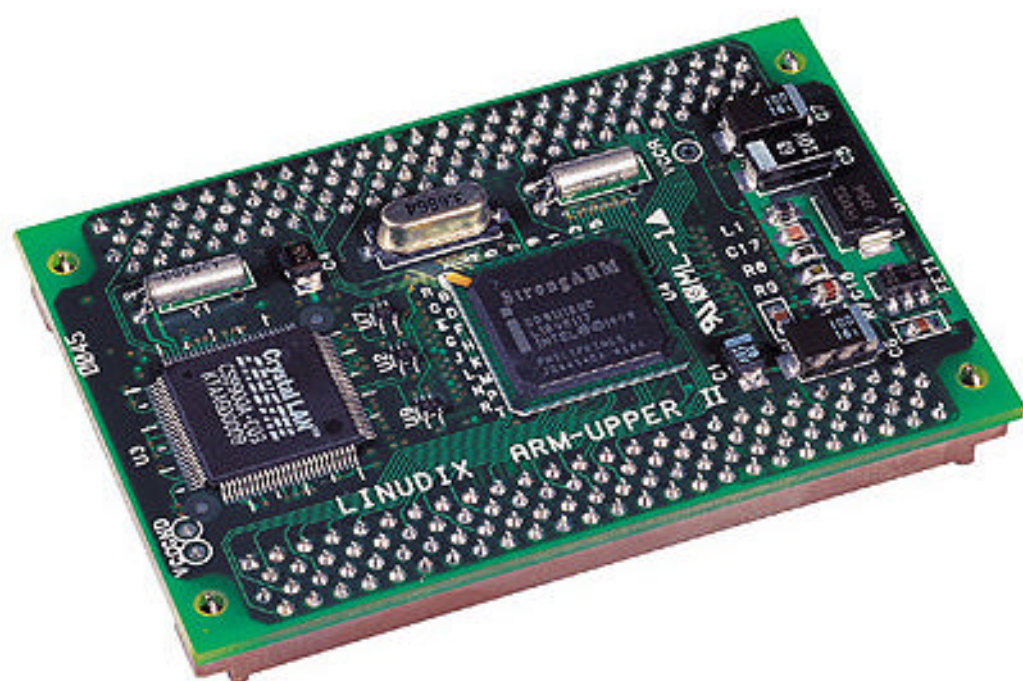


LOSA
LinuxOnStrongArm

User's Manual



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- : 2001.7.24

[LOSA(Linux On Strong Arm)]

Operating system	Linux kernel 2.4.0-test4-np1
File system	Journalling flash file system
Protocol	TCP/IP, HTTP, FTP, TELNET, SNMP SMTP, PPP, DHCP, NFS, etc
GUI	X-window based GUI (optional 1)
Browser	(optional 1)
Web server	Boa web server
Ethernet	10M ethernet, direct to LAN ADSL(DHCP) ADSL(PPPoE) Cable modem(DHCP)
PPP	PPP for wired or wireless modem
Development env.	GCC arm compiler NFS GDB debugger

optional 1 : 16Mbyte Flash ROM 가 .

CPU	Intel Strong ARM processor SA1110-206Mhz operation
ROM	8, 16Mbyte flash ROM
RAM	8, 16, 32, 64Mbyte SDRAM, PC100
LAN	10base-T
Serial	3 UART
Bus	Full address bus(A0 ~ A25) 32bit Data bus(D0 ~ D31)
LCD controller & GPIO	Direct operation of Mono & color LCD Total 39 GPIO pin

6. LCD controller & 8 general I/O port

27 general I/O port 가 . port general I/O . pin
dual function 가 .
12 LCD controller pin . LCD controller I/O
pin . 16bit LCD general I/O port pin

Intel Strong ARM advanced developer's manual 11 .

7. 3.3V operating voltage

5V
3.3V 5V .

- : TTL level , 5V TTL IC(74LSxx) .
- : pin 3.3V , 5V . LVC
LVT series buffer , 가가 voltage divider
- port : , data bus pin
3.3V 5V . LVT245
. LVC, LVT 3.3V to 5V interface
Motorola TI web site application note

4.

"Hello! LinuxOnChip." console print . Host PC
directory /home/LOSA sample directory code

#pwd

/home/LOSA

#mkdir sample

#cd sample

#buildenv

, hello.c file .

```
#include <stdio.h>
```

```
main(int argc, char *argv[])
```

```
{
```

```
    puts("Hello! LinuxOnChip.");
```

```
}
```

compile .

compile option .

#arm-linux-gcc hello.c -o hello

arm-linux-gcc : compiler file

hello.c : test program source

-o : compiler option

hello : LOSA 가 binary file

5. Host PC

file LOSA

- file LOSA target board NFS(Network File System)

- Host PC directory LOSA mount , LOSA host PC

directory LOSA local directory .

- NFS host pc /etc/exports file /etc/hosts file

nfs daemon stop, start

- Host PC /home/LOSA directory directory 가 ,

- vi editor host pc /etc/exports file

home/LOSA (rw,insecure)

가 .

#cd /etc

#vi exports

/home/LOSA (rw,insecure)

#

- host pc /etc/hosts file . /etc/hosts file

192.168.1.200 LOSA

가 .

#cd /etc

#vi hosts

192.168.1.200 LOSA

#

LOSA IP 가 192.168.1.200 . IP 'netconfig'

- /etc/exports, /etc/hosts file ,

#/etc/rc.d/init.d/nfs stop

#/etc/rc.d/init.d/nfs start

- LOSA host PC directory mount file 가
Minicom console LOSA

#mount -t nfs 192.168.1.2:/home2/LOSA /mnt

#mount

/dev/ram on / type ext2 (rw)

none on /proc type proc (rw)

192.168.1.2:/home2/LOSA on /mnt type nfs (rw,addr=192.168.1.2)

가 . 192.168.1.2 host PC IP address . , LOSA host PC LOSAal directory

- file 'hello' LOSA copy . 'cp' Flash Write 가 . LOSA CD 가 가 가 *

[]

LOSA /usr/bin directory file hello 가 . ,

#pwd

/usr/bin

#!/hello

Hello! LinuxOnChip.

#

가 . LOSA 가 /etc/rc.d/rc.local file 가 .

/usr/bin/hello &

[DC characteristic]

- Supply voltage : 3.0V, 3.6V
- Input voltage : 3.0V, 3.6V
- Operating temp. : 0°C, 70°C
- Power rating : 0.5W

3.3V . chip 3.3V 3.3V
, 3.3V 가

[Memory map]

		Address range
60	nCS1	0xd4000000 (16 MB)
61	nCS2	0xd5000000 (16 MB)
62	nCS3	0xd6000000 (16 MB)
63	nCS4	0xd7000000 (8 MB)

[Flash file system]

LOSA Flash memory file system 가 ,
가 file , , , 가 .
"mount" key in , .

mount

/dev/ram on / type ext2 (rw)

none on /proc type proc (rw)

PC directory NFS(Network File System) mount ,

mount

/dev/ram on / type ext2 (rw)

none on /proc type proc (rw)

192.168.1.2:/home2 on /mnt type nfs (rw,addr=192.168.1.2)

, 192.168.1.2 host /home2 directory 가 mount . LOSA
192.168.1.2:/home2 directory local directory 가 .
PC , mount 가
LOSA .

file Flash disk , OS PC /dev/ram
, /dev/ram /mnt mount 가 .
LOSA .
[()] .

[Monitor mode]

LOSA monitor mode . LOSA 가 booting ESC code console
port 3 Linux booting monitor mode .
1. minicom ESC
2. LOSA .
3. 'mon>' 가 .
'help'

Another Linux loader for SA-1110 (c) 2000 LinuxOnChip.com

press <esc> for entering monitor mode (1 seconds)

unprotect sector (kernel/ramdisk)

.....done.

mon>

mon>help

rx - enter xmodem recv mode

md - memory dispnay

mm - enter memory modify mode

in the mm mode 1) just enter - goto next addr

2) enter whith . - exit mm mode

3) enter whith data - modify data

env - set environment variable

ex) env a b (set environ a as b)

speed - change serial speed

ex) speed 38400 (avail speed: 9600/19200/38400/115200)

program kernel - program loaded kernel image to flash

program ramdisk - program loaded ramdisk image to flash

help - show this message

load - exit monitor mode, load Linux

unprotect sector

가

,

write

.

IP

LOSA IP file(rc file),
IP netconfig .
minicom emulator telnet LOSA prompt netconfig
IP .

```
bash-2.01# netconfig
network configuration
IPaddr: 192.168.1.200
Netmask: 255.255.255.0
Gateway: 192.168.1.1
NameSer: 192.168.1.200
hostname: LOSA
ip=192.168.1.200
netmask=255.255.255.0
gateway=192.168.1.1
nameserver=192.168.1.200
hostname=LOSA
correct? y
update network environmnt
update boot parameters
unprotect sector 3
protect sector 3
done
bash-2.01#
```

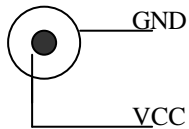
```
IPaddr IP address
netmask network 가 network
Linux
gateway nameserver
host name
```

Evaluation board

LOSA board

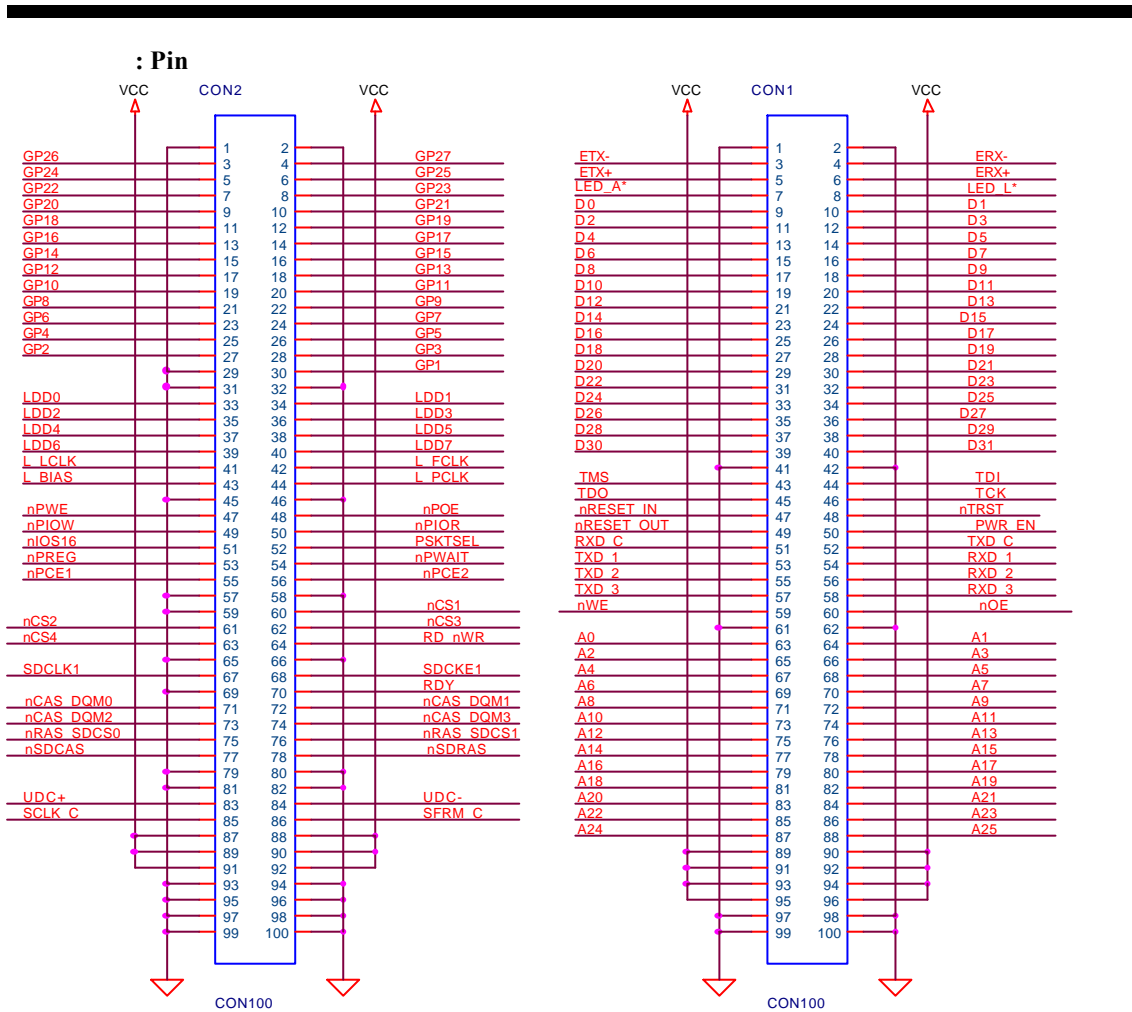
Serial port	1 RS-232C port(RX, TX only) 1 modem port
Ethernet	1 10base-T ethernet port
LCD port	5(R),6(G),5(B) color LCD port LCD Inverter port
Audio	Optional
TV out	Optional
GPIO	8 LED out (can be used as general output) 8 S/W input (can be used as general input)
Touch panel interface	Analog type interface, optional

- : DC 9 ~ 12V



- Evaluation board

linudix@linuxonchip.com



LOSA pin name , LOSA connector con1,con2
 1600 mil .
 connector KEL 8901 series . evaluation board pin
 8901 spec sheet . www.kel-system.co.jp

pin Strong ARM processor , 1:1 match .
 * 100 pin

- KEL CORPORATION
- 8900 series
- (1) 8901-100-177s (Receptacle) : LOSA EB
- (2) 8911-100-178s (Plug) : LOSA CPU
- PCB con1 con2 : 1600 mil



:

NFS mount

flashloader LOSA , LOSA
 gzip loop ,
 , redhat 5.2 가
 가 .

1.

1) LOSA (8M byte disk image) : **ramdisk8M.gz**
 - LOSA CDROM .
 - CD , , 가 .
 (: /usr/bin flashloader, netconfig, envconfig
 3 가 .
 , .)

2) 가 ramdisk ramdisk size
 가 . (8M bytes)

- # cat /proc/devices

Character devices:

- 1 mem
- 2 pty
- 3

Block devices:

- 1.ramdisk ←
- 2.fd
- 3.

ramdisk ,
 ramdisk 가

3)

dd - disk dump utility
zcat - uncompress and cat
mount
gzip

2. ()

1) PC 가

`#dmesg | grep RAM`

..Ramdisk driver initialized : 16 ramdisks of xxxxK size

xxxx 가 8192

8M bytes

가 8M (2 4096K bytes)

2) PC

`/etc/lilo.conf`

`lilo.conf`

`lilo.conf`

vi /etc/lilo.conf

boot=/dev/had

map=/boot/map

install=/boot/boot.b

image=/boot/vmlinuz-2.0.36-lrp-flash

label=linux

ramdisk =16384 ← ()

root=/dev/hda5

read-only

append="mem=64m ether=0,0,eth1"

#lilo

Added linux

#

2

3.

가 .

1) mount

mount .

```
# mkdir /mnt/ramdisk
# zcat ramdisk8M.gz > /dev/ram
# mount /dev/ram /mnt/ramdisk
#
```

LOSA 가 가 /mnt/ramdisk mount

```
hello libmylib.so 가 ,
/usr/bin , /lib ( path LOSA
) ,
```

/mnt/ramdisk/usr/bin, /mnt/ramdisk/lib .

```
# cp hello /mnt/ramdisk/usr/bin
# cp libmylib.so /mnt/ramdisk/lib
```

```
# ls /mnt/ramdisk/usr/bin/hello
# ls /mnt/ramdisk/lib/libmylib.so
```

```
startup script
hello LOSA
startup script /mnt/ramdisk/etc/rc.d/rc.local /usr/bin/hello
가 .
```

```
# umount /mnt/ramdisk
# dd if=/dev/ram of=ramdisk8Mnew bs=1k count=8192
```

```

# gzip -9 ramdisk8Mnew
# ls -l
    ramdisk8Mnew.gz
#
    ramdisk8Mnew.gz      LOSA
    LOSA
ramdisk8Mnew.gz      ,      LOSA
NFS mount      . (      /mnt      mount      ..).

```

```

# mount -t nfs 192.168.1.2:/home2 /mnt

```

mount 가

```

# flashloader ramdisk /mnt/ramdisk8Mnew.gz

```

--

#

LOSA hello libmylib.so 가

, x-modem

```

,
ramdisk flash write
flash 가 unprotect . LOSA "unprotect sector"
가 , 가 ,
unprotect

```

4. 8M

가

가 , 8M
bytes 가 가 가
(16Mbytes)

1) ramdisk mount .

8) LOSA ramdisk monitor mode setenv

(1) LOSA . (minicom ESC LOSA)

(2) Initial ramdisk size (K bytes) initrd_size

mon> setenv initrd_size xxxxxxxx

mon>

(3) xxxxxxxx 6 1024

hex 8 , ramdisk16M.gz 가

2235474 1024 2184 hex

0x00000888 ,

(4) **mon> setenv initrd_size 00000888**

initrd_size

, (Kbyte)

mon> setenv initrd_size 00001000

9) monitor command line argument ramdisk

LOSA

command line

mon>setenv

....

cmdline mem=32m ramdisk_size=8192

....

cmdline ramdisk_size ,

mem=32m LOSA 32Mbytes SDRAM 가

16Mbytes ramdisk_size=8192 ramdisk_size=16384

cmdline

mon> setenv cmdline mem=32m ramdisk_size=16384

mon>

10) LOSA . 16Mbytes 가 LOSA 가
df .

df

Filesystem	1024-blocs	Used	Available	Capacity	Mounted on
/dev/ram	16384	xxx	xxx	xxx	/

: Evaluation board

-
- CD , .