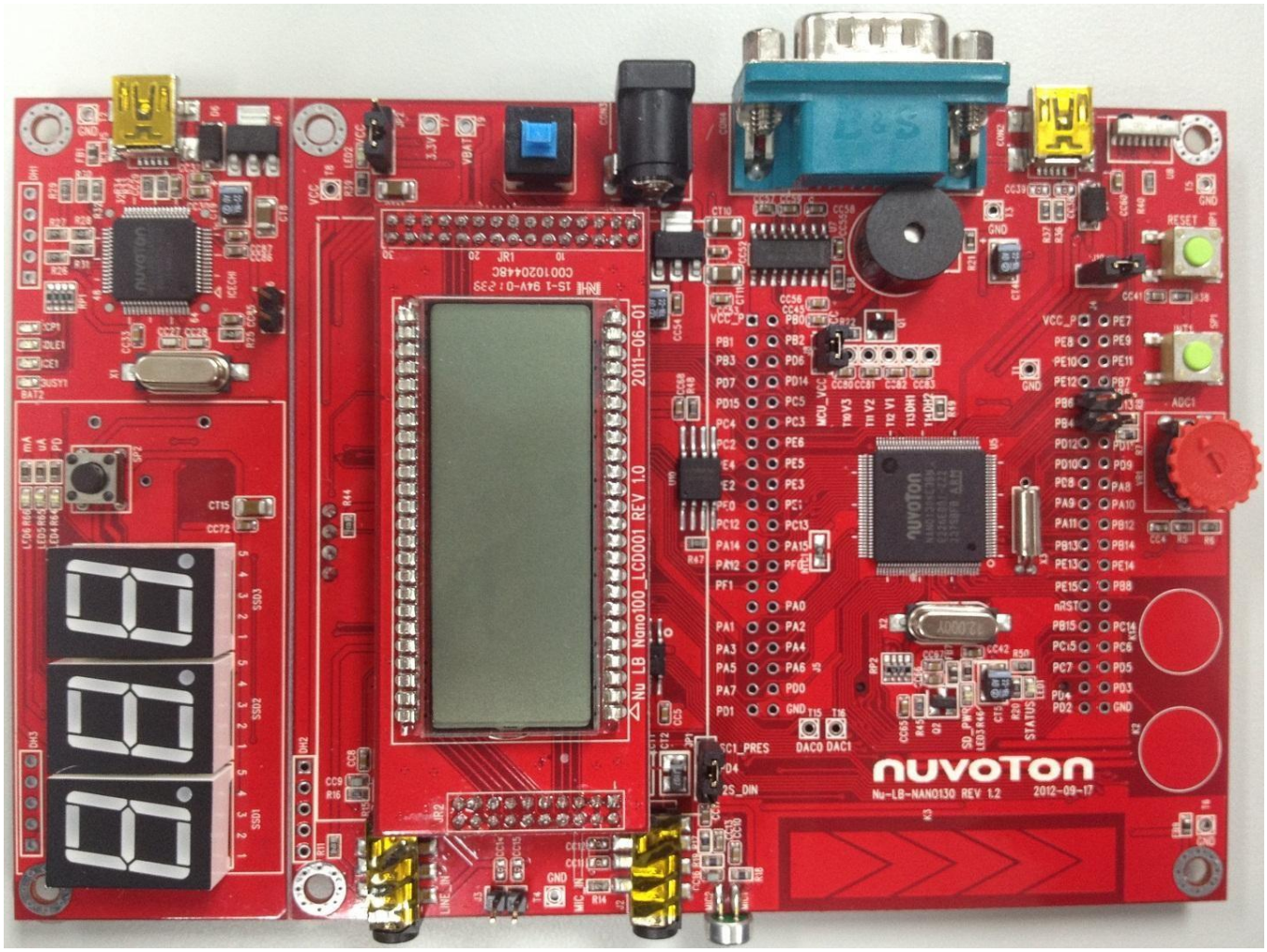
HƯỚNG DẪN SỬ DỤNG KIT NU-LB-Nano130



MỤC LỤC

1. Giới thiệu dòng Nano100Series

1.1 Nano100 Series family

Nano100 Series gồm 4 dòng:

- ✓ Nano100 Base Line : Dòng cơ bản
- ✓ Nano110 LCD Line : Ngoài tính năng cơ bản, có hỗ trợ giao tiếp LCD
- ✓ Nano120 USB Connectivity Line : Hỗ trợ giao tiếp USB
- ✓ Nano130 Advanced Line : Hỗ trợ đầy đủ các tính năng dòng Nano100 Series

Dòng Nano100 Base Line

Part No.	Flash	SRAM	Data Flash Shared AP ROM	LDROM ISP Flash	I/O	Timer	Connectivity				I2S	PWM	12-bit ADC	RTC	EBI	IRC 10KHz 12MHz	PDMA	LCD	12-bit DAC	Smart Card	Touch Key	ISP ICP	Package
							UART	SPI	I2C	USB													
NANO100LC2BN	32K	8K	Configurable	4K	up to 38	4x32-bit	4	3	2	-	1	6	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO100LD2BN	64K	8K	Configurable	4K	up to 38	4x32-bit	4	3	2	-	1	6	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO100LD3BN	64K	16K	Configurable	4K	up to 38	4x32-bit	4	3	2	-	1	6	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO100LE3BN	128K	16K	Configurable	4K	up to 38	4x32-bit	4	3	2	-	1	6	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO100SC2BN	32K	8K	Configurable	4K	up to 52	4x32-bit	5	3	2	-	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO100SD2BN	64K	8K	Configurable	4K	up to 52	4x32-bit	5	3	2	-	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO100SD3BN	64K	16K	Configurable	4K	up to 52	4x32-bit	5	3	2	-	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO100SE3BN	128K	16K	Configurable	4K	up to 52	4x32-bit	5	3	2	-	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO100KC2BN	32K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	-	2	3	16	V	LQFP128
NANO100KD2BN	64K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	-	2	3	16	V	LQFP128
NANO100KD3BN	64K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	-	2	3	16	V	LQFP128
NANO100KE3BN	128K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	-	2	3	16	V	LQFP128

Dòng Nano110 LCD Line

Part No.	Flash	SRAM	Data Flash Shared AP ROM	LDROM ISP Flash	I/O	Timer	Connectivity				I2S	PWM	12-bit ADC	RTC	EBI	IRC 10KHz 12MHz	PDMA	LCD	12-bit DAC	Smart Card	Touch Key	ISP ICP	Package
							UART	SPI	I2C	USB													
NANO110SC2BN	32K	8K	Configurable	4K	up to 51	4x32-bit	5	3	2	-	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO110SD2BN	64K	8K	Configurable	4K	up to 51	4x32-bit	5	3	2	-	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO110SD3BN	64K	16K	Configurable	4K	up to 51	4x32-bit	5	3	2	-	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO110SE3BN	128K	16K	Configurable	4K	up to 51	4x32-bit	5	3	2	-	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO110KC2BN	32K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128
NANO110KD2BN	64K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128
NANO110KD3BN	64K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128
NANO110KE3BN	128K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	-	1	8	12	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128

Dòng Nano120 USB Line

Part No.	Flash	SRAM	Data Flash Shared AP ROM	LDROM ISP Flash	I/O	Timer	Connectivity				I2S	PWM	12-bit ADC	RTC	EBI	IRC 10KHz 12MHz	PDMA	LCD	12-bit DAC	Smart Card	Touch Key	ISP ICP	Package
							UART	SPI	I2C	USB													
NANO120LC2BN	32K	8K	Configurable	4K	up to 34	4x32-bit	4	3	2	1	1	4	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO120LD2BN	64K	8K	Configurable	4K	up to 34	4x32-bit	4	3	2	1	1	4	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO120LD3BN	64K	16K	Configurable	4K	up to 34	4x32-bit	4	3	2	1	1	4	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO120LE3BN	128K	16K	Configurable	4K	up to 34	4x32-bit	4	3	2	1	1	4	7	V	-	V	8	-	2	2	4	V	LQFP48
NANO120SC2BN	32K	8K	Configurable	4K	up to 48	4x32-bit	5	3	2	1	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO120SD2BN	64K	8K	Configurable	4K	up to 48	4x32-bit	5	3	2	1	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO120SD3BN	64K	16K	Configurable	4K	up to 48	4x32-bit	5	3	2	1	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO120SE3BN	128K	16K	Configurable	4K	up to 48	4x32-bit	5	3	2	1	1	8	7	V	-	V	8	-	2	3	8	V	LQFP64
NANO120KC2BN	32K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	-	2	3	8	V	LQFP128
NANO120KD2BN	64K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	-	2	3	16	V	LQFP128
NANO120KD3BN	64K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	-	2	3	16	V	LQFP128
NANO120KE3BN	128K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	-	2	3	16	V	LQFP128

Dòng Nano130 Advanced Line

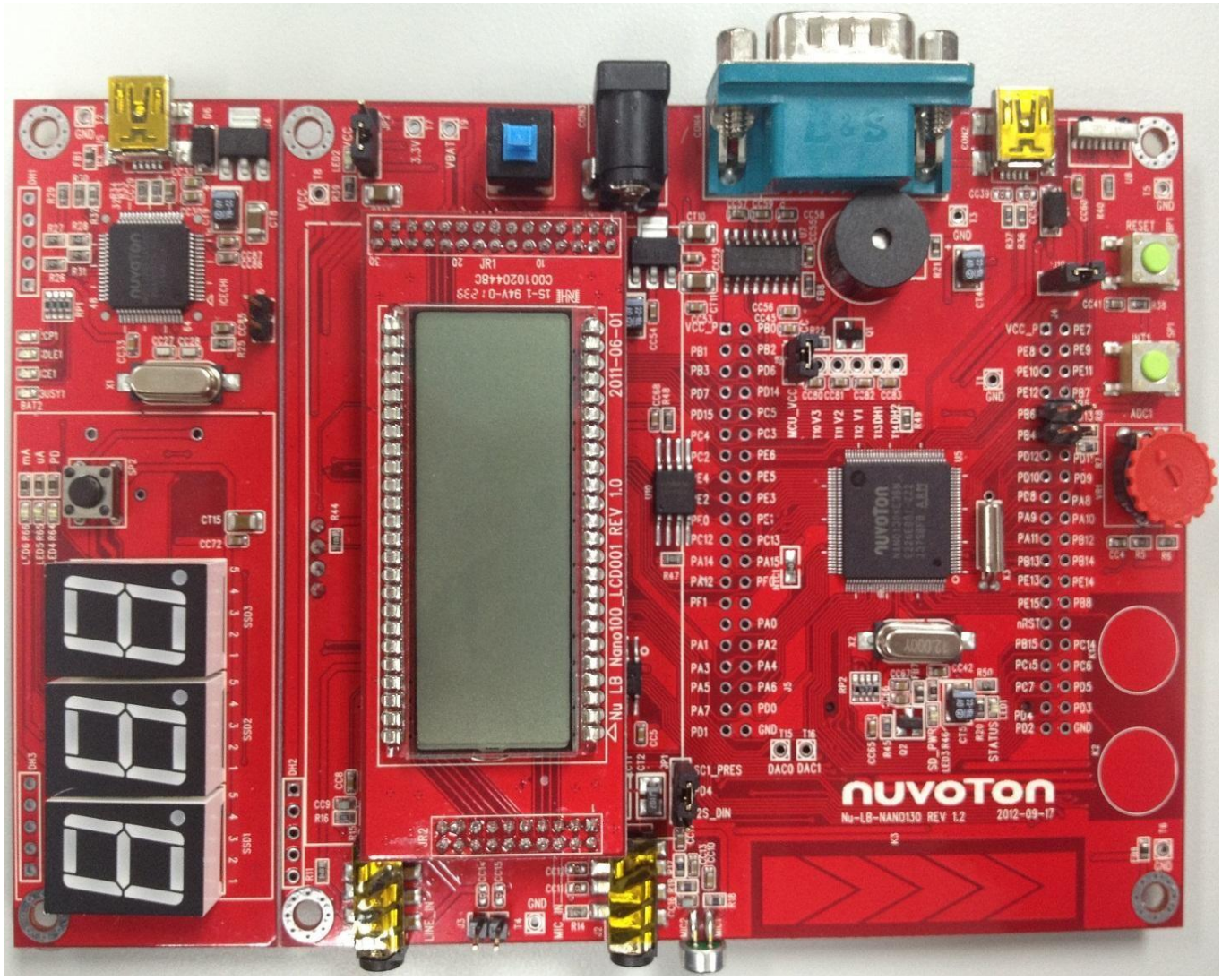
Part No.	Flash	SRAM	Data Flash Shared AP ROM	LDROM ISP Flash	I/O	Timer	Connectivity				I2S	PWM	12-bit ADC	RTC	EBI	IRC 10KHz 12MHz	PDMA	LCD	12-bit DAC	Smart Card	Touch Key	ISP ICP	Package
							UART	SPI	I2C	USB													
NANO130SC2BN	32K	8K	Configurable	4K	up to 47	4x32-bit	5	3	2	1	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO130SD2BN	64K	8K	Configurable	4K	up to 47	4x32-bit	5	3	2	1	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO130SD3BN	64K	16K	Configurable	4K	up to 47	4x32-bit	5	3	2	1	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO130SE3BN	128K	16K	Configurable	4K	up to 47	4x32-bit	5	3	2	1	1	7	7	V	-	V	8	4x31, 6x29	2	3	8	V	LQFP64
NANO130KC2BN	32K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128
NANO130KD2BN	64K	8K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128
NANO130KD3BN	64K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128
NANO130KE3BN	128K	16K	Configurable	4K	up to 86	4x32-bit	5	3	2	1	1	8	8	V	V	V	8	4x40, 6x38	2	3	16	V	LQFP128

1.2 Các đặc điểm dòng Nano100 Series

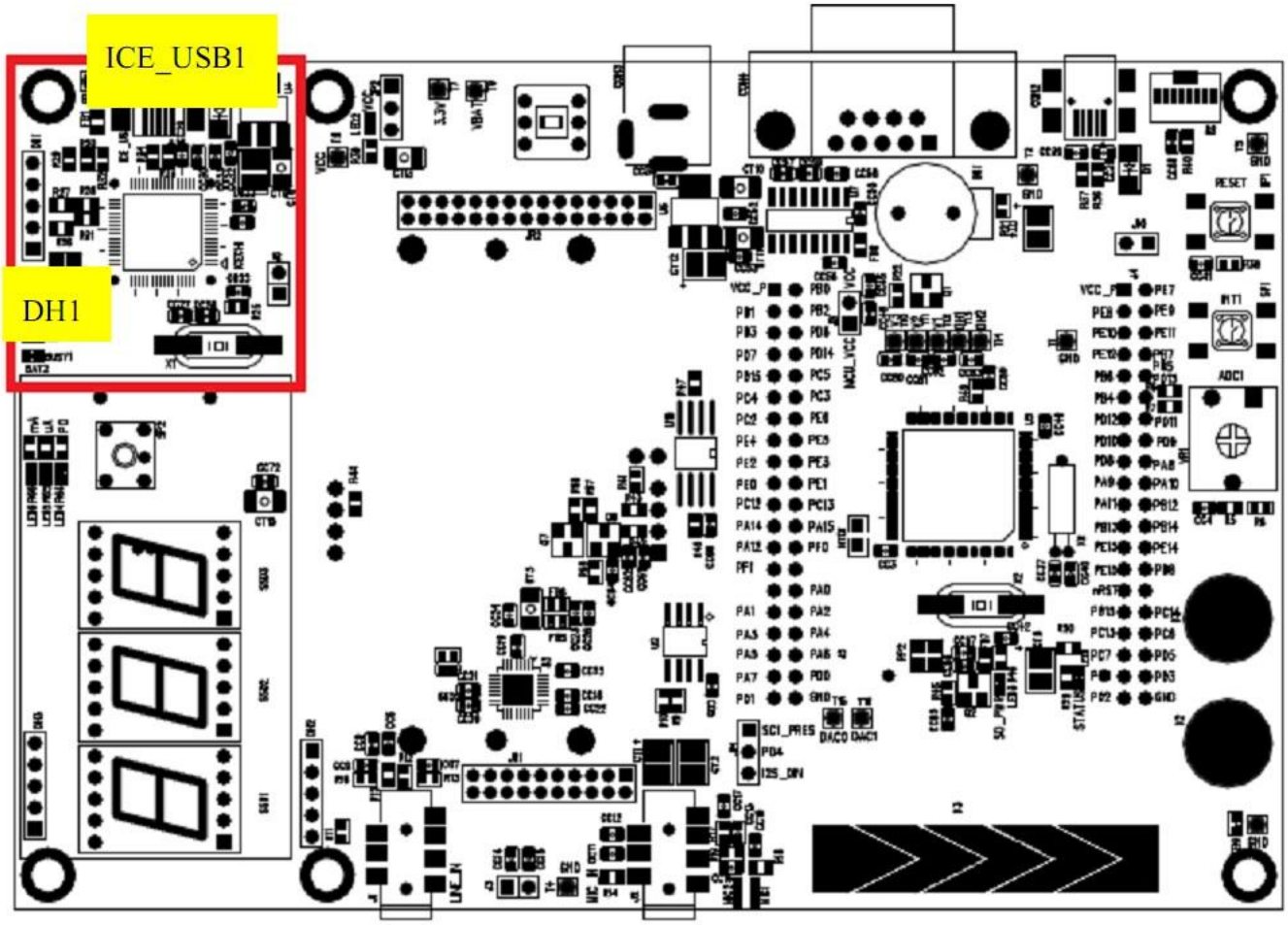
Dòng Nano130 là mang đầy đủ tính năng của dòng Nano100 Series:

- ✓ Dải điện áp hoạt động thấp: 1.8 ~ 3.6VDC
- ✓ Tần số CPU lên tới 42Mhz
- ✓ Hỗ trợ nạp ICP/ISP
- ✓ 32/64/128K Bytes bộ nhớ Flash
- ✓ 8/16K Bytes bộ nhớ SRAM
- ✓ Nhiều chân vào ra số
- ✓ 8 kênh ADC 12 bits
- ✓ 2 kênh DAC 12 bits
- ✓ Các khối giao tiếp: 2xUART, IrDA, 2xSPI, 2xI2C, I2S, USB…
- ✓ Khối điều khiển động cơ 8xPWM ✓RTC
- ✓ Hỗ trợ giao tiếp LCD 4x40 hoặc 6x38
- ✓ Hỗ trợ giao tiếp cảm ứng điện dung(Touch key)
- ✓ Hỗ trợ giao tiếp Smart Card : 3xISO-7816-3

2. BOARD NU-LB-Nano130



Hình 2.1 NU-LB-Nano130 Board



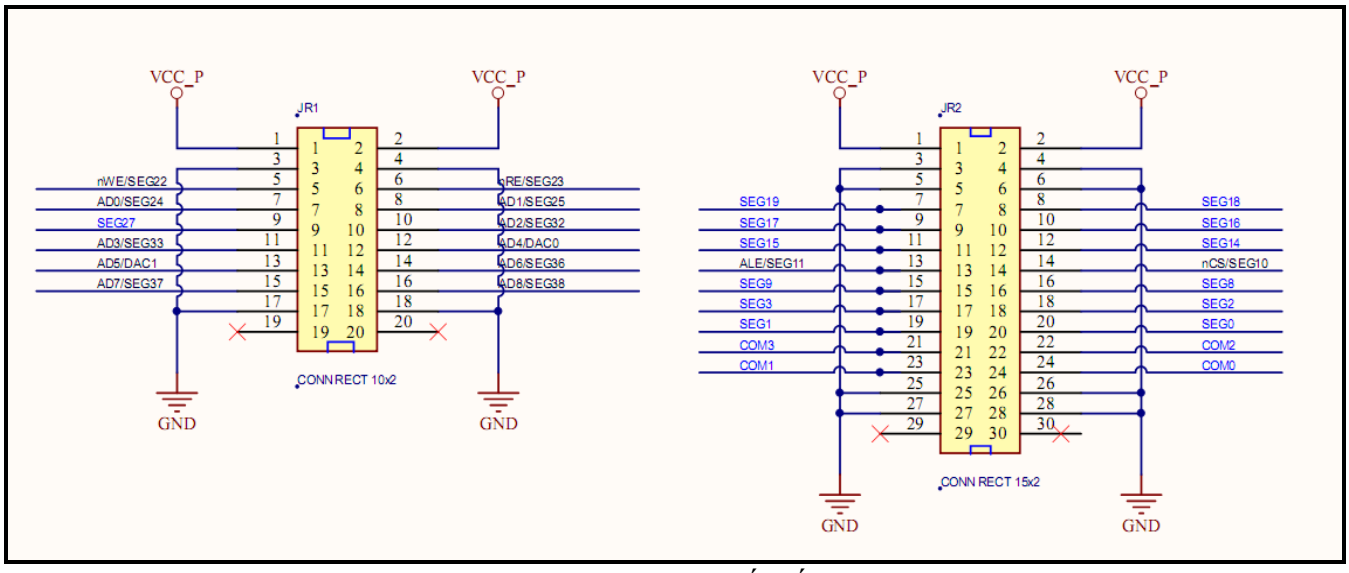
Hình 2.2 NU-LB-Nano130 PCB

Các thành phần chính:

1. **MCU**: Nano130KE3BN
2. **AUDIO**: WAU8822 audio codec
3. **I2C EEPROM**: giao tiếp với 24LC64
4. **SPI FLASH**: 25Q16 SPI serial FLASH
5. **UART**: Kết nối máy tính qua cổng UART Port0
6. **Khe cắm SD card**: Giao tiếp SPI với thẻ nhớ MMC/SD
7. **Khe cắm Smart card**: Giao tiếp qua cổng SMC Port1
8. **Mạch nạp ICE-USB**
9. **LCD connector**: Hỗ trợ moduel TN/STN LCD và TFT LCM
10. **Touch Pads**: 5-key slider và 2 key touch pads
11. **ADC, Buzz, Led 7 thanh.**
12. **Giắc nguồn DC**

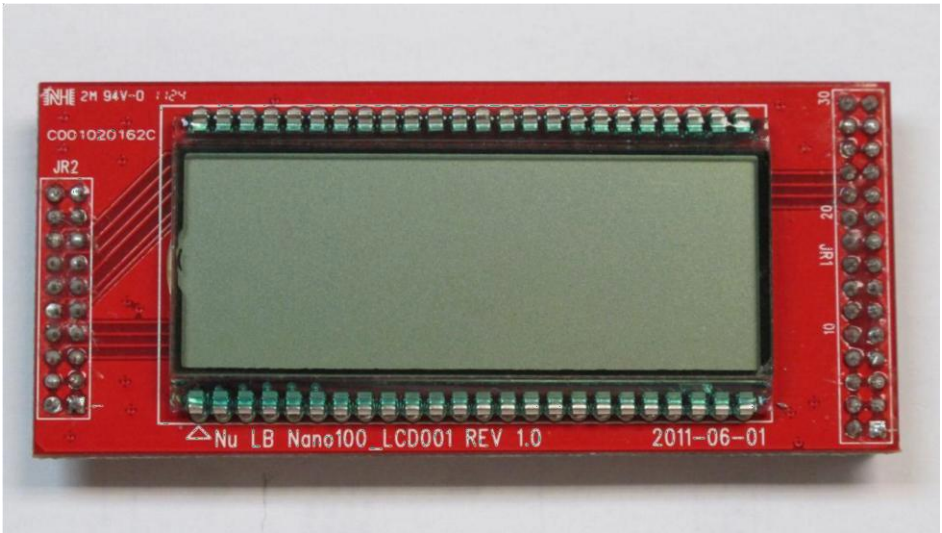
2.1 Giao tiếp LCD

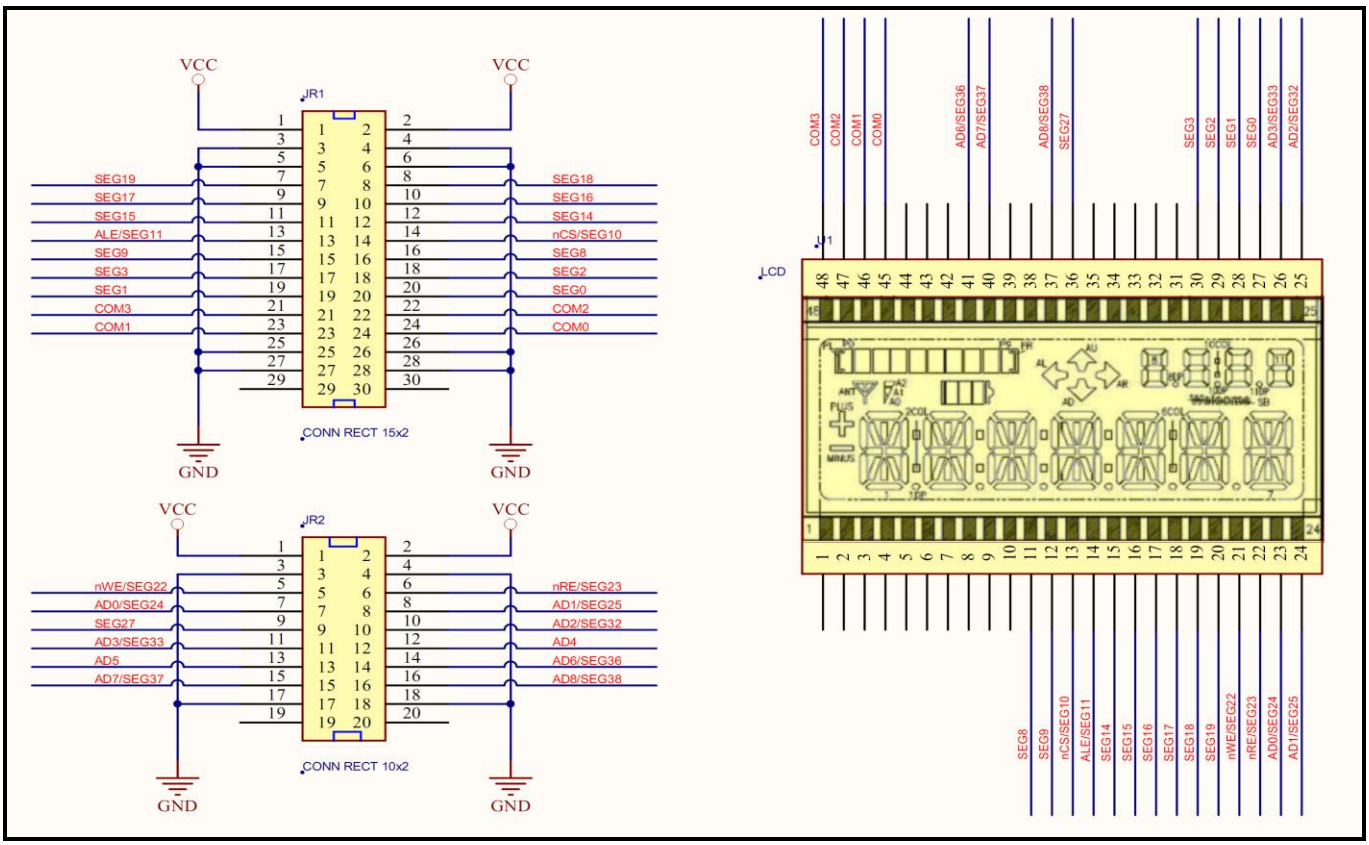
Kit NU-LB-Nano130 có sẵn connector, kết nối với module LCD glass và TFT LCD 240x320 (GFT024CA240320)



Hình 2.3 Connector kết nối LCD

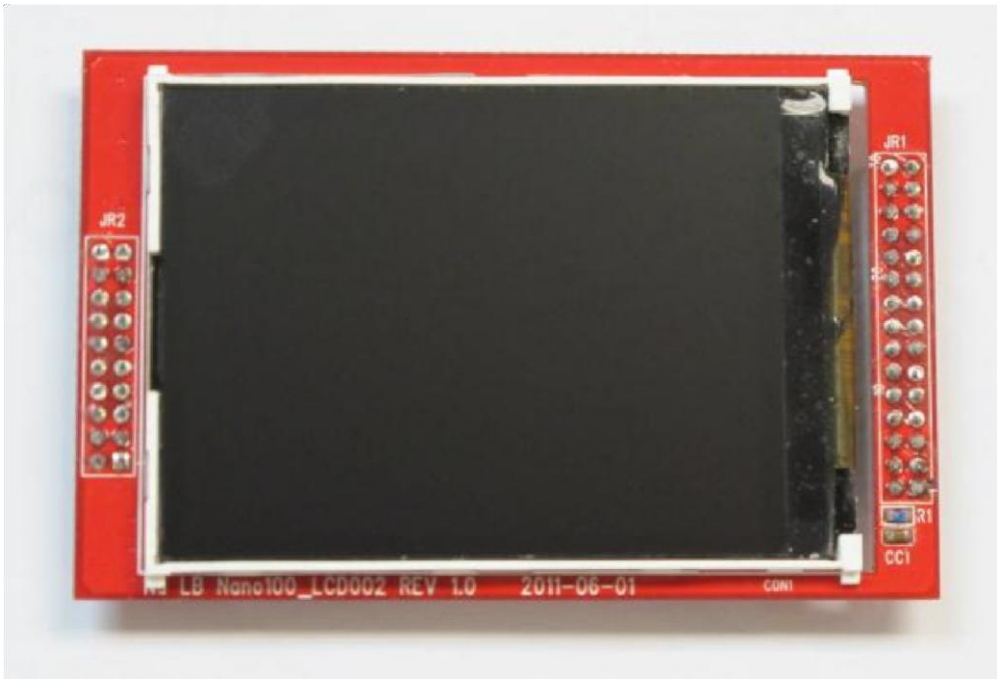
2.1.1 Board LCD glass 4x40

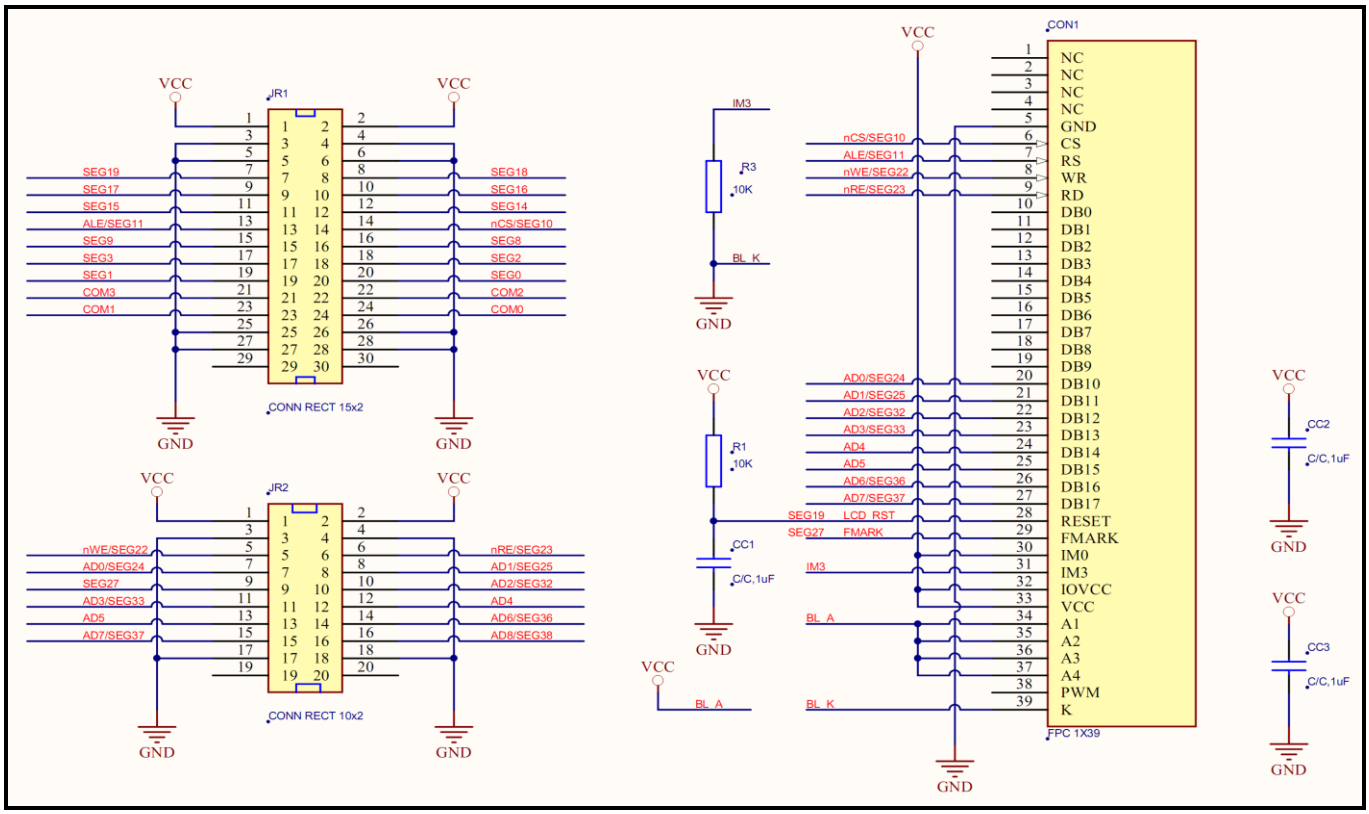




Hình 2.4 LCD glass 4x40

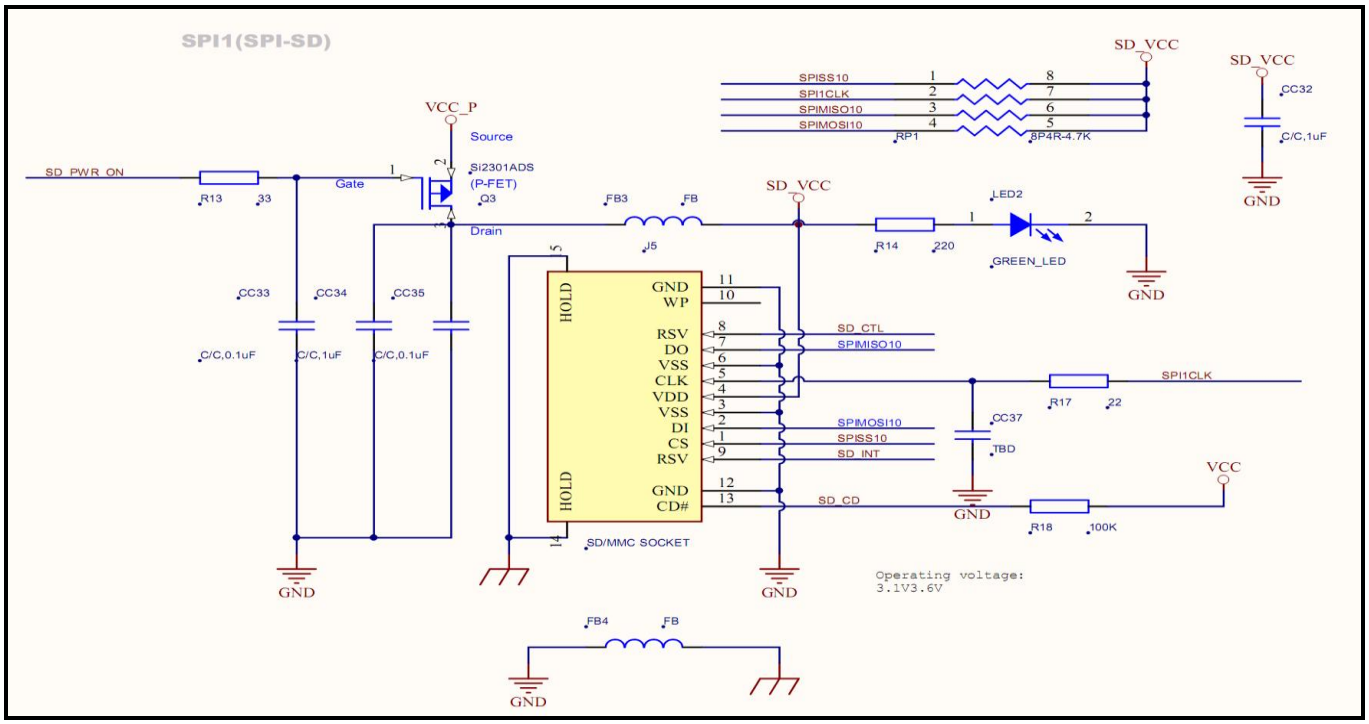
2.1.2 TFT LCD Board(GFT024CA240320)





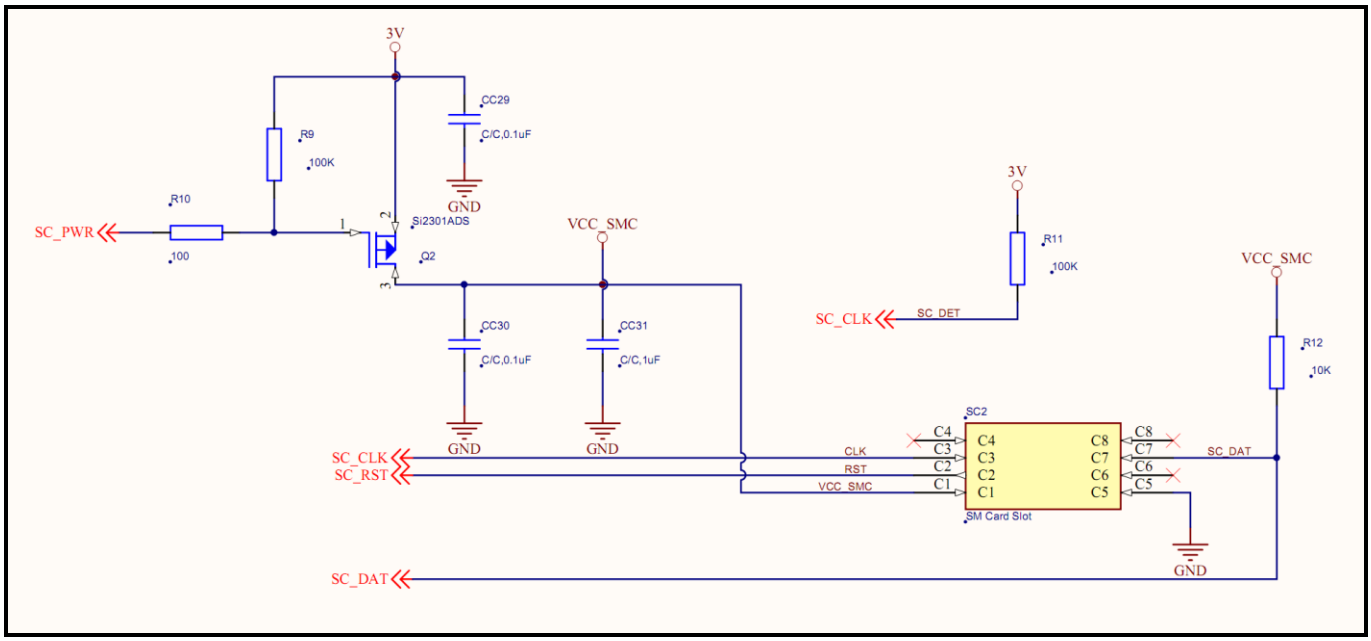
Hình 2.5 TFT LCD GFT024CA240320

2.2 Giao tiếp với thẻ nhớ SD/MMC



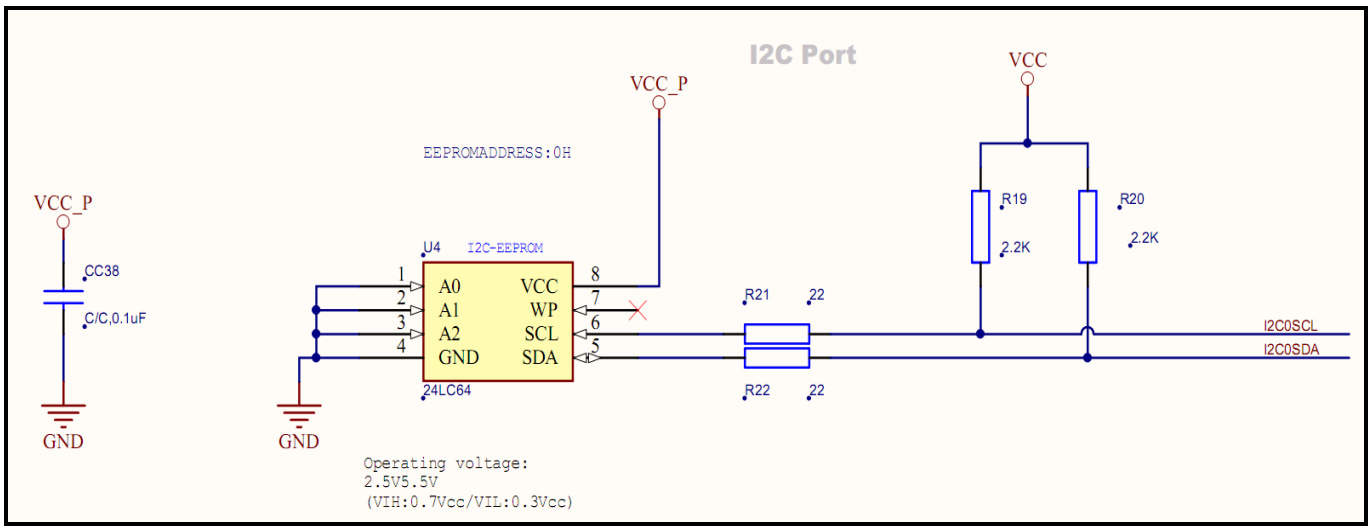
Hình 2.6 Giao tiếp SD/MMC Card

2.3 Giao tiếp với Smart Card SMC



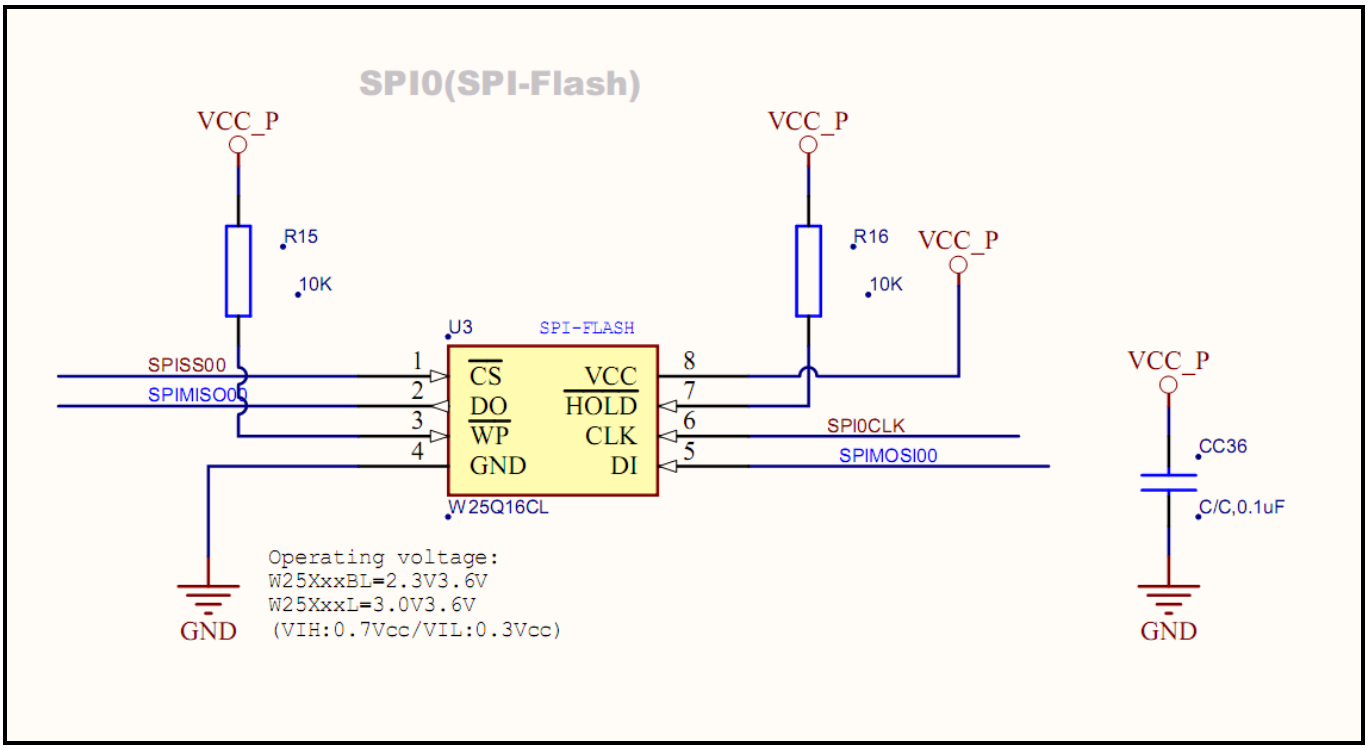
Hình 2.7 Giao tiếp Smart Card

2.4 Giao tiếp I2C với EEPROM (24LC64)



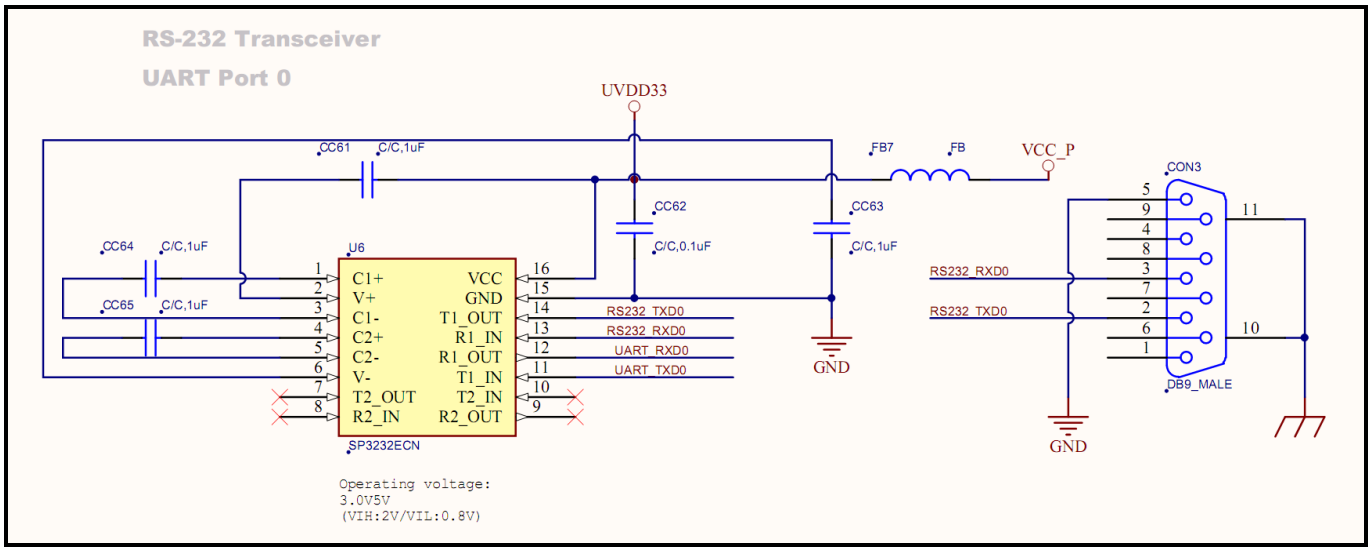
Hình 2.8 Giao tiếp 24LC64

2.5 Giao tiếp SPI với bộ nhớ FLASH (W25Q16LC)



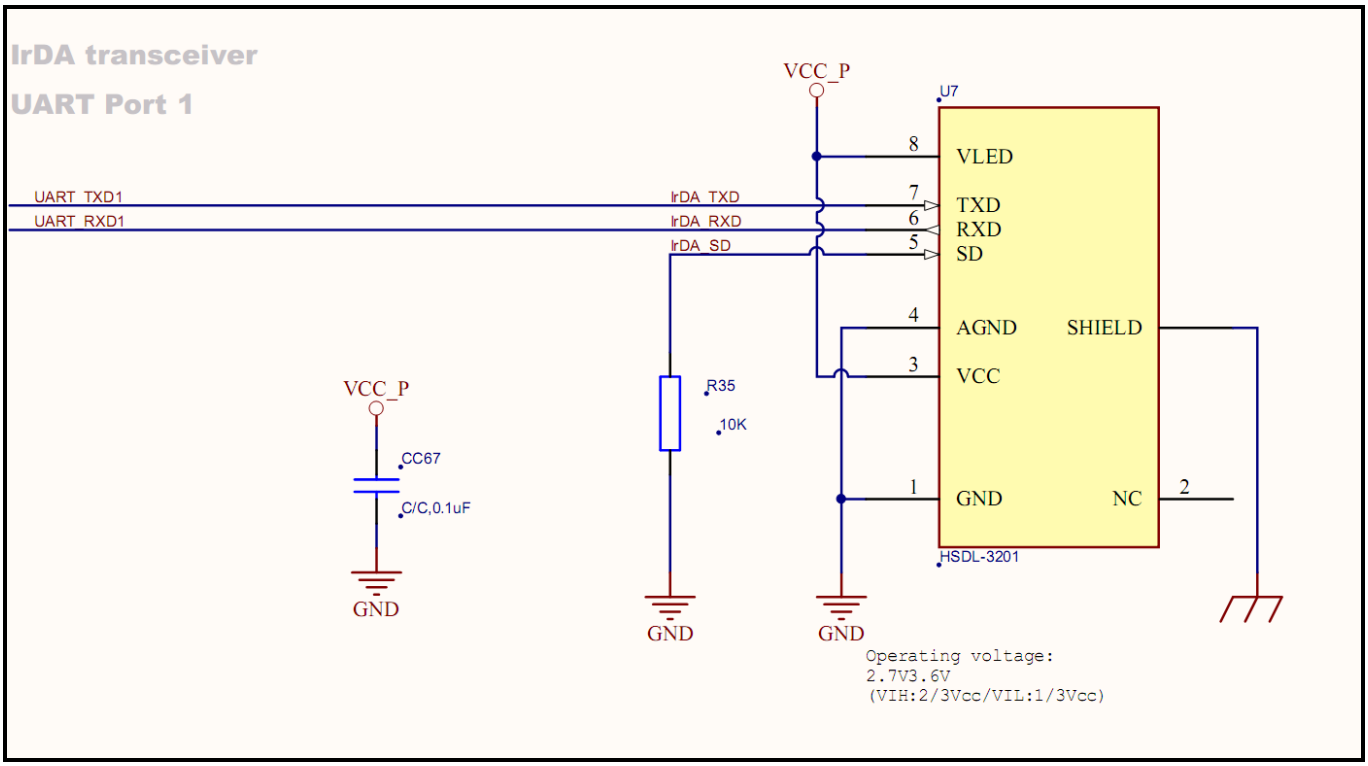
Hình 2.9 Giao tiếp W25Q16LC

2.6 Giao tiếp UART



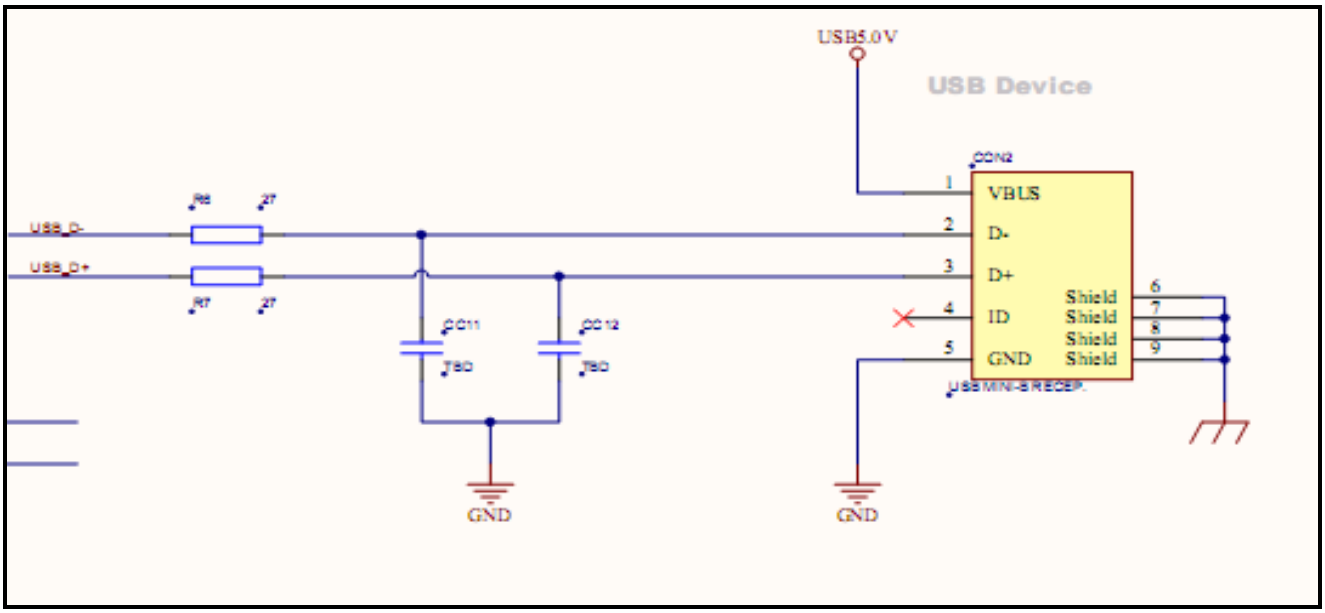
Hình 2.10 Giao tiếp UART

2.7 Giao tiếp hồng ngoại IrDA (HSDL-3201)



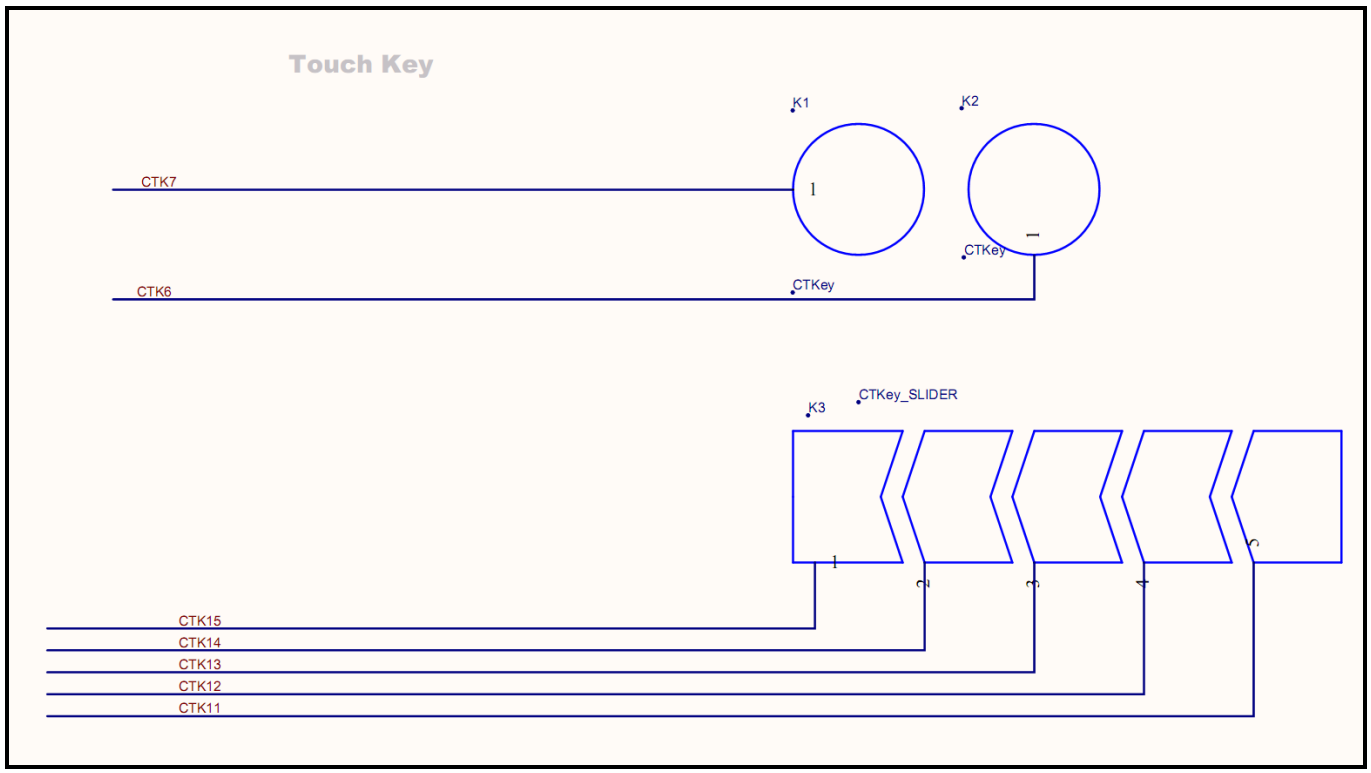
Hình 2.11 Giao tiếp HSDL-3201

2.8 Giao tiếp USB



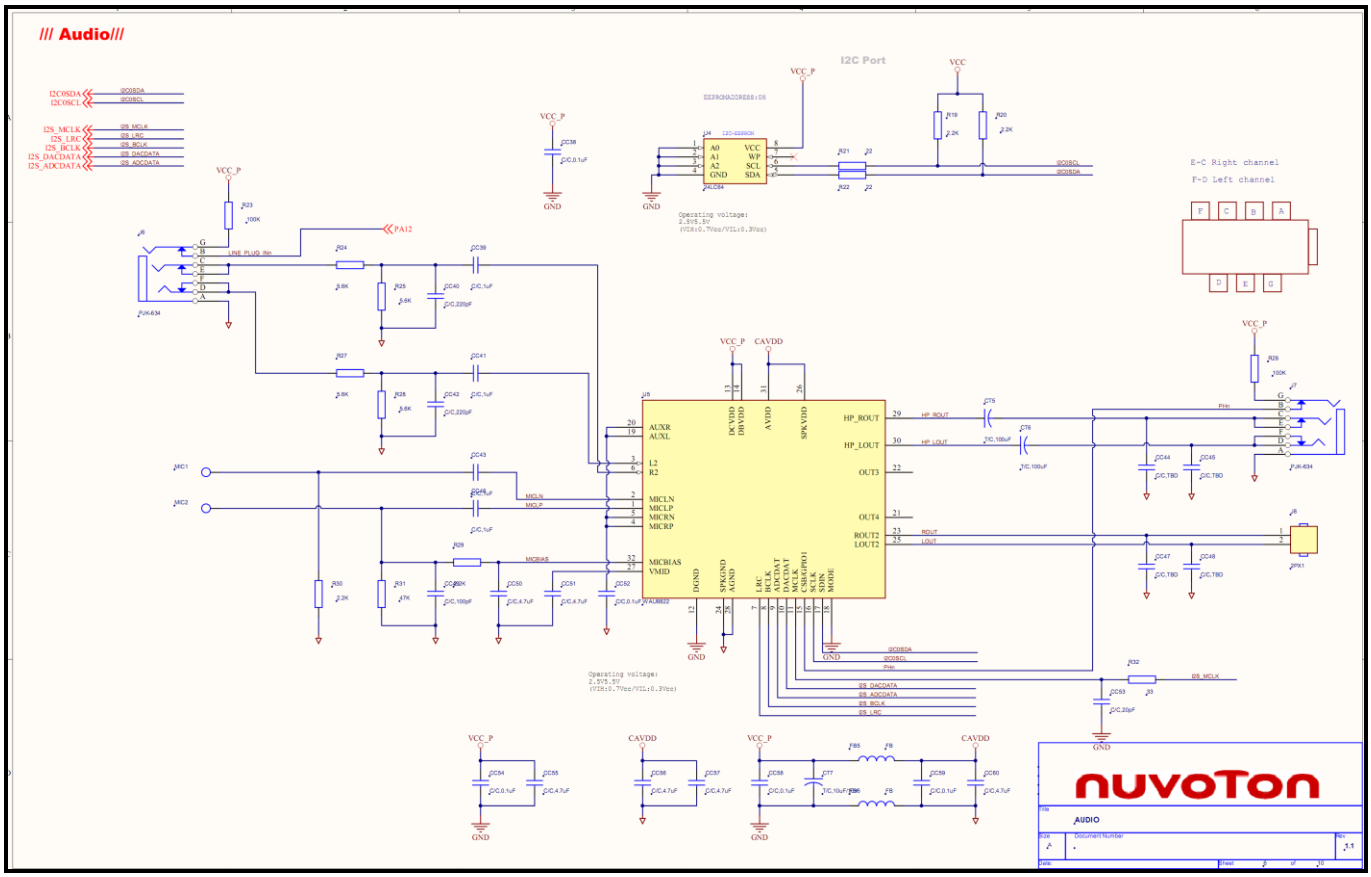
Hình 2.12 Giao tiếp USB

2.9 Giao tiếp cảm ứng điện dung (Touch Key)



Hình 2.13 Giao tiếp phím cảm ứng

2.10 Giao tiếp Audio (I2S)

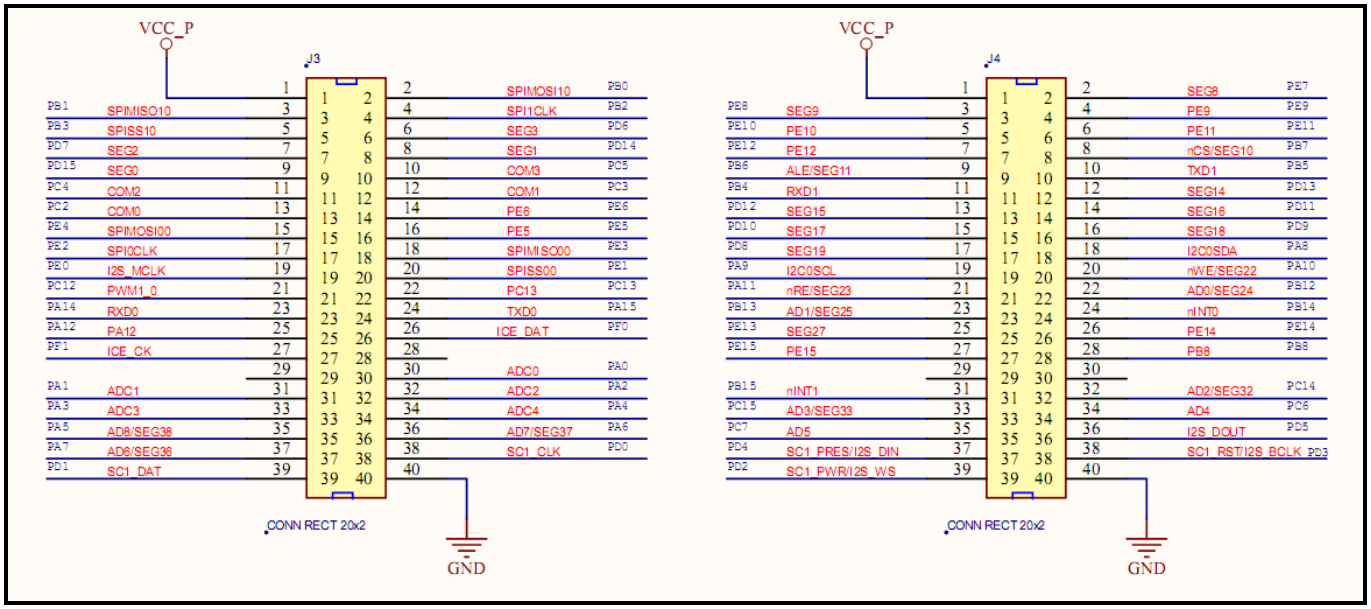


Hình 2.12 Giao tiếp Audio

3. Chân cắm mở rộng và bảng chức năng các chân I/O

3.1 Chân cắm mở rộng

Hai connector mở rộng J3, J4 nối với các chân tín IO của MCU Nano130KE3BN giúp người sử có thể dễ dàng kết nối, điều khiển các module bên ngoài sử dụng KIT NU-LB-Nano130



Hình 3.1 Connecter mở rộng

3.2 Bảng chức năng các chân I/O

Pin No.	Pin Name	Pin Type	Description
1	PE.13	I/O	General purpose digital I/O pin
	LCD_SEG27	O	LCD segment output 27 at LQFP128
2	PB.14	I/O	General purpose digital I/O pin

Pin No.	Pin Name	Pin Type	Description
	INT0	I	External interrupt0 input pin
	SC2_CD	I	SmartCard2 card detect
	SPI2_SS1	O	SPI2 2nd slave select pin
	LCD_SEG12	O	LCD segment output 12 at LQFP64
	LCD_SEG26	O	LCD segment output 26 at LQFP128
3	PB.13	I/O	General purpose digital I/O pin
	EBI_AD1	I/O	EBI Address/Data bus bit1
	LCD_SEG11	O	LCD segment output 11 at LQFP64
	LCD_SEG25	O	LCD segment output 25 at LQFP128
4	PB.12	I/O	General purpose digital I/O pin
	EBI_AD0	I/O	EBI Address/Data bus bit0
	CLKO	O	Frequency Divider output pin
	LCD_SEG10	O	LCD segment output 10 at LQFP64
	LCD_SEG24	O	LCD segment output 24 at LQFP128
5			NC
6	X32O	O	External 32.768 kHz crystal output pin
7	X32I	I	External 32.768 kHz crystal input pin
8			NC
9	PA.11	I/O	General purpose digital I/O pin
	I2C1_SCL	I/O	I2C 1 clock pin

Pin No.	Pin Name	Pin Type	Description
	EBI_nRD	O	EBI read enable output pin
	SC0_RST	O	SmartCard0 RST pin
	SPI2_MOSI0	I/O	SPI2 1st MOSI (Master Out, Slave In) pin
	LCD_SEG9	O	LCD segment output 9 at LQFP64
	LCD_SEG23	O	LCD segment output 23 at LQFP128
10	PA.10	I/O	General purpose digital I/O pin
	I2C1_SDA	I/O	I2C 1 data I/O pin
	EBI_nWR	O	EBI write enable output pin
	SC0_PWR	O	SmartCard0 Power pin
	SPI2_MISO0	I/O	SPI2 1st MISO (Master In, Slave Out) pin
	LCD_SEG8	O	LCD segment output 8 at LQFP64
	LCD_SEG22	O	LCD segment output 22 at LQFP128
11	PA.9	I/O	General purpose digital I/O pin
	I2C0_SCL	I/O	I2C 0 clock pin
	SC0_DAT	I/O	SmartCard0 DATA pin
	SPI2_CLK	O	SPI2 serial clock pin
	LCD_SEG7	O	LCD segment output 7 at LQFP64
	LCD_SEG21	O	LCD segment output 21 at LQFP128
12	PA.8	I/O	General purpose digital I/O pin
	I2C0_SDA	I/O	I2C 0 data I/O pin

Pin No.	Pin Name	Pin Type	Description
	SC0_CLK	O	SmartCard0 clock pin
	SPI2_SS0	O	SPI2 1st slave select pin
	LCD_SEG6	O	LCD segment output 6 at LQFP64
	LCD_SEG20	O	LCD segment output 20 at LQFP128
13	PD.8	I/O	General purpose digital I/O pin
	LCD_SEG19	O	LCD segment output 19 at LQFP128
14	PD.9	I/O	General purpose digital I/O pin
	LCD_SEG18	O	LCD segment output 18 at LQFP128
15	PD.10	I/O	General purpose digital I/O pin
	LCD_SEG17	O	LCD segment output 17 at LQFP128
16	PD.11	I/O	General purpose digital I/O pin
	LCD_SEG16	O	LCD segment output 16 at LQFP128
17	PD.12	I/O	General purpose digital I/O pin
	LCD_SEG15	O	LCD segment output 15 at LQFP128
18	PD.13	I/O	General purpose digital I/O pin
	LCD_SEG14	O	LCD segment output 14 at LQFP128
19	PB.4	I/O	General purpose digital I/O pin
	UART1_RXD	I	UART1 Data receiver input pin
	SC0_CD	I	SmartCard0 card detect pin
	SPI2_SS0	O	SPI2 1st slave select pin

Pin No.	Pin Name	Pin Type	Description
	LCD_SEG5	O	LCD segment output 5 at LQFP64
	LCD_SEG13	O	LCD segment output 13 at LQFP128
20	PB.5	I/O	General purpose digital I/O pin
	UART1_TXD	O	UART1 Data transmitter output pin
	SC0_RST	O	SmartCard0 RST pin
	SPI2_CLK	O	SPI2 serial clock pin
	LCD_SEG4	O	LCD segment output 4 at LQFP64
	LCD_SEG12	O	LCD segment output 12 at LQFP128
21	PB.6	I/O	General purpose digital I/O pin
	UART1_nRTS	O	UART1 Request to Send output pin
	EBI_ALE	O	EBI address latch enable output pin
	SPI2_MISO0	I/O	SPI2 2nd MISO (Master In, Slave Out) pin
	LCD_SEG3	O	LCD segment output 3 at LQFP64
	LCD_SEG11	O	LCD segment output 11 at LQFP128
22	PB.7	I/O	General purpose digital I/O pin
	UART1_nCTS	I	UART1 Clear to Send input pin
	EBI_nCS	O	EBI chip select enable output pin
	SPI2_MOSI0	I/O	SPI2 1st MOSI (Master Out, Slave In) pin
	LCD_SEG2	O	LCD segment output 2 at LQFP64
	LCD_SEG10	O	LCD segment output 10 at LQFP128

Pin No.	Pin Name	Pin Type	Description
23			NC
24	LDO_CAP	P	LDO output pin
25			NC
26			NC
27	VDD	P	Power supply for I/O ports and LDO source
28			NC
29	VSS	P	Ground
30	VSS	P	Ground
31	VSS	P	Ground
32	VSS	P	Ground
33	PE.12	I/O	General purpose digital I/O pin
34	PE.11	I/O	General purpose digital I/O pin
35	PE.10	I/O	General purpose digital I/O pin
36	PE.9	I/O	General purpose digital I/O pin
37	PE.8	I/O	General purpose digital I/O pin
	LCD_SEG9	O	LCD segment output 9 at LQFP128
38	PE.7	I/O	General purpose digital I/O pin
	LCD_SEG8	O	LCD segment output 8 at LQFP128
39			NC
40	USB_VBUS	USB	POWER SUPPLY: From USB Host or HUB.

Pin No.	Pin Name	Pin Type	Description
41	USB_VDD33_CAP	USB	Internal Power Regulator Output 3.3V Decoupling Pin
42	USB_D-	USB	USB Differential Signal D-
43	USB_D+	USB	USB Differential Signal D+
44	PB.0	I/O	General purpose digital I/O pin
	UART0_RXD	I	UART0 Data receiver input pin
	SPI1_MOSI0	I/O	SPI1 1st MOSI (Master Out, Slave In) pin
	LCD_SEG1	O	LCD segment output 1 at LQFP64
	LCD_SEG7	O	LCD segment output 7 at LQFP128
45	PB.1	I/O	General purpose digital I/O pin
	UART0_TXD	O	UART0 Data transmitter output pin
	SPI1_MISO0	I/O	SPI1 1st MISO (Master In, Slave Out) pin
	LCD_SEG0	O	LCD segment output 0 at LQFP64
	LCD_SEG6	O	LCD segment output 6 at LQFP128
46	PB.2	I/O	General purpose digital I/O pin
	UART0_nRTS	O	UART0 Request to Send output pin
	EBI_nWRL	O	EBI low byte write enable output pin
	SPI1_CLK	O	SPI1 serial clock pin
	LCD_COM3	O	LCD common output 3 at LQFP64
	LCD_SEG5	O	LCD segment output 5 at LQFP128
47	PB.3	I/O	General purpose digital I/O pin

Pin No.	Pin Name	Pin Type	Description
	UART0_nCTS	I	UART0 Clear to Send input pin
	EBI_nWRH	O	EBI high byte write enable output pin
	SPI1_SS0	O	SPI1 1st slave select pin
	LCD_COM2	O	LCD common output 2 at LQFP64
	LCD_SEG4	O	LCD segment output 4 at LQFP128
48	PD.6	I/O	General purpose digital I/O pin
	LCD_SEG3	O	LCD segment output 3 at LQFP128
49	PD.7	I/O	General purpose digital I/O pin
	LCD_SEG2	O	LCD segment output 2 at LQFP128
50	PD.14	I/O	General purpose digital I/O pin
	LCD_SEG1	O	LCD segment output 1 at LQFP128
51	PD.15	I/O	General purpose digital I/O pin
	LCD_SEG0	O	LCD segment output 0 at LQFP128
52	PC.5	I/O	General purpose digital I/O pin
	SPI0_MOSI1	O	SPI0 2nd MOSI (Master Out, Slave In) pin
	LCD_COM3	O	LCD common output 3 at LQFP128
53	PC.4	I/O	General purpose digital I/O pin
	SPI0_MISO1	I	SPI0 2nd MISO (Master In, Slave Out) pin
	LCD_COM2	O	LCD common output 2 at LQFP128
54	PC.3	I/O	General purpose digital I/O pin

Pin No.	Pin Name	Pin Type	Description
	SPI0_MOSI0	O	SPI0 1st MOSI (Master Out, Slave In) pin
	I2S_DO	O	I2S data output
	SC1_RST	O	SmartCard1 RST pin
	LCD_COM1	O	LCD common output 1 at LQFP64
	LCD_COM1	O	LCD common output 1 at LQFP128
55	PC.2	I/O	General purpose digital I/O pin
	SPI0_MISO0	I	SPI0 1st MISO (Master In, Slave Out) pin
	I2S_DI	I	I2S data input
	SC1_PWR	O	SmartCard1 PWR pin
	LCD_COM0	O	LCD common output 0 at LQFP64
	LCD_COM0	O	LCD common output 0 at LQFP128
56	PC.1	I/O	General purpose digital I/O pin
	SPI0_CLK	I/O	SPI0 serial clock pin
	I2S_BCLK	I/O	I2S bit clock pin
	SC1_DAT	I/O	SmartCard1 DATA pin
	LCD_DH2	O	LCD external capacitor pin of charge pump circuit at LQFP64
	LCD_DH2	O	LCD external capacitor pin of charge pump circuit at LQFP128
57	PC.0	I/O	General purpose digital I/O pin
	SPI0_SS0	I/O	SPI0 1st slave select pin

Pin No.	Pin Name	Pin Type	Description
	I2S_LRCLK	I/O	I2S left right channel clock
	SC1_CLK	O	SmartCard1 clock pin
	LCD_DH1	O	LCD external capacitor pin of charge pump circuit at LQFP64
	LCD_DH1	O	LCD external capacitor pin of charge pump circuit at LQFP128
58	PE.6	I/O	General purpose digital I/O pin
59	LCD_VLCD	AO	LCD power supply pin
60			NC
61	PE.5		General purpose digital I/O pin
62	PB.11	I/O	General purpose digital I/O pin
	PWM1_CH0	I/O	PWM1 Channel0 output
	TM3	O	Timer3 external counter input
	SC2_DAT	I/O	SmartCard2 DATA pin
	SPI0_MISO0	I/O	SPI0 1st MISO (Master In, Slave Out) pin
	LCD_V1	O	LCD Unit voltage for LCD charge pump circuit at LQFP64
	LCD_V1	O	LCD Unit voltage for LCD charge pump circuit at LQFP128
63	PB.10	I/O	General purpose digital I/O pin
	SPI0_SS1	I/O	SPI0 2nd slave select pin
	TM2	O	Timer2 external counter input

Pin No.	Pin Name	Pin Type	Description
	SC2_CLK	O	SmartCard2 clock pin
	SPI0_MOSI0	I/O	SPI0 1st MOSI (Master Out, Slave In) pin
	LCD_V2	O	LCD driver biasing voltage at LQFP64
	LCD_V2	O	LCD driver biasing voltage at LQFP128
64	PB.9	I/O	General purpose digital I/O pin
	SPI1_SS1	I/O	SPI1 2nd slave select pin
	TM1	O	Timer1 external counter input
	SC2_RST	O	SmartCard2 RST pin
	INT0	I	External interrupt0 input pin
	LCD_V3	O	LCD driver biasing voltage at LQFP64
	LCD_V3	O	LCD driver biasing voltage at LQFP128
65	PE.4	I/O	General purpose digital I/O pin
	SPI0_MOSI0	I/O	SPI0 1st MOSI (Master Out, Slave In) pin
66	PE.3	I/O	General purpose digital I/O pin
	SPI0_MISO0	I/O	SPI0 1st MISO (Master In, Slave Out) pin
67	PE.2	I/O	General purpose digital I/O pin
	SPI0_CLK	O	SPI0 serial clock pin
68	PE.1	I/O	General purpose digital I/O pin
	PWM1_CH3	I/O	PWM1 Channel3 output
	SPI0_SS0	O	SPI0 1st slave select pin

Pin No.	Pin Name	Pin Type	Description
69	PE.0	I/O	General purpose digital I/O pin
	PWM1_CH2	I/O	PWM1 Channel2 output
	I2S_MCLK	O	I2S master clock output pin
70	PC.13	I/O	General purpose digital I/O pin
	SPI1_MOSI1	O	SPI1 2nd MOSI (Master Out, Slave In) pin
	PWM1_CH1	O	PWM1 Channel1 output
	SNOOPER	I	Snooper pin
	INT0	I	External interrupt 0 input pin
	I2C0_SCL	O	I2C 0 clock pin
71	PC.12	I/O	General purpose digital I/O pin
	SPI1_MISO1	I	SPI1 2nd MISO (Master In, Slave Out) pin
	PWM1_CH0	O	PWM1 Channel0 output
	INT0	I	External interrupt0 input pin
	I2C0_SDA	I/O	I2C 0 data I/O pin
72	PC.11	I/O	General purpose digital I/O pin
	SPI1_MOSI0	O	SPI1 1st MOSI (Master Out, Slave In) pin
	UART1_TXD	O	UART1 Data transmitter output pin
	CTK15	I	Touch key 15
	LCD_SEG31	O	LCD segment output 31 at LQFP64
73	PC.10	I/O	General purpose digital I/O pin

Pin No.	Pin Name	Pin Type	Description
	SPI1_MISO0	I	SPI1 1st MISO (Master In, Slave Out) pin
	UART1_RXD	I	UART1 Data receiver input pin
	CTK14	I	Touch key 14
	LCD_SEG30	O	LCD segment output 30 at LQFP64
74	PC.9	I/O	General purpose digital I/O pin
	SPI1_CLK	I/O	SPI1 serial clock pin
	I2C1_SCL	I/O	I2C 1 clock pin
	CTK13	I	Touch key 13
	LCD_SEG29	O	LCD segment output 29 at LQFP64
75	PC.8	I/O	General purpose digital I/O pin
	SPI1_SS0	I/O	SPI1 1st slave select pin
	EBI_MCLK	O	EBI external clock output pin
	I2C1_SDA	I/O	I2C 1 data I/O pin
	CTK12	I	Touch key 12
	LCD_SEG28	O	LCD segment output 28 at LQFP64
76	PA.15	I/O	General purpose digital I/O pin
	PWM0_CH3	I/O	PWM0 Channel3 output
	I2S_MCLK	O	I2S master clock output pin
	TC3	I	Timer3 capture input
	SC0_PWR	O	SmartCard0 Power pin

Pin No.	Pin Name	Pin Type	Description
	UART0_TXD	O	UART0 Data transmitter output pin
	LCD_SEG27	O	LCD segment output 27 at LQFP64
77	PA.14	I/O	General purpose digital I/O pin
	PWM0_CH2	I/O	PWM0 Channel2 output
	EBI_AD15	I/O	EBI Address/Data bus bit15
	TC2	I	Timer 2 capture input
	UART0_RXD	I	UART0 Data receiver input pin
	LCD_SEG26	O	LCD segment output 26 at LQFP64
78	PA.13	I/O	General purpose digital I/O pin
	PWM0_CH1	I/O	PWM0 Channel1 output
	EBI_AD14	I/O	EBI Address/Data bus bit14
	TC1	I	Timer1 capture input
	I2C0_SCL	I/O	I2C 0 clock pin
	CTK11	I	Touch key 11
	LCD_SEG25	O	LCD segment output 25 at LQFP64
79	PA.12	I/O	General purpose digital I/O pin
	PWM0_CH0	I/O	PWM0 Channel0 output
	EBI_AD13	I/O	EBI Address/Data bus bit13
	TC0	I	Timer 0 capture input
	I2C0_SDA	I/O	I2C 0 data I/O pin

Pin No.	Pin Name	Pin Type	Description
	CTK10	I	Touch key 10
	LCD_SEG24	O	LCD segment output 24 at LQFP64
80	ICE_DAT	I/O	Serial Wired Debugger Data pin
	PF.0	I/O	General purpose digital I/O pin
	INT0	I	External interrupt0 input pin
81	ICE_CLK	I	Serial Wired Debugger Clock pin
	PF.1	I/O	General purpose digital I/O pin
	CLKO	O	Frequency Divider output pin
	INT1	I	External interrupt1 input pin
82			NC
83	VDD	P	Power supply for I/O ports and LDO source for internal PLL and digital circuit
84			NC
85	VSS	P	Ground
86	VSS	P	Ground
87	AVSS	AP	Ground Pin for analog circuit
88	AVSS	AP	Ground Pin for analog circuit
89	PA.0	I/O	General purpose digital I/O pin
	AD0	AI	ADC analog input0
	SC2_CD	I	SmartCard2 card detect
	CTK8	AI	Touch key 1

Pin No.	Pin Name	Pin Type	Description
90	PA.1	I/O	General purpose digital I/O pin
	AD1	AI	ADC analog input1
	EBI_AD12	I/O	EBI Address/Data bus bit12
	CTK9	AI	Touch key 9
91	PA.2	I/O	General purpose digital I/O pin
	AD2	AI	ADC analog input2
	EBI_AD11	I/O	EBI Address/Data bus bit11
	UART1_RXD	I	UART1 Data receiver input pin
	LCD_SEG23	AO	LCD segment output 23 at LQFP64
92	PA.3	I/O	General purpose digital I/O pin
	AD3	AI	ADC analog input3
	EBI_AD10	I/O	EBI Address/Data bus bit10
	UART1_TXD	O	UART1 Data transmitter output pin
	LCD_SEG22	AO	LCD segment output 22 at LQFP64
93	PA.4	I/O	General purpose digital I/O pin
	AD4	AI	ADC analog input4
	EBI_AD9	I/O	EBI Address/Data bus bit9
	SC2_PWR	O	SmartCard2 Power pin
	I2C0_SDA	I/O	I2C 0 data I/O pin
	LCD_SEG21	AO	LCD segment output 21 at LQFP64

Pin No.	Pin Name	Pin Type	Description
	LCD_SEG39	AO	LCD segment output 39 at LQFP128
94	PA.5	I/O	General purpose digital I/O pin
	AD5	AI	ADC analog input5
	EBI_AD8	I/O	EBI Address/Data bus bit8
	SC2_RST	O	SmartCard2 RST pin
	I2C0_SCL	I/O	I2C 0 clock pin
	LCD_SEG20	AO	LCD segment output 20 at LQFP64
	LCD_SEG38	AO	LCD segment output 38 at LQFP128
95	PA.6	I/O	General purpose digital I/O pin
	AD6	AI	ADC analog input6
	EBI_AD7	I/O	EBI Address/Data bus bit7
	TC3	I	Timer3 capture input
	SC2_CLK	O	SmartCard2 clock pin
	PWM0_CH3	O	PWM0 Channel3 output
	LCD_SEG19	AO	LCD segment output 19 at LQFP64
	LCD_SEG37	AO	LCD segment output 37 at LQFP128
96	PA.7	I/O	General purpose digital I/O pin
	AD7	AI	ADC analog input7
	EBI_AD6	I/O	EBI Address/Data bus bit6
	TC2	I	Timer2 capture input

Pin No.	Pin Name	Pin Type	Description
	SC2_DAT	I/O	SmartCard2 DATA pin
	PWM0_CH2	O	PWM0 Channel2 output
	CTK_CAP	AI	Touch key Capacitor pin
	LCD_SEG18	AO	LCD segment output 18 output at LQFP64
	LCD_SEG36	AO	LCD segment output 36 output at LQFP128
97	VREF	AP	Voltage reference input for ADC
98			NC
99	AVDD	AP	Power supply for internal analog circuit
100	PD.0	I/O	General purpose digital I/O pin
	UART1_RXD	I	UART1 Data receiver input pin
	SPI2_SS0	I/O	SPI2 2nd slave select pin
	SC1_CLK	O	SmartCard1 clock pin
	CTK0	AI	Touch key 0
	AD8	AI	ADC analog input8
101	PD.1	I/O	General purpose digital I/O pin
	TX1	O	UART1 Data transmitter output pin
	SPI2_CLK	I/O	SPI2 serial clock pin
	SC1_DAT	I/O	SmartCard1 DATA pin
	AD9	AI	ADC analog input9
	CTK1	AI	Touch key 1

Pin No.	Pin Name	Pin Type	Description
102	PD.2	I/O	General purpose digital I/O pin
	UART1_nRTS		UART1 Request to Send output pin
	I2S_LRCLK	I/O	I2S left right channel clock
	SPI2_MISO0	I	SPI2 1st MISO (Master In, Slave Out) pin
	SC1_PWR	O	SmartCard1 Power pin
	AD10	AI	ADC analog input10
	CTK2	AI	Touch key 2
103	PD.3	I/O	General purpose digital I/O pin
	UART1_nCTS		UART1 Clear to Send input pin
	I2S_BCLK	I/O	I2S bit clock pin
	SPI2_MOSI0	O	SPI2 1st MOSI (Master Out, Slave In) pin
	SC1_RST	O	SmartCard1 RST pin
	AD11	AI	ADC analog input11
	CTK3	AI	Touch key 3
104			NC
105	PD.4	I/O	General purpose digital I/O pin
	I2S_DI	I	I2S data input
	SPI2_MISO1	I	SPI2 2nd MISO (Master In, Slave Out) pin
	SC1_CD	I	SmartCard1 card detect
	CTK4	AI	Touch key 4

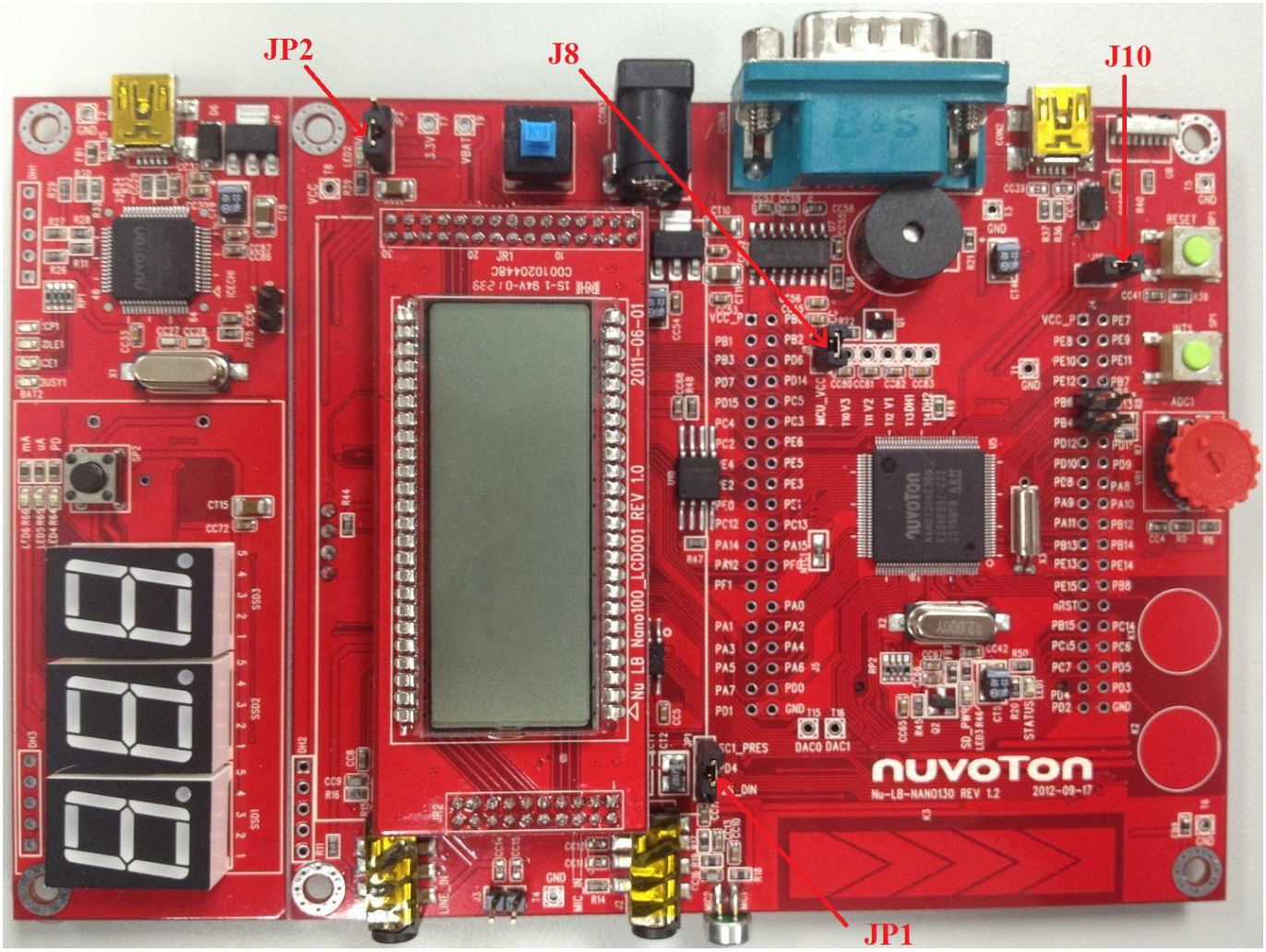
Pin No.	Pin Name	Pin Type	Description
	LCD_SEG35	AO	LCD segment output 35 at LQFP128
106	PD.5	I/O	General purpose digital I/O pin
	I2S_DO	O	I2S data output
	SPI2_MOSI1	O	SPI2 2nd MOSI (Master Out, Slave In) pin
	CTK5	AI	Touch key 5
	LCD_SEG34	AO	LCD segment output 34 at LQFP128
107	PC.7	I/O	General purpose digital I/O pin
	DA1_OUT	AO	DAC 1 output
	EBI_AD5	I/O	EBI Address/Data bus bit5
	TC1	I	Timer1 capture input
	PWM0_CH1	O	PWM1 Channel1 output
	LCD_SEG17	AO	LCD segment output 17 at LQFP64
108	PC.6	I/O	General purpose digital I/O pin
	DA0_OUT	I	DAC0 output
	EBI_AD4	I/O	EBI Address/Data bus bit4
	TC0	I	Timer 0 capture input
	SC1_CD		SmartCard1 card detect pin
	PWM0_CH0	O	PWM0 Channel0 output
109	PC.15	I/O	General purpose digital I/O pin
	EBI_AD3	I/O	EBI Address/Data bus bit3

Pin No.	Pin Name	Pin Type	Description
	TC0	I	Timer0 capture input
	PWM1_CH2	O	PWM1 Channel1 output
	LCD_SEG16	AO	LCD segment output 16 at LQFP64
	LCD_SEG33	AO	LCD segment output 33 at LQFP128
110	PC.14	I/O	General purpose digital I/O pin
	EBI_AD2	I/O	EBI Address/Data bus bit2
	PWM1_CH3	I/O	PWM1 Channel3 output
	LCD_SEG15	AO	LCD segment output 15 at LQFP64
	LCD_SEG32	AO	LCD segment output 32 at LQFP128
111	PB.15	I/O	General purpose digital I/O pin
	INT1	I	External interrupt1 input pin
	SNOOPER	I	Snooper pin
	SC1_CD	I	SmartCard1 card detect
	LCD_SEG14	AO	LCD segment output 14 at LQFP64
	LCD_SEG31	AO	LCD segment output 31 at LQFP128
112			NC
113	XT1_IN	O	External 4~24 MHz crystal output pin
114	XT1_OUT	I	External 4~24 MHz crystal input pin
115			NC

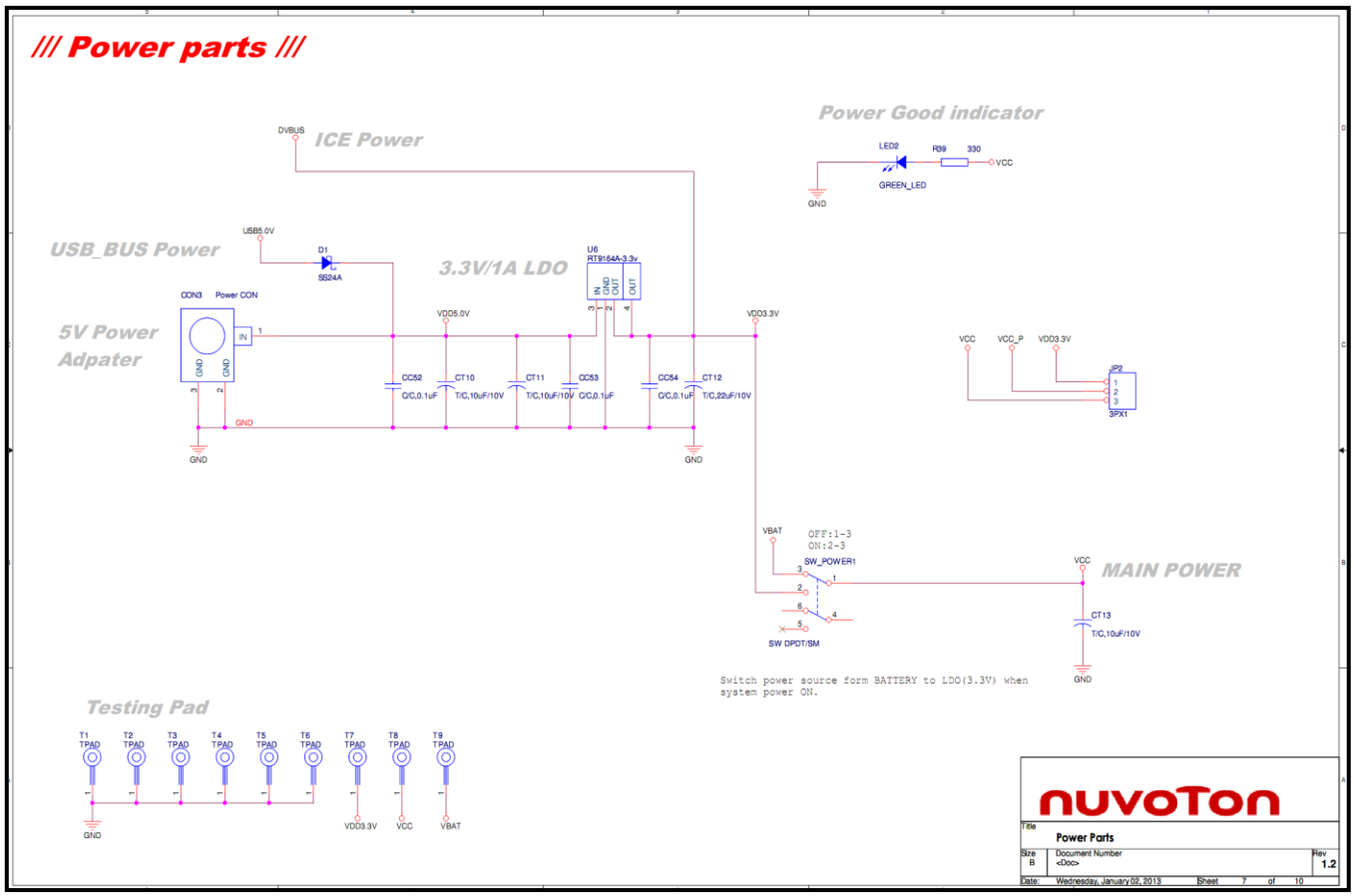
Pin No.	Pin Name	Pin Type	Description
116	nRESET	I	External reset input: Low active, set this pin low reset chip to initial state. With internal pull-up.
117	VSS	P	Ground
118	VSS	P	Ground
119			NC
120	VDD	P	Power supply for I/O ports and LDO source for internal PLL and digital circuit
121			NC
122	PF.4	I/O	General purpose digital I/O pin
	I2C0_SDA	I/O	I2C 0 data I/O pin
	CTK6	AI	Touch key 6
123	PF.5	I/O	Digital GPI/O pin
	I2C0_SCL	I/O	I2C 0 clock pin
	CTK7	AI	Touch key 7
124	VSS	P	Ground
125	PVSS	I/O	PLL Ground
126	PB.8	I/O	General purpose digital I/O pin
	STADC	I	ADC external trigger input.
	TM0	I	Timer0 external counter input
	INT0	I	External interrupt0 input pin
	SC2_PWR	O	SmartCard2 Power pin

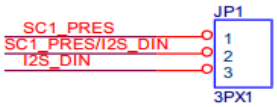
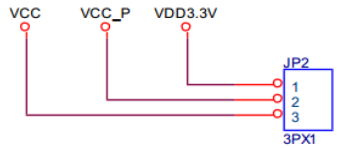
Pin No.	Pin Name	Pin Type	Description
	LCD_SEG13	AO	LCD segment output 13 at LQFP64
	LCD_SEG30	AO	LCD segment output 30 at LQFP128
127	PE.15	I/O	General purpose digital I/O pin
	LCD_SEG29	O	LCD segment output 29 at LQFP128
128	PE.14	I/O	General purpose digital I/O pin
	LCD_SEG28	O	LCD segment output 28 at LQFP128

4. Nguồn và các Jăm nối

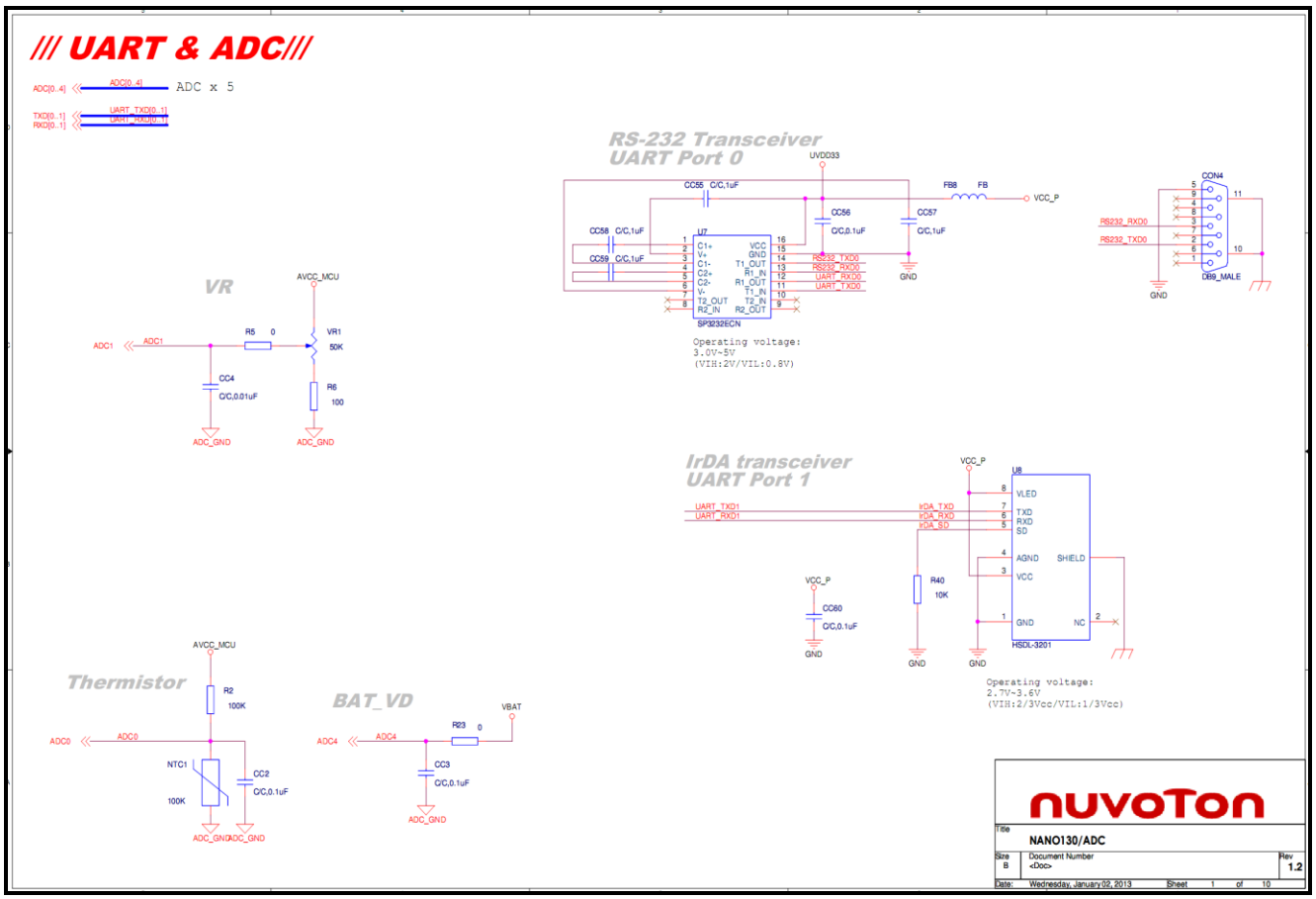


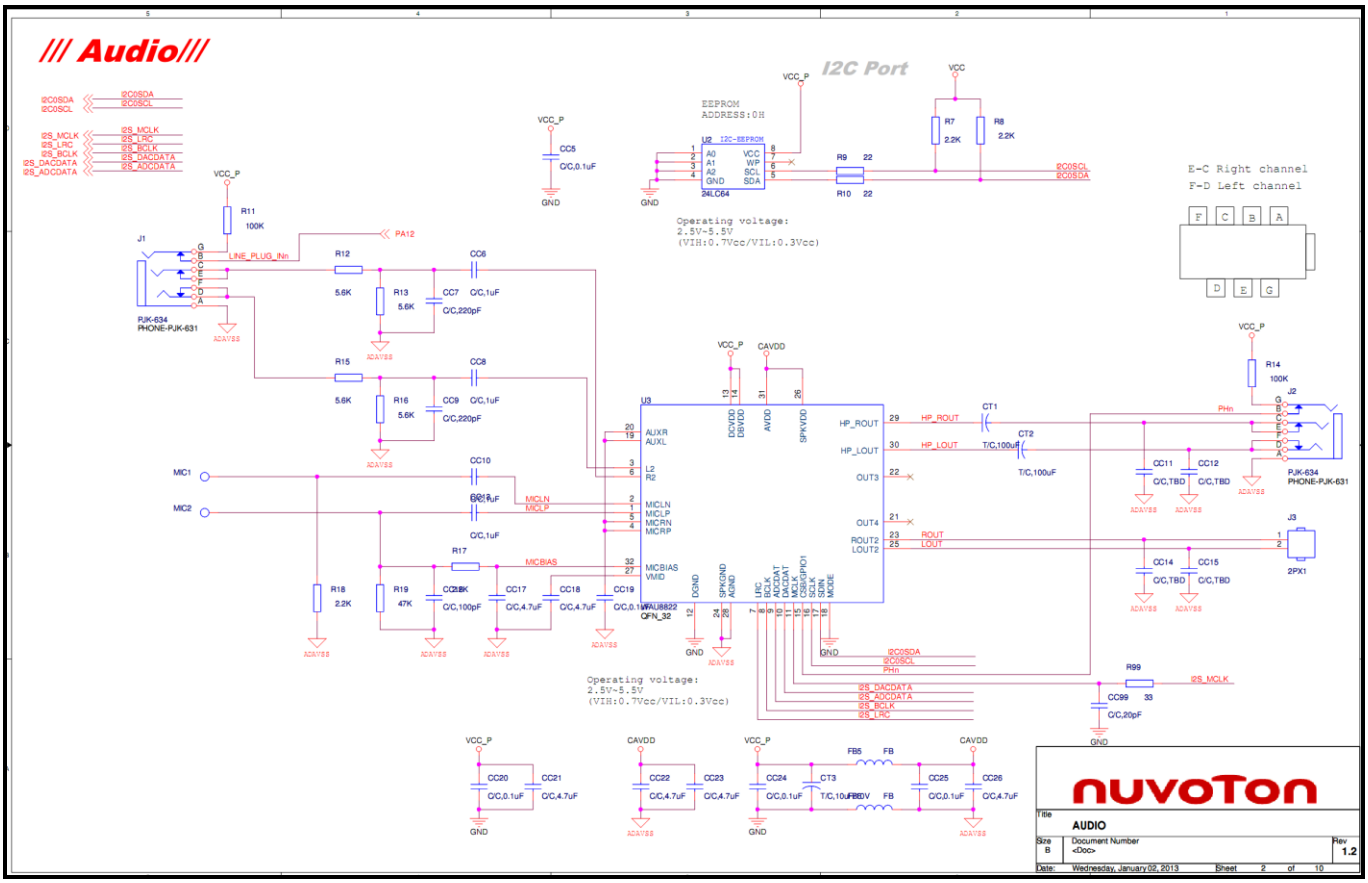
Nguồn	Ghi chú
VDD3.3V	Nguồn ra 3V3 với nguồn vào có thể lấy từ USB, Jac CON3 hoặc VDBUS(từ mạch nạp)
VBAT	Nguồn lấy từ chân T9
VCC	Lấy từ VDD3.3V hoặc VBAT qua công tắc chọn SWDPDT/SM
VCC_P	Nguồn cấp cho các khối SPI flash W25Q16CL, MMC/SD Card, Smart card, RS232, hồng ngoại HSDL-3201,Audio, EEPROM, LCD
VCC_MCU	Nguồn VDD vi điều khiển Nano130KE3BN
AVCC_MCU	Nguồn AVDD vi điều khiển Nano130KE3BN

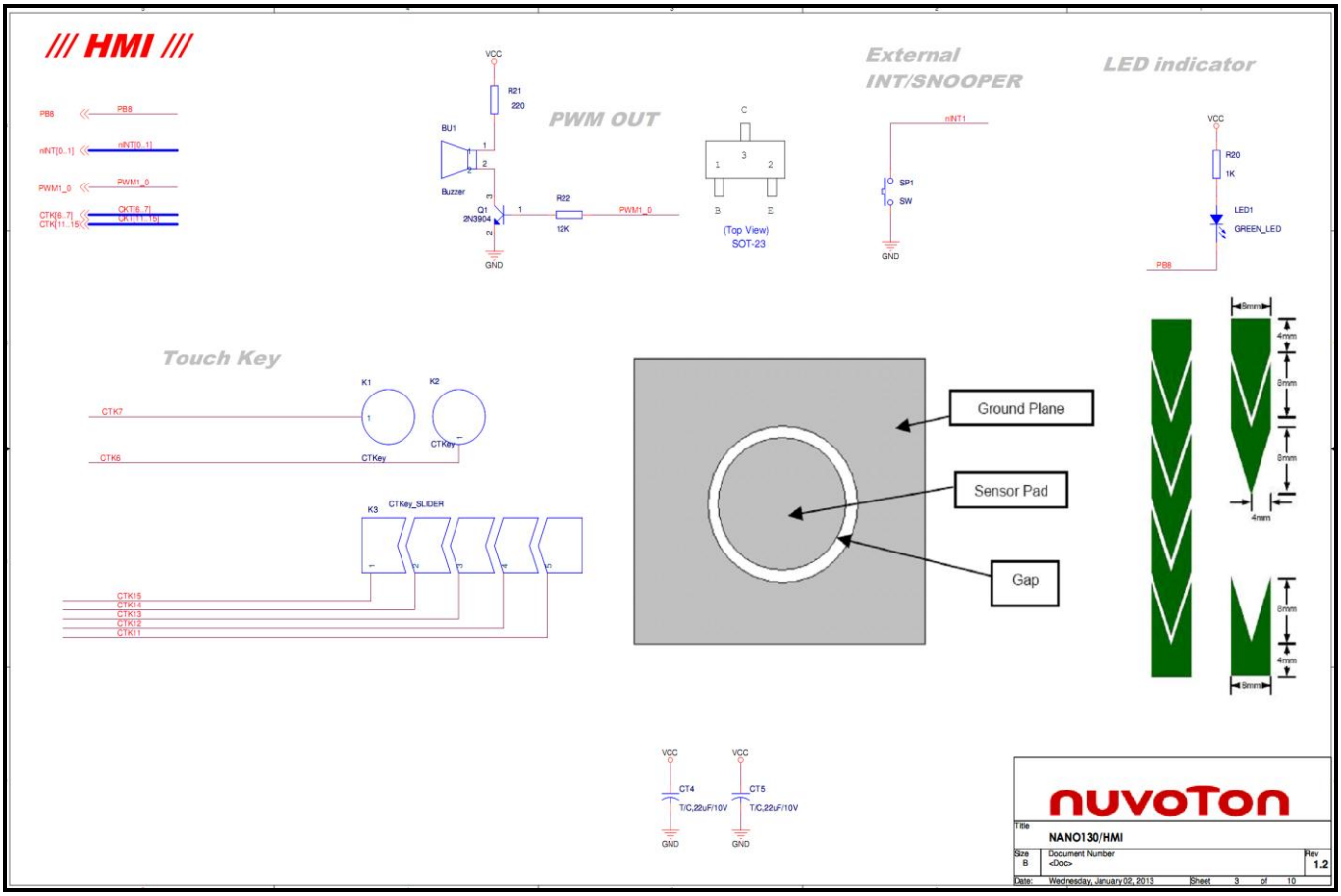


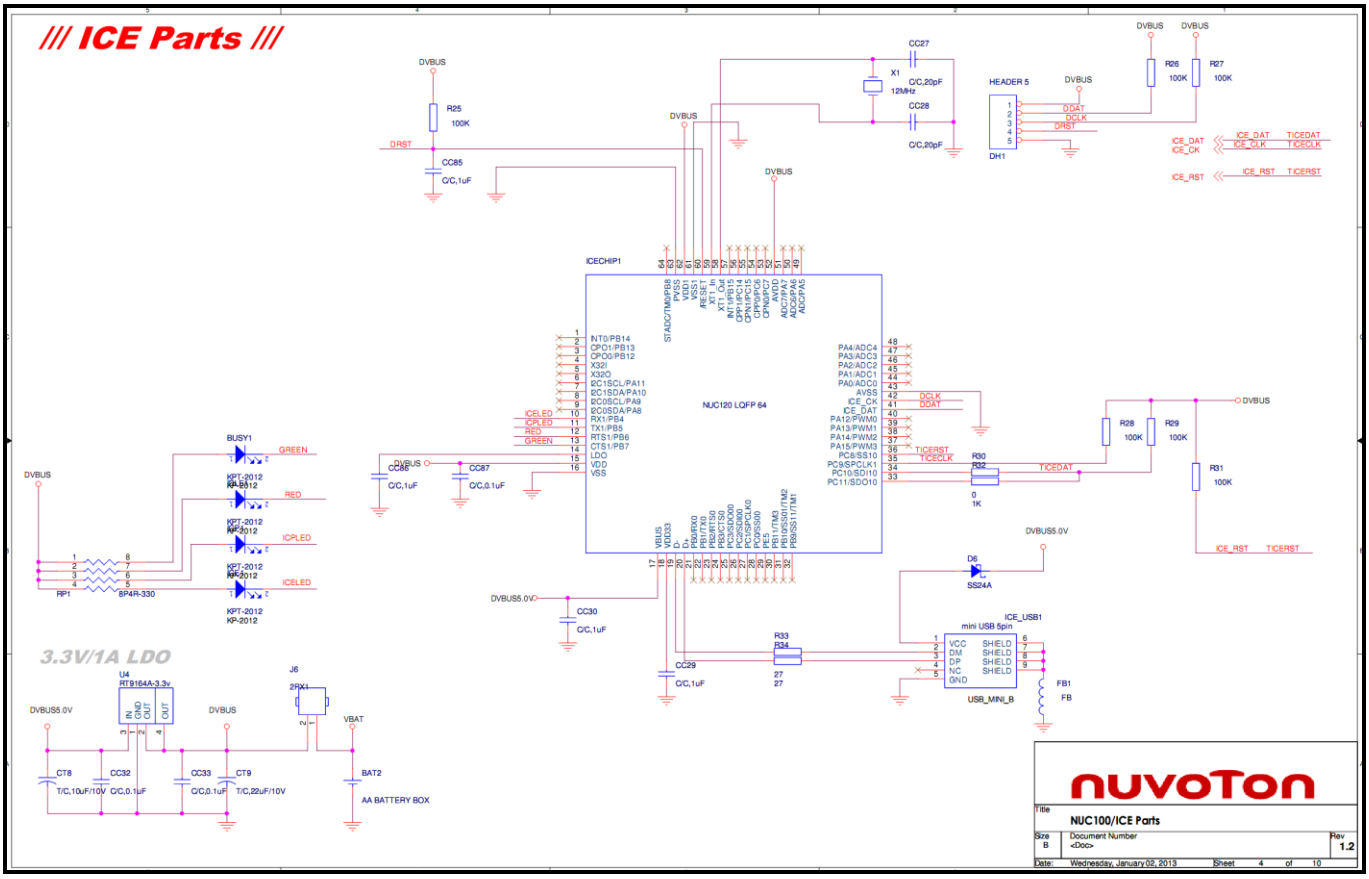
Jam		Ghi chú
JP1		Lựa chọn chức năng chân PD4 1-2: giao tiếp Smart Card 2-3: giao tiếp Audio
JP2		Lựa chọn nguồn vào VPP 1-2: VCC_P lấy từ VDD3.3V 2-3: VCC_P lấy từ VCC
J3		Jac nối với Speaker output of WAU8822
J8		Nối MCU_VCC với VCC
J10		Nối chân Reset của mạch nạp với chân Reset của vi điều khiển Nano130KE3BN

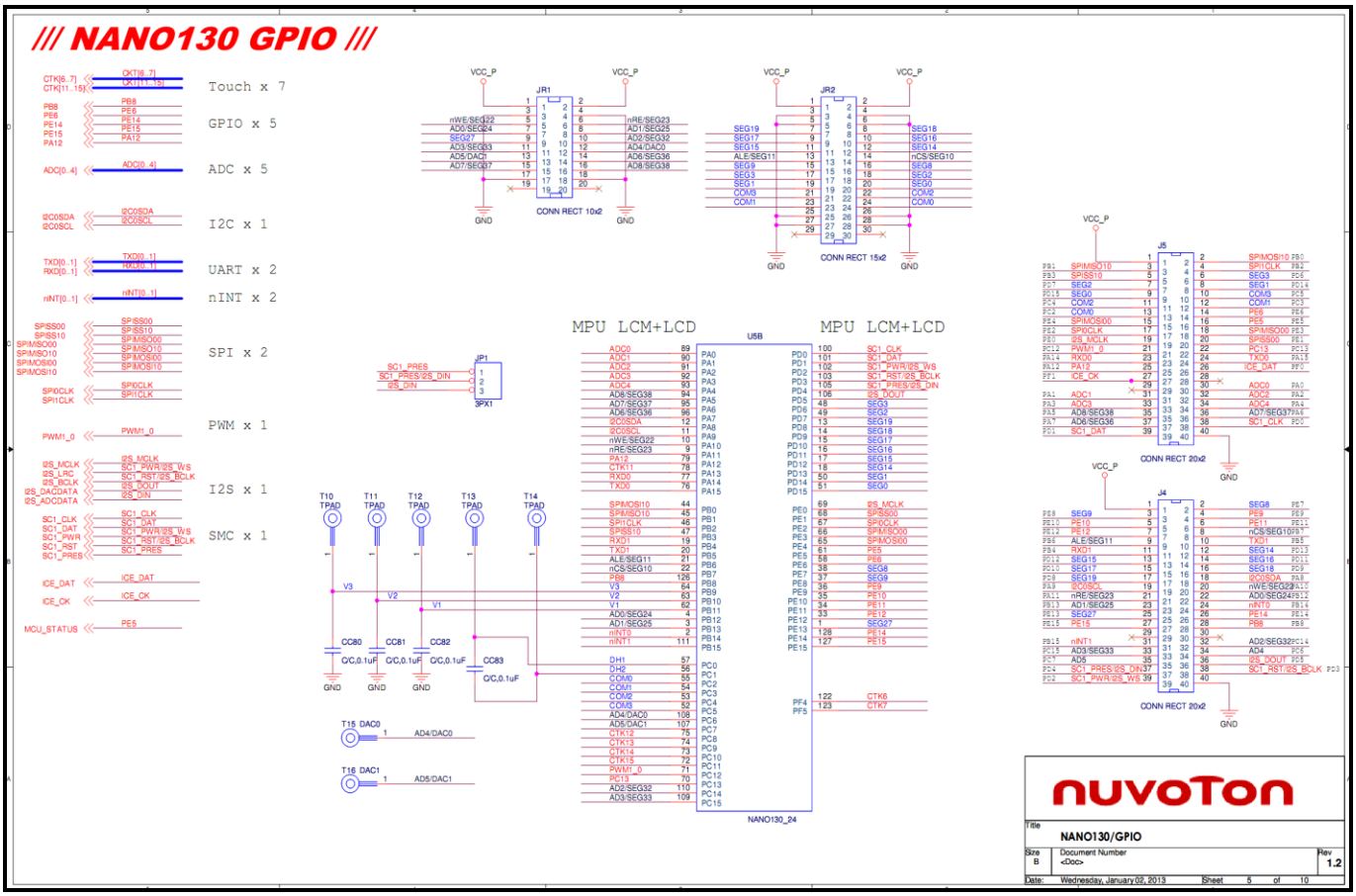
5. Sơ đồ mạch nguyên lý

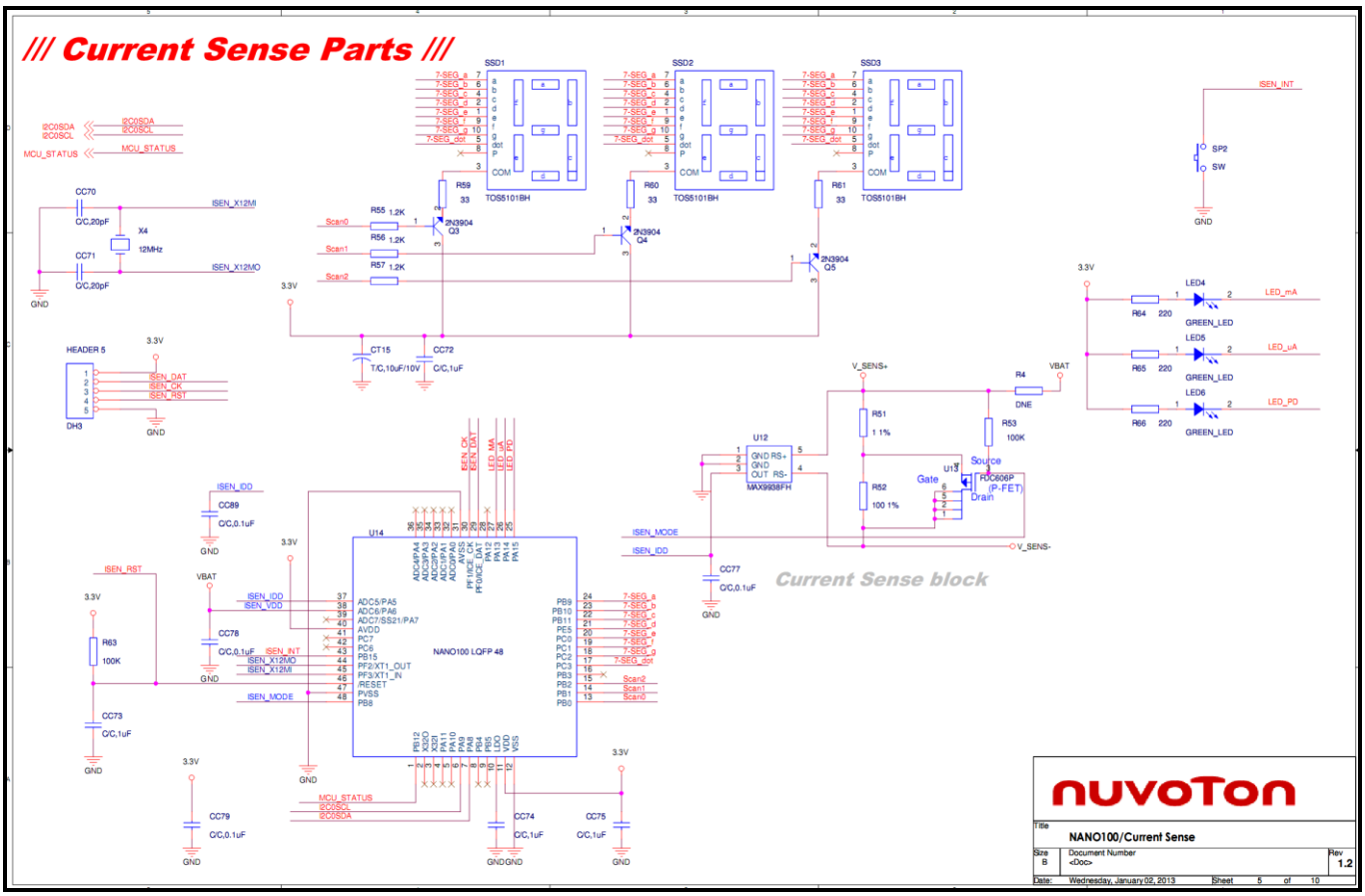


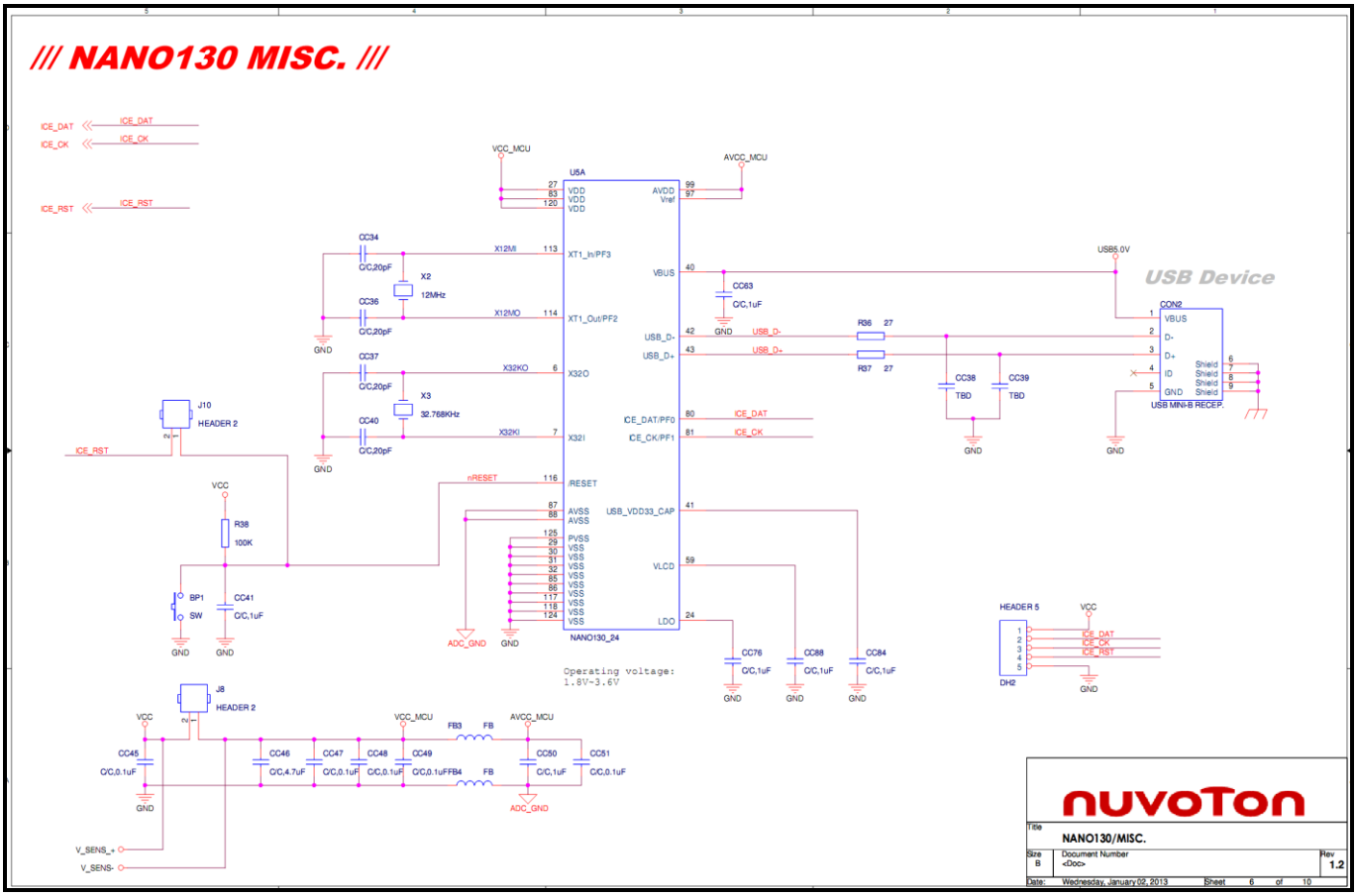

/// Audio///
I2C Port
EEPROM ADDRESS:0H
Operating voltage: 2.5V~5.5V (VIH:0.7Vcc/VIL:0.3Vcc)
E-C Right channel
F-D Left channel
PJK-634 PHONE-PJK-631
WAU8822 QFN_32
nuvoTon
AUDIO
Wednesday, January 02, 2013


/// HMI ///
PB8
nINT[0..1]
PWM1_0
CTK[6..7]
CTK[11..15]
VCC
R21
220
BU1
Buzzer
Q1
2N3904
R22
12K
GND
PWM OUT
PWM1_0
C
B
E
(Top View)
SOT-23
External
INT/SNOOPER
nINT1
SP1
SW
GND
LED indicator
VCC
R20
1K
LED1
GREEN_LED
PB8
Touch Key
K1
K2
CTK7
CTK6
CTKey
CTKey
K3
CTKey_SLIDER
CTK15
CTK14
CTK13
CTK12
CTK11
Ground Plane
Sensor Pad
Gap
8mm
4mm
8mm
8mm
4mm
8mm
4mm
8mm
VCC
VCC
CT4
CT5
T/C,22uF/10V
T/C,22uF/10V
GND
GND
nuvoTon
Title
NANO130/HMI
Size
B
Document Number
<Doc>
Rev
1.2
Date:
Wednesday, January 02, 2013
Sheet
3
of
10


/// ICE Parts ///
3.3V/1A LDO
NUC120 LQFP 64
ICECHIP1
nuvoTon
NUC100/ICE Parts


/// NANO130 GPIO ///
Touch x 7
GPIO x 5
ADC x 5
I2C x 1
UART x 2
nINT x 2
SPI x 2
PWM x 1
I2S x 1
SMC x 1
MPU LCM+LCD
MPU LCM+LCD
CONN RECT 10x2
CONN RECT 15x2
CONN RECT 20x2
CONN RECT 20x2
NANO130_24
nuvoTon
NANO130/GPIO


/// Current Sense Parts ///
Current Sense block
NANO100 LQFP 48
MAX9938FH
TOS5101BH
NANO100/Current Sense
nuvoTon


/// NANO130 MISC. ///
ICE_DAT
ICE_CK
ICE_RST
VCC_MCU
AVCC_MCU
U5A
NANO130_24
USB Device
CON2
USB MINI-B RECEP.
J10
HEADER 2
J8
HEADER 2
HEADER 5
DH2
Operating voltage:
1.8V~3.6V
NUVOTON
NANO130/MISC.
Document Number
<Doc>
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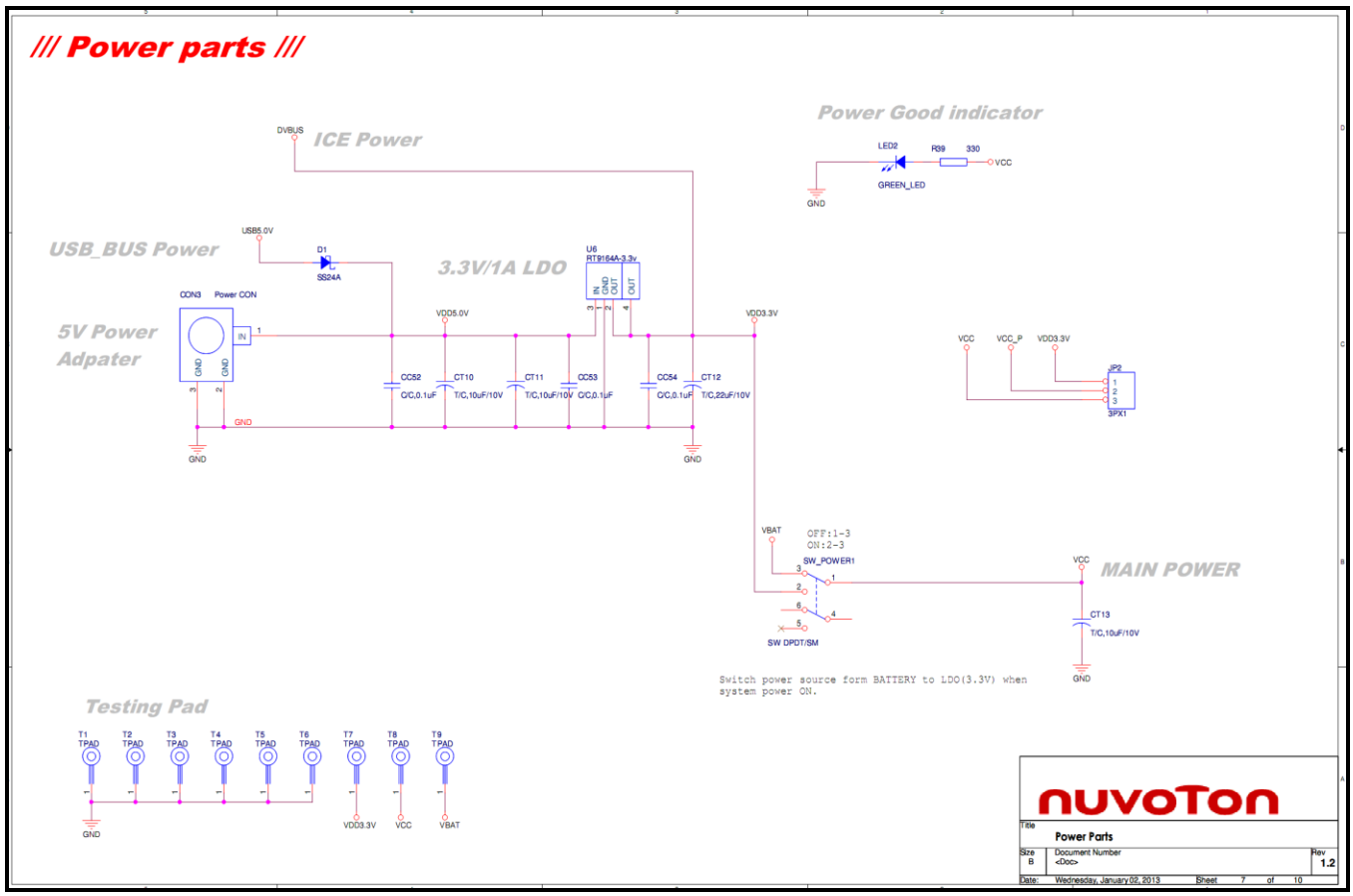
1.2
Wednesday, January 02, 2013


/// Power parts ///
Power Good indicator
ICE Power
DVBUS
LED2
R99
330
VCC
GREEN_LED
GND
USB_BUS Power
USB5.0V
D1
SS24A
3.3V/1A LDO
U6
RT9184A-3.3v
IN
GND
OUT
OUT
5V Power
Adpater
CON3
Power CON
IN
GND
GND
VDD5.0V
VDD3.3V
CC52
C/C,0.1uF
CT10
T/C,10uF/10V
CT11
T/C,10uF/10V
CC53
C/C,0.1uF
CC54
C/C,0.1uF
CT12
T/C,22uF/10V
VCC
VCC_P
VDD3.3V
JP2
3PX1
VBAT
OFF:1-3
ON:2-3
SW_POWER1
SW DPDT/SM
VCC
MAIN POWER
CT13
T/C,10uF/10V
GND
Switch power source form BATTERY to LDO(3.3V) when system power ON.
Testing Pad
T1 TPAD
T2 TPAD
T3 TPAD
T4 TPAD
T5 TPAD
T6 TPAD
T7 TPAD
T8 TPAD
T9 TPAD
GND
VDD3.3V
VCC
VBAT
nuvoTon
Title
Power Parts
Size
B
Document Number
<Doc>
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1.2
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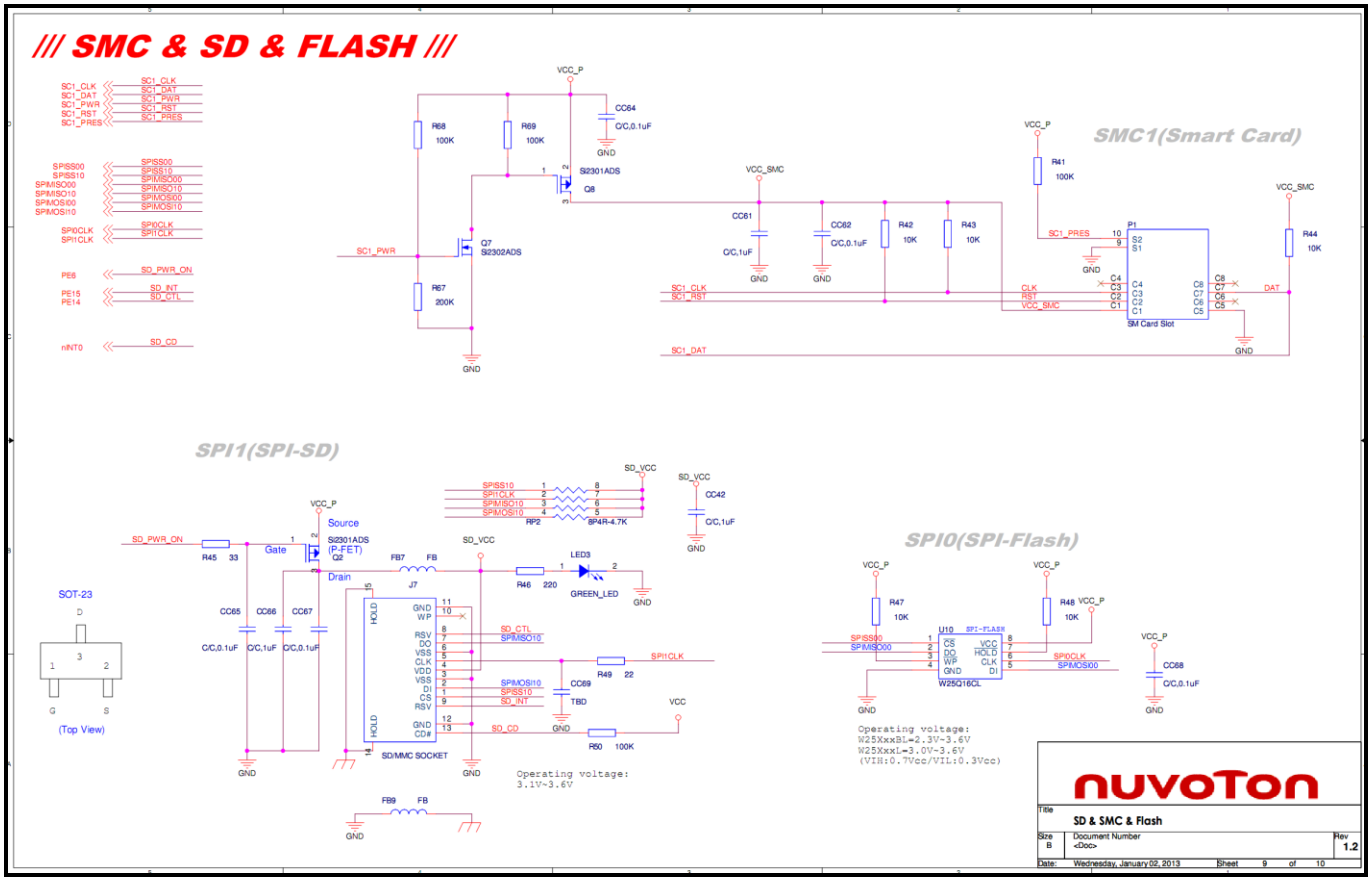
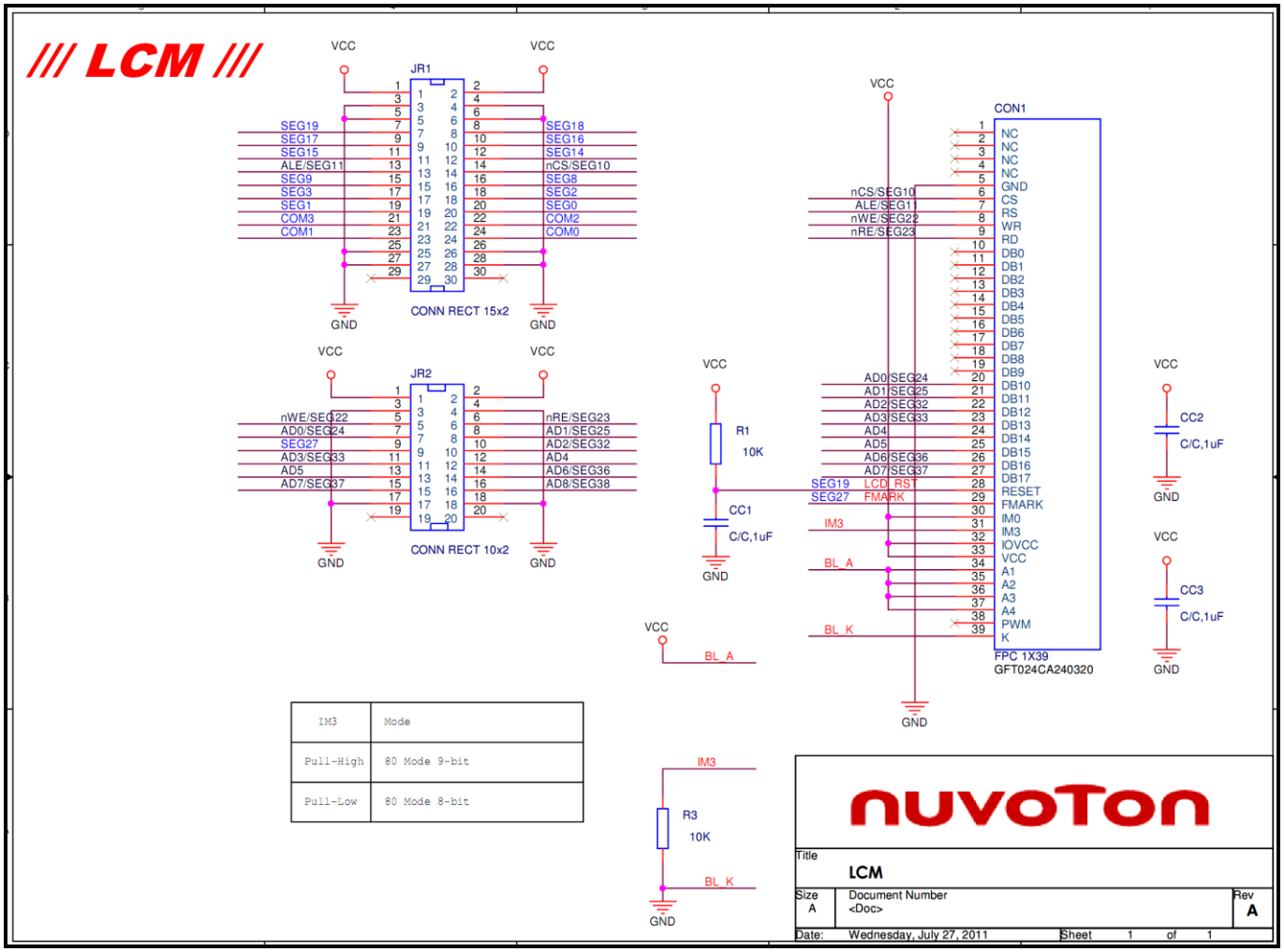

/// SMC & SD & FLASH ///
SMC1(Smart Card)
SPI1(SPI-SD)
SPI0(SPI-Flash)
SD/MMC SOCKET
SM Card Slot
nuvoTon
SD & SMC & Flash


/// LCM ///
JR1
CONN RECT 15x2
JR2
CONN RECT 10x2
CON1
FPC 1X39
GFT024CA240320
R1
10K
R3
10K
CC1
C/C,1uF
CC2
C/C,1uF
CC3
C/C,1uF
VCC
GND
IM3
Mode
Pull-High
80 Mode 9-bit
Pull-Low
80 Mode 8-bit
nuvoTon
Title
LCM
Size
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Document Number
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Rev
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Wednesday, July 27, 2011
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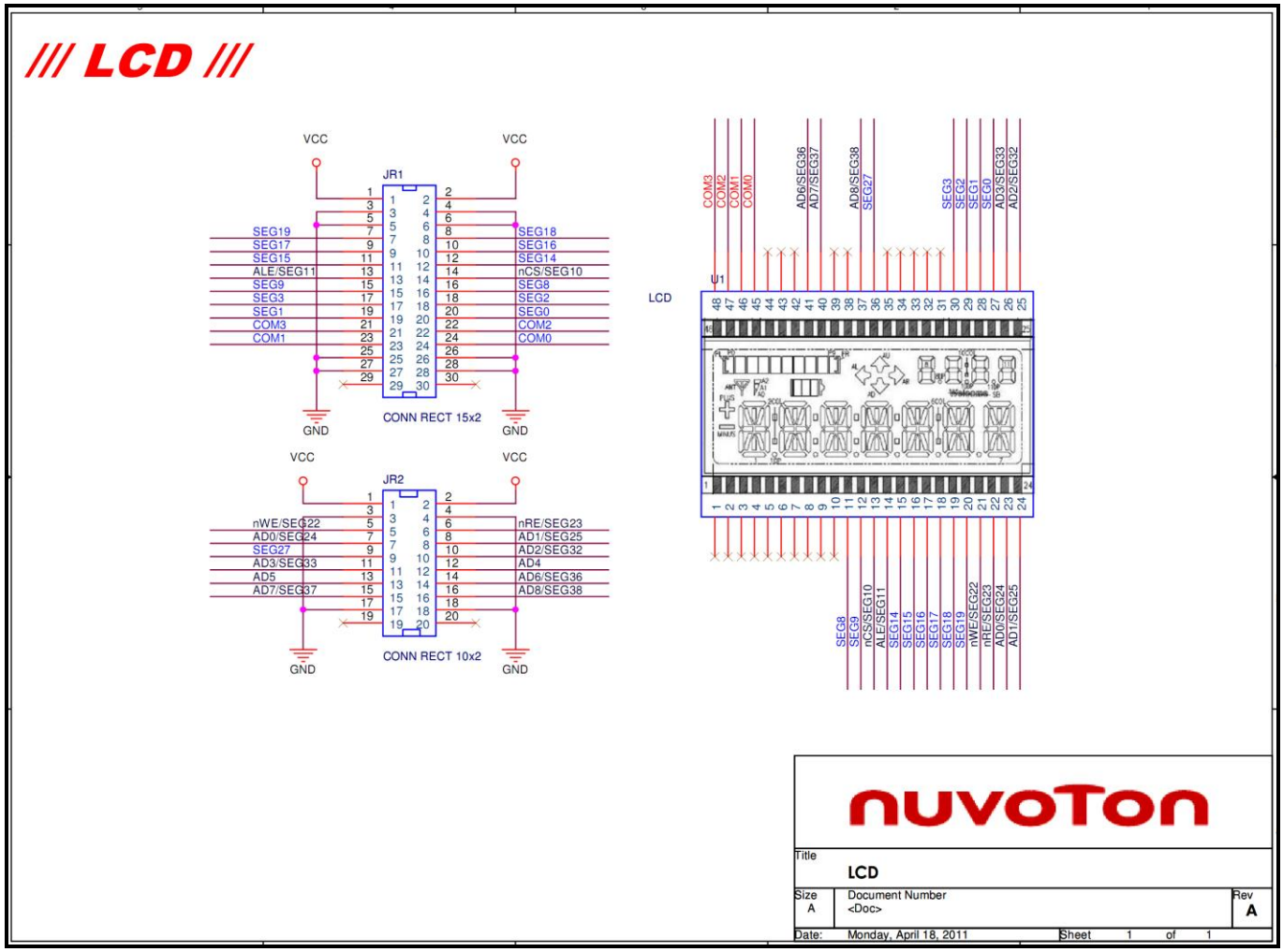
/// LCD ///
VCC
VCC
JR1
SEG19
SEG17
SEG15
ALE/SEG11
SEG9
SEG3
SEG1
COM3
COM1
SEG18
SEG16
SEG14
nCS/SEG10
SEG8
SEG2
SEG0
COM2
COM0
GND
GND
CONN RECT 15x2
VCC
VCC
JR2
nWE/SEG22
AD0/SEG24
SEG27
AD3/SEG33
AD5
AD7/SEG37
nRE/SEG23
AD1/SEG25
AD2/SEG32
AD4
AD6/SEG36
AD8/SEG38
GND
GND
CONN RECT 10x2
LCD
U1
COM3
COM2
COM1
COM0
AD6/SEG36
AD7/SEG37
AD8/SEG38
SEG27
SEG3
SEG2
SEG1
SEG0
AD3/SEG33
AD2/SEG32
SEG8
SEG9
nCS/SEG10
ALE/SEG11
SEG14
SEG15
SEG16
SEG17
SEG18
SEG19
nWE/SEG22
nRE/SEG23
AD0/SEG24
AD1/SEG25
nuvoTon
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LCD
Size
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Document Number
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Rev
A
Date:
Monday, April 18, 2011
Sheet
1
of
1

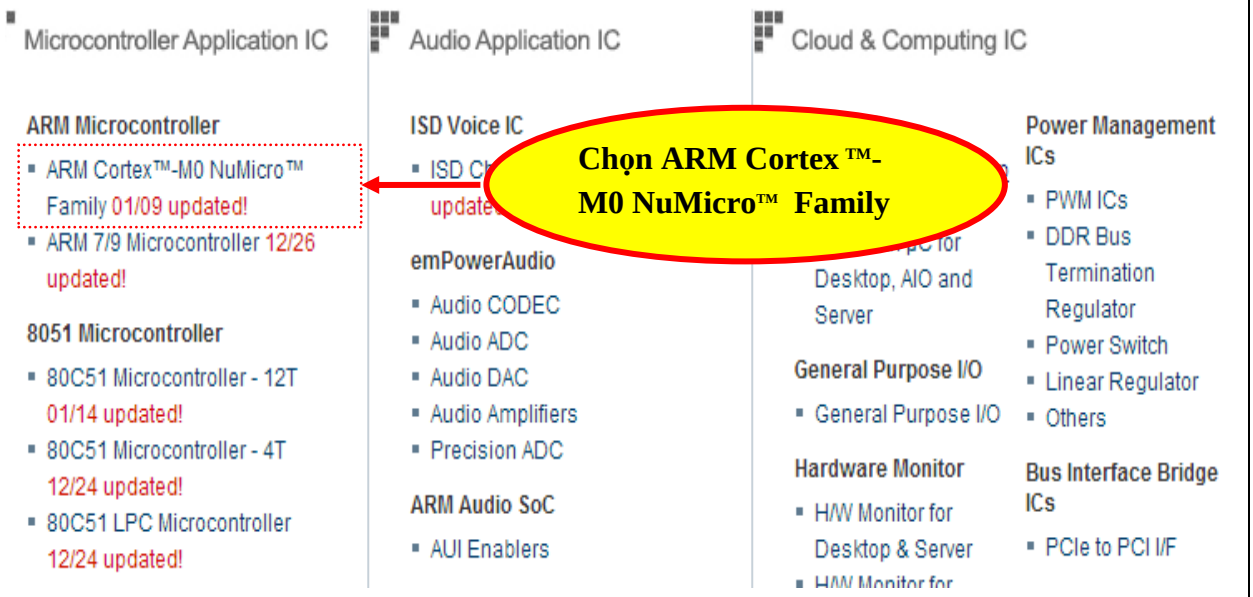
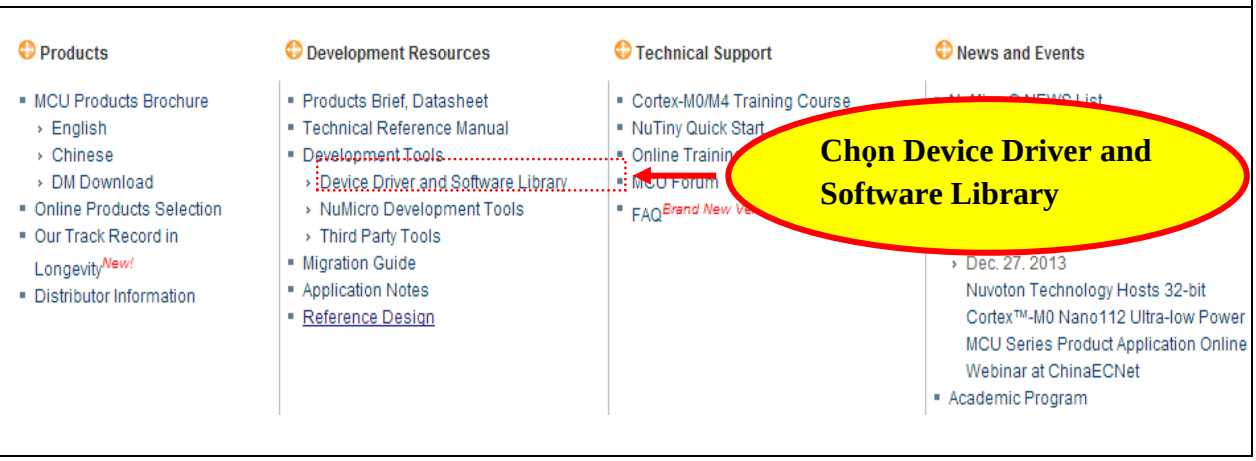
6. Công cụ hỗ trợ lập trình và phát triển

6.1 Công cụ hỗ trợ

Như các dòng ARM Cortex M0 khác của hãng Nuvoton như NUC100Series, M051, Mini51… để phát triển những ứng dụng sử dụng dòng Nano100Series(trong đó có Nano130) cần có:

- ✓ Môi trường ứng dụng phát triển(IDE): KeilC, IAR hoặc CooCox.
- ✓ Driver Nulink
- ✓ Thư viện hỗ trợ lập trình dòng Nano100 Series
- ✓ Phần mềm hô trợ nạp.

Tải các công cụ hỗ trợ, dựa theo hình ảnh:

Bước 1	Kết nối với trang chủ của công ty Nuvoton Website: http://www.nuvoton.com
Bước 2	
Bước 3	

Bước 4

Programmer Software Tools Package

File name	Description	Version	Date
ICP Programming Tool V1.23.6103.zip Revision History	NuMicro ICP tool & user manual	V1.23.6103	10-28-2013
ISP Programming Tool V1.42.zip Revision History	Nu	V1.42	01-20-2012
NuGang Programmer V6.19.zip Revision History	NuGang Programmer software & user manual	V6.19	11-01-2012

Phần mềm nạp chương trình

Nu-Link Driver

File name	Description	Version	Date
Nu-Link Driver for Keil RVMDK V1.23.6103.zip Revision History	This driver is to sup Keil RVMDK D NuMicro Fa		10-28-2013
Nu-Link Driver for IAR EWARM V1.23.6103.zip Revision History	This driver is IAR EWARM Deve NuMicro Family Devices.		10-28-2013

Driver hỗ trợ lập trình chíp ARM Cortex M0 Nuvoton trên KeilC & IAR

Contact us: NuMicro@nuvoton.com

Bước 5

Nano100B Series CMSIS BSP_EN_V1.00.007.zip Revision History	Nano100B series software package based on CMSIS version 3.1. It supports both devel and S code for N and Learning Board are included. For detailed, please download it and unzip it.		-2013

Thư viện lập trình dòng Nano100 Series

Bước 6

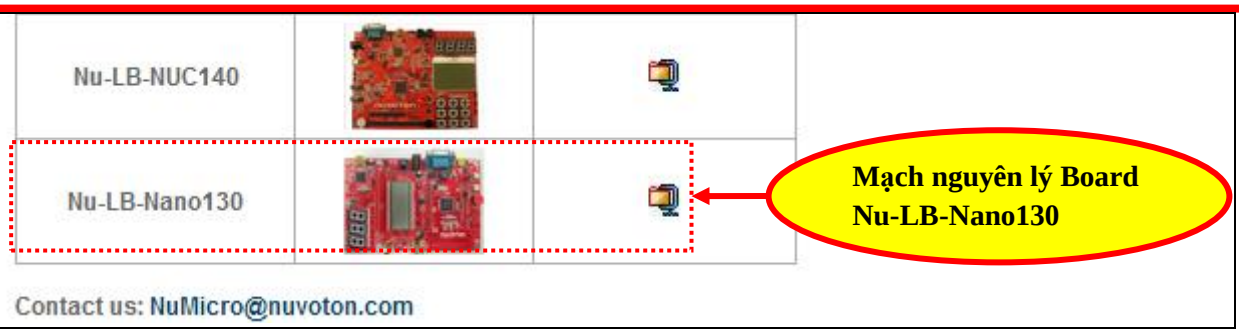
Products
- MCU Products Brochure
  - English
  - Chinese
  - DM Download
- Online Products Selection
- Our Track Record in Longevity *New!*
- Distributor Information

Development Resources
- Products Brief, Datasheet
- Technical Reference Manual
- Development Tools
  - Device Driver and Software Library
  - NuMicro Development Tools
  - Third Party Tools
- Migration Guide
- Application Notes
- Reference Design

Technical Support
- Cortex-M0/M4 Training Course
- NuTiny Quick Start
- Online Training
- MCU Forum
- FAQ

News and Events
- NuMicro® NEWS List
  - Jul.31, 2013
- Micro™ Family 32-bit
- New Series –
- Nuvoton Technology Hosts 32-bit Cortex™-M0 Nano112 Ultra-low Power MCU Series Product Application Online Webinar at ChinaECNet
- Academic Program

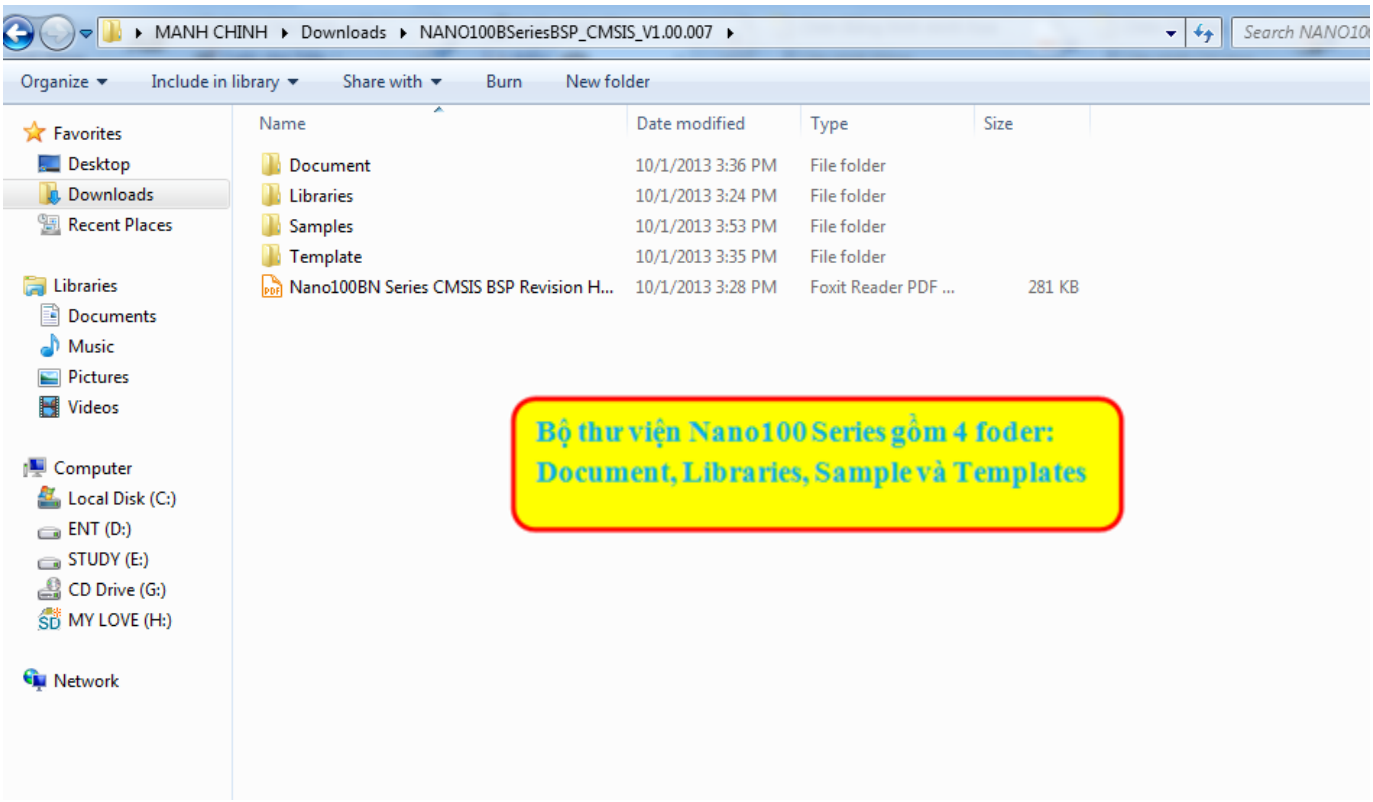
Chọn NuMicro Development Tools

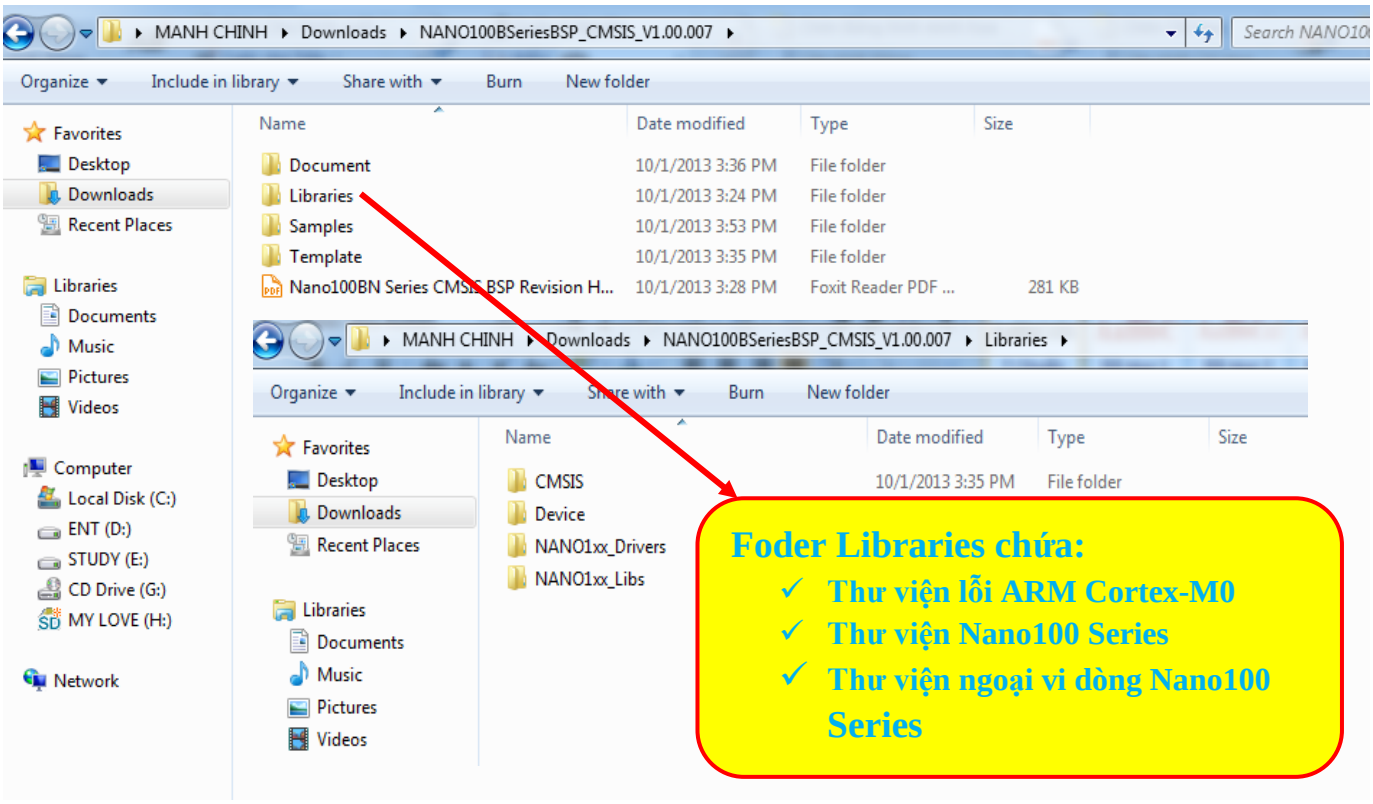
Bước 7	

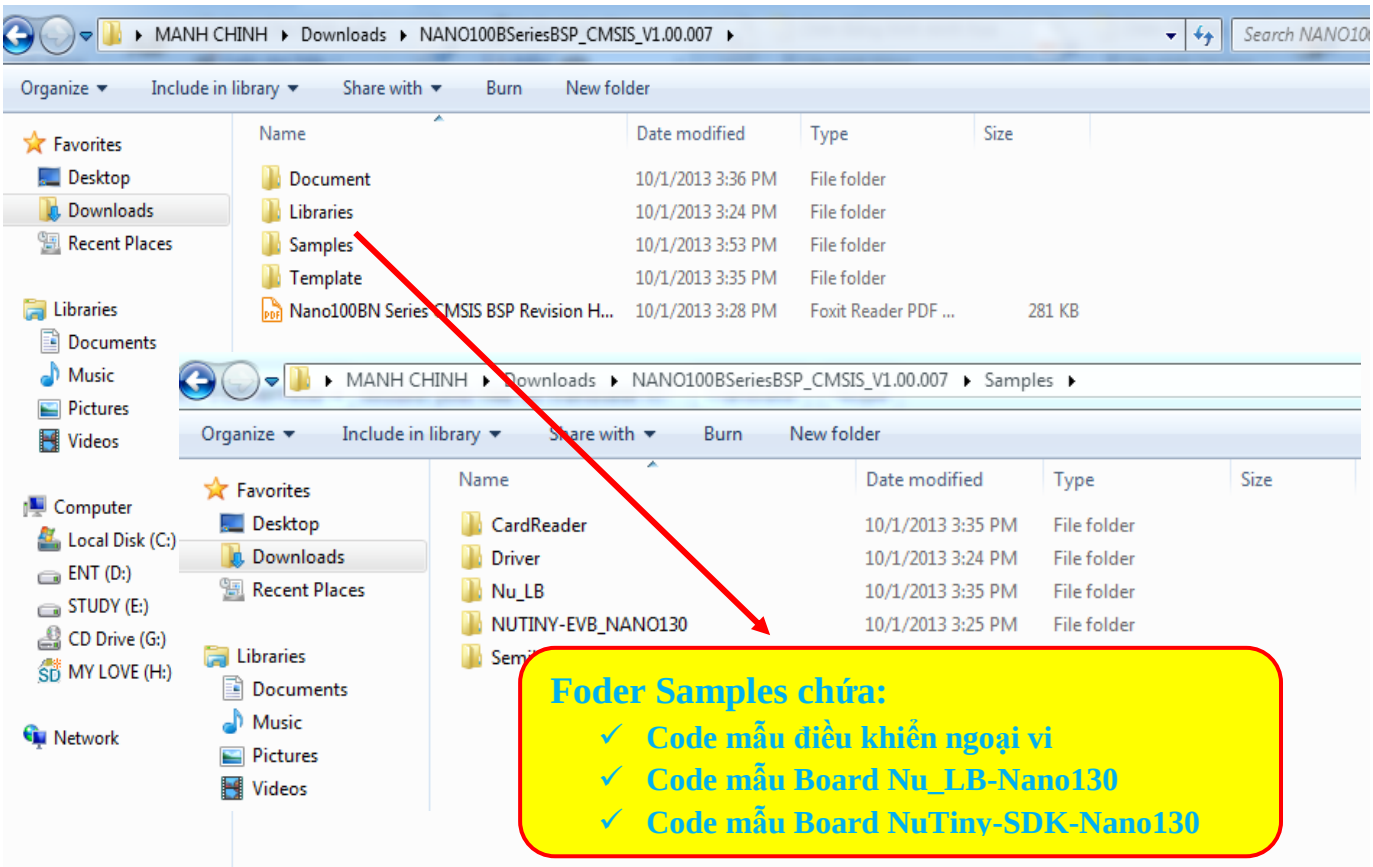
Tải file Technical Reference Manual:

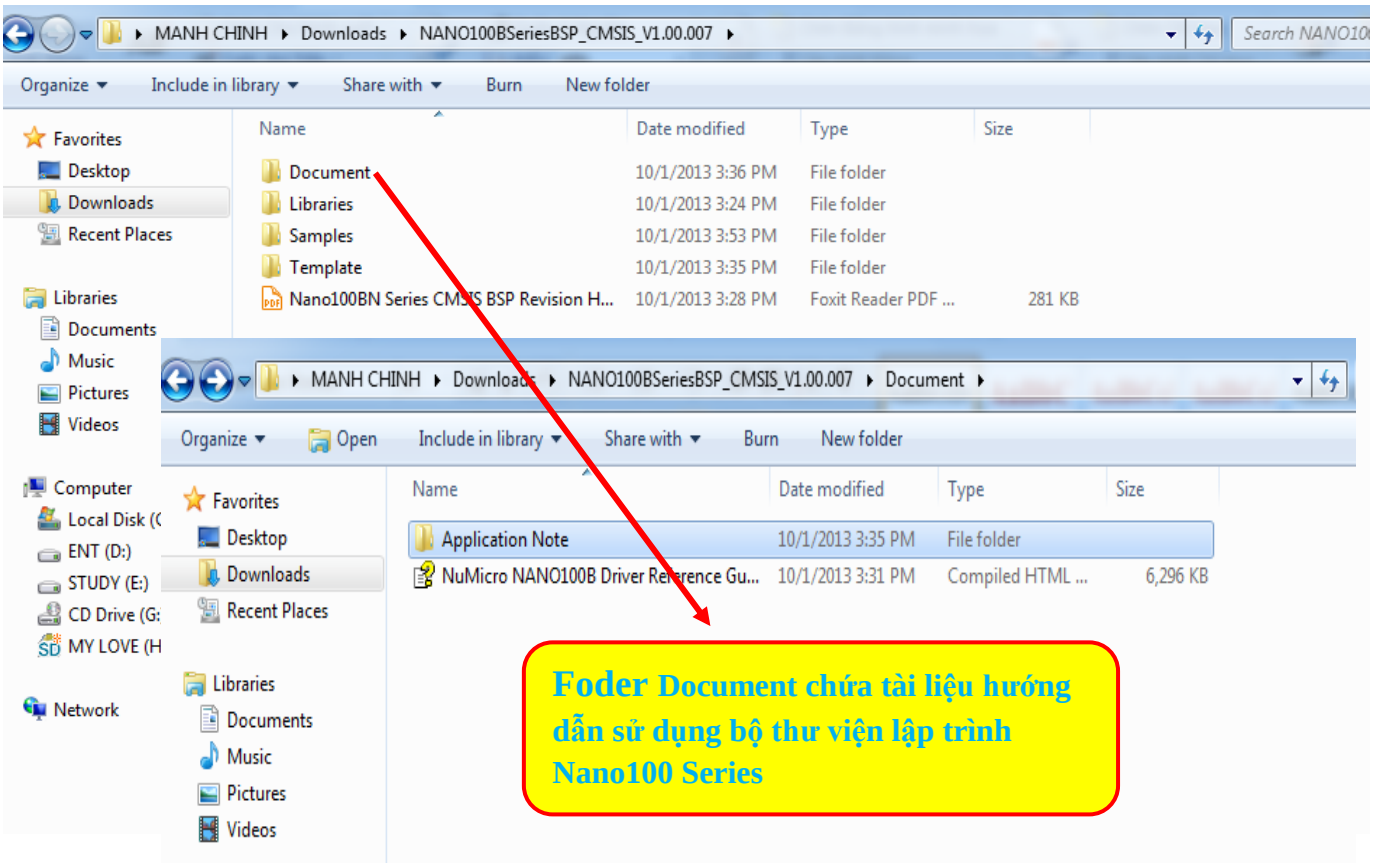
File name	Language	Version	Updated	Language	Version	Updated
Mini51 DE Technical Reference Manual V1.00	English	V1.00	10-31-2013	Chinese	-	-
M051 BN/DN/DE Series Technical Reference Manual V1.00	English	V1.00	09-17-2013	Chinese	-	-
M058S Technical Reference Manual V1.02	English	V1.02	11-06-2013	Chinese	-	-
NUC100 / 120 Technical Reference Manual V2.02	English	V2.02	01-16-2012	Chinese	V2.01	07-21-2011
NUC122 Technical Reference Manual V1.07	English	V1.07	06-27-2011	Chinese	V1.07	06-27-2011
NUC123 Technical Reference Manual V1.07	English	V1.07	03-29-2013	Chinese	V1.06	10-05-2012
NUC130 / 140 Technical Reference Manual V2.02	English	V2.02	01-19-2012	Chinese	V2.01	06-23-2011
NUC200 / 220 Technical Reference Manual V1.00	English	V1.00	12-07-2012	Chinese	-	-
Nano100 BN Series Technical Reference Manual V1.07	English	V1.07	12-04-2013	Chinese	V1.07	12-04-2013
AU9110 Technical Reference Manual V1.29	English	V1.29	11-07-2013	Chinese	-	-

Bộ thư viện dòng Nano100 Series






MANH CHINH ▸ Downloads ▸ NANO100BSeriesBSP_CMSIS_V1.00.007 ▸
Organize
Include in library
Share with
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Computer
Local Disk (C:)
ENT (D:)
STUDY (E:)
CD Drive (G:)
MY LOVE (H:)
Network
Name
Date modified
Type
Size
Document 10/1/2013 3:36 PM File folder
Libraries 10/1/2013 3:24 PM File folder
Samples 10/1/2013 3:53 PM File folder
Template 10/1/2013 3:35 PM File folder
Nano100BN Series CMSIS BSP Revision H... 10/1/2013 3:28 PM Foxit Reader PDF ... 281 KB
MANH CHINH ▸ Downloads ▸ NANO100BSeriesBSP_CMSIS_V1.00.007 ▸ Samples ▸
CardReader 10/1/2013 3:35 PM File folder
Driver 10/1/2013 3:24 PM File folder
Nu_LB 10/1/2013 3:35 PM File folder
NUTINY-EVB_NANO130 10/1/2013 3:25 PM File folder
Foder Samples chứa:
✓ Code mẫu điều khiển ngoại vi
✓ Code mẫu Board Nu_LB-Nano130
✓ Code mẫu Board NuTiny-SDK-Nano130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Organize
Include in library
Share with
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
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Documents
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Pictures
Videos
Name
Date modified
Type
Size
Document 10/1/2013 3:36 PM File folder
Libraries 10/1/2013 3:24 PM File folder
Samples 10/1/2013 3:53 PM File folder
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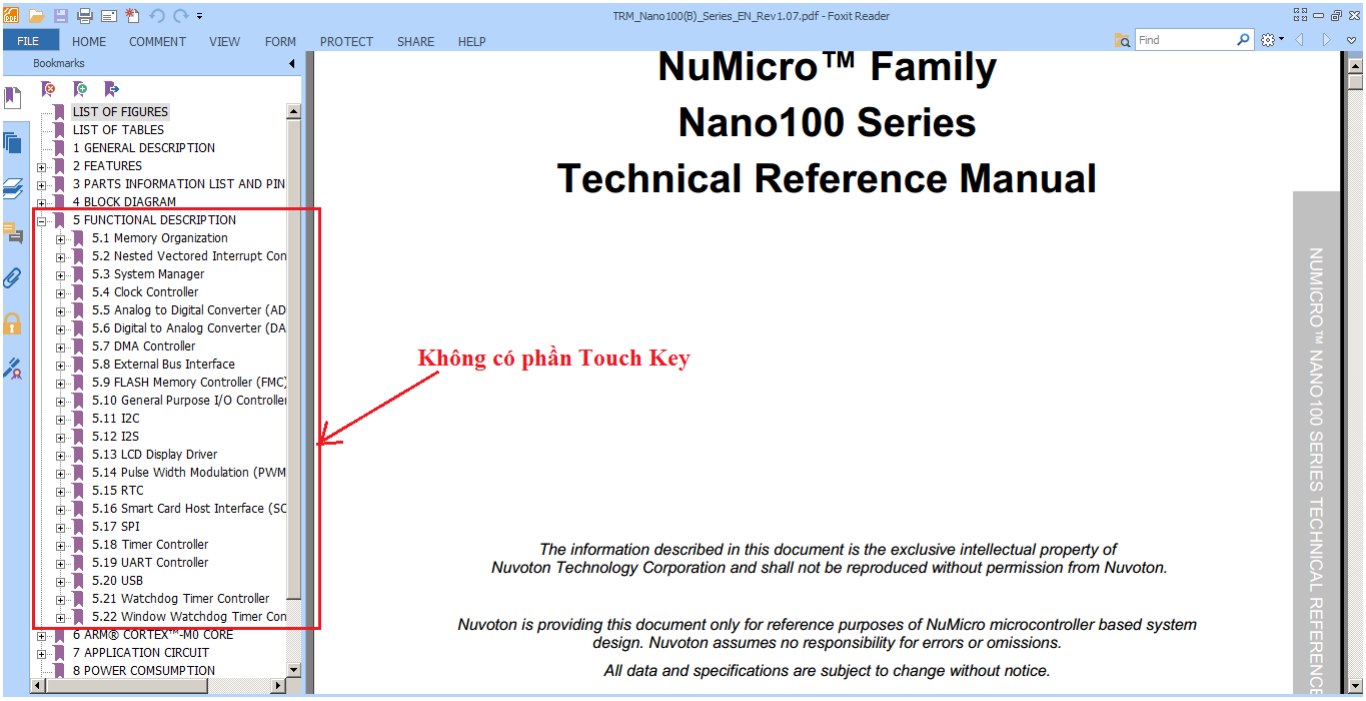
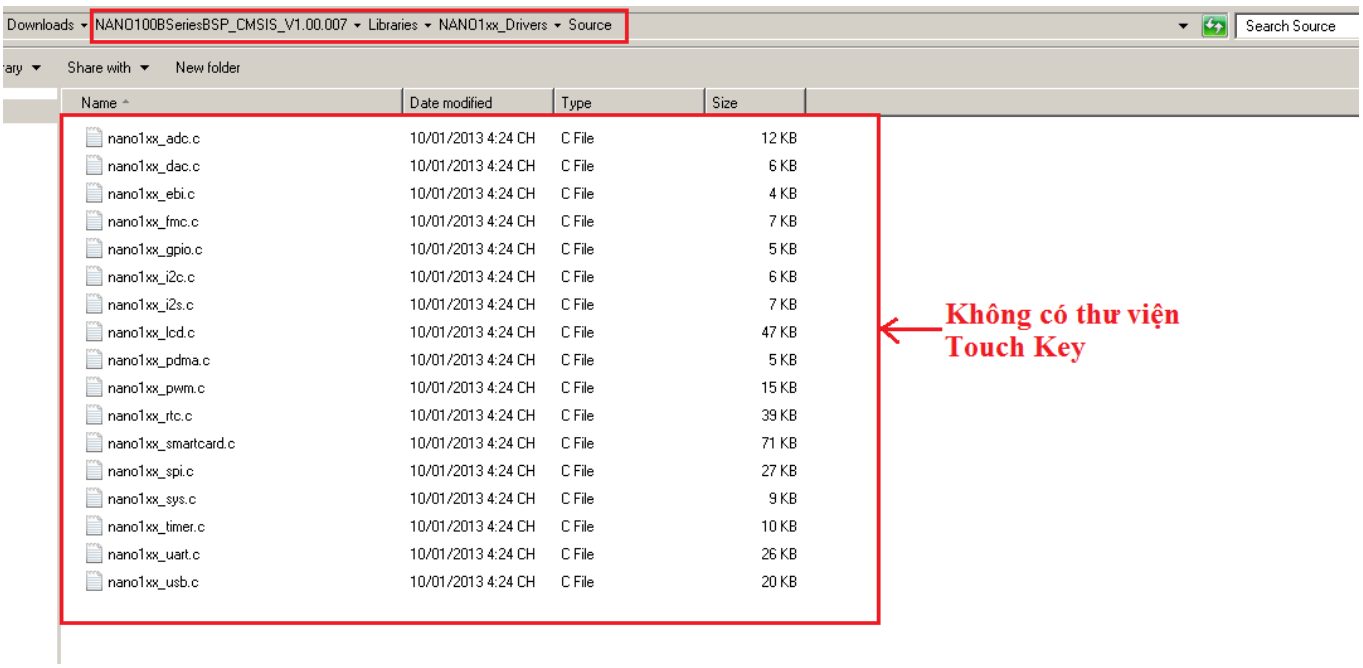
Nano100BN Series CMSIS BSP Revision H... 10/1/2013 3:28 PM Foxit Reader PDF ... 281 KB
MANH CHINH ▸ Downloads ▸ NANO100BSeriesBSP_CMSIS_V1.00.007 ▸ Document ▸
Open
Computer
Local Disk ((
ENT (D:)
STUDY (E:)
CD Drive (G:
MY LOVE (H
Network
Application Note 10/1/2013 3:35 PM File folder
NuMicro NANO100B Driver Reference Gu... 10/1/2013 3:31 PM Compiled HTML ... 6,296 KB
Foder Document chứa tài liệu hướng dẫn sử dụng bộ thư viện lập trình Nano100 Series

6.2 Bổ sung và chỉnh sửa tài liệu

Bộ thư viện thư viện lập trình dòng Nano (NANO100BSeriesBSP_CMSIS_V1.00.007) và tài liệu Technical Reference Manual tải trên trang chủ phía trên chưa cập nhật thư viện hỗ trợ giao tiếp cảm ứng Touch Key



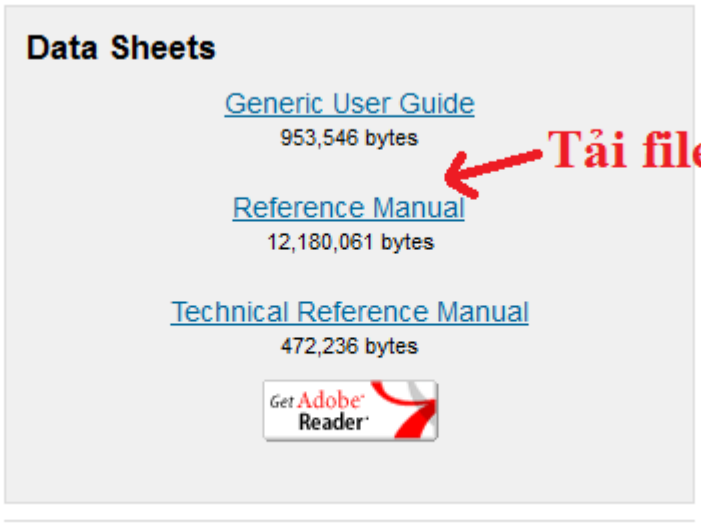


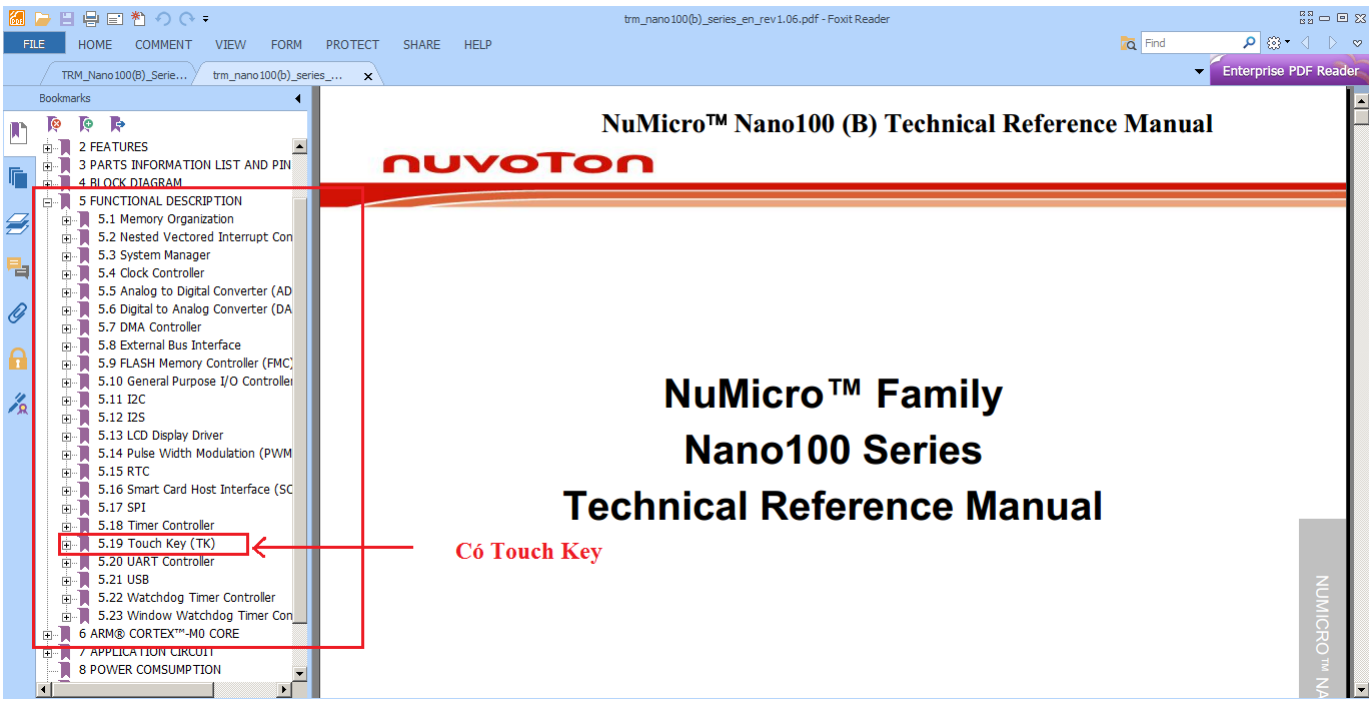
Để bổ sung thêm tính năng Touch Key làm theo các bước sau:

Bước 1: Tải tài liệu bổ sung

_ Tải tài liệu Technical Reference(có Touch Key) theo đường dẫn sau:

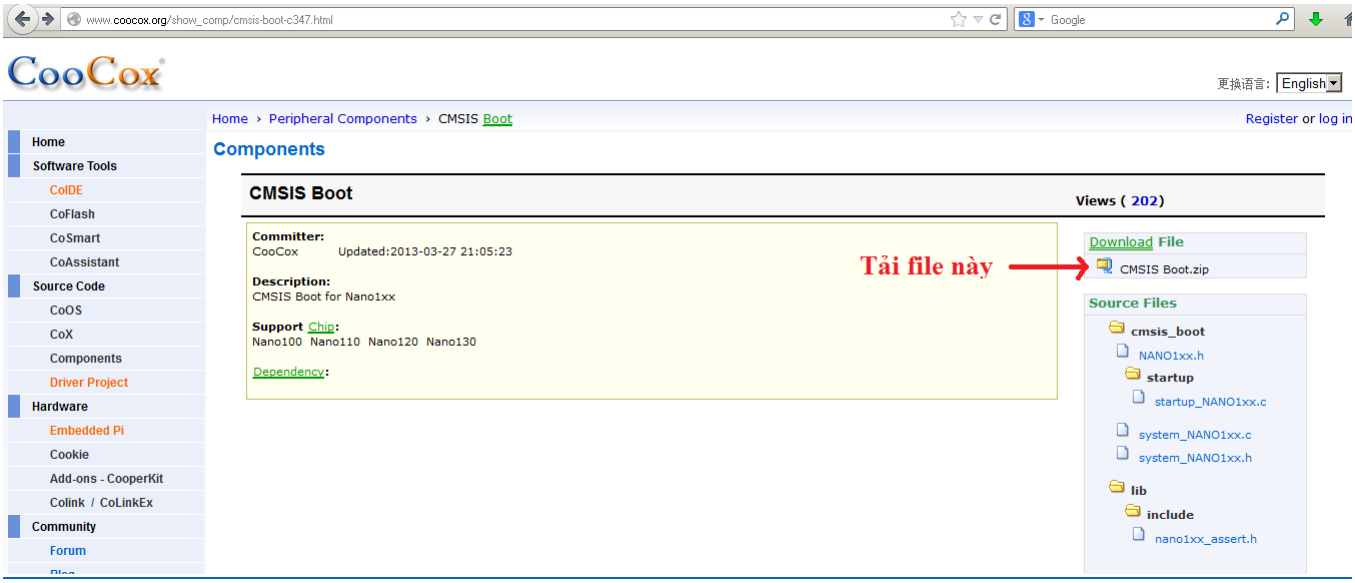
http://www.keil.com/dd/chip/7148.htm





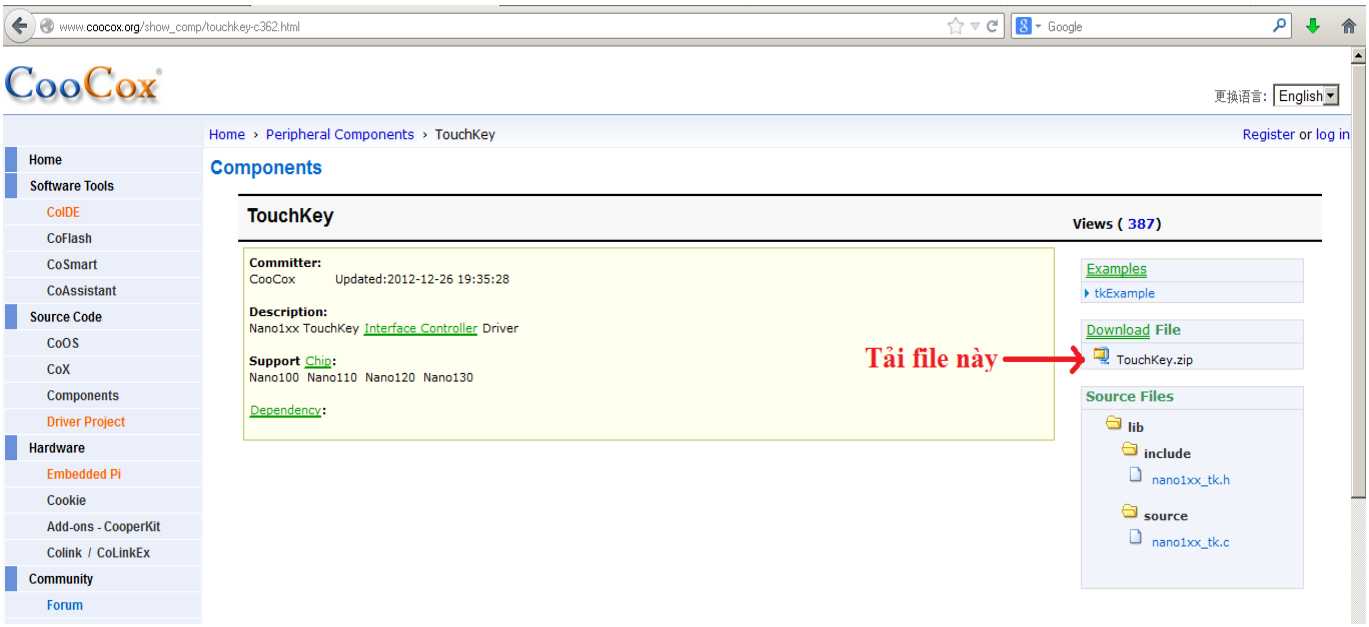
_ Tải thư viện Nano130 Series theo đường dẫn

http://www.coocox.org/show_comp/cmsis-boot-c347.html



_ Tải thư viện Touch Key theo đường dẫn

http://www.coocox.org/show_comp/touchkey-c362.html



Bước 2: Sửa file *startup_nano1xx.s* trong thư viện

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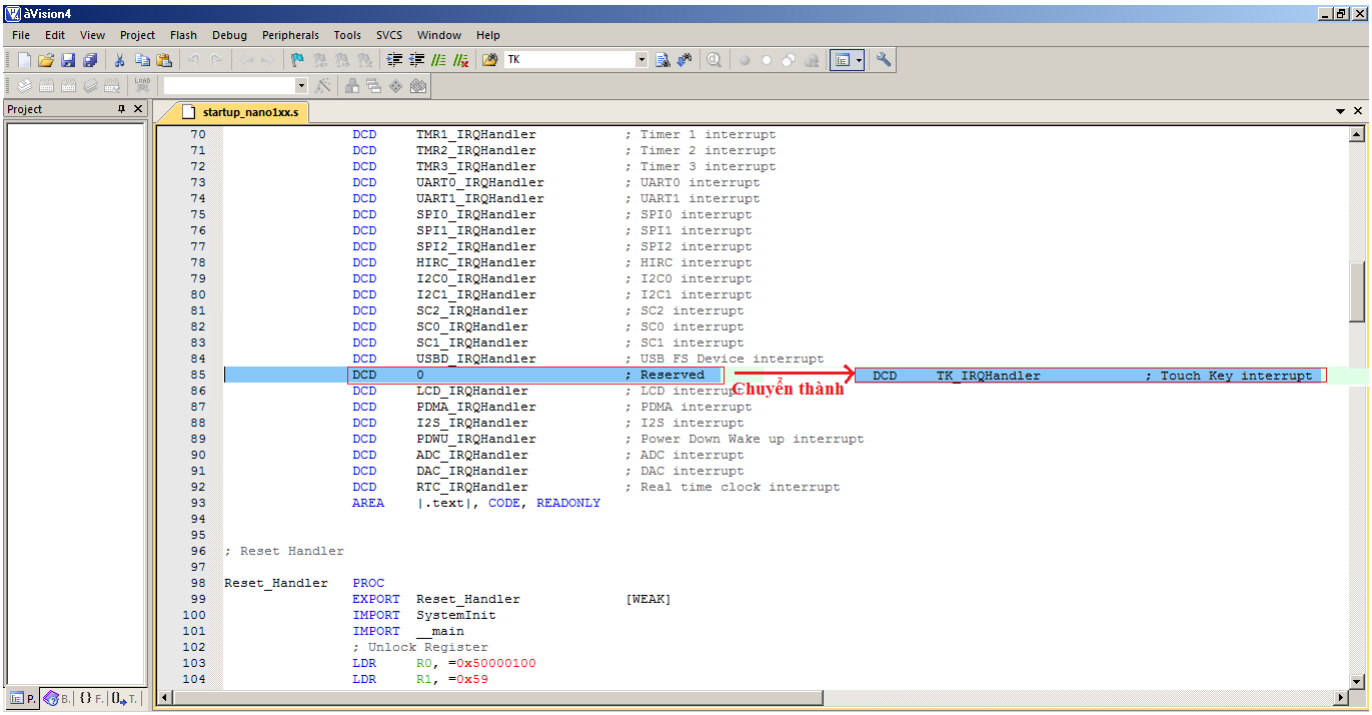
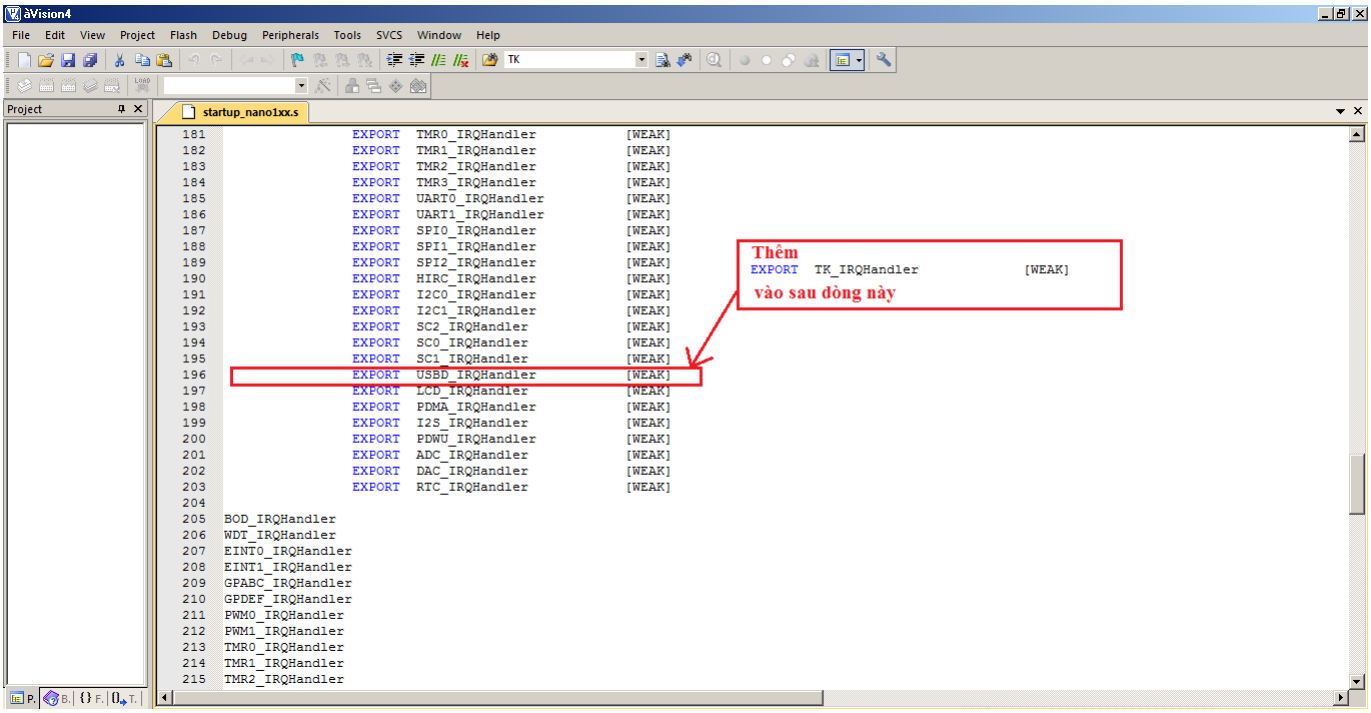
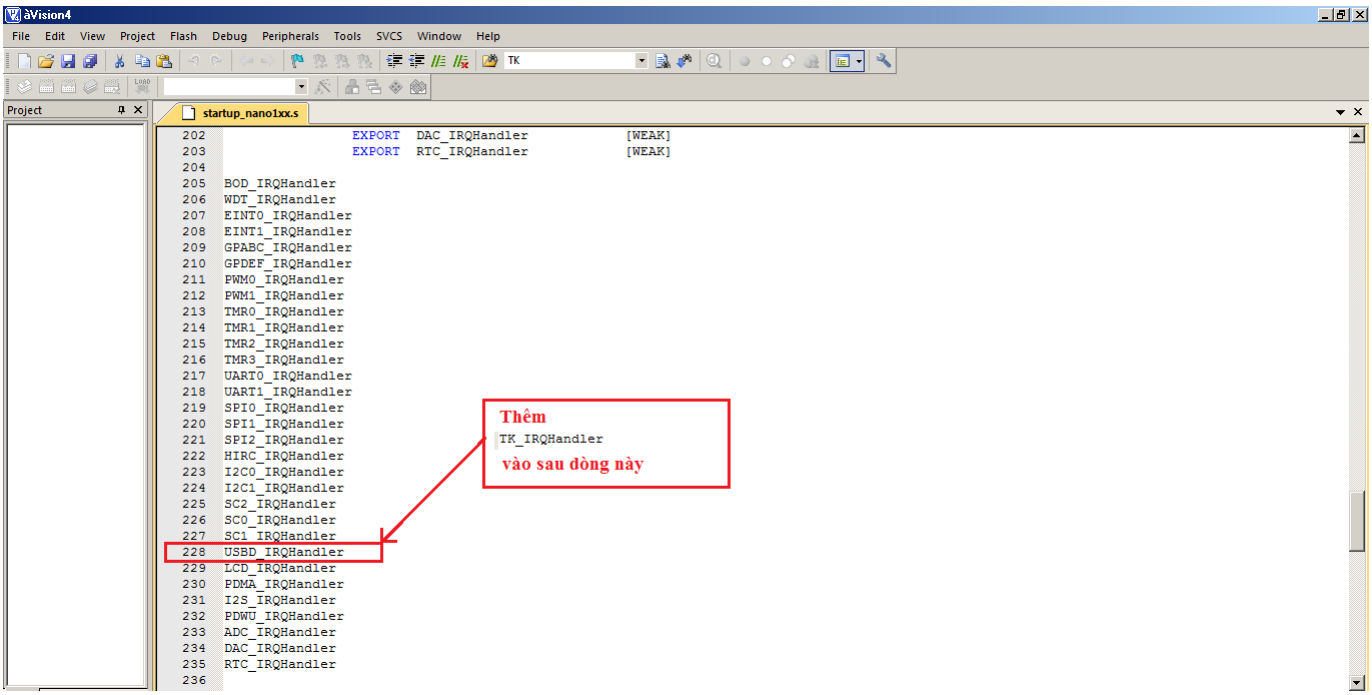
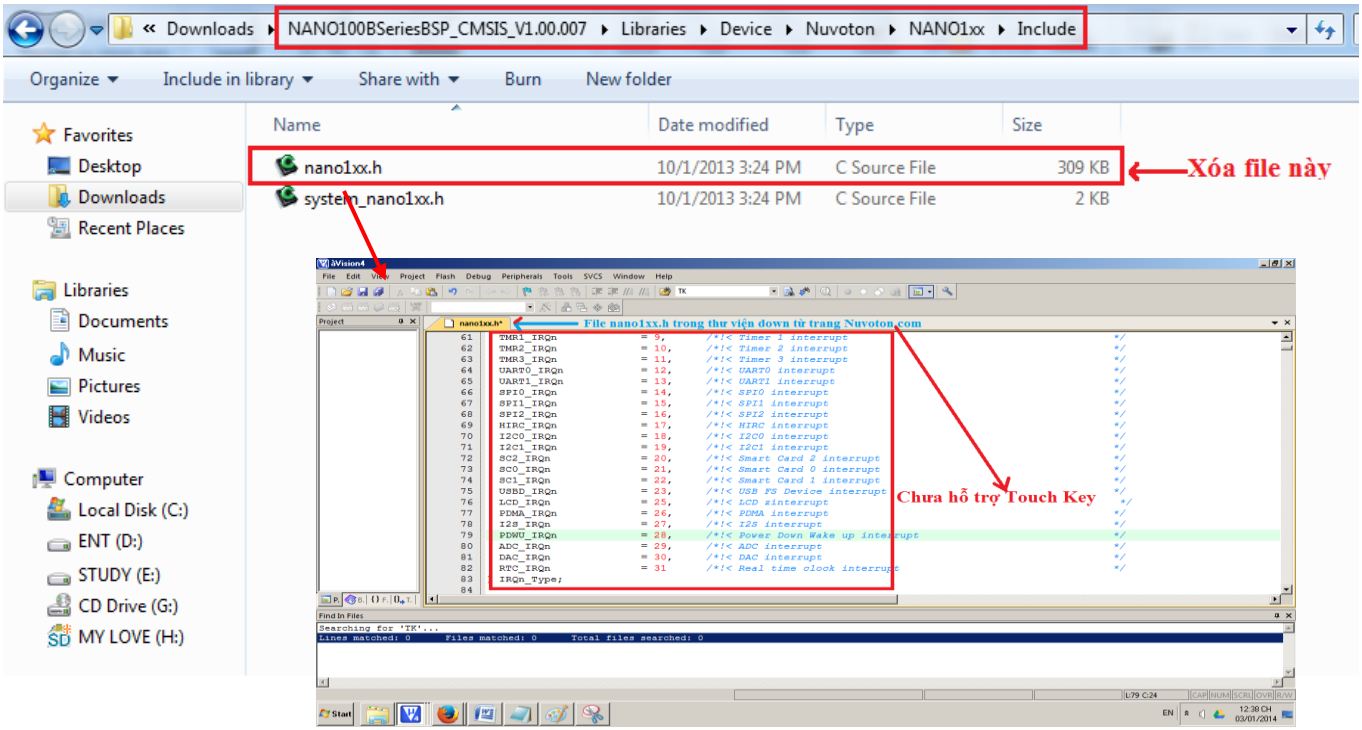



Thêm
EXPORT TK_IRQHandler [WEAK]
vào sau dòng này

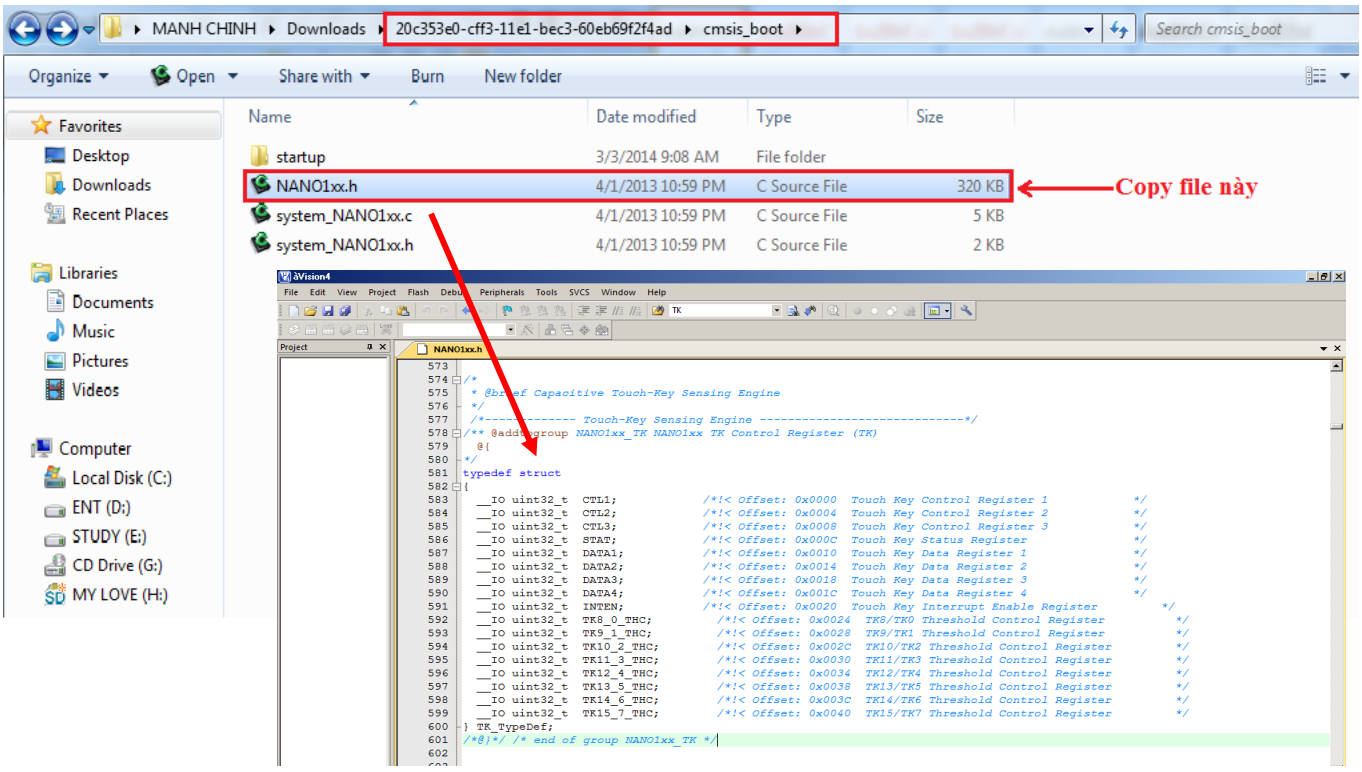

Thêm
TK_IRQHandler
vào sau dòng này

Bước 3: Sửa file *nano1xx.h* trong thư viện

Xóa file *nano1xx.h* theo đường dẫn như hình dưới đây

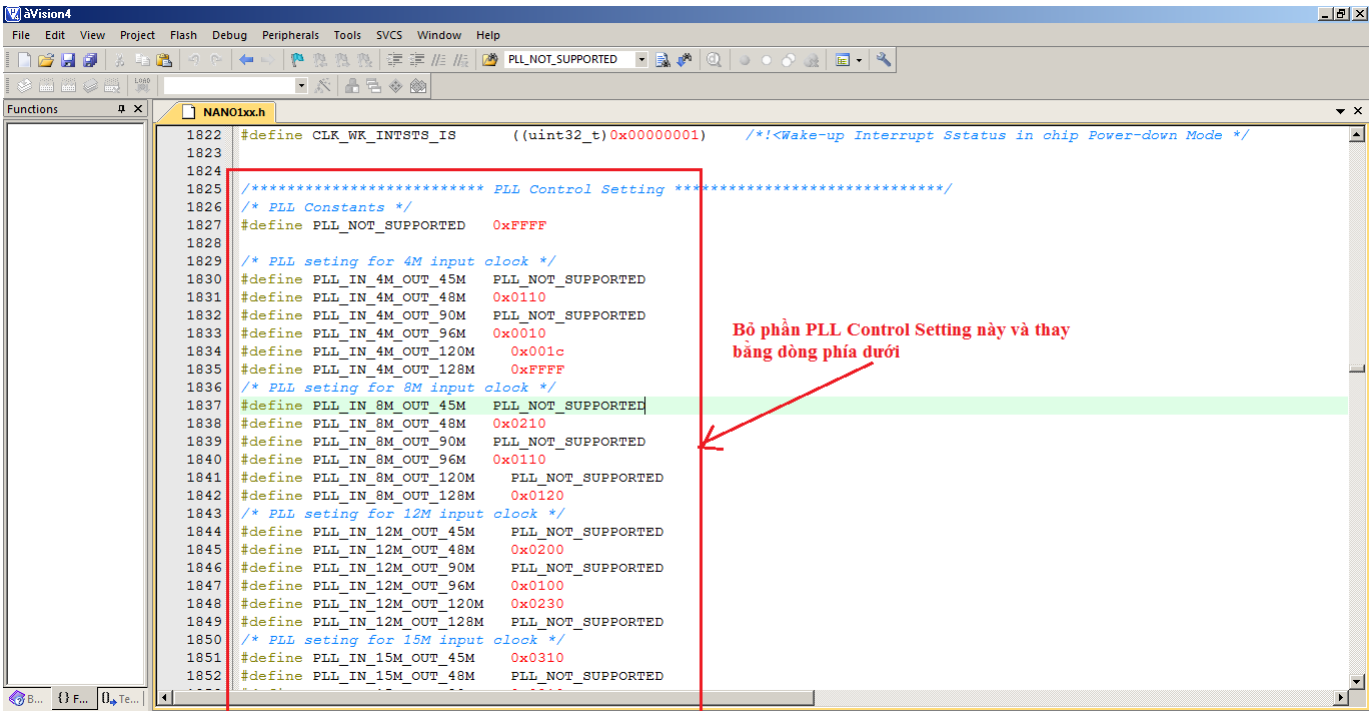


Sau đó copy file *NANO1xx.h* vừa mới tải về vào



Mở file NANO1xx.h vừa copy lên và chỉnh như sau:

_ Xóa phần PLL Control Setting



Và thay bằng khối sau:

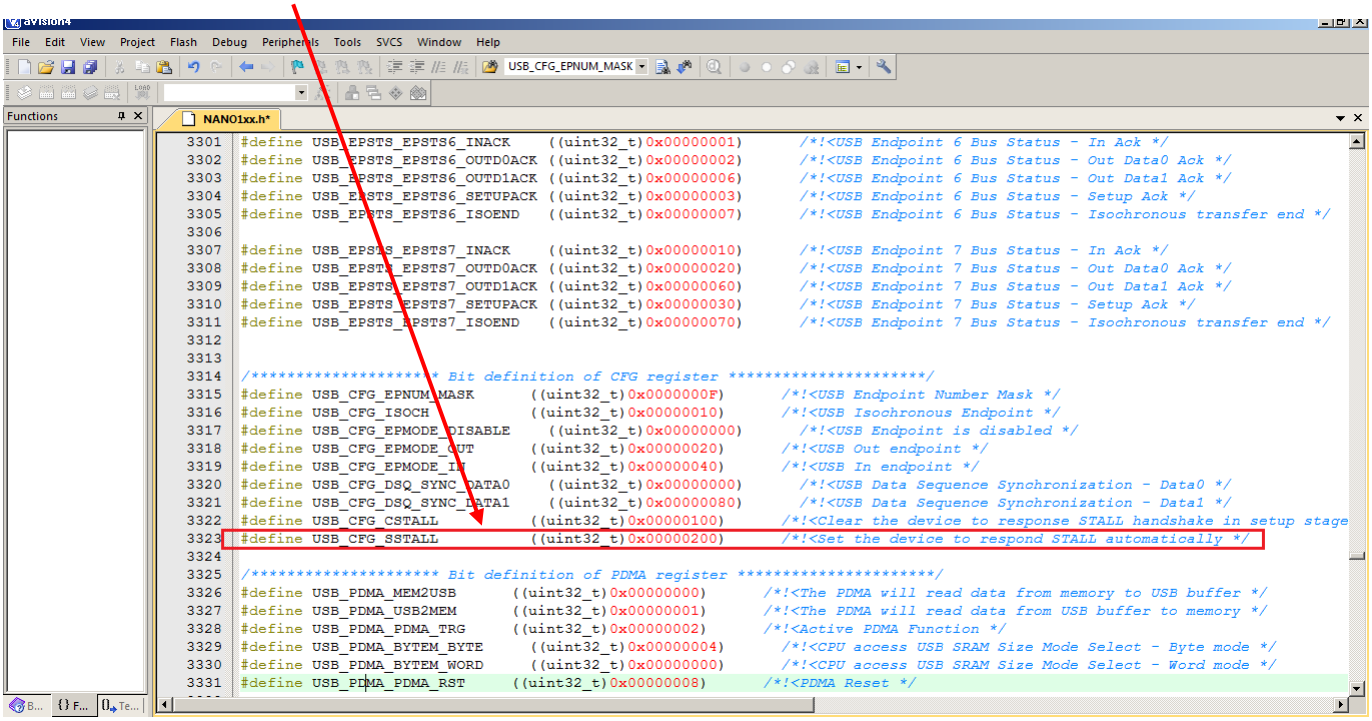
```
/************************* PLL Control Setting *****************************/
/* PLL Constants */
#define PLL_NOT_SUPPORTED          0xFFFF

/* PLL setting for 4M input clock */
#define PLL_IN_4M_OUT_42M          0x010A
#define PLL_IN_4M_OUT_45M          PLL_NOT_SUPPORTED
#define PLL_IN_4M_OUT_48M          0x0110
#define PLL_IN_4M_OUT_84M          0x000A
#define PLL_IN_4M_OUT_90M          PLL_NOT_SUPPORTED
#define PLL_IN_4M_OUT_96M          0x0010
#define PLL_IN_4M_OUT_120M         0x001c
#define PLL_IN_4M_OUT_128M         PLL_NOT_SUPPORTED
/* PLL setting for 8M input clock */
#define PLL_IN_8M_OUT_42M          0x020A
#define PLL_IN_8M_OUT_45M          PLL_NOT_SUPPORTED
#define PLL_IN_8M_OUT_48M          0x0210
#define PLL_IN_8M_OUT_84M          0x010A
#define PLL_IN_8M_OUT_90M          PLL_NOT_SUPPORTED
#define PLL_IN_8M_OUT_96M          0x0110
#define PLL_IN_8M_OUT_120M         PLL_NOT_SUPPORTED
#define PLL_IN_8M_OUT_128M         0x0120
/* PLL setting for 12M input clock */
```

```
#define PLL_IN_12M_OUT_42M      0x0318
#define PLL_IN_12M_OUT_42M      0x0318
#define PLL_IN_12M_OUT_45M      PLL_NOT_SUPPORTED
#define PLL_IN_12M_OUT_48M      0x0320
#define PLL_IN_12M_OUT_84M      0x0218
#define PLL_IN_12M_OUT_90M      PLL_NOT_SUPPORTED
#define PLL_IN_12M_OUT_96M      0x0220
#define PLL_IN_12M_OUT_120M     0x0108
#define PLL_IN_12M_OUT_128M     PLL_NOT_SUPPORTED
/* PLL setting for 16M input clock */
#define PLL_IN_16M_OUT_42M      0x030A
#define PLL_IN_16M_OUT_45M      PLL_NOT_SUPPORTED
#define PLL_IN_16M_OUT_48M      0x0310
#define PLL_IN_16M_OUT_84M      0x020A
#define PLL_IN_16M_OUT_90M      PLL_NOT_SUPPORTED
#define PLL_IN_16M_OUT_96M      0x0210
#define PLL_IN_16M_OUT_120M     PLL_NOT_SUPPORTED
#define PLL_IN_16M_OUT_128M     0x0220
/* PLL setting for 24M input clock */
#define PLL_IN_24M_OUT_42M      PLL_NOT_SUPPORTED
#define PLL_IN_24M_OUT_45M      PLL_NOT_SUPPORTED
#define PLL_IN_24M_OUT_48M      0x0300
#define PLL_IN_24M_OUT_84M      PLL_NOT_SUPPORTED
#define PLL_IN_24M_OUT_90M      PLL_NOT_SUPPORTED
#define PLL_IN_24M_OUT_96M      0x0200
#define PLL_IN_24M_OUT_120M     0x0208
#define PLL_IN_24M_OUT_128M     PLL_NOT_SUPPORTED
```

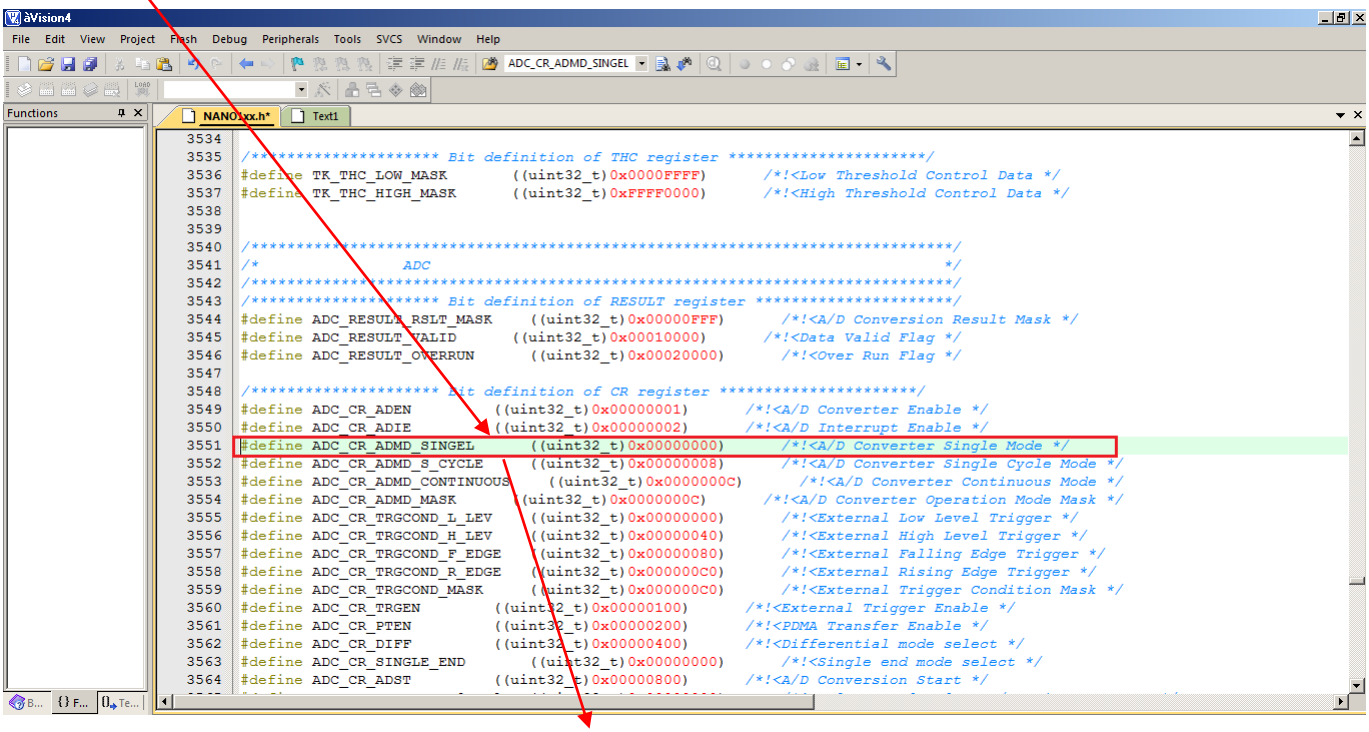
Thêm dòng

```
#define USB_CFG_CLRRDY          ((uint32_t)0x00008000)        /*!<Clear Ready */
```

Vào sau dòng dòng này



Sửa dòng

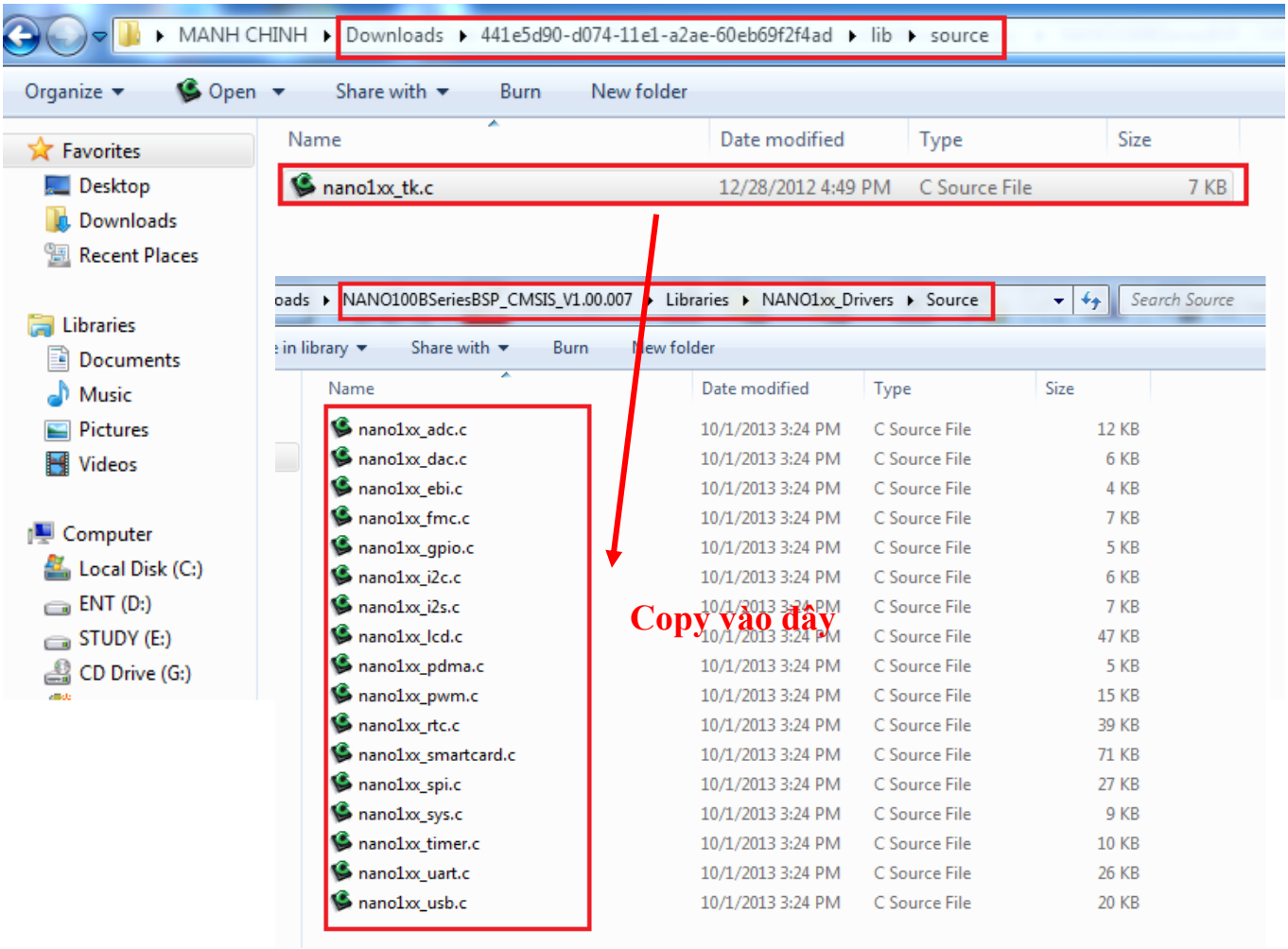



```
#define ADC_CR_ADMD_SINGEL      ((uint32_t)0x00000000)      /*!<A/D Converter Single Mode */
```

Bước 4: Thêm file thư viện Touch Key

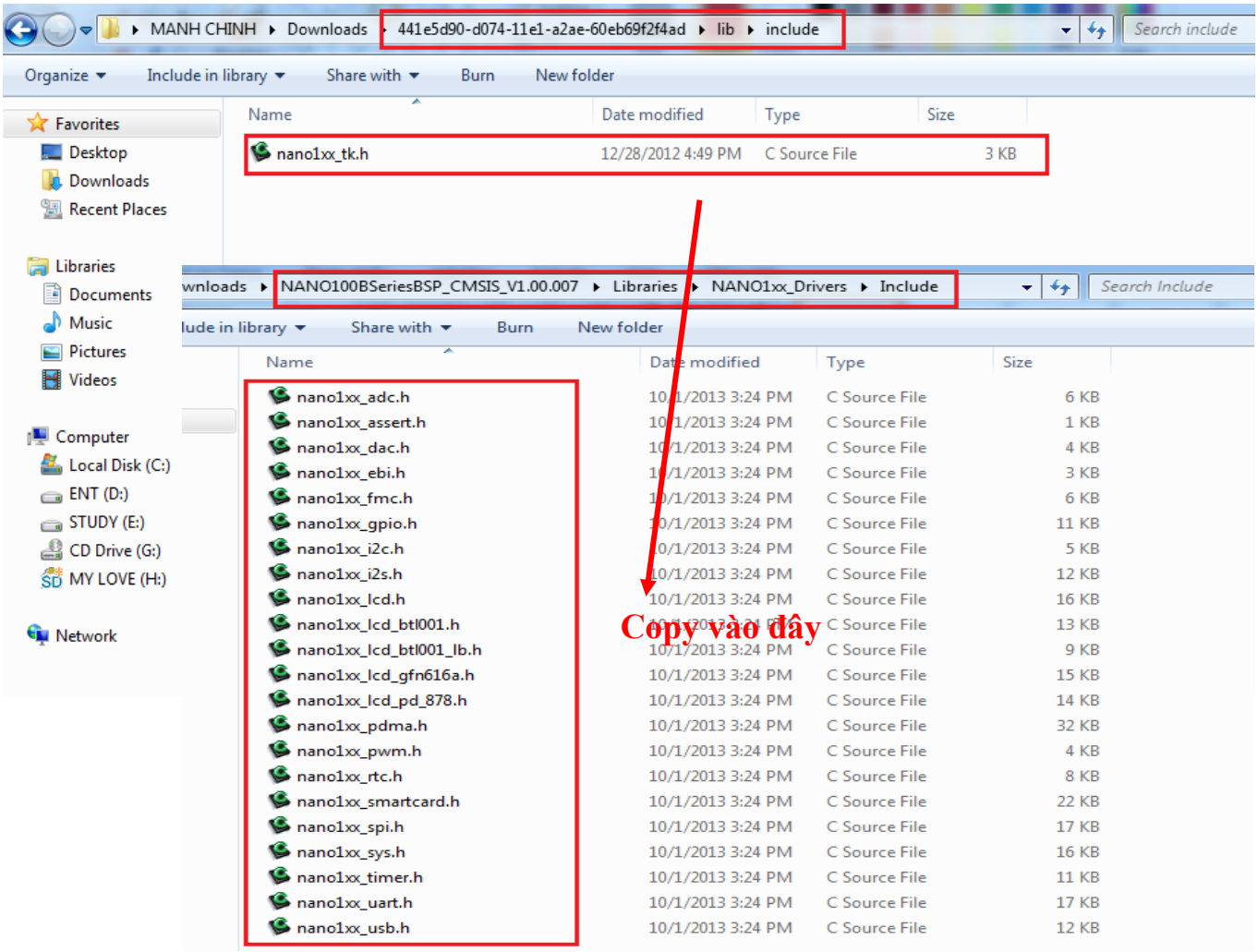
Copy file nano1xx_tk.c tải ở trên vào thư mục:

\\NANO100BSeriesBSP_CMSIS_V1.00.007\Libraries\NANO1xx_Drivers\Source



Copy file nano1xx_tk.c tải ở trên vào thư mục:

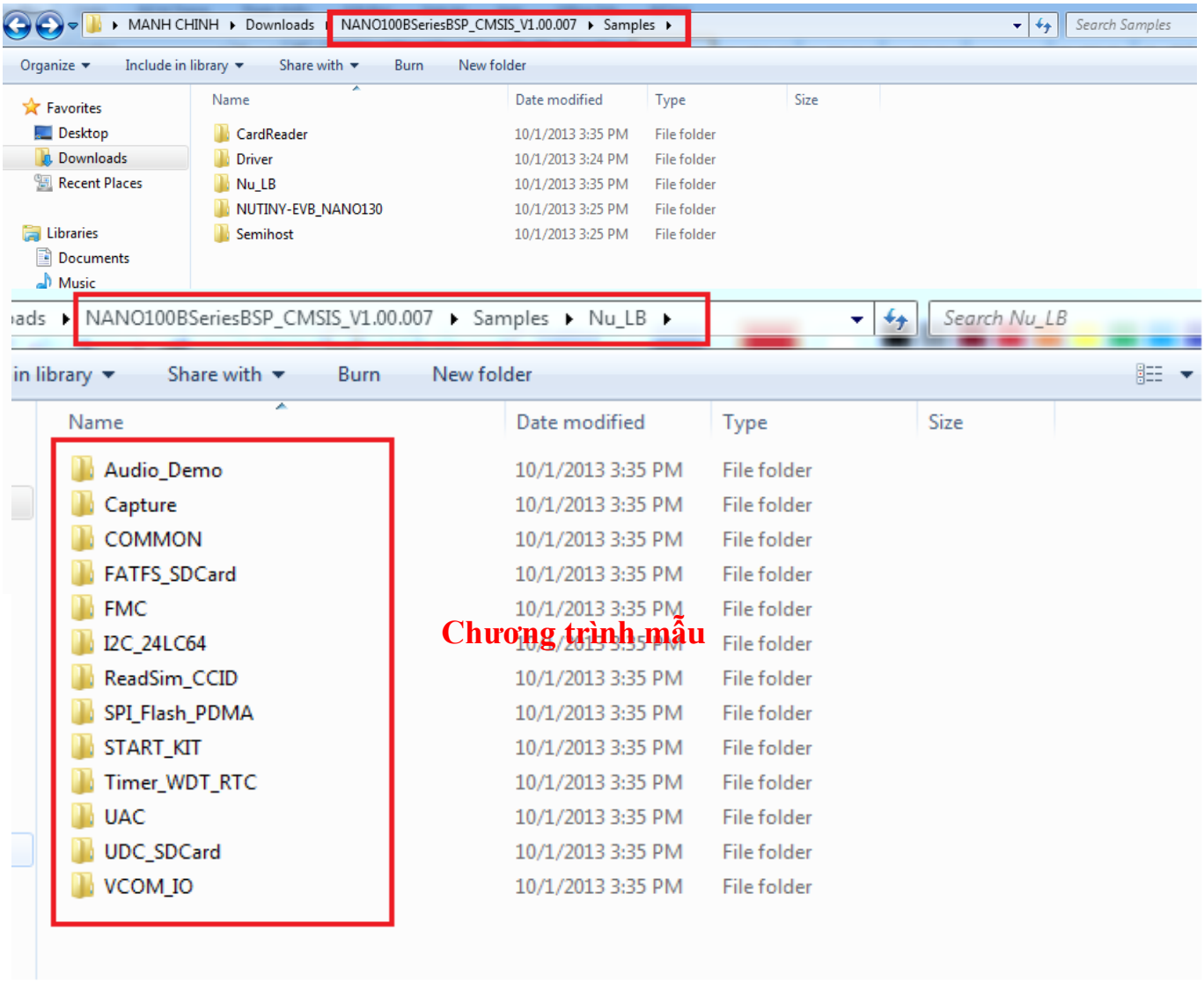
\\NANO100BSeriesBSP_CMSIS_V1.00.007\Libraries\NANO1xx_Drivers\Include



7. Lập trình Nano100 Series

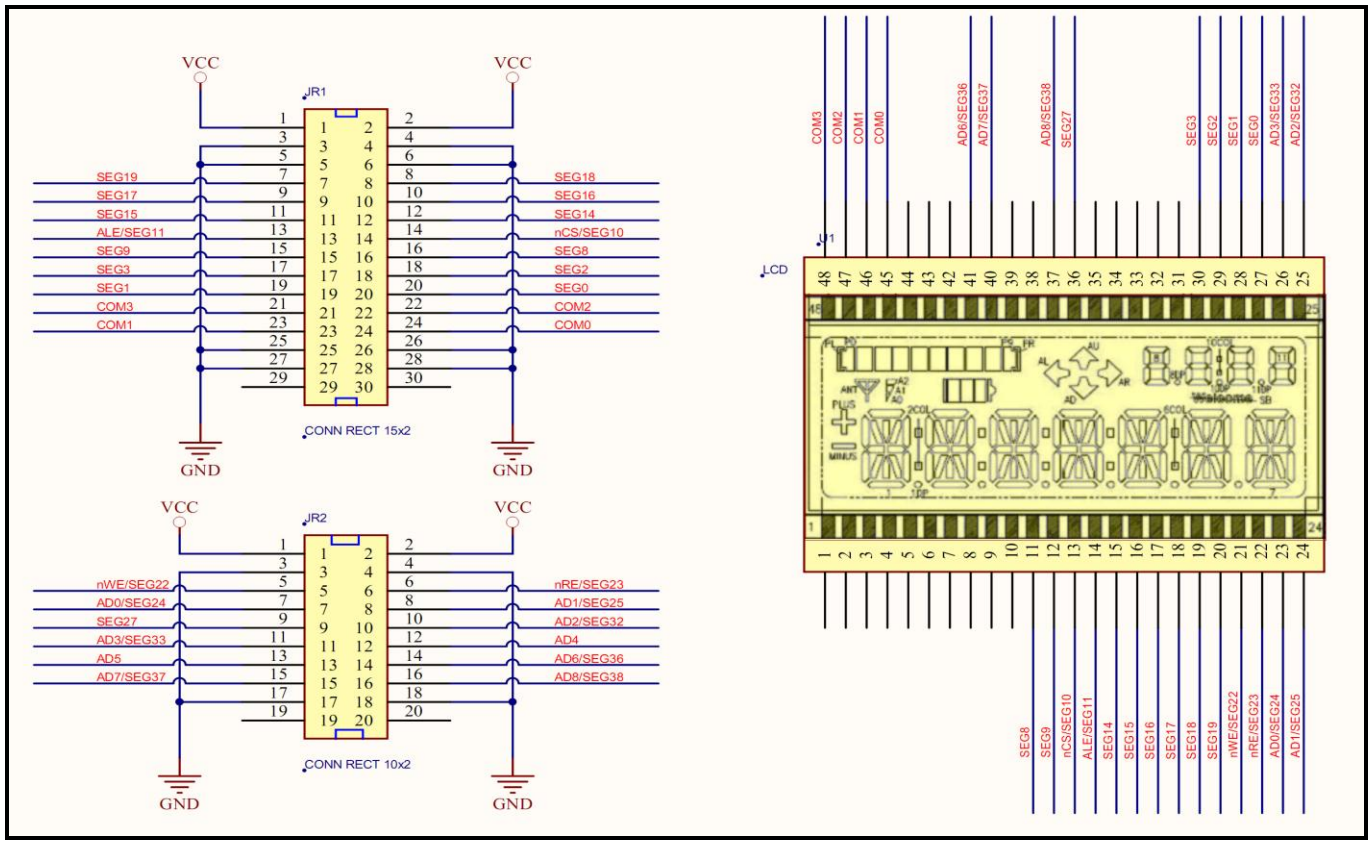
Trong phần này sẽ hướng dẫn lập trình trên KeilC

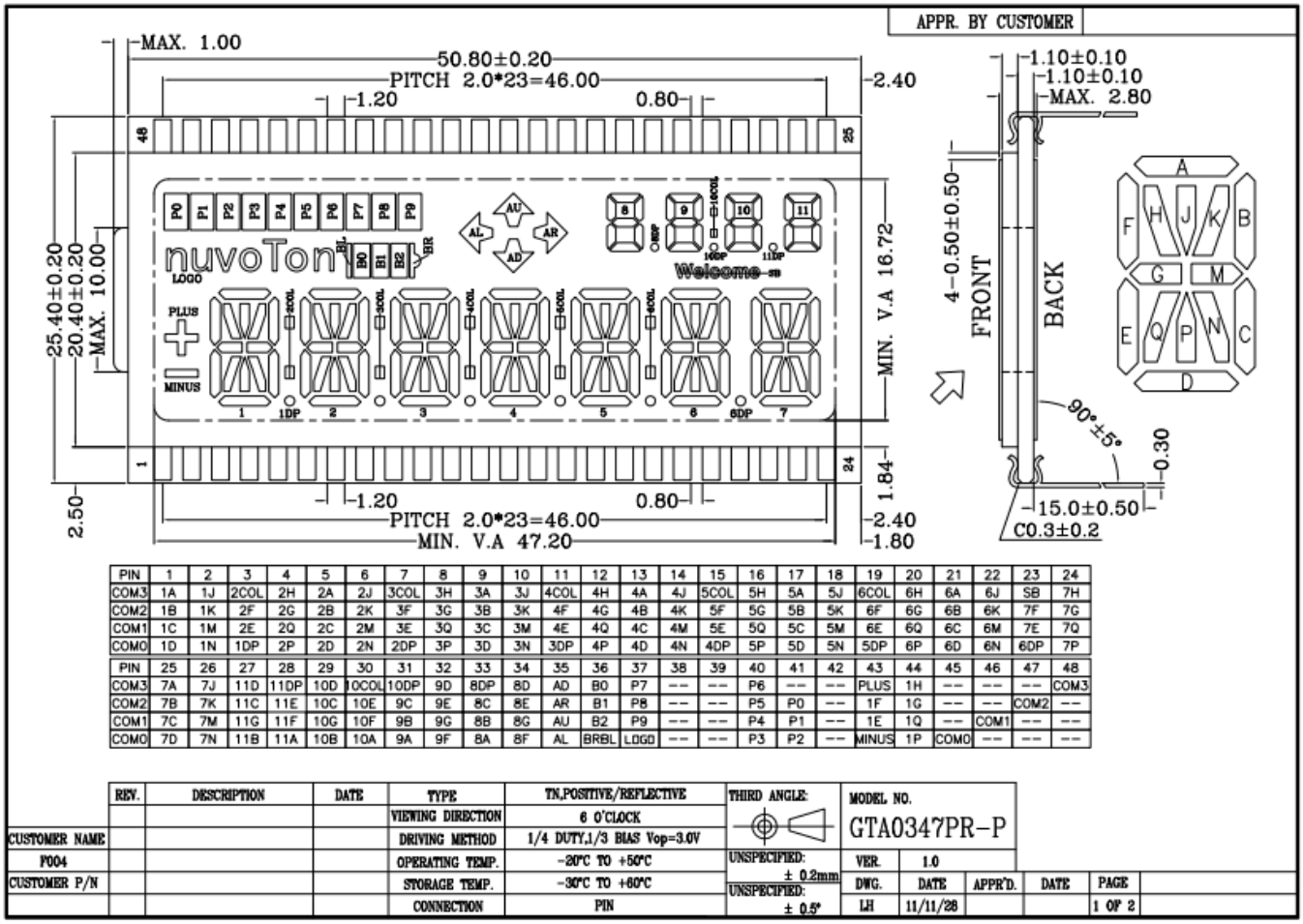
Cũng giống như các dòng vi điều khiển khác của Nuvoton như NUC100 Series, M051, Mini51… hay như các dòng ARM khác, cách thức tạo Project cho những ứng dụng sử dung dòng Nano100 Series cũng tương tự. Bạn có thể tham khảo tại đây:
http://tula.vn/modules.php?name=monline&file=sdtc1&_run=view&cid=84&arrange=tu5&desc=1&showcol=52735&showtype=0



7.1 Giao tiếp LCD

a) Mạch nguyên lý





PIN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
COM3	1A	1J	2COL	2H	2A	2J	3COL	3H	3A	3J	4COL	4H	4A	4J	5COL	5H	5A	5J	6COL	6H	6A	6J	5B	7H
COM2	1B	1K	2F	2G	2B	2K	3F	3G	3B	3K	4F	4G	4B	4K	5F	5G	5B	5K	6F	6G	6B	6K	7F	7G
COM1	1C	1M	2E	2Q	2C	2M	3E	3Q	3C	3M	4E	4Q	4C	4M	5E	5Q	5C	5M	6E	6Q	6C	6M	7E	7Q
COM0	1D	1N	1DP	2P	2D	2N	2DP	3P	3D	3N	3DP	4P	4D	4N	4DP	5P	5D	5N	5DP	6P	6D	6N	6DP	7P

PIN	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
COM3	7A	7J	11D	11DP	10D	10COL	10DP	9D	8DP	8D	AD	B0	P7	--	--	P6	--	--	PLUS	1H	--	--	--	COM3
COM2	7B	7K	11C	11E	10C	10E	9C	9E	8C	8E	AR	B1	P8	--	--	P5	P0	--	1F	1G	--	--	COM2	--
COM1	7C	7M	11G	11F	10G	10F	9B	9G	8B	8G	AU	B2	P9	--	--	P4	P1	--	1E	1Q	--	COM1	--	--
COM0	7D	7N	11B	11A	10B	10A	9A	9F	8A	8F	AL	BRBL	LOGD	--	--	P3	P2	--	MINUS	1P	COM0	--	--	--

REV.	DESCRIPTION	DATE	TYPE	TN,POSITIVE/REFLECTIVE
			VIEWING DIRECTION	6 O'CLOCK
			DRIVING METHOD	1/4 DUTY,1/3 BIAS Vop=3.0V
			OPERATING TEMP.	-20°C TO +50°C
			STORAGE TEMP.	-30°C TO +60°C
			CONNECTION	PIN

CUSTOMER NAME: F004
CUSTOMER P/N:

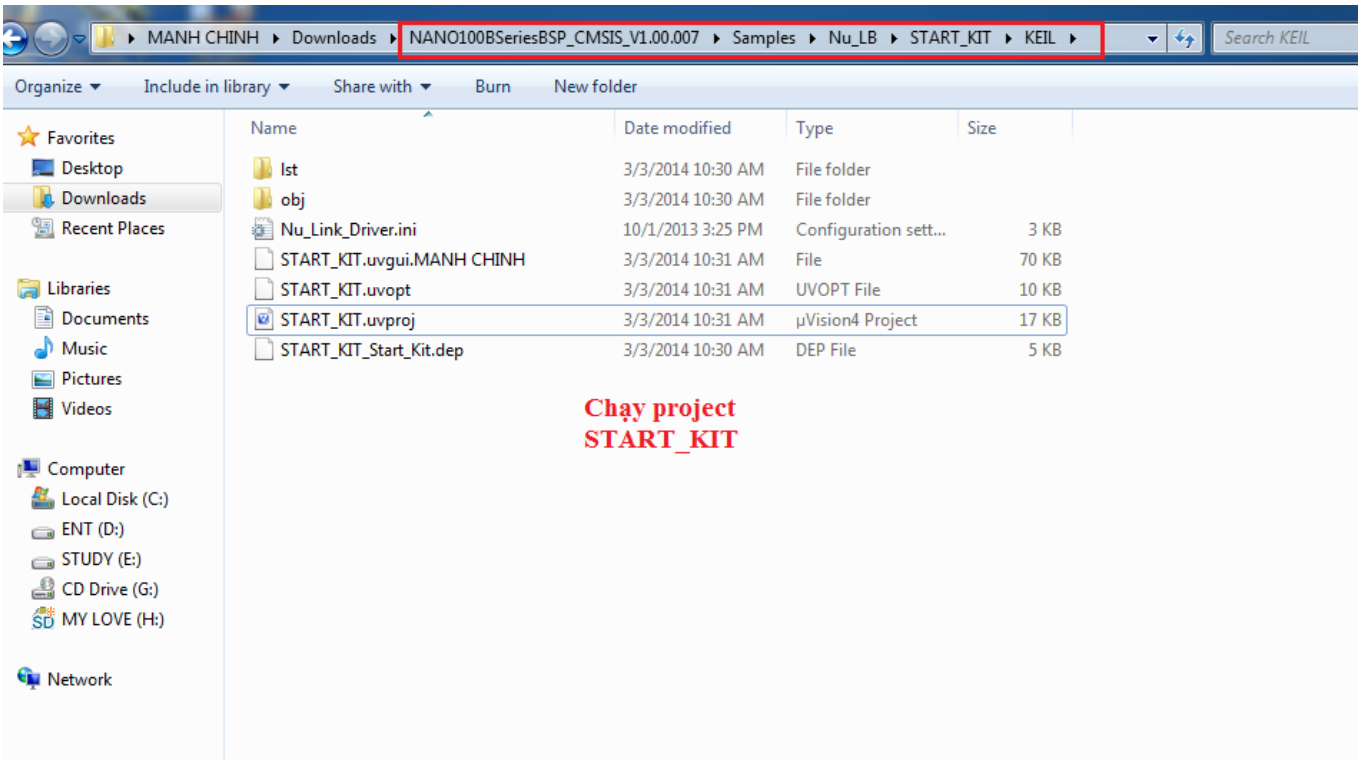
THIRD ANGLE:
UNSPECIFIED: ± 0.2mm
UNSPECIFIED: ± 0.5°

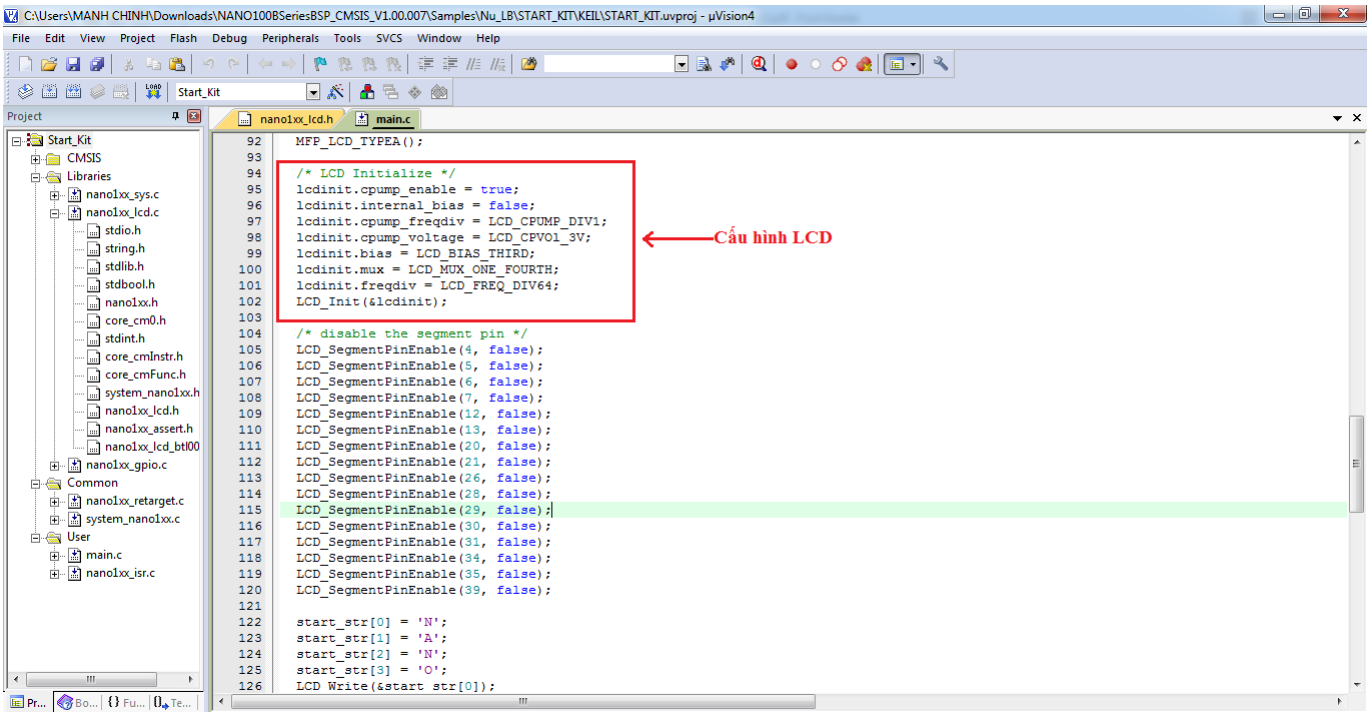
MODEL NO. GTA0347PR-P
VER. 1.0

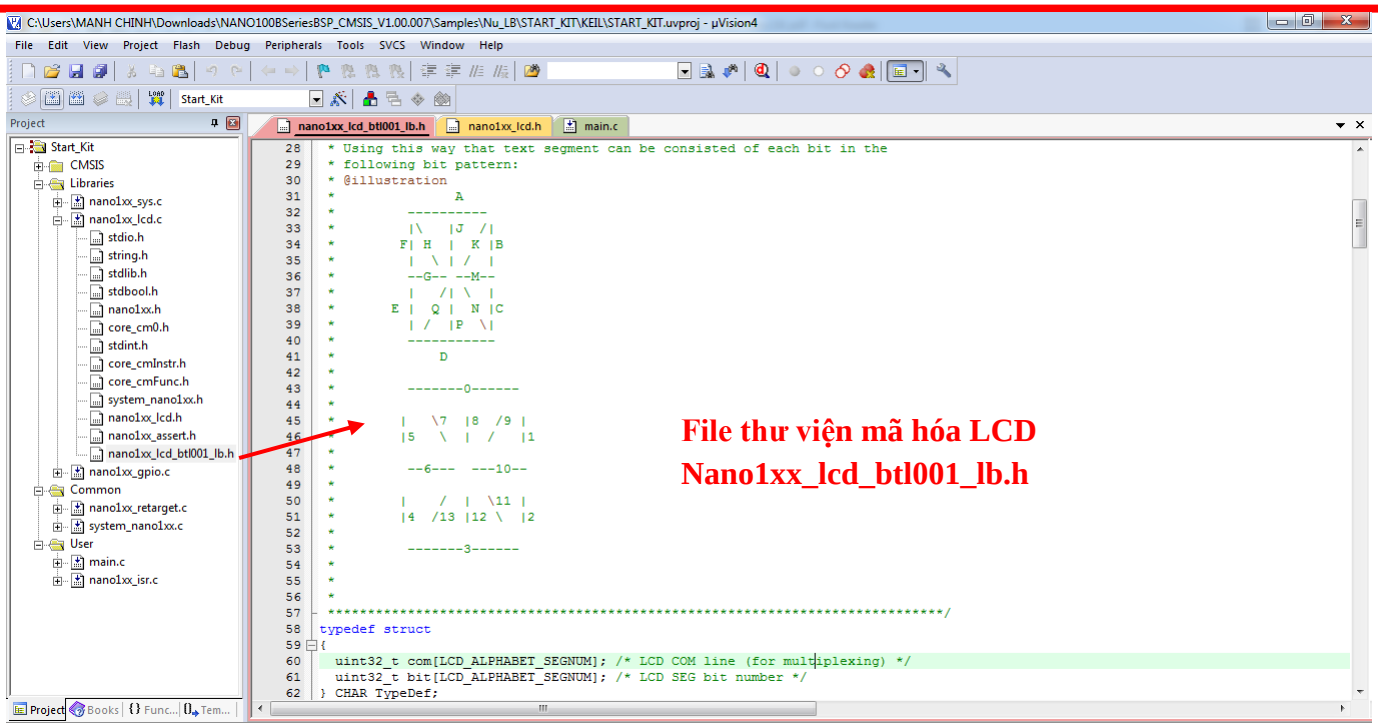
DWG.	DATE	APPR'D.	DATE	PAGE
LH	11/11/28			1 OF 2

GLCD GTA0347PR

b) Code mẫu

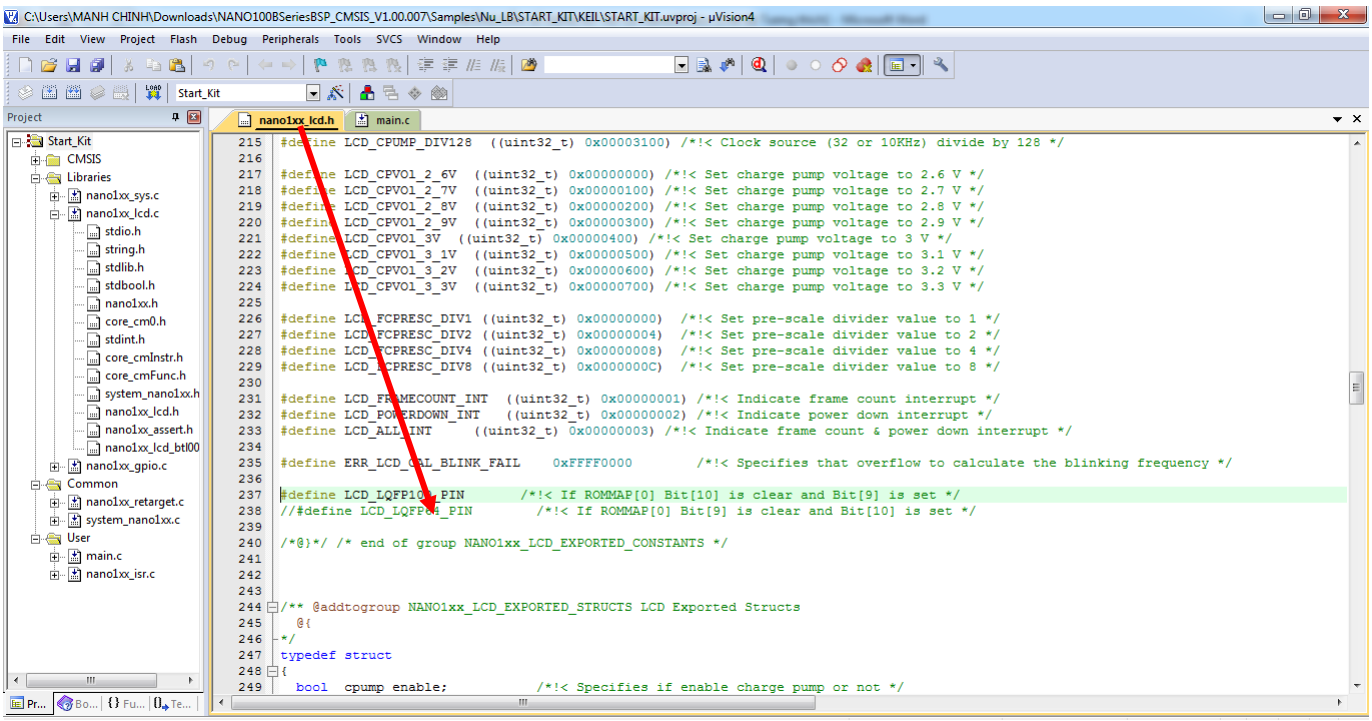

MANH CHINH ▸ Downloads ▸ NANO100BSeriesBSP_CMSIS_V1.00.007 ▸ Samples ▸ Nu_LB ▸ START_KIT ▸ KEIL ▸
Search KEIL
Organize
Include in library
Share with
Burn
New folder
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Computer
Local Disk (C:)
ENT (D:)
STUDY (E:)
CD Drive (G:)
MY LOVE (H:)
Network
Name
Date modified
Type
Size
lst 3/3/2014 10:30 AM File folder
obj 3/3/2014 10:30 AM File folder
Nu_Link_Driver.ini 10/1/2013 3:25 PM Configuration sett... 3 KB
START_KIT.uvgui.MANH CHINH 3/3/2014 10:31 AM File 70 KB
START_KIT.uvopt 3/3/2014 10:31 AM UVOPT File 10 KB
START_KIT.uvproj 3/3/2014 10:31 AM µVision4 Project 17 KB
START_KIT_Start_Kit.dep 3/3/2014 10:30 AM DEP File 5 KB
Chạy project
START_KIT


C:\Users\MANH CHINH\Downloads\NANO100BSeriesBSP_CMSIS_V1.00.007\Samples\Nu_LB\START_KIT\KEIL\START_KIT.uvproj - µVision4
File Edit View Project Flash Debug Peripherals Tools SVCS Window Help
Start_Kit
Project
Start_Kit
CMSIS
Libraries
nano1xx_sys.c
nano1xx_lcd.c
stdio.h
string.h
stdlib.h
stdbool.h
nano1xx.h
core_cm0.h
stdint.h
core_cmInstr.h
core_cmFunc.h
system_nano1xx.h
nano1xx_lcd.h
nano1xx_assert.h
nano1xx_lcd_bt100
nano1xx_gpio.c
Common
nano1xx_retarget.c
system_nano1xx.c
User
main.c
nano1xx_isr.c
nano1xx_lcd.h
main.c
92 MFP_LCD_TYPEA();
93
94 /* LCD Initialize */
95 lcdinit.cpump_enable = true;
96 lcdinit.internal_bias = false;
97 lcdinit.cpump_freqdiv = LCD_CPUMP_DIV1;
98 lcdinit.cpump_voltage = LCD_CPVOl_3V;
99 lcdinit.bias = LCD_BIAS_THIRD;
100 lcdinit.mux = LCD_MUX_ONE_FOURTH;
101 lcdinit.freqdiv = LCD_FREQ_DIV64;
102 LCD_Init(&lcdinit);
103
104 /* disable the segment pin */
105 LCD_SegmentPinEnable(4, false);
106 LCD_SegmentPinEnable(5, false);
107 LCD_SegmentPinEnable(6, false);
108 LCD_SegmentPinEnable(7, false);
109 LCD_SegmentPinEnable(12, false);
110 LCD_SegmentPinEnable(13, false);
111 LCD_SegmentPinEnable(20, false);
112 LCD_SegmentPinEnable(21, false);
113 LCD_SegmentPinEnable(26, false);
114 LCD_SegmentPinEnable(28, false);
115 LCD_SegmentPinEnable(29, false);
116 LCD_SegmentPinEnable(30, false);
117 LCD_SegmentPinEnable(31, false);
118 LCD_SegmentPinEnable(34, false);
119 LCD_SegmentPinEnable(35, false);
120 LCD_SegmentPinEnable(39, false);
121
122 start_str[0] = 'N';
123 start_str[1] = 'A';
124 start_str[2] = 'N';
125 start_str[3] = 'O';
126 LCD_Write(&start_str[0]);
Cấu hình LCD



Lưu ý:

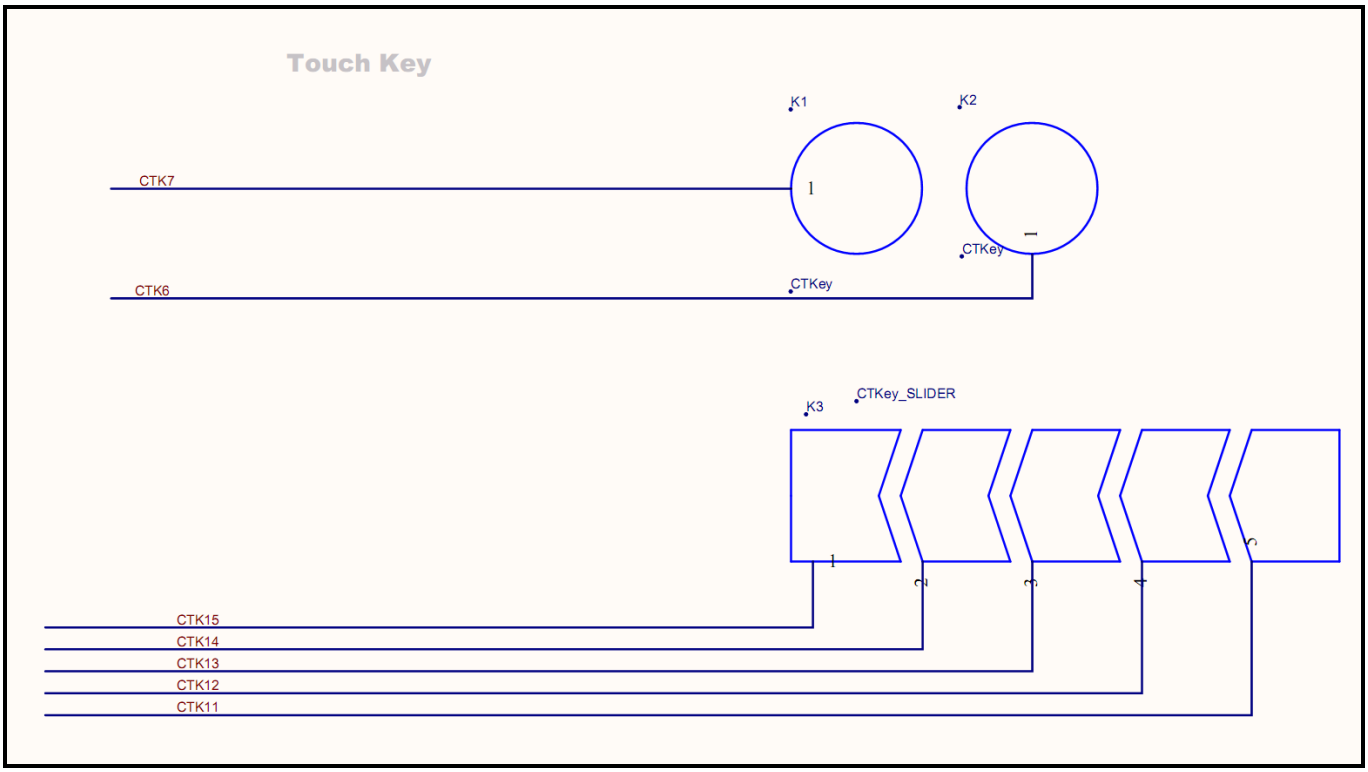
Dòng Nano100 Series(Có hỗ trợ giao tiếp LCD) gồm 2 loại: 64 chân và 128 chân. Lựa chọn loại phù hợp trong khi viết các ứng dụng



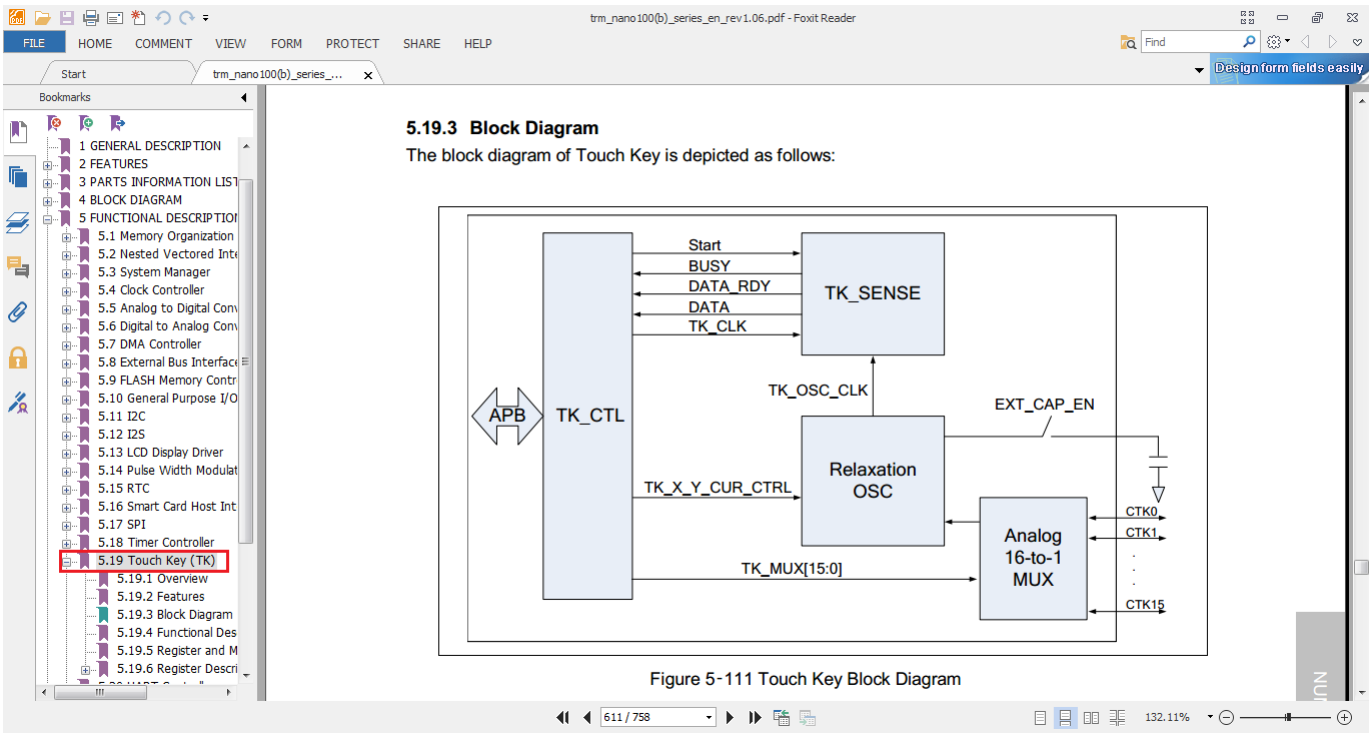
Biên dịch chương trình, nạp xuống Kit Nu_LB-Nano130 và xem kết quả.

7.2 Giao tiếp Touch Key

a) Mạch nguyên lý



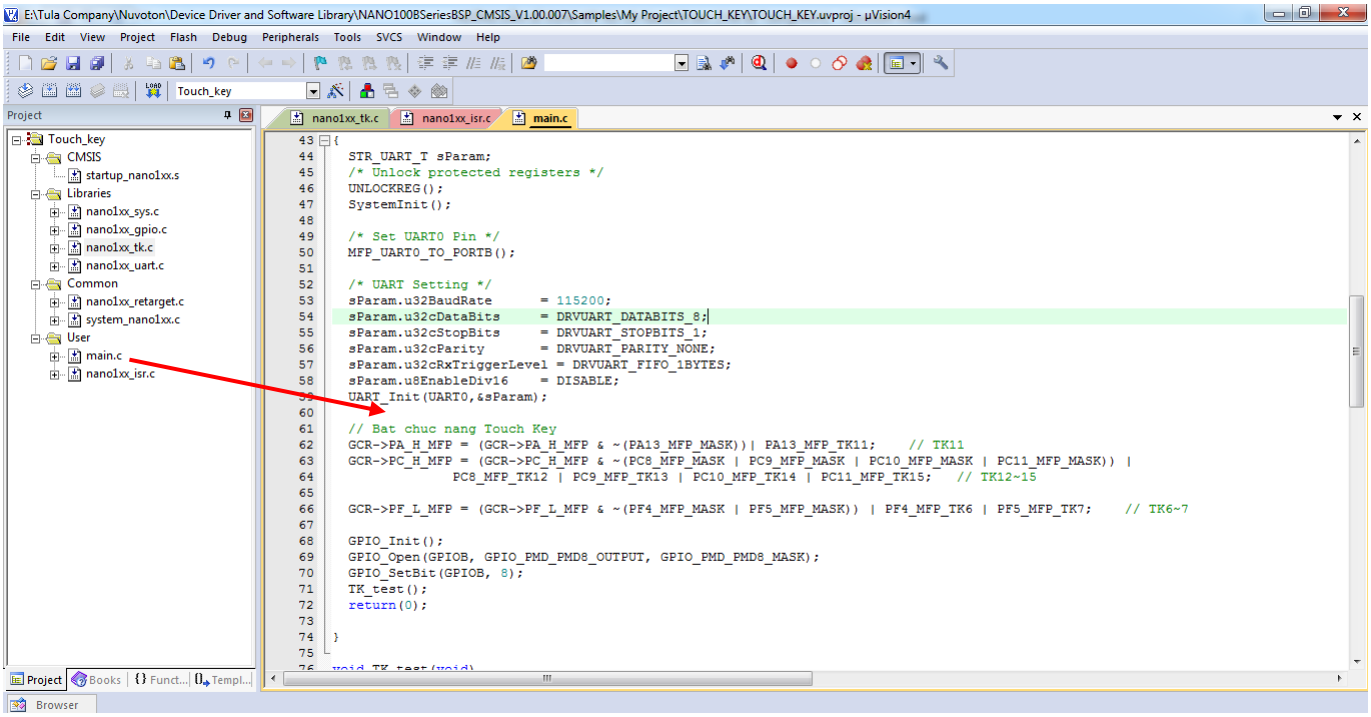
Chi tiết về giao tiếp Touch key ở đây



b) Code mẫu

Khi chạm K1 hoặc K2 thì led sáng

File main.c



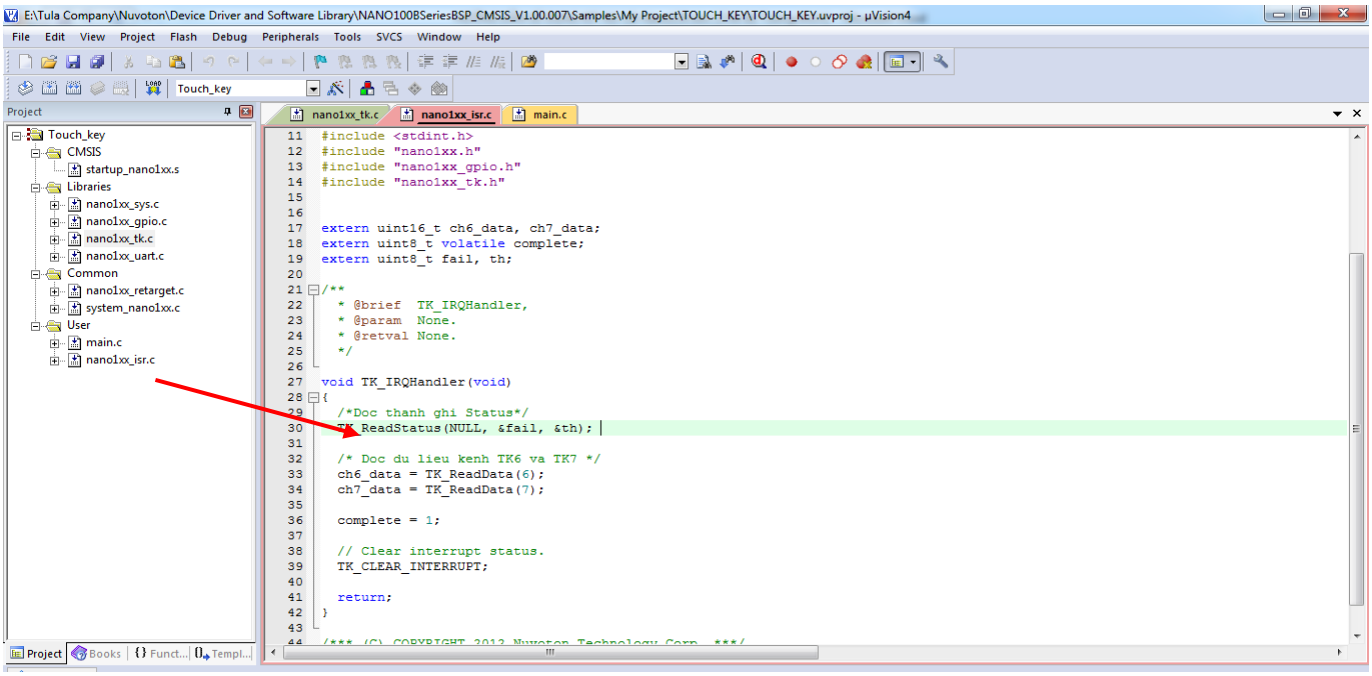
Code chương trình:

```
#include <stdio.h>
#include "nano1xx_sys.h"
#include "nano1xx_lcd.h"
#include "nano1xx_gpio.h"
#include "nano1xx_uart.h"
#include "nano1xx_tk.h"

#define TK_HIGH_THRESHOLD        0x0000
#define TK_LOW_THRESHOLD         0xFFFF
#define TK_DATA_THRESHOLD        0xA100

void TK_test(void);

uint8_t fail, th;
uint16_t ch6_data, ch7_data;
uint8_t volatile complete = 0;

void delay_loop(void)
{
      __IO uint32_t i,j;

      for(i=0;i<3;i++)
      {
            for(j=0;j<60000;j++);
```

```
        }
}

/**
  * @brief  main function.
  * @param  None
  * @return None
  */
int32_t main(void)
{
        STR_UART_T sParam;
        /* Unlock protected registers */
        UNLOCKREG();
        SystemInit();

        /* Set UART0 Pin */
        MFP_UART0_TO_PORTB();

        /* UART Setting */
        sParam.u32BaudRate          = 115200;
        sParam.u32cDataBits         = DRVUART_DATABITS_8;
        sParam.u32cStopBits         = DRVUART_STOPBITS_1;
        sParam.u32cParity           = DRVUART_PARITY_NONE;
        sParam.u32cRxTriggerLevel   = DRVUART_FIFO_1BYTES;
        sParam.u8EnableDiv16        = DISABLE;
        UART_Init(UART0,&sParam);

// Bat chuc nang Touch Key
GCR->PA_H_MFP = (GCR->PA_H_MFP & ~(PA13_MFP_MASK))| PA13_MFP_TK11; // TK11
GCR->PC_H_MFP = (GCR->PC_H_MFP & ~(PC8_MFP_MASK | PC9_MFP_MASK |
                PC10_MFP_MASK | PC11_MFP_MASK)) | PC8_MFP_TK12 | PC9_MFP_TK13 |
                PC10_MFP_TK14 | PC11_MFP_TK15;          // TK12~15

GCR->PF_L_MFP = (GCR->PF_L_MFP & ~(PF4_MFP_MASK | PF5_MFP_MASK)) |
                PF4_MFP_TK6 | PF5_MFP_TK7;       // TK6~7

        GPIO_Init();
        GPIO_Open(GPIOB, GPIO_PMD_PMD8_OUTPUT, GPIO_PMD_PMD8_MASK);
        GPIO_SetBit(GPIOB, 8);
        TK_test();
        return(0);

}

void TK_test(void)
{

        uint32_t reg;
         uint8_t i;

        S_TK_CH_CFG ch_cfg;
        ch_cfg.u8Level = 8;
```

```
      ch_cfg.u8Div = 2;
      ch_cfg.u16HighThld = TK_HIGH_THRESHOLD;
      ch_cfg.u16LowThld = TK_LOW_THRESHOLD;

      TK_Init(TK_CTL1_SEN_SEL_16BIT); // Do nhay 16 bit
      /* Cau hinh TK6, TK7*/
       TK_ConfigChannel(6, &ch_cfg);
      TK_ConfigChannel(7, &ch_cfg);

      /* Cho phep ngat */
      TK_EnableInterrupt(TK_INT_ALL);

      printf("=================== Nano 100 series touch key =============");
   while(1)
  {
      complete = 0;

      reg = TK_CTL1_EN_TK14_6 | TK_CTL1_EN_TK15_7; // Lua chon qet kenh 6 va 7
      TK->CTL1 = (TK->CTL1 & (0xffff<<16)) | reg | TK_CTL1_START_BY_SW;//bat
dau quet

      while(complete == 0); // doi den khi chuyen doi xong

      printf("ch%02d: l_th-%04x h_th-%04x data-%04x %04x %04x\n\r",
                  6, TK_LOW_THRESHOLD,TK_LOW_THRESHOLD,ch6_data,fail,th);
      printf("ch%02d: l_th-%04x h_th-%04x data-%04x %04x %04x\n\r",
                   7, TK_LOW_THRESHOLD,TK_LOW_THRESHOLD,ch7_data,fail,th);
      /* Neu TK6 hoac TK7 lon hon TK_DATA_THRESHOLD thi sang led*/
      if((ch6_data>=TK_DATA_THRESHOLD)||(ch7_data>=TK_DATA_THRESHOLD))
            GPIO_ClrBit(GPIOB, 8);
      else
            GPIO_SetBit(GPIOB, 8);

      for(i=0; i<5; i++)
            delay_loop();
  }
  return;
}


#ifdef USE_ASSERT

void assert_error(uint8_t * file, uint32_t line)
{
      printf("[%s] line %d : wrong parameters.\r\n", file, line);
      /* Infinite loop */
      while(1) ;

}
#endif
```

File nano1xx_isr.c



Code chương trình

```
#include <stdint.h>
#include "nano1xx.h"
#include "nano1xx_gpio.h"
#include "nano1xx_tk.h"

extern uint16_t ch6_data, ch7_data;
extern uint8_t volatile complete;
extern uint8_t fail, th;

/**
  * @brief  TK_IRQHandler,
  * @param  None.
  * @retval None.
  */
void TK_IRQHandler(void)
{
      /*Doc thanh ghi Status*/
      TK_ReadStatus(NULL, &fail, &th);
      /* Doc du lieu kenh TK6 va TK7 */
      ch6_data = TK_ReadData(6);
      ch7_data = TK_ReadData(7);

      complete = 1;
      // Clear interrupt status.
      TK_CLEAR_INTERRUPT;

      return;
}
```