



## {Sigmastar IPCM UART 使用参考}

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{ Version 1 }

### 摘要

本文主要介绍 IPCM UART 以及其使用，包括简单的原理以及多路串口的配置说明，方便配合客户端使用多路串口。

### 关键词:

UART ttyS0 ttyS1 ttyS



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## REVISION HISTORY

Revision No.	Description	Date
{Version 1}	• {Initial release}	12/17/2019

## 目录

1	HW 原理图介绍 .....	错误!未定义书签。
1.1	公版电路图说明 .....	错误!未定义书签。
1.2	EVB board uart pad 介绍.....	错误!未定义书签。
2	IPCM UART SW 配置方法.....	错误!未定义书签。
3	测试 UART .....	错误!未定义书签。

## 1 HW 原理图介绍

### 1.1 公版电路图说明

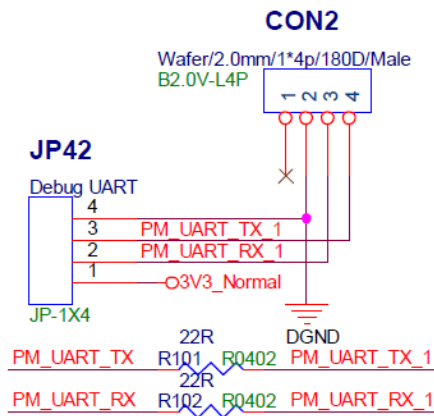
关于 UART 的电路图做简单的说明 ,QFN88pin EVB board ,对应 chip 来说我们是有两路 UART port:

CON2/JP42 for debug UART

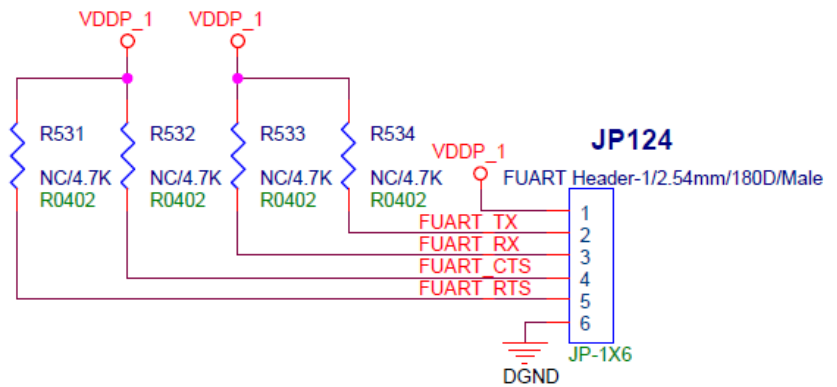
JP124 for FUART

如下图：

#### Debug UART



#### FUART



### 1.2 EVB board uart pad 介绍

在内部共有一路 debug uart 与一路 Fuart , 公版电路图上显示两路 pad , 对应 EVB 的 board 亦有两路 pad , 分别对应 CON2/JP42、JP124。**Debug UART** 仅供系统 logging 与 debug 使用。每一个具体的 board 上对应的接口都可以配置具体的 uart(可以通过缓存器将所有的 uart 都通过一个 pad 来测试 ,可以通过敲缓存器实现测试)。

## 2 IPCM UART SW 配置方法

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IPCM 的 uart 与具体的 pad 配置流程如下：

1、首先在 linux-4.9\arch\arm\boot\dts\infinity6.dtsi

```
aliases {
    console = &uart0;
    serial0 = &uart0;
    serial1 = &uart1;
    serial2 = &fuart;
};
.....
uart0: uart@1F221000 {
    compatible = "mstar,uart";
    reg = <0x1F221000 0x100>;
    interrupts = <GIC_SPI INT_IRQ_UART_0 IRQ_TYPE_LEVEL_HIGH>;
    clocks = <&CLK_uart0>;
    status = "ok";
};
uart1: uart@1F221200 {
    compatible = "mstar,uart";
    reg = <0x1F221200 0x100>;
    interrupts = <GIC_SPI INT_IRQ_UART_1 IRQ_TYPE_LEVEL_HIGH>;
    clocks = <&CLK_uart1>;
    pad = <PAD_UART1_TX>;
    status = "ok";
};
fuart: uart@1F220400 {
    compatible = "mstar,uart";
    reg = <0x1F220400 0x100>, <0x1F220600 0x100>;
    interrupts = <GIC_SPI INT_IRQ_FUART IRQ_TYPE_LEVEL_HIGH>, <GIC_SPI INT_IRQ_URDMA
IRQ_TYPE_LEVEL_HIGH>;
    clocks = <&CLK_fuart>;
    dma = <1>;
    pad = <PAD_UART0_TX>;
    status = "ok";
};
```

该文件是 linux 系统的设备树配置文件，该档中的 uart0—fuart 对应在系统中通过命令查看到的 ttyS0—ttyS2 如下：

```

[/sys/class/tty]## ls -l
lrwxrwxrwx root root 2016-01-01 00:07 console -> ../../devices/virtual/tty/console
lrwxrwxrwx root root 2016-01-01 00:07 ptmx -> ../../devices/virtual/tty/ptmx
lrwxrwxrwx root root 2016-01-01 00:07 tty -> ../../devices/virtual/tty/tty
lrwxrwxrwx root root 2016-01-01 00:07 ttyS0 -> ../../devices/soc0/soc/1f221000.uart/tty/ttyS0
lrwxrwxrwx root root 2016-01-01 00:07 ttyS1 -> ../../devices/soc0/soc/1f221200.uart/tty/ttyS1
lrwxrwxrwx root root 2016-01-01 00:07 ttyS2 -> ../../devices/soc0/soc/1f220400.uart/tty/ttyS2
[/sys/class/tty]##

```

对应配置文件说明如下：

```

uart number
example: ttyS1
uart register
address offset(buffer size)
start address
interrupt number
pad mapping for IC, could be customized
};

```

在板子中查看 uart 设备相关信息可直接 cat ms\_uart 文件，如下：

```

-r--r--r-- root root 0 2016-01-01 00:14 ms_uart
[/proc/tty/driver]## cat ms_uart
serinfo:1.0 driver revision:
0: uart:unknown mmio:0x00000000 irq:98 tx:9920 rx:312 RTS|CTS|DTR|DSR|CD
1: uart:unknown mmio:0x00000000 irq:99 tx:0 rx:0 CTS|DSR|CD
2: uart:unknown mmio:0x00000000 irq:111 tx:0 rx:0 CTS|DSR|CD
[/proc/tty/driver]##

```

也可以通过命令行查看如下：

```

[/sys/firmware/devicetree/base/soc]## dmesg | grep ttys
Kernel command line: console=ttyS0,115200n8r root=/dev/ram rootwait
console [ttyS0] enabled
1f221000.uart: ttyS0 at MMIO 0x0 (irq = 98, base_baud = 10750000) is a unknown
1f221200.uart: ttyS1 at MMIO 0x0 (irq = 99, base_baud = 10750000) is a unknown
1f220400.uart: ttyS2 at MMIO 0x0 (irq = 111, base_baud = 10750000) is a unknown
[/sys/firmware/devicetree/base/soc]##

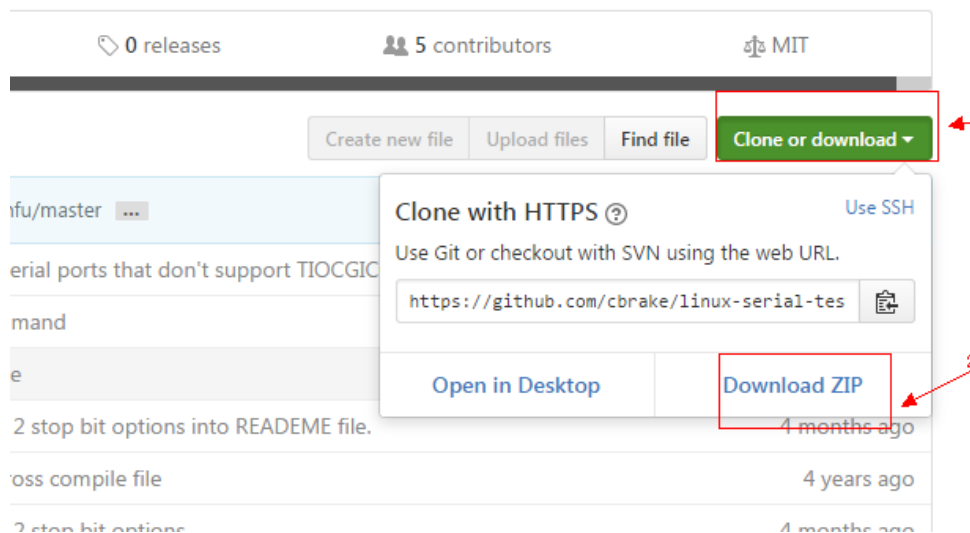
```

dtb 里默认 ttyS1 用 PAD\_UART0\_TX RX，ttyS2 用 PAD\_UART1\_TX RX。

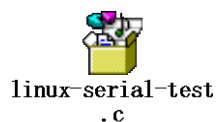
PAD\_FUART\_TX RX 可以做 ttyS1。

### 3 测试 UART

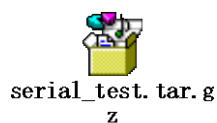
- 1、在网上 dump 一个开源的测试程序，地址如下:<https://github.com/cbrake/linux-serial-test> 可以直接点击进行按照如下方式下载即可：



下载后的文件如下：



- 2、编译下载的.c 文件



用上述档，里面包含 makefile 以及 serial\_test.c 档，然后操作如下步骤：

```
tar xzvf serial_test.tar.gz
cd serial_test
make
```

然后去 bin 目录下取可执行文件



具体操作如下：



```

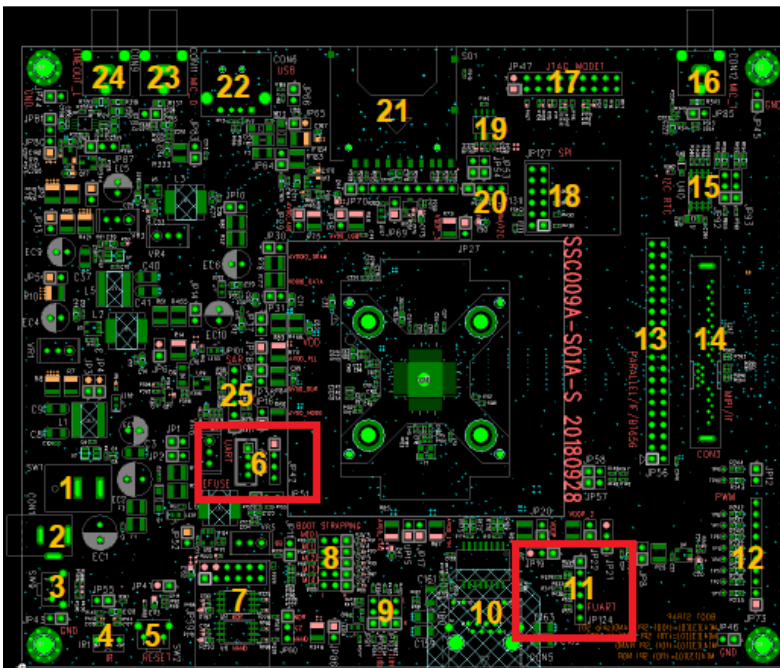
tar: Exiting with failure status due to previous errors
gavin.ran@szsmc220:~/linux$ tar xzvf serial_test.tar.gz 1
serial_test/
serial_test/Makefile
serial_test/src/
serial_test/src/serial-test.c
gavin.ran@szsmc220:~/linux$ cd serial_test 2
gavin.ran@szsmc220:~/linux/serial_test$ make 3
cc src/serial-test.c
BIN /home/gavin.ran/linux/serial_test/obj/serial_test

cp -f /home/gavin.ran/linux/serial_test/obj/serial_test /home/gavin.ran/linux/serial_test/bin 4
gavin.ran@szsmc220:~/linux/serial_test$

```

2、EVB board 上对应的 JP-Connection 都可以配置具体的 uart，具体如下：

## ■ EVB Top View

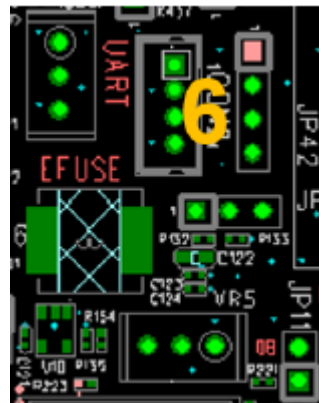


1. System Power Switch (SW1)
2. DC 12V Input (CON1)
3. Wake up key (SW9)
4. IRDA Receiver (IR1, JP55)
5. Reset Button (SW2, JP41)
6. Debug UART (CO2, JP42)
7. SPI Flash (U12, U14, JP59)
8. H/W Boot Strap (SW3~SW7)
9. PM GPIO Pad
10. Ethernet (CON5)
11. FUART (JP124, JP125)
12. PWM test Interface (JP73)
13. Sensor Parallel interface (JP56)
14. Sensor MIPI interface (CON3)
15. I2C RTC (U40)
16. Audio\_MIC/LINE\_in\_R (CON12, JP85)
17. ARM\_JTAG (JP47)
18. SPI Interface (JP127)
19. EEPROM Interface (U11, JP53, JP54)
20. I2C/PWM (JP131)
21. SD 2.0 Card (SD1, JP69, JP70)
22. USB Connector (CON6)
23. Audio\_MIC/Line\_in\_L (JP83, JP84, CON11)
24. Audio Lineout\_L (U17, JP80, JP81, CON9)
25. SAR Control (JP101)



### 11. FUART Interface

- a. Header\_1x6 : JP124
- b. Register Pad :
  - FUART multi pad : reg\_fuart\_mode 1



### 6. Debug UART

- a. Wafer header : CON2
- b. Header : JP42

对应 pc 端的连接

```

Linux serial test/app
Error opening serial port
[/system/vendor/serial_test]## ./serial_test -s -e -p /dev/ttyS1 -b 115200
Linux serial tes[11]CHIP_FUNCTION SET. ID=2, param=1
t[appug UART]
[11]CHIP_FUNCTION SET. ID=1, param=1
[11]CHIP_FUNCTION SET. ID=2, param=1
[11]CHIP_FUNCTION SET. ID=1, param=1
[11]CHIP_FUNCTION SET. ID=2, param=1
[11]CHIP_FUNCTION SET. ID=1, param=1
/dev/ttyS1: count for this session: rx=0, tx=69391, rx err=0
/dev/ttyS1: TIOCGICOUNT: ret=0, rx=0, tx=65296, frame = 0, overrun = 0, par
/dev/ttyS1: count for this session: rx=0, tx=138511, rx err=0
/dev/ttyS1: TIOCGICOUNT: ret=0, rx=0, tx=134416, frame = 0, overrun = 0, par
/dev/ttyS1: count for this session: rx=0, tx=207631, rx err=0
/dev/ttyS1: TIOCGICOUNT: ret=0, rx=0, tx=203536, frame = 0, overrun = 0, par
/dev/ttyS1: count for this session: rx=0, tx=276751, rx err=0
/dev/ttyS1: TIOCGICOUNT: ret=0, rx=0, tx=272656, frame = 0, overrun = 0, par
/dev/ttyS1: count for this session: rx=0, tx=349711, rx err=0
/dev/ttyS1: TIOCGICOUNT: ret=0, rx=0, tx=345616, frame = 0, overrun = 0, par
/dev/ttyS1: count for this session: rx=0, tx=418831, rx err=0

```

#### 4、将服务器 mount 的一个目录 mount 到板子上，如我讲如下目录 mount 到 board 上：

/home/gavin.ran/gavin\_demo/serial\_test

用在 board 上执行：mount -t nfs -o nolock 172.21.28.81:/home/gavin.ran/gavin\_demo /system/vendor

然后进入：cd /system/vendor/serial\_test 测试。