


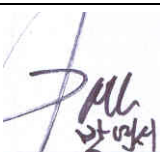



ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	1/29

# ANTENNA SPECIFICATION

	Prepared by	Reviewed by	Check by	Approved by
R F		/		
	09/03/12			
R & D		/		
	09/03/12			

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	BT antenna	PAGE	2/29

# CONTENTS

1. Approval Sheet Check List
2. Material Certification.
3. Technical Specifications
  - 3.1 Electrical Specifications
  - 3.2 Mechanical Specifications
  - 3.3 Packing Specifications
4. Test Equipments
5. Electrical Demands
  - 5.1 V.S.W.R.
  - 5.2 Radiation Pattern
  - 5.3 Gain
6. Mechanical Demands
  - 6.1 Contact Pin Force Test.
  - 6.2 Contact Pin Resistance Test.
  - 6.3 Drop Test.
7. Environmental demands
  - 7.1 Operation Temperature Test
  - 7.2 Temperature Change Test
  - 7.3 High Humidity Test
  - 7.4 Vibration test
  - 7.5 Salt Spray Test
  - 7.6 Storage Temperature

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	3/29

## 8. Antenna Data

- 8.1. Electrical Data (V.S.W.R & GAIN)
- 8.2. Antenna Drawing
- 8.3. Packing Spec Drawing
- 8.4. Reliability Test
- 8.5. Environment Test Report

ace antenna **A**

ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	4/29

## 1. Approval Check List

Approval Check List				
No	Date	Change Contents	Change Cause	Rev
1	2009.03.12	ANTENNA SPECIFICATION		A
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	BT antenna	PAGE	5/29

## 2. Material Certification

No	Part material	Raw material	Processing	Finishing	EA	Raw material company	Processing Plant	Etc
1	CARRIER	SC1004A-KPA1	MOLD	-	1	LG CHEM, LTD.	DUCK SUNG M&P Co.	-
2	PATTERN	STS301	PRESS	-	1	TAIHAN STAINLESS STEEL CO., LTD	DAE JIN	-
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	6/29

### 3. Technical Specifications

#### 3.1 Electrical Specifications.

##### – Slide Down

Electrical Spec.	BAND	
Frequency Range (MHz)	Bluetooth (2400 ~ 2480 MHz)	
V.S.W.R (Max.)	2400 MHz	2480 MHz
	2.7:1 below	3.2:1 below
PEAK GAIN (Min., E2-Plane)	-6.0 dBi	-6.0 dBi
AVERAGE GAIN (Min., H-Plane)	-8.0 dBi	-9.0 dBi

##### – Slide Up

Electrical Spec.	BAND	
Frequency Range (MHz)	Bluetooth (2400 ~ 2480 MHz)	
V.S.W.R (Max.)	2400 MHz	2480 MHz
	3.1:1 below	3.3:1 below
PEAK GAIN (Min., E2-Plane)	-5.6 dBi	-6.3 dBi
AVERAGE GAIN (Min., H-Plane)	-15 dBi	-16 dBi

Impedance(Nominal)	50 ohms
Polarization	VERTICAL
Radiation Pattern	OMNI-DIRECTIONAL
Maximum Power	2 W

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	7/29

### 3.2 Mechanical Specifications

Mechanical Spec.	
Connector	Board contact pin type
Overall length	See drawing
Operating Temperature	-40℃ ~+85 ℃
Weight	About 1.33g (Unit)

### 3.3 Packing Specifications

Packing Spec.		
PRODUCT	QUANTITY (Antenna)	MATERIAL
TRAY	1/30EA	P.S (0.8t)
TRAY INNER PAD	2/600EA	SW 2 type (B corrugated paper)
CARTON BOX	600EA/1BOX	DW 2 type (AB corrugated paper)

ace antenna **A**

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	8/29

## 4. Test Equipment

The equipment for antenna test is as follows,

- ◆ Network Analyzer (E5071C) to measure the V.S.W.R., Standing wave ratio(SWR) and impedance bandwidth of antenna
- ◆ Standard horn antennas adjustable to the Bluetooth bands
- ◆ Anechoic Chamber installed the cables, connectors and equipments for measurements
- ◆ Digital Caliper to measure the dimensions
- ◆ Torque Driver to measure the torque force of the helix
- ◆ Push/Pull gauge to measure the pulling forces
- ◆ Climatic Chamber for environmental tests

ace antenna **A**



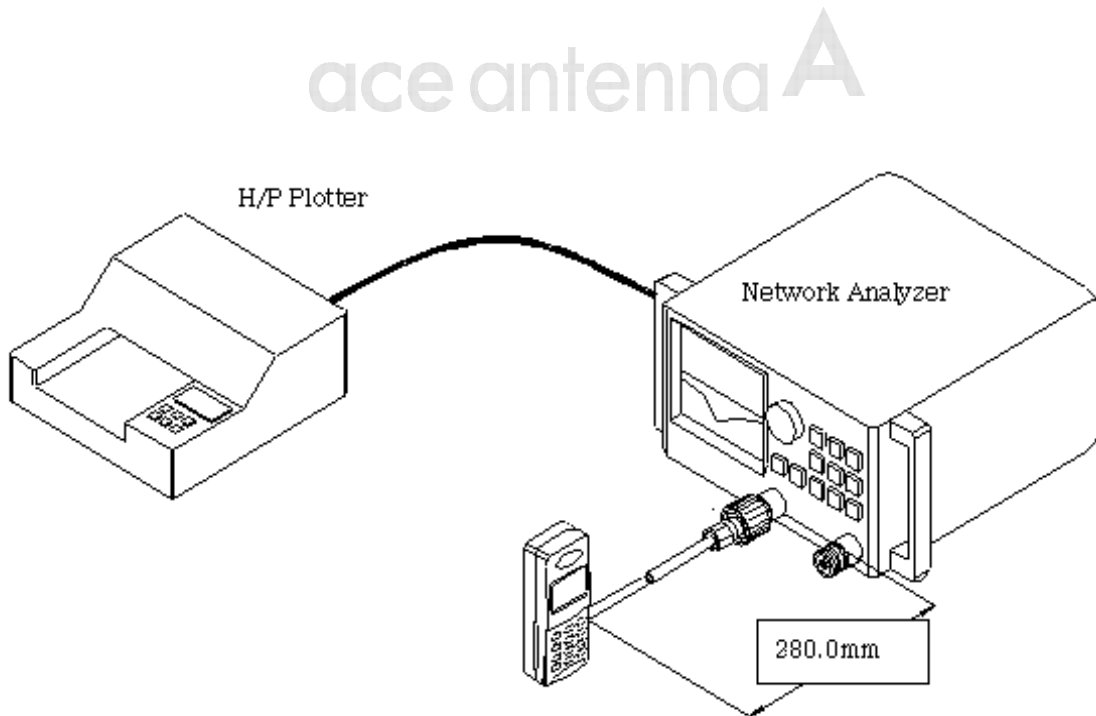
<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	9/29

## 5. Electrical Demands

### 5.1 V.S.W.R

The V.S.W.R characteristics must be satisfied the electrical demands in the below table.

Electrical Spec.	BAND	
Frequency Range (MHz)	Bluetooth (2400 ~ 2480 MHz)	
V.S.W.R (Slide Down)	2400 MHz	2480 MHz
	2.7:1 below	3.2:1 below
V.S.W.R (Slide Up)	2400 MHz	2480 MHz
	3.1:1 below	3.3:1 below



<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	10/29

## 5.2 Radiation Pattern

The radiation pattern must have the omni-directional characteristic in Cellular Band and PCS and AWS Band.

## 5.3 Gain

The gain is expressed as dBi. with condition (E2, H-Plane), the minimum Gain of antenna must be satisfied the electrical demands in the below table.

### - Slide Down State

Frequency Range (MHz)	2400 MHz	2480 MHz
PEAK GAIN (Min., E2-Plane)	-6.0 dBi	-6.0 dBi
AVERAGE GAIN (Min., H-Plane)	-8.0 dBi	-9.0 dBi

### - Slide Up State

Frequency Range (MHz)	2400 MHz	2480 MHz
PEAK GAIN (Min., E2-Plane)	-5.6 dBi	-6.3 dBi
AVERAGE GAIN (Min., H-Plane)	-15 dBi	-16 dBi

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	11/29

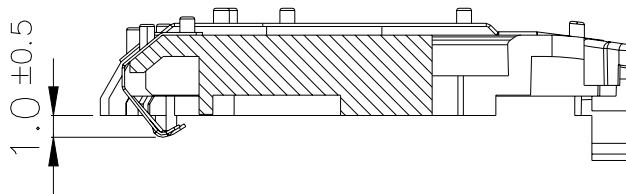
## 6. Mechanical Demands

### 6.1. Contact Pin Force Test

Contact pin of antenna must keep 200g/f  $\pm$ 150 in operation distance.

(Operation distance of antenna is same to under drawing.

PCB overlap : 0mm~1.5mm)



### 6.2. Contact Pin Resistance Test.

After assemble antenna to test equipment, Contact pins are pressed to nominal assembly position 500 times. The antenna contact force must satisfy of (6.1) operation force. (Cycle time: 60 times/min )

### 6.3 Drop Test

The antenna is attached to the handset. The handset is dropped with the antenna downward onto a concrete surface at 1.5 m height and 6 plane

The number of drop is 2 times.

After the test, the original shape shall be possible to restore. The antenna shall satisfy the electrical demands.

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	12/29

## 7.Environmental Demands

### 7.1 Operation Temperature Test

- Test A: Place the antennas for testing in chamber. The chamber condition should be as follows: 1hours at  $-20^{\circ}\text{C}$ .
- Final measurements: The antenna shall be visually inspected and electrically and also mechanically checked as required by products standard.
- Test B: Place the antennas for testing in chamber. The chamber condition should be as follows: 1hours at  $70^{\circ}\text{C}$ .
- Final measurements: The antenna shall be visually inspected and electrically and also mechanically checked as required by products standard.

ace antenna **A**

### 7.2 Temperature Change Test

The object of temperature test is to evaluate the reliability of antenna component at temperature change.

Test: Temperature cycle is as follows. 2 hours at  $-40^{\circ}\text{C}$ .

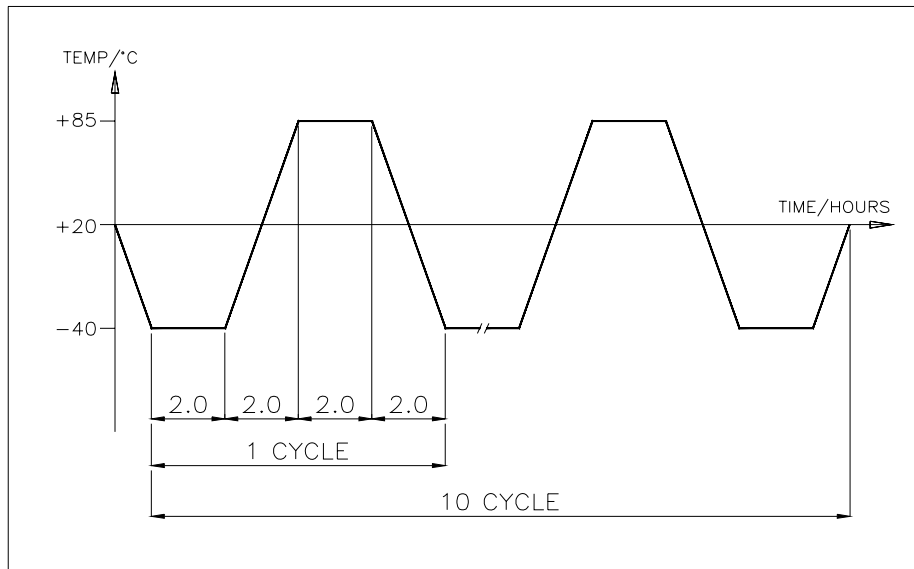
2 hours at  $+85^{\circ}\text{C}$ .

Temperature increase/decrease time (Temperature change time) is

2 hours. 10 cycles.

Final measurements: The antenna shall be visually inspected and electrically and mechanically checked as required by products standard.

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	13/29



### 7.3 High Humidity Test

Test: Place the antennas for testing in chamber. The chamber condition should be as follows: 24hours at +55°C, Relative humidity is 95%.

Final measurements: The antenna shall be visually inspected and electrically and also mechanically checked as required by products standard.

### 7.4 Vibration Test

After assemble antenna to test equipment, Do test in X, Z direction per 1hour as a under spec. The antenna shall be visually inspected and electrically and mechanically checked as required by products standard. The test must satisfy to IEC 68-2-6 spec

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	<b>BT antenna</b>	PAGE	14/29

Vibration frequency	F=5~55~5Hz(1cycle)
Sweeping Rate	0.5 octave/min
Maximum displacement	1.5mm
Maximum acceleration	2 g
Crossover Frequency	18.0Hz

### 7.5 Salt spray Test

Sprayed with the salt spray solution for a period of 96 hours at a temperature of +35°C.

The antenna shall be visually inspected and electrically and mechanically checked as required by products standard. The test must satisfy to IEC 68-2-11 spec .

ace antenna A

### 7.6 Storage temperature Test

After antenna are stored for a period of 96 hours at a temperature of -30 °C and a relative humidity of 95 %. Stored for a period of 96 hours at a temperature of +80 °C and a relative humidity of 95 % (total: 192 hour)

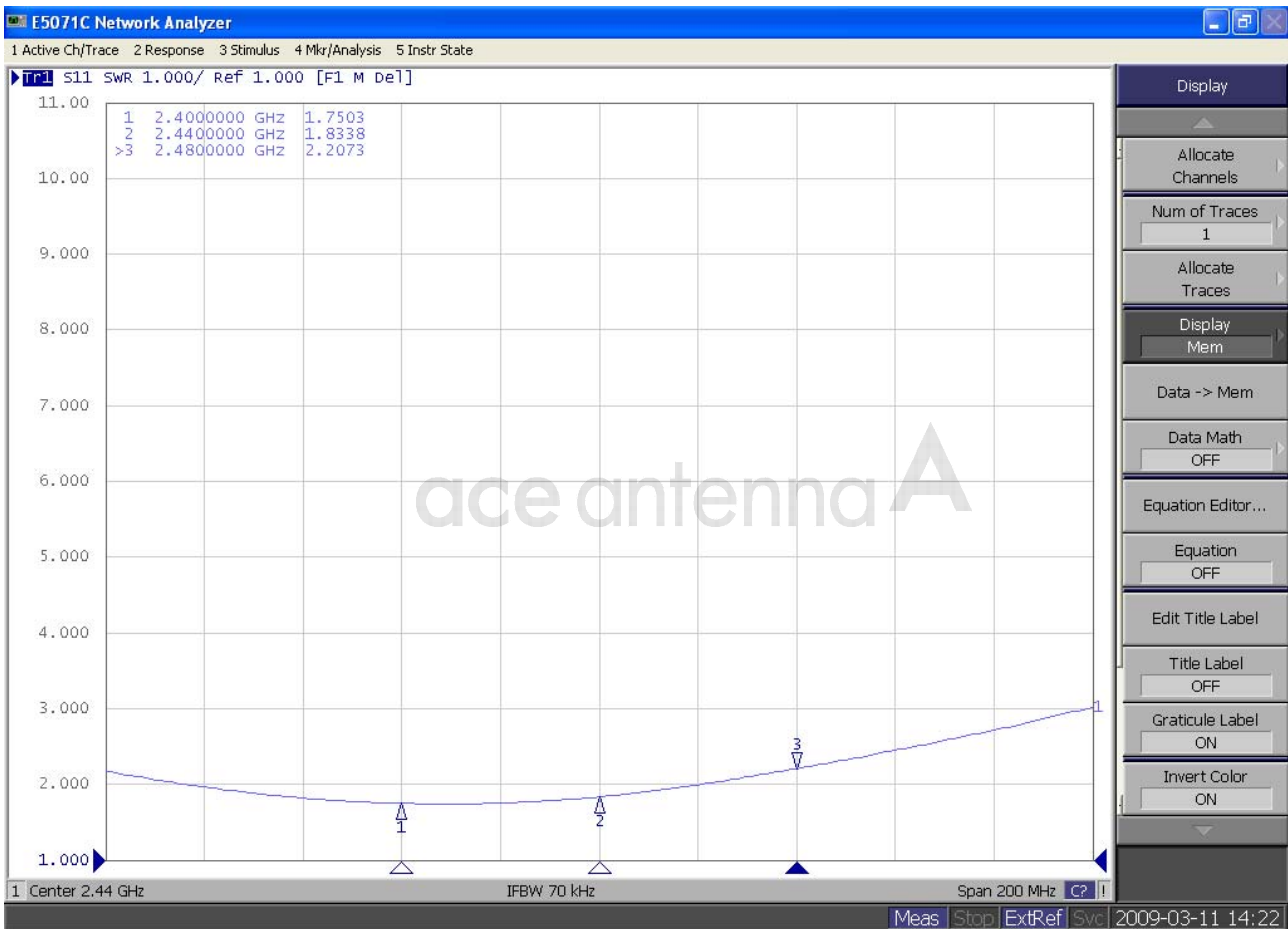
The antenna shall be visually inspected and electrically and mechanically checked as required by products standard.

ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	15/29

## 8. Antenna data

### 8.1. Electrical data(V.S.W.R & GAIN)

→ V.S.W.R (Slide Down)

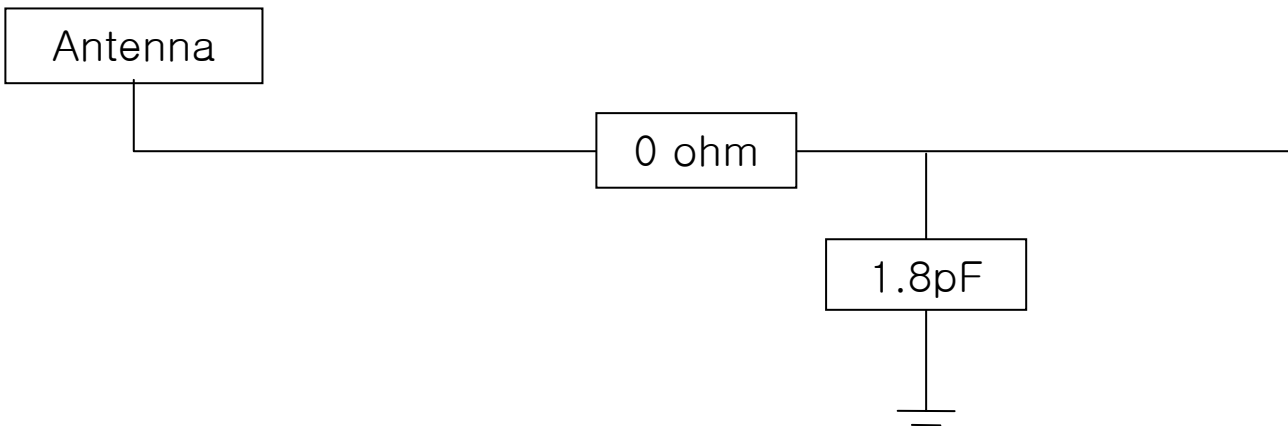


ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	16/29

→ V.S.W.R (Slide Up)



→ Matching Circuit Diagram



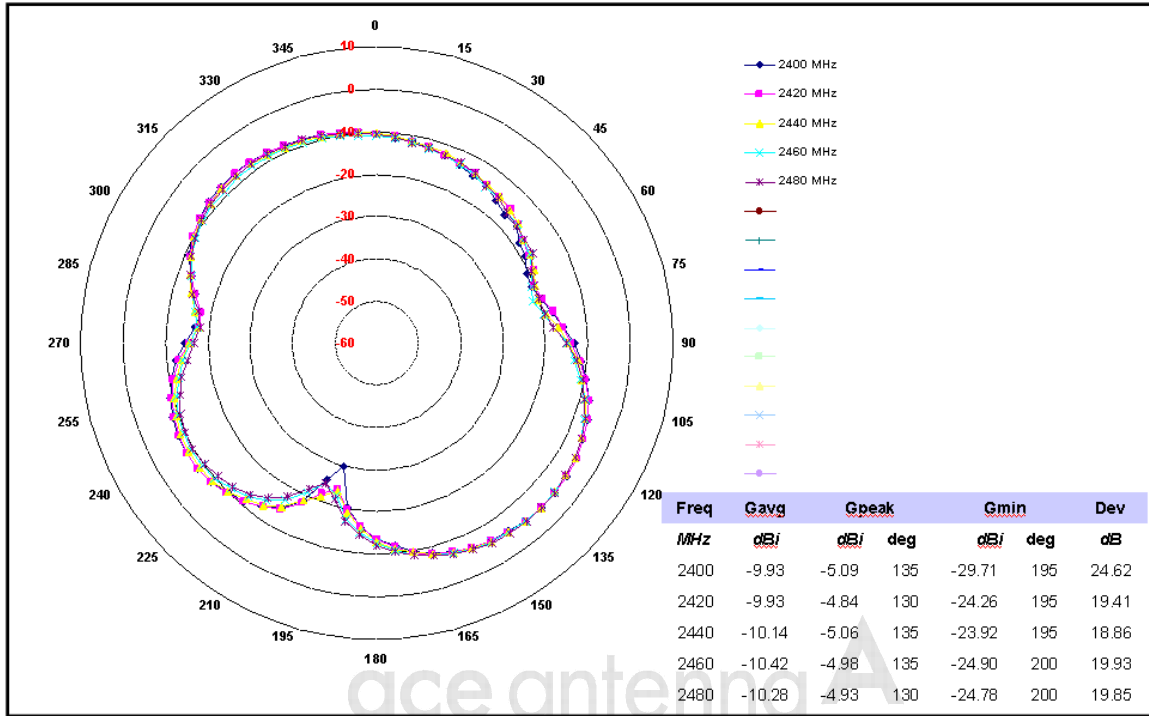


<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	17/29

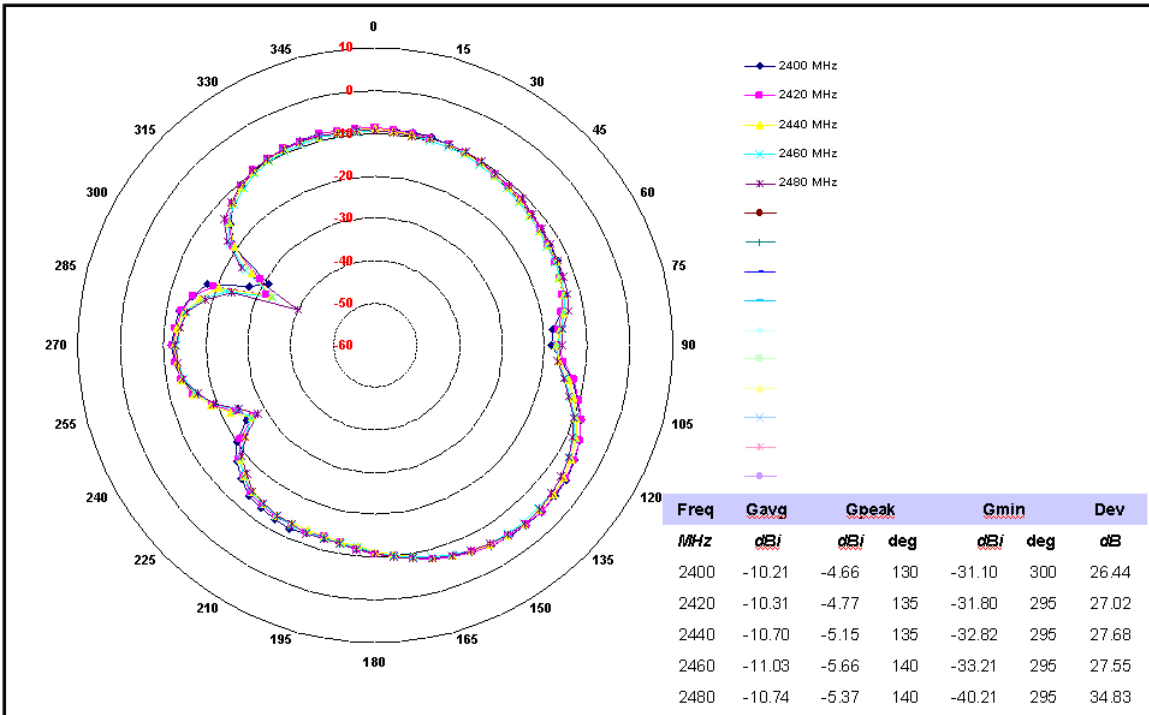
→ GAIN (with Matching Circuit)

- E2-Plane

→ [Slide Down]



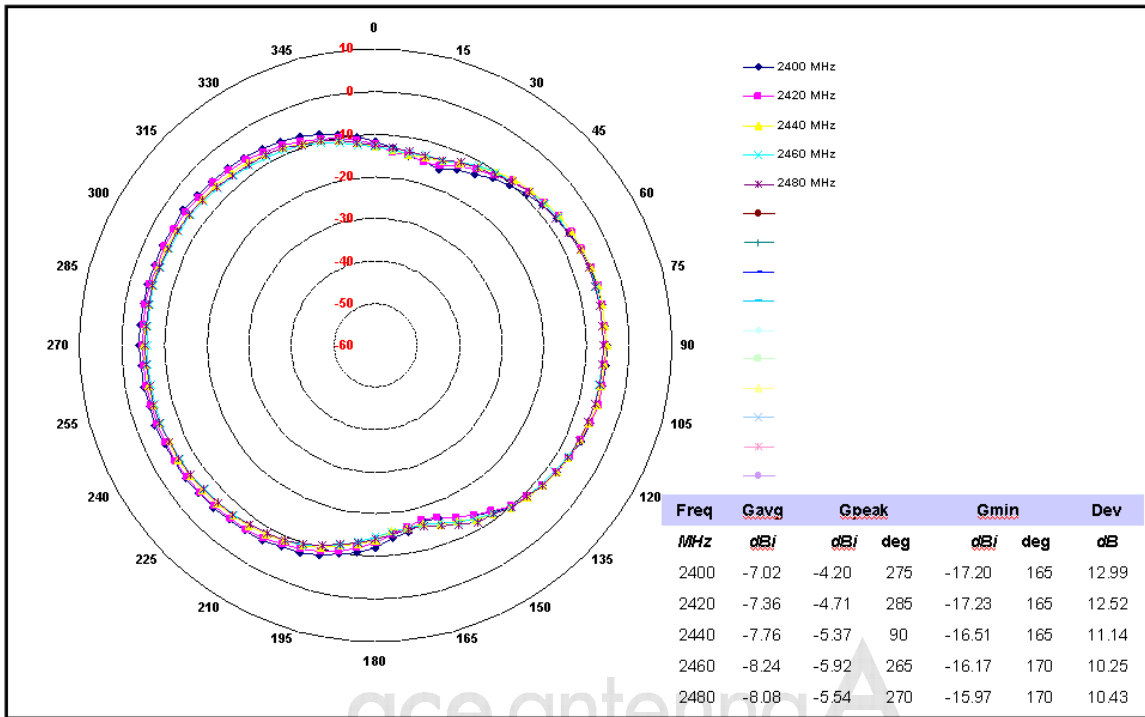
→ [Slide Up]



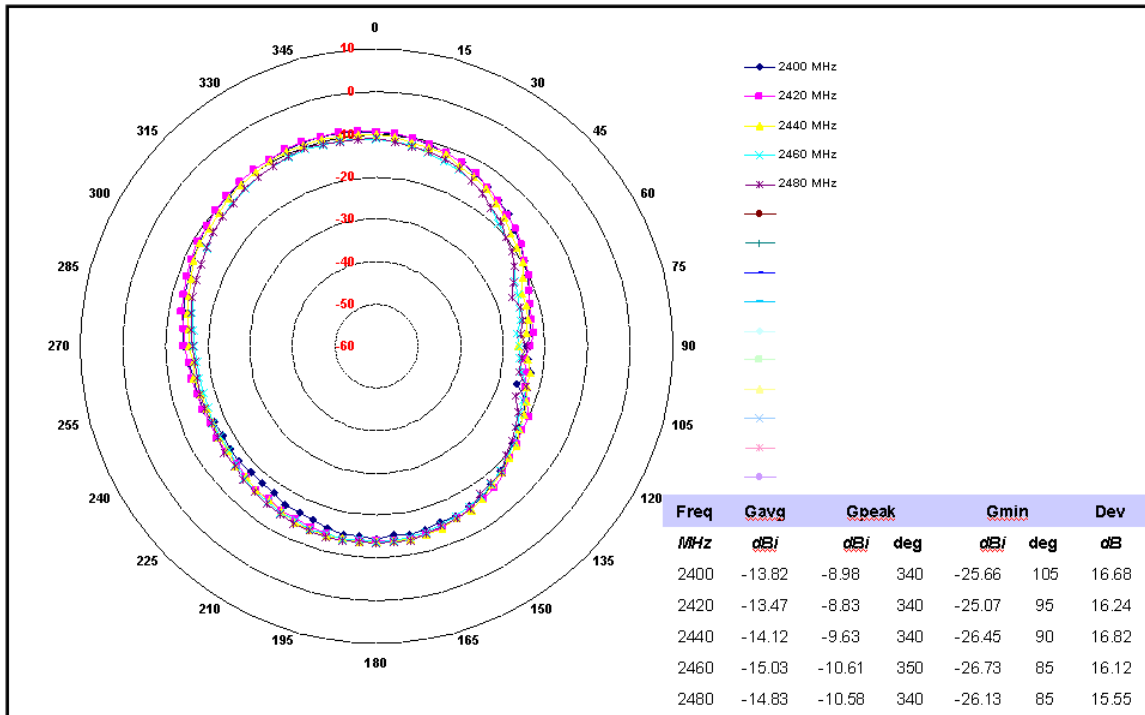
<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	18/29

- H-Plane

→ [Slide Down]

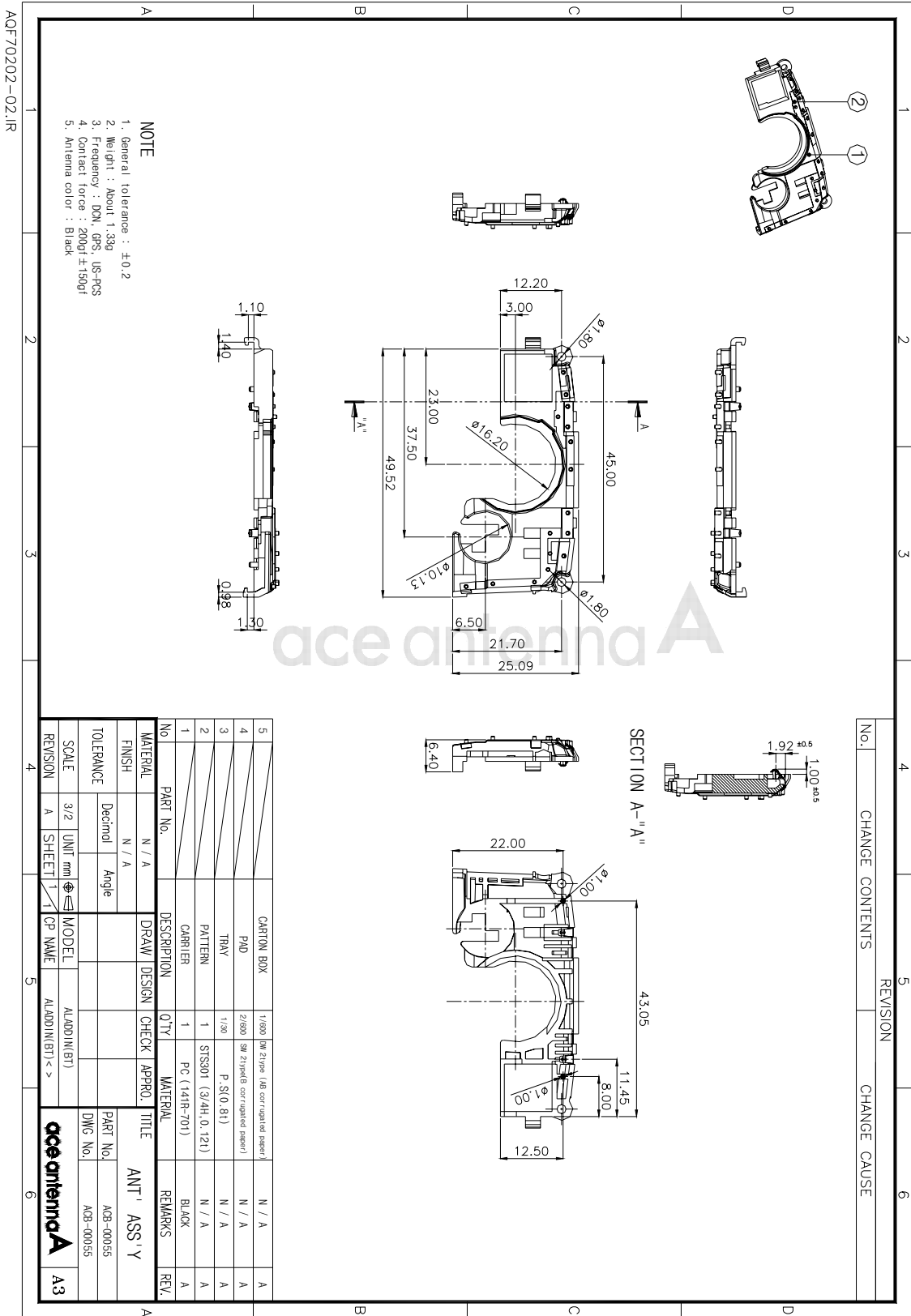


→ [Slide Up]



<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	BT antenna	PAGE	19/29

### 8.2. Antenna Drawing



- NOTE**
1. General tolerance : ±0.2
  2. Weight : About 1.33g
  3. Frequency : GSM, GPRS, US-PCS
  4. Contact force : 200gf ±150gf
  5. Antenna color : Black

No.	PART No.	DESCRIPTION	QTY	MATERIAL	REMARKS	REV.
5		CARTON BOX	1/600	[DW 21 type (48 corrugated paper)]	N / A	A
4		PAD	2/600	[SFR 21 type (8 corrugated paper)]	N / A	A
3		TRAY	1/30	P. S.(0.81)	N / A	A
2		PATTERN	1	STSS01 (3/4H, 0.121)	N / A	A
1		CARRIER	1	PC (141R-701)	BLACK	A

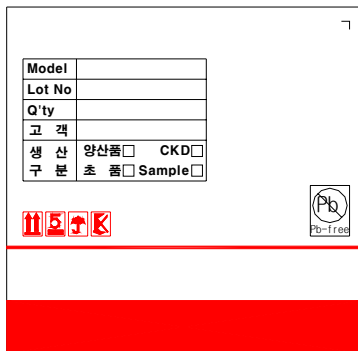
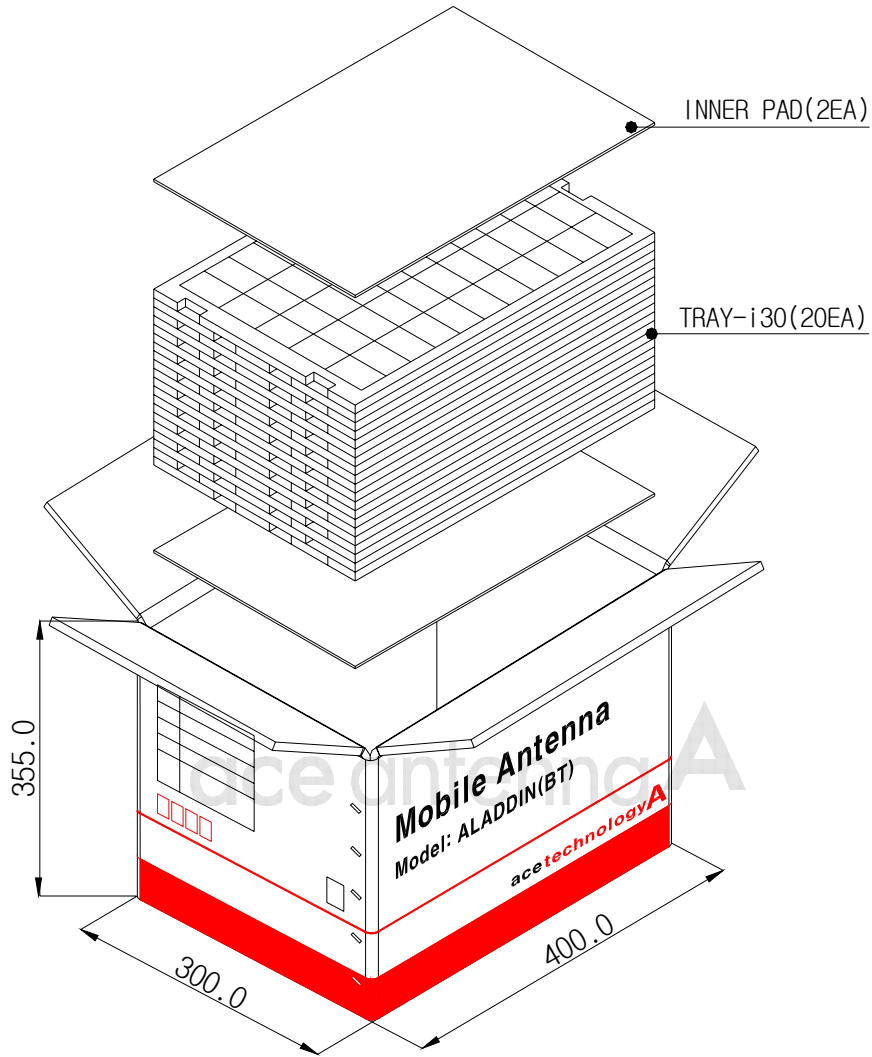
  

MATERIAL	N / A	DRAW	DESIGN	CHECK	APPRO.	TITLE
FINISH	N / A					ANT ASS'Y
TOLERANCE	Decimal	Angle				
SCALE	3/2	UNIT mm	MODEL			
REVISION	A	SHEET 1	CP NAME			

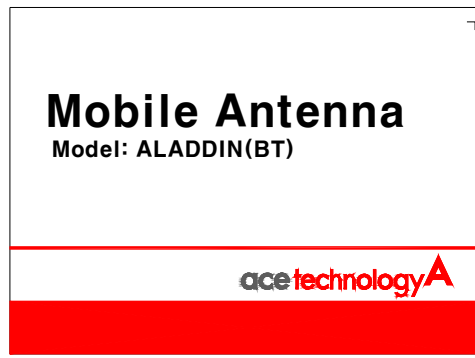
ace antenna A

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	BT antenna	PAGE	20/29

### 8.3. Packing Spec Drawing.



좌측면 인쇄 사양



양쪽 전면 인쇄 사양

ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	21/29

#### 8.4 Reliability Test.

#### 8.5. Environment test report

##### 8.5.1 CARRIER [ LUPOY SC1004A-KPA1 ]



**Test Report No.** F690501/LF-CTSAYAA08-27498

Issued Date: October 13, 2008

Page 1 of 3

**To:** LG CHEM, LTD.  
 LG twin tower 23  
 Yeouuido-dong  
 Yeongdeungpo-gu  
 SEOUL  
 Korea

The following merchandise was submitted and identified by the client as:

**Product Name** : LUPOY SC1004A-KPA1

**SGS File No.** : AYAA08-27498

**Received Date** : October 07, 2008

**Test Performing Date** : October 08, 2008

**Test Performed** : SGS Testing Korea tested the sample(s) selected by applicant with following results

**Test Results** : For further details, please refer to following page(s)

Pluto Kim  
 Monet Jeong  
 Billy Oh / Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

This document is issued by the Company under its General Conditions of Service printed elsewhere or available on request and accessible at <http://www.sgstesting.com/conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction clauses detailed therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its information only and within the limits of Client's instructions. It may, therefore, not be responsible to its Client and this document does not constitute either a transaction nor a warranty of the rights and obligations under the transaction documents. Any unauthorised alteration, forgery or falsification of the content or appearance of this document is intended and criminals may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this file refer to the sample submitted. This document cannot be reproduced without prior approval of the Company.

F052 Ver:0a2

SGS Testing Korea Co., Ltd.

322, The O Valley, 666-9, Rongye-dong, Bongam-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
 t+82 (0)31 4608 0000 f+82 (0)31 4608 0599 http://www.sgslab.co.kr www.kr.sgs.com/greenlab

Member of the SGS Group (Société Générale de Surveillance)

ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	22/29



**Test Report No.** F690501/LF-CTSAYAA08-27498

Issued Date: October 13, 2008

Page 2 of 3

**Sample No.** : AYAA08-27498.001

**Sample Description** : LUPOY SC1004A-KPA1

**Item No./Part No.** : N/A

#### Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

#### Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Dibromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Tribromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Tetrabromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Heptabromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Octabromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Nonabromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Decabromobiphenyl	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Monobromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Tribromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Octabromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.
Decabromodiphenyl ether	mg/kg	US EP A 3540C, GC/MS	5	N.D.

- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm
  - (3) MDL = Method Detection Limit
  - (4) - = No regulation
  - (5) \*\* = Qualitative analysis (No Unit)
  - (6) Negative = Undetectable / Positive = Detectable

This document is issued by the Company under its General Conditions of Service printed elsewhere or available on request and accessible at [http://www.sgs.com/eng/eng\\_conditions.html](http://www.sgs.com/eng/eng_conditions.html). Attention is drawn to the limitation of liability, indemnification and jurisdiction clauses stated therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its issuance only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from waiving all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report are only for the sample submitted. This document cannot be reproduced without prior approval of the Company.

F052 Ver10102

SGS Testing Korea Co., Ltd.

322, The 0 valley, 555-9, Hoge-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
 T+82 (0)31 4908 0000 F+82 (0)31 4908 0999 http://www.sgslab.co.kr www.kr.sgs.com/greenlab

Member of the SGS Group (Société Générale de Surveillance)

ace antenna **A**

ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	23/29

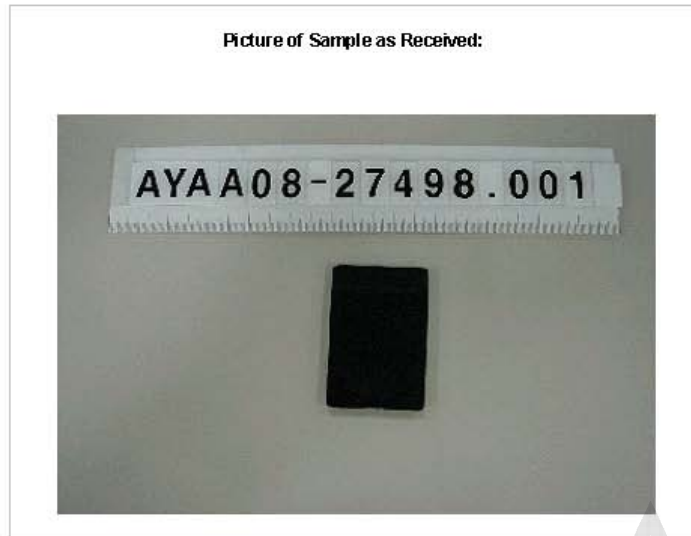


Test Report No. F690501/LF-CTSAYAA08-27498

Issued Date: October 13, 2008

Page 3 of 3

Picture of Sample as Received:



\*\*\* End \*\*\*

- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm
  - (3) MDL = Method Detection Limit
  - (4) - = No regulation
  - (5) \*\* = Qualitative analysis (No Unit)
  - (6) Negative = Undetectable / Positive = Detectable

This document is issued by the Company under its General Conditions of Service printed together or available on request and accessible at <http://www.sgs.com/terms-and-conditions.html>. Attention is drawn to the limitation of liability, indemnification and jurisdiction clauses therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from waiving all their rights and obligations under the transaction documents. Any unwarranted alteration, forgery or falsification of this content or appearance of this document is criminal and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the samples tested. This document cannot be reproduced except in full, without prior approval of the Company.

FD52 Ver 10.12

SGS Testing Korea Co., Ltd.

322, The 0 valley, 666-9, Hoge-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
 t+82 (0)31 4933 0000 f+82 (0)31 4933 0999 http://www.sgstab.co.kr /www.kr.sgs.com/greenlab

Member of the SGS Group (Société Générale de Surveillance)

ace antenna **A**

ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	24/29



**Test Report No.** F690501/LF-CTSAYAA08-27499

**Issued Date:** October 13, 2008

**Page 1 of 2**

**To:** LG CHEM, LTD.  
 LG twin tower 23  
 Yeeuido-dong  
 Yeongdeungpo-gu  
 SEOUL  
 Korea

The following merchandise was submitted and identified by the client as:

**Product Name** : LUPOY SC1004A-KPA1  
**SGS File No.** : AYAA08-27499  
**Received Date** : October 07, 2008  
**Test Performing Date** : October 08, 2008  
**Test Performed** : SGS Testing Korea tested the sample(s) selected by applicant with following results  
**Test Results** : For further details, please refer to following page(s)

ace antenna **A**

Pluto Kim  
 Monet Jeong  
 Billy Oh / Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

This document is issued by the Company under its General Conditions of Service printed together or available on request and accessible at <http://www.sgs.com/brn/eng/condofservice.htm>. Attention is drawn to the limitation of liability, indemnification and jurisdiction clauses therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not constitute parties to a transaction from waiving all their rights and obligations under the transaction documents. Any unauthorised alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report are only for the sample(s) tested. This document cannot be reproduced except in full, without prior approval of the Company.

FD52 Ver 10.12

SGS Testing Korea Co., Ltd.

322, The 0 valley, 666-9, Hogeje-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080  
 t+82 (0)31 4933 0000 f+82 (0)31 4933 0999 http://www.sgstest.co.kr www.kr.sgs.com/greenlab

Member of the SGS Group (Société Générale de Surveillance)

ace antenna **A**



ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	25/29



**Test Report No.** F690501/LF-CTSAYAA08-27499

Issued Date: October 13, 2008

Page 2 of 2

**Sample No.** : AYAA08-27499.001

**Sample Description** : LUPOY SC1004A-KPA1

**Item No./Part No.** : N/A

#### Halogen Contents

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	EN 14582:2007 , IC	30	N.D.
Chlorine(Cl)	mg/kg	EN 14582:2007 , IC	30	N.D.

Picture of Sample as Received:



\*\*\* End \*\*\*

**NOTE:**

- (1) N.D. = Not detected.(<MDL)
- (2) mg/kg = ppm
- (3) MDL = Method Detection Limit
- (4) - = No regulation
- (5) \*\* = Qualitative analysis (No Unit)
- (6) Negative = Undetectable / Positive = Detectable

This document is issued by the Company under its General Conditions of Service printed together or available on request and accessible at [http://www.sgs.com/terms\\_and\\_conditions.html](http://www.sgs.com/terms_and_conditions.html). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained herein reflects the Company's findings at the time of the information only and within the limits of Client's instructions. In any case, the Company's sole responsibility is to its Client and this document does not constitute parties to a transaction nor assumption of their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated, the results shown in this file refer to the sample tested. This document cannot be reproduced or copied in full, without prior approval of the Company.

FD52 Ver:01/2

SGS Testing Korea Co., Ltd.

322, The O-wallye, 555-B, Hoge-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-030  
 t +82 (0)31 4608 0000 f +82 (0)31 4608 0999 http://www.sgstbb.co.kr www.kr.sgs.com/greenlab

Member of the SGS Group (Société Générale de Surveillance)

ace antenna **A**

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	<b>ALADDIN(BT)</b>	TYPE	BT antenna	PAGE	26/29

## 8.5.2 PATTERN [ STS 301 ]



**Test Report No. F690501/LF-CTSAYA07-25043**

Issued Date: November 14, 2007 Page 1 of 4

To: TAIHAN STAINLESS STEEL CO., LTD  
603 Seonggok-dong  
Danwon-gu  
Ansan-city  
GYEONGGI-DO  
Korea

The following merchandise was submitted and identified by the client as :

Product Name : STS301  
SGS File No. : AYA07-25043  
Received Date : November 08, 2007  
Test Performing Date : November 09, 2007  
Test Performed : SGS Testing Korea tested the sample(s) selected by applicant with following results  
Test Results : For further details, please refer to following page(s)  
Buyer(s) : LG,SAMSUNG

ace antenna **A**

Pluto Kim  
Monet Jeong  
Billy Oh / Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

This document is issued by the Company subject to its General Conditions of Service printed overleaf or available on request and accessible at [www.sgs.com](http://www.sgs.com). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. Unless otherwise stated the results shown in this test report refer only to the sample (s) tested. This document cannot be reproduced except in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this report is unlawful and offenders may be prosecuted to the fullest extent of the law.

F052 Version2

ace antenna **A**

<b>ANTENNA SPECIFICATION</b>		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	27/29


**Test Report No.** F690501/LF-CTSAYA07-25043

Issued Date: November 14, 2007 Page 2 of 4

**Sample No.** : AYA07-25043.001  
**Sample Description** : STS301  
**Style/Item No.** : N/A  
**Comments** : Material is stainless steel.

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

**Flame Retardants-PBBs/PBDEs**

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Monobromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.

NOTE: (1) N.D. = Not detected. (<MDL)  
 (2) mg/kg = ppm  
 (3) MDL = Method Detection Limit  
 (4) - = No regulation  
 (5) \*\* = Qualitative analysis (No Unit)  
 (6) Negative = Undetectable / Positive = Detectable

This document is issued by the Company subject to its General Conditions of Service printed overleaf or available on request and accessible at [www.sgs.com](http://www.sgs.com). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This document cannot be reproduced except in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this report is unlawful and offenders may be prosecuted to the fullest extent of the law.

F052 Version2

ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	28/29

# SGS

Test Report No. F690501/LF-CTSAYA07-25043

Issued Date: November 14, 2007 Page 3 of 4



ace antenna **A**

- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm
  - (3) MDL = Method Detection Limit
  - (4) - = No regulation
  - (5) \*\* = Qualitative analysis (No Unit)
  - (6) Negative = Undetectable / Positive = Detectable

This document is issued by the Company subject to its General Conditions of Service printed overleaf or available on request and accessible at [www.sgs.com](http://www.sgs.com). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. Unless otherwise stated the results shown in this test report refer only to the sample (s) tested. This document cannot be reproduced except in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this report is unlawful and offenders may be prosecuted to the fullest extent of the law.

F052 Version2

ace antenna **A**

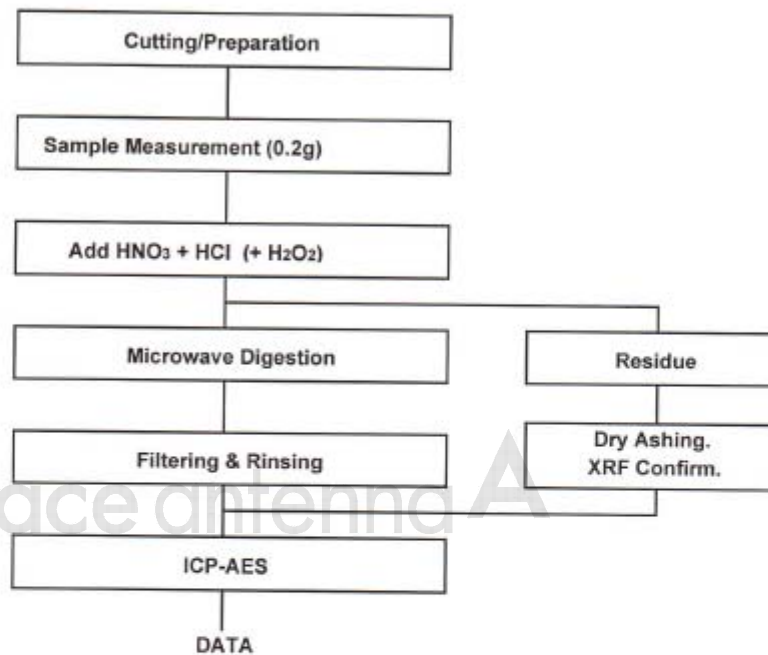
ANTENNA SPECIFICATION		DATE	2009-03-12	REV.	A
MODEL	ALADDIN(BT)	TYPE	BT antenna	PAGE	29/29

Test Report No. F690501/LF-CTSAYA07-25043

Issued Date: November 14, 2007 Page 4 of 4

### Flow Chart of Digestion

(EPA 3052 for Cd, Pb)



The samples were dissolved totally by pre-conditioning method according to above flow chart.

Operator Dami Yeom

Section Chief Jeff Jang

\*\*\* End \*\*\*

- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm
  - (3) MDL = Method Detection Limit
  - (4) - = No regulation
  - (5) \*\* = Qualitative analysis (No Unit)
  - (6) Negative = Undetectable / Positive = Detectable

This document is issued by the Company subject to its General Conditions of Service printed overleaf or available on request and accessible at [www.sgs.com](http://www.sgs.com). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. Unless otherwise stated the results shown in this test report refer only to the sample (s) tested. This document cannot be reproduced except in full, without prior approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this report is unlawful and offenders may be prosecuted to the fullest extent of the law.

F052 Version2