Test Report

No. CRSSA/15719-1/17 Date: 03/01/2018 Page: 1 of 11
CRS Ref. CRSSA/17/3247/Possehl

POSSEHL ELECTRONICS (MALAYSIA) SDN. BHD.
LOT 9 & LOT 33, PHASE III, BATU BERENDAM FTZ
75350 MELAKA, MALAYSIA

The following merchandise was (were) submitted and identified by the client as:

Sample Description	:	Pd Plating
Sample Receiving Date	:	22/12/2017
Testing Period	:	22/12/2017 to 03/01/2018
Date Completed	:	03/01/2018
Reporting Date	:	03/01/2018

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).
Analysts	:	Tan Mei Ann, Ling Yii Ming & Chew Jia Jia
Conclusion	:	Based on the performed tests on submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE) comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.

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Test results:

Test Part Description :

Sample Description : Pd Plating

RoHS Directive 2011/65/EU Annex II

Test Item(s):	Unit	Test Method	Results	MDL	Limit of RoHS
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cd by ICP-OES)	N.D.	2	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Pb by ICP-OES)	N.D.	2	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013/AMD 1:2017 (Determination of Hg by ICP-OES)	N.D.	2	1000
Hexavalent Chromium (CrVI) #	$\mu g/cm^2$	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-VIS)	N.D.	0.10	-
Sum of PBBs	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	-	1000
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-

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Sum of PBDEs	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	-	1000
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-

Note :

(a) mg/kg = ppm ; 0.1wt% = 1000ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) # = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 $\mu g/cm^2$. The sample coating is considered to contain CrVI
b. The sample is negative for CrVI if the CrVI concentration is less than 0.10 $\mu g/cm^2$. The coating is considered a non-CrVI based coating
c. The result between 0.10 $\mu g/cm^2$ and 0.13 $\mu g/cm^2$ is considered to be inconclusive - unavoidable coating variations may influence the determination
For corrosion protection coatings on metals: 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 represent status of the sample at the time of testing.
(e) - = not regulated

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Test results by chemical method:

Test Item (s):	Unit	Method	Result	MDL
Antimony (Sb)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Beryllium (Be)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2

Test Part Description :

Sample Description : Pd Plating

Note : (a) mg/kg = ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) --- = Not Conducted

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Test results by chemical method:

Test Item (s):	Unit	Method	Result	MDL
Hexabromocyclododecane (HBCDD) (Cas#25637-99-4 & 3194-55-6)	mg/kg	Based on IEC 62321:2008, and performed by GC-MS	N.D.	10
Phthalates	---	---	---	---
DBP (Di-butyl phthalate) (CAS No.: 000084-74-2)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DEHP (Di-(2-ethylhexyl phthalate) (CAS No.: 000117-81-7)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
BBP (Benzyl Butyl phthalate) (CAS NO.: 000085-68-7)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DIBP (Di-isobutyl phthalate) (CAS No.: 000084-69-5)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DIDP (Di-isodecyl phthalate) (CAS No.: 026761-40-0)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.010
DNOP (Di-n-octyl phthalate) (CAS No.: 000117-84-0)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DNHP (Di-n-hexyl phthalate) (CAS No.: 000084-75-3)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DINP (Di-isononyl phthalate) (CAS No.: 028553-12-0)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.010

Test Part Description :

Sample Description : Pd Plating

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Note : (a) mg/kg = ppm ; (0.1wt% = 1000ppm)
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) - = Not regulated
(e) On 4 June 2015, Commission Directive (EU) 2015/863 was published in the Official Journal of the European Union (OJEU) to include the phthalates BBP, DBP, DEHP and DIBP into ANNEX II of the Rohs Recast Directive. The new law restricts each phthalate to no more than 0.1% in each homogeneous material of an electrical product.
(f)The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.
(g)The restriction of DEHP, BBP, DBP and DIBP shall not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of EEE placed on the market before 22 July 2019, and of medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, placed on the market before 22 July 2021.
(h)The restriction of DEHP, BBP and DBP shall not apply to toys which are already subject to the restriction of DEHP, BBP and DBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.

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Test Method: With reference to CEN/TS 15968. Analysis was conducted by LC-MS.

	Result (%)	Max. Limit (ug/m2) (Textile/Coated material)	Max. Limit (%) (Plastic)	Max. Limit (%) (Substances or in mixtures)
	1			
PFOS ^	N.D.	1	0.1	0.001
PFOA	N.D.	/	/	/
Conclusion	**PASS**			

Note: N.D. = Not Detected
* = exceeds the limit

Detection limit = 1 µg/m^2 for Textile / Coated Material
= 0.001% for Plastic, substances or mixtures

Remark: Max. limit specified by commission regulation (EU) No. 757/2010 amending Regulation (EC) No 850/2004 (previously restricted under entry 53 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006)

^ PFOS refer to Perfluorooctanesulfonic acid and its derivatives including Perfluoroctanesulfonic acid, Perfluoroctane sulfonamide, N-Methylperfluoroctane sulfonamide, N-Ethylperfluoroctane sulfonamide, N-Methylperfluoroctane sulfonamidoethanol and N-Ethylperfluoroctane sulfonamidoethanol

Test Part Description :

Sample Description : Pd Plating

Note : (a) N.D. = Not Detected = < MDL
(b) MDL = Method Detection Limit
(c) --- = Not Conducted

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Test Part Description:

Sample Description : Pd Plating

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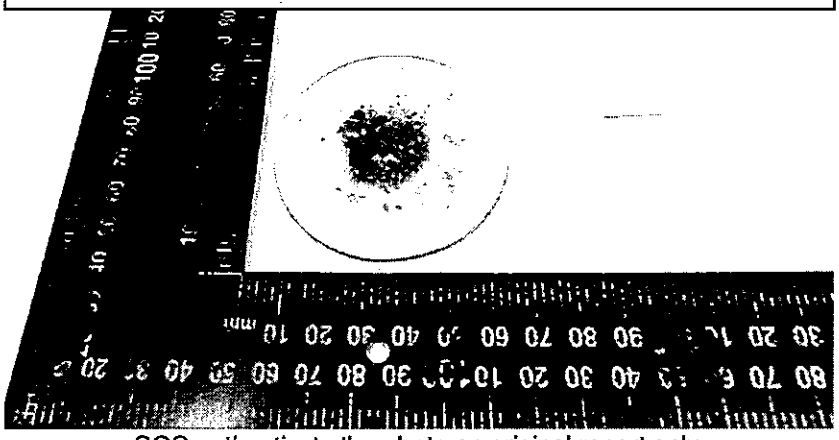

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1. DETERMINATION OF CADMIUM CONTENT BY IEC 62321-5 2013

Sample Receiving and Registration
↓
Cut sample in small pieces
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (Hotplate)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

2. DETERMINATION OF LEAD CONTENT BY IEC 62321-5 2013

Sample Receiving and Registration
↓
Cut sample in small pieces
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (Hotplate)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

3. DETERMINATION OF MERCURY CONTENT BY IEC 62321-4 2013/AMD1 2017

Sample Receiving and Registration
↓
Cut sample in small pieces
↓
Weight sample (0.1-0.5g) into digestion vessel
↓
Acid digestion (Hotplate)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

4. DETERMINATION OF HEXAVALENT CHROMIUM BY IEC 62321-7-1 2015

Sample Receiving and Registration
↓
Sample Preparation
↓
Boiling-water-extraction
↓
Analyses by UV- Spectrophotometer
↓
Test Report

5. DETERMINATION OF PBB/PBDE WITH GC-MS BY IEC 62321-6 2015

Cut sample in small pieces
↓
Weight sample (0.5-4.0g) into extraction thimble
↓
Soxhlet Extraction with Toluene
↓
Filter through 0.45 um membrane filter
↓
Analyses by GC-MS (with appropriate dilution)

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6. ACID DIGESTION OF ORGANICALLY BASED METRICES (US EPA 3051A)

Cut sample in small pieces
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (HNO_3) – Hotplate
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

DETERMINATION OF HBCDD CONTENT

Cut sample in small pieces
↓
Weight sample (0.5-4.0g) into extraction thimble
↓
Soxhlet Extraction with Toluene
↓
Filter through 0.45 um membrane filter
↓
Analyses by GC-MS (with appropriate dilution)

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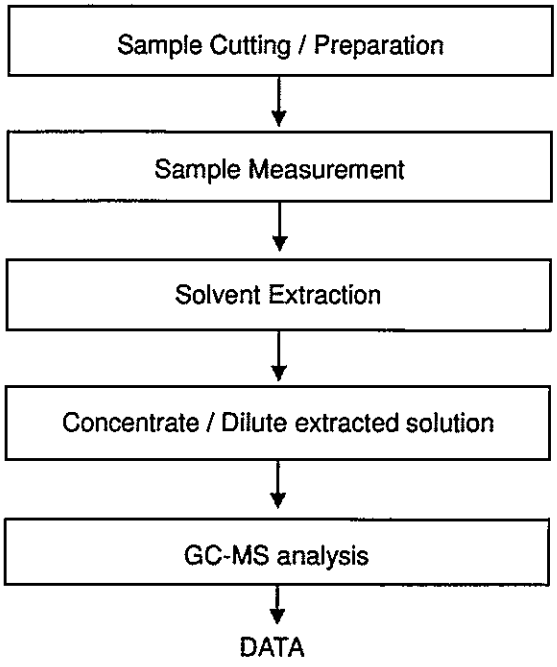
Flowchart for Phthalates Measurement

Method: IEC62321



****End of Report****

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Test Report

No. CRSSA/04223/18 Date: 12/04/2018
CRS Ref. CRSSA/18/0905/Possehl

POSSEHL ELECTRONICS (MALAYSIA) SDN. BHD.
LOT 9 & LOT 33, PHASE III, BATU BERENDAM FTZ
75350 MELAKA, MALAYSIA

The following merchandise was (were) submitted and identified by the client as:

Sample Description	:	Pd Plating
Sample Receiving Date	:	06/04/2018
Testing Period	:	06/04/2018 to 12/04/2018

Test Results	:	Please refer to next page.
Analyst	:	Nurfarahima Ibrahim

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Test results by chemical method:

Test Item (s):	Unit	Method	Result	MDL
Halogen	---	---	---	---
Halogen-Fluorine (F)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC method for Fluorine content.	N.D.	50
Halogen-Chlorine (Cl)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC method for Chlorine content.	65	50
Halogen-Bromine (Br)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC method for Bromine content.	120	50
Halogen-Iodine (I)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC method for Iodine content.	N.D.	50

Test Part Description :

Sample Description : Pd Plating

Note : (a) mg/kg = ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) --- = Not Conducted

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Test Part Description:

Sample Description : Pd Plating

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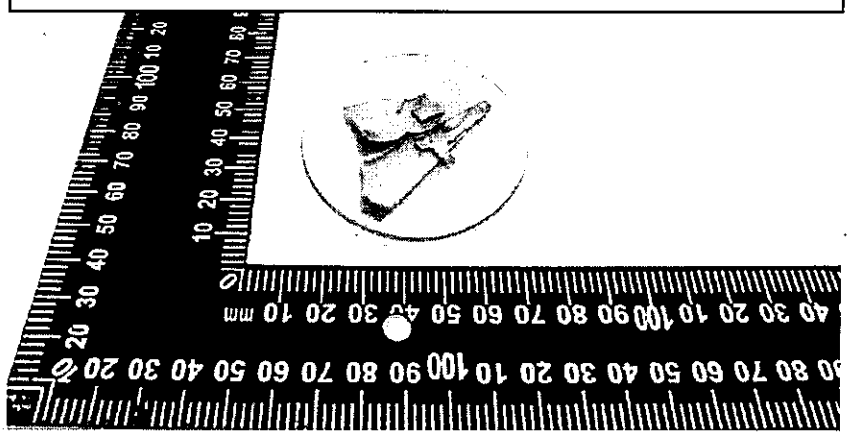

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DETERMINATION OF HALOGEN CONTENT BY EN 14582 2016

Sample pretreatment
↓
Weighting and putting sample in cell
↓
Combustion / Absorption
↓
Dilution to fixed volume
↓
Analyses by IC

**** End of Report ****

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