ASUS IPC Motherboard LMB75A Cut2

Reliability & Environment Test Report

Project Start: 04, 09, 2012
Project End: 04, 23, 2012

Project Leader: Nick Liao

Rev. 1.1

05, 14, 2012

No.	Date	Description	Page	Revision
1	05,07,2012	First Release	42	1.0
2	05,14,2012	Modify Erp test result and bug.	19, 41	1.1
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Released on	**05,14, 2012**
Sampling quantity	**10 Mother Boards**
Test Phase	**Cut 2**
Product	**LMB75A**
BIOS Ver.	**0201**
Testing engineers	**Mr. Nick Liao** **Mr. Bruce Chen**
Reviewed by	**Mr. Tony Yang**
Approved by	**Mr. Tommy Chen**

ASUS Motherboard Test Configuration

No.	CPU	DIMM	VGA	HDD	PSU	Chassis	Heatsink
1	Intel CPU-1155-QC8J-3.4G-IVY BRIDGE100-3M/EM64T	Micron DDR3 1333 1GB*2	Integrated Gfx in North bridge	Hitachi HDT72252DLA 300 250G	PENTAGRAM P 9103-2 500W	ASUS	Intel E94334-001
2	Intel CPU-1155-QC8J-3.4G- IVY BRIDGE100-3M/EM64T	OCZ DDR3 1600 2GB*2	Integrated Gfx in North bridge	Seagate ST3250820AS 250G	PENTAGRAM P 9103-2 500W	N/A	Intel E94334-001
3	Intel CPU-1155-QC8J-3.4G-IVY BRIDGE100-3M/EM64T	Samsung DDR3 1333 1GB*2	Integrated Gfx in North bridge	Seagate ST3250820AS 250G	PENTAGRAM P 9103-2 500W	N/A	Intel E94334-001
4	Intel CPU-1155-QC8J-3.4G-IVY BRIDGE100-3M/EM64T	Samsung DDR3 1333 1GB*2	Integrated Gfx in North bridge	Hitachi HDT72252DLA 300 250G	PENTAGRAM P 9103-2 500W	ASUS	Intel E94334-001
5	Intel CPU-1155-Q1HK-3.4G-Sandy Bridge100-8M/EM64T	Samsung DDR3 1333 1GB*2	Integrated Gfx in North bridge	Seagate ST3250820AS 250G	LITEON PS-6301-2 300W	N/A	Intel E94334-001

ASUS Motherboard Test Items

No.	Test Item	Qty	Test Day	Test System				
				No.1	No. 2	No.3	No.4	No.5
1	Thermal Measurement	1	1	V				
2	Temperature and DC Margin	1	1		V			
3	Power on/off Test	2	4		V	V		
4	Temperature/ Humidity Test	1	3	V				
5	Power Consumption Test	1	1			V		
6	Non-Operation Vibration Test	1	1				V	
7	Non-Operation Shock Test	1	1					V
8	Hardware Monitor Test	1	1	V				
9	Burn In Test	1	3				V	
10	Installation Test	5	1	V	V	V	V	V
11	Thermal Shock Test	1	2			V		
12	Drop Test	10	1	Use 1 bulk package				

Remark: The sample No.3 do thermal shock test, No.4 do Vibration test, No.5 do Shock test independently.

RELIABILITY & ENVIRONMENT TEST

1. Thermal Measurement

1.1 Objective

The purpose of performing thermal profile test is to identify potential thermal problem of products. And it is to aid products in reliability assessment considering that semiconductor failure rates rise rapidly with increasing junction temperature. In case of product cooling, to make sure well solution to fulfill worst case processor, chipset thermal requirement.

1.2 Testing Procedure

1. Using black paint to paint the M/B surface, then use hairdryer blow 30 mins, check if the paint is dry, the power on the M/B, check the M/B function.
2. Put the system in 25^{o}C condition, run test program 30 mins, then use IR camera to take the M/B overall, NB, SB, and VRM thermal image
3. Base on the Thermal Image, select the test points and attaches thermocouples to the desired test points.
4. Put the product in a reference bare bone under normal condition (25^{o}C), turn the system on to run test program and turn on the thermal meter to measure the actual temperature of the test points.
5. After two hours, check the product function and print out thermal profile data.
6. Turn off the power of all equipment.
7. Put the same product (within chassis) into the chamber, turn on the temperature chamber, set the temperature to 35^{o}C
8. Turn the product on to run test programs and turn on the thermal recorder to measure the actual temperature of the test points.
9. After two hours, check the product function and print out thermal profile data.
10. Turn off the power of all equipment.

1.3 Testing Equipment

1. YOKOGAWA HR1300 HYBRID RECORDER
2. Thermotron SM-32CTest Chamber Tester Chamber
3. K Type Thermocouple
4. OMEGA Smallest Thermocouple Connector

1.4 Testing Software

ASUS QC Test program under Windows 7 32bit Operation System
CPU Stress test program under Windows 7 32bit Operation System
3Dmark 2003 V3.4 for X-series M/B
3Dmark 2005 rev. 1.2.0 testing program
3Dmark 2006 rev. 1.1.0 testing program

1.5 Testing Location

ASUSTeK Reliability & Environment Lab

1.6 Testing Specifications

The measurement is base on AC 110 V voltage
The system is operated under the designated ambient temperature (typically 35 ^{o}C) for a period of two hours at least.
Chamber condition: (Thermal measurement)
Temperature: 35 ^{o}C
Relative humidity: 50%

1.7 Testing Points

1. Those points to be selected for measurement should include
   a. High power dissipating components
   b. The component which MTBF affected
   c. The component which specification is close to system specification
   d. According pre-scan measurement choose high power dissipating component.
   e. Linear regulators or switch regulators power MOSFET need to be measured at North Bridge, South Bridge and DDR memory.
2. 1 cm above highest power dissipating components as in chassis internal ambient temperature.

1.8 Testing Criteria

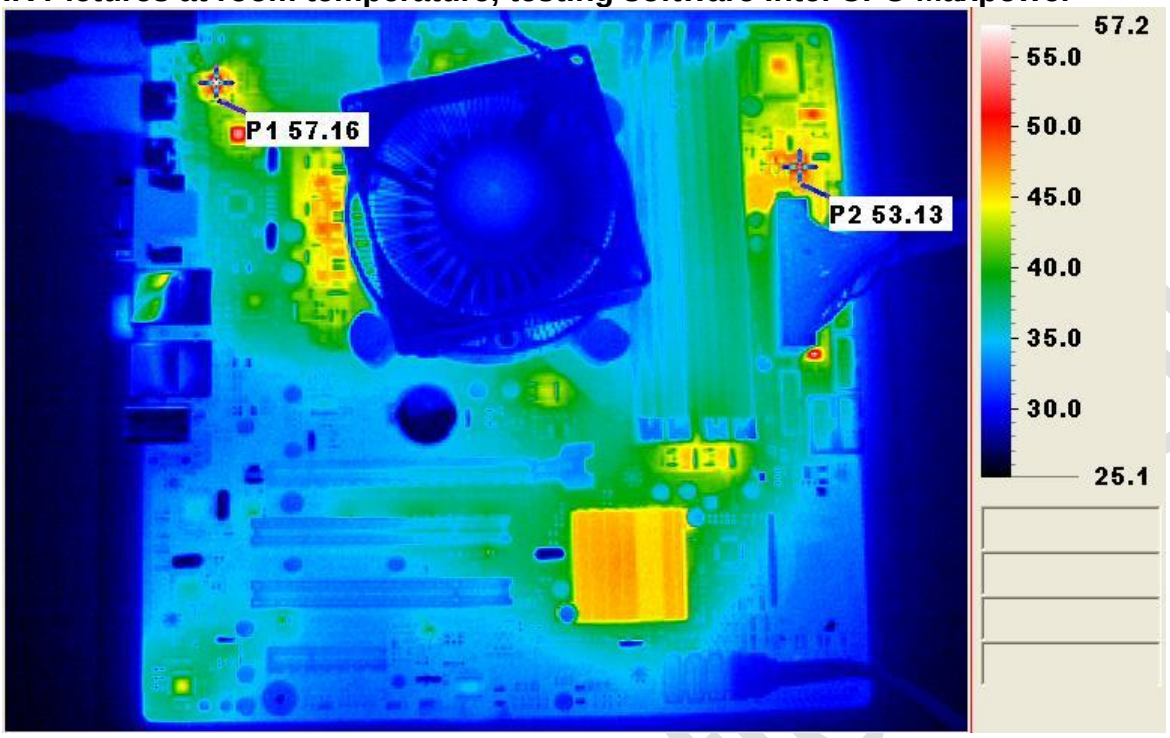
1. A minimum of 1 motherboard must be test.
2. There must be no function error.
3. No any selected component temperature is higher than the max. specified components specification.
4. The test result of all the selected point should meet specified components thermal specification.
5. If without anything special requirement the operation power is fixed on AC 115V.
6. Minimum testing in chassis product configuration: M.B. highest speed CPU, Add on card, SPS HDD, FDD, max. RAM memory.

1.9 Testing Result

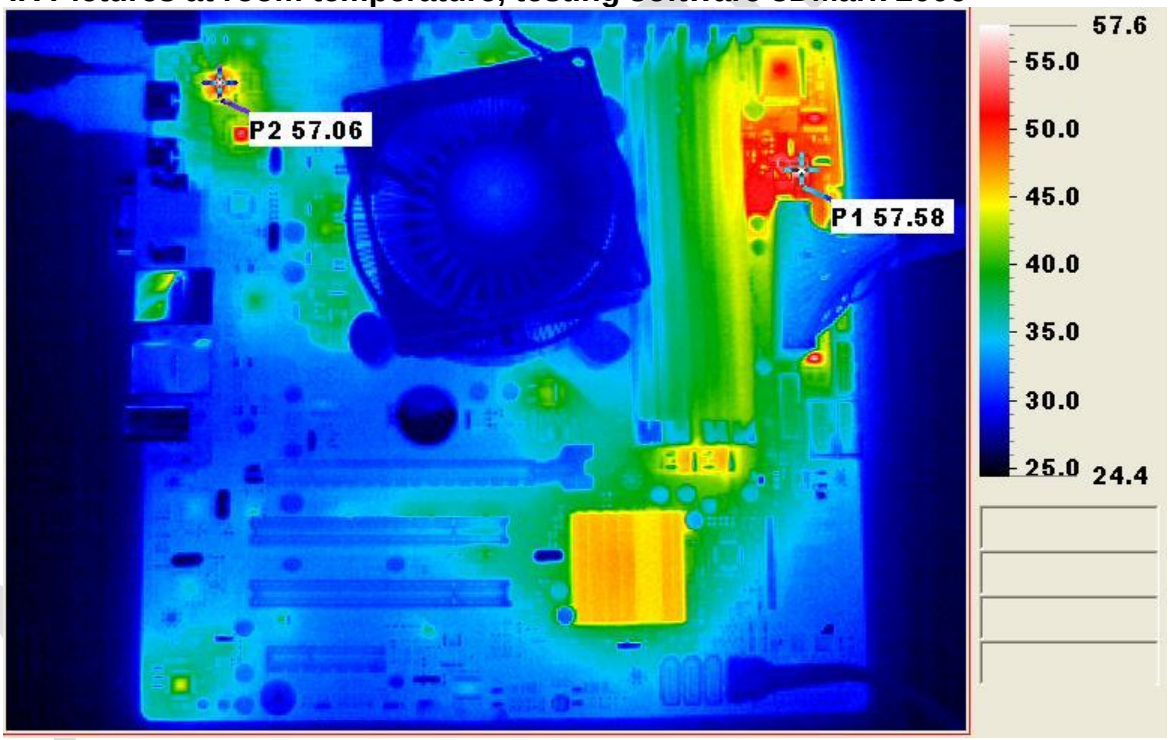
CPU Type: Intel® Ivy Bridge CPU 3.4 GHz
Heatsink: Intel CPU FAN E41747_001_0014
PCB Rev: 1.01
BIOS: 201
Intel PSC Maxpower rev.1.4.2 100 % & 3DMark06 rev.110 in 35°C Chamber Condition

Channel No.	*Step Channel*	*Location*	*Specification*	*Measured data*		*Result*
				Maxpower	*3DMark06*	
CH1 (TP1)	Intel E153A600 SLJ85		104	54.2	55.9	PASS
CH2 (TP2)	NIKOS P0903BDL	PQ34	105	54.6	62.7	PASS
CH3 (TP3)	NIKOS P0903BDL	PQ20	105	54.6	56.3	PASS
CH4 (TP4)	RT8120	PU13	Tj=150	59.9	65.6	PASS
CH5 (TP5)	ADM 213		Ta=85	57.5	62.3	PASS
CH6 (TP6)	ITE IT8783F		Ta=85	54.1	58.5	PASS
CH7 (TP7)	232GE		Tj=150	62.2	64.5	PASS
CH8 (TP8)	RT9025		Tj=125	44.4	43.5	PASS
CH9 (TP9)	1R2		105	43.0	42.1	PASS
CH10 (TP10)	CPU Fan Inlet	--	--	40.0	39.4	PASS
CH11 (TP11)	Chamber	--	--	35.4	35.2	PASS
CH12 (TP12)	Intel® Ivy Bridge CPU 3.4 GHz	Socket 1155	TCC Target Temperature: 105	68	63	PASS

IR Pictures at room temperature, testing software Intel CPU Maxpower



IR Pictures at room temperature, testing software 3DMark 2006



2. Temperature and DC Margin Test

2.1 Objective

The purpose of the temperature & DC margin test is to prove the impact of product stability, which the specification of supply voltage's vibrating ranges in difference temperature condition; it is help to confirm the product design stability.

2.2 Testing Procedure

1. Put the product into temperature chamber
2. Connect DC power supply to an appropriate AC power source. Set the proper output voltage in power supply then turn it off.
3. Turn the power supplies on and set supply voltages as specifications. Run the test program to check and monitor the functions of system. Before turn off the power each item should be cyclical checked at least.

2.3 Testing Equipment

ASUS PDPS Power Supplier
Chroma 6530 DC source
ASUS DC Control Box
TES 2320 Multi meter
TAKAMISAWA OTC-2C-N Test Chamber

2.4 Testing Software

ASUS QC Test program under Windows 7 32bit test program

2.5 Testing Location

ASUSTeK Reliability & Environment Lab

2.6 Testing Specifications

		+/- 5%		
No.	***Temp.***	***5V***	***3.3V***	***12V***
1	40 °C	5.25 V	3.5 V	12.6 V
2	40 °C	4.75 V	3.5 V	11.4 V
3	40 °C	5.25 V	3.1 V	12.6 V
4	40 °C	4.75 V	3.1 V	11.4 V
1	60 °C	5.25 V	3.5 V	12.6 V
2	60 °C	4.75 V	3.5 V	11.4 V
3	60 °C	5.25 V	3.1 V	12.6 V
4	60 °C	4.75 V	3.1 V	11.4 V
1	0 °C	5.25 V	3.5 V	12.6 V
2	0 °C	4.75 V	3.5 V	11.4 V
3	0 °C	5.25 V	3.1 V	12.6 V
4	0 °C	4.75 V	3.1 V	11.4 V
1	-10 °C	5.25 V	3.5 V	12.6 V
2	-10 °C	4.75 V	3.5 V	11.4 V
3	-10 °C	5.25 V	3.1 V	12.6 V
4	-10 °C	4.75 V	3.1 V	11.4 V

Table 2-1

+/- 10%				
No.	***Temp.***	***5V***	***3.3V***	***12V***
1	40 °C	5.5 V	3.63 V	13.2 V
2	40 °C	4.5 V	3.63 V	10.8 V
3	40 °C	5.5 V	2.97 V	13.2 V
4	40 °C	4.5 V	2.97 V	10.8 V
1	60 °C	5.5 V	3.63 V	13.2 V
2	60 °C	4.5 V	3.63 V	10.8 V
3	60 °C	5.5 V	2.97 V	13.2 V
4	60 °C	4.5 V	2.97 V	10.8 V
1	0 °C	5.5 V	3.63 V	13.2 V
2	0 °C	4.5 V	3.63 V	10.8 V
3	0 °C	5.5 V	2.97 V	13.2 V
4	0 °C	4.5 V	2.97 V	10.8 V
1	-10 °C	5.5 V	3.63 V	13.2 V
2	-10 °C	4.5 V	3.63 V	10.8 V
3	-10 °C	5.5 V	2.97 V	13.2 V
4	-10 °C	4.5 V	2.97 V	10.8 V

Table 2-2

2.7 Testing Criteria

1. A minimum 1 motherboard must be test.
2. During DC margin test all units should pass ASUS QC Test program (please refer appendix 1) under Windows 7 32bit Operation System, without any malfunction or failure.
3. If anything fail happen should specific real failure voltage condition.
4. Minimum testing systems configuration: highest speed CPU, Add on card, SPS, HDD, FDD, max. RAM memory.
5. Follow IEC 60068-2-1 (Low temperature), IEC60068-2-2 (High temperature), MIL-STD-810 Method 501.3 (high temperature), MIL-STD-810 Method 502.3 (low temperature)

2.8 Testing Result

+/- 5%								
No.	Temp.	5V		3.3V		12V		Result
		Spec	DC Source	Spec	DC Source	Spec	DC Source	
1	40 °C	5.25 V	5.25 V	3.5 V	3.49 V	12.6 V	12.58 V	PASS
2	40 °C	4.75 V	4.75 V	3.5 V	3.49 V	11.4 V	11.38 V	PASS
3	40 °C	5.25 V	5.25 V	3.1 V	3.10 V	12.6 V	12.58 V	PASS
4	40 °C	4.75 V	4.75 V	3.1 V	3.10 V	11.4 V	11.38 V	PASS
1	60 °C	5.25 V	5.24 V	3.5 V	3.49 V	12.6 V	12.54 V	PASS
2	60 °C	4.75 V	4.75 V	3.5 V	3.49 V	11.4 V	11.38 V	PASS
3	60 °C	5.25 V	5.24 V	3.1 V	3.09 V	12.6 V	12.57 V	PASS
4	60 °C	4.75 V	4.74 V	3.1 V	3.09 V	11.4 V	11.35 V	PASS
1	0 °C	5.25 V	5.24 V	3.5 V	3.50 V	12.6 V	12.58 V	PASS
2	0 °C	4.75 V	4.74 V	3.5 V	3.50 V	11.4 V	11.38 V	PASS
3	0 °C	5.25 V	5.24 V	3.1 V	3.09 V	12.6 V	12.57 V	PASS
4	0 °C	4.75 V	4.74 V	3.1 V	3.10 V	11.4 V	11.38 V	PASS
1	-10 °C	5.25 V	5.25 V	3.5 V	3.50 V	12.6 V	12.57 V	PASS
2	-10 °C	4.75 V	4.75 V	3.5 V	3.50 V	11.4 V	11.38 V	PASS
3	-10 °C	5.25 V	5.25 V	3.1 V	3.09 V	12.6 V	12.55 V	PASS
4	-10 °C	4.75 V	4.74 V	3.1 V	3.09 V	11.4 V	11.35 V	PASS

+/- 10%								
No.	Temp.	5V		3.3V		12V		Result
		Spec	DC Source	Spec	DC Source	Spec	DC Source	
1	40 °C	5.5 V	5.50 V	3.63 V	3.62 V	13.2 V	13.19 V	PASS
2	40 °C	4.5 V	4.50 V	3.63 V	3.63 V	10.8 V	10.74 V	PASS
3	40 °C	5.5 V	5.49 V	2.97 V	2.96 V	13.2 V	13.12 V	PASS
4	40 °C	4.5 V	4.50 V	2.97 V	2.97 V	10.8 V	10.75 V	PASS
1	60 °C	5.5 V	5.49 V	3.63 V	3.62 V	13.2 V	13.18 V	PASS
2	60 °C	4.5 V	4.50 V	3.63 V	3.62 V	10.8 V	10.72 V	PASS
3	60 °C	5.5 V	5.49 V	2.97 V	2.97 V	13.2 V	13.11 V	PASS
4	60 °C	4.5 V	4.50 V	2.97 V	2.97 V	10.8 V	10.73 V	PASS
1	0 °C	5.5 V	5.50 V	3.63 V	3.63 V	13.2 V	13.20 V	PASS
2	0 °C	4.5 V	4.50 V	3.63 V	3.63 V	10.8 V	10.79 V	PASS
3	0 °C	5.5 V	5.50 V	2.97 V	2.96 V	13.2 V	13.20 V	PASS
4	0 °C	4.5 V	4.50 V	2.97 V	2.96 V	10.8 V	10.79 V	PASS
1	-10 °C	5.5 V	5.49 V	3.63 V	3.62 V	13.2 V	13.18 V	PASS
2	-10 °C	4.5 V	4.50 V	3.63 V	3.63 V	10.8 V	10.80 V	PASS
3	-10 °C	5.5 V	5.49 V	2.97 V	2.95 V	13.2 V	13.19 V	PASS
4	-10 °C	4.5 V	4.50 V	2.97 V	2.97 V	10.8 V	10.74 V	PASS

3. Power On/Off Test

3.1 Objective

The purpose of Power On/Off test is to make sure the system has been keep in normal working mode, even after an abnormal break condition of the power line.

3.2 Testing Procedure

1. Manual system power on off test
   a) Repeat a cycle of turn on/off of the power switch with the finger 50 times.
   b) Then test the system must be re-turn on OK.
2. Warm boot power on off test
   a) Repeat a reboot cycle of the system 50 times.
   b) Then test the system must be re-turn on OK.
3. Reset system power on off test
   a) Repeat a cycle of turn on/off of the reset switch with the finger 50 times.
   b) Then test the system must be re-turn on OK.
4. Auto system power on off test
   a) The power off time will set as 1 second, and 20 second, in each of setting to at least run 24 hours system AC power on off test.
   b) Before and after the test all the system should under function test anything malfunction cannot be allowed.
5. Margin temperature power on off test
   a) Repeat the manual power at low temperature 10 times and high temperature 10 times.
   b) Then check the Motherboard can boot up successfully.

3.3 Testing Equipment

ASUSTeK Power On Off Tester
TAKAMISAWA OTC-2C-N Test Chamber

3.4 Testing Software

ASUS Power Cycle Test program under DOS 6.22 Operation System
ASUS Power Cycle Test program under Windows 7 32bit Operation System

3.5 Testing Location

ASUSTeK Reliability and Environment Test Lab.

3.6 Testing SPS Model

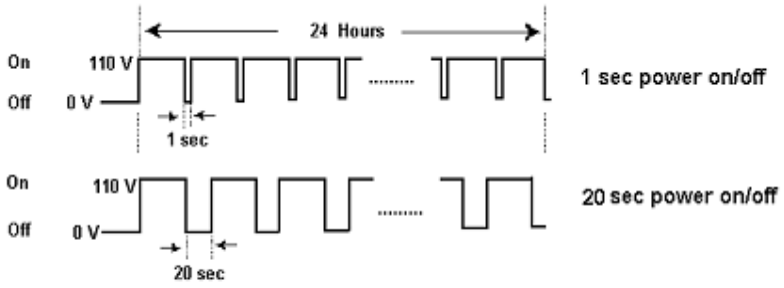
No.	*Manufacture*	*Model No.*	*Watts*
1	PENTAGRAM	P 9103-2	500W
2	LITEON	PS-6301-2	300W

3.7 Testing Specifications

1. There must be no damages or safety problem before and after the function test. And no any system power on boot failure founded.
2. Testing systems configuration: The max loading system with a fully operational configuration of SPS, video controller, ODD, HDD, M.B, CPU, RAM, K.B., Mouse.

No.	System Power On Off Test Condition	Test Specification
1	Manual System Power On Self Test	Total 50 cycles / check in each 10 cycles
2	Warm Boot Power On Self Test	Total 50 cycles / check in each 10 cycles
3	Reset System Power On Self Test	Total 50 cycles / check in each 10 cycles
4	Margin Temperature Power On Off Test	Total 10 cycles in each –10°C /50°C

24 hours		24 hours	
Power on	Power off	Power on	Power off
1 minute	1 second	1 minute	20 second
System boot		System boot	
Function test		Function test	



Power ON/OFF Cycle Test

3.8 Testing Criteria

1. A minimum of 2 motherboards must be test. (Please refer to the test configuration table).
2. There must be no damages or safety problem before and after the test & check RTC. And no any system boot failure is founded, and the RTC specification is 3 sec/day
3. Testing systems configuration: The max loading system with a fully operational configuration of SPS, video controller, ODD, HDD, FDD, M.B, CPU, RAM, K.B., Mouse.

3.9 Testing Result

Power On / Off Test Times	Manual System Power On/Off Test		Remark
	Power On	Power Off	
10 Times	PASS	PASS	
20 Times	PASS	PASS	
30 Times	PASS	PASS	
40 Times	PASS	PASS	
50 Times	PASS	PASS	

Power On / Off Test Times	Warm Boot Power On/Off Test		Remark
	Power On	Power Off	
10 Times	PASS	PASS	
20 Times	PASS	PASS	
30 Times	PASS	PASS	
40 Times	PASS	PASS	
50 Times	PASS	PASS	

Power On / Off Test Times	Reset Power On/Off Test		Remark
	Power On	Power Off	
10 Times	PASS	PASS	
20 Times	PASS	PASS	
30 Times	PASS	PASS	
40 Times	PASS	PASS	
50 Times	PASS	PASS	

Power On / Off Test Times	Margin Power On/Off Test		Remark
	-10°C	50°C	
2 Times	PASS	PASS	
4 Times	PASS	PASS	
6 Times	PASS	PASS	
8 Times	PASS	PASS	
10 Times	PASS	PASS	

AC115 V / 60 Hz

115 V Power On / Off Test Times For Windows			Auto System Power On/Off Test			Remark
	Real Time	BIOS Time	Delay T	Function	Result	
Start	16:25:30	16:25:30	0	PASS	PASS	Power off 20 sec
End	16:34:20	16:34:19	0	PASS		

AC230 V / 50 Hz

230 V Power On / Off Test Times For Windows			Auto System Power On/Off Test			Remark
	Real Time	BIOS Time	Delay T	Function	Result	
Start	16:45:10	16:45:10	0	PASS	PASS	Power off 20 sec
End	17:02:20	17:02:20	0	PASS		

4. Temperature/ Humidity Test

4.1 Objective

To meet the varied temperature and humidity requirements of different areas, because of products may be subjected at varied operation temperature/ humidity condition. The product must be tested to verify its temperature/humidity endurance. This procedure defines the method of testing for a combination of operating temperature/humidity cycles.

4.2 Testing Procedure

1. Turn on the system to do function test and record the reference reading and adjust system RTC time, then turn off the system.
2. Place the system inside the temperature/humidity chamber, and do the function test.
3. Decrease the chamber temperature from the initial level to the lower limit, and maintain this condition of 20 hours at least.
4. Check the system, if there is any error occurred at low temperature, and then check RTC accuracy under Bios mode.
5. Increase the chamber temperature from the lower to the higher temperature limit, and maintain this condition for a period of 20 hours at least.
6. Decrease the chamber temperature from the upper to the room temperature.
7. Check the system, and make sure the system without any malfunction.
8. The temperature change must under 20^{o}C/hour.
9. Check the RTC accuracy under Bios mode.

4.3 Testing Equipment

Thermotron SM-32CTest Chamber Tester Chamber

4.4 Testing Software

ASUSTeK QC Test Program under Microsoft Windows 7 32bit operation system

4.5 Testing Location

ASUSTeK Reliability and Environment Test Lab

4.6 Testing Specifications

Step	*Temperature (^{o}C)*	*Relative Humidity (%)*	*Time (Hour: Minutes)*	*Remark*
1	0	-	02:00	
2	0	-	20:00	
3	0	-	00:30	Check RTC
4	60	90	04:00	
5	60	90	20:00	
6	60	90	00:30	Check RTC
7	25	50	02:00	
8	25	50	02:00	

4.7 Testing Criteria

1. 1 unit must be test.
2. During the temperature test all units must be pass ASUSTeK QC Test Program under Microsoft Windows 7 32bit when testing, RTC error (the specification is 3 sec/day) and any function(include VGA wave issue) error cannot be allowed.
3. Within in the margin all units during or after the testing should without any malfunction and damage.
4. Follow IEC-60068-2-1(low temperature), IEC 60068-2-3, 30, 56, IEC-60068-2-2(high temperature), MIL-STD-810, Method501.3, 502.3, MIL-STD-202F, MIL-STD-883., MIL-STD-810 Method 507.3(Humidity).

4.8 Testing Result

Step	*Temperature (°C)*	*Relative Humidity (%)*	*Time (Hour: Minutes)*	*Result*
1	0	-	02:00	PASS
2	0	-	20:00	PASS
3	0	-	00:30	PASS
4	60	90	04:00	PASS
5	60	90	20:00	PASS
6	60	90	00:30	PASS
7	25	50	02:00	PASS
8	25	50	02:00	PASS

5. Power Consumption Test

5.1 Objective

The purpose of the power consumption test is to verify the capability of the products comply with EPA Energy Star standard.

5.2 Testing Procedure

1. Energy Star:
   a. The computer is connected to a live Gigabit Ethernet (IEEE 802.3) HUB. Another computer is also connected to HUB. Make sure the status is “connected” and LOM LED is light on.
   b. Turn on the AC source and Power Meter, and then set the output voltage /frequency. Switch on the system and entering BIOS. Make sure all BIOS setup set to default (Factory).
   c. Save BIOS and wait system into windows, and then wait 15 minutes and record the power value. (5 minute average)
   (Change advance power settings: “turn off the display” set up as “never”, “put the computer to sleep” set up as “never”, “turn off hard disk after” set up as “0 minute”)
   d. After completing Idle measurements, place in sleep mode (S3), and record the power value. (5 minute average)
   e. After completing sleep mode measurements, place in standby mode (off mode: S5), and record the power value. (5 minute average)

2. ErP:
   a. Turn on the AC source and Power Meter, and then set the output voltage /frequency. Switch on the system and entering BIOS. Make sure all BIOS setup set to default (Factory) and then set ErP for enable.
   b. Save BIOS and wait system into windows, and in standby mode (off mode: S5) to record the power value. (5 minute average)

5.3 Testing Equipment

1. Chroma PROGRAMMABLE AC SOURCE MODEL 61604
2. YOKOGAWA WT210 DIGITAL POWER METER

5.4 Operation System

Microsoft Windows 7 32bit operation system

5.5 Testing Location

ASUSTeK Reliability and Environment Test Lab

5.6 Testing Specifications

TEC in each category:

Desktop & Integrated computer	
TEC (KWh)	Category A ≦ 148.0 Category B ≦ 175.0 Category C ≦ 209.0 Category D ≦ 234.0
Capability Adjustment	
DIMM	1 KWh per GB over base, Base memory: Cat. A, B, C: 2GB Cat. D: 4GB
Premium Graphics	Cat. A, B: 35KWh (FB width ≦ 128 bit) 50KWh (FB width ＞ 128 bit) Cat. C, D: 50KWh (FB width ＞ 128 bit)
Additional Internal Storage	25KWh

ErP

Mode	Specification
Off Mode (S5)	≦0.5W

5.7 Testing Criteria

E_{TEC} = (8760/1000)*(P_{OFF} * T_{OFF} + P_{SLEEP} * T_{SLEEP} + P_{IDLE} * T_{IDLE}),

E_{TEC} : Annual energy consumption (kWh)

Px : Power values in watts

Tx : Time values in % of year, as below.

T_{OFF}: 55%, T_{SLEEP}: 5%, T_{IDLE}: 40%

5.8 Testing Configuration

System Configuration			
Mother Board	LMB75A	**Mouse**	ASUS USB Mouse
PCB Ver.	Rev. 1.01	**Keyboard**	ASUS USB KB
BIOS	0201	**PSU**	Antec HCP-1000 Platinum
CPU	Intel IVY BRIDGE 3.4G	**CPU Cooler**	Intel E94334-001
DIMM 2	Samsung DDR3 1333 1GB	**Lan Driver Rev.**	7.50.1123.2011
DIMM 4	Samsung DDR3 1333 1GB	**HDD1**	Hitachi HDT72252DLA300 250G
Category Classification		A	

5.9 Testing Result

Category Classification：A

WOL Enable:

Mode	*Idle Mode*	*S3 Mode*	*S5 Mode*	E_{TEC}	*Result*
100V/ 50Hz	30.978	1.114	0.619	112.017	PASS
100V/ 60Hz	30.983	1.115	0.620	112.040	PASS
115V/ 60Hz	30.720	1.128	0.635	111.196	PASS
230V/ 50Hz	31.034	1.348	0.838	113.371	PASS

WOL Disable:

Mode	*Idle Mode*	*S3 Mode*	*S5 Mode*	E_{TEC}	*Result*
100V/ 50Hz	37.628	1.109	0.311	133.833	PASS
100V/ 60Hz	31.012	1.113	0.311	110.652	PASS
115V/ 60Hz	30.886	1.131	0.328	110.300	PASS
230V/ 50Hz	30.392	1.348	0.521	109.594	PASS

ErP Result

Mode	*S5 Mode*	*Result*
230V/ 50Hz	0.32479	Pass

Remark: ErP Ready Function Disable in BIOS

6. Non Operation Vibration Test

6.1 Objective

The purpose of the vibration test is to determine mechanical weakness or performance degradation of an equipment or component when subjected to vibration and to use this information, in conjunction with the relevant specifications, to decide whether the equipment or component, herein after referred to as a specimen, is acceptable or not. It may be used in some cases to determine the structural integrity of specimens and study their dynamic behavior. Vibration testing may be performed anytime during the course of the test program. The accumulated effects of vibration-induced stress may affect equipment performance under other environmental conditions, such as temperature, altitude, humidity, leakage or EMI/EMC. When it is desired to evaluate the cumulative effects of vibration and other environmental factors, a single test item should be exposed to all environmental conditions, which vibration testing generally performed first.

6.2 Testing Procedure

1. Inspect the motherboard to establish operation pretest criteria and physical condition.
2. Verify the motherboard's functionality.
3. Mount the motherboard on the fixture, and then fix the fixture on the vibration equipment table.
4. Expose the system to the test level and duration as determined from the Specifications.
5. Inspect the system and compare it to pretest data and physical condition, if anything physical issue or malfunction during testing should under recorded & reported.
6. Repeat steps 1~6 for each axis.
7. Document the following test results:
   a) Prior test history of the system.
   b) Inspection and test procedures, including inspection requirements, test criteria instrumentation, data requirements and failure criteria.
   c) List of all test equipment, including vibration generating and analysis equipment, mounting arrangements and fixtures.
   d) Orientation of the system, including axes of applied vibration.
   e) Location of accelerometer used to control and measure vibration.
   f) Resonant frequencies, including those selected as applicable.
   g) Isolation characteristics, including sway amplitudes and transmissibility versus frequency.
   h) Applied test levels, duration and frequency ranges.
   i) Results of all performance measurements, including overall test results.
   j) Analysis of each failure and proposed corrective action.
   k) Analysis spectrum.

6.3 Testing Equipment

1. UD Vibration Testing System SA15-S452/ST
2. UD Signal Conditioner CAV-4
3. UD Accelerometer 10B10T(10 PC/h,1~10KHz,1000g)
4. DP550Win Vibration Controller

6.4 Testing Software

ASUSTeK QC Test Program under Microsoft Windows 7 32bit

6.5 Testing Location

ASUSTeK Reliability and Environment Test Lab.

6.6 Testing Specifications

Non Operating Random Mode

a) Axis: X, Y and Z.
b) Fixture used (wooden or plastic): fasten the unit to the table.
c) 10 min/axis

Frequency	***Slope***	***PSD***
Hz	***(dB/Oct.)***	***(g^2/Hz)***
5	-	0.01
20~500	-	0.02

Equivalent to 3.13 G_{rms}

6.7 Testing Criteria

1. 1 unit must be test.
2. During and after the vibration test all units must be pass diagnostic test.
   Diagnostic:
   a) Function test: After Non operation random mode test, the MB must be rebooted.
   b) Physical test: The MB must be inspected for any sign damage, looseness or loose of parts.
3. Follow IEC60068-2-6 (Sine wave), IEC60068-2-34, 35,36,37 (Random wave), MIL-STD-810E, Method 514.

6.8 Cross Section Soldering Analysis

N/A

6.9 Testing Result

Non Op Random Mode	***Function Test***	***Physical Check***
X axis	PASS	PASS
Y axis	PASS	PASS
Z axis	PASS	PASS

7. Non Operation Shock Test

7.1 Objective

The shock test is performed to ensure that material can withstand the relatively infrequent, non-repetitive shocks or transient vibration encountered in handling, transportation and service environments. The purpose of shock test is to reveal mechanical weakness or degradation in performance and to use this information, in conjunction with relevant specification, to decide whether a specimen is acceptable or not. It may also be used, in some cases, to determine the structural integrity of specimens or as a mean of quality control. There are often advantages to applying shock and vibration tests before climatic tests, provided that this sequence represents realistic service condition. However, test experience shows that climate-sensitive defects often show up more clearly after the application of shock and vibration forces.

7.2 Testing Procedure

1. Test specification: Half Sine Shock 50G, 11 ms or Trapezoidal Shock 50G,170 inches/sec.
2. 6 face, 3 shocks per face: each unit has to withstand the 18 shocks.
3. The motherboard with fixture will be installed on shock table in such a way that the shock input is transmitted directly to it.

7.3 Testing Instrument

Lansmont 95/115 DTTS2 Mechanical AUTO SHOCK System
TP3 software for shock mechanical

7.4 Testing Environment

Room Temperature Range：22 ^{o}C ~ 28 ^{o}C
Room Humidity Range ：40 % ~ 50 %

7.5 Testing Program

Running QC test programs under Windows 7 32bit operation system

7.6 Testing Location

ASUSTeK Reliability & Environment test Lab

7.7 Testing specification

1.Trapezoidal Shock (Square Wave Shock)
  a) Maximum faired acceleration: 50G
  b) Velocity change: 170 inches/sec
  c) Test direction: 6 orientation face

2.Half Sine Shock
  a) Maximum faired acceleration: 50G
  b) Duration time: 11 ms
  c) Test direction: 6 orientation face

Note: Intel platform chooseTrapezoidal Shock / AMD platform choose Half Sine Shock

7.8 Testing Criteria

1. Function test: After Non operation square wave shock test, the MB must be rebooted.
2. Physical test: The MB must be inspected for any sign damage, looseness or loose of parts.
3. Follow IEC60068-2-27, MIL-STD-810E, Method 516.

7.9 Cross Section Solder Analysis

N/A

7.10 Testing Result

Non Operating Half Sine Shock or Trapezoidal Shock		
Test side	***Function Test***	***Physical Check***
Top	PASS	PASS
Bottom	PASS	PASS
Left	PASS	PASS
Right	PASS	PASS
Front	PASS	PASS
Rear	PASS	PASS

8. Hardware Monitor Check

8.1 Objective

The purpose of the hardware monitor check is help to validate product durability and stability, the test is conjugation with temperature at continue long time operation, during the aging testing, during testing anything issue will under recorded and analysis, all the tested system should with well function in before and after the test.

8.2 Testing Procedure

1. In before the aging test all the system should pass the function test.
2. Place the product in a temperature/humidity chamber under standard condition (25 ^{o}C/50%RH)
3. Measure M.B. Vcore (+3.3V, +5V) by multimeter and compare with hardware monitor voltage item in BIOS.
4. Measure the speed rate of CPU fan and compare with hardware monitor speed item in BIOS.
5. Place the mother board in the following each condition (-10^{o}C, 10 ^{o}C, 25 ^{o}C, 40 ^{o}C, 60 ^{o}C) of the temperature chamber and measure the thermistor on M.B. in each condition compared with hardware monitor of M.B. temperature in BIOS.
6. Check Fan Control function at step 5.

8.3 Testing Instrument

TAKAMISAWA OTC-2C-N Test Chamber

8.4 Testing Environment

Chamber Temperature Range: -10^{o}C~60^{o}C
Chamber Humidity Range: 0 % ~ 50 %

8.5 Testing program

ASUS BIOS Hardware Monitor Item of Setup Screen

8.6 Testing Location

ASUSTeK Reliability & Environment test Lab

8.7 Testing Specification

Test Item	***Spec.***
+3.3V	3.3V±5%
+5V	5V±5%
CPU Fan Rotation	Correct RPM±10%
Power Fan Rotation	Correct RPM±10%
Chassis Fan Rotation	Correct RPM±10%
Differential Value of CPU Temperature (In 0 ^{o}C, 10 ^{o}C, 25 ^{o}C, 40 ^{o}C, 60 ^{o}C Environment)	$T_{measured}$±1 ^{o}C *1
Differential Value of MB Temperature (In 0 ^{o}C, 10 ^{o}C, 25 ^{o}C, 40 ^{o}C, 60 ^{o}C Environment)	$T_{measured}$±5 ^{o}C

*1 For thermal diode measurement, when temperature different between ±5 °C and ±7 °C, the bug priority is high, when the temperature different over 7 °C, the failure priority is stopper.
For PECI CPU measurement, when ambient temperature is over 0℃, the priority is stopper if difference is over +-10℃, and if ambient temperature is lower than 0℃, the stopper entrance will be +-15℃.

8.8 Testing Criteria

1. The 3.3V and 5V BIOS reading must be kept ±5% of measured data.
2. The fan rotation must be kept ±10% the specific value.
3. The two reading temperatures from BIOS and recorder must follow the test specification, when CPU and M/B under temperature tests.
4. Check Fan Control Function at different temperature,
5. Check the temperature value of CPU from BIOS. The value of fluctuation range must be kept in 5℃.

8.9 Testing Result

Test Item	*BIOS Value*	*Measurement Value*	*Differential Value*	*Unit*	*Result*
+3.3V	3.414	3.41	0.004	Volt	Pass
+5V	5.046	5.16	0.114	Volt	Pass
CPU Fan Rotation	1642	1670	28	RPM	Pass

Test Item	*Unit*	*-10°C*	*10°C*	*25°C*	*40°C*	*60°C*	*Result*
$T_{CPU\ from\ recorder}$	°C	-5.4	13.6	31.3	47.9	69.2	Pass
$T_{CPU\ from\ BIOS}$	°C	-5.0	14.0	31.0	47.0	68.0	Pass
Differential Value of CPU Temperature	°C	0.4	0.4	0.3	0.9	1.2	Pass

Test Item	*Unit*	*-10°C*	*10°C*	*25°C*	*40°C*	*60°C*	*Result*
$T_{M/B\ from\ recorder}$	°C	-9.3	9.4	25.0	41.7	61.4	Pass
$T_{M/B\ from\ BIOS}$	°C	-9.0	9.0	25.0	42.0	63.0	Pass
Differential Value of M/B Temperature	°C	0.3	0.4	0	0.3	1.7	Pass

9. Burn In Test

9.1 Objective

The purpose of burn in test is to make sure the motherboard is no any component failure at running condition, and check the motherboard stability.

9.2 Testing Procedure

1. Turn on the system to do function test and record the reference reading and adjust system RTC time, then turn off the system.
2. Place the system inside the temperature/humidity chamber, and do the function test.
3. Increase the chamber temperature from the initial level to the higher temperature, and maintain this condition of 48 hours at least.
4. After burn in test, check the motherboard function and mechanical, if there is any failure.

9.3 Testing Instrument

THERMOTRON SM-32-7800 Test Chamber

9.4 Testing Location

ASUSTeK Reliability & Environment test Lab

9.5 Testing Program

3Dmark 2006 rev. 1.1.0 test programs under Windows 7 32bit operation system

9.6 Testing Specification

Temperature (^{o}C)	*Relative Humidity (%)*	*Time (Hour: Minutes)*
45	80	48:00

9.7 Testing Criteria

1. During Burn in test after 48 hours at 45 ^{o}C temperature, test all units should pass the 3Dmark 2003 test program under Windows 7 32bit operation system which system should without any RTC delay (Specification is 3 sec/day) functional and mechanical malfunction.
2. Follow IEC 60068-2-3, 30, 56, IEC-60068-2-2(high temperature), MIL-STD-810, Method501.3, 502.3, MIL-STD-202F, MIL-STD-883., MIL-STD-810 Method 507.3(Humidity).

9.8 Testing Result

Temperature (^{o}C)	*Relative Humidity (%)*	*Time (Hour: Minutes)*	*Result*
45	80	48:00	Pass

10. Installation Interference

10.1 Objective

This test purpose is to check the motherboard installation is suitable for any chassis, device and component,

10.2 Testing Procedure

Following the testing specification list items, use the all connectors to check the mechanical function and do the plug in/out to make sure the motherboard is suitable for general device.

10.3 Testing Equipment

All connectors for the testing motherboard

10.4 Testing Location

ASUSTeK Reliability & Environment Lab

10.5 Testing specification

1. Internal Assemble Check

Check Item	*Location*	*Contain*	*Remark*
CPU Cooler Check	1	CPU heatsink insertion	-
	2	CPU heatsink installation	-
Power Connector Check	3	ATX power connector	-
	4	ATX 12V connector	-
Fan Connector Check	5	CPU fan connector	-
	6	Chassis fan connector	-
Cable Connector Check	7	Serial ATA connector	-
RAM Module Slot Check	8	DDR3 RAM module slot	-
PCI Slot Check	9	PCI slot	-
USB connector Check	10	USB connector	-
COM Port Connector	11	COM Port Connector	-

Table 10-1

2. Insertion Check, please refer appendix 2

Test item	Specification	Test system	Physical	Function	Remark
PS/2 keyboard	172				
USB port	6022				
HDMI port	545				
Audio port	2409				
LAN port	1205				
VGA port	172				
HDD connector	40				
SATA connector	40				
Power connector	40				
CPU socket	40				
PCI socket	80				
DIMM socket	40				

Table 10-2

10.6. Testing Criteria

10.7. Testing Result

1. Internal Assemble Check

Check Item	*Location*	*Contain*	*Result*
CPU Cooler Check	1	CPU heatsink insertion	PASS
	2	CPU heatsink installation	PASS
Power Connector Check	3	ATX power connector	PASS
	4	ATX 12V connector	PASS
Fan Connector Check	5	CPU fan connector	PASS
	6	Chassis fan connector	PASS
Cable Connector Check	7	Serial ATA connector	PASS
RAM Module Slot Check	8	DDR3 RAM module slot	PASS
PCI Slot Check	9	PCI slot	PASS
USB connector Check	10	USB connector	PASS
COM Port Connector	11	COM Port Connector	PASS

Table 10-3

1. Insertion Check, please refer appendix 2

Test item	*Specification*	*Test system*	*Physical*	*Function*	*Result*
PS/2 keyboard	172	1	PASS	PASS	PASS
USB port	6022	2	PASS	PASS	PASS
HDMI port	545	3	PASS	PASS	PASS
Audio port	2409	4	PASS	PASS	PASS
LAN port	1205	5	PASS	PASS	PASS
VGA port	172	1	PASS	PASS	PASS
HDD connector	40	2	PASS	PASS	PASS
SATA connector	40	4	PASS	PASS	PASS
Power connector	40	5	PASS	PASS	PASS
CPU socket	40	1	PASS	PASS	PASS
PCI socket	80	2	PASS	PASS	PASS
DIMM socket	40	3	PASS	PASS	PASS

Table 10-4

11. Thermal Shock Test

11.1 Objective

The purpose of thermal shock test is to accelerate the variation of temperature, in order to increase the temperature effect in a short time to find the potential defect of material.

11.2 Testing Procedure

1. Check the Motherboard function at room temperature.
2. Remove all connected device, and place the Motherboard into a thermal shock chamber.
3. Moving the system to cold zone and decrease the temperature with specified temperature gradient: 20°C /min.
4. Keep the system in low temperature limit in 0.75 hour.
5. Moving the system to the hot zone and increase the temperature with specified temperature gradient: 20°C /min.
6. Keep the system in high temperature limit in 0.75 hour.
7. Repeat steps 3 to 6, total 27 cycles.
8. Perform the function test should without any malfunction

11.3 Testing Equipment

Hitachi ES-1006L Thermal Shock chamber

11.4 Testing Software

None

11.5 Testing Location

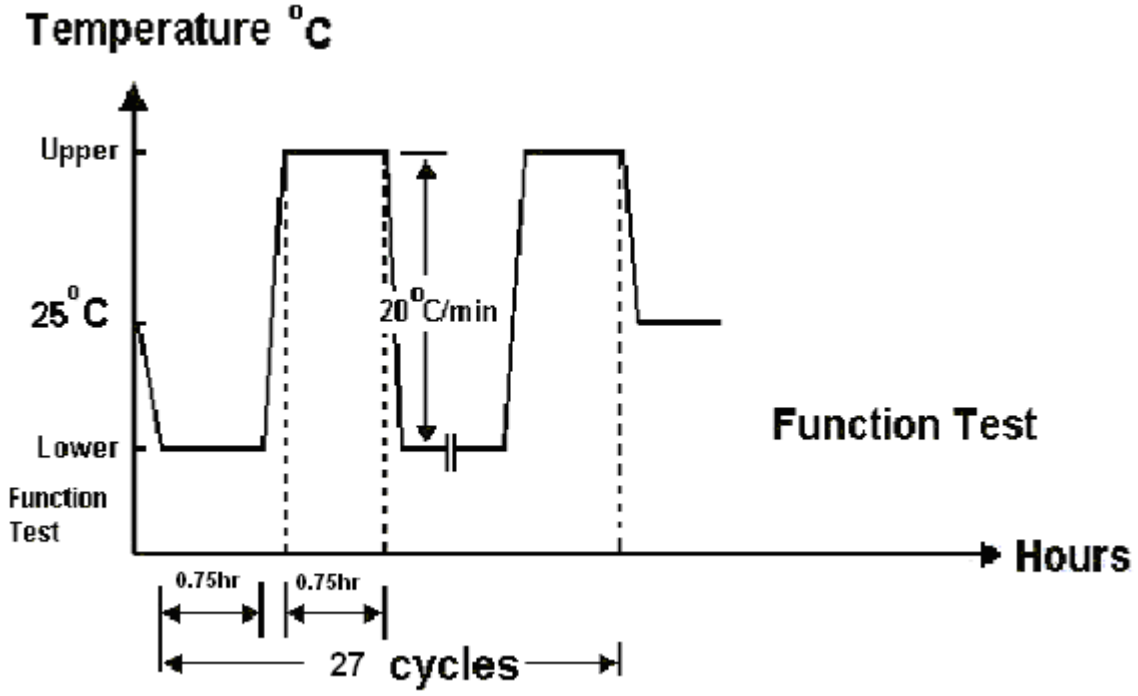
ASUSTeK Reliability & Environment Lab

11.6 Testing Specifications

Condition	*Low Temp.*	*High Temp.*	*Interval time*	*Gradient*	*Duration*
Non-operation	-40°C	85 °C	1.5 hr/cycle	20°C /min	27 cycles

11.7 Testing Criteria

1. 1 unit must be test.
2. The before test must be no function error, and mechanical malfunction cannot be allowed.
3. All units must be pass ASUSTeK QC Test Program under Microsoft Windows 7 32bit, any function error cannot be allowed.
4. Testing systems configuration should be equivalent to the specified System Basic Configuration on the test specification.
5. Follow IEC 60068-2-14(Na), MIL-STD-810, method 503.3(Thermal shock)



11.8 SEM Analysis

N/A

11.9 Testing Result

Condition	*Low Temp.*	*High Temp.*	*Interval time*	*Gradient*	*Duration*	*Result*
Non-operation	-40°C	85 °C	1.5 hr/cycle	20°C /min	27 cycles	PASS

12. Drop Test

12.1 Objective

To verify the ability of packaging to protect a product and to verify whether the packaged product can under protected and with well operation function which after normal environment of handling and transportation.

12.2 Testing Procedure

1. To confirm M.B with well functional, then package in carton and place it on the drop tester.
2. To perform a corner drop on the weakest corner of product.
3. To perform an edge drop with impact on the shortest edge radiating with first tested corner.
4. To perform a second edge drop with impact on the next shortest edge which radiating with first tested corner.
5. To perform an edge drop with impact on the longest edge radiating from first tested corner.
6. To perform a flat drop with impact on the front side.
7. To perform a flat drop with impact on the rear side.
8. To perform a flat drop with impact on the right side.
9. To perform a flat drop with impact on the left side.
10. To perform a flat drop with impact on the bottom side.
11. To perform a flat drop with impact on the top side.
12. To inspect the packaged M.B. and related accessory mechanical structure, and to execute the function test.

12.3 Testing Equipment

Lansmont Model PDT–56ED drop tester

12.4 Testing Software

ASUS QC Test program under Windows 7 32bit Operation System

12.5 Testing Location

ASUSTeK Reliability & Environment test LAB.

12.6 Testing Specification

Package Weight		***Drop Height***		***No. Drops***
KG	**lb**	**cm**	**inch**	**Times**
0 ~ 9.1	0 ~ 20	91	36	10
9.2 ~ 18.2	> 20 ~ 40	76	30	10
18.3 ~ 27.2	> 40 ~ 60	61	24	10
27.3 ~ 45.4	> 60 ~ 100	46	18	10
10 Drops: 1 corner, 3 edges and 6 surfaces				

12.7 Testing Criteria

1. A minimum of bulk package with 10 M/B color boxes must be test.
2. The minimum color box contain support CD, text book, SATA cable, IDE cable, FDD cable, rear I/O panel, application CD, SATA power cable, PCI COM port, PCI Game port, etc.
3. Follow IEC 60068-2-32, MIL-STD-810E, Method 516.
4. During and after the drop test all units must be pass diagnostic test.
   Diagnostic:
   a) Functional check: The drop tested M.B. must be pass ASUS QC test program under Windows 7 64bit operation system testing the basic M.B. functional HDD, ODD, FDD should under stressed.
   b) Visual inspection: The drop tested M.B. must without any mechanical damage and package inside cushion materials rupture are permitted.

Packaging Drop Test Bug Definition				
Priority	***Product***	***Sponge***	***Blister***	***Carton/ Color Box***
Stopper	Function Fail Appearance damaged or Reliability Issue Concern	Serious Damage and Broken	Edge、Front Cover damaged or any other parts broken over 1 cm	Serious Damage and Broken
High	Function OK Component escape but can recover or no Reliability Issue Concern	Serious Damage	Blister Broken under 1 cm expect Edge and Front cover.	Appearance check ok, the crack is less 10 % of length, but color box short edge crack is less 25 % of length
Low	Function OK Assembly shift and no Reliability Issue Concern	No damage	No damage	No damage

Stopper: The top priority issue will affect to product's transportation confidence seriously. In before the issue solved, the project should not moved to next project phase.

High: The issue is concerned of transportation package reliability, but no serious carton damaged further discussion is necessary in before any marketing requirement.

Low: The issue is low risk for transportation package reliability but the issue is under controlled and stands by for implemented schedule.

12.8 Testing Configuration

Gift box:
There are 10 color boxes in the bulk package, there is 1 level, and the level has 10 boxes.
Package Weight: 11.3KG
WEEE Weight (M/B+ cable): 0.635KG
Net Weight (M/B+ all accessories): 0.785KG
Accessory Weight: 0.210KG
Package Carton P/N: 15G020109901
Package Gift Box P/N: 15G030107200
PARTITION FOR L-TYPE BOX V4 P/N: 15240-00170000
Package size: 564*288*297mm

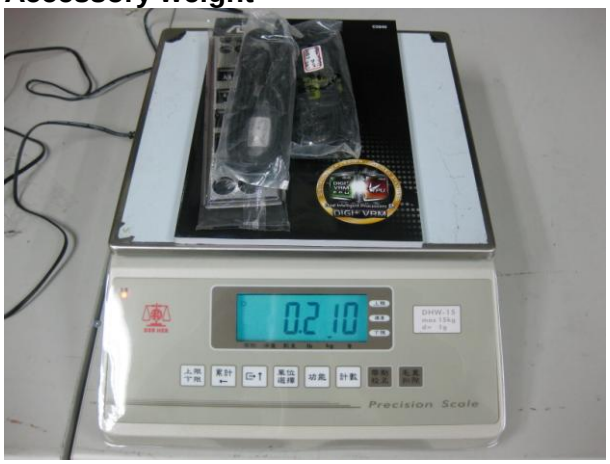
Gift box package weight

1MB weight

WEEE weight

1MB+ all accessory weight

Accessory weight



Gift box content

Bulk box:
Package Weight: 10.2KG
Package Carton P/N: 15G1101093C0
ACCESSORY BOX P/N: 15G020113300
Package size: 495*295*360mm

Bulk box carton weight

Accessory Box content

1.9 Testing Result

Gift box:

Condition	Drop Height	Function Check	Physical Check	Remark
Corner	76 cm	PASS	PASS	
Short Edge	76 cm	PASS	PASS	
Middle Edge	76 cm	PASS	PASS	
Longer Edge	76 cm	PASS	PASS	
Top Face	76 cm	PASS	PASS	
Bottom Face	76 cm	PASS	PASS	
Right Face	76 cm	PASS	PASS	
Left Face	76 cm	PASS	PASS	
Front Face	76 cm	PASS	PASS	
Rear Face	76 cm	PASS	PASS	

Corner

Short edge

Middle Edge

Longer Edge

Top face

Bottom face

Front face

Rear face

Left face

Right face

Bulk box:

Condition	Drop Height	Function Check	Physical Check	Remark
Corner	76 cm	PASS	PASS	
Short Edge	76 cm	PASS	PASS	
Middle Edge	76 cm	PASS	PASS	
Longer Edge	76 cm	PASS	PASS	
Top Face	76 cm	PASS	PASS	
Bottom Face	76 cm	PASS	PASS	
Right Face	76 cm	PASS	PASS	
Left Face	76 cm	PASS	PASS	
Front Face	76 cm	PASS	PASS	
Rear Face	76 cm	PASS	PASS	

Corner

Short edge

Middle Edge

Longer Edge

Top face

Bottom face

Left face

Right face

Front face

Rear face

BUGS & LIMITATIONS

1. BUGS

2. LIMITATIONS

3. SUGGESTIONS

APPENDIX:

2. ASUS QC Test Program under Microsoft Windows 7 32bit operation system which Include multi task feature for each testing task as below.

Test Driver	*Test Item*	*Remark*
Hard disk driver	Files copy & compare test	Hard disk to hard disk
ODD	Files copy & compare test	ODD to hard disk
Memory	Read/Write test	
Floppy driver	Files copy & compare test	Floppy to Hard disk
VGA	GDI demonstration & Mltithrd test	
LAN	Movie play from Server	Server to system
USB device	USB HDD, AI-Flash file copy& compare test	USB device to HDD

3. Insertion standard

Test time = Guarantee Year x Use Time Frequency x Safety Factor

Test Item	*Use time frequency*			*Guarantee Year*	*Safety Factor*	*Test times*
	Day	*Week*	*Month*			
PS/2 mouse		1		3	1.1	172
PS/2 keyboard		1		3	1.1	172
USB port	5			3	1.1	6022
Print port		1		3	1.1	172
COM port		3		3	1.1	515
1394 port	2			3	1.1	2409
Game port		5		3	1.1	858
LAN port	1			3	1.1	1205
Audio port	2			3	1.1	2409
VGA port		1		3	1.1	172
HDD connector			1	3	1.1	40
FDD connector			1	3	1.1	40
SATA connector			1	3	1.1	40
Power connector			1	3	1.1	40
CPU socket			1	3	1.1	40
PCI socket			2	3	1.1	80
PCI-E socket			1	3	1.1	40
DIMM socket			1	3	1.1	40

3. No function error means cannot allow any device cause damage, fail or blue screen during test and after test. The functional check detail situation is as follow:

Test Component	*Test* Criteria
Hard disk device	Copy & compare cannot occur error
Combo device	Read / Write/Copy/Comp. data cannot occur error
Memory	Cannot occur error message
Floppy device	Format, copy & compare files from HDD cannot occur error
VGA	Cannot occur noise, bad color on screen both for CRT & DVI ports
Time	Cannot occur time delay or stop
Other Devices	Cannot happen error or failure