



# 안테나 부품 승인원

| 결<br>재 | 담 당                                                                                 | 품질팀장                                                                                | 개발팀장                                                                                | 승 인                                                                                   |
|--------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|        |  |  |  |  |
|        | 심주용                                                                                 | 조병환                                                                                 | 정학재                                                                                 | 이승효                                                                                   |
|        | 05/22                                                                               | 05/22                                                                               | 05/22                                                                               | 05/22                                                                                 |

|       |                        |
|-------|------------------------|
| BUYER | 모본                     |
| 모 델 명 | ABM6020B1              |
| 부 품 명 | BLUETOOTH CHIP ANTENNA |
| 부품코드  |                        |
| 아로코드  | AT98-0007A             |

경기도 안양시 만안구 안양7동 205-11  
TEL : 031)448-8172 / FAX : 031)448-4194

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## 1. 승인원 이력 LIST

| NO | 일자 | 변경 전 | 변경 후 | 근거 사유 | REV |
|----|----|------|------|-------|-----|
| 1  |    |      |      |       |     |
| 2  |    |      |      |       |     |
| 3  |    |      |      |       |     |
| 4  |    |      |      |       |     |
| 5  |    |      |      |       |     |
| 6  |    |      |      |       |     |
| 7  |    |      |      |       |     |
| 8  |    |      |      |       |     |
| 9  |    |      |      |       |     |
| 10 |    |      |      |       |     |
| 11 |    |      |      |       |     |
| 12 |    |      |      |       |     |
| 13 |    |      |      |       |     |
| 14 |    |      |      |       |     |
| 15 |    |      |      |       |     |
| 16 |    |      |      |       |     |
| 17 |    |      |      |       |     |

상기 REV.은 승인 후 양산중의 변경사항에 대해서만 REVISION 변경 함.  
개발중의 변경사항에 대해서는 REVISION 변경 없음.

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## 2. 기술적 사항

### 2.1 일반적 사양

|              |                   |
|--------------|-------------------|
| MODEL        | ANTENNA           |
| ANTENNA TYPE | CHIP ANTENNA      |
| APPLICATIONS | BLUETOOTH ANTENNA |

### 2.2 전기적 사양

|                                  |                 |         |
|----------------------------------|-----------------|---------|
| FREQUENCY RANGE                  | 2400~2483(MHz)  |         |
| MEASUREMENT FREQUENCY POINT(MHz) | 2400            | 2483    |
| V.S.W.R                          | MAX 2.0         | MAX 2.0 |
| TOTAL GAIN(PEAK/AVG)(dBi)(F/O)   | -0.1/-5.6       |         |
| INPUT IMPEDANCE(Ω)               | 50(Ω)           |         |
| POLARIZATION                     | LINEAR          |         |
| RADIATION PATTERN                | OMNIDIRECTIONAL |         |

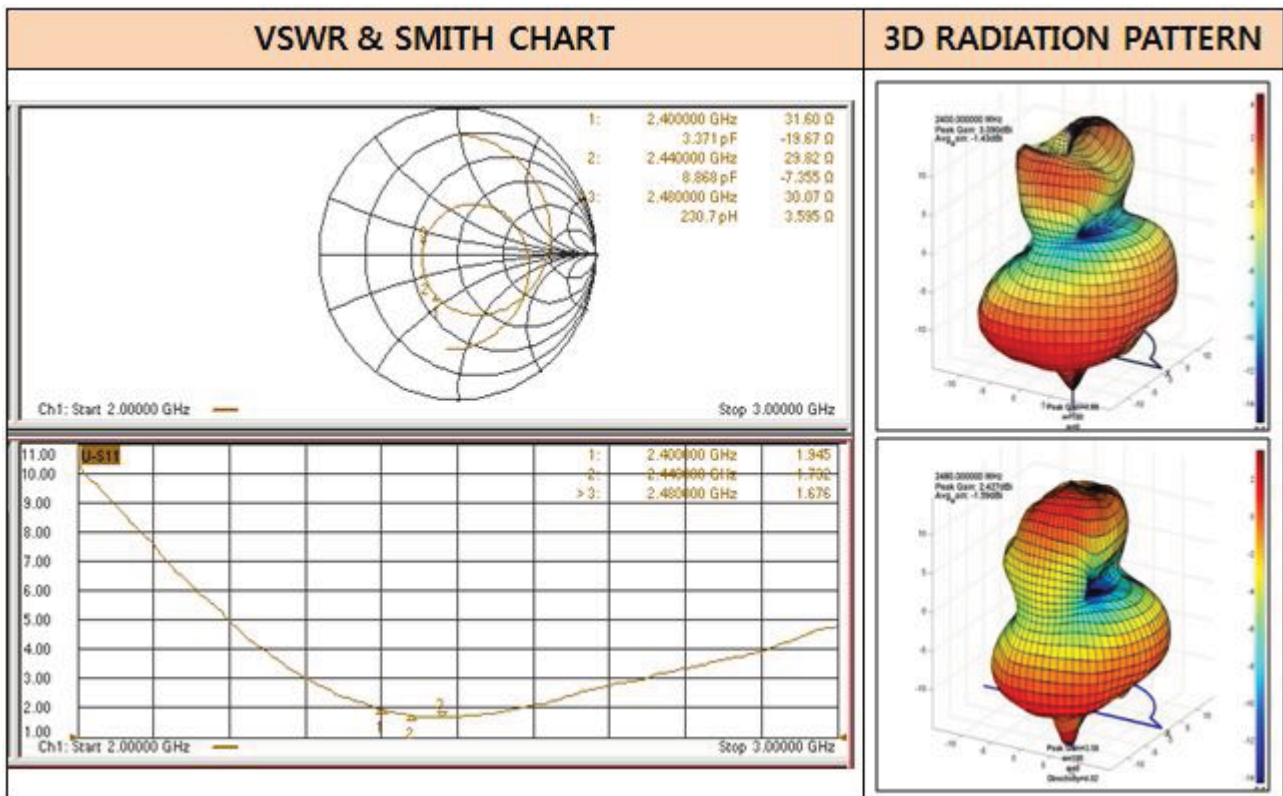
### 2.3 기구적 사양

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

|         |           |      |                |      |      |
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### 3. 전기적 요구 사항

#### 3.1 정재파비와 스미스차트



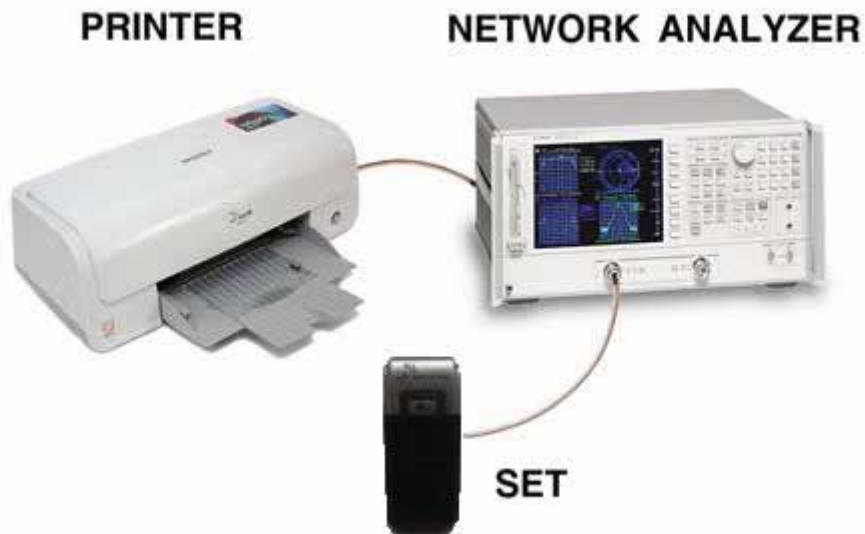
#### 3.2 PASSIVE

| Frequency [MHz] |         | 2400 | 2420 | 2440 | 2460 | 2480 |
|-----------------|---------|------|------|------|------|------|
| Gain[dBi]       | Peak    | 3.1  | 3.1  | 2.8  | 2.6  | 2.4  |
|                 | Average | -1.4 | -1.5 | -1.7 | -1.7 | -1.6 |
| Efficiency(%)   |         | 71.9 | 70.4 | 67.6 | 67.9 | 69.3 |

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### 3.3 임피던스

측정방법 : 그림 3-1과 같이 장비를 연결하고 NETWORK ANALYZER의 REFLECTION POINT에 안테나가 장착된 HANDY SET을 연결하여 사용주파수 대역 내에서의 IMPEDANCE를 측정한다.

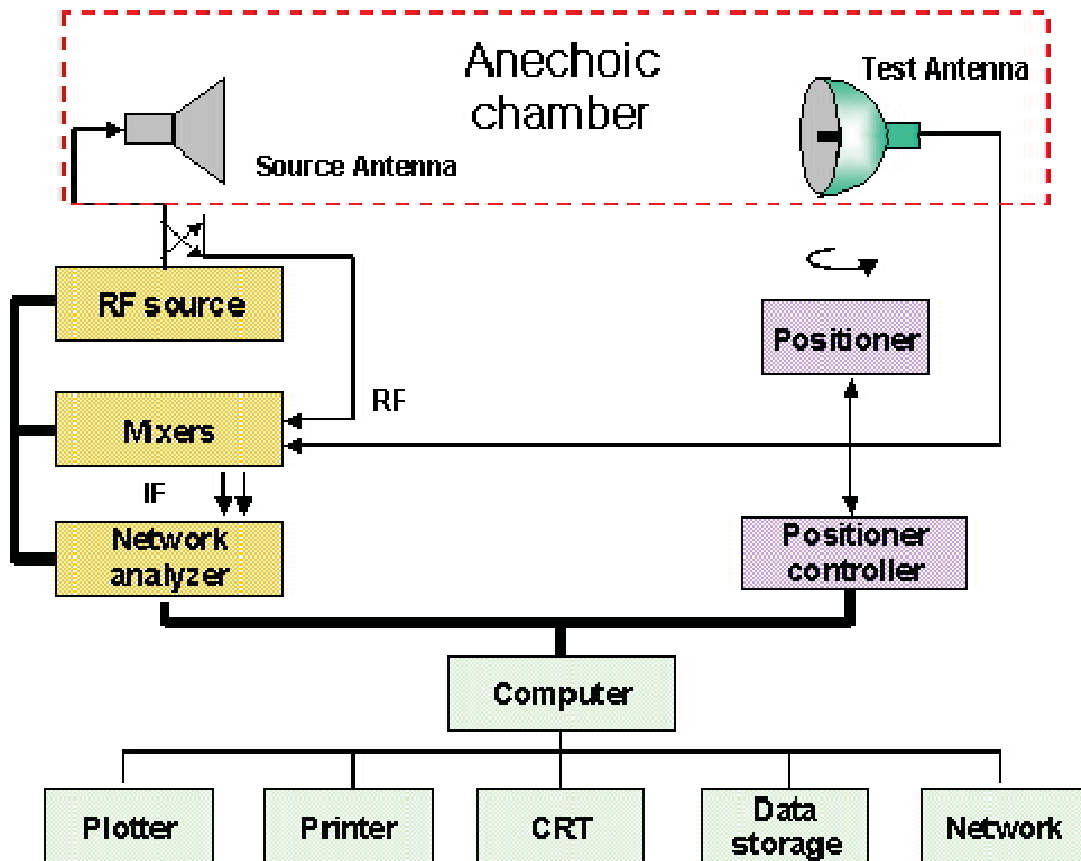


(그림 3-1)

|         |           |      |                |      |      |
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### 3.4 안테나 이득

측정방법 : 그림 3-2와 같이 혼 안테나를 표준 안테나로 설정하여 [dBi]로 나타내었다.

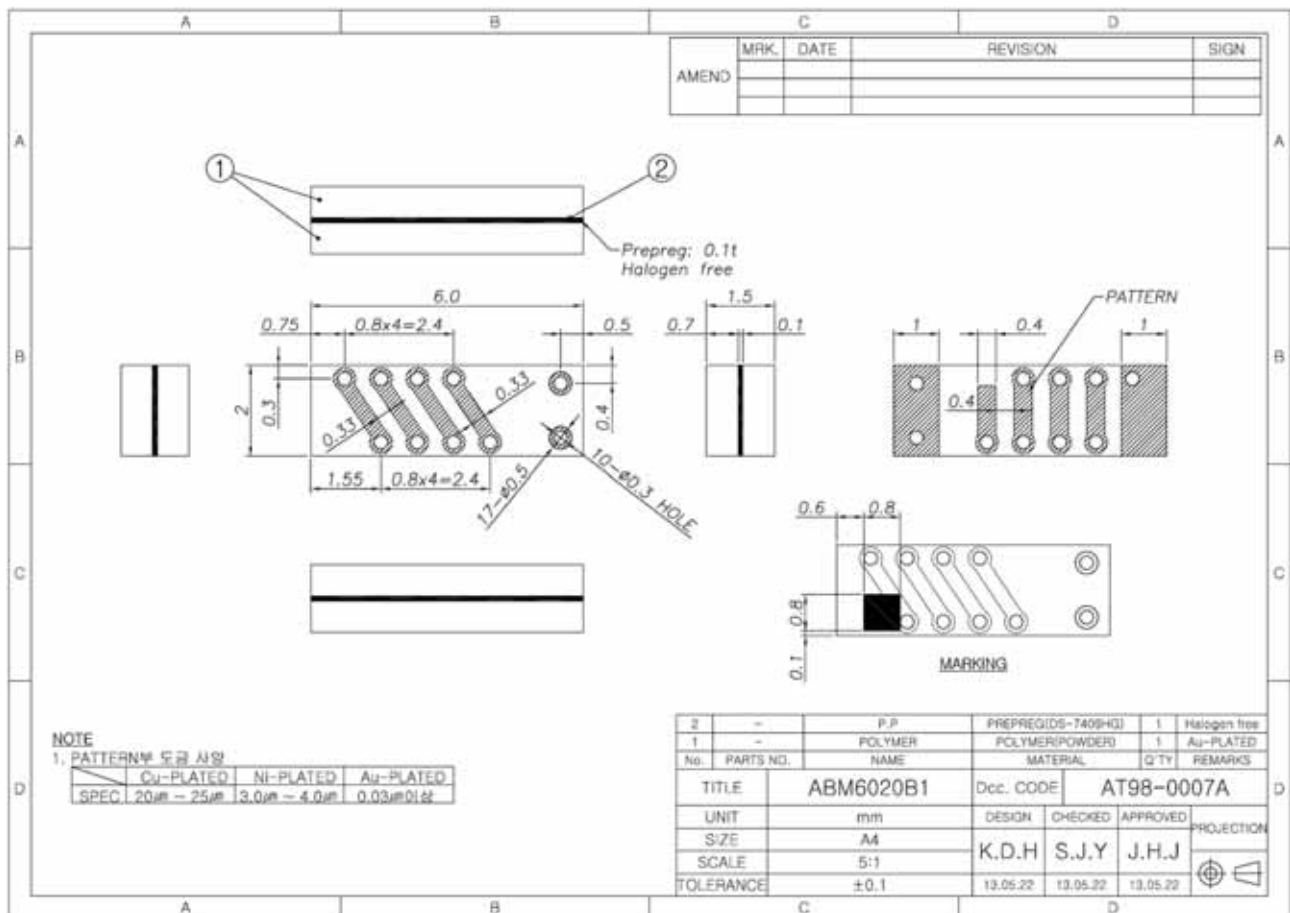


(그림 3-2)

|         |           |      |                |      |      |
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## 4. 기구적 요구 사항

### 4.1 기구적 도면



|         |           |      |                |      |      |
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## 5. 신뢰성 요구 사항

### 5.1 MSL LEVEL 시험

#### 1) JEDEC J-STD-020C 조건

| LEVEL | Floor Life |                                    | Soak Requirements    |                                    |
|-------|------------|------------------------------------|----------------------|------------------------------------|
|       | Time       | Conditions                         | Time                 | Conditions                         |
| 1     | Unlimited  | $\leq 30^{\circ}\text{C}$ / RH 85% | $168 \pm 5\text{hr}$ | $\leq 85^{\circ}\text{C}$ / RH 85% |

#### 2) 시험 조건

| 항 목               | 시험 조건                                                                                                                                                        | 판정 기준                                                                 |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Soak Requirements | <ul style="list-style-type: none"> <li><math>+85 \pm 3^{\circ}\text{C}</math>, RH 85%, <math>168 \pm 2\text{hr}</math> 방치 후 Aging없이 Reflow 3회 실시.</li> </ul> | <ul style="list-style-type: none"> <li>안테나 특성 기준에 만족해야 한다.</li> </ul> |

### 5.2 환경 시험

| 항 목   | 시험 조건                                                                                                                                 | 판정 기준                                                                 |
|-------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| PCT   | <ul style="list-style-type: none"> <li><math>+121 \pm 5^{\circ}\text{C}</math>, RH 100%, 96hr.</li> </ul>                             | <ul style="list-style-type: none"> <li>안테나 특성 기준에 만족해야 한다.</li> </ul> |
| 저온 동작 | <ul style="list-style-type: none"> <li><math>-40 \pm 3^{\circ}\text{C}</math>에서 1 시간 방치 후 시험온도 상태에서 측정.</li> </ul>                    |                                                                       |
| 저온 방치 | <ul style="list-style-type: none"> <li><math>-40 \pm 3^{\circ}\text{C}</math>, <math>120 \pm 2\text{hr}</math> 방치.</li> </ul>         |                                                                       |
| 내습 동작 | <ul style="list-style-type: none"> <li><math>+85 \pm 3^{\circ}\text{C}</math>, RH 85%에서 1 시간 방치 후 시험온도 상태에서 측정.</li> </ul>            |                                                                       |
| 내습 방치 | <ul style="list-style-type: none"> <li><math>+85 \pm 3^{\circ}\text{C}</math>, RH 85%, <math>120 \pm 2\text{hr}</math> 방치.</li> </ul> |                                                                       |

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### 5.3 열 충격, Reflow 시험

| 항 목  | 시험 조건                                                                                                                                                                                                                        | 판정 기준                                                                 |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| 열 충격 | <ul style="list-style-type: none"> <li>온도 조건 : <math>-40 \pm 3^{\circ}\text{C}/\text{min} \leftrightarrow +85 \pm 3^{\circ}\text{C}/\text{min}</math></li> <li>시험 CYCLE : 32cycle</li> <li>온도 변환 시간 : 5min 미만일 것.</li> </ul> | <ul style="list-style-type: none"> <li>안테나 특성 기준에 만족해야 한다.</li> </ul> |
| SMT  | <ul style="list-style-type: none"> <li>무연 납 사용<br/>무연 납 Reflow 온도 조건(별도 첨부)</li> <li>초기 측정 후 1 회, 환경시험 후 3 회 실시.</li> </ul>                                                                                                  |                                                                       |

### 5.4 기계적 시험

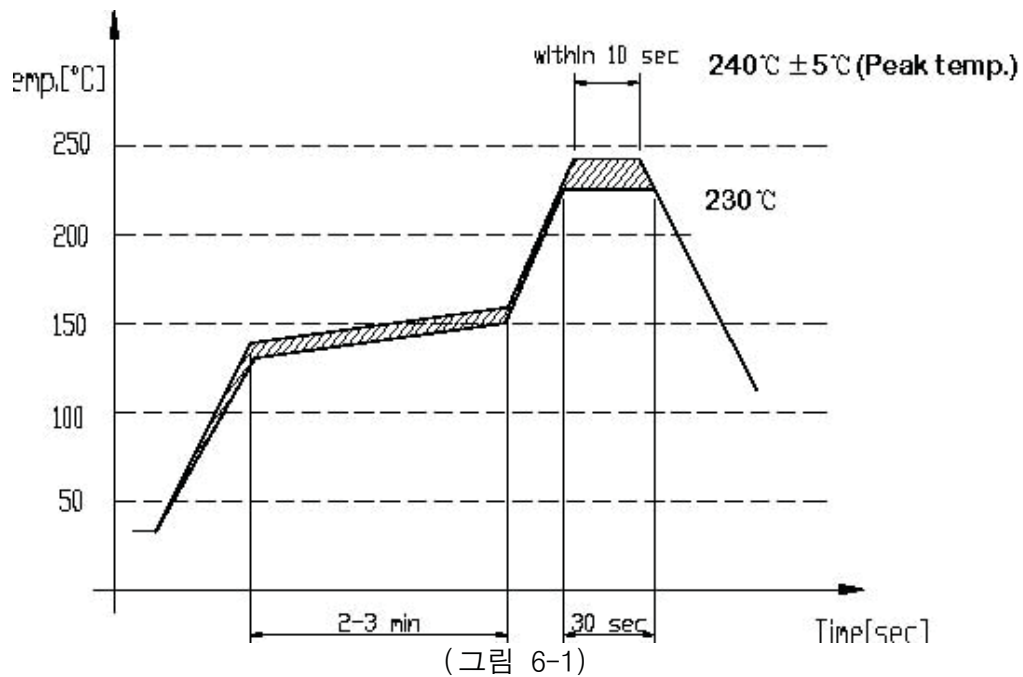
| 항 목   | 시험 조건                                                                                                                                                                                 | 판정 기준                                                                 |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| 진동 시험 | <ul style="list-style-type: none"> <li>주파수 : 10~500 Hz ,</li> <li>가속도 : <math>10 \times 9.8 \text{ m/s}^2 (\text{G})</math></li> <li>Sweep time : 15min, X.Y.Z each 5times</li> </ul> | <ul style="list-style-type: none"> <li>안테나 특성 기준에 만족해야 한다.</li> </ul> |
| 낙하 시험 | <ul style="list-style-type: none"> <li>조건 : 152 cm에서 낙하 지그를 이용하여 18 회 자유낙하(6 면 3 회)</li> <li>지그 : <math>120 \pm 20\text{g}</math> 플라스틱 지그 사용.</li> <li>바닥 : 콘크리트 또는 철판.</li> </ul>    |                                                                       |

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## 6. 납땜 조건(Pb Free)

- 1) 안테나의 특성 저하를 막기 위해 다음과 같은 납땜 조건을 지켜야 한다.
  - Reflow soldering 조건으로 납땜을 진행하여야 하며, Flow soldering을 하여서는 안 된다.
  - 비활성 Flux 를 사용하여야 한다.(최대 CI 함량 0.2% 미만)
  - Reflow cycle 횟수는 3 회 이내로 해야 한다.

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



## 7. 주의 사항

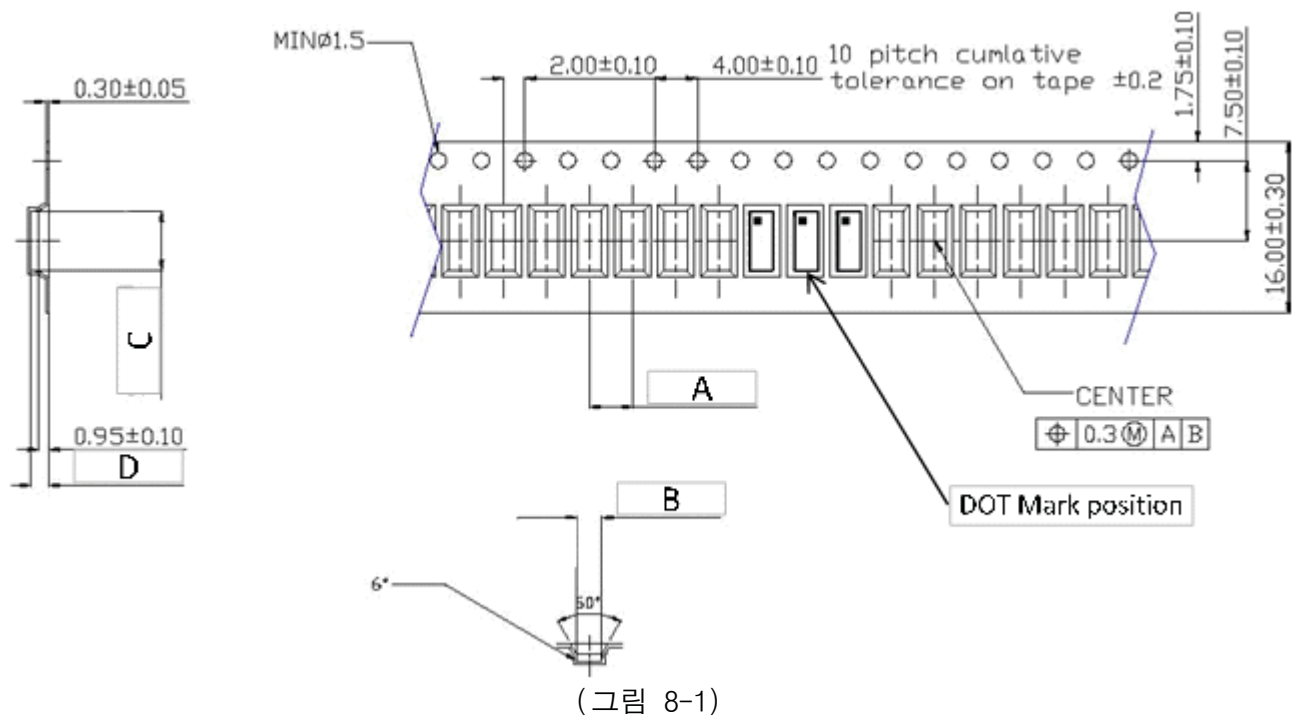
- 1) 보관환경은 -5 ~ 40°C, 상대습도 70% 이내의 대기에서 보관되어야 한다. (MSL Level 1)
- 2) Dielectric Chip Antenna는 고온/고습에서 사용하거나 또는 황이나 염소가스에 노출될 경우 전극의 납땜성 저하를 일으킬 수 있다.
- 3) Dielectric Chip Antenna 자체 무게에 의한 재료의 crack을 막기 위해 기계적 충격(낙하 등)을 피해야 한다.
- 4) Dielectric Chip Antenna는 6개월 이내에 사용되어야 하며 6개월이 경과한 칩은 사용하기 전에 반드시 납땜성을 확인하여야 한다.

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## 8. 포장 사양

### 8.1 Carrier tape 사양

#### 1) 크기



| 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 |

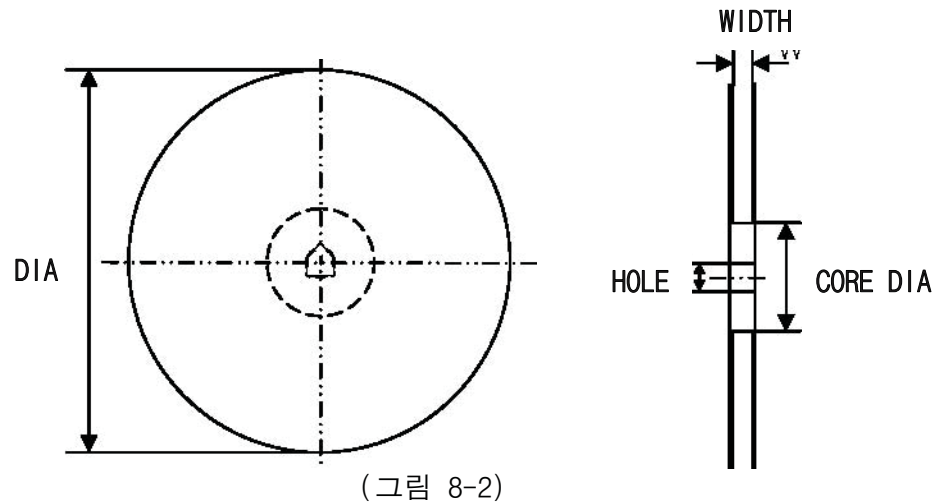
#### 2) 재질 및 표면저항

- 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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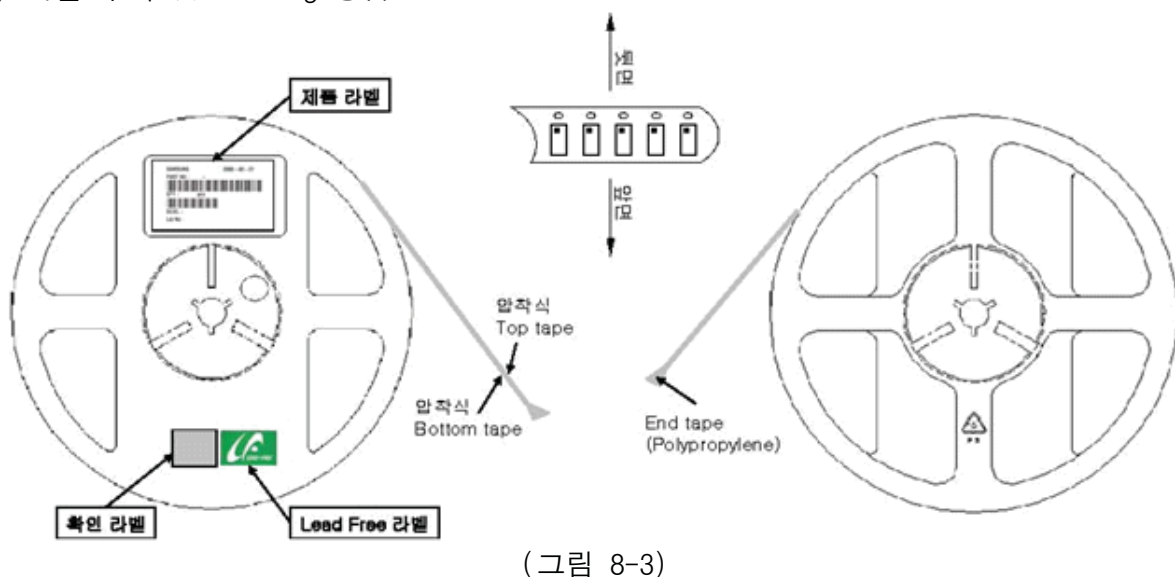
## 8.2 릴(Reel) 포장 사양

### 1) 크기



| 항 목    | DIA           | WIDTH          | CORE DIA     | HOLE           |
|--------|---------------|----------------|--------------|----------------|
| 치수(mm) | 180.0 ~ 183.0 | $17.0 \pm 0.3$ | $60.0 \pm 1$ | $13.0 \pm 0.5$ |

### 2) 라벨 부착 및 Winding 방법



### 3) 재질

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

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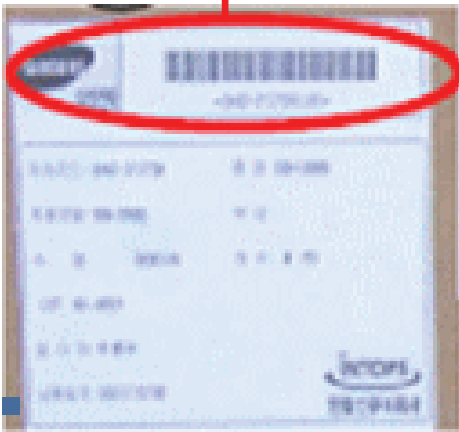
### 8.3 박스 포장 사양

#### 1) 라벨 종류 및 내용

- 그림 8-4와 같이 ① 납품회사 바코드(ex 삼성전자 바코드)와 ②LEAD FREE(Pb Free) 마크가 반드시 부착되어야 한다.

※ 포장작업 시 현품 표와 제품 및 수량을 필히 확인한 후 명세표에 싸인을 한다.

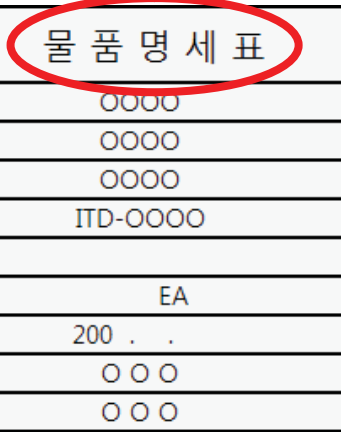
바코드



LEAD-FREE



명세표

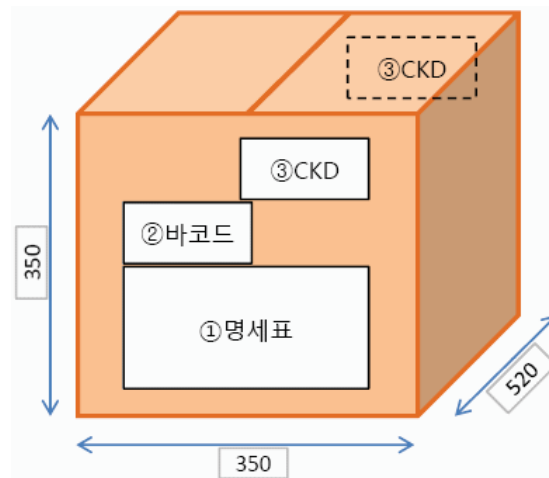


|       |          |
|-------|----------|
| 거 래 처 | 0000     |
| 모 델   | 0000     |
| 품 명   | 0000     |
| 코드No  | ITD-0000 |
| 로트No  |          |
| 수 량   | EA       |
| 일 자   | 200 . .  |
| 검 사 자 | 0 0 0    |
| 포 장 자 | 0 0 0    |

(그림 8-4)

#### 2) 라벨 부착 방법

- 제품을 포장 후 그림 8-5와 같이 부착한다.
  - CKD 제품의 경우는 우측상단과 후면에 CKD 표시를 반드시 할 것.
- ※ 신규초물과 변경초물의 경우 스티커를 작성하여 CKD 부착위치에 붙인다.



(그림 8-5)

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## 9. 유해물질 성적서

### 1) PREPREG / POWDER

| <div data-bbox="347 555 418 586" data-label="Image"></div> <h3 data-bbox="443 607 542 627">TEST REPORT</h3> <p data-bbox="304 642 619 689"> <b>Applicant :</b> Doosan Corporation Electro-Materials BG<br/> <b>Address :</b> 12<sup>th</sup> Floor, Doosan Technical Center Bldg., 39-3, Songbok-dong, Seongju, Yongsin-si, Kyungbuk-do, Korea </p> <p data-bbox="304 705 681 721"> <b>Report No.:</b> RT09R-S0182-011-E1 <b>Date:</b> Jan. 21, 2009 </p> <p data-bbox="304 736 585 752"> <b>Sample Description :</b> The following substituted sample(s) said to be:- </p> <p data-bbox="304 768 569 810"> <b>Name/Type of Product :</b> DS-7409HG<br/> <b>Sample ID No.:</b> RT09R-S0182-011<br/> <b>Manufacturer/Vendor :</b> Doosan Corporation Electro-Materials BG </p> <p data-bbox="304 826 673 882"> <b>Sample received:</b> Jan. 15, 2009<br/> <b>Testing Date:</b> Jan. 15, 2009 ~ Jan. 21, 2009<br/> <b>Testing Laboratory:</b> Intertek Testing Center<br/> <b>Testing Environment:</b> Temperature : ( 22 ± 26 ) °C      Relative Humidity : ( 55 ~ 65 ) % </p> <p data-bbox="304 893 533 934"> <b>Test Type :</b> RoHS wet chemical analysis<br/> <b>Test Method(s) :</b> Please see the following page(s).<br/> <b>Test Result(s) :</b> Please see the following page(s). </p> <p data-bbox="304 949 633 976"> <small>* Item 1 : The test results presented in this report relate only to the object tested.<br/>         * Item 2 : This report shall not be reproduced except in full without the written approval of the testing laboratory.</small> </p> <p data-bbox="304 1005 681 1081"> <b>Approved by:</b>  <b>Authorised by:</b> <br/> <b>Jade Jung / Lab. Technical Manager</b>      <b>Do Park / Lab. General Manager</b> </p> <p data-bbox="280 1144 707 1167"> <small>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.</small> </p> <p data-bbox="451 1171 536 1182">Intertek Testing Center</p> <p data-bbox="280 1189 673 1218"> <small>Seoul Office Tel: (82-2) 619-1270 Fax: (82-2) 619-1279 Client Office Tel: (82-44) 847-7447 Fax: (82-44) 847-7445 Web: <a href="http://www.intertek.co.kr">www.intertek.co.kr</a><br/>         Seoul Lab. #705, 70, An Seon Tower V, 18122, Guro-2Dong, Guro-Gu, Seoul 152-704 Korea Tel: (82-2) 619-1280 Fax: (82-2) 619-1279<br/>         Client Lab. #950-2, Yongsin-si, Chungbuk-do, Chungbuk-do, Korea Tel: (82-2) 247-6254 Fax: (82-2) 247-6252</small> </p> | <div data-bbox="954 555 1024 586" data-label="Image"></div> <h3 data-bbox="1050 589 1147 607">TEST REPORT</h3> <p data-bbox="908 613 1286 629"> <b>Report No.:</b> RT09R-S0182-011-E1 <b>Page:</b> 2 of 4<br/> <b>Sample ID No.:</b> RT09R-S0182-011 <b>Date:</b> Jan. 21, 2009<br/> <b>Sample Description:</b> DS-7409HG </p> <table border="1" data-bbox="908 660 1286 1041"> <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>0.5</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 (Cr<sup>6+</sup>) (For nonmetal)</td><td>ppm</td><td>With reference to IEC 62321 Edition 1.0 by elution digestion and determined by UVA/VIS Spectrophotometer</td><td>1</td><td>N.D.</td></tr> <tr> <td colspan="5"><b>Polychlorinated Biphenyl (PCB)</b></td></tr> <tr> <td>Monobromobiphenyl</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>Tetrabromobiphenyl</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Pentabromobiphenyl</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Hexabromobiphenyl</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Heptabromobiphenyl</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Octabromobiphenyl</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Nonabromobiphenyl</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Decabromobiphenyl</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td colspan="5"><b>Polychlorinated Diphenyl Ether (PCDE)</b></td></tr> <tr> <td>Monobromodiphenyl 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>Tetrabromodiphenyl ether</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Pentabromodiphenyl ether</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Hexabromodiphenyl ether</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Heptabromodiphenyl ether</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Octabromodiphenyl ether</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Nonabromodiphenyl ether</td><td>ppm</td><td>5</td><td>N.D.</td></tr> <tr> <td>Decabromodiphenyl ether</td><td>ppm</td><td>5</td><td>N.D.</td></tr> </tbody> </table> <p data-bbox="908 1057 1062 1106"> <small>Notes : ppm = parts per million<br/>         &lt; = Less than<br/>         N.D. = Not detected ( &lt; MDL )<br/>         MDL = Method detection limit</small> </p> <p data-bbox="908 1144 1313 1167"> <small>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.</small> </p> <p data-bbox="1053 1171 1137 1182">Intertek Testing Center</p> <p data-bbox="882 1189 1276 1218"> <small>Seoul Office Tel: (82-2) 619-1270 Fax: (82-2) 619-1279 Client Office Tel: (82-44) 847-7447 Fax: (82-44) 847-7445 Web: <a href="http://www.intertek.co.kr">www.intertek.co.kr</a><br/>         Seoul Lab. #705, 70, An Seon Tower V, 18122, Guro-2Dong, Guro-Gu, Seoul 152-704 Korea Tel: (82-2) 619-1280 Fax: (82-2) 619-1279<br/>         Client Lab. #950-2, Yongsin-si, Chungbuk-do, Chungbuk-do, Korea Tel: (82-2) 247-6254 Fax: (82-2) 247-6252</small> </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 | 0.5           | N.D. | Lead (Pb) | ppm           |    | 5       | N.D.   | Mercury (Hg) | ppm           |         | 2  | N.D.    | Hexavalent Chromium (Cr <sup>6+</sup> ) (For nonmetal) | ppm     | With reference to IEC 62321 Edition 1.0 by elution digestion and determined by UVA/VIS Spectrophotometer | 1             | N.D. | <b>Polychlorinated Biphenyl (PCB)</b> |               |    |         |        | Monobromobiphenyl | 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. | Tetrabromobiphenyl | ppm | 5 | N.D. | Pentabromobiphenyl | ppm | 5 | N.D. | Hexabromobiphenyl | ppm | 5 | N.D. | Heptabromobiphenyl | ppm | 5 | N.D. | Octabromobiphenyl | ppm | 5 | N.D. | Nonabromobiphenyl | ppm | 5 | N.D. | Decabromobiphenyl | ppm | 5 | N.D. | <b>Polychlorinated Diphenyl Ether (PCDE)</b> |  |  |  |  | Monobromodiphenyl 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. | Tetrabromodiphenyl ether | ppm | 5 | N.D. | Pentabromodiphenyl ether | ppm | 5 | N.D. | Hexabromodiphenyl ether | ppm | 5 | N.D. | Heptabromodiphenyl ether | ppm | 5 | N.D. | Octabromodiphenyl ether | ppm | 5 | N.D. | Nonabromodiphenyl ether | ppm | 5 | N.D. | Decabromodiphenyl ether | ppm | 5 | N.D. |
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                                                                      |               |      |           |               |    |         |        |              |               |         |    |         |                                                        |         |                                                                                                          |               |      |                                       |               |    |         |        |                   |     |                                                                                       |   |      |                 |     |   |      |                  |     |   |      |                    |     |   |      |                    |     |   |      |                   |     |   |      |                    |     |   |      |                   |     |   |      |                   |     |   |      |                   |     |   |      |                                              |  |  |  |  |                         |     |                                                                                       |   |      |                       |     |   |      |                        |     |   |      |                          |     |   |      |                          |     |   |      |                         |     |   |      |                          |     |   |      |                         |     |   |      |                         |     |   |      |                         |     |   |      |
| Cadmium (Cd)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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                                                                      |               |      |           |               |    |         |        |              |               |         |    |         |                                                        |         |                                                                                                          |               |      |                                       |               |    |         |        |                   |     |                                                                                       |   |      |                 |     |   |      |                  |     |   |      |                    |     |   |      |                    |     |   |      |                   |     |   |      |                    |     |   |      |                   |     |   |      |                   |     |   |      |                   |     |   |      |                                              |  |  |  |  |     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| Lead (Pb)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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                    |     |                                                                                       |   |      |                       |     |   |      |                        |     |   |      |                          |     |   |      |                          |     |   |      |                         |     |   |      |                          |     |   |      |                         |     |   |      |                         |     |   |      |                         |     |   |      |
| Mercury (Hg)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| Hexavalent Chromium (Cr <sup>6+</sup> ) (For nonmetal)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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                                                                      |               |      |           |               |    |         |        |              |               |         |    |         |                                                        |         |                                                                                                          |               |      |                                       |               |    |         |        |                   |     |                                                                                       |   |      |                 |     |   |      |                  |     |   |      |                    |     |   |      |                    |     |   |      |                   |     |   |      |                    |     |   |      |                   |     |   |      |                   |     |   |      |                   |     |   |      |                                              |  |  |  |  |                         |     |                                                                                       |   |      |                       |     |   |      |                        |     |   |      |                          |     |   |      |                          |     |   |      |                         |     |   |      |                          |     |   |      |                         |     |   |      |                         |     |   |      |                         |     |   |      |
| <b>Polychlorinated Biphenyl (PCB)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| Monobromobiphenyl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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                                                                      |               |      |           |               |    |         |        |              |               |         |    |         |                                                        |         |                                                                                                          |               |      |                                       |               |    |         |        |                   |     |                                                                                       |   |      |                 |     |   |      |                  |     |   |      |                    |     |   |      |                    |     |   |      |                   |     |   |      |                    |     |   |      |                   |     |   |      |                   |     |   |      |                   |     |   |      |                                              |  |  |  |  |     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| Dibromobiphenyl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| Tribromobiphenyl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| <div data-bbox="347 1288 418 1319" data-label="Image"></div> <h3 data-bbox="443 1323 542 1344">TEST REPORT</h3> <p data-bbox="304 1350 681 1391"> <b>Report No.:</b> RT09R-S0182-011-E1 <b>Page:</b> 3 of 4<br/> <b>Sample ID No.:</b> RT09R-S0182-011 <b>Date:</b> Jan. 21, 2009<br/> <b>Sample Description:</b> DS-7409HG </p> <p data-bbox="304 1422 414 1435"> <small>* View of sample as received:</small> </p> <div data-bbox="343 1451 638 1671" data-label="Image"></div> <p data-bbox="280 1883 707 1906"> <small>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.</small> </p> <p data-bbox="451 1910 536 1921">Intertek Testing Center</p> <p data-bbox="280 1928 673 1957"> <small>Seoul Office Tel: (82-2) 619-1270 Fax: (82-2) 619-1279 Client Office Tel: (82-44) 847-7447 Fax: (82-44) 847-7445 Web: <a href="http://www.intertek.co.kr">www.intertek.co.kr</a><br/>         Seoul Lab. #705, 70, An Seon Tower V, 18122, Guro-2Dong, Guro-Gu, Seoul 152-704 Korea Tel: (82-2) 619-1280 Fax: (82-2) 619-1279<br/>         Client Lab. #950-2, Yongsin-si, Chungbuk-do, Chungbuk-do, Korea Tel: (82-2) 247-6254 Fax: (82-2) 247-6252</small> </p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <div data-bbox="834 1272 1024 1319" data-label="Image"></div> <h3 data-bbox="1050 1272 1157 1290">TEST REPORT</h3> <p data-bbox="1173 1272 1361 1319"> <b>NSL ANALYTICAL SERVICES INC.</b><br/>         1800 HUB PARKWAY, CLIVE, OHIO 44020<br/>         PHONE: (440) 441-1880 FAX: (440) 441-1778<br/>         8000 447-6750<br/>         www.nsl-analytical.com E-MAIL: info@nsl-analytical.com </p> <p data-bbox="868 1368 1324 1422"> <b>From:</b> Corporation<br/> <b>Client:</b> Doosan Technical Center<br/> <b>Project:</b> YP-14527<br/> <b>Date:</b> 9/29/08<br/> <b>Report No.:</b> 121739 </p> <p data-bbox="868 1462 1324 1478"> <b>Client Description:</b> Powders <b>Page:</b> 3 of 3 </p> <p data-bbox="868 1485 1324 1500"> <b>NSL Lab No.:</b> N418588 <b>Sample ID:</b> Sample#09-219-SA #010148 Pack(2) </p> <table border="1" data-bbox="868 1507 1324 1601"> <thead> <tr> <th>Tests</th><th>Results/Units</th><th>Methods</th></tr> </thead> <tbody> <tr> <td>Cd</td><td>&lt;0.001%</td><td>ICP-MS</td></tr> <tr> <td>Cr (+6)</td><td>&lt;0.001%</td><td>Wet Chemistry</td></tr> <tr> <td>Hg</td><td>&lt;0.00001%</td><td>Cold Vapor AA</td></tr> <tr> <td>Pb</td><td>&lt;0.001%</td><td>ICP-MS</td></tr> </tbody> </table> <p data-bbox="868 1653 1324 1668"> <b>NSL Lab No.:</b> N418588 <b>Sample ID:</b> Sample#09-219-SA #010148 Pack(2) </p> <table border="1" data-bbox="868 1675 1324 1769"> <thead> <tr> <th>Tests</th><th>Results/Units</th><th>Methods</th></tr> </thead> <tbody> <tr> <td>Cd</td><td>&lt;0.001%</td><td>ICP-MS</td></tr> <tr> <td>Cr (+6)</td><td>&lt;0.001%</td><td>Wet Chemistry</td></tr> <tr> <td>Hg</td><td>&lt;0.00001%</td><td>Cold Vapor AA</td></tr> <tr> <td>Pb</td><td>&lt;0.001%</td><td>ICP-MS</td></tr> </tbody> </table> <p data-bbox="1042 1899 1257 1926"> <b>Reporting Officer:</b> <br/>         Vicky Tripathi, Laboratory Supervisor </p> <p data-bbox="834 1966 1361 1977"> <small>Unauthorized publishing, circulation, or use of this report is a violation of the intellectual property rights of the client. Any such use without the written consent of the reporting laboratory is strictly prohibited.</small> </p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Tests                                                                                                    | Results/Units | Methods     | Cd  | <0.001% | ICP-MS       | Cr (+6) | <0.001%                                                                             | Wet Chemistry | Hg   | <0.00001% | Cold Vapor AA | Pb | <0.001% | ICP-MS | Tests        | Results/Units | Methods | Cd | <0.001% | ICP-MS                                                 | Cr (+6) | <0.001%                                                                                                  | Wet Chemistry | Hg   | <0.00001%                             | Cold Vapor AA | Pb | <0.001% | ICP-MS |                   |     |                                                                                       |   |      |                 |     |   |      |                  |     |   |      |                    |     |   |      |                    |     |   |      |                   |     |   |      |                    |     |   |      |                   |     |   |      |                   |     |   |      |                   |     |   |      |                                              |  |  |  |  |                         |     |                                                                                       |   |      |                       |     |   |      |                        |     |   |      |                          |     |   |      |                          |     |   |      |                         |     |   |      |                          |     |   |      |                         |     |   |      |                         |     |   |      |                         |     |   |      |
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| 안테나 승인원 |           | DATE | 2013. 05. 22   | REV. | 1.0   |
| MODEL   | ABM6020B1 | TYPE | BLUETOOTH CHIP | PAGE | 16/16 |

## 2) Au-P

| <div data-bbox="231 488 758 1182">  <p><b>Test Report</b> No. F690501/LF-CT8AYAA08-10894 Issued Date: April 15, 2008 Page 1 of 3</p> <p>To: LM TECH<br/>#005 050-63<br/>Seonam-dong<br/>Seogwi<br/>INCHEON<br/>Korea</p> <p>The following merchandise was submitted and identified by the client as:</p> <p>Product Name : ENIG<br/>SGS File No. : AYAA08-10894<br/>Received Date : April 08, 2008<br/>Test Performing Date : April 08, 2008<br/>Test Performed : SGS Testing Korea tested the sample(s) selected by applicant with following results<br/>Test Results : For further details, please refer to following page(s)<br/>Comments : The sampling and testing was performed only for the part indicated in the photo without disassembly by the applicant's specific request.</p> <p>SGS Testing Korea Co., Ltd.<br/>Pluto Kim<br/>Monet Jeong<br/>Bily Oh / Testing Person</p> <p>Jeff Jang<br/>Jeff Jang / Chemical Lab Mgr</p> </div> | <div data-bbox="837 488 1364 1182">  <p><b>Test Report</b> No. F690501/LF-CT8AYAA08-10894 Issued Date: April 15, 2008 Page 2 of 3</p> <p>Sample No. : AYAA08-10894.001<br/>Sample Description : ENIG<br/>Item No./Part No. : ENIG<br/>Comments : Materials are Cu/Ni/Au</p> <p><b>Heavy Metals</b></p> <table border="1"> <thead> <tr> <th>Test Items</th> <th>Unit</th> <th>Test Method</th> <th>MDL</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Cadmium (Cd)</td> <td>mg/kg</td> <td>US EPA 3053 (1993), US EPA 6010K (1994), ICP</td> <td>0.5</td> <td>N.D.</td> </tr> <tr> <td>Lead (Pb)</td> <td>mg/kg</td> <td>US EPA 3053 (1993), US EPA 6010K (1994), ICP</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Mercury (Hg)</td> <td>mg/kg</td> <td>US EPA 3053 (1993), US EPA 6010K (1994), ICP</td> <td>2</td> <td>N.D.</td> </tr> <tr> <td>Hexavalent Chromium (Cr-VI)</td> <td>mg/kg</td> <td>US EPA 3060A (1995), US EPA 7190A (1997), LVI</td> <td>1</td> <td>N.D.</td> </tr> </tbody> </table> <p><b>Flame Retardants-PBBs/PBDEs</b></p> <table border="1"> <thead> <tr> <th>Test Items</th> <th>Unit</th> <th>Test Method</th> <th>MDL</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Monobromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Dibromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tribromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tetrabromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Pentabromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Hexabromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Heptabromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Octabromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Nonabromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Decabromobenzyl</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Monobromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Dibromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tribromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Tetrabromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Pentabromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Hexabromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Heptabromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Octabromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Nonabromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> <tr> <td>Decabromodiphenyl ether</td> <td>mg/kg</td> <td>US EPA 2840C, GC/MS</td> <td>5</td> <td>N.D.</td> </tr> </tbody> </table> <p>NOTE: (1) N.D. = Not detected (&lt;MDL)<br/>(2) mg/kg = ppm<br/>(3) MDL = Method Detection Limit<br/>(4) = = No regulation<br/>(5) ** = Qualitative analysis (No Unit)<br/>(6) Negative = Undetectable / Positive = Detectable</p> </div> | Test Items                                    | Unit | Test Method | MDL | Result | Cadmium (Cd) | mg/kg | US EPA 3053 (1993), US EPA 6010K (1994), ICP | 0.5 | N.D. | Lead (Pb) | mg/kg | US EPA 3053 (1993), US EPA 6010K (1994), ICP | 5 | N.D. | Mercury (Hg) | mg/kg | US EPA 3053 (1993), US EPA 6010K (1994), ICP | 2 | N.D. | Hexavalent Chromium (Cr-VI) | mg/kg | US EPA 3060A (1995), US EPA 7190A (1997), LVI | 1 | N.D. | Test Items | Unit | Test Method | MDL | Result | Monobromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Dibromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Tribromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Tetrabromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Pentabromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Hexabromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Heptabromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Octabromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Nonabromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Decabromobenzyl | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Monobromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Dibromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Tribromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Tetrabromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Pentabromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Hexabromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Heptabromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Octabromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Nonabromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. | Decabromodiphenyl ether | mg/kg | US EPA 2840C, GC/MS | 5 | N.D. |
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----------------------------|-------|-----------------------------------------------|---|------|------------|------|-------------|-----|--------|-----------------|-------|---------------------|---|------|---------------|-------|---------------------|---|------|----------------|-------|---------------------|---|------|------------------|-------|---------------------|---|------|------------------|-------|---------------------|---|------|-----------------|-------|---------------------|---|------|------------------|-------|---------------------|---|------|-----------------|-------|---------------------|---|------|-----------------|-------|---------------------|---|------|-----------------|-------|---------------------|---|------|-------------------------|-------|---------------------|---|------|-----------------------|-------|---------------------|---|------|------------------------|-------|---------------------|---|------|--------------------------|-------|---------------------|---|------|--------------------------|-------|---------------------|---|------|-------------------------|-------|---------------------|---|------|--------------------------|-------|---------------------|---|------|-------------------------|-------|---------------------|---|------|-------------------------|-------|---------------------|---|------|-------------------------|-------|---------------------|---|------|
| Test Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Test Method                                   | MDL  | Result      |     |        |              |       |                                              |     |      |           |       |                                              |   |      |              |       |                                              |   |      |                             |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |    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| Cadmium (Cd)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | mg/kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | US EPA 3053 (1993), US EPA 6010K (1994), ICP  | 0.5  | N.D.        |     |        |              |       |                                              |     |      |           |       |                                              |   |      |              |       |                                              |   |      |                             |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Lead (Pb)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | mg/kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | US EPA 3053 (1993), US EPA 6010K (1994), ICP  | 5    | N.D.        |     |        |              |       |                                              |     |      |           |       |                                              |   |      |              |       |                                              |   |      |                             |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Mercury (Hg)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | mg/kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | US EPA 3053 (1993), US EPA 6010K (1994), ICP  | 2    | N.D.        |     |        |              |       |                                              |     |      |           |       |                                              |   |      |              |       |                                              |   |      |                             |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Hexavalent Chromium (Cr-VI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | mg/kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | US EPA 3060A (1995), US EPA 7190A (1997), LVI | 1    | N.D.        |     |        |              |       |                                              |     |      |           |       |                                              |   |      |              |       |                                              |   |      |                             |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Test Items                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 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| Monobromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 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| Dibromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 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| Tribromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 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| Hexabromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 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                        |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Heptabromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 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                        |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Octabromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 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                        |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Nonabromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 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                        |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| Decabromodiphenyl ether                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 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                        |       |                                               |   |      |            |      |             |     |        |                 |       |                     |   |      |               |       |                     |   |      |                |       |                     |   |      |                  |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                  |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                 |       |                     |   |      |                         |       |                     |   |      |                       |       |                     |   |      |                        |       |                     |   |      |                          |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                          |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |
| <div data-bbox="231 1227 758 1912">  <p><b>Test Report</b> No. F690501/LF-CT8AYAA08-10894 Issued Date: April 15, 2008 Page 3 of 3</p> <p>Picture of Sample as Received:<br/>Sample Color : Gold</p>  <p>*** End ***</p> <p>NOTE: (1) N.D. = Not detected (&lt;MDL)<br/>(2) mg/kg = ppm<br/>(3) MDL = Method Detection Limit<br/>(4) = = No regulation<br/>(5) ** = Qualitative analysis (No Unit)<br/>(6) Negative = Undetectable / Positive = Detectable</p> </div>                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                        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|                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |                         |       |                     |   |      |