



Ingeniería Electrónica  
*SMART IDENT*

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KSX-3000  
COMPACT CARD READER  
MAGNETIC, IC CARD & RF  
Specifications

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User Manual

KSX3000.UM.F.EN.doc



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	3 OF 82	2016. 1 .19.

## MODEL NAME INFORMATION

### KSX-3XXX SERIES MODEL

K S  - 3

INTERFACE	FUNCTION	MS / IC	TRACK	OPTION
T: RS-232C U: USB	3: SLIM TYPE MOTORIZED MS/ IC CARD READER	0: - 1: IC ONLY 2: MS - READ ONLY 3: MS(READ ONLY) + IC 4: RF ONLY 5: RF + MS(READ ONLY) 6: RF + IC 7: RF + MS(READ ONLY) + IC	0: - 1: ISO 1 TRK 2: ISO 2 TRK 3: ISO 3 TRK 4: ISO 1,2 TRK 5: ISO 1,3 TRK 6: ISO 2,3 TRK 7: ISO 1,2,3 TRK	0: WITHOUT BEZEL 1: SHORT BEZEL 2: SHUTTER
* IC CONTACT : 8 PIN				

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
			F	4 OF 82

## **C O N T E N T S**

- 2. GENERALS**
- 3. SYSTEM BLOCK DIAGRAM**
- 4. SPECIFICATION**
- 5. INTERFACE REQUIREMENTS**
- 6. INTERFACE – PROTOCOL AND COMMANDS**

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	5 OF 82	2016. 1 .19.

## 1. GENERALS.

### 1.1. Overview

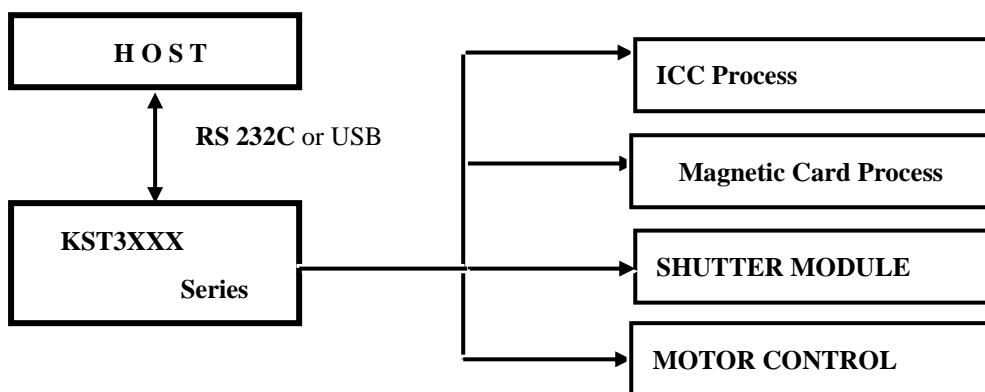
This specification is for the KSX-3XXX Series Motorized Magnetic and or IC Card Reader. In meeting customer's applications, intended data can be written and read through RS-232C or USB communication.

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.

### 1.2. Features.

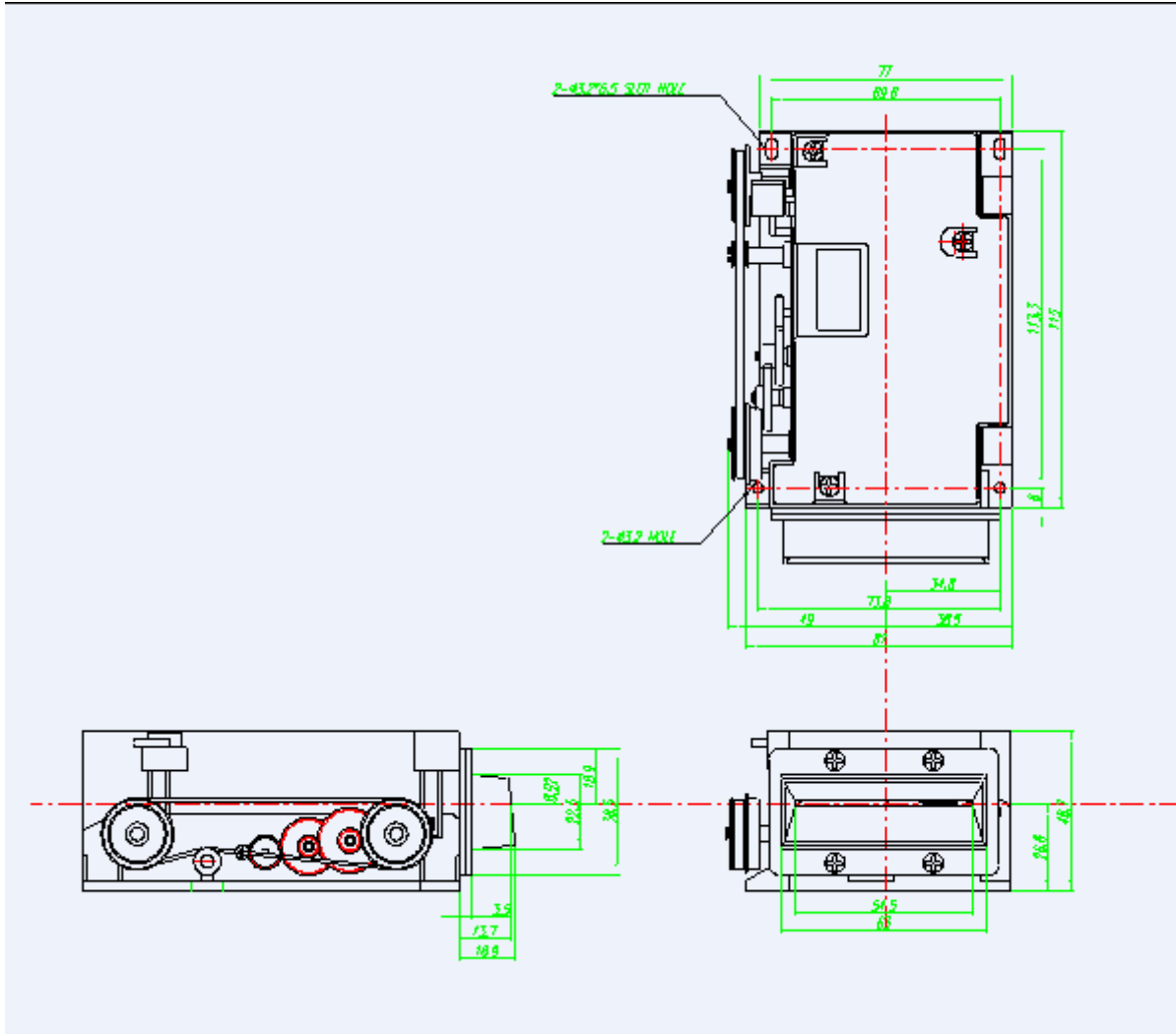
- 1.2.1. Magnetic Stripe reading Triple tracks.
- 1.2.2. When the power is turned on, if a card is inside of inserted module it will be eject.
- 1.2.3. RS-232C interface or USB interface with a HOST.
- 1.2.4. Support T=0 and T=1 protocol.
- 1.2.5. Shutter mechanism with per-head and sensors is provided.
  - (1) Card width sensor: Confirm the width of inserted card as standard.
  - (2) Magnetic stripe detection: A pre-head located at ISO dual track position.

## 2. SYSTEM BLOCK DIAGRAM

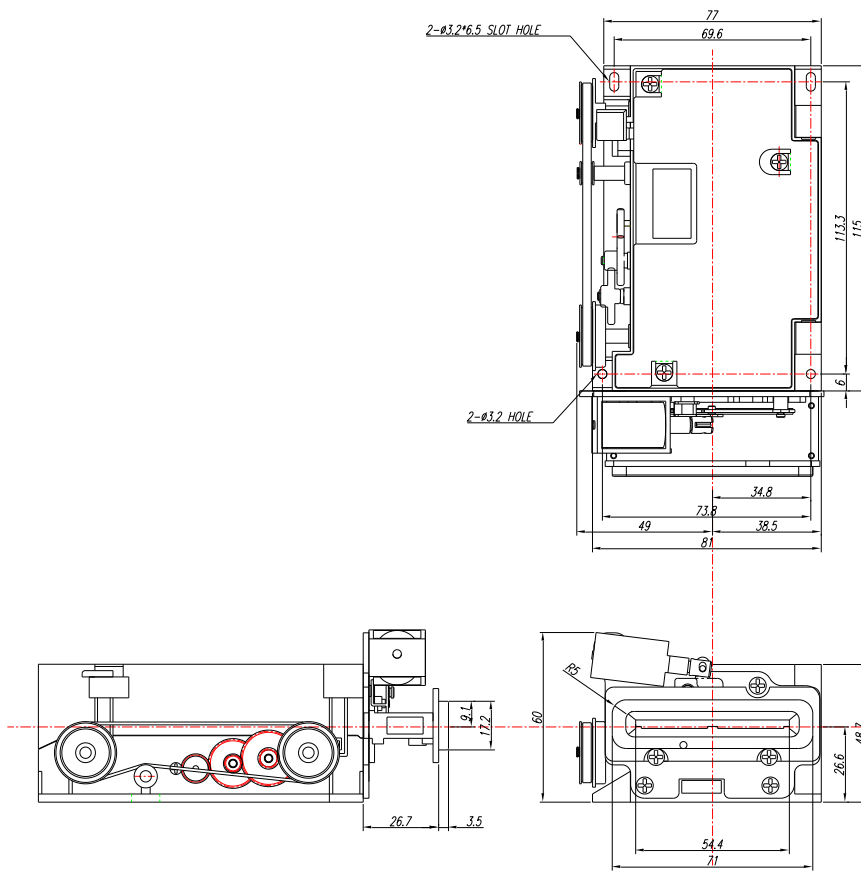


Doc No	KST3XXX Series SPECIFICATION	REV	PAGE	DATE
		F	6 OF 82	2016. 1 .19.

### 6.1 MODEL INFORMATION.

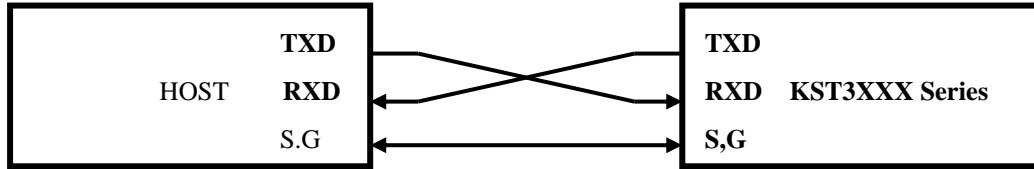


Doc No	KST3XXX Series SPECIFICATION	REV	PAGE	DATE
		F	7 OF 82	2016. 1 .19.



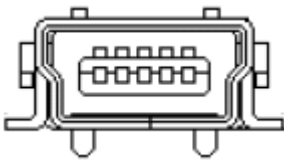
<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	8 OF 82	2016. 1 .19.

### 6.2 RS-232C Connection.



### 6.3 USB Connection.

\* Mini USB: B TYPE CONNECTOR 5PIN



## 3. SPECIFICATION.

### 3.1 Card Standard. (ISO7810, ISO7811, ISO7816)

#### 3.1.1. Magnetic Stripe Card - ISO7811

	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		

#### 3.1.2. ICC Contact.

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

C1

C5

C2

C6

C3

C7

C4

C8

**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 inut/output)**

**C8 :Reserved to ISO/IEC JTC 1/SC 17 for future use**



Doc No	KST3XXX Series SPECIFICATION	REV	PAGE	DATE
		F	9 OF 82	2016. 1 .19.

### 3.2 Environmental Requirements

#### 3.2.1 Ambient Temperature.

(1) Storage: -20°C ~ 70°C

(No function error to be found in 12 hours after returning to normal environment.)

(2) Operating: 5°C ~ 50°C

#### 3.2.2 Ambient Relative Humidity.

(1) Storage: 0 ~ 95%

(No function error to be found in 12 hours after returning to normal environment.)

(2) Operating: 0 ~ 90% (No Condensation)

#### 3.2.3 Vibration: Amplitude 2mm within 2G or less., 10 to 50Hz in X,Y,Z directions for 30 min.

#### 3.2.4 Shock: 30G, 11ms

(1) No functional error to be found after shock durability test.

(2) Direct shock to MSRW, without packing.

### 3.3. Physical Characteristics.

3.3.1 Dimensions : See Section . Dimension drawing.

3.3.2 Weight : Approximately 450 g.

#### 3.3.3 Power Requirement

(1) Input Voltage : DC 24V ±5%

(2) Power Consumption : Less than 2A

a. Motor Starting or Reversing : Less than mA

b. Card Feeding : Less than mA

c. Solenoid Action : Less than mA

(3) Ripple : Less than 200 mVp-p

3.3.4 Operating Locus : Indoor use only

### 3.4. Operational Characteristics

3.4.1 Card Feeding Speed : 240 mm/sec ±10% (With normal condition card)

3.4.2 Life of a head : Min. 1,000,000 passes.

(One pass stands for one direction movement in forward and backward)

#### 3.4.3 Mechanism

(1) Belt Timing : 700,000 cycle

(2) Machine(gear) : 700,000 cycle

### 3.5. Error Rate

Mag. Card : Less than 1/200 Times Per each track.

IC Card: Less than 1/200 cycles (One cycle: bi-direction movement in forward and backward)

### 3.6. Jitter Rate

Read : Less than 15% per each track of encoded card.

### 3.7. Warped Cards

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	10 OF 82	2016. 1 .19.

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.

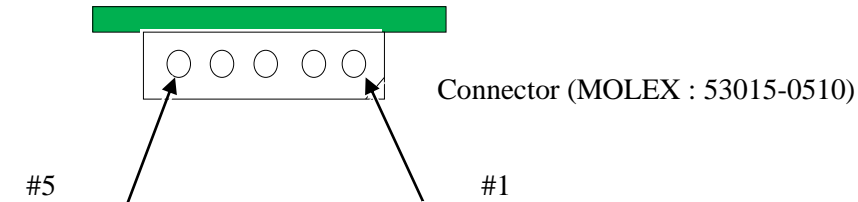


H : 2.00mm Max. for card jamming  
1.50mm Max for availability to read.

## 4. INTERFACE REQUIREMENTS

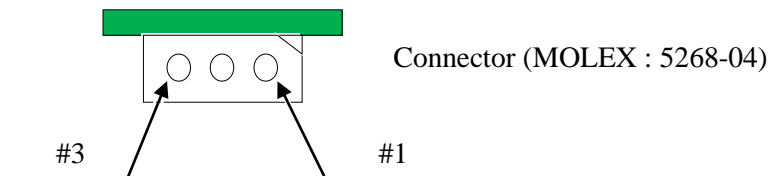
### 4.1. Physical Constructions.

#### 4.1.1. RS-232C Connector.



RS-232-C Signal Name	MSRW	Input / Output	Function
	CN1		
-	1		
RXD	2	I	Receive Data
TXD	3	O	Transmit Data
-	4		
SG	5	GND	Signal Ground

#### 4.1.2. Power Connector.



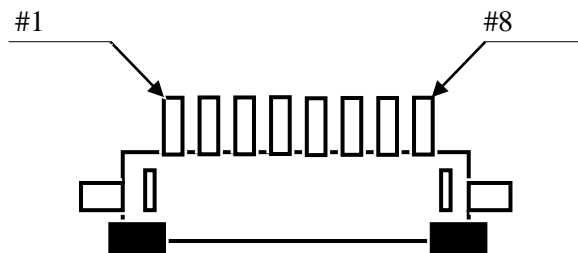
PIN No	Signal Name	Function
1	24V	+ 24 VDC
2	-	-
3	GND	Ground

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	11 OF 82	2016. 1 .19.

4.1.3. MS Head Zip Connector (MAIN B/D : J2)  
: 8 PIN (1mm Single side SMD)

PIN No	Signal Name	Function
1	Track 1-1	Track 1
2	Track 1-2	
3	GND	Ground
4	Track 2-1	Track 2
5	Track 2-2	
6	GND	Ground
7	Track 3-1	Track 3
8	Track 3-2	

4.1.4. IC card Zip Connector(TTL B/D : CN2)  
: 8 PIN(1mm Single side SMD)



PIN No	Signal Name	Function
1	IC-VCC	ICC VCC
2	GND	Signal Ground
3	IC-RST	ICC reset
4	-	N/C
5	IC-CLK	ICC clock
6	IC-IO	ICC I/O
7	-	N/C
8	-	N/C

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
			F	12 OF 82

# *Interface*

**Motorized Magnetic and IC Card**

**MODEL: KSX-3XXX**

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	13 OF 82	2016. 1 .19.

### 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

- F/W VERSION COMMAND

Hex : [01] [43] [31] [31] [02] [03] [42]

BCC[42] = [43] ^ [31] ^ [31] ^ [02] ^ [03]

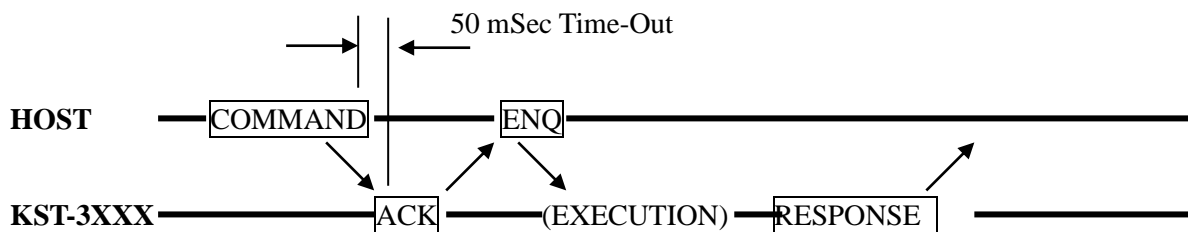
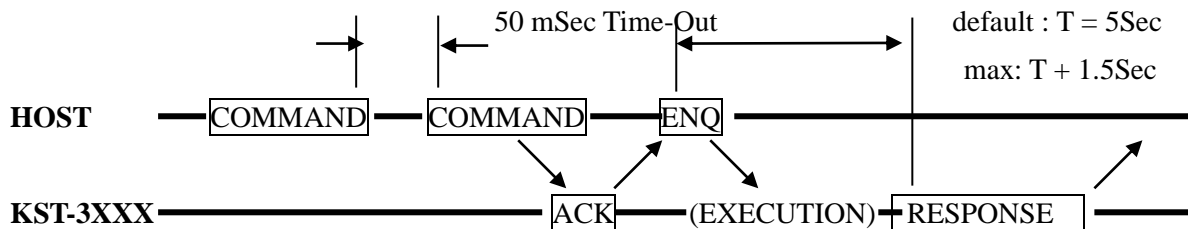
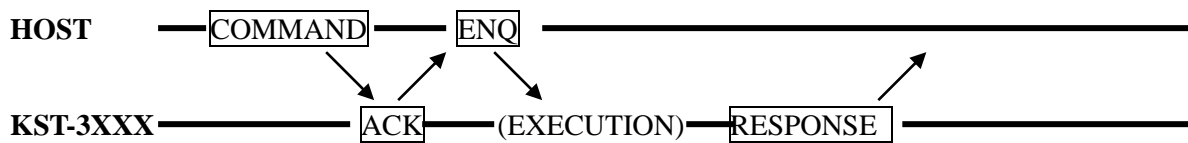
<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	14 OF 82	2016. 1 .19.

### 3.3.3 STATUS Structure Format

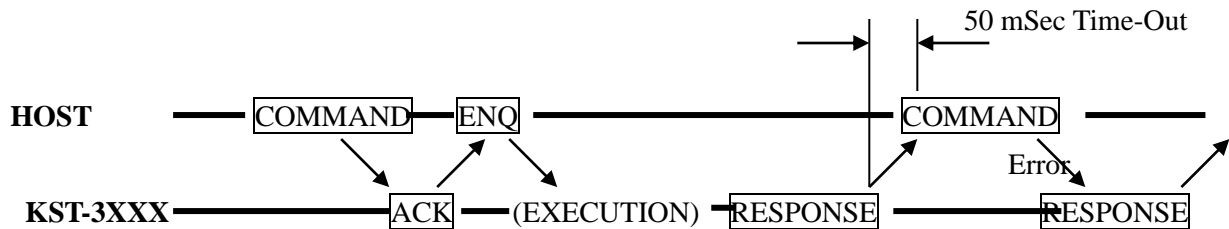
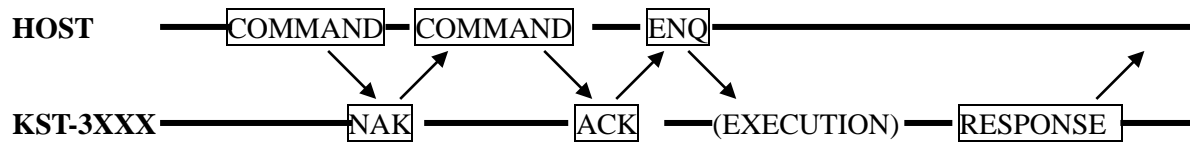
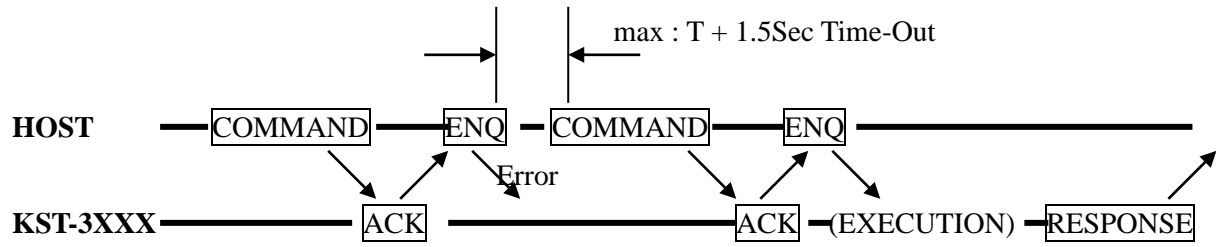
BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
-------	-------	-------	-------	-------	-------	-------	-------

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



Doc No	KST3XXX Series SPECIFICATION	REV	PAGE	DATE
		F	15 OF 82	2016. 1 .19.



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

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	16 OF 82	2016. 1 .19.

## 5. Command Sets List

	Code	Cm	Pm	Description	Note	
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		
	43h	32h	41h	Card Entry After M/S Check		
Moving	43h	33h	30h	Card Forward Direction Discharge	IC Control	
	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	41h	IC Card Accept & Contact		
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		
IC Card Control	43h	36h	35h	IC Direct Control	IC Contact Option	
	43h	36h	38h	IC Card Reset		
Setting	43h	39h	35h	Baud Rate Setting		
RF Card Control	52h	31h	30h	Identify the sector and block set at terminal.	Page 30	
	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..		
	52h	32h	41h	RF Card Data(balance or character) Read.		Secret key& Sector&Block& Key value inclusion  page 33.
	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..			



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	17 OF 82	2016. 1 .19.

	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	35h	30h	RF CARD Select Command.	
Ultra light Card	55h	31h	30h	UID Read	
	55h	31h	31h	Read data on Mifare Ultra Light card.	
	55h	31	32	Write data on Mifare Ultra Light card.	
Memory Card (SLE4442)	41h	30h	30h	ATR from IC Card(SLE4428 or SLE4442)	
	41h	30h	31h	PSC Compare.	
	41h	30h	32h	PSC Modify.	
	41h	30h	33h	PSC Read.	
	41h	30h	34h	Read Memory	
	41h	30h	35h	Read The Protection Bit	
	41h	30h	36h	Full write same character to the Memory without protect	
	41h	30h	37h	Write to the Memory.	
	41h	30h	38h	Write The Protection Bit	
	41h	30h	39h	Power OFF	
Memory Card (SLE428)	42h	30h	31h	PSC Compare.	
	42h	30h	32h	PSC Modify.	
	42h	30h	33h	PSC Read.	
	42h	30h	34h	Read Memory	
	42h	30h	35h	Read The Protection Bit	
	42h	30h	36h	Full write same character to the Memory without protect	
	42h	30h	37h	Write to the Memory.	
	42h	30h	38h	Write The Protection Bit With data Comparison	
	42h	30h	41h	Write Memory Data With Protection Bit.	

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	18 OF 82	2016. 1 .19.

## 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'	'8'	Blank Error	
8	'0'	'9'	Pre_Amble Error	
9	'1'	'0'	Parity Error	
10	'1'	'1'	Post_Amble Error	
11	'1'	'2'	LRC Error	
12	'1'	'4'	IC Card Contact Error	
13	'1'	'5'	IC Card Control Error	
14	'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 AntiClission 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	
29	'3'	'1'	RC Card Detect Error	
30	'4'	'0'	SLE4442 PSC MODIFY Error	
31	'4'	'1'	SLE4442 PSC Read Error	
32	'4'	'2'	SLE4442 Memory Read Error	
33	'4'	'3'	SLE4442 PSC NOT Error	
34	'4'	'6'	SLE4428 PSC MODIFY Error	
35	'4'	'7'	SLE4428 PSC Read Error	
36	'4'	'8'	SLE4428 Memory Read Error	
37	'4'	'9'	SLE4428 PSC NOT Error	

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	19 OF 82	2016. 1 .19.

## 7. Command Detail

### 7.1 Request

7.1.1 "C10" : Read exact Card location

Command Packet

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

Positive Response Packet

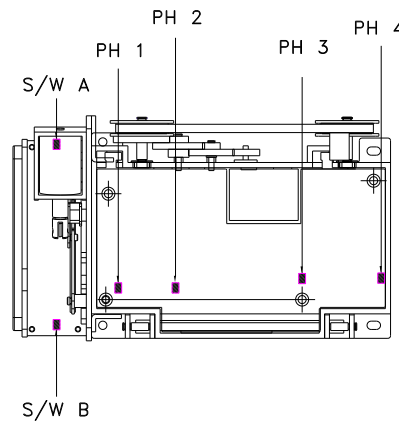
SOH	'C'	'1'	'0'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure

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

BIT

- 4 : Sensor 5( Front S/W : 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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.1.1 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	20 OF 82	2016. 1 .19.

## 7.2 Card Control

### 7.2.1 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 7.2.2 “C21” : Prohibit Card Insertion into the unit

This is a command to disable above command “C20” , “ C2A”.

#### 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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 7.2.3 “C2A” : 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 Pre Head and all following processes are executed according to commands

#### 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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	21 OF 82	2016. 1 .19.

### 7.3 Card Moving

7.3.1 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.3.2 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.3.3 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.3.4 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	22 OF 82	2016. 1 .19.

7.3.5 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.3.6 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.3.7 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	23 OF 82	2016. 1 .19.

#### 7.4 Magnetic Data Read

##### 7.4.1 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

##### 7.4.2 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

##### 7.4.3 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	24 OF 82	2016. 1 .19.

7.4.4 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.4.5 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.4.6 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	25 OF 82	2016. 1 .19.

7.4.7 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.4.8 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	26 OF 82	2016. 1 .19.

## 7.5 IC Card Control

### 7.5.1 "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
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

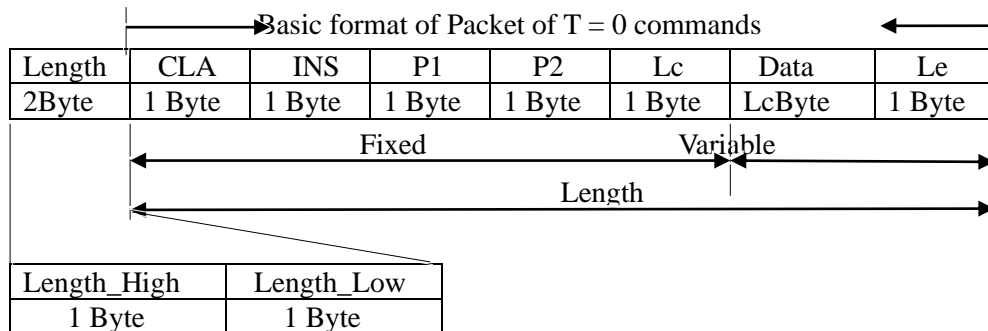
DATA Structure

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.



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 ;

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	27 OF 82	2016. 1 .19.

7.5.2 “C68” : Command for sending Reset Signal Contacted IC Card and for receiving ATR from IC Card.

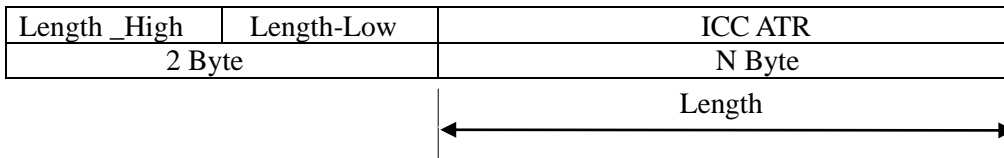
Command Packet

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 ;



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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

## 7.6 Setting

### 7.6.1 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	28 OF 82	2016. 1 .19.

## 7.7 RF Card Control

### 7.7.1 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 7.7.2 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	29 OF 82	2016. 1 .19.

7.7.3 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7. 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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	30 OF 82	2016. 1 .19.

7.7.5 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.6 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.7 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	31 OF 82	2016. 1 .19.

### 7.7.8 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 7.7.9 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

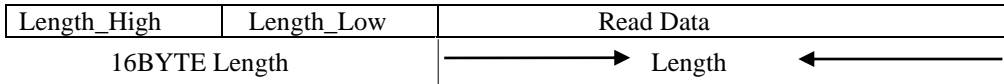
<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	32 OF 82	2016. 1 .19.

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

Command Packet

SOH	'R'	'2'	'3'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

DATA Structure



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

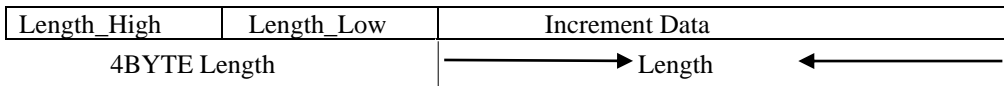
SOH	'R'	'2'	'3'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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

Command Packet

SOH	'R'	'2'	'4'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

DATA Structure



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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	33 OF 82	2016. 1 .19.

7.7.12 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.13 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	34 OF 82	2016. 1 .19.

7.7.14 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.15 “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

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	35 OF 82	2016. 1 .19.

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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

#### 7.7.16 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	36 OF 82	2016. 1 .19.

7.7 .17 “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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.18 “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

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	37 OF 82	2016. 1 .19.

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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

#### 7.7.19 "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	Key A 2	Key A 3	Key A4	Key A 5
Secret key A						
V7	V8	V9	V10	V11	V12	
KeyB0	KeyB1	KeyB2	KeyB3	KeyB4	KeyB5	
Secret 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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

#### 7.7.20 "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
Secret key A							Access	
V9	V10	V11	V12	V13	V14	V15	V16	
Acc3	Acc4	KeyB0	KeyB1	KeyB2	KeyB3	KetB4	Keyb5	
Condition	Secret key B							

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	38 OF 82	2016. 1 .19.

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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.21 "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	Key A 2	Key A 3	Key A4	Key A 5
Secret key A						
V7	V8	V9	V10	V11	V12	
KeyB0	KeyB1	KeyB2	KeyB3	KeyB4	KeyB5	
Secret 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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.22 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

7.7.23 "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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	39 OF 82	2016. 1 .19.

7.3.24 "R50" : RF CARD Select Command.

Command Packet

SOH	'R'	'5'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

Positive Response Packet

SOH	'R'	'5'	'0'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure

Length_High	Length_Low	RESULT[Serial Number]
2BYTE Length		Length

Result Structure.

Length_High	Length_LOW	1 BYTE	
0x00	0x05	0x31	<i>MIFARE CARD – UID(4BYTE)</i>
0x00	0x08	0x32	<i>MIFARE CARD – UID(7BYTE)</i>
0x00	0x08	0x33	<i>MIFARE ULTRA LIGHT CARD</i>

Negative Response Packet

SOH	'R'	'1'	'3'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	40 OF 82	2016. 1 .19.

◆ *MIFARE ULTRA LIGHT CARD*

**- 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

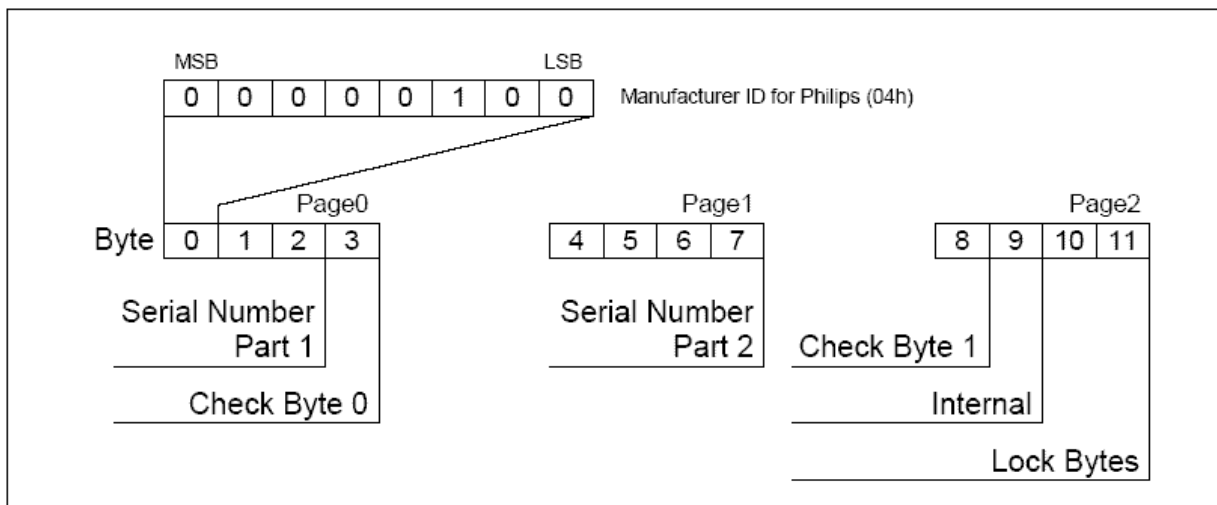
**Note:** Bold frame indicates user area



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	41 OF 82	2016. 1 .19.

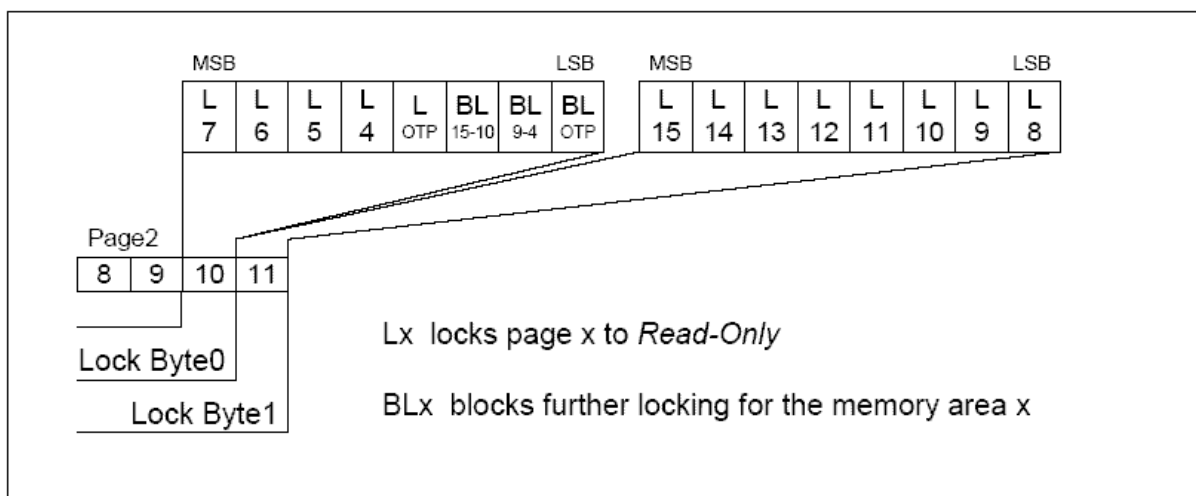
## - UID / SERIAL NUMBER

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.



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	42 OF 82	2016. 1 .19.

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	0011101	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”.

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	43 OF 82	2016. 1 .19.

## 8.MIFARE ULTRA LIGHT CONTROL

8.1 “U11” : It is to read data on Mifare Ultra Light card.

Command Packet

SOH	‘U’	‘1’	‘1’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

DATA Structure

Length_High	Length_Low	Page Select[0x00 ~ 0x0F]

Positive Response Packet

SOH	‘U’	‘1’	‘1’	STX	‘P’	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure

Length_High	Length_Low	RESULT

Negative Response Packet

SOH	‘U’	‘1’	‘1’	STX	‘N’	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

8.2 “U12” : It is to write data on Mifare Ultra Light card.

Command Packet

SOH	‘U’	‘1’	‘2’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

DATA Structure

Length_High	Length_Low	Page Select[0x00 ~ 0x0F]	DATA[4BYTE]

Positive Response Packet

SOH	‘U’	‘1’	‘2’	STX	‘P’	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

Negative Response Packet

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

8.3 “U10” : It is to read UID (Serial Number) on Mifare Ultra Light card.

Command Packet

SOH	‘U’	‘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		

Negative Response Packet

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

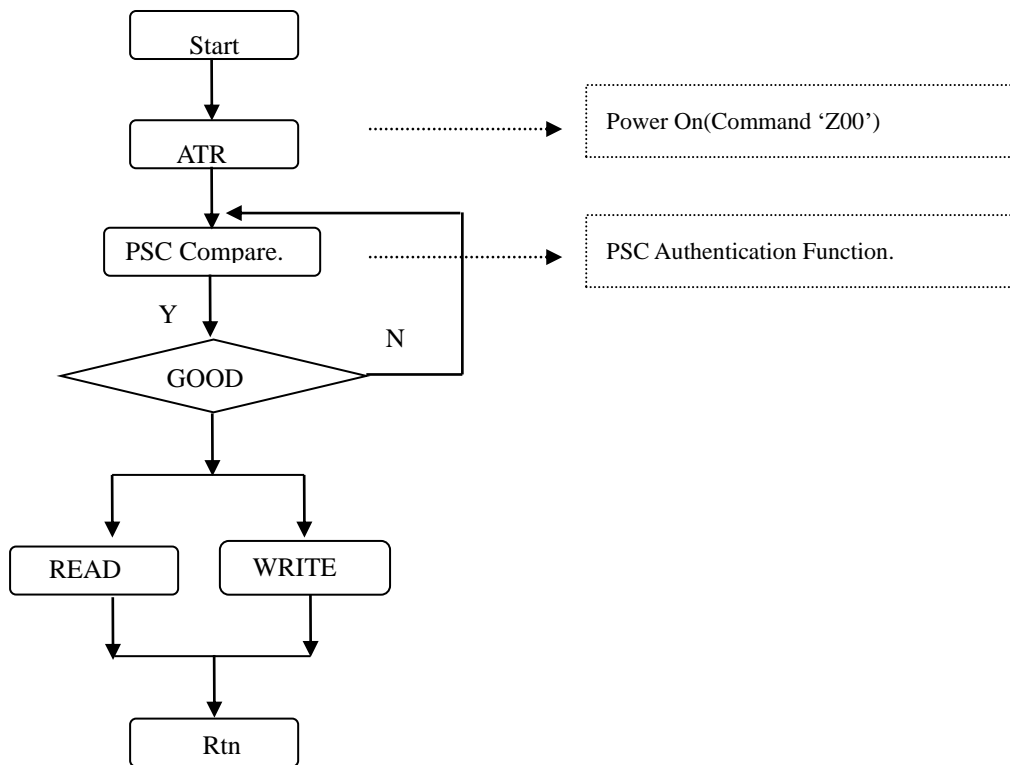
Doc No	KST3XXX Series SPECIFICATION	REV	PAGE	DATE
		F	44 OF 82	2016. 1 .19.

## 9. Memory Card.

### 9.1. SLE 4442(SLE 5542)

The Command is for communication with the IC card(SLE 5542) and it is available after executing ATR command('A00'). To read or write data on an IC card in hexa value, the start address is necessary which is available for 00h ~ FFh As "len" is the length of data to be read or written from start address , start address data length" should not be more than FFh.

#### EXECUTION PROCEDURES



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	45 OF 82	2016. 1 .19.

\* Memory Map.

Address (decimal)	Main Memory	Protection Memory	Security Memory (only SLE 4442)
255	Data Byte 255 (D7 ... D0)		
:	:		
32	Data Byte 32 (D7 ... D0)		
31	Data Byte 31 (D7 ... D0)	Protection Bit 31 (D31)	
:	:	:	
3	Data Byte 3 (D7 ... D0)	Protection Bit 3 (D3)	Reference Data Byte 3 (D7 ... D0)
2	Data Byte 2 (D7 ... D0)	Protection Bit 2 (D2)	Reference Data Byte 2 (D7 ... D0)
1	Data Byte 1 (D7 ... D0)	Protection Bit 1 (D1)	Reference Data Byte 1 (D7 ... D0)
0	Data Byte 0 (D7 ... D0)	Protection Bit 0 (D0)	Error Counter (0,0,0,0,0,D2,D1,D0)

### 9.1.1 'A00': Command for sending Reset Signal Contacted IC Card and for receiving ATR from IC Card(SLE4428 or SLE4442).

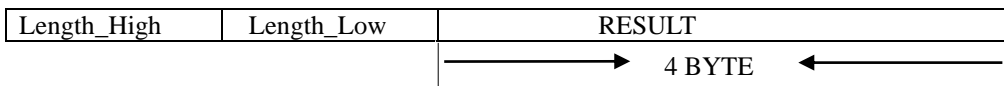
☞ Command Packet

SOH	'A'	'0'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'A'	'0'	'0'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure



EX) SLE5542.

0xA2	0x13	0x10	0x91
------	------	------	------

EX) SLE5528.

0x92	0x23	0x10	0x91
------	------	------	------

☞ Negative Response Packet

SOH	'A'	'0'	'0'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 9.1.2 'A09': Power OFF.

☞ Command Packet

SOH	'A'	'0'	'9'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'A'	'0'	'9'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

SOH	'A'	'0'	'9'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	46 OF 82	2016. 1 .19.

### 9.1.3 A01': PSC Compare.

- This command should be done before writing data if the input PSC code is different from the original PSC Code, the value at 00h of security memory will be down counted in bit and if the value of 00h be come '0' after 3 time of input the IC card will not be valid any move.

Therefore error count should be checked when this command is performed.

☞ Command Packet

SOH	'A'	'0'	'1'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	PSC1	PSC2	PSC3
-------------	------------	------	------	------

☞ Positive Response Packet

SOH	'A'	'0'	'1'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

\*Error Count.

- 0x07: Compare Good ,

- 0x06: Wrong One Time, 0x04: Wrong Two Time, 0x00: Locked the Card.

☞ Negative Response Packet

SOH	'A'	'0'	'1'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 9.1.4 'A02': PSC Modify.

This is command to modify PSC after executing PSC Compare command.

PSC Compare must be executed after PSC modification is done.

☞ Command Packet

SOH	'A'	'0'	'2'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	PSC1	PSC2	PSC3
-------------	------------	------	------	------

☞ Positive Response Packet

SOH	'A'	'0'	'2'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

SOH	'A'	'0'	'2'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	47 OF 82	2016. 1 .19.

### 9.1.5 'A03': PSC Read.

This is the command to read security memory where PSC error and PSC are existed.

☞ Command Packet

SOH	'A'	'0'	'3'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'A'	'0'	'3'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

Error Count	PSC1(1 Byte , Hex)	PSC2(1 Byte , Hex)	PSC3(1 Byte , Hex)
-------------	--------------------	--------------------	--------------------

☞ Negative Response Packet

SOH	'A'	'0'	'3'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 9.1.6 'A04': Read Memory.

This command is to read main memory data.

☞ Command Packet

SOH	'A'	'0'	'4'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Start Addr[1 BYTE]	Length[1 BYTE]
Start Addr(0x00), Length(0xFF) ----- (X)			
Start Addr(0x00), Length(0xFE) ----- (0)			
Start Addr(0xFF), Length(0x01) ----- (0)			

☞ Positive Response Packet

SOH	'A'	'0'	'4'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

((End addr – Start addr + 1)Byte , Hex)
---

☞ Negative Response Packet

SOH	'A'	'0'	'4'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	48 OF 82	2016. 1 .19.

### 9.1.7 'A05': Read The Protection Bit.

This command is to read Protection memory data.

☞ Command Packet

SOH	'A'	'0'	'5'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'A'	'0'	'5'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

Protection Bit(4Byte, Hex)
----------------------------

☞ Negative Response Packet

SOH	'A'	'0'	'5'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 9.1.8 'A06': Full write same character to the Memory without protect.

This command is to write memory data From 0x20 to 0xFF.

☞ Command Packet

SOH	'A'	'0'	'6'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Write Data[1 BYTE]
-------------	------------	--------------------

☞ Positive Response Packet

SOH	'A'	'0'	'6'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

STX	Len_H	Len_L	'N'	ST1	ST2	ETX	BCC
-----	-------	-------	-----	-----	-----	-----	-----

### 9.1.9 'A07': Write to the Memory.

This command is to write memory data.

☞ Command Packet

SOH	'A'	'0'	'7'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Start Addr[1 BYTE]	Length [1 BYTE]	Write Data
-------------	------------	--------------------	-----------------	------------

Start Addr(0x00), Length(0xFF) ----- (X)

☞ Positive Response Packet

SOH	'A'	'0'	'8'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

STX	Len_H	Len_L	'N'	ST1	ST2	ETX	BCC
-----	-------	-------	-----	-----	-----	-----	-----



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	49 OF 82	2016. 1 .19.

### 9.1.10 'A08': Write The Protection Bit.

This command is to write with protection to prevent over-writing.

This command can write on the area where the new data and exist data are same among protected Memories.

☞ Command Packet

SOH	'A'	'0'	'8'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Start Addr[1 BYTE]	Length[1 BYTE]	Write Data
-------------	------------	-----------------------	----------------	------------

☞ Positive Response Packet

SOH	'A'	'0'	'8'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

STX	Len_H	Len_L	'N'	ST1	ST2	ETX	BCC
-----	-------	-------	-----	-----	-----	-----	-----

Ex) When Write the Protection Memory area Address 0x10 to 0x12, Start Address :0x10, End Address :  
0x12, Input the Protection Data 3Byte continuously.

Doc No	KST3XXX Series SPECIFICATION	REV	PAGE	DATE
		F	50 OF 82	2016. 1 .19.

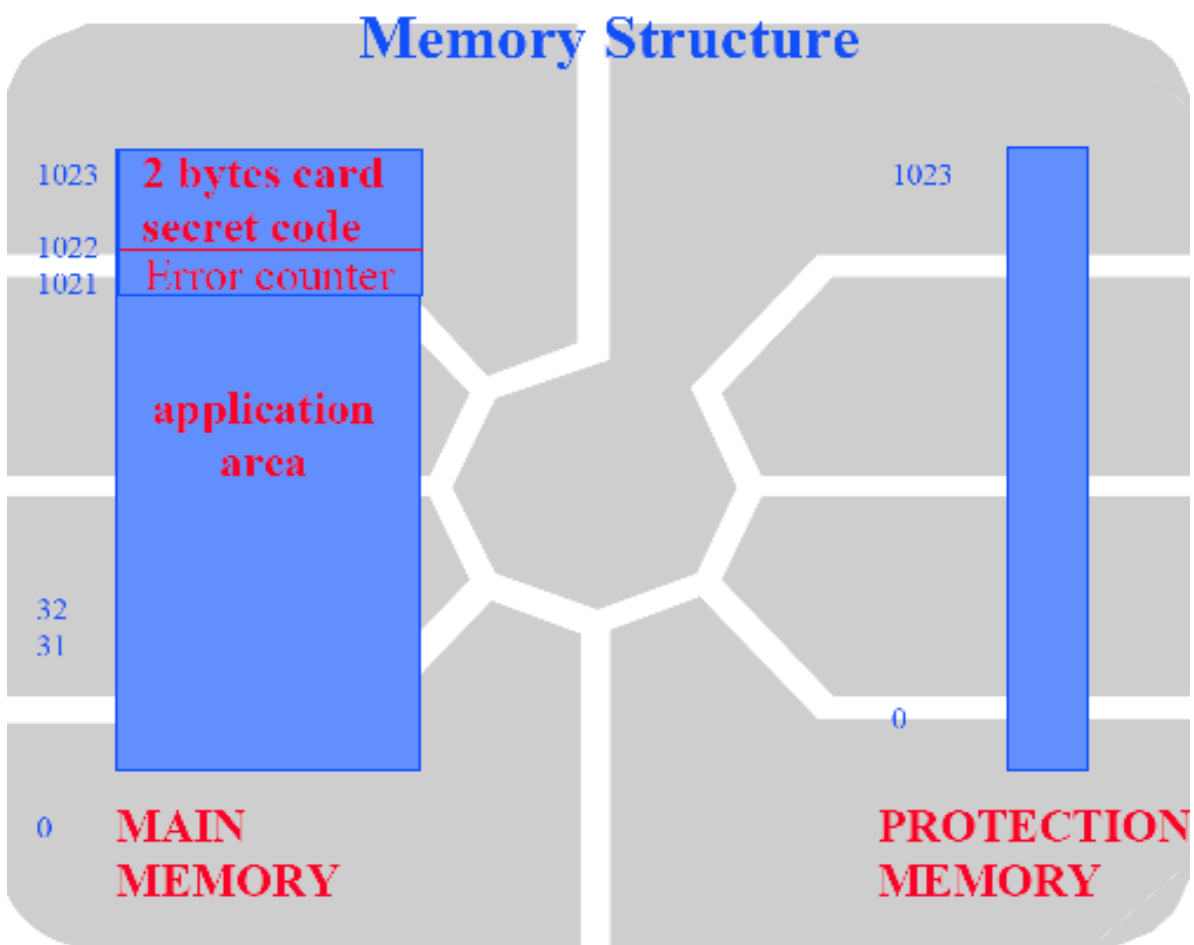
## 9.2 SLE 4428(SLE 5528)

The chip contains an EEPROM organized 1024 x 8 bit offering the possibility of programmable write protection for each byte. Reading of the whole memory is always possible. The memory can be written and erased byte by byte. Input data and the contents of the addressed byte are compared so that only bits are written which were not written before. Erasing is only possible byte-wise, even if only one bit is to be erased, but bits may be written individually. Each byte can be write/eraseprotected individually by setting a protect bit (EEPROM → ROM). The protect bit is only one time programmable and cannot be erased.

All the memory, except

for the PSC, can always be read. The memory can be written or erased only after PSC verification.

The error counter can always be written. After eight successive incorrect entries the error counter will block any subsequent attempt at PSC verification and hence any possibility to write and erase.



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	51 OF 82	2016. 1 .19.

### 9.2.1 'B01': PSC Compare.

- This command should be done before writing data if the input PSC code is different from the original PSC Code, the value at 00h of security memory will be down counted in bit and if the value of 00h become '0' after 7 time of input the IC card will not be valid any more.

Therefore error count should be checked when this command is performed.

☞ Command Packet

SOH	'B	'0	'1	STX	DATA	ETX	BCC
-----	----	----	----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	PSC1	PSC2
-------------	------------	------	------

☞ Positive Response Packet

SOH	'B	'0	'1	STX	'P	STATUS	DATA	ETX	BCC
-----	----	----	----	-----	----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ Negative Response Packet

SOH	'B	'0	'1	STX	'N	ST1	ST2	ETX	BCC
-----	----	----	----	-----	----	-----	-----	-----	-----

\*Error Count.

0xFF: Compare Good , 0x3F: Wrong 1 Time, 0x1F: Wrong 2 Time, 0x0F: Wrong 3 Time,  
0x07: Wrong 4 Time, 0x03: Wrong 5 Time, 0x01: Wrong 6 Time, 0x00: Locked the Card.

### 9.2.2 'B02': PSC Modify.

This is command to modify PSC after executing PSC Compare command.

PSC Compare must be executed after PSC modification is done.

☞ Command Packet

SOH	'B	'0	'2	STX	DATA	ETX	BCC
-----	----	----	----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	PSC1	PSC2
-------------	------------	------	------

☞ Positive Response Packet

SOH	'B	'0	'2	STX	'P	STATUS	DATA	ETX	BCC
-----	----	----	----	-----	----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ Negative Response Packet

SOH	'B	'0	'2	STX	'N	ST1	ST2	ETX	BCC
-----	----	----	----	-----	----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	52 OF 82	2016. 1 .19.

### 9.2.3 'B03': PSC Read.

This is the command to read security memory where PSC error and PSC are existed.

☞ Command Packet

SOH	'B'	'0'	'3'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	PSC1	PSC2
-------------	------------	------	------

☞ Positive Response Packet

SOH	'B'	'0'	'3'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

Error Count	PSC1(1 Byte , Hex)	PSC2(1 Byte , Hex)
-------------	--------------------	--------------------

☞ Negative Response Packet

SOH	'B'	'0'	'3'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 9.2.4 'B04': Read Memory.

This command is to read main memory.

**\*As the unit buffer size is 256byte, the unit can read Maximum 256 byte memory data At a Time.**

☞ Command Packet

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

☞ Command DATA Structure

Length_High	Length_Low	Start Addr[2 BYTE]	Length[1 BYTE]
-------------	------------	--------------------	----------------

Start Addr(0x0000), Length (0x0100) ----- (X)

Start Addr(0x0000), Length (0xFF) ----- (0)

☞ Positive Response Packet

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

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

((End addr – Start addr + 1)Byte , Hex)
---

☞ Negative Response Packet

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

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	53 OF 82	2016. 1 .19.

### 9.2.5 'B05': Read The Protection Bit.

This command is to read Protection memory data.

☞ Command Packet

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

☞ Positive Response Packet

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

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

Protection Bit(128Byte, Hex)
------------------------------

☞ Negative Response Packet

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

### 9.2.6 'B06': Full write same character to the Memory without protect.

This command is to write memory data From 0x0020 to 0x03FC.

☞ Command Packet

SOH	'B'	'0'	'6'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Write Data[1 BYTE]
-------------	------------	--------------------

☞ Positive Response Packet

SOH	'B'	'0'	'6'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

SOH	'B'	'0'	'6'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 9.2.7 'B07': Write to the Memory.

This command is to write memory data.

\*As the unit buffer size is 256byte, the unit can write Maximum 256 byte memory data At a Time.

☞ Command Packet

SOH	'B'	'0'	'7'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Start Addr[2 BYTE]	Length [1 BYTE]	Write Data
-------------	------------	--------------------	-----------------	------------

☞ Positive Response Packet

SOH	'B'	'0'	'7'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

SOH	'B'	'0'	'7'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	54 OF 82	2016. 1 .19.

### 9.2.8 'B08': Write The Protection Bit With data Comparison.

This command is to write with protection to prevent over-writing.

This command can write on the area where the new data and exist data are same among protected Memories.

**\*As the unit buffer size is 256byte, the unit can write Maximum 256 byte Protection data At a Time.**

☞ Command Packet

SOH	'B'	'0'	'8'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Start Addr[2 BYTE]	Length [1 BYTE]	Write Data
-------------	------------	--------------------	-----------------	------------

Start Addr[2 BYTE]	Length[1 BYTE]	Write Data
--------------------	----------------	------------

☞ Positive Response Packet

SOH	'B'	'0'	'8'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

SOH	'B'	'0'	'8'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 9.2.9 'B0A': Write Memory Data With Protection Bit.

This command is to write with protection to prevent over-writing.

This command can write on the area where the new data and exist data are same among protected Memories.

**\*As the unit buffer size is 256byte, the unit can write Maximum 256 byte Protection data At a Time.**

☞ Command Packet

SOH	'B'	'0'	'A'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command DATA Structure

Length_High	Length_Low	Start Addr[2 BYTE]	Length [1 BYTE]	Write Data
-------------	------------	--------------------	-----------------	------------

☞ Positive Response Packet

SOH	'B'	'0'	'A'	STX	'P'	STATUS	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	-----	-----

☞ Negative Response Packet

SOH	'B'	'0'	'A'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Doc No	KST3XXX Series SPECIFICATION	REV	PAGE	DATE
		F	55 OF 82	2016. 1 .19.

### ◆ *MIFARE DESFIRE CARD*

Our machine supports the old DESFire Tags(MF3ICD40) and the DESFire EV1 Tags(MF3ICD21, MF3ICD41 and MF3ICD81).

With the KYTronics DESFire Command Set the host application don't need to take care about the authentication procedure, (3)DES/AES crypto or CRC16/32 calculation.

The load data (data bytes in a command/response) are transferred in plain text between the reader and the host, because the 3DES/AES decryption and encryption takes place completely in our reader.

Firmware function in case of DESFire:

- AES Mutual three pass authentication procedure
- AES CBC (Cipher Block Chaining) send mode
- AES CBC (Cipher Block Chaining) receive mode
- AES padding bytes handling
- CRC 32 data integrity check, automatically set before AES cryptographic operations
- CRC 32 data integrity check, automatically verified after AES cryptographic operations
- (3)DES Crypto (DES/3DES En/Decryption algorithm in fast Assembler Code)
- (3)DES Mutual three pass authentication procedure
- (3)DES CBC (Cipher Block Chaining) send mode
- (3)DES CBC (Cipher Block Chaining) receive mode
- (3)DES padding bytes handling
- CRC16 data integrity check, automatically set before (3)DES cryptographic operations
- CRC16 data integrity check, automatically verified after (3)DES cryptographic operations

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	56 OF 82	2016. 1 .19.

## 10. Desfire EV1 Card.

### 10.1 Command List.

	Code	Cm	Pm	Description	Note
	52h	35h	30h	RF CARD Select Command.	
	52h	35h	31h	Request for Answer To Select (Only TYPE A)	ATS
	44h	31h	30h	returns manufacturing related data	
	44h	31h	31h	mutual three pass authentication procedure	
	44h	31h	32h	Gets the Key Settings	
	44h	31h	33h	changes the key settings	
	44h	31h	34h	Read out the current key version.	
	44h	31h	35h	Allows changing any key.	
	44h	31h	36h	allows to create new applications	
	44h	31h	37h	selects a specific application	
	44h	31h	38h	allows to permanently deactivate (delete) applications	
	44h	31h	39h	returns the Application Identifiers	
	44h	32h	30h	releases all allocated user memory	
	44h	32h	31h	allows getting information	
	44h	32h	32h	returns the File Identifiers of all active files	
	44h	32h	33h	changes the access parameters of an existing file	
	44h	32h	34h	Create Std Data File	
	44h	32h	35h	Create Backup Data File	
	44h	32h	36h	Create Linear record file	
	44h	32h	37h	Create Cyclic record file	
	44h	32h	38h	Create Value File.	
	44h	32h	39h	Delete a file	
	44h	33h	30h	Read data from Standard or Backup data file.	
	44h	33h	31h	Write data from Standard or Backup data file.	
	44h	33h	32h	Read data from Linear or Cyclic Record data file.	
	44h	33h	33h	Write data from Linear or Cyclic Record data file.	
	44h	33h	34h	allows reading the currently stored value	
	44h	33h	35h	allows to increase a value	
	44h	33h	36h	allows to decrease a value	
	44h	33h	37h	allows a limited increase of a value	
	44h	34h	30h	allows validating all previous write access	
	44h	34h	31h	allows invalidating all previous write access	
	44h	34h	32h	allows resetting cyclic or linear record file to empty state	
	44h	34h	33h	returns the free memory available on the DESFire EV1 card	
	44h	34h	34h	to perform security configurations at the PICC level	
	44h	34h	35h	returns the 7 byte unique card UID	



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	57 OF 82	2016. 1 .19.

## 10.2 Command Detail

### 10.2.1 “R51” : Request for Answer To Select for TYPE A.

☞ Command Packet

SOH	'R'	'5'	'1'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'R'	'5'	'1'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT(ATS : Answer To Select)
2BYTE Length		Length

☞ Negative Response Packet

SOH	'R'	'5'	'1'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.2 “D10” :Get Version.

-The Get Version command returns manufacturing related data of the PICC.

☞ Command Packet

SOH	'D'	'1'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'D'	'1'	'0'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

manufacturing related data of the PICC
--

Or

1byte error code (Refer to DESFire Datasheet)
---

☞ Negative Response Packet

SOH	'D'	'1'	'0'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.3 “D11” : Authenticate

- With this command the complete mutual three pass authentication procedure with a DESFire tag

is

automatically done.

☞ Command Packet

SOH	'D'	'1'	'1'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	Crypt Type (1Byte Hex)
-------------	------------	------------------------

Crypt Type (1Byte Hex)	Key Number (1 Bytes Hex)	Value of the KEY
0x00: Native TDES	0x00~0x0F	16 byte (hex)
0x01: ISO TDES		16 byte (hex)

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	58 OF 82	2016. 1 .19.

0x02: ISO 3KTDES		24 byte (hex)
0x03: AES		16 byte (hex)

☞ Positive Response Packet

SOH	'D'	'1'	'1'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

Key set Data
1 Byte (HEX)

☞ Negative Response Packet

SOH	'D'	'1'	'1'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.4 “D12” :Get Key Setting.

This command gets the key settings of the current selected application and the maximum number of

keys, which can be stored. Refer to DESFire Datasheet “GetKeySettings” to get more command details.

☞ Command Packet

SOH	'D'	'1'	'2'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'D'	'1'	'2'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

1byte Key Set Data	1byte Max No of Keys
--------------------	----------------------

Or

1byte error code (Refer to DESFire Datasheet)
---

☞ Negative Response Packet

SOH	'D'	'1'	'2'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	59 OF 82	2016. 1 .19.

### 10.2.5 “D13” :Change Key Settings

This command changes the key settings of a selected application. Refer to DESFire Datasheet “ChangeKeySettings” to get more command details. CRC calculation, padding of fill bytes and (3)DES/AES ciphering are automatically done by the firmware.

☞ Command Packet

SOH	'D'	'1'	'3'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	Key set Data (1Byte Hex)
-------------	------------	--------------------------

☞ Positive Response Packet

SOH	'D'	'1'	'3'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'1'	'3'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.6 “D14” :Get Key Version.

Read out the current key version of any stored key on the PICC. Refer to DESFire Datasheet “GetKeyVersion” to get more command details.

☞ Command Packet

SOH	'D'	'1'	'4'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	Key Number1 Byte (HEX) : 0x00 ~0xFF
-------------	------------	-------------------------------------

☞ Positive Response Packet

SOH	'D'	'1'	'4'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

Key version (1byte)
---------------------

Or

1byte error code (Refer to DESFire Datasheet)
---

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	60 OF 82	2016. 1 .19.

☞ Negative Response Packet

SOH	'D'	'1'	'4'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.7 “D15” : Change Key

-This command allows changing any key stored on the DESFire tag. Refer to DESFire Datasheet “ChangeKey” to get more command details. New and current key „Xoring” , CRC calculation, padding of fill bytes, (3)DES/AES ciphering and CBC are automatically done by the firmware.

This command needs an additional parameter ‘different key’. The original DESFire ChangeKey command performs the ciphering in two different ways and the MCU firmware has to know which kind of ciphering is now needed. Depending on the ‘different key’ flag the MCU selects the correct ciphering algorithm.

☞ Command Packet

SOH	'D'	'1'	'5'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA1 Structure

Crypt Type (1Byte)	Select Current Key/ Different Key (1byte)	Key No(1byte)	Change Key(16~48 Bytes)	
			Current Key	Different Key.
0x00: Native TDES	0x00:	0x00~0x0F	16 byte(New Key)	32 byte(Old + New Key)
0x01: ISO TDES	Change the Current Key		16 byte(New Key)	32 byte(Old + New Key)
0x02: ISO 3KTDES	0x01:		24 byte(New Key)	48 byte(Old + New Key)
0x03: AES	Change the Different Key		16 byte(New Key)	32 byte(Old + New Key)

☞ Positive Response Packet

SOH	'D'	'1'	'5'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'1'	'5'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark:

A prior card selection via 'R50' and 'R11' command, DESFire application selection and a 3DES or AES authentication depending on the application settings is necessary.

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	61 OF 82	2016. 1 .19.

### 10.2.8 “D16” : Create Application

The create application command allows to create new applications on the PICC. One PICC can hold up to 28 applications. Refer to DESFire Datasheet “ CreateApplication” to get more command details.

☞ Command Packet

SOH	'D'	'1'	'6'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Crypt Type (1Byte)	AID (3byte)	Key Set(1byte)	Number of the Keys(1Byte)
0x00: Native TDES	Range: 0x000001~0xFFFFFFFF	Data of the Key Set	Range: 0x01~0x0F
0x01: ISO TDES			
0x02: ISO 3KTDES			
0x03: AES			

☞ If you want to create the AID 0x000001, gives the LSB byte first as below.

SOH		AID	BCC
01 44 31 36 02 06 00	01 00 00	0F 05 03	XX
	LSB      MSB		

☞ Positive Response Packet

SOH	'D'	'1'	'6'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'1'	'6'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark:

A prior card selection via 'R50' and 'R11' command, DESFire application selection and a 3DES or AES authentication depending on the application settings is necessary.

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	62 OF 82	2016. 1 .19.

### 10.2.9 “D17”: Select Application.

This command selects a specific application for further access. An application must be selected to access the files stored in it. Refer to DESFire Datasheet “SelectApplication” to get more command details.

☞ Command Packet

SOH	‘D’	‘1’	‘7’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	AID (3byte) (HEX) 0x000001~0xFFFFFFFF
-------------	------------	--

☞ If you want to Select the AID 0x000001, gives the LSB byte first as below.

SOH							AID			BCC
01	44	31	37	02	03	01	00	00	03	XX
						LSB		MSB		

☞ Positive Response Packet

SOH	‘D’	‘1’	‘7’	STX	‘P’	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ Response RESULT Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)

☞ Negative Response Packet

SOH	‘D’	‘1’	‘7’	STX	‘N’	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark: Each SelectApplication command invalidates the current authentication status.

### 10.2.10 “D18” : Delete Application.

This command allows to permanently deactivate (delete) applications on the PICC. Refer to DESFire Datasheet “ DeleteApplication” to get more command details.

☞ Command Packet

SOH	‘D’	‘1’	‘8’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	AID (3byte) (HEX) 0x000001~0xFFFFFFFF
-------------	------------	--

☞ If you want to Select the AID 0x000001, gives the LSB byte first as below.

SOH							AID			BCC
01	44	31	38	02	03	01	00	00	03	XX

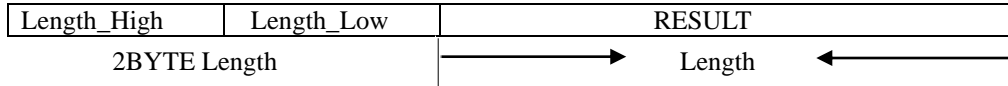
<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	63 OF 82	2016. 1 .19.

LSB                  MSB

☞ Positive Response Packet

SOH	'D'	'1'	'8'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure



☞ Response RESULT Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'1'	'8'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark:

Depending on the PICC master key settings preceding PICC master key authentication might be required

### 10.2.11 “D19” : Get Application IDs.

The get Application IDs command returns the Application Identifiers of all active applications on a PICC.

Refer to DESFire Datasheet “GetApplicationIDs” to get more command details.

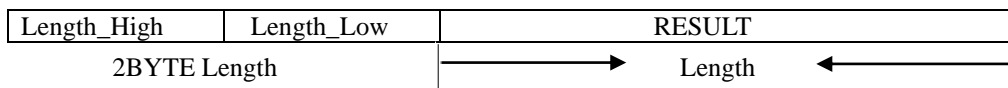
☞ Command Packet

SOH	'D'	'1'	'9'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'D'	'1'	'9'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure



☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

Status Code	up to 28 applications		
1 byte	AID (3byte)	AID (3byte)	AID (3byte)    .....

☞ Negative Response Packet

SOH	'D'	'1'	'9'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark:

Depending on the PICC master key settings preceding PICC master key authentication might be required.

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	64 OF 82	2016. 1 .19.

### 10.2.11 “D20” : Format PICC

The format PICC command releases all allocated user memory on a PICC. All applications and files

are deleted. Refer to DESFire Datasheet “FormatPICC” to get more command details.

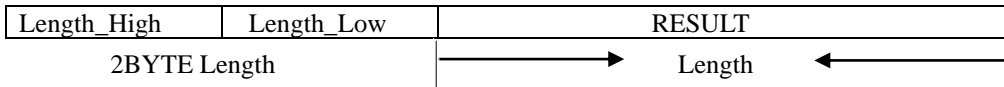
☞ Command Packet

SOH	'D'	'2'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'D'	'2'	'0'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure



☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'2'	'0'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark:

This command always requires a preceding authentication with the PICC master key.

### 10.2.12 “D21” : Get File Settings.

The Get File Settings command allows getting information on the properties of a specific file.

The information provided by this command depends on the type of the file which is queried.

Refer to DESFire Datasheet “GetFileSettings” to get more command details.

☞ Command Packet

SOH	'D'	'2'	'1'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

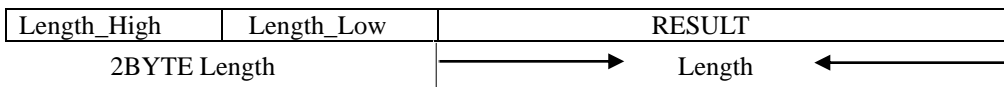
☞ Command Data Structure

Length_High	Length_Low	Key Number 1 Byte (HEX)0x00~0x1F
-------------	------------	----------------------------------

☞ Positive Response Packet

SOH	'D'	'2'	'1'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure



☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

Status Code	Data of the File Settings
1 byte	7 ~ 17 byte (Refer to DESFire Datasheet).

☞ Negative Response Packet

SOH	'D'	'2'	'1'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	65 OF 82	2016. 1 .19.

Remark:

Depending on the file type additional data might be seen behind the access rights parameter.

In case of value files: Lower limit, upper limit, limited credit value, limited credit enabled

(Refer to

DESFire Datasheet)

In case of record files: Record size, max. nbr. of records, current nbr. of records (Refer to

DESFire Datasheet).

Depending on the PICC master key settings preceding PICC master key authentication might be required.

### 10.2.13 “D22” : Get File IDs.

The Get File IDs command returns the File Identifiers of all active files within the current selected application. Refer to DESFire Datasheet “ GetFileIDs” to get more command details.

☞ Command Packet

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

☞ Command Data Structure

Length_High	Length_Low	Key Number 1 Byte (HEX)0x00~0x1F
-------------	------------	----------------------------------

☞ Positive Response Packet

SOH	'D'	'2'	'2'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

Status Code	0 to 32 File IDs			
1 byte	FID (1byte)	FID (1byte)	FID (1byte)	.....

☞ Negative Response Packet

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

Remark:

Depending on the PICC master key settings preceding PICC master key authentication might be required.

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	66 OF 82	2016. 1 .19.

### 10.2.14 “D23” : Change File Settings.

This command changes the access parameters of an existing file. CRC calculation, padding of fill bytes, (3)DES/AES ciphering are automatically done by the firmware.

Refer to DESFire Datasheet “ChangeFileSettings” to get more command details.

☞ Command Packet

SOH	‘D’	‘2’	‘3’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Current Com.Set.(1Byte)	File Number	New Com. Set.(1byte)	Access Right
0x00: Plain	0x00~0x1F (1Byte)	0x00: Plain	(2 byte)
0x01: MACing		0x01: MACing	
0x03: TDES		0x02: TDES	

☞ Positive Response Packet

SOH	‘D’	‘2’	‘3’	STX	‘P’	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

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

### 10.2.15 “D24” : Create Std Data File.

The CreateStdDataFile command is used to create files for the storage of plain unformatted user data

within an existing application on the PICC. Refer to DESFire Datasheet “ CreateStdDataFile” to get

more command details.

☞ Command Packet

SOH	‘D’	‘2’	‘4’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

File Number	Com. Set.(1byte)	Access Right	File Size(3byte)
0x00~0x1F	0x00: Plain	(2 byte)	Range: 1~256

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	67 OF 82	2016. 1 .19.
(1Byte)	0x01: MACing			
	0x03: TDES			

☞ If you want to make the file size to 32byte, gives the LSB byte first as below.

SOH										Acc Right	Size	BCC
01	44	32	34	02	00	07	04	01	00	00	20 00 00	03 XX
											LSB	MSB

☞ Positive Response Packet

SOH	'D'	'2'	'4'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'2'	'4'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.16 “D25” : Create Backup Data File.

The CreateBackupDataFile command is used to create files for the storage of plain unformatted user

data within an existing application on the PICC, additionally supporting the feature of an integrated

backup mechanism. Every write command is done in an independent mirror image of this file.

To validate a write access to this file type, it is necessary to confirm it with a

#### CommitTransaction

command. The file number must be in the range from 00h to 07h. Refer to DESFire Datasheet “CreateBackupDataFile” to get more command details.

☞ Command Packet

SOH	'D'	'2'	'5'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

File Number	Com. Set.(1byte)	Access Right	File Size(3byte)
0x00~0x07 (1Byte)	0x00: Plain	(2 byte)	Range: 1~256
	0x01: MACing		
	0x03: TDES		

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	68 OF 82	2016. 1 .19.

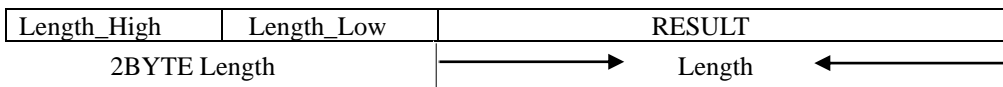
☞ If you want to make the file size to 32byte, gives the LSB byte first as below.

SOH											Acc Right		Size		BCC	
01	44	32	35	02	00	07	05	00	00	00			20	00	00	03 XX

☞ Positive Response Packet

SOH	'D'	'2'	'5'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure



☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'2'	'5'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.17 “D26” : Create Linear Record File.

The Create Linear Record File command is used to create files for multiple storage of structural data

within an existing application. Once the file is filled completely with data records, further writing to the

file is not possible unless it is cleared. Record files feature always the integrated backup mechanism.

Therefore every access appending a record needs to be validated using the **CommitTransaction** command. The file number must be in range from 00h to 07h. Refer to DESFire Datasheet

“ CreateLinearRecordFile “ to get more command details.

☞ Command Packet

SOH	'D'	'2'	'6'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

File Number	Com. Set.(1byte)	Access Right	Record Size	Max Num of Record
0x00~0x07 (1Byte)	0x00: Plain	2 byte	3byte	3byte
	0x01: MACing			
	0x03: TDES			

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	69 OF 82	2016. 1 .19.

☞ If you want to create the Linear File(File number 0x02, ComSet.: plain, Access Right:0x0000, Record Size :32byte and the Max Num of Record :10) , gives LSB byte first as below.

01 44 32 36 02 00 0A 02 00 00 00 20 00 00 0A 00 00 03 XX

☞ Positive Response Packet

SOH	'D'	'2'	'6'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

☞ Negative Response Packet

SOH	'D'	'2'	'6'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.18 “D27”: Create Cyclic Record File.

The Create Cyclic Record File command is used to create files for multiple storage of structural data within an existing application. Once the file is filled completely with data records, the PICC automatically overwrites the oldest record with the latest written one. Record files feature always the

integrated backup mechanism. Therefore every access appending a record needs to be validated using the

**CommitTransaction** command. The file number must be in range from 00h to 07h. Refer to DESFire

Datasheet “CreateCyclicRecordFile” to get more command details.

☞ Command Packet

SOH	'D'	'2'	'7'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

File Number	Com. Set.(1byte)	Access Right	Record Size	Max Num of Record
0x00~0x07 (1Byte)	0x00: Plain	2 byte	3byte	3byte
	0x01: MACing			
	0x03: TDES			

☞ If you want to create the Linear File(File number 0x02, ComSet.: plain, Access Right:0x0000, Record Size :32byte and the Max Num of Record :10) , gives LSB byte first as below.

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	70 OF 82	2016. 1 .19.

01 44 32 37 02 00 0A 03 00 00 00 20 00 00 0A 00 00 03 XX

☞ Positive Response Packet

SOH	'D'	'2'	'7'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)

☞ Negative Response Packet

SOH	'D'	'2'	'7'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.19 “D28”: Create Value File.

The CreateValueFile command is used to create files for the storage and manipulation of 32bit signed integer values (LSB first) within an existing application. Value files feature always the integrated backup mechanism. Therefore, every access changing the value needs to be validated using the

**CommitTransaction** command. The file number must be in range from 00h to 07h. Refer to DESFire

Datasheet “CreateValueFile” to get more command details.

☞ Command Packet

SOH	'D'	'2'	'8'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

File Number	Com. Set.(1byte)	Access Right	Lower Limit	Upper Limit	Value	Limited Credit Enabled
0x00~0x07 (1Byte)	0x00: Plain 0x01: MACing 0x03: TDES	2 byte	4byte	4byte	4byte	0x00: Disable 0x01: Enable

☞ If you want to make the Value file(Lower Limit = 1,Upper Limit = 1000, Value = 1000 , gives the LSB byte first as below.

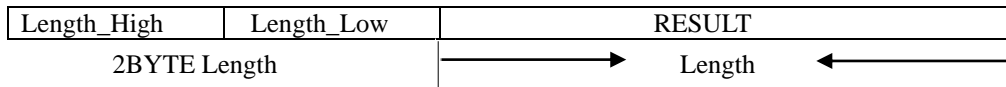
01 44 32 38 02 00 11 01 00 00 00 01 00 00 00 E8 03 00 00 E8  
03 00  
00 01 03 XX

☞ Positive Response Packet

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	71 OF 82	2016. 1 .19.

SOH	'D'	'2'	'8'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure



RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

Negative Response Packet

SOH	'D'	'2'	'8'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark:

The limited credit command allows a limited increase of a value stored in a Value File. Refer to the LimitedCredit command.

### 10.2.20 “D29” : Delete File.

This command deactivates, deletes a file on tag in a selected application. Allocated memory blocks associated with the file are not set free. To release memory blocks for reuse, the whole PICC memory

needs to be erased by using the FormatPICC command. Refer to DESFire Datasheet “DeleteFile” to get

more command details.

Command Packet

SOH	'D'	'2'	'9'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

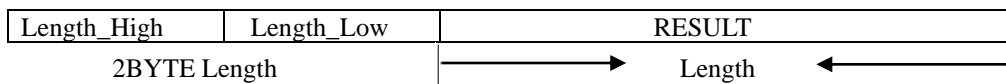
Command Data Structure

Length_High	Length_Low	File IDs 1 Byte (HEX)0x00~0x1F
-------------	------------	--------------------------------

Positive Response Packet

SOH	'D'	'2'	'9'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure



RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code.

1byte status code (Refer to DESFire Datasheet)
--

Negative Response Packet

SOH	'D'	'2'	'9'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark:

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	72 OF 82	2016. 1 .19.

Depending on the PICC master key settings preceding application master key authentication might be required.

### 10.2.21 “D30” : Read Data.

The Read Data command allows reading data from standard data files or backing up data files. CRC calculation, padding of fill bytes, (3)DES/AES ciphering and CBC are automatically done by the firmware. Refer to DESFire Datasheet “ ReadData” to get more command details.

☞ Command Packet

SOH	'D'	'3'	'0'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Com. Set.(1byte)	File Number (1byte)	Offset(3byte)	Data Length(3byte)
0x00: Plain	0x00~0x0F	0~ File Size-1 LSB First	Range: 1~256 LSB First
0x01: MACing			
0x03: TDES			

☞ Positive Response Packet

SOH	'D'	'3'	'0'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code	Data
1 byte	1~256 byte.

☞ Negative Response Packet

SOH	'D'	'3'	'0'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.22 “D31” : Write Data.

The Write Data command allows writing data to standard data files or backing up data files. To validate a write access for back up data files, it is necessary to confirm it with a **CommitTransaction** command.

The file number must be in the range from 00h to 07h. CRC calculation, padding of fill bytes,

(3)DES/AES ciphering and CBC are automatically done by the firmware. Refer to DESFire Datasheet



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	73 OF 82	2016. 1 .19.

“WriteData” to get more command details.

☞ Command Packet

SOH	‘D’	‘3’	‘1’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Com. Set.(1byte)	File Number (1byte)	Offset(3byte)	Data Length(3byte)	Data
0x00: Plain	0x00~0x0F(Std)	0~ File Size-1 LSB First	Range: 1~256 LSB First	1~256 bytes
0x01: MACing	0x00~0x07(BackUp )			
0x03: TDES				

☞ Positive Response Packet

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

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code
1 byte

☞ Negative Response Packet

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

Remark: The write command requires a preceding authentication either with the key specified for write

Or read & write access.

### 10.2.23 “D32” : Read Records.

The Read Records command allows reading out a set of complete records from a cyclic or linear record

file. The file number must be in the range from 00h to 07h. CRC calculation, padding of fill bytes, (3)DES/AES ciphering and CBC are automatically done by the firmware. Refer to DESFire Datasheet

“ ReadRecords” to get more command details.

☞ Command Packet

SOH	‘D’	‘3’	‘2’	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	74 OF 82	2016. 1 .19.

Com. Set.(1byte)	File Number (1byte)	Offset(3byte)	Number of records to be read (3byte)
0x00: Plain	0x00~0x0F	0~ File Size-1 LSB First	Range: 1~ No of Existing Records (Max 256 bytes) LSB First
0x01: MACing			
0x03: TDES			

☞ Positive Response Packet

SOH	'D'	'3'	'2'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code	Data
1 byte	1~256 byte.

☞ Negative Response Packet

SOH	'D'	'3'	'2'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark: The ReadRecords command requires a preceding authentication either with the key specified for

write or read & write access.

### 10.2.24 “D33” : Write Record.

The Write Record command allows writing data to a record in a cyclic or linear record file. To validate a

write access, it is necessary to confirm it with a **CommitTransaction** command. The file number must be

in the range from 00h to 07h. The write record command appends one record at the end of the linear

record file; it erases and overwrites the oldest record in case of a cyclic record file if it is already full.

CRC calculation, padding of fill bytes, (3)DES/AES ciphering and CBC are automatically done by the

firmware. Refer to DESFire Datasheet “WriteRecords” to get more command details.

☞ Command Packet

SOH	'D'	'3'	'3'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	75 OF 82	2016. 1 .19.

Com. Set.(1byte)	File Number (1byte)	Offset(3byte)	Data Length(3byte)	Data
0x00: Plain	0x00~0x07	0~ File Size-1 LSB First	Range: 1~256 LSB First	1~256 bytes
0x01: MACing				
0x03: TDES				

☞ Positive Response Packet

SOH	'D'	'3'	'3'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code
1 byte

☞ Negative Response Packet

SOH	'D'	'3'	'3'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark: The WriteRecord command requires a preceding authentication either with the key specified

for write or read & write access.

### 10.2.25 “D34” : Get Value.

The GetValue command allows reading the currently stored value from value files. The value is always

represented LSB first. CRC calculation, padding of fill bytes and (3)DES/AES ciphering are automatically done by the firmware. Refer to DESFire Datasheet “GetValue” to get more command

details.

☞ Command Packet

SOH	'D'	'3'	'4'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Com. Set.(1byte)	File Number (1byte)
0x00: Plain	0x00~0x07
0x01: MACing	
0x03: TDES	

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	76 OF 82	2016. 1 .19.

☞ Positive Response Packet

SOH	'D'	'3'	'4'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code	Data
1 byte	4 byte.(LSB First)

☞ Negative Response Packet

SOH	'D'	'3'	'4'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark: The GetValue command requires a preceding authentication either with the key specified for

write or read & write access.

### 10.2.26 “D35” : Credit.

The Credit command allows to increase a value stored in a value file (4 Byte signed integer, LSB first).

Only positive values are allowed. To validate the updated value, it is necessary to confirm it with a

**CommitTransaction** command. The file number must be in the range from 00h to 07h. CRC calculation,

padding of fill bytes and (3)DES/AES ciphering are automatically done by the firmware. Refer to DESFire

Datasheet “Credit “ to get more command details.

☞ Command Packet

SOH	'D'	'3'	'5'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Com. Set.(1byte)	File Number (1byte)	Data
0x00: Plain	0x00~0x07	4 byte.(LSB First)
0x01: MACing		
0x03: TDES		

☞ Positive Response Packet

SOH	'D'	'3'	'5'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
-------------	------------	--------

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	77 OF 82	2016. 1 .19.

2BYTE Length

Length

RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code
1 byte

Negative Response Packet

SOH	'D'	'3'	'5'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark: The Credit command requires a preceding authentication either with the key specified for write

or read & write access.

### 10.2.27 "D36" : Debit.

The Debit command allows to decrease a value stored in a value file (4 Byte signed integer, LSB first).

Only positive values are allowed. To validate the updated value, it is necessary to confirm it with a **CommitTransaction** command. The file number must be in the range from 00h to 07h. CRC

calculation,

padding of fill bytes and (3)DES/AES ciphering are automatically done by the firmware. Refer to DESFire Datasheet "Debit" to get more command details.

Command Packet

SOH	'D'	'3'	'6'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

Command DATA 1 Structure

Com. Set.(1byte)	File Number (1byte)	Data
0x00: Plain	0x00~0x07	4 byte.(LSB First)
0x01: MACing		
0x03: TDES		

Positive Response Packet

SOH	'D'	'3'	'6'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	78 OF 82	2016. 1 .19.

Status Code
1 byte

☞ Negative Response Packet

SOH	'D'	'3'	'6'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Remark: The Debit command requires a preceding authentication either with the key specified for write or read & write access.

### 10.2.28 “D37” : Limited Credit.

The LimitedCredit command allows a limited increase of a value stored in a Value File without having full

Read & write permission to the file (4 Byte signed integer, LSB first). Only positive values are allowed.

This feature can be enabled or disabled during value file creation. To validate the updated value, it is necessary to confirm it with a **CommitTransaction** command. The file number must be in the range from 00h to 07h. CRC calculation, padding of fill bytes and (3)DES/AES ciphering are automatically done by the firmware. Refer to DESFire Datasheet > LimitedCredit < to get more command details.

☞ Command Packet

SOH	'D'	'3'	'7'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Com. Set.(1byte)	File Number (1byte)	Data
0x00: Plain	0x00~0x07	4 byte.(LSB First)
0x01: MACing		
0x03: TDES		

☞ Positive Response Packet

SOH	'D'	'3'	'7'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code
1 byte

☞ Negative Response Packet

SOH	'D'	'3'	'7'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	79 OF 82	2016. 1 .19.

Remark: The LimitedCredit command requires a preceding authentication either with the key specified for

write or read & write access.

### 10.2.29 “D40”: Commit Transaction.

The Commit Transaction command allows validating all previous write access on:

- Backup Data Files
- Value Files
- Linear Record Files
- Cyclic Record Files

The Commit Transaction is typically the last command of a transaction. Refer to DESFire Datasheet

“CommitTransaction” to get more command details.

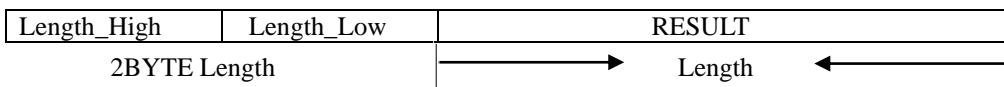
☞ Command Packet

SOH	'D'	'4'	'0'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'D'	'4'	'0'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure



☞ RESULT DATA Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code

Status Code(1 byte)
---------------------

☞ Negative Response Packet

SOH	'D'	'4'	'0'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.30 “D41”: Abort Transaction

The Abort Transaction command allows invalidating all previous write access on:

- Backup Data Files
- Value Files
- Linear Record Files
- Cyclic Record Files

This is useful to cancel a transaction without the need for re-authentication to the PICC. Refer to DESFire

Datasheet “AbortTransaction” to get more command details.

☞ Command Packet

SOH	'D'	'4'	'1'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	80 OF 82	2016. 1 .19.

SOH	'D'	'4'	'1'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

RESULT DATA Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code

Status Code(1 byte)
---------------------

Negative Response Packet

SOH	'D'	'4'	'1'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.31 “D42” : Clear Record File

The Clear Record File command allows resetting cyclic or linear record file to empty state. The file number must be in the range from 00h to 07h. After executing the ClearRecordFile command but before

**CommitTransaction**, all subsequent WriteRecord commands will fail. Refer to DESFire Datasheet

“ ClearRecordFile “ to get more command details.

Command Packet

SOH	'D'	'4'	'2'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

Command DATA 1 Structure

File Number (1byte)
0x00~0x07

Positive Response Packet

SOH	'D'	'4'	'2'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

or

Error code.

Status Code
1 byte

Negative Response Packet

SOH	'D'	'4'	'2'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----



<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	81 OF 82	2016. 1 .19.

### 10.2.32 Free Memory

This command returns the free memory available on the DESFire EV1 card.

☞ Command Packet

SOH	'D'	'4'	'3'	STX	ETX	BCC
-----	-----	-----	-----	-----	-----	-----

☞ Positive Response Packet

SOH	'D'	'4'	'3'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT DATA Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code

Status Code	Memory Size
1 byte	3 byte

☞ Negative Response Packet

SOH	'D'	'4'	'3'	STX	'N'	ST1	ST2	ETX	BCC
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

### 10.2.33 “D44” :Set Configuration .

This command is used to perform security configurations at the PICC level of the DESFire EV1 card. A

prior authentication with the PICC master key is necessary.

**\*Before using this command, you must know what the parameters mean. So Refer to DESFire DataSheet.**

☞ Command Packet

SOH	'D'	'4'	'4'	STX	DATA	ETX	BCC
-----	-----	-----	-----	-----	------	-----	-----

☞ Command Data Structure

Length_High	Length_Low	DATA1
-------------	------------	-------

☞ Command DATA 1 Structure

Type	Data
0x00: Configuration	Refer to DESFire DataSheet
0x01: Key & Key Ver	
0x03: User ATS	

☞ Positive Response Format

SOH	'D'	'4'	'4'	STX	'P'	STATUS	DATA	ETX	BCC
-----	-----	-----	-----	-----	-----	--------	------	-----	-----

☞ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

☞ RESULT Data Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status

<b>Doc No</b>	<b>KST3XXX Series SPECIFICATION</b>	<b>REV</b>	<b>PAGE</b>	<b>DATE</b>
		F	82 OF 82	2016. 1 .19.

or

Error code.

Status Code
1 byte

↳ Negative Response Packet

SOH	'D'	'4'	'4'	STX	'N'	ST1	ST2	ETX	BCC
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Remark: This command is applicable only for DESFire EV1 tags – MF3ICD21, MF3ICD41 or MF3ICD81. This command may result in irreversible configurations of the tag; hence the user should be

careful and aware of the exact usage of the command options as specified in the DESFire EV1 datasheet.

### 10.2.34 Get Card UID.

This command returns the 7 byte unique card UID of the DESFire EV1 card. A prior authentication at the

PICC level or at the application level is necessary.

↳ Command Packet

SOH	'D'	'4'	'5'	STX	ETX	BCC
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↳ Positive Response Packet

SOH	'D'	'4'	'5'	STX	'P'	STATUS	DATA	ETX	BCC
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↳ DATA Structure

Length_High	Length_Low	RESULT
2BYTE Length		Length

↳ RESULT DATA Structure

The First byte is Status Code by DESFire PICC(Refer to DESFire Datasheet). 0x00 is good status or Error code

Status Code	UID
1 byte	7 byte

↳ Negative Response Packet

SOH	'D'	'4'	'5'	STX	'N'	ST1	ST2	ETX	BCC
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