



Date :2012. 11. 15

SPECIFICATION

Product Name	Antenna
Customer	Samsin innotec
Model Name	Iriver-on antenna
Customer Code.	
Provider	RadiAnt
Part Code.	RKA1233-0000AA

Buyer	Submitted	Checked		Approved
RadiAnt	Submitted	Checked	Checked	Approved
				



– Table of Contents –

1. Product History-----	3
2. Electrical Feature -----	4
2.1 Frequency Band	
2.2 Impedance	
2.3 VSWR	
2.4 Directivity	
2.5 Maximum Power	
3. Environment Test -----	6
4. Electric Performance Data -----	8
5. Drawing -----	10
6. Certification of RoHS -----	11



1. Product History

LIST

NO	Data	Front	After	Change	REV
1	2012.11.15			Approval	0
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					



2. Electrical Feature

2.1. Frequency Band

BAND	Bluetooth
FREQUENCY	2.4GHz~2.485GHz

2.2 Impedance

2.2.1 Input Impedance

- $R = 50\Omega$

2.2.2 Measuring Method

By using Network Analyzer, connect the antenna installed Set Bluetooth terminal to the reflection point of Analyzer and measure the impedance value within the designated frequency band.

2.3 VSWR

Impedance Matching optimization is performed under the below mentioned environment.

2.3.1 Free Space Environment

BAND	Bluetooth			
FREQ	2.4GHz	2.425GHz	2.45GHz	2.485GHz
VSWR	2.0:1	2.0:1	2.0:1	2.0:1



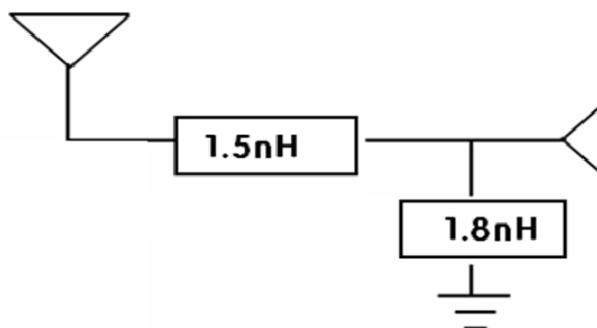
2.3.2 Measuring Method

Connect (soldering) 50Ω semi-rigid coaxial cable to the 50Ω spot in Set Bluetooth terminal. To minimize the loss of transmission, semi-rigid coaxial cable is used. Including PCB, the Set Bluetooth terminal shouldn't be different from the one, which will be used for mass production.

Specification should be the same for all frequency bands. Free Space means that Set Bluetooth terminal is put on the surface of no conducting plastic.

2.3.3 Matching circuit

Matching Circuit is composed in free space of 2.1 frequency band while satisfying customer's requirements.



<Figure 2.3.1 Matching circuit>

2.4 Directivity

Directional (Horizontal)

BAND		2.4GHz	2.425GHz	2.45GHz	2.485GHz
GAIN	AVG	-3.90dBi	-4.12dBi	-3.68dBi	-4.12dBi
	Peak	1.43dBi	1.23dBi	1.27dBi	0.81dBi

2.5 Maximum Power

- P=2W Under



3. Environment Test

3.1 Operating Temperature Test

3.1.1 Test Condition

Temperature = -30°C, +80°C

Duration time = 1 hour

3.1.2 Requirements

After the test, the antenna must not have an outer damage, and also it

must pass requirement shown in 2.4.

3.1.3 Measuring Method

Antenna is kept at -30°C for 1 hour and +80°C for 1 hour and than

passed test of 2.4

3.2 Temperature Cycling Test

3.2.1 Test Condition

- Low cycling Temperature TLC = -40°C
- High cycling Temperature THC = +80°C
- 1Cycle = 4 hours
- Test number = 10Cycle

3.2.2 Requirements

After the test, the antenna must not have an outer damage, and also it

must pass requirement shown in 2.4.

3.2.3 Measuring Method

Antenna is kept at low temperature -40°C for 2 hours and increase the temperature up to $+80^{\circ}\text{C}$ within 2 hour and kept for another 2 hours at the same temperature will be 1 cycle. As shown in Figure 3.2.1 repeat 10 cycle and kept for 2 hour in normal temperature.

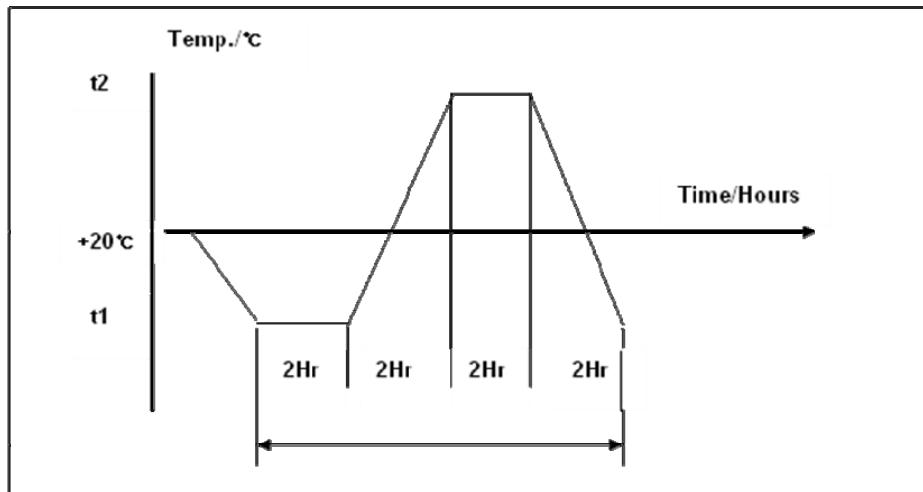


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

- NaCl = 90%
- Water Temperature = 60°C
- Duration Time = 96 hours

3.3.2 Requirements

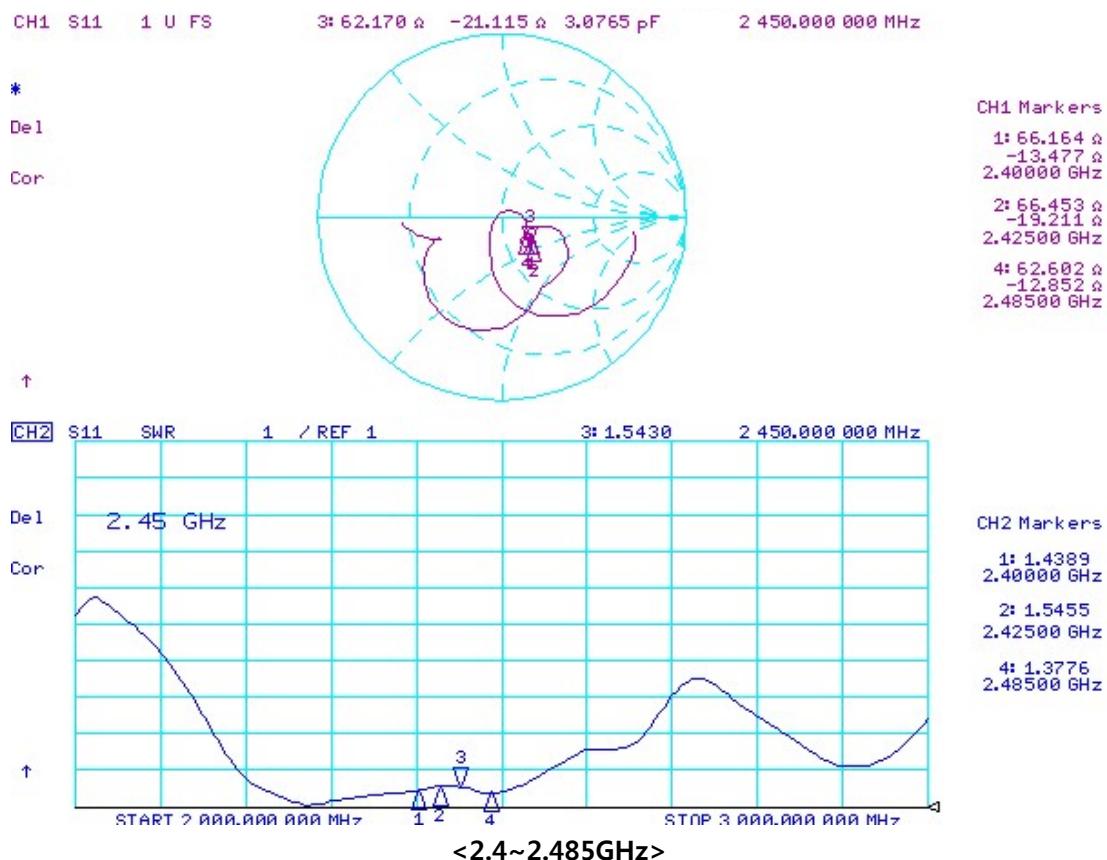
After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.3.3 Measuring Method

Antenna is soaked in sodium chloride solution at temperature $+60^{\circ}\text{C}$ and 90%(NaCl) for 96 hours and dry out.

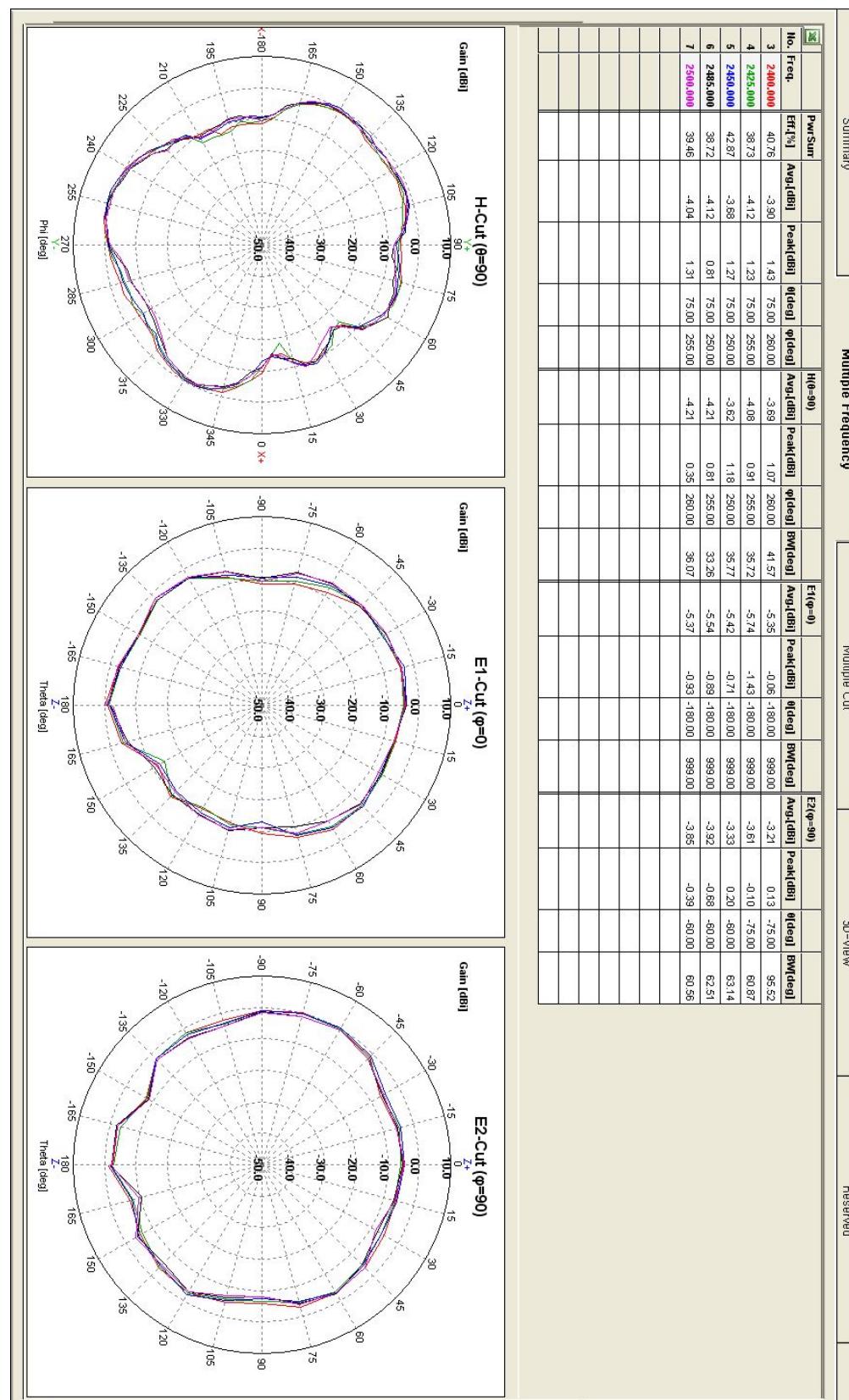
4. Electric Performance Data

4.1. Smith Chart & VSWR



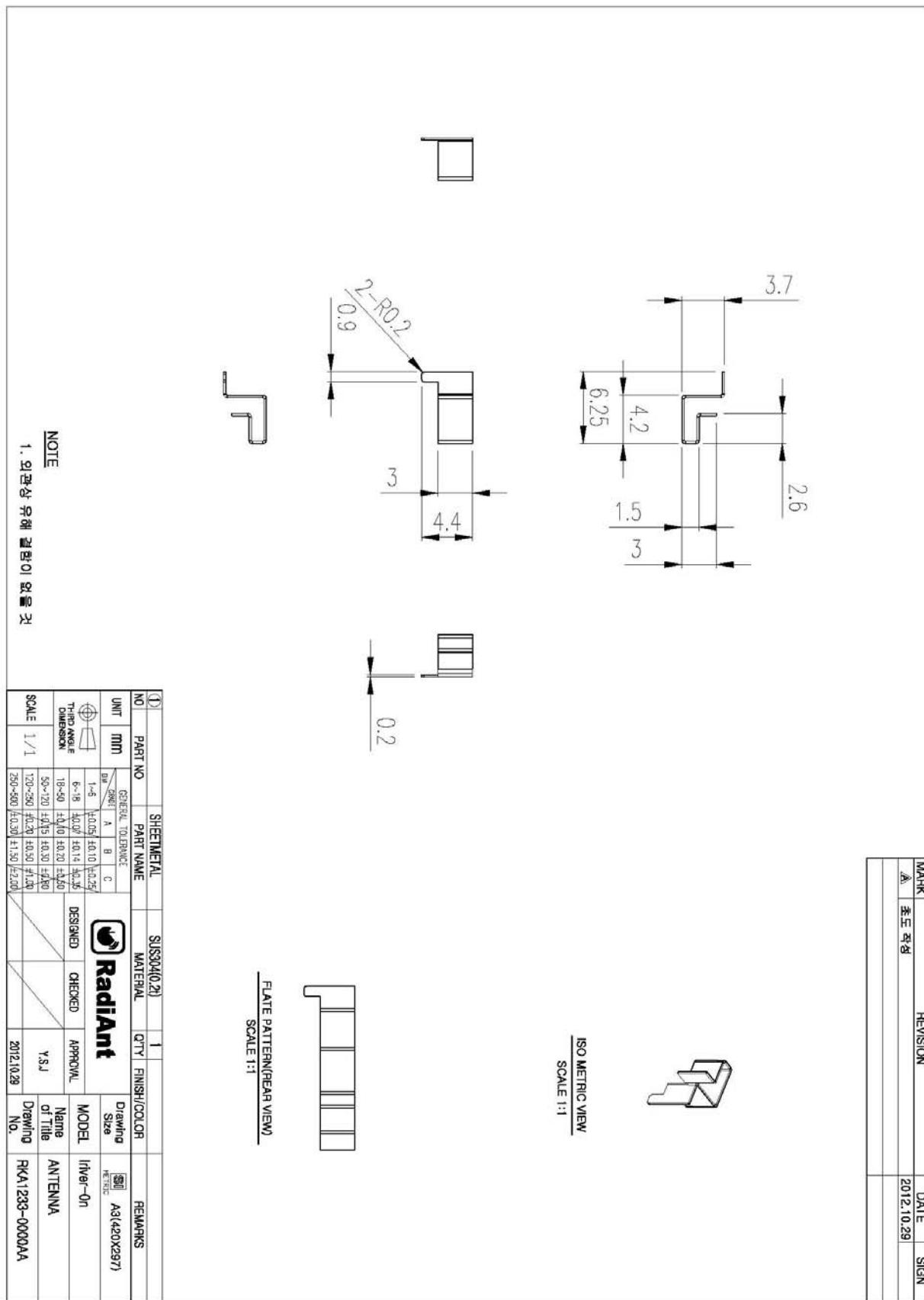
4.2. GAIN DATA

4.2. 3D-Gain Data (2.4~2.485GHz)





5. Drawing





6.Certification of RoHS

6-1. SUS304

**Test Report No.** F690101/LF-CTSAYAA12-08483

Issued Date: 2012. 03. 02 Page 1 of 4

To: **IETAL CO., LTD.**
100B-15L Namdong Industrial, #666-18
Gojan-Dong
Namdong-Gu
Incheon
Korea

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

SGS File No. : AYAA12-08483
Product Name : SUS 304
Item No./Part No. : N/A
Received Date : 2012. 02. 27
Test Period : 2012. 02. 28 to 2012. 03. 02
Test Results : For further details, please refer to following page(s)
Test Performed : SGS Korea tested the sample(s) selected by applicant with following results.

SGS Korea Co. Ltd.

Timothy Jeon
Jinhee Kim
Cindy Park
Jerry Jung/ Testing Person

Jeff Jang / Chemical Lab Mgr

This document is issued by the Company subject to the General Conditions of Business printed on back, available on request or accessible at www.sgs.com/kr and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/kr.
All rights are reserved to the Company, including, inter alia, the right to cancel this document if it becomes evident that it has been used for purposes other than those for which it was issued. The Company's liability in respect of this document is limited to the sum of the fees charged for the issue of this document. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content of this document will be cause for the total cancellation of the test report and may result in the suspension of the Company's license to practice.

SGS Korea Co.,Ltd.

322, The O valley, 555-9, Hopye-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080
t+82 (0)31 4808 0000 f+82 (0)31 4808 050 <http://www.sgslab.co.kr> www.kr.sgs.com/gsantab

FO52 Version4

Member of the SGS Group (Société Générale de Surveillance)



Test Report No. F690101/LF-CTSAYAA12-08483

Issued Date: 2012. 03. 02 Page 3 of 4

Sample No. : AYAA12-08483.001
Sample Description : SUS 304
Item No./Part No. : N/A
Materials : N/A

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, GC-MS	5	N.D.



NOTE: (1) N.D. = Not detected.(<MDL)

(2) mg/kg = ppm

(3) MDL = Method Detection Limit

(3) MDE = Method D
(4) - = No regulation

(5) Negative = Undetectable / Positive = Detectable

(B) *** = Qualitative analysis (No Unit)

(6) = Qualitative analysis (NB
(7) * = Boiling-water-extraction

- Boiling-water-extraction:
Negative = Absence of CrVI coating

Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

322, The O valley, 555-8, Hogyo-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080

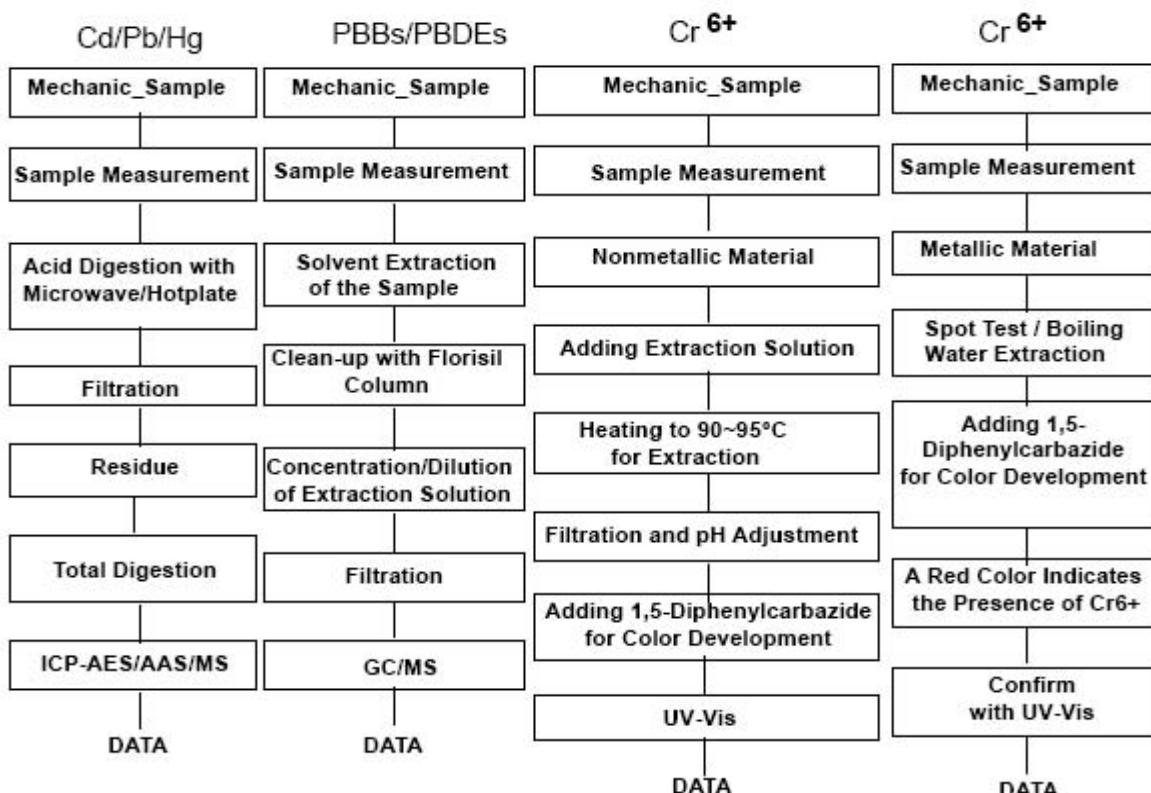
Members of the SOS Group (Béatrice Gérard de Saint-Pierre)



Test Report No. F690101/LF-CTSAYAA12-08483

Issued Date: 2012-03-02 Page 4 of 4

Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr⁶⁺ /PBBs&PBDEs Testing



The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg. Section Chief : Gilseae Yi

*** End ***

NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = Boiling-water-extraction:
 Negative = Absence of CrVI coating
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

322, The O valley, 555-8, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080
E-mail: info@ssgkorea.co.kr

EFCA Version 1

卷之三



6-2. Ni도금

**Test Report No. F690101/LF-CTSAYAA12-11059**

Issued Date: 2012. 03. 20 Page 1 of 5

To: **MAIN TECH**
3B, 2-1L Banwol Industrial Complex
393-7, Moknae-dong, Danwon-gu
Ansan-si
Gyeonggi-do
Korea

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

SGS File No. : AYAA12-11059
Product Name : Electroless Ni Plating Agent
Item No./Part No. : N/A
Received Date : 2012. 03. 15
Test Period : 2012. 03. 16 to 2012. 03. 20
Test Results : For further details, please refer to following page(s)
Test Performed : SGS Korea tested the sample(s) selected by applicant with following results.

SGS Korea Co. Ltd.

Timothy Jeon
Jinhee Kim
Cindy Park
Jerry Jung/ Testing Person

Jeff Jang / Chemical Lab Mgr

This document is issued by the Company subject to the General Conditions of Testing for products available on request or accessible at [http://www.sgs.com/sgs-lab-testing/chemicals-testing/chemicals-testing](http://www.sgs.com/sgs-lab-testing/chemicals-testing/chemicals-testing/chemicals-testing) and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at [http://www.sgs.com/sgs-lab-testing/chemicals-testing/chemicals-testing](http://www.sgs.com/sgs-lab-testing/chemicals-testing/chemicals-testing/chemicals-testing). Any holder of this document is advised that the Company's original at the time of issuance is the only document that binds the Company to the terms of the General Conditions of Testing for products, and that the electronic version of this document does not constitute a binding contract in the event of any dispute. This document can not be reproduced except in the event of written approval of the Company. Any such visual alteration, forgery or falsification of the content or terms otherwise stated the results of test referred to in the sample tested and such samples are retained for 180 days only.

SGS Korea Co.,Ltd.

322, The O valley, 565-8, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080

t +82 (0)31 4909 000 F +82 (0)31 4909 059 <http://www.sgslab.co.kr> www.kr.sgs.com/ysrcslab

F052 Version4

Member of the SGS Group (Société Générale de Surveillance)

**Test Report No. F690101/LF-CTSAYAA12-11059**

Issued Date: 2012. 03. 20 Page 2 of 5

Sample No. : AYAA12-11059.001
Sample Description : Electroless Ni Plating Agent
Item No./Part No. : N/A
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, ICP	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, ICP	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008, UV-VIS	1	N.D.

Inorganic Contents

Test Items	Unit	Test Method	MDL	Results
Bromide (Br ⁻)	mg/L	US EPA300.0, IC	30	N.D.
Chloride (Cl ⁻)	mg/L	US EPA300.0, IC	30	38

NOTE: (1) N.D. = Not detected.(<MDL)

(2) mg/kg = ppm

(3) MDL = Method Detection Limit

(4) - = No regulation

(5) Negative = Undetectable / Positive = Detectable

(6) ** = Qualitative analysis (No Unit)

(7) * = Boiling-water-extraction:

Negative = Absence of CrVI coating

Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

This document is issued by the Company subject to the Conditions of Service printed on front, available on request or accessible at www.sgs.com/kr and www.sgs.com/kr and www.sgs.com/kr. Any rights in or to the document are reserved by the Company. Any unauthorized reproduction of the document is prohibited. Information contained herein reflects the Company's knowledge of the facts at the time this document was issued and until the date of Cradle-to-Gate, Korea. The Company is not responsible for any errors and omissions due to inaccurate, partial or incomplete information or for any changes in the facts occurring after the date of issue. This document can be reproduced except in the circumstances of the Company's written approval. Any unauthorized alteration, forgery or falsification of the content of this document is a crime and offenders may be prosecuted to the full extent of the law. Under otherwise stated the results shown in this test report refer only to the sample(s) tested and such(s) property are retained for 100 days only.

SGS Korea Co.,Ltd.

322, The O Valley, 555-9, Hopyeong-dong, Gwangju-si, Gyeonggi-do, Korea 431-080

t+82 (0)31 4805 000 F+82 (0)31 4805 050 <http://www.sgs.com/kr> www.kr.sgs.com/kr

F052 Version4

Member of the SGS Group (Société Générale de Surveillance)



Picture of Sample as Received:

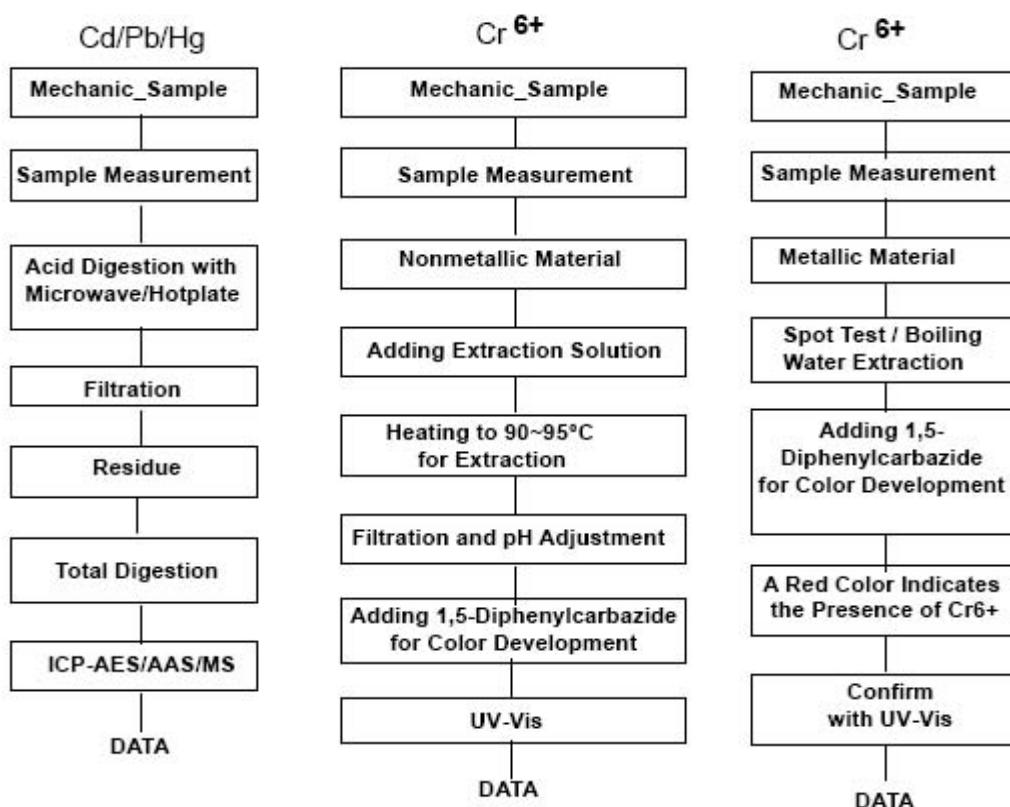


NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = Boiling-water-extraction:
 Negative = Absence of CrVI coating
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction
 solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

This document is issued by the Company subject to its General Conditions of Service printed inside, available on request or accessible on www.sgs.com/gcs and, for instance, General documents, subject to Terms and Conditions for Breeding Countries of www.sgs.com/gcs and, subject to the conditions of delivery, the Company is not liable for any damage resulting from the use of this document. Information and services provided by the Company in relation to the use of this document only entitle the holder of this document to sue the Company in respect of the damage resulting from the use of this document in accordance with the laws of the country in which the damage occurred. This document may not be reproduced except in the circumstances indicated in the General Conditions of Service. SGS is trademarks of the Company. All other trademarks, service marks and registered trademarks are the property of their respective owners.

SGS Korea Co.,Ltd. 322, The O valley, 555-9, Hopye-dong, Dongtan-gu, Anyang-si, Gyeonggi-do, Korea 431-080

t +82 (0)31 4808 000 f +82 (0)31 4808 050 <http://www.sgsk.co.kr> www.kr.sgs.com/gcs/kr

Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr⁶⁺ Testing

The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg.
Section Chief : Gilsae Yi

NOTE: (1) N.D. = Not detected.(<MDL)

(2) mg/kg = ppm

(3) MDL = Method Detection Limit

(4) - = No regulation

(5) Negative = Undetectable / Positive = Detectable

(6) ** = Qualitative analysis (No Unit)

(7) * = Boiling-water-extraction:

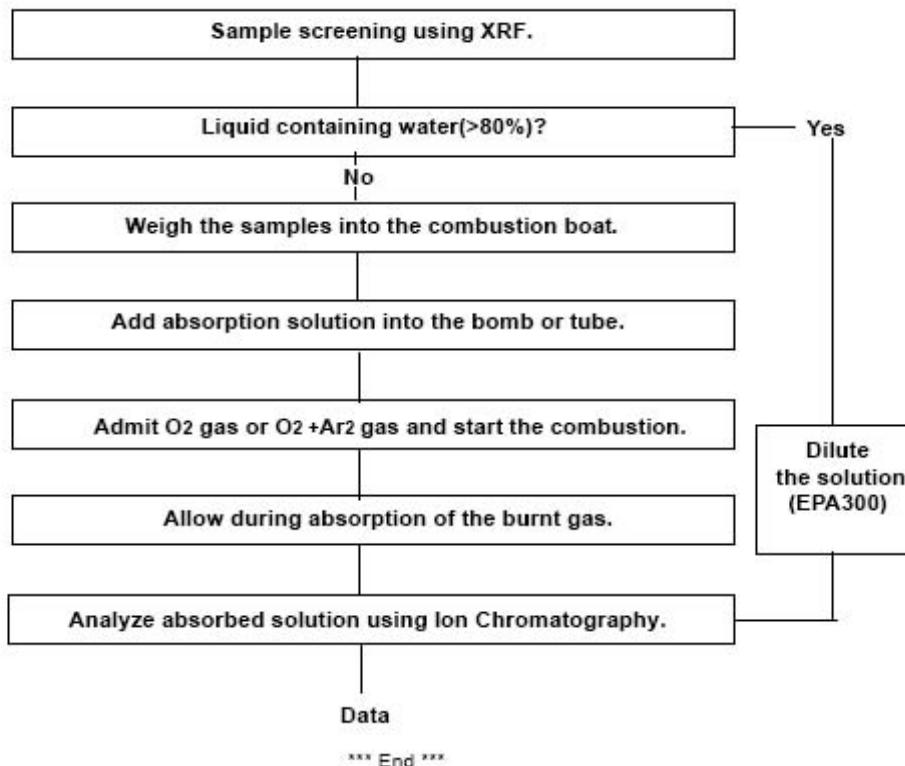
Negative = Absence of Cr⁶⁺ coating

Positive = Presence of Cr⁶⁺ coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

This document is issued by the Company subject to the General Conditions of Service printed on back, available on request or accessible through our website. For inquires about documents, please refer to Terms and Conditions for Radiant Documents at www.radiant-lab.com. Any use of this document is subject to the General Conditions of Service. Any document issued by the Company may only be used for the purpose intended and within the scope of the test. Any unauthorized use of this document may be prosecuted to the full extent of the law. This document can be reproduced except in the official form as approved by the Company. Any unauthorized alteration, forgery or falsification of the content of this document is illegal and offenders may be prosecuted to the full extent of the law.



Flow Chart for Halogen Test



NOTE: (1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = Boiling-water-extraction:
 Negative = Absence of CrVI coating
 Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction
 solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

This document is issued by the Company subject to the General Conditions of Business or other contract, available on request or accessible through our website, and applies to the test. For electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms-and-conditions. Any use of this document, in whole or in part, without prior written permission from the Company, is illegal. The Company shall not be liable for any damages resulting from the use of this document. The Company shall not be liable for any damages resulting from the use of this document, in whole or in part, without prior written permission from the Company, in the event of any infringement of the Company's rights and interests. The document can be reproduced except in the electronic version agreed by the Company. Any use and distribution, copying or translation of the content of this document is subject to the terms and conditions set out in the General Conditions of Business or other contract.

SGS Korea Co.,Ltd. 322, The O valley, 555-8, Hogye-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-080
t +82 (0)31 4808 000 f +82 (0)31 4808 050 <http://www.sgskorea.co.kr> www.kr.sgs.com/ko/ko/standards