TEST REPORT
(测试报告件)

申请公司(APPLICANT) : SAMSUNG ELECTRO-MECHANICS
公司住所(ADDRESS) : 150, Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea

报告号(REPORT NO.) : RT18R-S4702-043-C 日期(DATE) : 2018 年 11 月 12 日

样品描述(SAMPLE DESCRIPTION) :
样品名称 : MLCC F(Y5V) TYPE
样品编号 : RT18R-S4702-043
生产者/贸易商 : SAMSUNG ELECTRO-MECHANICS
样品收到日期 : 2018年 10月29日
测试进行日期 : 2018年 10月29日至 2018年 11月09日

测试方法 : 参考续页。
(TEST METHOD(S)) : Please see the following page(s).
测试结果 : 参考续页。
(TEST RESULT(S)) : Please see the following page(s).

注1：检测结果只是针对来样所做的测试。
(Note 1 : The test results presented in this report relate only to the object tested.)

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注3：此报告所测试项目并不属于KOLAS 认证范围内。
(Note 3 : This report is not related to the scope of Korea laboratory accreditation scheme.)

测试 (Approved by) : Jade Jang / 测试负责人

批注 (Authorized by) : Bo Park / 实验室经理
## TEST REPORT

**测试报告件**

**报告号(REPORT NO.)**  : RT18R-S4702-043-C  
**日期(DATE) :** 2018年 11 月 12 日

**样品编号(SAMPLE ID NO.)**  : RT18R-S4702-043  
**样品名称(SAMPLE DESCRIPTION)**  : MLCC F(Y5V) TYPE

<table>
<thead>
<tr>
<th>测试项目 (TEST ITEM)</th>
<th>单位 (UNIT)</th>
<th>测试方法 (TEST METHOD)</th>
<th>报告限量值 (MDL)</th>
<th>结果 (RESULT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>镉 (Cadmium, Cd)</td>
<td>mg/kg</td>
<td>参照 IEC 62321-5: Edition 1.0 : 2013, 用 ICP-OES 进行的分析</td>
<td>0.5</td>
<td>N.D.</td>
</tr>
<tr>
<td>铅 (Lead, Pb)</td>
<td>mg/kg</td>
<td>参照 IEC 62321-4: Edition 1.0 : 2013, 用 ICP-OES 进行的分析</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>汞 (Mercury, Hg)</td>
<td>mg/kg</td>
<td>参照 IEC 62321-7-2: Edition 1.0 : 2017, by alkaline/toluene digestion 用 UV-VIS Spectrophotometer 进行的分析</td>
<td>2</td>
<td>N.D.</td>
</tr>
<tr>
<td>六价铬 (Hexavalent Chromium, Cr⁶⁺)</td>
<td>mg/kg</td>
<td>参照 IEC 62321-6: Edition 1.0 : 2015, 用 GC/MS 进行的分析</td>
<td>8</td>
<td>N.D.</td>
</tr>
</tbody>
</table>

**多溴联苯 (Polybrominated Biphenyl, PBBS)  
检测方法：**  

<table>
<thead>
<tr>
<th>多溴联苯 (Polybrominated Biphenyl, PBBS)</th>
<th>单位 (UNIT)</th>
<th>报告限量值 (MDL)</th>
<th>结果 (RESULT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>一溴联苯 (Monobromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>二溴联苯 (Dibromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>三溴联苯 (Tribromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>四溴联苯 (Tetrabromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>五溴联苯 (Pentabromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>六溴联苯 (Hexabromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>七溴联苯 (Heptabromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>八溴联苯 (Octabromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>九溴联苯 (Nonabromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>十溴联苯 (Decabromobiphenyl)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
</tbody>
</table>

**多溴联苯醚 (Polybrominated Diphenyl Ether, PBDEs)  
检测方法：**  

<table>
<thead>
<tr>
<th>多溴联苯醚 (Polybrominated Diphenyl Ether, PBDEs)</th>
<th>单位 (UNIT)</th>
<th>报告限量值 (MDL)</th>
<th>结果 (RESULT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>一溴联苯醚 (Monobromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>二溴联苯醚 (Dibromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>三溴联苯醚 (Tribromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>四溴联苯醚 (Tetrabromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>五溴联苯醚 (Pentabromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>六溴联苯醚 (Hexabromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>七溴联苯醚 (Heptabromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>八溴联苯醚 (Octabromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>九溴联苯醚 (Nonabromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>十溴联苯醚 (Decabromodiphenyl ether)</td>
<td>mg/kg</td>
<td>5</td>
<td>N.D.</td>
</tr>
</tbody>
</table>

**注释 (Notes):**  

- mg/kg = ppm = 百万分之一 (parts per million)  
- < = 小于 (Less than)  
- N.D. = 未检出 (Not detected (<MDL))  
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</tr>
</thead>
<tbody>
<tr>
<td>溴 (Bromine, Br)</td>
<td>mg/kg</td>
<td>参考 EN 14582, IC 测试定量</td>
<td>30</td>
<td>N.D.</td>
</tr>
<tr>
<td>氯 (Chlorine, Cl)</td>
<td>mg/kg</td>
<td>参考 EN 14582, IC 测试定量</td>
<td>30</td>
<td>N.D.</td>
</tr>
<tr>
<td>砷 (Arsenic, As)</td>
<td>mg/kg</td>
<td>参考 US EPA 3052, 酸消化法处理样品，ICP-OES 测试定量</td>
<td>2</td>
<td>N.D.</td>
</tr>
<tr>
<td>锂 (Beryllium, Be)</td>
<td>mg/kg</td>
<td>参考 US EPA 3052, 酸消化法处理样品，ICP-OES 测试定量</td>
<td>2</td>
<td>N.D.</td>
</tr>
<tr>
<td>锑 (Antimony, Sb)</td>
<td>mg/kg</td>
<td>参考 US EPA 3052, 酸消化法处理样品，ICP-OES 测试定量</td>
<td>2</td>
<td>N.D.</td>
</tr>
<tr>
<td>聚氯乙烯 (Polyvinyl chloride, PVC)</td>
<td>-</td>
<td>参考 KS K 0210-1, FT-IR 测试定量</td>
<td>N.A.</td>
<td>Negative</td>
</tr>
</tbody>
</table>

 Tested by: Hyojoo Kim, Jooyeon Lee

**注释 (Notes):**

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- N.A. = 不适用 (Not applicable)
- Negative = Undetectable
- Positive = Detectable

Intertek Testing Services Korea Ltd.
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Seoul Lab. Address : 7, Achasan-ro 5-gil, Seongdong-gu, Seoul, 04793 Korea
Ulsan Lab. Address : 34, Yongam-gil, Chongryang-myeon, Uiju-gun, Ulsan 44989 Korea
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<th>结果 (RESULT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>六溴环十二烷 (Hexabromocyclododecane, HBCDD)</td>
<td>mg/kg</td>
<td>参考 IEC 62321-9(111/409/CD), 溶剂萃取法, LC/MS 和 GC/MS 测试定量</td>
<td>10</td>
<td>N.D.</td>
</tr>
<tr>
<td>SCCP (Short-chain chlorinated paraffin)</td>
<td>mg/kg</td>
<td>参考 US EPA 3540C, 溶剂萃取法, LC/MS/MS 和/或 GC/ECD 测试定量</td>
<td>100</td>
<td>N.D.</td>
</tr>
<tr>
<td>PCBs (Polychlorinated biphenyls)</td>
<td>mg/kg</td>
<td>参考 US EPA 3540C/8082, 溶剂萃取法, GC/MS 测试定量</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>PCTs (Polychlorinated terphenyls)</td>
<td>mg/kg</td>
<td>参考 US EPA 3540C, 溶剂萃取法, GC/MS 测试定量</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>PCNs (Polychlorinated naphthalenes)</td>
<td>mg/kg</td>
<td>参考 US EPA 3540C, 溶剂萃取法, GC/MS 测试定量</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>PCP (Pentachlorophenol)</td>
<td>mg/kg</td>
<td>参考 ISO 17070, GC/MS 测试定量</td>
<td>5</td>
<td>N.D.</td>
</tr>
<tr>
<td>PFOA (Perfluorooctanoic acid)</td>
<td>mg/kg</td>
<td>参考 US EPA 3550C/8321B, 超声萃取法, LC/MS 或 LC/MS/MS 测试定量</td>
<td>0.1</td>
<td>N.D.</td>
</tr>
<tr>
<td>PFOS (Perfluorooctane sulfonate)</td>
<td>mg/kg</td>
<td>参考 US EPA 3550C/8321B, 超声萃取法, LC/MS 或 LC/MS/MS 测试定量</td>
<td>0.1</td>
<td>N.D.</td>
</tr>
</tbody>
</table>

 Tested by: Sujung Lee

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### 样品编号(SAMPLE ID NO.)
RT18R-S4702-043

### 样品名称(SAMPLE DESCRIPTION)
MLCC F(Y5V) TYPE

### 测试项目(TESE ITEM)
<table>
<thead>
<tr>
<th>CAS 数(CAS NO.)</th>
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<th>测试方法(TESE METHOD)</th>
<th>报告限量值(MDL)</th>
<th>结果(RESULT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>邻苯二甲酸二丁酯(DBP)</td>
<td>84-74-2</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二(2-乙基己基)酯(DEHP)</td>
<td>117-81-7</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二辛酯(DNOP)</td>
<td>117-84-0</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二异壬酯(DINP)</td>
<td>28553-12-0</td>
<td>ng/kg</td>
<td>100</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二异癸酯(DIDP)</td>
<td>26761-40-0</td>
<td>ng/kg</td>
<td>100</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸丁酯苯甲酯(BBP)</td>
<td>85-68-7</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二丁酯(DIBP)</td>
<td>84-69-5</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>苯二甲酸二甲酯(DMP)</td>
<td>131-11-3</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>苯二甲酸二乙酯(DEP)</td>
<td>84-66-2</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二戊酯(DPP)</td>
<td>131-18-0</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二己酯(DNHP)</td>
<td>84-75-3</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸二C6-8 支链烷基酯(C7-rich)</td>
<td>71888-89-6</td>
<td>ng/kg</td>
<td>50</td>
<td>N.D.</td>
</tr>
</tbody>
</table>

### 测试方法

| MDL | 参考 IEC 62321-8 Edition 1.0 : 2017, 溶剂萃取法, GC/MS 测试定量 |

### 测试项目

| EDG | 12 N.D. |

### 报告限量值

| MDL | 未检出 (Not detected (<MDL)) |

### 测试方法

| MDL | 报告限量值 (Method detection limit) |

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### 注释 (Notes)

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<th>结果 (RESULT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2-鄰苯二酸二(C7-11支鏈與直鏈)烷酯 (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters, DHNUP)</td>
<td>68515-42-4</td>
<td>mg/kg</td>
<td>参考 IEC 62321-8 Edition 1.0 : 2017，溶剂萃取法, GC/MS 测试定量</td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>鄰苯二甲酸二甲氧乙酯 (Di(2-methoxyethyl) phthalate, DMEP(BMP/BMEP))</td>
<td>117-82-8</td>
<td>mg/kg</td>
<td></td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>鄰苯二甲酸二異戊酯 (Diisopentylphthalate, DIPP)</td>
<td>605-50-5</td>
<td>mg/kg</td>
<td></td>
<td>50</td>
<td>N.D.</td>
</tr>
<tr>
<td>邻苯二甲酸正戊基異戊基酯 (N-pentyl-isopentylphthalate, NPIP)</td>
<td>776297-69-9</td>
<td>mg/kg</td>
<td></td>
<td>50</td>
<td>N.D.</td>
</tr>
</tbody>
</table>

Tested by: Sujung Lee

注释 (Notes): mg/kg = ppm = 百万分之一 (parts per million)

<= 小于 (Less than)
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MDL = 报告限量值 (Method detection limit)

* 样品相片: -
(View of sample as received;-)

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Ulsan Lab. Address : 34, Yongam-gil, Chongryang-myeon, Ulju-gun, Ulsan 44989 Korea
Flow Chart (IEC62321 Edition 1.0)

Receipt
Sampling/Grinding or Cutting

For different material, digest the sample with appropriate acid

Confirm the tested samples are totally dissolved

Make up with deionized water

Analyzer by ICP-OES

Pb, Cd, Hg

Cd²⁺

Weigh sample and add organic solvent

Sorbite extraction or solvent extraction

Concentrate the extract and make up with organic solvent

Analyzed by GC-MS

*1: List of appropriate acid:

<table>
<thead>
<tr>
<th>Material</th>
<th>Acid added for digestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymers</td>
<td>HNO₃, HCl, HF, H₂O₂, H₃BO₃</td>
</tr>
<tr>
<td>Metals</td>
<td>HNO₃, HCl, HF</td>
</tr>
<tr>
<td>Electronics</td>
<td>HNO₃, HCl, H₂O₂, HBF₄</td>
</tr>
</tbody>
</table>

*2: The samples were dissolved totally by pre-conditioning method according to above flow chart.
Flow Chart (EN14582)

Receipt

Sample preparation

Sample weighing

Bomb preparation

Oxygen bomb combustion

Absorption solvent preparation of absorption solution

Collection of halides make up Vol. 100mL

Cooling, for 1hr

Analyzed by IC

Data

Report
**Remarks**: The samples were dissolved totally by pre-conditioning method according to above flow chart.
Flow Chart (PVC)

Receipt

Sample preparation

Analyzed by FT-IR

PVC Characteristic peaks

A. Broad band : 600~700 cm⁻¹
B. Strong peak : 1250cm⁻¹
   1330cm⁻¹
C. Strong peak : 1430cm⁻¹
D. Strong peak : 2900cm⁻¹

Data

Report
Flow Chart (HBCDD)

Receipt

Sample preparation

Extraction

Concentration

Clean up

Concentration

Analyzed by LC/MS and/or GC-MS

Data

Report
Flow Chart (EPA 3540C)

Receipt

Sample preparation

Extraction

Concentration

Clean up

Concentration

Analyzed by GC-ECD or GC-MS or LC/MS or LC/MS/MS

Data

Report
Flow Chart (PCB, PCT, PCN)

- Receipt
- Sample preparation
- Extraction
- Concentration
- Clean up
- Concentration
- Analyzed by GC-MS
- Data
- Report
Flow Chart (PCP)

1. Receipt
2. Sample preparation
3. Extraction
4. Concentration
5. Clean up
6. Concentration
7. Analyzed by GC-MS
8. Data
9. Report
Flow Chart (PFOS, PFOA)

- Receipt
- Sample preparation
- Loading in a vial
- Methanol loading
- Ultrasonication
- Filtering & Cleaning
- Make up (Methanol)
- Analyzed by LC/MS or LC/MS/MS
- Data
- Report
**Flow Chart (Phthalates)**

1. Receipt
2. Sample preparation
3. Extraction
4. Concentration
5. Clean-up
6. Concentration
7. Analyzed by GC-MS
8. Data
9. Report

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