


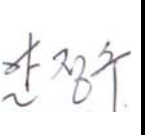


Specifications for Approval

결 재	Person in Charge	Q.A	R&D	Approved by
				
	S.J.Y	J.B.H	L.S.H	N.J.S
	02/19	02/19	02/19	02/19

BUYER	U-NEEDS
MODEL	UD-3000TV
Part Name	BLUETOOTH CHIP ANTENNA
Part Code	-
Arro Code	ABM6020B2

205-11, Anyang 7-Dong, Manan-Gu, Anyang-Si, Gyeonggi-Do, Korea
TEL : (031)441-4181, FAX : (031)448-4194

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1. Approval History

NO	DATE	Before a change	After a change	Reason	REV
1					
2					
3					
4					
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2. Technical Properties

2.1 General Properties

MODEL	ANTENNA
ANTENNA TYPE	CHIP ANTENNA
APPLICATIONS	BLUETOOTH ANTENNA

2.2 Electrical Properties

SEPARATION	MAIN	DIVERSITY
FREQUENCY RANGE	2,400 ~ 2,485(MHz)	2,400 ~ 2,485(MHz)
V.S.W.R	LESS THEN 2.3:1	LESS THEN 3.5:1
Maximum.GAIN(dBi)	1.1 (3D MEASUREMENT)	(3D MEASUREMENT)
IMPEDANCE(NOMINAL)	50(Ω)	
POLARIZATION	LINEAR	
RADIATION PATTERN	OMNIDIRECTIONAL	

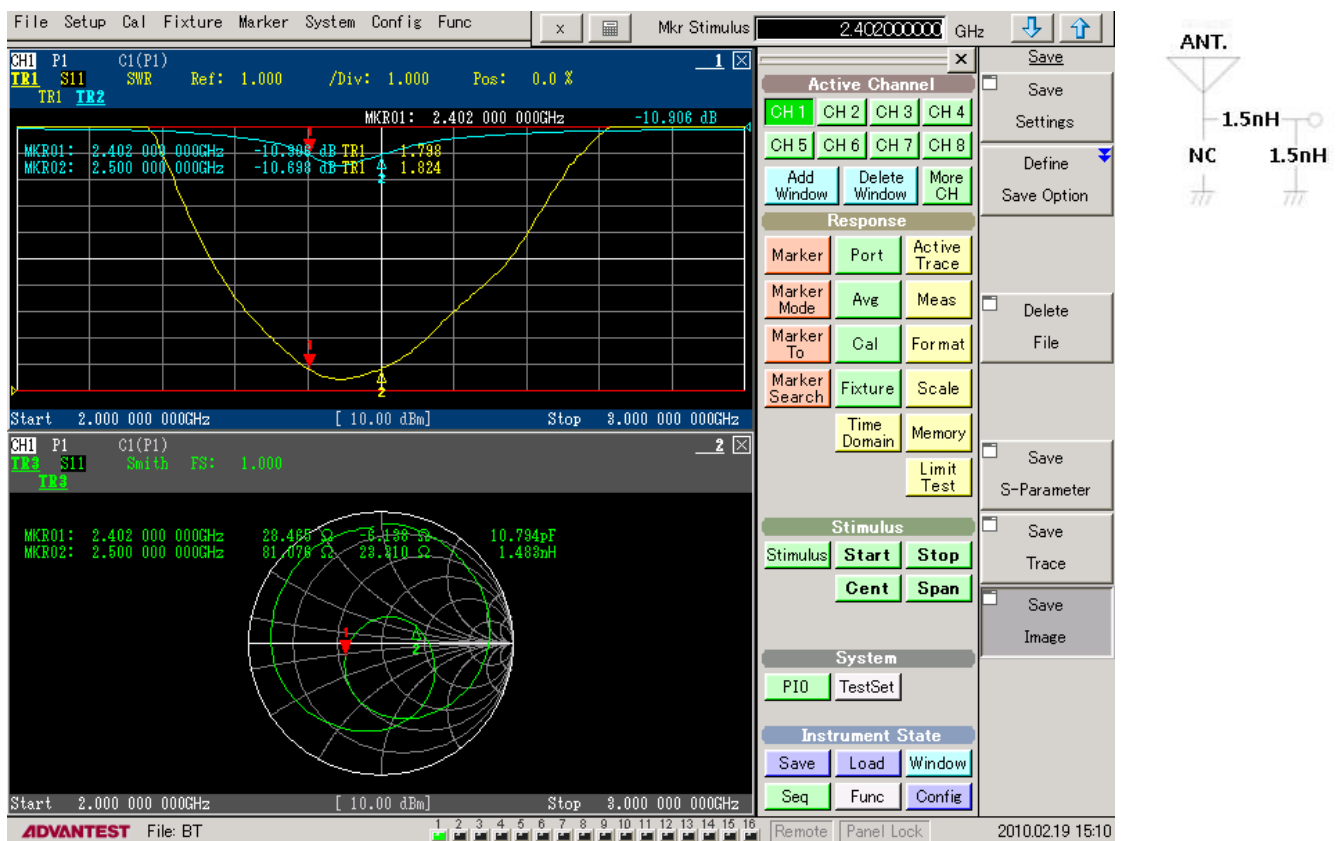
2.3 Mechanical Properties

CONNECTOR	N/A
LENGTH	REF DRAWING (No. 4.1)
TEMPERATURE	-20 ~ 70(°C)
WEIGHT	0.1(g)

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3. Electrical requirements

3.1 VSWR & Smith chart



VSWR & smith chart (MAIN)

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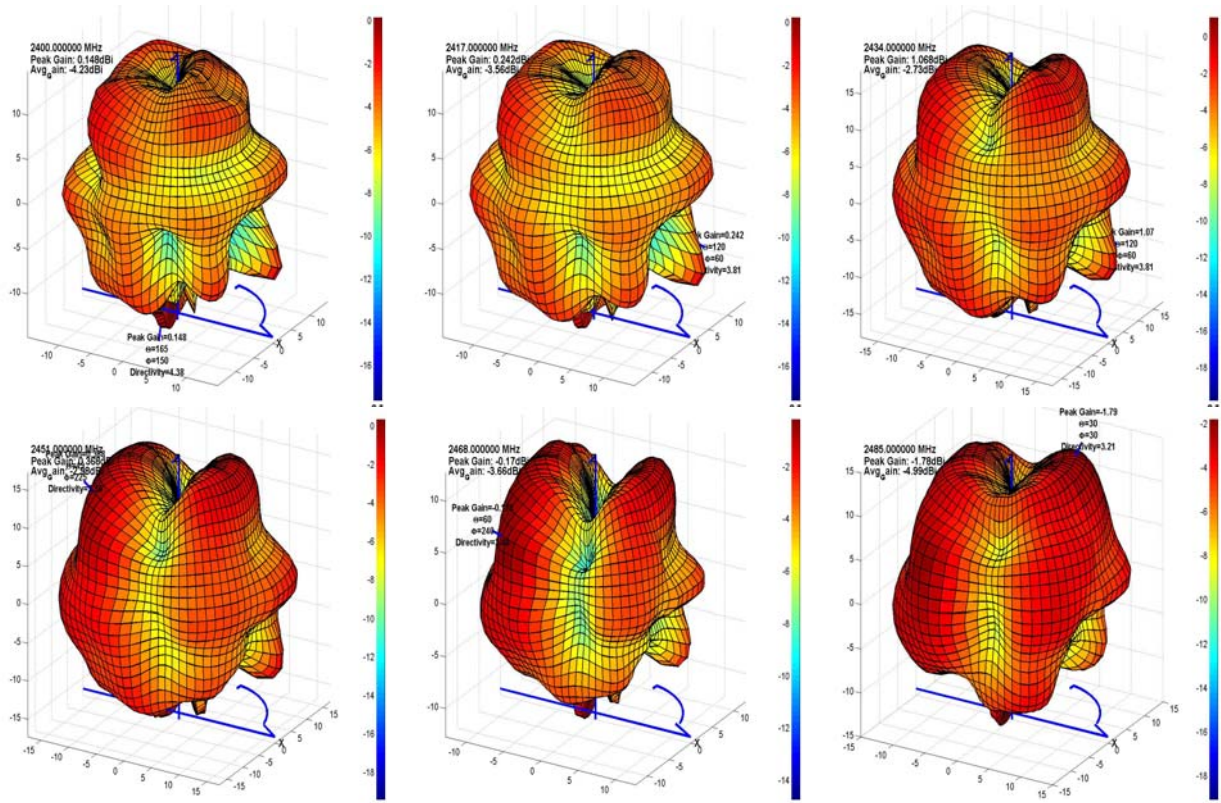
VSWR & smith chart (DIVERSITY)

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3.2 PASSIVE

Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
2400.000000 MHz	37.7 %	-7.0 dBi	-7.6 dBi	-4.2 dBi	-0.6 dBi	-2.2 dBi	0.1 dBi	Theta165/Pie150	4.38 dB
2417.000000 MHz	44.0 %	-6.8 dBi	-6.4 dBi	-3.6 dBi	-0.1 dBi	-1.0 dBi	0.2 dBi	Theta120/Pie60	3.81 dB
2434.000000 MHz	53.2 %	-6.3 dBi	-5.3 dBi	-2.7 dBi	0.6 dBi	-0.3 dBi	1.1 dBi	Theta120/Pie60	3.81 dB
2451.000000 MHz	50.3 %	-6.7 dBi	-5.4 dBi	-3.0 dBi	-0.7 dBi	-0.4 dBi	0.4 dBi	Theta45/Pie225	3.36 dB
2468.000000 MHz	43.0 %	-7.1 dBi	-6.3 dBi	-3.7 dBi	-1.2 dBi	-0.7 dBi	-0.2 dBi	Theta60/Pie240	3.48 dB
2485.000000 MHz	31.6 %	-8.2 dBi	-7.8 dBi	-5.0 dBi	-2.8 dBi	-2.4 dBi	-1.8 dBi	Theta30/Pie30	3.21 dB

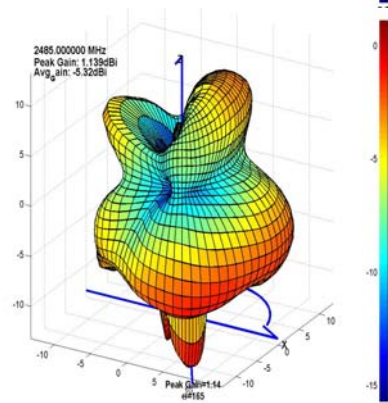
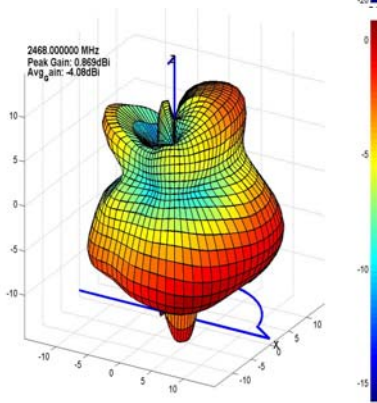
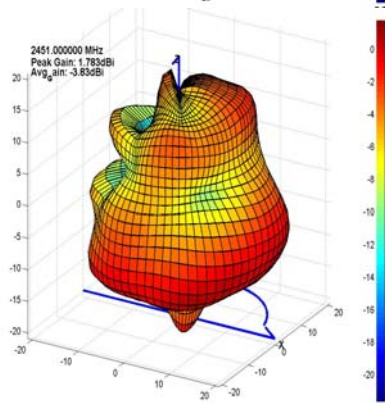
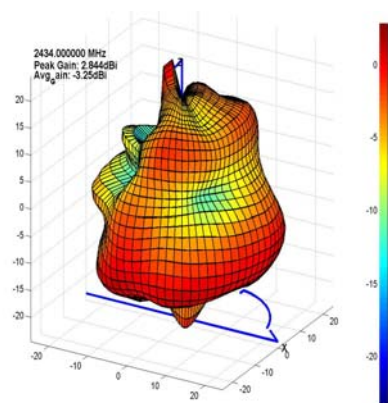
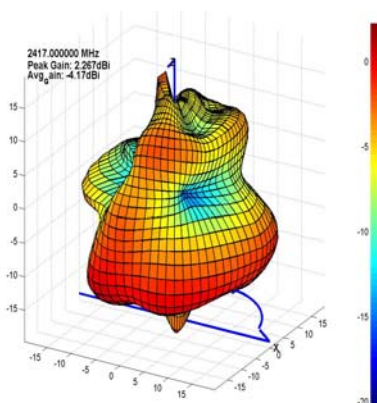
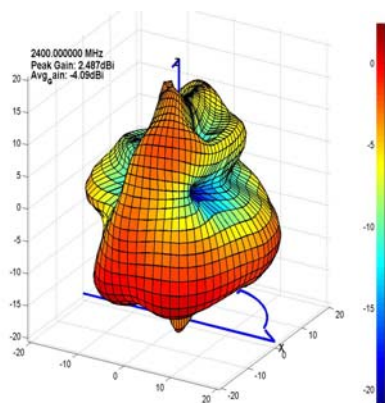
PASSIVE (3D MEASUREMENT) – MAIN



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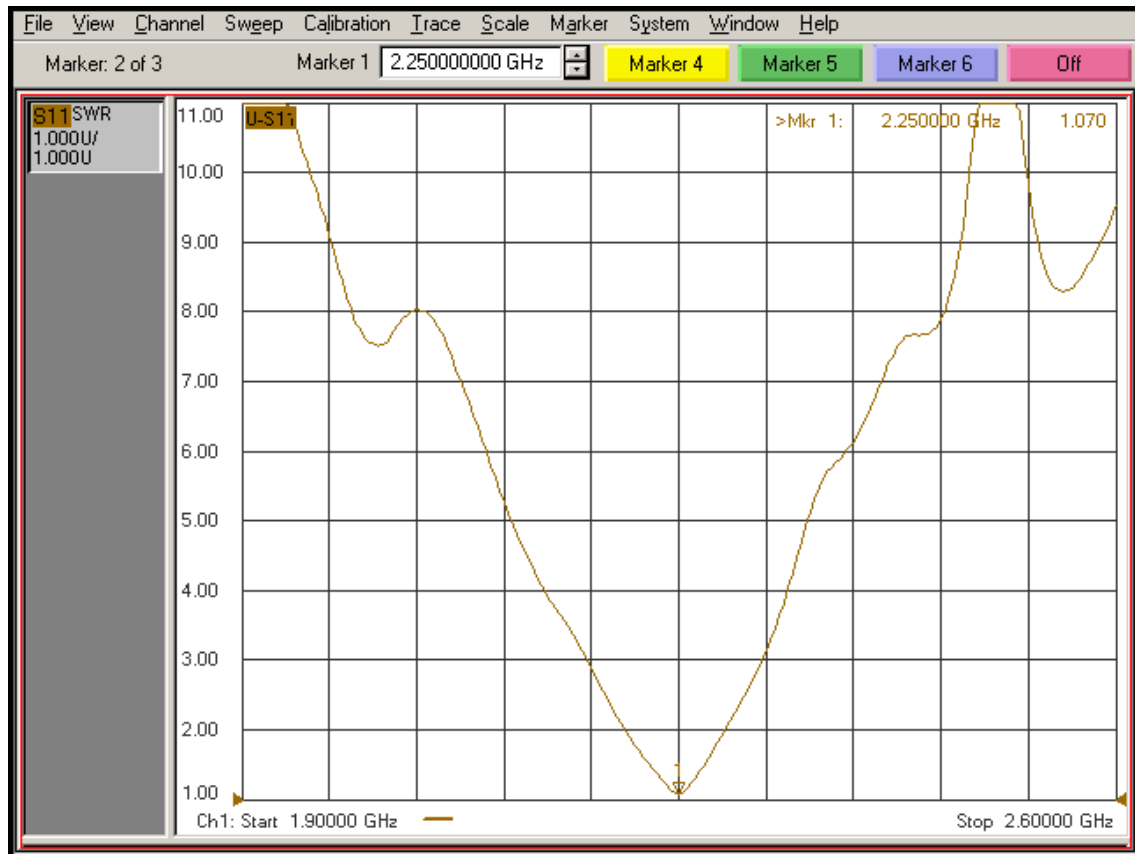
Frequency	Efficiency	Average Gain			Max Gain			Max Position	Directivity
		Ver	Hor	Total	Ver	Hor	Total		
2400.000000 MHz	39.0 %	-8.8 dBi	-5.9 dBi	-4.1 dBi	-0.3 dBi	0.9 dBi	2.5 dBi	Theta120/Pie105	6.58 dB
2417.000000 MHz	38.2 %	-8.9 dBi	-5.9 dBi	-4.2 dBi	-0.1 dBi	0.6 dBi	2.3 dBi	Theta120/Pie105	6.44 dB
2434.000000 MHz	47.3 %	-8.2 dBi	-4.9 dBi	-3.3 dBi	0.3 dBi	1.1 dBi	2.8 dBi	Theta120/Pie105	6.10 dB
2451.000000 MHz	41.3 %	-9.5 dBi	-5.2 dBi	-3.8 dBi	-0.9 dBi	0.6 dBi	1.8 dBi	Theta120/Pie105	5.62 dB
2468.000000 MHz	39.0 %	-10.5 dBi	-5.2 dBi	-4.1 dBi	-0.1 dBi	0.4 dBi	0.9 dBi	Theta120/Pie90	4.96 dB
2485.000000 MHz	29.3 %	-11.4 dBi	-6.6 dBi	-5.3 dBi	0.7 dBi	-1.2 dBi	1.1 dBi	Theta165/Pie315	6.47 dB

PASSIVE (3D MEASUREMENT) – MAIN



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3.3 JIG DATA

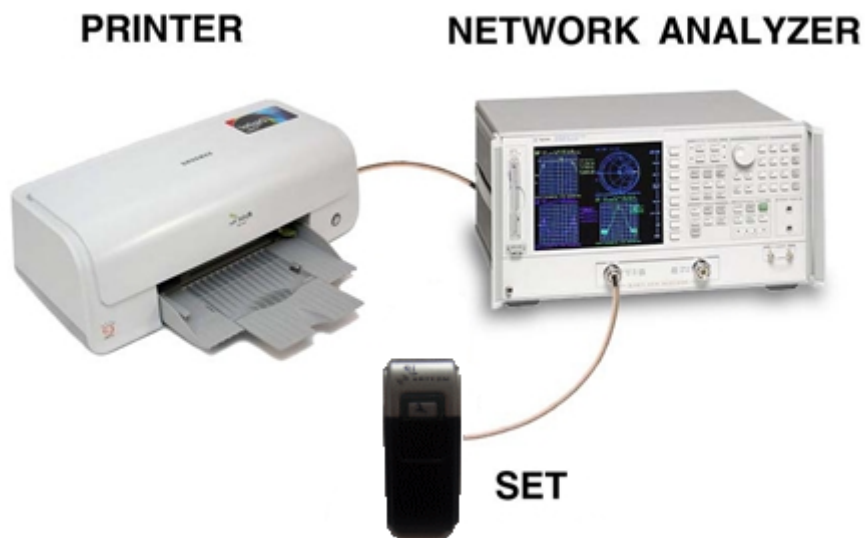


Measurement Equipment	NETWORK ANALYZER E8357A	
Measurement Cable	TYPE	N-MALE TO N-FEMALE
	LENGTH	55 cm
PCB Copper plate SIZE	40(Horizontal) x 40(Vertical) x 1(t)	
JIG State frequency	BLUE TOOTH	Standard Resonant frequency 2.25GHz (±50MHz)

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3.4 IMPEDANCE

Measurement Methodology: Setting equipments as shown in fig. 3-1, connecting the hand set to the reflection port of the Network Analyzer, measure the impedance.

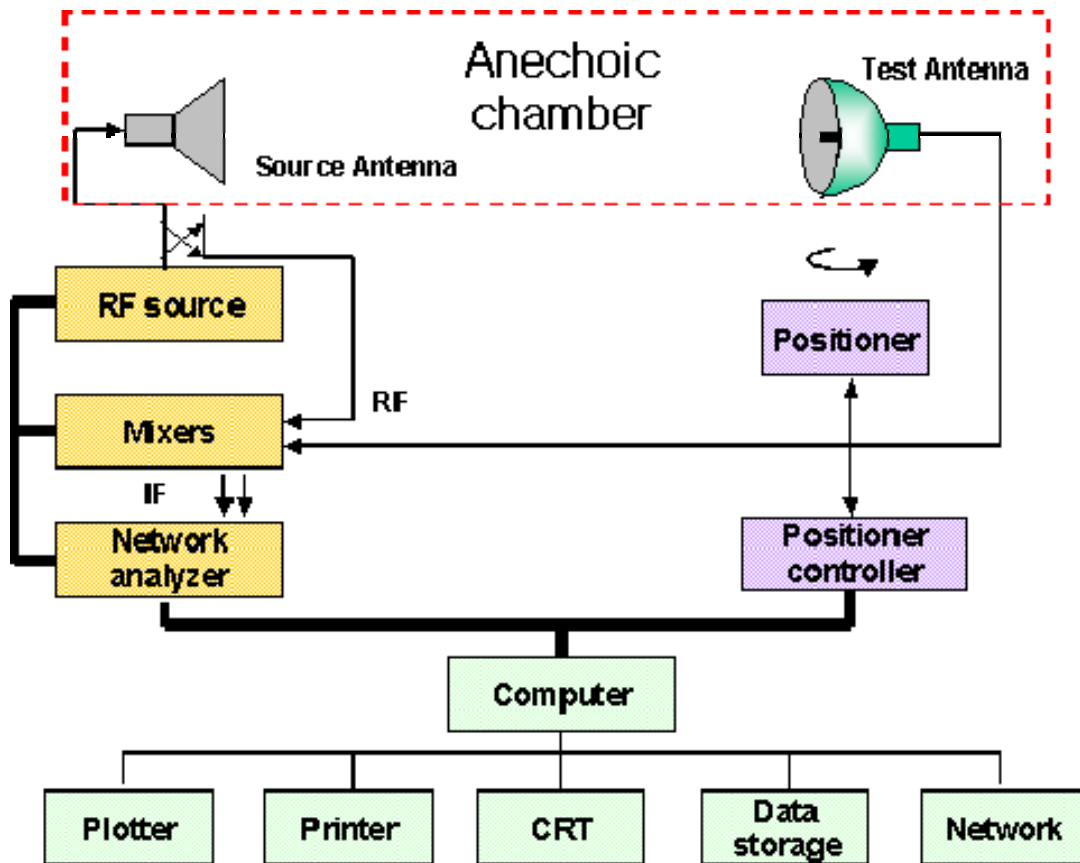


(Fig. 3-1)

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3.5 Gain

Measurement Method : As shown in fig.3-2, setting the horn antenna as standard antenna, measure the gain by [dBi].

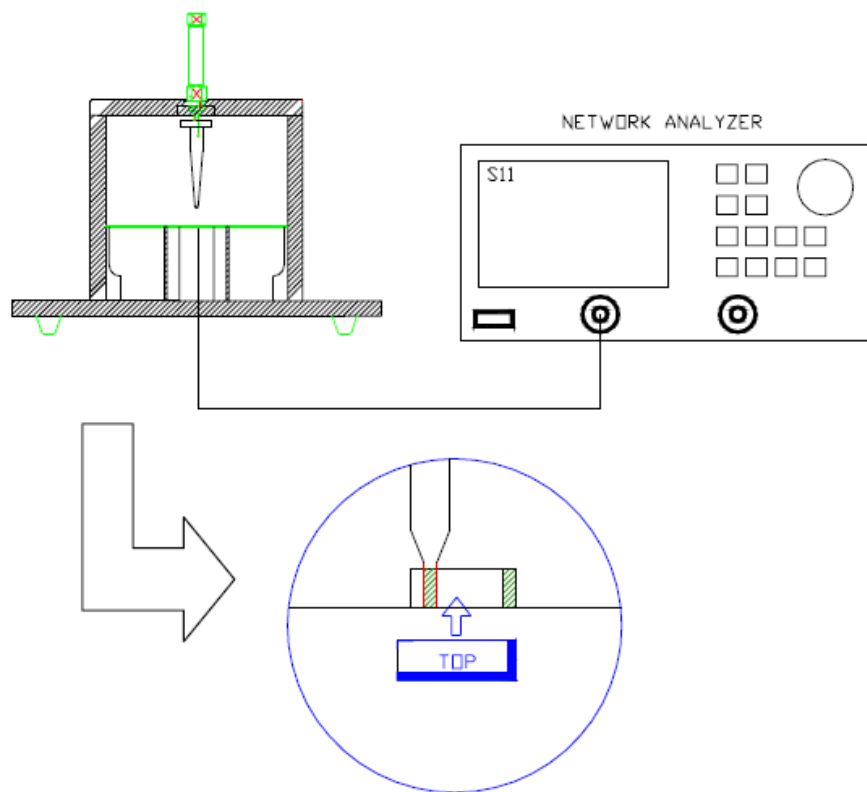


(Fig.3-2)

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3.6 Jig Measurement

Measurement Method : Setting equipments as shown in fig. 3-5, connecting the measurement jig to the reflection port of the Network Analyzer, measure VSWR of the reference antenna and specimens.

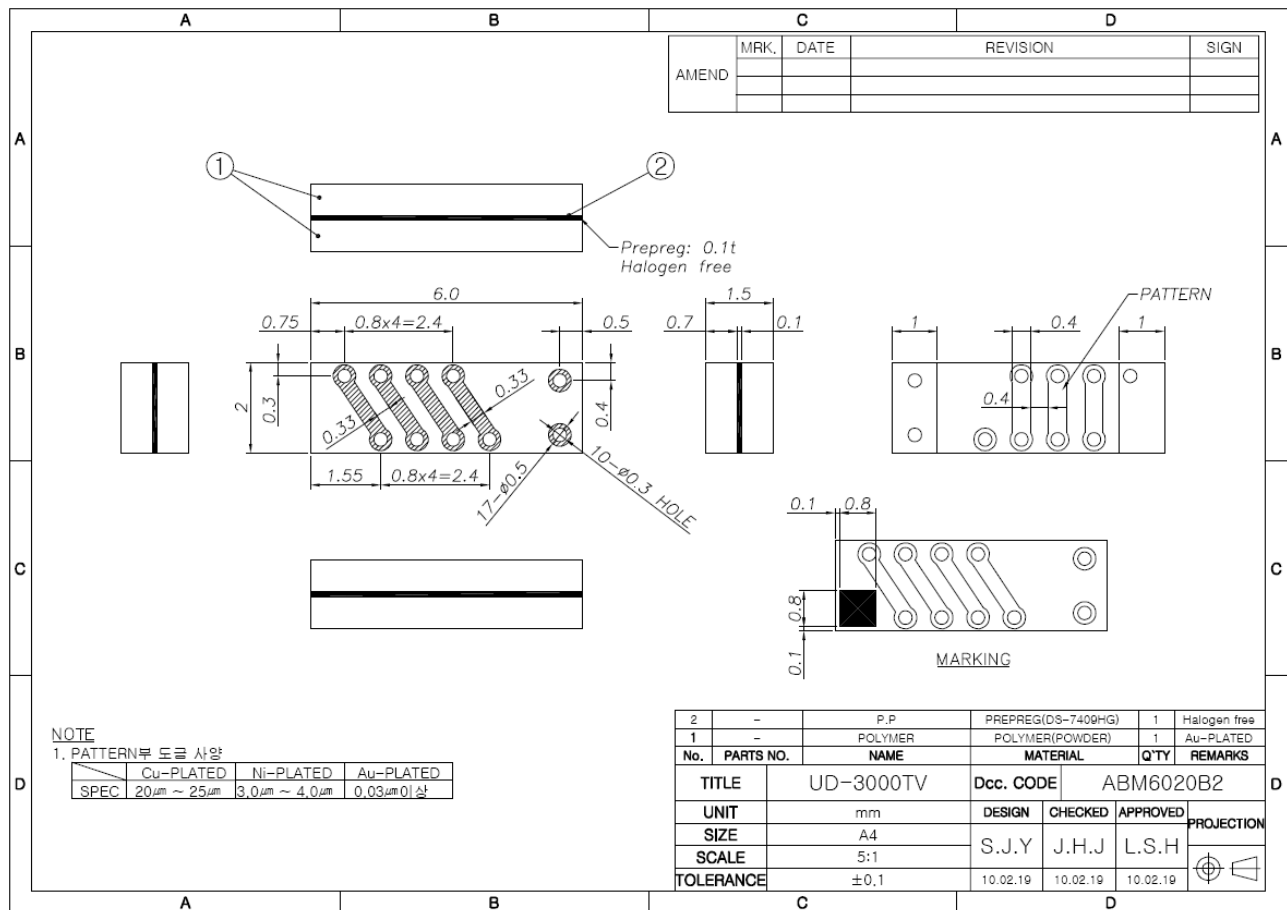


(Fig.3-3)

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4. Mechanical Specifications

4.1 Mechanical Drawing



4.2 Figure of assembled antenna

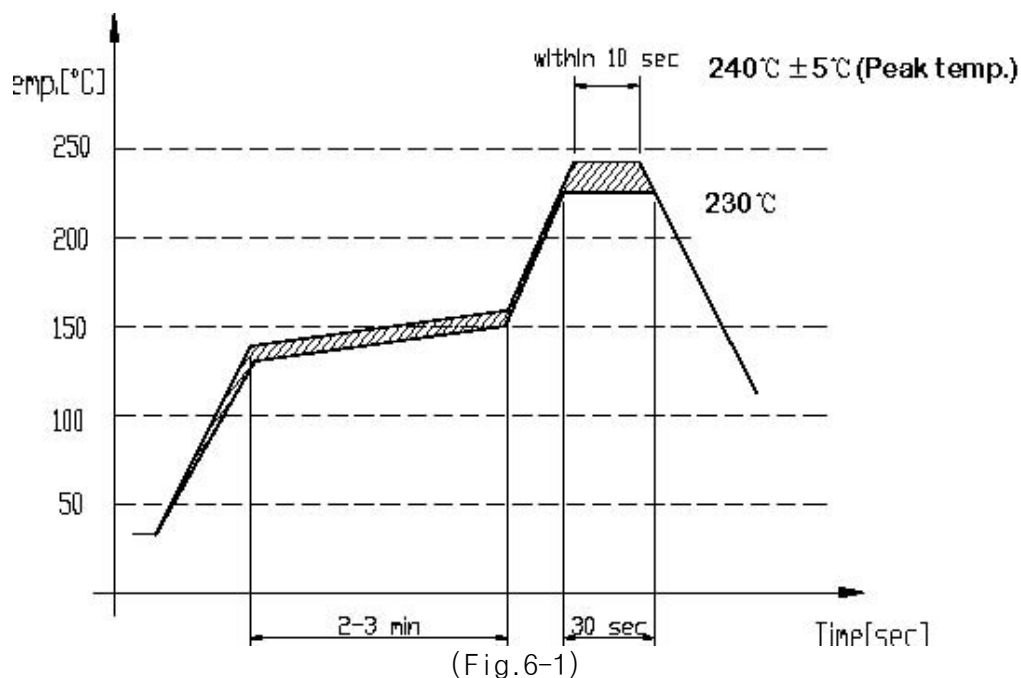


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5. Soldering Conditions (Pb Free)

- 1) To prevent deterioration of antenna performance, fellow conditions are satisfied.
 - Only reflow soldering process is available.
 - Inactive flux should be used.(Contents of CI is below 0.2%)
 - Reflow cycle must be under 3 times.

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



6. Notice

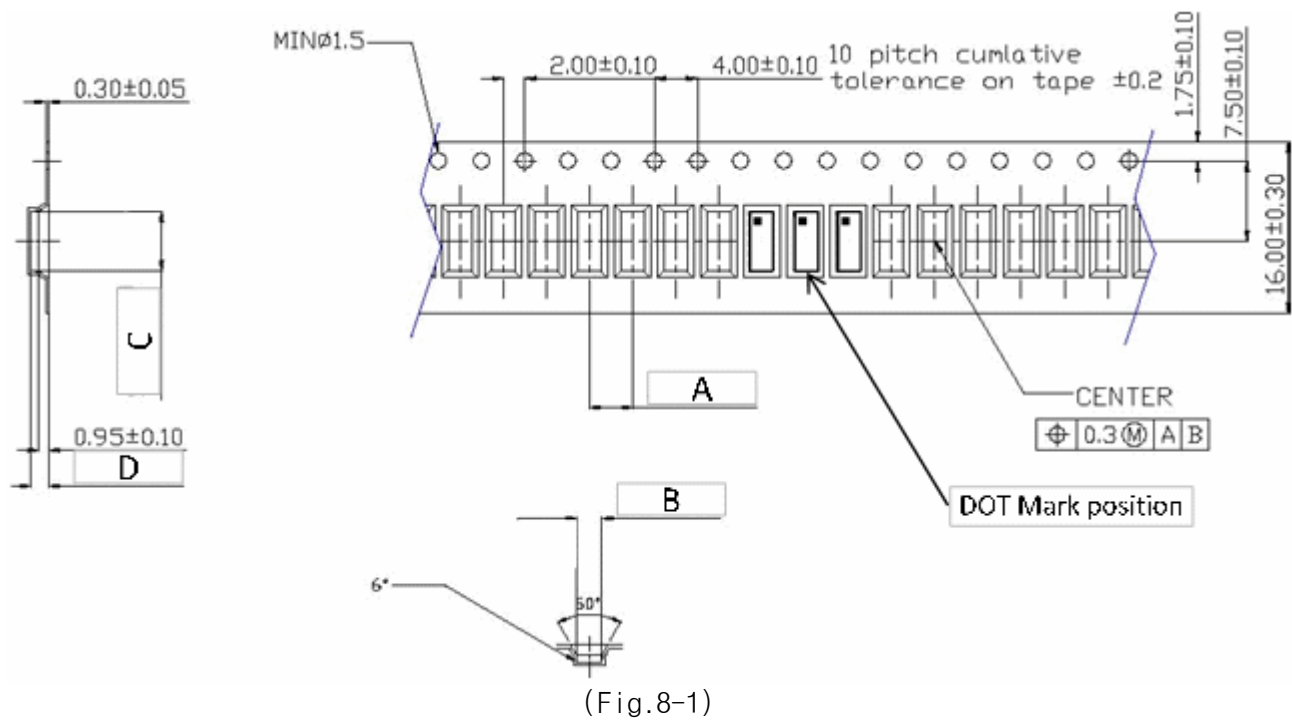
- 1) Specimens should be kept in environment of $-5 \sim 40^{\circ}\text{C}$ and under RH70% for standby.(MSL Level 1)
- 2) Working in high temperature or humidity, or environment of exposure to chlorine gas or sulfur can cause the dielectric chip antenna to deteriorate in ability of soldering on electrode.
- 3) Mechanical Impact should be avoided to prevent crack by the weight of Dielectric Chip Antenna itself.
- 4) Dielectric Chip Antenna should be soldered within 6months. The chip antenna over 6months should be checked about soldering availability

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7. Packing Specifications

7.1 Carrier tape specifications

1) Dimensions



ANTENNA SIZE(mm)	A	B	C	D
6 x 2 x 1.5t	4.0±0.1	2.1 ~ 2.2	6.1 ~ 6.2	1.65±0.1

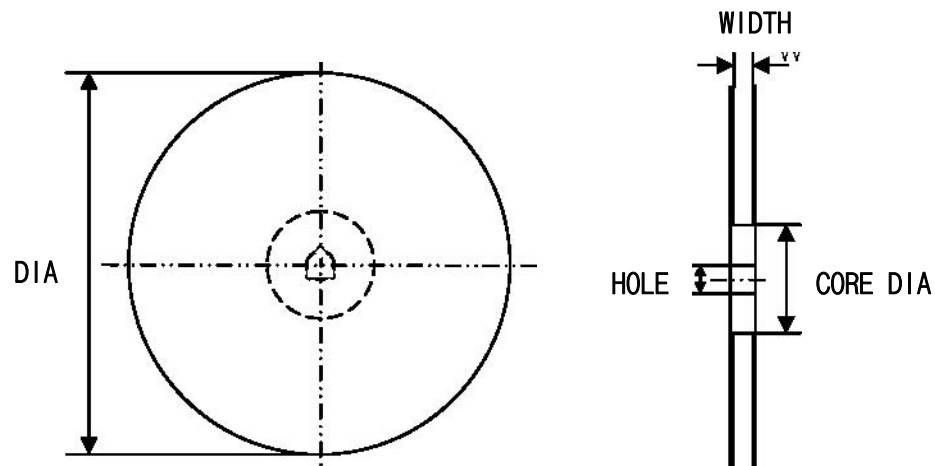
2) Material and surface resistance

- Carrier tape : $10^9 \sim 10^{11} \Omega$
- Cover tape : $10^8 \sim 10^{11} \Omega$
- Reel : $10^9 \sim 10^{11} \Omega$

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7.2 Reel Specifications

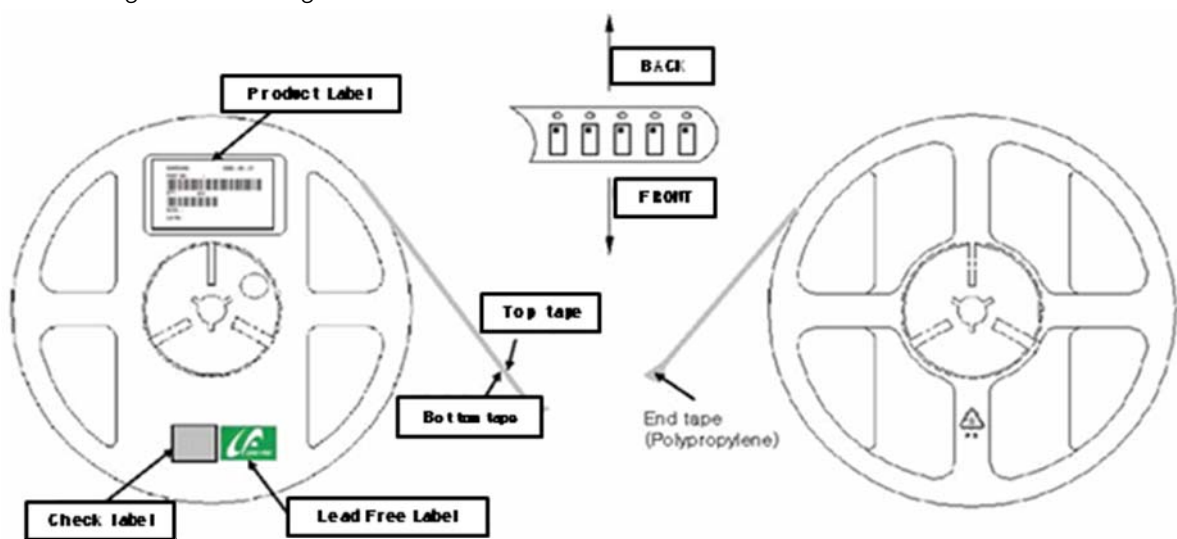
1) Size



(Fig.8-2)

Item	DIA	WIDTH	CORE DIA	HOLE
Dimention(mm)	180.0 ~ 183.0	17.0 ± 0.3	60.0 ± 1	13.0 ± 0.5

2) Labeling and Winding Method



(Fig. 8-3)

3) Material

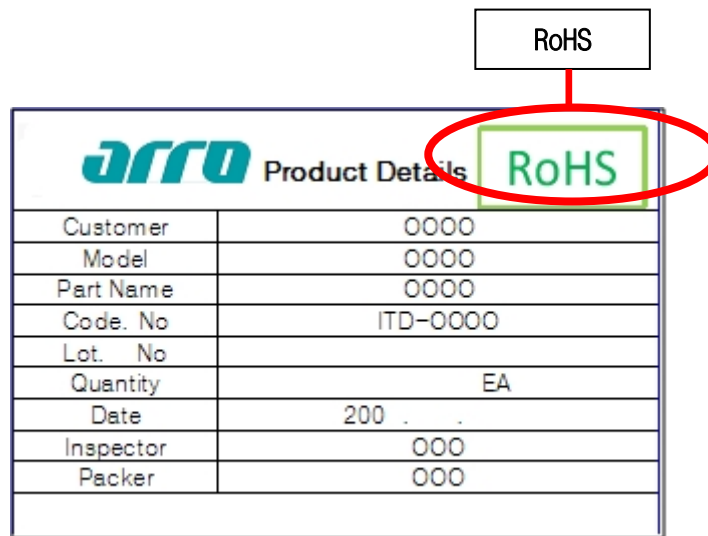
- Plastic reel : GPPS (General Purpose Poly Styrene) resin.

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7.3 Box Specifications

1) Contents of labels

- As shown in Fig.8-4, ① RoHS Mark should be on the box.
- ※ It need to confirm the product and quantity before sign on the Product Details table.



arro Product Details	
Customer	0000
Model	0000
Part Name	0000
Code. No	ITD-0000
Lot. No	
Quantity	EA
Date	200 . .
Inspector	000
Packer	000

(Fig. 8-4)

2) Labeling Method

- Label should be attached as shown in Fig.8-5
- If the product is for CKD, CKD label should be attached on the right top side of box front and opposite face of it.







(Fig. 8-5)

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8. RoHS Report

1) PREPREG / POWDER

<div data-bbox="347 555 418 586" data-label="Image"></div> <p align="center">TEST REPORT</p> <p>Report No. RT09R.S0182-011-E1 Date: Jan. 21, 2009</p> <p>Page: 1 of 4</p> <p>Applicant : Doosan Corporation Electro-Materials BG Address : 12th Floor, Doosan Technical Center Bldg., 39-3, Songdo-dong, Suik-gu, Yongin-si, Kyungki-do, Korea</p> <p>Sample Description : The following submitted sample(s) said to be:- Name/Type of Product : DG-7409HG Sample ID No. : RT09R.S0182-011 Manufacturer/Vendor : Doosan Corporation Electro-Materials BG</p> <p>Sample received : Jan. 15, 2009 Testing Date : Jan. 15, 2009 ~ Jan. 21, 2009 Testing Laboratory : Intertek Testing Center Testing Environment : Temperature : (22 ± 26) °C Relative Humidity : (55 ± 65) %</p> <p>Test Type : RoHS wet chemical analysis Test Method(s) : Please see the following page(s). Test Result(s) : Please see the following page(s).</p> <p>* 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.</p> <p>Approved by:  Jade Jang / Lab. Technical Manager Authorized by:  Do Park / Lab. General Manager</p> <p>This Test Report is issued by the Company subject to its Terms and Conditions of Business printed hereon. Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. This Test Report shall not be reproduced, except in full, without prior written consent of the Company.</p> <p align="center">Intertek Testing Center</p> <p>Seoul Office Tel: (02) 2109-1250 Fax: (02) 2109-1259 Guro Office Tel: (054) 402-8647 Fax: (054) 402-8157 9846-516 www.intertek.com Seoul Lab. #018, 70, Ase Techno Tower V, 18F-02, Guro-2Dong, Guro-Gu, Seoul 152-764 Korea Tel: (02) 2109-1260 Fax: (02) 2109-1258 Ulsan Lab. #050-2, Yongsin-2, Chonggyung-Myeon, Ulsan-Gu, Ulsan 680-600 Korea Tel: (052) 257-6754 Fax: (052) 257-6752</p>	<div data-bbox="954 555 1024 586" data-label="Image"></div> <p align="center">TEST REPORT</p> <p>Report No. RT09R.S0182-011-E1 Sample ID No. : RT09R.S0182-011 Sample Description : DG-7409HG</p> <p>Page: 2 of 4 Date: Jan. 21, 2009</p> <table border="1"> <thead> <tr> <th>Test Item</th> <th>Unit</th> <th>Test Method</th> <th>MDL</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>Cadmium (Cd)</td> <td>ppm</td> <td>With reference to IEC 62321 Edition 1.0 by acid digestion and determined by ICP-OES</td> <td>0.3</td> <td>N.D.</td> </tr> <tr> <td>Lead (Pb)</td> <td>ppm</td> <td></td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Mercury (Hg)</td> <td>ppm</td> <td></td> <td>2</td> <td>N.D.</td> </tr> <tr> <td>Hexavalent Chromium (Cr⁶⁺) (For nonmetal)</td> <td>ppm</td> <td>With reference to IEC 62321 Edition 1.0 by alkaline digestion and determined by UV/VIS Spectrophotometer</td> <td>1</td> <td>N.D.</td> </tr> <tr> <td colspan="5">Polychlorinated Biphenyl (PCBs)</td> </tr> <tr> <td>Monoaromobiphenyl</td> <td>ppm</td> <td rowspan="11">With reference to IEC 62321 Edition 1.0 by solvent extraction and determined by GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Dibromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tribromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tetraaromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Pentaaromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Hexaaromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Heptaaromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Octaaromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Nonaaromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Decaaromobiphenyl</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td colspan="5">Polychlorinated Diphenyl Ether (PCDEs)</td> </tr> <tr> <td>Monoaromodiphenyl ether</td> <td>ppm</td> <td rowspan="10">With reference to IEC 62321 Edition 1.0 by solvent extraction and determined by GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Dibromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tribromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tetraaromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Pentaaromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Hexaaromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Heptaaromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Octaaromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Nonaaromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Decaaromodiphenyl ether</td> <td>ppm</td> <td>5</td> <td>N.D.</td> </tr> </tbody> </table> <p>Notes : ppm = parts per million N.D. = Not detected (< MDL) MDL = Method detection limit</p> <p>Tested by : Nikkie Lee, HR Kim, Chen Xing</p> <p>This Test Report is issued by the Company subject to its Terms and Conditions of Business printed hereon. Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. This Test Report shall not be reproduced, except in full, without prior written consent of the Company.</p> <p align="center">Intertek Testing Center</p> <p>Seoul Office Tel: (02) 2109-1250 Fax: (02) 2109-1259 Guro Office Tel: (054) 402-8647 Fax: (054) 402-8157 9846-516 www.intertek.com Seoul Lab. #018, 70, Ase Techno Tower V, 18F-02, Guro-2Dong, Guro-Gu, Seoul 152-764 Korea Tel: (02) 2109-1260 Fax: (02) 2109-1258 Ulsan Lab. #050-2, Yongsin-2, Chonggyung-Myeon, Ulsan-Gu, Ulsan 680-600 Korea Tel: (052) 257-6754 Fax: (052) 257-6752</p>	Test Item	Unit	Test Method	MDL	Results	Cadmium (Cd)	ppm	With reference to IEC 62321 Edition 1.0 by acid digestion and determined by ICP-OES	0.3	N.D.	Lead (Pb)	ppm		5	N.D.	Mercury (Hg)	ppm		2	N.D.	Hexavalent Chromium (Cr ⁶⁺) (For nonmetal)	ppm	With reference to IEC 62321 Edition 1.0 by alkaline digestion and determined by UV/VIS Spectrophotometer	1	N.D.	Polychlorinated Biphenyl (PCBs)					Monoaromobiphenyl	ppm	With reference to IEC 62321 Edition 1.0 by solvent extraction and determined by GC/MS	5	N.D.	Dibromobiphenyl	ppm	5	N.D.	Tribromobiphenyl	ppm	5	N.D.	Tetraaromobiphenyl	ppm	5	N.D.	Pentaaromobiphenyl	ppm	5	N.D.	Hexaaromobiphenyl	ppm	5	N.D.	Heptaaromobiphenyl	ppm	5	N.D.	Octaaromobiphenyl	ppm	5	N.D.	Nonaaromobiphenyl	ppm	5	N.D.	Decaaromobiphenyl	ppm	5	N.D.	Polychlorinated Diphenyl Ether (PCDEs)					Monoaromodiphenyl ether	ppm	With reference to IEC 62321 Edition 1.0 by solvent extraction and determined by GC/MS	5	N.D.	Dibromodiphenyl ether	ppm	5	N.D.	Tribromodiphenyl ether	ppm	5	N.D.	Tetraaromodiphenyl ether	ppm	5	N.D.	Pentaaromodiphenyl ether	ppm	5	N.D.	Hexaaromodiphenyl ether	ppm	5	N.D.	Heptaaromodiphenyl ether	ppm	5	N.D.	Octaaromodiphenyl ether	ppm	5	N.D.	Nonaaromodiphenyl ether	ppm	5	N.D.	Decaaromodiphenyl ether	ppm	5	N.D.
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Lead (Pb)	ppm		5	N.D.																																																																																																																		
Mercury (Hg)	ppm		2	N.D.																																																																																																																		
Hexavalent Chromium (Cr ⁶⁺) (For nonmetal)	ppm	With reference to IEC 62321 Edition 1.0 by alkaline digestion and determined by UV/VIS Spectrophotometer	1	N.D.																																																																																																																		
Polychlorinated Biphenyl (PCBs)																																																																																																																						
Monoaromobiphenyl	ppm	With reference to IEC 62321 Edition 1.0 by solvent extraction and determined by GC/MS	5	N.D.																																																																																																																		
Dibromobiphenyl	ppm		5	N.D.																																																																																																																		
Tribromobiphenyl	ppm		5	N.D.																																																																																																																		
Tetraaromobiphenyl	ppm		5	N.D.																																																																																																																		
Pentaaromobiphenyl	ppm		5	N.D.																																																																																																																		
Hexaaromobiphenyl	ppm		5	N.D.																																																																																																																		
Heptaaromobiphenyl	ppm		5	N.D.																																																																																																																		
Octaaromobiphenyl	ppm		5	N.D.																																																																																																																		
Nonaaromobiphenyl	ppm		5	N.D.																																																																																																																		
Decaaromobiphenyl	ppm		5	N.D.																																																																																																																		
Polychlorinated Diphenyl Ether (PCDEs)																																																																																																																						
Monoaromodiphenyl ether	ppm	With reference to IEC 62321 Edition 1.0 by solvent extraction and determined by GC/MS	5	N.D.																																																																																																																		
Dibromodiphenyl ether	ppm		5	N.D.																																																																																																																		
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Decaaromodiphenyl ether	ppm		5	N.D.																																																																																																																		
<div data-bbox="347 1290 418 1321" data-label="Image"></div> <p align="center">TEST REPORT</p> <p>Report No. RT09R.S0182-011-E1 Sample ID No. : RT09R.S0182-011 Sample Description : DG-7409HG</p> <p>Page: 3 of 4 Date: Jan. 21, 2009</p> <p>* View of sample as received:</p>  <p>This Test Report is issued by the Company subject to its Terms and Conditions of Business printed hereon. Attention is drawn to the limitations of liability, indemnification and jurisdictional issues defined therein. This Test Report shall not be reproduced, except in full, without prior written consent of the Company.</p> <p align="center">Intertek Testing Center</p> <p>Seoul Office Tel: (02) 2109-1250 Fax: (02) 2109-1259 Guro Office Tel: (054) 402-8647 Fax: (054) 402-8157 9846-516 www.intertek.com Seoul Lab. #018, 70, Ase Techno Tower V, 18F-02, Guro-2Dong, Guro-Gu, Seoul 152-764 Korea Tel: (02) 2109-1260 Fax: (02) 2109-1258 Ulsan Lab. #050-2, Yongsin-2, Chonggyung-Myeon, Ulsan-Gu, Ulsan 680-600 Korea Tel: (052) 257-6754 Fax: (052) 257-6752</p>	<div data-bbox="837 1265 1029 1332" data-label="Image"></div> <p align="center">TEST REPORT</p> <p>7050 HUB PARKWAY CLEVELAND, OHIO 44125 PHONE: (216) 447-1550 FAX: (216) 447-0716 8000 497-6752 www.nsl-analytical.com E-MAIL: nsl@nsl-analytical.com</p> <p>The REPORTED TEST RESULTS RELATE ONLY TO THE TESTED TESTS</p> <p>Ferro Corporation 1780 Transcend Drive, Penn Yan, NY 14527 Date: 9/29/04 Report No.: 121759 Attn: Alan LoPrelli</p> <p>Client Description: Powders</p> <p>Page: 3 of 3</p> <p>NSL Lab No: 0418539 Sample ID: Sample#5: 219-3A #109148 Pack/223</p> <table border="1"> <thead> <tr> <th>Tests</th> <th>Results/Units</th> <th>Methods</th> </tr> </thead> <tbody> <tr> <td>Cd</td> <td><0.005%</td> <td>ICP/MS</td> </tr> <tr> <td>Cr (+6)</td> <td><0.0001%</td> <td>Wet Chemistry</td> </tr> <tr> <td>Hg</td> <td><0.00005%</td> <td>Cold Vapor AA</td> </tr> <tr> <td>Pb</td> <td><0.005%</td> <td>ICP/MS</td> </tr> </tbody> </table> <p>NSL Lab No: 0418540 Sample ID: Sample#6: 219 #95667 Pack/223</p> <table border="1"> <thead> <tr> <th>Tests</th> <th>Results/Units</th> <th>Methods</th> </tr> </thead> <tbody> <tr> <td>Cd</td> <td><0.005%</td> <td>ICP/MS</td> </tr> <tr> <td>Cr (+6)</td> <td><0.0001%</td> <td>Wet Chemistry</td> </tr> <tr> <td>Hg</td> <td><0.00005%</td> <td>Cold Vapor AA</td> </tr> <tr> <td>Pb</td> <td><0.005%</td> <td>ICP/MS</td> </tr> </tbody> </table> <p>Reporting Officer:  Vera Hain, Laboratory Supervisor PR 1</p> <p>This REPORT is copyrighted and intended FOR TOP MANAGEMENT ONLY. If YOU RECEIVE IT BY EMAIL, YOU MAY REQUESTED FROM COMPANY, ANYTHING OR ANY USE OR THE INFORMATION. Please CONTACT OUR OFFICE FOR INFORMATION.</p>	Tests	Results/Units	Methods	Cd	<0.005%	ICP/MS	Cr (+6)	<0.0001%	Wet Chemistry	Hg	<0.00005%	Cold Vapor AA	Pb	<0.005%	ICP/MS	Tests	Results/Units	Methods	Cd	<0.005%	ICP/MS	Cr (+6)	<0.0001%	Wet Chemistry	Hg	<0.00005%	Cold Vapor AA	Pb	<0.005%	ICP/MS																																																																																							
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