R7F0C80212ESP

ADC-to-UART 示例程序

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介绍

示例程序包括以下函数和功能:

- 微控制器的初始化
  a. 间隔定时器功能, UART发送功能, AD转换功能初始化
  b. 设置选项字节(Option Byte)
- 主应用循环
  a. 启动AD转换, UART发送, 间隔定时器
  b. 轮询一秒钟间隔, 重新启动AD转换
  c. 轮询AD转换完毕, 发送数据
  d. MCU中断启动

目标器件

RL78 / R7F0C80212ESP

当应用此示例程序于其他微控制器时，请根据目标微控制器规格修改程序，并对修改的程序充分进行评估。

目录

1. 执行示例程序

示例按以下顺序执行：

(1) 打开工程“AD_Data-to-UART.mtpj”

(2) 连接CS+内设GUI软件仿真;

(3) 下载程序;

(4) 重新执行(Restart)程序;

(5) 用户可以在软仿真视窗里的“I/O Panel1”, 调节输入电压.

(6) 用户可以在软仿真视窗里的“Serial2”,定时输出数据.

- 软件仿真具有一定的局限性。用户程序发布前，请使用仿真器进行测试确认。
- 在使用仿真器仿真前，请先明确E1/EZ-CUBE硬件设置和与目标连接是否正确。
- 具体细节请参见E1/EZ-CUBE用户手册。并请检查E1/EZ-CUBE是否使用了最新固件。

2. 操作环境

工作频率	内部时钟
综合开发环境	瑞萨电子综合开发环境 CubeSuite+ V1.03.00
示例工程	AD_Data-to-UART.mtpj

3. 函数说明

此节描述示例程序中的各个函数。

[函数名称] IO_Init	
概要	I/O端口初始化
头文件	无
声明	void IO_init(void)
说明	
返回值	无
备注	无

[函数名称] SAU_Init	
概要	SAU初始化
头文件	无
声明	void SAU_init(void)
说明	- UART设置 - 38400bps, 8, N, 1 - TXD0为UART输出口 - UART发送完毕中断
返回值	无
备注	无

[函数名称] SAU _Start	
概要	启动SAU
头文件	无
声明	void SAU_Start(void)
说明	
返回值	无
备注	无

[函数名称] SAU_Stop	
概要	停止SAU
头文件	无
声明	void SAU_Stop(void)
说明	
返回值	无
备注	无

[函数名称] ADC_Init	
概要	ADC初始化
头文件	无
声明	void ADC_init(void)
说明	- 设置10-bit转换 - 设置转换ANI0电压 - 使用ADC中断
返回值	无
备注	无

[函数名称] ADC _Start	
概要	启动ADC
头文件	无
声明	void ADC _Start(void)
说明	
返回值	无
备注	无

[函数名称] ADC_Stop	
概要	停止ADC
头文件	无
声明	void ADC_Stop(void)
说明	
返回值	无
备注	无

[函数名称] interrupt_intadc	
概要	ADC中断服务程序
头文件	无
声明	void interrupt_intadc (void)
说明	- 记录ADC值至变量ad_data - 设置标志位ad_flag
返回值	无
备注	无

[函数名称] TAU0_Init	
概要	定时器初始化
头文件	无
声明	void TAU0_init(void)
说明	设置为间隔定时器, 每1秒钟产生中断.
返回值	无
备注	无

[函数名称] TAU0_Start	
概要	启动定时器
头文件	无
声明	void TAU0_Start(void)
说明	
返回值	无
备注	无

[函数名称] TAU0_Stop	
概要	停止定时器
头文件	无
声明	void TAU0_Stop(void)
说明	
返回值	无
备注	无

[函数名称] Main	
概要	主应用循环
头文件	无
声明	void main(void)
说明	- ADC, 定时器, UART初始化及启动 - 轮询一秒钟间隔, 重新启动AD转换 - 轮询AD转换完毕, 通过UART发送AD转换数据
返回值	无
备注	无

[函数名称] interrupt_inttm00	
概要	定时器通道0中断服务程序
头文件	无
声明	void interrupt_inttm00 (void)
说明	变量'cnt'程序计数器, 每秒钟加一
返回值	无
备注	无

[函数名称] interrupt_inttm01	
概要	定时器通道1中断服务程序
头文件	无
声明	void interrupt_inttm01 (void)
说明	
返回值	无
备注	无

[函数名称] interrupt_inttm01h	
概要	定时器通道1起始中断服务程序
头文件	无
声明	void interrupt_inttm01h (void)
说明	
返回值	无
备注	无

[函数名称] interrupt_intst0	
概要	SAU发送完毕中断服务程序
头文件	无
声明	void interrupt_intst0 (void)
说明	- 设置f_tx_end为发送完毕
返回值	无
备注	无

[函数名称] interrupt_intsr0	
概要	SAU接收完毕中断服务程序
头文件	无
声明	void interrupt_intsr0 (void)
说明	
返回值	无
备注	无

[函数名称] interrupt_intsre	
概要	SAU接收错误中断服务程序
头文件	无
声明	void interrupt_intsre (void)
说明	
返回值	无
备注	无

4. 设置选项字节 (Option Byte)

R7F0C80212ESP 闪存的00C0H、00C1H、00C2H 和00C3H 为选项字节区域。打开电源或从复位状态重启器件时，器件将自动参考选项字节设置指定功能。使用本产品时，必须使用选项字节设置下列功能。

选项字节以汇编码格式保全在”optionbyte.asm”汇编文档, 用户可按需求自行更改设置.以下是本示例使用的设置.

```
OPT     CSEG    OPT_BYTE
        DB      0E0H        ; 看门狗定时器不操作
                            ; 看门狗定时器的溢出时间：64/fIL,
                            ; 禁止使用软件停止内部振荡电路不能通过软件。
        DB      0EBH        ; P125/RESET脚为端口功能
                            ; 上电复位,上升电压值2.55V, 下降电压值2.50V
        DB      0FAH        ; 内部高速振荡时钟频率 10 MHz
        DB      85H         ; On-chip 调试允许操作。 On-chip 调试安全ID 认证失败
                            ; 时，禁止清除闪存数据。
```

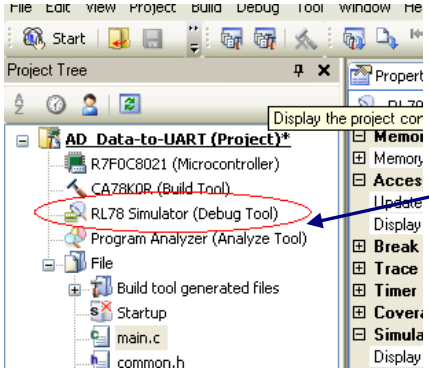
备注:

有关选项字节详情, 请参考微控制器的使用手册, 第十六章 选项字节

5. 使用 CS+内设 GUI 软件仿真器

5.1 启动 CS+内设 GUI 软件仿真:

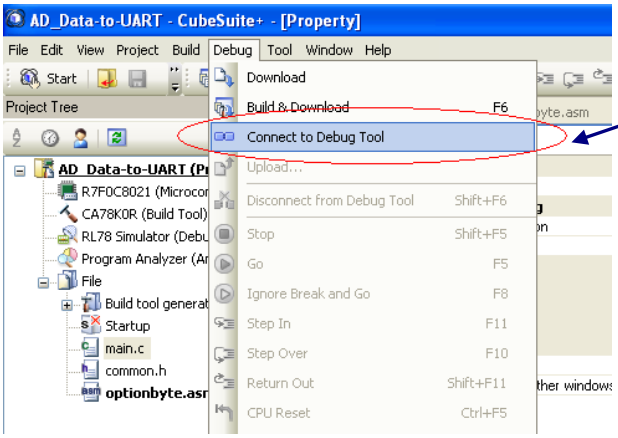
1. 打开工程后, 在'Project Tree'视窗里的'(Debug Tool), 按鼠标右键, 选择'RL78 Simulator' (RL78 软件仿真).



选择'RL78 Simulator'

(RL78 软件仿真)

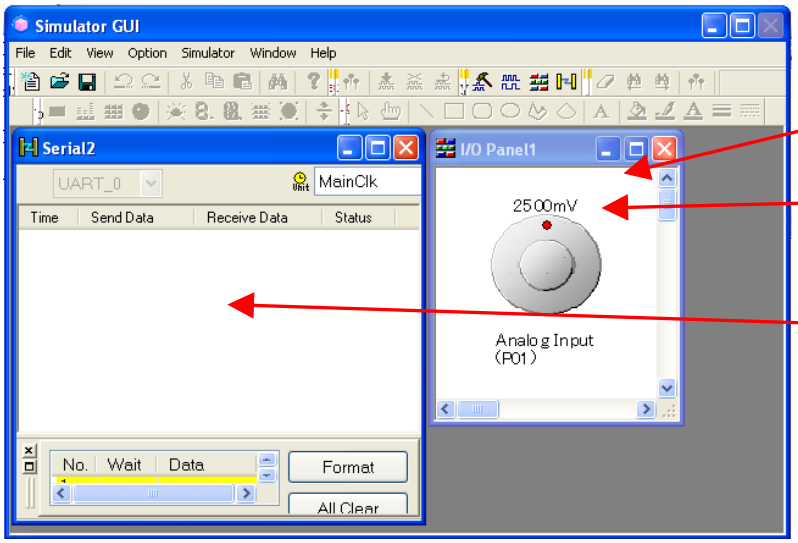
2. 选择'Debug'内的选项'Connect to Debug Tool' RL78 软件仿真.



选择'Connect to Debug Tool'连接软件仿真

3. 连接成功后,软件仿真GUI视窗启动操作界面

5.2 UART 接收数据调节定时器 PWM 占空比示例程序操作:



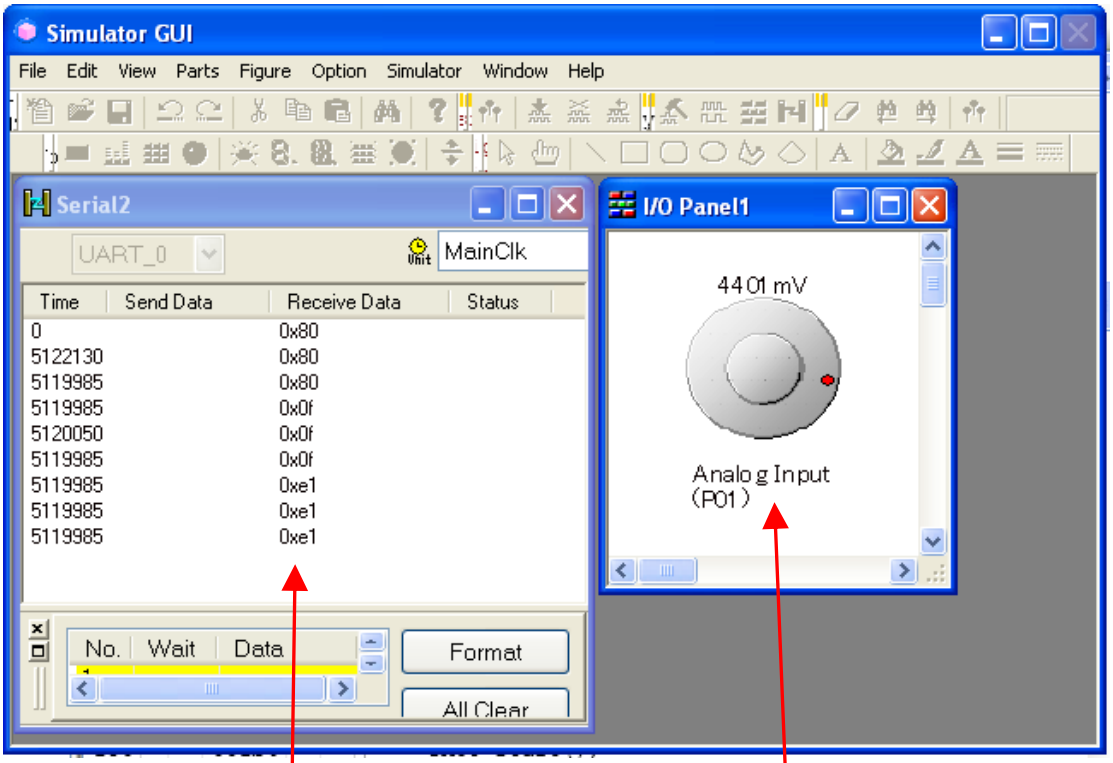
用户操作界面

调节电压输入

(0V~5V)

串行界面

输出 ADC 转换数据



每秒钟输出 ADC 转换数据

随意调节电压输入

(0V~5V)

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修订记录

		描述	
版本	**日期**	**页**	**概要**
1.00	Nov 15, 2012	—	第一版发行

产品使用时的注意事项

本文对适用于单片机所有产品的“使用时的注意事项”进行说明。有关个别的使用时的注意事项请参照正文。此外，如果在记载上有与本手册的正文有差异之处，请以正文为准。

1. 未使用的引脚的处理

【注意】将未使用的引脚按照正文的“未使用引脚的处理”进行处理。

CMOS产品的输入引脚的阻抗一般为高阻抗。如果在开路的状态下运行未使用的引脚，由于感应现象，外加LSI周围的噪声，在LSI内部产生穿透电流，有可能被误认为是输入信号而引起误动作。

未使用的引脚，请按照正文的“未使用引脚的处理”中的指示进行处理。

2. 通电时的处理

【注意】通电时产品处于不定状态。

通电时， LSI内部电路处于不确定状态，寄存器的设定和各引脚的状态不定。通过外部复位引脚对产品进行复位时，从通电到复位有效之前的期间，不能保证引脚的状态。

同样，使用内部上电复位功能对产品进行复位时，从通电到达到复位产生的一定电压的期间，不能保证引脚的状态。

3. 禁止存取保留地址（保留区）

【注意】禁止存取保留地址（保留区）

在地址区域中，有被分配将来用作功能扩展的保留地址（保留区）。因为无法保证存取这些地址时的运行，所以不能对保留地址（保留区）进行存取。

4. 关于时钟

【注意】复位时，请在时钟稳定后解除复位。

在程序运行中切换时钟时，请在要切换成的时钟稳定之后进行。复位时，在通过使用外部振荡器（或者外部振荡电路）的时钟开始运行的系统中，必须在时钟充分稳定后解除复位。另外，在程序运行中，切换成使用外部振荡器（或者外部振荡电路）的时钟时，在要切换成的时钟充分稳定后再进行切换。

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