Positive Response Format

SOH	Null	Node	Length	STX	“P23”	GOOD	0x01	ETX	Bcc
-----	------	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Node	Length	STX	“P23”	E-Code	0x00	ETX	Bcc
-----	------	------	--------	-----	-------	--------	------	-----	-----

☞ Note

♫(ASCII CODE 0x20) : 1 character fills blank.

♫(ASCII CODE 0x0D): Next Line moving.

☞ Data Variable

< Optional Flag >

Code	Setting	Detail
0x00	Bar Code/Rotate	Bar Code in the SRAM memory is excluded / An angle of 0 degrees (0 °)
0x01	Bar Code/Rotate	Bar Code in the SRAM memory is included / An angle of 0 degrees (0 °)
0x02	Rotate	An angle of 90 degrees (90 °)
0x04	Rotate	An angle of 90 degrees (180 °)
0x06	Rotate	An angle of 90 degrees (270 °)

1.2 “P32” : It is to clean Thermal Printer Head.

☞ Command Format

SOH	Null	Node	Length	STX	“P32”	ETX	Bcc
-----	------	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Node	Length	STX	“P32”	GOOD	0x01	ETX	Bcc
-----	------	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Node	Length	STX	“P32”	E-Code	0x00	ETX	Bcc
-----	------	------	--------	-----	-------	--------	------	-----	-----

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	27 OF 45	2014. 07. 29.

1.3 “P37” : Sets Bar Code options into the SRAM buffer.

***To print this Bar Code data, use the “P23” command.**

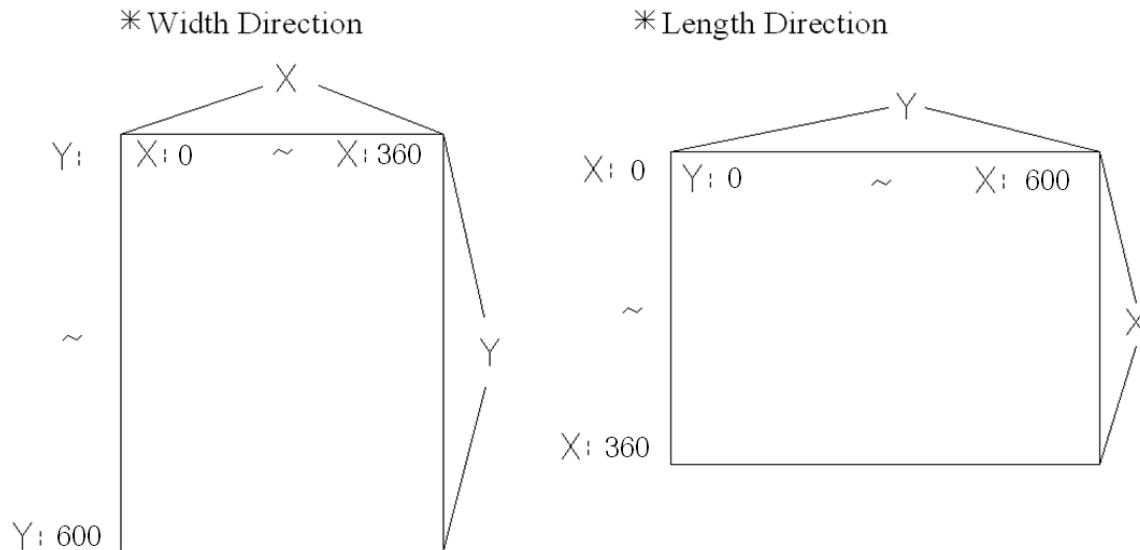
☞ Command Format

SOH	Null	Length	STX	“P37”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Fixed byte				
X Point	Y Point	Font Select	Direction	Bar-Code Scale
2byte(Hex)	2byte(Hex)	1byte(Hex)	1byte(Hex)	1byte(Hex)
Decimal : 0~360	Decimal : 0~600	0x01: Code 128 0x02: - 0x03: - 0x04: -	0x01: 0 degree 0x02: 90 degree 0x03: 180 degree 0x04: 270 degree	0x01: One bar is 0.25mm 0x02: One bar is 0.33mm 0x03: One bar is 0.42mm
Hex: 0x00~0x168	Hex: 0x00~0x258			

Fixed byte		Variable Byte
Bar Code Height	Bar Code Text On/Off	Bar-Code Data to print
2byte(Hex)	1byte(Hex)	Max: 23 byte(ASCII)
Decimal : 0~500	0x00: Off the BarCode Text.	
Hex: 0x00~0x1F4	0x01: On the BarCode Text.	



☞ Positive Response Format

SOH	Null	Length	STX	“P37”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“P37”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	28 OF 45	2014. 07. 29.

◆ *RF CARD*

This section describes the commands that can use at the 'RF CARD'.

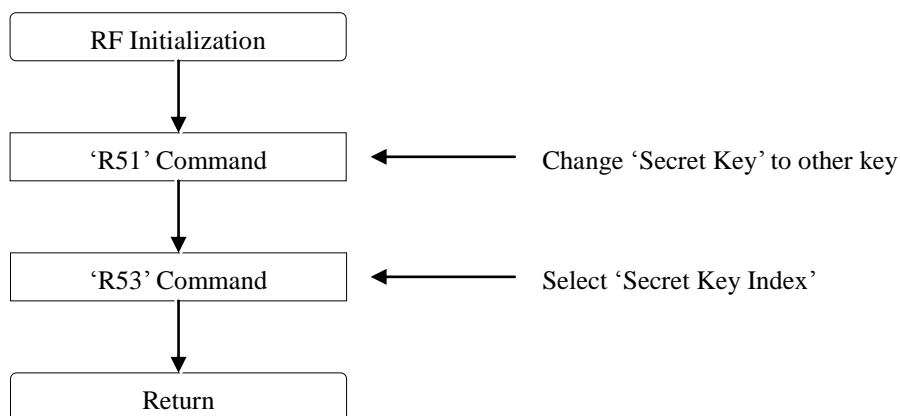
The RF Module of his model supports only the MIFARE card.

The applicable models of the TAM-3XXXX Series is the CIM-560 the available commands are as follows.

Item	Cm0	Cm1	Cm2	Detail	Note
RF CARD READ / WRITE	'R'	'3'	'1'	RF Card Read in Block Range	
	'R'	'3'	'2'	RF Card Write in Block Range	Verify
	'R'	'3'	'6'	RF Card Read in Sector Range	
	'R'	'3'	'7'	RF Card Write in Sector Range	
BALANCE	'R'	'4'	'1'	Balance Increment	
	'R'	'4'	'2'	Balance Decrement	
SECRET KEY CHANGE	'R'	'5'	'1'	Change 'Secret Key' to other Key	
	'R'	'5'	'2'	Change 'Secret Key' to all the same Key value	
	'R'	'5'	'3'	Select 'Secret Key Index'	
	'R'	'5'	'4'	Change 'RF Card Secret Key' to other Key	
	'R'	'5'	'5'	Key Set and Change 'Secret Key' to other Key	
	'R'	'5'	'6'	Key Set and Change 'Secret Key' to all the same Key value	
RF DETECT	'R'	'6'	'1'	Check RF card in antenna area	

To use the RF card, you need to initialize at first.

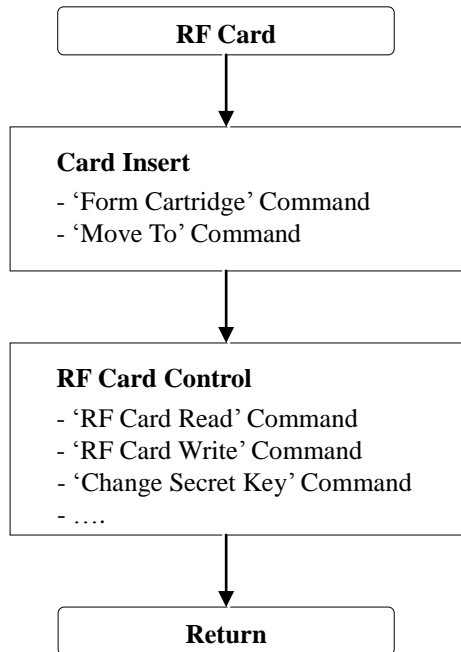
- Setting and updating of the secret key and secret key index.



RF Module Initialization

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	29 OF 45	2014. 07. 29.

Basic Operating Procedure of the RF card:



RF Card Basic Operating Procedures

Memory Architecture(map) of the RF card: 8Kbit

Sector	Block	Size	Detail	Note
Sector 0	Block 0	16Byte	RF Card Information	Can't use
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		
Sector 1	Block 0	16Byte	User Available Memory	
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		
Sector 2	Block 0	16Byte	User Available Memory	
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		
---	---	---	---	---
Sector 15	Block 0	16Byte	User Available Memory	
	Block 1	16Byte		
	Block 2	16Byte	'Sector Key'	
	Block 3	16Byte		

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	30 OF 45	2014. 07. 29.

1 RF CARD READ / WRITE

1.1 “R31” : Read RF card data & Secret Key in block range

☞ Command Format

SOH	Null	Length	STX	“R31”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	Block
0x00 – 0x0f	0x00 – 0x03
1Byte (Hex)	1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R31”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R31”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Sector	Block	Read Data
1Byte (Hex)	1Byte (Hex)	16 Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

1.2 “R32” : Write RF card data in block range

☞ Command Format

SOH	Null	Length	STX	“R32”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	Block	Write Data
0x00 – 0x0f	0x00 – 0x02	0x00 – 0xff
1Byte (Hex)	1Byte (Hex)	16Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

☞ Positive Response Format

SOH	Null	Length	STX	“R32”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R32”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	31 OF 45	2014. 07. 29.

1.3 “R36” : Read RF card data in sector range

☞ Command Format

SOH	Null	Length	STX	“R36”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector
0x00 – 0x0f
1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R36”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R36”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Sector	0x00	Read Data (0)	0x01	Read Data (1)	0x02	Read Data (2)
1Byte (Hex)	1Byte (Hex)	16Byte (Hex)	1Byte (Hex)	16Byte (Hex)	1Byte (Hex)	16Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

1.4 “R37” : Write RF card data in sector range (except Sector 0)

☞ Command Format

SOH	Null	Length	STX	“R37”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	Write Data
0x01 – 0x0f	0x00 – 0xff
1Byte (Hex)	51Byte (Hex)

0x00	Read Data (0)	0x01	Read Data (1)	0x02	Read Data (2)
1Byte (Hex)	16Byte (Hex)	1Byte (Hex)	16Byte (Hex)	1Byte (Hex)	16Byte (Hex)

D0	D1	D2	---	D14	D15
1Byte	1Byte	1Byte	---	1Byte	1Byte

☞ Positive Response Format

SOH	Null	Length	STX	“R37”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R37”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	32 OF 45	2014. 07. 29.

2 BALANCE

2.1 “R41” : Increment the balance of card to the specified amount.

Command Format

SOH	Null	Length	STX	“R41”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

Command Data Structure

Sector	Block	Index Value
0x00 – 0x0f	0x00 – 0x02	0x00000000 – 0xffffffff
1Byte (Hex)	1Byte (Hex)	4Byte (Hex)

V0	V1	V2	V3
0x00-0xff	0x00-0xff	0x00-0xff	0x00-0xff
1Byte(Hex, LSB)	1Byte(Hex)	1Byte(Hex)	1Byte(Hex, MSB)

Positive Response Format

SOH	Null	Length	STX	“R41”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

Negative Response Format

SOH	Null	Length	STX	“R41”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

Note

The balance should be written in the Electronic Purse format in the card.

2.1 “R42” : Decrement the balance of card to the specified amount..

Command Format

SOH	Null	Length	STX	“R42”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

Command Data Structure

Sector	Block	Index Value
0x00 – 0x0f	0x00 – 0x02	0x00000000 – 0xffffffff
1Byte (Hex)	1Byte (Hex)	4Byte (Hex)

V0	V1	V2	V3
0x00-0xff	0x00-0xff	0x00-0xff	0x00-0xff
1Byte(Hex, LSB)	1Byte(Hex)	1Byte(Hex)	1Byte(Hex, MSB)

Positive Response Format

SOH	Null	Length	STX	“R42”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

Negative Response Format

SOH	Null	Length	STX	“R42”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

Note

The balance should be written in the Electronic Purse format in the card.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	33 OF 45	2014. 07. 29.

3 SECRET KEY

3.1 “R51” : Change ‘Secret Key’ to a new key

☞ Command Format

SOH	Null	Length	STX	“R51”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Sector	KEY A	KEY B
0x00 – 0x0f	0x00 – 0xff	0x00 – 0xff
1Byte (Hex)	6Byte (Hex)	6Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R51”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R51”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Note

TAM-3XXXX Series ‘Secret Key’ Default – Key Set 0

KEY A : FFFFFFFFFF

KEY B : FFFFFFFFFF

3.2 “R52” : Change ‘Secret Key’ to all the same key value

☞ Command Format

SOH	Null	Length	STX	“R52”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

KEY A	KEY B
0x00 – 0xff	0x00 – 0xff
6Byte (Hex)	6Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R52”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R52”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Note

TAM-3XXXX Series ‘Secret Key’ Default – Key Set 0

KEY A : FFFFFFFFFF

KEY B : FFFFFFFFFF

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	34 OF 45	2014. 07. 29.

3.3 “R53” : Select ‘Secret Key Index’

☞ Command Format

SOH	Null	Length	STX	“R53”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Index
0x01 – 0x02
1Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R53”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R53”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Data Variable

<Index>

Code	Setting	Detail
0x01	KEY A	Select ‘Secret Key A’
0x02	KEY B	Select ‘Secret Key B’

☞ Note

TAM-3XXXX Series ‘Secret Key Index’ Default

‘Secret Key Index ‘ : KEY A

3.4 “R54” : Change RF card ‘Secret Key’ to other key

☞ Command Format

SOH	Null	Length	STX	“R54”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

- Command data structure with ‘Access Condition’

Sector	KEY A	Access	KEY B
0x00 – 0x0f	0x00 – 0xff	0x00 – 0xff	0x00 – 0xff
1Byte (Hex)	6Byte (Hex)	4Byte (Hex)	6Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R54”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R54”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Warning

If you use this command incorrectly, it couldn’t be authenticated from the card.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	35 OF 45	2014. 07. 29.

3.5 “R55” : Change ‘Secret Key’ to a new key from Key Set Number.

☞ Command Format

SOH	Null	Length	STX	“R55”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Key Set	Sector	KEY A	KEY B
0x00 – 0x02	0x00 – 0x0f	0x00 – 0xff	0x00 – 0xff
1 Byte(Hex)	1Byte (Hex)	6Byte (Hex)	6Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R55”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R55”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Note

Key Set <Index>

Code	Detail
0x00	Key Set 0
0x01	Key Set 1
0x02	Key Set 2

3.6 “R56” : Change ‘Secret Key’ to all the same key value from Key Set Number.

☞ Command Format

SOH	Null	Length	STX	“R56”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Key Set	KEY A	KEY B
0x00 – 0x02	0x00 – 0xff	0x00 – 0xff
1 Byte(Hex)	6Byte (Hex)	6Byte (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“R56”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R56”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Note

Key Set <Index>

Code	Detail
0x00	Key Set 0
0x01	Key Set 1
0x02	Key Set 2

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	36 OF 45	2014. 07. 29.

4 RF DETECT

4.1 “R61” : RF card detect in antenna area

☞ Command Format

SOH	Null	Length	STX	“R61”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Length	STX	“R61”	GOOD	DATA	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“R61”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Serial Number
Hex Code
4Byte

☞ Note

If the RF card is detected, this command send the serial number to host. But, it doesn't authenticate the Secret Key of the RF card.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	37 OF 45	2014. 07. 29.

◆ *MIFARE ULTRA LIGHT CARD(Only Use the CIM-18xx Series)*

- Memory Organisation

The 512Bit EEPROM Memory is organized in 16 pages with 4 bytes each.

In the erased state the EEPROM cells are read as a logic “0”, in the written state as a logical “1”

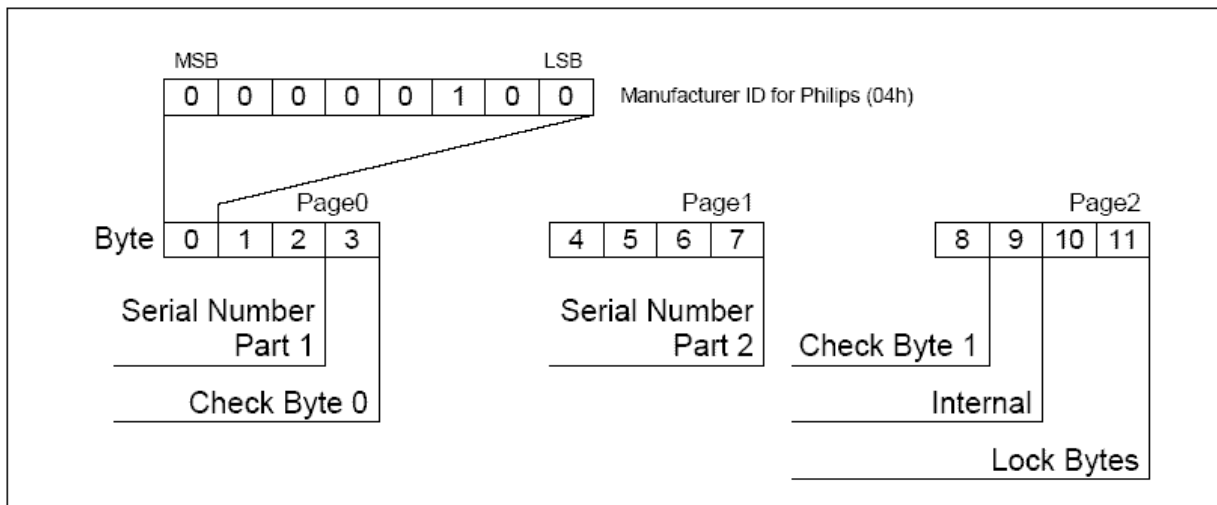
Byte Number	0	1	2	3	Page
Serial Number	SN0	SN1	SN2	BCC0	0
Serial Number	SN3	SN4	SN5	SN6	1
Internal / Lock	BCC1	Internal	Lock0	Lock1	2
OTP	OTP0	OTP1	OTP2	OTP3	3
Data read/write	Data0	Data1	Data2	Data3	4
Data read/write	Data4	Data5	Data6	Data7	5
Data read/write	Data8	Data9	Data10	Data11	6
Data read/write	Data12	Data13	Data14	Data15	7
Data read/write	Data16	Data17	Data18	Data19	8
Data read/write	Data20	Data21	Data22	Data23	9
Data read/write	Data24	Data25	Data26	Data27	10
Data read/write	Data28	Data29	Data30	Data31	11
Data read/write	Data32	Data33	Data34	Data35	12
Data read/write	Data36	Data37	Data38	Data39	13
Data read/write	Data40	Data41	Data42	Data43	14
Data read/write	Data44	Data45	Data46	Data47	15

Note: Bold frame indicates user area

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	38 OF 45	2014. 07. 29.

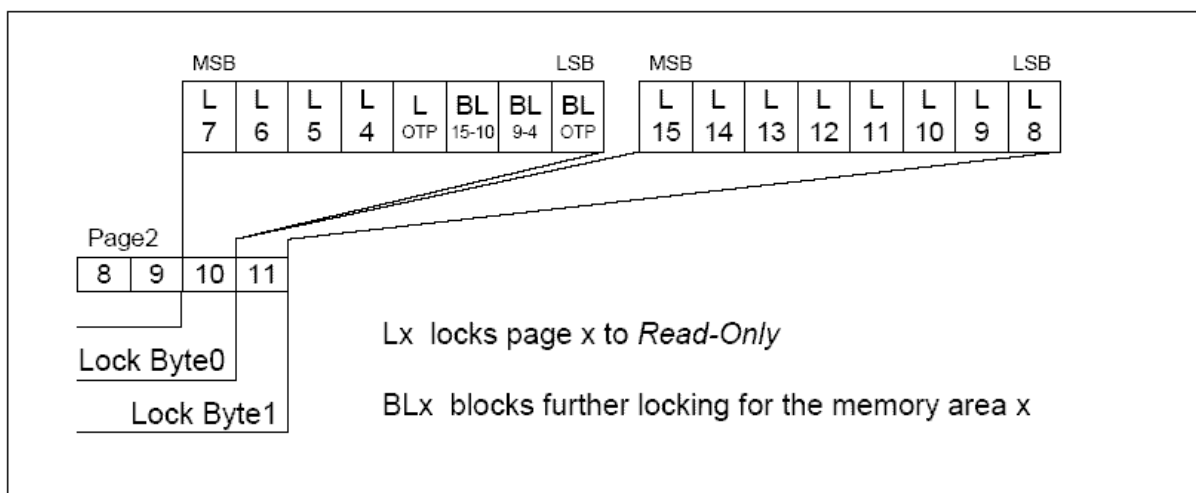
- UID / SERIAL NUMBER

The unique 7 byte serial number (UID) and its two Check Bytes are programmed into the first 9 bytes of the memory. It therefore covers page 0, page 1 and the first byte of page 2. The second byte of page2 is reserved for internal data. Due to security and system requirements these bytes are write-protected after having been programmed by the IC manufacturer after production



- LOCK BYTES

The bits of Byte 2 and 3 of page 2 represent the field-programmable read-only locking mechanism. Each Page x from 3 (OTP) to 15 may be locked individually to prevent further write access by setting the corresponding locking bit Lx to 1. After locking the page is read-only memory.



Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	39 OF 45	2014. 07. 29.

The 3 least significant bits of lock byte 0 are the block-locking bits. Bit 2 handles pages 15 to 10, bit 1 pages 9 to 4 and bit 0 page 3 (OTP). Once the block-locking bits are set the locking configuration for the corresponding memory area is frozen

- OTP BYTES

Page 3 is the OTP page. It is pre-set to all “0” after production. These bytes may be bit-wise modified by a write command.

Byte	Page 3			
	12	13	14	15
OTP Bytes				

Example			
Default Value		OTP Bytes	
00000000	00000000	00000000	00000000
1st Write Command to page 3			
11111111	11111100	00000101	00000111
Result in page 3			
11111111	11111100	00000101	00000111
2nd Write Command to page 3			
11111111	00000000	00111001	10000000
Result in page 3			
11111111	11111100	00111101	10000111

The bytes of the write command and the current contents of the OTP bytes are bit-wise “or-ed” and the result becomes the new contents of the OTP bytes. This process is irreversible. If a bit is set to “1”, it cannot be changed back to “0” again.

Note : This memory area may be used as a 32 ticks one-time counter.

- DATA PAGES

Pages 4 to 15 constitute the user read/write area. After production the data pages are initialized to all “0”.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	40 OF 45	2014. 07. 29.

1 MIFARE ULTRA LIGHT CONTROL

1.1 “U31” : Read data on Mifare Ultra Light card.

☞ Command Format

SOH	Null	Length	STX	“U31”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Page (1Byte)

☞ Positive Response Format

SOH	Null	Length	STX	“U31”	GOOD	0x01	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“U31”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

Page	Read Data
1 Byte (Hex)	16 Bytes (Hex)

1.2 “U32” : Write data on Mifare Ultra Light card.

☞ Command Format

SOH	Null	Length	STX	“U32”	DATA	ETX	Bcc
-----	------	--------	-----	-------	------	-----	-----

☞ Command Data Structure

Page	Write Data
1Byte (Hex)	4 Bytes (Hex)

☞ Positive Response Format

SOH	Null	Length	STX	“U32”	GOOD	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“U32”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

1.3 “U41” : Read UID (Serial Number) on Mifare Ultra Light card.

☞ Command Format

SOH	Null	Length	STX	“U41”	ETX	Bcc
-----	------	--------	-----	-------	-----	-----

☞ Positive Response Format

SOH	Null	Length	STX	“U41”	GOOD	DATA	0x01	ETX	Bcc
-----	------	--------	-----	-------	------	------	------	-----	-----

☞ Negative Response Format

SOH	Null	Length	STX	“U41”	E-Code	0x00	ETX	Bcc
-----	------	--------	-----	-------	--------	------	-----	-----

☞ Response Data Structure

UID (Serial Number)
7 Bytes (Hex)

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	41 OF 45	2014. 07. 29.

ERROR DETAIL

<GOOD>

Code : 0x0000

Description: Normal Execution

Procedures: None

<NOT_DEFINE_COMMAND>

Code : 0x2001

Description : Using the command that does not defined in this model.

Action : Use the valid command in this model.

<COMM_FRAME_ERROR>

Code : 0x2003

Description : Sending the command that has the invalid communication frame.

Action : Check the data format and the corresponding module specification.

<CARD_JAM>

Code : 0x2004

Description : When the card is jammed.

Action : Remove the jammed card.

<NO_CARD>

Code : 0x2005

Description : No cards.

Action : Insert the card.

<BUSY>

Code : 0x2007

Description : When the terminal is running or busy.

Action : Wait until the previous operation is completed.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	42 OF 45	2014. 07. 29.

<TWO_CARD_ERROR>

Code : 0x2009

Description : When more than one card is presented in the feeder part.

Action : Remove one card.

<RF_ERROR>

Code : 0x2300

Description : Unavailable RF module.

Action : Change the RF MODULE

<RF_COMM_ERROR>

Code : 0x2301

Description : Communication error at the RF Module.

Action : Check the connection socket

<RF_AUTHEN_ERROR>

Code : 0x2302

Description : Authentication Error at the RF Module.

Action : Change the 'SECRET KEY'

<RF_WRITE_ERROR>

Code : 0x2303

Description : Error while the terminal writes at the RF Card.

Action : Be sure that the card exists in the detection range.

<RF_READ_ERROR>

Code : 0x2304

Description : Error while the terminal reads at the RF Card.

Action: Be sure that the card exists in the detection range.

<RF_DETECT_ERROR>

Error Code : 0x2305

Description : No RF Card.

Action : Insert the RF Card into the terminal.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	43 OF 45	2014. 07. 29.

<RF_AMOUNT_ERROR>

Error Code : 0x2306

Description : Error while the terminal increases(or decreases) the balance at the RF card.

Action : Tune the RF module.

<SHUTTER_OPEN_ERROR>

Code : 0x2602

Description : THERMAL SHUTTER OPEN ERROR.

Action : Check the Shutter Sensor or Motor.

<SHUTTER_CLOSE_ERROR>

Code : 0x2603

Description : THERMAL SHUTTER CLOSE ERROR.

Action : Check the Shutter Sensor or Motor.

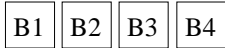
Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	44 OF 45	2014. 07. 29.

◆ SELF TEST

There are 4 buttons to test and check this unit. (B1 ~ B4)

And you can see the main menu at the LCD as below.

Four Button



LCD

```

**** TAM-3XXXX ****
STATUS:GOOD
CODE:0x0000
KYTronics Corp.,Ltd.

```

“B1” is main menu selection or execution button.

“B2” is move up button.

“B3” is move down button.

“B4” is exit button.

*Execution sequence

Ex1) Basic sequence

1: Push “B1” button ---- LCD will be changed to Self-mode.

LCD

```

*1.Eject
2.Sensor Check
3.Printing
4.RF

```

2: Push “B2” or “B3” button ---- Move up and down button to select CMD.

3: Push “B1” button ----Execution CMD.

4: Push “B4” button to exit ---- LCD will be changed to main menu.

Doc No	TAM-3XXX Specification	REV	PAGE	DATE
91000180		B	45 OF 45	2014. 07. 29.

***Command**

1. Eject---- Dispense the card to front and hold it at the exit roller of the unit.
2. Sensor check----Refer to page.17
- 3: Card printing----Moves card to Stand-by position, and start printing

Ex)



4. RF

LCD

- *1.Mifare
- 2.Ultra Mifare

- 4.1. Mifare Re/write test
- 4.2. Ultra Mifare Re/write test