Long Trail Reference Design

EVT Test Plan

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1. Overview

1.1 Introduction

The purpose of this document is to define the required testing for Long Trail system engineering verification test including entry and exit criteria. Given the current status on Golden Gate / Tollgate bring-up, this plan will focus primarily on activity to support test and qualification of Pass-2 Long Trail. Pass-1 testing will be limited to testing in support of Pass-2 as well as Comdex support (If necessary on pass-1).

1.1.1 How to obtain the latest level

To obtain the latest level of this document you can contact the author at BERRYR@AUSVMR, or from the ISO-9000 document control file in the HQCS document center. Before using this document, please insure that you are working with the latest level.

Revision Level	Change Description
0.1	Original Draft for review
1.0	First Revision
2.0	Second Revision (Covers revised pass-2)
2.1	Reflects key program changes (Pass 2.1 & Windows/NT removal)

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1.1.2 Reference Documentation

Long Trail Reference Design Specification for Pass-1, Howard Tanner, 8/20/96
Long Trail Reference Design Specification for Pass-2, Howard Tanner, 8/14/96
Long Trail Firmware RFQ, 12/13/95
Long Trail Motherboard Schematics (Pass-2.1)

1.2 System Definition

Long Trail is a CHRP compatible Uni-processor PowerPC reference design with the following features:

1.2.1 Long Trail Motherboard: (Pass-1)

ATX form factor
Pluggable processor card supporting both 603 and 604 families of processors.
Two ISA, Three PCI and one shared expansion slots.
VLSI Golden Gate II 60X to PCI bridge chip & memory controller (66Mhz maximum)
VLSI Tollgate PCI to ISA bridge (Initially using Winbond).

Three 168 pin DIMM sockets (3.3V non-buffered standard DIMMs)
L2 Cache up to 1M Cache (Burst or Async)
MAC-ROM socket -, Up to 4M of flash or burst ROM
512KB boot ROM (on ISA bridge)
32K NVRAM & RTC
IBM Compatible I/O (2 Serial & 1 Parallel)
PS/2 Keyboard and Mouse connector
Apple compatibility (ADB Keyboard/Mouse, 2 SCC serial ports, 1 SCSI)
Dual IDE (Up to 4 devices)
Apple MESH SCSI (External only)
Crystal 4232 business audio.
Timer-2 speaker sound
Power Management (Energy Star, Hibernate only)
RISCwatch support

1.2.2 Board changes for pass-2:

Processor card replaced with PGA socket.

1.2.3 Processor card regulator replaced by VRM DC-DC Converter.

Frequency configuration PAL replaced with jumpers.
L2 changed to COAST 160-pin standard.
Crystal 4236 Audio
Pass 2 of the Golden Gate 2-chip bridge.
Pass-2 is a 2S2P Board

1.2.4 Board changes for pass-2.1:

Support for Mach/5 added.
All EC's embedded into board.
Additional processor decoupling on Vdd & OVdd.
Pass-4 of the Golden Gate VLSI chipset

1.2.5 Long Trail System: Basic ship configuration

ATX System Form factor
1.44M Floppy with media sense (Autoeject)
Open Firmware Video
ATI Xclaim PCI video card (Open Firmware)

ATX Chassis (Palo Alto Design Group ATMT)
Power Supply (Seasonic SS-200GPX, 200W)
IDE CD-ROM (6X minimum)
IDE Hard drive (Quantum Fireball - 1.2GB)
Memory DIMMs (32M Synchronus Minimum)

1.3 Currently supported Processor configurations for Longtrail:

Processor	PLL Config	CPU Clock	Local Bus	PCI	DVR-Mode
603ev	5:2	150	60	30	Normal
603ev	5:2	166	66.67	33.33	Normal
603ev	3:1	180	60	30	Normal
603ev	3:1	200	66.67	33.33	Normal
604e	5:2	150	60	30	Normal
604e	5:2	166	66.67	33.33	Normal
604e	3:1	180	60	30	Normal
604e	3:1	200	66.67	33.33	Normal
604ev	3:1	180	60	30	Super
604ev	3:1	200	66.67	33.33	Super
604ev	7:2	233	66.67	33.33	Super
Mach/5	4:1	266	66.67	33.33	Super
Mach/5	9:2	300	66.67	33.33	Super
Mach/5	5:1	333	66.67	33.33	Super
Arthur	4:1	266	66.67	33.33	Normal
Arthur	9:2	300	66.67	33.33	Normal

Note: All testing is planed with Golden Gate in synchronous mode, no major performance benefit is
expected in Async. Mode at 30Mhz.

1.4 Document Approvals:

CSSP Test Manager _____

Elmer Corbin Date

Engineering Manager _____

Steve Curtis Date

CSSP Project Manager

_____

Scot Hallman Date

1.5 Project Summary

This plan outlines the testing required for EVT (Engineering Verification Test). The areas of bring-up test can be split into five major categories. The first two categories are primarily associated with bring-up and early engineering test.

Initial Bring-Up (Firmware boot capability)
BUD (Bring-Up Drivers) Testing

- Software Compatibility Testing (CHRP System 7.6)
  - Operating System Compatibility Testing and Certification
  - Application Compatibility Testing
  - Benchmark Results

- Hardware Compatibility Testing (CHRP System 7.6)
  - Adapter Compatibility Testing
    - Video Adapter Testing
    - Disk Interface Adapter Testing
    - Multimedia Adapter Testing
    - Network Adapter Testing
  - Peripheral Compatibility Testing
  - Memory Testing

- Classical Testing
  - Signal Quality Analysis (Owned by engineering)
  - Signal Timing Analysis (Owned by engineering)
  - Temperature/Voltage Guardband Analysis

2. EVT entry and exit criteria

2.1 EVT Entry Criteria

Test involvement is planned from initial power-on, but Engineering Verification Test entry is based on the following requirements:

Motherboard boots and runs BUD
The board installs and boots CHRP Macintosh System/7.6.
Up-to-date and complete specifications for VLSI Golden Gate 4.0 chipset.

All chip errata and proposed fixes/workarounds defined and verified at VLSI.

VLSI Golden-Gate test plan, and test results as they are available

Up-to-date Schematics for the Long Trail Motherboard.
System Mechanical chassis available
Peripherals required for testing available
CMVC problem tracking system with defect trees in place
UCD file for Motherboard available (Preferably less than 1.4MB).
Full open Firmware support (With fully functional FORTH interpreter) available

Firmware documentation available

MacOS available at EVT entry (Beta release):

6 pass-2 systems available and functional (Boot and pass BUD, MacOS), plus 1 spare.

2.2 EVT Exit Criteria

EVT exit requires the following to be successfully completed. Additional testing required for any full system requirements of volume production would be performed as part of an DVT test.

BUD runs without failure for all supported configurations and processor combinations

System 7.6 CHRP must successfully install from CD.

All required Apple Macintosh Compatibility Environment Tests must pass without failure for all key configurations.

All defined application testing must pass for Mac/OS.
All defined hardware configuration tests must have passed.
All classical testing has passed, or an agreed upon plan has been established to insure there will not be a problem.

System Level Stress and Guardband
Full VLSI qualification of both PCI bridge chips.
All severity 1 & 2 problems are closed or have been assessed by program management as having an acceptable action plan and/or the appropriate risk assessment.

Any exception to this list must be approved through Long Trail Engineering and Test management, and a plan be in place to close the issue or the function be removed from the Long Trail functional documentation.

2.3 Schedule

The current program schedule can be obtained from the program manager Scot Hallman.

3. Bring-up Testing:

Bring-up test will be performed by the CSSP Engineering Team. The primary test software will be Firmworks code and BUD.

4. BUD Test

4.1 Bring Up Driver (BUD)

BUD is a tool developed for initial debug of RS/6000 PowerPC systems. It is an operating system independent tool, which allows each sub-system of a system to be uniquely exercised. In addition, BUD provides the capability of combining and looping different tests to support error logging for extended runs. BUD is used as the exerciser for most classical testing.

4.2 BUD Sub-system Tests

The following subsystem tests are supported by BUD. . Each sub-system test provides both a stand-alone test suite and a test that can be run along with other devices. The stand-alone test typically will have a slightly higher test coverage, but the group (Interrupting) test will provide a much higher level of overall system stress.

4.3 BUD tests supported:

Memory Test
Serial-2 (Wrap plug & functional tests)
Floppy disk test (1.44M)
IDE Drive test
IDE CD ROM Test
SCSI drive test (NCR 810 or 825 PCI Adapter)
MESH SCSI (External drive must be attached)
AMD PCI Ethernet test (Wrap plug)
IBM ISA Master Token Ring test (Wrap Plug)
Serial-2 test (Wrap plug)
Real time clock & NVRAM
L2 Cache (Asynchronous or Burst)
Video - S3 Trio-64
Hydra - VIA (Registers & Timers)
SCC - Functional and wrap tests
Keyboard & Mouse
Parallel port (wrap plug & Printer tests)

4.4 BUD test configurations:

Configuration #	1	2	3	4
Processor	604ev	604e	603ev	603ev
BUS speed	200/66/33	200/66/33	200/66/33	233/66/33
Memory [1:3]	1 X 64M Sync	2 X 32M Sync	3 X 16M EDO	2 X 16M EDO
IDE Drive(s)	540M	1.2G Fireball	1.2G Fireball	540M
Token Ring	ISA Master	ISA Master	None	ISA Master
Ethernet	AMD 10M	AMD 10M	None	AMD 10M
Video Card	ATI	ATI	ATI	ATI
SCSI HDD	540M	540 Maxtor	540M	540M
CD ROM	IDE 4X	IDE 6X	IDE 4X	IDE 4X
Floppy Drive	1.44	1.44	1.44	1.44
L2 Cache)	256K P.Burst	256K Burst	512K Burst	256K P.Burst

Configuration #	5	6	7	8
Processor	Arthur	Mach/5	604ev	604ev
BUS speed	300/66/33	300/66/33	240/60/30	200/66/33
Memory [1:3]	2 X 32M Sync	3 X 8M EDO	2 X 64M Sync	2 X 16M sync
IDE Drive(s)	1.2G Fireball	1.2G Fireball	1.2G Fireball	540M
Token Ring	ISA Master	None	None	ISA Master
Ethernet	AMD 10M	AMD 10M	None	AMD 10M
Video Card	ATI	ATI Xclaim	ATI	ATI
SCSI HDD	540 Maxtor	1G Spitfire	540M	1G Spitfire
CD ROM	IDE 6X	IDE 6X	IDE 4X	IDE 4X
Floppy Drive	1.44	1.44	1.44	1.44
L2 Cache)	256K Burst	512K P.Burst	512K Burst	256K P.Burst

Each configuration will be regressed through a full stand-alone suite, as well as an overnight (8 hours minimum) run of BUD interrupting test. At least two configurations will be run with BUD for extended runs of 48 hours. All these tests must pass successfully, or an agreed-upon action plan/risk assessment must be in place. Additional configurations may be tested for additional coverage.

5. Software Compatibility Testing (Apple System 7.5)

5.1 Operating System Compatibility Testing with System 7.5

5.1.1 Apple Test Suite and Hardware Compatibility Testing

Operating System Compatibility for this design will be Apple CHRP System/7.6 for PowerPC. The operating system testing will include MCE (Macintosh Compatibility Tests) testing in a variety of configurations. Power management feature testing will be limited to power off on shutdown.
For each of the following configurations, System 7.6 must be installed and have all required MCE tests run without failure. Installation should be from CD ROM and include any patches required.

Configuration #	1	2	3	4
Processor	603ev	604ev	603ev	603ev
BUS speed	240/60/30	200/66/33	200/66/33	200/66/33
Memory [1:3]	2 X 32M Sync.	3 X 32M EDO	3 X 16M FPM	3 X 32M FPM
SCSI Card	Adaptec AHA2940	Adaptec AHA2940	Adaptec AHA2940	Adaptec AHA2940
L2 Cache	256K Burst	512K P.Burst	512K Burst	256K P.Burst
Modem	US Robotics 28.8 external (Apple)	None	US Robotics 28.8 external (Apple)	US Robotics 28.8 external (Apple)
Ethernet	3-COM Etherlink	DEC21140	DEC21140	3-COM Etherlink
Video Card	ATI Xclaim	S3 Trio64V	S3 Trio64V	ATI Xclaim
SCSI HDD	1G Spitfire	540M	540M	1G Spitfire
CD ROM	IDE	IDE	SCSI	IDE
Floppy Drive	1.44 Sony	1.44Mitsubishi	1.44 Sony	1.44 Mitsubishi
Keyboard/Mouse	IBM	Apple	Apple	IBM
MACROM	Yes	Yes	Yes	Yes
IDE Drive	1G Quantum	1G Quantum	540M	1G Quantum

Configuration #	5	6	7	8
Processor	603ev	603ev	604ev	604ev
BUS speed	180/60/30	200/66/33	233/66/33	266/66/33
Memory [1:3]	2 X 32M Sync.	2 X 64M Sync	2 X 32M Sync.	3 X 32M EDO
SCSI Card	Adaptec AHA2940	Adaptec AHA2940	Adaptec AHA2940	Adaptec AHA2940
L2 Cache	256K Burst	512K P.Burst	256K Burst	512K P.Burst
Modem	US Robotics 28.8 external (Apple)	None	US Robotics 28.8 external (Apple)	None
Ethernet	3-COM Etherlink	DEC21140	3-COM Etherlink	DEC21140
Video Card	ATI Xclaim	S3 Trio64V	ATI Xclaim	S3 Trio64V
SCSI HDD	1G Spitfire	540M	1G Spitfire	540M
CD ROM	IDE	IDE	IDE	IDE
Floppy Drive	1.44 Sony	1.44Mitsubishi	1.44 Sony	1.44Mitsubishi
Keyboard/Mouse	IBM	Apple	IBM	Apple
MACROM	Yes	Yes	Yes	Yes
IDE Drive	1G Quantum	540M	540M	1G Quantum

Configuration #	9	10	11	12
Processor	604e	604e	604e	604ev
BUS speed	166/66/33	180/60/30	200/66/33	200/66/33
Memory [1:3]	2 X 32M Sync.	3 X 32M EDO	3 X 16M FPM	3 X 32M FPM
SCSI Card	Adaptec AHA2940	Adaptec AHA2940	Adaptec AHA2940	Adaptec AHA2940
L2 Cache	256K Burst	512K P.Burst	512K Burst	256K P.Burst
Modem	US Robotics 28.8 external (Apple)	None	US Robotics 28.8 external (Apple)	US Robotics 28.8 external (Apple)
Ethernet	3-COM Etherlink	DEC21140	DEC21140	3-COM Etherlink
Video Card	ATI Xclaim	S3 Trio64V	S3 Trio64V	ATI Xclaim
SCSI HDD	1G Spitfire	540M	540M	1G Spitfire
CD ROM	IDE	IDE	SCSI	IDE
Floppy Drive	1.44 Sony	1.44Mitsubishi	1.44 Sony	1.44 Mitsubishi
Keyboard/Mouse	IBM	Apple	Apple	IBM
MACROM	Yes	Yes	Yes	Yes

5.1.2 Required MCE tests for Apple Certification

The following MCE (Macintosh Compatibility Environment) tests are required to pass for Apple certification:

Compatibility Test	Required?	Notes and considerations
Manual Tests	Y	Standard Compression
Automated tests:		
- Network	Y	8 sub-tests
- Quicktime	Y	12 Sub-tests
- Toolbox	Y	5-Subtests

5.2 Application Compatibility Testing

The following applications will be installed and have all key functions verified on the Long Trail platform. CSSP procedures on most of these applications are in place.

Vendor	Application	Version
Claris	Claris Works	4.0
Claris	Claris Draw	1.0
Norton	Norton Utilities	3.2
Claris	Claris Organizer	1.0
Claris	Claris Filemaker	3.0
Claris	Claris Em@iler	1.0
Claris	Claris Impact	2.0
Adobe	Illustrator	6.0
Adobe	Photoshop	1.0
Adobe	Pagemaker	6.0
Adobe	Premiere	4.2
Microsoft	Office	4.21
	--Word	6.01
	--Excel	5.0
	--Access	4.0
ID Software	Doom	2.0
Adobe	Pagemill	1.0
	Quicken	1.0
	RAM Doubler	1.0
	Speed Doubler	1.0
Apple	Personal Diagnostics	
Extensis	Drawtools	1.01
GSI	FA-18 Hornet Demo	2.0

6. Hardware Compatibility Testing

6.1 Adapter Testing

Adapter Compatibility Testing utilizes adapters in Operating Systems tests, diagnostic tests, benchmarks, and further verifies the adapters through the variety of configurations available for each adapter (i.e. interrupts, DMA channels, etc.). Out of adapter testing comes a list of adapters tested compatible with the system.

6.1.1 Video Adapter Testing

PCI video adapters will be utilized for the system during operating system installation and normal usage. A list of adapters to be tested is provided below:

Vendor	Adapter	Bus
ATI	Xclaim VR	PCI
ATI	Xclaim GA	PCI
Matrox	MGA Millenium 3D	PCI
Number-9		PCI
Apple	3D Accelerator	PCI
LeadTek		PCI

This list is dependent on proper open firmware support on the video cards themselves, or
Firmworks “Super driver” support.

6.1.2 Disk Drive Compatibility Testing

The following IDE hard files and CD ROMs will be verified with the Long Trail system. The primary focus will be on IDE once MacOS fully supports IDE functionality.

Vendor Number	Size	Type
Quantum Sirocco	1GB	IDE HDD
Quantum Fireball	1.28G	IDE HDD
Quantum Fireball	2-4G	IDE HDD
Quantum Fireball	>4G	IDE HDD
Seagate Medalist	1-2G	IDE HDD
Seagate Medalist	2-4G	IDE HDD
Seagate Medalist	>4G	IDE HDD
IBM	>4G	IDE HDD
Western Digital	1.6G	IDE HDD
Creative Blaster	8X	IDE CD-ROM
Matsushita (Panasonic)	12X	IDE CD-ROM
Toshiba ATAPI	12X	IDE CD-ROM

The following SCSI hard drives will be verified with Mesh SCSI, and a subset will be tested with the PCI adapters.

Vendor Number	Size	Type
Seagate Barracuda	1.6G	SCSI HDD
Quantum Prodrive	700M	SCSI HDD
IBM DPES-31080	1G	SCSI HDD
Apple CD 600I	6X	SCSI CD ROM

Disk tests to be performed (Hard Drives):

Disk Format
Disk Partitioning
Disk Mount
Disk Copy Testing:
- Diskette to Disk
- CD ROM to Disk
- Disk to disk (Both SCSI & IDE)
- Network to Disk
- ZIP drive to disk

Install MacOS to disk and boot
MacBench Disk benchmarks

6.1.3 Disk Interface Adapter Testing

Both the on-board IDE and PCI SCSI disk interface adapters will be utilized for hard disk and CD-ROM interfaces to the system during operating system installation and normal usage. A list of adapters to be tested for the ISA and PCI bus will be included in the detailed test plan, but may include: These adapters will be stressed by the Windows/NT HCT's as well as with application testing with multiple drives. Each configuration will be verified by adding at least one additional Hard drive and using the system administrator to initialize and format the drives.

Vendor	Adapter	Bus
FWB	JackHammer	PCI SCSI
Adaptec	AHA2940	PCI SCSI

6.1.4 Network Adapters

Ethernet and Token Ring Adapters will be utilized in the Operating System compatibility testing. Token Ring will be utilized under BUD. Ethernet will be utilized in the Windows NT application testing. Each card will be stressed by the transfer of large files from another system.

Adapter type & BUS	Manufacturer	BUS	OS to be tested
Apple Token Ring	Apple	PCI	MacOS
Asante 10/100 Ethernet	Asante	PCI	MacOS
Blue Streak 10/100 E/N	DynaPort	PCI	MacOS
FastEther 10/100 TX	Farallon	PCI	MacOS

6.2 Peripheral Testing

Keyboards and mice will be tested with diagnostics and through their usage in operating system tests to verify compatibility of these peripherals with the system. Both IBM Compatible and Apple compatible versions will be tested - limited by the Operating System support available.

Kbd. / Mouse	Vendor	Adapter
Keyboard	Interex Products	105A (ADB)
Keyboard	IBM	101
Keyboard	Various	IBM PS/2 Compatible 101
Mouse	Interex Products	100A (ADB)
Mouse	IBM	
Mouse	Various	IBM PS/2 Compatible

6.3 External Peripherals

In addition to the external SCSI devices, the following external devices will be verified with Long Trail:

Removable Storage
- IOMEGA Jazz drive (80M)
- Zip Drive (SCSI)

Digital Video Disk
- Pioneer (If hardware is available)
- Mitsubishi MF355F-3792ME

Scanners

UMAX Vista S6E

Tape Drives (SCSI)

APS ProDAT

Modems (Apple Talk ports)
- US Robotics 33.6Kbs
- Motorola 33.6Kbs

Printers
- Apple Laserwriter 12-600 PS
- Apple Color printer M9500

Ethernet
- 10 & 100Mb HUBs for LAN communication
- Apple Laserwriter 12-600 PS

6.4 Memory Testing

The system will be tested with most representative possible memory configurations and a variety of DIMM types and sizes will be utilized to ensure that their is no sensitivity to types/makes of memory. See the BUD and Windows/NT configurations for a sample of some of the tested configurations. Since the 2S2P version of pass-2 will not support Parity There is risk inherent here. Testing will be limited to EDO and Synchronus DIMMs.

Memory DIMM Size	Firmworks	System/7.6
8M EDO		
16M EDO		
32M EDO		
64M EDO		
128M EDO		
8M Sync.		
16M Sync.		
32M Sync.		
64M Sync.		
128M Sync.		
256M Sync.		

Longtrail allows three slots for EDO and two slots for synchronous DRAM. The matrix below shows the basic compatibility testing for Long Trail memory. Each configuration will be verified for proper detection by Firmworks and a brief regression with MacOS.

Configuration	DIMM slot 1	DIMM slot 2	DIMM slot 3
1	8M EDO	8M EDO	
2	16M EDO		
3	32M EDO		
4	64M EDO		
5	128M EDO		
6	8M Sync.	8M Sync.	
7	16M Sync.		
8	32M Sync.		
9	64M Sync.		
10	128M Sync		
11	256M sync.		
12	32M EDO	16M EDO	32M EDO
13	8M EDO		64M EDO
14	64M EDO	64M EDO	64M EDO
15		8M EDO	16M EDO
16	32M EDO	32M EDO	32M EDO
17		32M Sync.	
18	64M Sync.	64M Sync.	
19	16M Sync.	32M Sync.	
20	64M Sync.	8M Sync.	
21	128M Sync.	256M Sync.	
22	8M Sync.	256M Sync.	

6.5 AUDIO Sub-System Verification:

The Long Trail on-board audio subsystem requires extensive verification. This testing must be done in the final system chassis including all EMC hardware and engineering changes! The audio driver for this testing should be the Windows/NT operating system. This will allow system activity (SCSI, mouse, IDE, etc.) to be going on during the audio signal verification.

6.5.1 Audio Features and I/O.

Audio Features
- Sampling rate to 48Khz.
- Simultaneous record and playback (8 or 16 bit stereo)
- Soundblaster Pro compatibility
- Feature connector for Waveblaster compatible expansion modules.
- Feature connector for Philips 3-D sound processor module.

Audio Subsystem Inputs
- Stereo line input (mini-din)
- Stereo microphone input (Mini-din)
- Stereo auxiliary input (CD ROM Input - 4 pin header).

Audio Subsystem outputs
- Stereo line output (mini-din)
- Stereo headphone output (mini-din).
- Mono speaker output.

Input/Output connectors
- MIDI interface
- Fax/Modem auxiliary connector

6.5.2 Audio required testing

Using Windows/NT audio drivers, the audio sub-system will be verified with the "Audio Precision" test set-up. Each input and output must be verified to be within the system specified requirements for the following parameters:

Frequency Response
Signal to noise ratio
Background noise (FFT) with heavy system activity.

This testing should be ideally done with the system stress HCT running simultaneously. It is imperative that the actual "ship level" box be used for this testing, as results are very box dependent. Each mini-din output should also be able to accept a long term "short" without damage or over heating in the audio section. It is anticipated that this test effort will be performed jointly with the CSSP engineering audio design team.

6.5.3 Multimedia Adapters

The on-board audio provides for feature cards which will be verified as follows: :

Function	Vendor	Adapter
Wave Table	Yamaha	DB50XG
Wave Table	Creative	Waveblaster
3D Sound	Phillips	ISH 9022-588-00001

These cards will be verified with both Windows/NT and Mac/OS provided drivers are available.

6.6 Power supply DC to DC VRM cards

When 604e, 604ev, and 603ev processor cards are used, the Long Trail-2 board requires a power supply card to generate the required 2.5V supply. There are currently several vendors making these cards – the following will be verified:

Vendor	Vendor Number
Semtech	MP60-2.9PA Rev-01

Verification of these cards will be done jointly with development and will include the following tests:

Ripple Noise Measurements
High Frequency Noise (Measured at processor pins)
Maximum specified load verification
Efficiency (Power out / power in)

6.7 Power Management

Long Trail supports two levels of power management. These are hibernate mode and suspend. Software support MUST be provided to facilitate the testing of these two functions. The key measurements to be taken are:

6.7.1 System power (Limited to 5V and 3.3V supplies)

Ability to Wake-up system
- Keyboard/Mouse Interrupts
- Modem
- LAN

The software functions should take advantage of all possible sub-systems that support power management. These typically include (Super I/O, Audio, LAN functions, processor, etc.).

7. Classical Test

7.1 Signal Quality Analysis

Measurements of the rise time, fall time, overshoot, undershoot, and other quality parameters of the critical signals of the system will be examined and documented.

These measurements are to be taken by the design team and to be reviewed by the test team. Appendix B provides a partial list of critical signals to be measured as part of signal quality analysis. For each signal the key parameters should be recorded as well as scope pictures for each signal or representative signal for bus's (i.e.: data bus).

7.2 Signal Timing Analysis

Measurements of the critical timings on the various buses in the system will be measured and documented. These signals are listed in Appendix B.

These measurements are to be taken by the design team and to be reviewed by the test team. Additional measurements and verification may be performed by the test team.

7.3 Temperature/Voltage Guardband

The system will be put through temperature and voltage stress in an environmental chamber to give a gross measure of system stability. The temperatures to be tested will be 0C, 25C, 50C and the 3.3V will be varied from 2.9 to 4.0 V. The voltage regulation circuit on the board will also be varied to account for tolerances over the lifetime of the board/power supply. In addition the +/-5V and +/-12 volt supplies will be varied by 10%.

7.4 Thermal Analysis

The system will be thermocoupled on critical system components and run through several operating conditions at nominal. The thermocouple data will be collected and analyzed (extrapolated to the Class B environmental limit) to ensure that all components are within their specifications.

7.5 EMC Analysis

EMC testing is planned for Long Trail. Data will be collected to show passing results to the Class-A criteria. FCC filing is not currently planned.

7.6 Safety Analysis

UL Safety verification is planned for Long Trail.

8. Summary

The Long Trail ET and EVT test plan includes both extensive functional testing with BUD and both Windows/NT and Apple System/7.5 as well as classical environmental testing. Completion of this testing should ensure that the Long Trail design is solid and ready to enter the final stage of testing before manufacturing (DVT).

A final test report will be provided documenting the test results, key test data, and the summary of Engineering Test exit criteria. In addition, records of the signal quality data including scope pictures will be available for review.

9. Appendix A: BUD Record Sheet

Board Number: _____ Tester: _____

Configuration:

L2 Cache: _____ Date: _____

DIMM-1: _____

DIMM-2: _____ BUD Level: _____

DIMM-3: _____

Processor Type: _____ DD: _____ OF Level: _____
Speed: _____/_____/_____

PCI Slot-1 _____
PCI Slot-2:_____
PCI Slot-3:_____
Shared Slot:_____
ISA Slot 1:_____

Check tests run, note any fails. Interrupting test duration
_____

BUD Test	Interrupting test	Stand-alone test	Notes and fail information
Serial-2			
Memory			
Mesh SCSI			
SCC			
Video			
Parallel			
Keyboard			
Mouse			
Audio			
ISA Master T/R			
SCSI (NCR PCI)			
IDE			
L2 Cache			
Real Time Clock			
Floppy			
AMD Ethernet			

10. Appendix B: Signal Quality & Timing

10.1 Signal Quality Measurements: (To Be provided by development)

10.1.1 Clock Signals

CLOCK	LOCATION	Rise/Fall TIME	JITTER	SKEW	MIN. CYCLE
CPU B CLK					
GG1 B CLK					
GG2 B CLK					
L2 B CLK 0					
L2 B CLK 1					
SIO PCI CLK					
Slot-1 PCI CLK					
Slot-2 PCI CLK					
Slot-3 PCI CLK					
Slot-4 PCI CLK					
ISA CLOCK 1					
ISA CLOCK 5					
SuperIO_24M					
Audio 14.318					
SDRAM 0:7					
GGA PCI CLK					
Hydra CLK					

10.1.2 Key Signals (PCI BUS)

Signal Name	Rise	Fall	Overshoot	Undershoot	Notes (Photo #)
-PCI_FRAME					
-PCI_IRDY					
-PCI_TRDY					
-PCI_DEVSEL					
-PCI_STOP					
-PCI_C/BE_0					
-PCI_C/BE_1					
-PCI_C/BE_2					
-PCI_C/BE_3					
AD0:31-Addr					
AD1:31-Data					
PCI IRQW					
PCI IRQX					
PCI IRQY					
PCI IRQZ					

10.1.3 Key Signals (ISA BUS)

Signal Name	Rise	Fall	Overshoot	Undershoot	Notes (Photo #)
-ISA_IOR					
-ISA_IOW					
-ISA_BALE					
-ISA_RESET					
-ISA_Iochrdy					
-ISA_MEMR					
-ISA_MEMW					
-ISA_SMEMR					
-ISA_SMEMW					
SA0:19					
LA17:23					
-MCE0:7					
-MRE0:3					
-MWE0:1					
MA0:63					
MDP1:7					
MD0:63					
-ISA_MASTER					
-ISA_TC					
-ISA_Refresh					
-ISA_SBHE					
-ISA_IOCS16					
SD0:15					
ISA_DRQ0:7					
-ISA_DACK0:7					
IRQ3					
IRQ4					
IRQ5					
IRQ6					
IRQ7					
IRQ8					
IRQ9					
IRQ10					
IRQ11					
IRQ12					
IRQ13					
IRQ14					
IRQ15					
IRQ2					

10.1.4 Key Signals (Memory)

Signal Name	Rise	Fall	Overshoot	Undershoot	Notes (Photo #)
MD 0:63					
MA 0:10					
CAS 0:7					
I2C DATA					
I2C CLOCK					
RAS 0:5					
MemWE 0:2					
MA 11/BA0					
MA 12/BA1					
MA 13/MA 11					

10.1.5 Key Signals (General System)

Signal Name	Rise	Fall	Overshoot	Undershoot	Notes (Photo #)
-ROM_OE					
-ROM_WE					
-KYBD_CS					
-RTC_RD					
-RTC_WR					
-XIOR					
-XIOW					
XD0:7					
-PCI_GNT0					
-PCI_GNT1					
-PCI_GNT2					
-CPU_GNT					
-CPU_REQ					
PCI_PAR					
-FLUSH_REQ					
-KYBD_CLK					
-MOUSE_CLK					
-KYBD_DATA					
-Mouse_DATA					
-BURST_CAP					
-Macrom_WE					
-Macrom_CS					
MacAddr 9:28					

10.1.6 CPU Local Bus

Signal Name	Rise	Fall	Overshoot	Undershoot	Notes (Photo #)
D0:D63					
DP0:DP7					
ADDR 0:31					
TS					
TA					
AACK					
ARTRY					
DRTRY					
INT					
REQ					
GNT					
DBG					
DBB					
ABB					
TEA					
XATS					
TT 0:3					
SHARED					
GLOBAL					
T SIZ 0:2					
TBST					
MCB					
HRESET					
SRESET					
TAG 0:9					
CDOE					
CA4/TSC					
CA3/BAA					
CDWE					
TWE					

10.1.7 APPLE I/O SIGNALS

Signal Name	Rise	Fall	Overshoot	Undershoot	Notes (Photo #)
SCSI DB 0:8					
SCSI_REQ					
SCSI_CXD					
SCSI_SEL					
SCSI_MSG					
SCSI_RST					
SCSI_BSY					
SCSI_ATN					
SCSI_IXO					
SCSI_FACK					
SCSI_ACK					
ADB_I/O					
ADB_RESET					
RTSA					
RTSB					
RXDA					
RXDB					
TXDA					
TXDB					
CTSA					
CTSB					
DTRA					
DTRB					

10.1.8 I/O SIGNALS

Signal Name	Rise	Fall	Overshoot	Undershoot	Notes (Photo #)
IDEA 0:2					
IDE_DRQS					
IDE_DRQP					
IDE_Data 0:15					
IDEIORS					
IDEIORP					
IDEIOWS					
IDEIOWP					
IDE_INTS					
IDE_INTP					
IDEDACKS					
IDEDACKP					
IDEIORDY					
FLOPPY SIGS					
WDATA_					
WGATE_					
HDSEL					
STEP_					
MTR0_					
DR0					
DR1					
DENSEL					
RDATA_					
TRK0					
INDEX					
WP_					
SIN1:2					
SOUT1:2					
RTS1:2					
DTR1:2					
CTS1:2					
DSR1:2					
DCD1:2					
RI1:2					
Parallel D0:7					
SLIN_					
P_STB					
P_AFD					
INIT					
BUSY					
PE					
SLCT					
P_ACK					