



Applicant: Barker Microfarads
205 Mill Street, Hillsville, VA 24343

Test Subject: Aluminum Electrolytic Capacitors
Style No.: Varies (Radial, Axial, Tubular, AC Motor Start)

Purpose of examination: **Restriction of Hazardous Substances (RoHS) 2011/65/EU Annex II article 4(1)**

(1) **Quantitative screening of Lead, Cadmium, Mercury, Chromium and Bromine**
Energy-Dispersive X-Ray Fluorescence Spectroscopy with reference to IEC 62321-2008 Ed. 1

(2) **Heavy Metals Content Test (Total Cadmium, Total Lead, Total Mercury, Hexavalent Chromium)**
Test method:
US EPA 3052 : 1996 or Acid Digestion by ICP-OES / AAS
US EPA 3060A & US EPA 7196A /IEC 62321-2008 Ed.1 -Annex B (For Hexavalent Chromium)

(3) **Brominated Flame Retardants (PBBs & PBDEs) Test**
Ultrasonic extraction with toluene, qualitatively and quantitatively analysed by GC-MSD according to US EPA 3550 C

Test result: Refer to section 3

Conclusion: **Restriction of Hazardous Substances (RoHS) 2011/65/EU Annex II article 4(1)**

(1) Quantitative screening of Lead, Cadmium, Mercury, Chromium and Bromine	Pass
(2) Heavy Metals Content Test (Total Cadmium, Total Lead, Total Mercury, Hexavalent Chromium)	Pass
(3) Brominated Flame Retardants (PBBs & PBDEs) Test	Pass

Remarks (1) The results relate only to the items tested.
(2) Samples are tested as received.
(3) Data of samples 001 to 012 were transferred from samples 001 to 012 of technical report 60.160.13.0609.02 issued on 2013-05-27.



1. Order

1.1 Customer's Reference

Rated Voltage: Varies

1.2 Receipt Date of Test Sample, Location

Received on 2013-01-29, 2013-02-14 and 2013-05-16, Hong Kong

1.3 Date of Testing, Location

From 2013-01-29 to 2013-02-18 and 2013-05-20 to 2013-05-24, Hong Kong

1.4 Document submitted

Nil

2. Description of the Test Subject

Sample No.	Color and Description	Photograph
001	White soft plastic with black and green printing (sticker)	Refer to Appendix 1
002	Black plastic (case)	
003	Silvery metal (ring)	
004^	Dark brown plastic (base)	
005	Silvery metal (contact plate)	
006	White plastic (base)	
007	Silvery metal (rivet)	
008	Silvery metal (strip)	
009	White soft plastic with adhesive backing (tape)	
010	Black plastic (glue)	
011	Brown paper (strip)	
012	Silvery metal (strip)	

Note: 1. “^” denotes sample was received on 2013-05-16



3. Test Results

3.1 Quantitative screening of Lead, Cadmium, Mercury, Chromium and Bromine

Energy-Dispersive X-Ray Fluorescence Spectroscopy with reference to IEC 62321-2008 Ed. 1

Compounds	Total Cadmium [mg/kg]	Total Lead [mg/kg]	Total Chromium [mg/kg]	Total Mercury [mg/kg]	Total Bromine [mg/kg]
RoHS Requirements	100	1000	1000	1000	1000
Reporting Limit	50	500	500	500	300
Sample 001	≤50	≤500	≤500	≤500	≤300
Sample 002	≤50	≤500	≤500	≤500	≤300
Sample 003	≤50	≤500	≤500	≤500	N/A
Sample 005	≤50	≤500	≤500	≤500	N/A
Sample 006	≤50	≤500	≤500	≤500	>300**
Sample 007	≤50	≤500	>500#	≤500	N/A
Sample 008	≤50	≤500	≤500	≤500	N/A
Sample 009	≤50	≤500	≤500	≤500	>300**
Sample 010	≤50	≤500	≤500	≤500	≤300
Sample 011	≤50	≤500	≤500	≤500	≤300
Sample 012	≤50	≤500	≤500	≤500	N/A

Note : (a) “ ≤ ” denotes less than or equal to
 (b) “ > ” denotes more than
 (c) “mg/kg” denotes milligram per kilogram
 (d) “N/A” denotes Not Applicable
 (e) “ ** ” denotes further testing was conducted, please refer to the test result 3.3
 (g) “ # ” Hexavalent Chromium spot test with negative result. Hexavalent Chromium spot test was performed by the test method according to IEC 62321, Ed1 - Annex B. Negative result indicate no Hexavalent Chromium find on surface

3.2 Heavy Metals Content Test (Total Cadmium, Total Lead, Total Mercury, Hexavalent Chromium)

Test method:

US EPA 3052 : 1996 or Acid Digestion by ICP-OES / AAS

US EPA 3060A & US EPA 7196A /IEC 62321-2008 Ed.1 -Annex B (For Hexavalent Chromium)

Compounds	Total Cadmium [mg/kg]	Total Lead [mg/kg]	Total Mercury [mg/kg]	Hexavalent Chromium [mg/kg]
RoHS Requirements	100	1000	1000	1000
Reporting Limit	2.0	10.0	10.0	2.0
Sample 004	<2.0	<10.0	<10.0	<2.0^

Note: (a) “ < ” denotes less than
 (b) “ mg/kg ” denotes milligram per kilogram
 (c) “ ^ ” denotes reported as Total Chromium Content



3.3 Brominated Flame Retardants (PBBs & PBDEs) Test

Ultrasonic extraction with toluene, qualitatively and quantitatively analysed by GC-MSD according to US EPA 3550 C

	Sample 004	Sample 006	Sample 009
RoHS Requirements	1000	1000	1000
Reporting Limit (mg/kg)	5	5	5
Monobromobiphenyl	N.D.	N.D.	N.D.
Dibromobiphenyl	N.D.	N.D.	N.D.
Tribromobiphenyl	N.D.	N.D.	N.D.
Tetrabromobiphenyl	N.D.	N.D.	N.D.
Pentabromobiphenyl	N.D.	N.D.	N.D.
Hexabromobiphenyl	N.D.	N.D.	N.D.
Heptabromobiphenyl	N.D.	N.D.	N.D.
Octabromobiphenyl	N.D.	N.D.	N.D.
Nonabromobiphenyl	N.D.	N.D.	N.D.
Decabromobiphenyl	N.D.	N.D.	N.D.
Sum of detected PBBs	N.D.	N.D.	N.D.
Monobromodiphenyl ether	N.D.	N.D.	N.D.
Dibromodiphenyl ether	N.D.	N.D.	N.D.
Tribromodiphenyl ether	N.D.	N.D.	N.D.
Tetrabromodiphenyl ether	N.D.	N.D.	N.D.
Pentabromodiphenyl ether	N.D.	N.D.	N.D.
Hexabromodiphenyl ether	N.D.	N.D.	N.D.
Heptabromodiphenyl ether	N.D.	N.D.	N.D.
Octabromodiphenyl ether	N.D.	N.D.	N.D.
Nonabromodiphenyl ether	N.D.	N.D.	N.D.
Decabromodiphenyl ether	N.D.	N.D.	N.D.
Sum of detected PBDEs	N.D.	N.D.	N.D.

Note: 1. "N.D." denotes Not Detected
 2. "mg/kg" denotes milligram per kilogram



TÜV SÜD Hong Kong Ltd
TÜV SÜD Group

Tested by:

A handwritten signature in blue ink, appearing to read 'Angus'.



Reviewed by:

A handwritten signature in blue ink, appearing to read 'Christina'.

Angus Hung
Technical Manager
Chemical Department

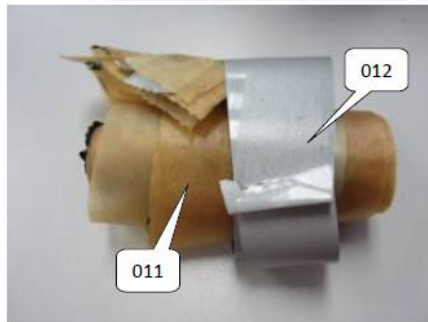
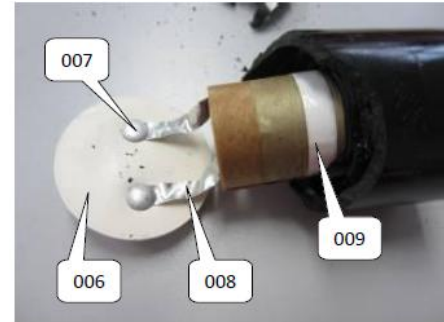
Christina Chan
Laboratory Manager
Chemical Department

- End of Report -



Appendix I – Sample Photos

Breakdown



General Terms and Conditions of TÜV SÜD Hong Kong Limited (hereinafter referred to as *the company*)

1. General Information and Definitions

- (1.1) In the event that an order for any services is placed, the Client shall accept the General Terms and Conditions. The General Terms and Conditions shall be applicable to all orders, resulting contracts and other arrangements, including all offers made or services provided by the Company or any of its affiliated companies. They are not applicable if and as far as they are in conflict with the regulations on services performed on behalf of governments, government bodies or any other public entity, or they are in conflict with mandatory provisions of local law. The Client's placement of orders as well as the conclusion of contracts with the Company shall be regarded as awareness and acceptance of these General Terms and Conditions.
- (1.2) The Company strongly recommends any Client or potential Client to read the full text of these General Terms and Conditions prior to placement of any order or conclusion of any contract with the Company. Ancillary agreements, promises and other statements made on the part of the Company staff or the experts called upon by them shall be binding only if they are expressly confirmed by the Company in writing. This shall also apply to any modifications of this clause.

2. Provision of Services

- (2.1) With due care and skill, the Company will provide services according to Client's specific instructions as made available by the Client. In the absence of Client's specific instructions, the following is deemed as instructions given to the Company:
- (a) The terms of any standard specification sheet or standard order form provided by the Company; and/or
- (b) Any relevant usage, practice or trade custom; and/or
- (c) Such methods the Company considers technically, operationally and/or on financial grounds appropriate.
- (2.2) No other party is entitled to give any instructions particularly on the scope and type of the services or the reports delivered, or on the resulting certificates (the "Reports of Findings"), unless the Company receives prior written instructions to the contrary from the Client. The Client hereby irrevocably authorizes the Company to deliver Reports of Findings to a third party where so instructed by the Client or, at the Company's discretion, where it implicitly follows from circumstances, trade custom, usage or practice.
- (2.3) The Information stated in the Report of Findings is derived from the results of inspection or testing procedures carried out in accordance with the instructions and/or Company's assessment of such results on the basis of any technical standards, trade custom or practice, or other circumstances which should in Company's professional experience be taken into account.
- (2.4) Reports of Findings issued after the testing of samples refer the Company's opinion only on samples under testing and not to the lot from which the samples were drawn.
- (2.5) Client agrees that the Company's sole responsibility is to be present at the time of the third party's intervention and to forward the results, or confirm the occurrence of the intervention, in case Client requests the Company to witness any third party's intervention. Client agrees that the Company will use the test methods for analysis as requested in the request form, and if none is stated in the form, the Company will choose the appropriate test methods for analysis.
- (2.6) The Reports of Findings issued by the Company will reflect the facts as recorded by it at the time of its intervention only and within the limits of the instructions received or, in the absence of such instructions, within the limits of the alternative parameters applied as provided for in Clause 2.1. The Company is under no obligation to refer to, or report upon, any facts or circumstances, which are outside the specific instructions received or alternative parameters applied.
- (2.7) The performance of all or part of the services may be delegated to an agent or subcontractor by the Company. The Client authorizes the Company to disclose all information necessary for such performance to the agent or subcontractor.
- (2.8) Documents reflecting engagements contracted between the Client and third parties or third party documents, e.g. sales contract copies, letters of credit, bills of lading, etc. should be made available to the Company. These are considered to be for information only, and do not extend or restrict the scope of the services or the obligations accepted by the Company.
- (2.9) The Company agrees that, by providing the services to the Client, it neither takes the place of Client or any third party, nor otherwise assumes, abridges, abrogates or undertakes to discharge any duty of the Client to any third party or that of any third party to the Client. Also, it does not release the Client or any third party from any of their obligations.
- (2.10) Depending on the nature of each sample, all samples given to the Company shall be retained for a maximum of 3 months or for such other shorter time period as the nature of the sample permits, and then sent back to Client or otherwise disposed of at the Company's discretion. After that time the Company will not be responsible for the samples. Storage of samples for more than 3 months shall incur a storage fee payable by the Client. If samples are returned to the Client, the Client will be billed a handling and freight fees. Special disposal charges will be billed to the Client if incurred.

3. Client's Obligations

The Client shall:

- (3.1) ensure that all required supporting documents, information and instructions as submitted are accurate, truthful and complete. These information are to be submitted in a timely not later than 2 working days from the date of which the services are requested by the Client
- (3.2) ensure to give all necessary access for the Company's representatives to the premises where the services are to be performed and to take all necessary steps to eliminate or remedy any obstacles to, or interruptions in the performance of the services;
- (3.3) make available any special equipment and personnel necessary for the performance of the services, if required;
- (3.4) ensure that for the safety and security of working conditions, sites and installations, all necessary measures are taken during the performance of services. In this respect, the Client will not rely on the Company's advice whether required or not;
- (3.5) inform the Company of any known hazards or dangers, actual or potential, associated with any order, samples, testing or any other service rendered by the Company well in advance. Those are, but are not limited to the presence or risk of radiation, environmental pollution or poisons-toxic or noxious or explosive elements or materials;
- (3.6) fully exercise all its rights and discharge all its liabilities under any relevant sales or other contract with a third party.

4. Fees and Payment

- (4.1) All Fees not agreed on between the Company and Client at the time the order is placed or a contract is concluded shall be determined by the Company's Schedule of Fees (which are subject to change). All applicable taxes shall be paid by Client, as far as mandatory laws do not provide otherwise.
- (4.2) Unless a specific period is established in the invoice, the Client shall pay upon receiving the invoice, but not later than 30 days from the relevant invoice date or within such other period as may be established by the Company in the invoice (the "Due Date").
- (4.3) The Client shall not be entitled to retain or defer due payment of any sums to the Company on account of any dispute, counter claim or set-off against the Company. The Company reserves the right to retain or defer any due payments if any dispute arises with or it raises any counterclaim against the Client. The Company is entitled to set off due payments against payments of the

Client.

- (4.4) For the collection of unpaid fees, the Company may decide to bring action in any court with competent jurisdiction. The corresponding collection costs, including attorney's fees and related costs, shall be borne by the Client, as far as the mandatory local law does not provide otherwise.
- (4.5) In case of any unforeseen problems or expenses arise while carrying out the services, the Company informs the Client. In such cases, the Company shall be entitled to charge additional fees to cover extra time and to invoice extra costs necessarily incurred to complete the services.
- (4.6) If the Company is unable to perform all or parts of the services for any cause whatsoever beyond the Company's control, including the failure by Client to comply with any of its obligations provided for in the foregoing Clause 3, the Company shall nevertheless be entitled to payments of:
- (1) The amount of all non-refundable expenses incurred by the Company; and
- (2) A proportion of the agreed fee equal to the proportion of the services actually carried out.

5. Suspension or Termination of Services

In any case mentioned below, the Company shall be entitled to either suspend or terminate the provision of the services immediately and without any liability:

- (5.1) Failure by the Client to comply with any of its obligations under these General Terms and Conditions and such failure is not remedied within 10 days after a notice of such failure has been delivered to the Client; or
- (5.2) Any suspension of payment, arrangement with creditors, bankruptcy, insolvency, receivership or cessation of business by Client.

6. Liability and Indemnification

(6.1) Limitation of Liability:

- (1) Clients seeking a guarantee against loss or damage should obtain appropriate insurance. The Company is neither an insurer nor a guarantor and disclaims all liability in such capacity.
- (2) Reports of Findings are issued on the basis of the information, documents and/or samples provided by, or on behalf of the Client and solely for the benefit of the Client who is obliged to act on the basis of such Reports of Findings. Neither the Company nor any of its staff, agents or subcontractors shall be liable to the Client nor to any third party for any actions taken or not taken on the basis of such Reports of Findings, or for any incorrect results arising from unclear, erroneous, incomplete, misleading or false information provided to the Company.
- (3) For any delayed, total or partial non-performance of the services arising directly or indirectly from any event beyond the Company's control, including failure by Client to comply with any of its obligations hereunder, the Company shall not be liable.
- (4) The liability of the Company in respect of any claim for loss, damage or expense of any nature and howsoever arising shall in no circumstances exceed a total aggregate sum equal to 10 times the amount of the fee paid in respect of the specific service which gives rise to such claim, and shall in any case not exceed the equivalent of 25,000 EUR in HKD.
- (5) For any indirect or consequential loss (including loss of profits), the Company shall not have any liabilities.
- (6) In case of any claim, the Client must give written notice to the Company within 30 days of discovery of the facts with all necessary documents to justify such claim. In any case, the Company shall be discharged from all liability for all claims for loss, damage or expense unless a lawsuit is brought within two years from:
- (i) the performance date of the Company for its services which refers to the claim; or
- (ii) the date when the service should have been completed in the event of any alleged non-performance.

- (6.2) Indemnification: Against all claims (actual or threatened) by any third party for loss, damage or expenses of whatsoever nature including all legal expenses and related costs and howsoever arising relating to the performance, purported performance or non-performance of any services, the Client shall guarantee, hold harmless and indemnify the Company and its officers, employees, agents or subcontractors.

7. Obligation of Confidentiality, Copyright, Data Privacy Protection

- (7.1) The Company shall be authorized to make file copies of written documents, which have been made available to it for review and which are important for processing the order.
- (7.2) Insofar as Reports of Findings are prepared in the course of processing the order and which are subject to the protection of copyright, then the Company shall grant the Client a simple, non-transferable right to use, insofar as this is necessary and in accordance with the contractually presupposed purpose. Other rights shall not be transferred; in particular, the customer shall not be entitled to modify and/or edit audit reports or to make use of such outside of his business premises.
- (7.3) The Company and its staff which may be called in shall not disclose or use trade and business matters about which they have gained knowledge during the performance of their work without proper authorization.

8. Miscellaneous

- (8.1) The validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired, even if any one or more provisions of these General Conditions are found to be illegal or unenforceable in any respect.
- (8.2) Client shall not directly or indirectly entice, encourage or make any offer to Company's employees to leave their employment with the Company, during the course of providing the services and for a period of one year thereafter.
- (8.3) Use of the Company's corporate name or registered marks for advertising purposes is not permitted without the Company's prior written authorization.

9. Governing Law, Jurisdiction and Dispute Settlement

- (9.1) Unless specifically agreed otherwise, all disputes arising out or in connection with contractual relationship(s) hereunder shall be governed by the applicable laws and regulations of the Hong Kong S.A.R Region.
- (9.2) Place of performance for any obligation arising out of this contract shall be Hong Kong, the Place of TÜV SÜD Hong Kong Limited, unless otherwise expressly agreed by the parties.

10. Languages

In the event of any discrepancy between the English and the Chinese version of these General Terms and Conditions, the English version shall prevail.