

TCA5013EVM Firmware and Software Guide

July 14th, 2014

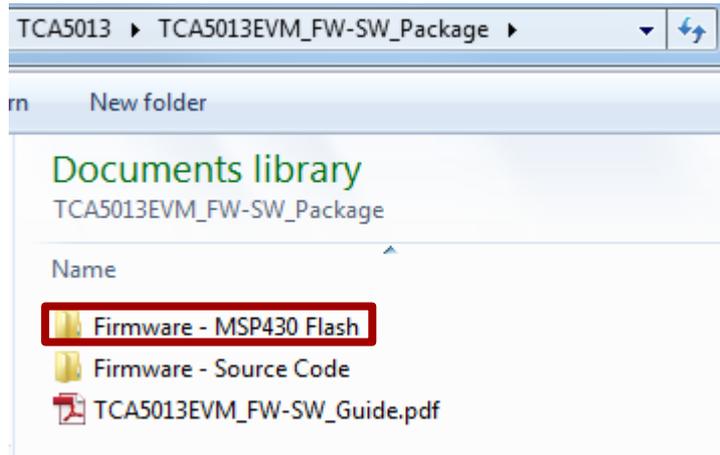
Release 1.0

Hardware setup and firmware installation instructions for the
MSP430 LaunchPad

HARDWARE SETUP & INSTALLATION

Folder descriptions

- The folder “*Firmware – MSP430*” flash will be discussed in the following slides

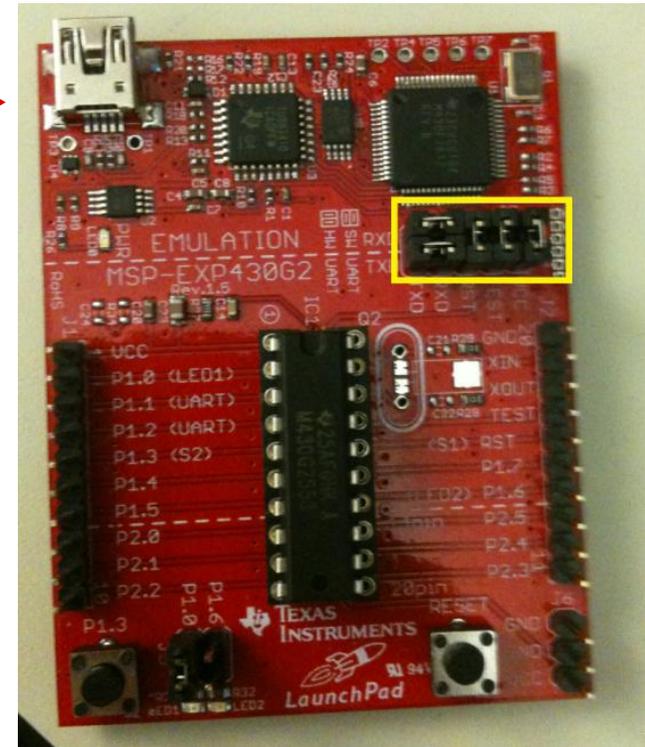
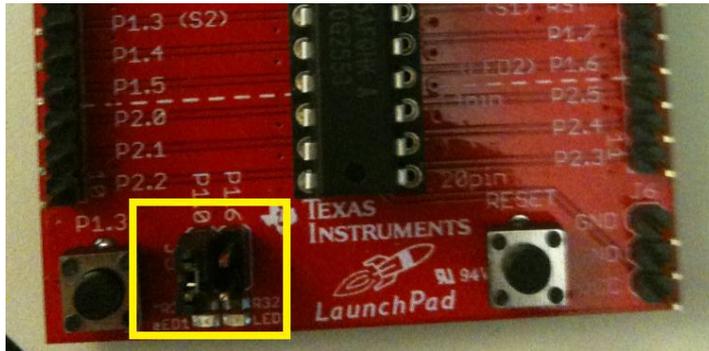


- The .txt file used to flash the LaunchPad was generated using the code in the folder “*Firmware – Source Code*”, which is outside the scope of this document
- This source code may be used as a reference in Code Composer to manipulate, debug, and use as a foundation for developing more complex firmware or firmware for another processor

LaunchPad hardware setup

- The MSP430 LaunchPad needs to be configured properly in order to flash the processor with the IO expander firmware, and the below steps must be followed before using the IO Expander EVM in conjunction with the LaunchPad.

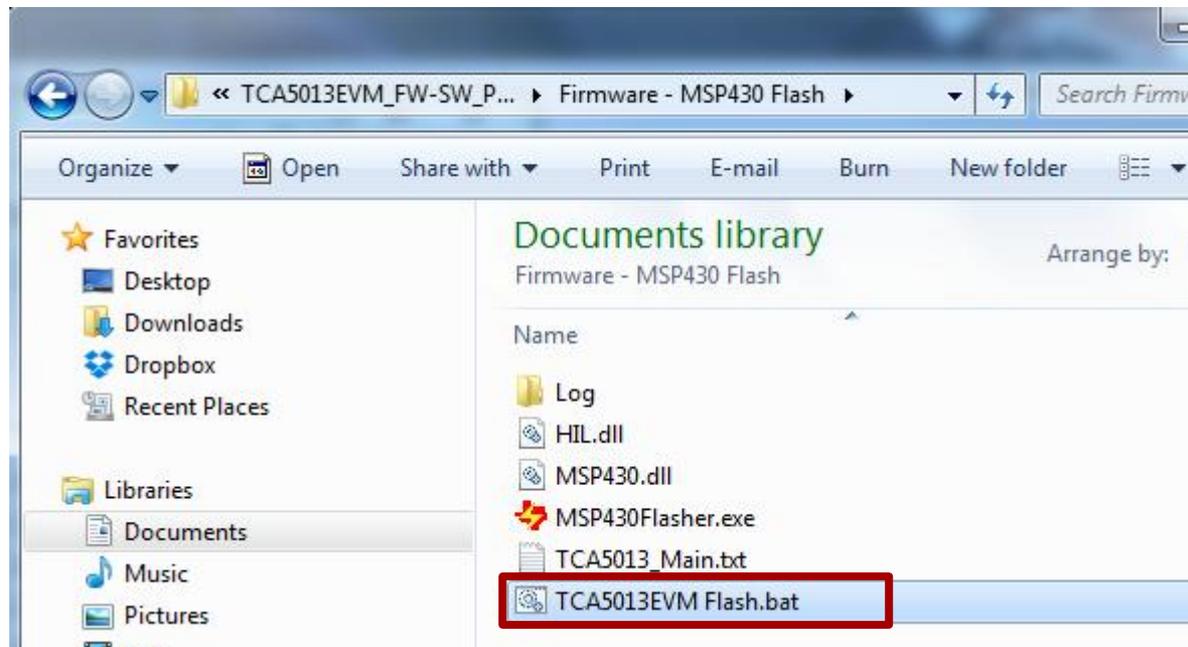
1. With the LaunchPad unplugged, Configure the headers on the Launch Pad to be in HW UART mode
2. With the LaunchPad still unplugged remove the rightmost jumper on P1.6 to match the yellow box below:



3. Connect the J1 and J2 receptacles of the TCA5013EVM printed circuit board (or PCB) to J1 and J2 of the LaunchPad.
4. Connect the LaunchPad to your computer with a USB standard-A to mini-B cable. A green LED should have turned on, labeled "PWR" and "LED0", to signify power to the LaunchPad

Run “TCA5013EVM Flash.bat” batch file

- Double-Click “TCA5013EVM Flash.bat”
- This file points “MSP430Flasher.exe” to use “TCA5013_Main.txt” while running to flash the MSP430 with the correct firmware



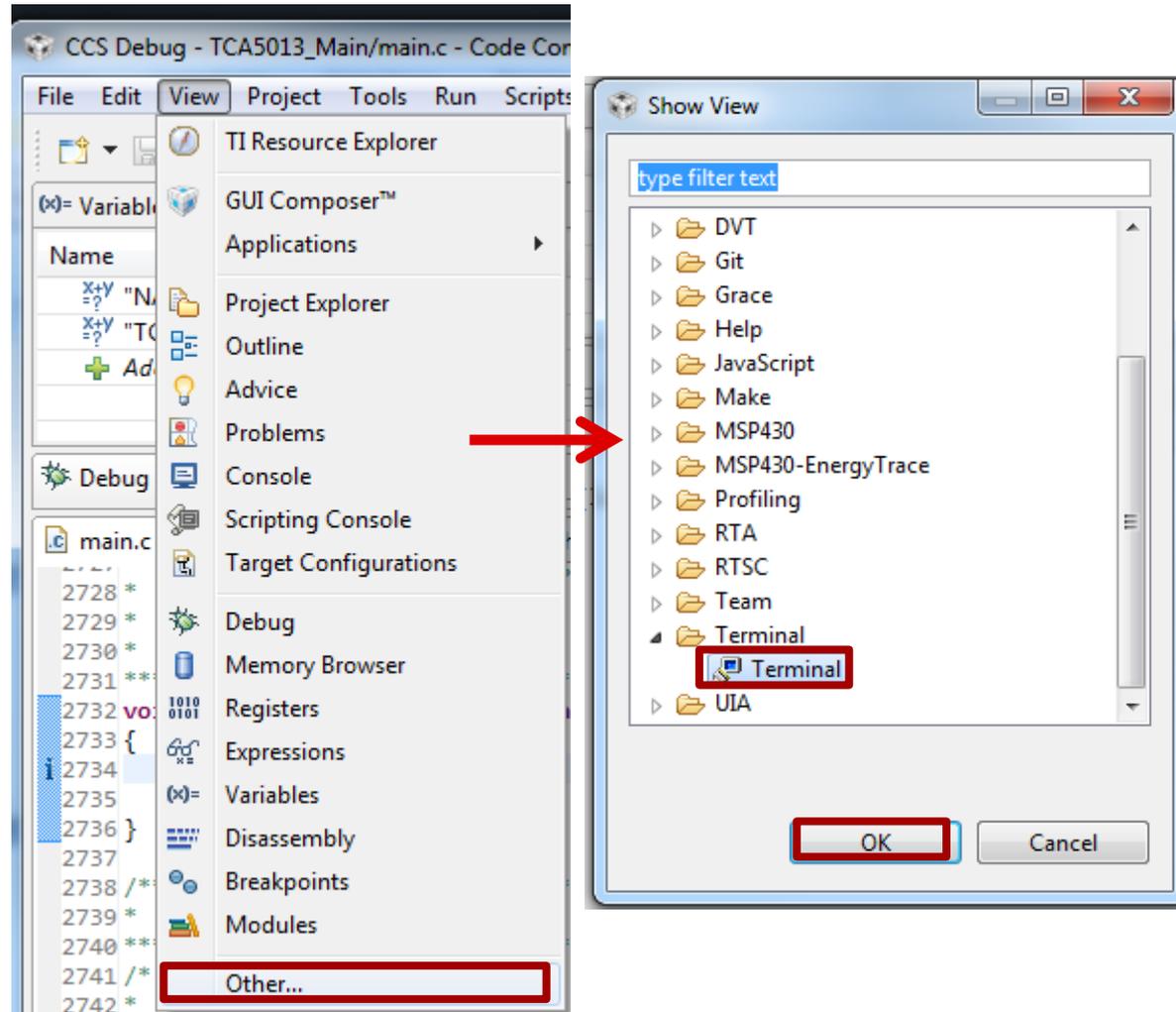
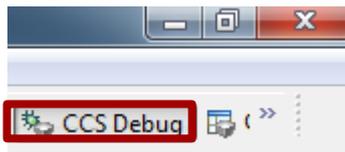
Successful firmware flash

- A successful firmware flash will look like the following command prompt

```
C:\Windows\system32\cmd.exe
Progaming TCA5013_Main.txt into MSP430G2553 .....
*-----*
*      \  /      MSP430 Flasher v1.3.0      /  \
*      /  \      *-----*
*-----*
* Evaluating triggers...done
* Checking for available FET debuggers:
* Found USB FET @ HID0111:COM17.
* Initializing interface on TIUSB port...done
* Checking firmware compatibility:
* FET firmware is up to date.
* Reading FW version...done
* Reading HW version...done
* Setting UCC to 3000 mV...done
* Accessing device...done
* Reading device information...done
* Loading file into device...done
* Verifying transfer...done
*-----*
/*
* Arguments      : -n MSP430G2553 -w TCA5013_Main.txt -v -g -z [UCC1]
* Warning: Default options used due to incomplete argument list.
*-----*
* Driver         : loaded
* Dll Version    : 20409001
* FwVersion      : 30394216
* Interface      : TIUSB
* HwVersion      : E 2.0
* Mode           : AUTO
* Device         : MSP430G2xx3
* EEM            : Level 1, ClockCntrl 1
* Prog.File      : TCA5013_Main.txt (ERASE_ALL, verified = TRUE)
* BSL Unlock     : FALSE
* InfoA Access   : FALSE
* UCC ON         : 3000 mV
*-----*
* Starting target code execution...done
* Disconnecting from device...done
*-----*
* Driver         : closed (No error)
*-----*
*/
Press any key to continue . . .
```

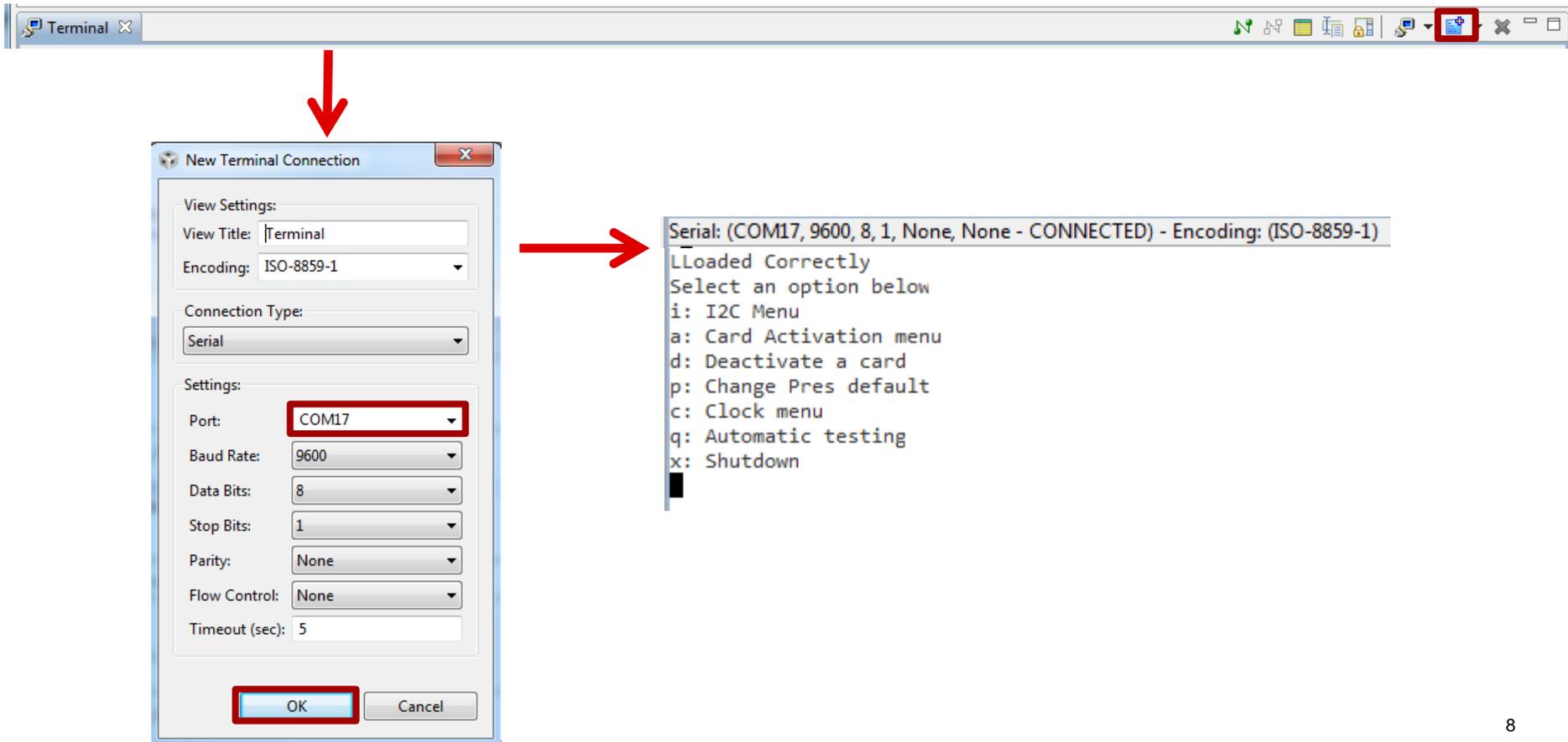
Opening a terminal connection

- Open a terminal connection to the MSP430 in Code Composer by using the “View” menu option
- Click “Other...”
- Scroll down to find “Terminal”
- Click “Terminal” and then click “OK”
- Ensure “CSS Debug” mode is enabled



Opening a terminal connection (cont'd)

- Open up the “device manager” on your PC and find which of the COM ports is associated with the LaunchPad
 - In the case below the com port is COM17
- Launch the terminal connection and Reset the LaunchPad by pressing S1 on the LaunchPad



The image shows a Windows Terminal window with a red box around the 'New Terminal Connection' icon in the taskbar. A red arrow points down to the 'New Terminal Connection' dialog box. In this dialog, the 'Port' is set to 'COM17', which is highlighted with a red box. The 'OK' button is also highlighted with a red box. A red arrow points from the dialog to the terminal window, which displays the following text:

```
Serial: (COM17, 9600, 8, 1, None, None - CONNECTED) - Encoding: (ISO-8859-1)
LLoaded Correctly
Select an option below
i: I2C Menu
a: Card Activation menu
d: Deactivate a card
p: Change Pres default
c: Clock menu
q: Automatic testing
x: Shutdown
```

Examples for commonly used menu options

COMMAND LINE INTERFACE

Reading the full register map

- Use the keyboard to type the following command sequence

```
Select an option below
```

```
i: I2C Menu
```

```
a: Card Activation menu
```

```
d: Deactivate a card
```

```
p: Change Pres default
```

```
c: Clock menu
```

```
x: Shutdown
```

```
I2C Menu
```

```
r: Read multiple registers
```

```
b: Read/Write any register
```

```
a: Read using autoincrement
```

```
n: Read without AI
```

```
r: Read all
```

```
u: Read User Card
```

```
1: Read Sam1
```

```
2: Read Sam2
```

```
3: Read Sam3
```

```
i: Read int status
```

User Card registers: 0x00, 0x60, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00,

SAM1 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0,

SAM2 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,

SAM3 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,

Interrupt and control registers: 0x00, 0x00, 0x80, 0xFF, 0x00, 0x00, 0x00,

Writing to any register (ex: Change clock clew rate setting)

- Use the keyboard to type the following command sequence, and then read all registers as in the previous example

```
User Card registers: 0x00, 0x60, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00,  
SAM1 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0,  
SAM2 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
SAM3 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
Interrupt and control registers: 0x00, 0x00, 0x80, 0xFF, 0x00, 0x00, 0x00,
```

```
Select an option below
```

```
i: I2C Menu
```

```
a: Card Activation menu  
d: Deactivate a card  
p: Change Pres default  
c: Clock menu  
x: Shutdown
```

```
I2C Menu
```

```
r: Read multiple registers  
b: Read/Write any register
```

```
r: Read  
a: Read Range  
w: Write
```

```
Enter register address: 0x08  
Enter databyte: 0x80
```

```
User Card registers: 0x00, 0x60, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0x80, 0x76, 0x00, 0x00, 0x00, 0x00,  
SAM1 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0,  
SAM2 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
SAM3 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
Interrupt and control registers: 0x00, 0x00, 0x80, 0xFF, 0x00, 0x00, 0x00,
```

Activating a card (ex: User Card at 5V with CLK div. by 1)

- Use the keyboard to type the following command sequence, and then read all registers

User Card registers: **0x02, 0x60, 0x0C,** 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00,

Select an option below

i: I2C Menu

a: Card Activation menu
d: Deactivate a card
p: Change Pres default
c: Clock menu
x: Shutdown

Activation Menu

a: Activate Async

s: Auto Activate Sync
m: Manual Sync Activate
1: Activate sam1
2: Activate sam2
3: Activate sam3

Select reset type

c: Cold reset

w: Warm Reset
e: Change Early&Mute
x: Switch to External Clock
k: Switch to Internal Clock

Select Voltage

1: 1.8V
2: 3.3V
3: 5V

Select CLK div

1: 1
2: 2
4: 4
5: 5
8: 8

User Card registers: **0x82, 0xE1, 0x00,** 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00, 12

Deactivating a card (ex: SAM1)

- Use the keyboard to type the following command sequence, and then read all registers

```
User Card registers: 0x02, 0xE0, 0x00, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00,  
SAM1 registers: 0x80, 0xA1, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0,  
SAM2 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
SAM3 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
Interrupt and control registers: 0x00, 0x00, 0x80, 0xFF, 0x00, 0x00, 0x00,
```

```
Select an option below
```

```
i: I2C Menu  
a: Card Activation menu  
d: Deactivate a card  
p: Change Pres default  
c: Clock menu  
x: Shutdown
```

```
a: Deactivate asynchronous card  
s: Deactivate synchronous card  
1: Deactivate SAM1  
2: Deactivate SAM2  
3: Deactivate SAM3
```

```
User Card registers: 0x02, 0xE0, 0x00, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00,  
SAM1 registers: 0x00, 0xA0, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0,  
SAM2 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
SAM3 registers: 0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,  
Interrupt and control registers: 0x00, 0x00, 0x80, 0xFF, 0x00, 0x00, 0x00,
```

Interrupt handling (ex: for card insertion)

- Insert a user card and read all registers twice after the interrupt

Interrupt status register **0x80.**



0x06. 0x60, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00,
0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0,
0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,
0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,
0x00, 0x00, 0x80, 0xFF, 0x00, 0x00, 0x00,



0x02. 0x60, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0, 0x76, 0x00, 0x00, 0x00, 0x00,
0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74, 0x80, 0xA0,
0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,
0x00, 0x40, 0x0C, 0xAA, 0x00, 0xA4, 0x74,
0x00, 0x00, 0x80, 0xFF, 0x00, 0x00, 0x00,