
STR71X CLOCK CONFIGURATIONS EASY SETUP

INTRODUCTION

This application note describes how to use the “*STR71x_Calculation.xls*” file which is intended as a tool to assist in the configuration of the STR71x clocks and baud rates.

The STR71x microcontroller contains a variety of peripherals running at different frequencies. Some peripherals have a prescaler to adjust their working frequency, but some others don't and need a specific frequency to run correctly.

The file “*STR71x_Calculation.xls*” calculates all the working frequencies and shows the related register values for each peripheral.

Note: This application note doesn't substitute the fact that it is mandatory to read the reference manual before the use of this tool.

1.2 CDU

This calculation sheet is used to configure the working clock frequency for the CPU, the APB1 and the APB2.

Figure 2. CDU calculation sheet

RCLK = 40 MHz (Clock Control Unit)
defined in "Clock Control Unit", to modify click here CCU

MCLK = 40 MHz (CPU & Memory Clock)
CPU and Memory Interface runs with this frequency

PCLK1 = 20 MHz (Peripheral Clock 1)
Peripheral Clock 1 is supplied for:
I²C-Bus, UARTs, USB, BSPI, HDLC - Interfaces

PCLK2 = 10 MHz (Peripheral Clock 2)
Peripheral Clock 2 is supplied for:
Wake-Up, Interrupt, I/O-Ports, ADC, Timer, RTC, Watchdog

Registers: **"PRCCU_MDIVR"** xxxx|xxxx|xxxx|xx00 (16 bit Reg)
"PRCCU_PDIVR" xxxx|xx10|xxxx|xx01 (16 bit Reg)

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Set "Prescaler" for CPU & Memory no prescaler

Reg: **"PRCCU_MDIVR", Bit 1&0** 00 binary

Setting the Serial Interface Clock (APB1 Bridge)

Set "Prescaler" for APB1 Peripherals RCLK/2

Reg: **"PRCCU_PDIVR", Bit 1&0** 01 binary

Setting the System Peripherals Clock (APB2 Bridge)

Set "Prescaler" for APB2 Peripherals RCLK/4

Reg: **"PRCCU_PDIVR", Bit 9&8** 10 binary

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Just select the required Prescaler and obtain as a result the MCLK, the PCLK1 and the PCLK2 working frequency values.

As an example, as shown in [Figure 2](#), the Prescaler for CPU & memory is set to 1, the Prescaler for the APB1 peripherals is set to 2 and the Prescaler for the APB2 peripherals is set to 4. This configuration allows the MCLK to be set to 40MHz, the PCLK1 to 20 MHz and the PCLK2 to 10MHz.

2 UART

In this calculation sheet we have two cases:

- Enter the Prescaler and obtain as a result the correspondent baud rate,
- Or, just enter the required baud rate and obtain as a result the corresponding Prescaler.

Figure 3. UART calculation sheet

Clk In MHz
 Prescaler Ratio PCLK1 Ratio

PCLK1 = MHz

"UART_BR" Register is set to:

Register: "UART_BR" (16 Bit Register)

BAUD Rate calculates to: $PCLK1 / (16 \times \text{<UART_BR>}) =$

BAUD Rate = 9.615 kBAUD

Calculate the UART's Baud-Rate

Value: provides BAUD rate

PLL Multiply:	12	16	20	24	
Direct:	1.923				kBaud
Div. 1/16:	0.12				kBaud
Divide 1/N					
1	not spec.	not spec.	not spec.	not spec.	kBaud
2	11.538	15.385	not spec.	not spec.	kBaud
3	7.692	10.256	12.82	15.385	kBaud
4	5.769	7.692	9.615	11.538	kBaud
5	4.615	6.154	7.692	9.231	kBaud
6	3.846	5.128	6.41	7.692	kBaud
7	3.297	4.396	5.494	6.594	kBaud
0 (Zero) means not available					
min. Deviation:	no match	no match	0.156006	no match	in %
	%	%	%	%	

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Calculate Baud Rates of STR 71x UART's

1) Fill in Reload-Value to calculate Baud-Rate
 Reg: "UART_BR" Register
 max. Value = 65534 decimal
(see left table)

2) Fill in Baud-Rate to calculate Reload-Value
 max. Value = 635 *(see right table)* kBaud

Reload-Value calculated for a certain BAUD-Rate is rounded by Spreadsheet

Calculate the Register Value for Baud Rate

kBaud: is achieved with Ratio

Deviation:		12	16	20	24	
%						
no match	26					decimal
no match	2					decimal
Divide 1/N						
1	0	0	0	0	0	decimal
2	156	208	0	0	0	decimal
3	104	139	174	208		decimal
4	78	104	130	156		decimal
5	63	83	104	125		decimal
6	52	69	87	104		decimal
7	45	60	74	89		decimal
0 (Zero) means not available						

In this sheet there are two tables, the first one gives the baud rate for all the PLL frequency for a given Prescaler and the deviation for the actual PLL configuration. The second table calculates the corresponding prescaler for a given baud rate.

Figure 3 shows how to configure the actual baud rate to 9600 BAUD by setting the Prescaler to 130.

Note: For more details on the allowed value and standard baud rates, refer to the UART section in the reference manual.

3 I2C

The I2C has two functioning modes:

- The Standard I2C mode,
- The Fast I2C mode.

Figure 4. I2C calculation sheet

	16	MHz				
	2	Ratio				

Input Clock Frequency (PLL) Prescaler Ratio (Clk In)					
PLL Multiply:	12	16	20	24	
Direct:	8	96	128	160	192 MHz
Div. 1/16:	0.5				
Divide 1/N					
1	not spec.	not spec.	not spec.	not spec.	MHz
2		48	64	not spec.	MHz
3		32	42.667	53.333	64 MHz
4		24	32	40	48 MHz
5		19.2	25.6	32	38.4 MHz
6		16	21.333	26.667	32 MHz
7		13.714	18.286	22.857	27.429 MHz

Calculating the I²C Bus Speed (in Master Mode)

PLL Multiply:	12	16	20	24	
Direct:	10.02506				KHz
Div. 1/16:	0.626566				KHz
Divide 1/N					
1	not spec.	not spec.	not spec.	not spec.	KHz
2		60.15	80.201	not spec.	KHz
3		40.1	53.467	66.834	80.201 KHz
4		30.075	40.1	50.125	60.15 KHz
5		24.06	32.08	40.1	48.12 KHz
6		20.05	26.734	33.417	40.1 KHz
7		17.186	22.914	28.643	34.372 KHz

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Calculate Clock Rate of STR 71x's - I²C

1) Fill in Value for Clock Divider

Reg. *lsb's* **I2C_CCR / Bits 0..6** decimal

msb's **I2C_ECCR / Bits 0..4**

entered value is within limits
value must be lower than 4096 and higher than 1 !!!!

2) Select Fast / Slow Mode in CCR

Reg. **I2C_CCR / Bit 7** Mode Standard

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Actual I²C Bus Settings:

PCLK1 for I²C Bus is MHz

Register **"OAR2"** (8 Bit) binary

Register **"CCR"** (8 Bit) binary

Register **"ECCR"** (8 Bit) binary

I²C Bus works at: 50.125 kHz

Standard Mode is specified for 0... 100 kHz, fast mode at 100...400kHz

In this calculation sheet, it is necessary to select the functioning mode (Standard or Fast) by pushing the "Mode" button, and then to input the required Prescaler. We obtain as a result the working frequency of the I2C bus.

Figure 4 illustrates how to configure the I2C mode to Standard mode and the working frequency of the Bus to 50KHz.

Note: For more information about the calculation formulas, refer to the I2C section in the reference manual.

4 BSPI

In this calculation sheet, it is necessary to enter the corresponding divider factor, to configure the clock polarity, the clock phase and the BSPI mode. We obtain as a result the working frequency of the BSPI bus.

Figure 5. BSPI calculation sheet

16	MHz	Input Clock Frequency (PLL) Prescaler Ratio (Clk In)			
2	Ratio				

PLL Multiply:	12	16	20	24		
Direct:	8	96	128	160	192	MHz
Div. 1/16:	0.5					MHz
Divide 1/N						
1		not spec.	not spec.	not spec.	not spec.	MHz
2		48	64	not spec.	not spec.	MHz
3		32	42.667	53.333	64	MHz
4		24	32	40	48	MHz
5		19.2	25.6	32	38.4	MHz
6		16	21.333	26.667	32	MHz
7		13.714	18.286	22.857	27.429	MHz

Calculating the BSPI Speed

PLL Multiply:	12	16	20	24		
Direct:	210.5263				KHz	
Div. 1/16:	13.15789				KHz	
Divide 1/N						
1		not spec.	not spec.	not spec.	not spec.	KHz
2		1263.158	1684.211	not spec.	not spec.	KHz
3		842.105	1122.807	1403.509	1684.211	KHz
4		631.579	842.105	1052.632	1263.158	KHz
5		505.263	673.684	842.105	1010.526	KHz
6		421.053	561.404	701.754	842.105	KHz
7		360.902	481.203	601.504	721.805	KHz

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Calculate Clock Rate of STR 71x's - BSPI

1) Fill in Value for Clock Divider

Reg: **BSPI_CLK / Bits 0..7**

max. Value = 255 decimal

INFO: value in range

2) Set Clock Phase & Polarity

Reg: **BSPI_CSR1 / Bit 8, Bit 9**

Clock Polarity Bit 8 **Polarity** active low

Clock Phase Bit 9 **Phase** sec. edge

3) Configure the BSPI mode **BSPI_CSR1 / Bit1**

BSPI mode Bit 1 **Mode** Master

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Actual BSPI Settings:

Register **"BSPI_CLK"** xxxx|xxxx|0001|0011

Register **"BSPI_CSR1"** xxxx|xx11|xxxx|xx1x

BSPI works at: 1052.632 kHz

This example, as shown in [Figure 5](#), illustrates how to configure the Clock Divider to 20, to set the BSPI working frequency to 1MHz, to set the polarity to "active low", to set the phase to "second edge" and to configure the BSPI as master.

5 WDG

In this calculation sheet, it is necessary to enter the corresponding Prescaler, to set the watchdog Preload value, and finally to select the functioning mode (Free Running Timer mode or Watchdog mode).

We obtain as a result the Free running Timer frequency value if this mode is selected or the Timeout value if the Watchdog mode is selected.

Figure 6. WDG calculation sheet

Reg: WDG_CR / Bit 0, Bit 1, Bit 2 (16 Bit)		(C) COPYRIGHT 2004 STMicroelectronics MCD Application Team Calculate time interval for WatchDoG timer 1) Fill in Value for Watchdog Prescaler Reg: WDG_PR / Bits 0..7 max. Value = 255 19 decimal INFO: Input Frequency for WDG_CNT = 0.5 MHz 2) Set Watchdog Count Preload Register Reg: WDG_VR / Bit 0...15 max. Value = 65535 9999 INFO: valid setting of 'reload register' Home Back Continue >
xxxx xxxx xxxx x001		
Bit 0	if set: Watchdog is enabled, else free running Timer WE	
Bit 1	if set: Counter loads "Preset Value", else stopped SC	
Reg: WDG_KR (16 Bit)		Actual Watchdog Settings: Current "PCLK2" Frequency is: 10 MHz To change PCLK2 frequency go to "Clock Distribution Unit" CDU Register "WDG_PR" xxxx xxxx 0001 0011 Register "WDG_VR" 0010 0111 0000 1111
Bit 0.. Bit 15 writing two consecutive values to this register reloads the counter with the content of WDG_VR		
Reg: WDG_SR (16 Bit)		
Bit 0	Bit is set by HW at "End of count", reset by software	
Reg: WDG_MR (16 Bit)		
Bit 0 if set: "End of count" interrupt is enabled, else disabled		
Free running Timer : Disabled		Watchdog Timeout: 20 ms

As an example, as shown in Figure 6, this calculation sheet illustrates how to configure the WDG Prescaler to 19, the WDG Count Preload value to 9999 and to select the Free Running Timer mode.

6 TIM

In this calculation sheet, it is necessary to select the clock source (internal or external), to select the external clock edge if external clock was selected, and to configure the needed prescaler. We obtain as a result the counter input frequency and the TIM period.

This sheet shows how to configure the different registers to:

- Enable/Disable the Timer Counter,
- Setting the operation mode of the Timer,
- Setting the Input Capture edge,
- Setting the Output Compare function,
- Setting the Output Compare signal Level,
- Enable the Output Compare signals.

Figure 7. TIM calculation sheet

Reg: TIMn_CR1 16 Bit		(C) COPYRIGHT 2004 STMicroelectronics MCD Application Team	
Enable the Timer Counter: Bit 15 Bit 15 if set: the Timer Counter is enabled ON		Calculate time interval for Timer (TIM) 1) Select Clock (internal / external) Reg. TIMn_CR1 / Bit 1 & Bit 0 00 Bit 1 Bit 0 INFO: EFT-Clock = PCLK2 / CC0..7	
Setting the Operation Mode of the Timer: Bit 4 Bit 4 if set: PWM Output is active none Bit 5 Bit 5 if set: One Pulse Mode is active none Bit 14 Bit 14 if set: PWM Input is active ON		external Clock on Port 1.1 is: 64 kHz 2) Fill in Value for TIM Prescaler Reg. TIMn_CR2 / Bits 0..7 max. Value = 255 49 INFO: Prescaler Output is = 200 kHz	
Setting the Input Capture Edge: Bit 2 (IEDGA) Bit 2 pos. Bit 3 (IEDGB) Bit 3 neg.		Home Back Continue >	
Setting the Output Compare Function: Bit 6 (OCAE) Bit 6 OFF Bit 7 (OCBE) Bit 7 OFF		Actual Timer Settings: "CNTR" Input Frequency is: 200 kHz To change PCLK2 frequency go to "Clock Distribution Unit" CNU1	
Setting The Output Compare Signal Level: Bit 8 (OLVL A) Bit 8 OFF Bit 9 (OLVL B) Bit 9 OFF		Register "TIMn_CR2" xxxx xxxx 0011 0001	
Enable the Output Compare Signals: Bit 10 (FOLVA) Bit 10 OFF Bit 11 (FOLVB) Bit 11 OFF		Register "TIMn_CR1" 1100 0000 0000 0100	
INFO: Select Interrupts in Register TIMn_CR2		TIM period: 327.675 ms TIM Frequency: 3.05180437933928 Hz	

As an example, as shown in Figure 7, this calculation sheet shows how to configure the TIM as follows:

- Select the Pulse Width Modulation Input mode,
- Configure ICAP A to a positive edge (Rising edge),
- Configure ICAP B to negative edge (Falling edge),
- Select the clock as internal and configure the Prescaler to 49,
- Enable the Timer Counter.

7 USB

The USB controller on STR71x works with an external clock generator supplying 48MHz as defined in the specification.

Note: However, due to USB data rate and packet memory interface requirements, the APB1 clock frequency must be greater than 8MHz to avoid data overrun/underrun problems.

8 CAN

In this calculation sheet, it will be needed to enter the two baud rates Prescaler (Baud Rate Prescaler and Ext. Baud Rate Prescaler) and to configure the bit time parameters (TSeg1, TSeg2 and SJW).

We obtain as a result:

- The total Prescaler Divider,
- The Time Quanta,
- The total Bit-Time for CAN,
- The total CAN-Bus Bitrate,
- The tolerance calculation.

Figure 8. CAN calculation sheet

The CAN Module uses PCLK1: 20 MHz		(C) COPYRIGHT 2004 STMicroelectronics MCD Application Team Setting the Bit Timing Register: Setting CAN_BTR (Baud Rate Prescaler): 9 value Setting CAN_BRPR (Ext. Baud Rate Pre.): 0 value Values in range Bit time is set by: Sync_Seg (fixed) 1 TSeg1 (pre sampling): Reg: BTR 10 value TSeg2 (post sampling): Reg: BTR 3 value SJW (sampling shift): Reg: BTR 3 value Home Back Continue >
Total Prescaler Divider:	10 value	
The "Time Quanta" is:	0.5 µs	
<i>Total Bit-Time is calculated as: (Sync_Seg + TSeg1 + TSeg2 + 2) * TimeQuanta</i>		
Total Bit-Time for CAN:	8 µs	
Total CAN-Bus Bitrate:	125 kBits/s	
<i>Tolerance calculation: min(PB1, PB2)/2*(13*(bit time - PB2))</i>		
Tolerance of CAN_CLK:	0.013 %	
CAN Section Settings:		
Register "CAN_BTR"	x011 1010 1100 1001 bin	
Register "CAN_BRPR"	xxxx xxxx xxxx 0000 bin	

Note: For further details about the formulas, refer to the CAN section in the reference manual.

As an example, the table 1 lists the different standard bitrates of the CAN with their timing parameters with PCLK1 = 20MHz.

Table 1. Standard bitrate configurations (PCLK1 = 20 MHz)

Bitrate	NTQ	TSEG1	TSEG2	SJW	BRP
100Kbit/s	20	13	4	3	10
125Kbit/s	16	10	3	3	10
250Kbit/s	8	3	2	2	10
500Kbit/s	8	3	2	1	5
1Mbit/s	5	1	1	1	4

With:

NTQ: $TSEG1 + TSEG2 + 3$

TSEG1: Time Segment before the sampling point minus Sync_seg

TSEG2: Time Segment after the sampling point

SJW: Synchronization Jump Width

BRP: Baud Rate Prescaler

9 RTC

In this calculation sheet, it will be needed to enter the Prescaler, the Alarm value and the counter value. We obtain as a result:

- The period,
- The frequency of the RTC counter,
- The Alarm time out.

Figure 9. RTC calculation sheet

ALARM & COUNTER Settings:

Setting RTC_ALRH (Alarm Register High) value

Setting RTC_ALRL (Alarm Register Low) value

INFO: Values in range

Setting RTC_CNTH (Counter High) value

Setting RTC_CNTL (Counter Low) value

INFO: Values in range

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Calculate the Oversampling Clock of STR 71x - ADC

Fill in Value for Clock Divider

Setting RTC_PRLH (Prescaler Divider High) value

Setting RTC_PRL (Prescaler Divider Low) value

INFO: Values in range

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Actual RTC Settings:

Total Prescaler Divider:	32768	value
Total Alarm Value:	2000	value
Total Counter Value:	500	value

RTC period:	1 s	
RTC Frequency:	1 Hz	
Alarm Time Out:	1500s	

RTC Section Settings:

Register	"RTC_PRLH" xxxx xxxx xxxx 0000	bin
Register	"RTC_PRL" 1000 0000 0000 0000	bin
Register	"RTC_ALRH" 0000 0000 0000 0000	bin
Register	"RTC_ALRL" 0000 0111 1101 0000	bin
Register	"RTC_CNTH" 0000 0000 0000 0000	bin
Register	"RTC_CNTL" 0000 0001 1111 0100	bin

As an example, as shown in [Figure 9](#):

- To configure the RTC period to 1s, just set the Prescaler to 32768;
- To configure the Alarm time out to 1500s just set the Alarm value to 2000 and the Counter value to 500.

10 ADC

In this calculation sheet, it is necessary to enter the clock divider. As a result, we will recuperate the ADC sampling frequency.

Figure 10. ADC calculation sheet

PLL Multiply:	12	16	20	24	
Direct:	8	96	128	160	192 MHz
Div. 1/16:	0.5				
Divide 1/N					
1	not spec.	not spec.	not spec.	not spec.	MHz
2	48	64	not spec.	not spec.	MHz
3	32	42.667	53.333	64	MHz
4	24	32	40	48	MHz
5	19.2	25.6	32	38.4	MHz
6	16	21.333	26.667	32	MHz
7	13.714	18.286	22.857	27.429	MHz

Calculating the ADC Sampling frequency

PLL Multiply:	12	16	20	24	
Direct:	98				Hz
Div. 1/16:	6				Hz
Divide 1/N					
1	not spec.	not spec.	not spec.	not spec.	Hz
2	586	781	not spec.	not spec.	Hz
3	391	521	651	781	Hz
4	293	391	488	586	Hz
5	234	313	391	469	Hz
6	195	260	326	391	Hz
7	167	223	279	335	Hz

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Calculate the sampling frequency of STR71x - ADC

Fill in Value for Clock Divider

Reg: **ADC_CPR / Bits 0..11**

max. Value = 4095 decimal

INFO: value in range

Actual ADC Settings:

Current "PCLK2" Frequency is: MHz

Register "ADC_CPR"

Sampling frequency: 488 Hz

As an example, as shown in Figure 10, setting the Prescaler to 5, configure the sampling frequency to 488 Hz.

11 HDLC

This calculation sheet allows the configuration and calculation of the transmit and the receive clocks.

For the two cases it is necessary to select the clock source (Internal or External), to set the value of the clock source if external clock source was selected, to configure the clock divider value and to select the transmission and the receive data code.

We obtain as a result:

- The transmit and the receive clocks,
- The transmit and the receive registers configuration.

Figure 11. HDLC calculation sheet

HDLC Section		(C) COPYRIGHT 2004 STMicroelectronics MCD Application Team	
Internal Clock:	20	MHz	
Input Clock for Transmit Divider :	20	MHz	
Transmit Clock :	1000	kHz	
Register: "HDLC_BRR"	xxx0 0000 0000 1001	16 bit	
Register: "HDLC_TCTL"	xxxx 11xx xxxx xxxx	16 bit	
Input Clock for Receive Divider:	20	MHz	
Receive Clock:	500	kHz	
Register: "HDLC_PRSL"	xxxx xx00 0010 0111	16 bit	
Register: "HDLC_RCTL"	xxxx 01 xx xxxx xxxx	16 bit	
		Transmit Clock Select Clock Source : Internal Clock none relevant in this mode 1000 kHz Provide Transmit Clock Divider : 9 value Value in range <0....4095> Select Transmission Data Code: Manchester	
		Receive Clock Select Clock Source : Internal Clock none relevant in this mode 1000 kHz Provide Receive Clock Divider : 39 value Value in range <0....255> Select Receive Data Coding: NRZI	
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Note: For more details, refer to the HDLC section of the reference manual.

As an example, as shown in [Figure 11](#), the HDLC is configured as follows:

- The transmit clock is set to 1MHz with an internal clock source, a clock divider value set to 9 and with Manchester transmission data code,
- The receive clock is set to 500KHz with an internal clock source, a clock divider value set to 39 and with NRZI transmission data code.

12 GPIO

In this sheet, there are three buttons (Port 0, Port 1 and Port 2) as shown in [Figure 12](#).

Figure 12. GPIO Settings sheet

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GPIO Settings

Configuration of the "General Purpose Input/Output" cells

This area provides a way of setting up port configurations.

Port 0 **Port 0 Settings**

Port 1 **Port 1 Settings**

Port 2 **Port 2 Settings**

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12.1 PORT 0

This sheet allows the configuration of all the port 0 pins independently. We obtain as a result the values to be loaded into the PC0, PC1 and PC2 registers.

Figure 13 shows how to configure the port 0 as follows:

- Bits 0, 1, 2, 3: BSPI0,
- Bits 4, 5, 6, 7, 12: GPIO,
- Bits 8, 9, 10, 11: UART1,
- Bits 13, 14: UART2,
- Bits 15: Wake-Up.

Figure 13. Port 0 configuration sheet

Port 0: Settings of I/O Pins

WakeUp	UART-2	UART-2	GPIO	UART-1	UART-1	UART-0	UART-0
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
III-TTL	AFct-OD	III-CMOs	AFct-PP	AFct-PP	III-CMOs	AFct-OD	AFct-OD

GPIO	GPIO	GPIO	GPIO	BSPI-0	BSPI-0	BSPI-0	BSPI-0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
III-CMOs	III-CMOs	AFct-OD	III-TTL	AFct-OD	AFct-PP	AFct-PP	III-TTL

Port 0: Settings of Configuration Registers

Port 0 Configuration Register 0:

1001|1000|0001|0111

0x9817h

Port 0 Configuration Register 1:

0111|1111|1110|1110

0x7FEEh

Port 0 Configuration Register 2:

0101|1011|0010|1110

0x5B2Eh

Use BSPI 0 / FC 1/ UART 3:

BSPI-0

Master

Use BSPI 1:

GPIO

Use UART 0:

UART-0

Half-Dpk

Use UART 1/ Smart Card:

UART-1

Use UART 2/ EFT 2:

UART-2

Use Wake-Up:

Wake Up

Select I/O Pin Function:

Select Pin: Bit 10

Select Function: IN-CMOS

Store

Alternate Function I/O Configuration is set properly !

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Port 1

Port 2

12.2 PORT 1

This sheet allows the configuration of all the port 1 pins independently. We obtain as a result the values to be loaded in to the PC0, PC1 and PC2 registers.

The [Figure 14](#) shows how to configure the port 1 as follows:

- Bits 0, 1, 2, 3: Timer 3,
- Bits 4, 5, 6, 7, 8, 9, 15: GPIO,
- Bits 10: USB,
- Bits 11, 12: CAN,
- Bits 13, 14: I2C.

Figure 14. Port 1 configuration sheet

Port 1: Settings of I/O Pins

GPIO Bit 15	I ² C-0 Bit 14	I ² C-0 Bit 13	CAN Bit 12	CAN Bit 11	USB Bit 10	GPIO Bit 9	GPIO Bit 8
AFct-PP	AFct-PP	AFct-PP	AFct-PP	III-CMOS	III-CMOS	OUT-PP	AFct-OD

GPIO Bit 7	GPIO Bit 6	GPIO Bit 5	GPIO Bit 4	Timer-3 Bit 3	Timer-3 Bit 2	Timer-3 Bit 1	Timer-3 Bit 0
AFct-PP	AFct-PP	AFct-PP	III-TTL	III-TTL	AFct-OD	III-CMOS	AFct-PP

Port 1: Settings of Configuration Registers

Port 1 Configuration Register 0:
1111|0010|1111|1001 0xF2F9h

Port 1 Configuration Register 1:
1111|1101|1110|0111 0xFDE7h

Port 1 Configuration Register 2:
1111|0011|1110|0101 0xF3E5h

Use Timer 3: Timer-3

Use HDLC / Timer 1: I²C-0 Master

Use CAN: CAN

Use USB : USB

Select I/O Pin Function:

Select Pin: Bit 14

Select Function: AFct-PP Store

Alternate Function I/O Configuration is set properly !

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Port 0
Port 2

12.3 PORT 2

This sheet allows the configuration of all the port 2 pins independently. We obtain as a result the values to be loaded in to the PC0, PC1 and PC2 registers.

The [Figure 15](#) shows how to configure the port 2 as follows:

- Bits 0, 1: External memory interface: Select memory bank,
- Bits 2, 3, 12, 13, 14, 15: GPIO,
- Bits 4, 5, 6, 7: External memory interface: Address bus,
- Bits 8, 9, 10, 11: External interrupt.

Figure 15. Port 2 Configuration sheet

Port 2: Settings of I/O Pins

GPIO Bit 15	GPIO Bit 14	GPIO Bit 13	GPIO Bit 12	INT 5 Bit 11	INT 4 Bit 10	INT 3 Bit 9	INT 2 Bit 8
III-TTL	III-OUT	AFct-PP	AFct-PP	III-TTL	III-CMO	III-TTL	III-TTL

Adr. 23 Bit 7	Adr. 22 Bit 6	Adr. 21 Bit 5	Adr. 20 Bit 4	GPIO Bit 3	GPIO Bit 2	CSN 1 Bit 1	CSN 0 Bit 0
AFct-PP	AFct-PP	AFct-OD	AFct-OD	AFct-OD	AFct-PP	AFct-OD	AFct-OD

Port 2: Settings of Configuration Registers

Port 2 Configuration Register 0:

1111|1011|1100|0100

0xFBC4h

Port 2 Configuration Register 1:

0111|0100|1111|1111

0x74FFh

Port 2 Configuration Register 2:

0011|0000|1111|1111

0x30FFh

Use ext. Bank Select:

use Bank Select

Use extended Addresses:

use Adr. Lines

Use ext. Interrupts:

use Interrupts

INT 2 , enabled

☒ select

INT 3 , enabled

☒ select

INT 4 , enabled

☒ select

INT 5 , enabled

☒ select

set Interrupts

Store

Select I/O Pin Function:

Select Pin:

Bit 1

Select Function:

AFct-OD

Store

Alternate Function I/O Configuration is set properly !

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Port 0

Port 1

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