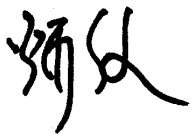
MSL Level 1

Approval Sheet

Products	Dielectric Chip Antenna		
Customer	Diostech		
Model			
Customer CODE			
Supplier	PARTRON		
Supplier CODE	ACS2450HBAHS2		
Diostech	By designed	By checked	By approved
PARTRON	By designed	By checked	By approved
			
	Research 2P	Quality Assurance	Laboratory
	Chanik.Jeon	Kwang-Gyu.Lee	Byoung-Jun.Yim
	01/02	01/02	01/02

2007 . 01. 02

33 Banwol-dong, Hwaseong-si, Gyeonggi-do,Korea 455-300
Tel : 82-31-201-7870~6
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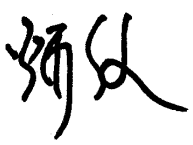
www.partron.co.kr

MSL Level 1

SPECIFICATION

MODEL : ACS2450HBAHS2

DIELECTRIC CHIP ANTENNA

By designed	By checked	By approved
		
Research, 2P	Quality Assurance	Laboratory
Chan-Ik.Jeon	Kwang-Gyu.Lee	Byoung-Jun.Yim
01/02	01/02	01/02

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- Contents -

1. Revision

Revision No	Originator	Description of changes	Date of changes
Ver 1.0	Chanik.Jeon	Issued	2007.01.02

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]	0.0 / -2.0

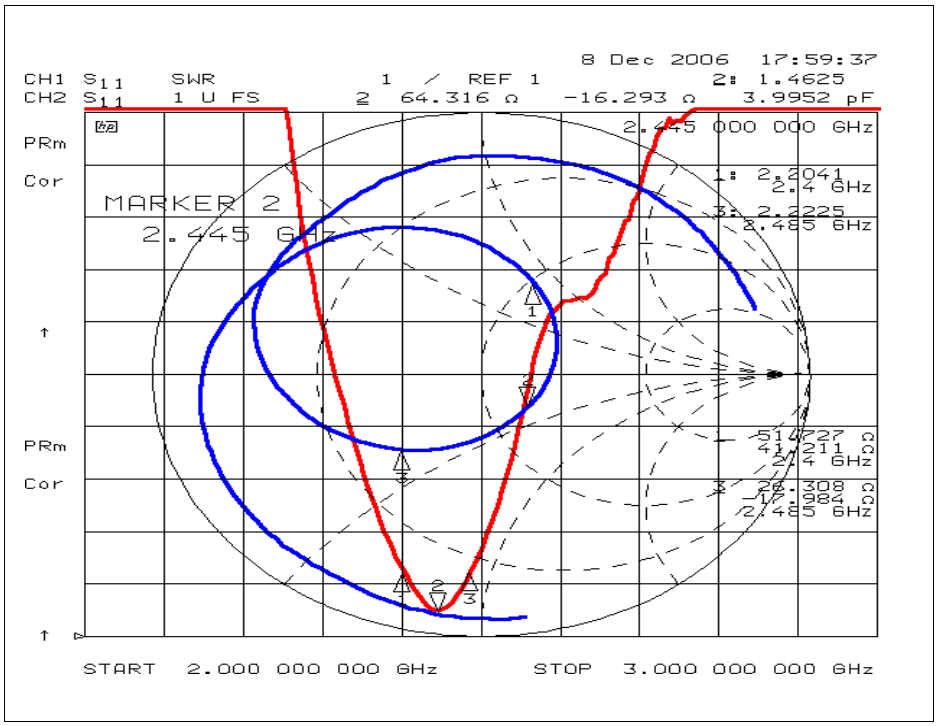
2.2 Set Condition

ITEM				SPEC
Frequency Range [MHz]				2400 ~ 2485
VSWR [Max]				3 : 1
Bandwidth [MHz]				85
Polarization				Linear
Gain[dBi]	Total Gain (Peak / Avg) [dBi]			-2.4 / -6.9
	Azimuth	Theta	Peak	-0.62
			Average	-4.83
		Phi	Peak	-3.87
			Average	-9.48
	Elevation 1	Theta	Peak	-5.18
			Average	-9.04
		Phi	Peak	-0.88
			Average	-5.30
	Elevation 2	Theta	Peak	-5.15
			Average	-9.63
		Phi	Peak	1.16
			Average	-3.41

2.3 Test Fixture Condition

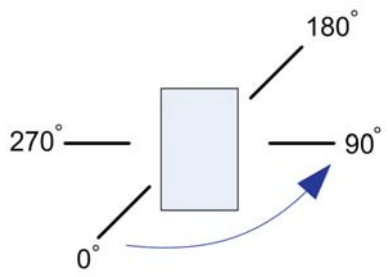
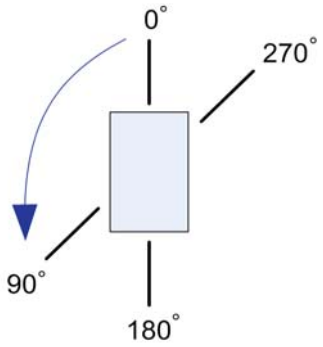
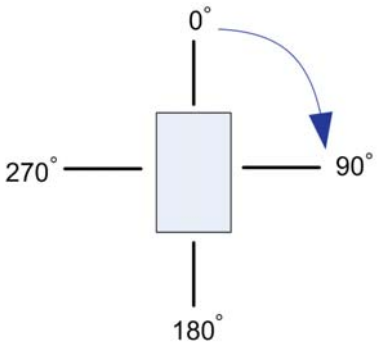
ITEM	SPEC CTQ
Frequency Range [MHz]	
SWR [Max]	
Bandwidth [MHz]	

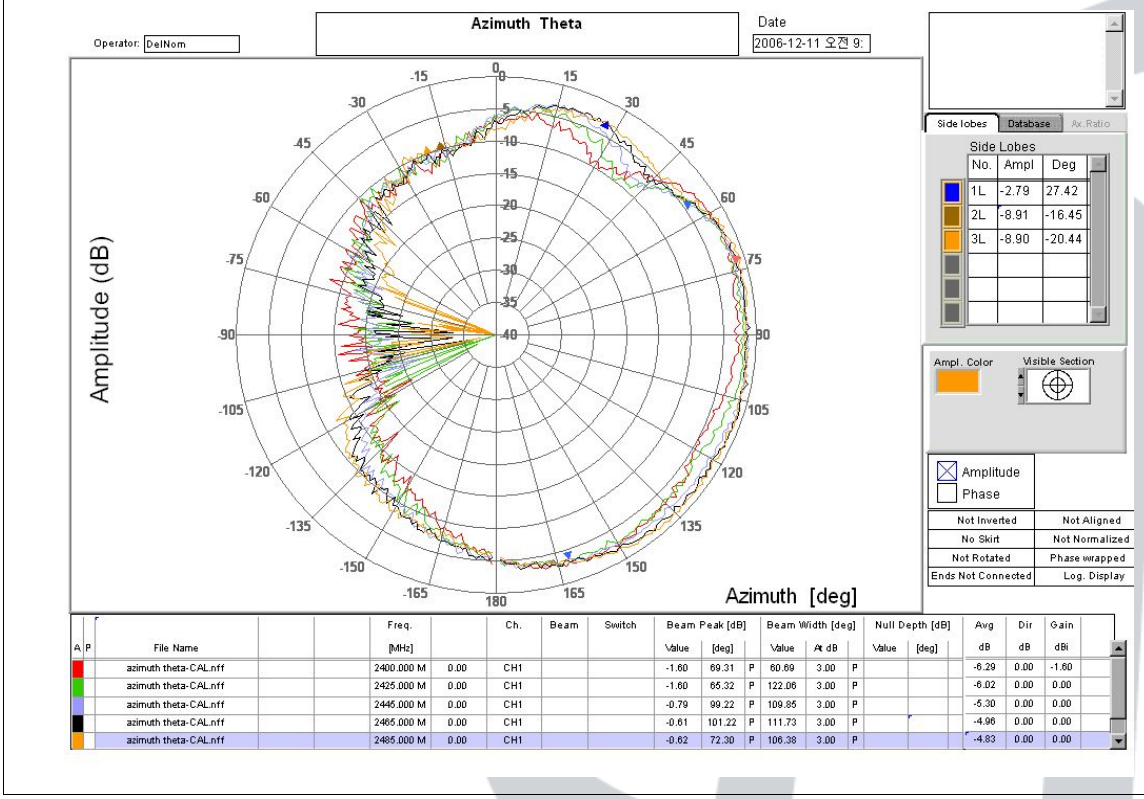
2.3 S11 Graph of Set Condition



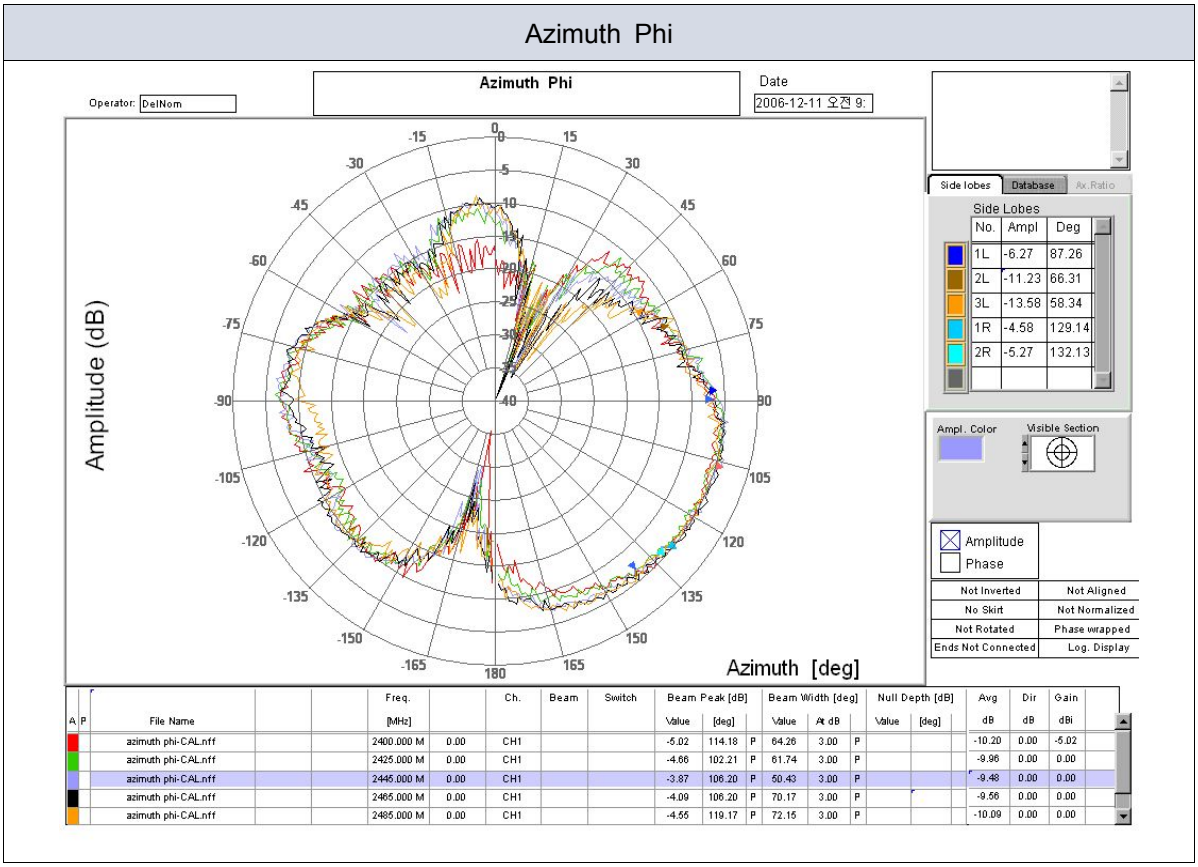
2.4 S11 Graph of Test Fixture Condition CTQ

2.5 Radiation Pattern

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

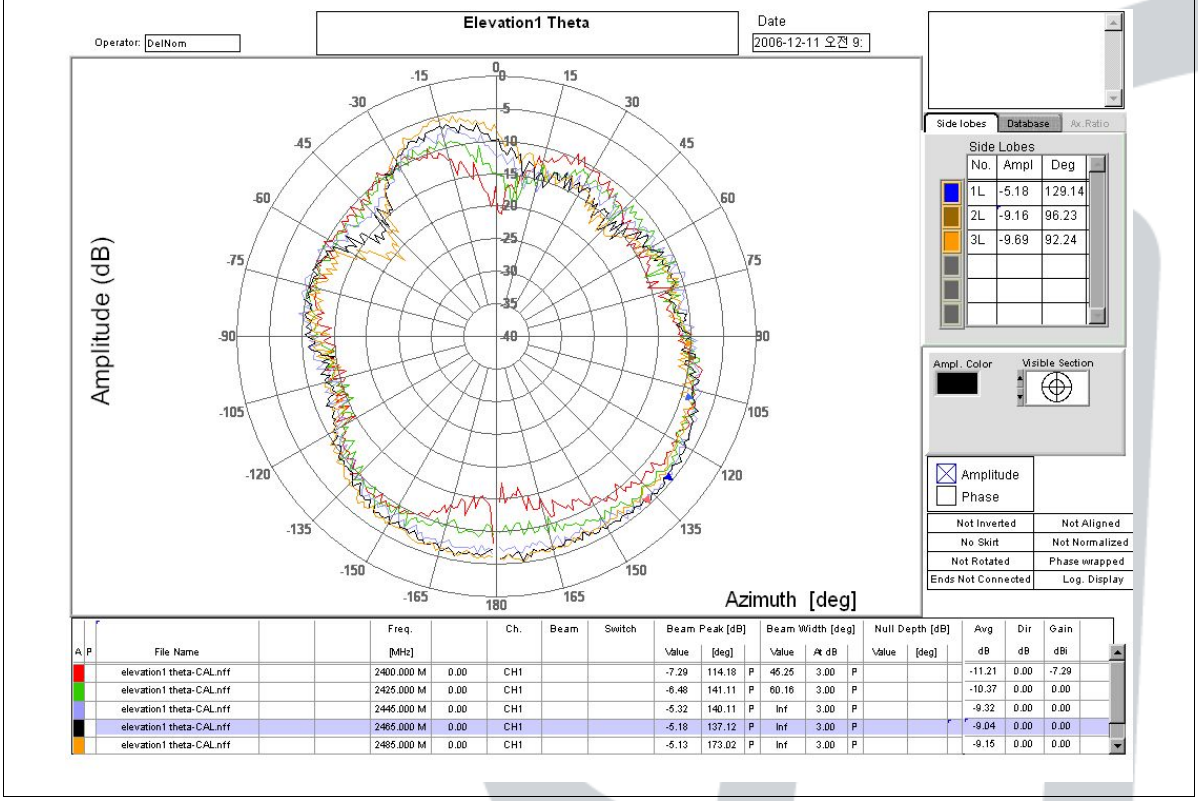
Azimuth Theta


Azimuth Phi



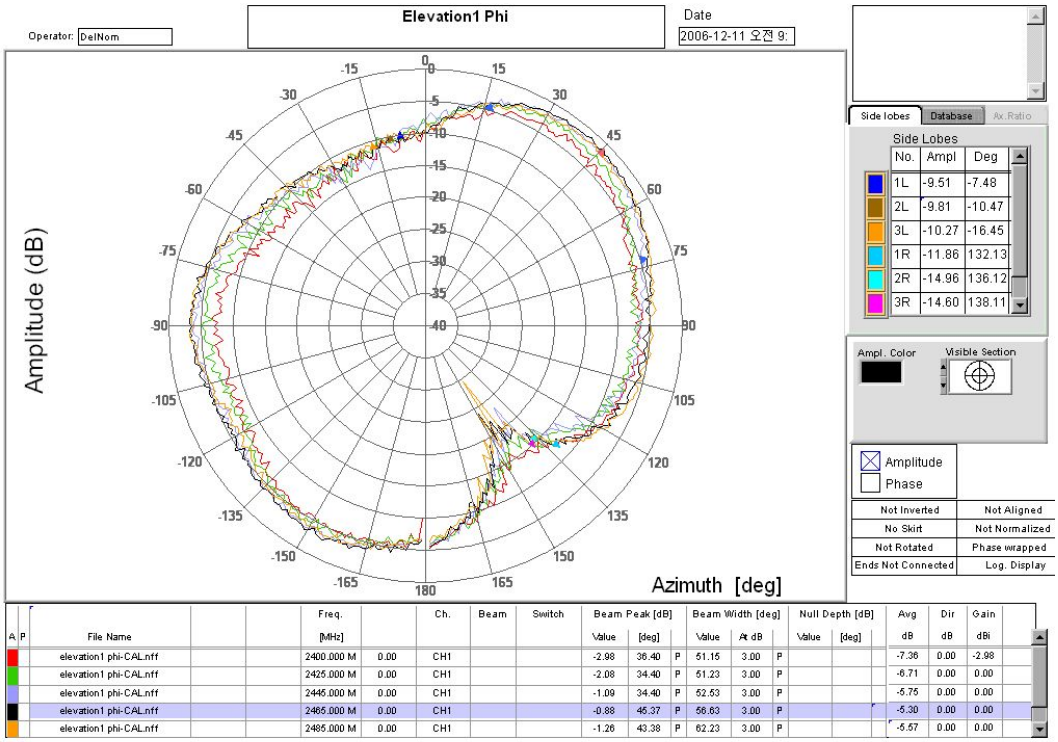
A	P	File Name	Freq. [MHz]		Ch.	Beam	Switch	Beam Peak [dB] Value	[deg]		Beam Width [deg] Value	At dB		Null Depth [dB] Value	[deg]	Avg dB	Dir dB	Gain dBi
		azimuth phi-CAL.nff	2400.000 M	0.00	CH1			-5.02	114.18	P	64.26	3.00	P			-10.20	0.00	-5.02
		azimuth phi-CAL.nff	2425.000 M	0.00	CH1			-4.66	102.21	P	61.74	3.00	P			-9.96	0.00	0.00
		azimuth phi-CAL.nff	2445.000 M	0.00	CH1			-3.87	106.20	P	50.43	3.00	P			-9.48	0.00	0.00
		azimuth phi-CAL.nff	2465.000 M	0.00	CH1			-4.09	106.20	P	70.17	3.00	P			-9.56	0.00	0.00
		azimuth phi-CAL.nff	2485.000 M	0.00	CH1			-4.55	119.17	P	72.15	3.00	P			-10.09	0.00	0.00

Elevation1 Theta



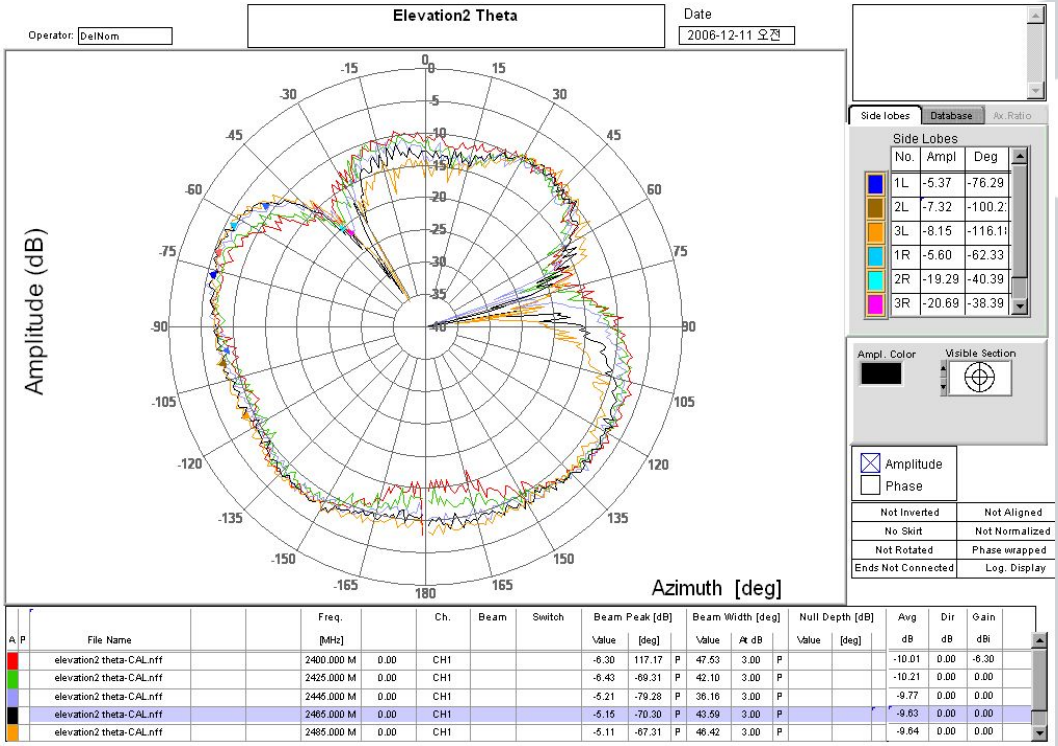
A	P	File Name	Freq. [MHz]		Ch.	Beam	Switch	Beam Peak [dB] Value	[deg]		Beam Width [deg] Value	At dB		Null Depth [dB] Value	[deg]	Avg dB	Dir dB	Gain dBi
		elevation1 theta-CAL.nff	2400.000 M	0.00	CH1			-7.29	114.18	P	45.25	3.00	P			-11.21	0.00	-7.29
		elevation1 theta-CAL.nff	2425.000 M	0.00	CH1			-6.48	141.11	P	60.16	3.00	P			-10.37	0.00	0.00
		elevation1 theta-CAL.nff	2445.000 M	0.00	CH1			-5.32	140.11	P	Inf	3.00	P			-9.32	0.00	0.00
		elevation1 theta-CAL.nff	2465.000 M	0.00	CH1			-5.18	137.12	P	Inf	3.00	P			-9.04	0.00	0.00
		elevation1 theta-CAL.nff	2485.000 M	0.00	CH1			-5.13	173.02	P	Inf	3.00	P			-9.15	0.00	0.00

Elevation1 Phi



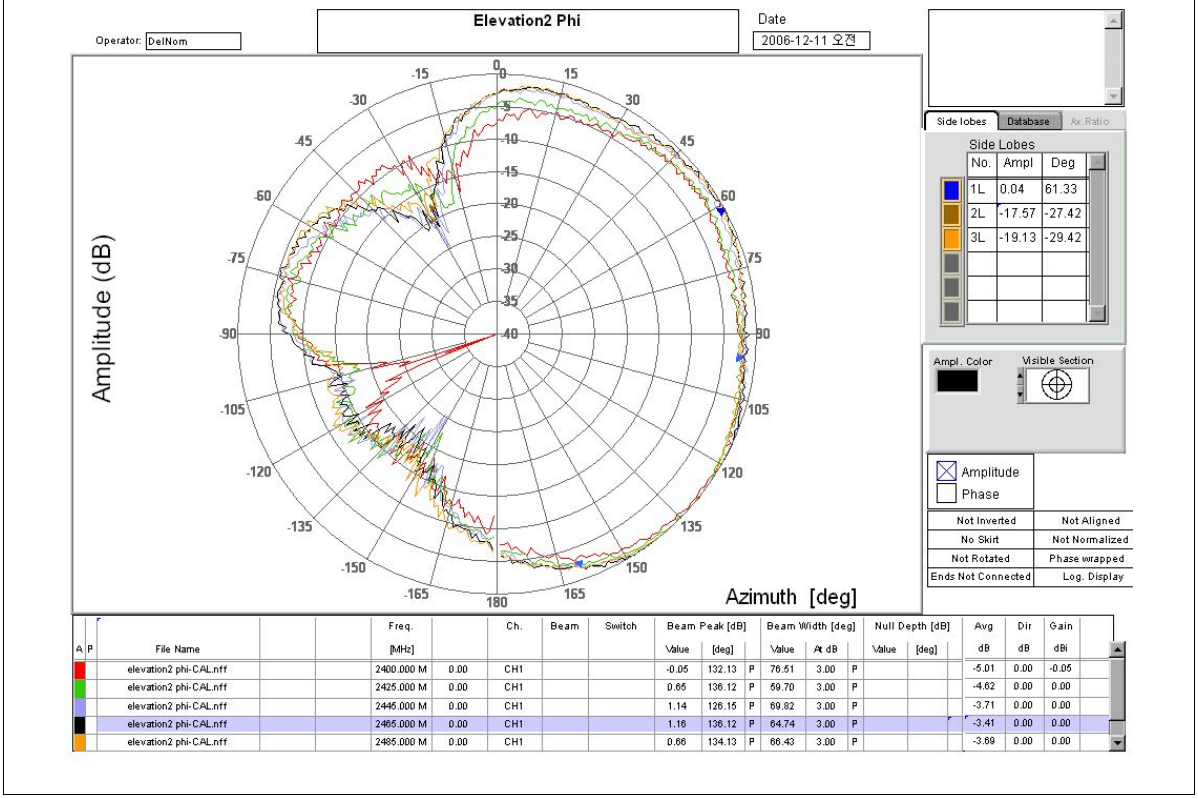
A	P	File Name	Freq. [MHz]		Ch.	Beam	Switch	Beam Peak [dB] Value	[deg]		Beam Width [deg] Value	At dB		Null Depth [dB] Value	[deg]	Avg dB	Dir dB	Gain dBi
		elevation1 phi-CAL.nff	2400.000 M	0.00	CH1			-2.98	36.40	P	51.15	3.00	P			-7.36	0.00	-2.98
		elevation1 phi-CAL.nff	2425.000 M	0.00	CH1			-2.08	34.40	P	51.23	3.00	P			-6.71	0.00	0.00
		elevation1 phi-CAL.nff	2445.000 M	0.00	CH1			-1.09	34.40	P	52.53	3.00	P			-5.75	0.00	0.00
		elevation1 phi-CAL.nff	2465.000 M	0.00	CH1			-0.88	46.37	P	56.63	3.00	P			-5.30	0.00	0.00
		elevation1 phi-CAL.nff	2485.000 M	0.00	CH1			-1.26	43.38	P	62.23	3.00	P			-5.57	0.00	0.00

Elevation2 Theta



A	P	File Name	Freq. [MHz]		Ch.	Beam	Switch	Beam Peak [dB] Value	[deg]		Beam Width [deg] Value	At dB		Null Depth [dB] Value	[deg]	Avg dB	Dir dB	Gain dBi
		elevation2 theta-CAL.nff	2400.000 M	0.00	CH1			-6.30	117.17	P	47.53	3.00	P			-10.01	0.00	-6.30
		elevation2 theta-CAL.nff	2425.000 M	0.00	CH1			-6.43	-69.31	P	42.10	3.00	P			-10.21	0.00	0.00
		elevation2 theta-CAL.nff	2445.000 M	0.00	CH1			-5.21	-79.28	P	36.16	3.00	P			-9.77	0.00	0.00
		elevation2 theta-CAL.nff	2465.000 M	0.00	CH1			-5.16	-70.30	P	43.59	3.00	P			-9.63	0.00	0.00
		elevation2 theta-CAL.nff	2485.000 M	0.00	CH1			-5.11	-67.31	P	46.42	3.00	P			-9.64	0.00	0.00

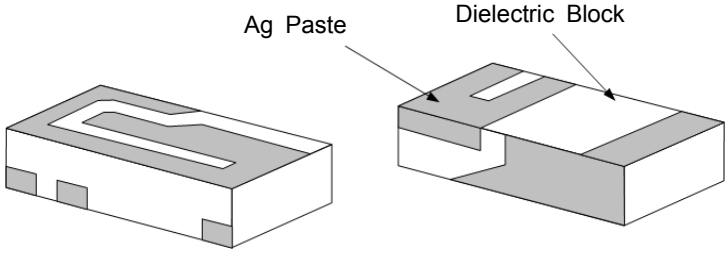
Elevation2 Phi



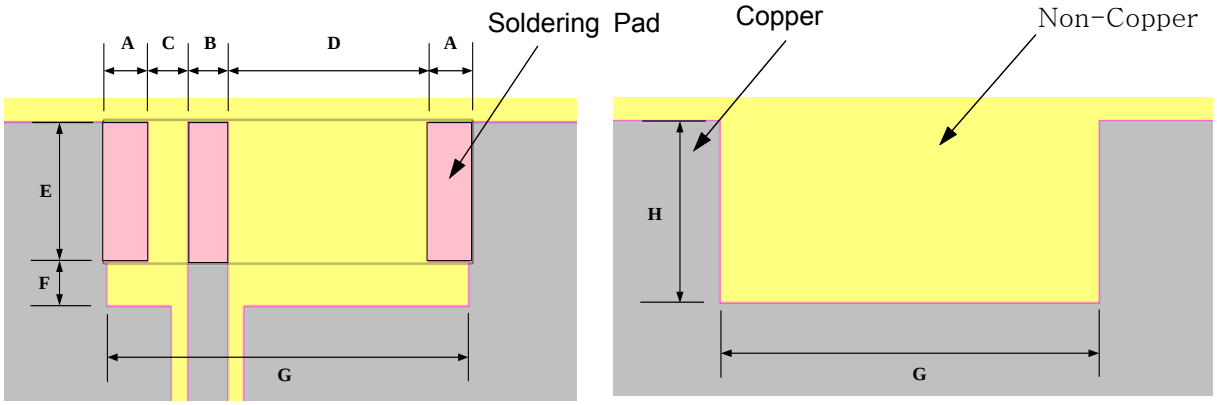
3. Mechanical Characteristics

- 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±0.15	
	L = 8.0±0.15	
	T = 1.2±0.15	
Temperature [℃]	- 40 ~ +80	
Humidity [%]	At the normal temperature, RH 100	

3.2 PCB Layout & Soldering Pad Dimension



Top Layout **Bottom Pattern**

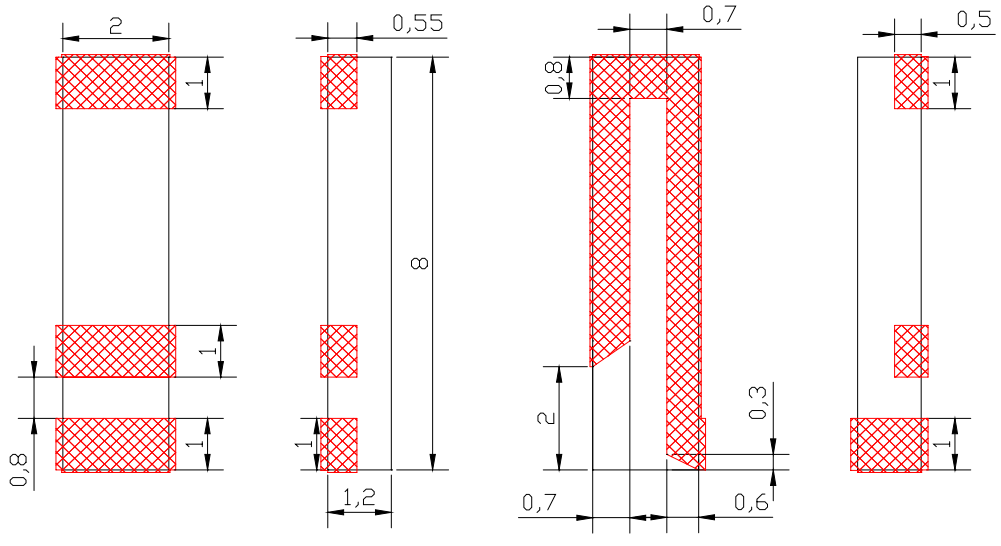
Parameter	A	B	C	D	E	F	G	H
Value[mm]	1.1	1.0	0.8	4.2	2.2	1.0	8.0	3.0

Unit ; mm

Unless specified tolerances are ±0.1

3.3 Antenna Pattern Dimension

Antenna Pattern View



Bottom Side1 Top Side2

Unit ; mm

Unless specified tolerances are ±0.1

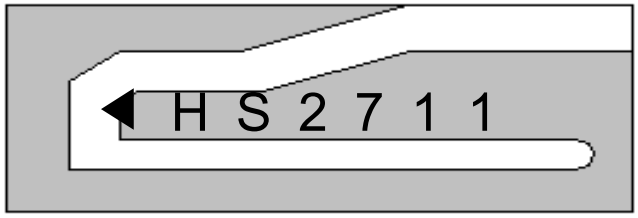
3.4 LOT Notation

7	1	1
①	②	③

① Year ; 1 - 2001, 2 - 2002, ···· 5 - 2005 ····
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

Marking View



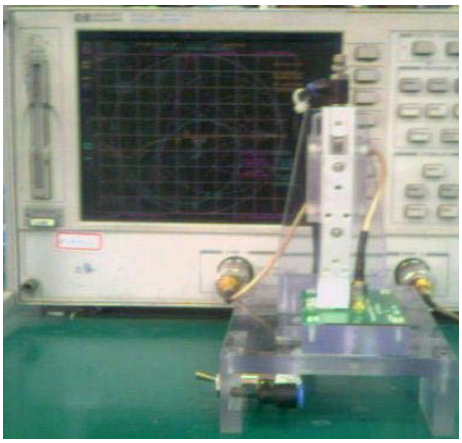
◀	HS2	7	1	1
①	②	③	④	⑤

① Input Signal
② Serial
③ Year; 1 - 2001, 2 - 2002, ···· 5 - 2005 ····
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

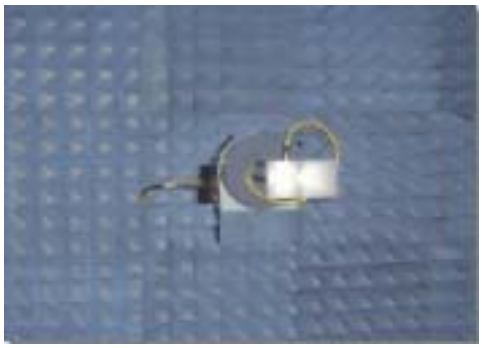
4.1 SWR/Returnloss

The SWR/Returnloss is measured by Network Analyzer

Set Condition	Test Fixture Condition
	

4.2 Gain

The Antenna Gain is measured using the set at Anechoic Chamber

Anechoic Chamber	
	
	

5. Primary Inspection List

Item	Electrical Characteristic [MHz] CTQ		Mechanical Dimension [mm] CTQ		
Standard	VSWR 3.0 Max		W=2.0±0.1	L=5.0±0.1	T=1.2±0.1
	2270 MHz	2350 MHz			
1	1.51	2.28	2.03	8.01	1.25
2	1.56	2.10	2.02	8.02	1.24
3	1.56	2.15	2.03	8.02	1.24
4	1.56	2.03	2.04	8.01	1.26
5	1.55	1.93	2.04	8.02	1.25
6	1.68	1.88	2.05	8.03	1.25
7	1.66	1.91	2.04	8.00	1.23
8	1.58	2.09	2.03	8.01	1.24
9	1.70	1.94	2.05	8.03	1.26
10	1.56	2.03	2.04	8.02	1.24
11	1.60	2.13	2.06	8.01	1.25
12	1.62	1.90	2.04	8.01	1.25
13	1.64	1.95	2.03	8.00	1.23
14	1.60	2.03	2.04	7.99	1.24
15	1.60	2.13	2.03	8.03	1.24
16	1.63	2.06	2.05	8.02	1.25
17	1.61	2.02	2.04	8.01	1.24
18	1.58	1.97	2.04	8.02	1.25
19	1.62	1.98	2.05	8.00	1.24
20	1.61	2.01	2.03	8.01	1.26
X	1.61	2.02	2.04	8.01	1.24
σ	0.04	0.10	0.01	0.01	0.01
Cpk	9.03	2.35	2.45	2.61	2.58
	OK	OK	OK	OK	OK

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

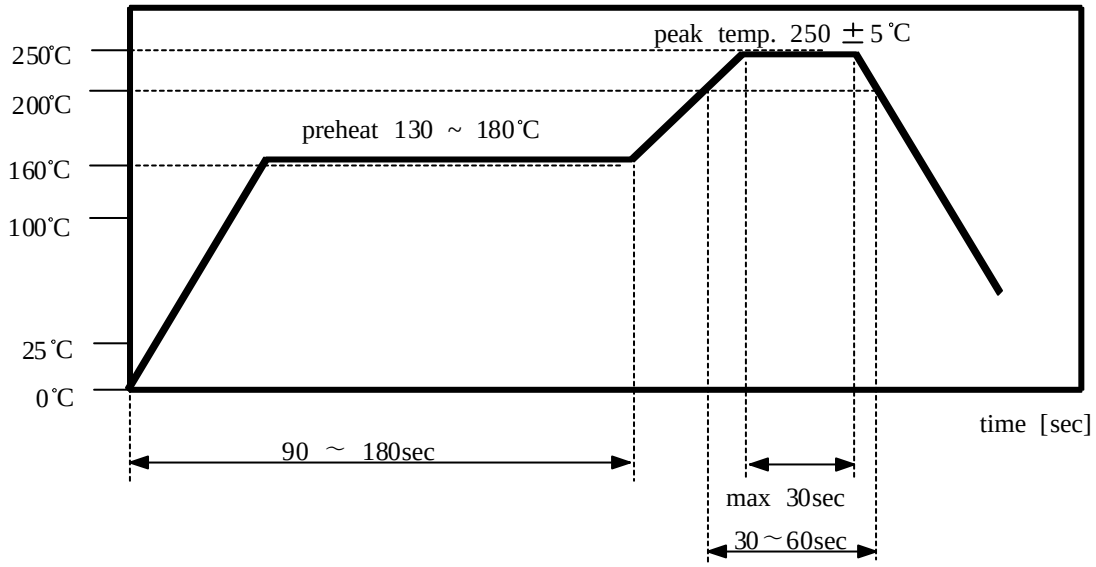
ITEM	TEST CONDITION	LIMIT
Random Vibration	Frequency 10~500Hz - 10 ×9.8㎨(G) Sweep time 15min , X.Y.Z each 5 times	*After the test, specimen sheet meet the electrical specification
Drop	Height 120㎝ , 12 times Height 152㎝ , 19 times	

6.4 Reliability Test Result

※ Appendix

7. Soldering Condion

7.1 Reflow Soldering



7.2 Manual Soldering

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

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

8. Attention

8.1 Temperature Condition

	Range of Temperature	unit
Application	-40 ~ +85	℃
Keeping	-40 ~ +85	℃

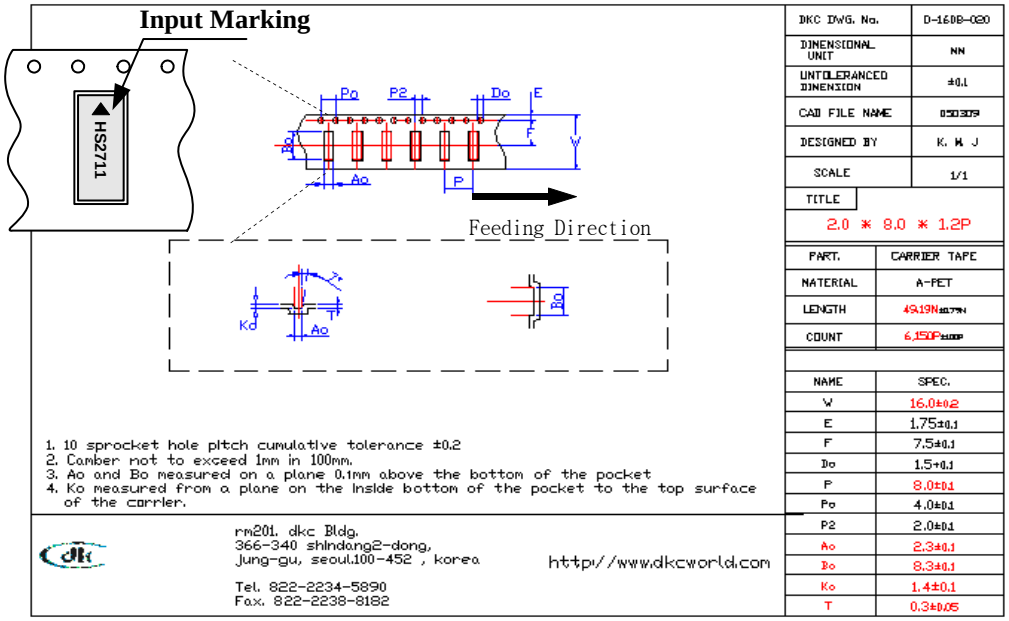
8.2 MSL LEVEL 1 (JEDEC J-STD-020C)

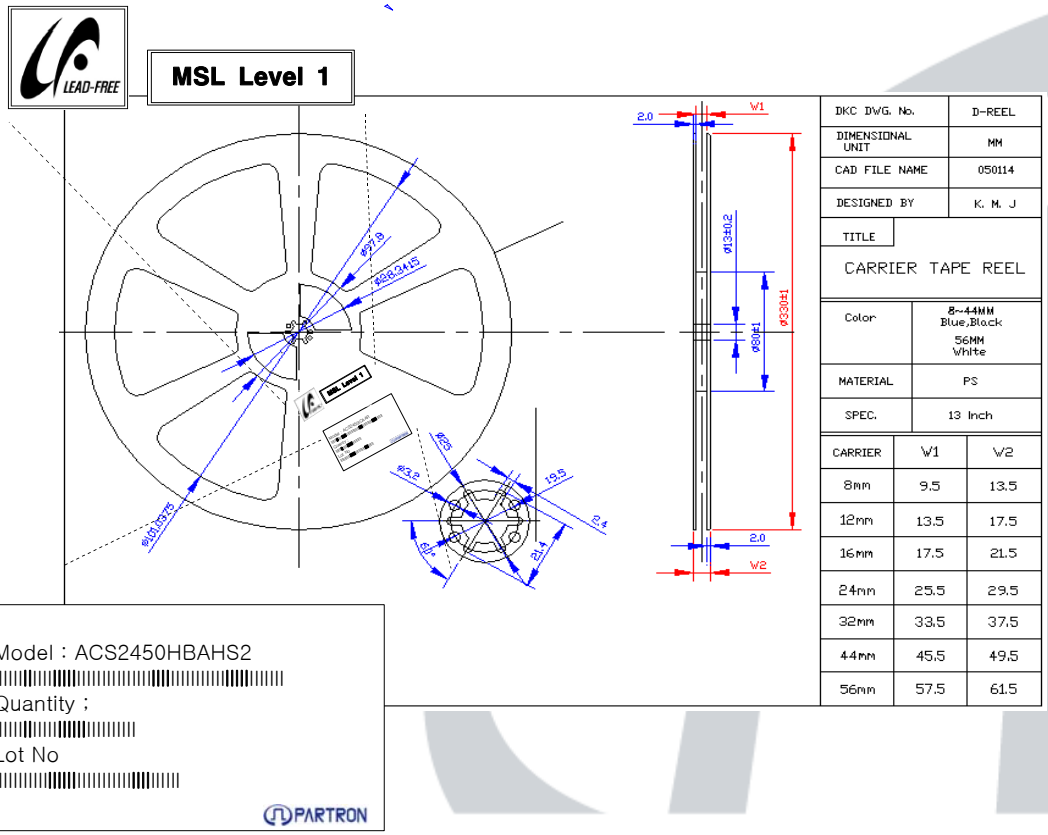
	Floor Life		Soak Requirements	
	Time	Conditions	Time	Conditions
1	Unlimited	= < 30℃/85%RH	168+5/-0	= < 85℃/85%RH

9. Packing

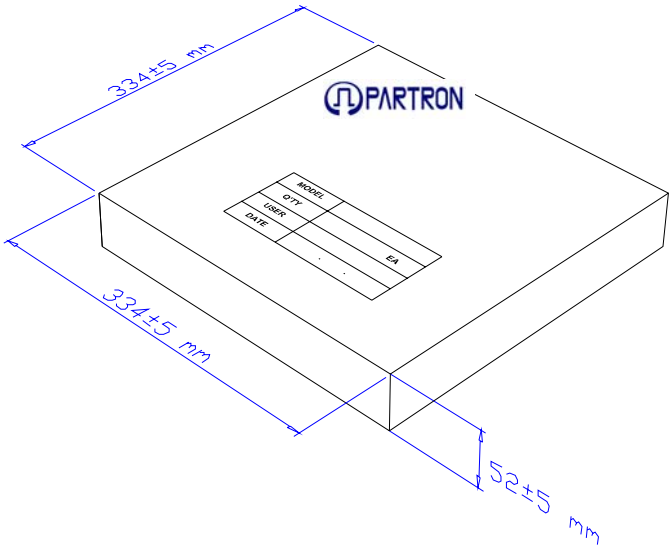
9.1 Carrier/Reel

Material	Surface Resistance	Method
PET	Typical $10^8\Omega$	Heat Press

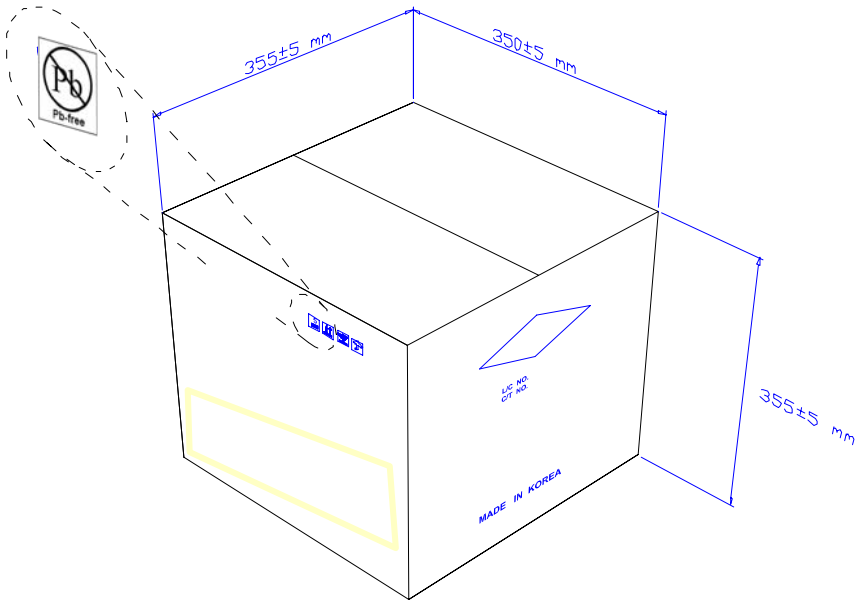




9.2 Box Specification



Material : SK/S/K-B
Cardboard box



10. Process Control

Product	Issued/Revision		Process Control	Record	By designed	By checked	By approved
CHIP ANTENNA	Issued	04.04.06		PRCP-C001			
	Revised	05.04.03					

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		PRCP-C001			
	Revised	05.04.03					

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 CTQ	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		PRCP-C001			
	Revised	05.04.03					

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

10. RoHS Data

1) Ceramic Powder

SGS

TEST REPORT

REPORT NO. JP/2006/031794
DATE: April 11th, 2006
PAGE: 1 OF 1

CLIENT :KCM Corporation
SAMPLE DESCRIPTION :HF-22K (SD)
CLIENT REF.NO :06-0001
TESTING DATE :2006/03/31 TO 2006/04/07
SAMPLE RECEIVED :2006/03/28

WE HAVE TESTED THE SAMPLE(S) SUBMITTED AS REQUESTED AND THE FOLLOWING RESULTS WERE OBTAINED.

TEST ITEM(S)	UNIT	RESULT	METHOD	INSTRUMENT	DET.LMT(ppm)
CADMIUM(Cd)	ppm	N.D	EPA3052	ICP-AES	2
MERCURY(Hg)	ppm	N.D	-	Mercury analyzer	2
LEAD(Pb)	ppm	N.D	EPA3052	ICP-AES	2
CHROMIUM VEO(**)	ppm	N.D	EPA3060A	UV-VIS	2

NOTE : N.D = not detected

<END>

Kuniyuki Goto / Laboratory Manager
SGS Far East Ltd., Green Testing Center

JP 608637

SGS Far East Ltd. Japan Branch
Green Testing Center
YBP East Tower 12F, 134 Godo-cho Hodogaya-ku Yokohama 240-0005, Japan
t +81(0) 45 330 1100 f +81(0) 45 330 1108 www.sgsgroup.co.jp / www.sgs.com

MATERIAL SAFETY DATA SHEET

KCM Corporation
No. 41, 2 Chome, Tsukiwa cho, Minato-ku, Nagoya, Japan
Electronic Ceramic Materials Department
TEL: (052) 653 8554 FAX: (052) 652-0035
Date Issued : January 27, 2004

【PRODUCT NAME & CHEMICAL NAME】 HF-22K (SD)

【SPECIFIC OF MATERIAL】
Classification of unit product or Mixiured product : unit product
Element & Content : $MgTiO_3$ (≒83%), $CaTiO_3$ (≒17%)
Chemical Formula : ——
Official Gazette No. : ——
(Chemical substances control law & Industry safety and health law)
Cas No. : $MgTiO_3$ (12032-30-3), $CaTiO_3$ (12049-50-2)
U.N. classification & U.N. No : none

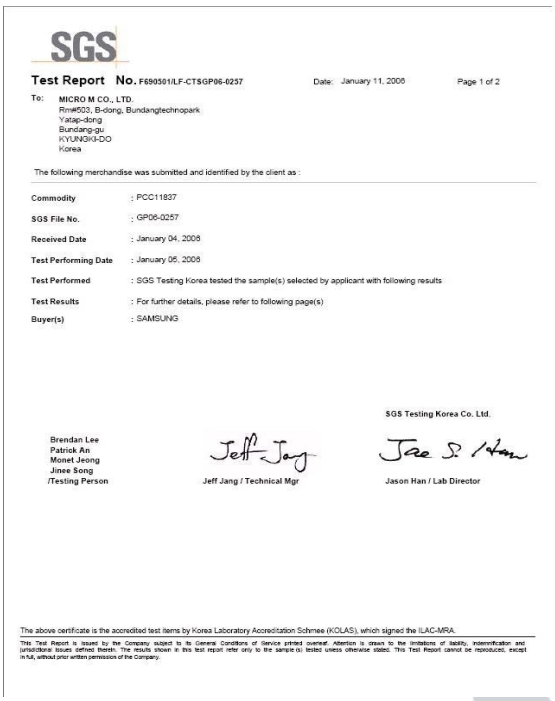
【HAZARDS INFORMATION】
Fire/Explosion hazard : not conflict with fire act
Toxicological hazard : no specific defect
Environmental hazard : no specific defect

【FIRST AID MEASURES】
Eyes : Flush thoroughly with water, and contact a physician.
Skin : Wash thoroughly with water, then with soap. If irritation occurs, contact a physician.
Inhalation : In case of inhalation of dust, wash nasalcavity with warm water and gargle the throat. If big volume of dust, contact a physician.
Ingestion : In case of ingestion, wash mouth with water. If big volume, induce vomiting after drinking water, and contact a physician.

【FIRE-FIGHTING MEASURES】
Extinguishing method : not flammable
Extinguishing media : not flammable

(1/3)

2) Ag paste



SGS

Test Report No. F690501/LF-CTSGP06-0257 Date: January 11, 2006 Page 1 of 2

To: MICRO M CO., LTD.
Rm#503, B-dong, Bundangtechnopark
Yatap-dong
Bundang-gu
KYUNGKI-DO
Korea

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

Commodity : PCC11837
SGS File No. : GP06-0257
Received Date : January 04, 2006
Test Performing Date : January 05, 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)
Buyer(s) : SAMSUNG

SGS Testing Korea Co. Ltd.

Brendan Lee
Patrick An
Monet Jeong
Jinee Song
/Testing Person

Jeff Jang / Technical Mgr

Jason Han / Lab Director

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

SGS

Test Report No. F690501/LF-CTSGP06-0257 Date: January 11, 2006 Page 2 of 2

Sample No. : GP06-0257.001
Sample Description : PCC11837
Style/Item 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 6010B(1996)	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996)	6	12.0
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996)	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992)	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 =2, k corresponding to a level of confidence of about 95%

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

3) Marking ink

SGS

Test Report No. F690501/LF-CTSGP06-07273 Date: March 31, 2006 Page 1 of 3

To: PARTRON
33, Banwol-ri
Taean-eup
Hwaseong-city
GYEONGGI-DO
Korea

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

Commodity	: INK(5135E)
SGS File No.	: GP06-07273
Received Date	: March 24, 2006
Test Performing Date	: March 27, 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)

SGS Testing Korea Co. Ltd.

Brendan Lee
Monet Jeong
Jully Oh
Jerry Jung
/Testing Person

Jeff Jang / Technical Mgr

Jason Han / Lab Director

SGS

Test Report No. F690501/LF-CTSGP06-07273 Date: March 31, 2006 Page 2 of 3

Sample No. : GP06-07273.001
Sample Description : INK(5135E)
Style/Item No. : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium(Cd)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996)	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996)	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996)	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992)	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.
Heptabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	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.
Heptabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromodiphenyl 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) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable