UltraBook

Technical White Paper

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TADPOLE RDI

Portable Unix Workstations and Servers for a Mobile World

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1. UltraBook Overview

1.1 Introduction

This document describes the UltraBook from Tadpole-RDI. The UltraBook packages all the power and functionality of the SUN Ultra 1 into a portable notebook, measuring 2.3" x 12.84" x 11.66" (58mm x 326mm x 296mm), weighing 7.5 lbs. (3.4 kgs) without battery.

The UltraBook provides 100% binary compatibility with Solaris 2.5.1, 2.6 and 7 operating environments allowing the Ultrabook to run all major SPARC/Solaris applications. The Ultrabook supports up to 24GB of internal removable robust disk storage and RAM configurations up to 512MB.

With a choice of graphics options, including Creator 3D, and display sizes of 12.1" and 14.1" the UltraBook is an ideal tool not just for presentations, demonstrations and training, but for advanced engineering applications and high-end graphic image applications.

The UltraBook can be easily carried between sites, has technology designed for performance, portability and robustness allowing the user true desktop functionality at work, home, or on the road.

1.2 Target Markets and Applications

Any company developing, selling or utilizing applications on a SUN platform (SPARC/Solaris). The user will have a portable/mobile requirement e.g.

Feature	**Benefit**
Full SUN UltraSPARC functionality	Runs any SPARC/Solaris application, at 100% power and functionality.
Weight 7.5 lbs.	Can be easily transported between office, customer site, home office and other locations.
Graphics	High end Creator 3D graphics for CAD/CAM applications.
Internal, removable hard disk drives, up to 24GB	User can quickly swap between different environments, e.g. Trainer: Multiple courses. SE: Different demonstrations or presentations. Can always return to known working system. Multi-purpose: Switch between personal, demo or test environments within minutes. Increased system utilization by using unit for different purposes. Disks removable for security of data.
Portable size	Reduced hardware footprint. Reduced shipping costs. Reduced time the system is out of use, i.e. no need for packing and shipping in advance. Efficient and economical transit, saves time in setup/finding equipment. Reduced volume and weight for shipment.

Use	Key features/benefits
SE for Demonstration	Increased sales/demonstration productivity. Reduced shipping costs. Controlled and consistent demonstration environments.
Training	Efficient set up. Lower shipping costs. Increased system utilization.
Show/Exhibition Demos	Reduced shipping costs. Controlled demonstration environment. Removable disk drives for maximum security.
Developer/Consultant	Full Architecture / Operating system compatibility. Single system with multiple personalities via removable hard disks for: benchmarking, data analysis, working at home, working in office, working at customer site.
Deployment	Portable system for temporary office, mobile command and control, on site data collection and analysis, mobile disaster recovery, etc. Reduced footprint frees up valuable space for deployment.

1.3 Hardware Overview

The UltraBook features include the following:

- UltraSPARC 1 Processor (200MHz and 167MHz).
- Up to 512MB of ECC memory.
- 12.1-inch or 14.1-inch TFT active matrix color LCD display sizes available.
- Up to three user removable disk drives. Each drive contains a 2.5-inch EIDE disk drive.
- Secondary Cache of 512KB.
- External Fast Wide SCSI interface.
- Auto sensing 10/100MB (10 BaseT) interface
- Dual PCMCIA slots, supporting two Type I/Type ll cards, or one Type III card.
- Lithium battery increasing flexibility of system use.

The UltraBook can be simply “personalized” with hard disk drives, PCMCIA cards and memory modules which are easily installed and removed.

1.4 Operating System Support

The UltraBook is shipped with Solaris 2.6 factory installed. Tadpole-RDI provides the binary version of the operating system without any source modifications. The UltraBook is 100% SPARC compliant allowing the user the ability to run any of the 10,000 plus Solaris applications at home, in the office, or other locations.

1.5 Security

- Removable disk drives allow classified information to be secured.

2. Technical Specifications

2.1 Major components

Processor	200 MHz UltraSPARC1	SPECint95: 7.44 SPECfp95: 10.4
	167 MHz UltraSPARC1	SPECint95: 5.56 SPECfp95: 9.06
Cache	64KB data, 64KB instruction	
Secondary Cache	Standard 512KB	
Memory (ECC - 60ns)	128MB - 512MB	
Disks	Up to 3 x 8GB 2.5-inch EIDE disk drives depending on configuration.	
Graphics	PCI based ATI RAGE LT (equivalent to SUN PGX24) *SUN Creator 3D double buffered 24-bit graphics	
Display Options	TFT Active matrix color LCD, 12.1” and 14.1” options 1024x768 resolution. * Creator 3D graphics only available with 14.1 inch display.	

	12.1-inch	**14.1-inch**
Color palette	256K	256K
Grayscale levels	64	64
Pixel aspect ratio	1:1	1:1
Screen aspect ratio	4:3	4:3
Dot Pitch	.24mm	.28mm
Dots per inch	106	90.7
Display height	7.26in	8.36in
(In mm)	185mm	214mm
Display Width	9.69in	11.14in
(In mm)	246mm	286mm
Display Diagonal	12.1in	14.1in
(In mm)	308mm	358mm

PCMCIA	Supports (1) OR (2) Type l/Type II or (1) Type lll

2.2 External Monitors

Supports up to 16 million colors and resolutions of 1280x1024, 1152x900, 1024x768, 800x600 and 640x480.

2.3 Keyboard/Pointing Device

A full-sized, 97 full travel keys, SUN-5 compatible integrated keyboard with 12 function keys, 3-button integrated trackpad.

2.4 Standard External Interfaces

Ethernet	10/100MB auto sensing Twisted Pair port
SCSI	Fast Wide SCSI
Serial	Two RS-232C serial ports
Parallel	Centronics-compatible
Audio	16-bit audio, 48KHz sampling rate stereo internal speaker, microphone jack
Video Port	13W3 D-type socket

Mouse/Keyboard	8 pin, mini-DIN connector, SUN type
External Floppy	15-pin connector

2.5 Software

Operating System	Solaris 2.5.1, 2.6, or 7
Network Support	AutoNET software tools, plus NTP NIS+, DHCP, NFS, VLSM
Java Tools with 2.6	Java virtual machine, HotJava browser
Power Management	Power Tools supporting multiple power modes and battery management.

2.6 Optional External Floppy Drive

Floppy disk drive	3.5 inch, auto-sensing
Capacity	720KB or 1.44MB

2.7 Optional Fax/Modem

56K/bps PCMCIA fax/modem card with cellular phone support.

2.8 System Dimensions

Height	2.3-inches (58mm)
Width	12.84-inches (326mm)
Length	11.66-inches (296mm)
Volume	0.18cu. ft. (.005 cu. m)
Weight	7.5 lbs. (3.4kg) (w/o battery)

2.9 Battery

Li-Ion battery	40 watt-hour capacity
Run Time	0.5 to 1 hour (application dependent)
Recharge time	2.5 hours charging only (battery is charged in background)
Weight	1.0 pounds (0.45kgs)

Quickcheck status on battery pack

2.10 AC Adapter Charger

Automatic voltage and frequency sensing

Voltage	100 to 240 VAC
Frequency	47 to 63 Hz
Power Supply	120 W continuous, maximum
DC Output	18VDC @ 6.5 A
Length	6.2-Inches (157mm)
Width	3.7-Inches (94mm)
Height	1.8-Inches (46mm)
Weight	1.3 lbs. (0.58kg)
AC Cord	3 terminal IEC standard, 3ft (.92m)
DC Cord	Locking connector, 6ft. (1.8M)
Safety	Class II, UL 1950, IEC 950, EN 60950

2.11 Power Management

LCD blanking

Graphics shutdown and low power mode
Hard drive spin down
Idle loop processor clock speed management
User definable power management profiles

2.12 Other Standard Features

Carrying case
Simultaneous display capabilities with connection to XGA resolution

2.13 Environmental

Altitude	0 - 10,000 ft. (0 - 3,048 m)
Operating	+40 degrees F to +104 degrees F (+4 degrees C +40 degrees C)
Storage	-4 degrees F to + 140 degrees F (-20 degrees C to +60 degrees C)

Temperature sensitive fan speed

2.14 Regulatory Compliance

Safety	UL 1950, CSA C22.2 No 950, TUV (EN60950), CE
EMC	ITE - FCC Part 15 Class B, CE (EN55022 Class “B”, EN50081-1, EN50082-1, IEC 801-2, IEC 801-3, IEC 801-4)

3. Description of Key Components/System Architecture

3.1 Processor Module

The processor in the Ultrabook is the UltraSPARC1 developed by Sun Microelectronics, and is based on the 2nd-generation SPARC V9 architecture. Two speed grades of processor are available for the Ultrabook.

The performance ratings of each CPU are as follows:

	167 MHz	200 MHz
SPECint95	5.56	7.44
SPECfp95	9.06	10.4

The secondary cache is connected directly to the processor via a dedicated bus. This ensures that the cache performance is not compromised by any conflicting needs for the main memory or I/O. In fact, transfers can occur on the secondary bus simultaneously with activity on the other busses.

The Ultrabook implements Sun's Ultra Port Architecture (UPA) interconnect. This interconnect provides a crossbar switch access for the processor and graphics controller to cache and memory.

3.2 System Memory

Memory on the UltraBook is accessed through a 144-bit data path. UltraBook memory includes ECC protection. The memory subsystem supports 60 ns memory modules.

UltraBook has available memory configurations of 64 MB to 512 MB. The memory is connected to the notebook through an opening in the bottom of the unit. The memory is field installable where the end user can access the memory modules and replace the two memory modules with higher capacity SIMMs available through Tadpole-RDI.

Four valid memory configurations are possible. The following table shows the memory card requirements for each memory configuration.

Valid Memory Configuration	Memory Modules Required
64MB	2 x 32MB SIMMs
128 MB	2 x 64MB SIMMs
256 MB	2 x 128MB SIMMs
512 MB	2 x 256MB SIMMs

3.3 Graphics Controller

3.3.1 Graphics Performance

Ultrabook supports high-end 3D graphics capabilities by providing Sun's Creator™ 3D graphics subsystem. Creator provides accelerated 24-bit 3D graphics and imaging with 8-bit overlay plane, high-speed convolution, rotation, panning, zooming, and color conversion. The Creator option is configured inside the UltraBook main unit, and displays to the internal LCD and to external displays. Performance numbers for the Ultrabook with Creator are shown below.

	Creator 3D
Xmark93	20.79
PLBwire93	146.8

PLBsurf93	208.3

3.3.2 External Monitors

The UltraBook supports up to 16 million colors and resolutions listed as follows:

VGA	640x480
SVGA	800x600
XGA	1024x768
SXGA	1280x1024
Frame rates	60Hz, 72Hz, 75Hz

The UltraBook can display simultaneously on the internal 1024x768 LCD and external 1024x768 monitor or LCD projection panel and projector. If an external 640x480, 800x600, 1280x1024 or 1600x1200 CRT monitor is used, the internal LCD will not operate (i.e., it will be blanked).

3.4 Display Technology

3.4.1 14.1-inch 1024x768 Color Active Matrix TFT Display

Tadpole-RDI offers a 14.1-inch diagonal 1024 x 768 high resolution color liquid crystal display (LCD) that uses Active Matrix, Thin Film Transistor technology. The dimensions of the LCD are 8.36-inches in height and 11.14-inches in width. The display has a dot pitch of .28 mm with 90.7 dots per inch.

The on-board ATI RAGE LT video controller provides a graphics accelerated display. The 14.1-inch 1024x768 display supports a color palette of 16M colors and 64 grayscales with 256K colors displayed simultaneously.

3.4.2 12.1-inch 1024x768 Color Active Matrix TFT Display

Also available is a 12.1-inch diagonal 1024x768 high resolution color liquid crystal display (LCD) that uses Active Matrix, Thin Film Transistor technology. The dimensions of the LCD are 7.26-inches in height and 9.69-inches in width. The display has a dot pitch of .24 mm with 106 dots per inch.

The on-board ATI RAGE LT controller provides a graphics accelerated display. The 12.1-inch 1024x768 display also supports a color palette 16M colors and 64 grayscales with 256K colors displayed simultaneously.

3.5 Hard Disk Storage

The UltraBook uses low profile, 2.5-inch IDE internal removable hard drives. Each hard disk drive has 8 GB of formatted storage, 13 msec average access time with burst transfer of 5 MB/sec.

The UltraBook supports up to three removable hard disk drives where the third drive replaces the battery. This provides an internal storage range of 8 GB to 24 GB.

3.6 Physical Packaging

The UltraBook provides a notebook-style package, while maintaining full workstation desktop configuration capability. The UltraBook has a weight of 7.5 lbs. (3.4 kg) without battery and a footprint of 11.6 inches (296mm) deep by 12.8 inches (326mm) wide by 2.3 inches (58 mm) in height.

The keyboard is forward mounted in the base section of the UltraBook. The base section provides a comfortable palm rest for wrist support during extended use. The center positioning of the touchpad allows right- or left-handed usage.

The audio ports are located on the front right hand side of the unit for easy access to use speakers or headphones. Other ports with right side access include the PCMCIA port, the external floppy drive connector, keyboard/mouse, and Fast/Wide SCSI port. The drives are removable with quick release sliding latches found underneath the system.

Rear Panel connectors available on the Ultrabook are the power socket, 10/100MB RJ45 network port, external DB13W Video port, and a socket for serial/parallel/AUI adapter

The UltraBook utilizes an external AC adapter for non-battery operation and battery charging. The AC adapter measures 5.24-inch x 2.28-inch x 1.15-inch (133 mm x 58 mm x 29 mm) and weighs 1.3 pounds (.58 kg).

3.7 PCMCIA

The UltraBook is designed with a PCMCIA slot located on the right side of the system. The PCMCIA slot supports one or two Type I/Type II cards or one Type III card. Various PCMCIA cards can be used in the UltraBook, including fax/modems.

3.8 Keyboard and Touchpad

A full-sized, 97 full travel key SUN-5 compatible integrated keyboard with 12 function keys is standard with each UltraBook. The keyboard has an integrated three button GlidePoint® touchpad. To move the cursor, simply place a finger on the touchpad and move across to the position needed. Tap once on the pad to "click," twice to "double-click," and tap and hold to drag and highlight.

The UltraBook supports external Sun Type 5 domestic keyboards. The dual-ported keyboard controller supports simultaneous external and internal keyboard connection. With an external keyboard connected before power up, the keyboard controller detects its presence on boot up. The touchpad is also usable when an external mouse or an external keyboard with a mouse is connected.

3.9 Power Supply

The UltraBook gets power from the internal battery pack or by connecting the external 120 watt AC power adapter. This adapter operates from 100-240 VAC, at 47 to 63 Hz. The adapter provides 18 volt DC power input for operating the system. International power cord options are available.

3.10 Battery Technology and Recharging

The battery pack used in the UltraBook is made up of nine Lithium-Ion cells packaged in one removable case. The 4050 mAH per cell battery pack typically provides up to 60 minutes of battery operation, depending on system configuration and power management mode. The battery pack supplies 11.1 volts DC (nominal) and weighs 1.0 pounds.

Tadpole-RDI has developed an intelligent battery management system relieving the user of battery management. The Lithium-Ion battery pack has no memory effect and the system will background charge the battery when connected to AC power. A utility called PowerTool allows the user to monitor the charge of the battery pack and can get up to the minute charge status. The battery pack has QuikCheck, an LED read out on the pack for immediate indication of the level of charge available for the battery pack.

The battery pack can be charged in 2.5 hours while the system is off and connected to the external power supply.

3.11 I/O

The following connectors are provided on the UltraBook:

Name	Description
SCSI Port	Fast/Wide SCSI
Ethernet	10/100MB/s Auto sensing
Serial Ports	2 x RS-232C interfaces on 9-pin D-Type
Parallel	1 x 25-pin D-Type Centronics compatible
Audio	Standard 16bit, 48 KHz interface with sampling rate stereo, internal speaker and microphone jacks

4. Accessories

4.1 Tadpole-RDI Supplied/Approved Items

NOTE: The accessories on this list are likely to be updated as customer requirements dictate, please contact Tadpole-RDI for latest product information or alternatively check Tadpole-RDI's web site at: http://www.tadpolerdi.com

The following items have been certified for compatibility by Tadpole-RDI for use with the UltraBook product, and may be supplied to the UltraBook user by Tadpole-RDI or obtained from another source. *Italics indicates items only available from Tadpole-RDI*:

PC Card (Modem)	Clippercom 56K Data/Fax Modem
PC Card (Wireless Modem)	Contact Tadpole-RDI for latest product information
Floppy Drive	*720K/1.44MB*
CD-ROM	*24 Speed portable CD-ROM unit (US only)* *40 Speed desktop CD-ROM unit*
Memory	*Upgrades available to 512MB maximum per system*
Disk	*Additional disk drives, up to a maximum of three disk drives per system (only two disk drives available when using battery option)*

4.2 Compatible Items

The following items will not be specifically approved or supplied by Tadpole-RDI but are likely to be compatible with the UltraBook product:

- SCSI - Most SCSI items for which suitable driver software exists (e.g. Sun disks)
- Serial - Most serial items for which suitable driver software exists (e.g. modem)
- Parallel - Most parallel items for which suitable driver software exists (e.g. printer)
- Displays - Most third-party monitors, projectors or flat-panel displays.
- Tape devices – Most SUN compatible SCSI tape drives.

5. Standards

5.1 Safety

US	UL 1950
Canada	CSA C22.2 No. 950
Europe	CE, TUV includes EN 60950

5.2 EMC

US	ITE FCC Part 15 Class B
Canada	Accepts US approvals
Europe	CE EN 55022 Class B (Emissions) EN 50081-1, EN 50082-1 (Immunity) IEC 801-2, 801-3, 801-4

6. Software

6.1 SUN Solaris Operating System

The UltraBook provides 100% binary compatibility with Solaris 2.5.1, 2.6 and 7 operating environments, allowing the Ultrabook to run all major SPARC/Solaris applications. The Ultrabook supports up to 24GB of internal removable robust disk storage and RAM configurations up to 512MB.

Each UltraBook is shipped with the following software environment:

1. Chosen version of Solaris operating system (2.5.1, 2.6, 7)
2. Solaris CD set (Chosen version)
3. Right To Use (RTU) License from Sun Microsystems
4. Factory loaded Tadpole-RDI software: Power Management Tool and PCMCIA
5. Tadpole-RDI Software CD
6. Manual set and CD

6.2 Other Software Standards Compliance

- CDE
- NFS
- DHCP
- VLSM
- Open Windows 3.x
- AutoNET software tools, plus NTP
- NIS+
- Java Tools with 2.6

6.3 Tadpole-RDI Software

A Tadpole-RDI software CD is also supplied with each UltraBook. Tadpole-RDI software provides a set of GUI-accessible tools for UltraBook users. These include system and power management, serial driver, PCMCIA driver and others. PowerTool provides system and power management. The end user can select various power usage modes to extend battery life. The AutoNET software utilities provide automatic network reconfiguration for multiple network environments.

7. System Configurations

The capabilities of the UltraBook product may be changed by configuring the main unit, or by connecting additional items.

7.1 Shipping Configurations

The UltraBook product will be supplied in a specific configuration defined at time of purchase by -

- Processor speed.
- LCD display size.
- Disk capacity (defined by the number of disk drives and/or battery required).
- Memory capacity.
- Graphics option.

7.2 System Upgrades

Changes to the main system configuration (as defined above) can be undertaken as a combination of field upgrade (i.e. by the user) or by returning the unit to a Tadpole-RDI approved service technician. Some upgrade items that are critical to the performance of the product must be purchased through an approved Tadpole-RDI channel:

- The processor module/system board can be upgraded as a return to factory option. Upgrade options will depend on which processor modules/system board are available at the time of upgrade.

- The memory is a field installable item. The upgrade involves purchasing additional UltraBook memory modules from Tadpole-RDI.

- The disk drives are field installable items. The upgrade involves purchasing additional UltraBook disk drives from Tadpole-RDI.

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About Tadpole-RDI

Tadpole-RDI, a subsidiary of Tadpole Technology Plc, is the global leader in the design and manufacture of portable UNIX workstations and server systems for Sun and Hewlett-Packard environments. Its North American headquarters are based in Carlsbad, California and European operations in Cambridge, England. Tadpole-RDI is certified ISO-9001 and operates through a global network of specialist distribution channels providing applications in industry, commerce and government. Tadpole-RDI can be visited at www.tadpolerdi.com.

About Tadpole Technology Plc.

Tadpole Technology is a listed company on the London Stock Exchange and also pioneer of mobile Java solutions called Cartesia for the world's utilities and related industries. Leveraging developments in Java and intranet technology, Cartesia brings the full advantages of integrated corporate workflow to the mobile environment allowing utilities to deploy the first set of truly location-independent, platform-neutral business tools that generate reductions in IT costs and gains in mobile workforce productivity.