

**Test Report** No. CANEC1512497201 Date: 29 Jul 2015 Page 1 of 16

CAMBRIDGE ELECTRONICS LTD.

HUANG YONG NO.3 INDUSTRIAL DISTRICT, ZHONG TANG TOWN, DONG GUAN CITY, GUANG DONG CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as: Silicone rubber; Dice; Ink; Epoxy; Solder; Lead Frame; Tin

SGS Job No. : CP15-041330 - GZ

Date of Sample Received: 20 Jul 2015

Testing Period: 20 Jul 2015 - 27 Jul 2015

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, Polybrominated biphenyls (PBBs),

Polybrominated diphenyl ethers (PBDEs) and Phthalates such as

Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP) 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 Co., Ltd. Guangzhou Branch

Merry Lv

Approved Signatory



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Test Results:

# Test Part Description:

Specimen No.	SGS Sample ID	Description
SN1	CAN15-124972.001	White liquid
SN2	CAN15-124972.002	Silver-grey grains
SN3	CAN15-124972.003	Grey paste
SN4	CAN15-124972.004	Black material
SN5	CAN15-124972.005	Silvery metal(5#)
SN6	CAN15-124972.006	Copper-colored metal
SN7	CAN15-124972.007	Silvery metal(7#)

#### 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

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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 ICP-OES. (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 Colorimetric Method using UV-Vis.

(5)With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS.

(6) With reference to EN 14372:2004, determination of phthalates by GC-MS.

Test Item(s)	Limit	<u>Unit</u>	MDL	<u>001</u>	<u>002</u>	<u>003</u>
Cadmium (Cd)	100	mg/kg	2	ND	ND	ND
Lead (Pb)	1,000	mg/kg	2	ND	362	ND
Mercury (Hg)	1,000	mg/kg	2	ND	ND	ND
Hexavalent Chromium (CrVI)	1,000	mg/kg	2	ND	ND	ND
Sum of PBBs	1,000	mg/kg	5	ND	ND	ND
Monobromobiphenyl	-	mg/kg	5	ND	ND	ND
Dibromobiphenyl	-	mg/kg	5	ND	ND	ND
Tribromobiphenyl	-	mg/kg	5	ND	ND	ND
Tetrabromobiphenyl	-	mg/kg	5	ND	ND	ND
Pentabromobiphenyl	-	mg/kg	5	ND	ND	ND



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Test Item(s)	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>	<u>002</u>	<u>003</u>
Hexabromobiphenyl	-	mg/kg	5	ND	ND	ND
Heptabromobiphenyl	-	mg/kg	5	ND	ND	ND
Octabromobiphenyl	-	mg/kg	5	ND	ND	ND
Nonabromobiphenyl	-	mg/kg	5	ND	ND	ND
Decabromobiphenyl	-	mg/kg	5	ND	ND	ND
Sum of PBDEs	1,000	mg/kg	5	ND	ND	ND
Monobromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Dibromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Tribromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Octabromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Decabromodiphenyl ether	-	mg/kg	5	ND	ND	ND
Dibutyl phthalate (DBP)	1,000	mg/kg	30	ND	ND	ND
Butyl benzyl phthalate (BBP)	1,000	mg/kg	30	ND	ND	ND
Bis (2-ethylhexyl) phthalate (DEHP)	1,000	mg/kg	30	ND	ND	ND
Diisobutyl Phthalates (DIBP)	1,000	mg/kg	30	ND	ND	ND
Test Item(s)	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>004</u>		
Cadmium (Cd)	100	mg/kg	2	ND		
Lead (Pb)	1,000	mg/kg	2	ND		
Mercury (Hg)	1,000	mg/kg	2	ND		
Hexavalent Chromium (CrVI)	1,000	mg/kg	2	ND		
Sum of PBBs	1,000	mg/kg	5	ND		
Monobromobiphenyl	-	mg/kg	5	ND		
Dibromobiphenyl	-	mg/kg	5	ND		
Tribromobiphenyl	-	mg/kg	5	ND		
Tetrabromobiphenyl	-	mg/kg	5	ND		
Pentabromobiphenyl	-	mg/kg	5	ND		
Hexabromobiphenyl	-	mg/kg	5	ND		
Heptabromobiphenyl	-	mg/kg	5	ND		
Octabromobiphenyl	-	mg/kg	5	ND		
Nonabromobiphenyl	-	mg/kg	5	ND		
Decabromobiphenyl	-	mg/kg	5	ND		
Sum of PBDEs	1,000	mg/kg	5	ND		
Monobromodiphenyl ether	-	mg/kg	5	ND		



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Test Item(s)	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>004</u>	
Dibromodiphenyl ether	-	mg/kg	5	ND	
Tribromodiphenyl ether	-	mg/kg	5	ND	
Tetrabromodiphenyl ether	-	mg/kg	5	ND	
Pentabromodiphenyl ether	-	mg/kg	5	ND	
Hexabromodiphenyl ether	-	mg/kg	5	ND	
Heptabromodiphenyl ether	-	mg/kg	5	ND	
Octabromodiphenyl ether	-	mg/kg	5	ND	
Nonabromodiphenyl ether	-	mg/kg	5	ND	
Decabromodiphenyl ether	-	mg/kg	5	ND	
Dibutyl phthalate (DBP)	1,000	mg/kg	30	ND	
Butyl benzyl phthalate (BBP)	1,000	mg/kg	30	ND	
Bis (2-ethylhexyl) phthalate (DEHP)	1,000	mg/kg	30	ND	
Diisobutyl Phthalates (DIBP)	1,000	mg/kg	30	ND	

#### Notes:

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.

# 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 ICP-OES.

(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)	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>005</u>	<u>006</u>	<u>007</u>
Cadmium (Cd)	100	mg/kg	2	ND	ND	ND
Lead (Pb)	1,000	mg/kg	2	948892▲	ND	160
Mercury (Hg)	1,000	mg/kg	2	ND	ND	ND
Hexavalent Chromium (CrVI)	-	-	$\Diamond$	Negative	Negative	Negative

#### Notes:

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) Spot-test:

Negative = Absence of CrVI coating, Positive = Presence of CrVI 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 CrVI coating

Positive = Presence of CrVI coating; the detected concentration in boiling-water-extraction solution is



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equal or greater than 0.02 mg/kg with 50 cm2 sample surface area.

Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing.

- (3) Result of Pb is only for reference
- (4) A:According to the declaration from the client, Lead (Pb) in specimen is exempted by EU RoHS directive 2011/65/EU based on |ANNEX III 7(a)|: Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead).

# Tetrabromobisphenol A (TBBP-A)

Test Method: With reference to US EPA Method 3540C:1996, analysis was performed by GC-MS&HPLC-MS.

Test Item(s)	<u>Unit</u>	<u>MDL</u>	<u>003</u>	<u>004</u>
Tetrabromobisphenol A (TBBP-A)	mg/kg	10	ND	ND

#### Polycyclic Aromatic Hydrocarbons (PAHs)

Test Method: With reference to AfPS GS 2014:01 PAK, analysis was performed by GC-MS.

Test Item(s)	CAS NO.	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Naphthalene(NAP)	91-20-3	mg/kg	0.1	ND
Acenaphthylene(ANY)	208-96-8	mg/kg	0.1	ND
Acenaphthene(ANA)	83-32-9	mg/kg	0.1	ND
Fluorene(FLU)	86-73-7	mg/kg	0.1	ND
Phenanthrene(PHE)	85-01-8	mg/kg	0.1	ND
Anthracene(ANT)	120-12-7	mg/kg	0.1	ND
Fluoranthene(FLT)	206-44-0	mg/kg	0.1	ND
Pyrene(PYR)	129-00-0	mg/kg	0.1	ND
Benzo(a)anthracene(BaA)	56-55-3	mg/kg	0.1	ND
Chrysene(CHR)	218-01-9	mg/kg	0.1	ND
Benzo(b)fluoranthene(BbF)	205-99-2	mg/kg	0.1	ND
Benzo(j)fluoranthene(BjF)	205-82-3	mg/kg	0.1	ND
Benzo(k)fluoranthene(BkF)	207-08-9	mg/kg	0.1	ND
Benzo(a)pyrene(BaP)	50-32-8	mg/kg	0.1	ND
Benzo(e)pyrene(BeP)	192-97-2	mg/kg	0.1	ND
Indeno(1,2,3-c,d)pyrene(IPY)	193-39-5	mg/kg	0.1	ND
Dibenzo(a,h)anthracene(DBA)	53-70-3	mg/kg	0.1	ND
Benzo(g,h,i)perylene(BPE)	191-24-2	mg/kg	0.1	ND



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Test Item(s)	<u>C.</u>	AS NO.	<u>Unit</u>	MDL	<u>001</u>
Sum of 7 PAHS Acenaphthylene. Ac		-	mg/kg	-	ND
Fluorene, Phenanthrene, Pyrene, Ar	nthracene,				
Fluoranthene					ND
Sum of 18 PAHs		-	mg/kg	-	ND
Test Item(s)	<u>C</u>	AS NO.	<u>Unit</u>	<u>MDL</u>	<u>003</u>
Naphthalene(NAP)	91	1-20-3	mg/kg	0.1	12.4
Acenaphthylene(ANY)	20	8-96-8	mg/kg	0.1	ND
Acenaphthene(ANA)	83	3-32-9	mg/kg	0.1	ND
Fluorene(FLU)	86	6-73-7	mg/kg	0.1	20.4
Phenanthrene(PHE)	85	5-01-8	mg/kg	0.1	96.7
Anthracene(ANT)	12	0-12-7	mg/kg	0.1	ND
Fluoranthene(FLT)	20	6-44-0	mg/kg	0.1	0.2
Pyrene(PYR)	12	9-00-0	mg/kg	0.1	ND
Benzo(a)anthracene(BaA)	56	6-55-3	mg/kg	0.1	ND
Chrysene(CHR)	21	8-01-9	mg/kg	0.1	ND
Benzo(b)fluoranthene(BbF)	20	5-99-2	mg/kg	0.1	ND
Benzo(j)fluoranthene(BjF)	20	5-82-3	mg/kg	0.1	ND
Benzo(k)fluoranthene(BkF)	20	7-08-9	mg/kg	0.1	ND
Benzo(a)pyrene(BaP)	50	)-32-8	mg/kg	0.1	ND
Benzo(e)pyrene(BeP)	19	2-97-2	mg/kg	0.1	ND
Indeno(1,2,3-c,d)pyrene(IPY)	19	3-39-5	mg/kg	0.1	ND
Dibenzo(a,h)anthracene(DBA)	53	3-70-3	mg/kg	0.1	ND
Benzo(g,h,i)perylene(BPE)	19	1-24-2	mg/kg	0.1	ND
Sum of 7 PAHS Acenaphthylene. Ac		-	mg/kg	-	117.3
Fluorene, Phenanthrene, Pyrene, Ar	nthracene,				
Fluoranthene Sum of 18 PAHs			ma/ka		129.7
Sull of 16 FARS		-	mg/kg	-	129.7
Test Item(s)	<u>C.</u>	AS NO.	<u>Unit</u>	<u>MDL</u>	<u>004</u>
Naphthalene(NAP)	91	1-20-3	mg/kg	0.1	ND
Acenaphthylene(ANY)	20	8-96-8	mg/kg	0.1	ND
Acenaphthene(ANA)	83	3-32-9	mg/kg	0.1	ND
Fluorene(FLU)	86	6-73-7	mg/kg	0.1	ND
Phenanthrene(PHE)	85	5-01-8	mg/kg	0.1	ND
Anthracene(ANT)	12	0-12-7	mg/kg	0.1	ND
Fluoranthene(FLT)	20	6-44-0	mg/kg	0.1	ND
Pyrene(PYR)	12	9-00-0	mg/kg	0.1	ND
Benzo(a)anthracene(BaA)	56	6-55-3	mg/kg	0.1	ND



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Test Item(s)	CAS No	O. Unit	MDL	<u>004</u>
Chrysene(CHR)	218-01-9	mg/kg	0.1	ND
Benzo(b)fluoranthene(BbF)	205-99-2	2 mg/kg	0.1	ND
Benzo(j)fluoranthene(BjF)	205-82-3	3 mg/kg	0.1	ND
Benzo(k)fluoranthene(BkF)	207-08-9	mg/kg	0.1	ND
Benzo(a)pyrene(BaP)	50-32-8	mg/kg	0.1	ND
Benzo(e)pyrene(BeP)	192-97-2	2 mg/kg	0.1	ND
Indeno(1,2,3-c,d)pyrene(IPY)	193-39-5	mg/kg	0.1	ND
Dibenzo(a,h)anthracene(DBA)	53-70-3	mg/kg	0.1	ND
Benzo(g,h,i)perylene(BPE)	191-24-2	2 mg/kg	0.1	ND
Sum of 7 PAHS Acenaphthylene. Acen	naphthene, -	mg/kg	-	ND
Fluorene, Phenanthrene, Pyrene, Anth	racene,			
Fluoranthene				
Sum of 18 PAHs	-	mg/kg	-	ND



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# AfPS (German commission for Product Safety): GS PAHs requirements

Parameter	Category 1	Catego	ory 2	Category 3			
	Material indented to be put in the mouth or toys with intended skin contact (longer than 30 s).	Materials not falling under category 1 with foreseeable contact to skin for longer than 30 s (long-term skin) or frequent contact.		Materials not falling category 1 or 2 with contact to skin for le (short-term skin con	foreseeable ss than 30 s		
		Toy under 2009/48/EC	Other products under ProdSG	Toy under 2009/48/EC	Other products under ProdSG		
Benzo(a)pyrene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Benzo(e)pyrene Mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Benzo(a)anthracene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Benzo(b)fluoranthene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Benzo(j)fluoranthene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Benzo(k)fluoranthene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Chrysene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Dibenzo(a,h)anthracene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Benzo(g,h,i)perylene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Indeno(I,2,3-cd)pyrene mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1		
Acenaphthylene, Acenaphthene, fluorene, phenanthrene, pyrene, anthracene, fluoranthene, mg/kg	< 1 Sum	< 5 Sum	< 10 Sum	< 20 Sum	< 50 Sum		
Naphthalene, mg/kg	< 1	< 2		< 10			
Sum of 18 PAHs	<1	< 5	< 10	< 20	< 50		

Remark: The result(s) of 001,003 shown is/are of the total weight of wet sample.



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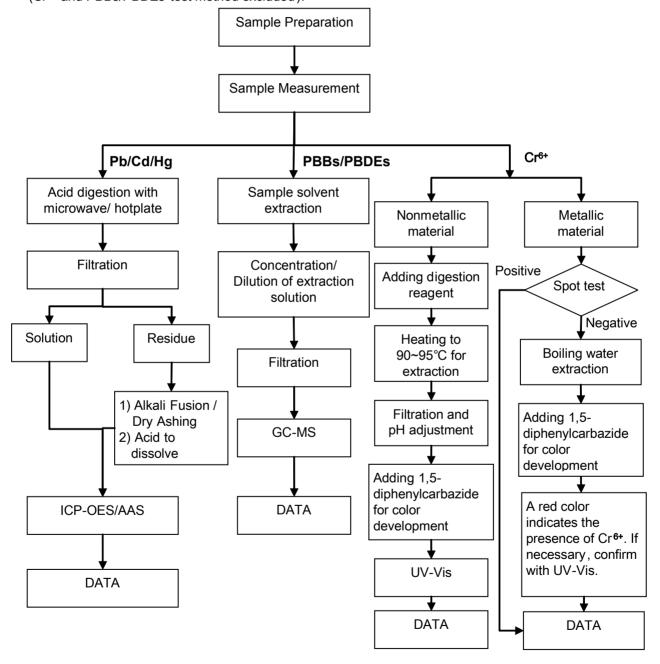
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## **ATTACHMENTS**

### **RoHS Testing Flow Chart**

- 1) Name of the person who made testing: Bruce Xiao / Sunny Hu
- 2) Name of the person in charge of testing: Bella Wang / Cutey Yu
- 3) These samples were dissolved totally by pre -conditioning method according to below flow chart (Cr<sup>6+</sup> and PBBs/PBDEs test method excluded).





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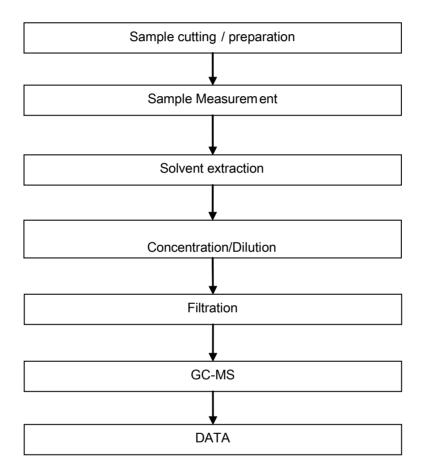


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## **ATTACHMENTS**

# **Phthalates Testing Flow Chart**

- 1) Name of the person who made testing: Sunny Hu
- 2) Name of the person in charge of testing: Cutey Yu



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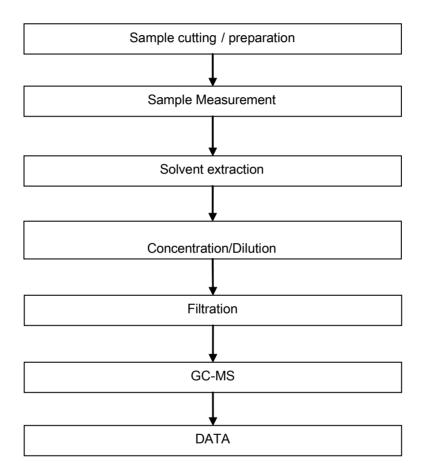
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## **ATTACHMENTS**

# **PAHs Testing Flow Chart**

- 1) Name of the person who made testing: Sunny Hu
- 2) Name of the person in charge of testing: Cutey Yu





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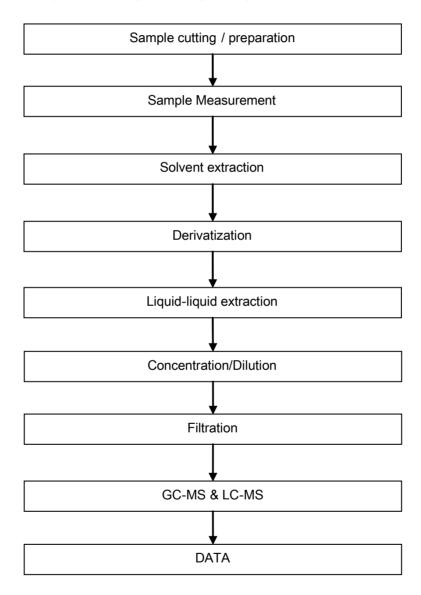
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# **ATTACHMENTS**

# **TBBP-A Testing Flow Chart**

- 1) Name of the person who made testing: Erin Guo
- 2) Name of the person in charge of testing: Cutey Yu



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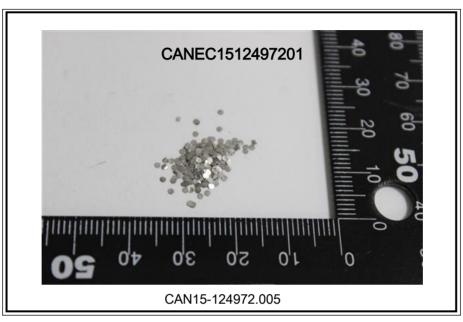
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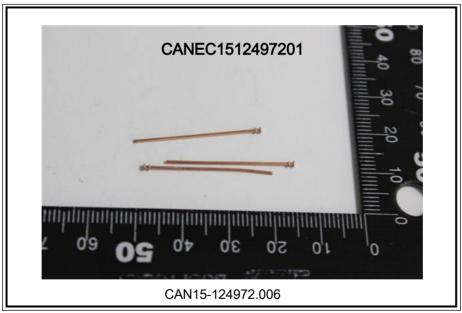
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