

EX-9486-2L-8 User Guide

Introduction:

EX-9486-2L-8 are ARM9-based Linux ready industrial computer. The keyfeatures are as follow:

1. ARM920T ARM Thumb Processor with 200MIPS at 180MHz,Memory Management Unit
2. 16-KByte Data Cache and 16-KByte Instruction Cache
3. 32MB SDRAM, 16MB Flash on board
4. Two 10/100 Mbps Ethernet
5. Two USB 2.0 full speed (12 Mbps) Host Ports
6. Multimedia Card Interface for SD memory card
7. Five 3-in-1 RS-232/422/485 ports and three RS-232 ports
8. 21 programmable Digital I/O port
9. LCM Display (2x18 character mode) with backlight (EX-9486-2L-8-LCM only)
10. Audio Output
11. 9 to 40VDC power input
12. Pre-installed Standard Linux 2.6 OS
13. GNU tool chain available in software CD
14. Optional DIN RAIL mounting adaptor

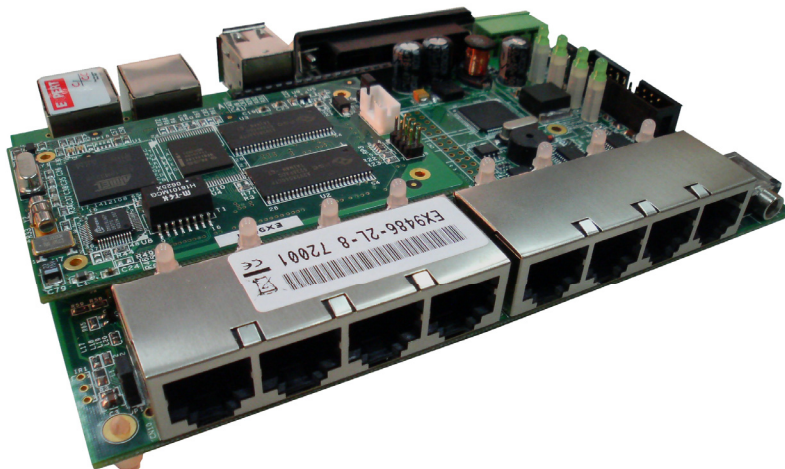
Packing List

1. EX-9486-2L-8 Box Computer
2. Wall mount bracket
3. Software CD

Optional Accessory:

1. CB-RJ45F9-150: RJ45 to DB9 Female Cable
2. CB-RJ2CON-100: Serial Console Cable
3. DK-35A: DIN RAIL Mounting Kit

EX-9486-2L-8 Layout



Reset Button

Press the “Reset” button to activate the hardware reset. You should only use this function if the software does not function properly.

Power LED

The Power LED will show solid green if power is properly applied

Ready LED

The Ready LED will show solid green if EX-9486-2L-8 complete system boot up. If Ready LED is off during system boot up, please check if power input is correct. Turn off the power and restart EX-9486-2L-8 again. If Ready LED is still off, please contact the manufacture for technical support.

Link/Act

When Ethernet port are connected to the network, Link/Act will show solid green and if there is traffic is the Ethernet, this LED will flash.

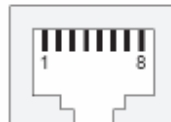
Serial Port LED

These eight dual color LEDs indicate the data traffic at the serial ports. When RXD line is high then Green light is ON and when TXD line is high, Yellow light is ON.

Pin Assignment and Definition

Ethernet Port

Pin	Signal
1	ETx+
2	ETx-
3	ERx+
6	ERx-



Serial Ports:

Port 1,5,6,7 and 8: 3-in-1 RS-232/422/485

Port 2: RS-232 with full modem control

Port 3, 4: RS-232 with hardware flow control

Note: RS-232/422/485 is software selection

Pin	RS-232	RS-422	RS-485
1	DSR		
2	RTS	TxD+	Data+
3	GND	GND	GND
4	TxD	TxD-	Data-
5	RxD	RxD+	

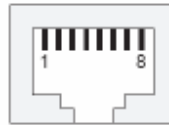


6	DCD	RxD-	
7	CTS		
8	DTR		

Serial Console Port:

Serial console port share the connector with Serial port 3 but the pin definition as shown as follow:

Pin	Signal
1	
2	TxD
3	GND
4	
5	
6	
7	RxD
8	



The serial console port is disabled as factory default setting. To enable the serial console, you need to use the serial console cable and connect it to port 3. Use any terminal software such as hyper terminal and setting as follow:

Baud Rate: 115200

Data bits: 8

Parity: N

Stop bit: 1

Terminal type: ANSI

Once system is power on, you will see “Starting EX-9486-2L”, Keep typing \$\$\$\$ to turn on the serial console function. If the serial console is enabled, you will see “Console (ttyS0)” as follow. Repeat this procedure will disable the serial console and Screen will show “Console (null)”

```

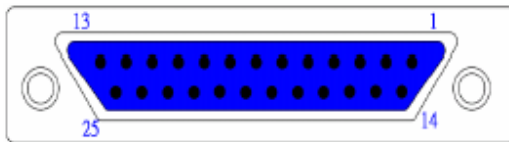
COM1,115200,None,8,1,VT100
asp_tables: (C) 2002 David S. Miller
TCP bic registered
Netfilter messages via NETLINK v0.90.
DTR NET: Registered protocol family 1
RTS NET: Registered protocol family 17
RAMDISK: Compressed image found at block 0
VFS: Mounted root (ext2 filesystem).
Freeing init memory: 100K
Init System.....Please Wait.....
eth0: Link now 100-FullDuplex
eth1: unknown interface: No such device
/etc/rc: lodctl: command not found
dhcpcd[732]: dhcpStart: ioctl SIOCGIFHWADDR: No such device

Welcome to
  _____  _____
 /  _  _  \  /  _  _  \
( (  (  ) ) \  (  (  ) )
  \  _  /    \  _  /
  _____  _____

For further information check:
http://www.topsccc.com/
#
State:OPEN  [CTS] [DSR] [RT] [DCD] Got Break Signal

```

Digital I/O Port (DB25 Female)



Pin No	Function	Pin	Function
1	DIO 0	14	DIO 13
2	DIO 1	15	DIO 14
3	DIO 2	16	DIO 15
4	DIO 3	17	DIO 16
5	DIO 4	18	DIO 17
6	DIO 5	19	DIO 18
7	DIO 6	20	DIO 19
8	DIO 7	21	DIO 20
9	DIO 8	22	GND
10	DIO 9	23	GND
11	DIO 10	24	VCC 3
12	DIO 11	25	VCC 5
13	DIO 12		

Note:

1. VCC3: 3.3 VDC output
2. VCC5: 5 VDC output
3. GND: Digital Ground

Factory Default Settings

LAN 1 IP Address: 192.168.2.127

LAN 2 IP Address: DHCP

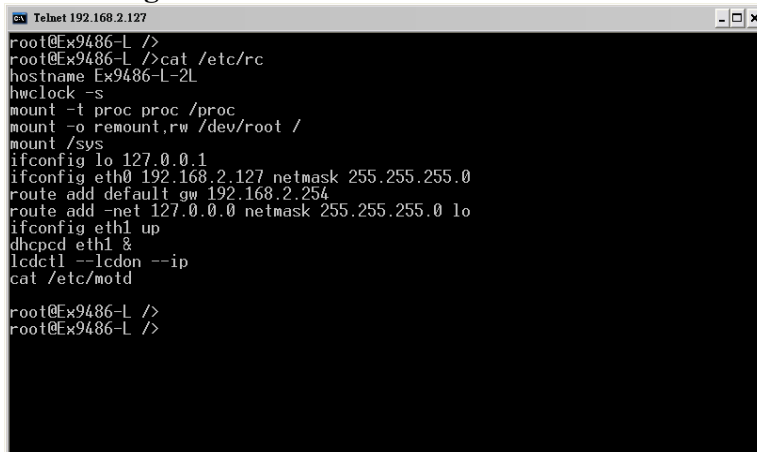
Login: guest

Password: guest

Supervisor: root (ssh supported)

Password: root

Network Settings



```
Telnet 192.168.2.127
root@Ex9486-L />
root@Ex9486-L />cat /etc/rc
hostname Ex9486-L-2L
hwclock -s
mount -t proc proc /proc
mount -o remount,rw /dev/root /
mount /sys
ifconfig lo 127.0.0.1
ifconfig eth0 192.168.2.127 netmask 255.255.255.0
route add default gw 192.168.2.254
route add -net 127.0.0.0 netmask 255.255.255.0 lo
ifconfig eth1 up
dhcpcd eth1 &
lcdctl --lcdon --ip
cat /etc/motd

root@Ex9486-L />
root@Ex9486-L />
```

To configure the IP address, Subnet mask and Gateway setting, please modify **/disk/etc/rc** as following:

ifconfig eth0 192.168.2.127 netmask 255.255.255.0

For DHCP setting:

dhcpcd eth1 &

Wireless LAN Configuration

EX-9486-2L-8 supports wireless LAN by using USB WLAN adaptor which uses Ralink RT2570 (rt2570) /2571 (rt73)controller. Please refer to the website <http://ralink.rapla.net> for the supporting list of the USB WLAN adaptor.

To configure the wireless LAN setting, please use command:

modprobe rt73 or ***modprobe rt2570***

ifconfig wlan0 up

iwconfig wlan0 essid XXXX key YYYYYYYY mode MMMM

For infrastructure mode

XXXX is the access point name

YYYYYYYY is the encryption key

MMMM should be ***managed***

For Ad-Hoc mode

XXXX is the EX-9486-2L-8 device name

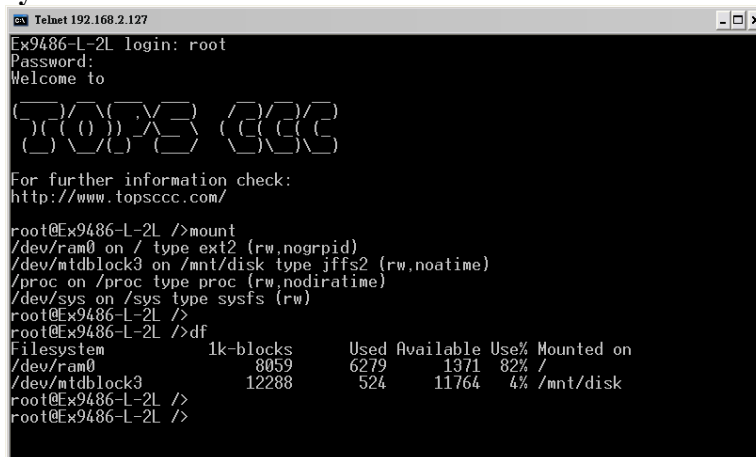
YYYYYYYY is the encryption key

MMMM should be ***adhoc***.

To configure the IP address use command

```
dhepcd wlan0 & or ifconfig wlan0 192.168.2.127 netmask  
255.255.255.0
```

File System



```
Ex9486-L-2L login: root
Password:
Welcome to

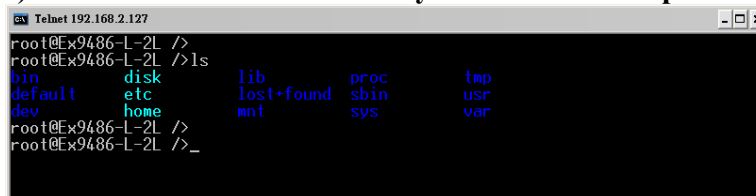
TOPS (CC)

For further information check:
http://www.topsccc.com/

root@Ex9486-L-2L />mount
/dev/ram0 on / type ext2 (rw,nogrpuid)
/dev/mtdblock3 on /mnt/disk type jffs2 (rw,noatime)
/proc on /proc type proc (rw,nodiratime)
/dev/sys on /sys type sysfs (rw)
root@Ex9486-L-2L />
root@Ex9486-L-2L />df
Filesystem            1k-blocks      Used Available Use% Mounted on
/dev/ram0              8059          6279      1371    82% /
/dev/mtdblock3        12288           524     11764     4% /mnt/disk
root@Ex9486-L-2L />
root@Ex9486-L-2L />
```

EX-9486-2L-8 configures the root file system as RAMDISK and the user disk (/disk) which includes /home and /etc directory are configured as Flash Disk. To find out the file system information, please use command /mount as show as above. In addition, use command /df to find out the disk space of the disk. The RAMDISK uses 8MB memory space to store the root file system and the user disk is about 11MB for user's program storage.

Therefore, user's program and utility software must be saved in the user disk space (/disk). Files saved to other directory will be loss after power off !!!



```
root@Ex9486-L-2L />
root@Ex9486-L-2L />ls
bin      disk      lib        proc       tmp
default  etc       lost+found sbin       usr
dev      home     mnt        sys        var
root@Ex9486-L-2L />
root@Ex9486-L-2L />_
```

Devices list

The supported devices are shown at /dev directory. Following list are most popular ones:

1. ttyS0: serial console port
2. ttyS1 to ttyS8: serial port 1 to port 8
3. mmc to mmc2: SD memory card
4. sda to sde: USB flash disk
5. ttyUSB0 to ttyUSB1: USB RS-232 adaptor (fdti_sio.ko)
6. rtc: Real Time Clock
7. gpio: General Purpose digital I/O
8. ttyACM0 and ttyACM1: USB Modem (CDC compliant)

```

Telnet 192.168.2.127
root@Ex9486-L-2L />cd /dev
root@Ex9486-L-2L /dev>ls
console  log      mtdblock3  ptyp6      sda3       tty6        tty2
cua0    mem      mtdr0      ptyp7      sda4       tty7        tty3
cual    mmc      mtdr1      ptyp8      sdb        tty8        tty4
flash   mmc0     mtdr2      ptyp9      sdc        tty9        tty5
gpio    mmc1     mtdr3      ram0       sdd        ttyS0       tty6
hda     mmc2     null       ram1       sde        ttyS1       tty7
hda1    mtd0     ppp        ram2       tty        ttyS2       tty8
hda2    mtd1     ptyp0      ram3       tty0       ttyS3       tty9
hda3    mtd2     ptyp1      random     tty1       ttyS4       urandom
hda4    mtd3     ptyp2      rtc        tty2       ttyUSB0     watchdog
ipsec   mtdblock0 ptyp3     sda        tty3       ttyUSB1     zero
kmem    mtdblock1 ptyp4     sda1       tty4       tty0
ledman  mtdblock2 ptyp5     sda2       tty5       tty1
root@Ex9486-L-2L /dev>
root@Ex9486-L-2L /dev>_

```

Utility Software:

EX-9486-2L-8 includes busybox utility collection and utility software as follow:

```

Telnet 192.168.2.127
root@Ex9486-L-2L /bin>
root@Ex9486-L-2L /bin>ls
addgroup          kill              sleep
adduser           grep             ln                smbmnt
amgrd             erase            login             smbmount
bash              false            ls                smbmount
boa               fgrep            mkdir              snmpd
busybox           find             mkfs.jffs2        stty
cat              grep             mknod             su
chat              gunzip           mktemp            sync
chgrp            gzip             more              tar
chmod            hostname         mount              telnetd
chown            inedit           mv                 tip
cp               init             netstat           touch
date             iptables         pidof             true
delgroup         iptables-restore ping              umount
deluser          iptables-save   pppd              update
df              iwconfig         ps                 usleep
dhcpcd           iwgetid         pwd                version
dhrystone        iwlist           rm                 vi
discard          iwpriv          rmdir              zcat
dmesg            iwspy           sh
root@Ex9486-L-2L /bin>
root@Ex9486-L-2L /bin>_

```

Utility Software:

The introduction of utility software as follow:

1. *update* :

```

Telnet 192.168.2.127
root@Ex9486-L-2L /bin>
root@Ex9486-L-2L /bin>update --help
Usage: update [OPTION] filename
Write image to flash.

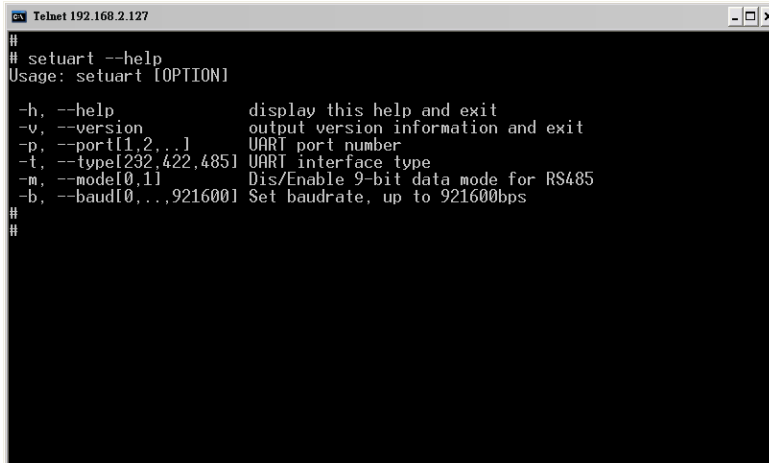
-q, --quiet      don't display progress messages
--silent        same as --quiet
--help          display this help and exit
--version       output version information and exit
--FORMAT        format userdisk
root@Ex9486-L-2L /bin>_

```

update loader, kernel or root file system image. Also use *update* —*FORMAT* to format

user disk. Type *update—help* to find the command usage Update can only operated under supervisor mode (password : root)

2. *setuart*:



```
Telnet 192.168.2.127
#
# setuart --help
Usage: setuart [OPTION]

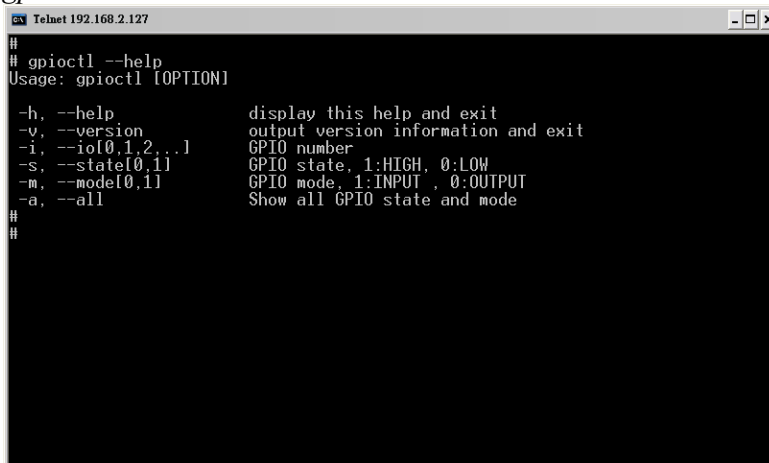
-h, --help            display this help and exit
-v, --version         output version information and exit
-p, --port[1,2,..]   UART port number
-t, --type[232,422,485] UART interface type
-m, --mode[0,1]      Dis/Enable 9-bit data mode for RS485
-b, --baud[0,..,921600] Set baudrate, up to 921600bps
#
#
```

configure serial port setting. An example show as followed to configure port 1 as RS-485 interface with baud rate 921600. Please note only port 1 support 9-bit data at RS-485

3. *lcdctl*:

lcdctl is used to control the LCD display. Use lcdctl to display user message, please prepare 2x18 text message and save it as a file. Then use lcdctl filename to display the message on the LCD screen. Use *lcdctl —ip 0* to display the ip address of the network setting on the LCD screen. The parameter *time* is the refresh rate in second and use *lcdctl —cpu 0* to display the system loading information

4. *gpiocctl*:



```
Telnet 192.168.2.127
#
# gpiocctl --help
Usage: gpiocctl [OPTION]

-h, --help            display this help and exit
-v, --version         output version information and exit
-i, --io[0,1,2,..]   GPIO number
-s, --state[0,1]     GPIO state, 1:HIGH, 0:LOW
-m, --mode[0,1]      GPIO mode, 1:INPUT , 0:OUTPUT
-a, --all            Show all GPIO state and mode
#
#
```

gpiocctl is used to control the programmable digital I/O port located on the DB25 connector. Following example is to configure DIO1 as digital input and DIO2 as digital output with low output state.

5. *vplay*:

How to make more utility software

You might also find utility software available on software CD under /EX-9486-2L-8/utility such as *ntpclient*, *ssh*, *scp*, *bluez* and *ssh-keygen*. If you want, you can ftp or copy the utility software to EX-9486-2L-8 user disk (/disk). Also you can use find the source code and use the GNU Tool Chain to make the utility by yourself.

Mounting External Storage Memory

To find out the device name of the external memory device which plug into EX-9486-2L-8, you can use the command

```
/dmesg | grep sd
```

or

```
/dmesg | grep mmc
```

Type

```
mount /dev/sda1 to mount the USB disk and
```

```
mount /dev/mmc0 to mount SD card
```

Adjust the system time

To adjust the RTC time, you can follow the command

```
/date MMDDhhmmYYYY
```

where

```
MM=Month (01~12)
```

```
DD=Date (01~31)
```

```
hh=Hour
```

```
mm=minutes
```

```
YYYY= Year
```

```
/hwclock -w
```

To write the date information to RTC User can also use NTP client utility in software CD to adjust the RTC time.

```
/ntpclient [time server ip]
```

SSH Console

EX-9486-2L-8 support SSH. If you use Linux computer, you can use SSH command to login EX-9486-2L-8. The configuration of SSH and key are located at

```
/etc/config/ssh
```

The key generation program is available at software CD

```
/EX-9486-2L-8/utility/ssh_keygen
```

User can copy this program to EX-9486-2L-8 to generate the key

Install GNU Tool Chain

Find a PC with Linux 2.6.X Kernel installed and login as a **root** user then copy the arm-linux-3.3.2.tar.gz to root directory of PC. Under root directory, type following command to install the EX-9486-2L-8 Tool Chain

```
#tar zxvf arm-linux-3.3.2.tar.gz
```

Welcome Message

To modify the welcome message, user can use text edit to modify the `/etc/motd`.

Web Page Directory

The web pages are placed at `/home/httpd` and the `boa.conf` contains the `boa` web server settings. The home page name should be ***index.html***

Getting started the Hello program

There are many example programs in software CD. To compile the sample you can use the `Make` file to and type

make

To compile and link the library. Once done, use `ftp` command

ftp 192.168.2.127

And `bin` command to set transfer mode to binary

ftp>bin

to transfer the execution file to EX-9486-2L-8 user disk (`/disk`) and use

chmod +x file.o

Change it to execution mode and

./file.o

to run the file