

Document	Datasheet
Type	Dielectric Chip Antenna
Application	2.442 GHz
Part No.	AMAN802012MS02
Revision	0.0

DATASHEET

Application

Bluetooth (2.442 GHz)

Features

PIFA structure

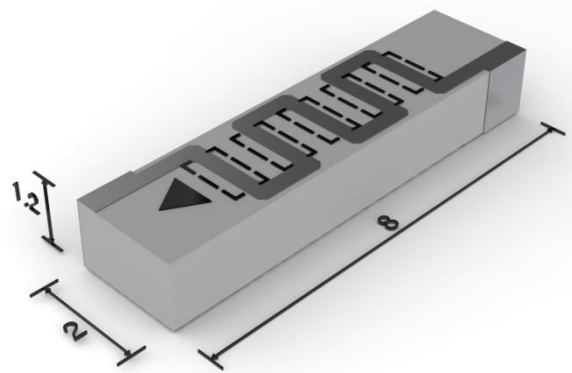
Size (8.0*2.0*1.2mm³)

Performance optimizing

with tuning the conductive pattern on the ceramic body

SMT available under Pb-free condition

RoHS compliant



AMOTECH

Notes

The contents of this datasheet are subject to change without notice. Please confirm the specifications and delivery conditions when placing your order.

Revision History

Rev. No	Date	Title	Contents	Page
0	2012. 08. 16		New Published	

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1. Specifications

1.1 Electrical Specifications

No	Item	Spec.	Remark
1	Frequency Range [GHz]	2.400 MHz ~2.485 MHz	
2	VSWR	Max 2.5:1	
3	Avg. Gain [dBi]	typ. -2.19	
4	Efficiency [%]	typ. 60.44	
5	Polarization	Linear	
6	Impedance [Ω]	Nominal 50	

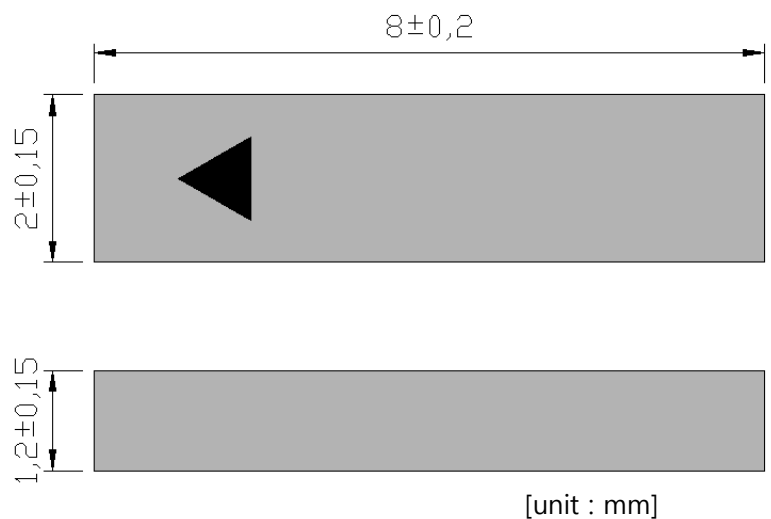
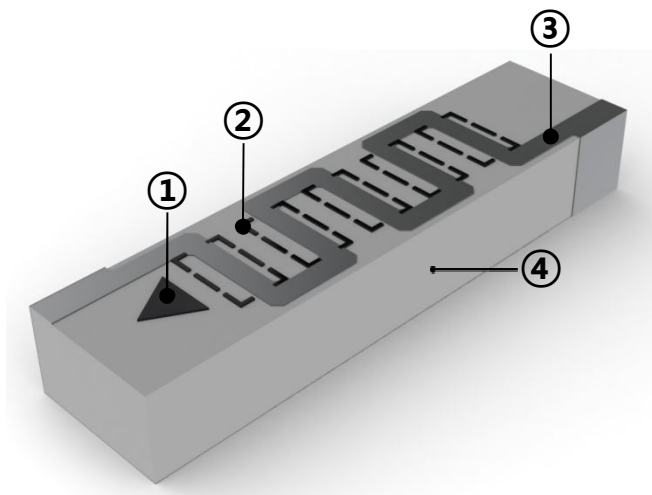
- ✓ The results are measured on the 100x50mm² evaluation board(EVB).
- ✓ See Page 6. for more detail gain parameter

1.2 Mechanical Specifications

No	Item	Spec.	Remark
1	Dimensions (LxWxH)	8.0x2.0x1.2 mm ³	
2	Unit Weight	typ. 63mg	
3	Operating Temperature	-35 ~ +85 °C	

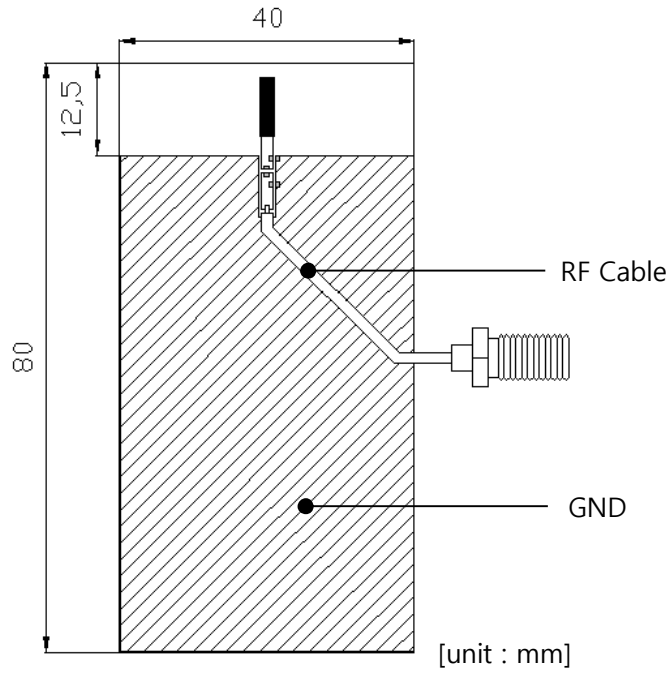
1.3 Appearance & Material

No	Item	Function	Material
①	Marking	Feeding Index	Ink
②	Marking	P/N, Year, Month, Day	Ink
③	Electrode	Radiation Element	Ag
④	Ceramic Body	-	Ceramic



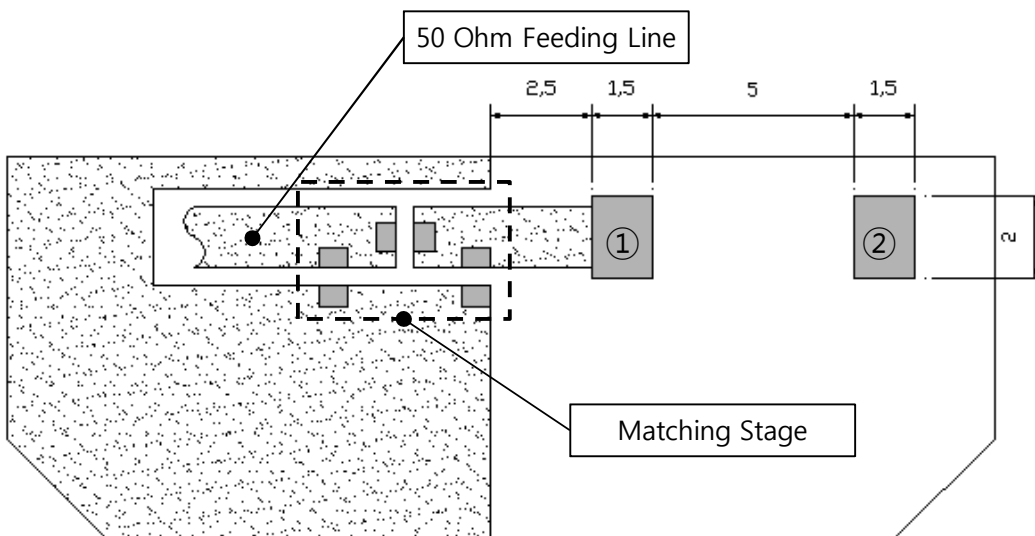
2. PCB Design for Test

2.1 Evaluation Board Dimension



- ✓ Evaluation board size ~ 40.0 x 80.0
- ✓ Fill Cut Area (GND Clearance) ~ 40.0 x 12.5

2.2 PCB Design Guide

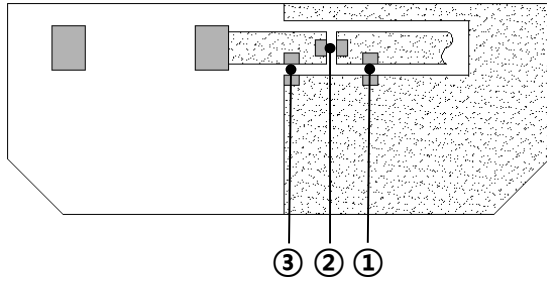


No	Pin Assignment
①	Feeding
②	N/C

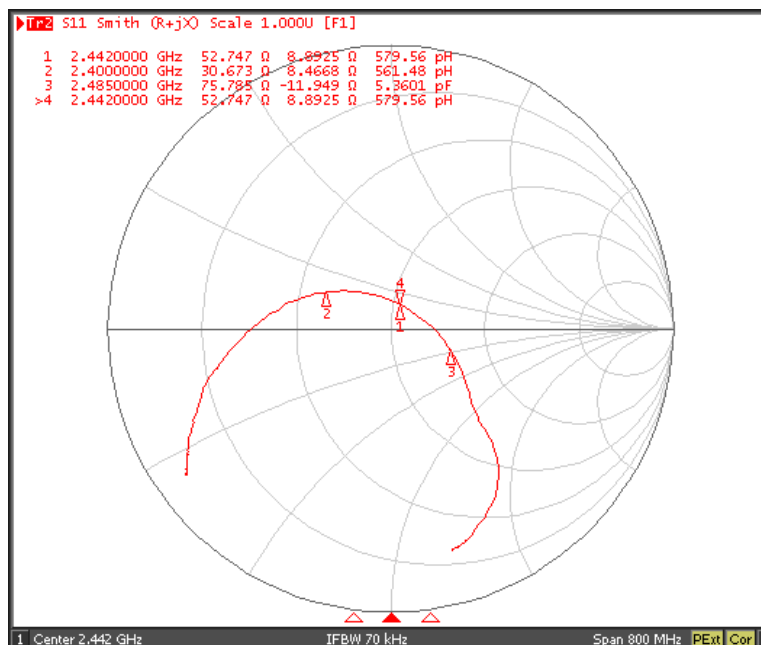
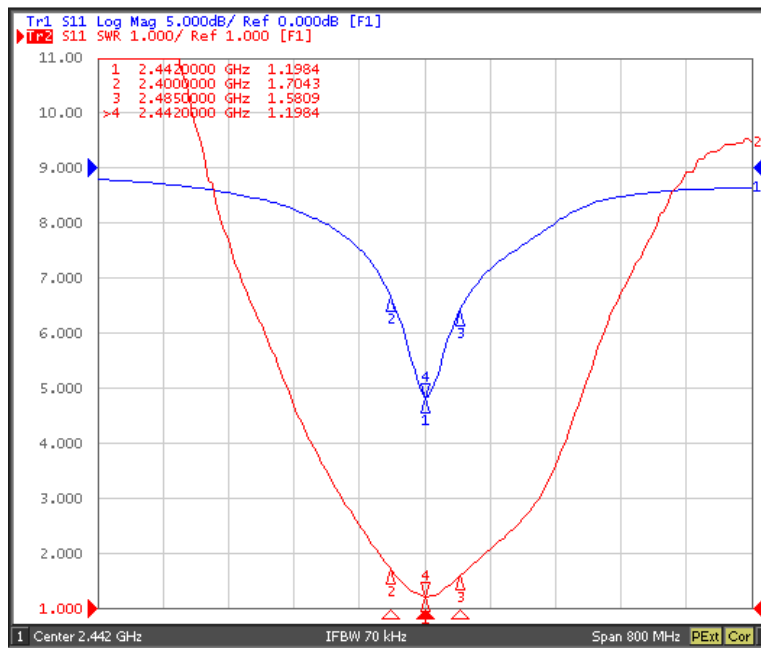
[unit : mm]

3. Measurement Result

3.1 Typical Measurement Result (VSWR/RL, Smithchart)



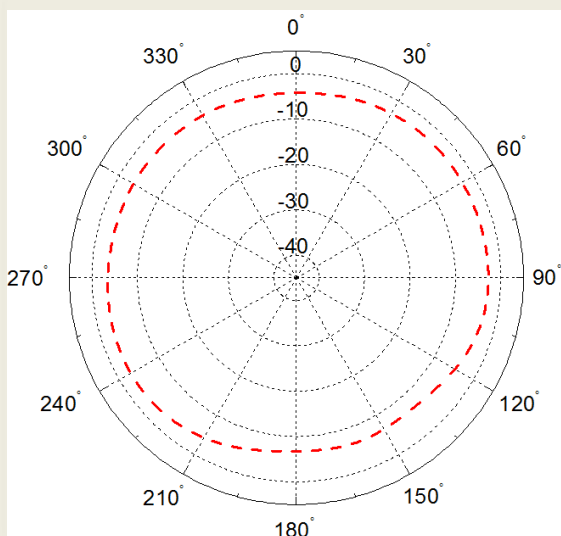
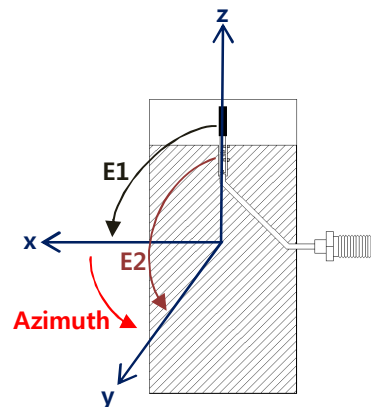
No	Matching Value
①	1.0 nH
②	2.2 nH
③	N/C



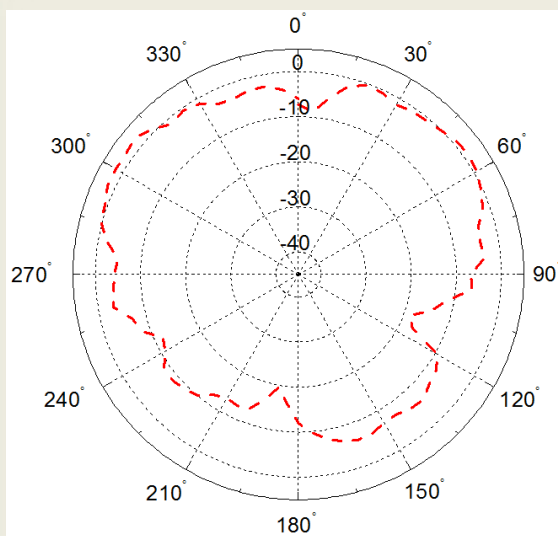
✓ The results are measured on the 100x50mm² evaluation board(EVB).

3.2 Typical Measurement Result (Gain, Radiation Pattern)

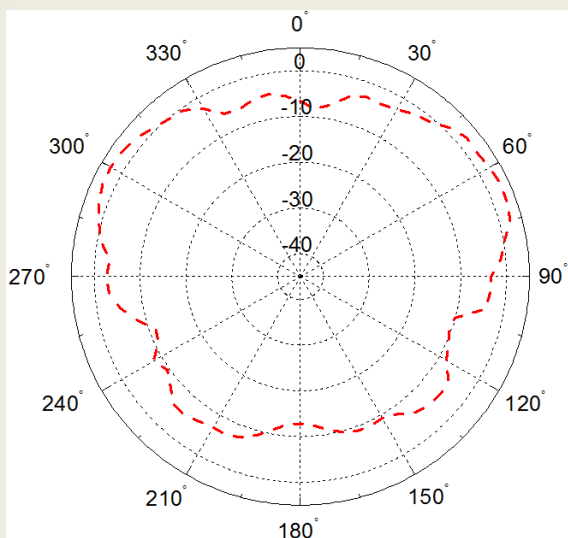
	Peak Gain (dBi)	Avg. Gain (dBi)	Efficiency(%)
Azimuth	-2.68	-3.89	60.44
Elevation 1	2.23	-3.29	
Elevation 2	3.14	-2.40	



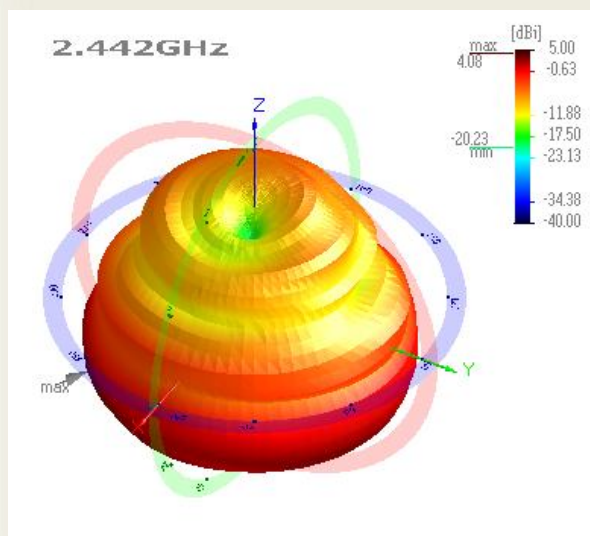
[Azimuth plane @2.442GHz]



[Elevation1 plane @2.442GHz]

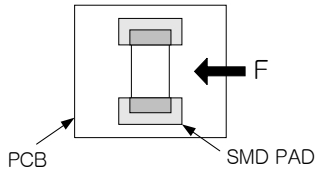


[Elevation2 plane @2.442GHz]

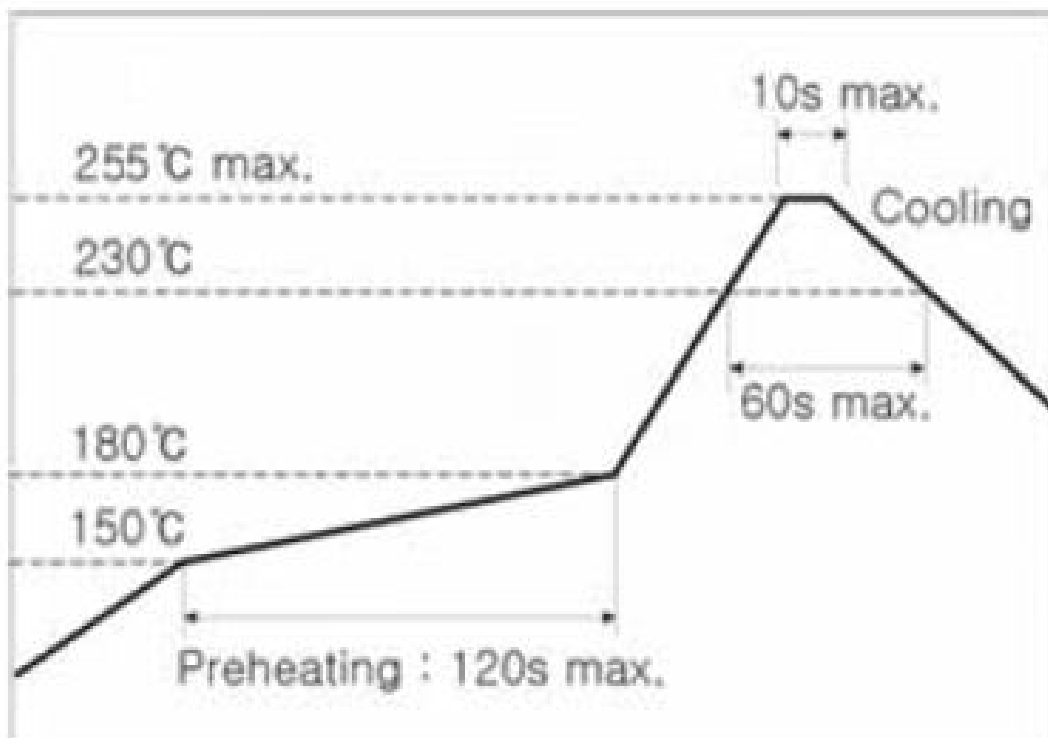


[3D Radiation Pattern]

4. Reliability

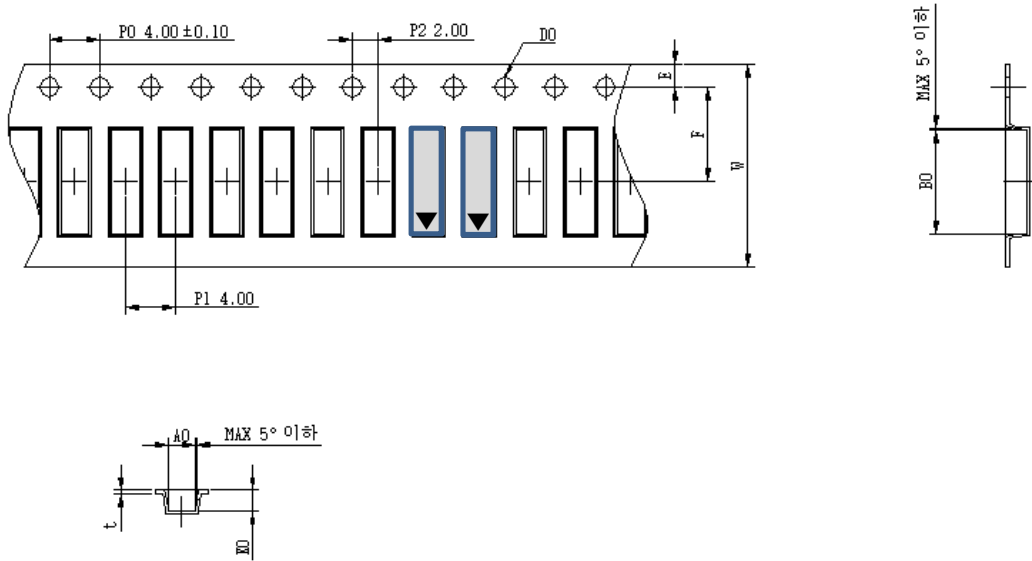
No	Item	Test Condition	Test Requirements
1	Adhesive Strength of Termination	1. Applied force on SMT chip till detached point from PCB. 	1. No mechanical damage by applied force 2. Strength (F) > 5 kgf
2	Thermal Shock (Cycle)	1. Step 1 : $-40 \pm 3^\circ\text{C}$, 30 min Step 2 : $+125 \pm 3^\circ\text{C}$, 30 min 2. Number of cycle : 30	1. No visual damage 2. Within electric spec (VSWR)
3	High Temperature Resistance	1. Temperature : $+125 \pm 5^\circ\text{C}$ 2. Time : 1000 ± 24 hrs	1. No visual damage 2. Within electric spec (VSWR)
4	Low Temperature Resistance	1. Temperature : $-40 \pm 5^\circ\text{C}$ 2. Time : 1000 ± 24 hrs	1. No visual damage 2. Within electric spec (VSWR)
5	Humidity	1. Humidity : 85 % RH Temperature : $+85 \pm 3^\circ\text{C}$ 2. Time : 1000 ± 24 hrs	1. No visual damage 2. Within electric spec (VSWR)

5. Soldering Reflow Profile



6. Packaging

6.1 Carrier Tape Dimension



Item	Spec.	Item	Spec.	Item	Spec.
A0	2.20 ± 0.10	P0	4.00 ± 0.10	E	1.75 ± 0.10
B0	8.20 ± 0.10	P1	4.00 ± 0.10	F	7.50 ± 0.10
K0	1.65 ± 0.10	P2	2.00 ± 0.10	W	16.00 ± 0.30
D0	1.55 ± 0.05	-	-	t	0.30 ± 0.05

6.2 Packaging Quantity

Item	Quantity	Dimension
Reel	2,000ea	Φ7" * 16mm
Inner Box	6,000 ea (3 reel)	183 * 70 * 185 (mm ³)
Outer Box1	30,000 ea (5 Inner Box)	375 * 200 * 205 (mm ³)
Outer Box2	60,000 ea (10 Inner Box)	390 * 375 * 205 (mm ³)

6.3 Packaging Label

AMOTECH Co., Ltd.

5BL-1Lot, 617, Namchon-Dong, Namdong-Gu, Incheon, Korea

Dielectric Chip Antenna

P/N : AMAN802012ST03




Lot No :

Quantity : 2,000 pcs Date : 2012/08/16

Date :2015. 05. 07

SPECIFICATION

Product Name	WIFI Antenna.
Customer	AI SOLUTION
Model Name	KDC350C2 WIFI
Customer Code.	
Provider	RadiAnt
Part Code.	RKA1506-0000AA

	Submitted	Checked		Approved
Buyer				
	Submitted	Checked	Checked	Approved
RadiAnt			/	

– Table of Contents –

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1. Product History

LIST					
NO	Data	Front	After	Change	REV
1	2015.05.07			Approval	0
2					1
3					2
4					3
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

2. Electrical Feature

2.1. Frequency Band

BAND	WiFi
Frequency	2.400 ~ 2.485 GHz

2.2 Impedance

2.2.1 Input Impedance

- R =50Ω

2.2.2 Measuring Method

By using Network Analyzer, connect the antenna KDC350C2 Set to the reflection point of Analyzer and measure the impedance value within the designated frequency band.

2.3 Matching circuit

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

- Not Apply -

2.4 V.S.W.R

Impedance Matching optimization is performed under the below mentioned environment.

2.4.1 Free Space Environment

BAND	WIFI			
FREQ.	2.400GHz	2.425GHz	2.450GHz	2.485GHz
V.S.W.R.	2.5 : 1	2.5 : 1	3.0 : 1	3.5:1

2.4.2 Measuring Method

Connect (soldering) 50Ω semi-rigid coaxial cable to the 50Ω spot in Set. To

minimize the loss of transmission, semi-rigid coaxial cable is used. Including PCB, the Set 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 is put on the surface of no conducting plastic.

2.5 Directivity

Omni-directional (Pwr sum.)

BAND		WIFI			
Freq.[MHz]		2.400	2.425	2.450	2.485
Gain	Avg.[dBi]	-3.03	-2.36	-3.88	-3.82
	Peak[dBi]	2.92	3.02	1.17	0.96

2.6 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 then 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.

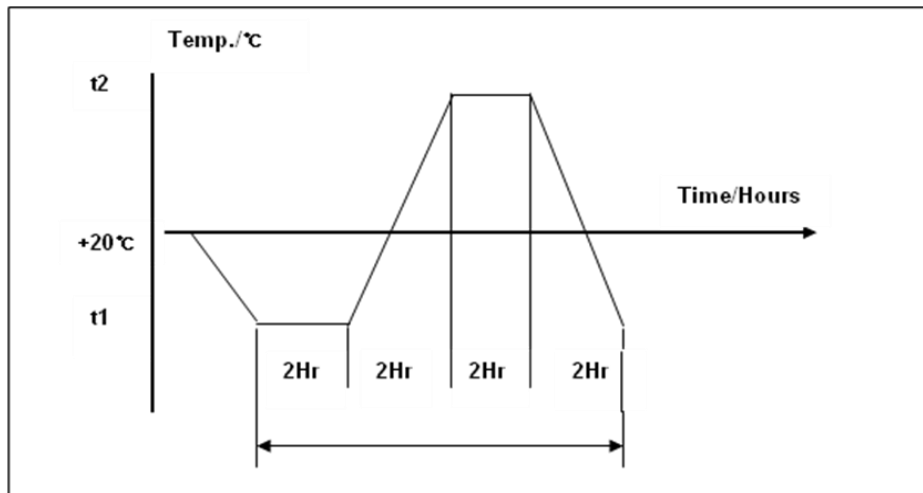


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

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

3.3.2 Requirements

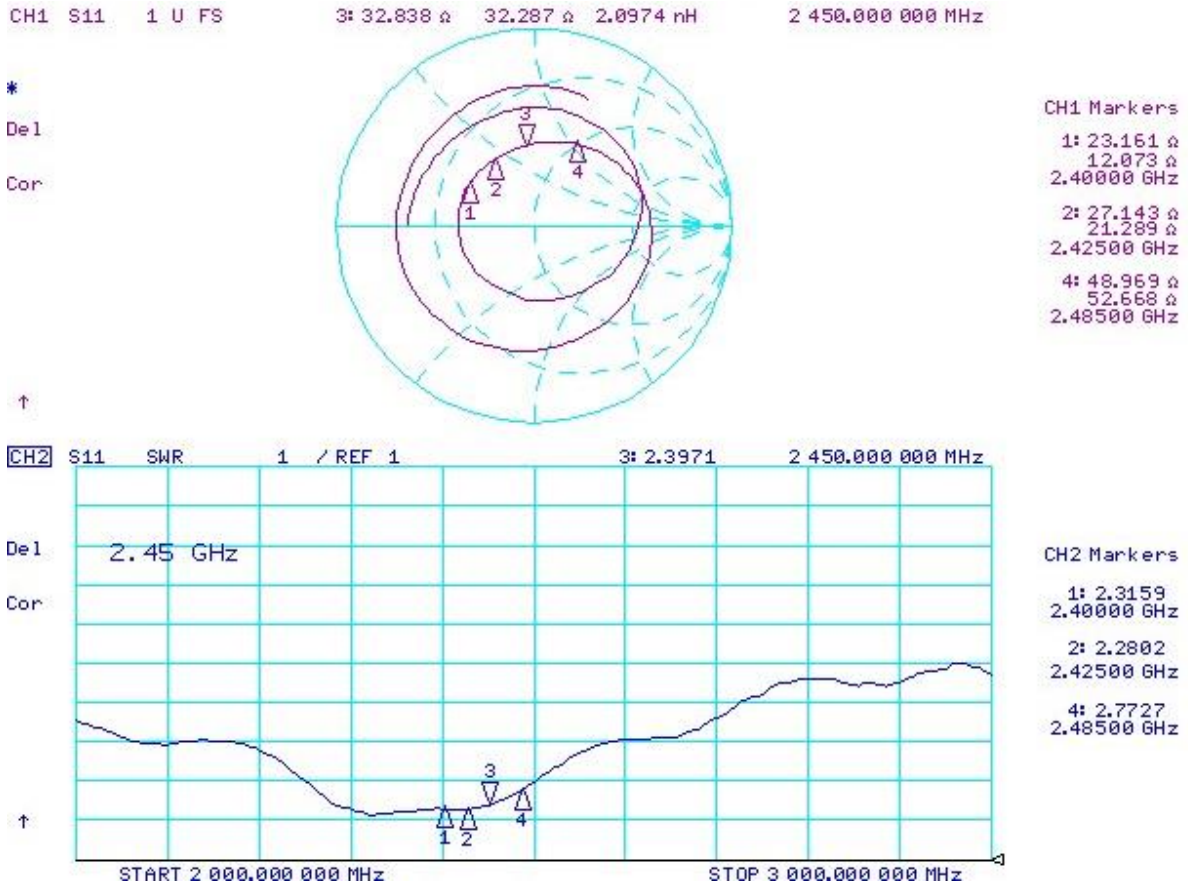
After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

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.

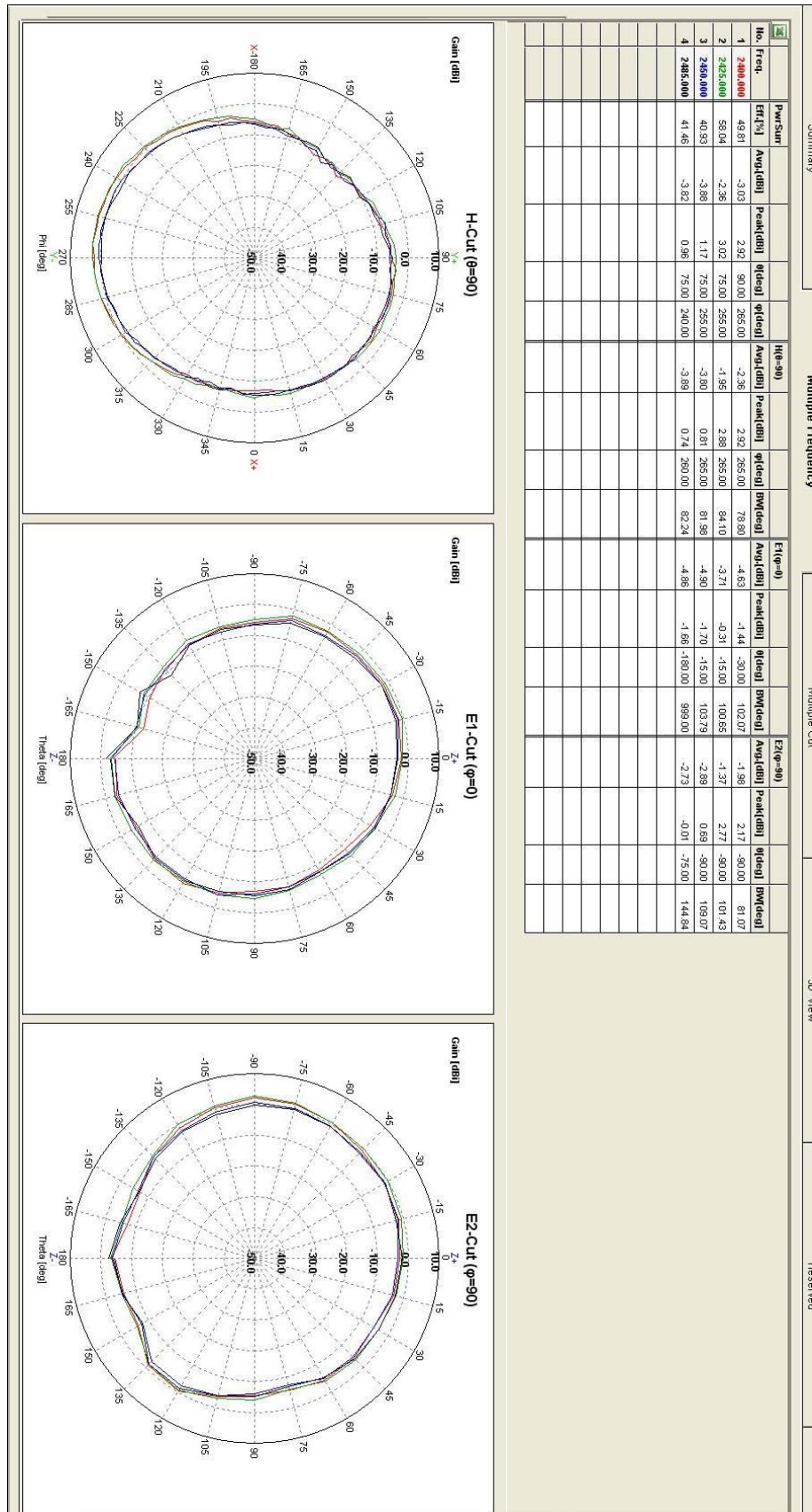
4. Electric Performance Data

4.1. Smith Chart & S.W.R.

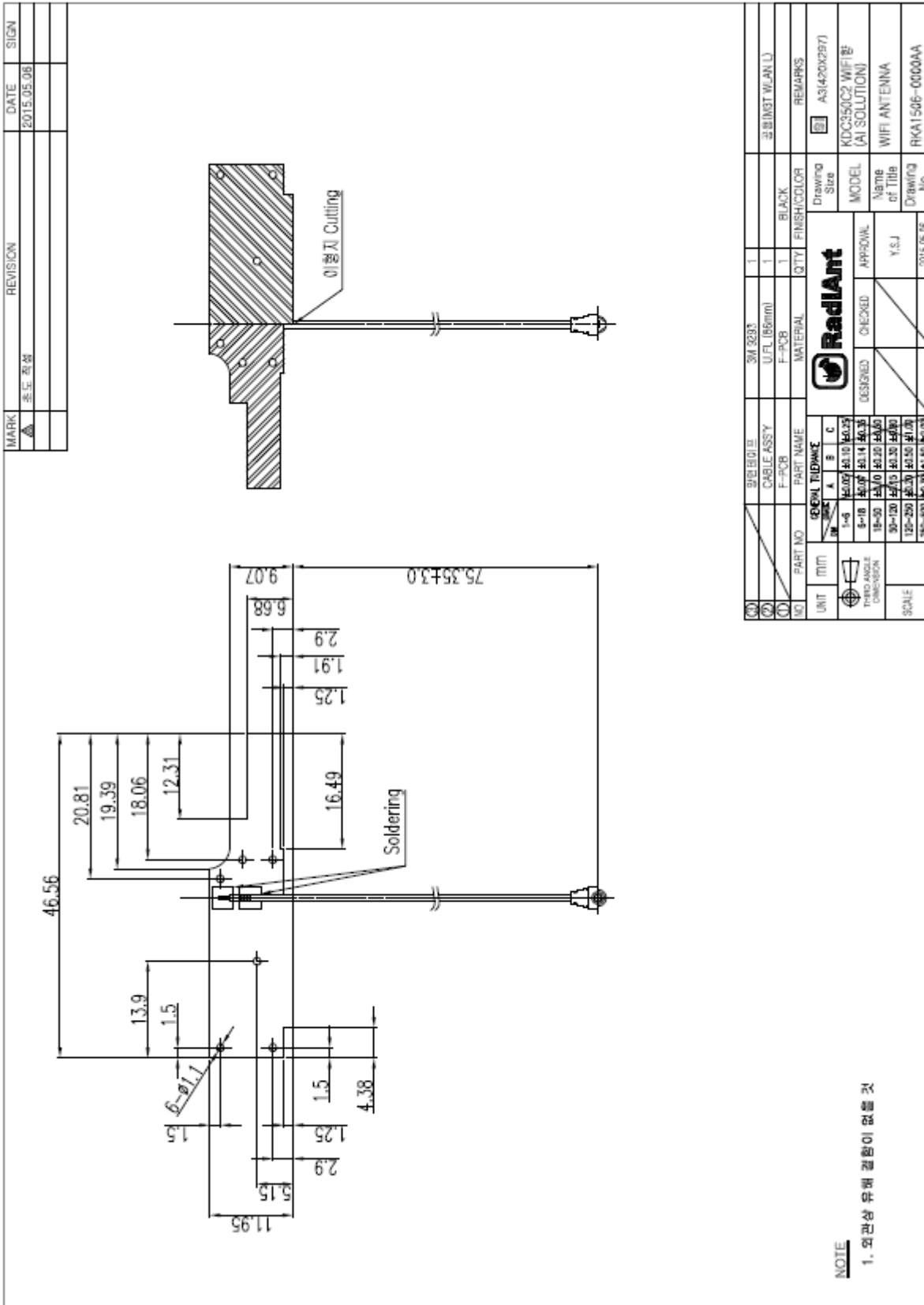


4.2. GAIN DATA

3D-Gain Data



5. Drawing



6. Certification of RoHS

6.1 F-PCB

6.1.1 BASE



TEST REPORT

Applicant : HANWHA L&C Corporation
Address : #79-20, Kumhoahngol-gil, Bukang-myeon,
Sejong special self-governing-city, Korea

Page: 1 of 13

Report No. RT13R-U2101-004-E-R

Date: Nov. 18, 2013

Sample Description : The following submitted sample(s) said to be:-

Name/Type of Product : HANWHAFLEX Halogen Free CCL
Name of Material : PI film + Epoxy type Adhesive + Copper foil
Sample ID No. : RT13R-U2101-004
Item No. : HGL
Manufacturer/Vender : HANWHA L&C Corporation

Sample received : Nov. 12, 2013
Testing Date : Nov. 12, 2013 ~ Nov. 18, 2013

Test Type : RoHS wet chemical analysis
Test Method(s) : Please see the following page(s).
Test Result(s) : Please see the following page(s).

* Note 1 : The test results presented in this report relate only to the object tested.

* Note 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.

* Note 3 : The item no. is assigned by client and indicated according to their requirement and guarantee letter.

Approved by,

Authorized by,



Jade Jang / Lab. Technical Manager

Bo Park / Lab. General Manager

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Intertek Testing Services Korea Ltd.

Seoul Office: Tel : 02-6090-9500 Fax : 02-3409-0026 Daegu Office : Tel : 053-600-8647 Fax : 053-600-8645 Web Site : www.intertek.co.kr
Seoul Lab. Address : 1/F, A-ju Digital Tower, #284-56, Seongsu 2-ga, Seongdong-Gu, Seoul, 133-833 Korea
Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Ulsu-Gun, Ulsan 689-865 Korea

6.1.2 Cover lay



TEST REPORT

Applicant : HANWHA L&C Corporation
Address : #79-20, Kumhoahngol-gil, Bukang-myeon,
Sejong special self-governing-city, Korea

Page: 1 of 12

Report No. RT13R-U2101-003-E-R

Date: Nov. 18, 2013

Sample Description : The following submitted sample(s) said to be:-

Name/Type of Product : HANWHAFLEX Halogen Free Coverlay
Name of Material : PI film + Epoxy type Adhesive
Sample ID No. : RT13R-U2101-003
Item No. : HGC
Manufacturer/Vender : HANWHA L&C Corporation

Sample received : Nov. 12, 2013
Testing Date : Nov. 12, 2013 ~ Nov. 18, 2013

Test Type : RoHS wet chemical analysis
Test Method(s) : Please see the following page(s).
Test Result(s) : Please see the following page(s).

* Note 1 : The test results presented in this report relate only to the object tested.

* Note 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.

* Note 3 : The item no. is assigned by client and indicated according to their requirement and guarantee letter.

Approved by,



Jade Jang / Lab. Technical Manager

Authorized by,



Bo Park / Lab. General Manager

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Seoul Office: Tel : 02-6090-9500 Fax : 02-3409-0026 Daegu Office : Tel : 053-600-8647 Fax : 053-600-8645 Web Site : www.intertek.co.kr
Seoul Lab. Address : 1/F, A-ju Digital Tower, #284-56, Seongsu 2-ga, Seongdong-Gu, Seoul, 133-833 Korea
Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Ulju-Gun, Ulsan 689-865 Korea

6.1.3 ink



Test Report No. F690101/LF-CTSAYAA14-03868

Issued Date : 2014. 01. 24

Page 1 of 8

SEOUL CHEMICAL RESEARCH LABORATORY CO., LTD.
1ma 606-5 Shihwa Ind. Com,1696-7 Jungwang-dong
Shiheung-si,Gyeonggi-do
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No. : AYAA14-03868
Product Name : SCM-500W HF With SH-4
Item No./Part No. : SCM-500 White HF2 With SH-4 HF2
Received Date : 2014. 01. 17
Test Period : 2014. 01. 20 to 2014. 01. 24
Test Results : For further details, please refer to following page(s)

SGS Korea Co., Ltd.



Jeff Jang / Chemical Lab Mgr

The results shown in this test report refer only to the sample(s) submitted by the client, not cover the quality of the whole batch. This report should be used as intended, and shall not be used for advertisement and lawsuit.

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F401 Version1

SGS Korea Co., Ltd.

322, The O valley, 78, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea 431-000
t +82 (0)31 4608 000 f +82 (0)31 4608 059 <http://www.sgskorea.kr>

Member of the SGS Group (Société Générale de Surveillance)

6.1.4 Plating

6.1.4.1 Au



TEST REPORT (시험 성적서)

신청기관 (인) : 세원코리아
 Applicant : Sewonkorea Co., LTD.
 주소 (한글) : 인천광역시 남동구 고잔동 203-2
 Address (Engl.) : 203-2, Gojan-dong, Namdong-gu,
 Incheon, Korea

발행면수 (Page) : 1 of 12
 발행일자 (Date) : 2013. 12. 20.

시험성적서 번호 (Report No.) : RT13R-55388-K1-RA-R

시료 명세 : 시료에 대한 상세한 정보는 아래와 같음
 (Sample Description) (The following submitted sample(s) said to be)

제품명/형식 : Potassium Gold Cyanide
 (Name/Type of Product) (Potassium Gold Cyanide)

시료고유번호 : RT13R-55388
 (Sample ID No.) (RT13R-55388)

제품 생산자/공급자 : 세원코리아
 (Manufacturer/Vender) (Sewonkorea Co., LTD.)

시료접수일자 : 2013. 11. 28.
 (Sample received) (Nov. 28, 2013)

시험일자 : 2013. 11. 28. ~ 2013. 12. 06.
 (Testing Date) (Nov. 28, 2013 ~ Dec. 06, 2013)

시험유형 : RoHS 화학분석
 (Test Type) (RoHS wet chemical analysis)

시험방법 : 이 시험성적서의 다음 페이지 참조
 (Test Method) (Please see the following page)

시험결과 : 이 시험성적서의 다음 페이지 참조
 (Test Result) (Please see the following page)

비고 (Notes) : 1. 이 시험성적서는 제시된 시료 및 시료명으로 시험한 결과로서 유사 대상시료에 적용할 수 없음.
 (The test results presented in this report relate only to the object tested.)
 2. 이 시험성적서는 승인없이 복사 사용을 금함.
 (This report shall not be reproduced except in full without the written approval of the testing laboratory.)

승인자 (Approved by)

권한자 (Authorized by)




장준용/기술책임자 (Jade Jang / Lab. Technical Manager)

박병욱/소장 (Bo Park / Lab. General Manager)

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 Seoul Lab. Address : 1/F, A-ju Digital Tower, #284-56, Seongsu 2-ga, Seongdong-Gu, Seoul, 133-833 Korea
 Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Ulsu-Gun, Ulsan 689-865 Korea



TEST REPORT

(시험 성적서)

신청기관 (인) : ㈜엠케이켄텍
 Applicant : MK Chem & Tech Co., Ltd.

 주소 (한글) : 경기도 안산시 단원구 원시로 71
 Address (Engl) : 71, Wonsi-ro, Danwon-gu,
 Ansan-si, Gyeonggi-do, Korea

발행면수 (Page) : 1 of 8
 발행일자 (Date) : 2013. 12. 13.

시험성적서 번호 (Report No.) : RT13R-55563-012-K

시료 명세 : 시료에 대한 상세한 정보는 아래와 같음
 (Sample Description) (The following submitted sample(s) said to be)
 제품명/형식 : NEOZEN Series
 (Name/Type of Product) (NEOZEN Series)
 시료고유번호 : RT13R-55563-012
 (Sample ID No.) (RT13R-55563-012)
 품번 : NEOZEN MP-M(K), NEOZEN MP-1(K), NEOZEN MP2(K), NEOZEN MP3(K), NEOZEN WETTER
 (Item No.) (NEOZEN MP-M(K), NEOZEN MP-1(K), NEOZEN MP2(K), NEOZEN MP3(K), NEOZEN WETTER)
 제품 생산자/공급자 : ㈜엠케이켄텍
 (Manufacturer/Vender) (MK Chem & Tech Co., Ltd.)
 시료접수일자 : 2013. 12. 09.
 (Sample received) (Dec. 09, 2013)
 시험일자 : 2013. 12. 09. ~ 2013. 12. 13.
 (Testing Date) (Dec. 09, 2013 ~ Dec. 13, 2013)
 시험유형 : RoHS 화학분석
 (Test Type) (RoHS wet chemical analysis)
 시험방법 : 이 시험성적서의 다음 페이지 참조
 (Test Method) (Please see the following page)
 시험결과 : 이 시험성적서의 다음 페이지 참조
 (Test Result) (Please see the following page)

비고 (Notes) : 1. 이 시험성적서는 제시된 시료 및 시료명으로 시험한 결과로서 유사 대상시료에 적용할 수 없음.
 (The test results presented in this report relate only to the object tested.)
 2. 이 시험성적서는 승인없이 복사 사용을 금함.
 (This report shall not be reproduced except in full without the written approval of the testing laboratory.)
 3. 이 시험성적서의 품번은 고객의 요청 및 보증서에 의거하여 명기함.
 (The item no. is assigned by client and indicated according to their requirement and guarantee letter)

승인자 (Approved by)

권한자 (Authorized by)




장관용/기술책임자 (Jade Jang / Lab. Technical Manager)

박병욱/소장 (Bo Park / Lab. General Manager)

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Intertek Testing Services Korea Ltd.

Seoul Office: Tel : 02-6090-9500 Fax : 02-3409-0026 Daegu Office : Tel : 053-600-8647 Fax : 053-600-8645 Web Site : www.intertek.co.kr
 Seoul Lab. Address : 1/F, A-ju Digital Tower, #284-56, Seongsu 2-ga, Seongdong-Gu, Seoul, 133-833 Korea
 Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Ulsu-Gun, Ulsan 689-865 Korea

**TEST REPORT**

Applicant : 3M KOREA Ltd.
Address : Yoido P.O Box 93
Seoul, Korea

Page: 1 of 4

Report No. RT14R-U1744-E1

Date: Sep. 01, 2014

Sample Description : The following submitted sample(s) said to be:-

Name/Type of Product : 3M High Performance Black Double Coated Tape
Item No. : 9293B, 9294B, 9295B, 9295B-25
Sample ID No. : RT14R-U1744
Manufacturer/Vendor : 3M KOREA Ltd.

Sample received : Aug. 27, 2014
Testing Date : Aug. 27, 2014 ~ Sep. 01, 2014

Test Type : RoHS wet chemical analysis
Test Method(s) : Please see the following page(s).
Test Result(s) : Please see the following page(s).

* Note 1 : The test results presented in this report relate only to the object tested.

* Note 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.

* Note 3 : The item no. is assigned by client and indicated according to their requirement and guarantee letter.

Approved by,



E.Y. Lee / Lab. Technical Manager

Authorized by,



H.W. Yoo / Lab. General Manager

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Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Ulsu-Gun, Ulsan 689-865 Korea

6.2 Cable
6.2.1 MHF PLUG

Doc No.: QR-Q131822-D1

QA REPORT

 Page 1 of 1
 Date:2013/12/24

 DAI-ICHI SEIKO CO., LTD.
 I-PEX Business Company
 Quality Assurance Dept.

Approved by	Prepared by
Y. Goto <i>Y. Goto</i>	M. Takagi <i>M. Takagi</i>

SUBJECT: SGS TEST REPORT

This is applied for the following products:

Product Name	Part Number
MHF PLUG	20278-112R-08
	20278-112R-13
	20278-112R-18
	20278-112R-32
	20351-112R-37

Attachment:

1. SGS TEST REPORT (Please see the following for details.)

Part Number	Component Name	SGS TEST REPORT No.
20278-112R-08	HOUSING	CE.2013.83876
20278-112R-18	CONTACT	CE.2013.B1847*
20351-112R-37	GROUND CONTACT	CE.2013.C2792*
20278-112R-13 20278-112R-32	HOUSING	CE.2013.83875
	CONTACT	CE.2013.B1847*
	GROUND CONTACT	CE.2013.C2792*

>>Remarks *: The attached SGS test reports can be applied to the requested products for the raw materials, plating specification and its production process are the same respectively.

Confidential III
I-PEX DAI-ICHI SEIKO CO.,LTD.
 I-PEX Business Company

Form No.: QKE-AFFQA04-01 Rev.3

6.2.2 Coaxial


Test Report

Report No. RLSHF001490580001R1

Page 1 of 8

Applicant JIANGSU YUANDA CABLES TECHNOLOGY CO., LTD

Address HANGKONG ROAD NO. 5 JIANHU COUNTY YANCHENG CITY JIANGSU PROVINCE

The following sample(s) and sample information was/were submitted and identified by/on the behalf of the client

No.	Final Product Name	Sample Name	Part No.	Color
1	Coaxial Cable	Silvery metal wire	RF0.81/RF1.1.3/RF1.32/RF1.37/ RG142/RG174/RG178/RG179/ RG180/RG187/RG188/RG316/ RG316D/RG195/RG196/RG302/ RG303/RG179D/RG223/RG304/ RG393/RG400/RG402/RG405	Silvery
2		Colorless transparent plastic		Colorless transparent
3		Silvery metal wire		Silvery metal
4		Colorless transparent plastic		Black

Sample Received Date May.14,2013

Testing Period May.14,2013 to May.18,2013

Test Requested As specified by client, to test Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium (Cr(VI)), Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ethers (PBDEs), Fluorine (F), Chlorine (Cl), Bromine (Br), Iodine (I), Tetrabromobisphenol-A (TBBP-A), Hexabromocyclododecane (HBCDD), Perfluorooctanoic Acid (PFOA), Perfluorooctane Sulfonates(PFOS) in the submitted sample(s).

Test Method Please refer to the following page(s).

Test Result(s) Please refer to the following page(s).

 Tested by Chen Lijuan Reviewed by Zhang Yijun

 Approved by Su Hongwei Date May.20,2013

 Su Hongwei
Senior Laboratory Manager

 No. 1130338974
Centre Testing International Corporation Shanghai Branch No.1996,New Jinqiao Road, Pudong District, Shanghai, China

6.3 Pb free**6.3.1 HES-02****TEST REPORT**

Applicant : HEESUNG MATERIAL LTD.
Address : 57, Donghanggongdan-gil, Yangseong-myeon,
Anseong-si, Gyeonggi-do, 456-931 Korea

Page: 1 of 6

Report No. RT14R-S4131-002-E

Date: Aug. 13, 2014

Sample Description : The following submitted sample(s) said to be:-

Name/Type of Product : HSE-02
Name of Material : Metal
Sample ID No. : RT14R-S4131-002
Manufacturer/Vendor : HEESUNG MATERIAL LTD.

Sample received : Aug. 08, 2014
Testing Date : Aug. 08, 2014 ~ Aug. 13, 2014

Test Type : RoHS wet chemical analysis
Test Method(s) : Please see the following page(s).
Test Result(s) : Please see the following page(s).

* Note 1 : The test results presented in this report relate only to the object tested.

* Note 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.

Approved by,



Jade Jang / Lab. Technical Manager

Authorized by,

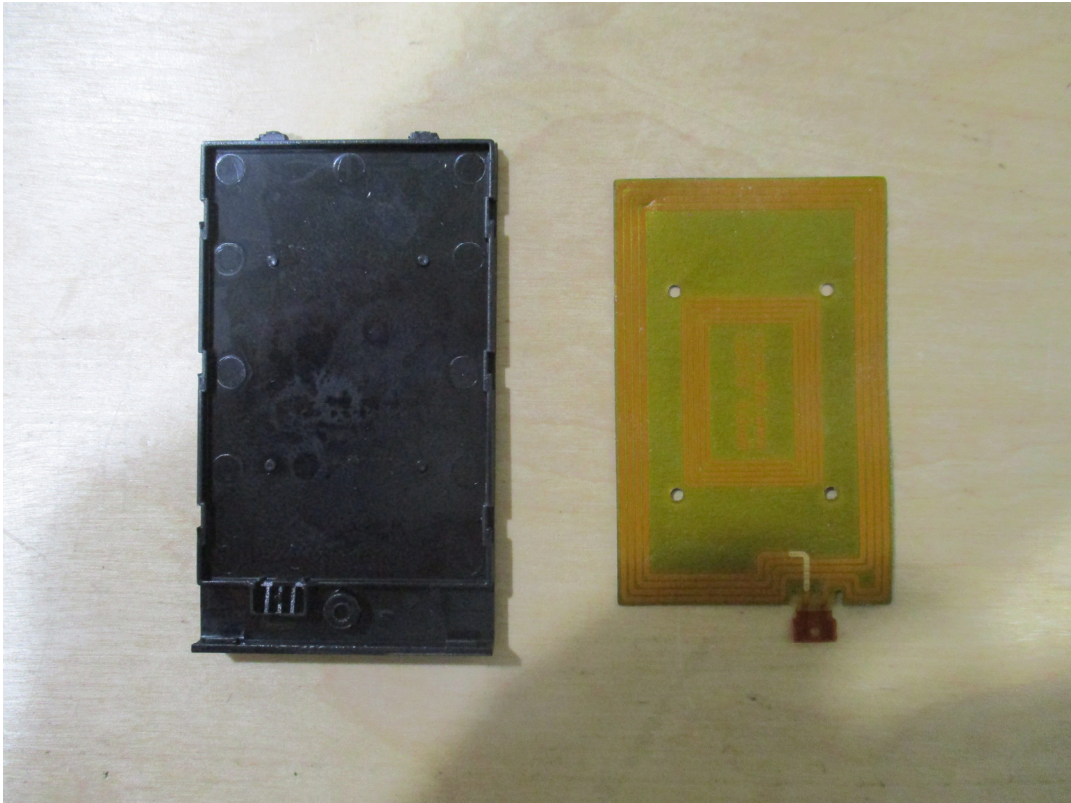


Bo Park / Lab. General Manager

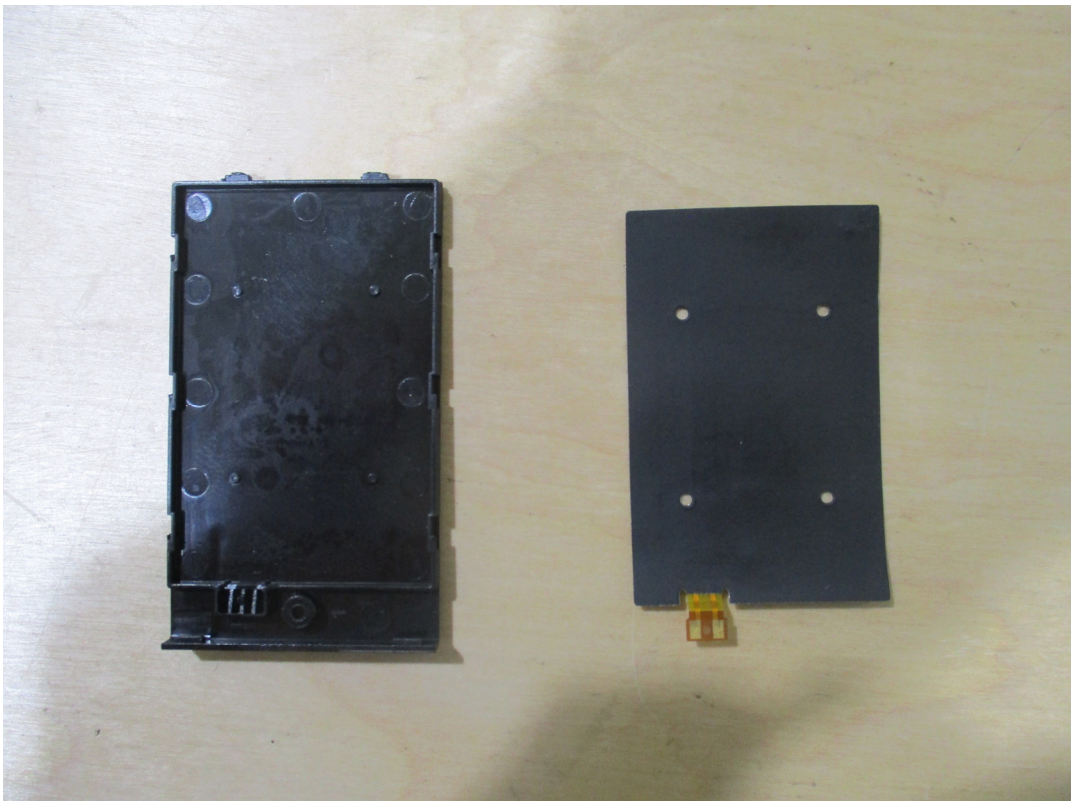
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Ulsan Lab. Address : #340-2, Yongam-Ri, Chongryang-Myun, Uiju-Gun, Ulsan 689-865 Korea



NFC Antenna - Front



NFC Antenna - Rear