R440LX Environmental Test Report Summary
Print/File/Multi-Purpose Server

intel®

Revision 2.5
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Revision History

Revision	Revision History	Date
1.0	Original draft	10/97
2.0	Reformatted for posting on web	12/97
2.5	Grammar changes	2/98

INTRODUCTION

The Intel Environmental Standards Handbook Board describes the test procedures used for all Intel server products. The purpose of this handbook is to document the environmental and reliability test profiles for board and system product. These standards are to insure the board level product is capable of withstanding the rigors of shipping, handling and the varied environmental conditions, which may occur during normal operation. This document lists, for each test, the procedures or conditions that are specific to the R440LX DP Server product in the Columbus-II chassis.

Temperature & Voltage (Four Corners)

The temperature & voltage test ensures the boards work under the designated and validated Operating systems and test software for at least six (6) hours at each corner of the specification. The +5V, +12Vand +3.3V to the R440LX server baseboards are adjusted to ±6%.
The testing was performed according to the profiles listed below. No failures occurred.

SETUP #	BASEBOARD	P/N	S/N	MEMORY	OS	CPU SPEED
1	R440LX DP	674688-020	INRD73300153	32MB	WINDOWS NT 4.0	266MHz
2	R440LX DP	674688-020	INRD73300151	32MB	WINDOWS NT 4.0	266MHz
3	R440LX DP	674688-020	INRD73300130	32MB	WINDOWS NT 4.0	266MHz

Voltage/Temperature Profile:
- Voltage +/-5% at -0°C for minimum of 12 hours
- Voltage +/-5% at 55°C for minimum of 12 hours

Extended Temperature and Voltage Operating Test:

The R440LX DP Server baseboard set is tested in the oven over a range of different temperatures and voltages. Ambient temperature varies from -30°C to +90°C in increments of 10°C. The voltage to the baseboards range from -10% to +10% of the specified value in increments of 2.5%. The voltages are varied for the standard +3.3V, +5V and +12V inputs. Strife test ensures the baseboards operate for at least one (1) hour at each temperature/voltage point. Only designated and validated operating systems and test software are utilized to exercise the boards. A fixture (or the system chassis) is used to avoid failures caused by unwanted movement of the modules. There were no failures.

SETUP #	BASEBOARD	P/N	S/N	MEMORY	OS	CPU SPEED
1	R440LX DP	674688-020	INRD73300153	32MB	WINDOWS NT 4.0	266MHz
2	R440LX DP	674688-020	INRD73300151	32MB	WINDOWS NT 4.0	266MHz
3	R440LX DP	674688-020	INRD73300130	32MB	WINDOWS NT 4.0	266MHz

Strife Profile:
- Voltage: nominal, +/- 2.5%, +/- 5%, +/-7.5%, +/-10%

- Temperature -30C to 80C at 10 degree intervals. Dwell time = 1 hour.

System #1
Redwood 2.0 266mhz
NT 4.0/HPIE

Temp	-10%	-7.5%	-5%	-2.5%	Nom.	2.5%	5%	7.5%	10%
80	P	P	P	P	P	P	P	P	P
75	P	P	P	P	P	P	P	P	P
70	P	P	P	P	P	P	P	P	P
65	P	P	P	P	P	P	P	P	P
60	P	P	P	P	P	P	P	P	P
55	P	P	P	P	P	P	P	P	P
50	P	P	P	P	P	P	P	P	P
45	P	P	P	P	P	P	P	P	P
40	P	P	P	P	P	P	P	P	P
35	P	P	P	P	P	P	P	P	P
30	P	P	P	P	P	P	P	P	P
25	P	P	P	P	P	P	P	P	P
20	P	P	P	P	P	P	P	P	P
15	P	P	P	P	P	P	P	P	P
10	P	P	P	P	P	P	P	P	P
5	P	P	P	P	P	P	P	P	P
0	P	P	P	P	P	P	P	P	P
-5	P	P	P	P	P	P	P	P	P
-10	P	P	P	P	P	P	P	P	P
-15	P	P	P	P	P	P	P	P	P
-20	P	P	P	P	P	P	P	P	P
-25	P	P	P	P	P	P	P	P	P
-30	P	P	P	P	P	P	P	Q	Q

System #2
Redwood 2.0 266mhz
NT 4.0/HPIE

Temp	-10%	-7.5%	-5%	-2.5%	Nom.	2.5%	5%	7.5%	10%
80	P	P	P	P	P	P	P	P	P
75	P	P	P	P	P	P	P	P	P
70	P	P	P	P	P	P	P	P	P
65	P	P	P	P	P	P	P	P	P
60	P	P	P	P	P	P	P	P	P
55	P	P	P	P	P	P	P	P	P
50	P	P	P	P	P	P	P	P	P
45	P	P	P	P	P	P	P	P	P
40	P	P	P	P	P	P	P	P	P
35	P	P	P	P	P	P	P	P	P
30	P	P	P	P	P	P	P	P	P
25	P	P	P	P	P	P	P	P	P
20	P	P	P	P	P	P	P	P	P
15	P	P	P	P	P	P	P	P	P
10	P	P	P	P	P	P	P	P	P
5	P	P	P	P	P	P	P	P	P
0	P	P	P	P	P	P	P	P	P
-5	P	P	P	P	P	P	P	P	P
-10	P	P	P	P	P	P	P	P	P
-15	P	P	P	P	P	P	P	P	P
-20	P	P	P	P	P	P	P	P	P
-25	P	P	P	P	P	P	P	P	P
-30	P	P	P	P	P	P	P	Q	Q

System #3
Redwood 2.0 266mhz
NT 4.0/HPIE

Temp	-10%	-7.5%	-5%	-2.5%	Nom.	2.5%	5%	7.5%	10%
80	P	P	P	P	P	P	P	P	P
75	P	P	P	P	P	P	P	P	P
70	P	P	P	P	P	P	P	P	P
65	P	P	P	P	P	P	P	P	P
60	P	P	P	P	P	P	P	P	P
55	P	P	P	P	P	P	P	P	P
50	P	P	P	P	P	P	P	P	P
45	P	P	P	P	P	P	P	P	P
40	P	P	P	P	P	P	P	P	P
35	P	P	P	P	P	P	P	P	P
30	P	P	P	P	P	P	P	P	P
25	P	P	P	P	P	P	P	P	P
20	P	P	P	P	P	P	P	P	P
15	P	P	P	P	P	P	P	P	P
10	P	P	P	P	P	P	P	P	P
5	P	P	P	P	P	P	P	P	P
0	P	P	P	P	P	P	P	P	P
-5	P	P	P	P	P	P	P	P	P
-10	P	P	P	P	P	P	P	P	P
-15	P	P	P	P	P	P	P	P	P
-20	P	P	P	P	P	P	P	P	P
-25	P	P	P	P	P	P	P	P	P
-30	P	P	P	P	P	P	P	Q	Q

Q	Qualifed Pass. Error not repeated. System non-operational one time.
(teal)	Product specification area
F	Failures

Thermal Shock and Stress

This test is used to demonstrate the R440LX server baseboard can withstand the temperature extremes of a non-operating or storage environment. Rapid temperature cycling is performed as an accelerated stress test. The baseboards and processor modules are tested again under nominal temperatures with the R440LX diagnostic tool. This is used to determine if there are any failures or functional damage.

SETUP #	BASEBOARD	P/N	S/N	MEMORY	OS	CPU SPEED
1	R440LX DP	674688-020	INRD73300153	32MB	WINDOWS NT 4.0	266MHz
2	R440LX DP	674688-020	INRD73300151	32MB	WINDOWS NT 4.0	266MHz
3	R440LX DP	674688-020	INRD73300130	32MB	WINDOWS NT 4.0	266MHz

Testing was performed with Pentiumâ II processors on baseboards.

Thermal Shock Profile:

- Temperature limits: -40°C and +70°C (non-operating)
- Thermal stress: 50 cycles per minute between limits of 15°C and 30°C
- Temperature non-operating: 25 hours at each limit (50 cycles at one-half hour intervals)

Power Cycling

Two profiles are used to ensure the R440LX server baseboard starts up reliably at all temperatures (within the product specifications). One profile utilized is thermal stepping. During baseboard thermal stepping, the baseboard is power cycled in the oven for at least 100 times at different temperatures. The baseboard must boot DOS and log the information onto the hard disk drive. The temperature ranges used are from -10°C to +60°C in 10°C increments. The second profile utilized is a thermal ramping test. The thermal ramping test performs operational ramping from -10°C to +60°C while power cycling with at least 100 power cycles during the thermal ramp and at each temperature extremes. The power cycling test is conducted at different temperature ranges. The table below shows the percentage failure at those temperatures.

SETUP #	BASEBOARD	P/N	S/N	MEMORY	OS	CPU SPEED
1	R440LX DP	674688-020	INRD73300153	32MB	DOS/CycleLog 1.0a	266MHz
2	R440LX DP	674688-020	INRD73300151	32MB	DOS/CycleLog 1.0a	266MHz
3	R440LX DP	674688-020	INRD73300130	32MB	DOS/CycleLog 1.0a	266MHz

Parameters:
- Temperature ramping/power cycling was performed by changing temperature (rapidly) between -10°C to +60°C in 10°C degree steps with 30 minute dwells at those extremes
- Temperature ramping/power cycling was performed by ramping temperature (rapidly) between -10°C to +60°C in 25°C degree steps with 30 minute dwells at those extremes
- Running test 1 hour at each temperature level; 5 minute ramps
- There were 100 power cycles per temperature point

TEMP°C	FAILURE % UNIT 1	FAILURE % UNIT 2
-10	0%	0%
0	0%	0%
10	0%	0%
20	0%	0%
25	0%	0%
30	0%	0%
40	0%	0%
50	0%	0%
60	0%	0%