APPROVAL SHEET

Dielectric Chip Antenna

Part No : AMAN542012XR01

Model : MI-4300

XROAD			
	/	/	/

	Written	Checked		Approved
Amotech				
	09/24	9/24	9/24	9/24

2008. 09. 24

AMOTECH Co., Ltd.

Content

1. Revision Record

Date	Content	Page
2008. 09. 24	NEW	

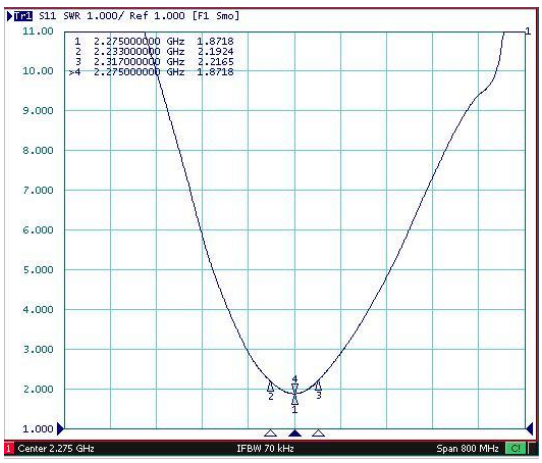
2. SPECIFICATIONS

2.1 Electrical Specification

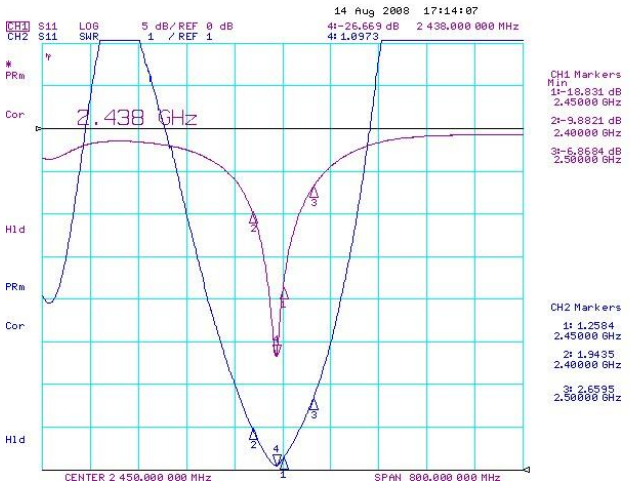
No	ITEM	Spec			Remark
1	VSWR	Max 3 : 1 @ 2275±42MHz			
2	Radiation Gain	Avg.	H	Min -5.0	dBi
			E1	Min -3.5	
			E2	Min -3.5	
		Peak	H	Min -3.0	
			E1	Min -1.0	
			E2	Min -1.0	
3	Radiation Pattern	Omni-directional			
4	Impedance	nominal 50			Ω

※ Radiation pattern : measured data after matching on the evaluation board(EVB)

※ VSWR : measured data on manual Jig(#2-1)

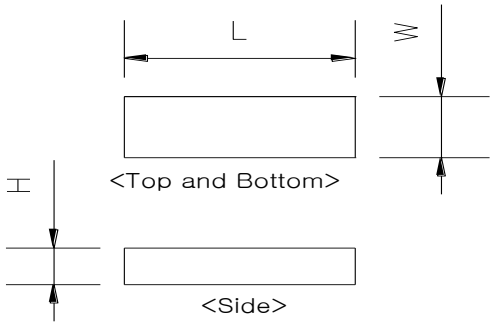


(VSWR on Reference Jig)



(VSWR on MI-4300)

Mechanical Specification



L (Length)	5.4
W (Width)	2.0
H (Height)	1.2

- unit : mm
- Tolerance : ± 0.15

2.2 Model & Lot notation

Model : **AMAN** (1) **542012** (2) **XR** (3) **01** (4)

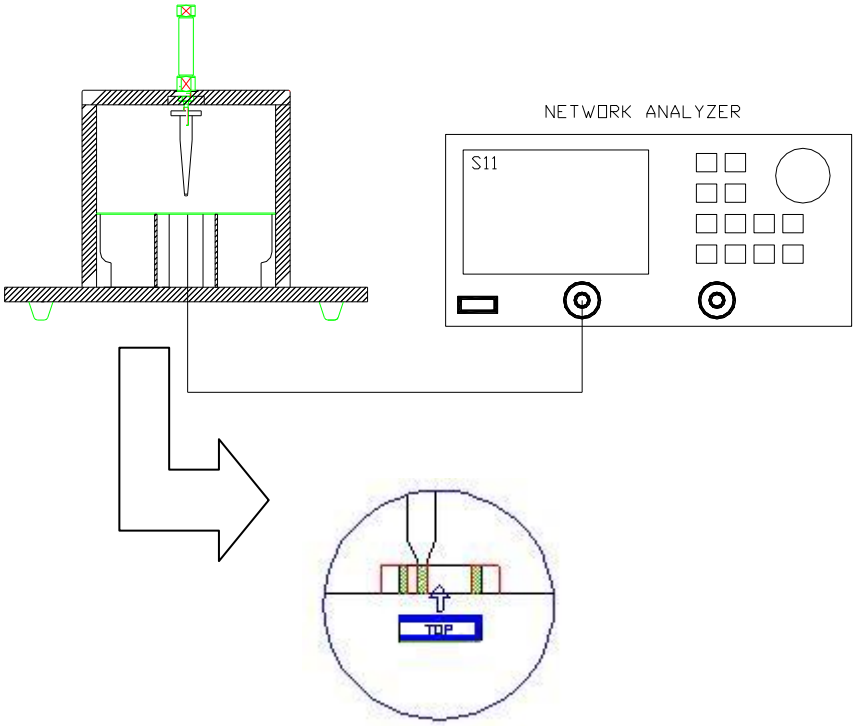
(1) : **AM**OTECH **AN**TENNA
(2) : Chip Size (Length X Width X Height)
(3) : Enterprise, Ex) XROAD - XR
(4) : Model Num. (Ex : MI-4300 - 01)

Lot : **XX** (1) **XX** (2) **X** (3) **X** (4) **XX** (5)

(1) : Year of body shaping
(2) : Month of body shaping
(3) : Permittivity ex)1 : 9.5, 2 : 20.5
(4) : Chip SIZE ex) A : 542012, B : 542015, C : 903012, D : 903015, E: 903040, F: 903045
G : 402027, H : 542020, I : 601815, J : 601818, K : 802012, L : 802015
M : 144050, N : 144060, O : 163040, P : 806040
(5) : Month order of body production

3. MEASUREMENT

3.1 VSWR's Measurement



3.1.1 VSWR specification

- Refer to page 4

3.1.2 Measurement method

A) Calibrate to RF cable

- Center frequency : Refer to page 4
- Span : 800MHz
- Number of point : 801

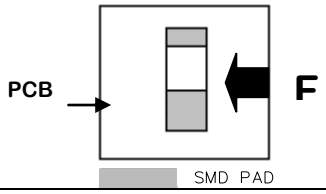
B) Connect RF Cable to SMA connector of jig.

C) SET format of network analyzer in VSWR(SWR).

D) Read the value of VSWR, after setting MARKER1, MARKER2, MARKER3.

E) Verify that the value of VSWR is within specification

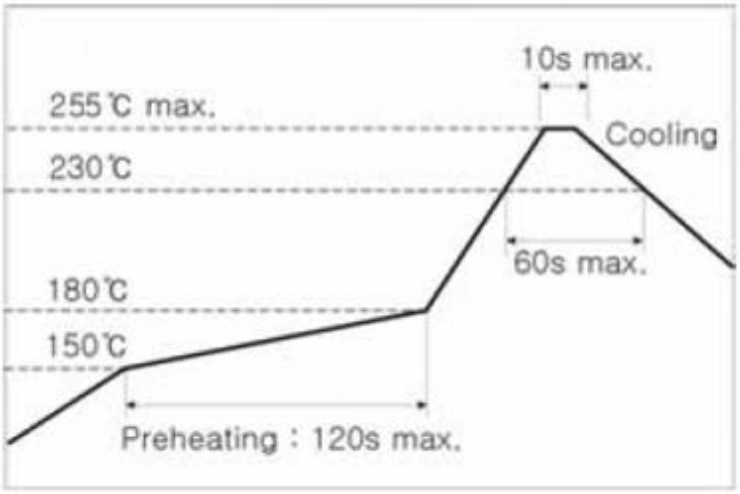
4. RELIABILITY TEST

No	ITEM	TEST CONDITION	TEST REQUIREMENTS
1	Adhesion strength	1. Applied force on SMD chip till detached point from PCB. 	1. No mechanical damage by forces applied on the right. 2. Strength (F) > 5kgf
2	Thermal shock	1. 1 cycle / 1 step : -40 ± 3℃, 30 min 2 step : +125 ± 3℃, 30 min 2. Number of cycle : 30 3. Measure fC after left for 48 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)
3	High temp. resistance	1. Temperature : +125 ± 5℃ 2. Time : 1000 ± 24 hrs 3. Measure fC after left for 48 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)
4	Low temp. resistance	1. Temperature : -40 ± 5℃ 2. Time : 1000 ± 24 hrs 3. Measure fC after left for 48 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)
5	High temp. & humidity :Steady Condition	1. Humidity : 85 % RH 1. Temperature : +85 ± 3℃ 2. Time : 1000 ± 24 hrs 3. Measure fC after left for 48 hrs min. at room temperature	1. No visual damage 2. Within electric spec (VSWR)
6	ESD	1. ESD Level : 8KV 2. Mode : Contact discharge 3. Number of Test: 100	1. No visual damage 2. Within electric spec (VSWR)

5. Soldering Recommendation

5.1 Soldering Profile

Solder paste : Sn/Ag/Cu:96.5/3.0/0.5



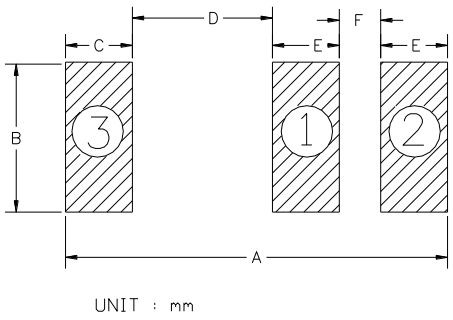
This product is designed for reflow soldering only. Do not use flow (wave) soldering.

① Use non-activated flux (Cl content 0.2% max.)

② Follow the recommended soldering conditions to avoid damage.

③ Reflow-cycle is max. 3 times.

5.2 Soldering Land Pattern

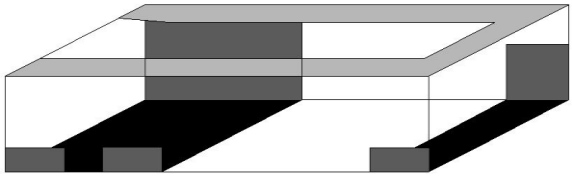


A	5.4
B	2.0
C	0.8
D	2.6
E	0.75
F	0.5

①	feeding
②, ③	GND

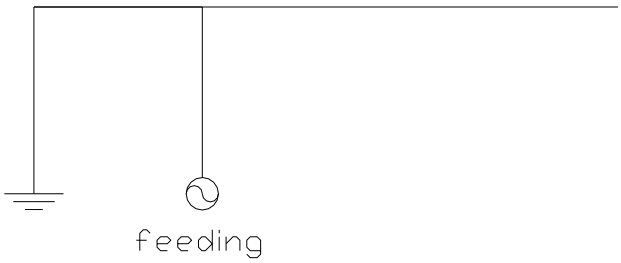
6. Structure & Material

6.1 Structure & Material



1	(Bulk)		Material
2	Pattern	TOP	Ag
		BOTTOM	
		SIDE	

6.2 Equivalent circuit



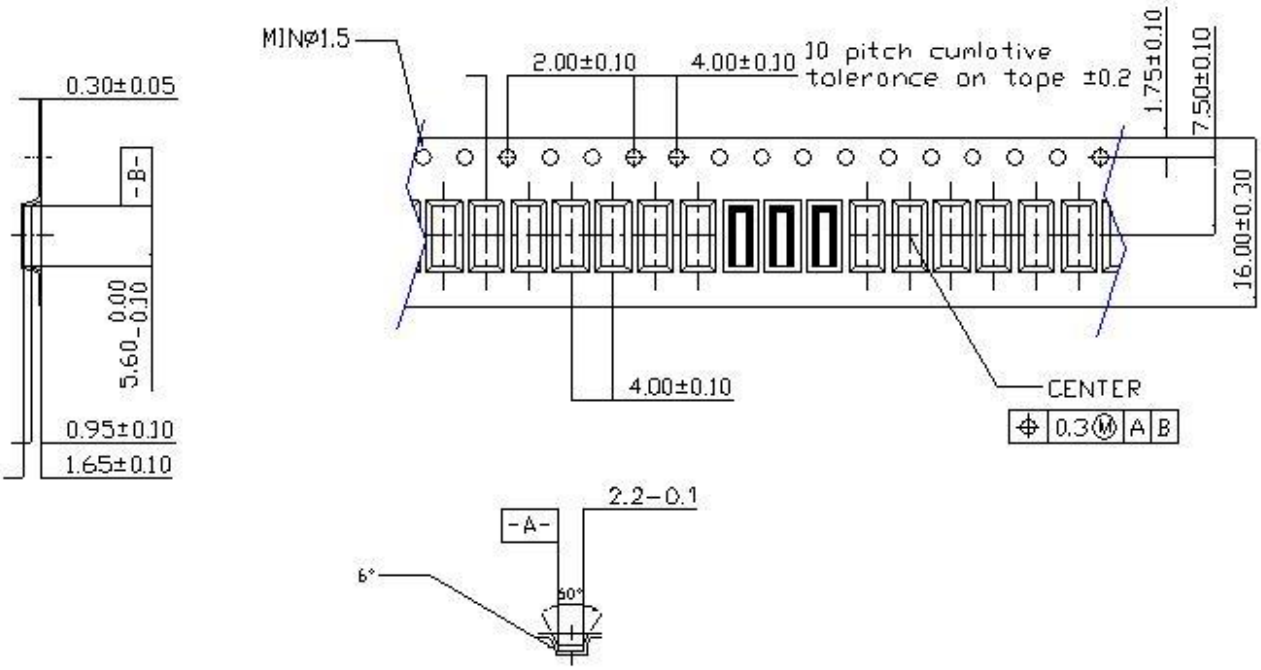
7. Caution and Warranty

1. Dielectric Chip Antennas can be degraded when used at high temperature and humidity.
2. Electrode metallization made from silver is unprotected and will tarnish during storage in normal atmospheres affected by sulphuric compounds but has no effect whatsoever on the electrical performance or the processability of the patches. Because of this normal and to be expected process, AMOTECH accepts no warranty claims for tarnished products.
3. Dielectric Chip Antennas must avoid shock and drop to prevent crack of antenna due to weight of itself.
4. Dielectric Chip Antennas must be used within 6 months, the antenna produced before 6 months should be checked for soldering feature before using

8. Packing

8.1 Tape Dimension (unit : mm)

8.1.1 Size



8.1.2 Surface resistance

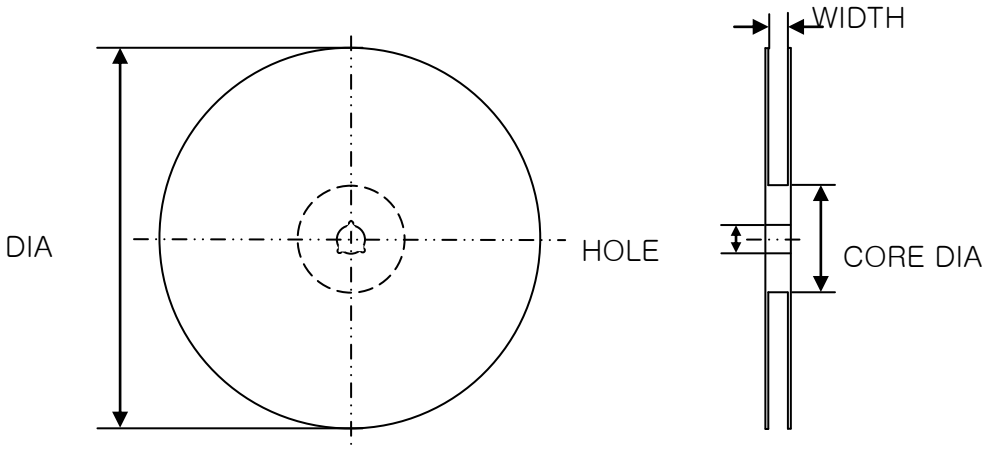
1) Carrier tape : 10^9 ~ 10^11Ω

2) Cover tape : 10^8 ~ 10^11Ω

3) Reel : 10^9 ~ 10^11Ω

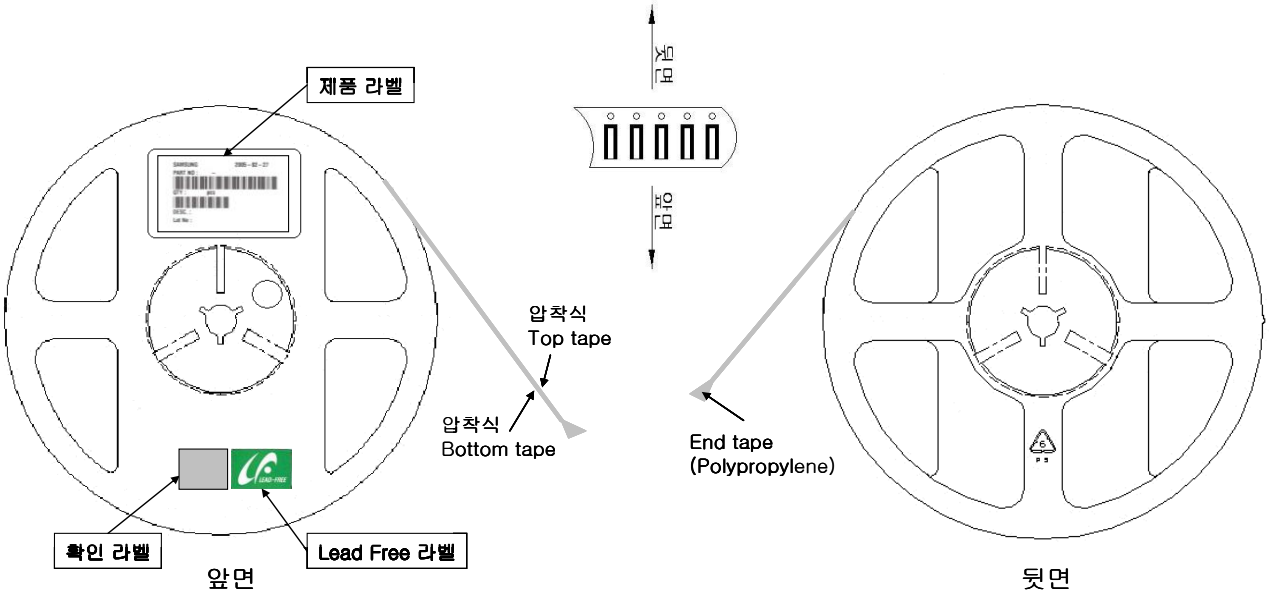
8.2 Description of Reel

8.2.1 Size



ITEM	DIA	WIDTH	CORE DIA	HOLE
Size(mm)	180.0 ± 0, -3	17.0 ± 0.3	60.0 ± 1	13.0 ± 0.5

8.2.2 Attaching Lavel & Winding Method

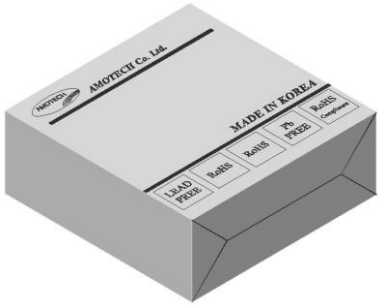


8.3 Description of Packing Box

8.3.1 Small Box

Size : 183 (W) x 70 (D) x 185 (T) (mm)

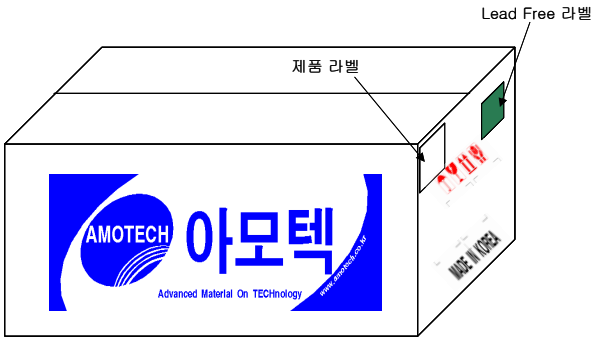
quantity : 3 reel (2,000 ea/reel × 3 reel = 6,000 ea)



8.3.2 Medium Box

Size : 365 (W) x 200 (D) x 200 (T) (mm)

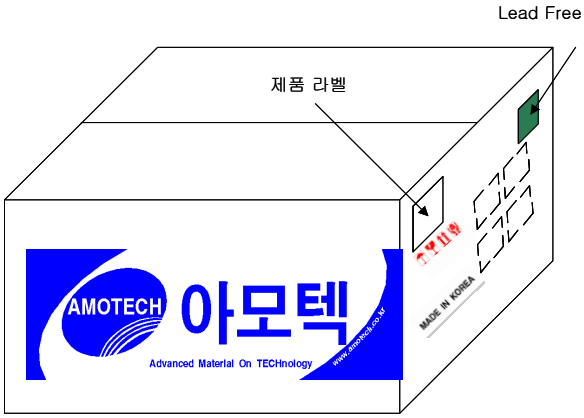
quantity : 5 Small Box (6,000 ea/ Small Box × 5 Small Box = 30,000 ea)



8.3.3 Large Box

Size : 390 (W) x 390 (D) x 280 (T) (mm)

quantity : 14 Small Box (6,000 ea/ Small Box ×14 Small Box = 84,000 ea)



8.4 Description of Packing Label

8.4.1 Reel, Inner box (80*40mm)

AMOTECH CO., LTD.
5B-1L Namdong industrial complex 617, Namchon-Dong
Namdong-Gu, Incheon, Korea
DIELECTRIC CHIP ANTENNA
Type : AMAN0000000000 Date : yyyy-mm-dd
Lot No : 0000-0000
Quantity : pcs

8.4.1 Outer box (100*100mm)

CUSTOMER	
ITEM	Dielectric Chip Antenna
MODEL	AMAN0000000000
QUANTITY	PCS
PART NO	
P/O NO	
SHIP DATE	yyyy-mm-dd
SUPPLIER	AMTOECH CO., LTD. 5B-1L Namdong industrial complex 617, Namchon-Dong, Namdong-Gu, Incheon-City, Korea TEL. 82-2-544-1351 FAX. 82-2-517-7183
MADE IN KOREA	

9. Harmfulness material's Test Report

9.1 Material ingredient Analysis

Intertek

TEST REPORT

Applicant : Amotech Co., Ltd.
Address : 5BL-1Lot, 617, Namchon-dong, Namdong-gu,
Incheon-city, 405-100 Korea

Page: 1 of 3

Report No. RT07R-6524-002 Date: Oct. 02, 2007

Sample Description	: The following submitted sample(s) said to be:-
Name/Type of Product	: Dielectric Chip Antenna
Name of Material	: Ceramic (MMT-20)
Sample ID No.	: RT07R-6524-002
Manufacturer/Vender	: Amotech Co., Ltd.
Sample received	: Sep. 27, 2007
Testing Date	: Sep. 27, 2007 ~ Oct. 02, 2007
Testing Laboratory	: Intertek Testing Center
Testing Environment	: Temperature : (22 ~ 26) ℃ Relative Humidity: (55 ~ 65) %
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.

Tested by, Authorized by,

E.Y.Lee / Chemist H.W.Yoo / Lab Manager

Intertek Testing Center

Seoul Office : Tel : 02-2109-1250 Fax : 02-2109-1259 Gumi Office : Tel : 054-462-7647 Fax : 054-462-7657 Web Site : www.intertek.co.kr
Seoul Lab. : #709, 7Fl, Ace Techno Tower V, 197-22, Guro-3Dong, Guro-Gu, Seoul 152-766 Korea Tel : 02-2109-1260 Fax : 02-2109-1258
Ulsan Lab. : #340-2, Yongam-Ri, Chongryang-Myun, Ulju-Gun, Ulsan 689-865 Korea Tel : 052-257-6754 Fax : 052-276-6792

Intertek

TEST REPORT

Page: 2 of 3
Report No. RT07R-6524-002 Date: Oct. 02, 2007

Sample ID No. : RT07R-6524-002
Sample Description : Dielectric Chip Antenna

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	With reference to US EPA 3052, by acid digestion and determined by ICP-OES	0.5	N.D
Lead (Pb)	mg/kg	With reference to US EPA 3052, by acid digestion and determined by ICP-OES	5	N.D
Mercury (Hg)	mg/kg	With reference to US EPA 3052, by acid digestion and determined by ICP-OES	2	N.D
Hexavalent Chromium (Cr^{6+})	mg/kg	US EPA 3060A and determined by UV-VIS	1	N.D
Polybrominated Biphenyl (PBBs)				
Monobromobiphenyl	mg/kg	With reference to US EPA 3540C, by solvent extraction and determined by GC/MS	5	N.D
Dibromobiphenyl	mg/kg		5	N.D
Tribromobiphenyl	mg/kg		5	N.D
Tetrabromobiphenyl	mg/kg		5	N.D
Pentabromobiphenyl	mg/kg		5	N.D
Hexabromobiphenyl	mg/kg		5	N.D
Heptabromobiphenyl	mg/kg		5	N.D
Octabromobiphenyl	mg/kg		5	N.D
Nonabromobiphenyl	mg/kg		5	N.D
Decabromobiphenyl	mg/kg		5	N.D
Polybrominated Diphenyl Ether (PBDEs)				
Monobromodiphenyl ether	mg/kg	With reference to US EPA 3540C, by solvent extraction and determined by GC/MS	5	N.D
Dibromodiphenyl ether	mg/kg		5	N.D
Tribromodiphenyl ether	mg/kg		5	N.D
Tetrabromodiphenyl ether	mg/kg		5	N.D
Pentabromodiphenyl ether	mg/kg		5	N.D
Hexabromodiphenyl ether	mg/kg		5	N.D
Heptabromodiphenyl ether	mg/kg		5	N.D
Octabromodiphenyl ether	mg/kg		5	N.D
Nonabromodiphenyl ether	mg/kg		5	N.D
Decabromodiphenyl ether	mg/kg		5	N.D

Notes : mg/kg = ppm = parts per million
< = Less than
N.D = Not detected (<MDL)
MDL = Method detection limit

Intertek Testing Center

Seoul Office : Tel : 02-2109-1250 Fax : 02-2109-1259 Gumi Office : Tel : 054-462-7647 Fax : 054-462-7657 Web Site : www.intertek.co.kr
Seoul Lab. : #709, 7Fl, Ace Techno Tower V, 197-22, Guro-3Dong, Guro-Gu, Seoul 152-766 Korea Tel : 02-2109-1260 Fax : 02-2109-1258
Ulsan Lab. : #340-2, Yongam-Ri, Chongryang-Myun, Ulju-Gun, Ulsan 689-865 Korea Tel : 052-257-6754 Fax : 052-276-6792

Intertek

TEST REPORT

Report No. RT07R-6524-002 Date: Oct. 02, 2007

Sample ID No. : RT07R-6524-002
Sample Description : Dielectric Chip Antenna

* View of sample as received;-

***** End of Report *****

Intertek Testing Center

Seoul Office : Tel : 02-2109-1250 Fax : 02-2109-1259 Gumi Office : Tel : 054-462-7647 Fax : 054-462-7657 Web Site : www.intertek.co.kr
Seoul Lab. : #709, 7Fl, Ace Techno Tower V, 197-22, Guro-3Dong, Guro-Gu, Seoul 152-766 Korea Tel : 02-2109-1260 Fax : 02-2109-1258
Ulsan Lab. : #340-2, Yongam-Ri, Chongryang-Myun, Ulju-Gun, Ulsan 689-865 Korea Tel : 052-257-6754 Fax : 052-276-6792

9.2 Powder

SGS

Test Report No. : CE/2007/C5661 Date : 2007/12/28 Page : 1 of 3

FUJI TITANIUM IND. CO., LTD.
12-8, SENGEN-CHO, HIRATSUKA-CITY, KANAKAWA-PREF. JAPAN

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

Sample Description	:	MIXTURE OF MAGNESIUM TITANATE, CALCIUM TITANATE
Style/Item No.	:	MMT-20L (B)
Sample Receiving Date	:	2007/12/21
Testing Period	:	2007/12/21 TO 2007/12/28

==========

Test Requested	:	In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.
Test Method	:	With reference to IEC 62321, Ed.1 111/54/CDV Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products. (1) Determination of Cadmium by ICP-AES. (2) Determination of Lead by ICP-AES. (3) Determination of Mercury by ICP-AES. (4) Determination of Hexavalent Chromium for non-metallic samples by UV/Vis Spectrometry. (5) Determination of PBB and PBDE by GC/MS.
Test Result(s)	:	Please refer to next page(s).

Chenyu Kung / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

SGS

Test Report

No. : CE/2007/C5661 Date : 2007/12/28 Page : 2 of 3

FUJI TITANIUM IND. CO., LTD.
12-8, SENGEN-CHO, HIRATSUKA-CITY, KANAKAWA-PREF. JAPAN

Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result No.1	MDL
Cadmium (Cd)	(1)	n.d.	2
Lead (Pb)	(2)	8	2
Mercury (Hg)	(3)	n.d.	2
Hexavalent Chromium Cr(VI) by alkaline extraction	(4)	n.d.	2
Sum of PBBs		n.d.	-
Monobromobiphenyl		n.d.	5
Dibromobiphenyl		n.d.	5
Tribromobiphenyl		n.d.	5
Tetrabromobiphenyl		n.d.	5
Pentabromobiphenyl		n.d.	5
Hexabromobiphenyl		n.d.	5
Heptabromobiphenyl		n.d.	5
Octabromobiphenyl		n.d.	5
Nonabromobiphenyl		n.d.	5
Decabromobiphenyl		n.d.	5
Sum of PBDEs (Mono to Nona) (Note 4)	(5)	n.d.	-
Monobromobiphenyl ether		n.d.	5
Dibromobiphenyl ether		n.d.	5
Tribromobiphenyl ether		n.d.	5
Tetrabromobiphenyl ether		n.d.	5
Pentabromobiphenyl ether		n.d.	5
Hexabromobiphenyl ether		n.d.	5
Heptabromobiphenyl ether		n.d.	5
Octabromobiphenyl ether		n.d.	5
Nonabromobiphenyl ether		n.d.	5
Decabromobiphenyl ether		n.d.	5
Sum of PBDEs (Mono to Deca)		n.d.	-

TEST PART DESCRIPTION:

NO.1 : GRAY POWDER

Note : 1. mg/kg = ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. According to 2005/717/EC DecaBDE is exempt.
5. "-" = Not Regulated

SGS TAIWAN LIMITED NO. 136-1, Wu Kung Road, WuKu Industrial Zone, Taipei county, Taiwan.
t(886-2) 22993939 f(886-2) 2299-3237 www.sgs.com.tw

SGS

Test Report No. : CE/2007/C5661 Date : 2007/12/28 Page : 3 of 3

FUJI TITANIUM IND. CO., LTD.
12-8, SENGEN-CHO, HIRATSUKA-CITY, KANAKAWA-PREF. JAPAN

** End of Report **

9.3 Ag paste

SGS

Test Report No. F690501/LF-CTSAYA08-00930 Issued Date: January 15, 2008 Page 1 of 2

To: METECH KOREA CO., LTD.
B-801 Dongyang Paragon officetel 17-2 Jeongja-dong
Bundang-gu
Sungnam-city
GYEONGGI-DO
Korea

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

Product Name	: Silver Paste
SGS File No.	: AYA08-00930
Received Date	: January 09, 2008
Test Performing Date	: January 10, 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)

SGS Testing Korea Co. Ltd.

Pluto Kim
Monet Jeong
Billy Oh / Testing Person

Jeff Jang / Chemical Lab Mgr

F052 Version2

SGS

Test Report No. F690501/LF-CTSAYA08-00930 Issued Date: January 15, 2008 Page 2 of 2

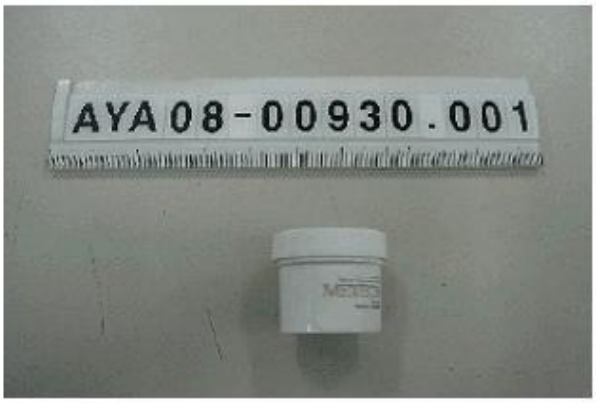
Sample No. : AYA08-00930.001
Sample Description : Silver Paste
Item No./Part No. : PCC11837
Comments : Material is silver.

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.

Picture of Sample as Received:

Sample Color : Gray



*** 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

F052 Version2

9.4 ink

SGS

Test Report No. F690501/LF-CTSAYA08-05172 Issued Date: February 19, 2008 Page 1 of 3

To: **IMAJE KOREA CO., LTD**
#1302 7th Daerung Techno Town 489-11
Gasan-dong
Geumcheon-gu
SEOUL
Korea

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

Product Name	: 5506 Black Ink
SGS File No.	: AYA08-05172
Received Date	: February 18, 2008
Test Performing Date	: February 19, 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)

SGS Testing Korea Co. Ltd.

Pluto Kim
Monet Jeong
Billy Oh / Testing Person

Jeff Jang / Chemical Lab Mgr

F052 Version2

SGS

Test Report No. F690501/LF-CTSAYA08-05172 Issued Date: February 19, 2008 Page 2 of 3

Sample No. : AYA08-05172.001

Sample Description : 5506 Black Ink

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 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

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SGS

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Sample No. : AYA08-05172.001

Sample Description : 5506 Black Ink

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 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

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Picture of Sample as Received:

Sample Color : Black

*** 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

F052 Version2

9.5 Carrier Tape

DENKA

DENKA BUNSEKI CENTER

3-6-1 Asahi-cho
Machida-shi Tokyo 194-8560 JAPAN

Registry Number for Measurement Laboratory Accreditation
of Tokyo metropolitan:541

Laboratory Analysis Report

Report Date : 07-09-12
Doc. No. : 29808-3
Sample Description : DENKA THERMOFILM ALS ALS-ATA
Prepared for : Isesaki Plant DENKA KAKO CO.,LTD.

Results of Analysis

Analyte	Concentration/ppm (Quantitative limit)	Method	date	person in charge
Cadmium (Cd)	N.D. (< 2ppm)	Graphite furnace Atomic Absorption Spectrometry	07-03-13	Tohru Inaba
Lead (Pb)	N.D. (< 9ppm)	Graphite furnace Atomic Absorption Spectrometry	07-03-12	Tohru Inaba
Chromium (Cr) (Total)	N.D. (< 3ppm)	Graphite furnace Atomic Absorption Spectrometry	07-03-08	Tohru Inaba
Mercury (Hg) (Total)	N.D. (< 2ppm)	Japanese Clinical Standard	07-03-05	Tohru Inaba
Bromine (Br) (Total)	N.D. (< 7ppm)	Combustion in a stream of oxygen Ion Chromatography	07-03-08	Tohru Inaba

Equipment for Measurement

Cd Atomic Absorption Spectrometer with Direct Solid Analysis
Analytik Jena AG AAS ZEEnit 60

Pb Atomic Absorption Spectrometer with Direct Solid Analysis
Analytik Jena AG AAS ZEEnit 60

Cr Atomic Absorption Spectrometer with Direct Solid Analysis
Analytik Jena AG AAS ZEEnit 60

Hg Au-Amalgam Reduction - Atomic Absorption Spectrometer
Nippon Instruments Corporation MA-2000

Br Ion Chromatography
Dionex Corporation ICS-1500

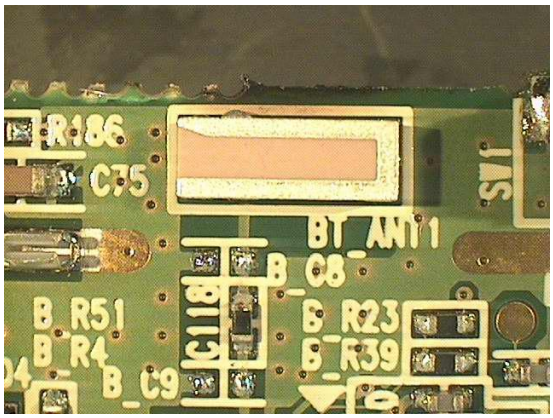
ID:481-A70651-29808-3-E

Yoichiro Furukawa
Manager

[Attachment]

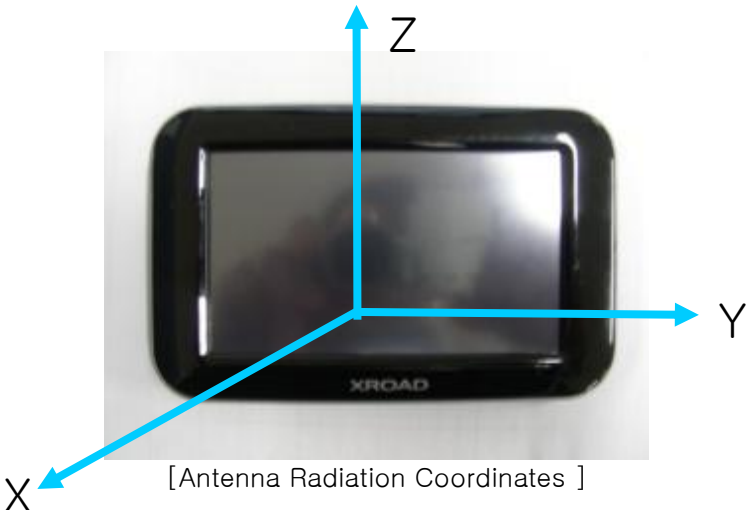
1. Electrical Characteristic on Handset

1.1 Antenna Layout



[AMAN542012XR01]

1.2 Test Condition

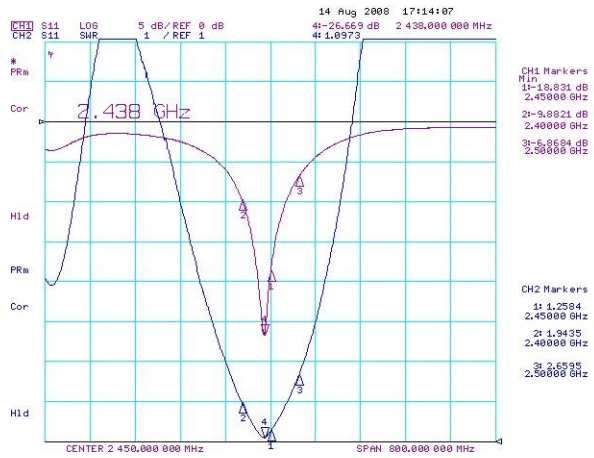


[Antenna Radiation Coordinates]

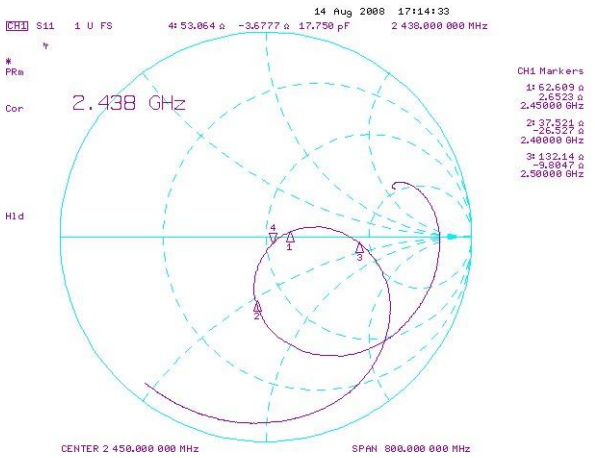
Parameters	Condition	Unit
Chamber size	6 X 3 X 3	m
Temperature	21.5	°C
Humidity	55	%
Absorption rate	-50dB under (over 2,000MHz)	-
Measurement	S21 (Network Analyzer)	HP E5071B
System software	MTG VWM_View	Version 2.0

1.3 Passive data

▪ VSWR and Smith chart on Handset



[S11 & VSWR]



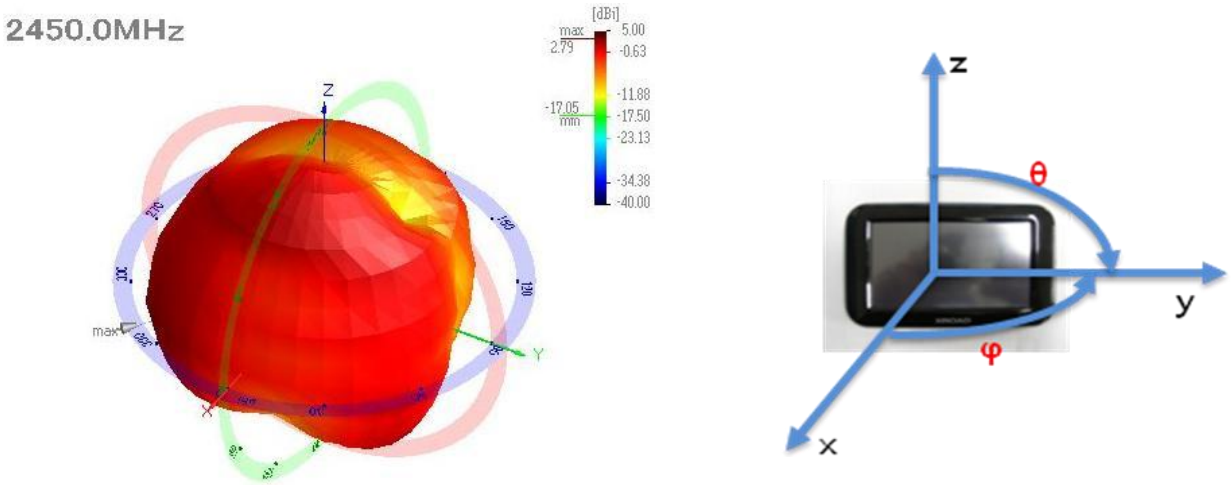
[Smith chart]

▪ Passive Gain (Unit : dBi)

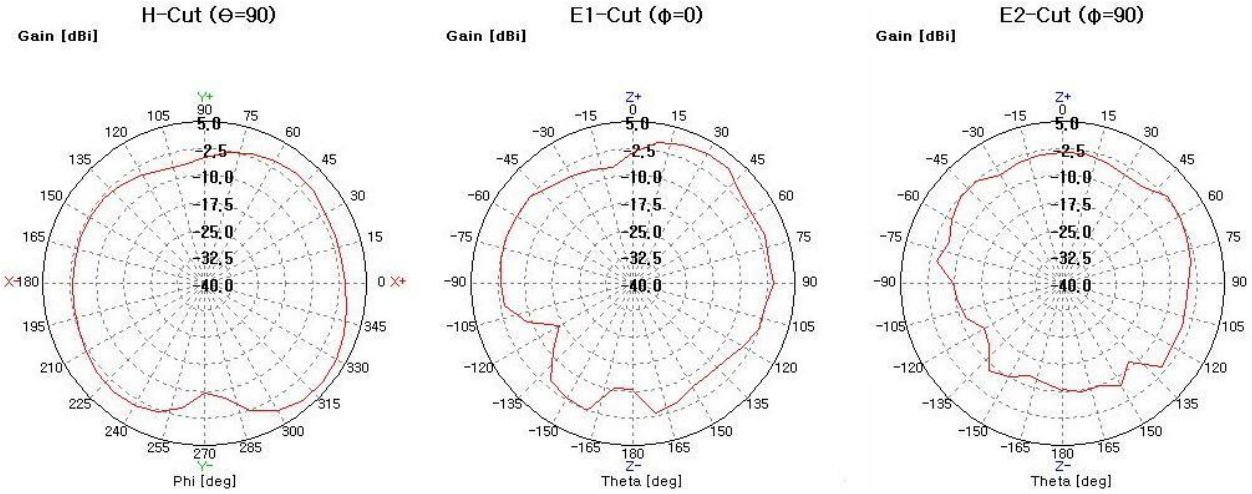
▪ Total Radiation Power (Unit : dBm)

Frequency (MHz)	Efficiency (%)	Average Gain (dBi)	Peak Gain (dBi)
2400.0 MHz	55.90	-2.53	2.51
2450.0 MHz	59.50	-2.26	2.79
2500.0 MHz	37.93	-4.21	0.55

▪ Radiation Pattern



[3D Radiation Pattern]



[2D Radiation Pattern]