






# Approval Sheet

Products	Dielectric Chip Antenna		
Customer	Pantech		
Model	IM		
Customer CODE			
Supplier	PARTRON		
Supplier CODE	ACS2450GBAIM		
Pantech	By designed	By checked	By approved
PARTRON	By designed	By checked	By approved
			
	Research 5Team	Quality Assurance	Laboratory
	Chanik.Jeon	Kwang-Gyu.Lee	Byoung-Jun.Yim
	06/05	06/05	06/05

**2007 . 06. 05**



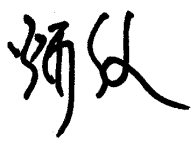


MSL Level 1

# SPECIFICATION

MODEL : ACS2450GBAIM

## DIELECTRIC CHIP ANTENNA

By designed	By checked	By approved
		
Research, 2P	Quality Assurance	Laboratory
Chan-Ik.Jeon	Kwang-Gyu.Lee	Byoung-Jun.Yim
06/05	06/05	06/05

2007 . 06. 05



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1. 이력관리

Revision No	Originator	Description of changes	Date of changes
Ver 1.0	Chanik.Jeon	Issued	2007.06.05

## 2. Electrical Characteristics


### 2.1 Single Element Spec

ITEM	SPEC
Frequency Range [MHz]	2400 ~ 2485
SWR [Max]	3 : 1
Bandwidth [MHz]	85
Gain (Peak / Avg) [dBi]	1.7 / -1.8

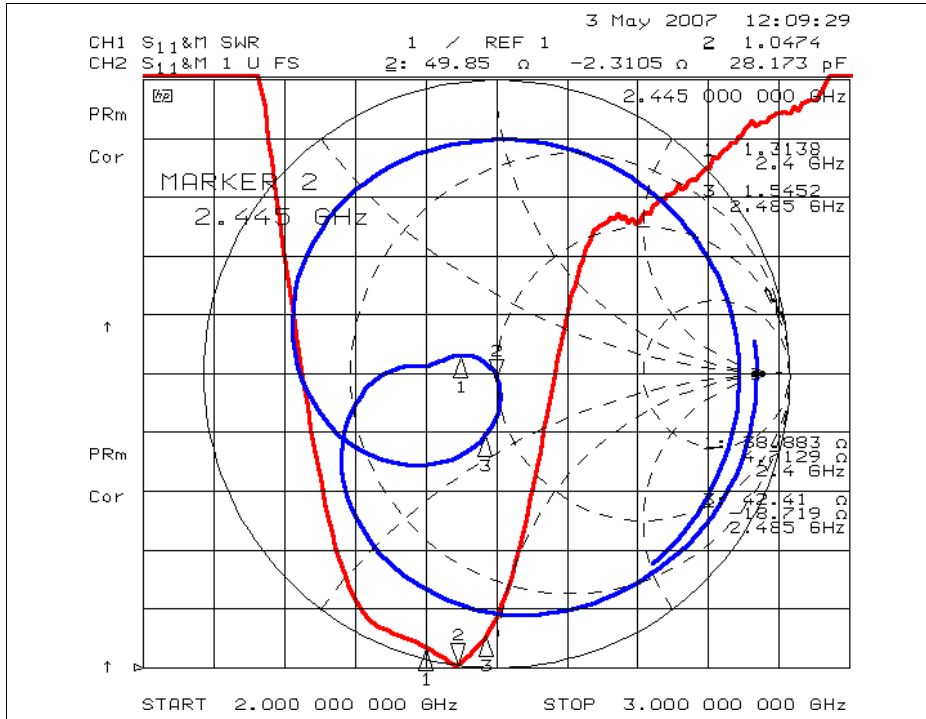
### 2.2 Set Condition

ITEM			SPEC	
Frequency Range [MHz]			2400 ~ 2485	
VSWR [Max]			3 : 1	
Bandwidth [MHz]			85	
Polarization			Linear	
Gain[dBi]	Total Gain ( Peak / Avg ) [dBi]		-0.2 / -7.0	
	Azimuth	Theta	Peak	-0.19
			Average	-4.74
		Phi	Peak	-2.04
			Average	-7.86
	Elevation 1	Theta	Peak	-2.58
			Average	-6.88
		Phi	Peak	-0.19
			Average	-6.59
	Elevation 2	Theta	Peak	-7.19
			Average	-12.19
		Phi	Peak	-2.97
Average			-6.55	

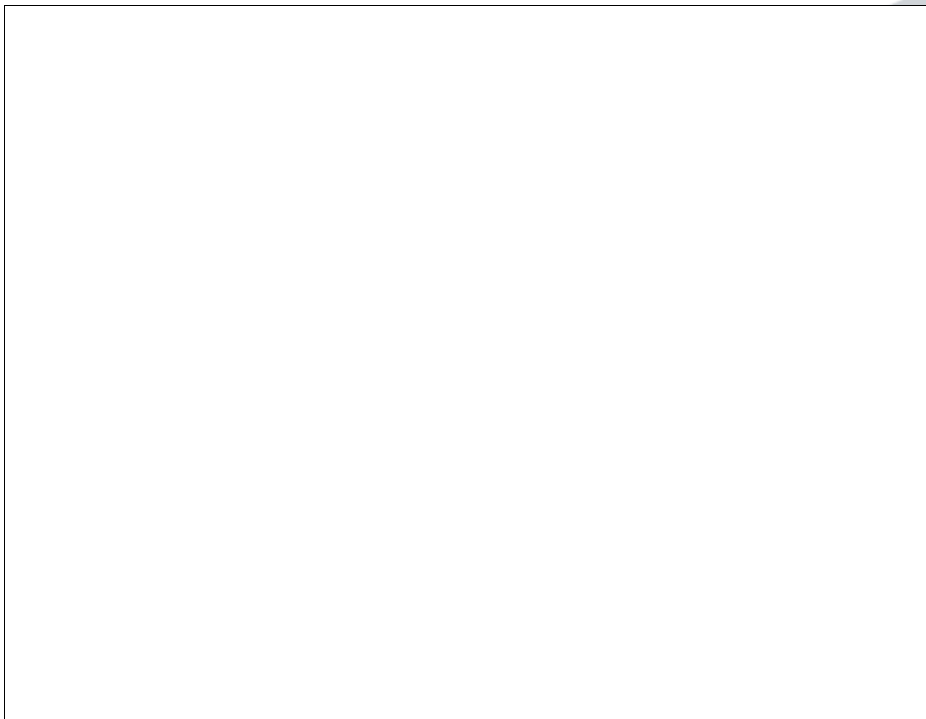
### 2.3 Test Fixture Condition

ITEM	SPEC	
Frequency Range [MHz]		
SWR [Max]	3 : 1	
Bandwidth [MHz]	80	

2.4 S11 Graph of Set Condition

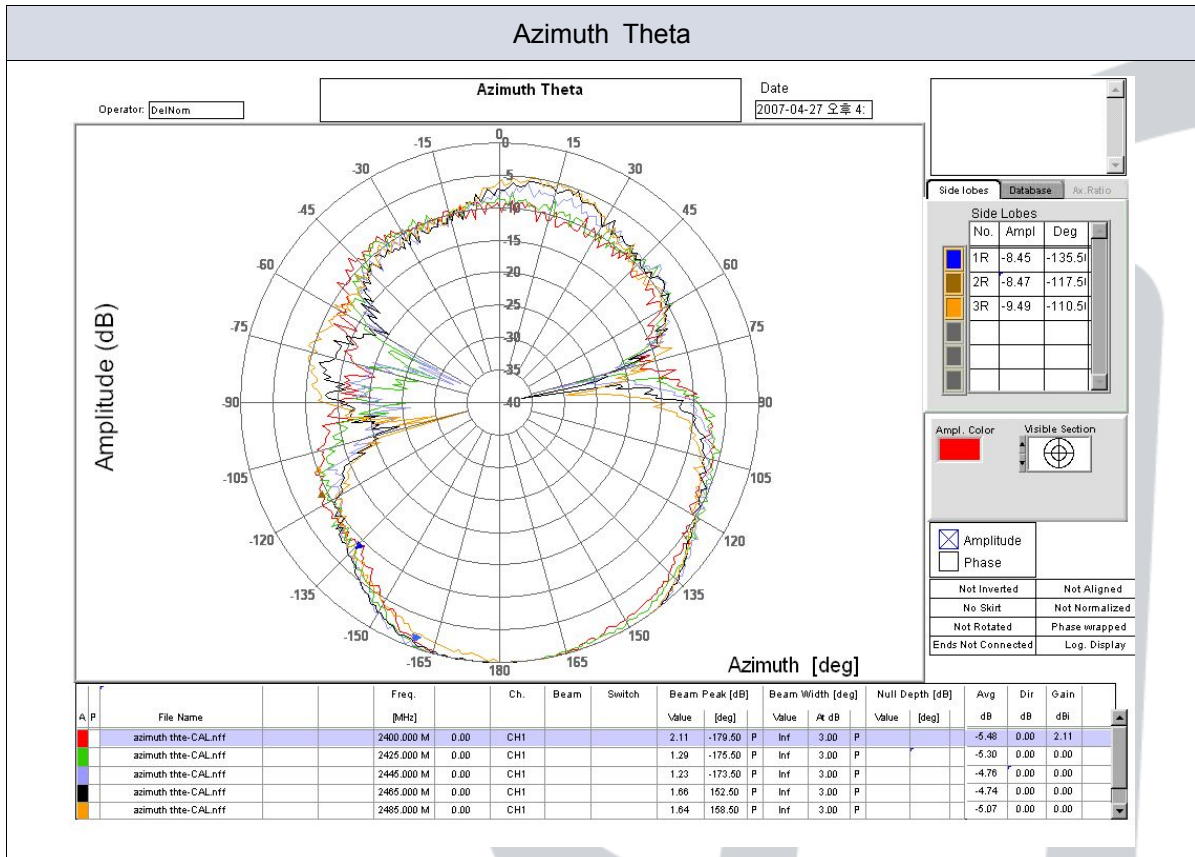


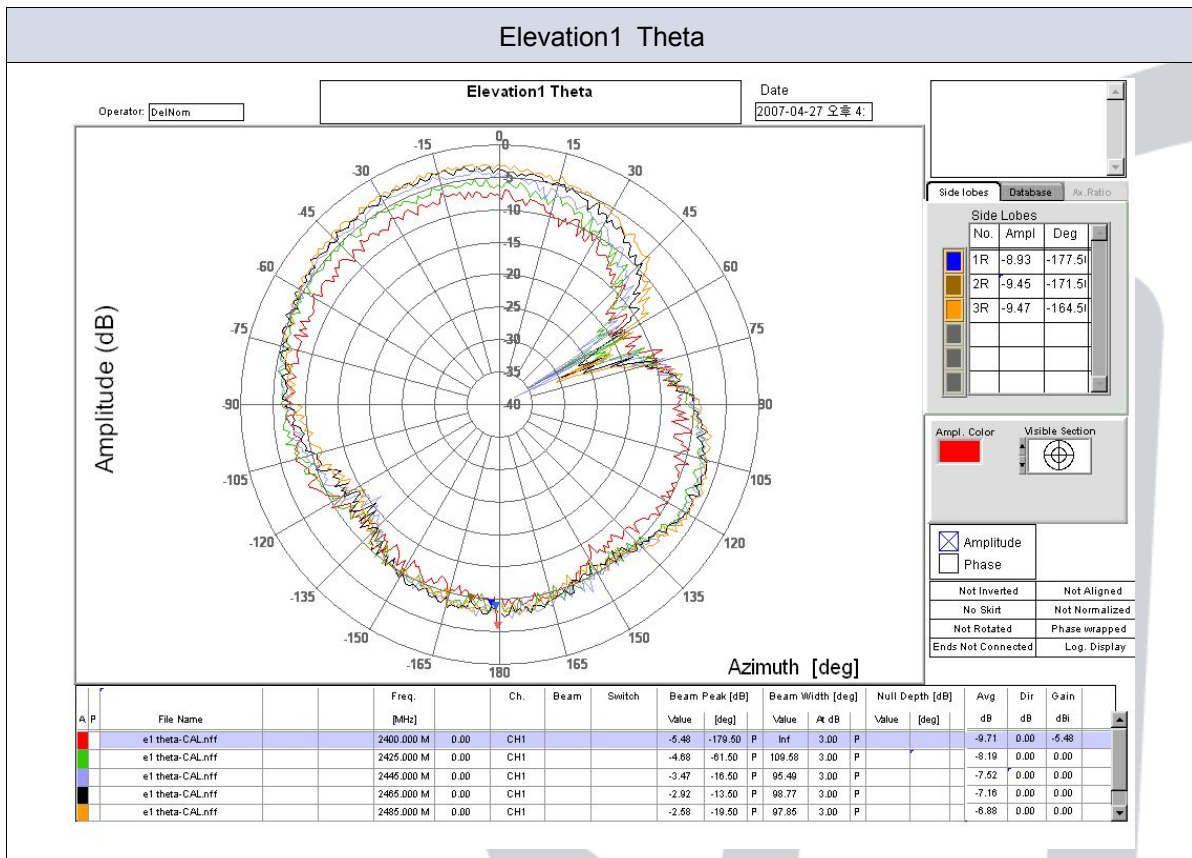
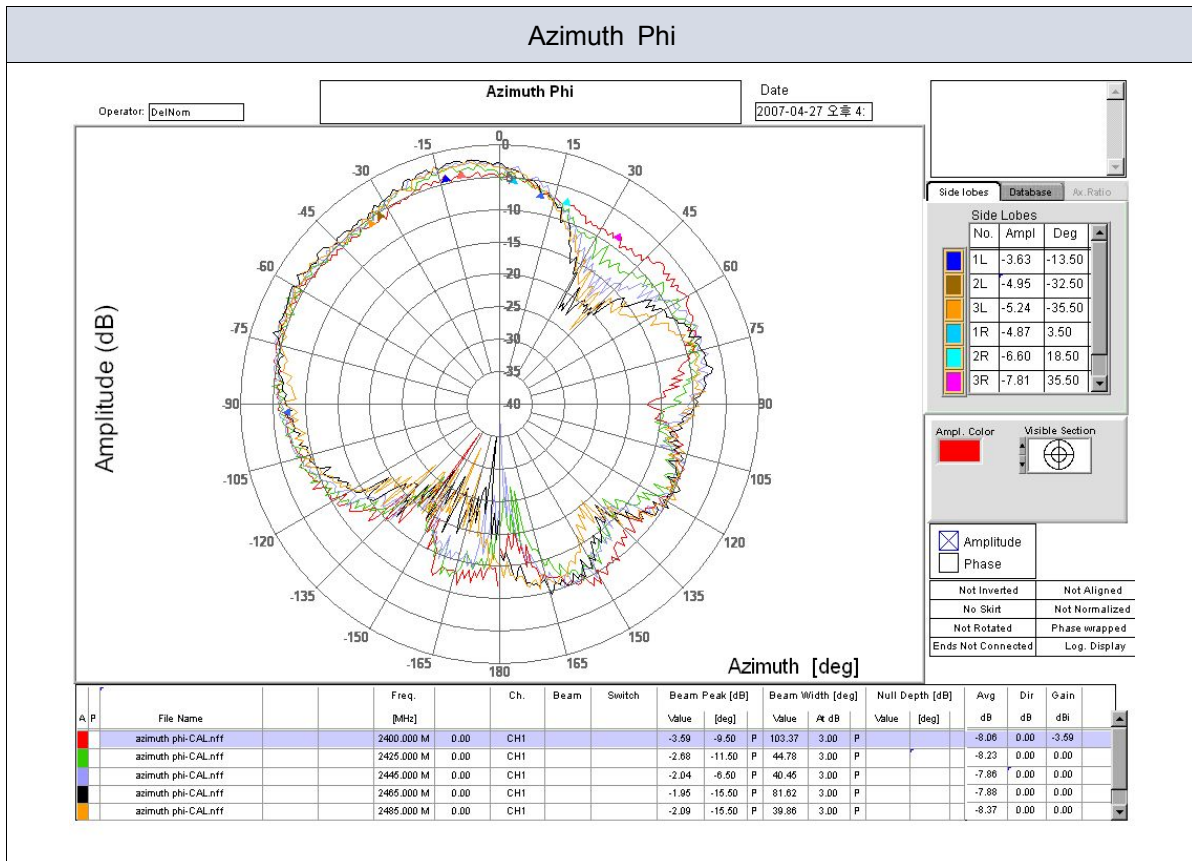
2.5 S11 Graph of Test Fixture Condition



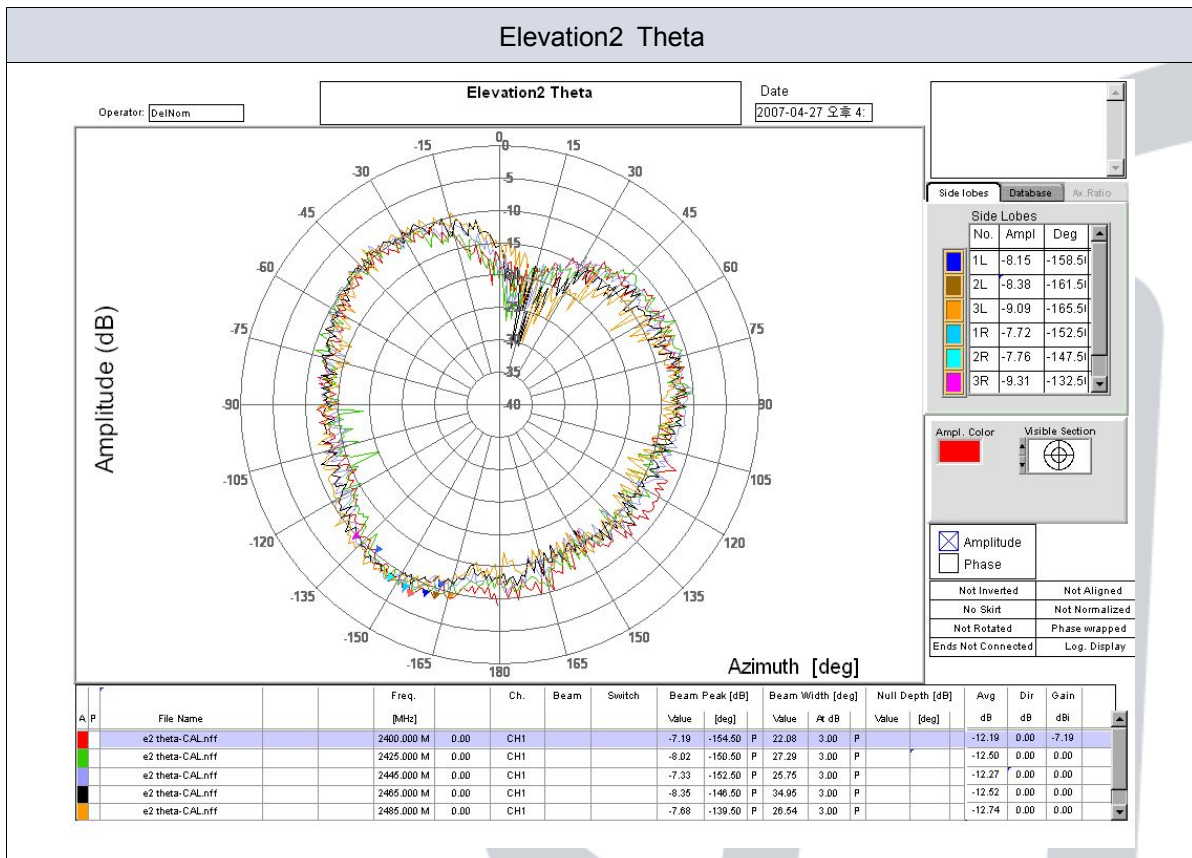
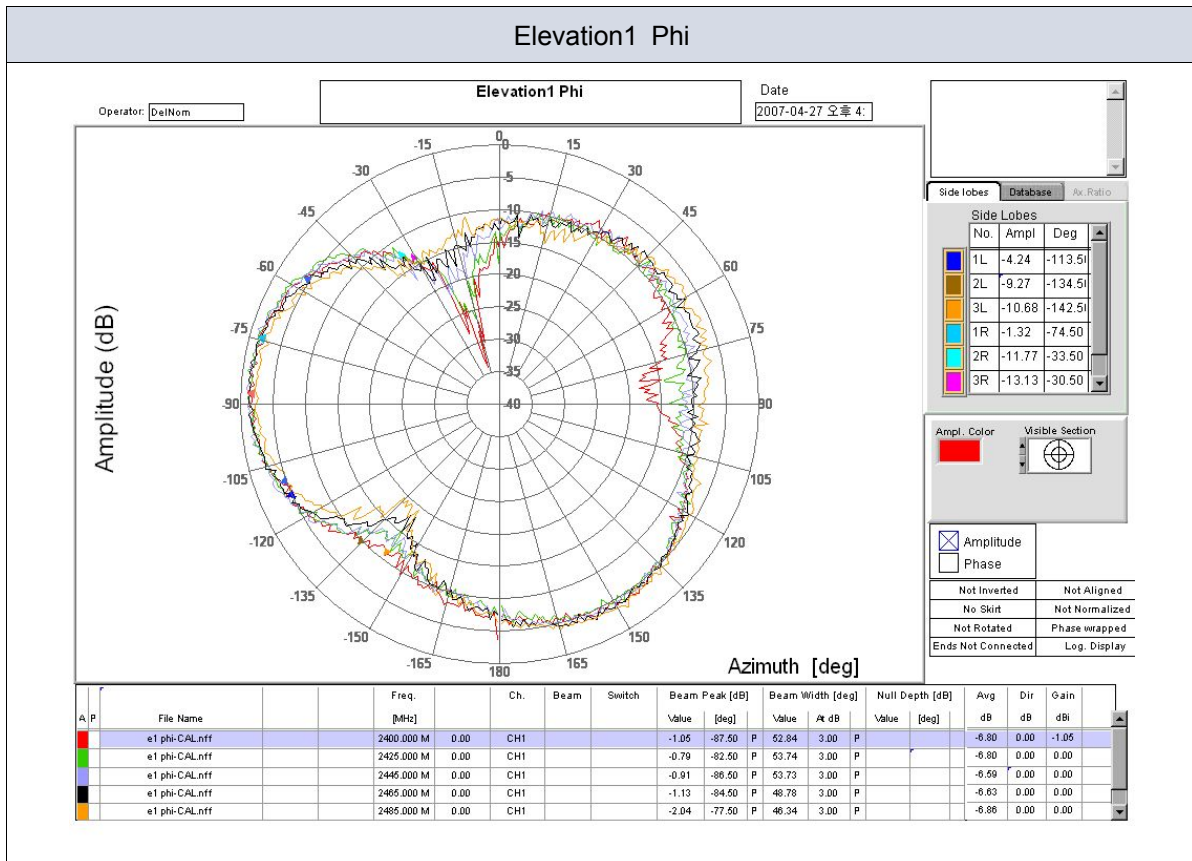
## 2.6 Radiation Pattern

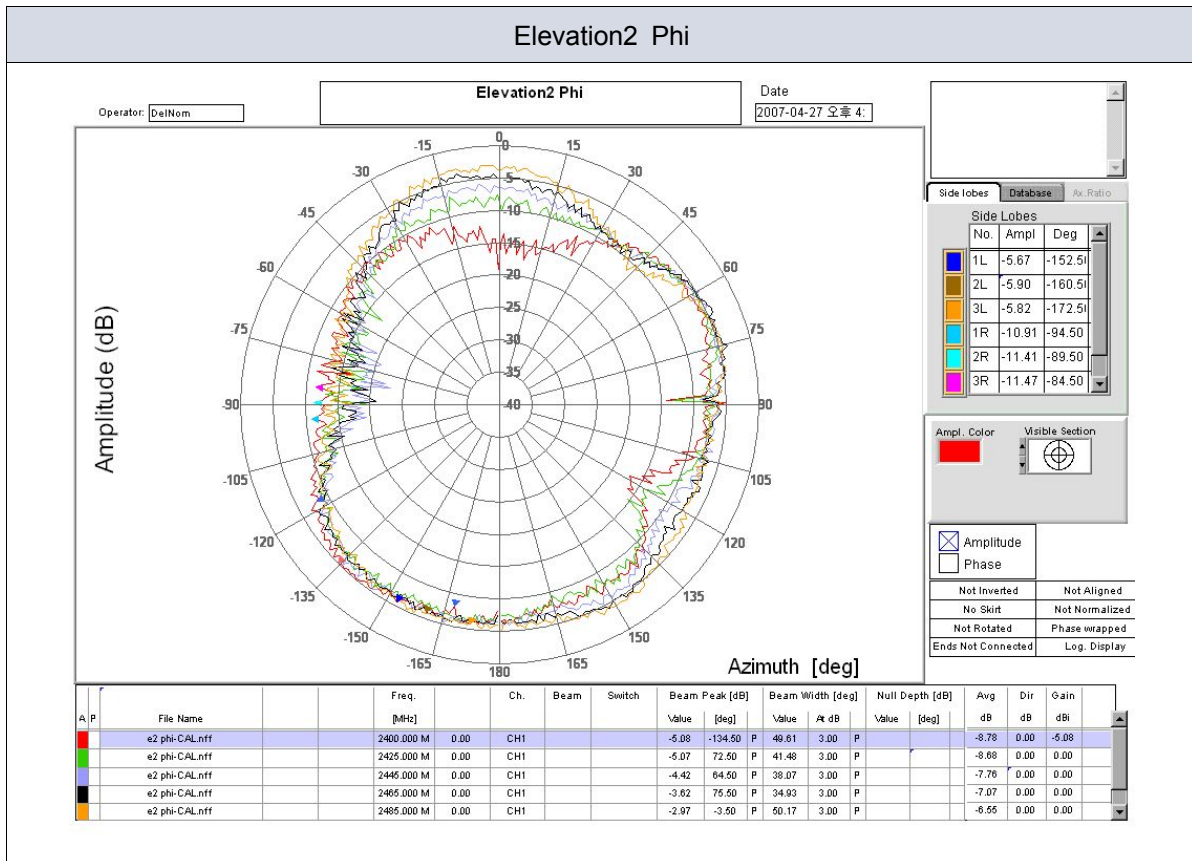
Azimuth Plane	Elevation 1 Plane	Elevation2 Plane
Theta	Vertical field of measured plane	
Phi	Horizontal field of measured plane	











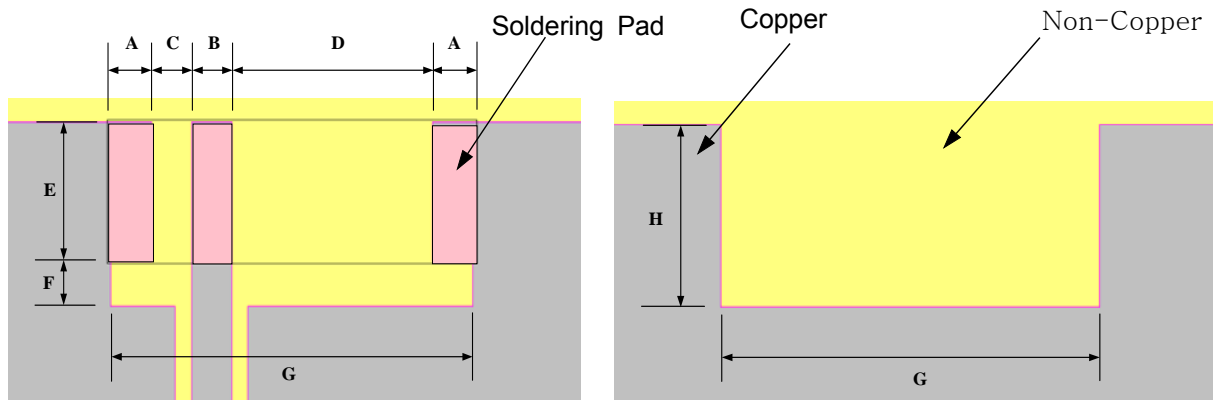
### 3. Mechanical Characteristics

- The structure is materialized printing Ag paste at the dielectric block

#### 3.1 Structure and Material

Material	Dielectric Block (MMS-08)	3D Structure
	Ag Paste (Metech)	
Size [mm]	W = 2.0±0.1	
	L = 7.0±0.1	
	T = 1.2±0.1	
Temperature [°C]	- 40 ~ +80	
Humidity [%]	At the normal temperature, RH 100	

3.2 PCB Layout & Soldering Pad Dimension



**Top Layout**

**Bottom Pattern**

Parameter	A	B	C	D	E	F	G	H
Value[mm]	1.1	1.0	0.5	3.5	2.2	1.0	7.0	3.2

Unit ; mm

Unless specified tolerances are  $\pm 0.1$

3.3 Antenna Pattern Dimension

Antenna Pattern View

Unit ; mm

Unless specified tolerances are  $\pm 0.1$

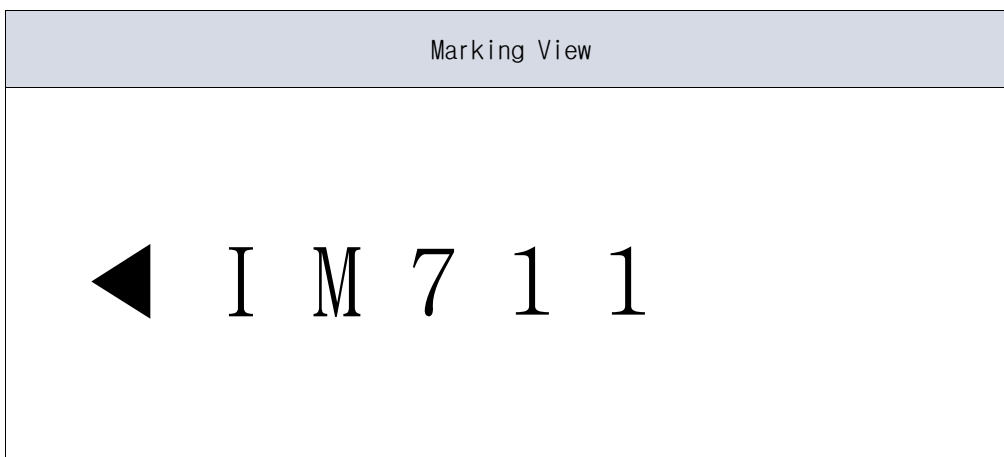
Top
Side1
Bottom
Side2

### 3.4 LOT Notation

<u>7</u>	<u>1</u>	<u>1</u>
①	②	③

- ① Year : 1 - 2001, 2 - 2002, ..... 7 - 2007 .....
- ② Month : 1 - January, 2 - February ..... 9 - September, A - October, B - November ..
- ③ Date : 1 - 1st , 2 - 2nd ..... A - 10th, B - 11th .....

### 3.5 Marking



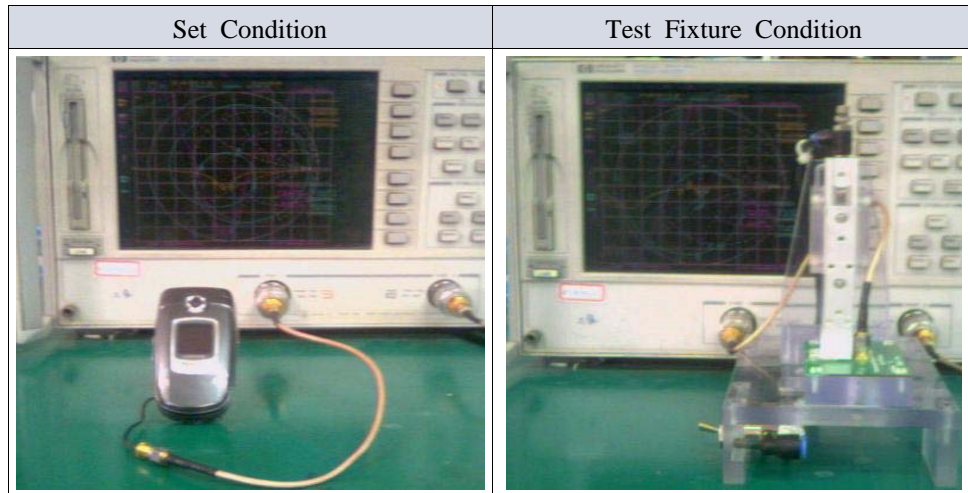
◀	<u>I</u>	<u>M</u>	<u>7</u>	<u>1</u>	<u>1</u>
①	②	③	④	⑤	

- ① Input Signal
- ② **Serial**
- ③ Year; 1 - 2001, 2 - 2002, ..... 7 - 2007 .....
- ④ Month ; 1 - January, 2 - February ..... 9 - September, A - October, B - November .....
- ⑤ Date : 1 - 1st , 2 - 2nd ..... A - 10th, B - 11th .....

#### 4. Measurement Process

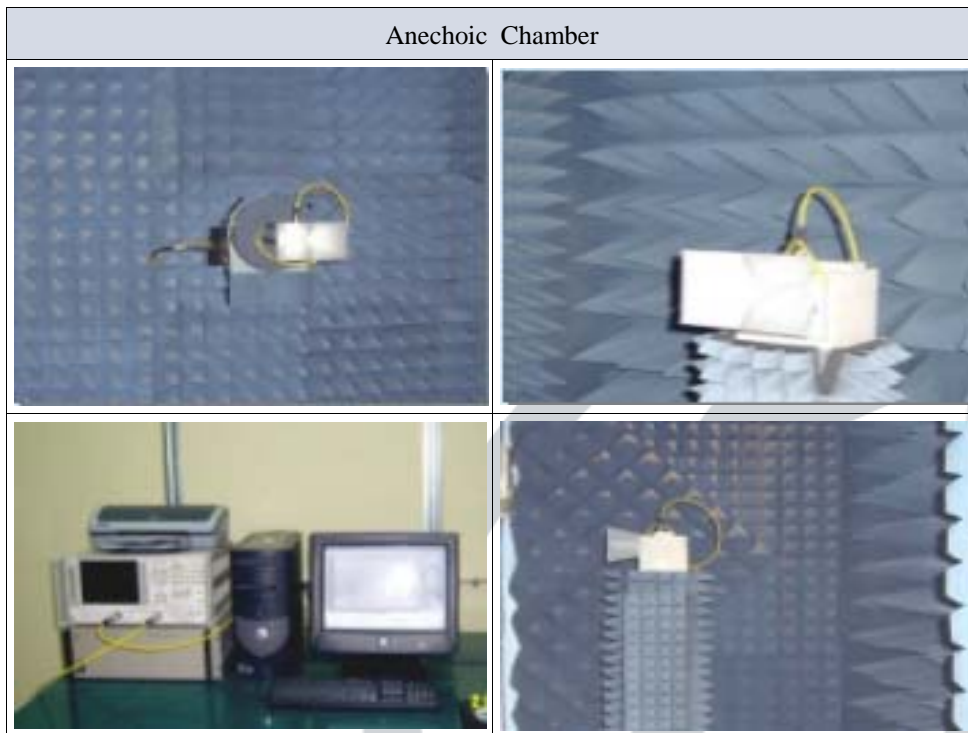
##### 4.1 SWR/Returnloss

The SWR/Returnloss is measured by Network Analyzer





##### 4.2 Gain

The Antenna Gain is measured using the set at Anechoic Chamber



**5. Primary Inspection List**

Item	Electrical Characteristic [MHz] 		Mechanical Dimension [mm] 		
	VSWR 3.0 Max		W=2.0±0.1	L=7.0±0.1	T=1.2±0.1
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
X					
σ					
Cpk					

## 6. Reliability Condition

### 6.1 ENVIRONMENT TEST

ITEM	TEST CONDITION	LIMIT
High Temperature Resistance	+85℃±3℃, 120hr±2hr	*After the test, specimen would be kept at 25℃±5℃ for 1 hours *specimen sheet meet the electrical specification
Low Temperature Resistance	-40℃±3℃, 120hr±2hr	
Humidity Resistance	+60±3℃, RH90~95%, 120hr±2hr	

### 6.2 Thermal Shock Test, Reflow Test

ITEM	TEST CONDITION	LIMIT
Thermal Shock	-40℃±3℃(2Hr) ↔ +85℃±3℃(2Hr) cycle : 15cycle recovery time : with in 5min	SAME as 6-1
Reflow	Pre Heating : 140±10℃, 60~120 sec peak Heating : 240℃, 10sec Max	

### 6.3 Mechanical Test

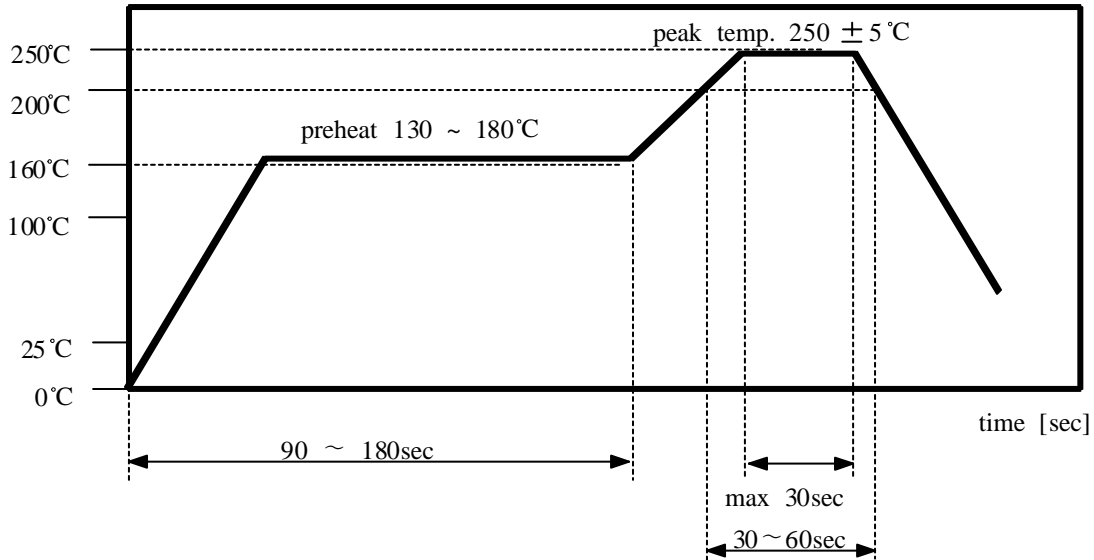
ITEM	TEST CONDITION	LIMIT
Random Vibration	Frequency 10~500Hz - 10 ×9.8m/s <sup>2</sup> (G) Sweep time 15min, X.Y.Z each 5 times	*After the test, specimen sheet meet the electrical specification
Drop	Height 120cm, 12 times Height 152cm, 19 times	

### 6.4 Reliability Test Result

※ Appendix

## 7. Soldering Condition

### 7.1 Reflow Soldering



### 7.2 Manual Soldering

Pre-heating Temperature : 120°C , 60 ~ 300 sec.

Soldering Temperature : 340°C±5°C , 5sec max per each terminal

## 8. Attention

### 8.1 Temperature Condition

	Range of Temperature	unit
Application	-40 ~ +85	°C
Keeping	-40 ~ +85	°C

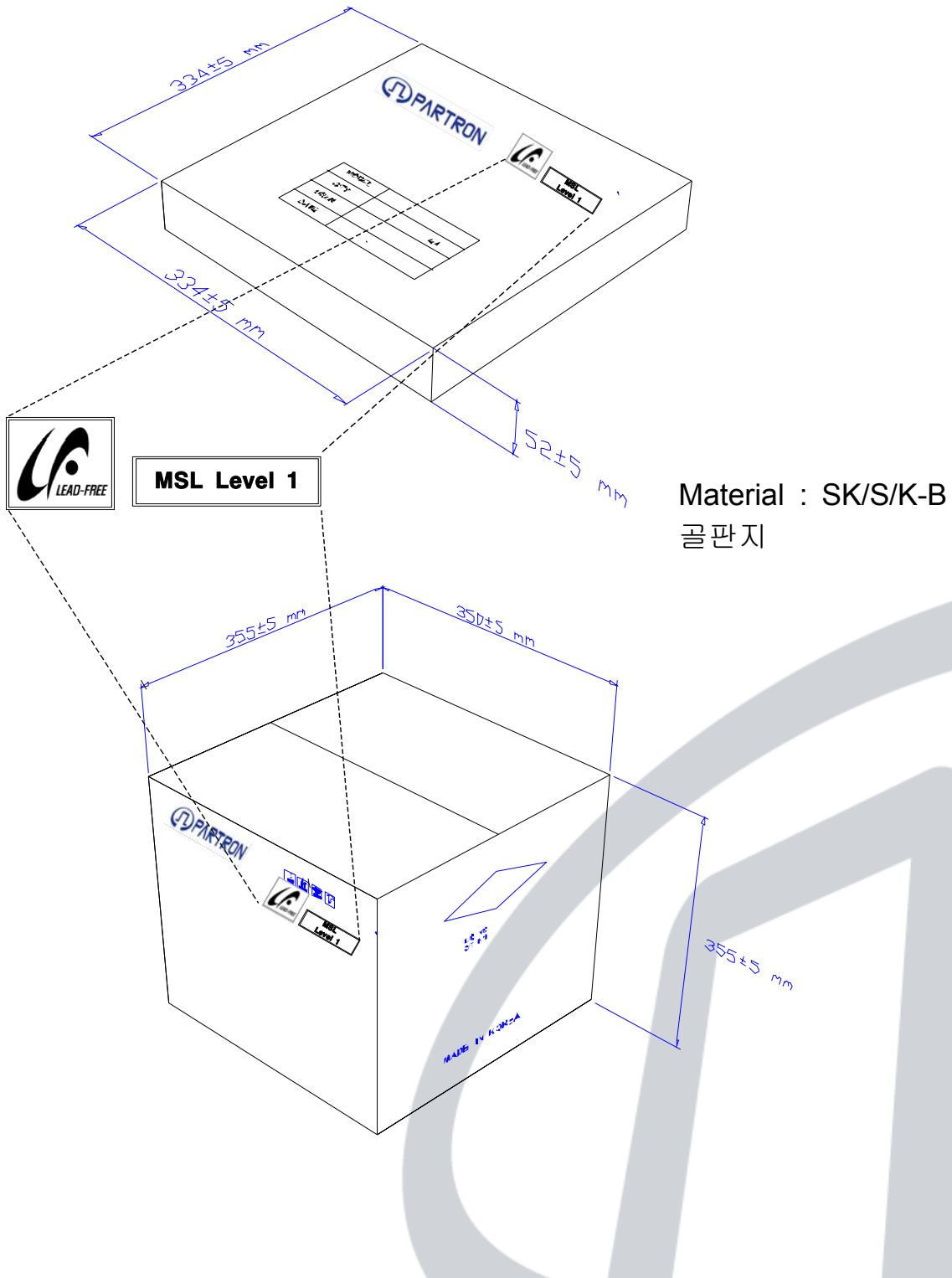
### 8.2 MSL LEVEL 1 (JEDEC J-STD-020C)

	Floor Life		Soak Requirements	
	Time	Conditions	Time	Conditions
	Unlimited	= < 30°C/85%RH	168+5/-0	= < 85°C/85%RH





9.2 Box Specification



**10. Process Control**

Product		Issued/Revision		Process Control					Record	By designed	By checked	By approved		
CHIP ANTENNA		Issued	04.04.06						Revised	05.04.03	PRCP-C001			
Input Materials	FLOW CHART		Process name	Management of Factors					Management of quality					
	preparation	Main Process		Equipment Name	Checked	Condition	Cycle of management	Record	Checked Item	Margin	Method of Inspection	Cycle of management	Record	Action
Ceramic POWDER			Import Inspection						shrinking rate permittivity	refer to Guide Sheet	Micrometer Network	10ea/LOT	C/sheet	Return
POWDER lubricant			powder	Mixer					mixing	POWDER lubricant	Scale	PER MIXING	-	Exhaust
			Shaping	Press	pressure Mold Condition	refer to Guide Sheet	Per LOT 1/day	parameter C/SHEET	dimension  weight density aspect	refer to Guide Sheet	Micrometer scale Calculated Visual	5/100EA  10ea/lot	LOT CARD	Exhaust
			Plasticity	Plasticity Hole	SETTER Outside Temperature PROFILE	refer to Guide Sheet	all 2/day 1/month	C/sheet						
			Block						wide length shape	refer to Guide Sheet	Micrometer Calipers Visual Inspection	20ea/LOT 20ea/LOT all	C/sheet	Exhaust
AG PASTE			SIDE1 PAD Printing	Printer screen	Squeeze velocity/presure SNAP	refer to Guide Sheet	1/day	-	PATTERN Dimension  aspect	refer to Guide Sheet	Microscope	10ea/3Jig	c/sheet	Rework
			Dry	Dryer Dry Jig	Temperature Belt speed	refer to Guide Sheet	1/week	Parameter	Dry Condition  Printed condition breakage	refer to Guide Sheet	Visual Inspection	all	Lot card	Rework

Product		Issued/Revision		Process Control					Record	By designed	By checked	By approved		
CHIP ANTENNA		Issued	04.04.06						Revised	05.04.03			PRCP-C001	
Input Materials	FLOW CHART		Process name	Management of Factors					Management of quality					
	preparation	Main Process		Equipment Name	Checked	Condition	Cycle of management	Record	Checked Item	Margin	Method of Inspection	Cycle of management	Record	Action
AG PASTE			SIDE 2 PAD Printing	Printer screen	Squeeze velocity/presure SNAP	refer to Guide Sheet	1/day	-	PATTERN Dimension aspect	refer to Guide Sheet	Microscope	10ea/3Jig	c/sheet	Rework
			Dry	Dryer Dry Jig	Temperature Belt speed	refer to Guide Sheet	1/week	Parameter	Dry Condition Printed condition breakage	refer to Guide Sheet	Visual Inspection	all	Lot card	Rework
			Baking	Baking Hole mesh net	Temperature Belt speed	refer to Guide Sheet	1/week	Parameter C/Sheet	Breakage Pollution	refer to Guide Sheet	Visual Inspection	all	Lot card	Exhaust Rework
AG PASTE			TOP printing	Printer screen	Squeeze velocity/presure SNAP	refer to Guide Sheet	1/day	-	PATTERN dimension	refer to Guide Sheet	measure	10ea/3Jig	c/sheet	Rework
			Dry	Dryer Dry Jig	Temperature Belt speed	refer to Guide Sheet	1/week	Parameter	Dry Condition Printed condition breakage	refer to Guide Sheet	Visual Inspection	all	Lot card	Rework
AG PASTE			BOTTOM PAD Printing <span style="color: blue;">CTQ</span>	printer screen	Squeeze velocity/presure SNAP	refer to Guide Sheet	1/day	-	PATTERN dimension aspect	refer to Guide Sheet	measure Microscope	10ea/3Jig	c/sheet	Rework

Product		Issued/Revision		Process Control					Record	By designed	By checked	By approved		
CHIP ANTENNA		Issued	04.04.06						Record					
		Revised	05.04.03	PRCP-C001										
Input Materials	FLOW CHART		Process name	Management of Factors					Management of quality					
	preparation	Main Process		Equipment Name	Checked	Condition	Cycle of management	Record	Checked Item	Margin	Method of Inspection	Cycle of management	Record	Action
			Dry	Dryer Dry Jig	Temperature Belt speed	refer to Guide Sheet	1/week	Parameter	Dry Condition Printed condition breakage	refer to Guide Sheet	Visual Inspection	all	Lot card	Rework
			Baking	Baking Hole mesh net	Temperature Belt speed	refer to Guide Sheet	1/week	Parameter C/Sheet	Breakage Pollution	refer to Guide Sheet	Visual Inspection	all	Lot card	Exhaust Rework
			aspect inspection						aspect	Reference SPL refer to Guide Sheet	Visual Inspection microscope	all	Lot card production diary	Exhaust repair
			MARKING	Marking Machine					marking	Reference SPL	Visual Inspection	all	Lot card production diary	Rework Exhaust
			Electrical Characteristic	NETWORK Inspection Jig	proofreading Condition	refer to Guide Sheet	1/2hour	C/sheet	Electrical Characteristic	refer to Guide Sheet	Network	all	Lot card production diary	Exhaust repair
			aspect inspection						aspect dimension	Reference SPL refer to Guide Sheet	Visual Inspection microscope	all	Lot card production diary	Exhaust repair
Carrier cover reel			Taping						Quantity Direction aspect	refer to Guide Sheet	Manual	all	Lot card production diary	Rework
			shipper inspection	NETWORK Inspection Jig	proofreading Condition	refer to Guide Sheet	1/person	C/sheet	Electrical Characteristic aspect packing	refer to Guide Sheet	Network microscope Visual Inspection	refer to Guide Sheet	Result Paper	return Exhaust
packing box label			packing	bar code printer					packing P/N Quantity	refer to Guide Sheet	Visual Inspection	all	-	Rework
			packing inspection						packing P/N Quantity	refer to Guide Sheet	Visual Inspection	all	-	return



## 2) Ag paste

**Test Report No. F690501/LF-CTSGP06-26952**

Date: October 27, 2006

Page 1 of 2

**To:** METECH KOREA CO., LTD.  
 B-01 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:

Commodity : PCC11837HV  
 SGS File No. : GP06-26952  
 Received Date : October 20, 2006  
 Test Performing Date : October 23, 2006  
 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  
 Patrick An  
 Monet Jeong  
 Jinee Song  
 /Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

The above certificate is the accredited test items by Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA.

**Test Report No. F690501/LF-CTSGP06-26952**

Date: October 27, 2006

Page 2 of 2

**Sample No.** : GP06-26952.001  
**Sample Description** : PCC11837HV  
**Item No./Part No.** : N/A  
**Comments** : Material is silver paste.

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3050B(1996), US EPA 8010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 8010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 8010B(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:

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

NOTE: (1) N.D. = Not detected (<MDL)  
 (2) ppm = mg/kg  
 (3) MDL = Method Detection Limit  
 (4) Estimated expanded uncertainty U with a coverage factor k=2, corresponding to a level of confidence of about 95%

The above certificate is the accredited test items by Korea Laboratory Accreditation Scheme (KOLAS), which signed the ILAC-MRA.

## 3) Marking ink

**Test Report No. F690501/LF-CTSGP06-27074**

Date: October 27, 2006

Page 1 of 3

**To:** INKUS KOREA CO., LTD.  
 51302 Daeyang Techno Town 7th  
 Kubeon-gil  
 Kyeongsu-buk-gu  
 Seoul  
 Korea

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

Commodity : ink-41302 tank ink  
 SGS File No. : GP06-27074  
 Received Date : October 20, 2006  
 Test Performing Date : October 23, 2006  
 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  
 Jinye Jeong  
 /Testing Person

SGS Testing Korea Co. Ltd.

Jeff Jang / Chemical Lab Mgr

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**Test Report No. F690501/LF-CTSGP06-27074**

Date: October 27, 2006

Page 2 of 3

**Sample No.** : (GP06-27074.001)  
**Sample Description** : ink-41302 tank ink  
**Style/Item No.** : N/A

**Heavy Metals**

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3050B(1996), US EPA 8010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 8010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 8010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

**Plasma Relatedly PPMs/MDLs**

Test Items	Unit	Test Method	MDL	Results
Monochlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Chlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Dichlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Tetrachlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Pentachlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Hexachlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Heptachlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Octachlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Nonachlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Decachlorophenyl	mg/kg	US EPA 3040C GC/MS	5	N.D.
Monochlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Dichlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Trichlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Tetrachlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Pentachlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Hexachlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Heptachlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Octachlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Nonachlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.
Decachlorophenyl ether	mg/kg	US EPA 3040C GC/MS	5	N.D.

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

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**Test Report No. F690501/LF-CTSGP06-27074**

Date: October 27, 2006

Page 3 of 3

Picture of Sample as Received:

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

NOTE: (1) N.D. = Not Detected (<MDL)  
 (2) ppm = mg/kg  
 (3) MDL = Method Detection Limit  
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 (6) Negative = Undetectable / Positive = Detectable

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