Ingeniería Electrónica

SMART IDENT

# KYT-3000

# MOTORIZED READER/WRITER MAGNETIC, IC CARD AND RF

## Specifications

User Manual

KYT3XXX.UM.K.EN.doc

Revision History

| CHECK | DATE | DESCRIPTION | REV | PAGE |
|---|---|---|---|---|
| 1 | 2003.2.10 | | A | 33 |
| 2 | 2006.6.09 | RF Module Add | B | 46 |
| 3 | 2006.7.11 | RF Card detect range Delete | C | 47 |
| 4 | 2006.10.31 | Modified the model name information in the SPEC. | D | 48 |
| 5 | 2007.10.18 | Bezel type dimension spec | E | 48 |
| 6 | 2008.06.10 | Model name change. | F | 50 |
| 7 | 2009.10.25 | USB interface & Ethernet interface<br>MS Hi-co & Low-Co Function Add. | G | |
| 8 | 2010.08.30 | Correct the typo on page 47 | H | 52 |
| 9 | 2012.05.30 | Add the C37 command | I | 25 |
| 10 | 2017.03.20 | Add the Mifare Plus card | J | 68 |
| 11 | 2017.08.30 | Page 14 ( Add Technical Drawing) | K | 69 |
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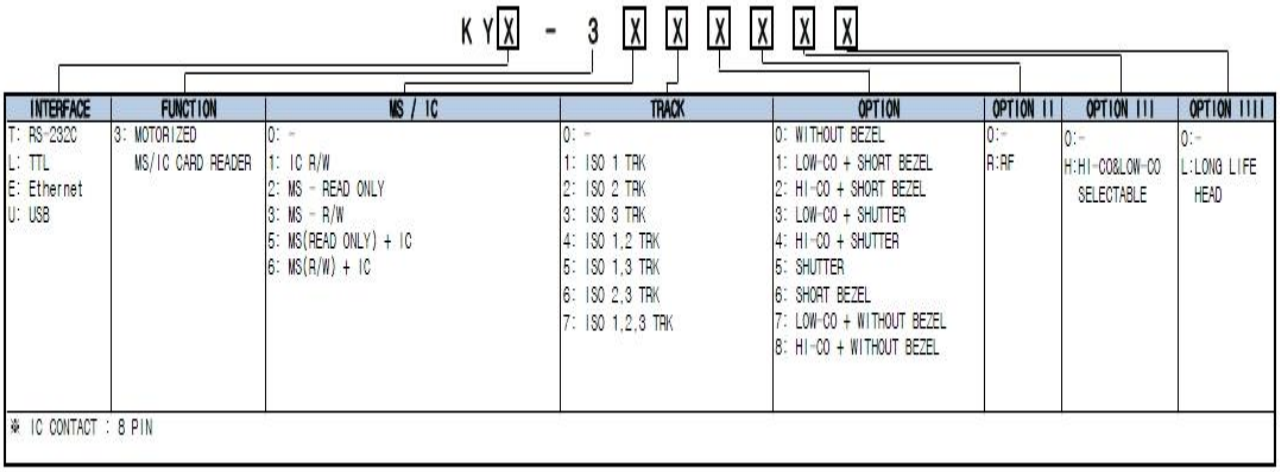
# MODEL NAME INFORMATION



# C O N T E N T S

# 1. OVERVIEW

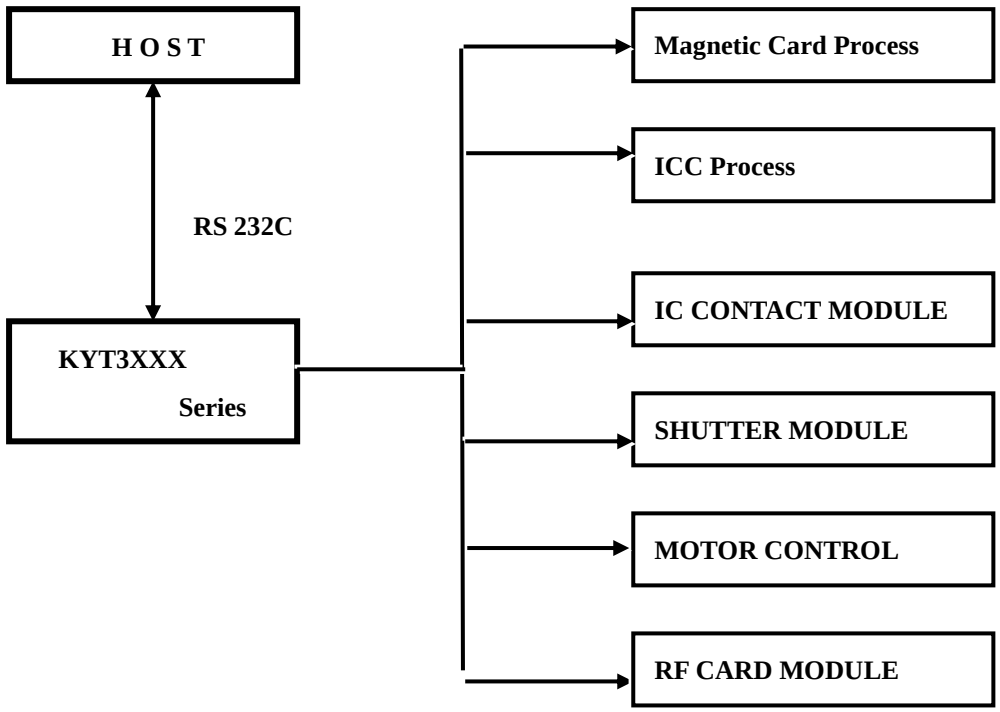
This specification is for the KYT-3XXX Series Motorized Magnetic and or IC Card Reader/Writer. In meeting customer's applications, intended data can be written and read through RS-232C communication.

This model has a function that is a reading writing a IC card confirming to ISO 7816 Part 1 – Part4(T=0, T=1) card, Additionally, this model also can be used for the RF card Conforming to the MIFARE.

KYT-3XXX Series has very compact and robust structure providing high reliability and long life.

KYT-3XXX series is suitable for Banking Terminals, Credit/Debit Card System, Auto ID and Access Control Application.

## 2. System Block Diagram



## 3. Features

3.1 Magnetic Stripe reading Triple tracks.
3.2 RS-232C interface with a HOST.
3.3 IC Card read and writers.
3.4 Support T=0 and T=1 protocol.

## 4. Environmental Requirements

4.1 Operating Locus : in door use Only
4.2 Operating Temperature and Humidity : 5°C to 50°C(In 0°C to +5°C range, all specifications but 'Warped card' to be satisfied)
4.3 Conservation Temperature and humidity : 5% to 80% RH(No Condensation)
4.4 Vibration : Amplitude 2mm, 10 to 50Hz X,Y,Z directions for 30min, 2G or less
4.5 Shock Resistance : Up to 30, 11msec

## 5. Specifications

5.1 Card Standard : ISO7811, ISO7816
5.2 Recording

| | ISO Track 1 | ISO Track 2 | ISO Track 3 |
|---|---|---|---|
| BPI | 210 | 75 | 210 |
| Capacity | Max 79 | Max 40 | Max 107 |
| Reading Methods | F2F | | |
| Length | Variable | | |
| Card thickness | Plastic : 0.76 (+−) 0.08mm | | |

5.3 Power Consumption

5.3.1 Input voltage

| Pin No | Remark |
|---|---|
| 1 | DC +24V( (+-) 10%, 2.0A) |
| 2 | NC |
| 3 | Power Ground |

5.3.2 Ripple : Less than 200 mVp-p

5.4 IC Contact Resistance : Less than 0.5Ω

5.5 IC Contact Force : 0.2N ~ 0.6N

5.6 Card Feeding Speed : 350mm/Sec( (+-) 10%)

5.7 Weight : 1.68KG (Full option)

### ♦ Communication Environment

Asynchronous, Half duplex.

Baud Rate : 9600, 19200, 38400, 57600 BPS (Default : 19200 BPS)

Start Bit : 1Bit

Data Length : 8Bits

Parity : None

Stop Bit : 1Bit

## 6. Magnetic Card Process

KYT3000 Series is able encode data on all three tracks of ISO 1,2 and 3 in one Pass, which makes read/write process time shorter. It is a basic standard option to Read and Write to Low-co card. Optionally Hi-Co Card is read/Write.

♦ Power Consumption

| | | |
|---|---|---|
| Motor Starting or Reversing | : | Less than 250 mA |
| Card Feed & Reading | : | Less than 600 mA |
| Card Feed & Writing | : | Less than 600 mA |
| Steady state | : | Less than 100 mA |

♦ Life and Reliability.

Life of Head : Approximately 1,000,000 passes
Long Life head option : 3,000,000 passes
(One pass is for forward or backward movement)

Error Rate : 3/1000 cycle

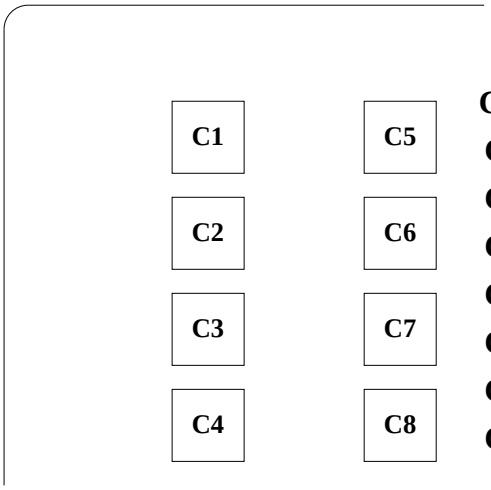
♦ Warped Cards : This term refers to an evenly warped card having a height from the top of the convex surface to the base of the warped edge.


H : 3.00mm Max. for card jamming

## 7. IC Card Process

KYT3XXX accepts most of IC cards supporting ISO7816 T=0 and T=1.

♦ Number and Location of the contacts on IC Card
: Number and location of the contacts on IC Card is specified in ISO 7816-2 figure 2 Refer to Appendix A.




**C1 : VCC(Supply voltage)**
**C2 : RST(Reset signal)**
**C3 : CLK(Clock signal)**
**C4 : Reserved to ISO/IEC JTC 1/SC 17 for future use**
**C5 :GND(Ground)**
**C6 :VPP(Programming voltage)**
**C7 :I/O(Data input/output)**
**C8 :Reserved to ISO/IEC JTC 1/SC 17 for future use**

♦ Power Consumption

Motor Starting or Reversing : Less than 250mA

Card Feed & Reading /Writing : Less than 700mA
Steady state : Less than 100mA

♦Life and Reliability
IC Contact : Approximately 1,000,000 Passes.
Error Rate : 3/1000 cycle.

# 8. RF Card Process

The RF module supports most of RF cards conforming with the ISO14443-3 Type A(MIFARE Card) with 8 K bit memory.

♦ *Processing time* : Once Block

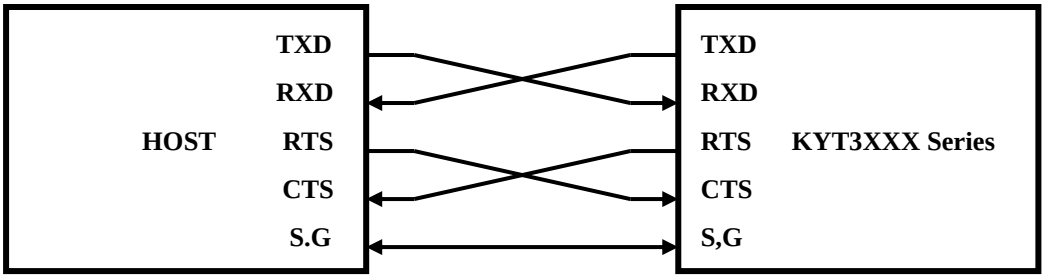
| Command | Parameter | Time (mSec) | | Note |
|---|---|---|---|---|
| | | Type | Max | |
| Card Read | 1 Block | 100 | | Without card moving |
| Card Write | 1 Block | 150 | | Without card moving, With Verify |
| Card Decrement | 1 Block | 120 | | Without card moving |
| Card Increment | 1 Block | 120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

♦ *Operating Frequency*

Operating Frequency : 13.56 MHz
Data Transfer Baud : Baud rate 106Kbaud

# 9. Interface Requirement

## 9.1 RS-232C Interface



CASE 1) Part Number : RED-9S-LNA(HIROSE)
Location Number : P1

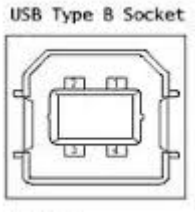
| Pin No | INDEX | Remark |
|---|---|---|
| 2 | RXD | Receive |
| 3 | TXD | Transmit |
| 7 | RTS | Request to Send |
| 8 | CTS | Clear to Send |
| 5 | S.G | Signal Ground |

CASE 2) Part Number : 53015-0510(MOLEX)
Location Number : CN1

| Pin No | INDEX | Remark |
|---|---|---|
| 1 | RTS | Request to Send |
| 2 | RXD | Receive |
| 3 | TXD | Transmit |
| 4 | CTS | Clear to Send |
| 5 | GND | Signal Ground |

## 9.2 USB Interface.

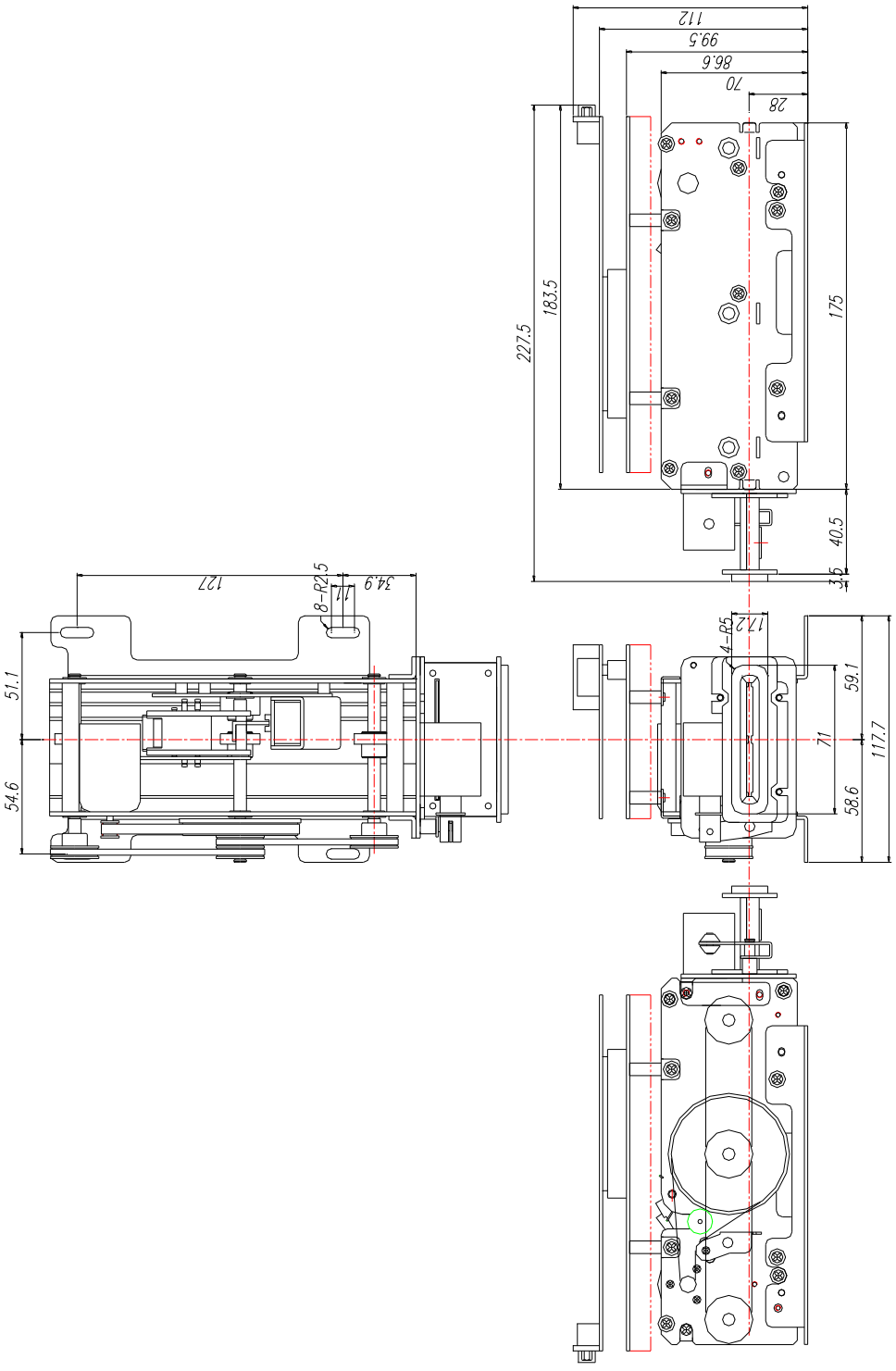
*** Mini USB : B TYPE CONNECTOR 5PIN**



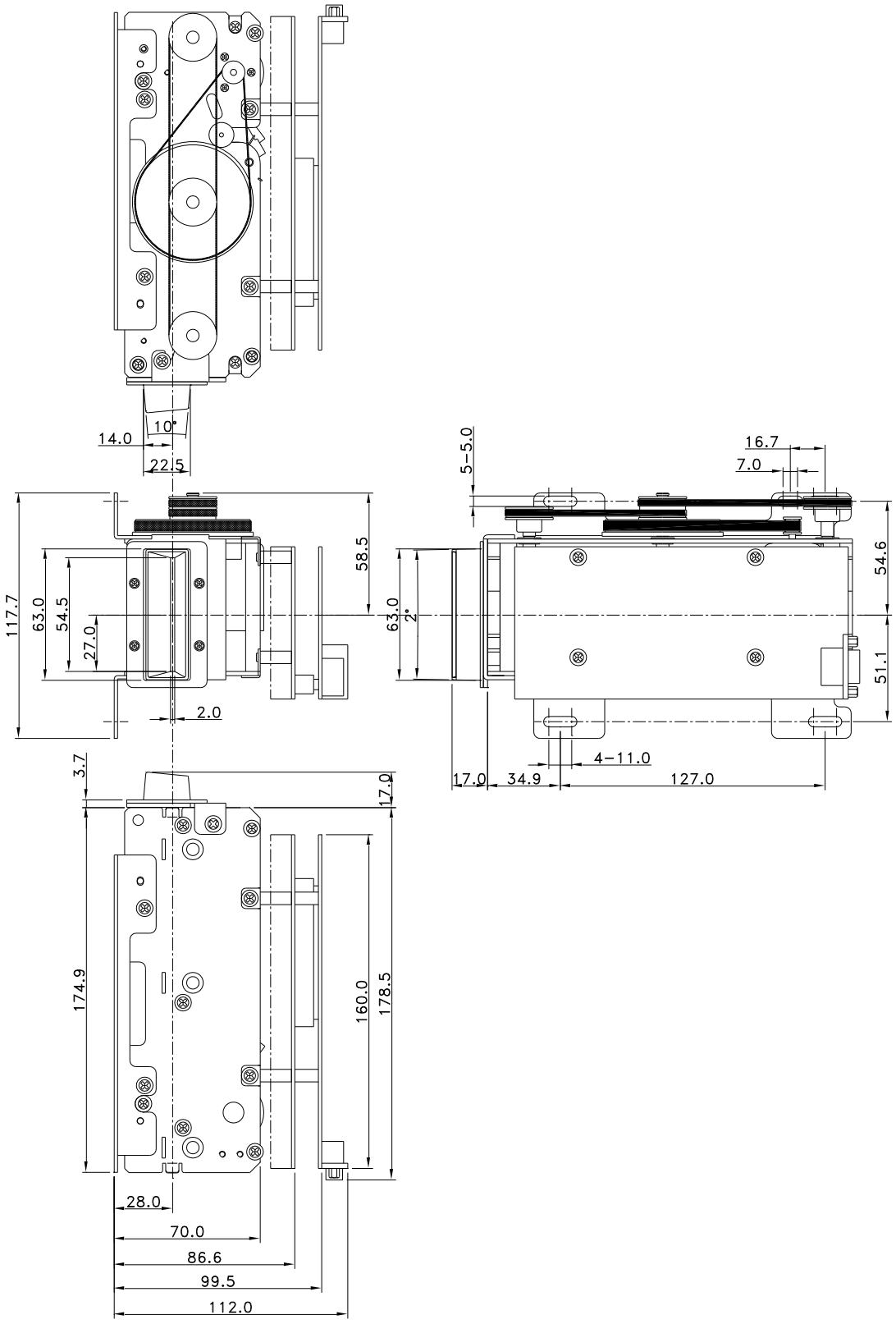

- Mini USB B & C TYPE CABLE (5PIN)

# 10 . Technical Drawing

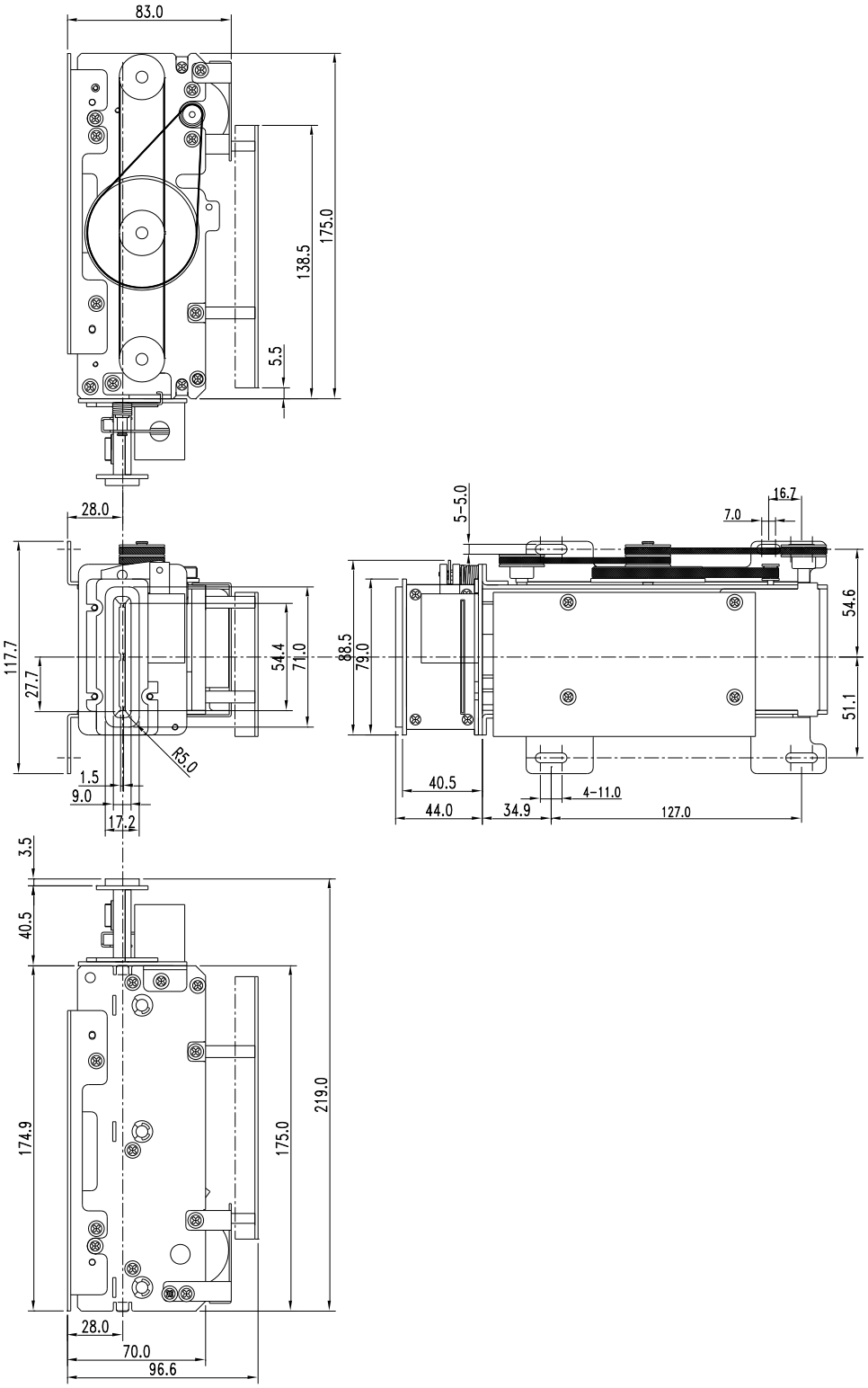
## - Shutter type -



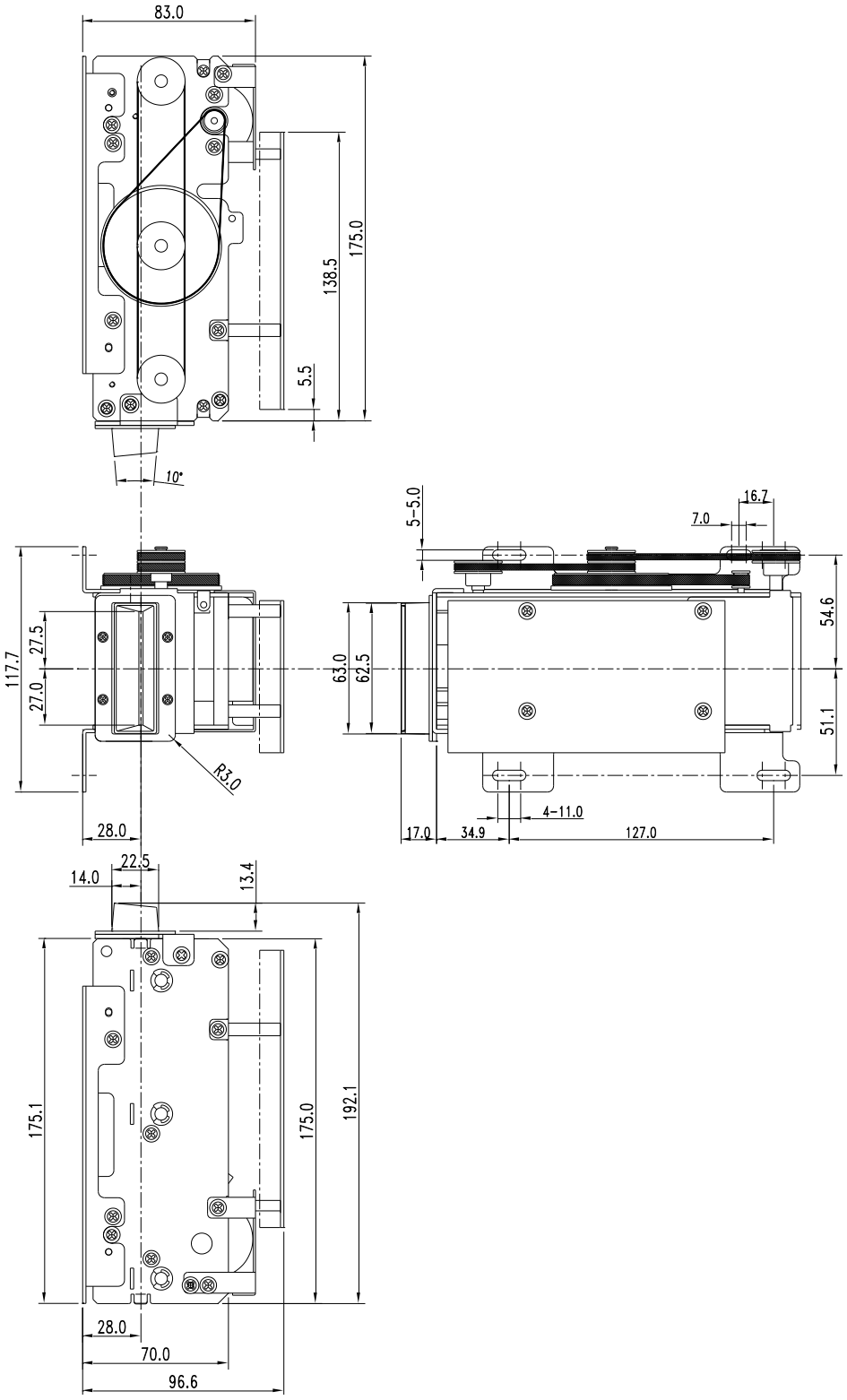
## - Short bezel type -



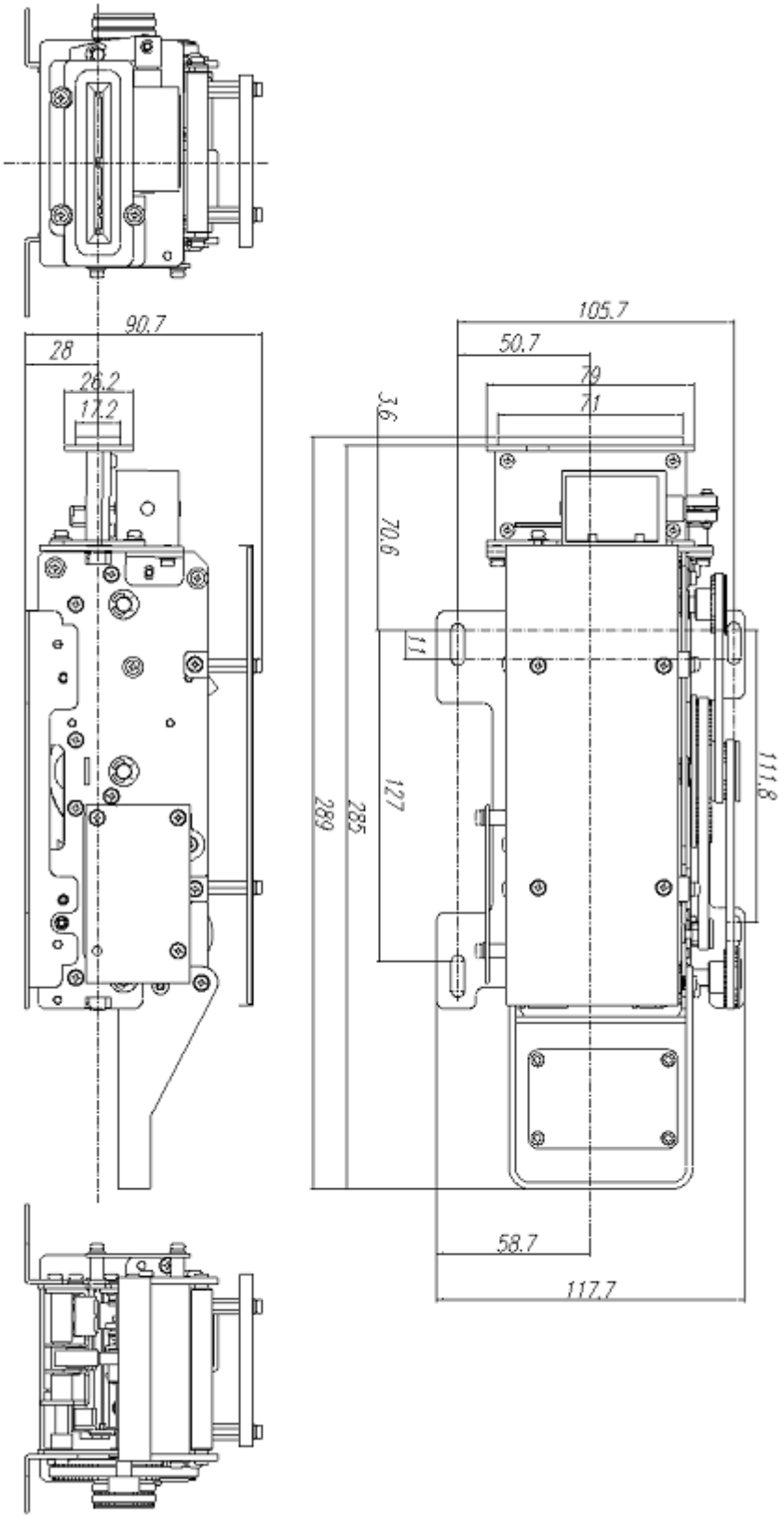
## - KYT-32XX Shutter type -



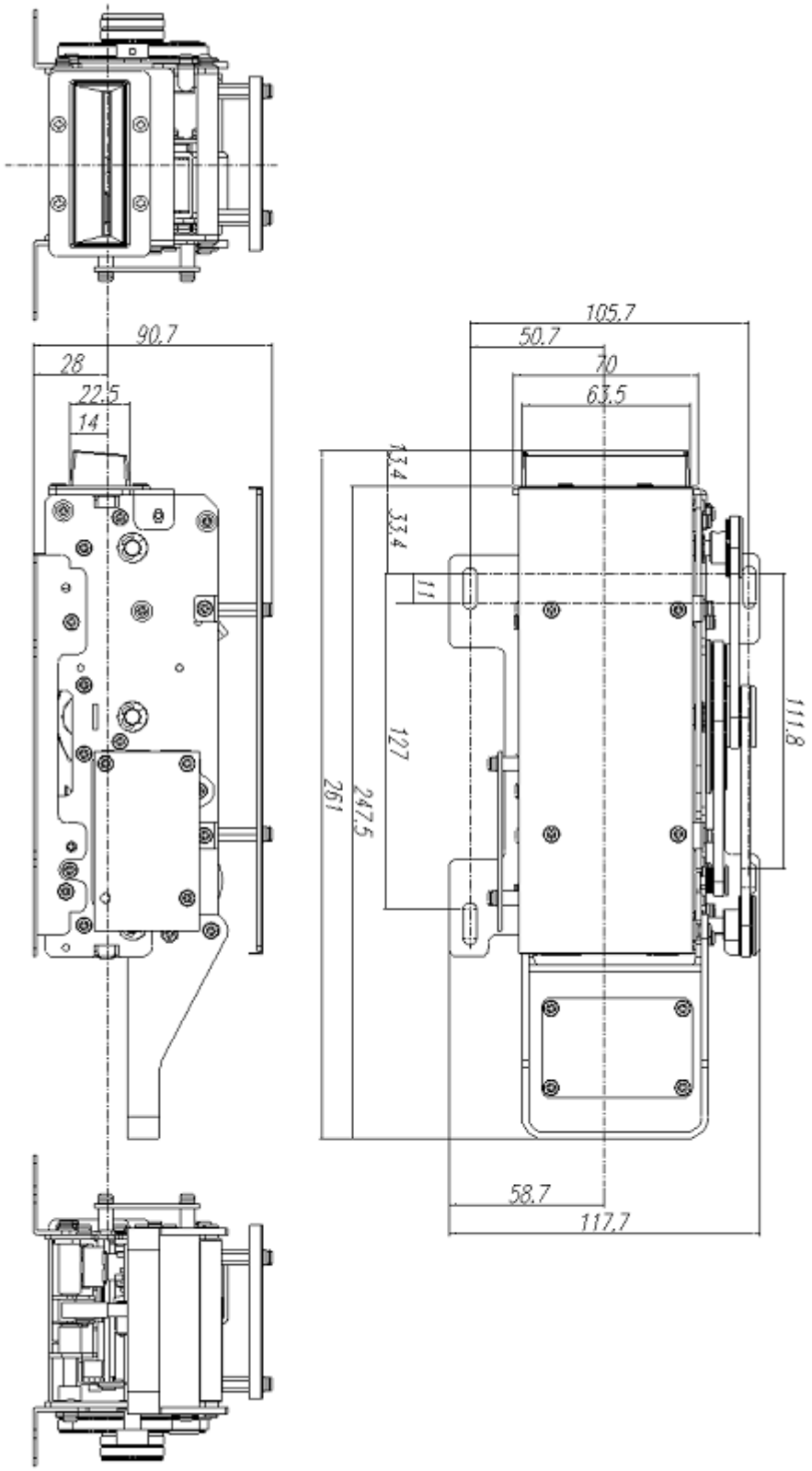
## - KYT-32XX Short bezel -



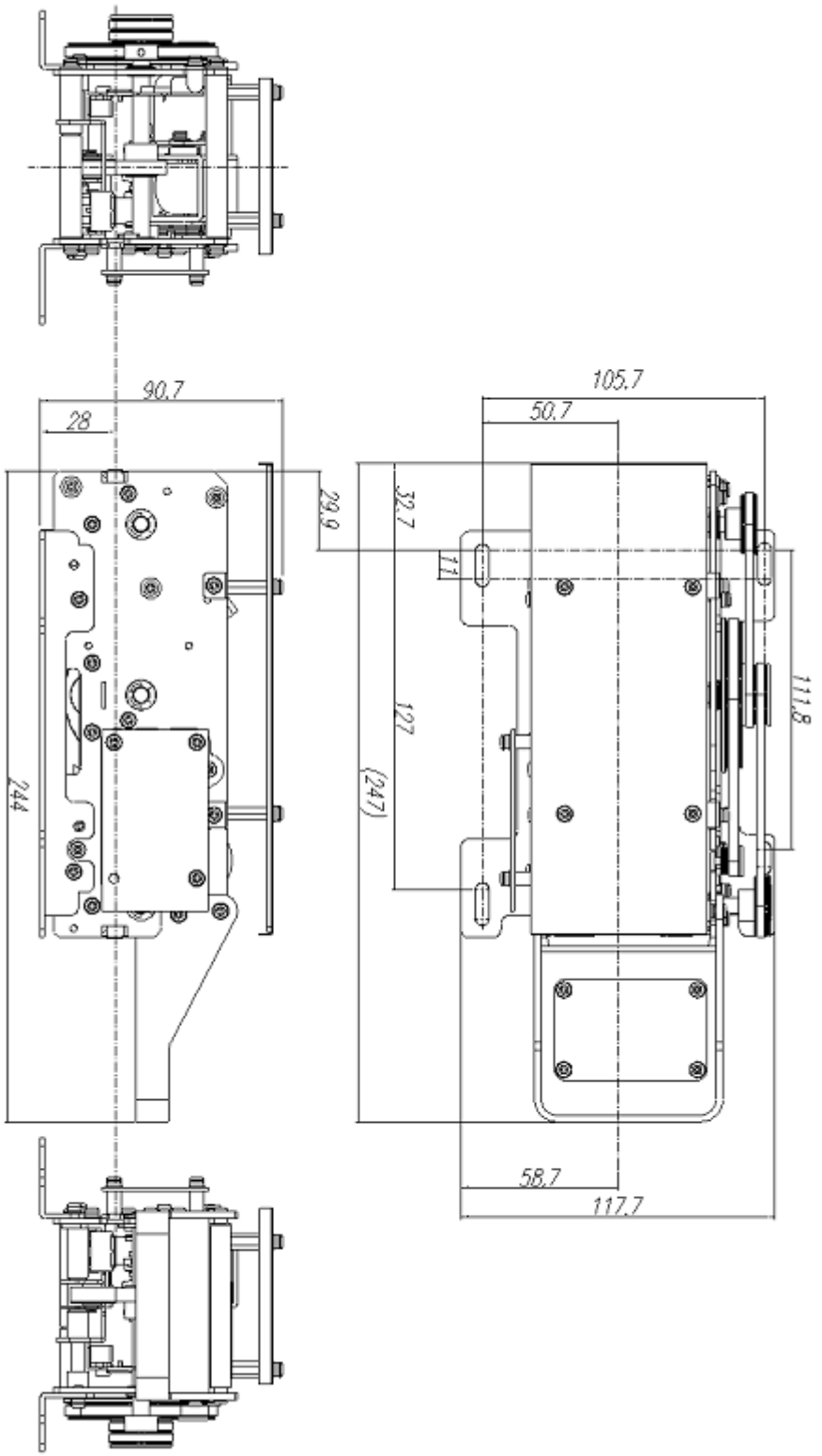
- KYT-3000 RF & shutter
  1. Shutter Type.



2. Short bezel Type.



3. Without Bezel.



# *Interface*

**Motorized Magnetic and IC Card And RF Card Reader/Writer**

## MODEL : KYT 3XXX

# 1.Communication Method

1.1. Asynchronous, Half duplex.
1.2. Baud Rate : 9600, 19200 38400, 57600BPS(Default : 19200 BPS)
1.3. Start Bit : 1Bit
1.4. Data Length : 8Bits
1.5. Parity : None
1.6. Stop Bit : 1Bit

# 2.Control Characters

| NANE | Hex Value | Description |
|---|---|---|
| SOH | 01 | Start of Header |
| STX | 02 | Start of Text |
| ETX | 03 | End of Text |
| EOT | 04 | End of Transmission |
| ENQ | 05 | Enquiry |
| ACK | 06 | Positive Acknowledge |
| NAK | 15 | Negative Acknowledge |

| | | |
|---|---|---|
| CAN | 18 | Cancel |
| | | |

# 3. Frame Format

## 3.1. Command structure

| SOH | Code | Cm | Pm | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Ref.) Command Sets List

## 3.2. Response structure

### 3.2.1. Positive Packet structure

| SOH | Code | Cm | Pm | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 3..2.2. Negative Packet structure

| SOH | Code | Cm | Pm | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

BCC(XOR)

Ref.) Negative Response Code List

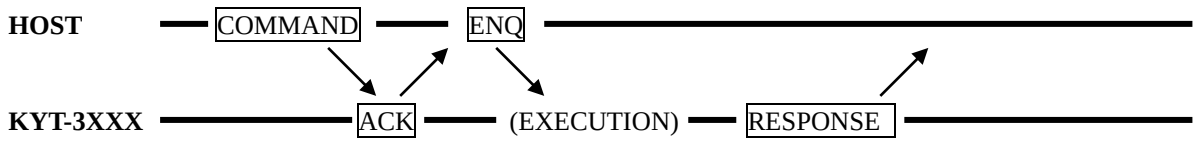
### 3.3.3 STATUS Structure Format

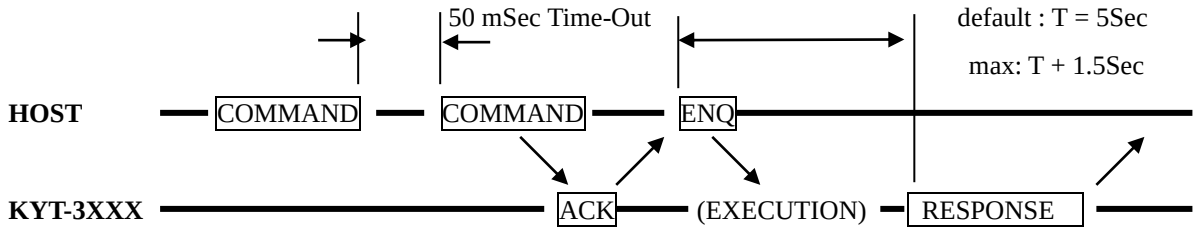
| BIT 7 | BIT 6 | BIT 5 | BIT 4 | BIT 3 | BIT 2 | BIT 1 | BIT 0 |
|---|---|---|---|---|---|---|---|

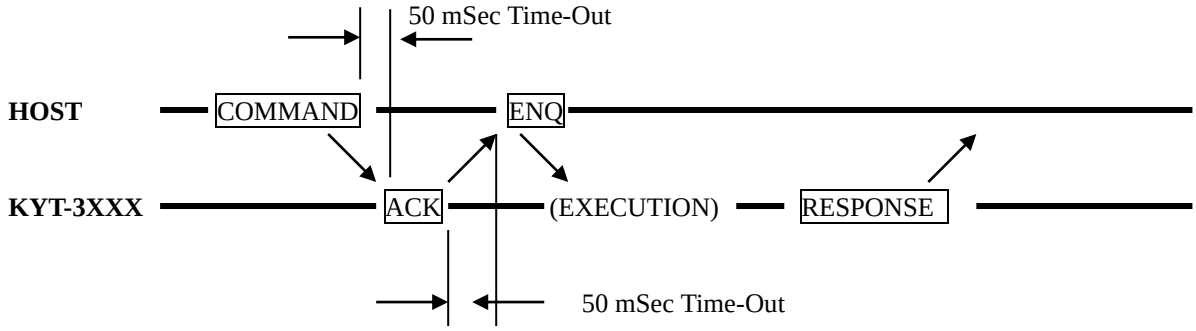
| BIT | Description | REMARK |
|---|---|---|
| 7 | If Card Remained inside the unit (Yes: 1, No: 0) | |
| 6 | Approval to insert Card (Yes: 1, No: 0) | |
| 5 | X | 0: Default |
| 4 | 1 – RTS/CTS Setting Up 0 – RTS/CTS Removal | |
| 3 | X | |
| 2 | X | |
| 1 | X | |
| 0 | 1 – Shutter Model 0 – Without Shutter Model | |

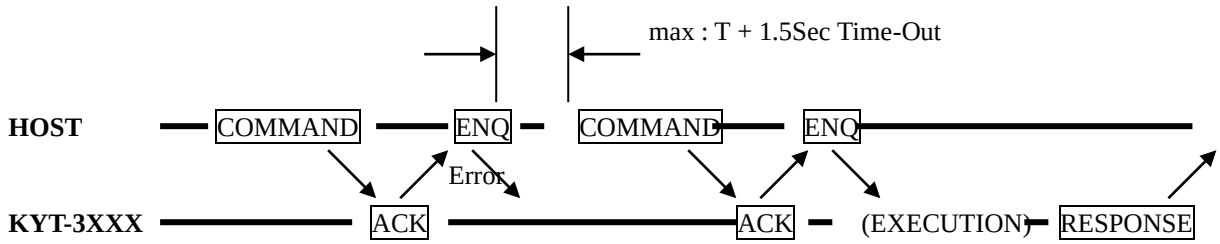
# 4. Communication Protocol Sequence & Timing

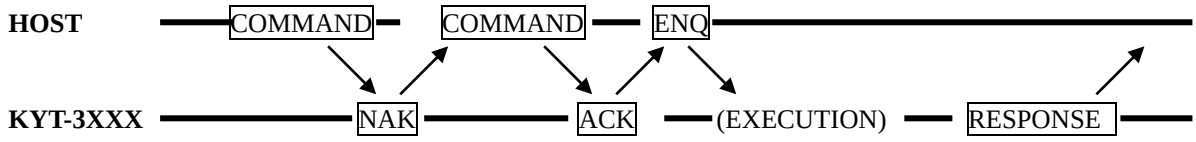
( T : Time Setting Value(Refer to "C90" ))

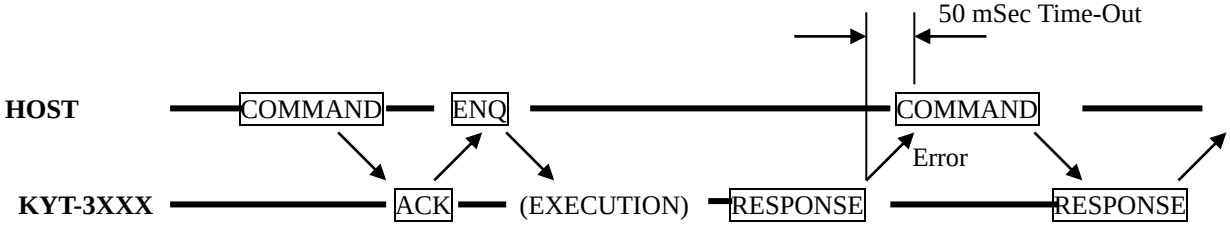



50 mSec Time-Out
default : T = 5Sec
max: T + 1.5Sec
HOST
COMMAND
COMMAND
ENQ
KYT-3XXX
ACK
(EXECUTION)
RESPONSE


50 mSec Time-Out
HOST
COMMAND
ENQ
KYT-3XXX
ACK
(EXECUTION)
RESPONSE
50 mSec Time-Out


max : T + 1.5Sec Time-Out
HOST
COMMAND
ENQ
COMMAND
ENQ
Error
KYT-3XXX
ACK
ACK
(EXECUTION)
RESPONSE


HOST
COMMAND
COMMAND
ENQ
KYT-3XXX
NAK
ACK
(EXECUTION)
RESPONSE


50 mSec Time-Out
HOST
COMMAND
ENQ
COMMAND
Error
KYT-3XXX
ACK
(EXECUTION)
RESPONSE
RESPONSE

- Exception : If Card “STAND-BY” Time is designated as longer than 5 Sec., designate time + 5 Sec

# 5. Command Sets List

| | Code | Cm | Pm | Description | Note |
|---|---|---|---|---|---|
| Initialize | 43h | 30h | 30h | Initialize after forward direction Card discharge | |
| | 43h | 30h | 31h | Initialize after reverse direction Card discharge | |
| | 43h | 30h | 32h | Initialize after transfer to “STAND-BY” mode | |
| Request | 43h | 31h | 30h | Read present Card location | |
| | 43h | 31h | 31h | Read F/W Version of unit | |
| Card Control | 43h | 32h | 30h | Approve to insert Card | Card Insertion Approval setting |
| | 43h | 32h | 31h | Prohibit to insert Card | |
| Moving | 43h | 33h | 30h | Card Forward Direction Discharge | |
| | 43h | 33h | 31h | Card Reverse Direction Discharge (Capture) | |
| | 43h | 33h | 32h | Transfer to “STAND-BY” mode | |
| | 43h | 33h | 33h | Card movement(FRONT ->REAR) | |
| | 43h | 33h | 34h | Card ejection to the front | |
| | 43h | 33h | 35h | Card Entry(M/S No Check) | |
| | 43h | 33h | 36h | Card Entry After M/S Check | Pre_Head |
| | 43h | 33h | 37h | Card Move to Rear with hold | |
| | 43h | 33h | 41h | IC Card Accept & Contact | IC Control |
| M/S Read | 43h | 34h | 30h | 1 Track Data Reading | |
| | 43h | 34h | 31h | 2 Track Data Reading | |
| | 43h | 34h | 32h | 3 Track Data Reading | |
| | 43h | 34h | 33h | 1,2,3 All Track Data Reading | |
| | 43h | 34h | 35h | 1 Track Reading after Card Insertion STAND-BY | |

| | | | | | |
|---|---|---|---|---|---|
| | 43h | 34h | 36h | 2 Track Reading after Card Insertion STAND-BY | |
| | 43h | 34h | 37h | 3 Track Reading after Card Insertion STAND-BY | |
| | 43h | 34h | 38h | 1,2,3 All Track Reading after Card Insertion STAND-BY | |
| M/S Write | 43h | 35h | 30h | 1 Track Data Writing | |
| | 43h | 35h | 31h | 2 Track Data Writing | |
| | 43h | 35h | 32h | 3 Track Data Writing | |
| | 43h | 35h | 35h | 1 Track Writing after Card Insertion STAND-BY | |
| | 43h | 35h | 36h | 2 Track Writing after Card Insertion STAND-BY | |
| | 43h | 35h | 37h | 3 Track Writing after Card Insertion STAND-BY | |
| IC Card Control | 43h | 36h | 35h | IC Direct Control | IC Contact Option |
| | 43h | 36h | 38h | IC Card Reset | |
| RF Mifare | 52h | 31h | 30h | Identify the sector and block set at terminal. | |
| | 52h | 31h | 31h | Identify whether if the antenna detect the card. | |
| | 52h | 31h | 32h | Change the sector and block set at terminal. | |
| | 52h | 31h | 33h | authentication key Read ( KeyA or KeyB). | |
| | 52h | 31h | 34h | Get the RF Card's serial. | |
| | 52h | 31h | 35h | Select the authentication key: KeyA or KeyB. | |
| | 52h | 32h | 30h | RF Card Data(balance or character) Read. | |
| | 52h | 32h | 31h | RF Card Data (balance) Read. | |
| | 52h | 32h | 32h | RF Card Data (balance) Write. | |
| | 52h | 32h | 33h | RF Card Data (balance or character) Write. | |
| | 52h | 32h | 34h | Increment the balance of card to the specified amount. | |
| | 52h | 32h | 35h | Decrement the balance of card to the specified amount.. | |

| | Code | Cm | Pm | Description | Note |
|---|---|---|---|---|---|
| | 52h | 32h | 41h | RF Card Data(balance or character) Read. | |
| | 52h | 32h | 42h | RF Card Data (balance) Read. | |
| | 52h | 32h | 43h | RF Card Data (balance) Write. | |
| | 52h | 32h | 44h | RF Card Data (balance or character) Write. | |
| | 52h | 32h | 45h | Increment the balance of card to the specified amount. | |
| | 52h | 32h | 46h | Decrement the balance of card to the specified amount.. | |
| | 52h | 33h | 30h | RF Card Key Change(Access Condition Data Exclude). | |
| | 52h | 33h | 31h | RF Card Key Change(Access Condition Data inclusion). | |
| | 52h | 33h | 32h | Module Key Change. | |
| | 52h | 34h | 30h | Power On (The carrier wave emitted in antenna.) | |
| | 52h | 34h | 31h | Power Off(The carrier wave not emitted in antenna.) | |
| | 52h | 36h | 30h | RF Card Read in Sector Range | |
| | 52h | 36h | 31h | RF Card Write in Sector Range | |
| | 52h | 36h | 41h | RF Card Read in Sector Range(with Key) | |
| | 52h | 36h | 42h | RF Card Read in Sector Range(with Key) | |
| Mifare Plus | 45h | 30h | 31h | Change the data and AES Keys. | |
| | 45h | 30h | 32h | Finalize the personalization and switch up. | |
| | 45h | 30h | 33h | Switch up to higher security levels. | |
| | 45h | 30h | 34h | Authentication of the Security level1. | |
| | 45h | 30h | 35h | Authentication of the Security level2. | |

| | | | | | |
|---|---|---|---|---|---|
| | 45h | 31h | 30h | First Authentication of the Security level3. | |
| | 45h | 31h | 31h | Follow Authentication of the Security level3. | |
| | 45h | 31h | 33h | Read the data and the VALUE data. | |
| | 45h | 31h | 34h | Write the data and the VALUE data. | |
| | 45h | 31h | 35h | Increment the VALUE data. | |
| | 45h | 31h | 36h | Decrement the VALUE data. | |
| | 45h | 31h | 37h | Stores the content to the specified address. | |
| | 45h | 31h | 38h | Copies the content found in the Value block. | |
| | 45h | 32h | 30h | Carry out by measuring the round trip time. | |
| Retry Set | 43h | 37h | 30h | Retry 0 | |
| | 43h | 37h | 31h | Retry 1 | |
| | 43h | 37h | 32h | Retry 2 | |
| | 43h | 37h | 33h | Retry 3 | |
| | 43h | 37h | 34h | Retry 4 | |
| Cleaning | 43h | 38h | 30h | Head Cleaning | |
| Buzzer Control | 43h | 38h | 31h | Good Buzzer On | |
| | 43h | 38h | 32h | Error Buzzer On | |
| Setting | 43h | 39h | 30h | Card Wait Time Set | |
| | 43h | 39h | 31h | Series(RTS,CTS) Setting | |
| | 43h | 39h | 32h | Series(RTS,CTS) Cancellation | |
| | 43h | 39h | 35h | Baud Rate Setting | |
| | 43h | 39h | 41h | High-Co and Low-Co Select | |
| | | | | | |

| | Code | Cm | Pm | Description | Note |
|---|---|---|---|---|---|
| Binary M/S Read/Write | 42h | 34h | 30h | 1 Track Data Reading | LOW DATA Read |
| | 42h | 34h | 31h | 3 Track Data Reading | |
| | 42h | 34h | 32h | 2 Track Data Reading | |
| | 42h | 34h | 35h | 1 Track Reading after Card Insertion STAND-BY | |
| | 42h | 34h | 36h | 3 Track Reading after Card Insertion STAND-BY | |
| | 42h | 34h | 36h | 3 Track Reading after Card Insertion STAND-BY | |
| | 42h | 34h | 37h | 2 Track Reading after Card Insertion STAND-BY | |
| | 42h | 35h | 30h | 1 Track Data Writing | LOW DATA WRITE |
| | 42h | 35h | 31h | 3 Track Data Writing | |
| | 42h | 35h | 32h | 2 Track Data Writing | |
| | 42h | 35h | 35h | 1 Track Writing after Card Insertion STAND-BY | |
| | 42h | 35h | 36h | 3 Track Writing after Card Insertion STAND-BY | |
| | 42h | 35h | 37h | 2 Track Writing after Card Insertion STAND-BY | |

# 6. Negative Response Code List

| NO | ST1 | ST2 | Description | NOTE |
|---|---|---|---|---|
| 1 | ‘0’ | ‘1’ | Command Not Define | |
| 2 | ‘0’ | ‘2’ | No Card | |
| 3 | ‘0’ | ‘3’ | Fail Card | |
| 4 | ‘0’ | ‘4’ | Card JAM Error | |
| 5 | ‘0’ | ‘5’ | Data Fail | |

| | | | | |
|---|---|---|---|---|
| 6 | ‘0’ | ‘6’ | Time Out | |
| 7 | ‘0’ | ‘7’ | Write Error | |
| 8 | ‘0’ | ‘8’ | Blank Error | |
| 9 | ‘0’ | ‘9’ | Pre_Amble Error | |
| 10 | ‘1’ | ‘0’ | Parity Error | |
| 11 | ‘1’ | ‘1’ | Post_Amble Error | |
| 12 | ‘1’ | ‘2’ | LRC Error | |
| 13 | ‘1’ | ‘4’ | IC Card Contact Error | |
| 14 | ‘1’ | ‘5’ | IC Card Control Error | |
| 15 | ‘1’ | ‘6’ | IC Read Error | |
| 16 | ‘1’ | ‘7’ | IC Write Error | |
| 17 | ‘1’ | ‘8’ | Not Define | |
| 18 | ‘1’ | ‘9’ | RF POWER On Error | |
| 19 | ‘2’ | ‘0’ | RF Card Authentic Error | |
| 20 | ‘2’ | ‘1’ | RF Card Select Error | |
| 21 | ‘2’ | ‘2’ | RF Card Anticollsion Error | |
| 22 | ‘2’ | ‘3’ | RF Card Read Error | |
| 23 | ‘2’ | ‘4’ | RF Card Write Error | |
| 24 | ‘2’ | ‘5’ | RF Card Inc Error | |
| 25 | ‘2’ | ‘6’ | RF Card Dec Error | |
| 26 | ‘2’ | ‘7’ | RF Card Value Error | |
| 27 | ‘2’ | ‘8’ | Sector or Block Error | |
| 28 | ‘2’ | ‘9’ | RC500 Init Error | |

# 7. Command Detail

## 7.1 Initialize

### 7.1.1 “C00” : If Card Remained inside the unit, Initialize after forward direction Card discharge

Command Packet

| | | | | | | |
|---|---|---|---|---|---|---|
| SOH | ‘C’ | ‘0’ | ‘0’ | STX | ETX | BCC |

Positive Response Packet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SOH | ‘C’ | ‘0’ | ‘0’ | STX | ‘P’ | STATUS | ETX | BCC |

Negative Response Packet

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SOH | ‘C’ | ‘0’ | ‘0’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |

### 7.1.2 “C01” : If Card Remained inside the unit, initialize after reverse direction Card discharge (Capture)

Command Packet

| | | | | | | |
|---|---|---|---|---|---|---|
| SOH | ‘C’ | ‘0’ | ‘1’ | STX | ETX | BCC |

Positive Response Packet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SOH | ‘C’ | ‘0’ | ‘1’ | STX | ‘P’ | STATUS | ETX | BCC |

Negative Response Packet

| SOH | 'C' | '0' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.1.3 "C02" : If Card Remained inside the unit , Initialize after transfer to "STAND-BY" mode

Command Packet

| SOH | 'C' | '0' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '0' | '2' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '0' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.2 Request

7.2.1 "**C10**" : Read exact Card location

Command Packet

| SOH | 'C' | '1' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '1' | '0' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| X | X | X | BIT 4 | BIT 3 | BIT 2 | BIT 1 | BIT 0 |
|---|---|---|---|---|---|---|---|

BIT

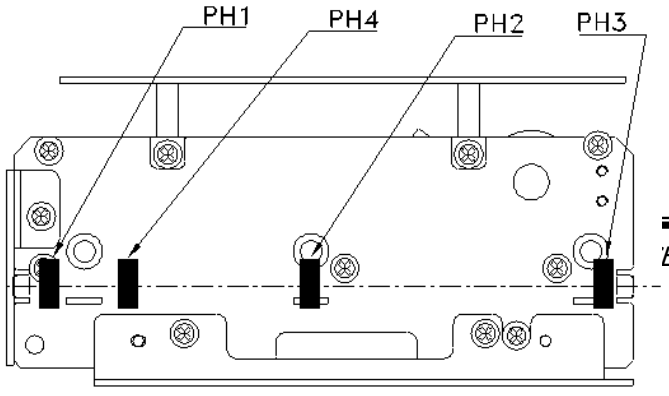
4 : Sensor 5( Front Sw : Shutter Model )

3 : Sensor 4

2 : Sensor 3

1 : Sensor 2

0 : Sensor 1



Negative Response Packet

| SOH | 'C' | '1' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.2.1 "**C11**" : F/W Version Read

Command Packet

| SOH | 'C' | '1' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '1' | '1' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| 'V' | X1 | '.' | X2 | X3 |
|---|---|---|---|---|

Ex) "V1.00"

Negative Response Packet

| SOH | 'C' | '1' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.3 Card Control

7.3.1 "**C20**" : Approval Card Insertion into the unit.

When this command is sent to card reader , card reader takes a card into its body after the card is detected by sensors. And all following processes are executed according to commands .

Command Packet

| SOH | 'C' | '2' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '2' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '2' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.3.2 "C21"** : Prohibit Card Insertion into the unit

This is a command to disable above command "C20" .

Command Packet

| SOH | 'C' | '2' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '2' | '1' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '2' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.4 Card Moving

**7.4.1 "C30"** : If Card Remained inside the unit, forward direction Card Discharge(EJECT)

Command Packet

| SOH | 'C' | '3' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '3' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '3' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.4.2 "C31"** : If Card Remained inside the unit, reverse direction Card Discharge(CAPTURE)

Command Packet

| SOH | 'C' | '3' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '3' | '1' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '3' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.4.3 "C32"** : If Card Remained inside the unit, transfer to "READ STAND-BY" mode

Command Packet

| SOH | 'C' | '3' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '3' | '2' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '3' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.4.4 "C33"** : If Card Remained inside the unit, transfer to "WRITE STAND-BY" mode ( Function "C32" identical )

Command Packet

| SOH | 'C' | '3' | '3' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '3' | '3' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '3' | '3' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.4.5 "C34"** : Card ejection to the front if card is inside MSRW.

Command Packet

| SOH | 'C' | '3' | '4' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '3' | '4' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '3' | '4' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.4.6 "C35"** : After receiving this command, Card Reader stands by for insertion of a card for defined time duration. After checking the insertion of a card, Card Reader takes in the card.

Command Packet

| SOH | 'C' | '3' | '5' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '3' | '5' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '3' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.4.7 "C36"** : After receiving this command, Card Reader stands by for insertion of a card defined time duration. Realizing the card insertion, Card Reader takes in the card after checking if data (i.e. bits) is written on magnetic stripe(Pre_Head setting)

Command Packet

| SOH | 'C' | '3' | '6' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SOH | 'C' | '3' | '6' | STX | 'P' | STATUS | | ETX | BCC |

Negative Response Packet

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SOH | 'C' | '3' | '6' | STX | 'N' | ST1 | ST2 | ETX | BCC |

**7.4.8 "C37"** : Card ejection to the rear(Hold) if card is inside MSRW.

Command Packet

| | | | | | | |
|---|---|---|---|---|---|---|
| SOH | 'C' | '3' | '7' | STX | ETX | BCC |

Positive Response Packet

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SOH | 'C' | '3' | '7' | STX | 'P' | STATUS | | ETX | BCC |

Negative Response Packet

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SOH | 'C' | '3' | '7' | STX | 'N' | ST1 | ST2 | ETX | BCC |

**7.4.8 "C3A"** : Card Reader considers the checked card IC card if Card Reader receives this command After making contact with IC card ,Card Reader stands by for IC card control command.

Command Packet

| SOH | 'C' | '3' | 'A' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '3' | 'A' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '3' | 'A' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.5 Magnetic Data Read

**7.5.1 "C40"** : If Card Remained inside the unit , Track Data Read

Command Packet

| SOH | 'C' | '4' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '0' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA : 1 – 76 Byte ASCII String

Negative Response Packet

| SOH | 'C' | '4' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.5.2 "C41"** : If Card Remained inside the unit, 2 Track Data Read

Command Packet

| SOH | 'C' | '4' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '1' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA : 1 – 37 Byte ASCII String

Negative Response Packet

| SOH | 'C' | '4' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.5.3 "C42"** : If Card Remained inside the unit, 3 Track Data Read

Command Packet

| SOH | 'C' | '4' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '2' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA : 1 – 104 Byte ISCII String

Negative Response Packet

| SOH | 'C' | '4' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.5.4 "C43"** : If Card Remained inside the unit, ALL Track(1, 2, 3 Track) Data Read

Command Packet

| SOH | 'C' | '4' | '3' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '3' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| 1 Track Data | 00h | 2 Track Data | 00h | 3 Track Data |
|---|---|---|---|---|

Return Negative Code in case of Read Error

(Ref. : Negative Response Code List)

Negative Response Packet

| SOH | 'C' | '4' | '3' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.5.5 "C45"** : If No Card Remained inside the unit, STAND-BY for specified time and Read 1 TRACK Data if Card is inserted.

Command Packet

| SOH | 'C' | '4' | '5' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '5' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA : 1 – 76 Byte ASCII String

Negative Response Packet

| SOH | 'C' | '4' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.5.6 "C46"** : If No Card Remained inside the unit, STAND-BY for specified time and Read 2 TRACK Data if Card is inserted.

Command Packet

| SOH | 'C' | '4' | '6' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '6' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA : 1 – 37 Byte ASCII String

Negative Response Packet

| SOH | 'C' | '4' | '6' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.5.7 "C47"** : If No Card Remained inside the unit, STAND-BY for specified time and Read 3 TRACK Data if Card is inserted.

Command Packet

| SOH | 'C' | '4' | '7' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '7' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA : 1 – 104 Byte ASCII String

Negative Response Packet

| SOH | 'C' | '4' | '7' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.5.8 "**C48**" : If No Card Remained inside the unit, STAND-BY for specified time and Read 1,2,3 all TRACK Data if Card is inserted.

Command Packet

| SOH | 'C' | '4' | '8' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '4' | '8' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| 1 Track Data | 00h | 2 Track Data | 00h | 3 Track Data |
|---|---|---|---|---|

Return Negative Code in case of Read Error

(Ref. : Negative Response Code List)

Negative Response Packet

| SOH | 'C' | '4' | '8' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.6 Magnetic Data Write

7.6.1 "**C50**" : If Card Remained inside the unit, 1 Track Data Write

Command Packet

| SOH | 'C' | '5' | '0' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA : 1 – 76 Byte ASCII(ALPHA_NEMERIC) String

Positive Response Packet

| SOH | 'C' | '5' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '5' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.6.2 "**C51**" : If Card Remained inside the unit, 2 Track Data Write

Command Packet

| SOH | 'C' | '5' | '1' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA : 1 – 37 Byte ASCII(NUMERIC Only) String

Positive Response Packet

| SOH | 'C' | '5' | '1' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '5' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.6.3 "**C52**" : If Card Remained inside the unit, 3 Track Data Write

Command Packet

| SOH | 'C' | '5' | '2' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA : 1 – 104 Byte ASCII(NUMERIC) String

Positive Response Packet

| SOH | 'C' | '5' | '2' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '5' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.6.5 "**C55**" : If No Card Remained inside the unit, STAND-BY for specified time and Write 1 TRACK Data if Card is inserted.

Command Packet

| SOH | 'C' | '5' | '5' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA : 1 – 76 Byte ASCII(ALPHA_NEMERIC) String

Positive Response Packet

| SOH | 'C' | '5' | '5' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '5' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.6.6 "**C56**" : If No Card Remained inside the unit, STAND-BY for specified time and Write 2 TRACK Data if Card is inserted.

Command Packet

| SOH | 'C' | '5' | '6' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA : 1 – 37 Byte ASCII(NUMERIC Only) String

Positive Response Packet

| SOH | 'C' | '5' | '6' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '5' | '6' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.6.7 "**C57**" : If No Card Remained inside the unit, STAND-BY for specified time and Write 3 TRACK Data if Card is inserted.

Command Packet

| SOH | 'C' | '5' | '7' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA : 1 – 104 Byte ASCII(NUMERIC) String

Positive Response Packet

| SOH | 'C' | '5' | '7' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '5' | '7' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.7 IC Card Control

### 7.7.1 "**C65**" : ICC Direct Control

This is a command for operation under ISO 7816 T= 0 . Accordingly , user can handle all IC cards conforming to ISO 7816 – 4 and T = 0, T=1.

Command Packet

| SOH | 'C' | '6' | '5' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '6' | '5' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | RESULT |
|---|---|---|
| 2BYTE Length | → | Length ← |

Negative Response Packet

| SOH | 'C' | '6' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

- Note : Add to Data block of above Command Packet Command Packet specified in ISO 7816-4 APDU.

Basic format of Packet of T = 0 commands

| Length | CLA | INS | P1 | P2 | Lc | Data | Le |
|---|---|---|---|---|---|---|---|
| 2Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | 1 Byte | LcByte | 1 Byte |

Fixed | Variable

Length

| Length_High | Length_Low |
|---|---|
| 1 Byte | 1 Byte |

| | | |
|---|---|---|
| CLA | Class | |
| INS | Instruction | |
| P1 | Offset(High Value) | |
| P2 | Offset(Low Value) | |
| Lc | A number of data to transfer | Max Value: 255 |
| Data | Data to transfer | |
| Le | A number of data to receive | |

Format of T=0 command is composed of followings ;

| Command | INS Code(Hex Value) |
|---|---|
| Read Binary Command | B0 |
| Write Binary Command | D0 |
| Update Binary Command | D6 |
| Erase Binary Command | 0E |
| Read Record(s) Command | B2 |
| Write Record Command | D2 |
| Append Record Command | E2 |
| Update Record Command | DC |
| Get Data Command | CA |
| Put Data Command | DA |
| Select File Command | A4 |
| Verify Command | 20 |
| Internal Authenticate Command | 88 |
| External Authenticate Command | 82 |
| Get Challenge Command | 84 |
| Manage Channel Command | 70 |

For more details, refer to ISO 7816-4 .

7.7.2 "**C68**" : Command for sending Reset Signal Contacted IC Card and for receiving ATR from IC Card.

Command Packet

| SOH | 'C' | '6' | '8' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '6' | '8' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA of above Positive Response Packet is ATR data received from IC card after Reset signal is sent to IC card . The format of DATA is as follows ;

| Length _High | Length-Low | ICC ATR |
|---|---|---|
| 2 Byte | | N Byte |

Length

EX)

| 3B | 6B | 00 | 00 | 80 | 31 | 90 | 63 | 53 | 46 | 01 | 83 | 03 | 90 | 00 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '6' | '8' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.8 RF Card Control

### 7.8.1 “R10” : Identify the sector and block set at terminal.

Command Packet

| SOH | ‘R’ | ‘1’ | ‘0’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘1’ | ‘0’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | RESULT |
|---|---|---|
| 2BYTE Length | | → Length ← |

Negative Response Packet

| SOH | ‘R’ | ‘1’ | ‘0’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.2 “R11” : Identify whether if the antenna detect the card.

Command Packet

| SOH | ‘R’ | ‘1’ | ‘1’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘1’ | ‘1’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | RESULT |
|---|---|---|
| 2BYTE Length | | → Length ← |

Result Structure.

| Result | Detail |
|---|---|
| 0x00 | Card Non-Detection(= No Card) |
| 0x01 | Card Detection |

Negative Response Packet

| SOH | ‘R’ | ‘1’ | ‘1’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.8.3 “R12” : Change the sector and block set at terminal.

Command Packet

| SOH | ‘R’ | ‘1’ | ‘2’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Sector&Block |
|---|---|---|
| 2BYTE Length | | → Length ← |

Result Structure.

| BYTE | |
|---|---|
| 1 Byte | Sector |
| 2 Byte | Block |

Positive Response Packet

| SOH | ‘R’ | ‘1’ | ‘2’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘1’ | ‘2’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.8.4 “R13” : authentication key Read ( KeyA or KeyB).

Command Packet

| SOH | ‘R’ | ‘1’ | ‘3’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘1’ | ‘3’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | RESULT |
|---|---|---|
| 2BYTE Length | | → Length ← |

Result Structure.

| Result | |
|---|---|
| 0x00 | Secret key A |
| 0x01 | Secret key B |

Negative Response Packet

| SOH | ‘R’ | ‘1’ | ‘3’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.8.5 “R14” : Get the RF Card’s serial.

Command Packet

| SOH | ‘R’ | ‘1’ | ‘4’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘1’ | ‘3’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | RESULT |
|---|---|---|
| 4BYTE Length | | → Length ← |

Result Structure.

| LSB | | | MSB |
|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘1’ | ‘4’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.8.6 “R15” : Select the authentication key: KeyA or KeyB.

Command Packet

| SOH | ‘R’ | ‘1’ | ‘5’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key Data |
|---|---|---|
| 1BYTE Length | | → Length ← |

| Secret key Data | |
|---|---|
| 0x00 | Secret key A |
| 0x01 | Secret key B |

Positive Response Packet

| SOH | ‘R’ | ‘1’ | ‘5’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘1’ | ‘5’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.6 “R20” : RF Card Data(balance or character) Read.

Command Packet

| SOH | ‘R’ | ‘2’ | ‘0’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘0’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 16BYTE Length | | → Length ← |

Read Data Structure.

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

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘0’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.7 “R21” : RF Card Data (balance) Read.

Command Packet

| SOH | ‘R’ | ‘2’ | ‘1’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘1’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 4BYTE Length | | → Length ← |

Result Structure.

| D0 | D1 | D2 | D3 |
|---|---|---|---|
| 1Byte | 1Byte | 1Byte | 1Byte |

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘1’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.8 “R22” : RF Card Data (balance) Write.

Command Packet

| SOH | ‘R’ | ‘2’ | ‘2’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Write Data |
|---|---|---|
| 4BYTE Length | | → Length ← |

Write Data Structure : 0x00000000 ~ 0xffffffff

| D0 | D1 | D2 | D3 |
|---|---|---|---|
| 1Byte | 1Byte | 1Byte | 1Byte |

Ex) DATA(balance) : ‘1000’

| D0 | D1 | D2 | D3 |
|---|---|---|---|
| 0xe8 | 0x03 | 0x00 | 0x00 |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘2’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘2’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.9 “R23” : RF Card Data (balance or character) Write.

Command Packet

| SOH | ‘R’ | ‘2’ | ‘3’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 16BYTE Length | | → Length ← |

Data Structure.

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

Ex) DATA(character) : ‘KYTRONICS’

| D0 | D1 | D2 | D3 | D4 | --- | D12 | D13 | D14 | D15 |
|---|---|---|---|---|---|---|---|---|---|
| 0x4b | 0x59 | 0x54 | 0x52 | 0x4f | --- | 0x00 | 0x00 | 0x00 | 0x00 |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘3’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘3’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.8.10 “R24” : Increment the balance of card to the specified amount.

Command Packet

| SOH | ‘R’ | ‘2’ | ‘4’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Increment Data |
|---|---|---|
| 4BYTE Length | → | Length ← |

Increment Data Structure : 0x00000000 ~ 0xffffffff

| D0 | D1 | D2 | D3 |
|---|---|---|---|
| 1Byte | 1Byte | 1Byte | 1Byte |

Ex) DATA(balance) : ‘1000’

| D0 | D1 | D2 | D3 |
|---|---|---|---|
| 0xe8 | 0x03 | 0x00 | 0x00 |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘4’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘4’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.8.11 “R25” : Decrement the balance of card to the specified amount..

Command Packet

| SOH | ‘R’ | ‘2’ | ‘5’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Decrement Data |
|---|---|---|
| 16BYTE Length | → | Length ← |

Decrement Data Structure : 0x00000000 ~ 0xffffffff

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

Ex) DATA(balance) : ‘1000’

| D0 | D1 | D2 | D3 |
|---|---|---|---|
| 0xe8 | 0x03 | 0x00 | 0x00 |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘5’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘5’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.8.12 “R2A” : RF Card Data(balance or character) Read.

Command Packet

| SOH | ‘R’ | ‘2’ | ‘A’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 9BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘A’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 16BYTE Length | | → Length ← |

Read Data Structure.

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

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘0’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.8.13 “R2B” : RF Card Data (balance) Read.

Command Packet

| SOH | ‘R’ | ‘2’ | ‘B’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 9BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘B’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 4BYTE Length | | → Length ← |

Result Structure.

| D0 | D1 | D2 | D3 |
|---|---|---|---|
| 1Byte | 1Byte | 1Byte | 1Byte |

Negative Response Packet

| SOH | 'R' | '2' | 'B' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.8.14 "R2C" : RF Card Data (balance) Write.

Command Packet

| SOH | 'R' | '2' | 'C' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 25BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |
| V9 | V10 | V11 | V12 | | | | | |
| B0 | B1 | B2 | B3 | | | | | |
| Balance Data | | | | | | | | |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

DATA(balance) : '1000'

| B0 | B1 | B2 | B3 |
|---|---|---|---|
| 0xe8 | 0x03 | 0x00 | 0x00 |

Positive Response Packet

| SOH | 'R' | '2' | '3' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'R' | '2' | '3' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.8.15 "R2D" : RF Card Data (balance or character) Write.

Command Packet

| SOH | 'R' | '2' | 'D' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 25BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |

| V9 | V10 | V11 | V12 | V13 | --- | V21 | V22 | V23 | V24 |
|---|---|---|---|---|---|---|---|---|---|
| D0 | D1 | D2 | D3 | D4 | --- | D12 | D13 | D14 | D15 |
| Balance or Character Data | | | | | | | | | |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

DATA(Charracter) : 'KYTRONICS'

Ex) DATA(character) : 'KYTRONICS'

| V9 | V10 | V11 | V12 | V13 | --- | V21 | V22 | V23 | V24 |
|---|---|---|---|---|---|---|---|---|---|
| 0x4b | 0x59 | 0x54 | 0x52 | 0x4f | --- | 0x00 | 0x00 | 0x00 | 0x00 |

Positive Response Packet

| SOH | 'R' | '2' | 'D' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'R' | '2' | 'D' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.8.16 "R2E" : Increment the balance of card to the specified amount.

Command Packet

| SOH | 'R' | '2' | 'E' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 13BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |

| V9 | V10 | V11 | V12 |
|---|---|---|---|
| B0 | B1 | B2 | B3 |
| Balance Data | | | |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

DATA(balance) : ‘1000’

| V9 | V10 | V11 | V12 |
|---|---|---|---|
| 0xe8 | 0x03 | 0x00 | 0x00 |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘E’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘E’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.8.17 “R2F” : Decrement the balance of card to the specified amount..

Command Packet

| SOH | ‘R’ | ‘2’ | ‘F’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 13BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |
| V9 | V10 | V11 | V12 | | | | | |
| B0 | B1 | B2 | B3 | | | | | |
| Balance Data | | | | | | | | |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

DATA(balance) : ‘1000’

| V9 | V10 | V11 | V12 |
|---|---|---|---|
| 0xe8 | 0x03 | 0x00 | 0x00 |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘F’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘F’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.18 “R30” : RF Card Key Change(Access Condition Data Exclude).

Command Packet

| SOH | ‘R’ | ‘3’ | ‘0’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 13BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 |
|---|---|---|---|---|---|---|
| Sector | Key A0 | Key A1 | KeyA 2 | KeyA 3 | Key A4 | KeyA 5 |
| | Sectret key A | | | | | |
| V7 | V8 | V9 | V10 | V11 | V12 | |
| KeyB0 | KeyB1 | KeyB2 | KeyB3 | KeyB4 | KeyB5 | |
| Sectret key B | | | | | | |

Positive Response Packet

| SOH | ‘R’ | ‘3’ | ‘0’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘3’ | ‘0’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.19 “R31” : RF Card Key Change(Access Condition Data inclusion).

Command Packet

| SOH | ‘R’ | ‘3’ | ‘1’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector |
|---|---|---|
| 17BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Sector | KeyA0 | KeyA1 | KeyA2 | KeyA3 | KeyA 4 | KeyA 5 | Acc0 | Acc1 |
| | Sectret key A | | | | | | Access | |
| V9 | V10 | V11 | V12 | V13 | V14 | V15 | V16 | |
| Acc3 | Acc4 | KeyB0 | KeyB1 | KeyB2 | KeyB3 | KetB4 | Keyb5 | |
| Condition | | Sectret key B | | | | | | |

Positive Response Packet

| SOH | ‘R’ | ‘3’ | ‘1’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘3’ | ‘1’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.20 “R32” : Module Key Change.

Command Packet

| SOH | ‘R’ | ‘3’ | ‘2’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 13BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 |
|---|---|---|---|---|---|---|
| Sector | Key A0 | Key A1 | KeyA 2 | KeyA 3 | Key A4 | KeyA 5 |
| | Sectret key A | | | | | |
| V7 | V8 | V9 | V10 | V11 | V12 | |
| KeyB0 | KeyB1 | KeyB2 | KeyB3 | KeyB4 | KeyB5 | |
| Sectret key B | | | | | | |

Positive Response Packet

| SOH | ‘R’ | ‘3’ | ‘2’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘3’ | ‘2’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.21 “R40” : Power On (The carrier wave emitted in antenna.)

Command Packet

| SOH | ‘R’ | ‘4’ | ‘0’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘F’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘F’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.22 “R41” : Power Off(The carrier wave not emitted in antenna.)

Command Packet

| SOH | ‘R’ | ‘4’ | ‘1’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘4’ | ‘1’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘4’ | ‘1’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.23 “R60” : Read RF Card data in Sector Range.

Command Packet

| SOH | ‘R’ | ‘6’ | ‘0’ | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | ‘R’ | ‘6’ | ‘0’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 51BYTE Length | | → Length ← |

Read Data Structure.

| Block | D0 | D1 | D2 | --- | D14 | D15 |
|---|---|---|---|---|---|---|
| 00 | 1Byte | 1Byte | 1Byte | --- | 1Byte | 1Byte |
| Block | D0 | D1 | D2 | --- | D14 | D15 |
| 01 | 1Byte | 1Byte | 1Byte | --- | 1Byte | 1Byte |
| Block | D0 | D1 | D2 | --- | D14 | D15 |
| 02 | 1Byte | 1Byte | 1Byte | --- | 1Byte | 1Byte |

Negative Response Packet

| SOH | ‘R’ | ‘6’ | ‘0’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.24 “R61” : Write RF Card data in Sector Range.

Command Packet

| SOH | ‘R’ | ‘6’ | ‘1’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 51BYTE Length | | → Length ← |

Data Structure.

| Block | D0 | D1 | D2 | --- | D14 | D15 |
|---|---|---|---|---|---|---|
| 00 | 1Byte | 1Byte | 1Byte | --- | 1Byte | 1Byte |
| Block | D0 | D1 | D2 | --- | D14 | D15 |
| 01 | 1Byte | 1Byte | 1Byte | --- | 1Byte | 1Byte |
| Block | D0 | D1 | D2 | --- | D14 | D15 |
| 02 | 1Byte | 1Byte | 1Byte | --- | 1Byte | 1Byte |

Positive Response Packet

| SOH | ‘R’ | ‘6’ | ‘1’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘6’ | ‘1’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.8.25 “R6A” Read RF Card data in Sector Range.

Command Packet

| SOH | ‘R’ | ‘6’ | ‘A’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 9BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

Positive Response Packet

| SOH | ‘R’ | ‘6’ | ‘A’ | STX | ‘P’ | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Read Data |
|---|---|---|
| 16BYTE Length | | → Length ← |

Read Data Structure.

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

Negative Response Packet

| SOH | ‘R’ | ‘6’ | ‘A’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.8.26 “R6B” Write RF Card data in Sector Range.

Command Packet

| SOH | ‘R’ | ‘6’ | ‘B’ | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA Structure

| Length_High | Length_Low | Secret key&Sector&Block&Key |
|---|---|---|
| 25BYTE Length | | → Length ← |

Ex) Secret key&Sector&Block&Key Structure

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| Secret key | Sector | Block | Key 0 | Key 1 | Key 2 | Key 3 | Key 4 | Key 5 |

| V9 | V10 | V11 | V12 | V13 | V14 | --- | V22 | V23 | V24 | V25 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0x00 | D0 | D1 | D2 | D3 | D4 | --- | D12 | D13 | D14 | D15 |
| V26 | V27 | V28 | V29 | V30 | V31 | --- | V39 | V40 | V41 | V42 |
| 0x01 | D0 | D1 | D2 | D3 | D4 | --- | D12 | D13 | D14 | D15 |
| V43 | V44 | V45 | V46 | V47 | V48 | --- | V56 | V57 | V58 | V59 |
| 0x02 | D0 | D1 | D2 | D3 | D4 | --- | D12 | D13 | D14 | D15 |

Ex) Secret : Key A, Sector : 0, Block : 0, Key Value : 0xff,0xff,0xff,0xff,0xff,0xff

| V0 | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 |
|---|---|---|---|---|---|---|---|---|
| 0x00 | 0x00 | 0x00 | 0xff | 0xff | 0xff | 0xff | 0xff | 0xff |

Positive Response Packet

| SOH | ‘R’ | ‘2’ | ‘D’ | STX | ‘P’ | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | ‘R’ | ‘2’ | ‘D’ | STX | ‘N’ | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.9 Retry Setting

### 7.9.1 "**C70**" : No RETRY in case of Data Error

Command Packet

| SOH | 'C' | '7' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '7' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '7' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.9.2 "**C71**" : Set Read RETRY 1 time in case of Data Error

Command Packet

| SOH | 'C' | '7' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '7' | '1' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '7' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.9.3 "**C72**" : Set Read RETRY 2 time in case of Data Error

Command Packet

| SOH | 'C' | '7' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '7' | '2' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '7' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.9.4 "**C73**" : Set Read RETRY 3 time in case of Data Error

Command Packet

| SOH | 'C' | '7' | '3' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '7' | '3' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '7' | '3' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.9.5 "**C74**" : Set Read RETRY 4 time in case of Data Error

Command Packet

| SOH | 'C' | '7' | '4' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '7' | '4' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '7' | '4' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.10 Head Cleaning

7.10.1"**C80**" : Head Cleaning If No Card Remained inside the unit, STAND-BY for specified time and reciprocate 5 times and eject Cleaning Card if Card is inserted.

Command Packet

| SOH | 'C' | '8' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '8' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '8' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.10.2 "**C81**" : Command for activating Buzzer once.

Example) To indicate that a command runs "Good" .

Command Packet

| SOH | 'C' | '8' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '8' | '1' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '8' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

7.10.3 "**C82**" : Command for activating Buzzer twice

Example) To indicate that a command runs "In Error".

Command Packet

| SOH | 'C' | '8' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '8' | '2' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '8' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.11 Setting

### 7.11.1 "**C90**" : Card Wait Time Set

Command Packet

| SOH | 'C' | '9' | '0' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA : Card STAND-BY time to be inserted (sec : "1" – "9")

Positive Response Packet

| SOH | 'C' | '9' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '9' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.11.2 "**C91**" : Series(RTS,CTS) Set.

Command Packet

| SOH | 'C' | '9' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '9' | '1' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '9' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.11.3 "**C92**" : Series(RTS,CTS) Cancellation.

Command Packet

| SOH | 'C' | '9' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'C' | '9' | '2' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '9' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.11.4 "C95" : Baud Rate Setting

Command Packet

| SOH | 'C' | '9' | '5' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA :

'0' – 9600 BPS

'1' – 19200 BPS(Default)

'2' – 38400 BPS

'3' – 57600 BPS

Positive Response Packet

| SOH | 'C' | '9' | '5' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '9' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.11.4 "C9A" : Magnetic Card High-co and Low-co select.

Command Packet

| SOH | 'C' | '9' | 'A' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

DATA :

'0' – 300Oe(Default)

'1' – 1750Oe.

'2' – 2750Oe

'3' – 4000Oe

Positive Response Packet

| SOH | 'C' | '9' | 'A' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'C' | '9' | 'A' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.12. TCP IP.

**:When KYT-6912 has connected the Ethernet and there is no receiving data for 30 Seconds, KYT-6912 disconnects and wait the connection.**

***You must use a cross cable.**

### 7.12.1 "T00" : Ethernet Close the connection

Command Packet

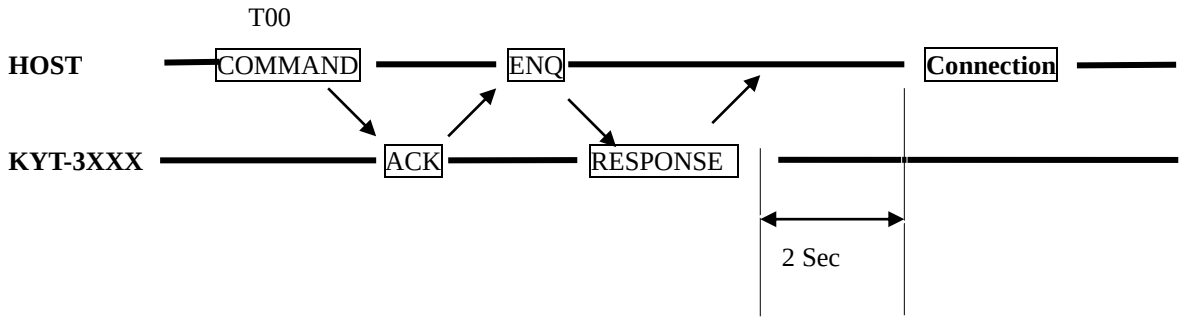
| SOH | 'T' | '0' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'T' | '0' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'T' | '0' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|



**7.12.2 "T01"** : TCP IP save.

Command Packet

| SOH | 'T' | '0' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

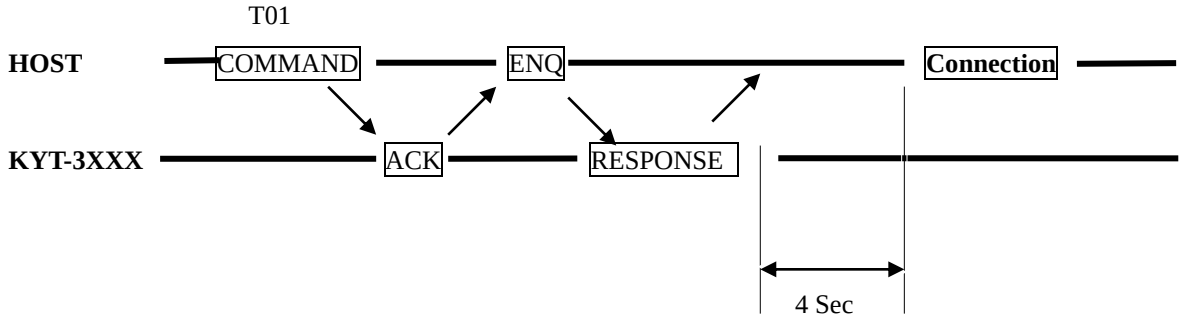
| SOH | 'T' | '0' | '1' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| 'I' | Address | 'M' | Address | 'G' | Address |
|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'T' | '0' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|




*** initial Ethernet status.**

**. IP address : 100.100.100.133**

**. Sub net mask address : 255.255.255.0**

**. Get way address : 100.100.100.1**

## 7.13 *MIFARE PLUS CARD*

Our machine supports the Mifare Plus S(MF1SPLUSx0y1),X(MF1PLUSx0y1) Tags.
With the KYTronics PLUS Command Set the host application don't need to take care about the authentication procedure, AES crypto or CRC32 calculation.
The load data (data bytes in a command/response) are transferred in plain text between the reader and the host, because the AES decryption and encryption takes place completely in our reader.

Firmware function in case of PLUS:
- AES Mutual three pass authentication procedure
- AES CBC (Cipher Block Chaining) send mode
- AES CBC (Cipher Block Chaining) receive mode
- AES padding bytes handling

### 7.13.1 "E01" : Write Perso.

This command is used to change the data and AES keys from the initial delivery configuration to a customer specific value. Refer to PLUS Datasheet > Write Perso < to get more command details.

Command Packet

| SOH | 'E' | '0' | '1' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Block Address | Data or AES KEY |
|---|---|
| 2byte (LSB First) | 16 byte |

Positive Response Packet

| SOH | 'E' | '0' | '1' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code |
|---|
| 1 byte |

Negative Response Packet

| SOH | 'E' | '0' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.2 "E02" : Commit Perso.

This command is used to finalize the personalization and switch up to security level 1 or level3.

Refer to PLUS Datasheet > Commit Perso < to get more command details.

Command Packet

| SOH | 'E' | '0' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'E' | '0' | '2' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code |
|---|
| 1 byte |

Negative Response Packet

| SOH | 'E' | '0' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.3 "E04" : Level 1 Authentication.

This command is used to authenticate the security level1. Refer to PLUS Datasheet to get more command details.

Command Packet

| SOH | 'E' | '0' | '4' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| SL1 Authentication KEY |
|---|
| 16 byte |

Positive Response Packet

| SOH | 'E' | '0' | '4' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code |
|---|
| 1 byte |

Negative Response Packet

| SOH | 'E' | '0' | '4' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

***You can use the Mifare Classic function. Please refer the Mifare Classic Part.**

### 7.13.4 "E05" : Level 2 Authentication.

This command is used to authenticate the security level2. Refer to PLUS Datasheet to get more command details.

Command Packet

| SOH | 'E' | '0' | '5' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Block Address | AES KEY |
|---|---|
| 2byte (LSB First) | 16 byte |

Positive Response Packet

| SOH | 'E' | '0' | '5' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code |
|---|
| 1 byte |

Negative Response Packet

| SOH | 'E' | '0' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

***After Authentication, you can use the Mifare Classic function. Please refer the Mifare Classic Part.**

### 7.13.5 "E10" : Level 3 Authentication.

This command is used to authenticate each blocks. Refer to PLUS Datasheet to get more command details.

Command Packet

| SOH | 'E' | '1' | '0' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Block Address | AES KEY |
|---|---|
| 2byte (LSB First) | 16 byte |

Positive Response Packet

| SOH | 'E' | '1' | '0' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code |
|---|
| 1 byte |

Negative Response Packet

| SOH | 'E' | '1' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.6 "E11" : Level 3 Follow Authentication.

This command is used to authenticate each blocks. Refer to PLUS Datasheet to get more command details.

Command Packet

| SOH | 'E' | '1' | '1' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Block Address | AES KEY |
|---|---|
| 2byte (LSB First) | 16 byte |

Positive Response Packet

| SOH | 'E' | '1' | '1' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code |
|---|
| 1 byte |

Negative Response Packet

| SOH | 'E' | '1' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.7 "E12" : Reset Authentication.

This command is used to reset the authentication. Refer to PLUS Datasheet to get more command details.

Command Packet

| SOH | 'E' | '1' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'E' | '1' | '2' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code |
|---|
| 1 byte |

Negative Response Packet

| SOH | 'E' | '1' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.8 "E13" : Security Level3 Read Command.

This command is used to read the Card. Refer to PLUS Datasheet to get more

Command Packet

| SOH | 'E' | '1' | '3' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Command Code(1byte) | Block Address | EXT (1byte) |
|---|---|---|
| 0x00: 0x30h.<br>0x01: 0x31h.<br>0x02: 0x32h.<br>0x03: 0x33h.<br>0x04: 0x34h.<br>0x05: 0x35h.<br>0x06: 0x36h.<br>0x07: 0x37h. | 2byte (LSB First) | 0x01~0x08 |

Positive Response Packet

| SOH | 'E' | '1' | '3' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code | Read Data | 8byte MAC |
|---|---|---|
| 1 byte | Max 256 byte | 0byte or 8byte |

*** Regarding the MAC byte, it is decided to add the MAC byte by the Command code.**

Negative Response Packet

| SOH | 'E' | '1' | '3' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.8 "E14" : Security Level3 Write Command.

This command is used to write the Card. Refer to PLUS Datasheet to get more

Command Packet

| SOH | 'E' | '1' | '4' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Command Code(1byte) | Block Address | Write data |
|---|---|---|
| 0x00: 0xA0h.<br>0x01: 0xA1h.<br>0x02: 0xA2h.<br>0x03: 0xA3h. | 2byte (LSB First) | Max 48 byte |

Positive Response Packet

| SOH | 'E' | '1' | '4' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code | 8byte MAC |
|---|---|
| 1 byte | 0 byte or 8byte. |

*** Regarding the MAC byte, it is decided to add the MAC byte by the Command code.**

Negative Response Packet

| SOH | 'E' | '1' | '4' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.9 "E15" : Security Level3 Increment Command.

This command is used to increment the Value data. Refer to PLUS Datasheet to get more

Command Packet

| SOH | 'E' | '1' | '5' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

*In case of the command code is 0x00(0xB0h) or 0x01(0xB1h)

| Command Code(1byte) | Source Block Address | Write data |
|---|---|---|
| 0x00: 0xB0h.<br>0x01: 0xB1h.<br>0x02: 0xB6h.<br>0x03: 0xB7h. | 2byte (LSB First) | 4 byte(LSB First) |

*In case of the command code is 0x02(0xB6h) or 0x03(0xB7h)

| Command Code(1byte) | Source Block Address | Target Block Address | Write data |
|---|---|---|---|
| 0x00: 0xB0h.<br>0x01: 0xB1h.<br>0x02: 0xB6h.<br>0x03: 0xB7h. | 2byte (LSB First) | 2byte(LSB First) | 4 byte(LSB First) |

Positive Response Packet

| SOH | 'E' | '1' | '5' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code | 8byte MAC |
|---|---|
| 1 byte | 0 byte or 8byte. |

*** Regarding the MAC byte, it is decided to add the MAC byte by the Command code.**

Negative Response Packet

| SOH | 'E' | '1' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.10 "E16" : Security Level3 Decrement Command.

This command is used to Decrement the Value data. Refer to PLUS Datasheet to get more

Command Packet

| SOH | 'E' | '1' | '6' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

*In case of the command code is 0x00(0xB2h) or 0x01(0xB3h)

| Command Code(1byte) | Source Block Address | Write data |
|---|---|---|
| 0x00: 0xB2h.<br>0x01: 0xB3h.<br>0x02: 0xB8h.<br>0x03: 0xB9h. | 2byte (LSB First) | 4 byte(LSB First) |

*In case of the command code is 0x02(0xB8h) or 0x03(0xB9h)

| Command Code(1byte) | Source Block Address | Target Block Address | Write data |
|---|---|---|---|
| 0x00: 0xB2h.<br>0x01: 0xB3h.<br>0x02: 0xB8h.<br>0x03: 0xB9h. | 2byte (LSB First) | 2byte(LSB First) | 4 byte(LSB First) |

Positive Response Packet

| SOH | 'E' | '1' | '6' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code | 8byte MAC |
|---|---|
| 1 byte | 0 byte or 8byte. |

*** Regarding the MAC byte, it is decided to add the MAC byte by the Command code.**

Negative Response Packet

| SOH | 'E' | '1' | '6' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.11 "E17" : Security Level3 Transfer Command.

This command stores the content of the Transfer Buffer to the specified address.

Refer to PLUS Datasheet to get more

Command Packet

| SOH | 'E' | '1' | '7' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Command Code(1byte) | Dest. Block Address |
|---|---|
| 0x00: 0xB4h.<br>0x01: 0xB5h. | 2byte (LSB First) |

Positive Response Packet

| SOH | 'E' | '1' | '7' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code | 8byte MAC |
|---|---|
| 1 byte | 0 byte or 8byte. |

*** Regarding the MAC byte, it is decided to add the MAC byte by the Command code.**

Negative Response Packet

| SOH | 'E' | '1' | '7' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

### 7.13.12 "E18" : Security Level3 Transfer Command.

This command copies the content found in the Value Block at the given address to the Transfer Buffer.

Refer to PLUS Datasheet to get more

Command Packet

| SOH | 'E' | '1' | '8' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Command Code(1byte) | Source Block Address |
|---|---|
| 0x00: 0xC2h.<br>0x01: 0xC3h. | 2byte (LSB First) |

Positive Response Packet

| SOH | 'E' | '1' | '8' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code | 8byte MAC |
|---|---|
| 1 byte | 0 byte or 8byte. |

*** Regarding the MAC byte, it is decided to add the MAC byte by the Command code.**

Negative Response Packet

| SOH | 'E' | '1' | '8' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.13.13 "E20" : Proximity Command**

This command is carried out by measuring the round trip time of a challenge-response interaction..

Refer to PLUS Datasheet to get more

Command Packet

| SOH | 'E' | '2' | '0' | STX | DATA Lengh High | Lengh Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| Proximity check key |
|---|
| 16byte |

Positive Response Packet

| SOH | 'E' | '2' | '0' | STX | 'P' | STATUS | DATA Length High | Length Low | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|

DATA Structure

The First byte is Status Code by Plus PICC(Refer to PLUS Datasheet). 0x90 is good status or Error code.

| Status Code | MAC |
|---|---|
| 1 byte | 8byte. |

Negative Response Packet

| SOH | 'E' | '2' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

## 7.14 Magnetic Binary Data Read.

**7.14.1 "B40"** : If Card Remained inside the unit , 1 Track binary data Read

Command Packet

| SOH | 'B' | '4' | '0' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '0' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '4' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.2 "B41"** : If Card Remained inside the unit, 3 Track binary data Read

Command Packet

| SOH | 'B' | '4' | '1' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '1' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '4' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.3 "B42"** : If Card Remained inside the unit, 2 Track binary data Read

Command Packet

| SOH | 'B' | '4' | '2' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '2' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '4' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.4 "B43"** : If Card Remained inside the unit, ALL Track(1, 2, 3 Track) binary data Read

Command Packet

| SOH | 'B' | '4' | '3' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '3' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| 1 Track Data | 00h | 2 Track Data | 00h | 3 Track Data |
|---|---|---|---|---|

Return Negative Code in case of Read Error (Ref. : Negative Response Code List)

Negative Response Packet

| SOH | 'B' | '4' | '3' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.5 "B45"** : If No Card Remained inside the unit, STAND-BY for specified time and Read 1 TRACK binary data if Card is inserted.

Command Packet

| SOH | 'B' | '4' | '5' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '5' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '4' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.6 "B46"** : If No Card Remained inside the unit, STAND-BY for specified time and Read 3 TRACK binary data if Card is inserted.

Command Packet

| SOH | 'B' | '4' | '6' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '6' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '4' | '6' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.7 "B47"** : If No Card Remained inside the unit, STAND-BY for specified time and Read 2 TRACK binary data if Card is inserted.

Command Packet

| SOH | 'B' | '4' | '7' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '7' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '4' | '7' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.8** "**B48**" : If No Card Remained inside the unit, STAND-BY for specified time and Read 1,2,3 all TRACK binary data if Card is inserted.

Command Packet

| SOH | 'B' | '4' | '8' | STX | ETX | BCC |
|---|---|---|---|---|---|---|

Positive Response Packet

| SOH | 'B' | '4' | '8' | STX | 'P' | STATUS | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

DATA Structure

| 1 Track Data | 00h | 2 Track Data | 00h | 3 Track Data |
|---|---|---|---|---|

Return Negative Code in case of Read Error (Ref. : Negative Response Code List)

Negative Response Packet

| SOH | 'B' | '4' | '8' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.9** "**B50**" : If Card Remained inside the unit, 1 Track binary data Write

Command Packet

| SOH | 'B' | '5' | '0' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Write Data : 1 – 130Byte ASCII(0 ~9, A~F) String

Positive Response Packet

| SOH | 'B' | '5' | '0' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '5' | '0' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.10** "**B51**" : If Card Remained inside the unit, 3 Track binary data Write

Command Packet

| SOH | 'B' | '5' | '1' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Write Data : 1 – 130Byte ASCII(0 ~9, A~F) String

Positive Response Packet

| SOH | 'B' | '5' | '1' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '5' | '1' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.11** "**B52**" : If Card Remained inside the unit, 2 Track binary data Write

Command Packet

| SOH | 'B' | '5' | '2' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Write Data : 1 – 130Byte ASCII(0 ~9, A~F) String

Positive Response Packet

| SOH | 'B' | '5' | '2' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '5' | '2' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.12** "**B55**" : If No Card Remained inside the unit, STAND-BY for specified time and Write 1 TRACK binary Data if Card is inserted.

Command Packet

| SOH | 'B' | '5' | '5' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Write Data : 1 – 130Byte ASCII(0 ~9, A~F) String

Positive Response Packet

| SOH | 'B' | '5' | '5' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '5' | '5' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.13**"**B56**" : If No Card Remained inside the unit, STAND-BY for specified time and Write 3 TRACK binary Data if Card is inserted.

Command Packet

| SOH | 'B' | '5' | '6' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Write Data : 1 – 130Byte ASCII(0 ~9, A~F) String

Positive Response Packet

| SOH | 'B' | '5' | '6' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

| SOH | 'B' | '5' | '6' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

**7.14.14** "**B57**" : If No Card Remained inside the unit, STAND-BY for specified time and Write 2 TRACK binary Data if Card is inserted.

Command Packet

| SOH | 'B' | '5' | '7' | STX | DATA | ETX | BCC |
|---|---|---|---|---|---|---|---|

Write Data : 1 – 130Byte ASCII(0 ~9, A~F) String

Positive Response Packet

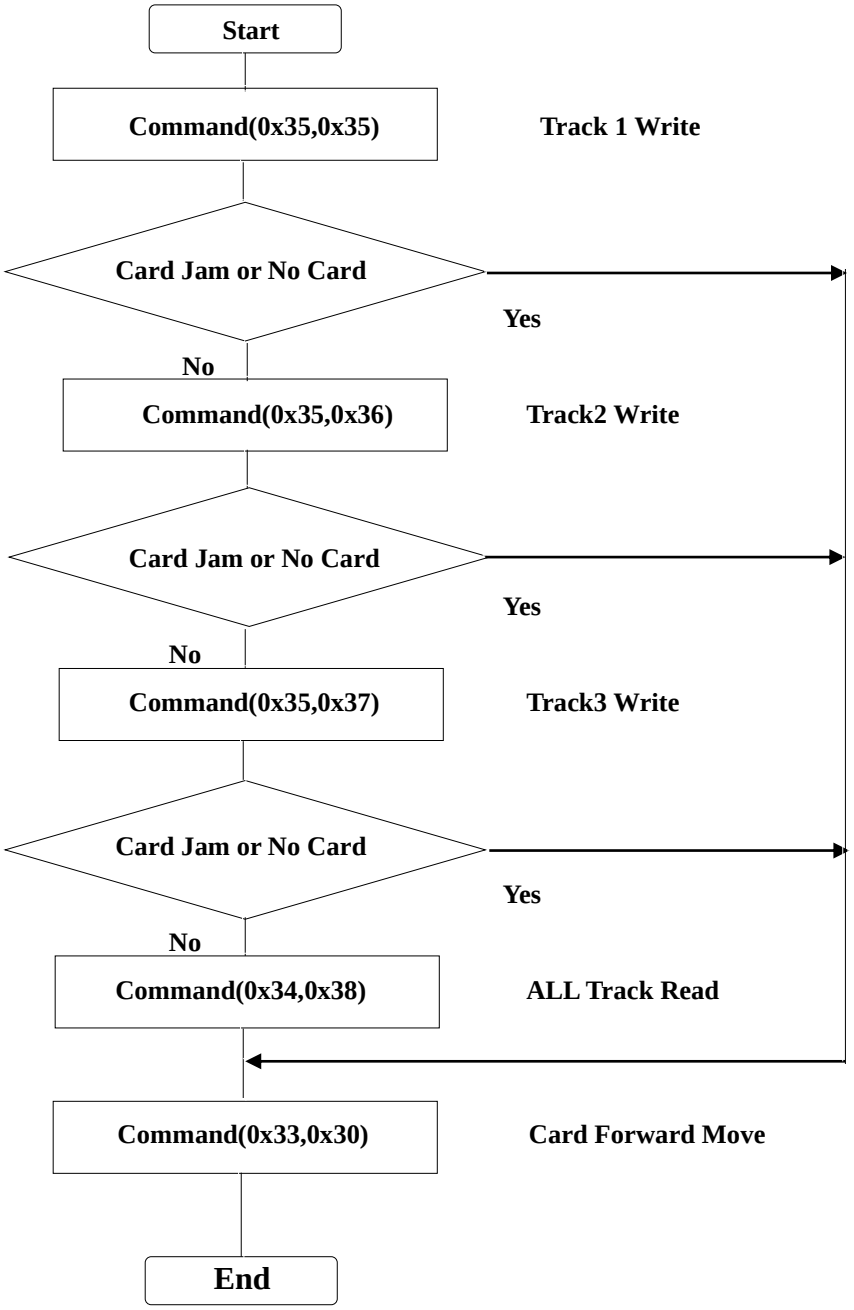
| SOH | 'B' | '5' | '7' | STX | 'P' | STATUS | ETX | BCC |
|---|---|---|---|---|---|---|---|---|

Negative Response Packet

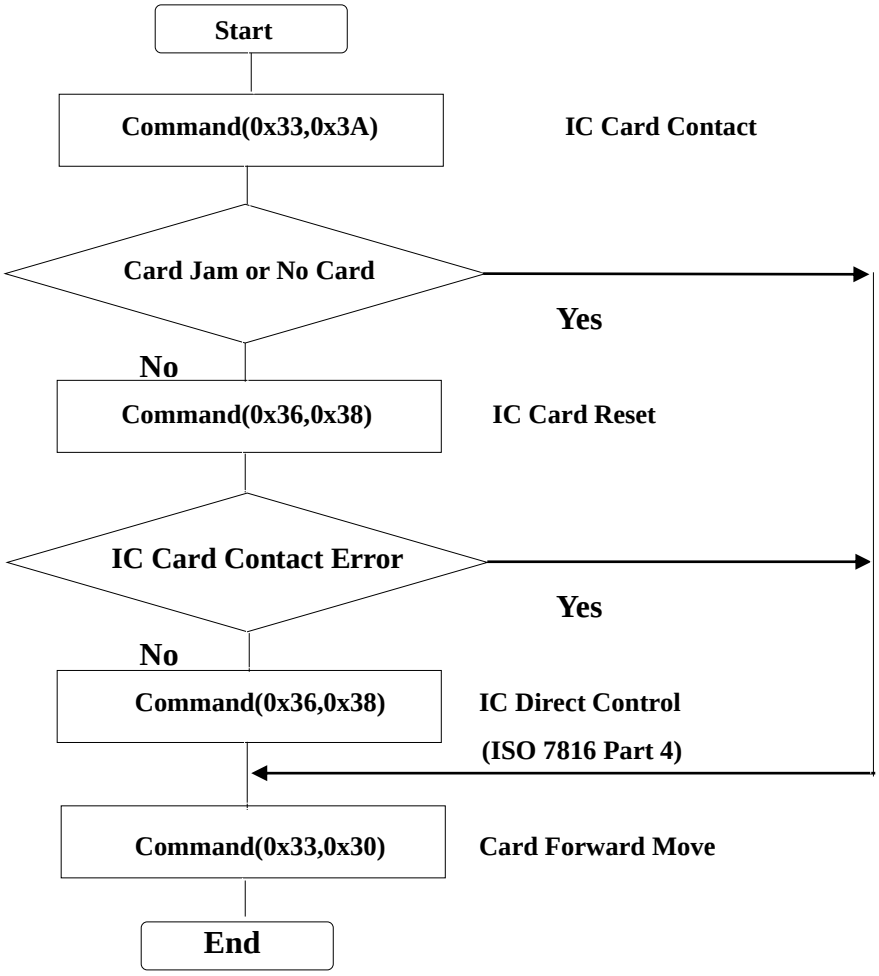
| SOH | 'B' | '5' | '7' | STX | 'N' | ST1 | ST2 | ETX | BCC |
|---|---|---|---|---|---|---|---|---|---|

# <Flow Chart>

## 1. Magnetic Card.



## 2. IC Card.


Start
Command(0x33,0x3A)
IC Card Contact
Card Jam or No Card
Yes
No
Command(0x36,0x38)
IC Card Reset
IC Card Contact Error
Yes
No
Command(0x36,0x38)
IC Direct Control
(ISO 7816 Part 4)
Command(0x33,0x30)
Card Forward Move
End

## 3. RF Card (Read).