

MIFARE & ISO14443A & ISO14443B & ISO7816 & ISO15693 IC CARD MODULE

JMY600 Series IC Card Module

MIFARE Ultralight C Card Operation Guide

(Revision 1.03)

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Please read this manual carefully before using. If any problem, please feel free to contact us, we will offer a satisfied answer ASAP.



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1 Overview

This file describes how to operate MIFARE Ultralight C card and the sequence via using JMY600 Series RFID module. It is suitable for the programmers who are using it to do the development.

Any questions during the programming, please feel free to contact our technical support via jinmuyu@vip.sina.com.

2 Features

2.1 MIFARE RF Interface (ISO/IEC 14443 A)

- Contactless transmission of data and supply energy
- Operating distance: Up to 100mm (depending on antenna geometry)
- Operating frequency: 13.56 MHz
- Fast data transfer: 106kbit/s
- High data integrity: 16 Bit CRC, parity, bit coding, bit counting
- True anticollision
- 7 byte serial number (cascade level 2 according to ISO/IEC14443-3)
- Typical ticketing transaction: < 35 ms
- Fast counter transaction: < 10 ms

2.2 EEPROM

- 1536-bit total memory
- 512-bit compatible to MF0ICU1
- 36 pages, 1152-bit user r/w area
- Field programmable read-only locking function per block
- Field programmable read-only locking function per page for first 512-bit
- 16-bit one-way counter
- 32-bit user definable One-Time Programmable (OTP) area
- Write endurance 100000 cycles
- Data retention of 10 years

3 General Description

NXP Semiconductors has developed the MIFARE Ultralight C - Contactless ticket IC MF0ICU2



to be used in a contactless smart ticket or smart card in combination with Proximity Coupling Devices (PCD). The communication layer (MIFARE RF Interface) complies with parts 2 and 3 of the ISO/IEC 14443 Type A standard (see Ref. 1 and Ref. 2).

The MF0ICU2 is primarily designed for limited use applications such as public transportation, event ticketing and loyalty applications.

4 Memory Organization

The 1536-bit EEPROM memory is organized in 48 pages with 32 bits each. In the erased state the EEPROM cells are read as a logical "0", in the written state as a logical "1".

Table 5. Memory organization

Page address		Byte number			
Decimal	Hex	0	1	2	3
0	00h	serial number			
1	01h	serial number			
2	02h	serial number	internal	lock bytes	lock bytes
3	03h	OTP	OTP	OTP	OTP
4 to 39	04h to 27h	user memory	user memory	user memory	user memory
40	28h	lock bytes	lock bytes	-	-
41	29h	16-bit counter	16-bit counter	-	-
42	2Ah	authentication configuration			
43	2Bh	authentication configuration			
44 to 47	2Ch to 2Fh	authentication key			

5 Card Operation

5.1 Active Mode

"Automatic detection card" only can be used via UART or RS232C interface. Under this function, the reader module output card Serial Number.

Under this working mode, the following information, you can refer to:

Continuous or discontinuous output card SNR

HEX or ASCII format output:

As an example: "Continuous output card Serial Number" + "HEX format output". We need choose "JCP04 communication protocol" to send the configuration commands via TransPort.

- TransPort input: 1E 03
- Host sends: 03 1E 03 1E
- Success: 02 1E 1C

SNR output:



- TransPort Close
- SSCOM Open, Choose the suitable Port, Baudrate 19200bps, and HEX display

Then put the MIFARE Ultralight C Card within the Antenna field, if the Module with Buzzer, the Buzzer will beep. And the SNR will output continuously on the SSCOM displayer. The output data: "0C 20 04 23 74 E1 ED 25 80 44 00 00 92" This is JCP04 protocol data packet. We choose JCP04 as an example, because of the data packet is less. (0C is Length; 20 is Command; "04 23 74 E1 ED 25 80" is card Serial Number; "44 00" is ATQA; 00 is SAK; 92 is Checksum).

Each MIFARE Ultralight C Card Serial Number is unique, that can be used as identification.

Module reset to factory default:

- TransPort input: 0F 52 45 53 45 54
- Host sends: 07 0F 52 45 53 45 54 5D
- Success: 02 0F 0D

After the power on, the Tested Module will be in factory default.

5.2 Passive Mode

During the MIFARE Ultralight C Card operations, if start "using the Key by 3DES to authenticate" function, the Auto-detecting Mode will be prohibited. If to operate the MIFARE Ultralight C Card via Auto-detecting Mode, the Module ICC Pin need be connected with User System. When the Auto-detecting Mode is ON, at this time the "MIFARE Ultralight C Request" function is prohibited. Once the Card is within the Antenna field, the IIC Pin will be in low level, you can directly send Read/Write commands to the Reader Module.

If the ICC Pin cannot be connected with User System, and start "using the Key by 3DES to authenticate" function, please use command 0x20 to request the Card. And then operate the requested the Card.

Put a new MIFARE Ultralight C Card into the antenna field, then to do the test via TransPort test tool. Please send the commands like the following sequence.

- MIFARE Ultralight C Request:
TransPort input: 20 00
Host sends: 00 05 00 20 00 25
Success: 00 0E 01 20 04 23 74 E1 ED 25 80 44 00 00 91
- MIFARE Ultralight C Data Block Write:
TransPort input: 42 05 55 55 55 55
Host sends: 00 09 00 42 05 55 55 55 55 4E
Success: 00 04 01 42 47
- MIFARE Ultralight C Data Block Read:
TransPort input: 41 05
Host sends: 00 05 00 41 05 41
Success: 00 14 01 41 55 55 55 55 00 00 00 00 00 00 00 00 00 00 54

Note: The above basic Operations for MIFARE Ultralight C Card are without Key authentication, but the following Operations will use the Key to authenticate.

- MIFARE Ultralight C Data Block Write(Key_Write):
TransPort input: 42 2C 00 00 00 00
Host sends: 00 09 00 42 2C 00 00 00 00 67



Success: 00 04 01 42 47
TransPort input: 42 2D 00 00 00 00
Host sends: 00 09 00 42 2D 00 00 00 00 66
Success: 00 04 01 42 47
TransPort input: 42 2E 00 00 00 00
Host sends: 00 09 00 42 2E 00 00 00 00 65
Success: 00 04 01 42 47
TransPort input: 42 2F 00 00 00 00
Host sends: 00 09 00 42 2F 00 00 00 00 64
Success: 00 04 01 42 47

- Authentication for write access:

Whatever for Read or Write operations, the default access for data protected blocks all need be authenticated.

- Access Control Field for written Key:

TransPort input: 42 2B 20 00 00 00
Host sends: 00 09 00 42 2B 20 00 00 00 40
Success: 00 04 01 42 47

- MIFARE Ultralight C Request:

TransPort input: 20 00
Host sends: 00 05 00 20 00 25
Success: 00 0E 01 20 04 23 74 E1 ED 25 80 44 00 00 91

- MIFARE Ultralight C Key Authentication:

TransPort input: 43 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
Host sends: 00 14 00 43 00 00 00 00 00 00 00 00 00 00 00 00 00 00 57
Success: 00 04 01 43 46

- Read Data out from protected Block by Key:

TransPort input: 41 20
Host sends: 00 05 00 41 20 64
Success: 00 14 01 41 00 00 00 00 00 00 00 00 00 00 00 00 00 00 54

- Write Data into protected Block by Key:

TransPort input: 42 20 01 02 03 04
Host sends: 00 09 00 42 20 01 02 03 04 6F
Success: 00 04 01 42 47

- Read Data out from protected Block by Key:

TransPort input: 41 20
Host sends: 00 05 00 41 20 64
Success: 00 14 01 41 01 02 03 04 00 00 00 00 00 00 00 00 00 00 50