

TO :

**Halogen Free Part**

# **SPECIFICATION FOR APPROVAL**

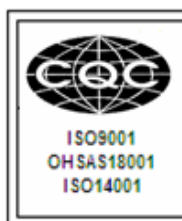
**DESCRIPTION:** 0.5mm M.2 8.5H M-KEY;HF □□

**CUSTOMER P/N :**

**LOTES P/N :** APCI0164-P001A

**CUSTOMER APPROVAL SIGN :**

SEND BY	QA CONFIRM	R&D CONFIRM	PREPARE BY
		Ford	Jinjin Tu



Lotes SZ

Lotes GZ

Lotes TW

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# LOTES CO., LTD

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PRODUCT SPECIFICATION		REV	ECN No.																		
		1B	SN14***																		
<p><b>DIMENSION</b></p> <p>1.This specification covers M.2 connector.</p> <p>2.The physical dimensions and the M.2 connector are shown in drawing.</p> <p><b>MATERIAL AND FINISH</b></p> <p>1.Housing: High temperature thermoplastic, Color: Black;</p> <p>2. Contact: Copper Alloy, 50-120u” Nickel under plated, Au on contact area, Au on soldering area;</p> <p>3. SMT TAB: S50C, 50-120u”Nickel under plated, plating Tin (Matte)80-180u” over all;</p> <p><b>OPERATING PERFORMANCE</b></p> <p>1.Operation Temperature: -55℃ to 85℃</p> <p>2.Voltage Rating: 30V</p> <p>3.Current Rating: 0.5A</p> <p><b>ELECTRICAL PERFORMANCE</b></p>																					
<table border="1"> <thead> <tr> <th>Test item</th> <th>Test condition</th> <th>Requirements</th> </tr> </thead> <tbody> <tr> <td>Examination of product</td> <td>• Visual inspection</td> <td>• No physical damage</td> </tr> <tr> <td>Low Level Contact Resistance</td> <td>• EIA-364-23 • Mate connectors: apply a current of 10mA(Max) at open circuit voltage of 20mV voltage(Max)</td> <td>• Initial 55mΩ Max. • Final <math>\Delta</math> LLCR =20mΩ Max.</td> </tr> <tr> <td>Insulation resistance</td> <td>• Applying 500VDC for one minute between adjacent contacts of unmated connectors EIA-364-21</td> <td>• 500MΩ Min.</td> </tr> <tr> <td>Dielectric withstanding voltage</td> <td>• Measured by applying 300V/AC for one minute between adjacent contacts of unmated connector assemblies. EIA-364-20</td> <td>• No breakdown or flash • Current leakage: 0.5 mA</td> </tr> <tr> <td>Temperature rise versus current</td> <td>• The temperature rise above ambient shall not exceed 30℃ .the ambient condition is still air at 25℃ . EIA-364-70 Method 2</td> <td>• No physical damage • <math>\Delta</math> T=30℃ Max.</td> </tr> </tbody> </table>				Test item	Test condition	Requirements	Examination of product	• Visual inspection	• No physical damage	Low Level Contact Resistance	• EIA-364-23 • Mate connectors: apply a current of 10mA(Max) at open circuit voltage of 20mV voltage(Max)	• Initial 55mΩ Max. • Final $\Delta$ LLCR =20mΩ Max.	Insulation resistance	• Applying 500VDC for one minute between adjacent contacts of unmated connectors EIA-364-21	• 500MΩ Min.	Dielectric withstanding voltage	• Measured by applying 300V/AC for one minute between adjacent contacts of unmated connector assemblies. EIA-364-20	• No breakdown or flash • Current leakage: 0.5 mA	Temperature rise versus current	• The temperature rise above ambient shall not exceed 30℃ .the ambient condition is still air at 25℃ . EIA-364-70 Method 2	• No physical damage • $\Delta$ T=30℃ Max.
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<p><b>LOTES CO., LTD</b></p>		<p><b>PRODUCT NAME:</b></p> <p><b>M.2 CONNECTOR</b></p>																			
		<p><b>DOCUMENT No:</b></p> <p><b>SP-APCI0018</b></p>	<p><b>REV:</b></p> <p><b>1B</b></p>	<p><b>PAGE:</b></p> <p><b>1 OF 5</b></p>																	
		<p><b>APPROVED BY:</b></p> <p><b>Barney</b></p>	<p><b>CHECKED BY:</b></p> <p><b>Vito</b></p>	<p><b>WRITTEN BY:</b></p> <p><b>TAN ZHI WU</b></p>																	

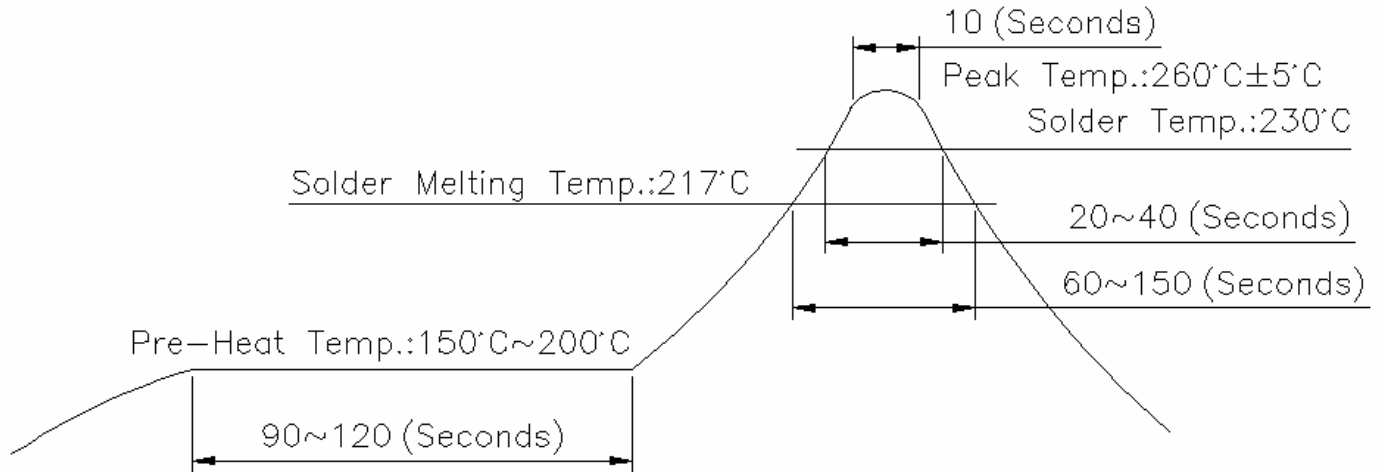
PRODUCT SPECIFICATION		REV	ECN No.
		1B	SN14***
MECHANICAL PERFORMANCE			
Test item	Test condition	Requirements	
Vibration test	<ul style="list-style-type: none"><li>EIA-364-28, test condition VII, test condition letter D( 15 minutes in each of 3 mutually perpendicular directions . Both mating halves should be rigidly fixed so as not to contribute to the relative motion of one contact against another . The method of fixturing should be detailed in the test report)</li></ul>	<ul style="list-style-type: none"><li>No electrical discontinuity greater than 1 microsecond.</li><li>△LLCR=20mΩ Max.(Final)</li></ul>	
Mechanical shock	<ul style="list-style-type: none"><li>250 G (Ultra-book) and 285 G (Tablet) at 2m Sec half sine on all six axis</li></ul>	<ul style="list-style-type: none"><li>No electrical discontinuity greater than 1 microsecond</li><li>△ LLCR=20mΩ Max.(Final)</li><li>No physical damage</li></ul>	
Insertion/Removal Force	<ul style="list-style-type: none"><li>Insertion Force-20 N (2.04 kgf) Max. Removal Force-Typical 20 N, 25 N (2.55 kgf) Max. EIA-364-13</li></ul>	<ul style="list-style-type: none"><li>No evidence of physical damage</li></ul>	
Durability (precondition)	<ul style="list-style-type: none"><li>EIA-364-09</li><li>Perform 5 unplug /plug cycles if the application requires up to 25 over the life of the connector , 20 cycles if the application requires 26-200;</li></ul>	<ul style="list-style-type: none"><li>No evidence of physical damage</li></ul>	
Durability	<ul style="list-style-type: none"><li>Option1:Repeat insertion the Card to the connector and extraction Card from the connector for 25 cycles(Au:30u”Max).</li><li>Option2:Repeat insertion the Card to the connector and extraction Card from the connector for 60 cycles(Au:30u”Min).</li><li>EIA-364-09</li></ul>	<ul style="list-style-type: none"><li>△LLCR=20mΩ Max.(Final)</li></ul>	
Reseating	<ul style="list-style-type: none"><li>Manually unplug/plug the connector or socket perform 3 cycles</li></ul>	<ul style="list-style-type: none"><li>No evidence of physical damage</li></ul>	
LOTES CO., LTD		TITLE:	
		M.2 CONNECTOR	
		DOCUMENT No:	REV:
		SP-APCI0018	1B
		PAGE:	
		2 OF 5	
APPROVED BY:		CHECKED BY:	WRITTEN BY:
Barney		Vito	TAN ZHI WU

PRODUCT SPECIFICATION		REV	ECN No.
		1B	SN14***
ENVIRONMENTAL PERFORMANCE			
Test item	Test condition	Requirements	
Cyclic temperature & Humidity	<ul style="list-style-type: none"> <li>EIA-364-31 method III without conditioning, initial measurements, cold shock and vibration. (Except cycle the connector or socket between <math>25^{\circ}\text{C} \pm 3^{\circ}\text{C}</math> at <math>80\% \pm 3\%</math> RH and <math>65^{\circ}\text{C} \pm 3^{\circ}\text{C}</math> at <math>50\% \pm 3\%</math> RH. Ramp times should be 0.5 hour and dwell times should be 1.0 hour. Dwell times start when the temperature and humidity have stabilized within the specified levels. Perform 24 such cycles.)</li> <li>EIA-364-31</li> </ul>	<ul style="list-style-type: none"> <li>Contact resistance: <math>\Delta\text{LLCR}=20\text{m}\Omega</math> Max.</li> <li>Insulation resistance: <math>500\text{M}\Omega</math> Min.</li> <li>No physical damage.</li> </ul>	
Thermal shock	<ul style="list-style-type: none"> <li>EIA-364-32, method A, test condition I, test duration A-4</li> <li>Cold extreme: <math>-55^{\circ}\text{C} +0/-5^{\circ}\text{C}</math></li> <li>Hot extreme: <math>85^{\circ}\text{C} +3/-0^{\circ}\text{C}</math></li> <li>each temperature dwell 2 hour, perform 10 cycles in mated condition.</li> </ul>	<ul style="list-style-type: none"> <li>Contact resistance: <math>\Delta\text{LLCR}=20\text{m}\Omega</math> Max.(Final)</li> <li>No physical damage.</li> </ul>	
Salt spray	<ul style="list-style-type: none"> <li>Subject the connector to 5% salt-solution concentration at <math>35^{\circ}\text{C}</math> for 48 hours.</li> </ul>	<ul style="list-style-type: none"> <li>Contact resistance: <math>\Delta\text{LLCR}=20\text{m}\Omega</math> Max. (Final)</li> <li>No physical damage.</li> </ul>	
Temperature life	<ul style="list-style-type: none"> <li>Mate PCB module and subject to <math>105 \pm 2^{\circ}\text{C}</math> for 120 hours</li> <li>EIA-364-17</li> </ul>	<ul style="list-style-type: none"> <li>Contact resistance: <math>\Delta\text{LLCR}=20\text{m}\Omega</math> Max.(Final)</li> <li>No physical damage.</li> </ul>	
Temperature life (preconditioning)	<ul style="list-style-type: none"> <li>Mate PCB module and subject to <math>105 \pm 2^{\circ}\text{C}</math> for 72 hours</li> <li>EIA 364-17 method A, using table 9 for reference</li> </ul>	<ul style="list-style-type: none"> <li>Contact resistance: <math>\Delta\text{LLCR}=20\text{m}\Omega</math> Max.(Final)</li> <li>No physical damage.</li> </ul>	
Resistance to Reflow Soldering Heat	<ul style="list-style-type: none"> <li>Test connector on PCB</li> <li>Pre-Heat: <math>100 \sim 150^{\circ}\text{C}</math></li> <li>Heat: <math>210^{\circ}\text{C}</math></li> <li>Heat Peak: <math>260 \pm 5^{\circ}\text{C} / -0^{\circ}\text{C}</math>, <math>10 \pm 1\text{s}</math></li> </ul>	<ul style="list-style-type: none"> <li>No physical damage</li> </ul>	
Solder ability	<ul style="list-style-type: none"> <li>Solder Temperature: <math>245 \pm 5^{\circ}\text{C}</math></li> <li>Solder time: <math>3 \pm 0.5\text{s}</math></li> </ul>	<ul style="list-style-type: none"> <li>Wet solder coverage: 95% Min.</li> </ul>	
Rework temperature	<ul style="list-style-type: none"> <li><math>350^{\circ}\text{C}</math>, 3-5 seconds for "solder iron-Max.", temperature of component by rework process.</li> </ul>	<ul style="list-style-type: none"> <li>No Damage</li> </ul>	
Mixed flowing gas	<ul style="list-style-type: none"> <li>EIA-364-65, Environmental Class – IIA</li> <li>For 7 days, Connectors should be mated during this portion of the test. Total Mixed flowing gas exposure 168 hours, include unmated exposure 112 hours and mated exposure 56 hours.</li> </ul>	<ul style="list-style-type: none"> <li>No discontinuations of microsecond or longer duration</li> <li>Contact resistance: <math>\Delta\text{LLCR}=20\text{m}\Omega</math> Max. (Final)</li> </ul>	
Thermal disturbance	<ul style="list-style-type: none"> <li>Cycle the mated connector between <math>15^{\circ}\text{C} \pm 3^{\circ}\text{C}</math> and <math>85^{\circ}\text{C} \pm 3^{\circ}\text{C}</math>, as measured on the part. Ramps should be a minimum of <math>2^{\circ}\text{C}</math> per minute, and dwell times should insure that the contacts reach the temperature extremes (a minimum of 5 minutes). Humidity is not controlled. Perform 10 such cycles.</li> </ul>	<ul style="list-style-type: none"> <li>No evidence of physical damage</li> <li>Contact resistance: <math>\Delta\text{LLCR}=20\text{m}\Omega</math> Max. (Final)</li> </ul>	
<div> <div>LOTES CO., LTD</div> <div> <div>TITLE:</div> <div>M.2 CONNECTOR</div> <div>DOCUMENT No: SP-APCI0018</div> <div>REV: 1B</div> <div>PAGE: 3 OF 5</div> <div>APPROVED BY: Barney</div> <div>CHECKED BY: Vito</div> <div>WRITTEN BY: TAN ZHI WU</div> </div> </div>			

PRODUCT SPECIFICATION	REV	ECN No.
	1B	SN14***

## LOTES RECOMMENDED LEAD FREE SMT TEMPERATURE PROFILE

Suggestion : In SMT process , the thickness of solder paste is 0.13mm minimum



### PACKAGE

All parts shall be packaged and packed to protect against physical damage, corrosion and deterioration during shipment and storage.

LOTES CO., LTD	PRODUCT NAME: M.2 CONNECTOR		
	DOCUMENT No: SP-APCI0018	REV: 1B	PAGE: 4 OF 5
	APPROVED BY: Barney	CHECKED BY: Vito	WRITTEN BY: TAN ZHI WU

PRODUCT SPECIFICATION				REV	ECN No.		
				1B	SN14***		
<b>Test conditions</b> The tests shall be carried out under the conditions as the referring.0 (1).Temperature:15~35℃. (2).Humidity: 45~75%							
<b>Test Sequence:</b>							
Test or Examination	Test Group						
	A	B	C	D	E	F	
Examination of Product	1,8	1,10	1,10	1,10	1,4	1	
Low Level Contact Resistance	2,5,7	2,5,7,9	2,5,7,9	2,6,9			
Dielectric Withstanding Voltage					2		
Insulation Resistance					3		
Temperature versus current						2	
Vibration			6				
Mechanical shock			8				
Insertion/Removal Force				3,5,8			
Durability (precondition)	3	3	3				
Durability				4,7			
Thermal Shock		4					
Cyclic temperature(Humidity)		6					
Mixed flowing gas							
Reseating	6	8					
Thermal disturbance							
Temperature life	4						
Temperature life (Preconditioning)			4				
Specimen quantity (pcs)	5	5	5	5	5	5	
<b>LOTES CO., LTD</b>			<b>PRODUCT NAME:</b> <b>M.2 CONNECTOR</b>				
			<b>DOCUMENT No:</b> <b>SP-APCI0018</b>		<b>REV:</b> <b>1B</b>		<b>PAGE:</b> <b>5 OF 5</b>
			<b>APPROVED BY:</b> <b>Barney</b>		<b>CHECKED BY:</b> <b>Vito</b>		<b>WRITTEN BY:</b> <b>TAN ZHI WU</b>

REV.	ECR/N NO./DESCRIPTION	DATE	DRAWN	CHECKED	APPROVE
1	SN14190	01/04'15	Sam	Vito	Barney

# NOTES:

- MATERIAL SPECIFICATION:  
1-1. HOUSING: LCP+40%GF,UL-94V0,BLACK.  
1-2. CONTACT: COPPER ALLOY C1065.  
1-3. SMT TAB: S50C.
- PLATING SPECIFICATION:  
2-1. CONTACT:  
50u" MIN. NICKEL UNDER PLATING OVER ALL.  
G/F" PLATING ON SOLDER AREA.  
GOLD PLATING ON CONTACT AREA SEE TABLE.  
2-2. SMT TAB:  
50u" MIN. NICKEL UNDER PLATING OVER ALL.  
80u" MIN. MATTE TIN PLATING ON SOLDER AREA.

3. HF COMPLIANT, ROHS COMPLIANT.

4. DATE CODE: XXXXXX

DAY  
WEEK  
YEAR

5. MECHANICAL PERFORMANCE:  
5-1. DURABILITY: SEE TABLE

6. ELECTRICAL PERFORMANCE:

6-1. CURRENT: 0.5A PER PIN.

6-2. LLCR: INITIAL 55mΩ MAX. ; FINAL ΔLLCR=20mΩ MAX..

7. IR REFLOW:

THE TEMPERATURE SHALL BE 260±5°C MAINTAINING 10±1 SECONDS.

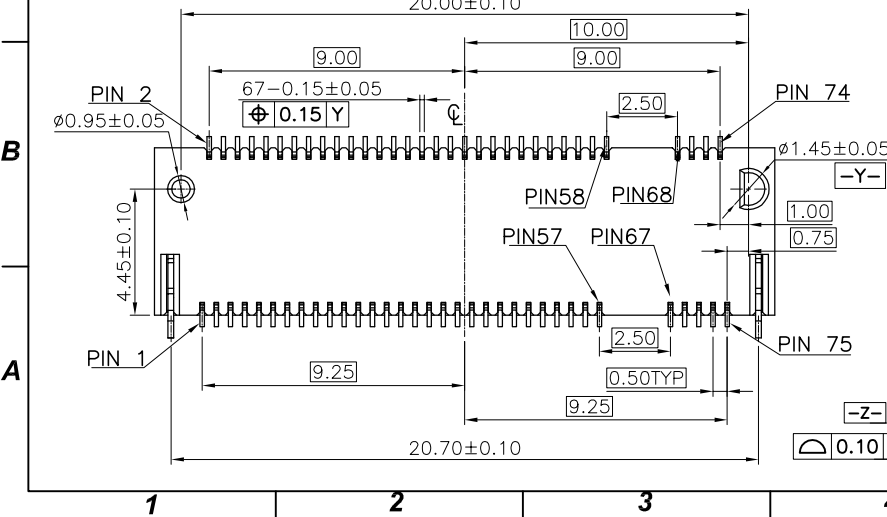
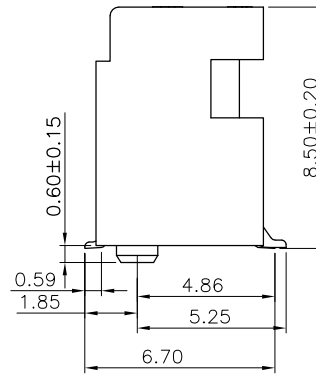
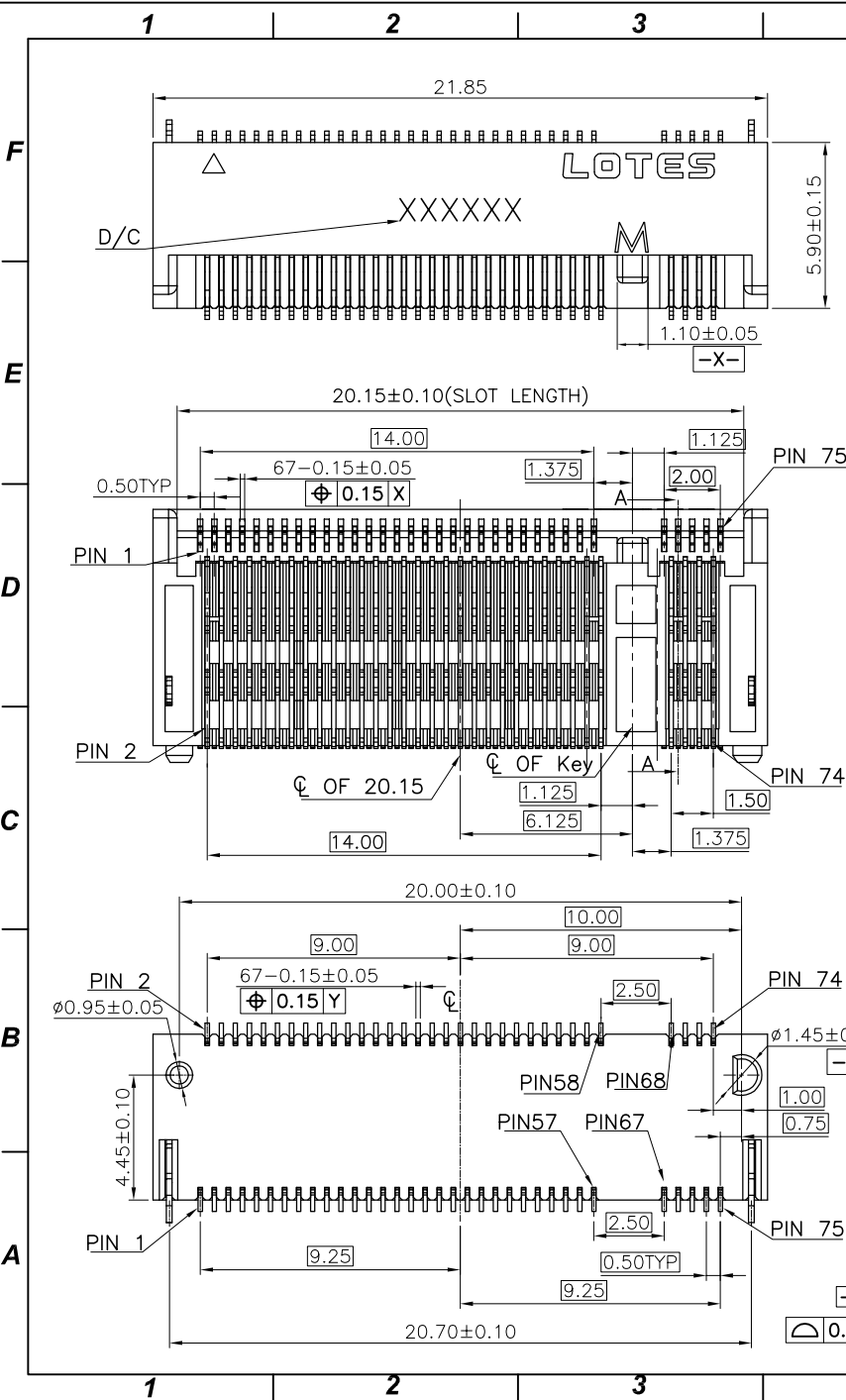
8. PRODUCT NUMBER NOTE

A P C I X X X X X X X X X X

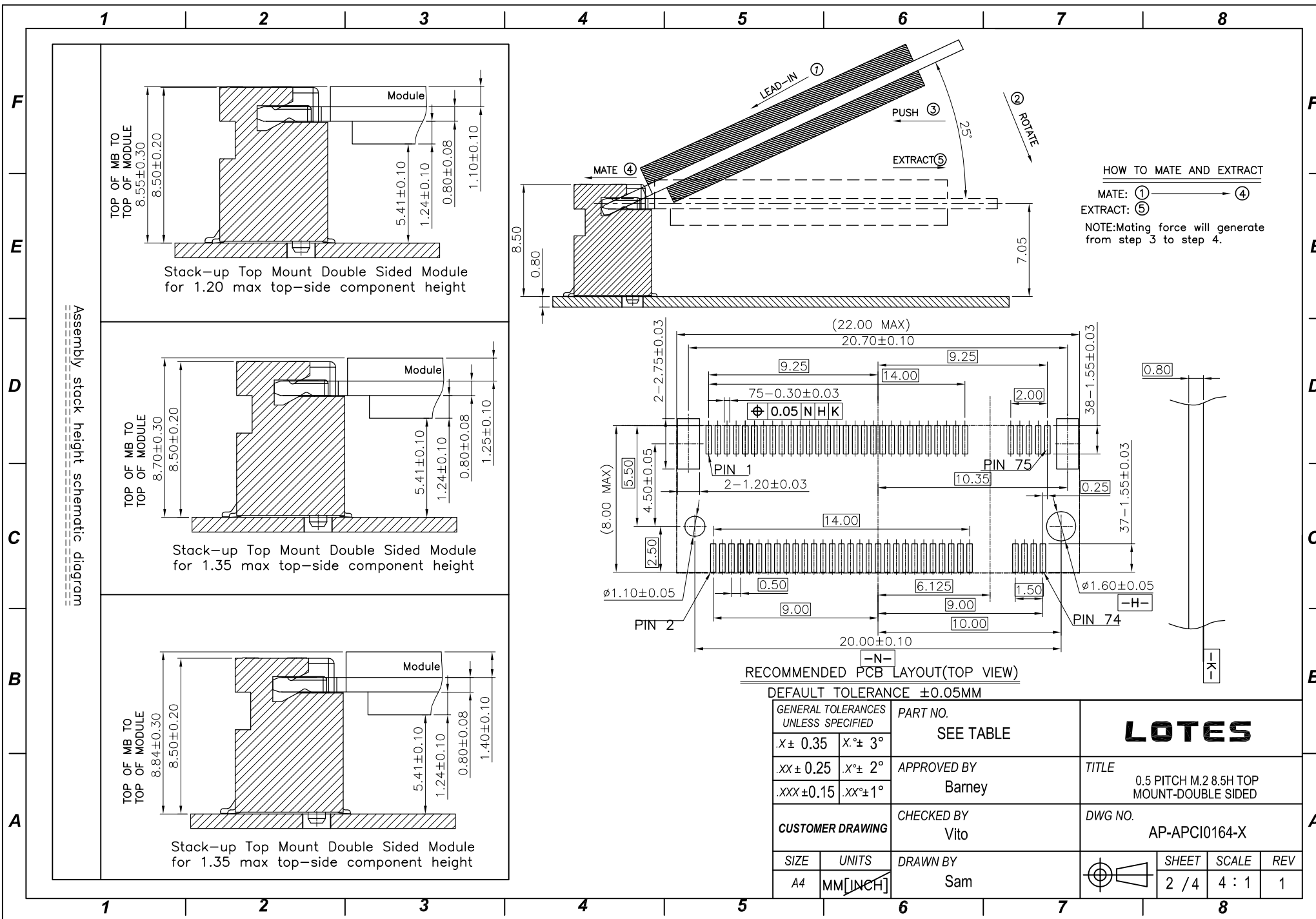
PACKING TYPE  
PRODUCT SERIAL NUMBER  
P:HF COMPLIANT  
TYPE SERIAL NUMBER  
PRODUCT TYPE  
FINISHED PRODUCT

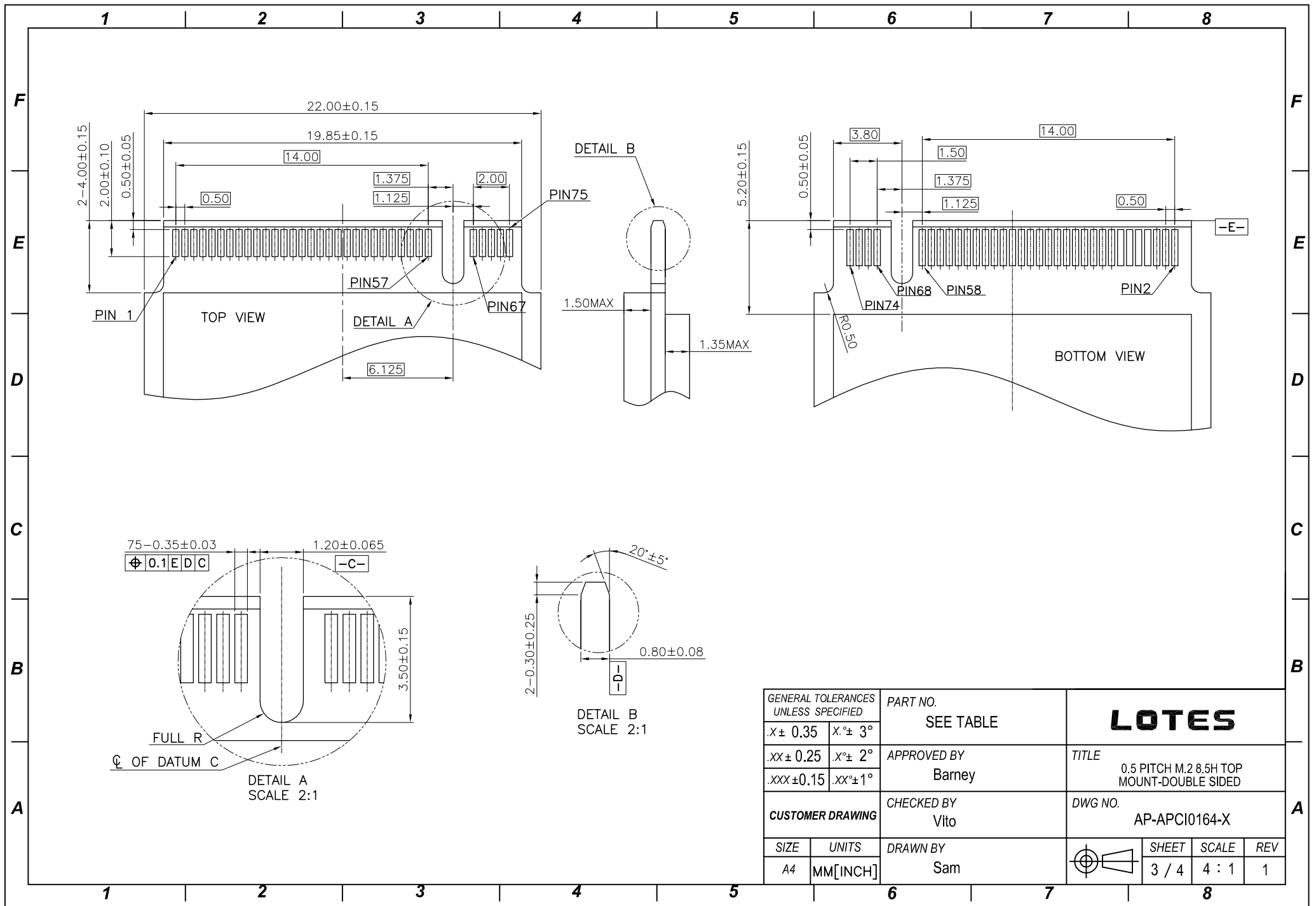
	APCI0164-P004A	30u" MIN. GOLD	60 CYCLES
M-KEY	APCI0164-P003A	15u" MIN. GOLD	25 CYCLES
	APCI0164-P002A	10u" MIN. GOLD	25 CYCLES
	APCI0164-P001A	1u" MIN. GOLD	25 CYCLES
KEY NO.	PART NO.	CONTACT PLATING	DURABILITY

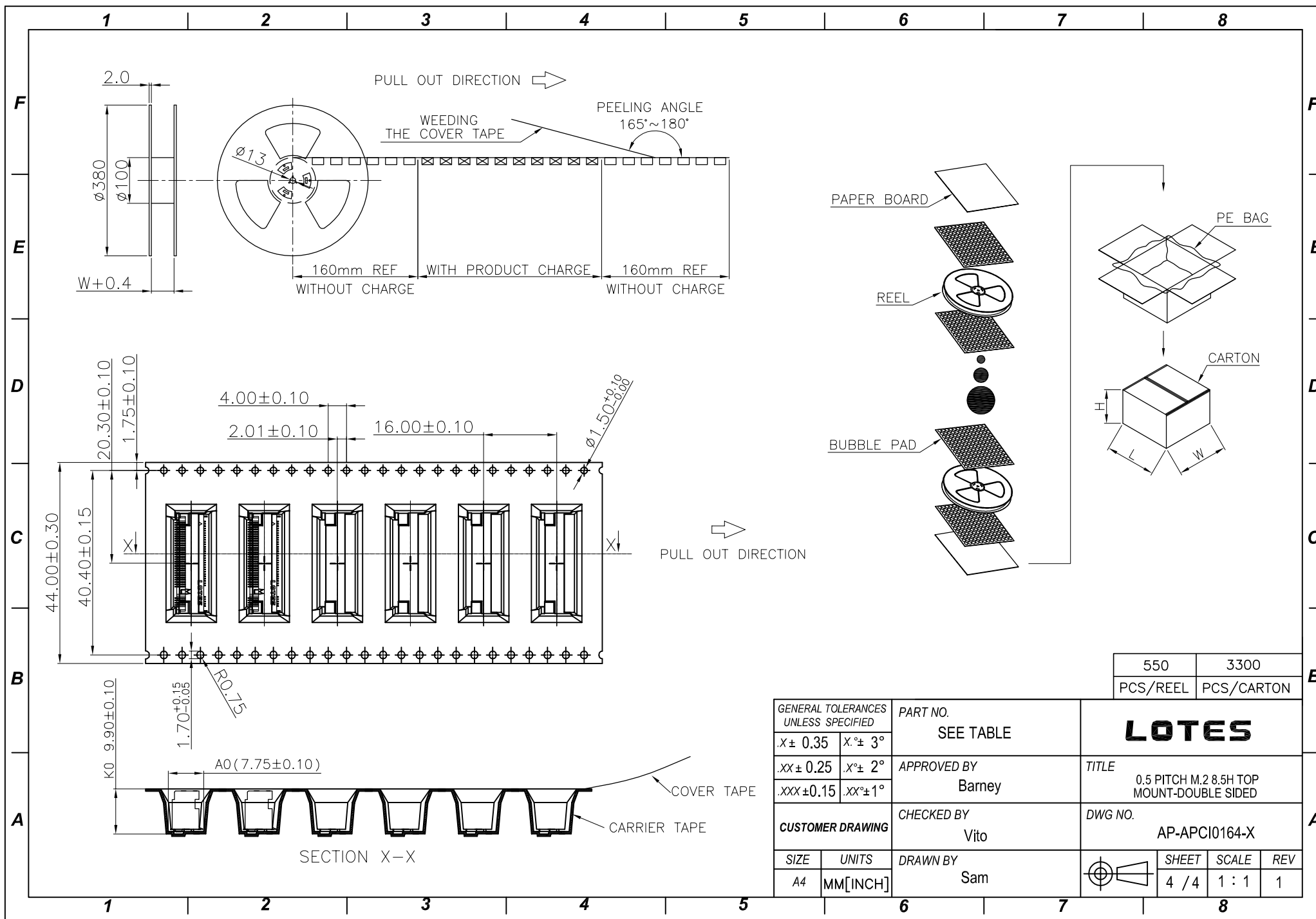
GENERAL TOLERANCES UNLESS SPECIFIED		PART NO.	SEE TABLE			LOTES		
X± 0.35	X°± 3°	APPROVED BY		Barney		TITLE		
.XX± 0.25	.X°± 2°	CHECKED BY		Vito		DWG NO.		
.XXX± 0.15	.XX°± 1°	DRAWN BY		Sam		AP-APCI0164-X		
SIZE	UNITS	SHEET		SCALE		REV		
A4	MM[INCH]	1 / 4		4 : 1		1		











# PRODUCT RELIABILITY TEST REPORT

ReportNo:GL-SZ20130315-01

product:0.50Pitch M.2 8.5H M key

Part NO:APCI0164-P\*\*\*

Test Object:Product Reliability Test

Sample Quantity:35PCS

Test Environment:20℃ 52%RH

Date of Test:2013-03-18~2013-03-29

Prepared By:周用双

Checked By:苏士坤

Approved By:周志奇

## Test Result Summary:

Qualification Group	Pass / Fail	Comments
groupA	Qualified	
groupB	Qualified	
groupC	Qualified	
groupD	Qualified	
groupE	Qualified	
groupF	Qualified	
groupG	Qualified	



## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

### 1. Testing Sequence:

Test or Examination	Test Group						
	1	2	3	4	5	6	7
Examination of Product	1,8	1,10	1,8	1,10	1,7	1,4	1
Low Level Contact Resistance	2,5,7	2,5,7,9	2,5,7	2,6,9	2,4,6		
Dielectric Withstanding Voltage						2	
Insulation Resistance						3	
Temperature Versus Current							2
Vibration			6				
Mechanical shock					5		
Insertion/Removal Force				3,5,8			
Durability (Precondition)	3	3	3		3		
Durability				4,7			
Thermal Shock		4					
Cyclic Temperature(Humidity)		6					
Reseating	6	8					
Thermal Disturbance							
Temperature Life	4						
Temperature Life (Preconditioning)			4				
Specimen Quantity (pcs)	5	5	5	5	5	5	5

# PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

## 2. Test Item & Condition & Requirements :

	Test item	Test condition	Requirements
1	Examination of product	Visual inspection	No physical damage
2	Low Level Contact Resistance	EIA-364-23 Mate connectors: apply a current of 10mA(Max) at open circuit voltage of 20mV voltage(Max)	Initial 55mΩ Max Final $\Delta$ LLCR =20mΩ Max
3	Insulation Resistance	EIA-364-21 Applying 500VDC for one minute between adjacent contacts of unmated connectors	500MΩ Min
4	Dielectric Withstanding Voltage	EIA-364-20 Measured by applying 300VAC for one minute between adjacent contacts of unmated connector assemblies.	No breakdown or flash Current leakage: 0.5 Ma
5	Temperature Versus Current	EIA-364-70 Method 2 The temperature rise above ambient shall not exceed 30°C .the ambient condition is still air at 25°C .	No physical damage $\Delta$ T=30°C Max
6	Vibration	EIA-364-28 Test condition VII, test condition letter D( 15 minutes in each of 3 mutually perpendicular directions . Both mating halves should be rigidly fixed so as not to contribute to the relative motion of one contact against another . The method of fixturing should be detailed in the test report)	No electrical discontinuity greater than 1 microsecond. $\Delta$ LLCR=20mΩ Max.(Final)
7	Mechanical Shock	250 G (Ultra-book) and 285 G (Tablet) at 2m Sec half sine on all six axis	No electrical discontinuity greater than 1 microsecond, $\Delta$ LLCR=20mΩ Max.(Final) No physical damage
8	Insertion/Removal Force	EIA-364-13 Insertion Force-20 N (2.04 kgf) max Removal Force-Typical 20 N, 25 N (2.55 kgf) max	No evidence of physical damage
9	Durability (Precondition)	EIA-364-09 Perform 5 unplug /plug cycles if the application requires up to 25 over the life of the connector ,20 cycles if the application requires 26-200	No evidence of physical damage

# PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

	Test item	Test condition	Requirements
10	Durability	EIA-364-09 Option1:Repeat insertion the Card to the connector and extraction Card from the connector for 25cycles(Au:30u'max). Option2:Repeat insertion the Card to the connector and extraction Card from the connector for 60 cycles(Au:30u'min).	$\Delta$ LLCR=20m $\Omega$ Max.(Final)
11	Reseating	Manually unplug/plug the connector or socket perform 3 cycles	No evidence of physical damage
12	Cyclic Temperature & Humidity	EIA-364-31 method III without conditioning,initial measurements,cold shock and vibration.(Except cycle the connector or socket between 25°C $\pm$ 3°C at 80% $\pm$ 3% RH and 65°C $\pm$ 3°C at 50% $\pm$ 3% RH . Ramp times should be 0.5 hour and dwell times should be 1.0 hour . Dwell times start when the temperature and humidity have stabilized within the specified levels.Perform 24 such cycles.)	Contact resistance: $\Delta$ LLCR=20m $\Omega$ Max. Insulation resistance:500M $\Omega$ Min. No physical damage.
13	Thermal Shock	EIA-364-32 method A,test condition I,test duration A-4 Cold extreme :-55°C+0/-5°C,Hot extreme :85°C+3/-0°C .Each temperature dwell 2 hour, perform 10 cycles in mated condition.	Contact resistance: $\Delta$ LLCR=20m $\Omega$ Max. No physical damage.
14	Salt Spray	Subject the connector to 5% salt-solution concentration at 35°C for 48 hours.	Contact resistance: $\Delta$ LLCR=20m $\Omega$ Max . No physical damage.
15	Temperature Life	EIA-364-17 Mate PCB module and subject to 105 $\pm$ 2°C for 120hours	Contact resistance: $\Delta$ LLCR=20m $\Omega$ Max. No physical damage
16	Temperature Life (Preconditioning)	EIA 364-17 Mate PCB module and subject to 105 $\pm$ 2°C for 72hours method A,using table 9 for reference	Contact resistance: $\Delta$ LLCR=20m $\Omega$ Max.(Final) No physical damage
17	Resistance to Reflow Soldering Heat	Test connector on PCB • Pre-Heat :100~150°C Heat : 210°C Heat Peak : 260+/-5°C,10+/-1s	No physical damage
18	Solder Ability	Solder Temperature :245 $\pm$ 5°C Solder time : 3 $\pm$ 0.5s	Wet solder coverage: 95%Min

## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

	Test item	Test condition	Requirements
19	Rework Temperature	350°C,3-5seconds for “solder iron-Max”,temperature of component by rework process.	No Damage
21	Thermal Disturbance	Cycle the mated connector between 15°C±3°C and 85°C±3°C, as measured on the part. Ramps should be a minimum of 2°C per minute, and dwell times should insure that the contacts reach the temperature extremes(a minimum of 5 minutes). Humidity is not controlled. Perform 10 such cycles.	No evidence of physical damage Contact resistance:△LLCR=20mΩ max. (Final )



## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

### 3. Testing Result:

#### Group A:

	Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass/fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass
2	LLCR	35.72	36.25	31.19	33.63	31.20	mΩ	Pass
3	Durability(Precondition)	Normal	Normal	Normal	Normal	Normal	/	Pass
4	Temperature life	Normal	Normal	Normal	Normal	Normal	/	Pass
5	LLCR	38.18	35.38	34.61	39.45	37.06	mΩ	Pass
	ΔLLCR	9.94	5.86	5.67	8.61	8.85	mΩ	Pass
6	Reseating	Normal	Normal	Normal	Normal	Normal	/	Pass
7	LLCR	35.69	34.38	32.41	35.43	34.72	mΩ	Pass
	ΔLLCR	8.60	7.18	5.69	6.84	8.61	mΩ	Pass
8	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass

#### Group B:

	Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass/fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass
2	LLCR	35.44	38.95	30.91	33.34	30.92	mΩ	Pass
3	Durability(Precondition)	Normal	Normal	Normal	Normal	Normal	/	Pass
4	Thermal Shock	Normal	Normal	Normal	Normal	Normal	/	Pass
5	LLCR	38.47	34.37	36.34	39.75	37.35	mΩ	Pass
	ΔLLCR	10.52	8.90	8.51	9.19	9.43	mΩ	Pass
6	Cyclic Temperature & Humidity	Normal	Normal	Normal	Normal	Normal	/	Pass
7	LLCR	35.65	36.95	33.72	35.94	35.23	mΩ	Pass
	ΔLLCR	9.39	9.34	8.21	7.63	10.95	mΩ	Pass
8	Reseating	Normal	Normal	Normal	Normal	Normal	/	Pass
9	LLCR	35.36	36.42	33.19	35.80	35.10	mΩ	Pass
	ΔLLCR	9.25	9.48	7.68	7.50	10.42	mΩ	Pass
10	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass

## PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005****Group C**

	Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass/fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass
2	LLCR	35.26	33.01	33.84	31.91	31.77	mΩ	Pass
3	Durability(Precondition)	Normal	Normal	Normal	Normal	Normal	/	Pass
4	Temperature life (preconditioning)	Normal	Normal	Normal	Normal	Normal	/	Pass
5	LLCR	36.03	33.88	34.81	34.56	34.30	mΩ	Pass
	ΔLLCR	4.74	7.64	5.92	4.28	4.55	mΩ	Pass
6	Vibration	Normal	Normal	Normal	Normal	Normal	/	Pass
7	LLCR	36.48	36.43	35.08	38.64	35.23	mΩ	Pass
	ΔLLCR	3.51	8.04	5.69	8.07	5.04	mΩ	Pass
8	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass

**Group D:**

	Examination step/ item	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass/fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass
2	LLCR	33.21	33.22	36.20	31.24	30.28	mΩ	Pass
3	Insertion force	1.42	1.43	1.40	1.38	1.31	kgf	Pass
	Removal Force	0.48	0.53	0.55	0.54	0.49	kgf	Pass
4	Durability	Normal	Normal	Normal	Normal	Normal	/	Pass
5	Insertion force	1.33	1.39	1.36	1.40	1.43	kgf	Pass
	Removal Force	0.51	0.50	0.46	0.51	0.52	kgf	Pass
6	LLCR	32.45	31.81	38.24	31.85	32.55	mΩ	Pass
	ΔLLCR	2.36	4.14	2.69	1.35	2.48	mΩ	Pass
7	Durability	Normal	Normal	Normal	Normal	Normal	/	Pass
8	Insertion force	1.23	1.28	1.23	1.29	1.30	kgf	Pass
	Removal Force	0.58	0.49	0.42	0.52	0.56	kgf	Pass
9	LLCR	32.71	32.15	37.39	31.04	31.52	mΩ	Pass
	ΔLLCR	4.67	4.26	2.92	3.25	2.68	mΩ	Pass
10	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass

# PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005****Group E:**

Examination step/ item		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass/fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass
2	LLCR	38.42	31.80	33.98	32.75	31.99	mΩ	Pass
3	Durability(Precondition)	Normal	Normal	Normal	Normal	Normal	/	Pass
4	LLCR	49.75	31.21	34.81	34.63	33.62	mΩ	Pass
	ΔLLCR	11.33	1.58	3.27	4.23	3.34	mΩ	Pass
5	Mechanical Shock	Normal	Normal	Normal	Normal	Normal	/	Pass
6	LLCR	41.13	31.99	38.57	32.69	32.89	mΩ	Pass
	ΔLLCR	4.62	3.14	6.47	3.78	3.20	mΩ	Pass
7	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass

**Group F:**

Examination step/ item		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass/fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass
2	Dielectric Withstanding Voltage	Normal	Normal	Normal	Normal	Normal	/	Pass
3	Insulation Resistance	Normal	Normal	Normal	Normal	Normal	/	Pass
4	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass

**Group G:**

Examination step/ item		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Unit	Pass/fail
1	Examination of Product	Normal	Normal	Normal	Normal	Normal	/	Pass
2	Temperature Versus Current	Normal	Normal	Normal	Normal	Normal	/	Pass

## PRODUCT RELIABILITY TEST REPORT

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### 4. The LLCR as follow(Unit :mΩ):

#### Group A:

No.	Initial				
	1-1	1-2	1-3	1-4	1-5
1	28.81	27.02	24.13	28.59	23.43
2	33.85	34.02	25.00	29.64	31.20
3	31.10	30.14	31.19	28.12	26.60
4	29.53	33.56	29.13	28.72	27.24
5	31.97	31.74	24.54	29.85	28.59
6	27.28	28.67	26.45	30.61	28.59
7	26.43	29.53	27.46	29.64	27.40
8	26.59	28.79	26.60	28.72	25.73
9	25.56	28.18	26.48	29.87	25.36
10	35.72	34.17	26.90	33.63	28.13
11	27.62	31.05	29.70	30.70	25.26
12	26.37	28.92	25.81	27.72	27.03
13	26.39	32.42	26.54	30.20	26.19
14	30.63	36.25	27.83	30.82	28.02
15	26.80	30.86	28.95	30.84	27.91
16	27.10	31.06	26.82	29.65	27.37
17	29.32	28.25	27.69	29.36	29.47
18	30.02	31.76	30.56	29.84	24.67
Max	35.72	36.25	31.19	33.63	31.20
Min	25.56	27.02	24.13	27.72	23.43
Aver	28.95	30.91	27.32	29.80	27.12

# PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005**

No.	After Temperature					$\Delta$ LLCR(After Temperature)				
	1-1	1-2	1-3	1-4	1-5	1-1	1-2	1-3	1-4	1-5
1	29.76	28.18	26.78	33.28	26.09	0.95	1.16	2.65	4.69	2.66
2	31.89	28.80	26.75	31.75	37.06	1.97	5.22	1.75	2.12	5.85
3	32.44	31.13	30.38	31.10	31.64	1.34	1.00	0.81	2.98	5.04
4	32.12	30.70	32.68	36.92	32.09	2.59	2.86	3.55	8.20	4.85
5	32.72	29.76	30.21	35.63	31.27	0.75	1.98	5.67	5.78	2.69
6	34.08	30.93	32.07	36.80	31.85	6.80	2.27	5.62	6.20	3.26
7	34.68	30.24	29.75	34.06	34.92	8.25	0.71	2.29	4.42	7.53
8	33.86	31.28	28.21	34.09	33.72	7.27	2.49	1.61	5.37	7.99
9	27.22	27.38	30.91	33.85	30.11	1.66	0.81	4.44	3.98	4.75
10	38.18	30.63	28.62	34.63	34.94	2.46	3.54	1.72	1.01	6.81
11	28.83	31.79	31.50	33.05	31.23	1.22	0.73	1.80	2.35	5.97
12	32.31	28.79	29.95	32.45	30.28	5.93	0.13	4.14	4.73	3.25
13	34.84	31.75	31.27	37.45	32.75	8.46	0.67	4.73	7.25	6.56
14	32.87	30.39	31.32	36.01	36.86	2.24	5.86	3.49	5.19	8.85
15	36.74	29.51	32.61	39.45	31.72	9.94	1.36	3.66	8.61	3.81
16	36.68	31.95	30.74	36.22	34.84	9.58	0.88	3.92	6.57	7.47
17	32.33	30.15	33.31	33.86	32.81	3.01	1.90	5.63	4.51	3.34
18	34.82	35.38	34.61	34.81	32.80	4.81	3.62	4.05	4.97	8.13
Max	38.18	35.38	34.61	39.45	37.06	9.94	5.86	5.67	8.61	8.85
Min	27.22	27.38	26.75	31.10	26.09	0.75	0.13	0.81	1.01	2.66
Aver	33.13	30.48	30.65	34.74	32.61	4.40	2.07	3.42	4.94	5.49

# PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005**

No.	After Reaseating					$\Delta$ LLCR(After Reaseating)				
	1-1	1-2	1-3	1-4	1-5	1-1	1-2	1-3	1-4	1-5
1	32.44	27.27	29.82	35.43	29.24	3.63	0.25	5.69	6.84	5.81
2	29.27	26.84	25.18	32.57	29.44	4.59	7.18	0.18	2.93	1.76
3	27.53	26.66	29.72	27.50	29.59	3.57	3.47	1.47	0.62	2.99
4	29.50	29.93	29.28	30.87	27.48	0.04	3.63	0.15	2.15	0.25
5	30.14	29.10	29.33	32.41	29.38	1.83	2.63	4.79	2.56	0.80
6	34.28	30.28	29.13	31.58	31.43	7.00	1.61	2.68	0.97	2.84
7	34.27	31.28	31.77	32.94	33.62	7.83	1.75	4.31	3.31	6.22
8	33.82	30.35	29.03	33.47	28.53	7.23	1.56	2.43	4.75	2.79
9	27.69	28.79	31.31	34.07	27.76	2.14	0.60	4.83	4.20	2.41
10	31.14	32.29	29.68	31.39	28.61	4.58	1.88	2.78	2.24	0.48
11	31.59	30.57	29.46	30.27	29.65	3.97	0.48	0.24	0.43	4.39
12	32.52	30.64	29.71	31.17	30.10	6.15	1.72	3.89	3.45	3.07
13	34.98	34.38	32.03	32.24	29.47	8.60	1.96	5.50	2.04	3.28
14	31.42	32.63	29.01	31.47	30.80	0.79	3.62	1.18	0.66	2.78
15	32.80	32.36	32.18	32.19	30.51	5.99	1.50	3.23	1.35	2.60
16	34.62	32.91	31.25	31.36	34.72	7.52	1.85	4.43	1.72	7.35
17	30.78	32.00	31.43	30.74	30.19	1.46	3.75	3.75	1.38	0.72
18	35.69	32.69	32.41	32.63	33.28	5.68	0.93	1.85	2.78	8.61
Max	35.69	34.38	32.41	35.43	34.72	8.60	7.18	5.69	6.84	8.61
Min	27.53	26.66	25.18	27.50	27.48	0.04	0.25	0.15	0.43	0.25
Aver	31.92	30.61	30.10	31.90	30.21	4.59	2.24	2.96	2.47	3.29



## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

### Group B:

No.	Initial				
	2-1	2-2	2-3	2-4	2-5
1	27.02	26.49	23.85	28.30	23.15
2	33.57	33.74	24.72	29.35	30.92
3	30.82	29.85	30.91	27.84	26.32
4	29.25	33.28	28.85	28.44	26.96
5	31.69	38.95	24.26	29.56	28.30
6	27.00	28.38	26.17	30.33	28.30
7	26.15	29.25	27.18	29.35	27.11
8	26.31	28.51	26.32	28.44	25.45
9	25.28	27.90	26.20	29.59	25.08
10	35.44	33.89	26.62	33.34	27.85
11	27.33	30.77	29.42	30.41	24.98
12	26.09	28.64	25.53	27.44	26.75
13	26.10	32.14	26.26	29.91	25.91
14	30.35	35.97	27.54	30.54	27.73
15	26.52	30.58	28.67	30.56	27.63
16	26.81	30.78	26.54	29.36	27.09
17	30.16	28.86	28.25	26.97	28.20
18	28.07	30.55	25.51	28.26	22.27
Max	35.44	38.95	30.91	33.34	30.92
Min	25.28	26.49	23.85	26.97	22.27
Aver	28.55	31.03	26.82	29.33	26.67



## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

No.	After Thermal Shock					$\Delta$ LLCR(After Thermal Shock)				
	2-1	2-2	2-3	2-4	2-5	2-1	2-2	2-3	2-4	2-5
1	30.05	28.48	27.08	33.57	26.39	3.03	1.99	3.23	5.27	3.24
2	32.18	29.09	27.04	32.05	37.35	1.39	4.65	2.33	2.70	6.43
3	32.73	31.43	30.68	31.39	31.94	1.92	1.58	0.24	3.55	5.62
4	32.42	31.00	32.98	37.21	32.38	3.17	2.28	4.13	8.78	5.43
5	33.02	30.05	30.51	35.93	31.57	1.33	8.90	6.25	6.36	3.26
6	34.38	31.23	32.36	37.10	32.15	7.38	2.84	6.20	6.77	3.84
7	34.98	30.54	30.05	34.35	35.22	8.83	1.29	2.87	5.00	8.10
8	34.16	31.58	28.51	34.39	34.02	7.85	3.07	2.19	5.95	8.57
9	27.52	27.67	31.21	34.15	30.40	2.24	0.23	5.01	4.56	5.33
10	38.47	30.92	28.92	34.93	35.23	3.04	2.97	2.30	1.58	7.39
11	29.13	32.08	31.80	33.34	31.52	1.79	1.31	2.38	2.93	6.55
12	32.60	29.08	30.25	32.74	30.57	6.51	0.45	4.72	5.30	3.82
13	35.14	32.04	31.57	37.75	33.05	9.03	0.10	5.31	7.83	7.14
14	33.17	30.68	31.61	36.30	37.16	2.82	5.29	4.07	5.77	9.43
15	37.04	29.80	32.91	39.75	32.01	10.52	0.78	4.24	9.19	4.38
16	36.98	32.24	31.03	36.51	35.14	10.16	1.46	4.50	7.15	8.05
17	33.63	32.70	36.34	34.22	32.70	3.47	3.84	8.09	7.25	4.51
18	36.29	34.37	34.02	35.75	31.24	8.22	3.82	8.51	7.49	8.97
Max	38.47	34.37	36.34	39.75	37.35	10.52	8.90	8.51	9.19	9.43
Min	27.52	27.67	27.04	31.39	26.39	1.33	0.10	0.24	1.58	3.24
Aver	33.55	30.83	31.05	35.08	32.78	5.15	2.60	4.25	5.75	6.11



## PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005**

No.	After Cyclic temperature					$\Delta$ LLCR(After Cyclic temperature)				
	2-1	2-2	2-3	2-4	2-5	2-1	2-2	2-3	2-4	2-5
1	32.94	27.77	30.33	35.94	29.75	5.92	1.29	6.48	7.63	6.60
2	29.78	27.34	25.69	33.08	29.95	3.80	6.39	0.97	3.72	0.97
3	28.04	27.17	30.23	28.01	30.10	2.78	2.68	0.68	0.17	3.78
4	30.00	30.44	29.79	31.38	27.99	0.75	2.84	0.94	2.94	1.04
5	30.65	29.61	29.84	32.92	29.89	1.04	9.34	5.58	3.35	1.59
6	34.79	30.78	29.64	32.09	31.94	7.79	2.40	3.47	1.76	3.63
7	34.77	31.79	32.28	33.45	34.13	8.62	2.54	5.10	4.10	7.01
8	34.33	30.85	29.54	33.98	29.03	8.02	2.35	3.22	5.54	3.58
9	28.20	29.30	31.82	34.58	28.27	2.93	1.39	5.62	4.99	3.20
10	31.65	32.80	30.19	31.89	29.12	3.79	1.09	3.57	1.45	1.27
11	32.10	31.08	29.97	30.77	30.16	4.76	0.31	0.55	0.36	5.18
12	33.03	31.15	30.21	31.68	30.61	6.94	2.51	4.68	4.24	3.86
13	35.49	34.89	32.54	32.74	29.98	9.39	2.75	6.29	2.83	4.07
14	31.93	33.14	29.51	31.98	31.31	1.58	2.83	1.97	1.45	3.57
15	33.30	32.87	32.69	32.70	31.02	6.78	2.29	4.02	2.14	3.39
16	35.12	33.42	31.75	31.87	35.23	8.31	2.64	5.22	2.51	8.14
17	32.10	33.04	32.50	32.38	30.86	1.95	4.18	4.25	5.40	2.67
18	35.65	36.95	33.72	33.54	33.22	7.57	6.40	8.21	5.28	10.95
Max	35.65	36.95	33.72	35.94	35.23	9.39	9.34	8.21	7.63	10.95
Min	28.04	27.17	25.69	28.01	27.99	0.75	0.31	0.55	0.17	0.97
Aver	32.44	31.35	30.68	32.50	30.70	5.15	3.12	3.93	3.33	4.14



## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

No.	After Reaseating					$\Delta$ LLCR(After Reaseating)				
	2-1	2-2	2-3	2-4	2-5	2-1	2-2	2-3	2-4	2-5
1	32.81	27.64	30.20	35.80	29.62	5.79	1.15	6.35	7.50	6.47
2	29.64	27.21	25.56	32.94	29.82	3.93	6.53	0.84	3.59	1.10
3	27.90	27.04	30.10	27.88	29.97	2.91	2.82	0.81	0.04	3.65
4	29.87	30.31	29.65	31.25	27.86	0.62	2.97	0.81	2.81	0.90
5	30.52	29.48	29.71	32.79	29.76	1.17	9.48	5.44	3.22	1.45
6	34.66	30.65	29.50	31.95	31.81	7.66	2.27	3.34	1.63	3.50
7	34.64	31.66	32.15	33.32	33.99	8.49	2.41	4.97	3.97	6.88
8	34.19	30.72	29.41	33.84	28.90	7.89	2.22	3.09	5.41	3.45
9	28.07	29.16	31.68	34.45	28.14	2.79	1.26	5.49	4.86	3.06
10	31.52	32.66	30.06	31.76	28.99	3.92	1.22	3.44	1.58	1.14
11	31.96	30.95	29.84	30.64	30.03	4.63	0.18	0.42	0.23	5.05
12	32.90	31.02	30.08	31.54	30.48	6.81	2.38	4.55	4.11	3.73
13	35.36	34.75	32.41	32.61	29.85	9.25	2.62	6.15	2.70	3.94
14	31.80	33.00	29.38	31.85	31.18	1.45	2.97	1.84	1.31	3.44
15	33.17	32.73	32.56	32.57	30.89	6.65	2.15	3.89	2.01	3.26
16	34.99	33.28	31.62	31.74	35.10	8.18	2.50	5.09	2.37	8.01
17	31.84	32.78	32.23	32.11	30.60	1.68	3.91	3.98	5.14	2.40
18	35.12	36.42	33.19	33.01	32.69	7.04	5.87	7.68	4.75	10.42
Max	35.36	36.42	33.19	35.80	35.10	9.25	9.48	7.68	7.50	10.42
Min	27.90	27.04	25.56	27.88	27.86	0.62	0.18	0.42	0.04	0.90
Aver	32.28	31.19	30.52	32.34	30.54	5.05	3.05	3.79	3.18	3.99

# PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005****Group C:**

No.	Initial				
	3-1	3-2	3-3	3-4	3-5
1	28.23	28.17	28.08	29.04	28.26
2	28.17	25.59	31.26	27.80	28.29
3	29.09	25.63	30.41	26.41	27.46
4	28.87	25.91	28.59	26.49	27.41
5	28.66	27.59	28.76	25.68	26.41
6	29.90	28.09	27.34	27.84	26.49
7	29.15	28.59	30.57	26.89	27.14
8	30.84	26.16	33.01	26.11	26.46
9	32.56	29.67	33.84	31.91	30.13
10	29.59	27.59	26.32	31.00	29.41
11	32.59	26.59	28.66	28.13	29.59
12	29.67	27.16	32.34	29.66	27.59
13	31.42	26.29	31.37	28.77	28.98
14	28.82	28.09	32.80	28.51	28.60
15	29.48	28.39	28.01	29.26	29.65
16	34.05	33.01	31.34	31.32	31.77
17	32.68	29.18	32.63	31.26	30.19
18	35.26	30.54	32.71	30.57	28.69
Max	35.26	33.01	33.84	31.91	31.77
Min	28.17	25.59	26.32	25.68	26.41
Aver	30.50	27.90	30.45	28.70	28.47

# PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005**

No.	After Temperature life					$\Delta$ LLCR(After Temperature life)				
	3-1	3-2	3-3	3-4	3-5	3-1	3-2	3-3	3-4	3-5
1	27.77	28.46	28.15	27.88	27.81	0.46	0.30	0.07	1.16	0.44
2	28.42	27.61	30.14	29.02	28.96	0.25	2.01	1.12	1.22	0.67
3	28.82	27.40	28.38	26.98	27.35	0.27	1.77	2.03	0.57	0.11
4	32.33	26.44	28.02	26.18	28.81	3.46	0.52	0.57	0.31	1.40
5	27.15	33.88	29.33	27.19	29.19	1.51	6.29	0.58	1.51	2.78
6	26.49	27.81	29.24	27.09	28.73	3.41	0.27	1.90	0.75	2.24
7	27.16	29.38	27.63	27.10	27.34	2.00	0.79	2.94	0.22	0.20
8	26.65	29.73	27.10	30.39	28.22	4.19	3.57	5.92	4.28	1.76
9	32.76	31.09	28.82	27.98	31.01	0.20	1.42	5.02	3.93	0.88
10	28.97	28.27	30.17	33.77	31.91	0.62	0.68	3.85	2.77	2.50
11	28.82	28.18	28.77	31.40	32.23	3.77	1.60	0.11	3.27	2.64
12	33.95	29.21	27.09	28.41	32.13	4.28	2.04	5.25	1.26	4.55
13	29.54	29.40	32.88	31.48	30.41	1.88	3.11	1.51	2.71	1.43
14	28.53	27.71	30.39	31.13	30.30	0.29	0.38	2.42	2.62	1.70
15	30.31	30.27	32.49	29.63	31.11	0.82	1.88	4.48	0.38	1.46
16	33.13	25.38	34.81	34.56	33.87	0.92	7.64	3.47	3.24	2.10
17	36.03	30.28	32.53	33.50	34.30	3.35	1.10	0.10	2.24	4.11
18	30.52	30.85	32.77	29.68	30.55	4.74	0.31	0.06	0.89	1.86
Max	36.03	33.88	34.81	34.56	34.30	4.74	7.64	5.92	4.28	4.55
Min	26.49	25.38	27.09	26.18	27.34	0.20	0.27	0.06	0.22	0.11
Aver	29.85	28.96	29.93	29.63	30.23	2.02	1.98	2.30	1.85	1.82

## PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005**

No.	After Vibration					$\Delta$ LLCR(After Vibration)				
	3-1	3-2	3-3	3-4	3-5	3-1	3-2	3-3	3-4	3-5
1	28.15	28.66	28.82	29.56	28.19	0.09	0.49	0.74	0.53	0.06
2	29.06	28.92	29.61	27.09	27.76	0.89	3.33	1.65	0.71	0.54
3	31.35	28.83	28.91	27.11	30.63	2.26	3.21	1.50	0.69	3.18
4	25.59	25.94	29.63	28.19	29.70	3.29	0.03	1.04	1.71	2.28
5	25.16	33.80	32.15	27.76	28.80	3.51	6.21	3.40	2.08	2.39
6	31.42	35.53	28.79	33.01	29.56	1.52	7.44	1.45	5.17	3.07
7	28.49	33.95	28.06	29.70	29.52	0.66	5.36	2.51	2.81	2.38
8	28.84	34.20	28.32	28.80	29.24	2.00	8.04	4.69	2.69	2.78
9	34.14	34.31	30.81	29.56	29.10	1.58	4.65	3.03	2.35	1.03
10	31.30	31.86	32.01	32.01	33.76	1.71	4.27	5.69	1.01	4.36
11	33.96	31.16	33.76	32.16	31.91	1.37	4.57	5.10	4.04	2.32
12	33.13	31.26	32.12	30.70	31.41	3.47	4.10	0.22	1.04	3.82
13	28.09	28.54	29.51	31.55	30.31	3.33	2.25	1.86	2.78	1.33
14	29.12	29.28	29.32	31.90	31.02	0.30	1.19	3.48	3.39	2.43
15	30.94	32.41	30.62	33.76	31.13	1.46	4.02	2.61	4.51	1.48
16	33.65	31.43	34.67	33.81	32.88	0.40	1.59	3.33	2.49	1.12
17	32.82	31.15	35.08	32.69	35.23	0.13	1.97	2.46	1.43	5.04
18	36.48	36.43	29.66	38.64	30.25	1.22	5.89	3.05	8.07	1.56
Max	36.48	36.43	35.08	38.64	35.23	3.51	8.04	5.69	8.07	5.04
Min	25.16	25.94	28.06	27.09	27.76	0.09	0.03	0.22	0.53	0.06
Aver	30.65	31.54	30.66	31.00	30.58	1.62	3.81	2.66	2.64	2.29



## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

### Group D:

No.	Initial				
	1-1	1-2	1-3	1-4	1-5
1	26.33	26.14	26.55	26.91	26.29
2	27.28	27.50	25.95	27.21	25.44
3	25.72	28.51	29.64	25.88	25.91
4	25.38	27.11	27.24	27.41	26.96
5	25.79	25.20	27.77	26.34	26.29
6	24.73	29.00	27.45	26.41	26.21
7	25.83	27.58	27.05	25.69	28.68
8	27.82	28.11	28.74	27.46	27.46
9	31.53	28.98	29.34	29.92	29.87
10	31.53	32.29	34.09	31.24	29.24
11	33.21	27.97	30.72	30.69	26.99
12	32.71	29.12	31.92	30.42	29.99
13	30.66	24.96	28.38	29.94	26.49
14	29.98	26.55	27.74	31.21	26.15
15	28.48	27.84	30.35	28.99	27.48
16	30.18	28.21	30.73	30.49	29.34
17	29.35	29.92	29.38	29.33	28.63
18	26.58	33.22	36.20	26.95	30.28
Max	33.21	33.22	36.20	31.24	30.28
Min	24.73	24.96	25.95	25.69	25.44
Aver	28.51	28.23	29.40	28.47	27.65



## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

No.	After Temperature					$\Delta$ LLCR(After Temperature)				
	1-1	1-2	1-3	1-4	1-5	1-1	1-2	1-3	1-4	1-5
1	26.64	25.22	28.11	27.05	26.74	0.31	0.91	1.56	0.13	0.45
2	27.85	27.29	26.41	28.03	25.57	0.57	0.22	0.46	0.82	0.13
3	26.59	27.45	29.54	26.79	25.99	0.87	1.06	0.10	0.91	0.08
4	27.16	27.42	28.59	26.97	25.65	1.77	0.31	1.35	0.44	1.31
5	27.91	26.99	28.41	26.11	25.08	2.12	1.79	0.64	0.23	1.21
6	26.06	29.42	27.39	25.25	25.36	1.33	0.43	0.05	1.15	0.85
7	26.53	28.32	27.11	27.04	27.26	0.71	0.73	0.06	1.35	1.42
8	28.41	27.95	29.10	27.10	26.97	0.59	0.16	0.35	0.36	0.49
9	30.76	30.33	29.96	30.47	28.90	0.77	1.35	0.62	0.55	0.97
10	32.45	31.81	31.40	31.85	29.26	0.91	0.48	2.69	0.61	0.03
11	31.01	28.55	30.40	30.30	28.37	2.20	0.58	0.31	0.39	1.38
12	31.84	30.12	31.29	29.44	30.76	0.87	1.01	0.63	0.99	0.77
13	31.32	27.40	28.71	31.07	26.89	0.66	2.44	0.33	1.13	0.40
14	32.35	27.12	28.42	31.33	28.23	2.36	0.57	0.69	0.12	2.08
15	29.19	28.17	29.62	28.39	29.96	0.72	0.33	0.73	0.61	2.48
16	31.04	30.03	31.74	29.72	29.73	0.86	1.82	1.01	0.77	0.40
17	30.79	30.59	29.94	28.13	29.09	1.44	0.67	0.56	1.20	0.46
18	28.23	29.08	38.24	27.39	32.55	1.65	4.14	2.04	0.44	2.27
Max	32.45	31.81	38.24	31.85	32.55	2.36	4.14	2.69	1.35	2.48
Min	26.06	25.22	26.41	25.25	25.08	0.31	0.16	0.05	0.12	0.03
Aver	29.23	28.51	29.69	28.47	27.91	1.15	1.06	0.79	0.68	0.95

## PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005**

No.	After Reaseating					$\Delta$ LLCR(After Reaseating)				
	1-1	1-2	1-3	1-4	1-5	1-1	1-2	1-3	1-4	1-5
1	27.13	26.82	27.41	27.56	27.16	0.80	0.68	0.87	0.65	0.88
2	28.96	27.42	28.04	27.37	27.59	1.68	0.08	2.09	0.15	2.16
3	27.49	28.13	27.41	27.54	25.38	1.77	0.38	2.22	1.66	0.54
4	26.90	27.12	28.09	27.24	26.41	1.51	0.01	0.86	0.18	0.55
5	27.40	28.16	27.46	26.56	27.54	1.61	2.96	0.31	0.22	1.25
6	28.51	28.74	28.08	26.41	27.41	3.79	0.26	0.63	0.00	1.20
7	27.65	30.34	29.96	27.54	26.31	1.83	2.76	2.92	1.86	2.37
8	28.82	27.42	29.14	27.37	27.16	1.00	0.69	0.39	0.09	0.30
9	31.74	31.92	30.09	30.66	28.59	0.21	2.94	0.75	0.74	1.28
10	32.12	32.15	31.19	31.04	28.79	0.59	0.14	2.90	0.20	0.45
11	31.66	29.80	30.67	30.82	29.08	1.55	1.83	0.04	0.13	2.09
12	32.71	29.74	31.24	28.99	30.39	0.01	0.62	0.69	1.44	0.40
13	31.79	28.57	29.09	30.49	27.71	1.13	3.61	0.72	0.55	1.22
14	32.19	27.59	28.71	30.82	28.32	2.20	1.04	0.98	0.40	2.17
15	29.99	28.41	29.32	28.96	30.16	1.51	0.57	1.04	0.04	2.68
16	30.81	29.90	30.91	30.01	28.94	0.63	1.69	0.18	0.48	0.40
17	28.98	29.75	29.13	26.08	29.85	0.38	0.18	0.25	3.25	1.22
18	31.25	28.96	37.39	28.99	31.52	4.67	4.26	1.19	2.04	1.24
Max	32.71	32.15	37.39	31.04	31.52	4.67	4.26	2.92	3.25	2.68
Min	26.90	26.82	27.41	26.08	25.38	0.01	0.01	0.04	0.00	0.30
Aver	29.78	28.94	29.63	28.58	28.24	1.49	1.37	1.06	0.78	1.24





## PRODUCT RELIABILITY TEST REPORT

Report No. GL-SZ20130315-01

GL-P-027-005

Group E:

No.	Initial				
	6-1	6-2	6-3	6-4	6-5
1	27.98	25.74	27.80	26.61	25.78
2	28.09	27.29	31.63	27.80	28.29
3	29.04	25.72	30.22	26.42	27.46
4	28.87	25.69	28.31	26.47	27.41
5	28.67	25.20	28.60	25.43	26.16
6	29.35	25.09	27.37	25.74	26.12
7	29.39	26.24	30.57	26.89	26.78
8	30.83	26.16	29.06	26.11	26.56
9	34.87	29.66	33.98	31.91	31.08
10	29.64	27.79	31.08	31.00	29.46
11	32.94	26.61	32.23	28.00	29.57
12	38.02	27.23	32.44	29.57	27.59
13	31.48	26.22	31.31	28.79	28.98
14	28.96	27.78	32.66	28.64	28.60
15	29.41	28.39	30.31	29.74	29.65
16	33.90	31.80	31.54	32.75	31.99
17	32.62	27.36	32.10	31.36	31.04
18	38.42	27.15	29.21	25.05	28.61
Max	38.42	31.80	33.98	32.75	31.99
Min	27.98	25.09	27.37	25.05	25.78
Aver	31.25	27.06	30.58	28.24	28.40

## PRODUCT RELIABILITY TEST REPORT

**Report No. GL-SZ20130315-01****GL-P-027-005**

No.	After Durability					$\Delta$ LLCR(After Durability)				
	6-1	6-2	6-3	6-4	6-5	6-1	6-2	6-3	6-4	6-5
1	27.77	25.96	28.47	27.91	27.67	0.21	0.22	0.68	1.30	1.89
2	28.49	27.61	29.97	29.02	28.51	0.40	0.32	1.66	1.22	0.21
3	28.86	26.90	28.38	26.98	27.07	0.17	1.18	1.84	0.57	0.39
4	32.33	26.44	28.02	26.18	27.59	3.46	0.75	0.29	0.30	0.17
5	27.15	25.76	26.83	27.19	26.69	1.52	0.56	1.76	1.76	0.53
6	26.48	26.08	26.74	26.94	26.23	2.87	0.98	0.64	1.20	0.11
7	27.16	26.94	27.63	27.29	27.31	2.24	0.70	2.94	0.40	0.53
8	26.65	27.17	27.10	27.82	28.22	4.19	1.01	1.96	1.71	1.66
9	32.81	31.21	33.05	31.56	31.01	2.05	1.55	0.93	0.35	0.06
10	28.97	28.27	30.03	31.27	29.43	0.68	0.48	1.05	0.27	0.02
11	38.55	28.18	30.36	28.77	30.48	5.62	1.58	1.86	0.77	0.90
12	38.76	26.72	30.04	30.91	30.93	0.74	0.51	2.40	1.34	3.34
13	29.74	27.00	30.94	28.60	31.61	1.74	0.78	0.36	0.20	2.63
14	28.62	27.51	30.44	28.64	30.30	0.33	0.26	2.23	0.00	1.70
15	30.31	29.79	32.49	32.13	31.87	0.90	1.40	2.18	2.39	2.21
16	36.51	30.52	34.81	34.63	33.62	2.61	1.27	3.27	1.88	1.63
17	35.53	28.72	30.38	30.29	32.80	2.91	1.37	1.72	1.07	1.76
18	49.75	27.92	31.96	29.28	28.93	11.33	0.77	2.75	4.23	0.32
Max	49.75	31.21	34.81	34.63	33.62	11.33	1.58	3.27	4.23	3.34
Min	26.48	25.76	26.74	26.18	26.23	0.17	0.22	0.29	0.00	0.02
Aver	31.91	27.70	29.87	29.19	29.46	2.44	0.87	1.70	1.16	1.12

## **PRODUCT RELIABILITY TEST REPORT**

**Report No. GL-SZ20130315-01**

**GL-P-027-005**

No.	After Mechanical shock					$\Delta$ LLCR(After Mechanical shock)				
	6-1	6-2	6-3	6-4	6-5	6-1	6-2	6-3	6-4	6-5
1	25.21	26.15	28.49	27.44	26.24	2.77	0.41	0.69	0.83	0.46
2	26.56	28.17	29.68	29.14	28.82	1.54	0.88	1.95	1.34	0.52
3	26.04	26.33	28.41	27.60	26.41	3.00	0.61	1.81	1.18	1.05
4	25.63	25.94	27.13	26.45	27.20	3.24	0.25	1.18	0.02	0.22
5	24.97	25.73	27.09	25.38	26.55	3.70	0.53	1.51	0.05	0.39
6	24.74	26.46	27.11	25.69	26.74	4.62	1.37	0.27	0.05	0.62
7	25.90	26.17	28.19	26.70	27.84	3.50	0.07	2.38	0.19	1.05
8	26.41	26.54	27.76	27.54	28.94	4.43	0.38	1.30	1.43	2.38
9	34.09	31.99	33.01	31.34	30.57	0.77	2.33	0.97	0.57	0.51
10	30.79	29.31	29.70	29.52	27.92	1.14	1.52	1.39	1.48	1.54
11	35.65	28.18	28.80	29.24	30.79	2.71	1.57	3.43	1.24	1.21
12	41.13	30.37	29.56	29.18	30.79	3.11	3.14	2.88	0.39	3.20
13	30.97	28.55	29.51	28.39	30.31	0.50	2.33	1.80	0.40	1.33
14	31.62	29.28	29.32	29.25	31.02	2.66	1.51	3.34	0.61	2.43
15	30.93	30.02	30.62	31.34	30.19	1.52	1.63	0.31	1.60	0.54
16	33.17	31.18	34.56	32.68	32.89	0.73	0.62	3.02	0.07	0.90
17	35.27	29.89	38.57	32.69	31.23	2.65	2.54	6.47	1.33	0.19
18	36.18	26.43	31.38	28.83	29.37	2.24	0.72	2.17	3.78	0.76
Max	41.13	31.99	38.57	32.69	32.89	4.62	3.14	6.47	3.78	3.20
Min	24.74	25.73	27.09	25.38	26.24	0.50	0.07	0.27	0.02	0.19
Aver	30.29	28.15	29.94	28.80	29.10	2.49	1.24	2.05	0.92	1.07

### **Group G:**

I=1.5A

	sample 1	sample 2	sample 3	sample 4	sample 5
Initial	20.00	19.68	22.33	19.64	20.58
Max	28.88	29.95	32.47	26.64	27.52
$\Delta$ Temp	8.88	10.27	10.14	7.00	6.94



## **Properties of Sumikasuper LCP SV6808THF**

		ASTM	Unit	SV6808THF
Specific gravity		D792		1.72
Mold shrinkage rate	MD	Sumitomo chemical method	%	0.22
	TD		%	0.91
Tensile		Strength	D638	100MPa
		Elongation		4.30%
Flexural	Strength	D790	MPa	127
	Modulus		GPa	9.3
Izod impact strength	D256	J/m		590
TDUL 1.82MPa		D648	Degree C	270

1. The tool of 64mmX64mmX3mmt was used.
2. The highest temperature at which the test piece does not deform after immersing in a solder bath for 60 seconds.

\* The above physical properties data are just for reference, and are not intended for any warranty or guaranty on the materials stated in this brochure.

- End of document -

SUMITOMO CHEMICAL CO LTD

ELECTRONIC MATERIALS DIV, TOKYO SUMITOMO TWIN BLDG, 27-1 SHINKAWA 2-CHOME, CHUO-KU TOKYO 104-8260 JP

SV6808THF(r5)

Liquid Crystal Polymer (LCP), "SUMIKASUPER", furnished as pellets

Color	Min Thk (mm)	Flame Class	HWI	HAI	RTI Elec	RTI Imp	RTI Str
NC, BK	0.3	V-0	-	-	130	130	130
	3.0	V-0	-	-	130	130	130

- Comparative Tracking Index (CTI): -
- Inclined Plane Tracking (IPT): -
- Dielectric Strength (kV/mm): -
- Volume Resistivity (10<sup>x</sup> ohm-cm) : -
- High-Voltage Arc Tracking Rate (HVTR): -
- High Volt, Low Current Arc Resis (D495): -
- Dimensional Stability (%): -

(r5) - Virgin and regrind material up to 70% by weight have the same V-0 flammability characteristics. No other properties have been evaluated for 25% - 70% regrind.

ANSI/UL 94 small-scale test data does not pertain to building materials, furnishings and related contents. ANSI/UL 94 small-scale test data is intended solely for determining the flammability of plastic materials used in the components and parts of end-product devices and appliances, where the acceptability of the combination is determined by UL.

Report Date:2012-12-26

Last Revised:2012-12-27

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IEC and ISO Test Methods

Test Name	Test Method	Units	Thickness	Value
			Tested (mm)	
Flammability	IEC 60695-11-10	Class (color)	0.3	V-0 (NC, BK)
			3.0	V-0 (NC, BK)
Glow-Wire Flammability (GWFI)	IEC 60695-2-12	C	-	-
Glow-Wire Ignition (GWIT)	IEC 60695-2-13	C	-	-
IEC Comparative Tracking Index	IEC 60112	Volts (Max)	-	-
IEC Ball Pressure	IEC 60695-10-2	C	-	-
ISO Heat Deflection (1.80 MPa)	ISO 75-2	C	-	-
ISO Tensile Strength	ISO 527-2	MPa	-	-
ISO Flexural Strength	ISO 178	MPa	-	-
ISO Tensile Impact	ISO 8256	kJ/m <sup>2</sup>	-	-
ISO Izod Impact	ISO 180	kJ/m <sup>2</sup>	-	-
ISO Charpy Impact	ISO 179-2	kJ/m <sup>2</sup>	-	-

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## 測試報告

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華立企業股份有限公司

WAH LEE INDUSTRIAL CORP.

台北市復興北路369號11樓

11F, NO. 369, FU-HSING N. ROAD, TAIPEI, 105 TAIWAN, R. O. C.



以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by/on behalf of the applicant as) :

送樣廠商(Sample Submitted By) : SUMITOMO CHEMICAL CO., LTD.  
 樣品名稱(Sample Description) : SUMIKASUPER LCP RESIN  
 樣品型號(Style/Item No.) : SUMIKASUPER E6006LMRB & E4008MRB & E6008MRB & E5008LB & E5006LB & E6807LHFBZ & E6808UHFBZ & E6808LHFBZ & E6007LHFBZ & E6810LHFBZ & E6810GHFBZ & E6810KHFBZ & E6810MRB & SZ6505HFB & SZ6506HFB & E6809CHFBZ & E6208LHFBZ & SV6808THFB & SV6808GHFB & SV6807B & E6807TB & SR2506B & SZ4506B & SV6808LB  
 收件日期(Sample Receiving Date) : 2016/04/15  
 測試期間(Testing Period) : 2016/04/15 TO 2016/04/21

### 測試需求(Test Requested) :

- (1) 依據客戶指定，參考RoHS2011/65/EU Annex II及其修訂指令(EU) 2015/863測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚，DBP, BBP, DEHP, DIBP. (As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample.)
- (2) 其他測試項目請見下一頁。(Please refer to next pages for the other item(s).)

測試結果(Test Results) : 請見下一頁 (Please refer to next pages).

  
 Troy Chang Manager- Tech  
 Signed for and on behalf of  
 SGS TAIWAN LTD.  
 Chemical Laboratory - Taipei

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## 測試結果(Test Results)

測試部位(PART NAME)No.1 : 黑色塑膠粒 (BLACK PLASTIC PELLETS)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)
				No. 1
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.
汞 / Mercury (Hg)	mg/kg	參考IEC 62321-4 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-4 (2013) and performed by ICP-AES.	2	n. d.
六價鉻 / Hexavalent Chromium Cr(VI)	mg/kg	參考IEC 62321 (2008), 以UV-VIS檢測. / With reference to IEC 62321 (2008) and performed by UV-VIS.	2	n. d.
銻 / Antimony (Sb)	mg/kg	參考US EPA 3050B (1996), 以感應耦合電漿原子發射光譜儀檢測. / With reference to US EPA 3050B (1996). Analysis was performed by ICP-AES.	2	n. d.
三氧化二銻 / Antimony trioxide (Sb <sub>2</sub> O <sub>3</sub> )* (CAS No.: 1309-64-4)	mg/kg	參考US EPA 3050B (1996), 以感應耦合電漿原子發射光譜儀檢測. / With reference to US EPA 3050B (1996). Analysis was performed by ICP-AES.***	-	n. d.

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11F, NO. 369, FU-HSING N. ROAD, TAIPEI, 105 TAIWAN, R. O. C.



測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)
				No. 1
六溴環十二烷及所有主要被辨別出的異構物 / Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified ( $\alpha$ -HBCDD, $\beta$ -HBCDD, $\gamma$ -HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	參考IEC 62321 (2008), 以氣相層析/質譜儀檢測。 / With reference to IEC 62321 (2008). Analysis was performed by GC/MS.	5	n. d.
鄰苯二甲酸丁苄酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	參考IEC 62321-8/CD (2013), 以氣相層析儀/質譜儀檢測。 / With reference to IEC 62321-8/CD (2013). Analysis was performed by GC/MS.	50	n. d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg		50	n. d.
鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg		50	n. d.
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg		50	n. d.
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg		50	n. d.
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg		50	n. d.
鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg		50	n. d.
鄰苯二甲酸二戊酯 / Di-n-pentyl phthalate (CAS No.: 131-18-0)	mg/kg		50	n. d.
鄰苯二甲酸二正己酯 / DNHP (Di-n-hexyl phthalate) (CAS No.: 84-75-3)	mg/kg		50	n. d.
鄰苯二甲酸二(2-甲氧基乙基)酯 / DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg		50	n. d.

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)
				No. 1
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	參考US EPA 3550C (2007), 以液相層析/質譜儀檢測. / With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	10	n. d.
全氟辛酸 / PFOA (CAS No. : 335-67-1)	mg/kg	參考US EPA 3550C (2007), 以液相層析/質譜儀檢測. / With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	10	n. d.
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321-6 (2015), 以氣相層析/質譜儀檢測. / With reference to IEC 62321-6 (2015) and performed by GC/MS.	-	n. d.
一溴聯苯 / Monobromobiphenyl	mg/kg		5	n. d.
二溴聯苯 / Dibromobiphenyl	mg/kg		5	n. d.
三溴聯苯 / Tribromobiphenyl	mg/kg		5	n. d.
四溴聯苯 / Tetrabromobiphenyl	mg/kg		5	n. d.
五溴聯苯 / Pentabromobiphenyl	mg/kg		5	n. d.
六溴聯苯 / Hexabromobiphenyl	mg/kg		5	n. d.
七溴聯苯 / Heptabromobiphenyl	mg/kg		5	n. d.
八溴聯苯 / Octabromobiphenyl	mg/kg		5	n. d.
九溴聯苯 / Nonabromobiphenyl	mg/kg		5	n. d.
十溴聯苯 / Decabromobiphenyl	mg/kg		5	n. d.
多溴聯苯醚總和 / Sum of PBDEs	mg/kg		-	n. d.
一溴聯苯醚 / Monobromodiphenyl ether	mg/kg		5	n. d.
二溴聯苯醚 / Dibromodiphenyl ether	mg/kg		5	n. d.
三溴聯苯醚 / Tribromodiphenyl ether	mg/kg		5	n. d.
四溴聯苯醚 / Tetrabromodiphenyl ether	mg/kg		5	n. d.
五溴聯苯醚 / Pentabromodiphenyl ether	mg/kg		5	n. d.
六溴聯苯醚 / Hexabromodiphenyl ether	mg/kg		5	n. d.
七溴聯苯醚 / Heptabromodiphenyl ether	mg/kg		5	n. d.
八溴聯苯醚 / Octabromodiphenyl ether	mg/kg		5	n. d.
九溴聯苯醚 / Nonabromodiphenyl ether	mg/kg		5	n. d.
十溴聯苯醚 / Decabromodiphenyl ether	mg/kg		5	n. d.

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11F, NO. 369, FU-HSING N. ROAD, TAIPEI, 105 TAIWAN, R. O. C.



測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)
				No. 1
鹵素 / Halogen				
鹵素 (氟) / Halogen-Fluorine (F) (CAS No. : 14762-94-8)	mg/kg	參考BS EN 14582 (2007), 以離子層析 儀分析. / With reference to BS EN 14582 (2007). Analysis was performed by IC.	50	268
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No. : 22537-15-1)	mg/kg		50	n. d.
鹵素 (溴) / Halogen-Bromine (Br) (CAS No. : 10097-32-2)	mg/kg		50	n. d.
鹵素 (碘) / Halogen-Iodine (I) (CAS No. : 14362-44-8)	mg/kg		50	n. d.

### 備註(Note) :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n. d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)
5. \*\*\*: 該物質是由銻之測試結果計算得知. 其MDL是針對銻之評估. (The substance was calculated by the test results of Antimony. The MDL was evaluated for Antimony.)
6. 參數換算表 / Parameter Conversion Table :  
Please refer to [http://twap.sgs.com/sgsrsts/chn/download-REACH\\_tw.asp](http://twap.sgs.com/sgsrsts/chn/download-REACH_tw.asp)

### PFOS參考資訊(Reference Information) : 持久性有機污染物 POPs - (EU) 757/2010

PFOS濃度在物質或製備中不得超過0.001%(10ppm), 在半成品、成品或零部件中不得超過0.1%(1000ppm), 在紡織品或塗層材料中不得超過1µg/m<sup>2</sup>。

(Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m<sup>2</sup>.)

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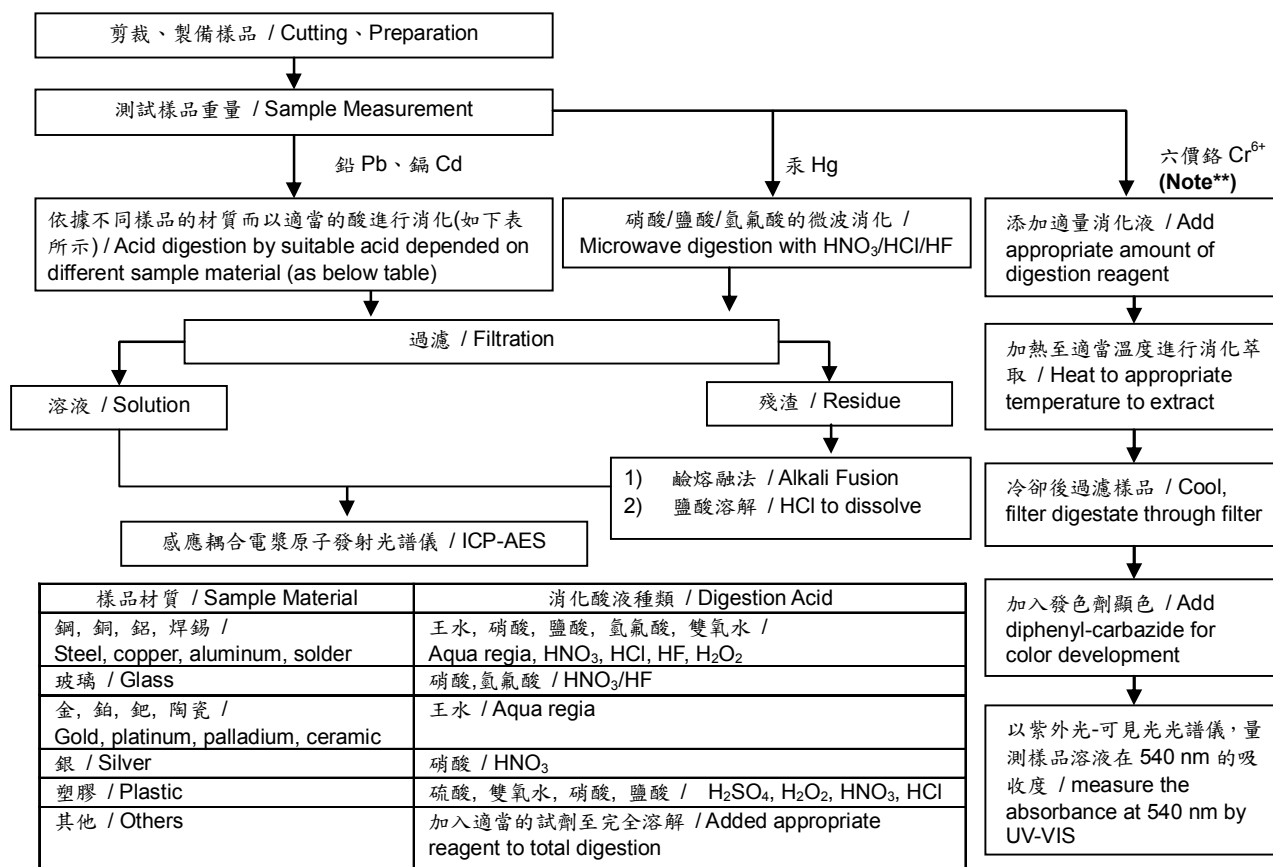
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根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外)

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> test method excluded)

- 測試人員：楊登偉 / Technician : Climbgreat Yang
- 測試負責人：張啟興 / Supervisor: Troy Chang



### Note\*\* (For IEC 62321)

- (1) 針對非金屬材料加入鹼性消化液，加熱至 90~95°C 萃取。 / For non-metallic material, add alkaline digestion reagent and heat to 90~95°C.
- (2) 針對金屬材料加入純水，加熱至沸騰萃取。 / For metallic material, add pure water and heat to boiling.

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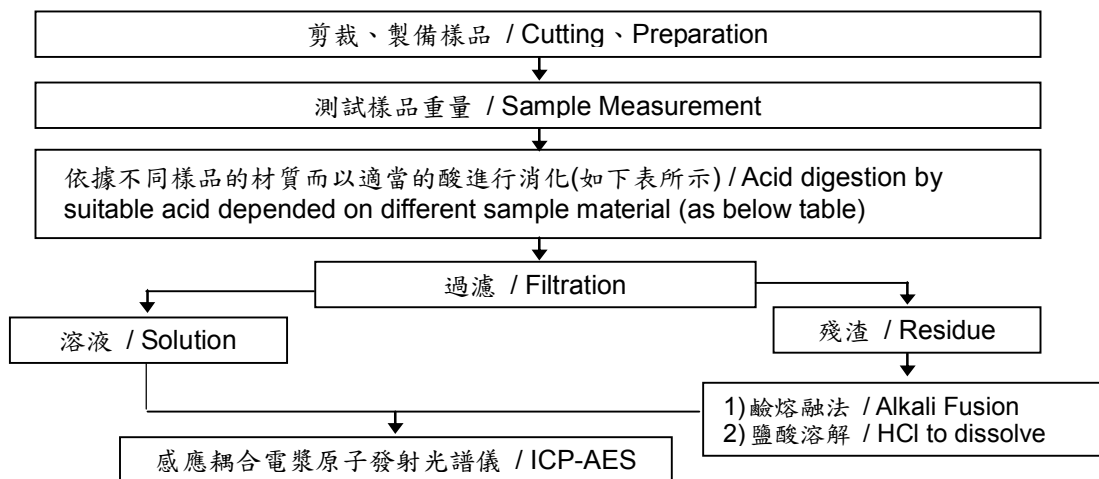
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台北市復興北路369號11樓  
11F, NO. 369, FU-HSING N. ROAD, TAIPEI, 105 TAIWAN, R. O. C.



根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.

- 測試人員：楊登偉 / Technician: Climbgreat Yang
- 測試負責人：張啟興 / Supervisor: Troy Chang

### 元素以 ICP-AES 分析的消化流程圖 (Flow Chart of digestion for the elements analysis performed by ICP-AES)



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub>
玻璃 / Glass	硝酸,氫氟酸 / HNO <sub>3</sub> /HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO <sub>3</sub>
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCl
其他 / Others	加入適當的試劑至完全溶解 / Added appropriate reagent to total digestion

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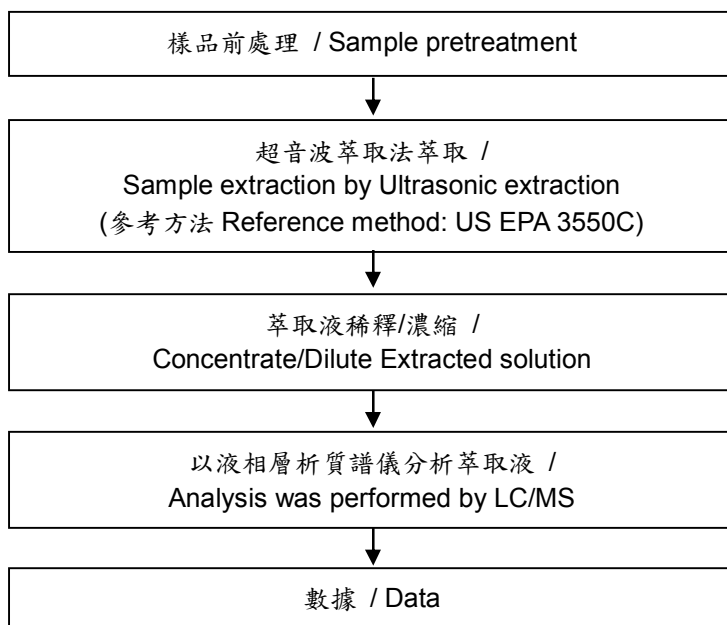
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### 全氟辛酸/全氟辛烷磺酸分析流程圖 / Analytical flow chart - PFOA/PFOS

- 測試人員：翁賜彬 / Technician: Roman Wong
- 測試負責人：張啟興 / Supervisor: Troy Chang



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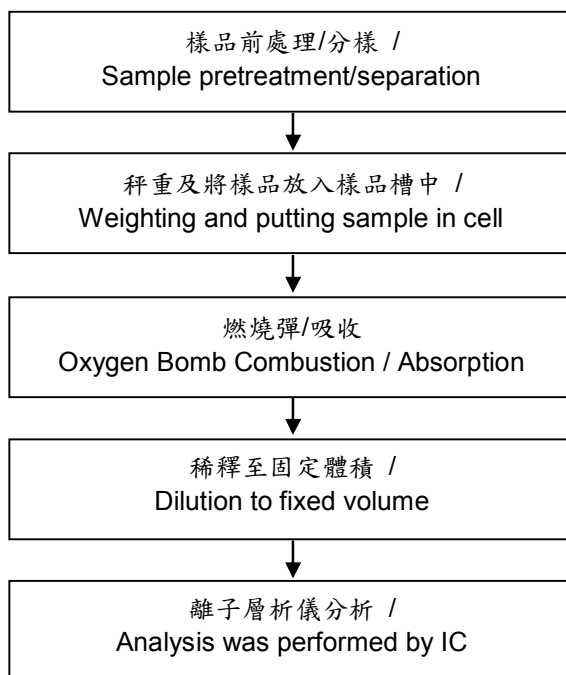
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### 鹵素分析流程圖 / Analytical flow chart - Halogen

- 測試人員：陳恩臻 / Technician: Rita Chen
- 測試負責人：張啟興 / Supervisor: Troy Chang



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## 測試報告

## Test Report

號碼(No.) : CE/2016/43083

日期(Date) : 2016/04/21

頁數(Page): 10 of 13

華立企業股份有限公司

WAH LEE INDUSTRIAL CORP.

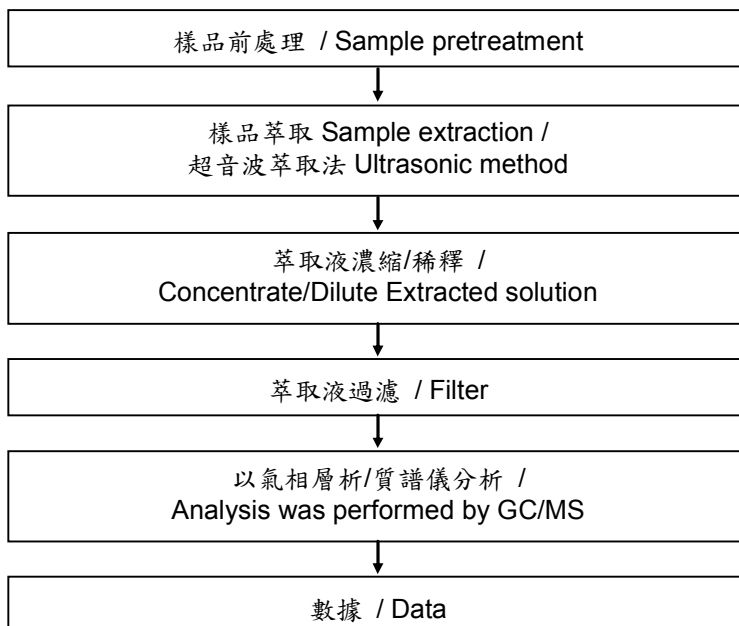
台北市復興北路369號11樓

11F, NO. 369, FU-HSING N. ROAD, TAIPEI, 105 TAIWAN, R. O. C.



### 六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD

- 測試人員：翁賜彬 / Technician: Roman Wong
- 測試負責人：張啟興 / Supervisor: Troy Chang



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## 測試報告

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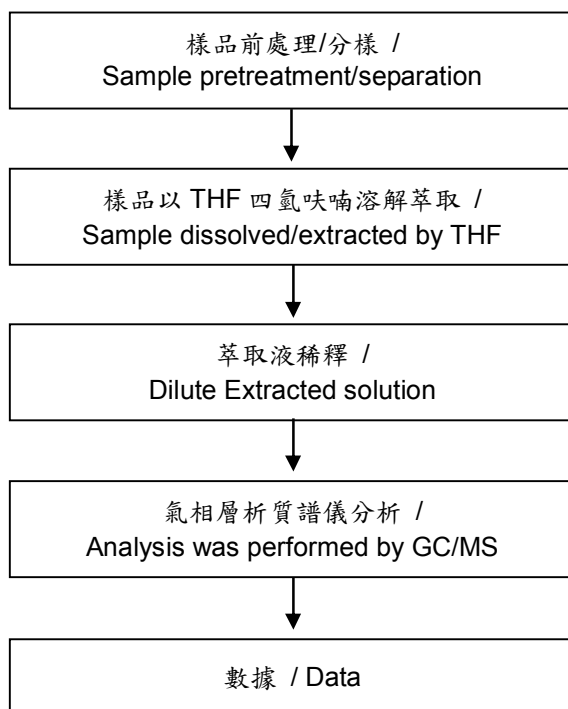
11F, NO. 369, FU-HSING N. ROAD, TAIPEI, 105 TAIWAN, R. O. C.



### 可塑劑分析流程圖 / Analytical flow chart - Phthalate

- 測試人員：徐毓明 / Technician: Andy Shu
- 測試負責人：張啟興 / Supervisor nt: Troy Chang

#### 【測試方法/Test method: IEC 62321-8】



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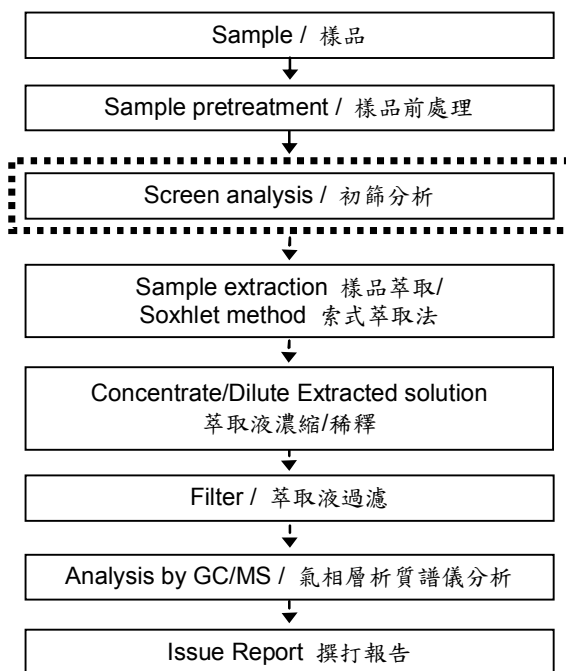
11F, NO. 369, FU-HSING N. ROAD, TAIPEI, 105 TAIWAN, R. O. C.



### 多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBB/PBDE

- 測試人員：翁賜彬 / Technician: Roman Wong
- 測試負責人：張啟興 / Supervisor: Troy Chang

初次測試程序 / First testing process —————>  
 選擇性篩檢程序 / Optional screen process .....  
 確認程序 / Confirmation process - - ->



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## Test Report

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華立企業股份有限公司

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台北市復興北路369號11樓

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\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*  
(The tested sample / part is marked by an arrow if it's shown on the photo.)

### CE/2016/43083



\*\* 報告結尾 (End of Report) \*\*

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**INSPECTION CERTIFICATE according to EN10204 3.1**

**Our Reference:**  
Shipping Zutphen

**Certificate No:**  
13 05453

**Date:**  
19-09-2013

**Customer:****AURUBIS AHE MATERIAL D.C.**

(Shanghai) Co.Ltd.Section A  
1th Fl. No.211 Fute Road  
Waigaoqiao Free Trade Zone  
200131 SHANGHAI China.

**Description:** BRSTRP 305 X 0.15 MM

**Order No/Ref:** PO000366B

**Mark:**

**Part No:**

**Order No:** 378759 / 1

**Alloy - Temper:** 1065 - 95

**Norm Specification:**

**Our part no:** 768719

**Net weight:** 911 kg

**CHEMICAL COMPOSITION**

	Coil	Cu min/max	Zn min/max
<b>Specified values:</b>		64,5 / 66,5	33,5 / 35,5
<b>Actual values:</b>	<b>214524</b>	65,7 / 66,0	Remainder

**DIMENSIONAL REQUIREMENTS**

	Coil	Thickness min/max mm	x	s	n	Width min/max mm
<b>Specified values:</b>		0,143 / 0,157				304,85 / 305,15
<b>Actual values:</b>	<b>214524</b>	0,147 / 0,154	0,149	0,0013	794	304,98 / 304,98

**MECHANICAL PROPERTIES**

	Coil	Hardness (Vickers) min/max	Tensile strength N/mm2 min/max
<b>Specified values:</b>		180 / 210	565 / 635
<b>Actual values:</b>	<b>214524</b>	194 / 195	635 / 635

All properties stated on this document are according to your specifications

**This document is generated automatically and therefore not signed.**

**AURUBIS NETHERLANDS B.V.**

Oostzeestraat 1, P.O. Box 2, 7200 AA Zutphen, The Netherlands

Tel. +31 575 594 594, Fax +31 575 512 171

K.v.K. Apeldoorn 52930610, VAT NL850670676B01



**BUREAU  
VERITAS**

# TEST REPORT

LAB NO. : (6617)005-1071  
DATE : January 16, 2017  
PAGE : 1 OF 6

Applicant 申请人公司名称:

**AURUBIS METAL PRODUCTS (SHANGHAI) CO., LTD/奥鲁比斯金属制品(上海)有限公司**  
PART A, 1F, NO. 211, FUTE RD(N), WAIGAOQIAO FREE TRADE ZONE, SHANGHAI  
上海外高桥保税区富特北路 211 号一层 A 部

Date of Submission 样品收取日期: January 5, 2017  
Test Period 所需工作周期: January 5, 2017 to January 16, 2017

Sample Description 样品描述: Sample(s) received is(are) stated to be Copper Strip 铜带  
Test Item(s) 测试项目: Details see page 2 详见第二页

Manufacturer: Aurubis Netherlands BV Style No(s): SM1065  
Buyer: 得意精密电子(苏州)有限公司 PO No.: /  
Country of Origin: 荷兰 LOTES Suzhou CO., LTD Country of Destination: /

## SUMMARY OF TEST RESULTS 测试结果摘要

TEST REQUESTED 测试要求	CONCLUSION 结论
Heavy Metals and Flame Retardants Content – European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) with its Amendments 重金属和阻燃剂含量 - 有关欧盟委员会针对电子产品的指令(电子电器禁用某些有害物质指令), 2011/65/EU 及其修订条款	PASS 通过

Note 注释: The tested part of the sample was specified by client. 样品的测试部位由客户指定。  
The test conclusion was given based on the results of tested part. 结论基于测试部位结果。

### REMARK/备注

If there are questions or concerns on this report, please contact the following persons:

若有任何疑问或咨询, 可通过下述联络方式与我们联系

General enquiry and invoicing  
其他问题

Technical enquiry  
技术问题

俞文杰 先生/陈蕾 小姐 Mr. Speed Yu/ Ms. Joanna Chen  
(021) 24166888\*6832/6849  
Speed.yu@cn.bureauveritas.com/ Joan.chen@cn.bureauveritas.com  
余克刚 / 何丹青 先生 Mr. Gorden Yu/ Ken He  
(021) 24166888\*6852/6859  
Gorden.Yu@cn.bureauveritas.com/ Kenny.he@cn.bureauveritas.com

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**CONSUMER PRODUCTS SERVICES DIVISION (SHANGHAI)**  
必维国际检验集团-必维申美商品检测(上海)有限公司

PREPARED BY : Sherry/Violet/Lily  
制定:

余克刚 Gorden Yu  
化学实验室经理 Analytical Lab Manager

Bureau Veritas  
Consumer Products Services Division (Shanghai)  
No. 168, Guanghua Road, Zhuangqiao Town,  
Minhang, Shanghai China, 201108  
Tel.: 86-21-24081888 Fax: 86-21-64890042  
Email: bvcpsh\_info@cn.bureauveritas.com  
Http: www.bureauveritas.com/cps

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LAB NO. : (6617)005-1071  
DATE : January 16, 2017  
PAGE : 2 OF 6

**Sample Description Assigned by Laboratory:**

**实验室对样品的描述:**

Test Item 测试项目	Description 描述
1	Coppery metal

Note 注释:

g = gram(s) 克

mcg = microgram(s) 微克

mg/kg = milligram per kilogram 毫克每千克

mg/L = milligram per litre 毫克每升

g/kg = gram(s) per kilogram 克每千克

MDL = Method Detection Limit 方法检测限

ND = Not Detected (< MDL) 未检出

EX = Exempted 豁免

% = percentage 百分比

1 mg/kg = 0.0001%

"<" = less than 小于

">" = Greater than 大于

Req. = Requirement 要求

"-" = Not Regulated 未规定

NA = Not applicable 不适用

**Photo of the Submitted Sample**

**递交样品照片**



**66170051071**



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LAB NO. : (6617)005-1071  
DATE : January 16, 2017  
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### TEST RESULT 测试结果

**Heavy Metals and Flame Retardants Content - European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) with its Amendments**  
**重金属和阻燃剂含量 - 有关欧盟委员会针对电子产品的指令(电子电器禁用某些有害物质指令), 2011/65/EU 及其修订条款**

Test Method 测试方法 : See Appendix. 见附录。

-	Unit 单位	Maximum Allowable Limit (Req.) 最大允许限值 (要求)	Result 结果
<b>Test Item 测试项目</b>	-	-	<b>1</b>
<b>Parameter 参数</b>	-	-	-
Lead (Pb) 铅	mg/kg	1000	22.0
Cadmium (Cd) 镉	mg/kg	100	ND
Mercury (Hg) 汞	mg/kg	1000	ND
Chromium VI (Cr VI) 六价铬	-	Negative	Negative
MonoBB 一溴联苯	mg/kg		ND
DiBB 二溴联苯	mg/kg		ND
TriBB 三溴联苯	mg/kg		ND
TetraBB 四溴联苯	mg/kg		ND
PentaBB 五溴联苯	mg/kg		ND
HexaBB 六溴联苯	mg/kg		ND
HeptaBB 七溴联苯	mg/kg		ND
OctaBB 八溴联苯	mg/kg		ND
NonaBB 九溴联苯	mg/kg		ND
DecaBB 十溴联苯	mg/kg		ND
Sum of PBBs 多溴联苯总和	mg/kg	1000	ND
MonoBDE 一溴联苯醚	mg/kg		ND
DiBDE 二溴联苯醚	mg/kg		ND
TriBDE 三溴联苯醚	mg/kg		ND
TetraBDE 四溴联苯醚	mg/kg		ND
PentaBDE 五溴联苯醚	mg/kg		ND
HexaBDE 六溴联苯醚	mg/kg		ND
HeptaBDE 七溴联苯醚	mg/kg		ND
OctaBDE 八溴联苯醚	mg/kg		ND
NonaBDE 九溴联苯醚	mg/kg		ND
DecaBDE 十溴联苯醚	mg/kg		ND
Sum of PBDEs 多溴联苯醚总和	mg/kg	1000	ND
<b>Conclusion 结论</b>	-	-	<b>PASS 通过</b>



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**LAB NO. : (6617)005-1071**  
**DATE : January 16, 2017**  
**PAGE : 4 OF 6**

**Note / Key 注释:**

Detection Limit 检出限(mg/kg) :

Each (Pb, Cd, Hg & Cr VI) 2 各 (铅, 镉, 汞和六价铬) 2;

Each PBB 5; Each PBDE 5 各多溴联苯 5; 各多溴联苯醚 5

**Remark 备注:**

- The list of analytes is summarized in table of Appendix. 分析物列表 – 见附录。
- The test flowchart of heavy metals and flame retardants content is listed in table of Appendix.  
重金属和阻燃剂含量的测试流程图 – 见附录
- Result(s) of Cr VI for metallic material(s) was (were) expressed in term of positive and negative. Negative means the absence of Cr VI on the tested areas and the result(s) was (were) regarded as in compliance with European Parliament and Council Directive 2011/65/EU, Article 4(1). While, positive means the presence of Cr VI on tested areas and the result(s) was (were) regarded as in conflict with European Parliament and Council Directive 2011/65/EU, Article 4(1).  
金属材料的六价铬结果以阴性和阳性表示。阴性表示六价铬未被检出在测试表面，即结果被认为符合 2011/65/EU 指令中，条款 4(1) 的要求。而阳性则表示六价铬存在在测试表面，即不符合 2011/65/EU 指令中，条款 4(1)的要求。
- According to European Parliament and Council Directive 2011/65/EU, Article 5 “Adaptation of the Annexes to scientific and technical progress”, exemption(s) should be granted to the materials and components of Test Item(s) in the lists in Annexes III and IV of this directive.  
根据欧盟委员会 2011/65/EU 指令中，条款 5“适应科学技术进步的附件”，附件 III 和 IV 中列明的测试项目中的材料和部件可予以豁免。

END



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LAB NO. : (6617)005-1071  
DATE : January 16, 2017  
PAGE : 5 OF 6

## APPENDIX 附录

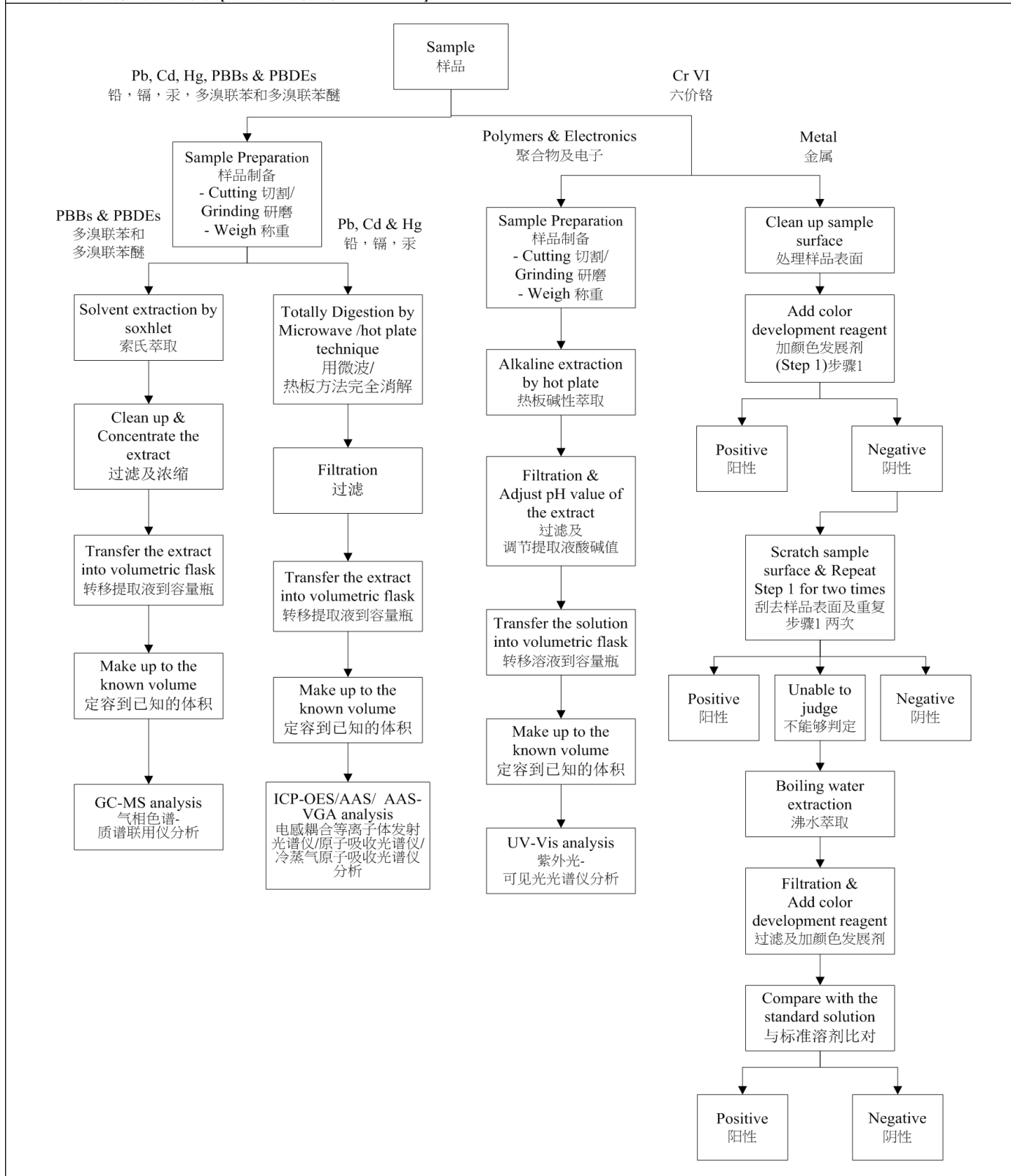
List of Analytes and their Corresponding Test Methods [ European Parliament and Council Directive 2011/65/EU ] : 分析物名单及其相应的测试方法   欧盟委员会指令 2011/65/EU  :		
No.	Name of Analytes 分析物名称	Test Method(s) 测试方法
1	Lead (Pb) 铅	With reference to IEC 62321-5: 2013. 参照 IEC 62321-5: 2013.
2	Cadmium (Cd) 镉	
3	Mercury (Hg) 汞	With reference to IEC 62321-4: 2013. 参照 IEC 62321-4: 2013.
4	Chromium VI (Cr VI) 六价铬	<u>Metal 金属</u> : With reference to IEC 62321-7-1:2015. 参照 IEC 62321-7-1: 2015. <u>Polymers &amp; Electronics 聚合物及电子件</u> : With reference to EN 62321: 2009, Annex C. 参照 EN 62321: 2009, Annex C.
5	Polybromobiphenyls (PBBs) 多溴联苯 - Bromobiphenyl (MonoBB) - Dibromobiphenyl (DiBB) - Tribromobiphenyl (TriBB) - Tetrabromobiphenyl (TetraBB) - Pentabromobiphenyl (PentaBB) - Hexabromobiphenyl (HexaBB) - Heptabromobiphenyl (HeptaBB) - Octabromobiphenyl (OctaBB) - Nonabromobiphenyl (NonaBB) - Decabromobiphenyl (DecaBB)	With reference to IEC 62321-6:2015. 参照 IEC 62321-6:2015.
6	Polybromodiphenyl ethers (PBDEs) 多溴联苯醚 - Bromodiphenyl ether (MonoBDE) - Dibromodiphenyl ether (DiBDE) - Tribromodiphenyl ether (TriBDE) - Tetrabromodiphenyl ether (TetraBDE) - Pentabromodiphenyl ether (PentaBDE) - Hexabromodiphenyl ether (HexaBDE) - Heptabromodiphenyl ether (HeptaBDE) - Octabromodiphenyl ether (OctaBDE) - Nonabromodiphenyl ether (NonaBDE) - Decabromodiphenyl ether (DecaBDE)	





APPENDIX 附录

Test Flowchart of Heavy Metals and Flame Retardants Content [ European Parliament and Council Directive 2011/65/EU ] :  
重金属和阻燃剂的测试流程图[ 欧盟委员会指令 2011/65/EU ]:



# 材 質 證 明 書

昆山瑞华达精密电子材料有限公司

MATERIAL CERTIFICATE

昆山市张浦镇振新西路 300 号

Kunshan Ruihuada Precision Electronic Material Co., Ltd.

TEL : 0512-57299581 FAX : 0512-36603722

製造編號		得意								生產編號 Customer No		20110825002		開立日期 Issue Date		2011-8-25		證明書編號 Certificate No		20110825002					
鋼種名稱		S50C								訂單編號 Order No				依據規範 By Standard		JIS									
專案 Item	鋼卷編號 Coil No		厚度 (MM) Thickness		寬度 (MM) Width		長度 (MM) Length		數量 Quantity		重量 (KG) Weight		成品表面加工 Surface Finish												
1			0.4		26		COIL COIL COIL COIL COIL		1C		样品														
2																									
3																									
4																									
5																									
規格	化學 (Chemical Analysis Wtx%)										規格 Spec		硬度 Hardness		降伏強度 (N/mm <sup>2</sup> ) Yieldstress		引張強度 (N/mm <sup>2</sup> ) Tensile Stress		伸長率 (%) Elongation		彎曲試驗 BendTest				
Spec	C	Si	Mn	P	S	Ni	Cr	Mo	N																
專案 Item	0.47 0.53	0.15 0.35	0.60 0.90	0.030 max.	0.035 max.						試片編號 Specimen		HV		min		min		min		min				
1	0.48	0.25	0.74	0.022	0.003							20110825002		170								OK			
2																									
3																									
4																									
5																									
以上所列出的典型資料，僅供參考，並不代表技術資料的最大或最小值，也不用於最終設計。任一具體材料的資料可能與此表中所列出的資料有所不同。 Data shown are typical,For reference only,and should not be construed as maximum or minimum values for specification or for final .Data on any particular piece of material may vary from those shown heren.												如有異常，請於三天內回復。 Only discrepancy pls contact us within3day`s.						技術部經理 Mamger ,Technology Department							

## Test Report

No. SHAEC1614613901

Date: 06 Jul 2016

Page 1 of 4

Kunshan Ruihuada Precision Electronic Material Co., Ltd  
Vibration, ZhangPu town, Kunshan City West Road No.889

The following sample(s) was/were submitted and identified on behalf of the clients as : S50C

SGS Job No. : SP16-024362 - SH  
Model No. : S50C  
Date of Sample Received : 04 Jul 2016  
Testing Period : 04 Jul 2016 - 06 Jul 2016  
Test Requested : Selected test(s) as requested by client.  
Test Method : Please refer to next page(s).  
Test Results : Please refer to next page(s).  
Conclusion : Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Signed for and on behalf of  
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

*Marry Ma*

Marry Ma  
Approved Signatory



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SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.  
Testing Center-Chenchen Laboratory

3<sup>rd</sup> Building, No.889 Yishan Road Xuhui District, Shanghai China 200233  
中国·上海·徐汇区宜山路889号3号楼 邮编: 200233

t E&E (86-21) 61402553 f E&E (86-21) 64953679 www.sgs.com.cn  
t HL (86-21) 61402594 f HL (86-21) 61156899 e [sgs.china@sgs.com](mailto:sgs.china@sgs.com)

## Test Report

No. SHAEC1614613901

Date: 06 Jul 2016

Page 2 of 4

Test Results :

### Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA16-146139.001	Silvery metal

Remarks :

- (1) 1 mg/kg = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected ( < MDL )
- (4) "-" = Not Regulated

### RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : (1) With reference to IEC 62321-5:2013, determination of Cadmium by ICP-OES.  
 (2) With reference to IEC 62321-5:2013, determination of Lead by AAS.  
 (3) With reference to IEC 62321-4:2013, determination of Mercury by ICP-OES.  
 (4) With reference to IEC 62321:2008, determination of Hexavalent Chromium by spot test / Colorimetric Method using UV-Vis.

Test Item(s)	Limit	Unit	MDL	001
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	-	-	◇	Negative

Notes :

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) ◇Spot-test:  
 Negative = Absence of Cr(VI) coating, Positive = Presence of Cr(VI) coating;  
 (The tested sample should be further verified by boiling-water-extraction method if the spot test result is Negative or cannot be confirmed.)  
 ◇Boiling-water-extraction:  
 Negative = Absence of Cr(VI) coating  
 Positive = Presence of Cr(VI) coating; the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.  
 Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.



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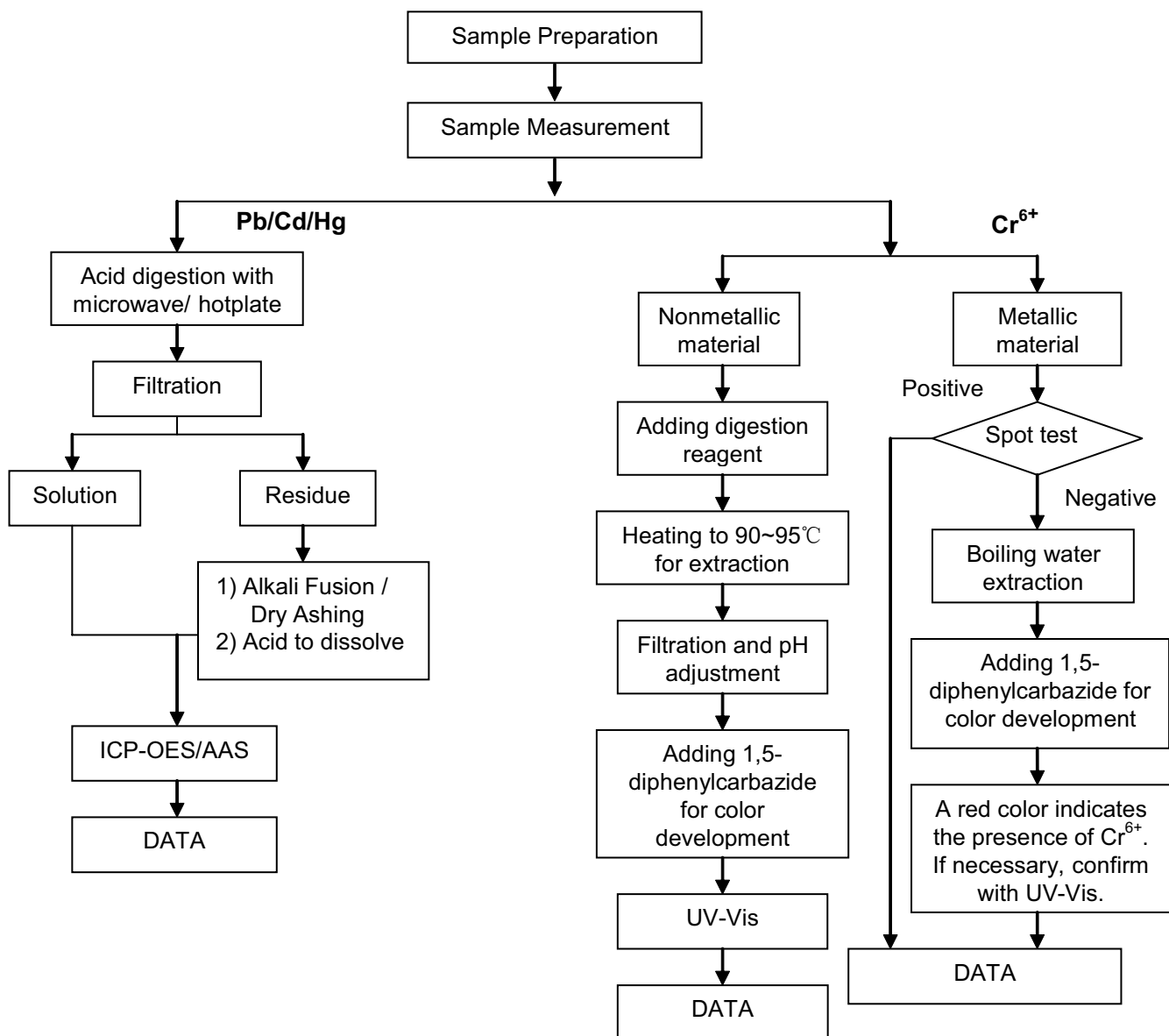
3<sup>rd</sup> Building, No. 889 Yishan Road Xuhui District, Shanghai China 200233  
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## ATTACHMENTS

### RoHS Testing Flow Chart

- 1) Name of the person who made testing: Bob Zhang/Jing Zhang/Shimin Zhang
- 2) Name of the person in charge of testing: Luna Xu/Jan Shi/Stone Chen
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart.  
(Cr<sup>6+</sup> test method excluded)



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## Test Report

No. SHAEC1614613901

Date: 06 Jul 2016

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Sample photo:



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Testing Center-Chemical Laboratory

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# 检测报告 Test Report

报告编号 ECL01I062655002E  
Report No. ECL01I062655002E

第 1 页 共 6 页  
Page 1 of 6

申请单位 得意精密电子(苏州)有限公司  
Applicant LOTES(SUZHOU) CO.,LTD

地址 江苏省苏州市相城经济开发区漕湖大道26号  
Address NO.26 CAOJU ROAD XIANGCHENG ECONOMIC DEVELOPMENT ZONE,SUZHOU  
CHINA

以下测试之样品及样品信息由申请者提供并确认

The following sample(s) and sample information was/were submitted and identified by/on the behalf of the client

样品名称 鍍Ni Au  
Sample Name

材料名称 C1065  
Material

样品接收日期 2016.10.24  
Sample Received Date Oct. 24, 2016

样品检测日期 2016.10.24-2016.10.27  
Testing Period Oct. 24, 2016 to Oct. 27, 2016

检测要求 根据客户要求, 对所提交样品中的铅(Pb), 镉(Cd), 汞(Hg), 六价铬(Cr(VI)), 全氟辛烷磺酸盐(PFOS)进行测试。  
Test Requested As specified by client, to test Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent Chromium(Cr(VI)), Perfluorooctane Sulfonates(PFOS) in the submitted sample(s).

检测依据/检测结果 请参见下页。  
Test Method/Test Result(s) Please refer to the following page(s).

主 检 陈娟娟  
Tested by

批准 林红伟  
Approved by

审 核 陶英  
Reviewed by

日 期 2016.10.27  
Date

林红伟  
Senior Laboratory Manager  
上海华测品标检测技术有限公司  
Centre Testing International Pinbiao(Shanghai) Co., Ltd.

No. R264041685

上海市浦东新区新金桥路1996号  
No.1996,Xinjiniao Road, Pudong New District, Shanghai, China

# 检测报告 Test Report

报告编号 ECL01I062655002E  
Report No. ECL01I062655002E

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Page 2 of 6

## 检测依据 Test Method

测试项目 Test Item(s)	测试方法 Test Method	测试仪器 Measured Equipment(s)
铅(Pb) Lead (Pb)	参考 IEC 62321-5:2013 Ed. 1.0 Refer to IEC 62321-5:2013 Ed.1.0	ICP-OES
镉(Cd) Cadmium (Cd)	参考 IEC 62321-5:2013 Ed. 1.0 Refer to IEC 62321-5:2013 Ed.1.0	ICP-OES
汞(Hg) Mercury (Hg)	参考 IEC 62321-4:2013 Ed. 1.0 Refer to IEC 62321-4:2013 Ed.1.0	ICP-OES
六价铬(Cr(VI)) Hexavalent Chromium(Cr(VI))	IEC 62321-7-1:2015	UV-Vis
全氟辛酸磺酸盐(PFOS) Perfluorooctane Sulfonates(PFOS)	参考 US EPA 3550C:2007 & US EPA 8321B:2007 Refer to US EPA 3550C:2007 & US EPA 8321B:2007	LC-MS-MS

## 检测结果 Test Result(s)

测试项目 Test Item(s)	结果 Result	方法检出限 MDL
铅(Pb) Lead (Pb)	60 mg/kg	2 mg/kg
镉(Cd) Cadmium (Cd)	N.D.	2 mg/kg
汞(Hg) Mercury (Hg)	N.D.	2 mg/kg
六价铬(Cr(VI)) Hexavalent Chromium(Cr(VI))	N.D. ▼	0.10 µg/cm <sup>2</sup> (LOQ)
测试项目 Test Item(s)	结果 Result	方法检出限 MDL
全氟辛酸磺酸盐(PFOS) Perfluorooctane Sulfonates(PFOS)	N.D.	0.5 µg/m <sup>2</sup>



# 检测报告 Test Report

报告编号 ECL01I062655002E  
Report No. ECL01I062655002E

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Page 3 of 6

测试样品/部位描述 银色镀层  
Tested Sample/Part Description Silvery plating

备注: 对于检测铅, 镉, 汞之样品已完全溶解。  
-N.D. = 未检出 (小于方法检出限或定量限)  
-mg/kg = ppm = 百万分之一  
-LOQ = 定量限, 六价铬的定量限为0.10 µg/cm<sup>2</sup>  
-▼六价铬浓度小于0.10 µg/cm<sup>2</sup>, 样品未检出六价铬。

**Remark: The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.**  
-MDL = Method Detection Limit  
-N.D. = Not Detected (<MDL or LOQ)  
-mg/kg = ppm = parts per million  
-LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is 0.10 µg/cm<sup>2</sup>  
-▼The sample is negative for Cr(VI) – The Cr(VI) concentration is below 0.10 µg/cm<sup>2</sup>. The coating is considered a non-Cr(VI) based coating.

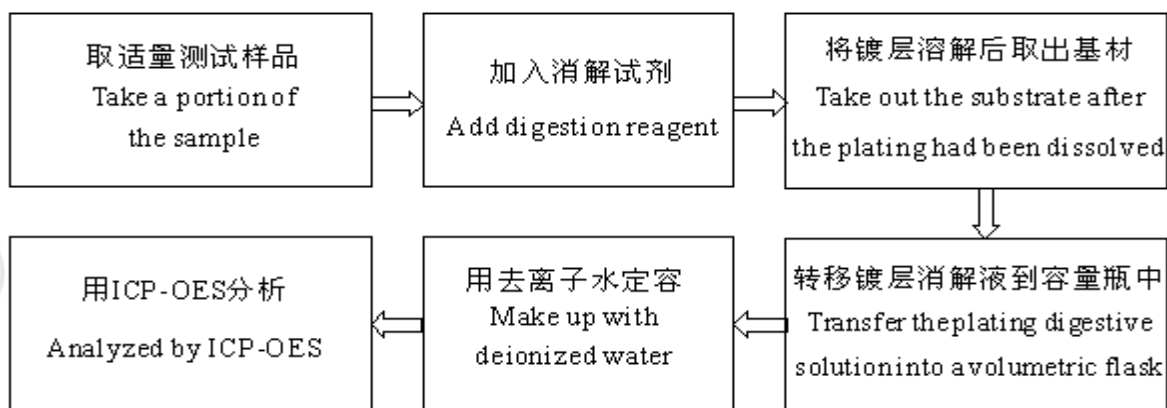
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Report No. ECL01H062655002E

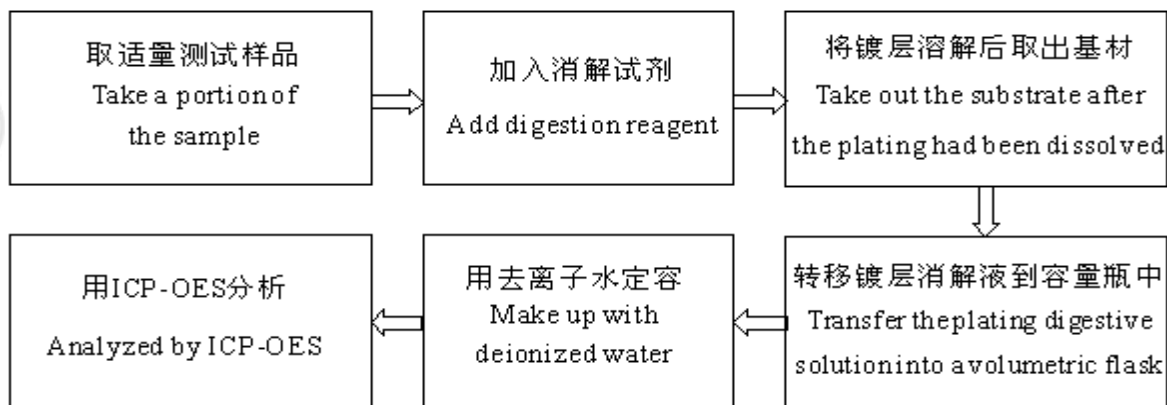
第 4 页 共 6 页  
Page 4 of 6

## 检测流程 Test Process

### 1. 铅(Pb), 镉(Cd) Lead (Pb), Cadmium (Cd)



### 2. 汞(Hg) Mercury (Hg)

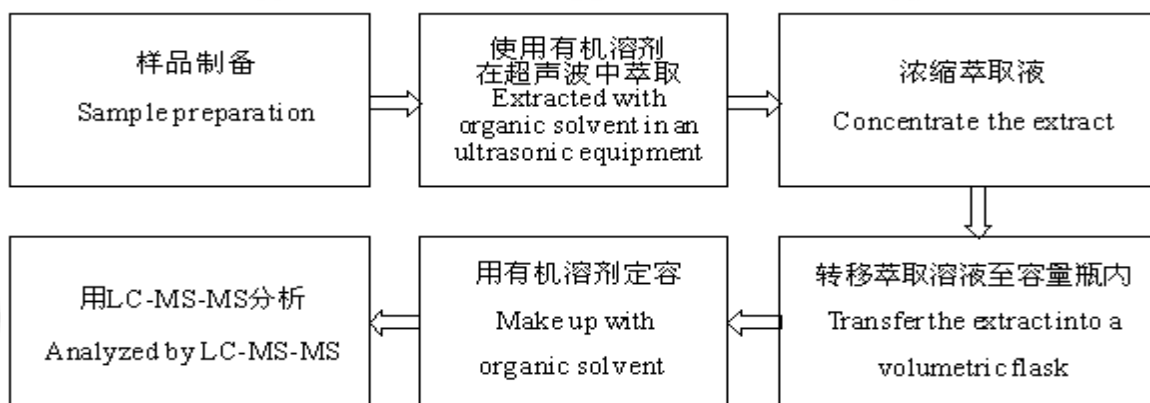


# 检测报告 Test Report

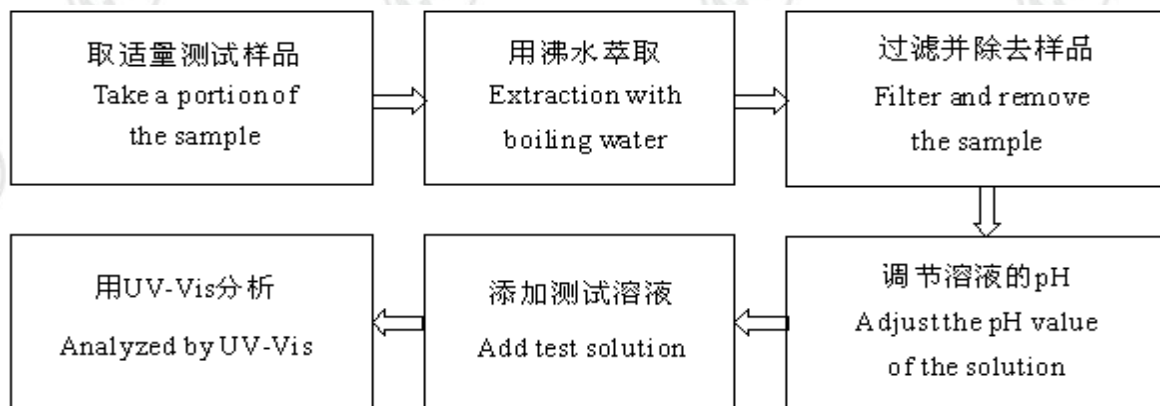
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Report No. ECL01H062655002E

第 5 页 共 6 页  
Page 5 of 6

## 3. 全氟辛烷磺酸盐(PFOS) Perfluorooctane Sulfonates(PFOS)



## 4. 六价铬(Cr(VI)) Hexavalent Chromium(Cr(VI))

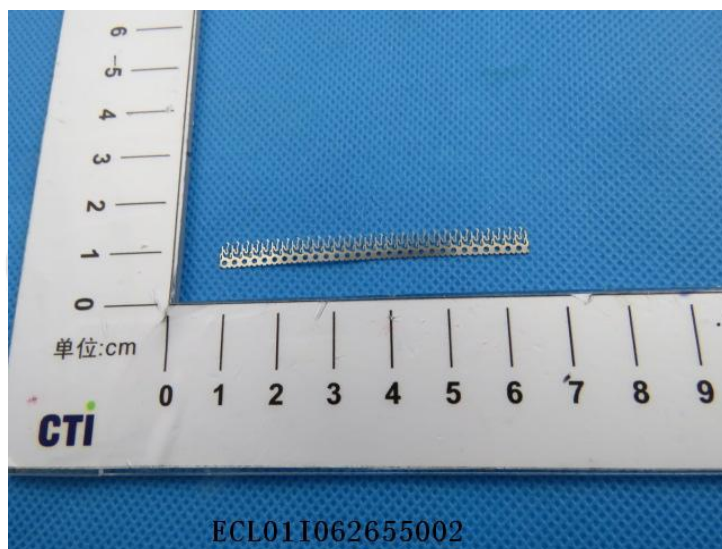


# 检测报告 Test Report

报告编号 ECL01I062655002E  
Report No. ECL01I062655002E

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Page 6 of 6

## 样品图片 Photo(s) of the sample(s)



\*\*\*报告结束\*\*\*  
\*\*\* End of report \*\*\*

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# 检测报告 Test Report

报告编号 ECL01I062655001E  
Report No. ECL01I062655001E

第 1 页 共 6 页  
Page 1 of 6

申请单位 得意精密电子(苏州)有限公司  
Applicant LOTES(SUZHOU) CO.,LTD

地 址 江苏省苏州市相城经济开发区漕湖大道26号  
Address NO.26 CAOHU ROAD XIANGCHENG ECONOMIC DEVELOPMENT ZONE,SUZHOU CHINA

以下测试之样品及样品信息由申请者提供并确认

The following sample(s) and sample information was/were submitted and identified by/on the behalf of the client

样品名称 鍍層Ni Sn  
Sample Name

材料名称 S50C  
Material

样品接收日期 2016.10.24  
Sample Received Date Oct. 24, 2016

样品检测日期 2016.10.24-2016.10.27  
Testing Period Oct. 24, 2016 to Oct. 27, 2016

检测要求 根据客户要求, 对所提交样品中的铅(Pb), 镉(Cd), 汞(Hg), 六价铬(Cr(VI)), 全氟辛烷磺酸盐(PFOS)进行测试。

Test Requested As specified by client, to test Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent Chromium(Cr(VI)), Perfluorooctane Sulfonates(PFOS) in the submitted sample(s).

检测依据/检测结果 请参见下页。  
Test Method/Test Result(s) Please refer to the following page(s).

主 检 陈娟娟  
Tested by

批准 苏红伟  
Approved by

CTI  
Centre Testing International Pinbiao(Shanghai) Co., Ltd.  
Senior Laboratory Manager  
报告专用章  
上海市浦东新区新金桥路1996号  
Centre Testing International Pinbiao(Shanghai) Co., Ltd.

审 核 陶英  
Reviewed by

日 期 2016.10.27  
Date

No. R264041685

上海市浦东新区新金桥路1996号  
No.1996,Xinjinqiao Road, Pudong New District, Shanghai, China



# 检测报告 Test Report

报告编号 ECL01I062655001E  
Report No. ECL01I062655001E

第 2 页 共 6 页  
Page 2 of 6

## 检测依据 Test Method

测试项目 Test Item(s)	测试方法 Test Method	测试仪器 Measured Equipment(s)
铅(Pb) Lead (Pb)	参考 IEC 62321-5:2013 Ed. 1.0 Refer to IEC 62321-5:2013 Ed.1.0	ICP-OES
镉(Cd) Cadmium (Cd)	参考 IEC 62321-5:2013 Ed. 1.0 Refer to IEC 62321-5:2013 Ed.1.0	ICP-OES
汞(Hg) Mercury (Hg)	参考 IEC 62321-4:2013 Ed. 1.0 Refer to IEC 62321-4:2013 Ed.1.0	ICP-OES
六价铬(Cr(VI)) Hexavalent Chromium(Cr(VI))	IEC 62321-7-1:2015	UV-Vis
全氟辛烷磺酸盐(PFOS) Perfluorooctane Sulfonates(PFOS)	参考 US EPA 3550C:2007 & US EPA 8321B:2007 Refer to US EPA 3550C:2007 & US EPA 8321B:2007	LC-MS-MS

## 检测结果 Test Result(s)

测试项目 Test Item(s)	结果 Result	方法检出限 MDL
铅(Pb) Lead (Pb)	36 mg/kg	2 mg/kg
镉(Cd) Cadmium (Cd)	N.D.	2 mg/kg
汞(Hg) Mercury (Hg)	N.D.	2 mg/kg
六价铬(Cr(VI)) Hexavalent Chromium(Cr(VI))	N.D. ▼	0.10 µg/cm <sup>2</sup> (LOQ)
测试项目 Test Item(s)	结果 Result	方法检出限 MDL
全氟辛烷磺酸盐(PFOS) Perfluorooctane Sulfonates(PFOS)	N.D.	0.5 µg/m <sup>2</sup>

# 检测报告 Test Report

报告编号 ECL01I062655001E  
Report No. ECL01I062655001E

第 3 页 共 6 页  
Page 3 of 6

测试样品/部位描述 银白色镀层  
Tested Sample/Part Description Silver-white plating

备注: 对于检测铅, 镉, 汞之样品已完全溶解。  
-N.D. = 未检出 (小于方法检出限或定量限)  
-mg/kg = ppm = 百万分之一  
-LOQ = 定量限, 六价铬的定量限为0.10 µg/cm<sup>2</sup>  
-▼六价铬浓度小于0.10 µg/cm<sup>2</sup>, 样品未检出六价铬。

**Remark:** **The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.**  
-MDL = Method Detection Limit  
-N.D. = Not Detected (<MDL or LOQ)  
-mg/kg = ppm = parts per million  
-LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is 0.10 µg/cm<sup>2</sup>  
-▼The sample is negative for Cr(VI) – The Cr(VI) concentration is below 0.10 µg/cm<sup>2</sup>. The coating is considered a non-Cr(VI) based coating.

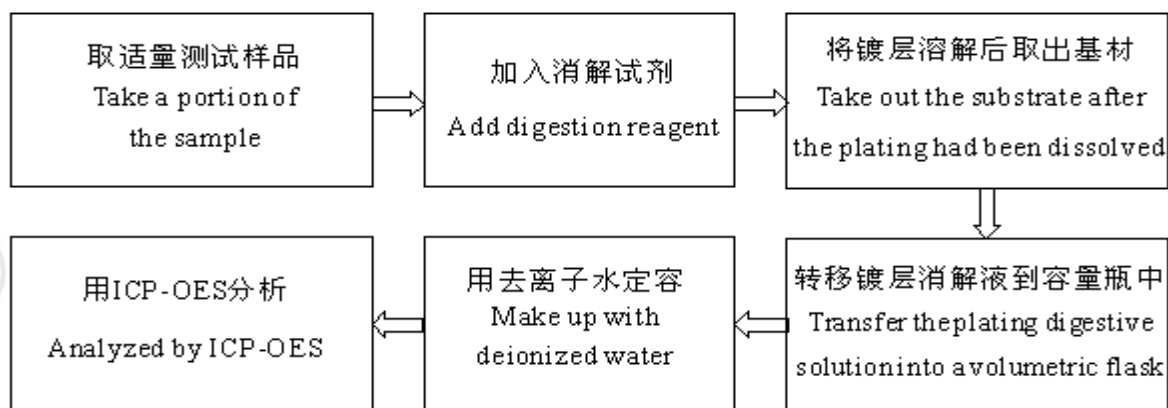
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Report No. ECL01H062655001E

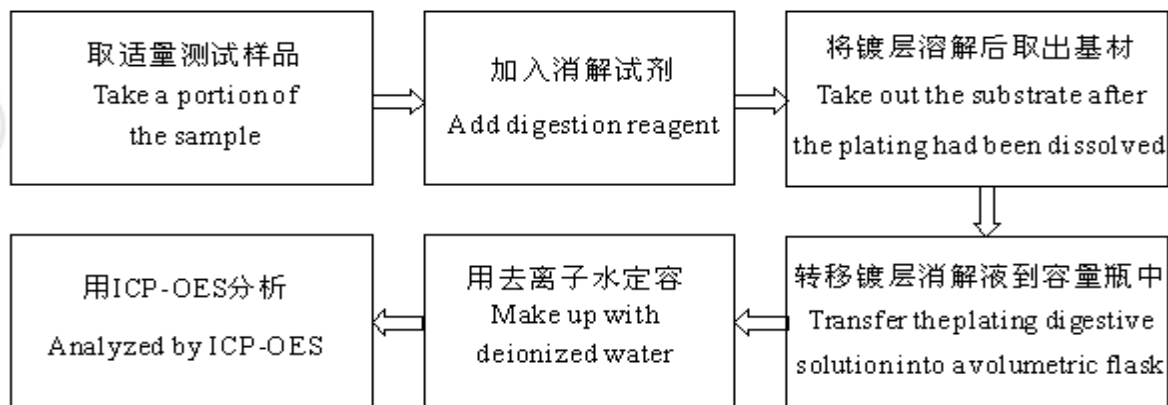
第 4 页 共 6 页  
Page 4 of 6

## 检测流程 Test Process

### 1. 铅(Pb), 镉(Cd) Lead (Pb), Cadmium (Cd)



### 2. 汞(Hg) Mercury (Hg)



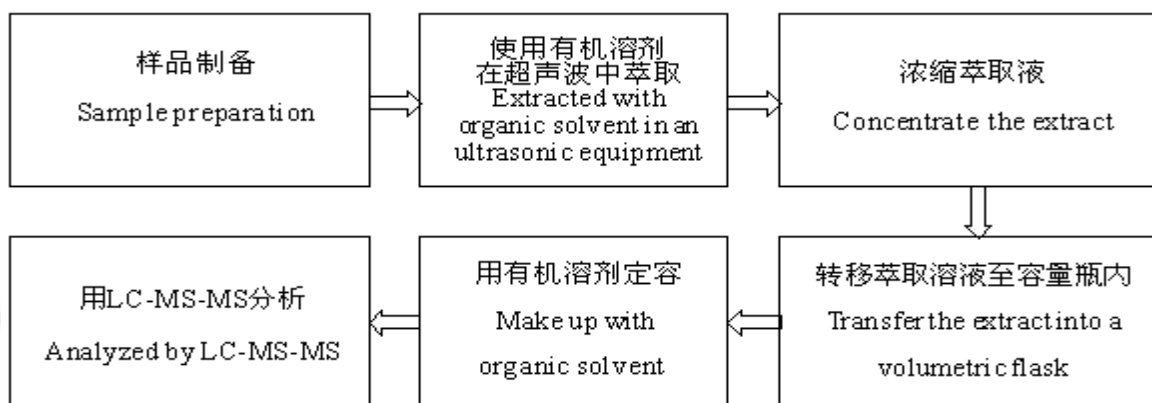


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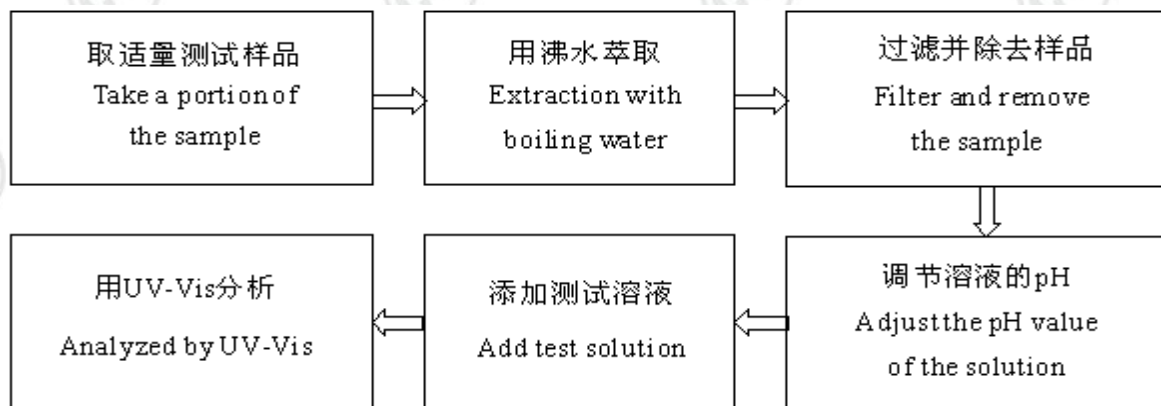
报告编号 ECL01H062655001E  
Report No. ECL01H062655001E

第 5 页 共 6 页  
Page 5 of 6

## 3. 全氟辛烷磺酸盐(PFOS) Perfluorooctane Sulfonates(PFOS)



## 4. 六价铬(Cr(VI)) Hexavalent Chromium(Cr(VI))

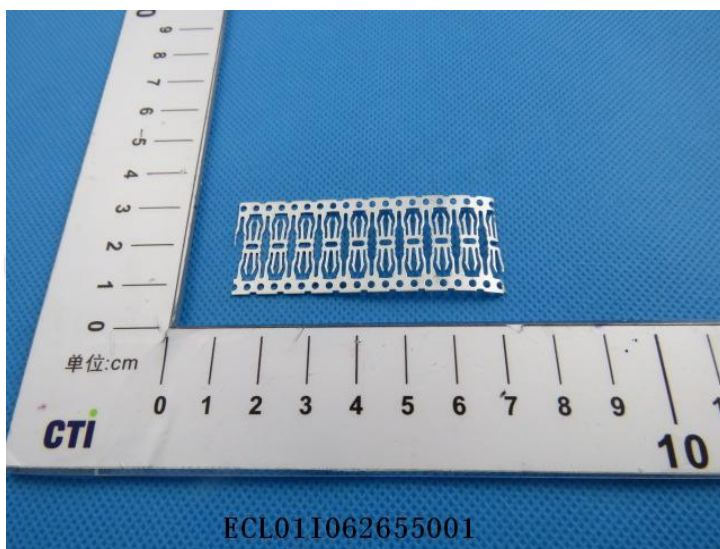


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报告编号 ECL01I062655001E  
Report No. ECL01I062655001E

第 6 页 共 6 页  
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## 样品图片 Photo(s) of the sample(s)



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