LS9200 User Guide

LinkSprite Technologies, Inc.

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1. Foreword

Thank you for choosing LS9200. This guide will introduce the function and application of LS9200 in detail from simple program to embedded LINUX.

2. Features

CPU
180 MHz ARM920T Processor AT91RM
-16 KBytes data cache and 16 KBytes instruction cache
-MMU Embedded Linux
-DSP Instruction Extensions

Memories
-16MB NOR Flash -32MB NAND Flash -32MB SDRAM

Integrated peripheral interfaces
-10/100 Mbps Ethernet MAC
-One-ports USB 2.0 full-speed host
-One-ports USB 2.0 full-speed device
-Two 3-wires UARTs(16550 type)
-One full function UARTs(16550 type)
-One RS485 Port
-One CAN Port
-One LCD with black and white
-SD Card Port
-AC' 97 Part

General-purpose I/Os (GPIOs)
-Five independent key
-Tow independent LED

JTAG Port
-The JTAG Port allows use other in-circuit emulators

Expansion interface
-Standard IDE slot

3. Part and jumper description

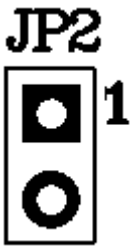
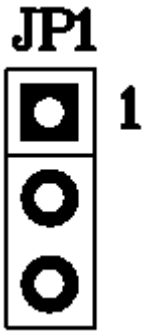
Part description

Item	label	function
Debug interface	J3	Download, communicattion
3-Wire serial port	J4	Serial communicate
Full function serial port	J2	Serial communicate
Ethernet interface	J9	10M/100M Ethernet
JTAG interface	J13	Emulate, debug
Audio frequency output interface	J1	Audio frequency output
IDE Buss interface	J10	Connect with 2.5” IDE HDD
Power input interface	J16	Power supply
Power switch	J14	Power switch
SD card jack	J6	Connect with SD card
CAN Bus interface	J12	Connect with CAN Buss
RS485 Bus interface	J5	Connect with RS485 Buss
USB device interface	J8	USB device
USB Host interface	J7	USB Host
LCD interface	J11	LCD expansion
Expansion interface	EXT_IO	GPIO expansion

LED and Key description

Item	label	feature
HDD work indicator LED	D5	HDD working
CPU usage indicator LED	D6	CPU usage indicator
Independent LED	D7	Independent LED output
Power indicator LED	D8	5V works normally denote
Power indicator LED	D13	3.3V works normally denote
Power indicator LED	D14	1.8V works normally denote
CPU reset button	S6	System reset
Independent key-up	S2	Independent key input
Independent key-down	S1	Independent key input
Independent key-left	S5	Independent key input
Independent key-light	S4	Independent key input
Independent key-enter	S3	Independent key input

Jumper description

Item	Label (1,2)	1,2 closed	1,2 open
CAN resistance setup	JP3	Income CAN Bus suited resistance	Disconnect resistance
CF card master/slave select	JP5	Income RS485 Bus suited resistance	Disconnect resistance
EEPROM address setup	JP2	0x02 as address	0x00 as address
 Jumper(1,2)		 Jumper(1,2,3)	
Designation	Label (1,2,3)	1,2 close	2,3 close
System boot select	JP1	Boot from internal ROM	Boot from NORFLASH
JTAG mode select	JP4	Normal mode	Boundary scan features

4. Running Linux

Start Linux

By using the serial cable, supplied in the LS9200 Evaluation Kit, connect the board to your PC through the J3 Serial Debug port Connector.

Power-up the Development Kit through the J16 connector.

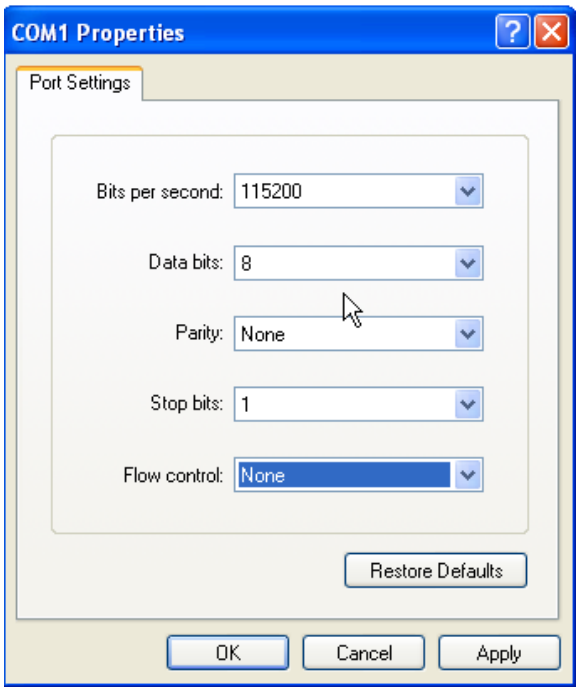
Start the HyperTerminal.

The connection can be called DBUG, for example. Valid by using the "OK" button.

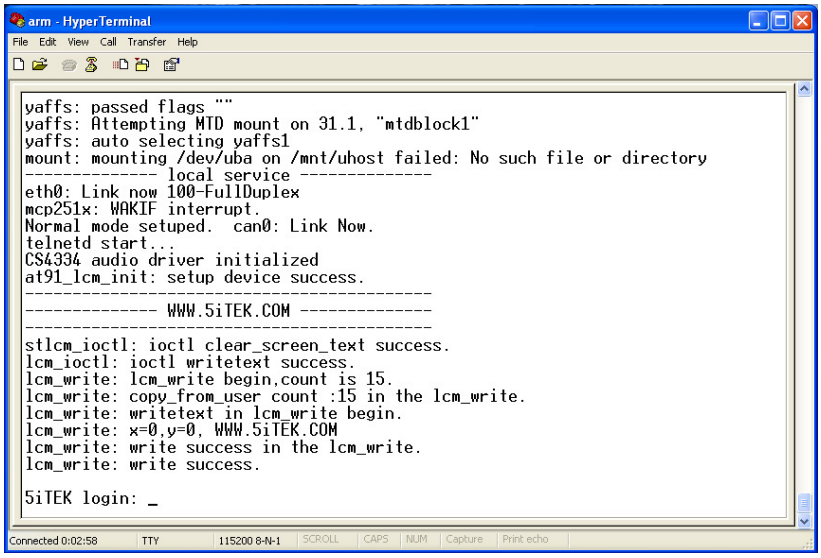
From the "Connection to" window, select the COM port used and valid by using the "OK" button. Set the serial parameters as described below:

- Bit rate @115 kbps,
- Data bit @8-bit,
- Parity NONE,
- Stop bit equal to 1,
- Flux control NONE

Reset the board, wait for about 1 minute.



Press the Reset button (S6) on the LS9200board, See the message sent from the board to the HyperTerminal console (Remark: This message can change according to the "U-Boot" evolution). Booting from the external 16-bit flash (JP1 Boot Mode select Jumper on EXT position)



How to use the ping command

Connect the Ethernet interface (J9) to you PC using Network Cable. Activate the Ethernet link under Linux, by typing the following commands.For stop the ping press ctrl-c keys.

```
[root@5iTEK root]#ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 22:19:78:10:21:99
          inet addr:172.16.0.92  Bcast:172.16.0.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:17 errors:0 dropped:0 overruns:0 frame:0
          TX packets:9 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1694 (1.6 KiB)  TX bytes:826 (826.0 B)
          Interrupt:24 Base address:0xc000

[root@5iTEK root]#ping 172.16.0.74
PING 172.16.0.74 (172.16.0.74): 56 data bytes
64 bytes from 172.16.0.74: seq=0 ttl=128 time=0.702 ms
64 bytes from 172.16.0.74: seq=1 ttl=128 time=0.489 ms
64 bytes from 172.16.0.74: seq=2 ttl=128 time=0.489 ms
64 bytes from 172.16.0.74: seq=3 ttl=128 time=0.489 ms
64 bytes from 172.16.0.74: seq=4 ttl=128 time=0.489 ms
— 172.16.0.74 ping statistics —
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 0.489/0.531/0.702 ms64 bytes from 192.168.0.103: icmp_seq=5 ttl=128 time=0.4 ms
```

How to use USB flash disk

```
[root@5iTEK root]#usb 1-1: new full speed USB device using at91_ohci and address 3
usb 1-1: configuration #1 chosen from 1 choice
  uba: unknown partition table
[root@5iTEK root]#mount -t vfat /dev/uba /mnt/uhost/
Filesystem           1k-blocks      Used Available Use% Mounted on
rootfs                    7931      6294      1637  79% /
/dev/root                 7931      6294      1637  79% /
/dev/uba               1003056    748576    254480  75% /mnt/uhost
```

How to use NOR flash

```
[root@5iTEK root]#mount –t jffs2 /dev/mtdblock0 /mnt/jffs2/
[root@5iTEK root]#df
Filesystem           1k-blocks      Used Available Use% Mounted on
rootfs                    7931      6294      1637  79% /
/dev/root                 7931      6294      1637  79% /
/dev/uba               1003056    748576    254480  75% /mnt/uhost
/dev/mtdblock0           10240       516      9724   5% /mnt/jffs2
```

How to use NAND flash

```
[root@5iTEK root]#mount -t yaffs /dev/mtdblock1 /mnt/yaffs/
[root@5iTEK root]#df
Filesystem           1k-blocks      Used Available Use% Mounted on
rootfs                    7931      6294      1637  79% /
/dev/root                 7931      6294      1637  79% /
/dev/uba               1003056    748576    254480  75% /mnt/uhost
/dev/mtdblock0           10240       516      9724   5% /mnt/jffs2
/dev/mtdblock1           65536      4220     61316   6% /mnt/yaffs
```

How to use HDD

```
[root@5iTEK root]#mount -t vfat /dev/hda1 /mnt/hd/
[root@5iTEK root]yaffs]#df
Filesystem           1k-blocks      Used Available Use% Mounted on
rootfs                    7931      6294      1637  79% /
/dev/root                 7931      6294      1637  79% /
/dev/uba               1003056    748576    254480  75% /mnt/uhost
/dev/mtdblock0           10240       516      9724   5% /mnt/jffs2
/dev/mtdblock1           65536      4220     61316   6% /mnt/yaffs
/dev/hda1             10233752   6914312   3319440  68% /mnt/hd
```

How to use SD card

```
[root@5iTEK root]#mount -t vfat /dev/mmcblk0p1 /mnt/sdcard/
[root@5iTEK root]#df
Filesystem           1k-blocks      Used Available Use% Mounted on
rootfs                    7931      6294      1637  79% /
/dev/root                 7931      6294      1637  79% /
/dev/uba               1003056    748576    254480  75% /mnt/uhost
/dev/mtdblock0           10240       516      9724   5% /mnt/jffs2
/dev/mtdblock1           65536      4220     61316   6% /mnt/yaffs
/dev/hda1             10233752   6914312   3319440  68% /mnt/hd
/dev/mmcblk0p1          991488     20992    970496   2% /mnt/sdcard
```

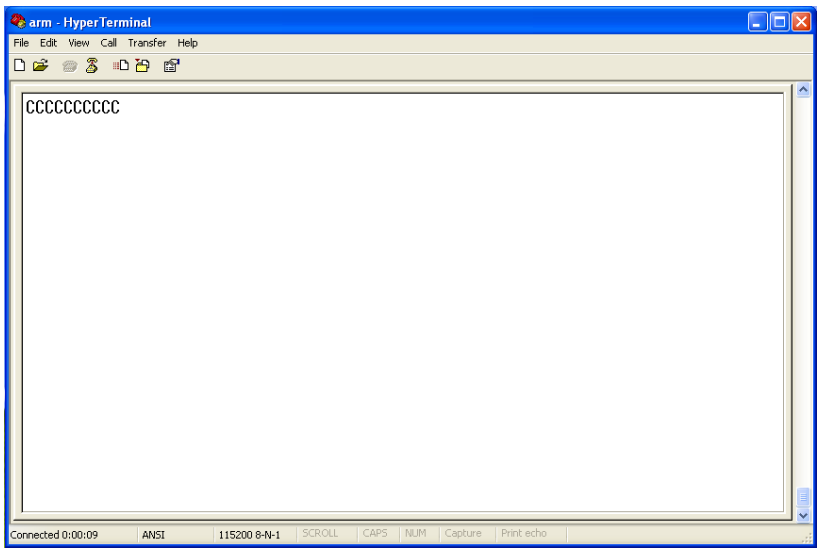
How to use audio

```
[root@5iTEK root]#cd /mnt/yaffs
[root@5iTEK root]#madplay moon.mp3
MPEG Audio Decoder 0.15.2 (beta) - Copyright (C) 2000-2004 Robert Leslie et al.
```

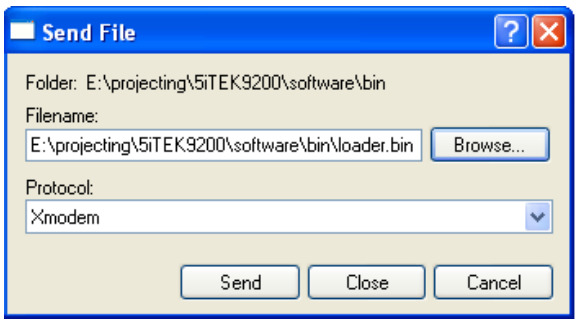
5. How To Download Program

Prepare

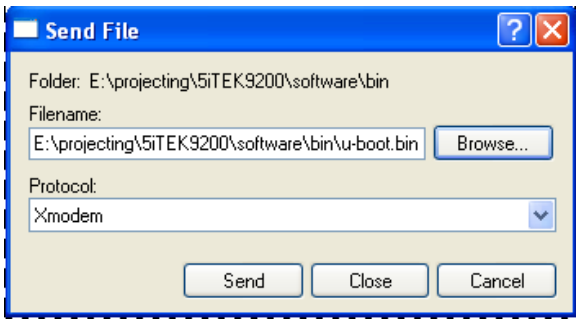
Connect the board to your PC through the J3 Serial Debug port Connector.
Configure Hyper Terminal is the same with Chapter 4. Boot from internal ROM (JP1 Boot Mode select Jumper on INT position). Power on and push reset button (S6).Then 'C' is appearance continuing on the Hyper Terminal.



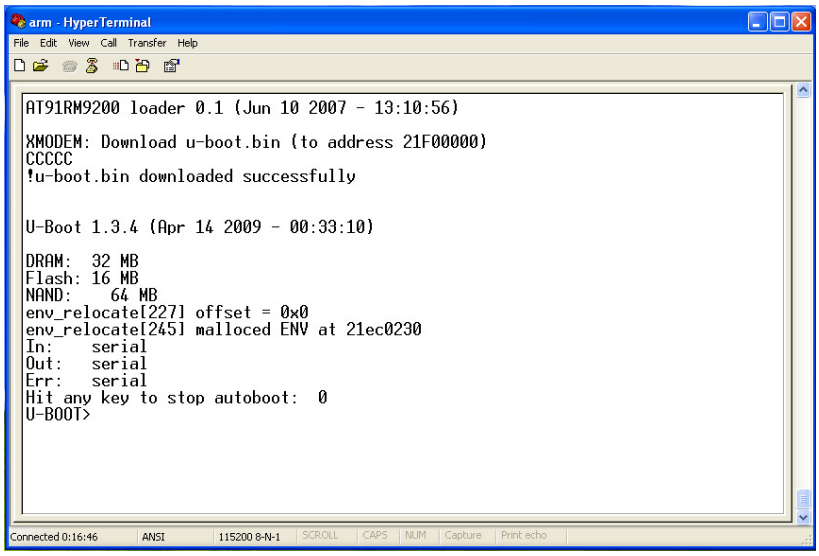
send loader.bin by clicking "Transfer->send file..."



send u-boot.bin by clicking "Transfer->send file..."



Then you will see “U-BOOT> ”, Waiting your input.



Connect the board to your PC through the J9 RJ45 port Connector.

Dwnload u-boot to Norflash

```
U-BOOT> protect off 10000000 1001ffff
U-BOOT> erase 10000000 1001ffff
U-BOOT> tftp 20000000 boot.bin
U-BOOT> cp.b 20000000 10000000 20000
U-BOOT> protect on 10000000 1001ffff

U-BOOT> protect off 10020000 1003ffff
U-BOOT> erase 10020000 1003ffff
U-BOOT> tftp 20000000 u-boot.gz
U-BOOT> cp.b 20000000 10020000 20000
U-BOOT> protect off 10020000 1003ffff
```

Dwnload Linux kernel to Norflash

```
U-BOOT> protect off 10060000 1025ffff
U-BOOT> erase 10060000 1025ffff
U-BOOT> tftp 20000000 uImage
U-BOOT> cp.b 20000000 10060000 200000
U-BOOT> protect on 10060000 1025ffff
```

Dwnload filesystem to Norflash

```
U-BOOT> protect off 10260000 1055ffff
U-BOOT> erase 10260000 1055ffff
```

```
U-BOOT> tftp 20000000 ramdisk.gz
U-BOOT> cp.b 20000000 10260000 300000
U-BOOT> protect on 10260000 1055ffff
```

At last, JP1 Boot Mode select Jumper on EXT position and Press reset button(S6).

6. Compiling u-boot..bin and u-boot.gz

Install ARM-LINUX-GCC

If you have not installed ARM-LINUX-GCC, copy file “arm-linux-gcc-4.1.1-920t.tar.bz2”under the file “arm” to the file “/” at the root directory of Linux. Install “arm-linux-gcc”in the file “/usr/local/arm” .
“tar –jxvf arm-linux-gcc-4.1.1-920t.tar.bz2”.

Configure U-Boot

Download U-Boot source code “u-boot-1.3.4.tar.bz2”to a catalog of Linux, decompress it by ”tar -jxvf u-boot-1.3.4.tar.bz2”.

```
#tar –jxvf u-boot-1.3.4.tar.bz2
```

Run the following command to configure 9200 at the directory of source code

```
#make at91rm9200dk_config
#make dep
```

Run command “make” to compile

```
#make
#gzip –c u-boot.bin > u-boot.gz
```

7. Compiling Linux Kernel

Install ARM-LINUX-GCC

If you have not installed ARM-LINUX-GCC, copy file “arm-linux-gcc-4.1.1-920t.tar.bz2”under the file “arm” to the file “/” at the root directory of Linux. Install “arm-linux-gcc”in the file “/usr/local/arm” .
“tar –jxvf arm-linux-gcc-4.1.1-920t.tar.bz2”.

Configure LINUX

Download kernel source code “linux-2.6.23.17.tar.bz2” to a catalog of Linux, decompress it by “tar -zxvf linux-2.6.23.17.tar.bz2”

```
#tar –jxvf linux-2.6.23.17.tar.bz2
```

Configure the kernel by inputting “make menuconfig”

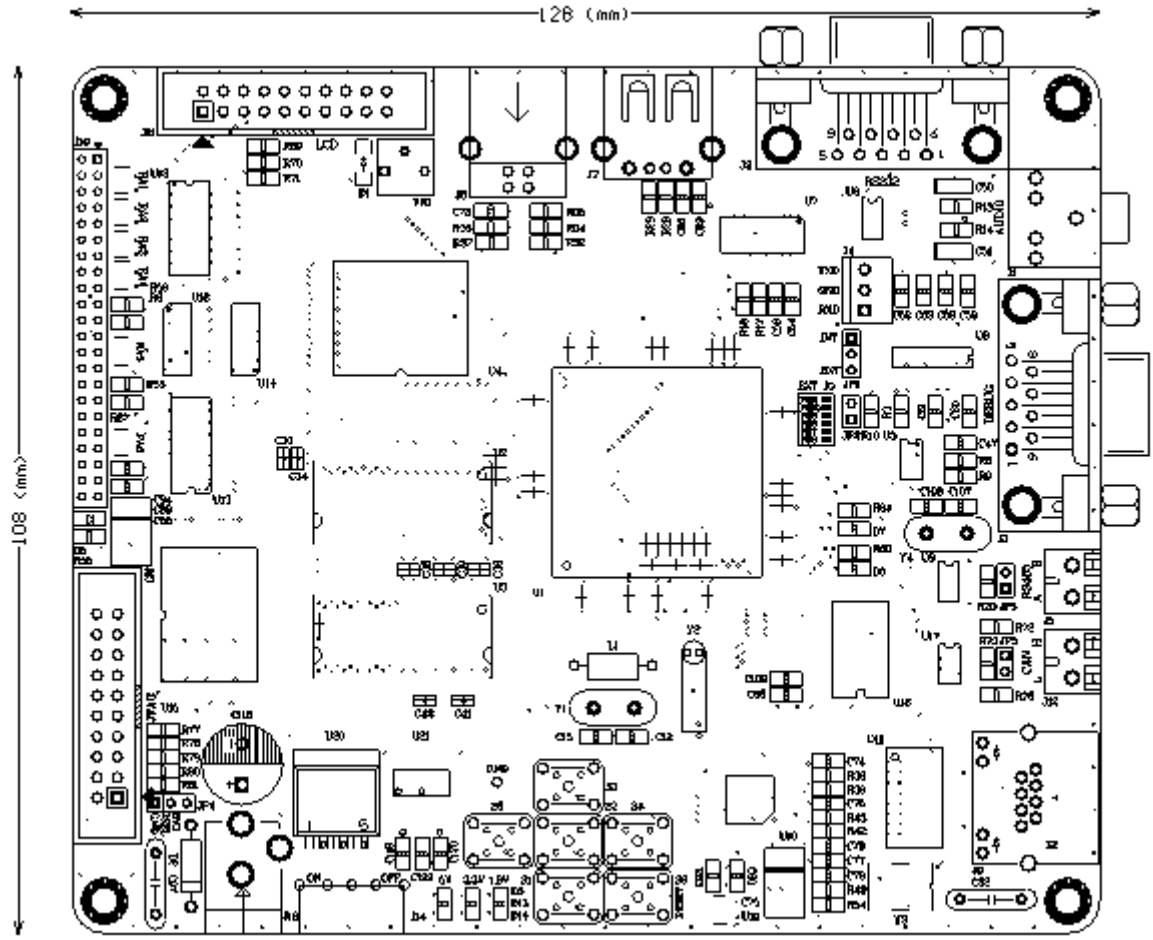
```
#make menuconfig
```

compile kernel

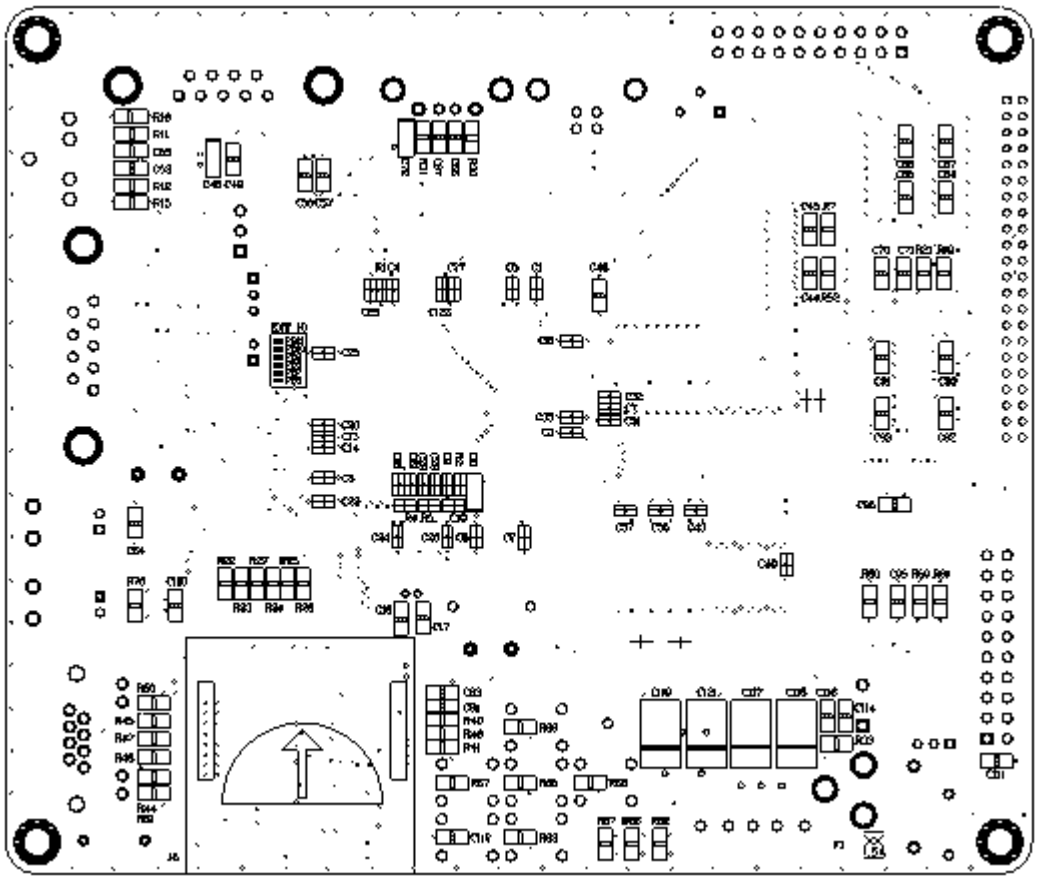
```
#./mkimage –A arm –O linux –C none –T kernel –a 20008000 –e 20000000 –n linux-2.6 –d arch/arm/boot/zImage uImage
```

8. Appendix

Top silkscreen



Bottom silkscreen



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